**Communicative rotary actuator with fail-safe for ball valves**

- **Torque motor 10 Nm**
- **Nominal voltage AC/DC 24 V**
- **Control modulating, communicative 2...10 V variable**
- **Position feedback 2...10 V variable**
- **Communication via Belimo MP-Bus**
- **Conversion of sensor signals**
- **Deenergised closed (NC)**
- **PWIS/LABS-compliant according to VDMA 24364**

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 | 7 W |
| | Power consumption in rest position | 3.5 W |
| | Power consumption for wire sizing | 9.5 VA |
| | Connection supply / control | Cable 1 m, 4x 0.75 mm² |
| | Parallel operation | Yes (note the performance data) |
| **Data bus communication** | Communicative control | MP-Bus |
| | Number of nodes | MP-Bus max. 8 |
| **Functional data** | Torque motor | 10 Nm |
| | Torque fail-safe | 10 Nm |
| | Operating range Y | 2...10 V |
| | Input impedance | 100 kΩ |
| | Operating range Y variable | Start point 0.5...30 V<br>End point 2.5...32 V |
| | Operating modes optional | Open/close<br>3-point (AC only)<br>Modulating (DC 0...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<br>End point 2.5...10 V |
| | Position accuracy | ±5% |
| | Direction of motion motor | Y = 0 (0 V = A – AB = 0%) |
| | Direction of motion fail-safe | Deenergised NC, valve closed (A – AB = 0%) |
| | Direction of motion note | for valves with L-bore (A – AB = 100%) |
| | Manual override | by means of hand crank and locking switch |
| | Running time motor | 90 s / 90° |
| | Running time motor variable | 40...150 s |
| | Running time fail-safe | <20 s @ -20...50°C / <60 s @ -30°C |
| | Sound power level, motor | 45 dB(A) |
| | Adaptation setting range | manual (automatic on first power-up) |
| | Adaptation setting range variable | No action<br>Adaptation when switched on<br>Adaptation after using the hand crank |

## Technical data

| | | |
|---|---|---|
| **Functional data** | 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 |
| | Position indication | Mechanical |
| | Service life | Min. 60'000 fail-safe positions |
| **Safety data** | Protection class IEC/EN | III, Safety Extra-Low Voltage (SELV) |
| | Power source 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 |
| | UL Approval | cULus according to UL60730-1A, UL60730-2-14 and CAN/CSA E60730-1<br>The UL marking on the actuator depends on the production site, the device is UL-compliant in any case |
| | PWIS/LABS-conformity | According to VDMA 24364 (test class C1)<br>Approved for use in zone II<br>Cleaning with low-pressure plasma treatment |
| | Type of action | Type 1.AA |
| | Rated impulse voltage supply / control | 0.8 kV |
| | Pollution degree | 3 |
| | Ambient humidity | Max. 95% RH, non-condensing |
| | Ambient temperature | -30...50°C [-22...122°F] |
| | Storage temperature | -10...40°C [14...104°F] |
| | Servicing | maintenance-free |
| **Weight** | Weight | 2.0 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 device and that it is ensured that the ambient conditions remain within the thresholds according to the data sheet at any time.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied with 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 must not be disposed of as household refuse. All locally valid regulations and requirements must be observed.
- PWIS/LABS-conformity is guaranteed as long as the packaging is unopened. Once the PWIS/LABS-compliant packaging has been opened, the proper handling of the products is the responsibility of the customer. PWIS/LABS-conformity of unopened products is guaranteed for a period of one year after cleaning, provided they are handled properly, professionally and cleanly. Proof of proper, professional and clean handling is the responsibility of the purchaser. Ensure that the required cleanliness of the products is maintained. Do not touch the products with bare hands. Belimo accepts no liability for the consequences resulting from the contamination of a product caused by the customer.

## Product features

**Operating mode**

Conventional operation:

The actuator is connected with a standard control signal 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 fail-safe position by spring force when the supply voltage is interrupted.

Operation on Bus:

The actuator receives its digital control 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.

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

**Manual override**

By using the hand crank the valve can be operated manually and engaged with the locking switch at any position. Unlocking is carried out manually or automatically by applying the operating voltage.

**Adjustable angle of rotation**

Adjustable angle of rotation with mechanical end stops.

**Home position**

The first time the supply voltage is switched on, i.e. at the time of commissioning, the actuator carries out an adaptation, 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 control signal.

Factory setting: Y2 (counter-clockwise rotation).

## Product features

**Adaptation and synchronisation**

An adaptation can be triggered manually by pressing the "Adaptation" button or with the PC-Tool. Both mechanical end stops are detected during the adaptation (entire setting range). Automatic synchronisation after actuating the hand crank 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

| Tools | Description | Type |
|---|---|---|
| | Service tool, with ZIP-USB function, for parametrisable and communicative Belimo actuators, VAV controller and HVAC performance devices | ZTH EU |
| | Belimo PC-Tool, Software for adjustments and diagnostics | MFT-P |
| | Adapter for Service-Tool ZTH | MFT-C |
| | Connecting cable 5 m, A: RJ11 6/4 ZTH EU, B: 6-pin for connection to service socket | ZK1-GEN |
| | Connecting cable 5 m, A: RJ11 6/4 ZTH EU, B: free wire end for connection to MP/PP terminal | ZK2-GEN |

| Electrical accessories | Description | Type |
|---|---|---|
| | MP-Bus power supply for MP actuators | ZN230-24MP |

| Gateways | Description | Type |
|---|---|---|
| | Gateway MP to BACnet MS/TP | UK24BAC |
| | Gateway MP to Modbus RTU | UK24MOD |

## Electrical installation

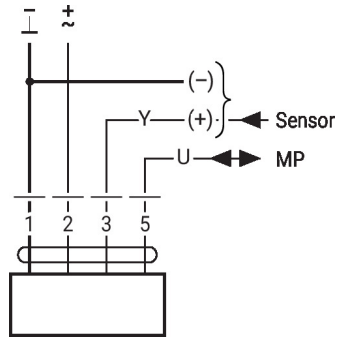
**Supply from isolating transformer.**

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

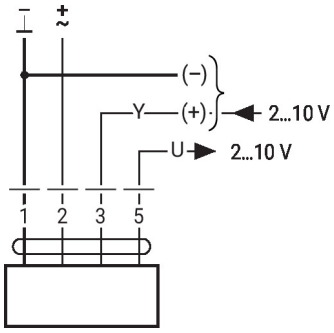
**Wire colours:**
1 = black
2 = red
3 = white
5 = orange

**Wiring diagrams**

MP-Bus



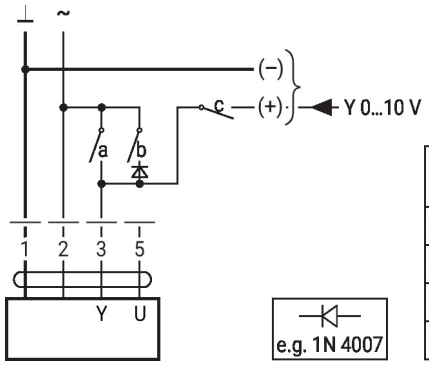

AC/DC 24 V, modulating



## Further electrical installations

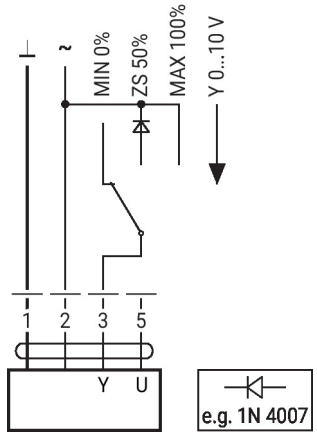
**Functions with basic values (conventional mode)**

Override control with AC 24 V with relay contacts

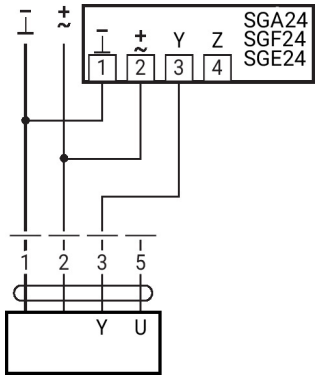



| 1 | 2 | a | b | c | |
|---|---|---|---|---|---|
| | | | | | 0 % |
| | | | | | ZS 50% |
| | | | | | 100% |
| | | | | | Y |

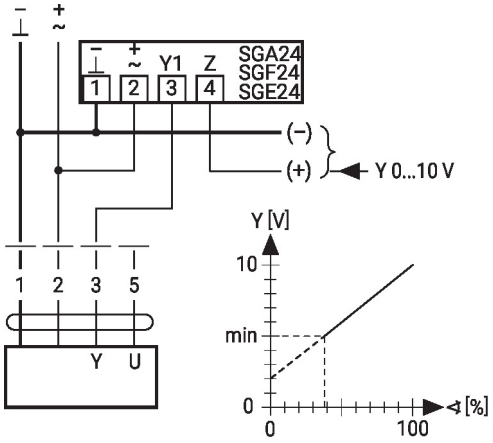
Override control with AC 24 V with rotary switch



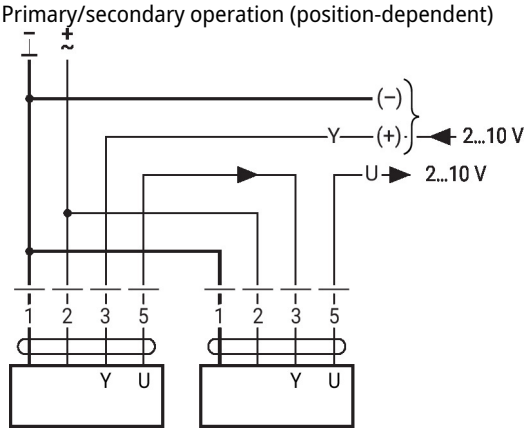

Control remotely 0...100% with positioner SG..




Minimum limit with positioner SG..

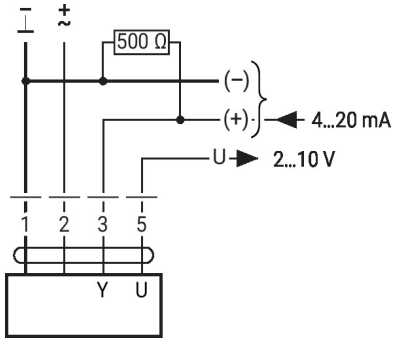



Primary/secondary operation (position-dependent)



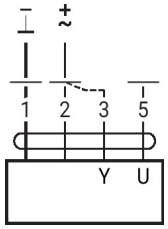
### Functions with basic values (conventional mode)

Control with 4...20 mA via external resistor




**Caution:**
The operating range must be set to DC 2...10 V.
The 500 Ohm resistor converts the 4...20 mA current signal to a voltage signal DC 2...10 V.

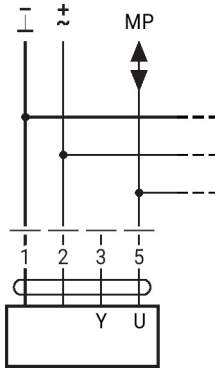
Functional check




**Procedure**
1. Connect 24 V 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

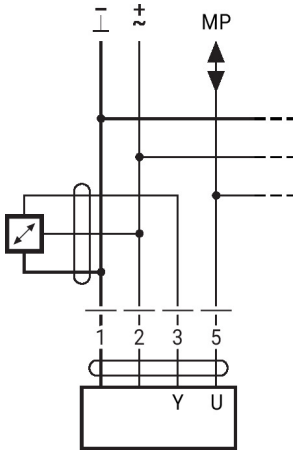
### Functions with specific parameters (Parametrisation necessary)

Connection on the MP-Bus




Max. 8 MP-Bus nodes

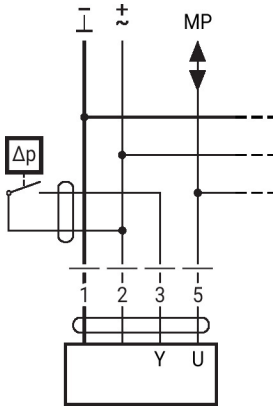
Connection of active sensors




- Supply AC/DC 24 V
- Output signal 0...10 V (max. 0...32 V)
- Resolution 30 mV

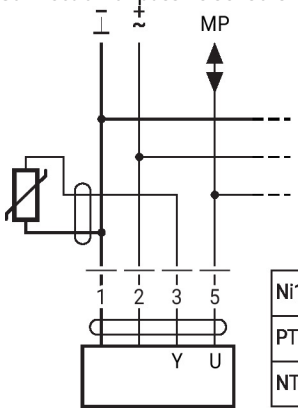
**Functions with specific parameters (Parametrisation necessary)**

Connection of external switching contact




- Switching current 16 mA @ 24 V
- Start point of the operating range must be parametrised on the MP actuator as ≥0.5 V

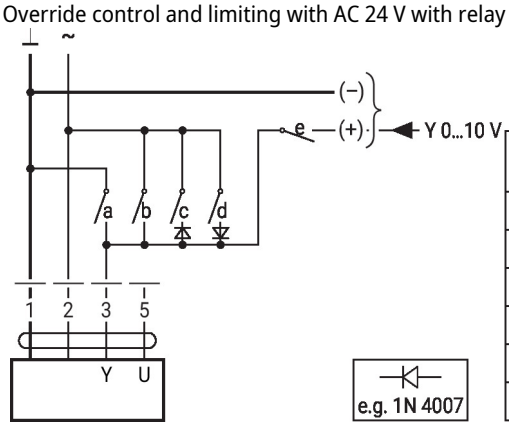
Connection of passive sensors




| | | |
|---|---|---|
| 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) |

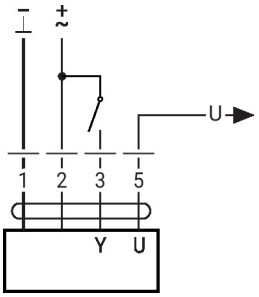
1) Depending on the type
2) Resolution 1 Ohm
Compensation of the measured value is recommended

Override control and limiting with AC 24 V with relay contacts




| 1 | 2 | a | b | c | d | e | |
|---|---|---|---|---|---|---|---|
| ⊥ | ⊥ | ⊥ | – | – | – | – | Close |
| ⊥ | ⊥ | – | ⊥ | – | – | – | MIN |
| ⊥ | ⊥ | – | – | ⊥ | – | – | ZS |
| ⊥ | ⊥ | – | – | – | ⊥ | – | MAX |
| ⊥ | ⊥ | – | – | – | – | ⊥ | Open |
| ⊥ | ⊥ | – | – | – | – | – | Y |

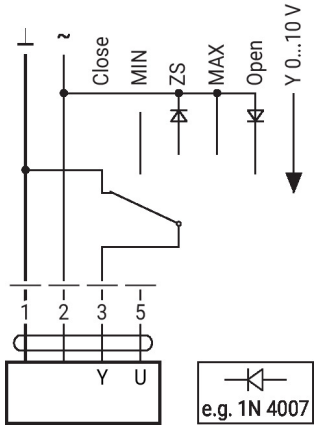
Control open/close



## Further electrical installations

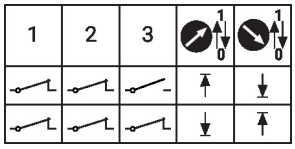
**Functions with specific parameters (Parametrisation necessary)**

Override control and limiting with AC 24 V with rotary switch

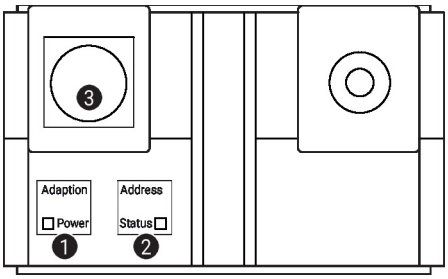



**Caution:**
The "Close" function is only guaranteed if the start point of the operating range is defined as min. 0.5 V.

Control 3-point with AC 24 V




## Operating controls and indicators




**1 Membrane key and LED display green**

| | |
|---|---|
| Off: | No power supply or malfunction |
| On: | In operation |
| Press button: | Triggers angle of rotation adaptation, followed by standard mode |

**2 Membrane key and LED display yellow**

| | |
|---|---|
| Off: | Standard mode |
| On: | Adaptation or synchronisation process active |
| Flickering: | MP-Bus communication active |
| Flashing: | Request for addressing from MP client |
| Press button: | Confirmation of the addressing |

**3 Service plug**

For connecting parametrisation and service tools

**Operating elements**

The manual override, locking switch and direction of rotation switch elements are available on both sides

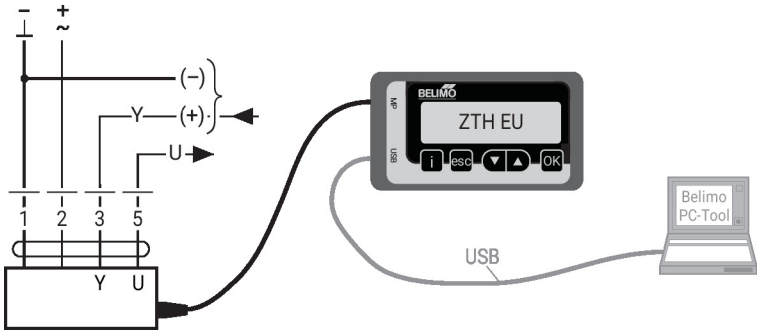
## Service

**Tool connection**

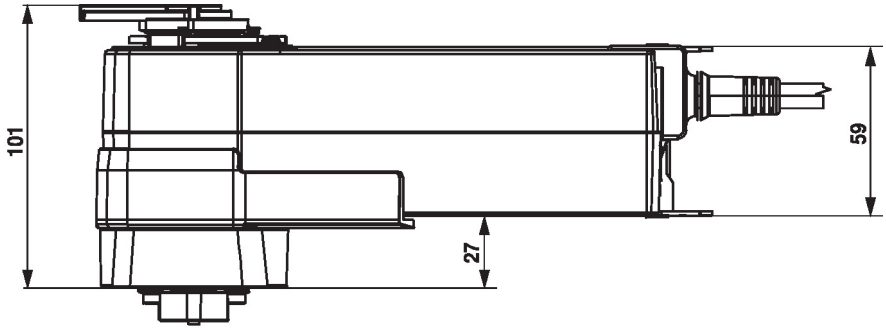
The actuator can be parametrised by ZTH EU via the service socket.

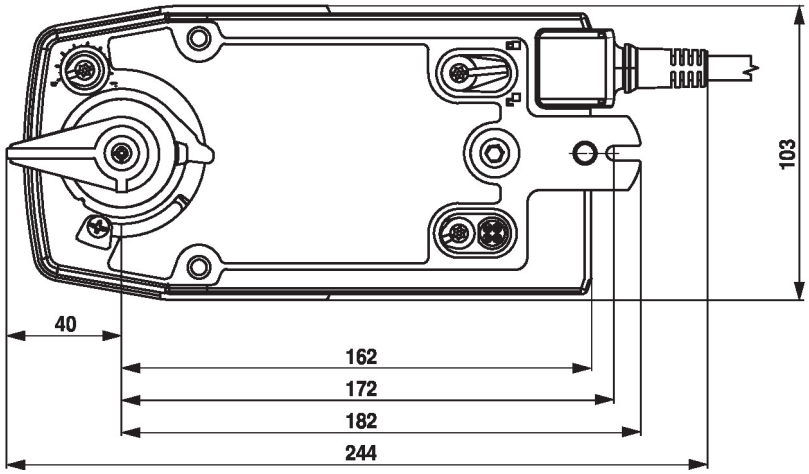
For an extended parametrisation the PC tool can be connected.

Connection ZTH EU / PC-Tool




## Dimensions




## Further documentation

- Overview MP Cooperation Partners
- Tool connections
- Introduction to MP-Bus Technology
- 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