

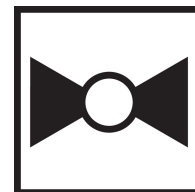
2-way, Characterized Control Valve, Stainless Steel Ball and Stem



Picture may differ from product



5-year warranty



## Type overview

### Type

B208

### DN

1/2" [15]

## Technical data

|                    |                          |                                        |
|--------------------|--------------------------|----------------------------------------|
| Functional data    | Valve size [mm]          | 0.5" [15]                              |
|                    | Fluid                    | chilled or hot water, up to 60% glycol |
|                    | Fluid Temp Range (water) | 0...250°F [-18...120°C]                |
|                    | Body Pressure Rating     | 600 psi                                |
|                    | Close-off pressure Δps   | 200 psi                                |
|                    | Flow characteristic      | equal percentage                       |
|                    | Leakage rate             | 0% for A-AB                            |
|                    | Pipe connection          | Internal thread<br>NPT (female)        |
|                    | Servicing                | maintenance-free                       |
|                    | Flow Pattern             | 2-way                                  |
|                    | Controllable flow range  | 75°                                    |
|                    | Cv                       | 0.46                                   |
| Materials          | Valve body               | Nickel-plated brass body               |
|                    | Stem                     | stainless steel                        |
|                    | Stem seal                | EPDM (lubricated)                      |
|                    | Seat                     | PTFE                                   |
|                    | Characterized disc       | TEFZEL®                                |
|                    | O-ring                   | EPDM (lubricated)                      |
|                    | Ball                     | stainless steel                        |
| Suitable actuators | Non Fail-Safe            | TR<br>LRB(X)<br>LRQB(X)<br>NRB(X) N4   |
|                    |                          | Spring                                 |
|                    |                          | TFRB(X)<br>LF                          |

## Safety notes



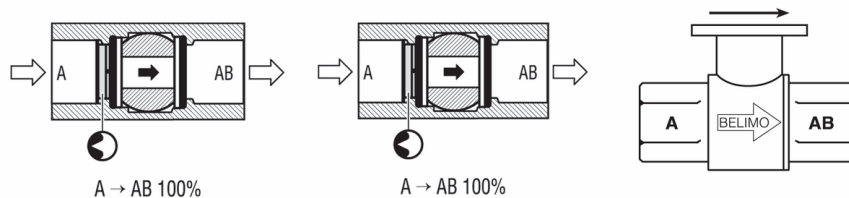
- WARNING: This product can expose you to lead which is known to the State of California to cause cancer and reproductive harm. For more information go to [www.p65warnings.ca.gov](http://www.p65warnings.ca.gov)

## Product features

**Application** This valve is typically used in air handling units on heating or cooling coils, and fan coil unit heating or cooling coils. Some other common applications include Unit Ventilators, VAV box re-heat coils and bypass loops. This valve is suitable for use in a hydronic system with variable flow.

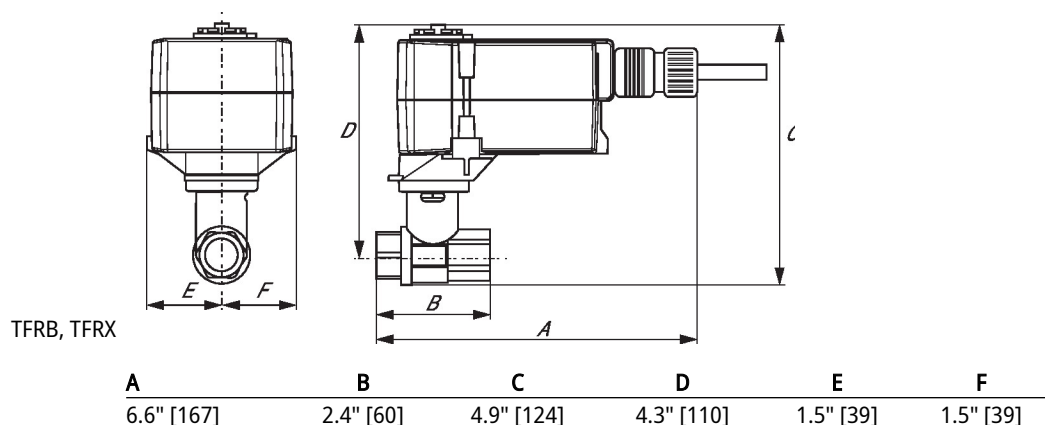
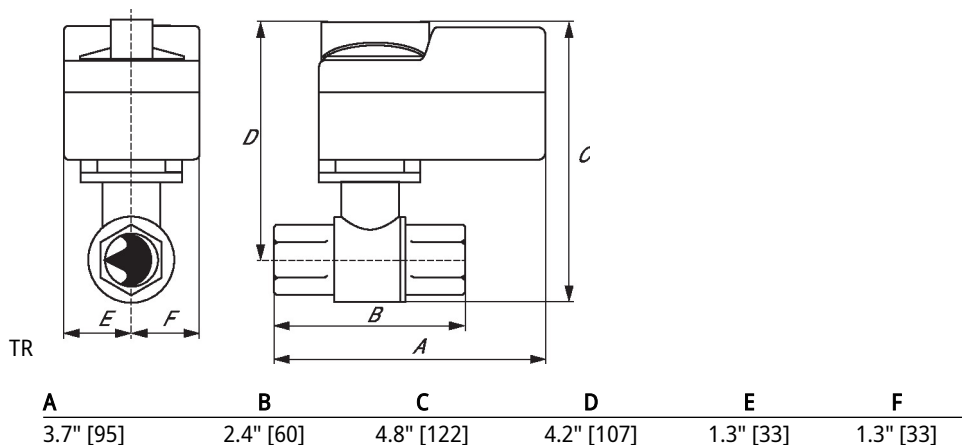
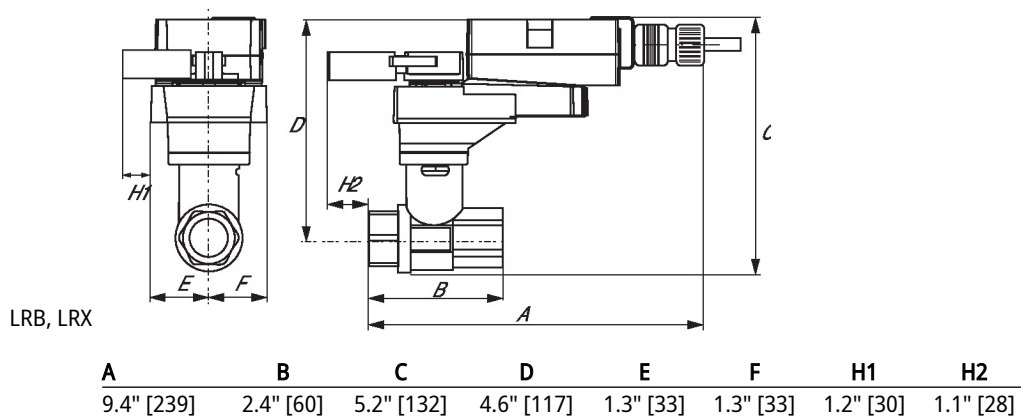
## Flow/Mounting details

Two-way valves should be installed with the disc upstream.

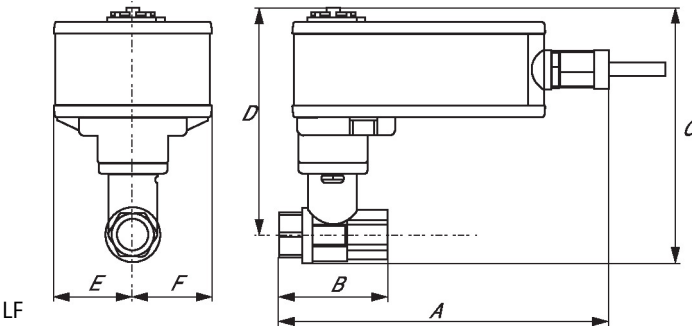


## Dimensions

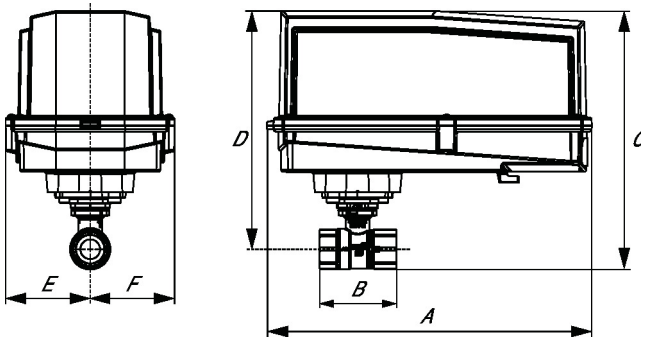
| Type | DN        | Weight            |
|------|-----------|-------------------|
| B208 | 1/2" [15] | 0.50 lb [0.23 kg] |



Dimensions



| A           | B         | C          | D          | E         | F         |
|-------------|-----------|------------|------------|-----------|-----------|
| 7.91" [200] | 2.4" [60] | 5.7" [146] | 5.1" [129] | 1.8" [46] | 1.8" [46] |



ARB N4, ARX N4, NRB N4, NRX N4

| A           | B         | C          | D          | E         | F         |
|-------------|-----------|------------|------------|-----------|-----------|
| 11.4" [289] | 2.4" [60] | 7.7" [196] | 7.0" [179] | 3.1" [80] | 3.1" [80] |

Basic Fail-Safe modulating actuator for controlling dampers in typical commercial HVAC applications.

- Torque motor 35 in-lb [4 Nm]
- Nominal voltage AC/DC 24 V
- Control Modulating, On/Off, Floating point, Communicative
- Position feedback 2...10 V



Picture may differ from product

## Technical data

|                               |                                    |                                                                                                            |
|-------------------------------|------------------------------------|------------------------------------------------------------------------------------------------------------|
| <b>Electrical data</b>        | Nominal voltage                    | AC/DC 24 V                                                                                                 |
|                               | Nominal voltage frequency          | 50/60 Hz                                                                                                   |
|                               | Nominal voltage range              | AC 19.2...28.8 V / DC 21.6...35.0 V                                                                        |
|                               | Power consumption in operation     | 2 W                                                                                                        |
|                               | Power consumption in rest position | 0.8 W                                                                                                      |
|                               | Transformer sizing                 | 3.5 VA                                                                                                     |
|                               | Connection supply/control          | Cable 3 ft. [1 m], 4x 0.75 mm <sup>2</sup>                                                                 |
|                               | Parallel operation                 | Yes (note the performance data)                                                                            |
| <b>Data bus communication</b> | Communicative control              | MP-Bus                                                                                                     |
|                               | Number of nodes                    | MP-Bus max. 16                                                                                             |
| <b>Functional data</b>        | Torque motor                       | 35 in-lb [4 Nm]                                                                                            |
|                               | Torque Fail-Safe                   | 4 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           | variable (VDC, on/off, floating point)                                                                     |
|                               | Position feedback U                | 2...10 V                                                                                                   |
|                               | Position feedback U note           | Max. 1 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          | selectable with switch L/R                                                                                 |
|                               | Direction of motion variable       | electronically reversible                                                                                  |
|                               | Direction of motion fail-safe      | selectable by mounting L/R                                                                                 |
|                               | Manual override                    | No                                                                                                         |
|                               | Angle of rotation                  | Max. 95°                                                                                                   |
|                               | Angle of rotation note             | Adjustable 37...100% with integrated mechanical limitation                                                 |
|                               | Running Time (Motor)               | 150 s / 90°                                                                                                |
|                               | Running time motor variable        | 75...300 s                                                                                                 |
|                               | Running time fail-safe             | <20 s @ -20...50°C, <60 s @ -30°C                                                                          |
|                               | Sound power level, motor           | 36 dB(A)                                                                                                   |
|                               | Adaptation Setting Range           | with Belimo Assistant 2                                                                                    |
|                               | Override control                   | MIN (minimum position) = 0%<br>MID (intermediate position, AC only) = 50%<br>MAX (maximum position) = 100% |

**Technical data**

|                        |                              |                                                                                             |
|------------------------|------------------------------|---------------------------------------------------------------------------------------------|
| <b>Functional data</b> | Override control variable    | MIN = 0%...(MAX – 32%)<br>MID = MIN...MAX<br>MAX = (MIN + 32%)...100%                       |
|                        | Mechanical interface         | Universal shaft clamp 8...16 mm                                                             |
|                        | Position indication          | Mechanical                                                                                  |
|                        | Service life                 | Min. 60'000 fail-safe positions                                                             |
| <b>Safety data</b>     | Power source UL              | Class 2 Supply                                                                              |
|                        | Degree of protection NEMA/UL | NEMA 2                                                                                      |
|                        | Housing                      | UL Enclosure Type 2                                                                         |
|                        | Agency Listing               | cULus acc. To UL 873 and CAN/CSA C22.2 No. 24-93                                            |
|                        | Quality Standard             | ISO 9001                                                                                    |
|                        | UL 2043 Compliant            | Suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC |
|                        | Ambient humidity             | Max. 95% RH, non-condensing                                                                 |
|                        | Ambient temperature          | -22...122°F [-30...50°C]                                                                    |
|                        | Storage temperature          | -40...176°F [-40...80°C]                                                                    |
| <b>Weight</b>          | Servicing                    | maintenance-free                                                                            |
|                        | Weight                       | 3.2 lb [1.5 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 actuator and that is ensured that the ambient conditions remain at any time within the thresholds according to the data sheet.
- Only authorized 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.
- To calculate the torque required, the specifications supplied by the damper manufacturers concerning the cross-section and design, as well as the installation site and 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.

**Product features**

- Operating mode** Conventional operation:
- The actuator is connected with an analog control signal Y (note the operating range) and drives to the position defined.
- The actuator moves the damper to the operating position at the same time as tensioning the return spring. The damper 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.

## Product features

|                                     |                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Converter for sensors</b>        | Connection option for an active sensor. The actuator serves as an analog/digital converter for the transmission of the sensor signal via MP-Bus to the higher-level system.<br>Additional material may be required for the sensor connection. See "Electrical accessories".                                                                                                                     |
| <b>Configurable Device</b>          | The factory settings cover the most common applications. Single parameters can be modified with the Belimo Assistant 2 or ZTH US.                                                                                                                                                                                                                                                               |
| <b>Simple direct mounting</b>       | Simple direct mounting on the damper shaft with a universal shaft clamp, supplied with an anti-rotation mechanism to prevent the actuator from rotating.                                                                                                                                                                                                                                        |
| <b>Adjustable angle of rotation</b> | Adjustable angle of rotation with mechanical end stops.                                                                                                                                                                                                                                                                                                                                         |
| <b>High functional reliability</b>  | The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.                                                                                                                                                                                                                                                                            |
| <b>Innovative motorization</b>      | The actuator uses the powerful Belimo M600 microchip in combination with the INFORM method. It provides the full starting torque from a standstill with high precision (sensorless INFORM-Drive by Prof. Schrödl).                                                                                                                                                                              |
| <b>Home position</b>                | The first time the supply voltage is switched on, i.e. at the time of commissioning, the actuator carries out a synchronization. The synchronization is in the home position (0%).<br>The actuator then moves into the position defined by the control signal.                                                                                                                                  |
| <b>Adaptation</b>                   | An adaptation can be triggered manually by switching the direction-of-rotation switch from the left to the right twice within 5 s or with Belimo Assistant 2. Both mechanical end stops are detected during the adaptation (entire setting range).<br>The actuator then moves into the position defined by the control signal.<br>A range of settings can be made using the Belimo Assistant 2. |

## Accessories

| Tools                  | Description                                                                                                    | Type               |
|------------------------|----------------------------------------------------------------------------------------------------------------|--------------------|
|                        | Service tool for wired and wireless setup, on-site operation and troubleshooting.                              | Belimo Assistant 2 |
|                        | Connecting cable 16 ft [5 m], A: RJ11 6/4 LINK.10, B: free wire end for connection to MP/PP terminal           | ZK2-GEN            |
|                        | Belimo Assistant Link Bluetooth and USB to NFC and MP-Bus converter for configurable and communicative devices | LINK.10            |
| Electrical accessories | Description                                                                                                    | Type               |
|                        |                                                                                                                | IRM-100            |
|                        | Auxiliary switch, mercury-free                                                                                 | P475               |
|                        | Auxiliary switch, mercury-free                                                                                 | P475-1             |
|                        | Signal simulator, Power supply AC 120 V                                                                        | PS-100             |
|                        | Convert Pulse Width Modulated Signal to a 2...10 V Signal for Belimo Proportional Actuators                    | PTA-250            |
|                        | Positioner for wall mounting                                                                                   | SGA24              |
|                        | Positioner for front-panel mounting                                                                            | SGF24              |
|                        | Resistor, 500 $\Omega$ , 1/4" wire resistor with 6" pigtail wires                                              | ZG-R01             |
|                        | Resistor kit, 50% voltage divider                                                                              | ZG-R02             |
|                        | Transformer, AC 120 V to AC 24 V, 40 VA                                                                        | ZG-X40             |
| Mechanical accessories | Description                                                                                                    | Type               |
|                        | Shaft extension 170 mm $\varnothing$ 10 mm for damper shaft $\varnothing$ 6...16 mm                            | AV6-20             |
|                        | End stop indicator                                                                                             | IND-LF             |
|                        | Shaft clamp for LF..                                                                                           | K6 US              |
|                        | Shaft clamp reversible, clamping range $\varnothing$ 16...20 mm                                                | K6-1               |
|                        | Ball joint suitable for damper crank arm KH8 / KH10                                                            | KG10A              |
|                        | Ball joint suitable for damper crank arm KH8                                                                   | KG6                |
|                        | Ball joint suitable for damper crank arm KH8                                                                   | KG8                |
|                        | Damper crank arm Slot width 8.2 mm, for $\varnothing$ 1.05"                                                    | KH12               |
|                        | Damper crank arm Slot width 6.2 mm, clamping range $\varnothing$ 10...18 mm                                    | KH6                |
|                        | Damper crank arm Slot width 8.2 mm, clamping range $\varnothing$ 10...18 mm                                    | KH8                |

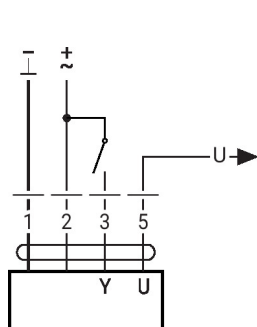
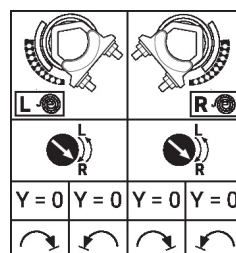
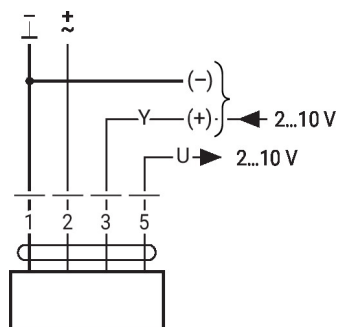
**Accessories**

| Description                                                                                                                                                         | Type                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Actuator arm, clamping range ø8...16 mm, Slot width 8.2 mm                                                                                                          | KH-LF<br>KH-LFV<br>LF-P                                              |
| Push rod for KG10A ball joint L 36", 3/8" diameter                                                                                                                  | SH10<br>SH8                                                          |
| Wrench 0.32 in and 0.39 in [8 mm and 10 mm]                                                                                                                         | TOOL-06                                                              |
| Angle of rotation limiter, with end stop                                                                                                                            | ZDB-LF                                                               |
| Form fit adapter 8x8 mm                                                                                                                                             | ZF8-LF                                                               |
| Mounting bracket                                                                                                                                                    | ZG-109                                                               |
| Linkage kit                                                                                                                                                         | ZG-110                                                               |
| Mounting bracket for LF..                                                                                                                                           | ZG-112                                                               |
|                                                                                                                                                                     | ZG-DC1<br>ZG-DC2<br>ZG-LF112<br>ZG-LF2<br>ZG-LMSA-1<br>ZG-LMSA-1/2-5 |
| Weather shield 13x8x6" [330x203x152 mm] (LxWxH)                                                                                                                     | ZS-100                                                               |
| Baseplate, for ZS-100                                                                                                                                               | ZS-101                                                               |
| Weather shield 406x213x102 mm [16x8-3/8x4"] (LxWxH)                                                                                                                 | ZS-150                                                               |
| Explosion proof housing 16x10x6.435" [406x254x164 mm] (LxWxH), UL and CSA, Class I, Zone 1&2, Groups B, C, D, (NEMA 7), Class III, Hazardous (classified) Locations | ZS-260                                                               |
| Weather shield 17-1/4x8-3/4x5-1/2" [438x222x140 mm] (LxWxH), NEMA 4X, with mounting brackets                                                                        | ZS-300                                                               |
| Weather shield 17-1/4x8-3/4x5-1/2" [438x222x140 mm] (LxWxH), NEMA 4X, with mounting brackets                                                                        | ZS-300-5                                                             |
| Shaft extension 1/2"                                                                                                                                                | ZS-300-C1                                                            |
| Shaft extension 3/4"                                                                                                                                                | ZS-300-C2                                                            |
| Shaft extension 1"                                                                                                                                                  | ZS-300-C3                                                            |
| Linkage kit                                                                                                                                                         | ZG-JSL                                                               |
| Jackshaft RetroFIT+ Linkage with Belimo Rotary Actuators                                                                                                            |                                                                      |

**Electrical installation**

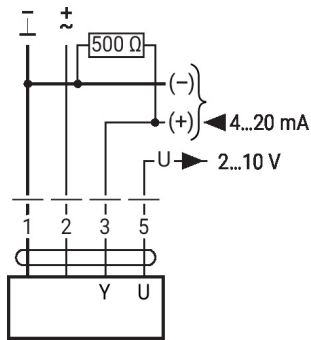
**Supply from isolating transformer.**
**Parallel connection of other actuators possible. Observe the performance data.**
**Wire colors:**

- 1 = black
- 2 = red
- 3 = white
- 5 = white

**Control on/off**

**AC/DC 24 V, modulating**


### Electrical installation

Control with 4...20 mA via external resistor



#### Caution:

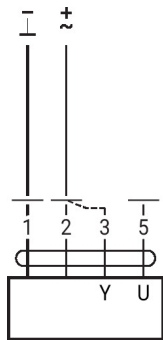
The operating range must be set to DC 2...10 V.

The 500 Ohm resistor converts the 4...20 mA current signal to a voltage signal DC 2...10 V.

### Further electrical installations

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

Functional check



#### Procedure

1. Connect 24 V 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 with basic values (conventional mode)

MP-Bus network topology

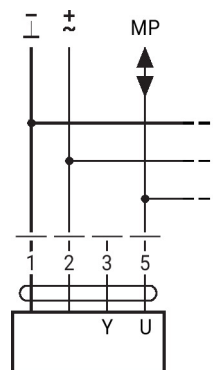


There are no restrictions regarding the network topology (bus, star, ring or mixed forms are permitted).

Supply and communication in one and the same 3-wire cable

- no shielding or twisting necessary
- no terminating resistors required

Connection on the MP-Bus



Max. 8 MP-Bus nodes

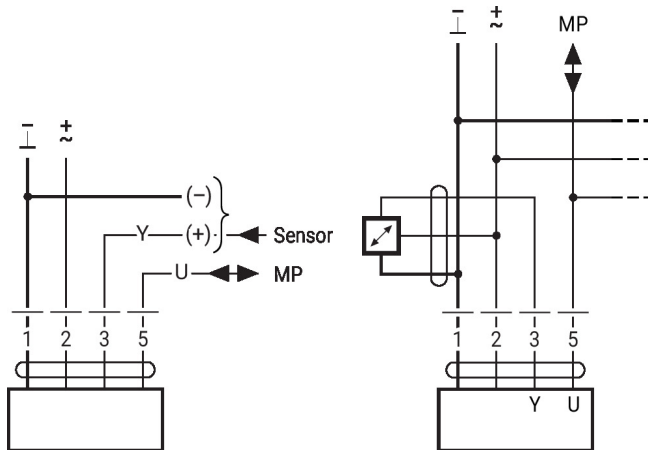


## Further electrical installations

### Functions with basic values (conventional mode)

MP-Bus

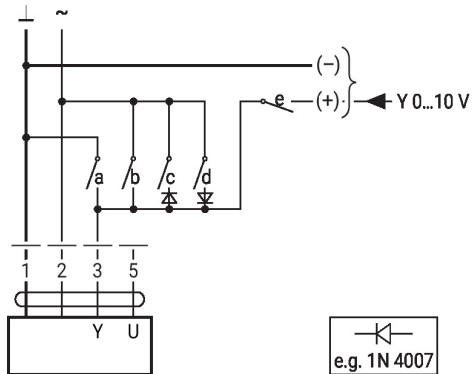
Connection of active sensors



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

### Functions with specific parameters (configuration necessary)

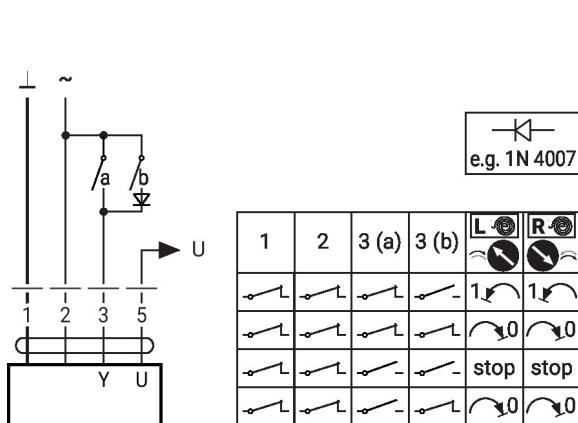
Override control and limiting with AC 24 V with relay contacts



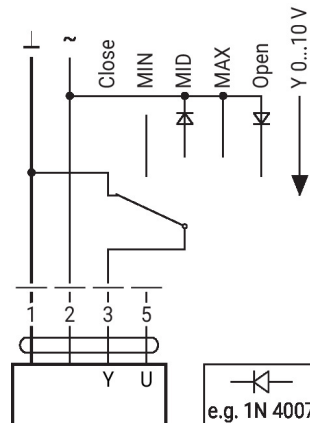
| 1 | 2 | a | b | c | d | e | M     | B     |
|---|---|---|---|---|---|---|-------|-------|
|   |   |   |   |   |   |   | Close | Close |
|   |   |   |   |   |   |   | MIN   | -     |
|   |   |   |   |   |   |   | MID   | MID   |
|   |   |   |   |   |   |   | MAX   | MAX   |
|   |   |   |   |   |   |   | Open  | Open  |
|   |   |   |   |   |   |   | Y     | Y     |

M = modulating  
B = Bus

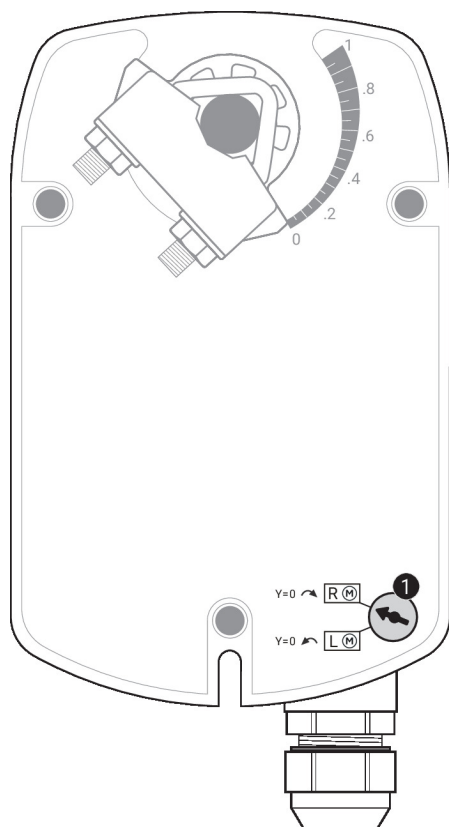
Control 3-point with AC 24 V



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.

**Operating controls and indicators**

**1 MP addressing**

Move direction of rotation switch in opposite position and backwards (within 4 seconds)

**Service**

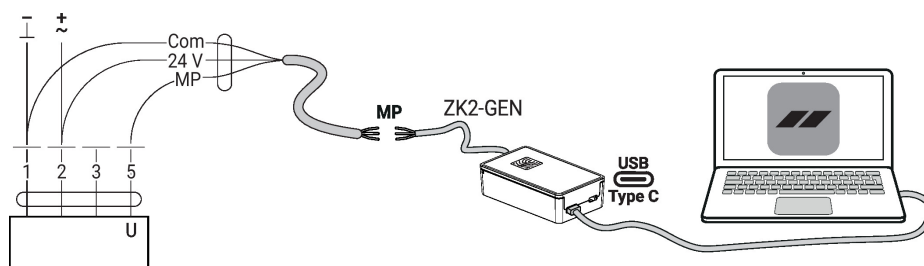
Using Belimo Assistant 2, device parameters can be modified. Belimo Assistant 2 can operate on a smartphone, tablet, or PC. The available connection options vary depending on the hardware on which Belimo Assistant 2 is installed.

For more information about Belimo Assistant 2, refer to the Quick Guide – Belimo Assistant 2.

**Wired connection**

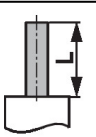
Alternatively, the Belimo devices can be accessed by connecting Belimo Assistant Link to the USB port on a PC or laptop and to the MP-Bus wire on the device.

Belimo Assistant 2 acts as MP client. Therefore, no other MP client shall be connected to the device.



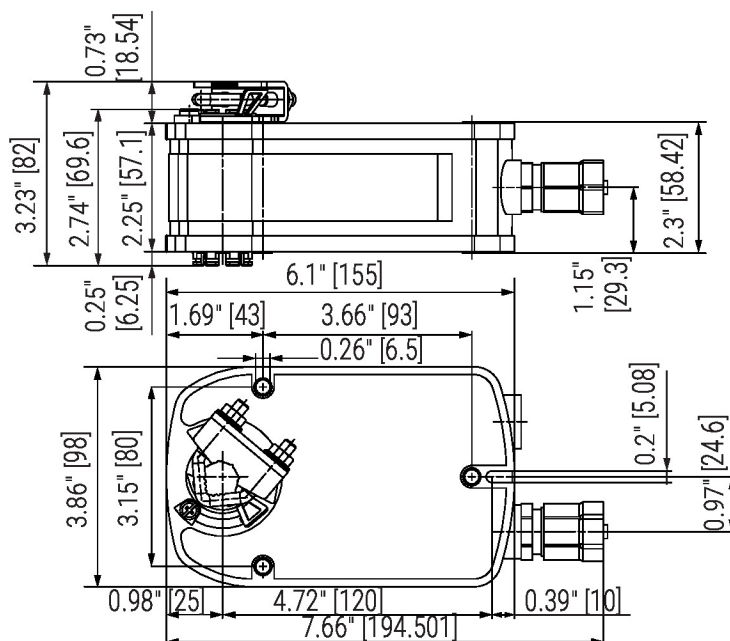
## Dimensions

### Shaft length

|                                                                                   |                    |
|-----------------------------------------------------------------------------------|--------------------|
|  | Min. 84            |
|  | Min. 0.75" [20 mm] |

### Clamping range

|                                                                                   |                                                                                   |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|  |  |
| 8...16                                                                            | 8...16                                                                            |



## Further documentation

- Overview MP Cooperation Partners
- Tool connections
- Introduction to MP-Bus Technology
- Quick Guide – Belimo Assistant 2