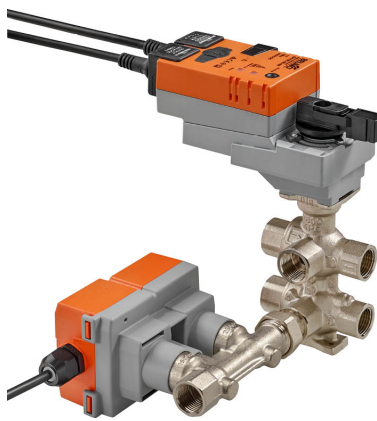


- Nominal voltage AC/DC 24 V
- Control MFT/programmable
- Two sequences (cooling/heating) with one 90° rotary actuator
- Switching or modulating control on the water side of thermal heating/cooling elements
- Communication via BACnet MS/TP, Modbus RTU, Belimo MP-Bus or analog control



5-year warranty



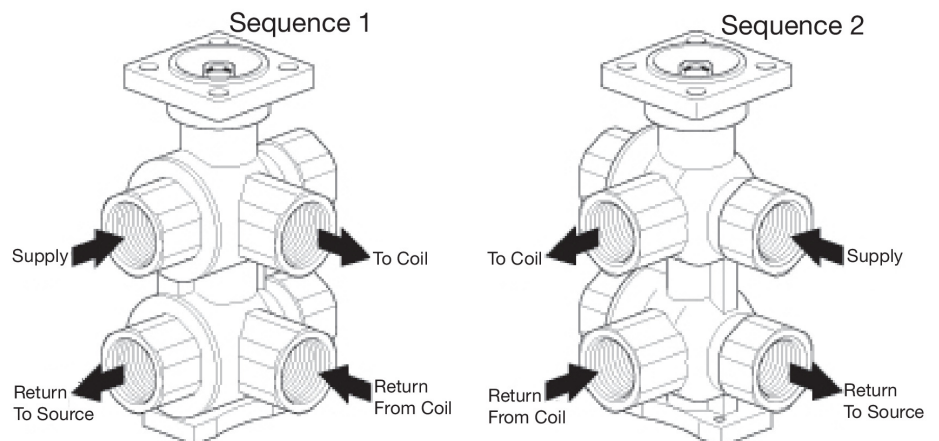
Technical data

| | | |
|-------------------------------|--------------------------------|---|
| Electrical data | Nominal voltage | AC/DC 24 V |
| | Nominal voltage frequency | 50/60 Hz |
| | Power consumption in operation | 3.5 W |
| | Connection supply / control | cable 3 ft. [1 m], 6 x 0.75 mm ² |
| | Parallel operation | Yes (note the performance data) |
| Data bus communication | Communicative control | BACnet MS/TP Modbus RTU MP-Bus |
| | Number of nodes | Max. 32 (without repeater) |
| Functional data | Valve size [mm] | 0.5" [15] |
| | Operating range Y | 2...10 V |
| | Operating range Y note | 4...20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor) |
| | Input Impedance | 100 kΩ (0.1 mA), 500 Ω |
| | Operating range Y variable | 0.5...10 V |
| | Options positioning signal | VDC variable |
| | Position feedback U | 2...10 V |
| | Position feedback U note | Max. 1 mA |
| | Position feedback U variable | 0.5...10 V |
| | Running Time (Motor) | 90 s |
| | Sound power level Motor | 35 dB(A) |
| | Adjustable flow rate V'max | 5...100% of Vnom |
| | Control accuracy | ±6% |
| | Fluid | chilled or hot water, up to 60% glycol |
| | Fluid Temp Range (water) | 43...180°F [6...82°C] |
| | Close-off pressure Δps | 50 psi |
| | Differential Pressure Range | 7 psi at V'nom (see flow reduction chart in the Tech Doc) |
| | Flow characteristic | linear |
| | Body Pressure Rating | 232 psi |
| | GPM | 5.5 |
| | Seq 1 GPM | 5.5 v'nom |
| Seq 2 GPM | 5.5 v'nom | |
| Servicing | maintenance-free | |
| Manual override | external push button | |
| Flow measurement | Measuring principle | Ultrasonic volumetric flow measurement |

| | | |
|-------------------------|------------------------------|--|
| Flow measurement | Measuring accuracy flow | ±2% |
| | Min. flow measurement | 1% of V'nom |
| | Measurement Repeatability | ±0.5% (Flow) |
| Safety data | Degree of protection IEC/EN | IP54 |
| | Degree of protection NEMA/UL | NEMA 2 |
| | Enclosure | UL Enclosure Type 2 |
| | Agency Listing | cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 2014/35/EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC and Section 602.2 of the IMC |
| | Quality Standard | ISO 9001 |
| | Ambient temperature | -22...122°F [-30...50°C] |
| | Storage temperature | -40...176°F [-40...80°C] |
| | Ambient humidity | Max. 95% RH, non-condensing |
| Materials | Valve body | Nickel-plated brass body |
| | Spindle | nickel-plated brass |
| | Spindle seal | EPDM (lubricated) |
| | Seat | PTFE |
| | Characterized disc | chrome plated steel |
| | O-ring | EPDM |
| | Ball | chrome plated brass |

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, insulation 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 during installation.
- 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.

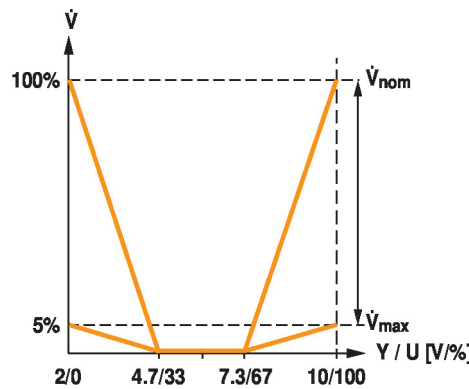
Product features
Flow/Mounting details


Product features

Mode of operation The final controlling device consists of three components: 6-way characterized control valve, measuring pipe with volumetric flow sensor and the actuator itself. The adjusted maximum flows for sequence 1 (V'_{max1}) and sequence 2 (V'_{max2}) are assigned to the positioning signal (2V/0% for sequence 1, 10 V/100% for sequence 2).
The performance device can be controlled communicatively or by an analog signal. The fluid is detected by the sensor in the measuring pipe and is applied as the flow value. The measured value is balanced with the setpoint. The actuator corrects the deviation by changing the valve position.

Flow measurement All flow tolerances are at 68°...77°F [20°... 25°C] and 0% glycol.

Definition V'_{nom} is the maximum possible flow. ($V'_{nom}=V'_{nom1}=V'_{nom2}$)
 V'_{max1} is the maximum flow rate which has been set with the smallest positioning signal, 2 V / 0%.
 V'_{max2} is the maximum flow rate which has been set with the highest positioning signal, 10 V / 100%.
 V'_{max1} and V'_{max2} can be adjusted 5...100% of V'_{nom} .
 V'_{min} 0% (non-variable).



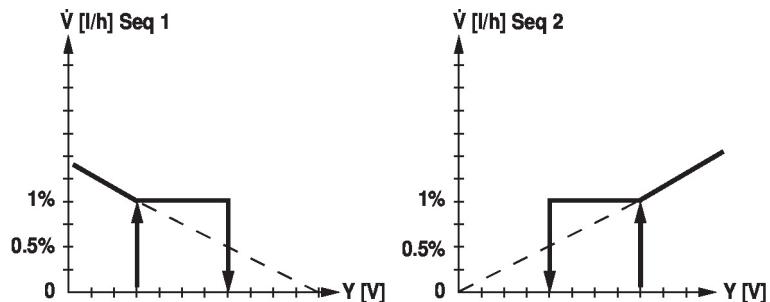
Creep flow suppression Given the very low flow speed in the opening point, this can no longer be measured by the sensor within the required tolerance. This range is overridden electronically.

Opening sequence

The valve remains closed until the volumetric flow required by the positioning signal Y corresponds to 1% of V'_{nom} . The control along the valve characteristic curve is active after this value has been exceeded.

Closing sequence

The control along the valve characteristic curve is active up to the required flow rate of 1% of V'_{nom} . Once the level falls below this value, the flow rate is maintained at 1% of V'_{nom} . If the level falls below the flow rate of 0.5% of V'_{nom} required by the reference variable Y , then the valve will close.



Configurable actuators The factory settings cover the most common applications.

Hydronic balancing With the ZTH US and the Belimo Assistant App, the maximum flow rates of sequence 1 and sequence 2 can be adjusted individually on-site in a few simple reliable steps.

Combination analogue - communicative (hybrid mode)

With conventional control by means of an analog positioning signal, BACnet or Modbus can be used for the communicative position feedback.

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 safety

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

Position feedback

Regardless of the setting of the control mode, the feedback signal U5 is always assigned to the flow V'max1 and V'max2.

Pressure compensation

In cases of combined heating/cooling control elements, the fluid remains in the control element when in the closed position (no heating or cooling). The pressure of the enclosed fluid can rise or fall due to changes in fluid temperature caused by the ambient temperature. The 6-way characterized control valves have an integrated pressure relief function for the purpose of compensating for such pressure changes.

The pressure relief function is active in the closed position (45°) of the valve; reliable separation of Sequences 1 and 2 continues. For additional information, consult the notes for project planning for the 6-way characterized control valve.

Electrical installation



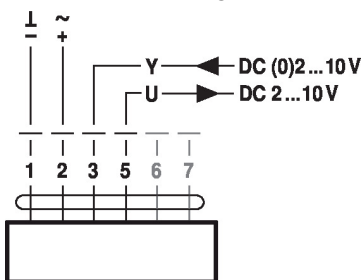
Supply from isolating transformer.

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 RS485 regulations.

Modbus / BACnet: Supply and communication are not galvanically isolated. Connect earth signal of the devices with one another.

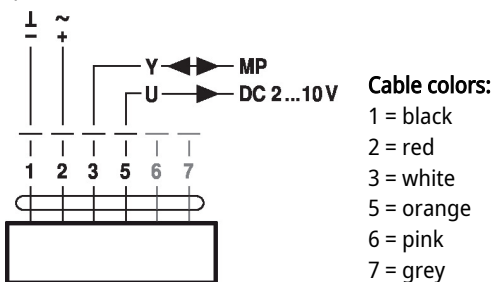
AC/DC 24 V, modulating



Cable colors:

- 1 = black
- 2 = red
- 3 = white
- 5 = orange
- 6 = pink
- 7 = grey

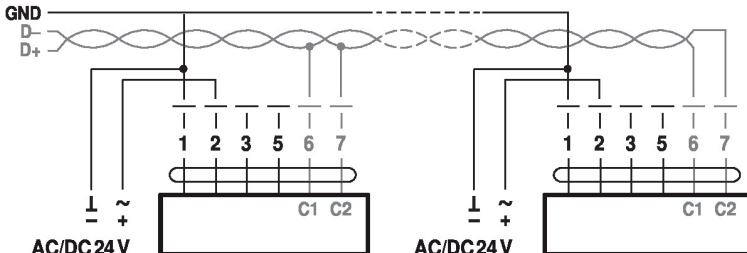
Operation on the MP-Bus



Cable colors:

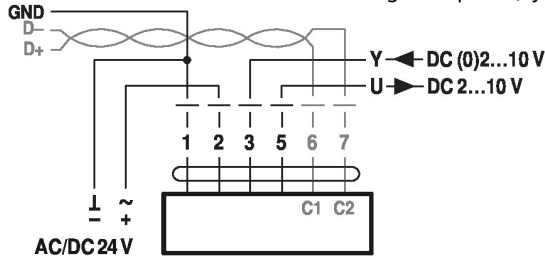
- 1 = black
- 2 = red
- 3 = white
- 5 = orange
- 6 = pink
- 7 = grey

BACnet MS/TP / Modbus RTU



C₁ = D- = A
C₂ = D+ = B

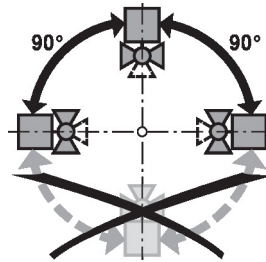
Modbus RTU / BACnet MS/TP with analogue setpoint (hybrid mode)



C₁ = D- = A
C₂ = D+ = B

Installation notes

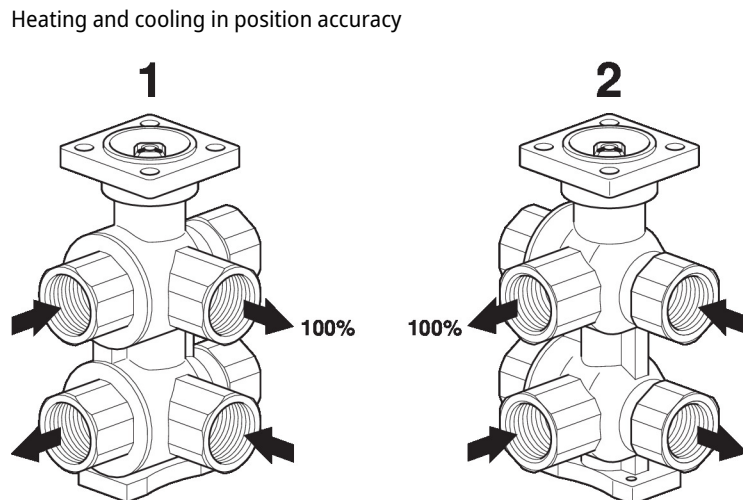
Recommended installation positions The ball valve can be installed upright to horizontal. The ball valve may not be installed in a hanging position, i.e. with the spindle pointing downwards.



Water quality requirements Belimo valves are regulating devices. For the valves to function correctly in the long term, they must be kept free from particle debris (e.g. welding beads during installation work). The installation of a suitable strainer is recommended.

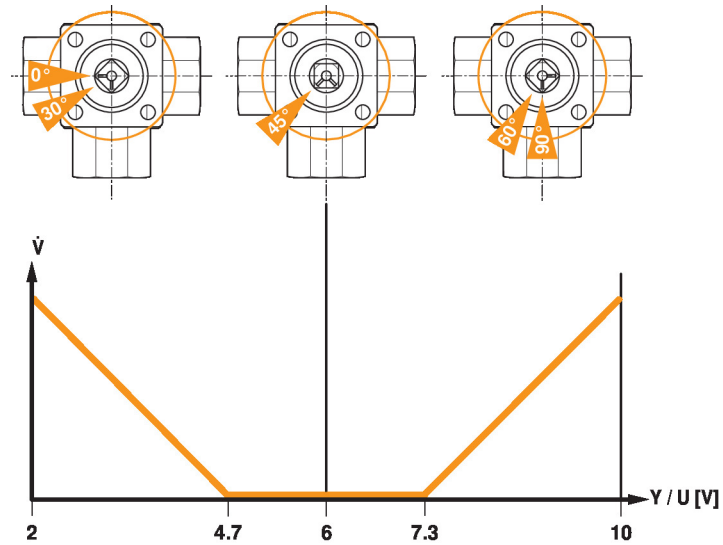
Servicing Ball valves, rotary actuators and sensors are maintenance-free.
Before any service work on the final controlling device is carried out, it is essential to isolate the rotary actuator from the power supply (by unplugging the electrical cable if necessary). Any pumps in the part of the piping system concerned must also be switched off and the appropriate slide valves closed (allow all components to cool down first if necessary and always reduce the system pressure to ambient pressure level).
The system must not be returned to service until the ball valve and the rotary actuator have been correctly reassembled in accordance with the instructions and the pipeline has been refilled by professionally trained personnel.

Flow direction The flow direction must be observed. The position of the ball can be identified from the L-marking on the damper shaft.



Valve characteristic curve The lower diagram shows the flow characteristic depending on the control signal.

Valve characteristic curve



Service

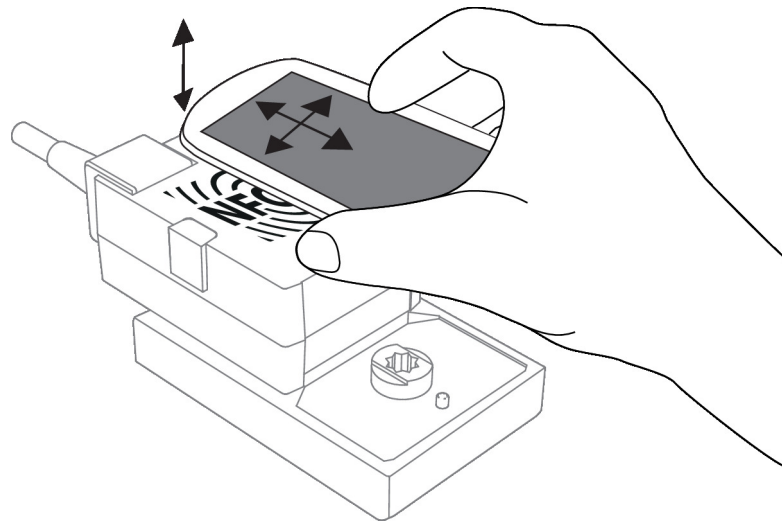
NFC connection Belimo devices marked with the NFC logo can be operated with the Belimo Assistant App.

Requirement:

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

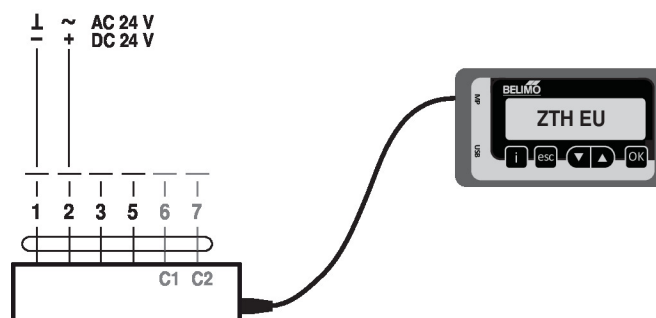
Align NFC-capable smartphone on the device so that both NFC antennas are superposed.

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.



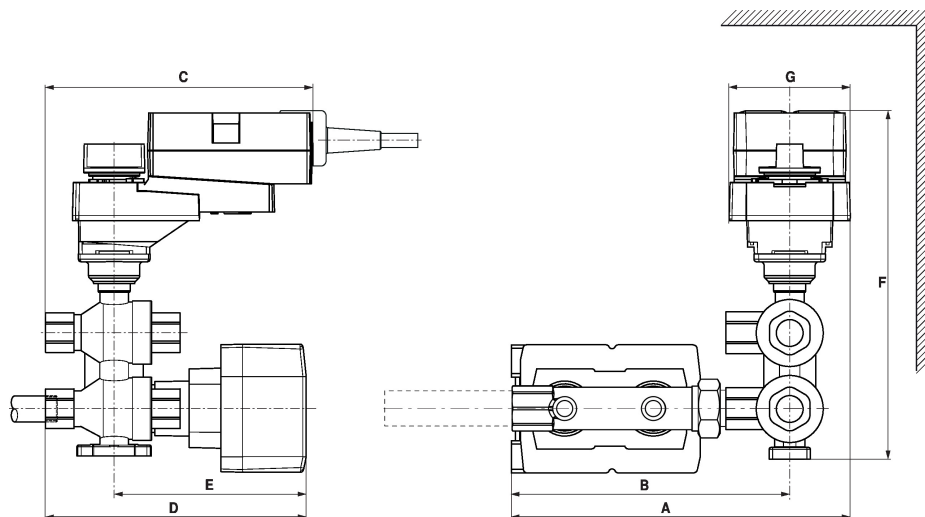
Service Tools connection

ZTH EU connection



Dimensions

Dimensional drawings



| A | B | C | D | E | F | G |
|-------------|------------|------------|------------|------------|------------|-----------|
| 10.2" [260] | 9.5" [241] | 7.4" [187] | 5.9" [150] | 4.3" [110] | 7.9" [201] | 2.6" [65] |