

Characterised control valve, 2-way, External thread

- For open and closed water systems
- For modulating control of air-handling and heating systems on the water side
- Air-bubble tight



Picture may differ from product

### Type overview

| Type | DN | G<br>["] | Kvs<br>[m³/h] | PN | n(gl) | Sv min. |
|------|----|----------|---------------|----|-------|---------|
| R409 | 15 | 1        | 0.63          | 40 | 3.2   | 50      |
| R410 | 15 | 1        | 1             | 40 | 3.2   | 50      |
| R411 | 15 | 1        | 1.6           | 40 | 3.2   | 50      |
| R412 | 15 | 1        | 2.5           | 40 | 3.2   | 50      |
| R413 | 15 | 1        | 4             | 40 | 3.2   | 100     |
| R414 | 15 | 1        | 6.3           | 40 | 3.2   | 100     |
| R417 | 20 | 1 1/4    | 4             | 40 | 3.2   | 100     |
| R418 | 20 | 1 1/4    | 6.3           | 40 | 3.2   | 100     |
| R419 | 20 | 1 1/4    | 8.6           | 40 | 3.2   | 100     |
| R422 | 25 | 1 1/2    | 6.3           | 40 | 3.2   | 100     |
| R423 | 25 | 1 1/2    | 10            | 40 | 3.2   | 100     |
| R424 | 25 | 1 1/2    | 16            | 40 | 3.2   | 100     |
| R431 | 32 | 2        | 16            | 25 | 3.2   | 100     |
| R438 | 40 | 2 1/4    | 16            | 25 | 3.2   | 100     |
| R439 | 40 | 2 1/4    | 25            | 25 | 3.2   | 100     |
| R448 | 50 | 2 3/4    | 25            | 25 | 3.2   | 100     |
| R449 | 50 | 2 3/4    | 40            | 25 | 3.2   | 100     |

### Technical data

|                        |                                        |                                                                                                                                                                                                                                          |
|------------------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Functional data</b> | Fluid                                  | Water, water with glycol up to max. 50% vol.                                                                                                                                                                                             |
|                        | Fluid temperature                      | -10...100°C [14...212°F]                                                                                                                                                                                                                 |
|                        | Fluid temperature note                 | At a fluid temperature of -10...2°C, a valve neck extension is recommended.<br>The allowed fluid temperature can be limited, depending on the type of actuator. Limitations can be found in the respective data sheets of the actuators. |
|                        | Close-off pressure $\Delta p_s$        | 1400 kPa                                                                                                                                                                                                                                 |
|                        | Differential pressure $\Delta p_{max}$ | 200 kPa                                                                                                                                                                                                                                  |
|                        | Flow characteristic                    | equal percentage (VDI/VDE 2173), optimised in the opening range                                                                                                                                                                          |
|                        | Leakage rate                           | air-bubble tight, leakage rate A (EN 12266-1)                                                                                                                                                                                            |
|                        | Angle of rotation                      | 90°                                                                                                                                                                                                                                      |
|                        | Angle of rotation note                 | Operating range 15...90°                                                                                                                                                                                                                 |
|                        | Pipe connection                        | External thread according to ISO 228-1                                                                                                                                                                                                   |

**Technical data**

|                        |                          |                                                    |
|------------------------|--------------------------|----------------------------------------------------|
| <b>Functional data</b> | Installation orientation | upright to horizontal (in relation to the spindle) |
|                        | Servicing                | maintenance-free                                   |
| <b>Materials</b>       | Valve body               | nickel-plated brass body                           |
|                        | Body finish              | nickel-plated                                      |
|                        | Closing element          | Stainless steel                                    |
|                        | Spindle                  | Stainless steel                                    |
|                        | Spindle seal             | EPDM O-ring                                        |
|                        | Seat                     | PTFE, O-ring Viton                                 |
|                        | Characterised disc       | ETFE                                               |

**Safety notes**


- The valve 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.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied with during installation.
- The valve does not contain any parts that can be replaced or repaired by the user.
- The valve may not be disposed of as household refuse. All locally valid regulations and requirements must be observed.
- When determining the flow rate characteristic of controlled devices, the recognised directives must be observed.

**Product features**

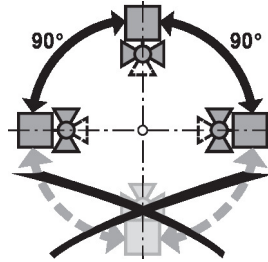
|                            |                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Operating mode</b>      | The characterised control valve is adjusted by a rotary actuator. The actuator is controlled by a commercially available modulating or 3-point control system and moves the ball of the valve – the throttling device – to the position dictated by the control signal. Open the characterised control valve counterclockwise and close it clockwise. |
| <b>Flow characteristic</b> | Equal percentage flow control is ensured by the integrated characterising disc.                                                                                                                                                                                                                                                                       |

**Accessories**

|                               |                                                                    |             |
|-------------------------------|--------------------------------------------------------------------|-------------|
| <b>Electrical accessories</b> | <b>Description</b>                                                 | <b>Type</b> |
|                               | Stem heater for ball valve DN 15...50, AC/DC 24 V, 20 W            | ZR24-2      |
| <b>Mechanical accessories</b> | <b>Description</b>                                                 | <b>Type</b> |
|                               | Valve neck extension for ball valve DN 15...50                     | ZR-EXT-01   |
|                               | Pipe connector for ball valve with external thread DN 15 Rp 1/2"   | ZR4515      |
|                               | Pipe connector for ball valve with external thread DN 20 Rp 3/4"   | ZR4520      |
|                               | Pipe connector for ball valve with external thread DN 25 Rp 1"     | ZR4525      |
|                               | Pipe connector for ball valve with external thread DN 32 Rp 1 1/4" | ZR4532      |
|                               | Pipe connector for ball valve with external thread DN 40 Rp 1 1/2" | ZR4540      |
|                               | Pipe connector for ball valve with external thread DN 50 Rp 2"     | ZR4550      |

**Installation notes**

**Permissible installation orientation** 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.



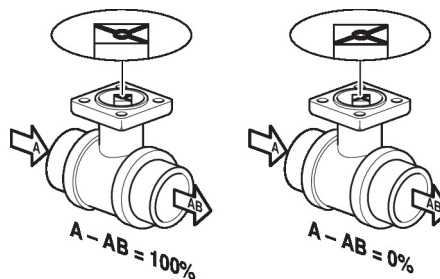
**Water quality requirements** The water quality requirements specified in VDI 2035 must be adhered to. Belimo valves are regulating devices. For the valves to function correctly in the long term, they must be kept free from particle debris (e.g. welding beads during installation work). The installation of a suitable strainer is recommended.

**Servicing** Ball valves and rotary actuators are maintenance-free.

Before any service work on the control element 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).

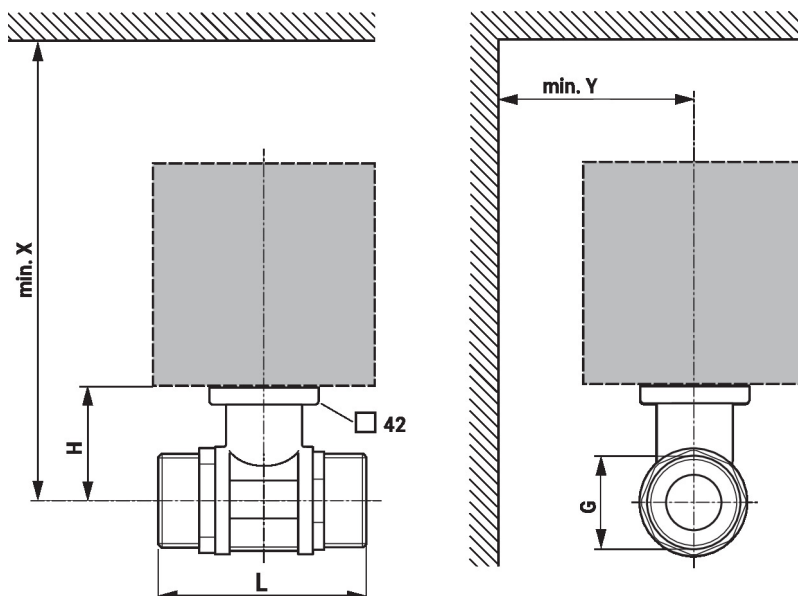
The system must not be returned to service until the ball valve and the rotary actuator have been correctly reassembled in accordance with the instructions and the pipeline has been refilled by professionally trained personnel.

**Flow direction** The direction of flow, specified by an arrow on the housing, is to be complied with, since otherwise the ball valve could become damaged. Please ensure that the ball is in the correct position (marking on the spindle).



## Dimensions

### Dimensional drawings



X/Y: Minimum distance with respect to the valve centre.

The actuator dimensions can be found on the respective actuator data sheet.

| Type | DN | G<br>["] | L<br>[mm] | H<br>[mm] | X<br>[mm] | Y<br>[mm] | kg   |
|------|----|----------|-----------|-----------|-----------|-----------|------|
| R409 | 15 | 1        | 74        | 44        | 220       | 90        | 0.50 |
| R410 | 15 | 1        | 74        | 44        | 220       | 90        | 0.50 |
| R411 | 15 | 1        | 74        | 44        | 220       | 90        | 0.50 |
| R412 | 15 | 1        | 74        | 44        | 220       | 90        | 0.50 |
| R413 | 15 | 1        | 74        | 44        | 220       | 90        | 0.50 |
| R414 | 15 | 1        | 74        | 44        | 220       | 90        | 0.50 |
| R417 | 20 | 1 1/4    | 85.5      | 46        | 220       | 90        | 0.76 |
| R418 | 20 | 1 1/4    | 85.5      | 46        | 220       | 90        | 0.76 |
| R419 | 20 | 1 1/4    | 85.5      | 46        | 220       | 90        | 0.76 |
| R422 | 25 | 1 1/2    | 84.5      | 46        | 220       | 90        | 0.77 |
| R423 | 25 | 1 1/2    | 84.5      | 46        | 220       | 90        | 0.77 |
| R424 | 25 | 1 1/2    | 84.5      | 46        | 220       | 90        | 0.77 |
| R431 | 32 | 2        | 102       | 50.5      | 230       | 90        | 1.2  |
| R438 | 40 | 2 1/4    | 103.5     | 50.5      | 230       | 90        | 1.3  |
| R439 | 40 | 2 1/4    | 103.5     | 50.5      | 230       | 90        | 1.3  |
| R448 | 50 | 2 3/4    | 115.5     | 56        | 240       | 90        | 2.2  |
| R449 | 50 | 2 3/4    | 115.5     | 56        | 240       | 90        | 2.2  |

### Further documentation

- The complete product range for water applications
- Data sheets for actuators
- Installation instructions for actuators and/or ball valves
- General notes for project planning