




Belimo Characterised Control Valve

8 Advantages


The 8 advantages of the characterised control valve at a glance:

1 Absolute tightness p. 4




- All-in-one: Control valve and shut-off valve
- No activation with zero load
- No energy loss with zero load

2 Equal-percentage flow characteristic p. 6




- Excellent control stability
- Reduced tendency to oscillate
- Optimum comfort

3 Excellent control characteristics p. 8




- High rangeability
- Good controllability in the opening range
- Excellent control characteristics

4 No holding torque necessary p. 10



- Simpler selection of actuators
- Actuator size not dependent on differential pressure
- Cost-effective and energy-efficient actuators

5 Reduced weight p. 12




- Simple material transport
- Fast installation
- Reduced installation costs

6 Low installation height p. 14



- Reduced space requirement
- No space problems
- Enhanced design flexibility

7 Reduced energy consumption p. 16



- Low power consumption
- Lower energy costs
- Less expensive electrical installation

8 Self-cleaning ball design p. 18



- No sticking
- Maintenance-free
- High operating safety

Please note that the calculations and presentations are only exemplary and that values may deviate depending on the respective product and dimensions.

Absolute tightness



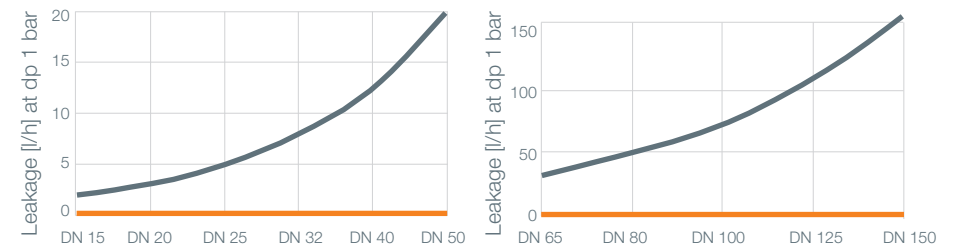
- ▶ Tight-sealing characterised control valve replaces the combination of control valve and shut-off valve
- ▶ No activation of the consumer with zero load
- ▶ No energy loss with zero load saves on operating costs

No leakage due to characterised control valve design

The tight-sealing characterised control valve reliably prevents internal leakage in the closed state and thus inadvertent consumption with zero load. The heating or cooling energy requirement is reduced. Because the characterised control valve is tight-sealing, it also replaces the shut-off valve.

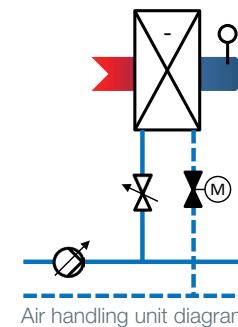
Leakage rate of the characterised control valve in comparison to the globe valve

In the case of globe valves, the amount of leakage water also increases along with the nominal diameter. This does not happen with the characterised control valve. Thus less energy is consumed with characterised control valves, which means that operating costs can be reduced considerably.



- Characterised control valve with leakage rate 0% (leakage rate A as per EN 12266-1)
- Globe valve with leakage rate >0.05% of k_{vs}

Energy loss with valve leakage

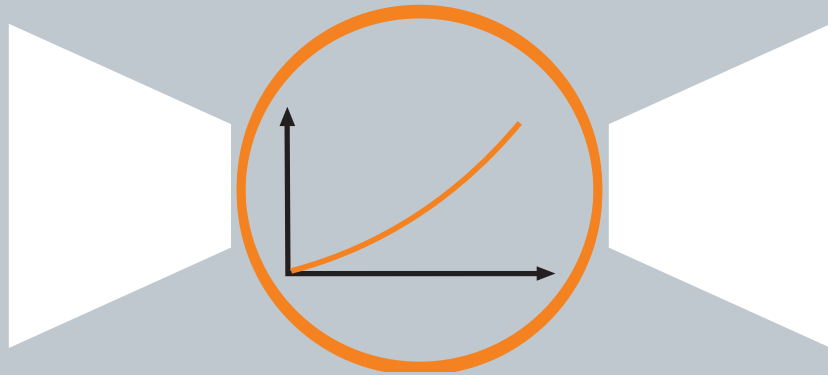


- System data:
- Air cooler with 100 kW power output
 - T_{supply} : 6 °C
 - T_{return} : 12 °C
 - T_{air} : 22 °C
 - Valve leakage rate:
 - Globe valve 0.05% of k_{vs}
 - Characterised control valve 0%
 - Valve authority P_v : 0.5
 - Zero load hours: 2000 per year

	Globe valve	Characterised control valve
Energy loss due to valve leakage	705 kWh/year	0 kWh/year

In the above example, an annual inadvertent energy release of 705 kWh takes place when a globe valve is used; this "energy loss" can be prevented with a tight-sealing characterised control valve. 14 MWh can thus be saved over an operating period of 20 years.

Equal-percentage flow characteristic



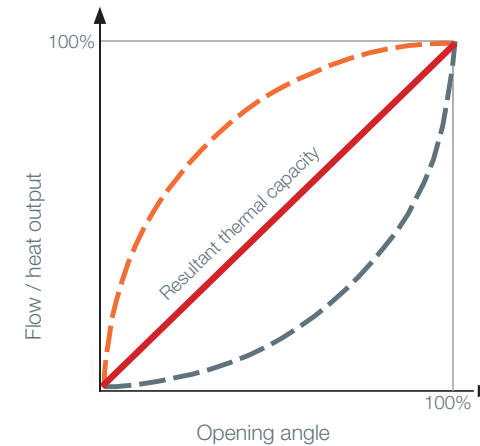
- ▶ Excellent control stability across the entire opening angle range
- ▶ Reduced tendency of the system to oscillate
- ▶ Optimum comfort with least possible use of energy

High stability of control thanks to the Belimo characterising disc

A cooling or heating system must exhibit a high stability of control in order to ensure comfort. This can be guaranteed with the Belimo characterising disc, because the characterising disc ensures an optimum ratio of ball geometry to borehole diameter.

High control stability

In order to achieve good stability of control, a hydraulic final controlling element must possess a flow characteristic that compensates for the non-linearity of the heat exchanger.



— — — Coil characteristic (typical) — — — Flow characteristic (equal percentage)

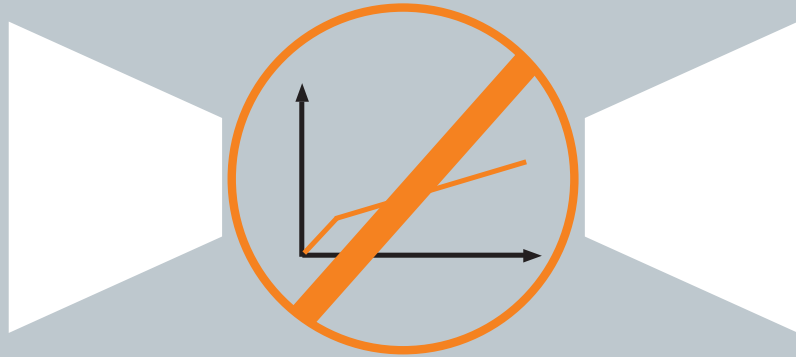
Thus, for example, the power output of a heat exchanger will become disproportionately high in the lower flow range as the flow increases. This can be compensated for if there is a flow increase through a valve that is disproportionately low in this range in comparison to the opening position or to the corrective signal requirement.

An equal-percentage flow characteristic at the valve is therefore ideally suitable for achieving linear heat discharge behaviour.

Flow characteristic of the characterised control valve

The characterising disc guarantees an equal-percentage flow characteristic. The stability of control achieved thereby reliably reduces the tendency of the cooling or heating system to oscillate. Optimum comfort with least possible use of energy is achieved.

3 Excellent control characteristics



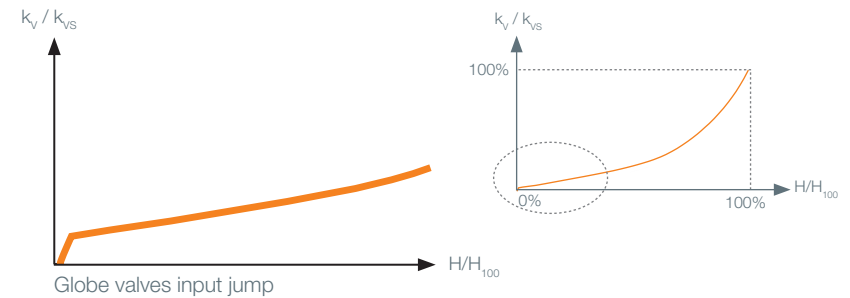
- ▶ High rangeability
- ▶ Good controllability in the opening range
- ▶ Excellent control characteristics across the entire control range

Controllability of low outputs

The behaviour of the valve in the opening range has a significant influence on the controllability of small heating or cooling outputs (lowest partial-load range).

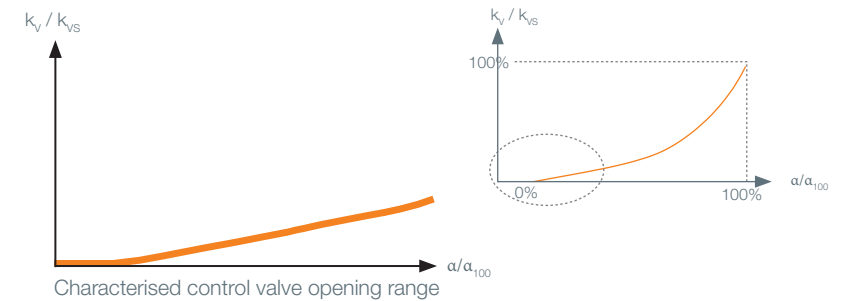
Globe valve input jump

Globe valves usually exhibit an initial jump. This means that the flow significantly increases in the opening point. This abrupt increase results in a sudden increase in the output at the heating or cooling register. This makes controllability more difficult in the lower partial-load operation.



Characterised control valve opening range

Due to the constructional design, the characterised control valve exhibits no initial jump. Even small outputs can be reliably regulated.



4 No holding torque necessary



- ▶ Simpler selection of actuators facilitates planning
- ▶ Actuator size not dependent on differential pressure
- ▶ Cost-effective and energy-efficient actuators

Reduced energy consumption due to design

The opening position of the valve is changed if the requirements change. If the valve is in the desired position, it is important that this no longer changes.

Holding torque of the characterised control valve

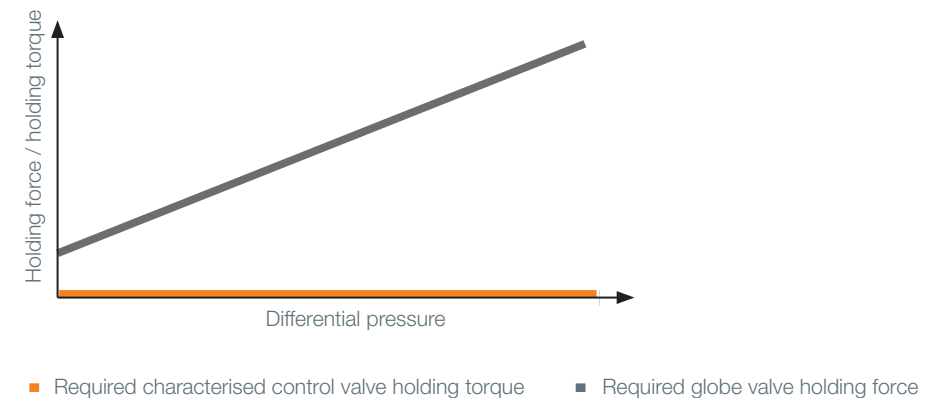
Characterised control valves are pressure-compensated as a result of their design. This means that no holding torque is required for maintaining the set valve position. The position does not change, even without an attached actuator.

Due to the pressure compensation, the actuator selection is not dependent on the pressure conditions to be expected in the system. The maximum differential pressure does not need to be taken into account except for the valve selection. Even with higher differential pressures, the motorisation can be carried out with a smaller, inexpensive actuator.

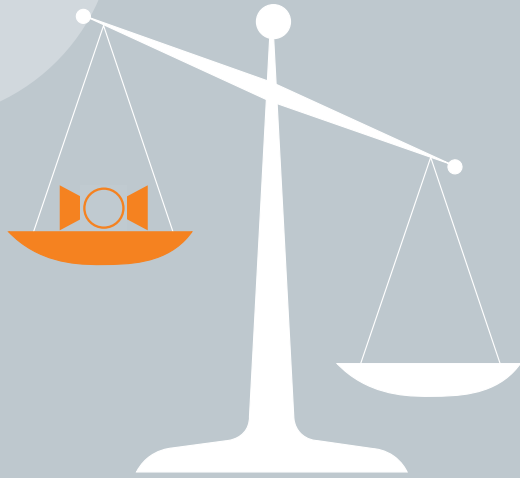
Comparative energy consumption

In the case of a conventional globe valve, a force must be continuously applied to the spindle by the actuator in order to keep the valve in the desired position. If the actuator is removed, the valve may move out of the desired position.

It must be taken into account at the time of actuator selection that the force required for maintaining the present valve position is dependent on the differential pressures that arise. This additional actuating variable makes the selection of required valve and actuator combinations more difficult. Larger and more expensive actuators must be used with greater differential pressures.



Reduced weight



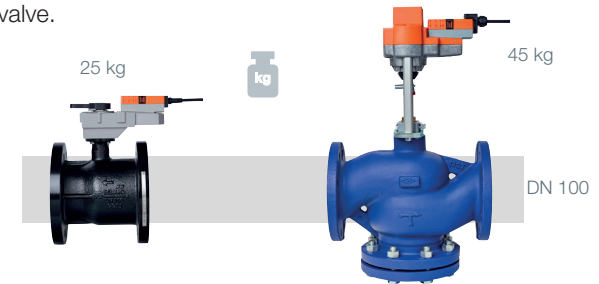
- ▶ Simple material transport to and at the installation site
- ▶ Fast installation
- ▶ Reduced installation costs

Simple installation

The weight influences all of the steps from transport to installation. The reduced weight of the characterised control valve offers advantages in all project phases.

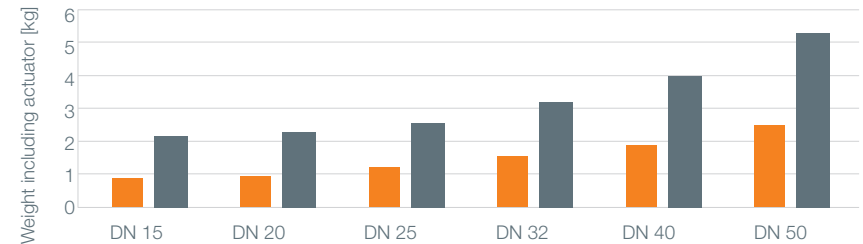
Simple installation

The low weight of the characterised control valve is an advantage not only with respect to transport. Because a characterised control valve is usually considerably lighter in weight than a globe valve, it also significantly reduces installation outlays. Depending on the nominal diameter, a globe valve weighs one-and-a-half to three times as much as a characterised control valve.

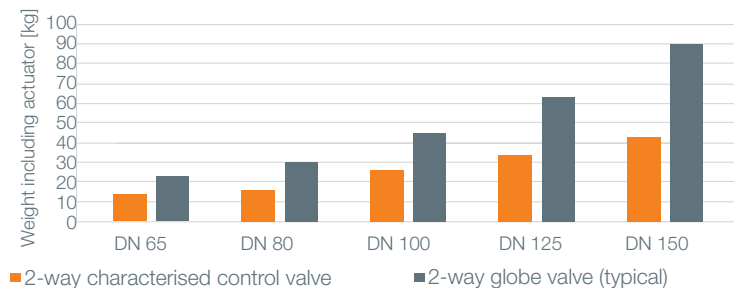


Thus, for example, a globe valve with a DN 100 nominal diameter will typically have a weight of 45 kg. The characterised control valve in the same nominal diameter weighs only 25 kg.

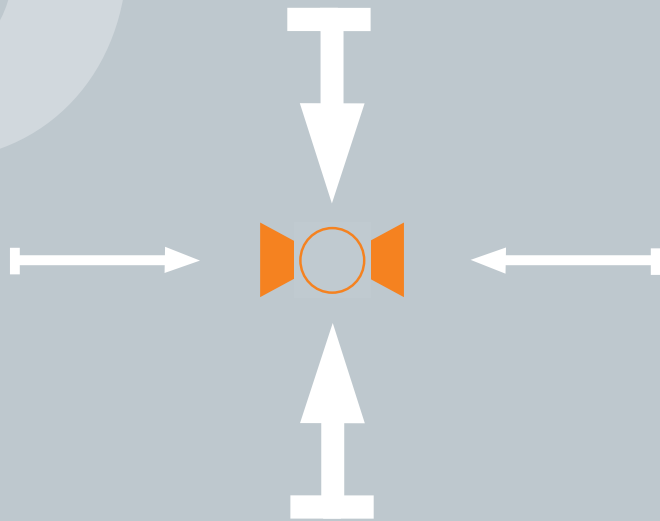
Weight comparison for nominal diameters of DN 15 ... DN 50



Weight comparison for nominal diameters of DN 65 ... DN 150



Small installation height



- ▶ Reduced space requirement
- ▶ Easy planning and smooth installation
- ▶ More flexibility thanks to enhanced design flexibility

Enables flexible installation

Not only the low weight of the components is important. The limited amount of available space must also be taken into account. Compact components facilitate optimum use of available space.

No problems with space thanks to characterised control valve

The bulkiness of globe valve units can lead to space utilisation problems, particularly because of the large installation height. A characterised control valve with a smaller installation height reduces the amount of space required and increases the design flexibility accordingly.

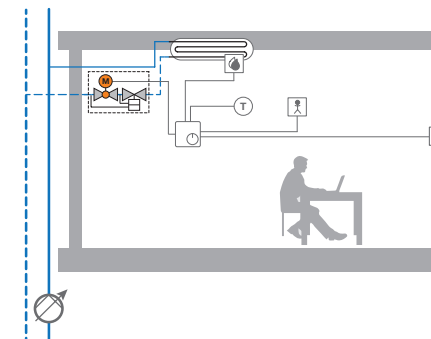
Comparison of the installation heights for nominal diameters DN 15 to DN 50



Zone valves from Belimo

The zone valves, which are specially tuned to meet the requirements of room and zone applications, have an even more compact structural shape in comparison with conventional characterised control valves. Thanks to this, the valves can be used in even the tightest of spatial conditions.

Room and zone application with pressure-independent zone valve PIQCV



Reduced energy consumption



- ▶ Lower power consumption
- ▶ Lower energy costs
- ▶ Less expensive electrical installation

Innovative actuator technology

Actuators for control valves are usually electrically operated. The power consumption – even with less-efficient actuators – appears at first glance to be negligible. Nonetheless, from the point of view of the entire life cycle, a considerable potential for savings in terms of energy and costs results from the use of energy-efficient solutions.

Actuators from Belimo – safe and energy-efficient

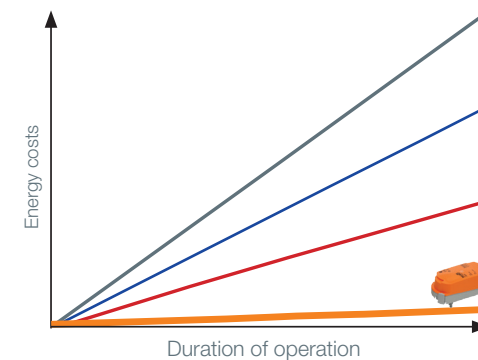
The use of actuators with durable brushless direct-current motors combined with specially constructed gearboxes and the patented motor control ensures safe and electricity-saving operation of the characterised control valves.

Energy-efficient motorisation of zone valves

The electrothermal actuators often used in zone and room applications work with a heating element. The application of a voltage causes the heating element to heat up and expand as a result. The expansion is transmitted to the control valve and thus changes its position.

Due to its simple construction, the investment costs can be kept low for electrothermal actuators. Nevertheless, high operating costs arise during operation due to the permanent amount of energy required to maintain the desired valve position. Operating costs can be considerably reduced thanks to the use of maintenance-free zone valves from Belimo with their exceptionally energy-efficient actuators.

Energy costs in room and zone application



- Electrical actuator 0...100%
- Electrothermal actuator at 70% requirement
- Electrothermal actuator at 40% requirement
- Electrothermal actuator at 100% requirement

Self-cleaning ball design



- ▶ No sticking after downtime
- ▶ Maintenance-free
- ▶ High operating safety

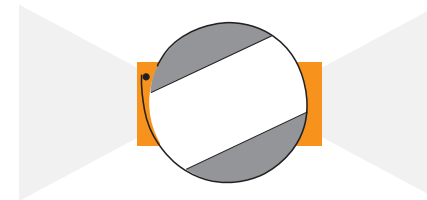
Safe operation

High operating safety is essential in all areas, and thus also in heating and cooling applications. Here, too, the design of the characterised control valves is impressive since the valves are maintenance-free in their design.

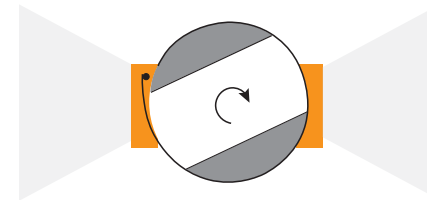
No sticking with contamination

As a result of their design, characterised control valves are exceptionally resistant to contamination. A Sticking of the control element is reliably prevented by the self-cleaning effect at the ball. Reliable activation of the cooling and heating output is thus ensured, even after prolonged standstill periods.

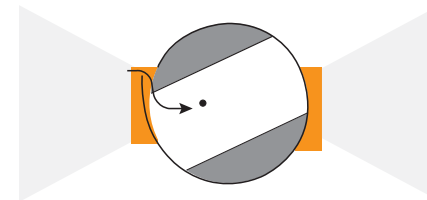
Self-cleaning of the characterised control valve



In order to be able to guarantee a faultless control function, it is important to ensure that contaminations cannot form deposits in the valve.



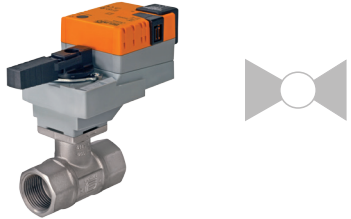
Contamination deposits are prevented, thanks to the design of the characterised control valve.



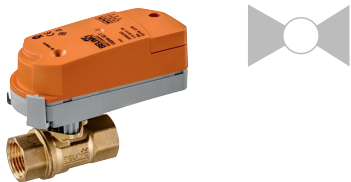
Contamination is washed out of the characterised control valve.

The Characterised Control Valves range from Belimo at a glance:

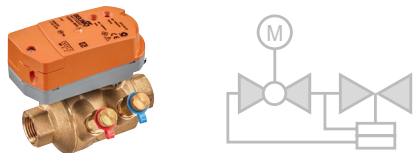
Characterised control valve. Proven millions of times over.



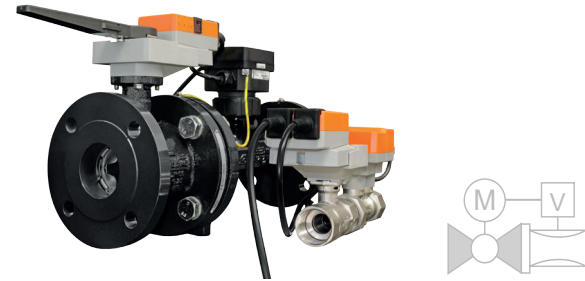
Compact zone valve QCV. Robust, flexible, tight-sealing.



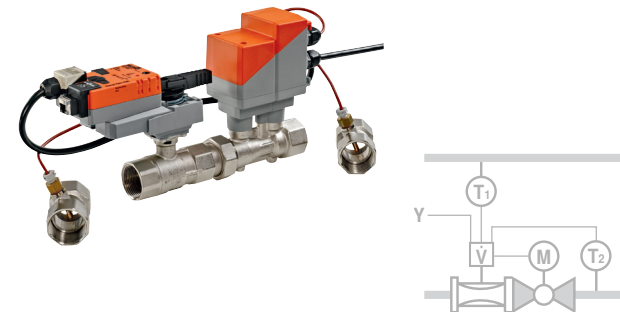
Pressure-independent zone valve PIQCV. Compact, flexible and efficient.



Electronic pressure-independent characterised control valve EPIV. The clever way to control the flow rate



Belimo Energy Valve™ with intelligent web server. A further step into the future.



Further advantages of the Characterised Control Valves

	5-year warranty	Adjustable flow characteristic	Ultra-compact for room and zone applications	Manually adjustable K_{vs} values	Easily adjustable maximum flow rate	Simple and fast valve selection	No balancing valve and hydronic balancing necessary
	✓		✓	✓			
	✓						
	✓		✓		✓	✓	✓
	✓	✓			✓	✓	✓
	✓ ¹⁾	✓			✓	✓	✓

¹⁾ 7 years when connected to the Belimo cloud

²⁾ Optional

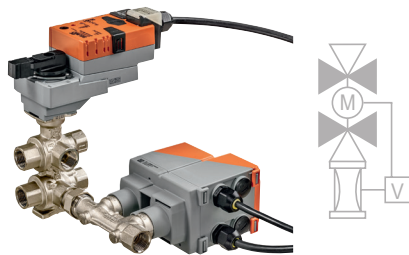
Real-time flow measurement	Pressure-independent flow control	Pressure and temperature-independent power control	All-in-one solution	Start-up Assistant	Delta-T Manager	Connection to Belimo Cloud	Glycol monitoring
	✓						
✓	✓		✓				
✓	✓	✓	✓	✓	✓	✓	✓ ²⁾

The 6-way zone valve assortment at a glance:

Precise 6-way zone valve. Compact, safe, economical.



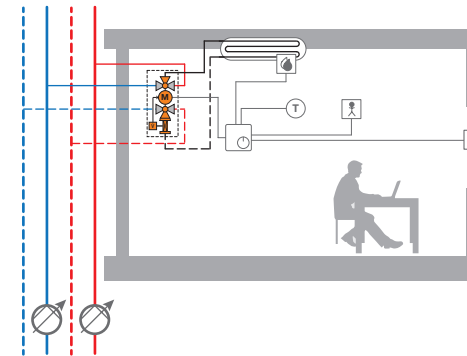
Pressure-independent 6-way zone valve. Functional, easy to install, versatile.



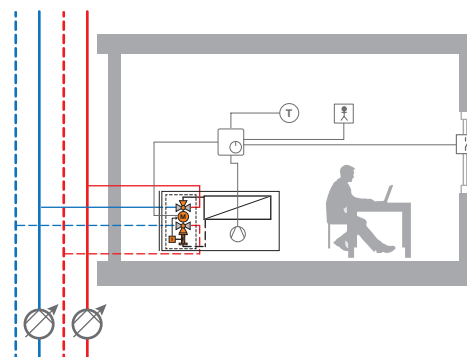
Possible applications of the 6-way zone valves

Since Belimo introduced the characterised control ball valve to the market in 1999, it has undergone continuous development. About 10 years later, the 6-way zone valve was developed on the basis of the same technology. This is specially designed for use in 4-pipe systems. A 6-way zone valve replaces four 2-way valves. Today, the electronic pressure-independent 6-way zone valve impresses with its high planning reliability and operating efficiency.



Application diagram for cooling and heating ceiling



Application diagram for fan coil



Further advantages of the 6-way zone valves

	5-year warranty	Ideal solution for 4-pipe systems	Replaces four 2-way valves	Heating and cooling sequence in one valve	Maximum system safety due to pressure relief function
	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓

Various K_{vs} -combinations	Simple and fast valve selection	No installation errors, as it is impossible to interchange valves	Easily adjustable maximum flow rates	No balancing valves and hydronic balancing	Real-time flow measurement	Pressure-independent flow control
✓		✓				
	✓	✓	✓	✓	✓	✓

All-inclusive.



The image features a dark grey world map with numerous orange dots scattered across all continents, representing a global presence. Below the map are six icons, each with a corresponding text label:

- 5-year warranty:** An icon of the number 5 with a checkmark inside a square.
- On site around the globe:** An icon of a globe with an information symbol (i) inside a square.
- Complete product range:** An icon of a stack of three boxes with a list icon.
- Tested quality:** An icon of two interlocking gears with the word "SWISS" in a box above them.
- Short delivery times:** An icon of a box with a clock icon.
- Comprehensive support:** An icon of a mobile phone with the letters "WWW" in a box above it.

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