

**8 reasons  
for the use of  
characterised  
control valves.**

**Belimo characterised control valves**



# Minimum effort and efficiency in every way.



In 1999, Belimo taught the ball valve how to control. The proven ball valve was further developed with a mechanical innovation, the integrated or mounted characterising disc in the ball. The control ball valve from Belimo is air-bubble tight when closed. Thanks to the optimum flow characteristic, the characterised control valve demonstrates high flow stability and offers excellent control characteristics over the entire operational range. Due to its design, the characterised control valve requires less energy since no holding torque is necessary. In addition, Belimo actuators for characterised control valves are very safe and energy efficient. This aspect is often neglected when selecting a product, but pays off during operation. The low installation height and reduced weight are further advantages of the Belimo characterised control valve. Just like the self-cleaning ball design, which prevents sticking due to contamination.



# Content.

- 1** Absolute tightness
- 2** Optimum flow characteristic
- 3** Excellent control characteristics
- 4** No holding torque necessary
- 5** Reduced weight
- 6** Low installation height
- 7** Reduced energy consumption
- 8** Self-cleaning ball design

# 1. Absolute tightness.

## No leakage due to characterised control valve design

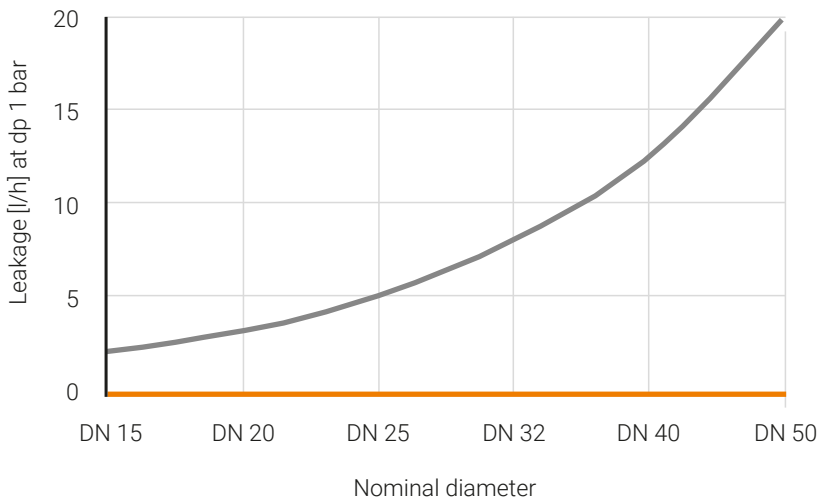
The tight-sealing characterised control valve reliably prevents internal leakage in the closed state and thus inadvertent consumption with zero load. There is a reduced energy requirement for heating and cooling. Since the characterised control valve is tight-sealing, it also replaces a motorised isolation valve.

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

While leakage increases with the nominal diameter of the globe valve, this effect does not occur with characterised control valves. This means that less energy is consumed with characterised control valves, which means that operating costs can be reduced considerably.

### ABSOLUTE TIGHTNESS

- Tight-closing characterised control valve replaces the combination of a control valve and isolation valve
- No activation of the consumer at zero load saves operating costs



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

## 2. Optimum flow characteristic.

### High stability of control thanks to the Belimo characterising disc

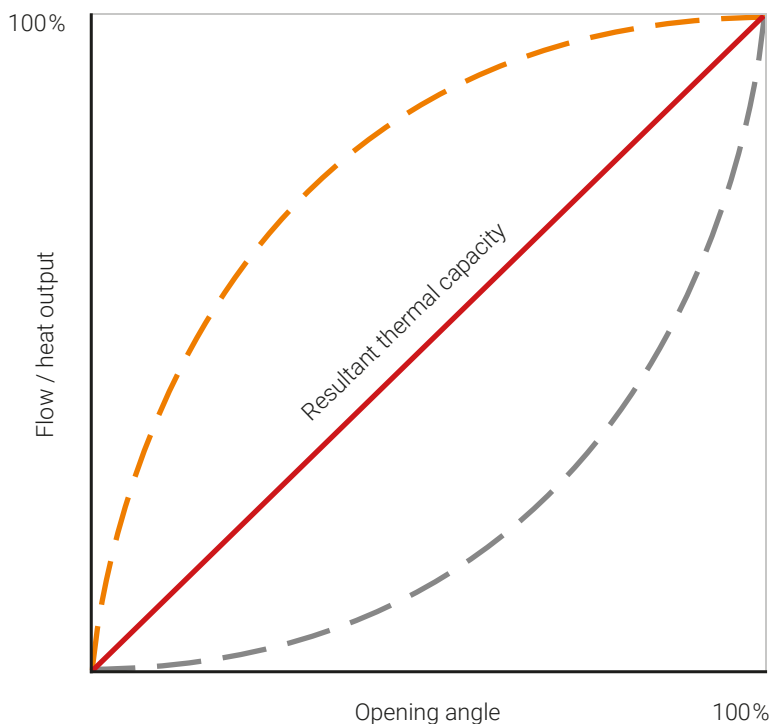
A cooling or heating system must exhibit a high stability of control in order to ensure comfort. This can be guaranteed with the Belimo characterising disc, since it ensures an optimum ratio of ball geometry to borehole diameter. In order to achieve good stability of control, a hydraulic final controlling element must possess a flow characteristic that compensates for the non-linearity of the heat exchanger. 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. This ensures that optimum comfort with the least possible use of energy is achieved.

### OPTIMUM FLOW CHARACTERISTIC

- Excellent control stability across the entire opening range
- Reduced tendency of the system to oscillate
- Best possible comfort with lowest possible energy consumption



- Heat exchanger characteristic (typical)
- Flow characteristic (equal percentage)



# 3. Excellent control characteristics.

## Controllability of low output

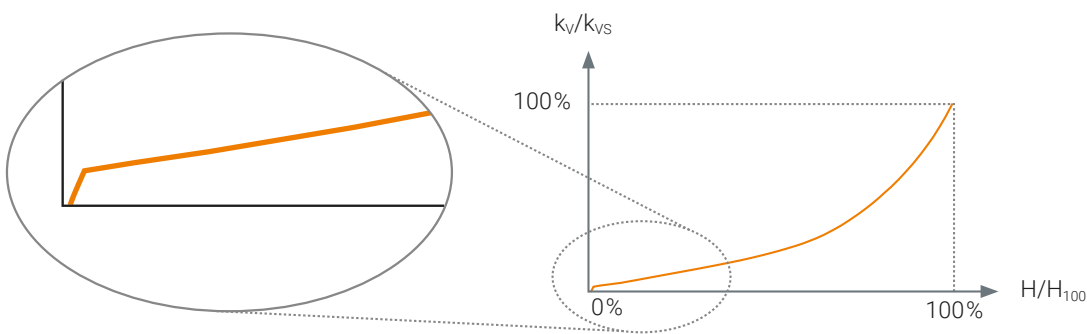
The behaviour of the valve in the opening range has a significant influence on the controllability of small heating or cooling outputs (lowest partial-load range).

## EXCELLENT CONTROL CHARACTERISTICS

- High rangeability
- Superior controllability in the opening range

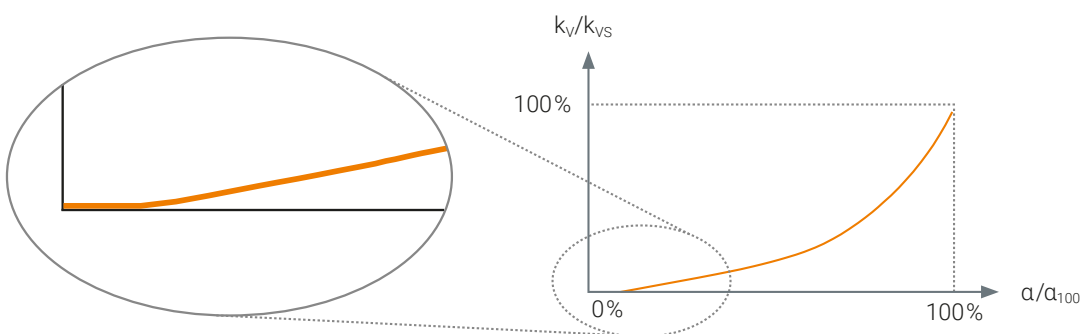
## Globe valve input jump

Globe valves usually exhibit an input 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 coil. This makes controllability more difficult in the lower partial-load operation.



## Characterised control valve opening range

Due to its construction, the characterised control valve has no initial jump. Even small outputs can be reliably regulated.



# 4. No holding torque necessary.

## Lower energy consumption due to design

Thanks to the pressure-compensated characterised control valve design, no holding torque is required to maintain 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 must only be taken into account when selecting the valve. Even with higher differential pressures, the motorisation can be effected with a smaller, inexpensive actuator.

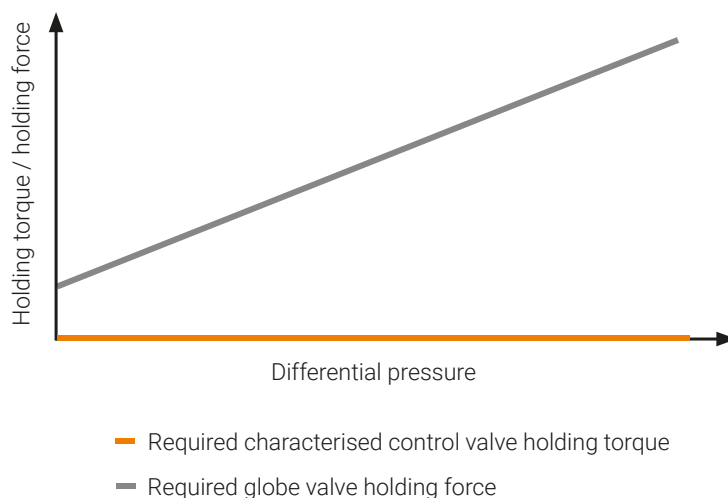
## Comparative energy consumption

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 current valve position is dependent on the differential pressures that occur. For higher differential pressures, larger and more expensive actuators must be used.

## NO HOLDING TORQUE NECESSARY

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



# 5. Reduced weight.

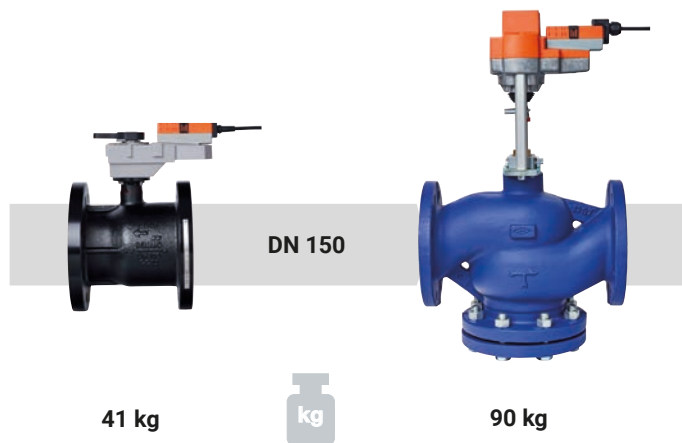
## Straightforward installation

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

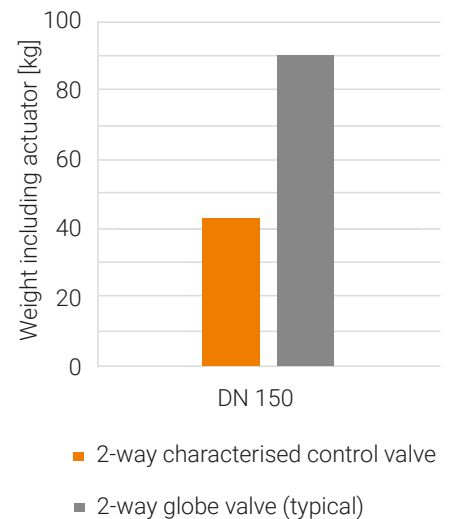
The low weight of the characterised control valve is an advantage not only with respect to transport. Because a characterised control valve is usually considerably lighter in weight than a globe valve, it also significantly reduces installation outlays. Depending on the nominal diameter, a globe valve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

A globe valve with a nominal diameter of DN 150 typically weighs 90 kg. The characterised control valve in the same nominal diameter weighs only 41 kg.



## REDUCED WEIGHT

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





## 6. Low installation height.

### Enables flexible installation

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

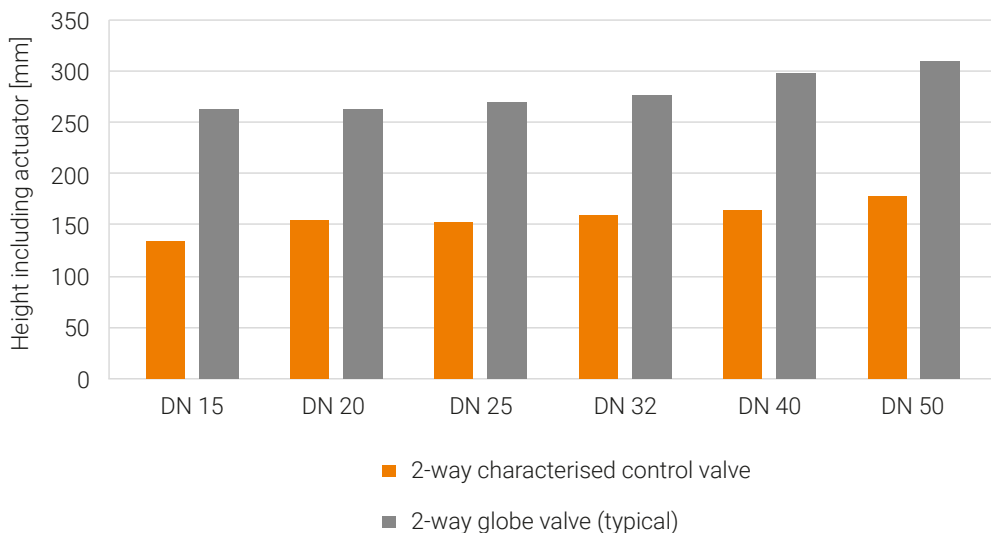
### No problems with space thanks to characterised control valve

Voluminous globe valves can lead to space utilisation problems, especially because of their large installation height. A characterised control valve with a smaller installation height reduces the amount of space required and increases the design flexibility accordingly.

### LOW INSTALLATION HEIGHT

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

Comparison of the installation heights in the nominal diameters DN 15...50



# 7. Reduced energy consumption.

## Actuators from Belimo – safe and energy-efficient

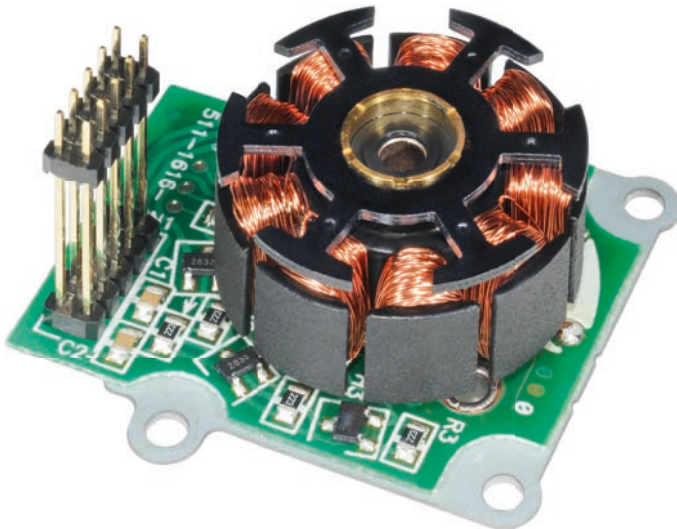
The power consumption of an actuator appears to be negligible at first glance. However, when viewed over the entire life cycle, the use of energy-efficient solutions offers considerable potential for savings in terms of energy and costs. Belimo actuators guarantee safe and energy-saving operation of characterised control valves.

### **REDUCED ENERGY CONSUMPTION**

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

## Dynamic holding force detection

The patented motor control system from Belimo features dynamic holding force detection. This ensures that only just as much current as absolutely necessary is used to keep the dampers or valves in position. This can reduce the annual actuator energy consumption by up to 70%.



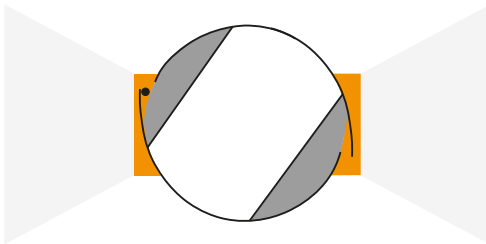
# 8. Self-cleaning ball design.

## Safe operation, without sticking due to contamination

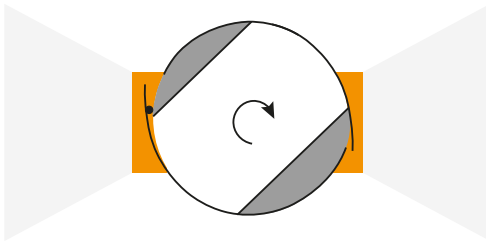
High operating safety is essential in all areas, and thus also in heating and cooling applications. Here, too, the design of the characterised control valves is impressive since the valves are maintenance-free in their design. A sticking of the control element is reliably prevented by the self-cleaning effect at the ball. This ensures reliable activation of the cooling or heating output even after prolonged standstill periods.

### SELF-CLEANING BALL DESIGN

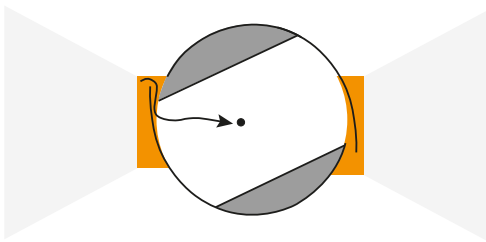
- No sticking after standstill
- Maintenance-free
- High operating safety



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 avoided, thanks to the design of the characterised control valve.



Contamination is flushed out of the characterised control valve.

# All inclusive.

Belimo as a global market leader develops innovative solutions for the controlling of heating, ventilation and air-conditioning systems. Actuators, valves and sensors represent our core business.

Always focusing on customer added value, we deliver more than only products. We offer you the complete product range for the regulation and control of HVAC systems from a single source. At the same time, we rely on tested Swiss quality with a five-year warranty. Our worldwide representatives in over 80 countries guarantee short delivery times and comprehensive support through the entire product life. Belimo does indeed include everything.

The "small" Belimo devices have a big impact on comfort, energy efficiency, safety, installation and maintenance. In short: Small devices, big impact.



5-year warranty



On site around the globe



Complete product range



Tested quality



Short delivery times



Comprehensive support



**BELIMO Automation AG**

Brunnenbachstrasse 1, 8340 Hinwil, Switzerland

Tel. + 41 43 843 61 11, [info@belimo.ch](mailto:info@belimo.ch), [www.belimo.com](http://www.belimo.com)

**BELIMO**<sup>®</sup>