The ball valve as a full-feature control device!
Great economy. The economical alternative to the conventional globe valve these days is often Belimo’s motorized characterized control valve. A unique characterizing disc allows this economically-priced control device to provide first-class control by means of an equal-percentage characteristic – for controlling the heating and cooling power in heating, ventilating and air conditioning systems.

Persuasive cost-savings. Since its launch, the characterized control valve has proved its worth in many heating, ventilating and air conditioning systems thanks to ease of installation, compactness and reliable operation. These advantages are a convincing argument for users to choose the precise control element when planning and implementing heating and cooling circuits.

The revolutionary characterized control valve from Belimo: Proven precision at a good price!
Compact in all power ratings: Belimo rotary actuators for characterized control valves

**TR rotary actuators**

The small, exceptionally compact TR rotary actuator has been specially developed for the motorized operation of characterized control valves and Open/Close ball valves of sizes DN 15. The TR is suitable for an AC / DC 24 V power supply.

**LR rotary actuators**

The compact LR rotary actuator, derived from the LM damper actuator which has been well-proven over the years by the millions of units that have been produced, is specifically intended for the motorized operation of ball valves up to size DN 32. The LR is available in versions suitable for an AC / DC 24 V or AC 230 V power supply.

**NR rotary actuators**

The powerful NR rotary actuator is suitable for the reliable motorized operation of characterized control valves and Open/Close ball valves up to size DN 50. It is available in versions for three methods of control all of which are suitable for an AC / DC 24 V or AC 230 V power supply.

**Co-ordinated motorized operation.** Optimum functionality of Belimo characterized control valves is assured by the provision of properly co-ordinated motorized operation. The specially-developed rotary actuators provide the necessary precision in all power ratings and modulating, 3-point or Open/Close methods of control are available depending on which type of actuator is employed. kvs

**For variable control and Open/Close applications.** Characterized control valves are available as 2 and 3-way versions with 2 to 5 kvs values for each nominal width. Ball valves without a characterizing disk are available for Open/Close and change-over applications. They are supplied either with the required rotary actuator mounted or packed loose, according to preference.
**A complete product range:**

**Ball valves and actuators**

**Motorized characterized control valves with an equal-percentage characteristic**

<table>
<thead>
<tr>
<th>DN [mm]</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>32</th>
<th>40</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN [inch]</td>
<td>⅛&quot;</td>
<td>⅜&quot;</td>
<td>⅛&quot;</td>
<td>⅛&quot;</td>
<td>⅛&quot;</td>
<td>⅛&quot;</td>
</tr>
<tr>
<td>kvs [m³/h]</td>
<td>0.63</td>
<td>1.0</td>
<td>1.6</td>
<td>2.5</td>
<td>4</td>
<td>6.3</td>
</tr>
</tbody>
</table>

**Motorized ball valves for Open/Close and change-over applications**

<table>
<thead>
<tr>
<th>DN [mm]</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>32</th>
<th>40</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN [inch]</td>
<td>½&quot;</td>
<td>⅜&quot;</td>
<td>1&quot;</td>
<td>1¼&quot;</td>
<td>1½&quot;</td>
<td>2&quot;</td>
</tr>
<tr>
<td>kvs [m³/h]</td>
<td>8.6</td>
<td>21</td>
<td>26</td>
<td>16</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>2-way</td>
<td>R215</td>
<td>R220</td>
<td>R225</td>
<td>R230</td>
<td>R232</td>
<td>R240</td>
</tr>
<tr>
<td>3-way</td>
<td>R315</td>
<td>R320</td>
<td>R325</td>
<td>R330</td>
<td>R332</td>
<td>R340</td>
</tr>
</tbody>
</table>

**Rotary actuator modulating**

- **DC 0…10 V**
  - TR24-SR
    - AC / DC 24 V
  - LR24-SR
    - AC / DC 24 V
  - NR24-SR
    - AC / DC 24 V
  - NRY24-SR
    - AC / DC 24 V

**Rotary actuator 3-point**

- **AC 24 V**
  - TR24-3
  - NR230-3
    - AC 230 V
  - NR24-3
    - AC 24 V
The unique characterizing disc for precision control in water systems

Equal-percentage valve characteristic

In order to ensure good stability of control it is essential for a control valve to have an equal-percentage characteristic. This type of characteristic produces a linear variation in thermal output according to the amount of opening of the valve (also known as the system characteristic). Under normal testing conditions a conventional ball valve exhibits an S-shaped characteristic. When it is installed in a real system, however, this characteristic is seriously deformed because, compared with its nominal size, a ball valve possesses an extremely high flow coefficient. Whether used with or without pipe reducers or a reduced bore they do not normally allow stable regulation of the thermal capacity.

Belimo’s unique characterized control valve is very different. A special characterizing disc incorporated in it gives it an equal-percentage characteristic which is comparable with that of a globe valve of the same nominal size. The side of the characterizing disc facing the ball is concave and the disc is in physical contact with the surface of the ball. The flow (the $k_{vs}$ value) is reduced to the required value by a combination of the hole in the ball and the V-shaped aperture. The increase in flow as the valve is opened is very slow and controlled, especially in the normal range of opening. This produces better part-load behaviour and improved stability of control while also optimizing energy consumption.

Key features of the characterized control valve

- Simple direct mounting of the actuator with a central bolt (no adapters)
- Identical mounting flange for all nominal sizes, no lateral stress on the spindle
- Square spindle head for form-fit attachment of the rotary actuator
- Spindle with two O-rings, press-out-proof
- Stainless steel ball and spindle
- Thermal decoupling of actuator and valve
- Drain hole to prevent the accumulation of condensate
- Forged body, nickel-plated brass
- Belimo characterizing disc for an equal-percentage characteristic
- Internal thread connections (Rp acc. ISO 7/1)

Optimized for control. The Belimo characterized control valve marries known ball-valve technology with an innovative development – the unique characterizing disc. This marriage of design has produced a range of highly-desirable key features for the new valve:

- An equal-percentage valve characteristic
- No sudden change in inlet flow on opening
- Excellent stability of control
- $k_{vs}$ values comparable with those of globe valves of the same size
- Fewer pipe reducers needed
- Tight sealing.
Belimo Headquarters
Belimo Headquarters
Contact the following for further information:

A partnership for motorizing HVAC actuators
Innovation, Quality and Consultancy:
in HVAC systems

Standard actuators and
spring-return actuators for air control dampers
Safety actuators for
motorizing fire and smoke extraction
VAV systems for individual
room air control

Air applications

Mixing actuators and
motorized ball valves for
HVAC water circuits

Water applications

Globe valves and intelligent
linear actuators – also for leading makes of valve

Contact the following for further information:

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