Richter Bellows-sealed Globe Control Valves

- Corrosion-resistant PFA lining
- ISO/DIN and ANSI/ISA face-to-face
- Heavy-duty bellows
- Special designs for chlorine and high-purity media
Richter bellows-sealed
globe control valves

Fields of application
Flow control of corrosive, hazardous, pure and/or slightly solids-laden liquids, vapours and gases in the chemical, pharmaceutical and other industries.

The Richter RSS series is especially suitable
- for media where stainless steel is not sufficiently corrosion-resistant.
- as an alternative to valves made of special metals (Hastelloy®, Monel®, titanium etc.).
- for environmentally critical media (German Clean Air Act – “TA-Luft”).
- for metal-reactive media, e.g. H₂O₂.
- for biotechnology and high-purity media where good cleaning and anti-adhesive surfaces are important (see page 5).
- for highly permeating media (see page 5).

Operating range
- -60 to +200 °C (-75 to 400 °F) operating temperature
- 0.1 mbar vacuum up to 16 bar (235 psi) operating pressure

Design
Bellows-sealed globe control valve in compliance with German Clean Air Act, TA-Luft. Lined with fluoroplastic. Safety stuffing box as standard. Pneumatic or electric actuation. Also available as manually actuated control or shut-off valve (HVR, HV series).

Control characteristics to DIN EN 60534
Equal percentage, linear, on-off. Rangeability 1:25. Rangeability 1:100 with V-control plug.

Product features
- Face-to-face to ISO 5752-R.1 (DIN EN 558-1 R.1), flanges ISO 7005-2/PN 16, on request drilled to ASME Cl. 150
- Face-to-face to ANSI/ISA 75.08.01 Cl. 150, flanges ASME B16.5 Cl. 150 RF
- Face-to-face to ANSI/ISA 75.08.01 Cl. 300 for DN 1” to 2”, flanges ASME B16.5 Cl. 300 RF
- Comprehensive options package

Type codes, wetted materials
- Bellows-sealed globe control valve, remote actuation RSS/...

Lining
- PFA ...
- Antistatic PFA-L ...
- Ultrapure (e.g. pharma applications) PFA-HP ...

Option: Heavy-duty PTFE bellows with stainless steel or PTFE/carbon support rings.

Option:
- Heavy-duty PTFE bellows

Option:
- Special V-control plug made of TFM-PTFE for minimum kₐ-values from 0.01 m³/h (Cv 0.012), see page 4.
- Special U-plug if there is a risk of cavitation.

Option:
- Change in kₐ/Cv value by replacing seat/plug.

Option:
- Screwed to bellows without play and secured by means of PTFE cord.

Option:
- Made of ductile cast iron EN-JS 1049 (ASTM A395).
- For special cases, e.g. extreme permeation and pressure/temperature conditions
Exchangeable seat
made of modified pure PTFE,
no fillers.

Easy top entry maintenance
of the wetted internals:
removable valve bonnet

High-quality external corrosion
protection:
• Epoxy coating of the valve;
  valve stem and screws made of
  stainless steel

Actuators and accessories
• Pneumatic or electric actuators
• Positioners, limit switches etc.
  All common makes.

Travel stop
protects plug and seat against
excessively high shut-off forces,
installation as per table on page 7
depending on Dp and seat Ø.
With protective rubber bellows.

Heavy-duty bellows for DN 25-150 (1“-6“)

These bellows were developed
for particularly difficult operating
conditions:
• Highly permeating media:
The wall thickness of 2.5 mm
(0.1“) ensures considerably
higher resistance to permeation.
Also available in modified
PTFE for particularly
strong permeation.
• Higher pressures and
temperatures:
The convolutions of the bellows
retain their function even at a
pressure of 16 bar (235 psi) and
at elevated temperatures: They
are individually supported on
the stainless steel support rings
(and not on the valve stem!) and
thus remain flexible. On request,
support rings are also available
in PTFE/carbon for an operating
pressure of 10 bar (145 psi).
• For high-purity media:
Large convolution distances
facilitate flushing/sterilisation
of the inner valve chamber
(see also page 5 “Version for
biotechnology/high-purity media”).
Operation close to cavitation
This special U-plug (U = circumferential guiding) is recommended, when cavitation might occur with DN 80, 100 and 150 (3”, 4”+6”). It reliably overcomes the higher loads by dividing the medium flow and through the permanent guide in the valve seat. Universal for all RSS bellows versions.

RSS V-plug for small k, 0.01-1.20 (Cv 0.012-1.4)

The V-plug made of compression-proof and dimensionally stable PTFE has 1 to 4 grooves, depending on the k_/Cv value. When the valve opens, the V-grooves offer an expanding opening cross section whilst the plug is always guided in the seat. This ensures high-quality control even at elevated temperatures and differential pressures.

A dynamic sealing lip integrated into the seat limits the flow precisely to the V-grooves, thus preventing undesired leakage. A PTFE cord prevents the plug from unscrewing. Hastelloy or tantalum plug inserts, which were previously used for stability and accuracy reasons, can now be dispensed with.

Customer benefits:
Lower costs than special metals, shorter delivery times, metal-free, maximum chemical resistance.
The V-plugs are the preferred version for RSS valves DN 15-25 (1/2”-1”) with low k_/Cv-values.

Operating range
• Up to 16 bar at 180 °C (235 psi at 360 °F)
• Pressure/temperature diagram: see page 6
• Not for highly viscous or solids-containing media

k_v100-values (m³/h), Cv-values (USgpm)
DN 15 + 20 (1/2” + 3/4”), seat Ø 8 mm. Travel 15 or 20 mm.
DN 25 (1”), seat Ø 14 mm. Travel 15 or 20 mm.

\[
\begin{align*}
k_v100 & \quad 0.01 & \quad 0.02 & \quad 0.05 & \quad 0.10 & \quad 0.20 & \quad 0.50 & \quad 0.80 & \quad 1.20^* \\
Cv & \quad 0.012 & \quad 0.023 & \quad 0.06 & \quad 0.12 & \quad 0.23 & \quad 0.58 & \quad 0.93 & \quad 1.40^* \\
\end{align*}
\]

Other sizes and k_/Cv-values on request.
^ only DN 25 (1”)

Control characteristics
Quadratic curve, rangeability 1:100

<table>
<thead>
<tr>
<th>Travel (%)</th>
<th>5</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow rate (%)</td>
<td>1.25</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>17</td>
<td>26</td>
<td>37</td>
<td>50</td>
<td>64</td>
<td>81</td>
<td>100</td>
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</tbody>
</table>

Components and material
204 Plug modified PTFE
205 Seat modified PTFE
522 Cord PTFE
Version for highly permeating media (e.g. chlorine)
The special bush a – material e.g. Hastelloy C – protects the cover flange in the valve stem area against corrosive attack by permeating media. The valve stem – also e.g. Hastelloy C – remains moveable. Bellows: modified PTFE heavy-duty bellows with PTFE/carbon or Hastelloy support rings or bellows made of Hastelloy C b. The thick-walled seamless PFA body lining provides outstanding protection against permeation.

Version for “biotechnology/pure media”
Pharmaceutical, fine and semiconductor chemicals, fermentation etc., suitable for CIP and SIP! In the segment of PFA lined globe control valves this time-tested version is unique:
- Free from cavities.
- Anti-adhesive PFA body lining without fillers with seamlessly integrated seat.
- One-piece PTFE bellows/plug design a with large convolution distances, easy to clean b, DN 15+20 (1/2”+3/4”) with standard bellows.
- On request, special “high-purity media production process” and FDA conformity certificate.

Design for combustible and potentially explosive media
The antistatic lining made of PFA-L reliably ensures the dissipation of electrostatic charges through the plastic lining and the metallic body. PFA-L has the same large pressure/temperature range as pure PFA. Its chemical resistance is also very good but it must be checked in specific cases owing to the carbon enrichment – approx. 3% in the PFA.
Components and materials

<table>
<thead>
<tr>
<th>Item</th>
<th>Designation</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Body</td>
<td>Shell: ductile iron EN-JS 1049/ ASTM A395</td>
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<tr>
<td></td>
<td></td>
<td>Lining: PFA, optionally PFA-L antistatic</td>
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<tr>
<td>106</td>
<td>Cover</td>
<td>D.C.I. EN-JS 1049/ASTM A395</td>
</tr>
<tr>
<td>204</td>
<td>Plug</td>
<td>modified PTFE</td>
</tr>
<tr>
<td>205</td>
<td>Seat</td>
<td>modified PTFE</td>
</tr>
<tr>
<td>206</td>
<td>Bellows</td>
<td>PTFE, modified PTFE, PTFE/carbon antistatic, Hastelloy. Heavy-duty version: with stainless steel or PTFE/carbon support rings</td>
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<tr>
<td>302/2</td>
<td>Guide ring</td>
<td>PTFE/carbon</td>
</tr>
<tr>
<td>402/1</td>
<td>Packing ring</td>
<td>PTFE/carbon</td>
</tr>
<tr>
<td>404</td>
<td>Packing nut</td>
<td>Stainless steel</td>
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<tr>
<td>405</td>
<td>Thrust ring</td>
<td>Stainless steel</td>
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<tr>
<td>508</td>
<td>Travel stop*</td>
<td>Stainless steel</td>
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<tr>
<td>510</td>
<td>Bracket</td>
<td>Steel, epoxy-coated</td>
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<tr>
<td>516</td>
<td>Yoke</td>
<td>Ductile cast iron, epoxy-coated</td>
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<td>522</td>
<td>Round cord</td>
<td>PTFE</td>
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<td>523</td>
<td>Travel indicator</td>
<td>Stainless steel</td>
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<tr>
<td>687</td>
<td>Protect. bellows</td>
<td>Rubber, w/travel stop</td>
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<tr>
<td>800</td>
<td>Valve stem</td>
<td>Stainless steel</td>
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<tr>
<td>801</td>
<td>Guide**</td>
<td>Stainless steel only w. DN80, 100, 150 [3&quot;, 4&quot;, 6&quot;]</td>
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<tr>
<td>804</td>
<td>Coupling</td>
<td>Stainless steel</td>
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<tr>
<td>850</td>
<td>Actuator</td>
<td>according to specification</td>
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<tr>
<td>917/1</td>
<td>Screw-in pipe connector***</td>
<td>Stainless steel, optionally hex. head screw plug</td>
</tr>
</tbody>
</table>

* depending on shut-off force
** Component not shown
*** option. with safety stuffing box

Dimensions and weights

** Face-to-face lengths ISO 5752 series 1 (DIN EN 588-1 series 1)*; flanges ISO 7005-2/PN16 (DIN EN 1092-2)*

<table>
<thead>
<tr>
<th>DN (mm)</th>
<th>H (mm)</th>
<th>L (mm)</th>
<th>Weight** approx.kg</th>
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<tr>
<td>15</td>
<td>130</td>
<td>130</td>
<td>6</td>
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<td>20</td>
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<td>100</td>
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<tr>
<td>150</td>
<td>512</td>
<td>480</td>
<td>155</td>
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</tbody>
</table>

* formerly DIN 3202/F1, 2532/33
** without actuator

** Face-to-face lengths ANSI/ISA 75.08.01 Cl. 150+300, flanges ASME B16.5 Cl. 150+300 RF

<table>
<thead>
<tr>
<th>DN (inch)</th>
<th>H (mm)</th>
<th>Cl. 150 (mm)</th>
<th>Cl. 300 (mm)</th>
<th>Weight** approx.kg</th>
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<td>130***</td>
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<td>1/4**</td>
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<td>1 1/2&quot;</td>
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<tr>
<td>3&quot;</td>
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<td>4&quot;</td>
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<tr>
<td>6&quot;</td>
<td>512</td>
<td>480***</td>
<td>-</td>
<td>155</td>
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</tbody>
</table>

* DN 1/2": flanges with tapped bore
** without actuator *** not to ANSI/ISA

Pressure/temperature range

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Vacuum (mbar)</th>
<th>Gauge pressure (bar)</th>
<th>Gauge pressure (psig)</th>
<th>Temperature (°F)</th>
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<tbody>
<tr>
<td>-75</td>
<td>210</td>
<td>0.36</td>
<td>3.0</td>
<td>95</td>
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<tr>
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<td>20</td>
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<td>1.5</td>
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<td>0.01</td>
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<td>2.5</td>
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<td>3</td>
<td>150</td>
<td>0.001</td>
<td>0.3</td>
<td>3</td>
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<tr>
<td>4</td>
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<td>0.3</td>
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<td>235</td>
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<td>6</td>
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<td>0.3</td>
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</table>

* depending on shut-off force
** Component not shown
*** option. with safety stuffing box

Dimensions and weights

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<td>480</td>
<td>155</td>
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</table>

* formerly DIN 3202/F1, 2532/33
** without actuator

** Face-to-face lengths ANSI/ISA 75.08.01 Cl. 150+300, flanges ASME B16.5 Cl. 150+300 RF

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<tr>
<th>DN (inch)</th>
<th>H (mm)</th>
<th>Cl. 150 (mm)</th>
<th>Cl. 300 (mm)</th>
<th>Weight** approx.kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2**</td>
<td>130</td>
<td>130***</td>
<td>-</td>
<td>6</td>
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<tr>
<td>1/4**</td>
<td>130</td>
<td>130***</td>
<td>-</td>
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<td>1&quot;</td>
<td>185</td>
<td>184</td>
<td>197</td>
<td>12</td>
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<tr>
<td>1 1/2&quot;</td>
<td>225</td>
<td>222</td>
<td>235</td>
<td>17</td>
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<tr>
<td>3&quot;</td>
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<tr>
<td>6&quot;</td>
<td>512</td>
<td>480***</td>
<td>-</td>
<td>155</td>
</tr>
</tbody>
</table>

* DN 1/2": flanges with tapped bore
** without actuator *** not to ANSI/ISA
### Flow rates \( k_{v100} \) (m³/h), Cv (US gpm)

| DN/ISO ANSI | \( k_{v100} \)/Cv | 145 (5.7) | 145 (5.7) | 120 (4.7) | 96 (3.8) | 80 (3.1) | 65 (2.6) | 50 (2) | 40 (1.6) | 30 (1.2) | 25 (1) | 20 (0.8) | 15 (0.6) | 8  | 5 (0.3) | 15+20 (1/2" + 3/4") Seat Ø 8 mm (0.31") | DN 25 (1") Seat Ø 14 mm (0.55") |
|-------------|-----------------|-----------|-----------|-----------|---------|---------|---------|-------|---------|----------|-------|---------|--------|---|--------|----------------|----------------|---|
| 15+20       | \( \frac{k_{v100}}{Cv} \) | 0.80     | 0.80     | 0.50     | 0.50   | 0.20   | 0.20   | 0.10   | 0.10   | 0.05   | 0.05  | 0.02   | 0.02  | 0.01 |
| 25          | 1               | 2.33   | 2.33   | 1.20     | 1.20  | 0.50   | 0.50   | 0.20   | 0.20   | 0.10   | 0.10  | 0.05   | 0.05  | 0.01 |
| 40          | \( \frac{1}{2} \) | 32.6   | 15      | 12.8     | 12.8  | 4      | 4      | 2.6    | 2.6    | 1.5    | 1.5   | 0.65   | 0.65  | 0.47 |
| 50+65       | 2               | 48.9   | 48.9   | 28       | 28    | 15     | 15     | 12.8   | 12.8   | 7      | 7     | 4      | 4     | 2.33 |
| 80          | 3               | 95.7   | 95.7   | 42       | 42    | 28     | 28     | 15     | 15     | 11.2   | 11.2  | 4.7    | 4.7   | 2.33 |
| 100         | 4               | 180*   | 180*   | 65       | 65    | 45     | 45     | 28     | 28     | 15     | 15    | 1.20   | 1.20  | 0.80 |
| 150         | 5               | 240    | 240    | 95.7     | 95.7  | 65     | 65     | 42     | 42     | 28     | 28    | 4.7    | 4.7   | 2.33 |

* If a U-plug is used, the \( k_{v100} \) (Cv) values reduce from 155 m³/h (180 US gpm) to 135 m³/h (157 US gpm) and from 100 m³/h (145 US gpm) to 90 m³/h (105 US gpm).

** - available for DN 25-100 (1"-4"). Heavy-duty PTFE bellows with PTFE/carbon support rings: max. operating pressure 16 bar/232 psi.

### Required shut-off forces (N) with seat and plug made of modified PTFE*

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<tbody>
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<td>8  (0.32)</td>
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<td>330</td>
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<tr>
<td>14+15 (0.55+0.6)</td>
<td>330</td>
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**Attention:** If \( \Delta p < p_2 \), then insert \( p_2 \) instead of \( \Delta p \) (see operating limits in pressure/ temperature diagram).

* Plugs and seats made of other materials sometimes require higher shut-off forces. Details on request.

** -  available for DN 25 (1") with 15 mm (0.55") travel. In the case of actuators with a larger travel, the required control curve is achieved by means of positioners.

- Valve opening travel requires higher forces than with standard PTFE bellows: DN 25 (1") = 900 N, DN 40/50/65 (1/2", 2", 2 1/2") = 2000 N, DN 80/100 (3", 4") = 800 N, DN 150 (6") = 2400 N

Please consider this when sizing the actuator.
Other Richter Control Valves

**Control ball valve KNR/KNAR**

Compact valve with special V-control ball for \( k_v \ 0.1-400 \ (Cv 0.12-466 \text{ US gpm}) \).
DN 15 - 200 (1/2”-8”),
face-to-face lengths and flanges to
ISO/DIN and ASME/ANSI.
See separate publication.

**Bellows-sealed shut-off and control valve HV/HVR**

The HV is preferable used where a ball or butterfly valve, for example, cannot be deployed owing to the requirement for hermetic tightness.
The body, seat and bellows can be replaced and varied independently.
Available from DN 15 to 100 (1/2 to 4”) with face-to-face and flanges acc. to
ISO/DIN and ASME.
See separate publication.