High precision, pressure independent manual control valves for low flow gas and liquid applications

> Introduction
Bronkhorst®, the European market leader in thermal Mass Flow Meters/Controllers and Electronic Pressure Controllers, has many years of experience in designing and manufacturing precise and reliable measurement and control devices. With a wide range of instruments, Bronkhorst offers innovative solutions for many different applications in many different markets.

> FLOW-CONTROL series
The new FLOW-CONTROL manual control valves are designed for extremely precise control of a constant flow rate in low flow gas and liquid applications. The desired flow rate is set via the needle valve. Any upstream or discharge pressure variations are automatically compensated by a built-in membrane operated valve to ensure a steady, constant flow. Thanks to its thought-out design and construction, these instrument models do not require any electrical power source.

The manual constant-flow control series is available in 4 different models to control flow capacities in a range from 0.02 l/min up to 50 l/min (N₂-equivalent). While process connections are optional available, the in-line valve assemblies are equipped with G 1/4” BSPP female in- and outlet ports.

> Features of the FLOW-CONTROL
- Compact design
- Ruggedized aluminium housing
- No power required
- Leak-free valve
- Precise flow adjustment
- Valve pin o-ring guarantees positive shut-off without stem damage
- Self-lubricating orifice liner assures long life
- Valve knob included for easy adjustment

Mass Flow ONLINE
**Technical specifications**

**Performance**
- Pressure sensitivity: Less than 0.5-1% Rd/bar
- Rangeability: up to 1:100
- Operating pressure: 0 .. 10 bar(g) / 0 .. 150 psi(g)
- Operating temperature: 0 .. 70°C (32 .. 158°F)
- Min. delta-P: 1 bar(d) (for model FC-005: 2 bar(d))
- Max. delta-P: 7 bar(d)

**Mechanical**
- Materials (wetted parts):
  - Body: Aluminium, Viton®, Stainless Steel
  - Needle valve: FC-001: Brass, SS316, Fluorisorb®, Bruna N
  - FC-002 / FC-004 / FC-005: Brass, SS316, Bruna N
- Membrane: Fiber-reinforced Nitrile
- Connections (in/out): G 1/4” BSPP female thread (compression fittings optional)
- Weight: 0.85 kg
- Closing: Clockwise

**Safety**
- Test pressure: 21 bar(a) / 300 psi(a)
- Ingress protection: IP65

**Warranty**
All instruments and accessories are warranted for a period of 3 years from order date.

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**Capacities**

<table>
<thead>
<tr>
<th>Gas (l/min)</th>
<th>FC-001</th>
<th>FC-002</th>
<th>FC-004</th>
<th>FC-005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>0.02 .. 0.6</td>
<td>0.02 .. 7</td>
<td>0.02 .. 25</td>
<td>0.02 .. 50</td>
</tr>
<tr>
<td>N₂</td>
<td>0.02 .. 0.6</td>
<td>0.02 .. 7</td>
<td>0.02 .. 25</td>
<td>0.02 .. 50</td>
</tr>
<tr>
<td>O₂</td>
<td>0.02 .. 0.55</td>
<td>0.02 .. 6.5</td>
<td>0.02 .. 23</td>
<td>0.02 .. 47</td>
</tr>
<tr>
<td>CO</td>
<td>0.02 .. 0.6</td>
<td>0.02 .. 7</td>
<td>0.02 .. 25</td>
<td>0.02 .. 50</td>
</tr>
<tr>
<td>Ar</td>
<td>0.04 .. 0.5</td>
<td>0.04 .. 5.5</td>
<td>0.04 .. 21</td>
<td>0.04 .. 42</td>
</tr>
<tr>
<td>CO₂</td>
<td>0.02 .. 0.45</td>
<td>0.02 .. 5.5</td>
<td>0.02 .. 20</td>
<td>0.02 .. 40</td>
</tr>
<tr>
<td>CH₄</td>
<td>0.01 .. 0.8</td>
<td>0.01 .. 9</td>
<td>0.01 .. 33</td>
<td>0.01 .. 66</td>
</tr>
<tr>
<td>C₂H₆</td>
<td>0.01 .. 0.45</td>
<td>0.01 .. 5.5</td>
<td>0.01 .. 20</td>
<td>0.01 .. 40</td>
</tr>
<tr>
<td>N₂O</td>
<td>0.02 .. 0.45</td>
<td>0.02 .. 5.5</td>
<td>0.02 .. 20</td>
<td>0.02 .. 40</td>
</tr>
<tr>
<td>C₃H₈</td>
<td>0.01 .. 0.4</td>
<td>0.01 .. 4.5</td>
<td>0.01 .. 17</td>
<td>0.01 .. 34</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liquid (ml/min)</th>
<th>FC-001</th>
<th>FC-002</th>
<th>FC-004</th>
<th>FC-005</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₂O (water)</td>
<td>3 .. 20</td>
<td>4 .. 400</td>
<td>10 .. 1000</td>
<td>18 .. 1800</td>
</tr>
</tbody>
</table>

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**Optional adapter sets (inlet and outlet)**

<table>
<thead>
<tr>
<th>Metric sizes</th>
<th>Inch sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 mm OD compression type</td>
<td>1/8” OD compression type</td>
</tr>
<tr>
<td>6 mm OD compression type</td>
<td>1/4” OD compression type</td>
</tr>
<tr>
<td>12 mm OD compression type</td>
<td>1/2” OD compression type</td>
</tr>
</tbody>
</table>

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**Dimensions**

Dimensions in mm:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø81.5</td>
<td>Max.</td>
<td>123</td>
<td>771</td>
<td>15</td>
<td>375</td>
<td>26</td>
</tr>
</tbody>
</table>

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**A PERFECT COMBINATION using a FLOW-CONTROL with a MASS-VIEW meter**

MASS-VIEW® series operate on the principle of direct thermal mass flow measurement (no by-pass). An advantage of using this type of sensor is that the instrument measures direct mass flow, without the need of temperature and pressure correction. By combining the FLOW-CONTROL with a MASS-VIEW meter you will get a Mass Flow Controller with a local display (MASS-VIEW series MV-400).

Other benefits, compared to conventional VA meters are:
- higher accuracy, wider;
- rangeability (up to 1:100);
- free of parallax errors;
- an inherently safer construction, by eliminating glass components in the flow path.

MASS-VIEW® flow controllers can be supplied in full scale ranges from 0.05 up to 50 l/min (Air equivalent), with a pressure rating of 10 bar(g) or 150 psi(g). A bright graphical OLED display, clearly visible at wide angles, allows reading of actual flow (value and a bar graph), total flow and type of gas.