

## IN-FLOW F-201CI

### Industrial Style Thermal Mass Flow Controller for Gases

- High accuracy
- Fast response, excellent repeatability
- Optional Multi Fluid / Multi Range functionality
- Virtually pressure and temperature independent
- Compact, rugged design (IP65, dust and waterproof)



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### Industrial Style Gas Mass Flow Controllers for low flow rates

Bronkhorst® model F-201CI Mass Flow Controllers (MFCs) are suited for accurate measurement and control of flow ranges between 0,16...8 ml<sub>n</sub>/min and 0,5...25 l<sub>n</sub>/min with pressure rating between vacuum and 64 bar. The MFC consists of a thermal mass flow sensor, a precise control valve and a microprocessor based pc-board with signal and fieldbus conversion. As a function of a setpoint value, the flow controller swiftly adjusts the desired flow rate. The IN-FLOW model is of rugged design (IP65) for use in industrial environments or even Zone 2 hazardous areas, with optional ATEX Cat. 3 or FM Class I, Div. 2 approval.

IN-FLOW series are equipped with a digital pc-board, offering high accuracy, excellent temperature stability and fast response. The main digital pc-board contains all of the general functions needed for measurement and control. In addition to the standard RS232 output the instruments also offer analog I/O. As an option, an on-board interface can be mounted to provide CANopen®, DeviceNet™, PROFIBUS DP, PROFINET, Modbus RTU/ASCII or FLOW-BUS protocols. The IN-FLOW model features optional Multi Gas / Multi Range functionality, providing (OEM-) customers with optimal flexibility and process efficiency.

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### Technical specifications

Measurement / control system

|  |   |  |  |  |
|--|---|--|--|--|
| Flow range (intermediate ranges available)               | min. 0,16...8 ml <sub>n</sub> /min<br>max. 0,5...25 l <sub>n</sub> /min<br>(based on N <sub>2</sub> )   |  |  |  |
| Accuracy (incl. linearity) (based on actual calibration) | ±0,5% Rd plus ±0,1% FS  |  |  |  |
| Repeatability  | < 0,2 % RD  |  |  |  |
| Turndown ratio   | up to 1:187,5 (1:50 in analog mode)   |  |  |  |
| Multi fluid capability                                   | storage of max. 8 calibration curves<br>optional Multi Gas / Multi Range functionality up to 10 bar abs |  |  |  |
| Settling time (in control, typical)                      | standard: 1...2 seconds<br>option: down to 500 msec   |  |  |  |
| Control stability  | < ± 0,1 % FS  |  |  |  |
| Operating temperature                                    | -10 ... +70 °C<br>for ATEX cat. 3 and FM Class 1 Div 2 : 0...50°C                                       |  |  |  |
| Temperature sensitivity                                  | zero: < 0,05% FS/°C; span: < 0,05% Rd/°C  |  |  |  |
| Pressure sensitivity                                     | 0,1% Rd/bar typical N <sub>2</sub> ; 0,01% Rd/bar typical H <sub>2</sub>                                |  |  |  |
| Max. Kv-value  | 6,6 x 10 <sup>-2</sup>  |  |  |  |
| Leak integrity, outboard                                 | tested < 2 x 10 <sup>-9</sup> mbar l/s He   |  |  |  |
| Attitude sensitivity                                     | max. error at 90° off horizontal 0,2% at 1 bar, typical N <sub>2</sub>                                  |  |  |  |
| Warm-up time   | 30 min. for optimum accuracy<br>2 min for accuracy ± 2% FS  |  |  |  |

Mechanical parts

|                         |   |  |  |  |
|-------------------------|---|--|--|--|
| Material (wetted parts) | stainless steel 316L or comparable  |  |  |  |
| Pressure rating (PN)    | 64 bar abs  |  |  |  |
| Process connections     | compression type or face seal couplings   |  |  |  |
| Seals                   | standard: Viton®;<br>options: EPDM, Kalrez® (FFKM), FDA and USP Class VI approved compounds |  |  |  |
| Weight                  | 1,4 kg  |  |  |  |
| Ingress protection      | IP65  |  |  |  |

Electrical properties

|                        |  |                |                |                    |
|------------------------|--|----------------|----------------|--------------------|
| Power supply           | +15 ... 24 Vdc   |                |                |                    |
| Max. power consumption | Supply   | at voltage I/O | at current I/O | extra for fieldbus |
|                        | 15 V   | 290 mA         | 320 mA         | <75 mA             |
|                        | 24 V   | 200 mA         | 215 mA         | <50 mA             |
| Analog output          | 0...5 (10) Vdc or 0 (4)...20 mA (sourcing output)  |                |                |                    |
| Digital communication  | standard: RS232;<br>options: CANopen®, DeviceNet™, PROFIBUS DP, PROFINET, Modbus RTU/ASCII or FLOW-BUS |                |                |                    |

**Electrical connection**

|                           |   |
|---------------------------|---|
| Analog/RS232              | 8 DIN (male);   |
| PROFIBUS DP               | bus: 5-pin M12 (female);<br>power: 8 DIN (male);  |
| CANopen® / DeviceNet™     | 5-pin M12 (male);   |
| FLOW-BUS/Modbus-RTU/ASCII | 5-pin M12 (male)  |
| PROFINET                  | bus: 2 x 5-pin M12 (female) (in/out);<br>power: 8 DIN (male);                                       |
| IEC 61010-1               | IEC-61010-1:2010 including national deviations for UL (61010-1:2012) and CSA (C22.2 No. 61010-1-12) |

Technical specifications subject to change without notice.

For dimensional drawings and hook-up diagrams please visit the [product page](#) on our [website](#)

## Recommended accessories



### E-8000 SERIES

#### Digital Readout / Control Systems

Bright, wide angle, 1.8" display (TFT technology)  
User friendly operation, menu driven with 4 push buttons



### BRIGHT SERIES

#### Compact Local R/C Module

Bright, wide angle, 1.8" display  
User friendly operation  
Indication/operation/configuration



### PIPS SERIES

#### Plug-in Power Supply

For lab-style or industrial devices  
Interchangeable plugs (Euro, UK, USA, Australian, IEC) for mains connection



### IN-LINE FILTER SERIE M-411 RS

1/4" female in / male out  
100 bar  
Average porosity 0.5...15  $\mu\text{m}$

## Related products



**IN-FLOW F-200CI**

Min. flow 0,014...0,7 mln/min  
Max. flow 0,18...9 mln/min  
Pressure rating 64 bar  
Compact IP65 design  
High accuracy and repeatability



**IN-FLOW F-201AI**

Min. flow 0,4...20 lln/min  
Max. flow 0,6...100 lln/min  
Pressure rating 64 bar  
Compact IP65 design  
High accuracy and repeatability



**IN-FLOW F-111BI**

Min. flow 0,16...8 mln/min  
Max. flow 0,16...25 lln/min  
Pressure rating 100 bar  
Compact IP65 design  
High accuracy



**BRONKHORST USA INC.**

57 South Commerce Way

Suite 120

USA - Bethlehem, PA 18017

Tel. [+1-610-866-6750](tel:+1-610-866-6750)

[sales@bronkhorstusa.com](mailto:sales@bronkhorstusa.com)