

DATASHEET D-6311-AND-D-6411

MASS-STREAM D-6311 & D-6411 MFC

Direct Thermal Mass Flow Controller for Gases, IP65 protected



Compact IP65 Mass Flow Controllers for low flow rates of gases

Bronkhorst® models D-6311 and D-6411 Mass Flow Controllers (MFCs) are suited for precise measurement of flow ranges between 10...200 ml_n/min and 0,1...2 l_n/min at operating pressures between vacuum and 10 bar (Aluminium) or 20 bar (Stainless Steel). The MFC consists of a proven inline thermal (CTA) 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 instrument is IP65 compliant and can optionally be equipped with a modern, multi-functional and multi-colour display, with operator buttons on the instrument.

The digital MASS-STREAM™ series is characterized by a high degree of signal integrity and, as an option, up to 8 calibration curves of different gases and process conditions can be memorized in the instrument. 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™, EtherCAT®, PROFIBUS DP, PROFINET, Modbus RTU, ASCII or TCP/IP, EtherNet/IP, POWERLINK or FLOW-BUS protocols.

Technical specifications

Measurement / control system

| | |
|--|--|
| Flow range (intermediate ranges available) | min. 10...200 ml _n /min max. 0,1...2 l _n /min (based on N ₂) |
| Accuracy (incl. linearity) (based on actual calibration) | ± 1,0 % RD plus ± 0.5% FS (at calibration conditions) |
| Repeatability | < 0,2 % FS |
| Turndown ratio | 1:20 |
| Type of gases | almost all gases, compatible with chosen materials |
| Response time (sensor) | approx. 0,3 sec. |
| Settling time (in control, typical) | < 2 sec. |
| Control stability | < 0,2 % FS typical |
| Operating temperature | 0 ... 50 °C |
| Storage / Transport conditions | -20 ... +80 °C, max. 95% RH (non-condensing) |
| Temperature sensitivity | D-63xx : ±0,2% Rd/°C (Air) D-64xx : ±0,1% Rd/°C (Air) |
| Pressure sensitivity | ± 0,3% Rd/bar typical (Air) |
| Max. Kv-value | 6,6 x 10 ⁻² |
| Leak integrity, outboard | tested < 2 x 10 ⁻⁸ mbar l/s He |

Measurement / control system

| | |
|----------------------|---|
| Attitude sensitivity | at 90° deviation from horizontal max. error 0,2 % at 1 bar typical N ₂ |
| Warm-up time | 30 min. for optimum accuracy, within 30 seconds for accuracy ±4% FS |

Mechanical parts

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|----------------------|---|
| Sensor | Stainless steel SS 316 (AISI 316L) |
| Instrument body | D-63xx : Aluminium AL 50ST/51ST (anodised) or stainless steel SS 316 / D-64xx : Aluminium EN AW-6082-T6 (non-anodised) or stainless steel SS 316 |
| Sieves and rings | Stainless steel SS 316 |
| Pressure rating (PN) | 10 bar g for instrument body in aluminium, 20 bar g for instrument body in stainless steel SS 316 |
| Process connections | G1/4" (D-63xx : RP-type cavity / D-64xx : ISO1179-1 cavity) / compression type or face seal (VCR/VCO) couplings |
| Seals | standard: FKM/Viton®; options: EPDM, FFKM/Kalrez®, FDA and USP Class VI approved compounds |
| Weight | Aluminium: 1,1 kg Stainless steel: 1,6 kg |
| Ingress protection | IP65 |

Electrical properties

| | | | | |
|------------------------|--|-------------|-------------------|------------------|
| Power supply | +15 ... 24 Vdc ±10% | | | |
| Max. power consumption | Supply | Basic model | Add. for fieldbus | Add. for display |
| | 15 V | 300 mA | 80 mA | 30 mA |
| | 24 V | 200 mA | 50 mA | 20 mA |
| Analog output | 0...5 (10) Vdc or 0 (4)...20 mA (sourcing output) | | | |
| Digital communication | standard: RS232 options: CANopen®, DeviceNet™, EtherCAT®, PROFIBUS DP, PROFINET, Modbus RTU, ASCII or TCP/IP, EtherNet/IP, POWERLINK or FLOW-BUS | | | |

Electrical connection

| | |
|---|---|
| Analog/RS232 | 8 DIN (male); |
| PROFIBUS DP | bus: 5-pin M12 (female); power: 8 DIN (male) |
| CANopen® / DeviceNet™ | 5-pin M12 (male) |
| Modbus RTU / FLOW-BUS | 5-pin M12 (male) |
| Modbus TCP / EtherNet/IP / POWERLINK | bus: 2 x 5-pin M12 (female) (in/out); power: 8 DIN (male); |
| EtherCAT® / PROFINET | bus: 2 x 5-pin M12 (female) (in/out); power: 8 DIN (male) |

Control valve options

External actuator options to be connected to the controller

Ex-proof specifications

Approvals / certificates

Technical specifications subject to change without notice.

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

Recommended accessories



PIPS SERIES

Plug-in Power Supply

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

Related products



**MASS-STREAM D-6310 &
D-6410 MFM**

Min. flow 0,01...0,2
ln/min
Max. flow 0,1...2 ln/min
Pressure rating up to 20
bar
Rugged sensor and
housing (IP65)
Optional integrated TFT
display



**MASS-STREAM D-6321 &
D-6421 MFC**

Min. flow 0,05...1 ln/min
Max. flow 0,35...7 ln/min
Pressure rating up to 20
bar
Rugged sensor and
housing (IP65)
Optional integrated TFT
display