DATASHEET F-110CI

IN-FLOW F-110CI

Industrial Style Thermal Mass Flow Meter for Gases

Industrial Style Gas Mass Flow Meters for lowest flow rates

Bronkhorst® model F-110CI Mass Flow Meters (MFMs) are suited for precise measurement of flow ranges between 0,014…0,7 ml_n/min and 0,6…9 ml_n/min with pressure rating between vacuum and 100 bar. The MFM consists of a thermal mass flow sensor and a microprocessor based pc-board with signal and fieldbus conversion and a PID controller for optional mass flow control by means of a separately mounted control valve. 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™, EtherCAT®, PROFIBUS DP, PROFINET, Modbus RTU, ASCII or TCP/IP, EtherNet/IP, POWERLINK or FLOW-BUS protocols. The IN-FLOW model features optional Multi Gas / Multi Range functionality, providing (OEM-) customers with optimal flexibility and process efficiency.

Technical specifications

Measurement / control system

Flow range (intermediate ranges available)	min. 0,014…0,7 ml_n/min max. 0,06…9 ml_n/min (based on N_2)
Accuracy (incl. linearity) (based on actual calibration)	±0,8% Rd plus ±0,2% FS for F-110CI-005; ±2% FS for F-110CI-002
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; optional Multi Gas / Multi Range functionality up to 10 bar abs
Response time (sensor)	FS < 3 ml_n/min: 2 sec; FS > 3 ml_n/min: 1…2 sec
Operating temperature	-10 … +70 °C 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_2; 0,01% Rd/bar typical H_2
Leak integrity, outboard	tested < 2 x 10^{-9} mbar l/s He
Attitude sensitivity	max. error at 90° off horizontal 0,2% FS at 1 bar, typical N_2
Warm-up time	30 min. for optimum accuracy 2 min for accuracy ± 2% FS

Mechanical parts

Material (wetted parts)	stainless steel 316L or comparable
Pressure rating (PN)	100 bar abs
Process connections	compression type or face seal couplings
Seals	standard: FKM/Viton®; options: EPDM, FFKM/Kalrez®, FDA and USP Class VI approved compounds
Weight	0,8 kg
Ingress protection	IP65

Electrical properties

Power supply	+15 … 24 Vdc			
Max. power consumption meter	Supply 15 V 24 V	at voltage I/O 95 mA 65 mA	at current I/O 125 mA 85 mA	extra for fieldbus <75 mA <50 mA
Max. Power consumption controller	Supply 15 V 24 V	at voltage I/O 290 mA 200 mA	at current I/O 320 mA 215 mA	extra for fieldbus <75 mA <50 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);
FLOW-BUS/Modbus-RTU/ASCII	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)
IEC 61010-1	IEC-61010-1:2010 including national deviations for UL (61010-1:2012) and CSA (C22.2 No. 61010-1-12)

Control valve options

External actuator options to be connected to the controller

Certification for hazardous areas

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

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

ULTRA LOW FLOW SERIE M-410

- 1/8" female in / male out
- 100 bar
- Average porosity 0.5...15 µm

Related products

IN-FLOW F-111BI

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

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-210CI

- Min. flow 0,014…0,7 mln/min
  Max. flow 0,18…9 mln/min
- Pressure rating 100 bar
- Compact IP65 design
- High accuracy and repeatability

Bronkhorst®

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Bronkhorst High-Tech designs and manufactures innovative instruments and subsystems for low-flow measurement and control for use in laboratories, machinery and industry. Driven by a strong sense of sustainability and with many years of experience, we offer an extensive range of (mass) flow meters and controllers for gases and liquids, based on thermal, Coriolis and ultrasonic measuring principles. Our global sales and service network provides local support in more than 40 countries. Discover Bronkhorst®!