

F-231MI

IN-FLOW F-231MI

Industrial Style High-Pressure Mass Flow Controller for Gases

- High accuracy, excellent repeatability
- Fast response
- Operating pressure / delta-P up to 400 bar
- Compact, rugged design (IP65, dust and waterproof)
- Virtually pressure and temperature independent



Industrial Style Gas Mass Flow Controllers for High Pressure / High Delta-P

Bronkhorst® model F-231MI Mass Flow Controllers (MFCs) are suited for accurate measurement and control of flow ranges between 10...500 ml_n/min and 0,2...10 l_n/min with an operating pressure up to 400 bar and max. 400 bar pressure difference (ΔP). 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 or FLOW-BUS protocols.

Technical specifications

Measurement / control system

Flow range (intermediate ranges available)	min. 10...500 mln/min max. 0,2...10 ln/min
Accuracy (incl. linearity) (based on actual calibration)	$\pm 0,5\%$ Rd plus $\pm 0,1\%$ FS
Repeatability	< 0,2 % RD
Turndown ratio	1:50
Multi fluid capability	storage of max. 8 calibration curves
Settling time (in control, typical)	24 sec.
Control stability	< $\pm 0,1\%$ FS
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% at 1 bar, typical N ₂
Warm-up time	30 min. for optimum accuracy 2 min for accuracy $\pm 2\%$ FS

Mechanical parts

Material (wetted parts)	stainless steel 316L or comparable
Pressure rating (PN)	400 bar abs
Max. ΔP	up to 400 bar dif.
Process connections	compression type or face seal couplings
Seals	standard: Viton®; options: EPDM, Kalrez® (FFKM)
Ingress protection	IP65

Electrical properties

Power supply	+15 24 Vdc
Max. power consumption	Supply at voltage I/O at current I/O
	15 V 290 mA 320 mA
	24 V 200 mA 215 mA
PROFIBUS DP	add 53 mA (15 V supply) or 30 mA (24 V supply)
PROFINET	add 77 mA (15 V supply) or 48 mA (24 V supply)
CANopen® / DeviceNet™	add 48 mA (24 V supply)
Analog output	0...5 (10) Vdc or 0 (4)...20 mA (sourcing output)
Digital communication	standard: RS232; options: CANopen®, DeviceNet™, PROFIBUS DP, PROFINET, Modbus 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)

Approvals / certificates

Environmental / EMC

0,1% Rd/bar typical N2; 0,01% Rd/bar typical H2

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

Related products



IN-FLOW F-230MI

Min. flow 0,2...10 mln/min
Max. flow 10...500 mln/min
Pressure / ΔP up to 400 bar
Compact IP65 design
High accuracy and repeatability



IN-FLOW F-232MI

Min. flow 0,2...10 l/min
Max. flow 2...100 l/min
Pressure / ΔP up to 400 bar
Compact IP65 design
High accuracy and repeatability



IN-FLOW F-131MI

Min. flow 0,3 ... 15 mln/min
Max. flow 0,4 ... 20 l/min
Pressure rating 400 bar
Compact IP65 design
High accuracy



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