

# F-221M

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## EL-FLOW SELECT F-221M

High-Pressure Mass Flow Controller for Gases

- High accuracy, excellent repeatability
- Fast response
- Operating pressure / delta-P up to 200 bar
- Compact design
- Virtually pressure and temperature independent



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### Gas Mass Flow Controllers for high pressure / high delta-P

Bronkhorst® model F-221M Mass Flow Controllers (MFCs) are suited for accurate measurement and control of flow ranges between 0,3...15 ml<sub>n</sub>/min and 0,4...20 l<sub>n</sub>/min at operating pressures up to 200 bar as well as max. 200 bar pressure difference ( $\Delta P$ ). 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.

EL-FLOW® Select 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 or FLOW-BUS protocols.

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### Technical specifications

## Measurement / control system

Flow range (intermediate ranges available)	min. 0,3...15 ml <sub>n</sub> /min max. 0,4...20 I <sub>n</sub> /min (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	1:50
Multi fluid capability	Storage of max. 8 calibration curves
Settling time (in control, typical)	typical 2 sec.
Control stability	< ± 0,1 % FS (typical for 1 I <sub>n</sub> /min N <sub>2</sub> )
Operating temperature	-10 ...+70 °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	1,5 x 10 <sup>-3</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 2 min. for accuracy ± 2% FS

## Mechanical parts

Material (wetted parts)	Stainless steel 316L or comparable
Pressure rating (PN)	200 bar abs
Min. ΔP	2 bar dif.
Max. ΔP	200 bar dif.
Process connections	compression type or face seal (VCR/VCO) couplings
Seals	Viton®
Weight	0,9 kg
Ingress protection	IP40

## 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; options: PROFIBUS DP, CANopen®, DeviceNet™, PROFINET, EtherCAT®, Modbus RTU, ASCII or TCP/IP, EtherNet/IP, FLOW-BUS			

## Electrical connection

Analog/RS232	9-pin D-connector (male);
PROFIBUS DP	bus: 9-pin D-connector (female); power: 9-pin D-connector (male);
CANopen® / DeviceNet™	5-pin M12-connector (male);
FLOW-BUS/Modbus-RTU/ASCII	RJ45 modular jack
Modbus TCP / EtherNet/IP	2 x RJ45 modular jack (in/out);
EtherCAT® / PROFINET	2 x RJ45 modular jack (in/out)

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-422 RS

1/4" female in / male out

200 bar

Average porosity 2...20 µm



**BRONKHORST (UK) LTD**

1 Kings Court

Willie Snaith Road

Newmarket Suffolk CB8 7TG

Tel. [+44 1223 833222](tel:+441223833222)

[sales@bronkhorst.co.uk](mailto:sales@bronkhorst.co.uk)

