

# F-102D

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## LOW- $\Delta$ P-FLOW F-102D

Mass Flow Meter for low pressure drop or corrosive gas service

- Large bore capillary (thermal bypass sensor)
- Very low pressure drop
- Less sensitivity to humidity or dirt
- Suitable of corrosive gases
- Easy to purge



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### Thermal Mass Flow Meters for low pressure drop or corrosive gas applications

Bronkhorst® model F-102D Mass Flow Meters (MFM) are suited for precise measurement of flow ranges between 0,28...14 l<sub>n</sub>/min and 0,5...25 l<sub>n</sub>/min (N<sub>2</sub>-equivalent). The instruments are particularly suited for corrosive gases or applications with very low differential pressure ( $\Delta$ P). Compared to conventional instruments, LOW- $\Delta$ P-FLOW meters have larger flow channels to minimize the risk of clogging, facilitate cleaning and purging, and cause lower pressure drop (the sensor only requires 0,5 to 5 mbar).

The integrated digital pc-board provides signal and fieldbus conversion as well as PID controller functionality for optional mass flow control by means of a (separately mounted) control valve. 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. 0,28...14 I <sub>N</sub> /min max. 0,5...25 I <sub>N</sub> /min (based on N <sub>2</sub> )
Accuracy (incl. linearity) (based on actual calibration)	± 1 % FS
Repeatability	< 0,2 % RD
Turndown ratio	1:50 (2...100%)
Max. operating pressure	10 bar g
Multi fluid capability	storage of max. 8 calibration curves
Response time (sensor)	1 ... 2 sec.
Operating temperature	-10 ... +70 °C
Mounting	horizontal
Temperature sensitivity	< 0,1% FS/°C
Pressure sensitivity	0,1% Rd/bar typical N <sub>2</sub> ; 0,01% Rd/bar typical H <sub>2</sub>
Leak integrity, outboard	tested < 2 x 10 <sup>-9</sup> mbar l/s He
Warm-up time	30 min. for optimum accuracy 2 min for accuracy ± 2% FS

## Mechanical parts

Material (wetted parts)	stainless steel 316L or comparable; other on request
Process connections	compression type or face seal (VCR/VCO) couplings
Seals	standard: Viton®; options: EPDM, Kalrez® (FFKM), FDA and USP Class VI approved compounds
Weight	0,6 kg
Ingress protection	IP40

## Electrical properties

Power supply	+15 ... 24 Vdc			
Max. power consumption meter	Supply	at voltage I/O	at current I/O	extra for fieldbus
	15 V	95 mA	125 mA	<75 mA
	24 V	65 mA	85 mA	<50 mA
Max. Power consumption controller	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

## Related products



**LOW-ΔP-FLOW F-101E**

Min. flow 0,028...1,4 l/min  
Max. flow 0,24...12 l/min  
Pressure rating up to 10 bar  
Very low pressure drop  
Suitable for corrosive gases



**LOW-ΔP-FLOW F-102E**

Min. flow 0,17...8,5 l/min  
Max. flow 1...50 l/min  
Pressure rating up to 10 bar  
Very low pressure drop  
Suitable for corrosive gases



**LOW-ΔP-FLOW F-102DI**

Min. flow 0,28...14 l/min  
Max. flow 0,5...25 l/min  
Pressure rating up to 10 bar  
Low ΔP, easy to purge  
Compact IP65 design



**LOW-ΔP-FLOW F-202DV**

Min. flow 0,28...14 l/min  
Max. flow 0,5...25 l/min  
Pressure rating up to 10 bar  
Low ΔP, easy to purge  
Compact design



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