

# DATASHEET F-102D

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

Mass Flow Meter for low pressure drop or corrosive gas service



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

Bronkhorst® model F-102D Mass Flow Meters (MFMs) are suited for precise measurement of flow ranges between 0,28...14 I<sub>n</sub>/min and 0,5...25 I<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, POWERLINK or FLOW-BUS protocols.

### 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: FKM/Viton®; options: EPDM, FFKM/Kalrez®, 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, POWERLINK, 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 / POWERLINK	2 x RJ45 modular jack (in/out);
EtherCAT® / PROFINET	2 x RJ45 modular jack (in/out);

### 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 MEDIUM FLOW SERIE M-422

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  
In/min  
Max. flow 0,24...12  
In/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  
In/min  
Max. flow 1...50 In/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  
In/min  
Max. flow 0,5...25 In/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  
In/min  
Max. flow 0,5...25 In/min  
Pressure rating up to 10  
bar  
Low ΔP, easy to purge  
Compact design