# DATASHEET F-202EI

# I OW-AP-FI OW F-202FI

Mass Flow Controller for low pressure drop or corrosive gas service, industrial style



## Thermal Mass Flow Controllers for low pressure drop or corrosive gas applications, industrial style

Bronkhorst $^{\circ}$  model F-202El Mass Flow Controllers (MFCs) are suited for precise measurement of flow ranges between 0,17...8,5  $I_n$ /min and 1...50  $I_n$ /min ( $N_2$ -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 MFCs 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). This 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.

The integrated digital pc-board provides signal and fieldbus conversion as well as PID controller functionality for mass flow control by means of the integrated 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. 0,178,5 $I_{\rm n}$ /min max. 150 $I_{\rm n}$ /min (based on $N_{\rm 2}$ )		
Accuracy (incl. linearity) (based on actual calibration)	± 1 % FS		
Repeatability	< 0,2 % RD		
Turndown ratio	1:50 (2100%)		
Max. operating pressure	10 bar g		
Multi fluid capability	Storage of max. 8 calibration curves		
Settling time (in control, typical)	2 3 sec.		
Control stability	< ± 0,1 % FS (typical)		
Operating temperature	-10 +70 °C for ATEX cat. 3 and FM Class 1 Div 2 : 050°C		
Mounting	horizontal		
Temperature sensitivity	< 0,1% FS/°C		
Pressure sensitivity	0,1% Rd/bar typical $N_2$		
Max. Kv-value	6,6 x 10 <sup>-2</sup>		
Leak integrity, outboard	tested $< 2 \times 10^{-9}$ mbar l/s He		

## Measurement / control system

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	1,5 kg/m³	
Ingress protection	IP65	

# **Electrical properties**

Power supply	+15 24 V	+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	05 (10) V	05 (10) Vdc or 0 (4)20 mA (sourcing output)					
Digital communication	options: CA	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

**Ex-proof specifications** 

Approvals / certificates

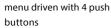
## **Recommended accessories**



#### E-8000 SERIES

#### Digital Readout / Control Systems

Bright, wide angle, 1.8" display (TFT technology) User friendly operation,





#### **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

# **Related products**



### LOW-ΔP-FLOW F-202DI

Min. flow 0,28...14 In/min Max. flow 0,5...25 In/min Pressure rating up to 10 bar Low  $\Delta P$ , easy to purge

Compact IP65 design



## LOW-ΔP-FLOW F-202EV

Min. flow 0,17...8,5 In/min Max. flow 1...50 In/min Pressure rating up to 10 bar Low ΔP, easy to purge

Compact design



### LOW-ΔP-FLOW F-102EI

Min. flow 0,17...8,5 In/min Max. flow 1...50 In/min Pressure rating up to 10 bar Low  $\Delta P$ , easy to purge Compact IP65 design



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