

# DATASHEET F-201CS

## EL-FLOW SELECT F-201CS

Thermal Mass Flow Controller with Integrated Shut-Off Valve



### Gas Mass Flow Controllers with Electrical Shut-Off Valves

Bronkhorst® model F-201CS Mass Flow Controllers (MFCs) are suited for accurate measurement and control of flow ranges between 0,2...10 ml<sub>n</sub>/min and 0,8...15 l<sub>n</sub>/min at operating pressures between vacuum and 10 bar abs. 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. For extra efficiency or safety, the F-201CS features an integrated, electrically operated shut-off valve.

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, POWERLINK or FLOW-BUS protocols.

### Technical specifications

#### Measurement / control system

Flow range (intermediate ranges available)	min. 0,2...10 ml <sub>n</sub> /min max. 0,8...15 l <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	up to 1:187,5 (1:50 in analog mode)
Multi fluid capability	Storage of max. 8 calibration curves
Settling time (in control, typical)	standard: 1...2 seconds option: down to 500 msec
Control stability	< ± 0,1 % FS (typical for 1 l <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	6,5 x 10 <sup>-2</sup>
Leak integrity, outboard	tested < 2 x 10 <sup>-9</sup> mbar l/s He

Measurement / control system

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)	10 bar abs
Max. ΔP	3 bar dif.
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	1,1 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
Shut-off valve (N/C)	+24 Vdc 3 W; using a shut-off control adapter reduces the power consumption			
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

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, 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-411 RS**

1/4" female in / male out

100 bar

Average porosity 0.5...15  $\mu\text{m}$



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