

# DATASHEET F-230MX

## EX-FLOW F-230MX

High-Pressure Mass Flow Controller for Gases, Ex-Protected style



### Intrinsically Safe Gas Mass Flow Controllers for High Pressure / High Delta-P

Bronkhorst® EX-FLOW Mass Flow Controllers (MFCs) are suited for precise gas flow control in ATEX Zone 1 hazardous areas. The flow meter part and the control valve of the MFC should be connected (via separate cables) to a power supply with galvanic isolation / preamplifier / readout system (located in the safe zone) which contains a controller board to complete the control loop. See Bronkhorst® [E-8000 Series](#).

EX-FLOW model F-230MX covers flow ranges from 0,2...10 ml<sub>N</sub>/min up to 10...500 ml<sub>N</sub>/min (N<sub>2</sub>-equivalent) at operating pressures up to 350 bar and max. 350 bar pressure difference (ΔP).

The intrinsically safe measuring head of the flow meter is tested according to ATEX 114 Directive 2014/34/EU and approved under EC-Type Examination Number: KEMA 01ATEX1172, protection II 2 G Ex ib IIC T4 Gb.

The intrinsically safe valve coils are explosion proof certified and available in two options (ATEX certification only):

Coil XB: protection II 1 G Ex ia IIC T6 / protection II 1 D Ex ta IIIC T80°C

Coil XC: protection II 2 G Ex eb IIC T4 / protection II 2 D Ex tb IIIC T130°C

### Technical specifications

#### Measurement / control system

|  |  |
|--|--|
| Flow range (intermediate ranges available)               | min. 0,2...10 ml <sub>N</sub> /min<br>max. 10...500 ml <sub>N</sub> /min<br>(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%)  |
| Time constant  | 5 sec.   |
| Control stability  | ≤ ± 0,1 % FS typical   |
| Operating temperature                                    | -10 ... +65 °C   |
| Temperature sensitivity                                  | zero: < 0,05% FS/°C; span: < 0,05% Rd/°C   |
| Leak integrity, outboard                                 | tested < 2 x 10 <sup>-9</sup> mbar l/s He  |
| Attitude sensitivity                                     | max. error at 90° off horizontal 0,2% FS at 1 bar, typical N <sub>2</sub>                              |
| Warm-up time   | 30 min. for optimum accuracy<br>2 min. for accuracy ± 2% FS  |

#### Mechanical parts

|                         |  |
|-------------------------|--|
| Material (wetted parts) | Stainless steel 316L or comparable                   |
| Pressure rating (PN)    | 350 bar abs  |
| Min. $\Delta P$         | 6 bar dif.   |
| Max. $\Delta P$         | up to 350 bar dif.                                   |
| Process connections     | compression type or face seal (VCR/VCO) couplings    |
| Seals                   | standard: FKM/Viton®;<br>options: EPDM, FFKM/Kalrez® |
| Ingress protection      | IP65   |

### Electrical properties

|  |   |
|--|---|
| Output signal  | 15 ... 20 mA (linear)<br>Terminal connection, cable gland M16x1,5   |
| I/O signals via PS/Readout<br>(located in safe area) | analog: 0...5 Vdc, 0...10 Vdc, 0...20 mA, 4...20 mA;<br>digital: RS232, PROFIBUS DP, DeviceNet™, Modbus RTU or ASCII, PROFINET, EtherCAT®, FLOW-BUS |
| XB-coil  | Coil voltage max. 28 V/110 mA;<br>295 Ohm at 20°C   |
| XC-coil  | Coil voltage max. 24 V;<br>65 Ohm at 20°C, Pmax = 9 W at 20°C   |

### Electrical connection

|                         |  |
|-------------------------|--|
| Ex-proof measuring head | Terminal connection, cable gland M16x1,5 |
| Control valve coil      | cable gland M20x1,5                      |

### Control valve options

### External actuator options to be connected to the controller

### Ex-proof specifications

### 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

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## Related products



**EX-FLOW F-130MX**

Lowest flow rates, from 0,15...7,5 mIn/min up to 0,2...10 mIn/min

Pressure rating 400 bar

ATEX approval Cat.2, Zone 1

Rugged IP65 construction



**EX-FLOW F-131MX**

Flow ranges from 0,3...15 mIn/min up to 0,4...20 lIn/min

Pressure rating 400 bar

ATEX approval Cat.2, Zone 1

Rugged IP65 construction



**EX-FLOW F-231MX**

Min. flow 0,01...0,5 lIn/min

Max. flow 0,2...10 lIn/min

Pressure /  $\Delta P$  up to 350 bar

ATEX approval Cat.2, Zone 1

Rugged IP65 construction