

DATASHEET F-231MX

EX-FLOW F-231MX

High-Pressure Mass Flow Controller for Gases, Ex-proof 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-231MX covers flow ranges from 10...500 ml_n/min up to 0,2...10 l_n/min (N₂-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. 10...500 ml _n /min max. 0,2...10 l _n /min (based on N ₂) |
| 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 ⁻⁹ mbar l/s He |
| Attitude sensitivity | max. error at 90° off horizontal 0,2% FS at 1 bar, typical N ₂ |
| 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) | 350 bar abs |
| Min. ΔP | 6 bar dif. |
| Max. ΔP | up to 350 bar dif. |
| Process connections | compression type or face seal (VCR/VCO) couplings |
| Seals | standard: FKM/Viton®; options: EPDM, FFKM/Kalrez® |
| Ingress protection | IP65 |

Electrical properties

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

Related products



EX-FLOW F-131MX

Flow ranges from 0,3...15 mln/min up to 0,4...20 lln/min
Pressure rating 400 bar
ATEX approval Cat.2, Zone 1
Rugged IP65 construction



EX-FLOW F-230MX

Min. flow 0,2...10 mln/min
Max. flow 10...500 mln/min
Pressure / ΔP up to 350 bar
ATEX approval Cat.2, Zone 1
Rugged IP65 construction



EX-FLOW F-232MX

Min. flow 0,2...10 lln/min
Max. flow 2...100 lln/min
Pressure / ΔP up to 400 bar
ATEX approval Cat.2, Zone 1
Rugged IP65 construction