

# F-230MX

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## EX-FLOW F-230MX

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

- ATEX approval Cat.2, Zone 1
  - High accuracy, excellent repeatability
  - Virtually pressure and temperature independent
  - Operating pressure / delta-P up to 400 bar
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### 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 400 bar and max. 400 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

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## Technical specifications

### Measurement / Control system

Flow range, based on N <sub>2</sub> (intermediate ranges available)	min. 0,2...10 ml <sub>n</sub> /min max. 10...500 ml <sub>n</sub> /min
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Accuracy (incl. linearity) (based on actual calibration)	±1% FS
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Turndown	1:50 (2...100%)
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Repeatability	< 0,2% Rd
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Time constant	5 seconds
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Control stability	≤ ±0,1% FS typical
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Operating temperature	-10...+65°C
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Temperature sensitivity	zero: < 0,05% FS/°C; span: < 0,05% Rd/°C
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Leak integrity, outboard	tested < 2 x 10 <sup>-9</sup> mbar l/s He
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Attitude sensitivity	max. error at 90° off horizontal 0,2% FS at 1 bar, typical N <sub>2</sub>
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Warm-up time	30 min. for optimum accuracy 2 min for accuracy ± 2% FS
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## Mechanical parts

Material (wetted parts)	stainless steel 316L or comparable
Pressure rating	400 bar abs
Min. $\Delta P$	6 bar dif.
Max. $\Delta P$	up to 400 bar dif.
Process connections	compression type or face seal couplings
Seals	standard: Viton <sup>®</sup> ; options: EPDM, Kalrez <sup>®</sup> (FFKM)
Ingress protection (housing)	IP65

## Electrical properties

Signal circuit	type of explosion protection: intrinsic safety Ex ib IIC, only for connection to a certified intrinsically safe circuit with the following maximum values: U <sub>i</sub> = 28 V, I <sub>i</sub> = 98 mA, P <sub>i</sub> = 686 mW The effective internal capacitance between: Terminals 1 and 3: C <sub>i</sub> = 1 nF; Effective internal inductance: L <sub>i</sub> = 0,3 mH
Output signal	15...20 mA (linear)
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 <sup>®</sup> , 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, P <sub>max</sub> = 9 W at 20°C

## Electrical connection

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

Technical specifications and dimensions subject to change without notice.

For dimensional drawings and hook-up diagrams please visit the [productpage](#) on our [website](#)

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## Recommended accessories



### E-8000 - 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-130MX

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

Pressure rating 400 bar

ATEX approval Cat.2, Zone 1

Rugged IP65 construction



### EX-FLOW F-131MX

Flow ranges from 0,3...15 mln/min up to 0,4...20 ln/min

Pressure rating 400 bar

ATEX approval Cat.2, Zone 1

Rugged IP65 construction



### EX-FLOW F-231MX

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

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

Pressure /  $\Delta P$  up to 400 bar

ATEX approval Cat.2, Zone 1

Rugged IP65 construction



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