

# mini CORI-FLOW™ Ex d

Coriolis Mass Flow Meters for small flow rates for Zone 1 applications



## Introduction

Bronkhorst® manufactures low-flow Coriolis Mass Flow Meters and Controllers for gases and liquids. The product range offers true mass flow in a range from 5 g/h up to 600 kg/h (Full Scale values). The mini CORI-FLOW™ Series M12-M14 are designed for capacities from 100 mg/h up to 30 kg/h. This compact mass flow instrument can be built in a flameproof (Ex d) housing for use in IECEx and ATEX Zone 1 hazardous areas. All electrical instrument connections are available on screw terminals in an increased safe (Ex e) housing connected to the flameproof housing. External actuators can be connected to the integrated flow controller.

## IECEx and ATEX approval

The mass flow meters, operating via the Coriolis principle, are now available with IECEx and ATEX approval II 2 G Ex d e IIB T6 Gb for use in hazardous areas. Hereto the instrument is built into a rugged enclosure with separated compartment for the electronics. The flow meters, suitable for both liquid and gas flow applications, cover flow rates from 0,1 g/h to 30 kg/h and can be used in systems with pipeline pressures up to 138 bar (1987 psi).



mini CORI-FLOW™ built in an Ex d housing for use in hazardous areas.

The unique design of the miniature Coriolis sensor features superior response time and high accuracy, irrespective of changing operating conditions with regard to pressure, temperature, density, conductivity and viscosity.

## Features

- > direct mass flow measurement, independent of fluid properties
- > fast and stable control
- > high accuracy, excellent repeatability
- > multi-range: easy on site re-ranging via digital interface (effective turndown 2000:1, typical XM13)
- > additional density and temperature outputs
- > bi-directional measurement
- > Communication: RS232 (optional fieldbus communication: Modbus, PROFIBUS DP, DeviceNet™, FLOW-BUS)
- > IECEx and ATEX approval II 2 G Ex d e IIB T6 Gb for use in Zone 1 hazardous areas
- > optional: display module

# Technical specifications

## Flow ranges

	Unit	XM12	XM13	XM14
Minimum full scale	[g/h]	5	50	1000
Nominal scale	[g/h]	100	1000	10000
Maximum full scale	[g/h]	200	2000	30000
Minimum flow	[g/h]	0,1	1	30
Rangeability meter		1:100	1:100	1:100
Rangeability controller		≥ 1:50	≥ 1:50	≥ 1:50

## Mechanical parts

Material (wetted parts)	Stainless steel AISI 316 or equivalent
Process connection (welded)	1/8" compression type couplings; other on request
Outer seals	Metal
Valve seat (controllers)	Kalrez®-6375, other on request
Ingress protection	IP66
Leak integrity	Outboard < 2 x 10 <sup>-9</sup> mbar l/s He
Maximum pressure	XM12: 138 bara XM13: 138 bara XM14: 107 bara
Temperature range	Ambient temperature range: 0 °C to +55 °C Process temperature range: 0 °C to 70 °C (Other temperature ranges on request)
Optional	Display module (BRIGHT™)
Dimensions	420x260x175 mm
Weight	12,5 kg

## ATEX specifications

Approvals	ATEX: II 2 G Ex d e IIB T6 Gb DEKRA 12ATEX0144X IECEX: Ex d e IIB T6 Gb IECEX DEK 12.0040
External actuator options to be connected to the controller	- C2I valve with XC coil or XB coil through barrier - Badger Meter RC200 valve with Ex d TEIP11 I/P converter - Pumps with ATEX zone 1 U/f converters
<b>Note:</b> Technical specifications in this brochure subject to change without notice.	

## Electrical properties

Electrical signals	- All instrument connections are wired to screw terminals - Valve/pump controller output
Power supply	+15...24 Vdc ±10% Max. ripple recommended: 50 mV tt
Power consumption	Meter: 3 W; Controller: max. 7 W
Analog output / command	0...5 (10) Vdc or 0 (4)...20 mA (sourcing output) On request: Ex i output 4...20 mA
Digital communication	RS232; Optional fieldbus communication: Modbus, PROFIBUS DP, DeviceNet™, FLOW-BUS

## Performance

Mass flow accuracy liquids	±0,2% of rate																																
Mass flow accuracy gases	±0,5% of rate																																
Repeatability (based on digital output)	±0,05% of rate ±1/2 [ZS x 100/flow]% (ZS = Zero Stability)																																
<b>Note:</b> optimal accuracy will be reached after approx. 30 minutes after instrument power-up.																																	
	<table border="1"> <thead> <tr> <th>Unit</th> <th>XM12</th> <th>XM13</th> <th>XM14</th> </tr> </thead> <tbody> <tr> <td>Zero stability (ZS)*</td> <td>[g/h] &lt; 0,02</td> <td>&lt; ±0,2</td> <td>&lt; ±6</td> </tr> <tr> <td>Density accuracy</td> <td>[kg/m<sup>3</sup>] &lt; ±5</td> <td>&lt; ±5</td> <td>&lt; ±5</td> </tr> <tr> <td>Temperature accuracy</td> <td>[°C] ±0,5</td> <td>±0,5</td> <td>±0,5</td> </tr> <tr> <td>Temperature effects</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Zero drift</td> <td>[g/h/°C] ±0,002</td> <td>±0,02</td> <td>±0,5</td> </tr> <tr> <td>Span drift</td> <td>[%Rd./°C] ±0,001</td> <td>±0,001</td> <td>±0,001</td> </tr> <tr> <td>Initial heating at zero flow</td> <td>[°C] ≤ 15 **</td> <td>≤ 15 **</td> <td>≤ 15 **</td> </tr> </tbody> </table>	Unit	XM12	XM13	XM14	Zero stability (ZS)*	[g/h] < 0,02	< ±0,2	< ±6	Density accuracy	[kg/m <sup>3</sup> ] < ±5	< ±5	< ±5	Temperature accuracy	[°C] ±0,5	±0,5	±0,5	Temperature effects				Zero drift	[g/h/°C] ±0,002	±0,02	±0,5	Span drift	[%Rd./°C] ±0,001	±0,001	±0,001	Initial heating at zero flow	[°C] ≤ 15 **	≤ 15 **	≤ 15 **
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* The zero stability is guaranteed at constant temperature and for unchanging process and environment conditions.																																	
** Total heating up of instrument depends on flow rate, heat capacity fluid, T <sub>amb</sub> , T fluid and cooling capacity.																																	
Mounting	In any position (attitude sensitivity negligible)***																																
Typical meter response time (t98%)	0,2 s																																
Typical settling time controller (<2% of setpoint)	1 s																																
*** External shocks or vibrations should be avoided.																																	



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