

# DATASHEET MI140

## mini CORI-FLOW™ MI140

Low Flow Coriolis Mass Flow Meter / Controller



### Low Flow Coriolis Mass Flow Meters / Controllers for Liquid and Gases

mini CORI-FLOW™ MI-series Mass Flow Meters and Controllers are precise, versatile and compact instruments, based on the [Coriolis measuring principle](#), featuring fast response and designed to cover the needs of the low flow market. Bronkhorst® model MI140 Mass Flow Meter (MFM) is suited for highly accurate measurement of gas or liquid flow ranges up to 30 kg/h (which corresponds 400 l<sub>n</sub>/min when used on nitrogen) at operating pressures up to 200 bar. The instruments are equipped with a robust IP66/IP67 weatherproof housing with screw terminal connections. The MI-series MkII are suitable for an industrial area up to pollution degree 3 with additional gas or dust (Ex) atmosphere (zone 2/22 or EPL Gc/Dc).

The instrument contains smart electronics, featuring alarm and counter functions, and a PID controller for optional mass flow control by means of a separately mounted control valve or pump. With regard to connectivity, the instruments can be equipped with a wide range of fieldbus options, beside their standard analog and RS232 I/O communication.

### Technical specifications

#### Measurement / control system

Flow rates	Liquid: 0...30 kg/h (nominal flow rate: 10 kg/h); Gas: 0...400 l <sub>n</sub> /min (N <sub>2</sub> ); Full Scale (FS) value user-configurable
Mass flow accuracy	Liquid: $\leq \pm 0,2\%$ Rd (of Reading); Gas: $\leq \pm 0,5\%$ Rd
Volume flow accuracy	Liquid: $\leq \pm 0,2\%$ Rd, at fixed density value; Gas: $\leq \pm 0,5\%$ Rd
Repeatability	Liquid mass flow: $\leq \pm 0,05\%$ Rd $\pm \frac{1}{2}$ ZS (Zero Stability); Gas mass flow: $\leq \pm 0,25\%$ Rd $\pm \frac{1}{2}$ ZS; Density: $\leq \pm 1$ kg/m <sup>3</sup> (at calibration conditions at stable flow)
Turndown ratio	up to 1:1000 (in digital mode)
Zero stability (ZS)	$< \pm 6$ g/h (Guaranteed at constant temperature and for unchanging process and environment conditions.)
Response time (sensor)	$\leq 200$ msec
Fluid temperature	-20 ... +70 °C
Ambient temperature	-20 ... +70 °C
Mounting	any position, attitude sensitivity negligible. External shocks or vibrations should be avoided.
Temperature sensitivity	$\leq 0,5$ g/h/°C
Temperature accuracy	$\pm 0,5$ °C

## Measurement / control system

Density accuracy	< ± 1 kg/m <sup>3</sup> (at calibration conditions at stable flow), up to 2500 kg/m <sup>3</sup>
Max. fluid viscosity	5000 cP
Leak integrity, outboard	tested < 2 x 10 <sup>-9</sup> mbar l/s He
Warm-up time	> 30 min for optimum accuracy

## Mechanical parts

Sensor	single tube, DN 1.14, Ra ≤0,8 μm
Material (wetted parts)	stainless steel 316L / 1.4404
Housing	stainless steel 316L / 1.4404 (body); high-grade anodised aluminium alloy (EN AW-6082-T6, AlSi1MgMn, housing and lid); FKM (sealings)
Pressure rating (PN)	200 bar abs
Process connections	compression type or face seal (VCR/VCO) couplings, or Tri-Clamp flanges (welded)
Seals	none (in fluid path)
Weight	5 kg
Ingress protection	IP66/IP67

## Electrical properties

Power supply	+15...24 Vdc +/- 10% Max. ripple recommended: 50 mV tt
Max. power consumption	meter: max. 3 W; controller: max 7 W
Analog output	0...5 (10) Vdc, min. load impedance > 2 kΩ; 0 (4)...20 mA (sourcing), regular, max. load impedance < 375 Ω; with HART, load impedance 250...600 Ω
Analog setpoint	(for MFM + pump or control valve) 0...5 (10) Vdc, min. load impedance > 100 kΩ 0 (4)...20 mA (sourcing), max. load impedance ~ 250 Ω
Digital communication	standard: RS232; options: CANopen®, DeviceNet™, EtherCAT®, PROFIBUS DP, PROFINET, Modbus RTU, ASCII or TCP/IP, EtherNet/IP, POWERLINK, FLOW-BUS or HART
Valve control signal	M12 cable gland, screw terminals <2,5 mm <sup>2</sup>
Bus termination	dipswitch integrated on pc-board
Support interface	micro USB on pc-board

## Electrical connection

Analog/RS232	M20 gland : I/O signals and Power M12 gland : Actuator output M12 gland : Bronkhorst valve out
PROFIBUS DP	M20 gland
CANopen® / DeviceNet™	M20 gland
FLOW-BUS/Modbus-RTU/ASCII	M20 gland
Modbus TCP / EtherNet/IP / POWERLINK	M20 gland

## Electrical connection

EtherCAT®/ PROFINET

M20 gland

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## Control valve options

## External actuator options to be connected to the controller

## Certification for hazardous areas

## Approvals / certificates

Hazardous areas

ATEX / IECEx / UKEx category 3, zone 2/22 hazardous areas (only for MkII)

Ex II 3G Ex ec IIC T4 Gc (gas)

Ex II 3D Ex tc IIIC T100 °C Dc (dust)

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Technical specifications subject to change without notice.

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

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## 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



**MINI CORI-FLOW™ M14**

Flow range 0...30 kg/h  
Pressure rating 200 bar  
Independent of fluid properties  
High accuracy, fast response



**MINI CORI-FLOW™ MI130**

Flow range 0...2000 g/h  
Pressure rating 200 bar  
Independent of fluid properties  
IP66/IP67 housing, terminal strip conn.



**MINI CORI-FLOW™ M15**

Flow range 0...300 kg/h  
Pressure rating 100 bar  
Independent of fluid properties  
High accuracy, fast response