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 and compact instruments, based on the Coriolis measuring principle, designed to cover the needs of the low flow market. Bronkhorst® model MI140 Mass Flow Meter (MFM) is suited for highly accurate control of liquid flow in the range of 0…30 kg/h (which corresponds with 0…400 l_n/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_n/min (N_2); Full Scale (FS) value user-configurable
Mass flow accuracy	Liquid: ≤±0,2% Rd (of Reading); Gas: ≤±0,5% Rd
Volume flow accuracy	Liquid: ≤ ±0,2% Rd, at fixed density value; Gas: ≤ ±0,5% Rd
Repeatability	Liquid mass flow: ≤ ±0,05% Rd ± ½ZS (Zero Stability); Gas mass flow: ≤ ±0,25% Rd ± ½ZS; Density: ≤ ±1 kg/m^3 (at calibration conditions at stable flow)
Turndown ratio	up to 1:1000 (in digital mode)
Zero stability (ZS)	< ± 6 g/h (Guaranteed at constant temperature and for unchanging process and environment conditions.)
Response time (sensor)	≤ 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	≤ 0,5 g/h/°C
Temperature accuracy	± 0,5 °C

Measurement / control system

Density accuracy	< ± 1 kg/m³ (at calibration conditions at stable flow), up to 2500 kg/m^3
Max. fluid viscosity	5000 cP
Leak integrity, outboard	tested < 2 x 10^{-9} 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 mm2
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

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)

Technical specifications subject to change without notice.

Control valve options

MI140+C0I: Gas flow control valve	Kv-max= 6,6 x 10^{-2}
MI140+C2I: Liquid flow control valve	Kv-max= 2,3 x 10^{-3}
MI140+C5I: Gas/Liquid flow control valve	Kv-max= 6,6 x 10^{-2}
MI140+F-004AI: Gas/Liquid flow control	Kv-max= 3,0 x 10^{-1}

Technical specifications and dimensions subject to change without notice.
Actual form, fit, function is subject to change in next release.

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

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

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Bronkhorst High-Tech designs and manufactures innovative instruments and subsystems for low-flow measurement and control for use in laboratories, machinery and industry. Driven by a strong sense of sustainability and with many years of experience, we offer an extensive range of (mass) flow meters and controllers for gases and liquids, based on thermal, Coriolis and ultrasonic measuring principles. Our global sales and service network provides local support in more than 40 countries. Discover Bronkhorst®!