

DATASHEET FF-M1X

FLEXI-FLOW Compact FF-M1x

Compact Mass Flow and Pressure Meter for Gases



Mass Flow/Pressure Meter for Low Gas Flows

FLEXI-FLOW Compact models FF-M10 and FF-M11 Compact Mass Flow / Pressure Meters are suited for accurate measurement of flow ranges between 0...500 ml_n/min and 0...20 l_n/min at operating pressures between vacuum and 17 bar(a). The instrument combines a swift and stable thermal mass flow sensor based on capillary MEMS technology with a precise and proven by-pass construction. Due to the unique **TCS Technology (Through Chip Sensor)**, accurate mass flow measurement, virtual independent of variations in temperature and line pressure is established. In combination with integrated temperature and up- and downstream pressure sensors, the embedded database for 22 gases allows accurate, on-board conversion. The **multi-parameter** instruments provide the user with useful process information:

- Model FF-M10: flow + temperature
- Model FF-M11: flow + temperature + up- and downstream pressure

Technical specifications

Measurement / control system

Flow range (intermediate ranges available)	min. 0...500 ml _n /min max. 0...20 l _n /min (based on N ₂)
Pressure ranges	FF-M10: not available / FF-M11: 0...17 bar(a)
Accuracy (incl. linearity) (based on actual calibration)	Up to ±0,5% Rd plus ±0,1% FS (N ₂ /Air/O ₂); for other gases add conversion uncertainty; see multi gas table ;
Repeatability	Flow sensor: < ±0,2% Rd; Pressure sensors: < ±0,2% FS
Turndown ratio	up to 1:1000
Max. operating pressure	16 bar g
Multi Gas/Multi Range	embedded gas data for <u>22 unique gases</u> plus any mixture of these gases
Response time (sensor)	< 30 ms (T ₆₃)
Long term stability	< 0,5% FS over period of 3 years; then < 0,2% FS per year
Operating temperature	0 ... 50 °C
Storage / Transport conditions	-20 ... +50 °C, max. 95% RH (non-condensing)
Mounting	any position, attitude sensitivity negligible
Temperature sensitivity	Flow sensor: zero 0,015% FS/°C; span 0,05% Rd/°C; Pressure sensors: zero 0,16 mbar/°C; span 0,05% Rd/°C
Temperature accuracy	± 0,2 °C (instrument body temperature)
Accuracy pressure sensors	±0,5% FS

Measurement / control system

Pressure sensitivity	standard: < 0,15% Rd/bar typical N ₂ ; with pressure correction: typical factor 5 improved
Leak integrity, outboard	tested < 2 x 10 ⁻⁹ mbar l/s He

Mechanical parts

Instrument body	Aluminium or Stainless steel (selectable)
Material (wetted parts)	aluminium, stainless steel, silicon nitride, epoxy, aluminium oxide, glass
Surface quality	< 1,6 µ Ra (<0,8 µ Ra for stainless steel body)
Pressure rating (PN)	16 bar(g) / 250 psig
Process connections	default: BSPP female thread (ISO1179-1) optional: compression type, push-in or face seal fittings
Seals	default: FKM 51415; for other materials contact factory
Weight	225 g with Aluminium body, 325 g with SS 316 body; add 50 g for Ethernet interface
Ingress protection	IP40

Electrical properties

Power supply	24 Vdc ± 10%
Max. power consumption	0,5 Watt; add 0,9 Watt for EtherNet communication
Digital communication	Modbus RTU or FLOW-BUS (selectable); Optional: PROFINET, EtherCAT, Modbus-TCP, Ethernet/IP or POWERLINK
Support interface	USB-C port for easy setup; Optional Bluetooth connection for monitoring
Electrical connection	9-pin D-sub (male)
Certification	CE / UKCA / KC

Electrical connection

Control valve options

External actuator options to be connected to the controller

Certification for hazardous areas

Approvals / certificates

Technical specifications subject to change without notice.

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

Related products



FLEXI-FLOW COMPACT FF-C1X

Flow 0...500 mln/min
up to 0...20 lln/min
Accuracy $\pm 0,5\%$ Rd +
 $\pm 0,1\%$ FS
Multi-parameter (P+T
output options)
Fast response (TCS
technology)



FLEXI-FLOW MULTI-CHANNEL SOLUTIONS

Multi-channel Mass
Flow/Pressure Control
Very compact assembly
Economical solution
Optional shut-off valves
or mixing chamber