

DATASHEET FF-C1X

FLEXI-FLOW Compact FF-C1x

Built-to-Order Mass Flow and Pressure Controller for Gases



Mass Flow / Pressure Controllers for Low Gas Flows

FLEXI-FLOW Compact Built-to-Order (BtO) Mass Flow / Pressure Controllers are suited for accurate measurement and control 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, internationally patented **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.

FLEXI-FLOW Compact Built-to-Order models feature a Mass Flow / Pressure Controllers **a turndown to 1:1000; free selection of ranges between 0,5 and 20 l_n/min** (FS, based on N₂). They are currently available in 2 variants:

- Type FF-C10: flow + temperature
- Type FF-C11: flow + temperature + up- and downstream pressure

BtO models may also be used to configure **multi-channel versions up to 8 channels**.

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-C10: not available / FF-C11: 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
Settling time (in control, typical)	< 150 ms
Long term stability	< 0,5% FS over period of 3 years; then < 0,2% FS per year
Control stability	< ± 0,1% FS (typical for 1 l _n /min N ₂)
Operating temperature	0 ... 50 °C

Measurement / control system

Storage / Transport conditions	-20 ... +80 °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
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
Leak-by through closed valve	typical < 1 x 10 ⁻⁴ 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
Max. ΔP	16 bar(d); 20 l/min models: 5 bar (d)
Process connections	default: BSPP female thread (ISO1179-1) optional: compression type, push-in or face seal fittings
Seals	FKM 51415; valve seat: FFKM with PI film; for other materials contact factory
Weight	200 g with Aluminium body, 300 g with SS 316 body; add 50 g for Ethernet interface
Ingress protection	IP40

Electrical properties

Power supply	24 Vdc ± 10%
Max. power consumption	2,5 Watt (typical, in control); 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

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-M1X

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



FLEXI-FLOW COMPACT FF-AXXX

Flow 0...5 mln/min up to 0...20 lln/min; ratio 1:500
Accuracy $\pm 0,8\%$ Rd + $\pm 0,2\%$ FS
Multi-parameter (P+T output options)
Fast response (TCS technology)



FLEXI-FLOW COMPACT FF-SXXX

Flow ranges 0...0,5 / 2 / 5 / 20 lln/min; ratio 1:50
Accuracy $\pm 1,5\%$ Rd + $\pm 0,5\%$ FS
Multi-parameter (T output option)
Fast response (TCS technology)