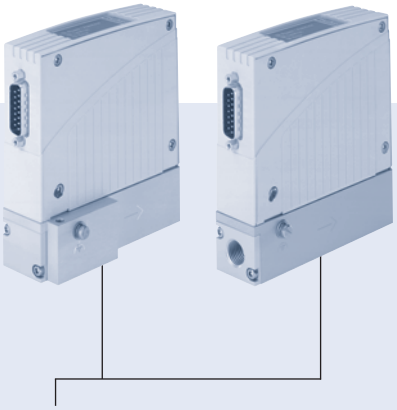
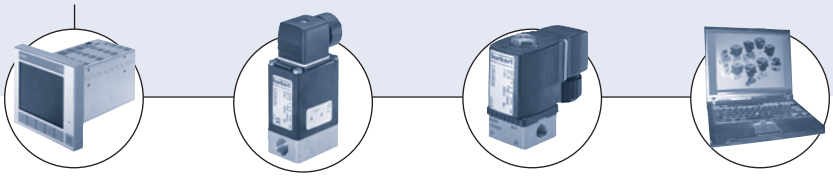
burkert
FLUID CONTROL SYSTEMS

Bypass Mass Flow Controller (MFC) for gases



- Bypass MFC with Capillary technology for nominal flow rates from 5 ml_N/min to 10 l_N/min
- Suitable for aggressive gases
- Fieldbus option

Type 8710 can be combined with...



Type 1150
Multi-channel programme controller

Type 0330
3/2 or 2/2-way valve

Type 6013
2/2-way valve

MFC
Configuration software

Type 8710 is a unit for the control of the mass flow of gases that is relevant for most applications in Process Technology. The measured value provided by the sensor (see the description on page 2) will be compared in the digital regulation electronics with the predefined set point according to the signal; if a control difference is present, the control value output to the proportional valve will be modified using a PI-control algorithm. In this way, the mass flow can be maintained at a fixed value or a predefined profile can be followed, regardless of pressure variations or other changes in the system. Type 8710 can optionally be calibrated for two different gases, the user is able to switch between these two gases.

The control element, a proportional valve working at low friction guarantees a high sensitivity and a good control characteristics of the unit. Typical application areas are gas dosing or rather the production of gas mixtures in:

- Process technology
- Environmental technology
- Surface treatment
- Material coating
- Fuel cell technology

Technical data

Full scale ranges[1] (Q_{nom})	5 to 10,000 ml_N/min N_2 equivalent
Operating media	neutral, non-contaminated gases, other gases on request
Max. operating pressure (inlet pressure)	10 bar (145 psi) depending on the orifice of the valve
Calibration medium	operating gas or air with conversion factor
Medium temperature	-10 to +70°C
Ambient temperature	-10 to +50°C
Accuracy (after 30 min. warm up time)	±1.5% of Rdg. ±0.3% F.S.
Linearity	±0.1% F.S.
Repeatability	±0.1% F.S.
Control range	1:50
Settling time ($t_{95\%}$)	<3 s
Body material	stainless steel 1.4305
Electr. housing material	Polycarbonate
Sealing material	FKM, EPDM, FFKM
Port connections	NPT 1/4, G 1/4, screw-in fitting or sub-base, others on request
Control valve (proportional valve) valve orifice k_{VS}-value	valve is closed when power is off 0.05 to 2.0 mm 0.00006 to 0.09 m^3/h
Electr. connection	15-pin sub-D plug 5-pin M12 plug (only with DeviceNet) 5-pin M12 socket code B (only with Profibus-DP)

[1] at standard conditions 1.013 bar (a) and 0°C

Power supply	24V DC
Voltage tolerance	±10 %
Residual ripple	<5 %
Power consumption	max. 7.5 W, max. 10 W (Fieldbus version)
Setpoint Feed impedance	0-5 V, 0-10 V, 0-20 mA or 4-20 mA > 20 kΩ (voltage), < 300 Ω (current)
Output signal Max. current, volt. output Max. load, current output	0-5 V, 0-10 V, 0-20 mA or 4-20 mA 10 mA 600 Ω
Digital communication	Profibus-DP, DeviceNet, CANopen, RS232/485 (RS interface only with adapter)
Protection class	IP50
Dimensions [mm]	see drawing
Total weight	ca. 850 g (stainless steel)
Mounting position	horizontal or vertical
Light emitting diode display (default, other allocations possible)	indication for Power, Limit/Communication, Error
Binary input (default, other functions possible)	two 1. start autotune 2. not assigned
Binary output (default, other functions possible)	one relay-output for 1. setpoint not reached max. load: 25V, 1A, 25VA
Certification (see operating instructions)	various environmental testing, electromagnetic compatibility

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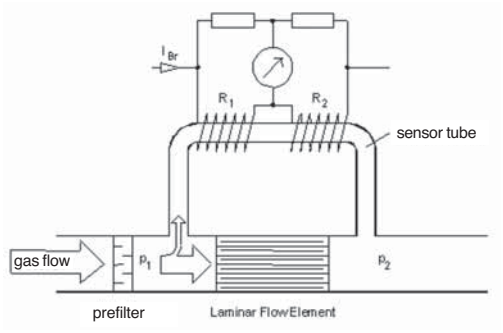
Sensor principle



Measurement is based on the bypass principle. A laminar flow element in the main channel generates a small pressure drop. This drives a small flow, proportional to the main flow through the bypass (sensor tube).

Two heater resistors, which are connected in measuring bridge, are wound on this stainless steel tube. In the zero-flow state, the bridge is balanced, but with flow, heat is transported in the flow direction and the bridge becomes unbalanced.

The dynamics of the measurement is determined by the tube walls, which act as a thermal barrier. Through use of suitable software in the controller, measuring times are obtained that are adequate for a large part of the applications (in the range of a few seconds).

With contaminated media, we recommend to install filter elements upstream. This avoids changes in the division ratio between main flow and sensor tube, as well as changes in the heat transmission chaused by deposits on the walls of the sensor tube.
With these sensors, even aggressive gases can be controlled, because all essential parts in contact with the medium are fabricated in stainless steel.
With this sensor principle it is also possible to convert between different gases.

By using the gas factors it is possible that the accuracy is not within the datasheet specification.
For applications which need high accuracy it is recommended to calibrate under application conditions.

Notes regarding the selection of the unit

For the proper choice of the actuator orifice within the MFC, not only the required maximum flow rate Q_{nom}, but also the pressure values *directly* before and after the MFC (p_1, p_2) at this flow rate Q_{nom} should be known. In general, these pressures are not the same as the overall inlet and outlet pressures of the whole plant, because usually there are additional flow resistors (tubing, additional shut-off valves, nozzles etc.) present both before and after the controller.

Please use the request for quotation form on p. 5 to indicate the pressures *directly* before and after the MFC. If these should be unknown or not accessible to a measurement, estimates are to be made by taking into account the approximate pressure drops over the flow resistors before and after the MFC, respectively, at a flow rate of Q_{nom}.
In addition, please quote the maximum inlet pressure p_{1max} to be encountered. This data is needed to make sure the actuator is able to provide a close-tight function within all the specified modes of operation.

The request for quotation form on page 5 contains the relevant fluid specification. Please use in this way the experience of Bürkert engineers already in the design phase and provide us with a copy of the request containing the data of your application together with your inquiry or order.

Ordering table for accessories (connectors are not included on the delivery)

Article	Item no.
15-pin electrical connection	
Sub-D socket 15-pin solder connection	918 274
Sub-D hood for Sub-D socket, with screw locking	918 408
Sub-D socket 15-pin with 5m cable, ass. on one side	787 737
Sub-D socket15-pin with 10m cable, ass. on one side	787 738
Adapter	
Adapter RS232	654 748
Adapter RS485	654 538
PC cable for RS232 9-pin socket/plug 2m	917 039
Adapter, USB	670 639
Communication software “MassFlowCommunicator”	Info at **www.burkert.com**

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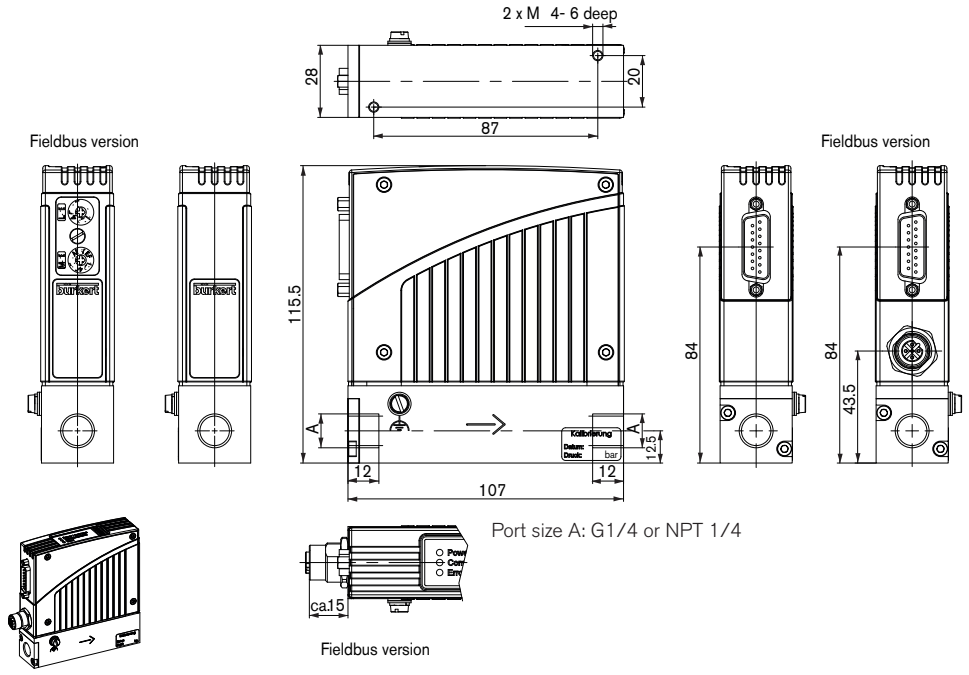
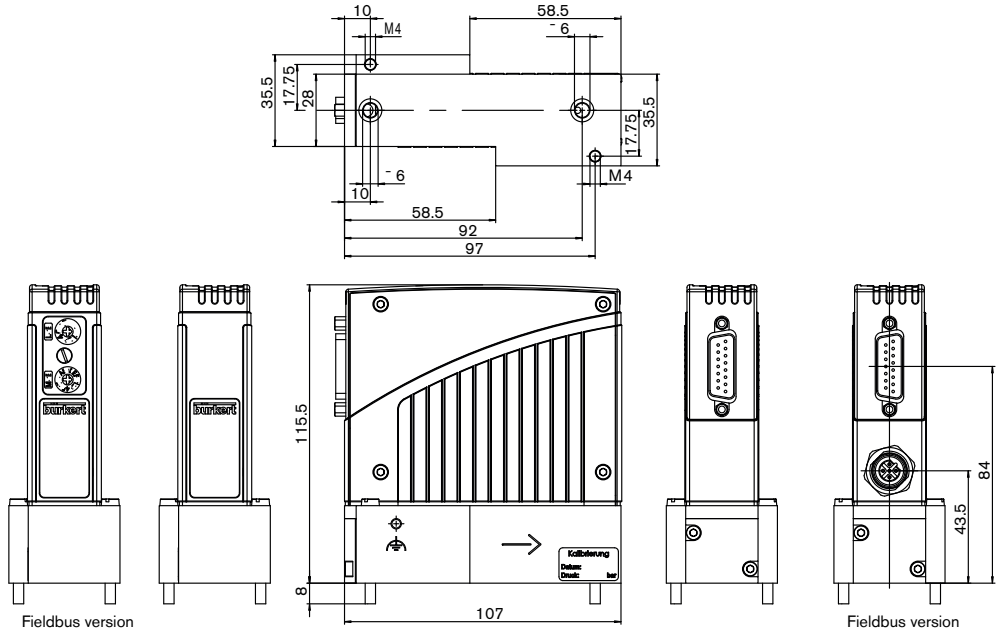
Dimensions [mm]

Standard version



Sub-base version



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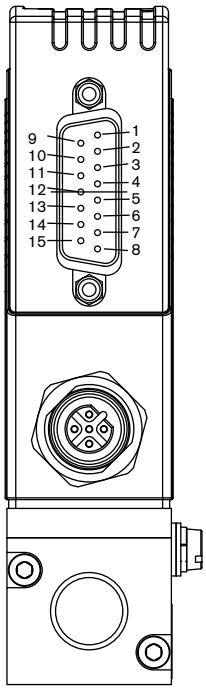
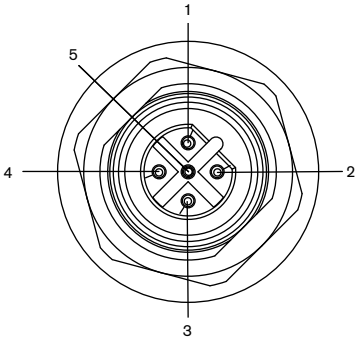
PIN connection



15-pole Sub-D plug

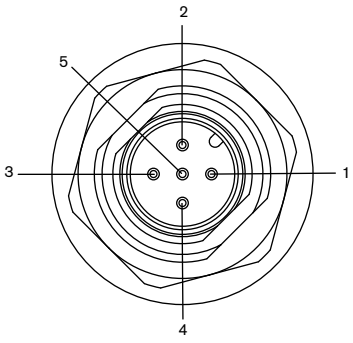
Pin	Connection
1	Relay output - NC contact
2	Relay output - NO contact
3	Relay output - C contact
4	GND 24 -V-supply and binary inputs
5	24 V supply +
6	8 V output (For factory use only!)
7	Setpoint input GND
8	Setpoint input +
9	Process value output GND
10	Process value output +
11	DGND (for RS232)
12	Binary input 1
13	Binary input 2
14	RS232 RxD (without driver)
15	RS232 TxD (without driver)

Only with fieldbus



Profibus DP – socket B-encoded M12 (DPV1 max. 12 Mbaud)

Pin	Connection
1	VDD
2	RxD / TxD - N (A-line)
3	DGND
4	RxD / TxD - P (B-line)
5	Shield



DeviceNet, CANopen – plug M12

Pin	Connection
1	Shield
2	VDD
3	DGND
4	CAN_H
5	CAN_L

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Note

You can fill out the fields directly in the PDF file before printing out the form.

MFC/MFM applications - request for quotation

Please fill out and send to your nearest Bürkert sales centre* together with your inquiry or order

Company	Contact person
Customer No.	Department
Address	Tel./Fax
Postcode/Town	E-mail

☐ **MFC-application** ☐ **MFM-application** ☐ **Quantity** ☐ **Required delivery date**

Medium data

Type of gas (or gas proportion in mixtures) ☐

Density [kg/m³] [1] ☐

Medium temperature [°C or °F] ☐ °C ☐ °F

Moisture content [g/m³] ☐

Abrasive components / solid particles ☐ no ☐ yes as follows ☐

Fluidic data

Maximum flow Q_{nom} ☐ l_N/min[1] ☐ cm_N^3/min[1]
☐ m_N^3/h[1] ☐ cm_s^3/min (sccm)[2]
☐ kg/h ☐ l_s/min (slpm)[2]

Minimum flow Q_{nom} ☐ l_N/min[1] ☐ cm_N^3/min[1]
☐ m_N^3/h[1] ☐ cm_s^3/min (sccm)[2]
☐ kg/h ☐ l_s/min (slpm)[2]

Inlet pressure at Q_{nom} p_1 ☐ barg ■

Outlet pressure at Q_{nom} p_2 ☐ barg ■

Max. inlet pressure p_{1max} ☐ barg ■

Pipe run (external-Ø) ☐ metric, mm ☐ imperial, inch

MFC/MFM- port connection
☐ without screw-in fitting
☐ 1/4" thread G-thread (DIN ISO 228/1)
☐ 1/4" thread NPT-thread (ANSI >B1.2)
☐ with screw-in fitting
☐ sub-base version

Ambient temperature ☐ °C

Material data

Sealing material ☐ FKM ☐ EPDM ☐ FFKM

Electrical data

Output/input signal
☐ 0-20 mA/0-20 mA ☐ 4-20 mA/4-20 mA
☐ 0-10 V/0-10 V ☐ 0-5 V/0-5 V
☐ Profibus DP ☐ DeviceNet ☐ CANopen

■ Please quote all pressure values as overpressures with respect to atmospheric pressure [barg]

[1] at: 1.013 bar (a) and 0°C [2] at: 1.013 bar (a) and 20°C

To find your nearest Bürkert facility, click on the orange box → **www.burkert.com**

In case of special application conditions, please consult for advice.

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