Mass Flow Meter (MFM) for gases

- Bypass MFM with CMOSens®, technology for nominal flow rates from 20 ml_N/min to 50 l_N/min
- High accuracy
- Fast response time
- Fieldbus option

Mass flow meters are used in Process Technology for the direct measurement of the mass flow of gases. In case of volumetric flow meters, it is necessary to measure the temperature and the pressure either the density, because gases change their density or rather their volume depending on the pressure. The measurement of the mass flow, on the other hand, is independent of the pressure and the temperature.

The digital mass flow meter Type 8702 uses a sensor on silicon chip basis (see the description on page 2) located directly in the bypass channel. Due to the fact that the sensor is directly in the bypass channel a very fast response time of the MFM is reached. The actual flow is given as an analog output signal or could be read out over Fieldbus communication.

Type 8702 can optionally be calibrated for two different gases, the user is able to switch between these two gases.

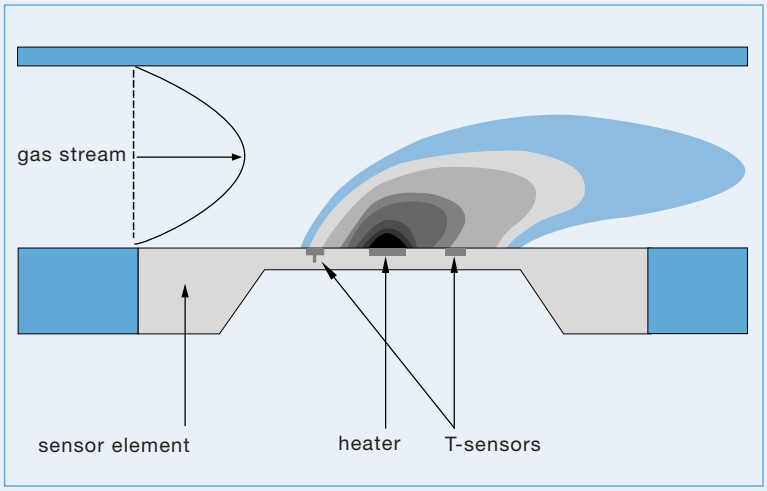
The materials of the parts that come into contact with the medium are selected according to customer specification so that the unit can be operated with the complete range of standard process gases.

Typical application areas are gas flow measurement in
- Test benches
- Packaging and foodstuff industry
- Environmental technology
- Medical technology and
- Analysis technology

Technical Data			
Full scale ranges[1] (Q_{nom})	0.02 to 50 l_N/min N_2 equivalent	**Voltage tolerance**	±10%
Operating media	neutral, non-contaminated gases, other gases on request	**Residual ripple**	<5%
Max. operating pressure	10 bar (145 psi)	**Power consumption**	max. 2.5 W at 24V DC, max. 5 W at 24V DC with Fieldbus communication
Max. pressure drop	30 mbar	**Output signal**	0–5 V, 0–10 V, 0–20 mA or 4–20 mA
Calibration medium	operating gas or air with conversion factor	Max. current, volt. output Max. load, current output	10 mA 600 Ω
Medium temperature	-10 to +70°C	**Fieldbus communication**	Profibus-DP, DeviceNet, others on request
Ambient temperature	-10 to +50°C	**Protection class**	IP65
Accuracy (after 1 min. warm up time)	±1% of rate ±0.5% F.S.	**Dimensions [mm]** (without fitting)	115 x 137.5 x 37 mm
Linearity	±1% F.S.	**Total weight**	1000 g
Repeatability	±0.5% F.S.	**Mounting position**	horizontal or vertical
Control range	1:50; 1:500 on request	**Light emitting diodes** (Default, other allocations possible)	indication for Power, Communication, Limit, Error
Response time ($t_{95\%}$)	<300ms	**Binary input**	three, different functions possible – with Default not assigned
Body material	stainless steel 1.4305	**Binary output** (Default, other functions possible)	two relay-outputs for 1. Limit (Q_{nom} almost reached) 2. error (e.g. sensor fault) max.load: 60 V, 1 A, 60 VA
Electr. housing material	PPS	**Certification** (see operating instructions)	various environmental testing, electromagnetic compatibility
Sealing material	FPM, EPDM, others on request		
Port connections	G 1/4, NPT 1/4 or screw-in fitting		
Electr. connection round socket sub-HD socket **Fieldbus comm.**	 8-pin 15-pin 9-pin sub-D socket		
Power supply	24V DC		

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

Functional principle of the registration of the measured values



The actual flow rate is detected by a sensor operating according to a thermal principle which has the advantage of delivering the mass flow without any corrections for pressure or temperature being needed.

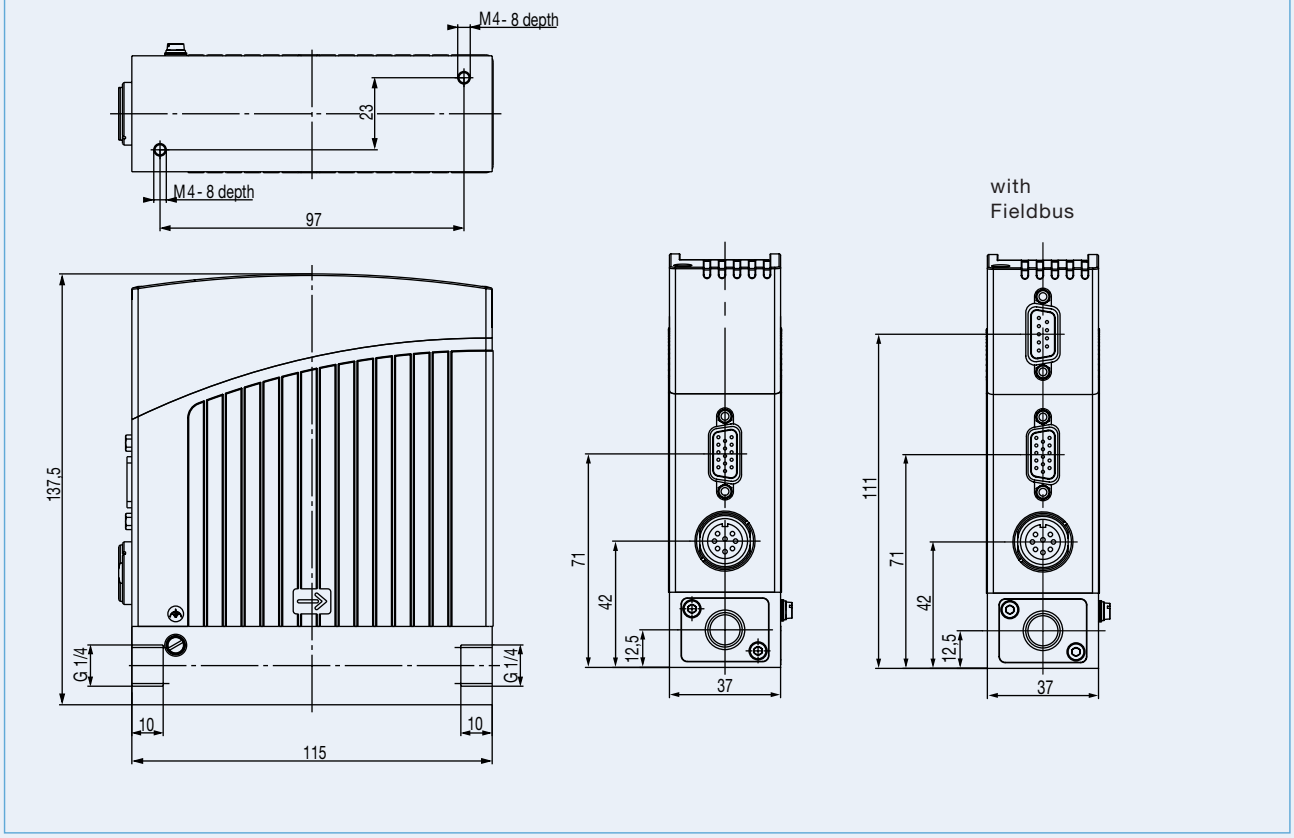
A small part of the total gas stream is diverted into a small, specifically designed bypass channel, that ensures laminar flow conditions. The sensor element is a chip immersed into the wall of this channel. The chip, produced in CMOS technology, contains a heating resistor and two temperature sensors (thermopiles) being arranged symmetrically upstream and downstream of the heater. The differential voltage of the thermopiles is a measure of the mass flow rate passing this bypass channel. The calibration procedure effectuates a unique assignment of the sensor signal to the total flow rate passing the device.

Notes regarding the selection of the unit

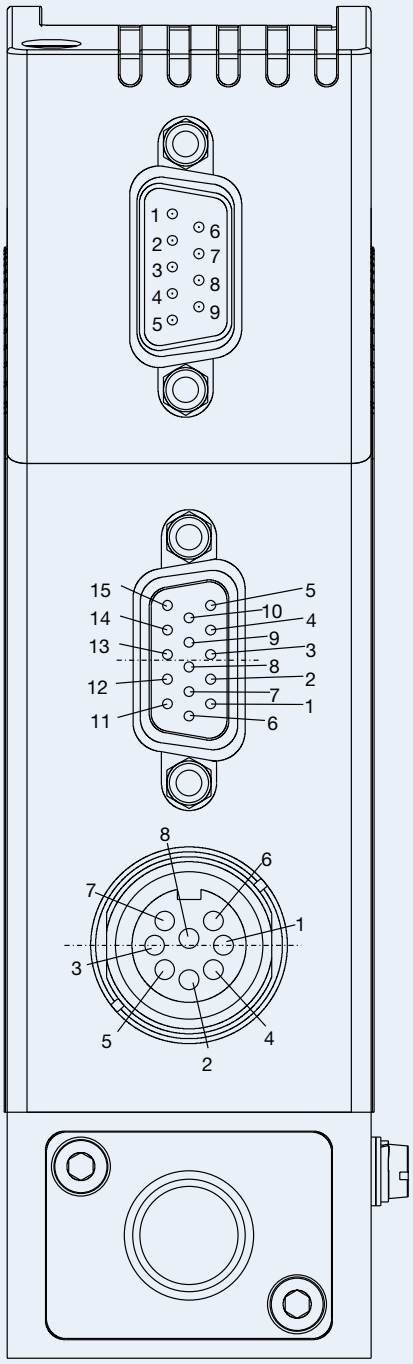
The decisive factors for the perfect functioning of an MFM within the application are the fluid compatibility, the normal inlet pressure and the correct choice of the flow meter range. The pressure drop over the MFM depends on the flow rate and the operating pressure.

The questionnaire on page 4 contains the relevant fluid specification. Please use in this way the experience of Burkert engineers already in the design phase and provide us with a copy of the questionnaire containing the data of your application together with your inquiry or order.

Dimensions [mm]



PIN Configuration



9-pin Sub-D socket

with Profibus-DP

Pin	Connection
1	shield
2	not used
3	RxD/TxD - P (B-line)
4	RTS (control signal for repeater)
5	GND
6	VDD
7	not used
8	RxD/TxD - N (A-line)
9	not used

with DeviceNet

Pin	Connection
1	shield
2	CAN_L
3	GND
4	not used
5	not used
6	not used
7	CAN_H
8	not used
9	not used

15-pin Sub-HD socket

Pin	Connection
1	not used
2	not used
3	signal output +
4	binary input 2
5	12V-output (only company internal use)
6	RS232 TxD (direct connection to PC)
7	binary input 1
8	DGND (for binary inputs)
9	only company internal use (do not connect!)
10	12V-output (only company internal use)
11	12V-output (only company internal use)
12	binary input 3
13	signal output GND
14	RS232 RxD (direct connection to PC)
15	DGND (for RS232)

(with bus version 3 and 13 not used)

8-pin socket round

Pin	Connection
1	supply 24V +
2	relay 1 - middle contact
3	relay 2 - middle contact
4	relay 1 - opener
5	relay 1 - closer
6	supply GND
7	relay 2 - closer
8	relay 2 - opener

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

Article	Ordering-No.
Round plug 8-pin Binder (solder termination)	918 299
Round plug 8-pin with 5m – cable, on one side prefabricated	787 733
Round plug 8-pin with 10m – cable, on one side prefabricated	787 734
SUB-HD-plug 15-pin with 5m – cable, on one side prefabricated	787 735
SUB-HD-plug 15-pin with 10m – cable, on one side prefabricated	787 736
RS232-adapter – for connection to a PC	654 757
Cable for RS232 9-pin socket/plug 2m	917 039

Specification sheet for MFC/MFM applications

Please fill in and send to your local Burkert Sales Centre via e-mail, fax or regular post together with your inquiry or order

☐ **MFC-application** ☐ **MFM-application** **Quantity** **Desired 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_{min}		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 or	psig ■
Outlet pressure at Q_{nom}	p_2=	barg or	psig ■
Max. inlet pressure p_{1max}		barg or	psig ■
Pipe run (external-Ø)		metric, mm	imperial, inch
MFC/MFM-port connection (1/4"-internal thread or screw-in fitting)		☐ without screw-in fitting ☐ G-thread (DIN ISO 228/1) ☐ NPT-thread (ANSI B1.2) ☐ with screw-in fitting	
Ambient temperature		°C	

Material Data

Body material	☐ Stainless steel		
Sealing material	☐ FPM (Viton)	☐ EPDM	Other:

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
Fieldbus communication	☐ **Profibus-DP**	☐ **DeviceNet**

■ 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

Please do not forget to fill in the customer data below

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

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

We reserve the right to make technical changes without notice.

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