Mass Flow Controller (MFC) for gases

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

Type 8712 can be combined with...

Type 1150
Multi-channel program controller

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

Type 6013
2/2-way valve

MFC
Configuration sofware

Type 8712 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. Due to the fact that the sensor is directly in the bypass channel a very fast settling time of the MFC is reached. 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 8712 can optionally be calibrated for two different gases, the user is able to switch between these two gases. As the control element, a proportional valve working at low friction guarantees a high sensitivity and the good control characteristics of the unit. Typical application areas are gas dosing or rather the production of gas mixtures in:

- Process technology
- Packaging and foodstuff industry
- Environmental technology
- Surface treatment
- Material coating
- Burner controllers
- Fuel cell technology

Technical Data

Full scale ranges[1] (Q_{nom})	0.02 to 50 l_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 1 min. warm up time)	±0.8% of rate. ±0.3% F.S.
Linearity	±0.1% F.S.
Repeatability	±0.1% F.S.
Control range	1:50; 1:500 on request
Settling time ($t_{95\%}$)	<300ms
Body material	stainless steel 1.4305
Electr. housing material	PPS
Sealing material	FKM, EPDM, others on request
Port connections	G 1/4, NPT 1/4 or screw-in fitting
Control valve (proportional valve) valve orifice k_{Vs}-value	valve is closed when power is off 0.05 to 1.6 mm 0.0002 to 0.05 m^3/h
Electr. connection round socket sub-HD socket **Fieldbus comm.**	 8-pin 15-pin 9-pin sub-D socket
Power supply	24V DC

Voltage tolerance	±10%
Residual ripple	<5%
Power consumption	max. 7.5 W at 24V DC, max. 10 W at 24V DC with Fieldbus comm.
Set point Feed impedance	0–5V, 0–10V, 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
Fieldbus comm.	Profibus-DP, DeviceNet, others on request
Protection class	IP65
Dimensions [mm] (without fitting)	115 x 137.5 x 37 mm
Total weight	1200 g
Mounting position	horizontal or vertical
Light emitting diodes (Default, other allocations possible)	indication for Power, Communication, Limit, Error
Binary input (Default, other functions possible)	three 1. start autotune 2. not assigned 3. not assigned
Binary output (Default, other functions possible)	two relay-outputs for 1. setpoint not reached 2. error (e.g. sensor fault) max.load: 60 V, 1 A, 60 VA
Certification (see operating instructions)	various environmental testing, electromagnetic compatibility

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

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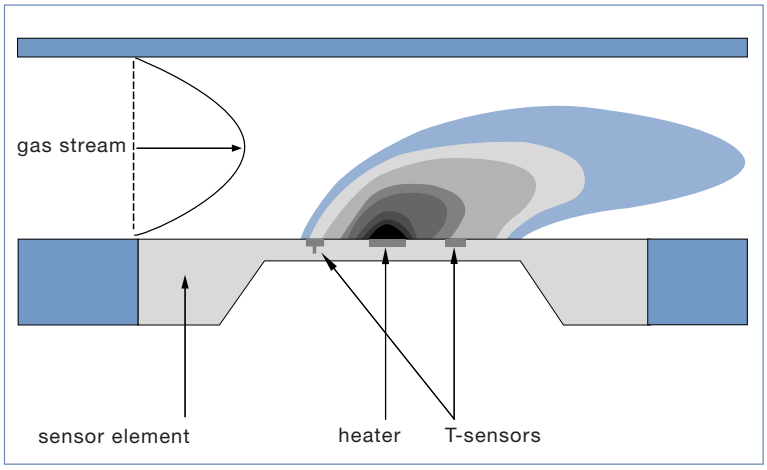
Functional principle of the registration of the measured values



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

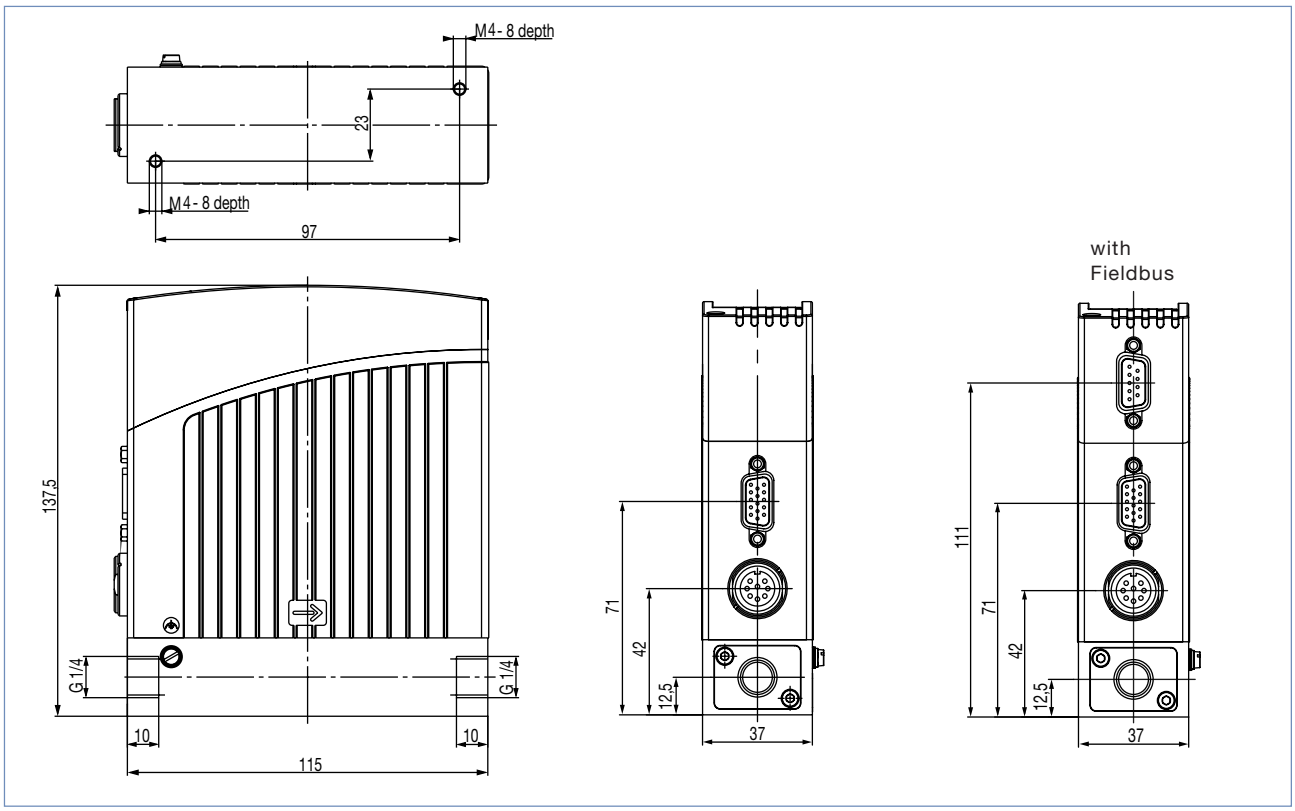
For the proper choice of the actuator orifice within the MFC, not only the required maximum flow rate Q_{nom}, but also the pressure values *directly* before and after the MFC (p_1, p_2) at this flow rate Q_{nom} should be known. In general, these pressures are not the same as the overall inlet and outlet 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 specification sheet (p. 4) 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}.

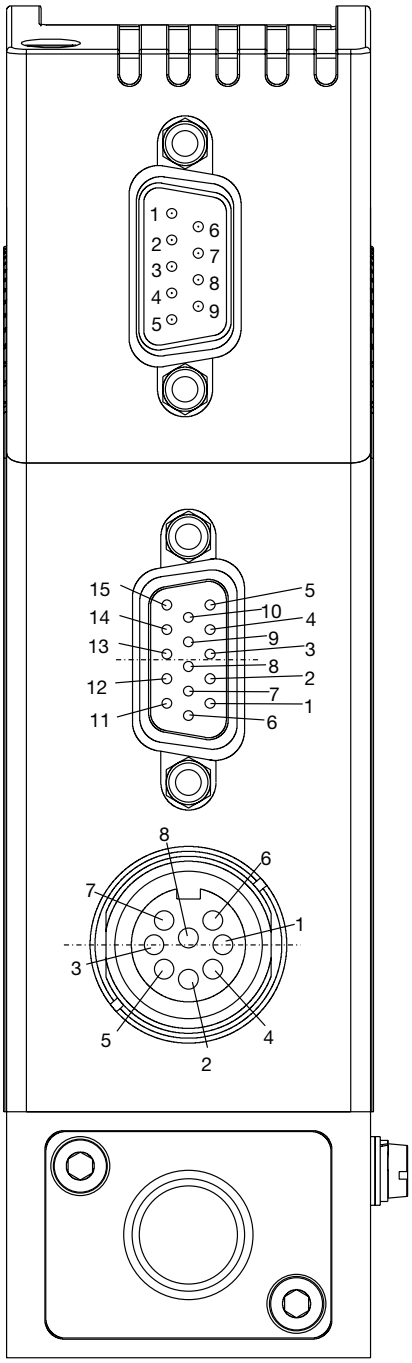
In addition, please quote the maximum inlet pressure p_{1max} to be encountered. This data is needed to make sure the actuator is able to provide a close-tight function within all the specified modes of operation.

The 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	signal input +
2	signal input GND
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 1-3 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	Item 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
Adapter RS485	658 499
Configuration software (Mass Flow Communicator)	Info at www.buerkert.com

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Specification sheet for MFC/MFM applications

Please copy and fill in or download the electronic version at *www.burkert.com* and send to your local Burkert Sales Centre 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 ☐ FKM ☐ EPD 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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