

Mass Flow Meter (MFM) for Gases



- Direct flow measurement by MEMS- Technology for nominal flow rates from 10 ml_N/min to 80 l_N/min (N₂)
- High accuracy
- Short response time
- Compact design and digital communication

Type 8703 can be combined with...



Type 8619

Multichannel
program controller



Type 0330

3/2 or 2/2-way
solenoid valve



Type 6013

2/2 way
solenoid valve

Mass flow meter 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 or 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 temperature. The digital mass flow meter type 8703 uses a sensor on silicon chip basis located directly in contact with the gas.

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 over RS485-communication.

Type 8703 can optionally be calibrated for two different gases, the user is able to switch between these two gases. This instrument communicates with master devices digitally, no further A/D conversions needed. The MassFlowCommunicator software can be used for parameterisation and diagnosis.

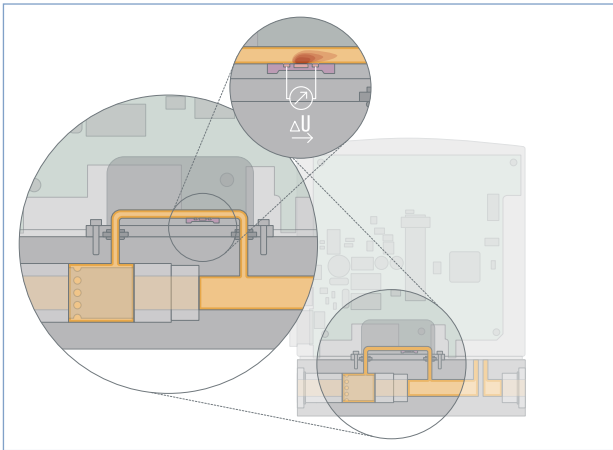
Technical Data			
Nominal flow range¹⁾ (Q _{nominal})	10 ml _N /min ²⁾ to 80 l _N /min (N ₂), see table on p. 2	Electr. connection	Plug D-Sub 9 pin
Turn-down ratio	1:50, higher turn-down ratio on request	Power supply	24 V DC
Operating gas	Neutral, non-contaminated gases, on request	Voltage tolerance	± 10 %
Calibration gas	Operating gas or air with conversion factor	Residual ripple	< 2 %
Max. operating pressure (Inlet pressure)	10 bar (145 psi) depending on the orifice of the valve	Power consumption	5 W
Gas temperature	- 10 to + 70 °C (- 10 to + 60 °C with oxygen)	Communication	Digital via RS485 (half-duplex or full- duplex), RS422
Ambient temperature	- 10 to + 50 °C	Protection class	IP40
Accuracy	± 0.8 % o.R. ± 0.3 % F.S. (after 1 min. warm up time)	Dimensions [mm]	see drawings p. 5-6
Repeatability	± 0.1 % F.S.	Total weight	ca. 500 g (aluminium body)
Response time (t_{95%})	< 300 ms	Installation	horizontal or vertical
Materials	Body Aluminium or stainless steel Housing Metal Seals FKM, EPDM	Light emitting diodes (default functions, other functions programmable)	Indication for power, limit and error
Port connection	NPT 1/4, G 1/4, screw-in fitting or sub-base, others on request	Binary Input (default, other functions program- mable)	Not assigned
		Binary Output (default, other functions program- mable)	One relay-output for Limit (process value close to full scale value) Max. load: 25 V, 1 A, 25 VA

¹⁾ The nominal flow value is the max. flow value calibrated which can be controlled. The nominal flow range defines the range of nominal flow rates (full scale values) possible.

²⁾ Index N: Flow rates referred to 1.013 bar and 0 °C.

Alternatively Index S which refers to 1.013 bar and 20 °C.

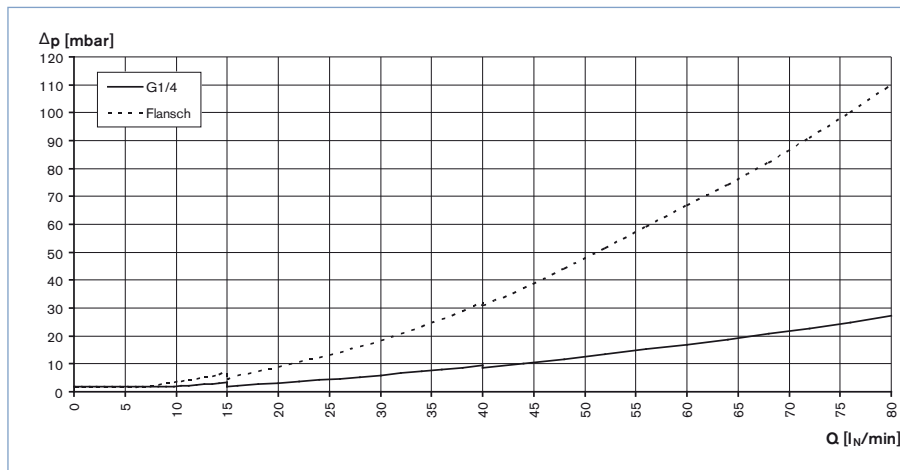
Measurement principle



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

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 MEMS technology, contains a heating resistor and two temperature sensors (thermopiles) which are 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.

Pressure Loss Diagram (ref. to air, with 250µm inlet filter)



The diagram shows exemplarily the pressure loss characteristics when air flowing through. For determining the pressure loss with another gas it needs to calculate the air equivalent and respect the fluidics needed with the other gas.

Notes regarding the selection of the unit

(Other gases on request)




Gas	Min. Q_{nom} [l _N /min]	Max. Q_{nom} [l _N /min]
Argon	0.01	80
Helium	0.01	500
Carbon dioxide	0.02	40
Air	0.01	80
Methane	0.01	80
Oxygen	0.01	80
Nitrogen	0.01	80
Hydrogen	0.01	500

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 request for quotation form on page 6 contains the relevant fluid specification.

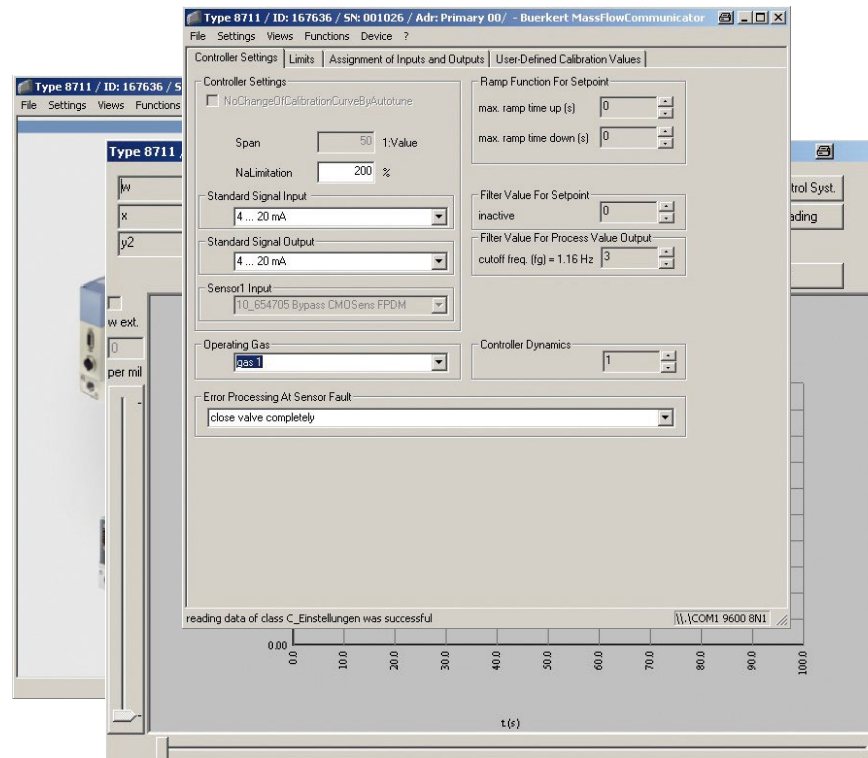
Ordering table for accessories

Article	Article no.
9 pin electrical connection	
D-Sub socket 9 pin solder connection with housing	917623 
Adapters³⁾	
USB adapter (version 1.1, USB-socket type B)	670693 
USB connection cable 2 m	772299 
Communication software "MassFlowCommunicator"	Download from www.buerkert.com

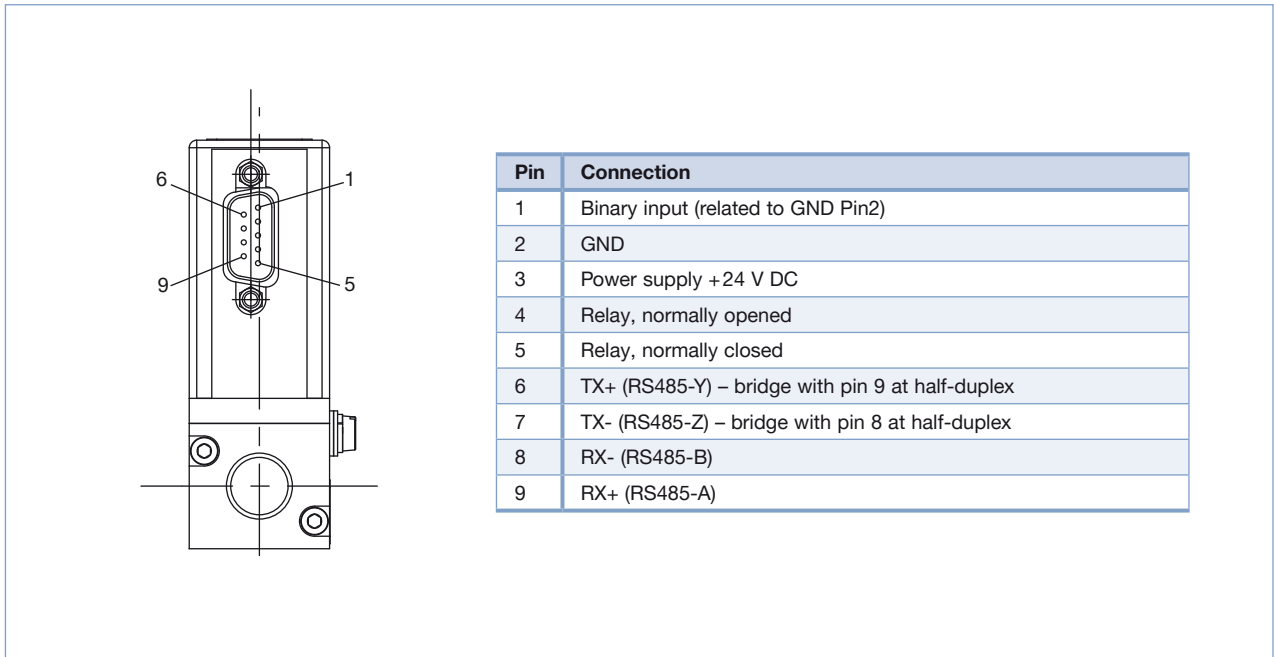
³⁾ The adapter accessories are used for commissioning and diagnostics and are not absolutely necessary for operation.

Software MassFlowCommunicator for Communication with Bürkert MFC/MFM

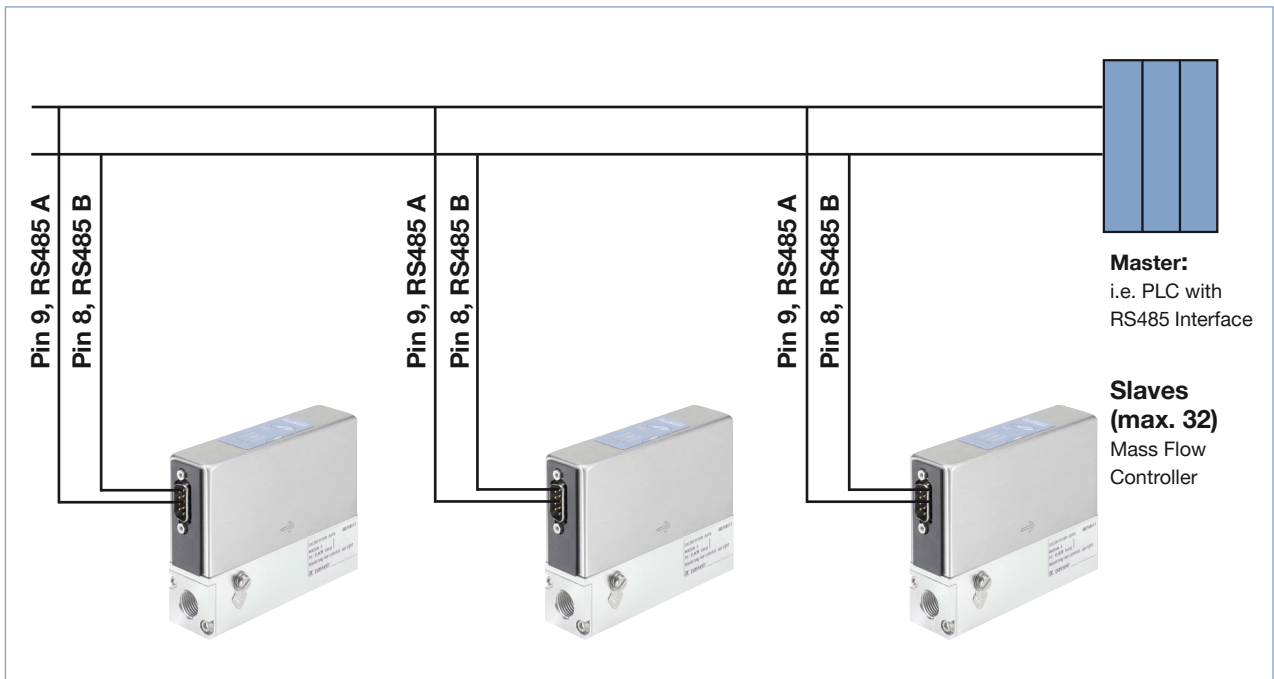
The communication software allows the user to program additionally various functions. For that purpose the MFC or MFM has to be connected to the computer by a RS232 adapter.



Pin Assignment

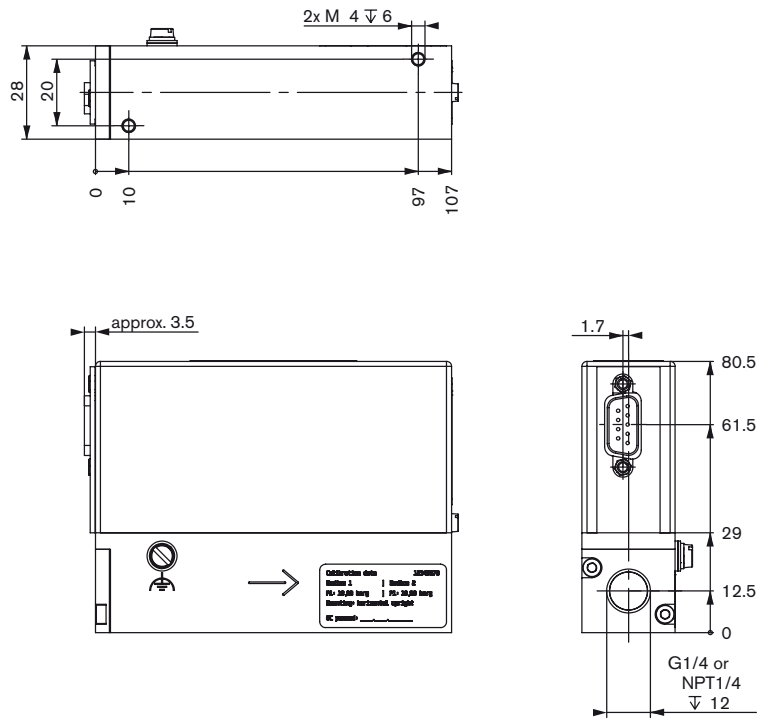


Networking

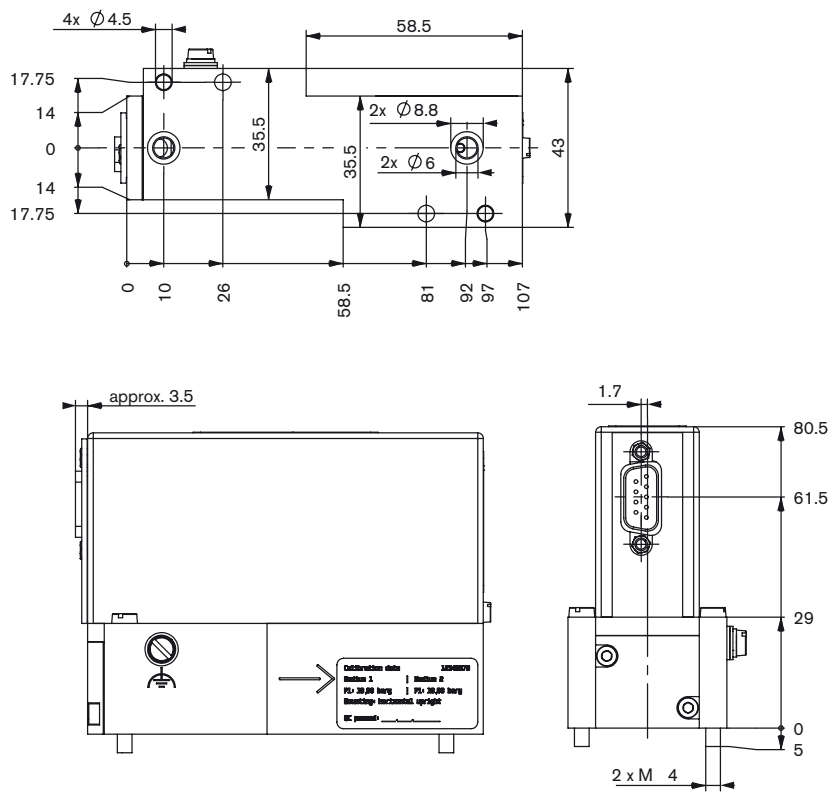


Dimensions [mm]

Threaded version



Sub-base version



Note

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

MFC/MFM-applications - Request for quotation

▶ Please complete and send to your nearest Bürkert sales centre

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/m^{3,4}

Gas temperature [°C or °F] °C °F

Moisture content g/m³

Abrasive components/solid particles no yes, as follows:

Fluidic data

Flow range Q_{nom} Min. l_N/min⁴ l_S/min (slpm)⁵
 Max. m_N³/h⁴ kg/h
 cm_N³/min⁴ cm_S³/min (sccm)⁵
 l_N/h⁴ l_S/h⁵

Inlet pressure at Q_{nom} ⁶ $p_1 =$ bar(g) ■

Outlet pressure at Q_{nom} $p_2 =$ bar(g) ■

Max. inlet pressure P_{1max} bar(g) ■

MFC/MFM port connection

without screw-in fitting

¼" G-thread (DIN ISO 228/1)

¼" NPT-thread (ANSI B1.2)

with screw-in fitting (acc. to specification for pipeline)

mm pipeline (external Ø)

inch pipeline (external Ø)

Flange version

Installation

horizontal

vertical, flow upwards vertical, flow downwards

Ambient temperature °C

Material data

Body Aluminium Stainless steel

Seal FKM EPDM

■ Please quote all pressure values as overpressures with respect to atmospheric pressure bar(ü)

4) at: 1.013 bar(a) and 0 °C

5) at: 1.013 bar (a) and 20 °C

6) matches with calibration pressure

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www.burkert.com

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

Subject to alteration.
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