








Mass Flow Meter (MFM) for Gases

- Nominal flow ranges from 0.010 l/min to 80 l/min
- High accuracy
- Very fast response times
- Digital communication via RS485
- Compact version



Product variants described in the data sheet may differ from the product presentation and description.

Can be combined with

| | | |
|---|---|---|
|  | Type 6013 Plunger valve 2/2 way direct-acting | ▶ |
|  | Type 0330 Direct-acting 2/2 or 3/2-way pivoted armature valve | ▶ |
|  | Type 8611 eCONTROL - Universal controller | ▶ |
|  | Type 8619 multiCELL - Multi-channel and multi-function transmitter/controller | ▶ |
|  | Type 6027 Direct-acting 2/2 way plunger valve | ▶ |

Type description

The mass flow meter (MFM) type 8703 is suited for measuring the mass flow of gases over a big flow range. The thermal MEMS sensor is located directly in the gas stream and therefore reaches very fast response times. Type 8703 can optionally be calibrated for two different gases; the user can switch between these two gases. The communication with master devices is fully digital, therefore no further analog/digital conversions are needed.

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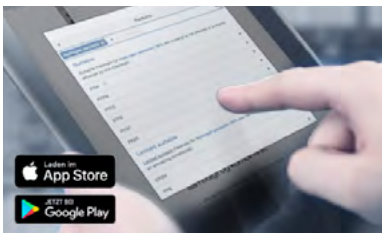
1. General Technical Data

| Product properties | |
|--|--|
| Material | |
| Block | Aluminium or stainless steel |
| Body | Metal |
| Seal | FKM, EPDM |
| Dimensions | Detailed information can be found in chapter "3. Dimensions" on page 4. |
| Total weight | approx. 500 g (Aluminium) |
| LED display | Indication for power, limit and error |
| Performance data | |
| Nominal flow range (Q_{Nom}) | 10 ml _N /min...80 l _N /min (N ₂) Detailed information can be found in chapter "6.2. Flow characteristic" on page 7. |
| Measuring range | 1:50 (2...100 %), higher measuring range on request |
| Max. operating pressure | 10 bar (145 psi) |
| Measuring accuracy | ±0.8 % o. R. ±0.3 % F. S. (after 1 min. warm-up time) |
| Repeatability | ±0.1 % F. S. |
| Response time (t ₉₅ %) | <300 ms |
| Electrical data | |
| Operating voltage | 24 V DC |
| Power consumption | 5 W |
| Voltage tolerance | ±10 % |
| Residual ripple | <2 % |
| Electrical connection | Plug D-Sub 9 pin |
| Medium data | |
| Operating medium | Neutral, non-contaminated gases, others on request |
| Calibration medium | Operating gas or air (with conversion factor) |
| Medium temperature | -10 °C...+70 °C (-10 °C...+60 °C for oxygen) |
| Process/Port connection & communication | |
| Port connection | NPT ¼, G ¼, screw-in fitting or sub-base, others on request |
| Fieldbus option | PROFIBUS DP, CANopen |
| Digitale Outputs | Relay outputs 1. Limit (Q_{Nom} almost reached) Load capacity: 25 V, 1 A, 25 VA |
| Digital inputs | Not connected |
| Digital (communication) interface | Digital via RS485 (Half-duplex or full duplex), RS422 |
| Environment and installation | |
| Installation position | Horizontal or vertical |
| Ambient temperature | -10 °C...+50 °C |
| Degree of protection | IP40 |
| Accessories | |
| Software-Tool | Mass Flow Communicator |

- 1.) The nominal flow value is the max. flow value calibrated which can be measured.
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 there is an Index S available which refers to 1.013 bar and 20 °C.

2. Materials

2.1. Chemical Resistance Chart – Bürkert resistApp



Bürkert resistApp – Chemical Resistance Chart

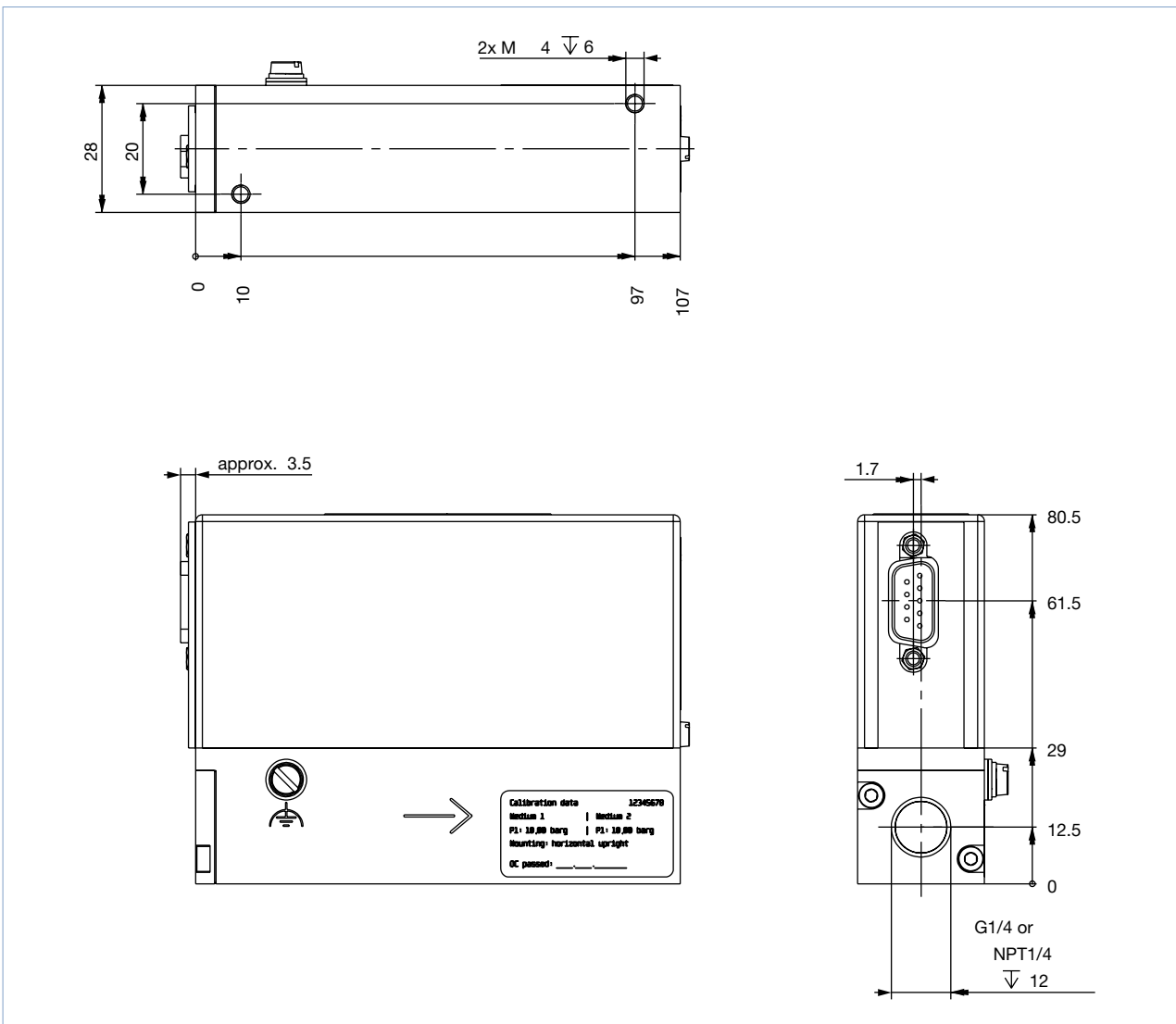
You want to ensure the reliability and durability of the materials in your individual application case? Verify your combination of media and materials on our website or in our resistApp.

[Start Chemical Resistance Check](#)

3. Dimensions

3.1. Threaded version

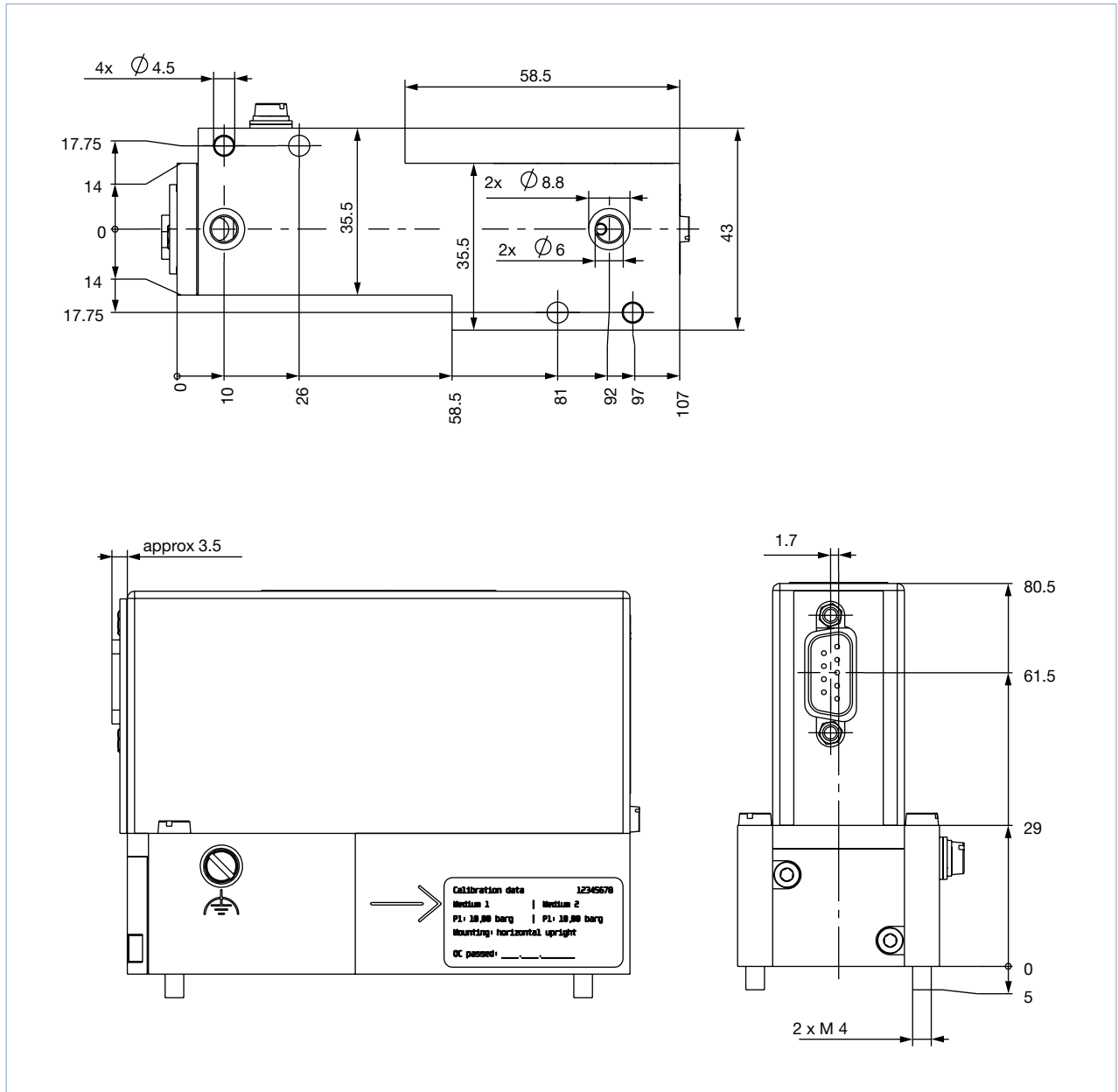
Note:
Dimensions in mm



3.2. Sub-base version

Note:

Dimensions in mm

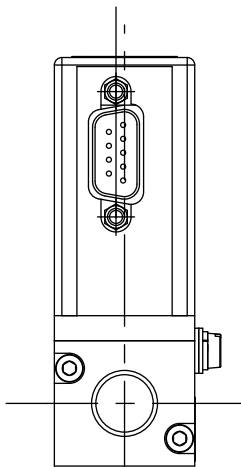


4. Device/Process connections

4.1. Analogue version

Note:

- Optionally pin 7 and pin 8 with bus version as transmitter input possible.
- The cable length for RS232/actual value signal is limited to 30 m.



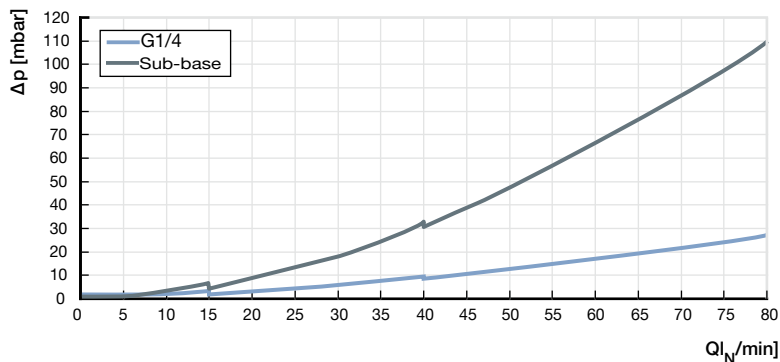
| Plug D-Sub, 15 pin | | Pin | Assignment |
|------------------------------|--|-----|--|
| Analogue control unit | | | |
| | | 1 | Binary input (related to GND Pin2) |
| | | 2 | GND |
| | | 3 | Power supply +24 V DC |
| | | 4 | Relay, normally opened |
| | | 5 | Relay, normally closed |
| | | 6 | TX+ (RS485-Y) – bridge with pin 9 at half duplex |
| | | 7 | TX- (RS485-Z) – bridge with pin 8 at half duplex |
| | | 8 | RX- (RS485-B) |
| | | 9 | RX+ (RS485-A) |

1.) RS232 interface only to be operated via RS232 adapter with integrated level adjustment

5. Performance specifications

5.1. Pressure loss diagram of MFMs

The diagram shows exemplary the pressure loss characteristics when air flowing through. To determine the pressure loss of another gas, it must first be converted to the corresponding air flow.

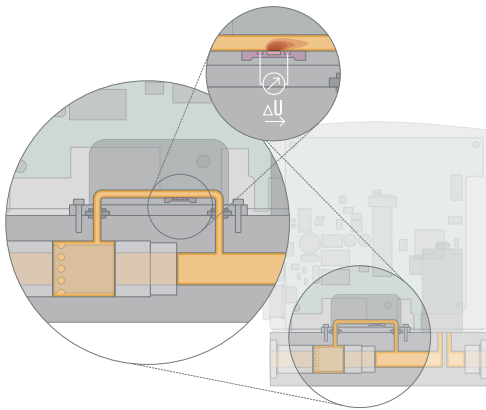


6. Product operation

6.1. Measuring principle

The mass flow sensor operates according to a thermal principle which has the advantage of providing the mass flow which is independent on pressure and temperature.

A small part of the total gas stream is diverted into a small, specifically designed bypassing channel which ensures laminar flow conditions. The sensor element is a chip immersed into the wall of this flow 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 the flow sensor. The calibration procedure effectuates a unique assignment of the sensor signal to the total flow rate through the device.



6.2. Flow characteristic

Nominal flow range of typical gases

Note:

- $Q(\text{Gas}) = f \times Q(\text{N}_2)$
- When using the gas factors, measurement errors may occur that are outside the data sheet specification. For applications requiring high accuracy, calibration under field conditions is recommended.
- Furthermore, the media compatibility of the sealing materials of the MFM should be checked before use with another gas.

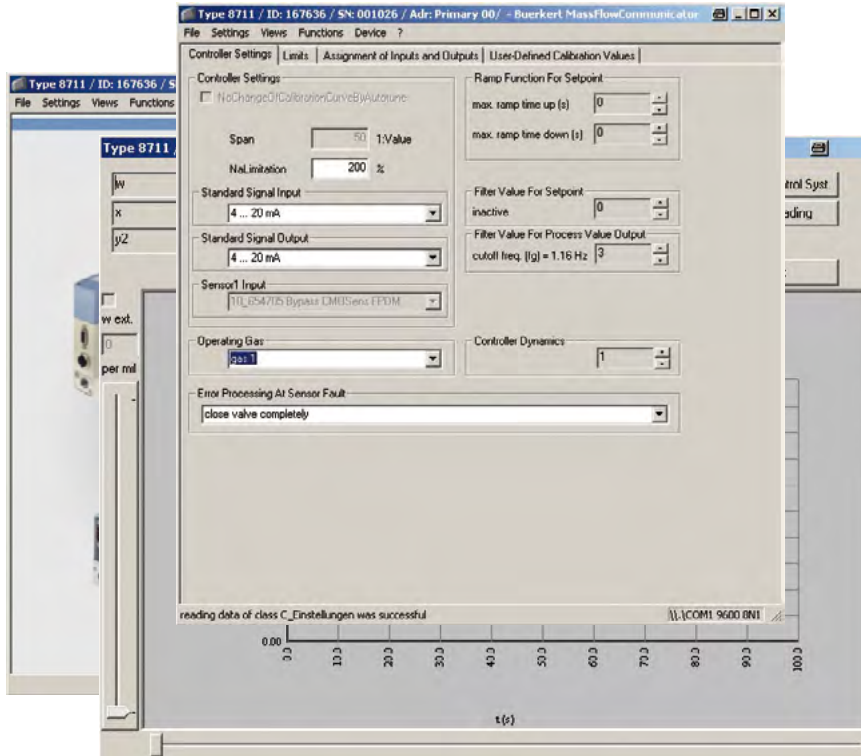
| Gas | Min. Q_{Nom} | Max. Q_{Nom} |
|----------------|-----------------------|-----------------------|
| | [l _N /min] | [l _N /min] |
| Argon | 0.01 | 80 |
| Helium | 0.01 | 500 |
| Carbon dioxide | 0.02 | 40 |
| Air | 0.01 | 80 |
| Methane | 0.01 | 80 |
| Oxygen | 0.01 | 80 |
| Nitrogen | 0.01 |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

6.3. Software Bürkert Communicator

Note:

To install the software, click [here](#) ▶.

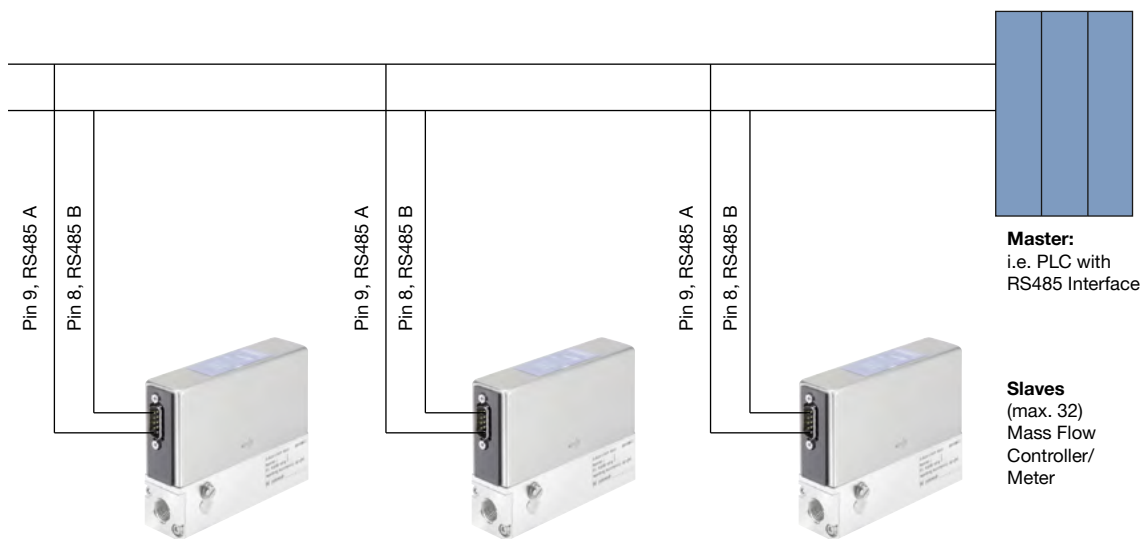
The communication software allows the user to program additionally various functions. For that purpose the MFC or MFM has to be connected to the computer by a RS232 adapter.



6.4. Networking

Note:


To install the software, click [here](#) ▶.



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7. Ordering information

7.1. Bürkert eShop – Easy ordering and quick delivery



Bürkert eShop – Easy ordering and fast delivery

You want to find your desired Bürkert product or spare part quickly and order directly? Our online shop is available for you 24/7. Sign up and enjoy all the benefits.

[Order online now](#)

7.2. Recommendation regarding product selection


Note:

The „**Product Enquiry Form**“ at the end of this document contains the relevant fluid specification. Using the experience of Bürkert engineers already in the design phase provide us with a copy of the request containing the necessary data together with your inquiry or order.

For the proper choice of the actuator orifice within the MFM, not only the required maximum flow rate Q_{Nom} , but also the pressure values directly before and after the MFM (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 „**Product Enquiry Form**“ at the end of this document to indicate the pressures directly before and after the MFM. If these are 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 MFM, respectively, at a flow rate of Q_{Nom} . In addition, please quote the maximum inlet pressure p_1 max. 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.

7.3. Bürkert product filter



Bürkert product filter – Get quickly to the right product

You want to select products comfortably based on your technical requirements? Use the Bürkert product filter and find suitable articles for your application quickly and easily.

[Try out our product filter](#)

7.4. Ordering chart accessories

Note:

The adapters serve mainly for initial operation or diagnosis. Those are not obligatory for continuous operation.

| Description | Article no. |
|---|-------------|
| Connections/Cables | |
| Socket D-Sub 9 pin solder connection | 917623 |
| Adapter accessories | |
| USB adapter (Version 1.1, USB socket type B) | 670693 |
| USB connection cable 2 m | 772299 |
| Communication software Mass Flow Communicator | LINK |

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Bürkert – Close to You

For up-to-date addresses
please visit us at
www.burkert.com

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Product Enquiry Form - Mass Flow Controller For Gases

Thank you for your interest in our products! In order to provide you with optimum advice, please fill out the following form and send it to your **Bürkert representative** or e-mail address: info@burkert.com. All information submitted will of course be kept strictly confidential.

Please fill in the **required fields!** *

*Note: The interactive functions of this PDF may be restricted depending on the PDF reader used.

| Personal Information | | | |
|----------------------|--|-----------------|--|
| Company | | Contact person | |
| Customer no. | | Department | |
| Street | | Postcode / Town | |
| Telephone no. | | Email | |

| Delivery | | | |
|-----------------|-----------------|----------|------------------------|
| MFC Application | MFM Application | Quantity | Required delivery date |

| Medium data | | | |
|----------------------------|--|------|----|
| Type of gas or gas mixture | | | |
| Medium temperature | | °C / | °F |
| Ambient temperature | | °C / | °F |

| Fluidic data | | | | | |
|--|------------------------------|-------------------|----------------|--|---|
| Flow range Q_{Nom} | | Min. | | Max. | unit Ref. N ^{1.)} Ref. S ^{1.)} |
| Inlet pressure at Q_{Nom} ^{2.)} | p_1 | = | | barg ^{3.)} | |
| Outlet pressure at Q_{Nom} | p_2 | = | | barg ^{3.)} | |
| Max. inlet pressure | p_{1max} | = | | barg ^{3.)} | |
| Port connection | Compression fitting | | Subbase | Vacuum fitting | |
| | Thread: | G (DIN ISO 228/1) | | NPT (ANSI B1.2) | |
| | | 1/4" | 3/8" | 1/2" | 3/4" 1" |
| Installation | horizontal, valve upright | | | vertical, upward flow | |
| | horizontal, valve horizontal | | | vertical, downward flow ^{4.)} | |

1.) Reference conditions: Ref. N: T=0°C, P=1,013 bar(a); Ref. S: T=20°C, P=1,013 bar(a)

2.) Corresponds to the calibration pressure

3.) Please indicate all pressure values as overpressure to atmospheric pressure [barg] (g = relative pressure)

4.) Possible reduction of the setting range to 1:10 for a vertical downwards flow

| Material specifications | | |
|-------------------------|-----------|-----------------|
| Body | Aluminium | Stainless steel |
| Seals | FKM | EPDM |

| Electrical data | | | | |
|---|-------------------|--------------------|---------------------|----------------------------|
| IP protection | Yes (IP65) | | No (IP20 or better) | |
| Control / Communication Note: Please choose one of the following options! | Normsignal | CANopen/büS | PROFIBUS DP | Industrial Ethernet |
| | 0 ... 5 V | CANopen | | PROFINET |
| | 0 ... 10 V | büS | | Ethernet IP |
| | 0 ... 20 mA | | | Modbus TCP |
| | 4 ... 20 mA | | | EtherCAT |
| Connection Note: Please choose one of the following options! | D Sub socket | M12 socket | D Sub socket | (RJ45 always standard) |
| | Terminal block | Terminal block | M12 socket | |

| Approvals / Conformities |
|---------------------------------|
| UL |
| ATEX II Cat. 3 G/D, IECEx |
| USP Class VI conformity |
| FDA conformity |
| EG 1935/2004 conformity |

| Additional Requirements / Comment |
|--|
| |

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