








## 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

	<b>Type 6013</b> Plunger valve 2/2 way direct-acting	▶
	<b>Type 0330</b> Direct-acting 2/2 or 3/2-way pivoted armature valve	▶
	<b>Type 8611</b> eCONTROL - Universal controller	▶
	<b>Type 8619</b> multiCELL - Multi-channel and multi-function transmitter/controller	▶
	<b>Type 6027</b> 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<sub>N</sub>/min...80 l<sub>N</sub>/min (N<sub>2</sub>)  
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  $\pm 0.8\%$  o. R.  $\pm 0.3\%$  F. S. (after 1 min. warm-up time)

Repeatability  $\pm 0.1\%$  F. S.

Response time ( $t_{95\%}$ ) < 300 ms

### Electrical data

Operating voltage 24 V DC

Power consumption 5 W

Voltage tolerance  $\pm 10\%$

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 1/4, G 1/4, 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.

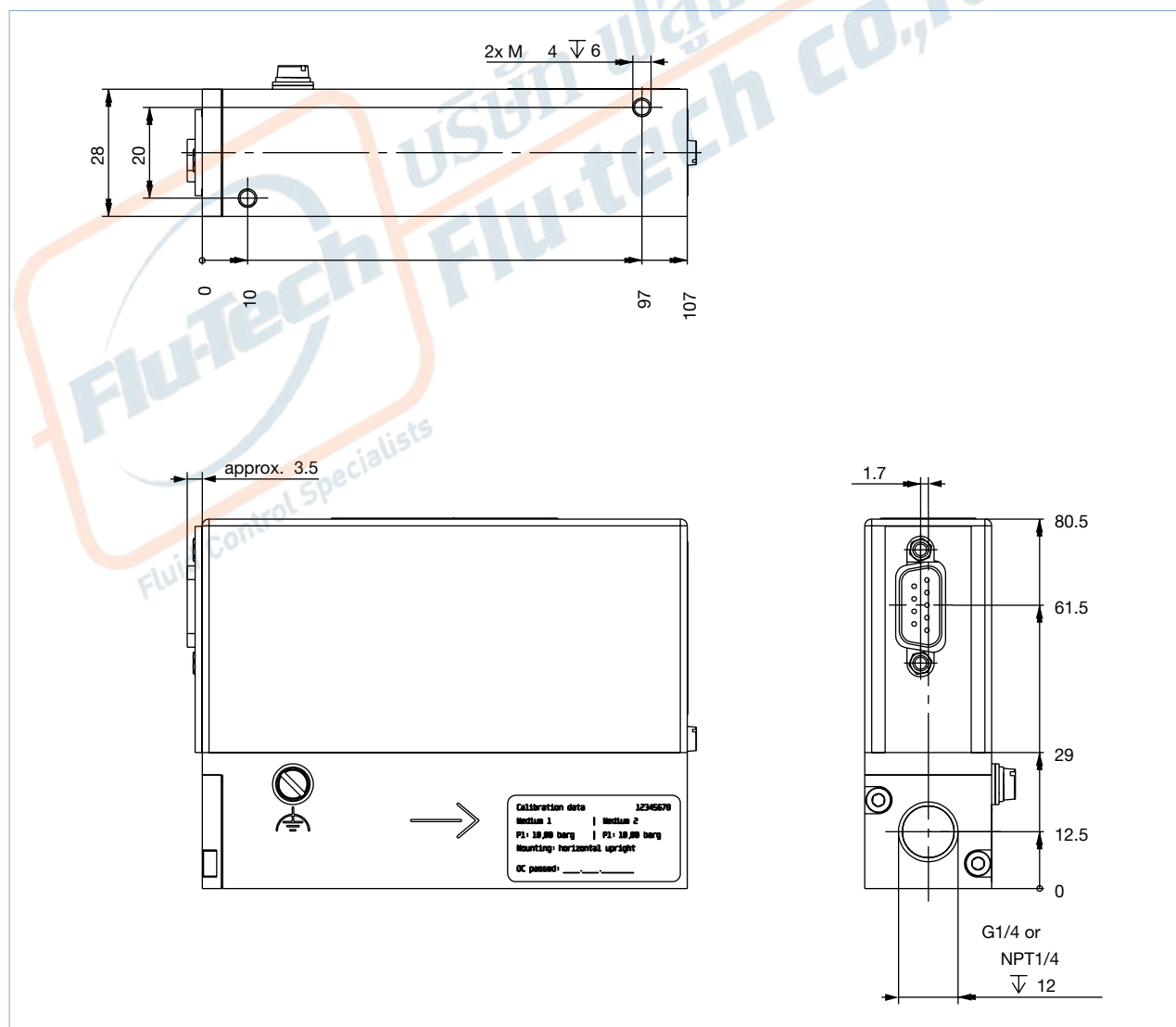
[Start Chemical Resistance Check](#)

## 3. Dimensions

### 3.1. Threaded version

#### Note:

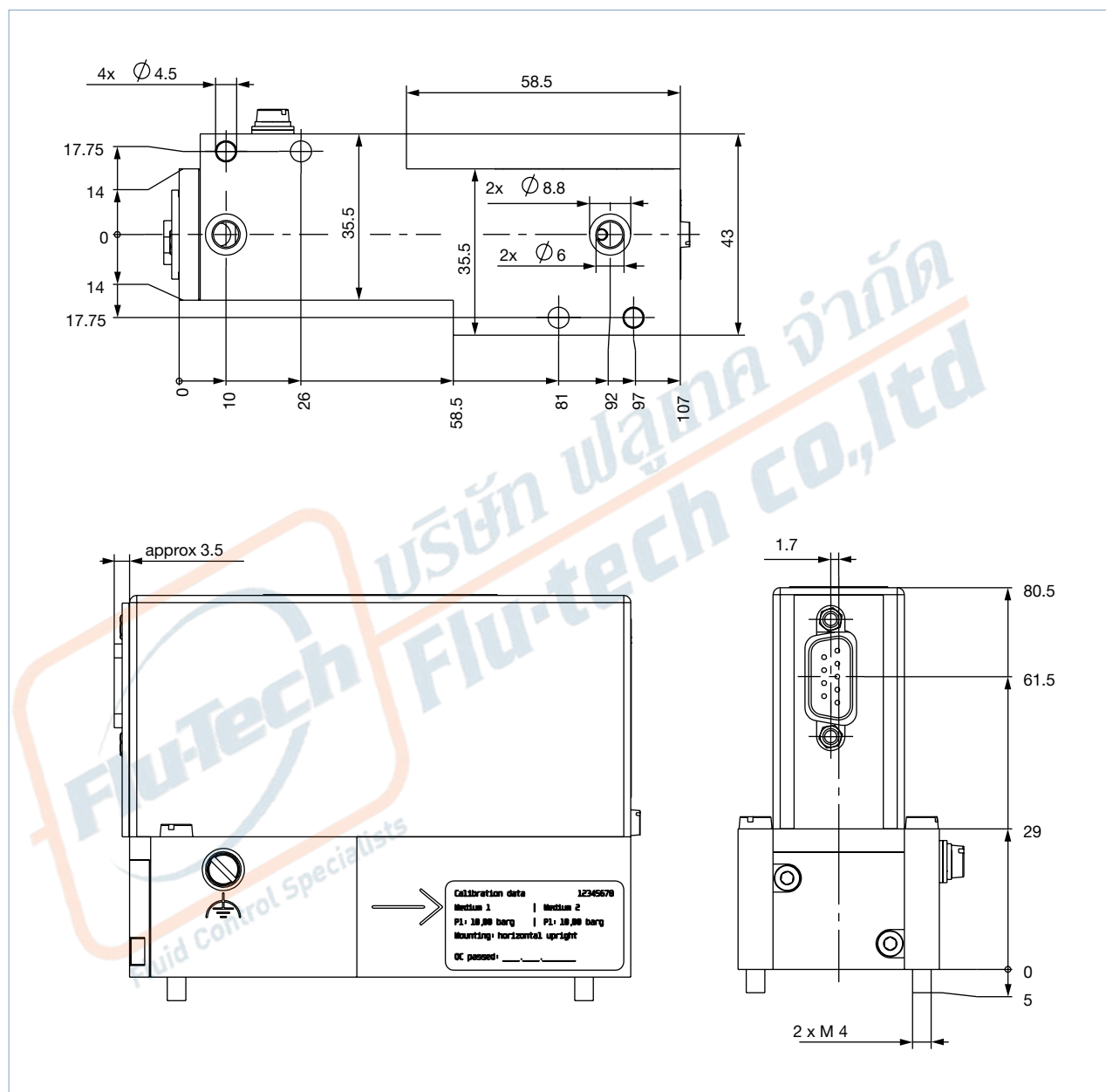
Dimensions in mm



### 3.2. Sub-base version

**Note:**

Dimensions in mm

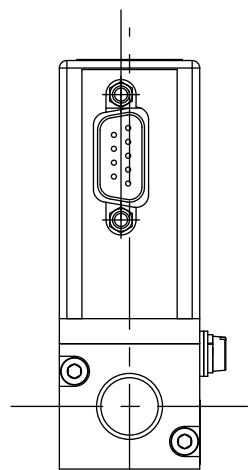


## 4. Device/Process connections

### 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.



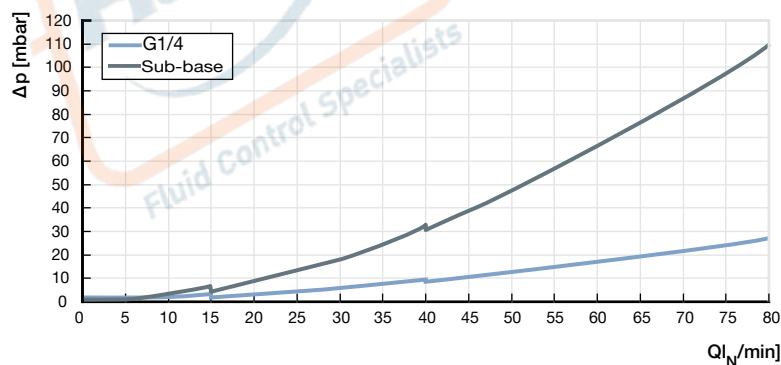
Plug D-Sub, 15 pin		Pin	Assignment
Analogue control unit			
		1	Binary input (related to GND Pin2)
		2	GND
		3	Power supply +24 V DC
		4	Relay, normally opened
		5	Relay, normally closed
		6	TX+ (RS485-Y) – bridge with pin 9 at half duplex
		7	TX- (RS485-Z) – bridge with pin 8 at half duplex
		8	RX-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



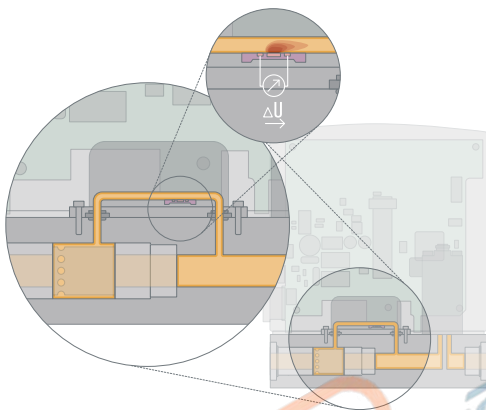


## 6. Product operation

### 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.

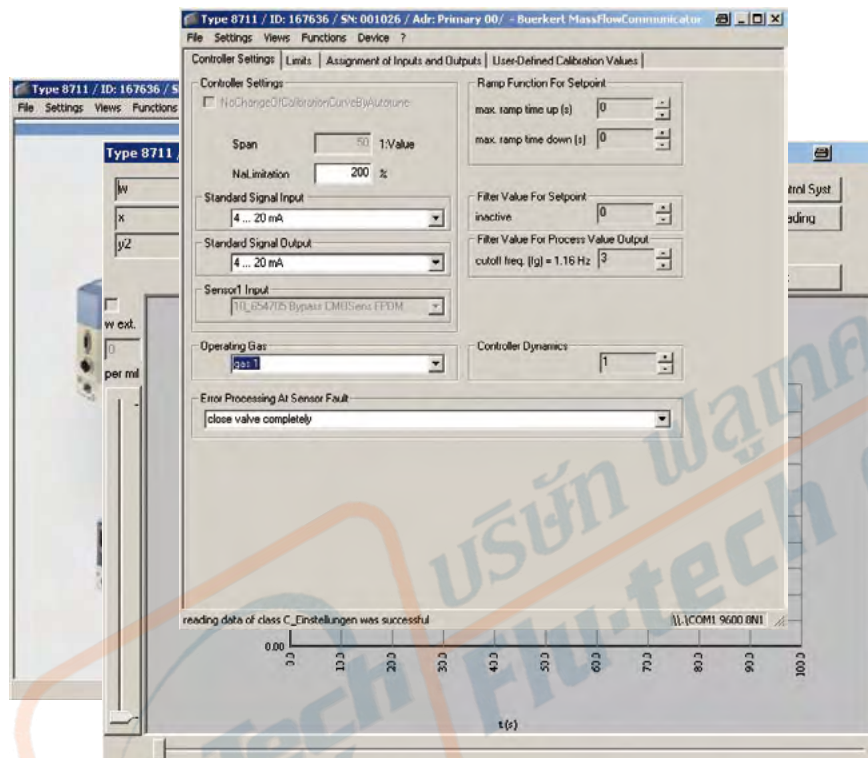
Gas	Min. $Q_{\text{Nom}}$ [l <sub>N</sub> /min]	Max. $Q_{\text{Nom}}$ [l <sub>N</sub> /min]
Argon	0.01	80
Helium	0.01	500
Carbon dioxide	0.02	40
Air	0.01	80
Methane	0.01	80
Oxygen	0.01	80
Nitrogen	0.01	80
Hydrogen	0.01	500

### 6.3. Software Bürkert Communicator

**Note:**

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

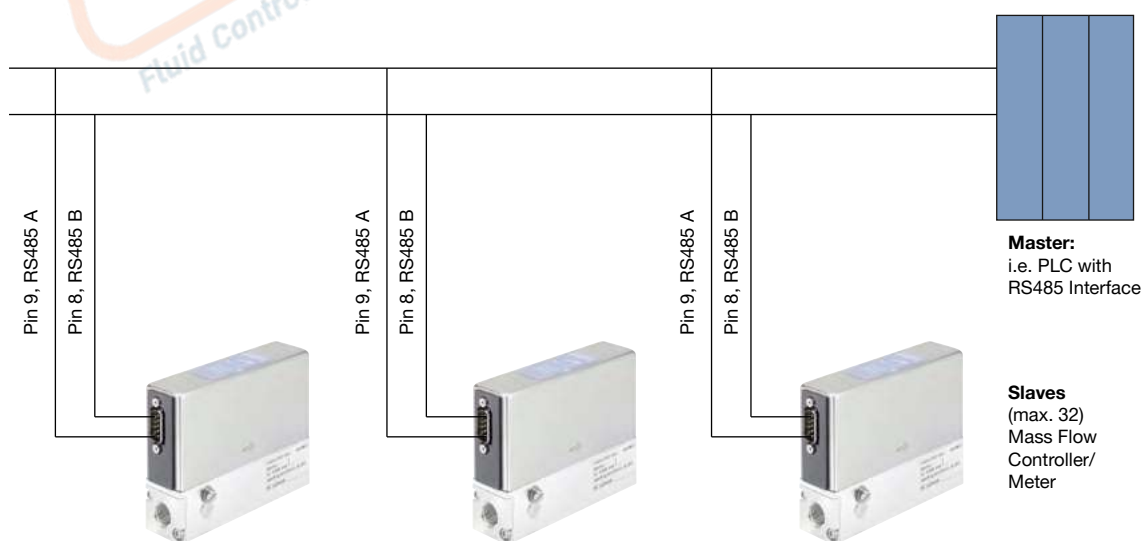
The communication software allows the user to program additionally various functions. For that purpose the MFC or MFM has to be connected to the computer by a RS232 adapter.



### 6.4. Networking

**Note:**

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





## 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.
<b>Connections/Cables</b>	
Socket D-Sub 9 pin solder connection	917623
<b>Adapter accessories</b>	
USB adapter (Version 1.1, USB socket type B)	670693
USB connection cable 2 m	772299
Communication software Mass Flow Communicator	<b>LINK</b>