







Mass Flow Meter (MFM) for Gases

- Nominal flow ranges from 0.005 l/min to 15 l/min
- High accuracy
- Applicable for aggressive gases
- Digital communication via RS485

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

Can be combined with

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

Type description

The mass flow meter (MFM) type 8705 is especially suited for measuring the mass flow of aggressive gases, which need a sensor which is not in direct contact with the gas. The thermal capillary sensor reaches fast response times. Type 8705 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.

Phase out

DTS 1000205124 EN Version: F Status: PO (Phase out) | Phase out | printed: 18.03.2025

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1. General technical data

Product properties	
Dimensions	Further information can be found in chapter "4. Dimensions" on page 5.
Material	
Seal	FKM, EPDM or FFKM
Housing	PC (polycarbonate) or metal
Base block	Stainless steel
Total weight	Approx. 850 g (stainless steel)
LED display	Status indication: 1. Power 2. Limit 3. Error
Performance data	
Nominal flow range (Q_N) ¹⁾	5...15 000 ml/min (N_2) ²⁾ Further information can be found in chapter "6.2. Nominal flow range of typical gases" on page 8.
Operating pressure ³⁾	Max. 10 bar (145 psi) (depending on the nominal valve size)
Measuring accuracy	± 1.5 % of reading ± 0.3 % FS (under calibration conditions and after 30 min warm-up time to achieve best measurement results)
Repeatability	± 0.1 % FS
Turndown ratio	1:50
Response time ($t_{95\%}$)	< 3 s
Electrical data	
Operating voltage	24 V DC
Power consumption	Max. 5 W
Residual ripple	< 2 %
Voltage tolerance	± 10 %
Electrical connection	D-Sub plug, 9-pin
Control valve (proportional valve)	Normally closed
Valve orifice	0.05...2.0 mm
K_{VS} value range	0.00006...0.09 m ³ /h
Medium data	
Operating medium	Neutral or aggressive gases
Calibration medium	Operating gas or N_2 (with conversion factor)
Medium temperature	- 10 °C...+ 70 °C (- 10 °C...+ 60 °C for oxygen)
Process/Port connection and communication	
Digital outputs	1 relay output: 1. Limit (desired value cannot be reached) Loading capacity: max. 25 V, 1 A, 25 VA
Digital inputs	Not assigned
Digital communication interface	Via RS485 (half duplex or full duplex), RS422 (see "8.4. Ordering chart accessories" on page 9)
Port connection	NPT 1/4, G 1/4, screw-in fitting, sub-base (others on request)
Approvals and conformities	
Degree of protection	IP40
Environment and installation	
Installation position	Horizontal or vertical
Ambient temperature	- 10...+ 50 °C

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 abs and 0 °C. Alternatively there is an Index S available which refers to 1.013 bar abs and + 20 °C.

3.) Overpressure to atmospheric pressure

2. Approvals and conformities

2.1. General notes

- The approvals and conformities listed below must be stated when making enquiries. This is the only way to ensure that the product complies with all required specifications.
- Not all available variants can be supplied with the below mentioned approvals or conformities.

2.2. Conformity

In accordance with the Declaration of Conformity, the product is compliant with the EU Directives.

2.3. Standards

The applied standards which are used to demonstrate compliance with the EU Directives are listed in the EU-Type Examination Certificate and/or the EU Declaration of Conformity.

3. Materials

3.1. 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](#)

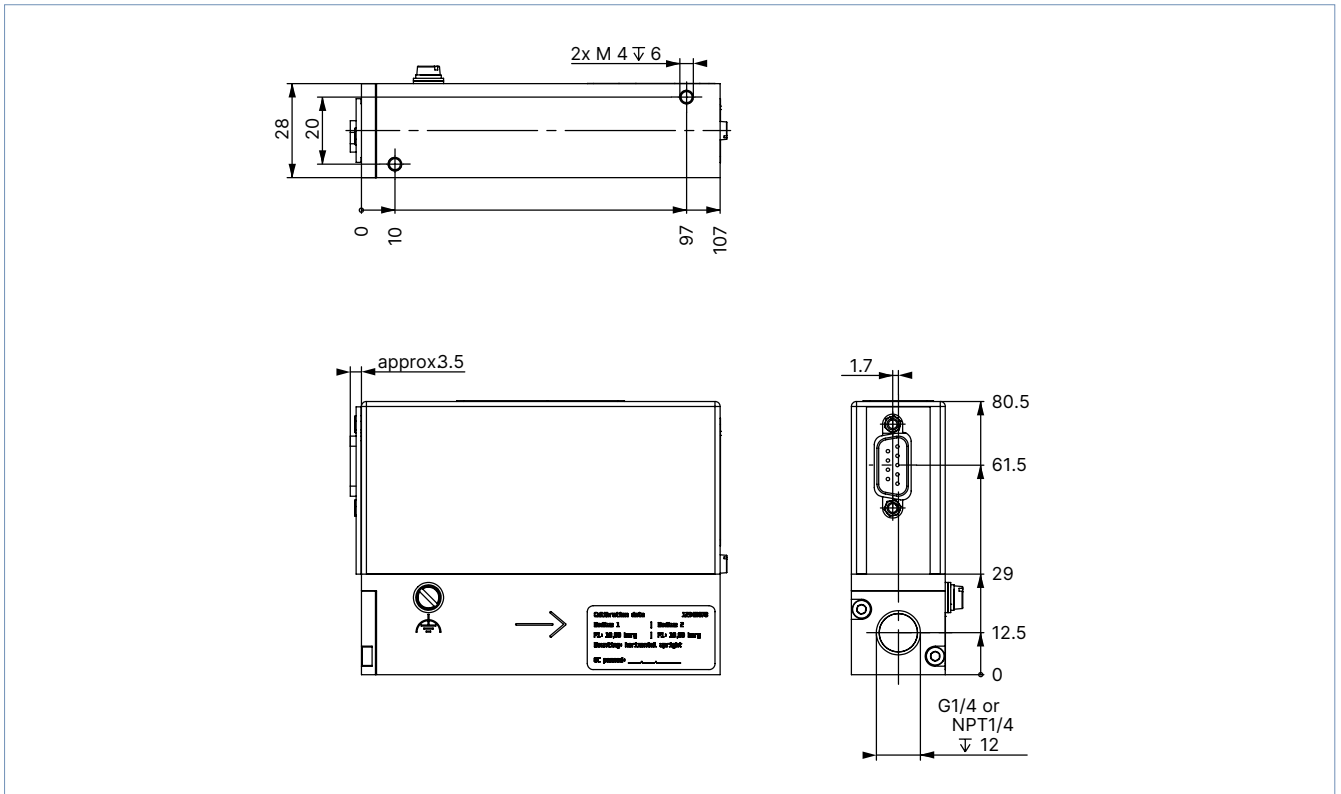
Phase out

4. Dimensions

4.1. Threaded variant

Note:

Dimensions in mm

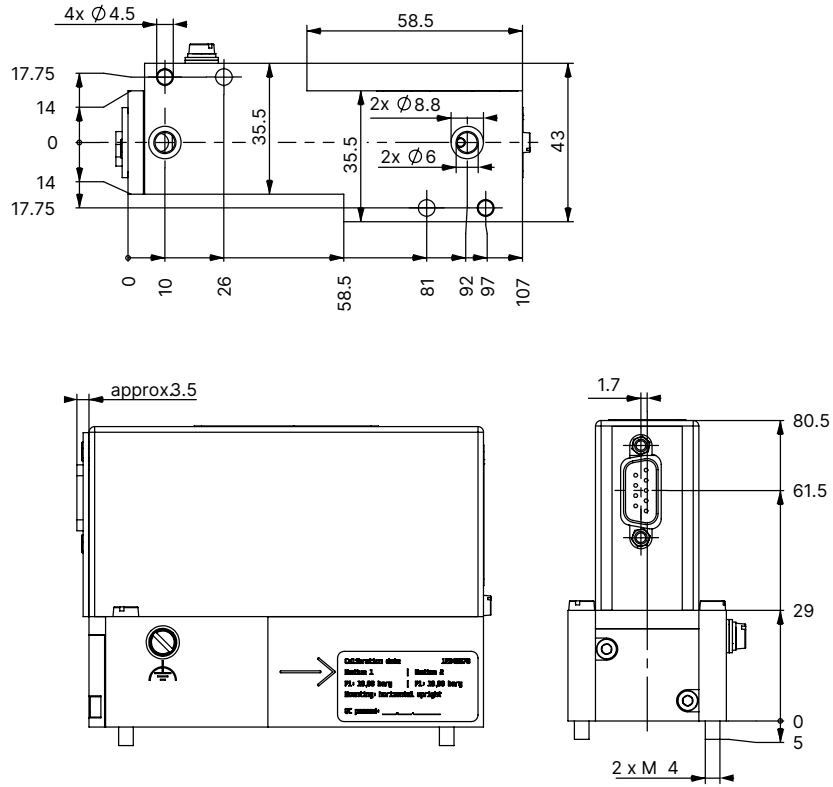


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4.2. Sub-base variant

Note:

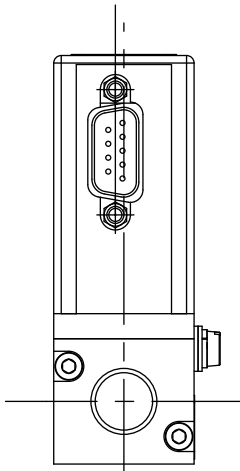
Dimensions in mm



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5. Device/Process connections

5.1. Analogue variant

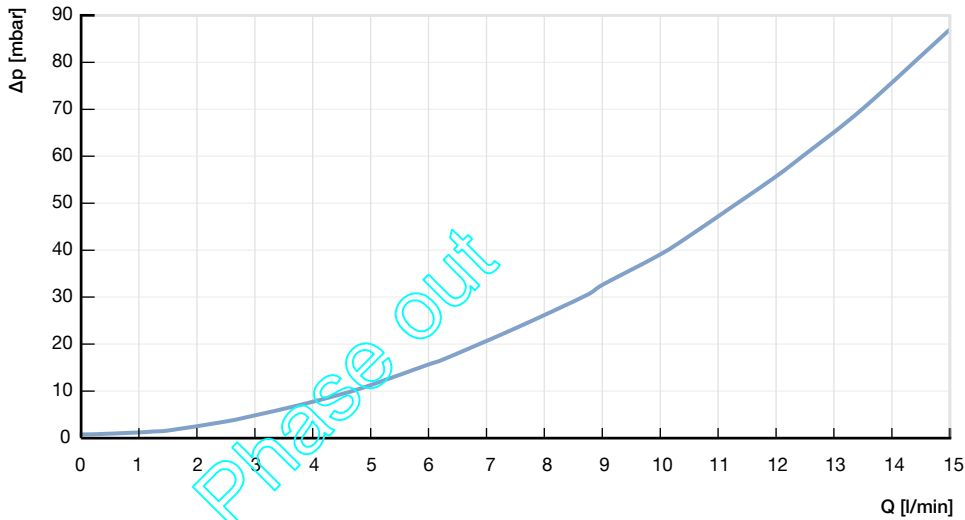


D-Sub socket, 9-pin		Pin	Assignment
Analogue control unit			
		1	Binary input (related to GND Pin 2)
		2	GND
		3	Power supply + 24 V DC
		4	Relay, normally opened
		5	Relay, normally closed
		6	TX+ (RS485-Y), bridge with pin 9 at half duplex
		7	TX- (RS485-Z), bridge with pin 8 at half duplex
		8	RX-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

6. Performance specifications

6.1. Pressure loss diagram

The diagram shows exemplarily the pressure loss characteristics when air flows through a flowmeter with a 1/4" pipe connection. To determine the pressure loss with another gas, you need to calculate the air equivalent and respect the fluidics needed with the other gas.



6.2. Nominal flow range of typical gases

Note:

- $Q(\text{Gas}) = f \times Q(\text{N}_2)$
- By using the gas factors it is possible that the accuracy is not within the datasheet specification. or applications which need high accuracy it is recommended to calibrate under application conditions.
- The compatibility of the sealing materials of the MFMs should be checked before use with another gas.

Gas	Factor f
N ₂	1.00
Air	1.00
O ₂	0.98
H ₂	1.01
Ar	1.4
He	1.42
CO ₂	0.77

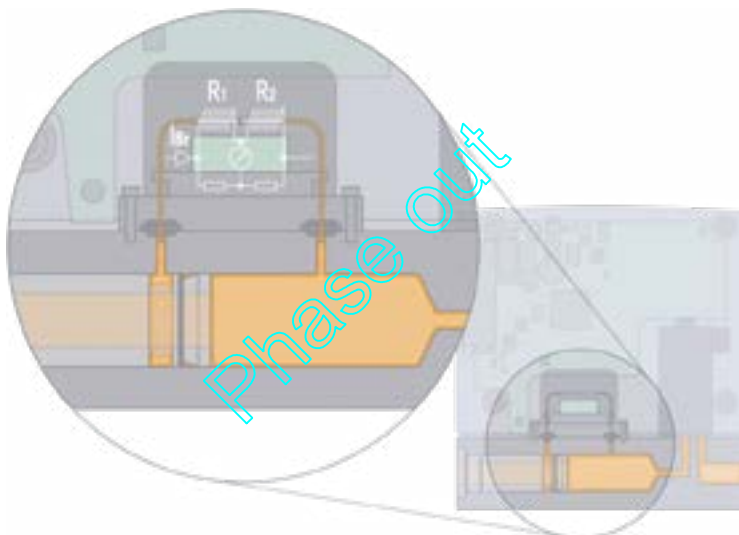
7. Product operation

7.1. Measuring principle

The measurement is based on the bypass principle. A laminar flow element in the main channel generates a small pressure drop. This drives a small flow, proportional to the main flow, through the bypass (sensor tube). Two heating resistors, which are connected in a measuring bridge, are wound on this stainless steel tube. In the zero-flow state, the bridge is balanced, but with flow, heat is transported in the flow direction and the bridge becomes unbalanced. The dynamics of the measurement is limited by the tube walls, which act as a thermal barrier. Through use of suitable software in the controller, response times are obtained (in the range of a few seconds) that are adequate for a wide range of applications.


With contaminated gases we recommend to install filter elements upstream. This avoids changes in the division ratio between main flow and sensor tube, as well as changes in the heat transmission caused by deposits on the walls of the sensor tube.

With these sensors even aggressive gases can be measured, because all essential parts in contact with the gas are fabricated in stainless steel. With this sensor principle it is also possible to convert between different gases.



8. Ordering information

8.1. Bürkert eShop



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8.2. Recommendation regarding product selection

Note:

Contact your Bürkert partner for device design.

The media compatibility, the maximum inlet pressure and the correct selection of the flow measuring span are decisive for the proper function of the device within the application. The pressure loss depends on the nominal flow rate and operating pressure.

8.3. Bürkert product filter



Bürkert product filter – Get quickly to the right product

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8.4. Ordering chart accessories

Description	Article no.
Connections/Cables	
Socket D-Sub, 9-pin, solder connection	917623
Adapters¹⁾	
USB adapter (Version 1.1, Type B USB socket)	670693
USB connection cable, cable length: 2 m	772299

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