DATA SHEET

Type 8711

bürkert
FLUID CONTROL SYSTEMS

Mass Flow Controller for Gases (MFC)

- Nominal flow ranges from 0.010 l_N/min to 80 l_N/min
- High accuracy and repeatability
- Very fast settling times
- Optional: Fieldbus interface

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

Can be combined with

Type 6606 ▸
2/2 or 3/2 way Rocker-Solenoid Valve with separating diaphragm

Type 6013 ▸
Plunger valve 2/2 way direct-acting

Type 0330 ▸
Direct-acting 2/2 or 3/2 way pivoted armature valve

Type 6027 ▸
Direct-acting 2/2 way plunger valve

Type description

The mass flow controller (MFC) Type 8711 is suited for regulating 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. A direct-acting proportional valve from Bürkert guarantees a high sensitivity. The integrated PI controller ensures outstanding control characteristics of the MFC. Type 8711 can optionally be calibrated for two different gases; the user can switch between these two gases. As electrical interfaces both, analog standard signals and fieldbuses are available. The mass flow controller type 8711 fits for various applications, like e.g. burner controls, heat treatment, material coatings, bio reactors, fuel cell technology or test benches.

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1. General Technical Data

Product properties	
Materials	
Basic block	Aluminium or stainless steel
Body	PC (Polycarbonate) or metal
Seal	FKM, EPDM
Dimensions	Detailed information can be found in chapter "3. Dimensions" on page 5.
Total weight	approx. 500 g (Aluminium)
LED display	Indication for power, limit (with analogue signals) / communication (with fieldbus) and error
Performance data	
Nominal flow range[1.] (Q_{Nom})	10 ml_N/min[2.]…80 l_N/min (N_2) Detailed information can be found in chapter "5.2. Flow characteristic" on page 9.
Measuring range	1:50, higher measuring range on request
Max. operating pressure	10 bar (145 psi) (depending on the nominal valve size)
Measuring accuracy	±0.8 % o. R. ±0.3 % F. S. (after 30 min. warm-up time)
Repeatability	±0.1 % F. S.
Response time (t95 %)	<300 ms
Electrical data	
Operating voltage	24 V DC
Power consumption	Max. 3.5…14 W (depending on the proportional valve used)
Voltage tolerance	±10 %
Residual ripple	<2 %
Electrical connection	Plug D-Sub, 15 pin with PROFIBUS DP: M12-Socket, 5 pin with CANopen: M12-Plug, 5 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 with oxygen)
Process/Port connection & communication	
Port connection	NPT ¼, G ¼, screw-in fitting or sub-base or flange, others on request
Fieldbus option	PROFIBUS-DP, CANopen
Digital outputs	1 Relay-output for setpoint not reached Load capacity: 25 V, 1 A, 25 VA
Digital inputs	Two 1. Start Autotune 2. Not assigned
Digital (communication) interface	RS232, Modbus RTU (via RS-Adapter), RS485, RS422 or USB (see "6.4. Ordering chart accessories" on page 11)
Analogue interfaces	4…20 mA, 0…20 mA, 0…10 V or 0…5 V Input impedance >20 kΩ (Voltage) resp. <300 Ω (Current) Max. load: 10 mA (Voltage output); max. load: 600 Ω (Current output)
Environment and installation	
Installation position	Horizontal or vertical
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.

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2. Materials

2.1. Chemical Resistance Chart – Bürkert resistApp

Bürkert resistApp – Chemical Resistance Chart

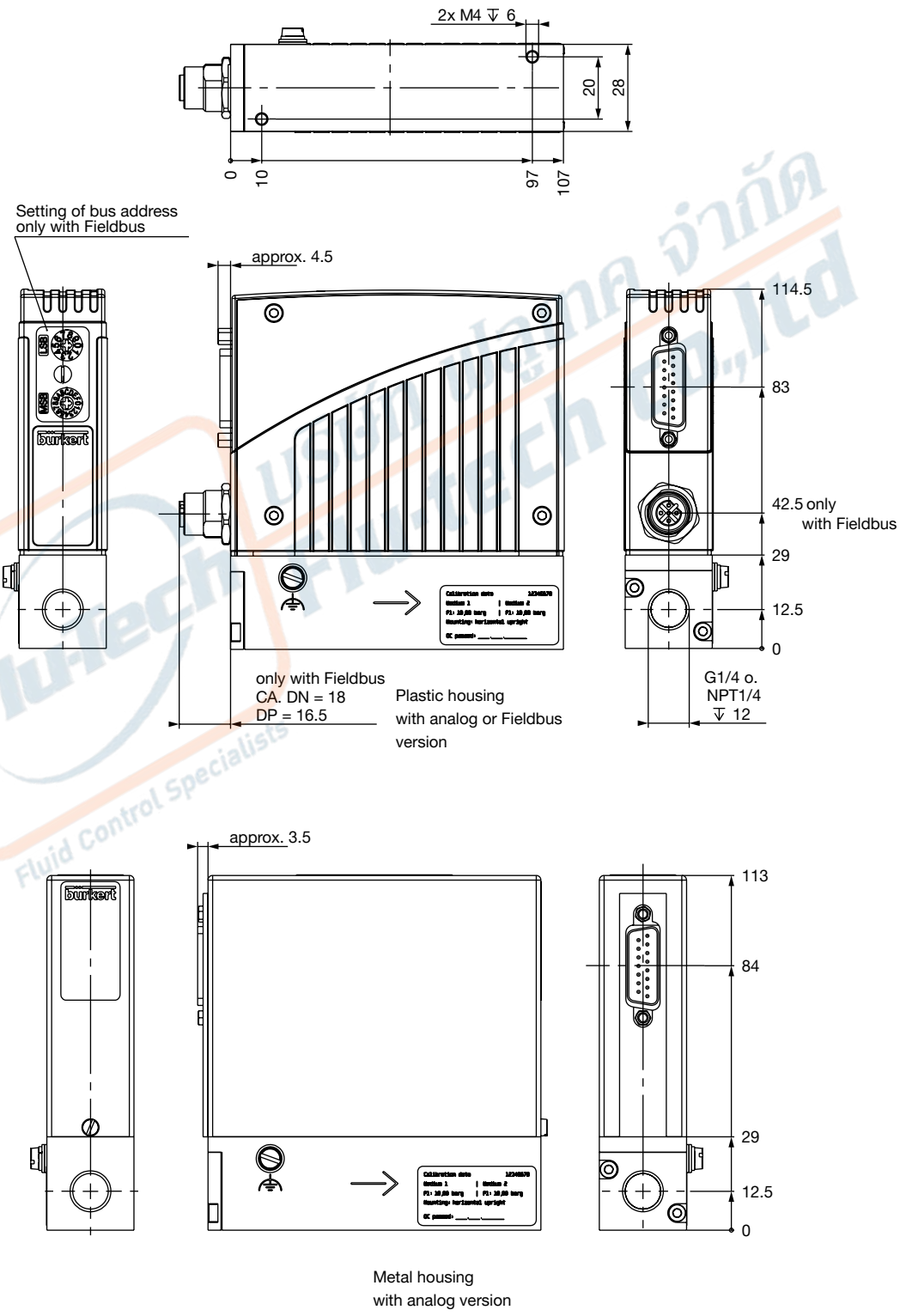
You want to ensure the reliability and durability of the materials in your individual application case? Verify your combination of media and materials on our website or in our resistApp.

Start Chemical Resistance Check

3. Dimensions

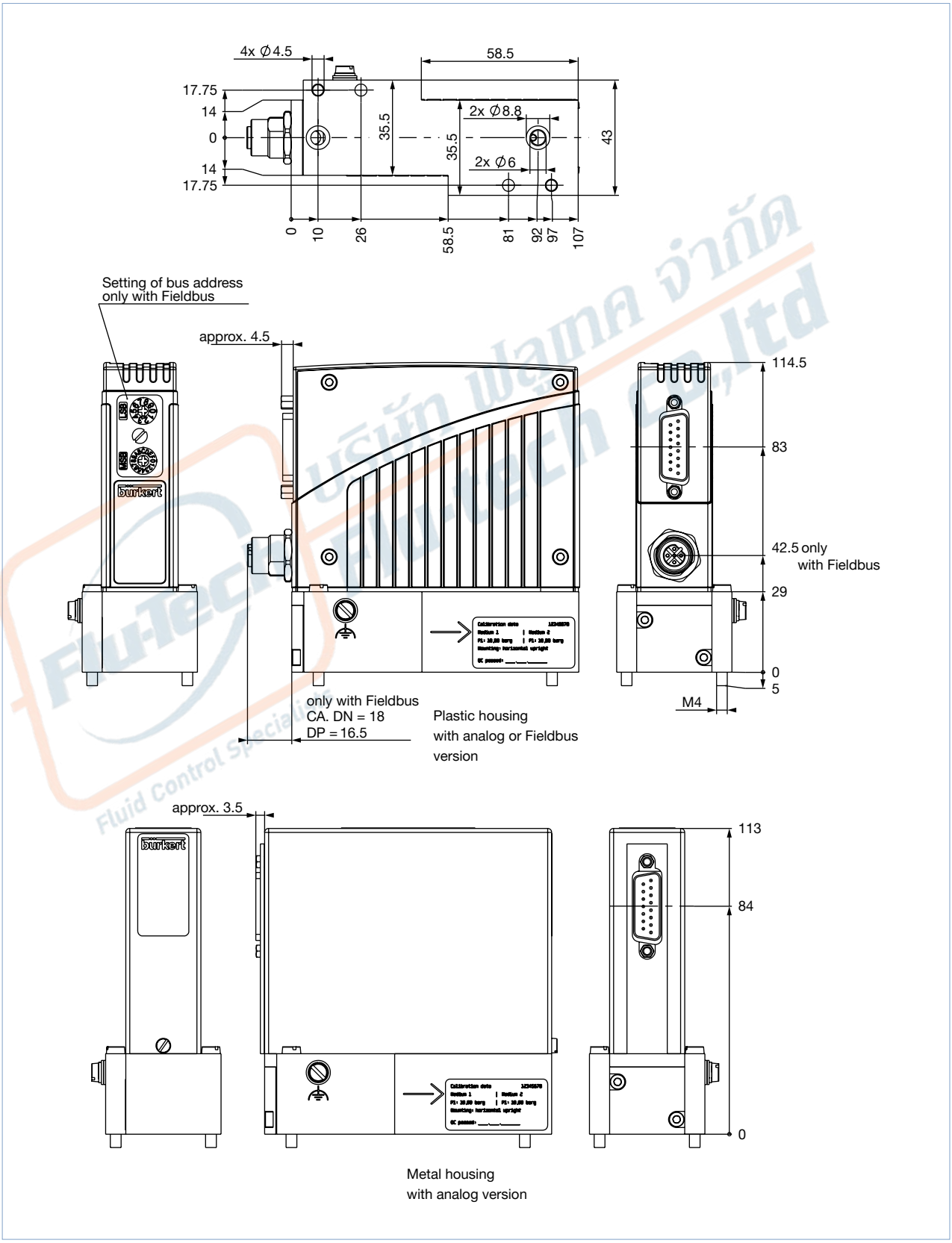
3.1. Standard version

Note:
Dimensions in mm



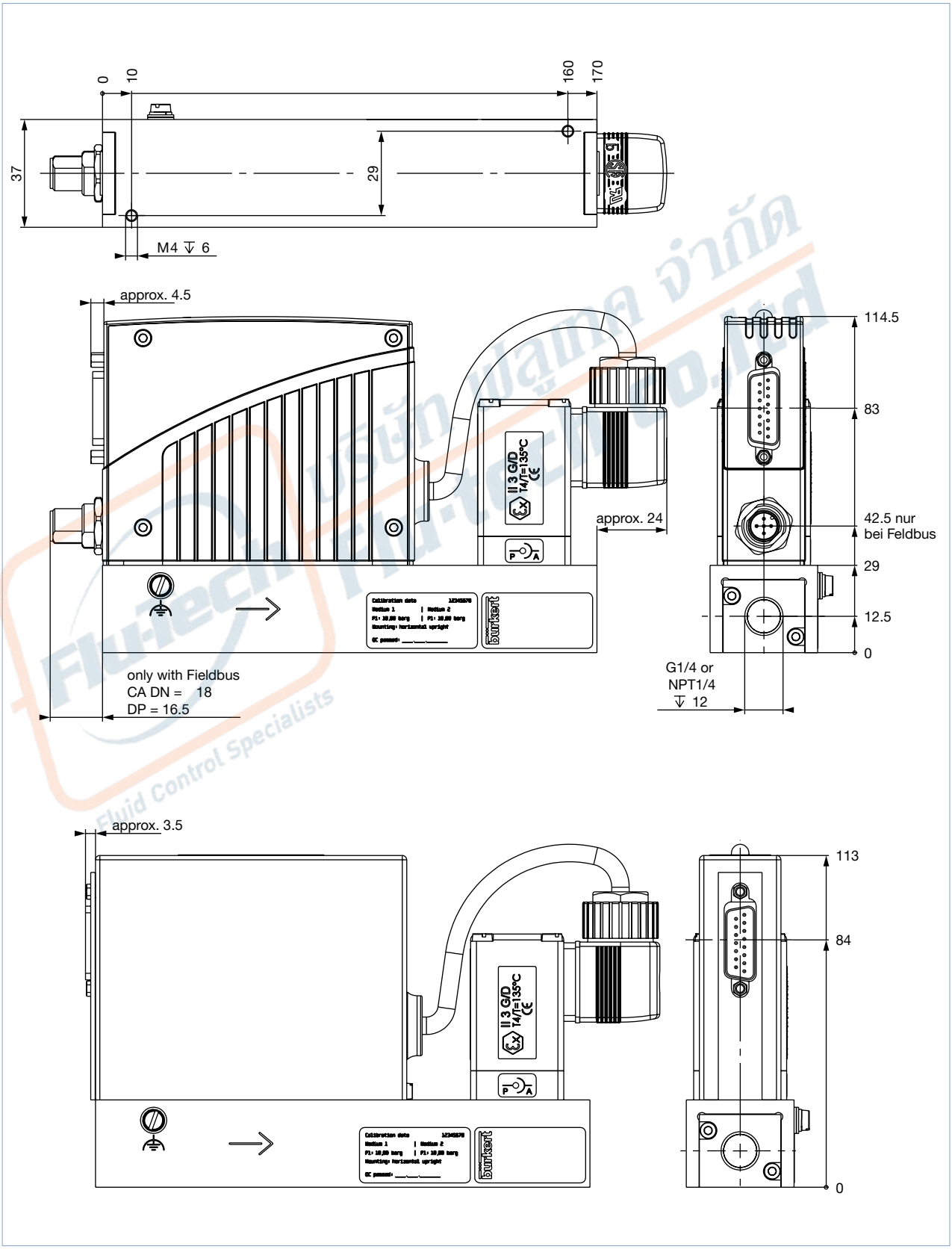
3.2. Sub-base version

Note:
Dimensions in mm



3.3. Version with external valve

Note:
Dimensions in mm

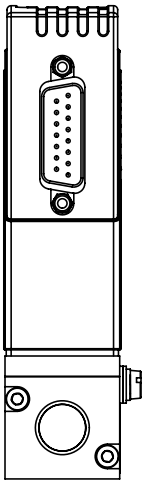


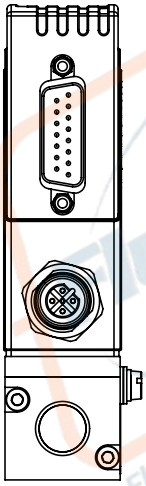
4. Device/Process connections

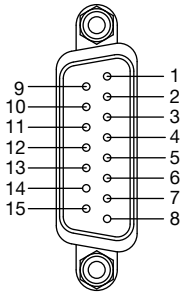
4.1. Analogue version/Fieldbus version

Note:

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

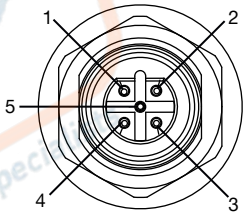


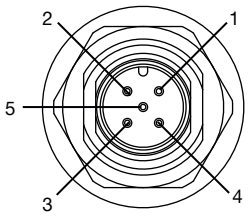


Plug D-Sub, 15 pin	Pin	Assignment	
		Analogue control unit	Bus control
	1	Relay – normally closed	
	2	Relay – normally open	
	3	Relay – middle contact	
	4	GND for 24 V-supply and binary inputs	
	5	24 V-supply +	
	6	12 V-Output (only for internal company use)	
	7	Set value input GND	Not connected
	8	Set value input +	Not connected
	9	Actual value output GND	Not connected
	10	Actual value output +	Not connected
	11	DGND (for RS232)[1.]	
	12	Binary input 1	
	13	Binary input 2	
	14	RS232 RxD (without driver)[1.]	
	15	RS232 TxD (without driver)[1.]	

1.) Driving RS232 interface only by RS232 adapter including an adaption of TTL levels

With Fieldbus version

PROFIBUS DP – socket B-coded M12 (DPV1 max. 12 MBaud)	Pin	Assignment
	1	VDD (only for termination resistor)
	2	RxD/TxD – N (A-Line)
	3	DGND
	4	RxD/TxD – P (B-Line)
	5	Not connected

CANopen – Plug M12	Pin	Assignment
	1	Shield
	2	Not connected
	3	DGND
	4	CAN_H
	5	CAN_L

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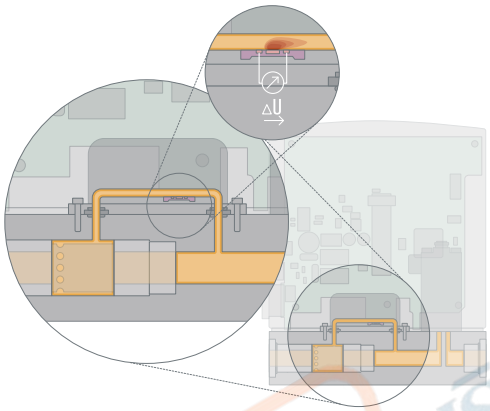
5. Product operation

5.1. 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.



5.2. Flow characteristic

Nominal flow range of typical gases

Note:

- Q(Gas) = f x Q(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} [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

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6. Ordering information

6.1. 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

6.2. Recommendation regarding product selection

Note:
Please use the **„Product Enquiry Form“** at the end of this document for unit design details and send us a copy of the enquiry with information about the application.

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 **„Product Enquiry Form“** at the end of this document 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_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.

6.3. Bürkert product filter

Bürkert product filter – Get quickly to the right product

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Try out our product filter

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6.4. 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 15 pin solder connection	918274
Hood for D-Sub socket, with screw locking	918408
Socket D-Sub 15 pin with 5 m cable	787737
Socket D-Sub 15 pin with 10 m cable	787738
Adapters[1.]	
RS232 adapter	654748
PC extension cable for RS232 9 pin socket/plug 2 m	917039
RS422 adapter (RS485 compatible)	666371
USB adapter (Version 1.1, USB socket type B)	670639
USB connection cable 2 m	772299
Communication software Mass Flow Communicator	**LINK** ▶
Accessories for Fieldbus	
PROFIBUS-DP (B-coded)	
Plug M12[2.]	918198
Socket M12 (coupling)[2.]	918447
Y-junction[2.]	902098
Termination resistor	902553
GSD-File (PROFIBUS), EDS-File (CANopen)	**LINK** ▶
CANopen (A-coded)	
Plug M12[2.]	917115
Socket M12 (coupling)[2.]	917116
Y-junction[2.]	788643
Termination resistor	On request
GSD-File (PROFIBUS), EDS-File (CANopen)	**LINK** ▶

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

2.) The M12 single connectors as listed here are not suitable for their simultaneous use with the Y-piece for reasons of space. Please always use at least one commercially available overmoulded cable whose connector is usually smaller.

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6.5. Adapter sketch