

Mass Flow Meter (MFM) for Gases

8701

- Direct flow measurement for nominal flow rates from 10 mlN/min to 80 lN/min (N₂) in MEMS technology
- High accuracy
- Short response time
- Optional Fieldbus



Mass flow meters 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 either 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 on pressure and the temperature.

The digital mass flow meter, Type 8701, uses a sensor on silicon chip basis (see the description on page 2) located directly in the bypass channel. Due to the fact that the sensor is directly in the bypass channel a very short response time of the MFM is reached. The actual flow is given as an analog output signal or could be read out over RS communication. Type 8701 can optionally be calibrated for two different gases, the user is able to switch between these two gases. The materials of the parts that come into contact with the medium are selected according to customer specification so that the unit can be operated with the complete range of standard process gases.

Typical application areas are gas flow measurement in

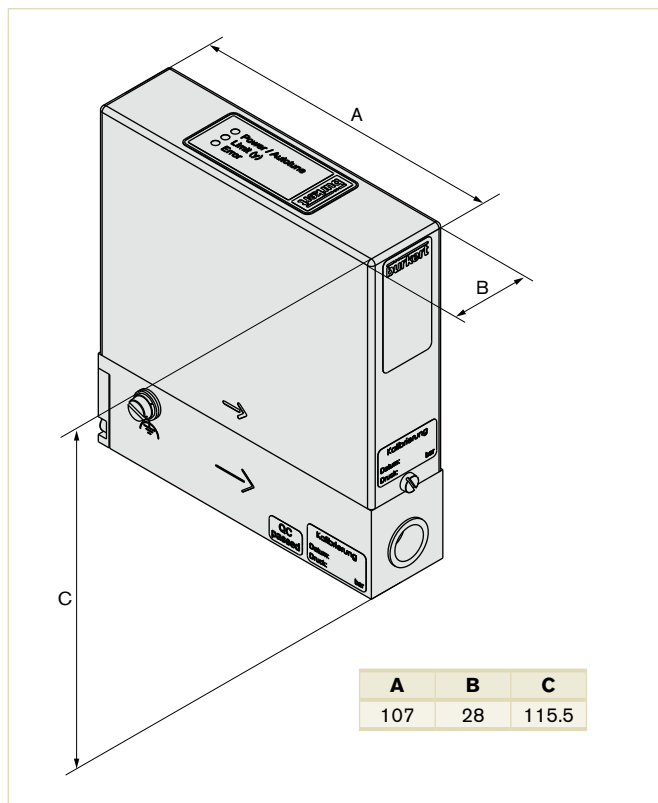
- Test benches
- Environmental technology
- Medical technology and
- Analytical instruments

Note: With the free downloadable communication software, numerous other functions can be programmed. To do this, the MFC / MFM should be connected via an adapter to a computer.

Technical Data

Nominal flow range¹⁾ (Q_{nom})	10 ml _N /min ²⁾ to 80 l _N /min (N ₂),
Span	1:50 (2-100%), (higher span on request)
Operating medium	Neutral, non-contaminated gases, (others on request)
Calibration medium	Operating gas or air with correction function
Max. operating pressure (Inlet pressure)	10 bar (145 psi)
Medium temperature	-10 °C to +70 °C (-10 °C to +60 °C with oxygen)
Ambient temperature	-10 °C to +50 °C
Measuring accuracy (after 1 min. warm up time)	±0.8% o. R. (of reading) ±0.3% F. S. (of full scale)
Repeatability	±0.1% F.S. (of full scale)
Response time (t_{95%})	< 300 ms
Materials	
Body	Aluminium or stainless steel
Housing	PC (Polycarbonate) or metal
Seals	FKM, EPDM
Port connection	G 1/4", others on request
Electr. connection	Plug D-Sub 15-pin
Additionally with Fieldbus:	with PROFIBUS DP: Socket M12 5-pin with DeviceNet/CANopen: Socket M12 5-pin
Power supply	24V DC
Voltage tolerance	±10%

Dimensions [mm] (see datasheet for more details)



Technical Data (continued)

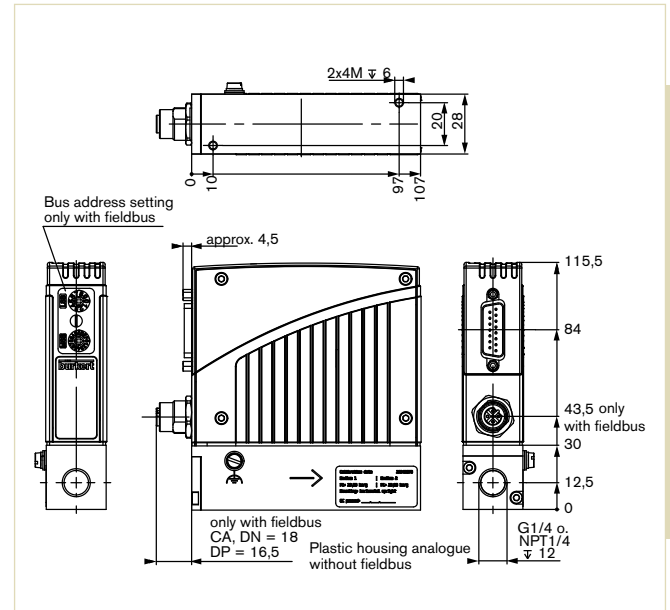
Residual ripple	< 2%
Power consumption	2.5 W
Output signal	0-5 V, 0-10 V, 0-20 mA or 4-20 mA
Max. current (voltage)	10 mA
Max. load (current)	600 Ω
Digital communication	RS232, Modbus RTU (via RS adapter)
via adapter possible:	RS485, RS422 or USB
Fieldbus option	PROFIBUS DP, DeviceNet, CANopen
Type of protection	IP40
Total weight	ca. 500 g (aluminum)
Installation	horizontal or vertical
Light emitting diodes	Indication for power, (default functions, other functions programmable)
	Limit (with analog signals) / Communication (with Fieldbus) and error
Binary inputs	Two
(default functions, other functions programmable)	1. not assigned
	2. not assigned
Binary output	A relay output for:
(default functions, other functions programmable)	1. Limit (actual value close to Q_{nom})
	Max. Load: 25V, 1A, 25VA

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.

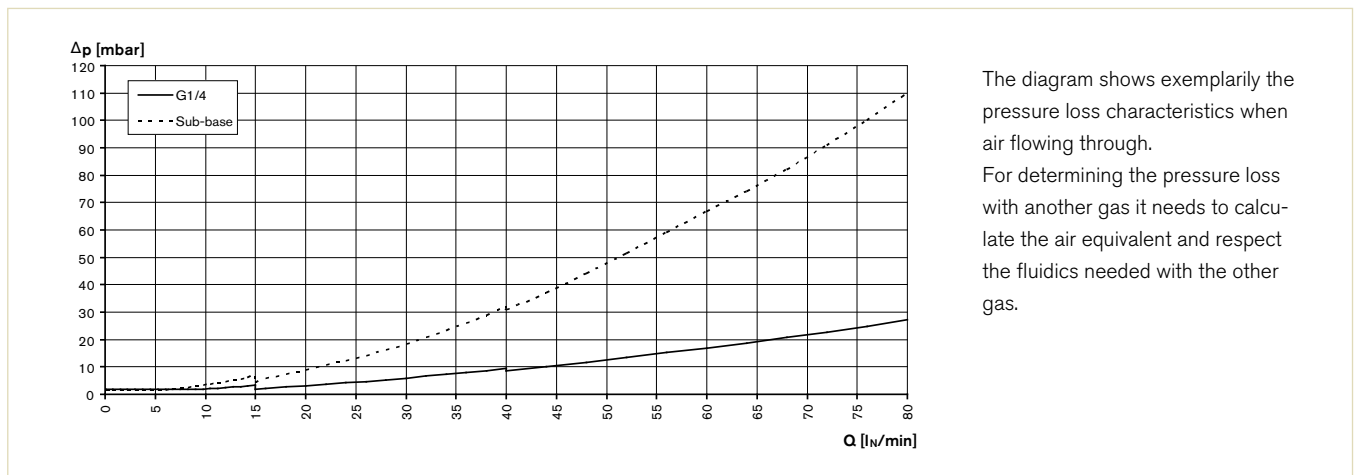
²⁾ Index N: Flow rates referred to 1.013 bar and 0° C.

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

Dimensions [mm] (see datasheet for more details)



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.

Nominal Flow Range of Typical Gases (Other gases on request)

Gas	Min. Q_{Nenn} [l _N /min]	Max. Q_{Nenn} [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

Ordering chart

Operating gas	Flow rate - Full scale	Base block Aluminium	Seal material	Operating pressure [bar(ü)]	Signal actual value output	Item no.
Type 8701						
Air	100 cm ³ N/min	x	FKM	1	4 - 20 mA	180 866
Air	500 cm ³ N/min	x	FKM	1	4 - 20 mA	219 568
Air	1 IN/min	x	FKM	3	0 - 10 V	226 222
Air	5 IN/min	x	FKM	1	0 - 10 V	202 858
Air	10 IN/min	x	FKM	5	4 - 20 mA	252 074
Air	25 IN/min	x	FKM	5	4 - 20 mA	171 006
Air	50 IN/min	x	FKM	5	4 - 20 mA	174 412
Air	80 IN/min	x	FKM	5	4 - 20 mA	241 884
Hydrogen	1 IN/min	x	FKM	5	4 - 20 mA	251 554
Hydrogen	10 IN/min	x	FKM	2	0 - 10 V	235 503
Hydrogen	100 IN/min	x	FKM	4	4 - 20 mA	182 567
Hydrogen	200 IN/min	x	FKM	4	4 - 20 mA	212 355
Dioxygen	20 IN/min	x	FKM	4	4 - 20 mA	253 550
Dioxygen	3 m ³ N/h	x	FKM	4	4 - 20 mA	181 207
Argon	10 IN/min	x	FKM	5	4 - 20 mA	235 159
Argon	30 IN/min	x	FKM	4	4 - 20 mA	174 419

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.

8701

Accessories

Article	Item No.	
Connections/Cables		
Socket D-Sub 15-pin solder connection		918 274
Hood for D-Sub socket, with screw locking		918 408
Socket D-Sub 15-pin with 5 m cable		787 737
Socket D-Sub 15-pin with 10 m cable		787 738
Adapters ¹⁾		
RS232 adapter (for connection of a PC, in combination with the PC cable)		654 748
PC extension cable for RS232 9-pin socket/plug 2 m		917 039
RS422 adapter (RS485 compatible)		666 371
USB adapter (Version 1.1, USB socket type B)		670 639
Communication software MassFlowCommunicator		Download from www.buerkert.com
Accessories for Fieldbus	PROFIBUS DP (B-coded)	DeviceNet, CANopen (A-coded)
Plug M12 ²⁾	918 198	917 115
Socket M12 ²⁾	918 447	917 116
Y-junction ²⁾	902 098	788 643
Terminating resistor	902 553	(on request)
GSD-File (PROFIBUS), EDS-File (DeviceNet, CANopen)	Download from www.buerkert.com (see Type 8701)	

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

²⁾ The two M12 connectors as listed above cannot be used together on the same side of the Y-junction. At least one of the two M12 connection needs to be an overmoulded cable which uses typically a thinner connector. A T-junction cannot be used together with this type of MFM.