



## Mass Flow Controller (MFC)/ Mass Flow Meter (MFM) for Gases

- Direct flow measurement for nominal flow rates from 10 ml<sub>N</sub>/min to 80 l<sub>N</sub>/min (N<sub>2</sub>) in MEMS technology
- High accuracy and repeatability
- Protection class IP65
- Communication via fieldbus based on CANopen
- Optional: ATEX II Cat. 3G/D

Type 8742 can be combined with...



### Type ME2X

System Control Unit with  
Gateway functionality



Type 8742 can be configured either as MFC or MFM and is intended for the use in a büS or CANopen network. The büS network technology which is based on CAN physics was developed by Bürkert especially for applications with quite a number of control loops run by Industrial Ethernet or other fieldbuses. The System Control Unit (SCU) Type ME2X (please see datasheet) transfers a customer's PLC fieldbus into the proprietary büS communication and operates all connected electronic devices. The communication of the devices can be switched from büS to CANopen. Given that, Type 8742 can also be integrated into an existing CANopen infrastructure.

Type 8742 measures (MFM) or controls (MFC) the mass flow of gases using a MEMS sensor. The sensor is in direct contact with the gas and therefore reaches very fast response times of a few hundred milliseconds. Furthermore, the measurement is independent from pressure or temperature deviations. The MFC/MFM can be optionally calibrated for two different gases, the user is able to switch between them. A direct-acting solenoid control valve from Bürkert's excellent 287x series as regulating unit ensures high sensitivity and good flow control of the device. Type 8742 is especially designed for use in harsh environments due to high IP and explosion protection. (see p. 2)

Technical data	
<b>Nominal flow range</b> (Q <sub>nom</sub> )	10ml <sub>N</sub> /min to 80 l <sub>N</sub> /min (N <sub>2</sub> )
<b>Turn-down ratio</b>	50:1, optional 100:1
<b>Operating medium</b>	Neutral, non-contaminated gases, (others on request)
<b>Calibration medium</b>	Operating gas or air
<b>Max. operating pressure</b>	10 bar (145 psi), with MFCs the max. pressure depends on the orifice of the valve
<b>Medium temperature</b>	-10 °C to +70 °C (-10 °C to +60 °C with oxygen)
<b>Ambient temperature</b>	-10 °C to +50 °C (higher temperatures on request)
<b>Accuracy</b>	±0.8% o.R. ±0.3% F.S. (after 1 min. warm up time)
<b>Repeatability</b>	±0,1% F.S.
<b>Settling (MFC)/ response (MFM) time (t<sub>95%</sub>)</b>	< 300 ms
<b>Materials</b>	Body Housing Seals
	Stainless steel or aluminium Aluminium die casting (coated) FKM or EPDM (depending on gas)
<b>Port connection</b>	NPT 1/4, G 1/4, screw-in fitting or subbase, others on request

Technical data	
<b>Control valve</b> (prop. valve)	normally closed
Valve orifice range	0,05 to 4 mm
k <sub>s</sub> value range	0,00006 to 0,32 m <sup>3</sup> /h
<b>Electr. connection</b>	M12 plug, 5-pin
<b>Operating voltage</b>	24V DC
<b>Voltage tolerance</b>	± 10%
<b>Power consumption</b>	Max. 1 W (as MFM), Max. 3 to 10 W (as MFC, independent from Proportional valve Type)
<b>Residual ripple</b>	± 2%
<b>Digital Comm.</b>	CANopen or CAN based büS
<b>Removable memory</b>	EEPROM (SIM card: büS relevant data and information about spec. control loop in order to ease replacement)
<b>Input-/ Output signals</b>	none, communication via bus
<b>Protection class</b>	IP65 and IP67
<b>ATEX compliance</b>	II 3G Ex nA IIC T* Gc X and II 3D Ex tc IIIC T***°C Dc X <sup>1)</sup>
<b>Dimensions</b>	See drawings on pages 4 to 6
<b>Total weight</b>	ca. 950 g (stainless steel body)
<b>Installation</b>	Horizontal or vertical
<b>Device status</b>	RGB-LED based on NAMUR NE107

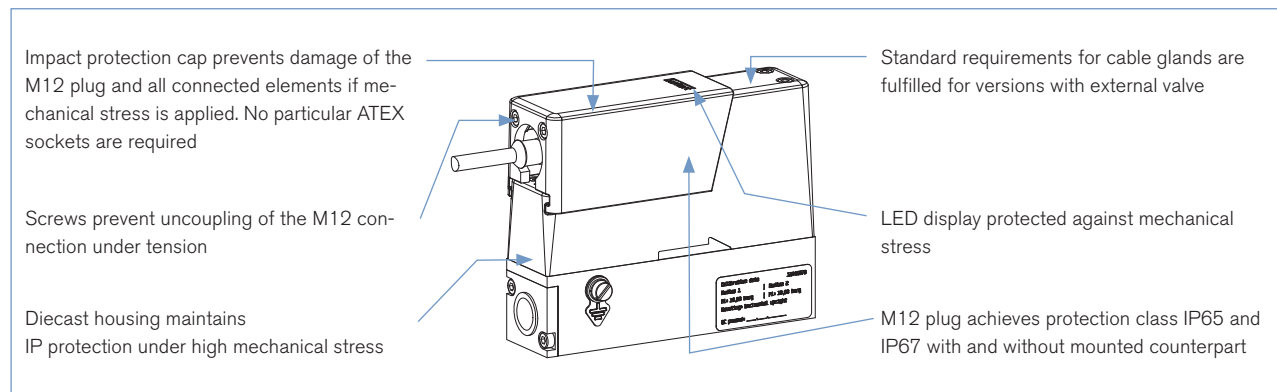
<sup>1)</sup> acc. to DIN EN 60079-0 and DIN EN 60079-15, T3/4 and T160°C/135°C depending on the device version

## Nom. flow ranges of typical Gase<sup>2)</sup>

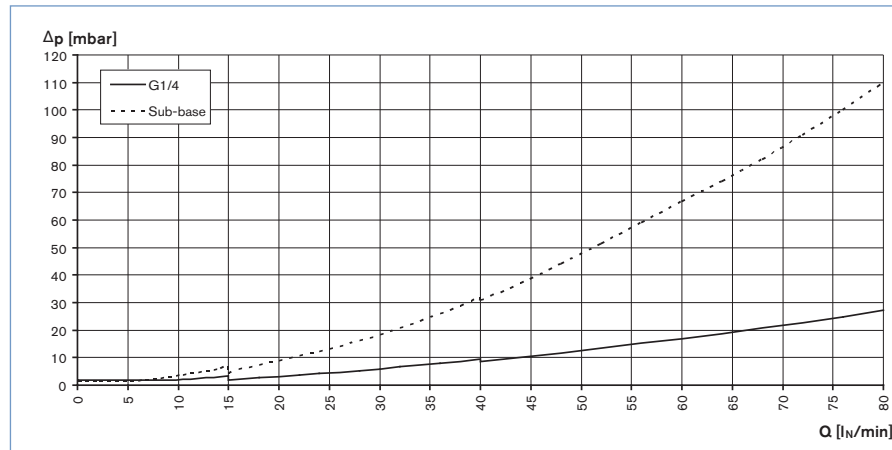
Gas	Min. $Q_{Nenn}$ [l <sub>N</sub> /min]	Max. $Q_{Nenn}$ [l <sub>N</sub> /min]
Argon	0.01	80
Helium	0.01	500
Carbon dioxide	0.02	40
Air	0.01	80
Methane	0.01	80
Oxygen	0.01	80
Nitrogen	0.01	80
Hydrogen	0.01	500
Propane	0.03	22

<sup>2)</sup> All values refer to 1,013 bara and 0 °C (Index N)

## Features to fulfill the ATEX requirements



## Pressure Loss Diagram of a MFM (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.

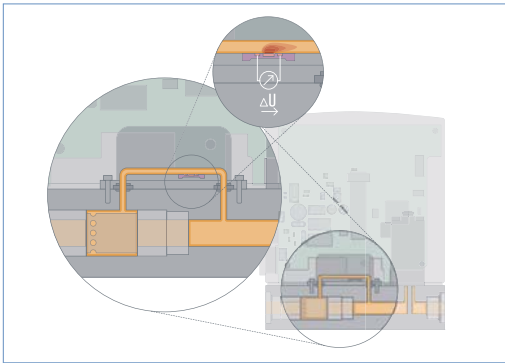
## Notes Regarding the Configuration

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 ( $p_{11}$ ,  $p_2$ ) 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 request for quotation form on p. 8 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  $p_{1max}$  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.

► **The request form on page 8 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.**

### Measuring Principle



The actual flow rate is detected by a sensor. This 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.

### Software Bürkert Communicator



Part of Bürkert's new EDIP program (Efficient Device Integration Platform) is the Bürkert Communicator. This software can be run under MS-Windows and it is available on Bürkert's website for free. The Bürkert Communicator allows convenient system configuration and parameterisation of all connected field devices. An accessory part, the büS stick – please see ordering chart for accessories – serves as the interface between computer and process instruments. It transfers "USB data" to "CAN data". The Communicator allows:

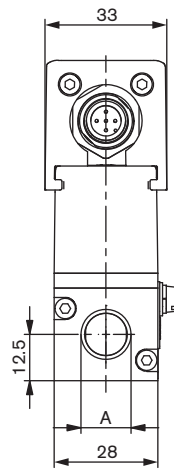
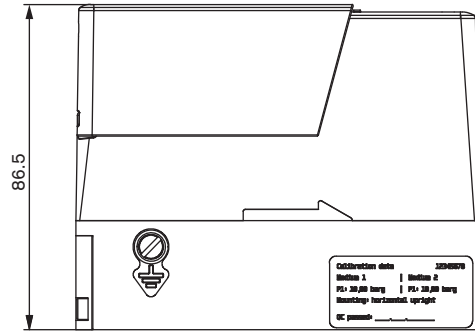
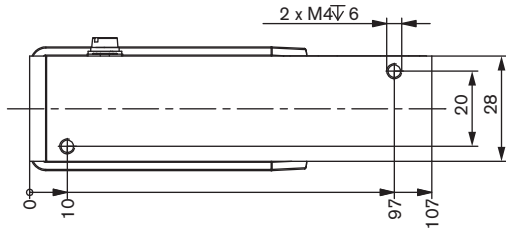
- Diagnosis - Parameterization - Registration and storage of process data. The Communicator allows:
- Diagnosis
- Parameterization
- Registration and storage of process data
- Data logging
- To watch graph of process
- To update firmware of the büS device connected
- To program system controls by User-f(x) – e.g. gas blending
- guided re-calibration
- ...

### Pin Configuration

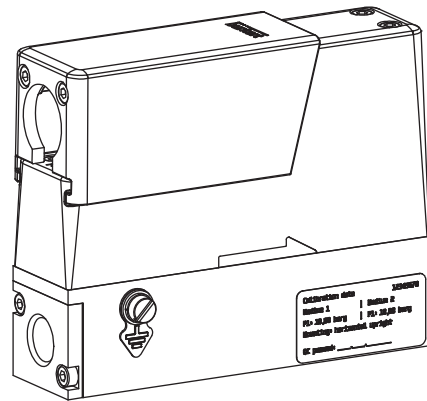
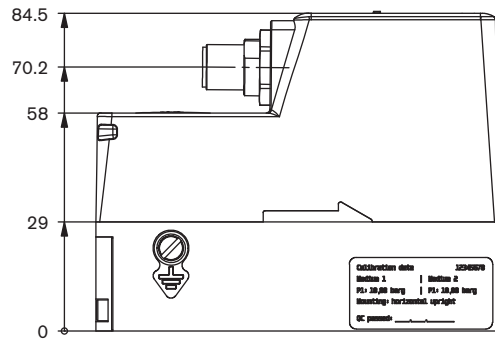
M12 Plug, 5-pin (A-coded)	Pin	Configuration
	1	SHIELD
	2	V+
	3	DGND
	4	CAN_H
	5	CAN_L

Dimensions [mm]

Standard Version

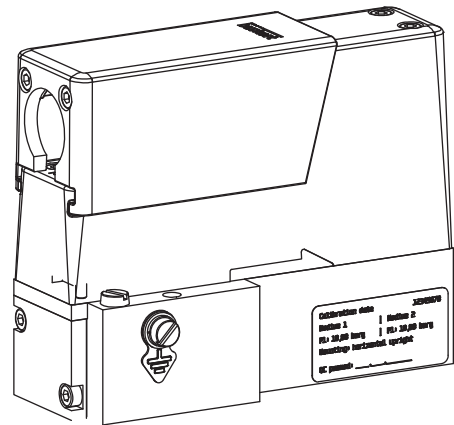
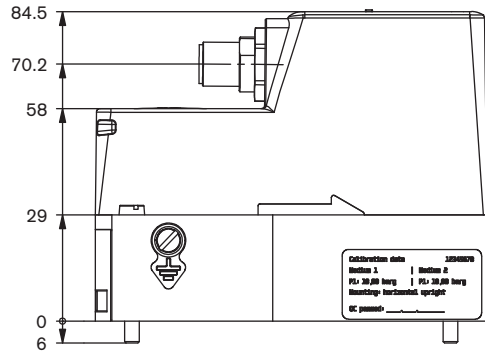
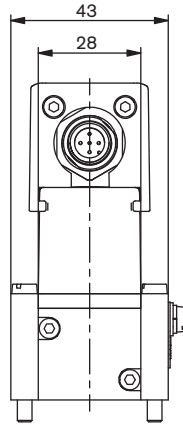
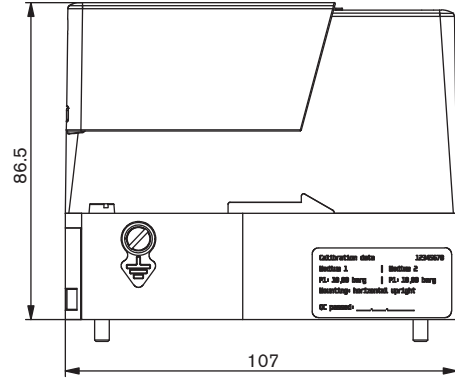
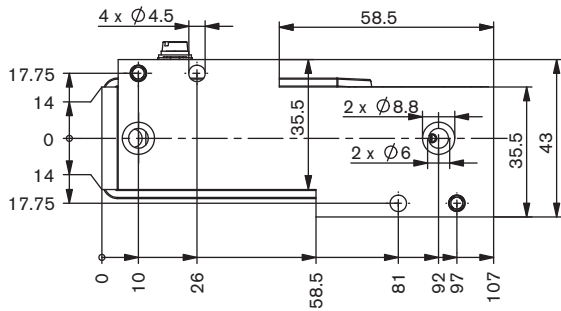


A: G 1/4 or NPT 1/4  
depth 12mm



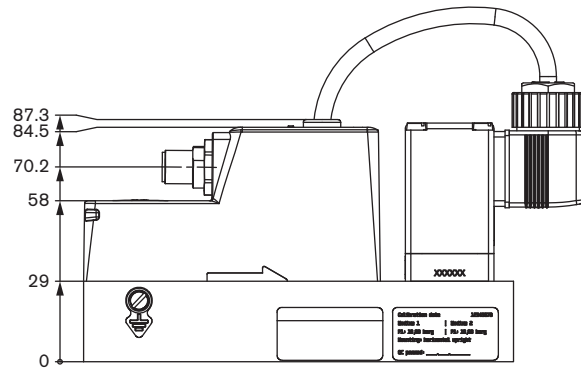
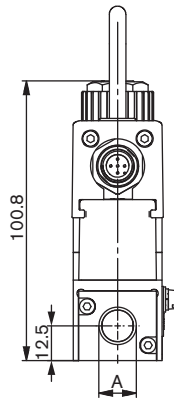
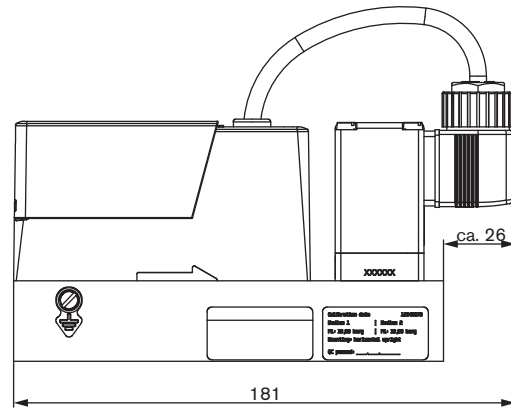
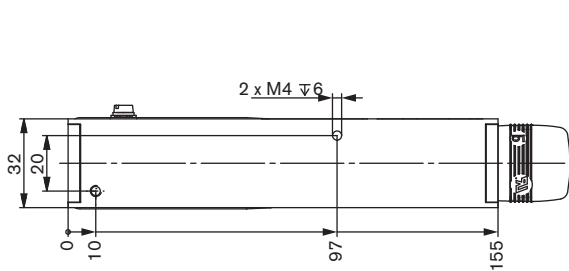
Dimensions [mm]

Sub-base Version

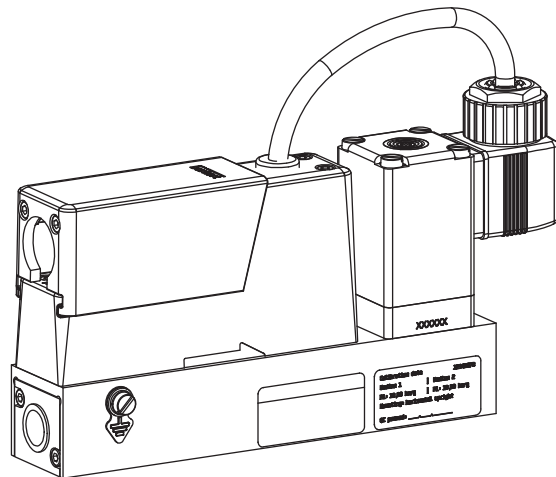


Dimensions [mm]

Version with external valve, Type 2873



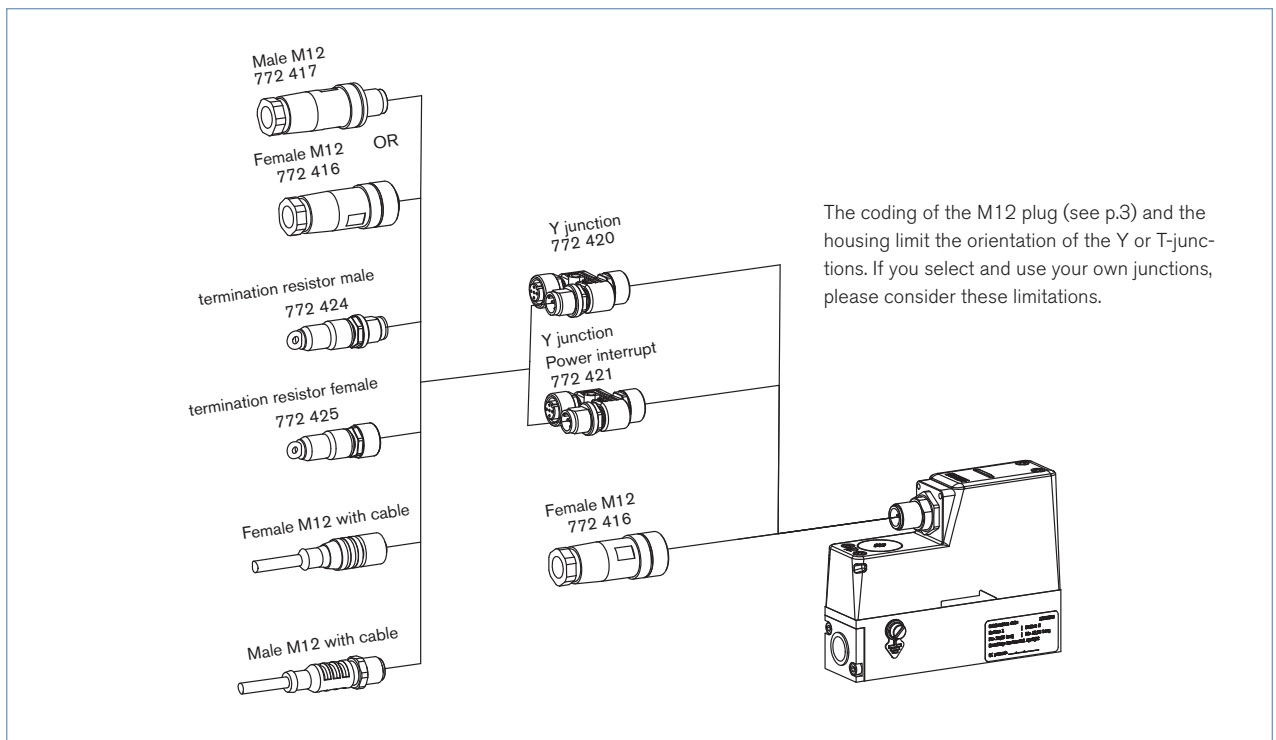
A: G 1/4 or NPT 1/4  
depth 12mm



## Ordering Chart for Accessories

Article	Item no.:
büS cable extension M12 0.1m	772 492
büS cable extension M12 0.2m	772 402
büS cable extension M12 0.5m	772 403
büS cable extension M12 1m	772 404
büS cable extension M12 3m	772 405
Connector M12, female, straight <sup>1)</sup>	772 416
Connector M12, male, straight <sup>1)</sup>	772 417
Connector M12, female, angled <sup>1)</sup>	772 418
Connector M12, male, angled <sup>1)</sup>	772 419
Y junction	772 420
Y junctionr for connecting two separately powered segments of a büS network	772 421
Termination resistor 120 Ohm M12 male	772 424
Termination resistor 120 Ohm M12 female	772 425
büS-Stick Set 1 (incl. cable (M12), büS termination, power supply, and software)	772 426
büS-Stick Set 2 (incl. cable (M12))	772 551
SIM card	on request
LabVIEW device driver	on request
EDS-File (CANopen)	Download from <a href="http://www.burkert.com">www.burkert.com</a>
Software Bürkert Communicator	Download from <a href="http://www.burkert.com">www.burkert.com</a>

<sup>1)</sup> It is possible that the M12 connectors cannot be used together on the same side of a Y-junction. If that is the case, please use a prefabricated cable which uses typically a thinner connector.



## Note

You can fill out the fields directly in the PDF file before printing out the form.

## MFC/MFM-applications - Request for quotation

▶ Please complete and send to your nearest Bürkert sales centre

Company	Contact person
Customer No	Department
Address	Tel./Fax
Postcode/Town	E-mail

MFC-Application     MFM-Application     Quantity     Required delivery date  
 ATEX compliance

## Medium data

Type of gas (or gas proportion in mixtures)

Density  kg/m<sup>3</sup> <sup>8)</sup>

Gas temperature [°C or °F]  °C     °F

Moisture content  g/m<sup>3</sup>

Abrasive components/solid particles  no     yes, as follows:

## Fluidic data

Flow range  $Q_{nom}$   Min.  l<sub>N</sub>/min <sup>8)</sup>     l<sub>S</sub>/min (slpm) <sup>9)</sup>  
 Max.  m<sub>N</sub><sup>3</sup>/h <sup>8)</sup>     kg/h  
 cm<sub>N</sub><sup>3</sup>/min <sup>8)</sup>     cm<sub>S</sub><sup>3</sup>/min (sccm) <sup>9)</sup>  
 l<sub>N</sub>/h <sup>8)</sup>     l<sub>S</sub>/h <sup>9)</sup>

Inlet pressure at  $Q_{nom}$  <sup>10)</sup>     $p_1 =$   bar(g) ■

Outlet pressure at  $Q_{nom}$      $p_2 =$   bar(g) ■

Max. inlet pressure  $P_{1max}$   bar(g) ■

MFC/MFM port connection

without screw-in fitting

1/4" G-thread (DIN ISO 228/1)

1/4" NPT-thread (ANSI B1.2)

with screw-in fitting (acc. to specification for pipeline)

mm Pipeline (external Ø)

inch Pipeline (external Ø)

Flange version

Installation

horizontal

vertical, flow upwards     vertical, flow downwards

Ambient temperature  °C

## Material data

Body base  Aluminium     Stainless steel

Seal  FKM     EPDM

## Electrical data

Signals for set point and actual value  CANopen    or     bÜS

■ Please quote all pressure values as overpressures with respect to atmospheric pressure bar(ü)

<sup>8)</sup> at: 1,013 bar(a) and 0 °C

<sup>9)</sup> at: 1.013 bar (a) and 20 °C

<sup>10)</sup> matches with calibration pressure