



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

- Nominal flow ranges from 0.010 IN/min to 160 IN/min
- High accuracy and repeatability with very fast response times
- Easy device exchange through configuration memory
- Communication via fieldbus based on CANopen
- Optional: ATEX II Kat. 3G/D or USP Class VI, FDA, EG 1935 conformity

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

Can be combined with

| | | |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------|---|
|  | Type 6011 Plunger valve 2/2 way direct-acting | ▶ |
|  | Type 6013 Plunger valve 2/2 way direct-acting | ▶ |
|  | Type 6027 Direct-acting 2/2 way plunger valve | ▶ |
|  | Type 0330 Direct-acting 2/2 or 3/2 way pivoted armature valve | ▶ |
|  | Type ME43 Fieldbus gateway | ▶ |

Type description

The mass flow controller (MFC) / meter (MFM) Type 8742 for gases is suitable for a wide range of applications. Type 8742 communicates via the Bürkert system bus (büS). This CANopen based interface is suitable for the integration into existing CANopen networks, as well as Industrial Ethernet or fieldbus networks in combination with the fieldbus gateway of Type ME43. The second option is tailor-made for applications with many control loops. Up to 32 MFC / MFM can be connected to one fieldbus gateway. Type ME43 translates the internal CANopen based communication to industry standards for both Industrial Ethernet and fieldbuses. The mass flow controller / meter can always be switched between büS and CANopen communication.

Type 8742 can be configured as MFM or MFC. Optional, up to four different gases calibrations can be stored in the device. The thermal MEMS sensor is located directly in the gas stream and therefore reaches very fast response times. A direct-acting proportional valve as regulating unit guarantees high sensitivity. The integrated PI controller ensures outstanding control characteristics of the MFC / MFM.

Type 8742 is especially designed for use in harsh environments due to high protection class and explosion-proof.

Table of contents

| | |
|----------------------------------------------------------------------------|-----------|
| 1. General technical data | 4 |
| 2. Approvals | 5 |
| 3. Dimensions | 6 |
| 3.1. MFM or MFC with internal valve (Type 2871) | 6 |
| 3.2. MFM or MFC with internal valve (Type 2871), sub-base version | 7 |
| 3.3. MFC with external valve (Type 2873) | 7 |
| 3.4. MFM for high nominal flow rates | 8 |
| 3.5. MFC with external valve (Type 2873) for high nominal flow rates | 8 |
| 3.6. MFC with external valve (Type 2875) for high nominal flow rates | 9 |
| 4. Device / Process connections | 9 |
| 4.1. Pin Configuration | 9 |
| 5. Performance specifications | 10 |
| 5.1. Pressure loss diagram | 10 |
| Pressure Loss Diagram of the MFM | 10 |
| 5.2. Flow characteristic | 10 |
| Nominal flow range of typical gases | 10 |
| 6. Product operation | 11 |
| 6.1. Measuring principle | 11 |
| 7. Product design and assembly | 11 |
| 7.1. Product features | 11 |
| Measures to comply with ATEX requirements | 11 |
| 7.2. Product assembly | 12 |
| 8. Product accessories | 13 |
| 8.1. Bürkert Communicator Software | 13 |
| Type 8742 connection with Bürkert Communicator software | 13 |
| 9. Ordering information | 14 |
| 9.1. Bürkert eShop – Easy ordering and quick delivery | 14 |
| 9.2. Advice on product choice: | 14 |
| 9.3. Ordering chart accessories | 14 |

1. General technical data







| Product properties | |
|---------------------------------------------------|----------------------------------------------------------------------------------------|
| Materials | |
| Body | Stainless steel or aluminium |
| Housing | Aluminium die casting (coated) |
| Seals | FKM or EPDM (depending on gas) |
| Dimensions | See "3. Dimensions" on page 5 |
| Total weight | ca. 950 g (stainless steel body) |
| Protection class | IP65 und IP67 |
| Configuration memory (included in delivery) | Industrial µSIM card for ease of replacement |
| Device status | RGB-LED based on NAMUR NE107 |
| Electrical data | |
| Operating voltage | 24 V DC |
| Voltage tolerance | ± 10 % |
| Power consumption ^{1.)} | 1 W (as MFM), Max. 3...17.5 W (as MFC, depending on type of solenoid control valve) |
| Electr. connection | M12 plug, 5 pin |
| Residual ripple | ± 2 % |
| Digital Comm. | CANopen or CAN based bus |
| Performance data | |
| Nominal flow range (Q_{nom}) | 10 ml _N /min to 160 l _N /min (N ₂) |
| Turn-down ratio | 1:50, optional 1:100 |
| Max. operating pressure | 10 bar (145 psi), for MFCs the max. pressure depends on the orifice of the valve |
| Ambient temperature | - 10 °C to + 50 °C (higher temperatures on request) |
| Accuracy | ± 0.8 % o.R. ± 0.3 % F.S. (after 1 min. warm up time) |
| Repeatability | ± 0.1 % F.S. |
| Settling (MFC)/response (MFM) time ($t_{95\%}$) | < 300 ms |
| Control valve (prop. valve) | Normally closed |
| Valve orifice range | 0.05...8 mm |
| K _{vs} value range | 0.00006...1.1 m ³ /h |
| Medium data | |
| Operating medium | Neutral, non-contaminated gases, others on request |
| Calibration medium | Operating gas or air |
| Medium temperature | - 10 °C to + 70 °C (- 10 °C to + 60 °C with oxygen) |
| Product connections | |
| Port connection | NPT ¼, G ¼, flange, clamp ring or vacuum fitting, others on request |
| Environment and installation | |
| Installation | Horizontal or vertical |
| Accessories | |
| Software | Bürkert Communicator |

1.) Data refers to the typical power consumption (at 23 °C ambient temperature, nominal flow rate and 30 min. control mode). The specifications according to UL 61010-1 can differ (see instruction manual).

2. Approvals

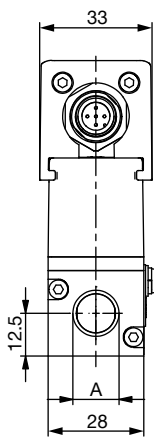
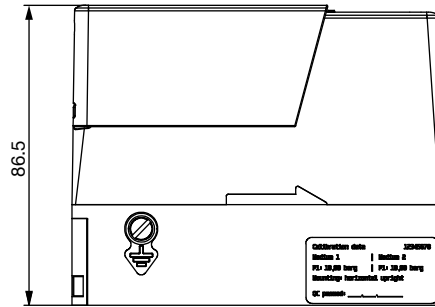
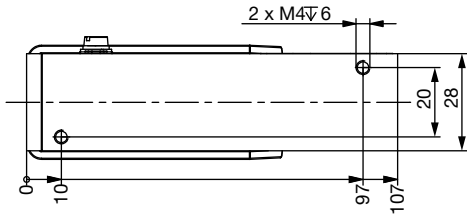
Note:

- 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 types can be supplied with the approvals or conformities below.

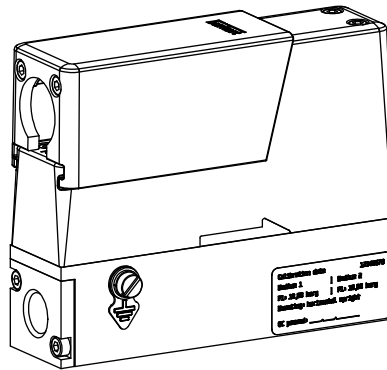
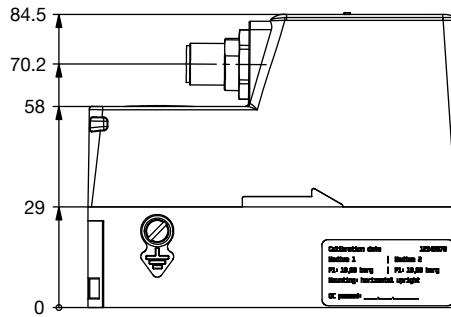
| | |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Approvals | Description |
|  | Approval UL 611010 – 1 (ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE - Part 1: General Requirements) |
| Approvals | Description |
|  | Approval CAN/CSA-C22.2 No. 61010-1 (ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE - Part 1: General Requirements) |
| Conformity | Description |
|  | Conformity of all materials in contact with the medium USP Class VI Kapitel “87 in vitro” and “88 in vivo, Implantation” – Code of Federal Regulations Title 21 Paragraph 177 (CFR 21 177.2600) |
| Conformity | Description |
|  | Conformity of all materials in contact with the medium FDA – Code of Federal Regulations Title 21 Paragraph 177 (CFR 21 177.2600) |
| Conformity | Description |
|  | Conformity of all materials in contact with the medium Regulation (EC) No 1935/2004 on materials and objects intended to come into contact with food |
| Conformity | Description |
|  | ATEX II 3G Ex nA IIC T* Gc X und II 3D Ex tc IIIC T***°C Dc X1 |

3. Dimensions

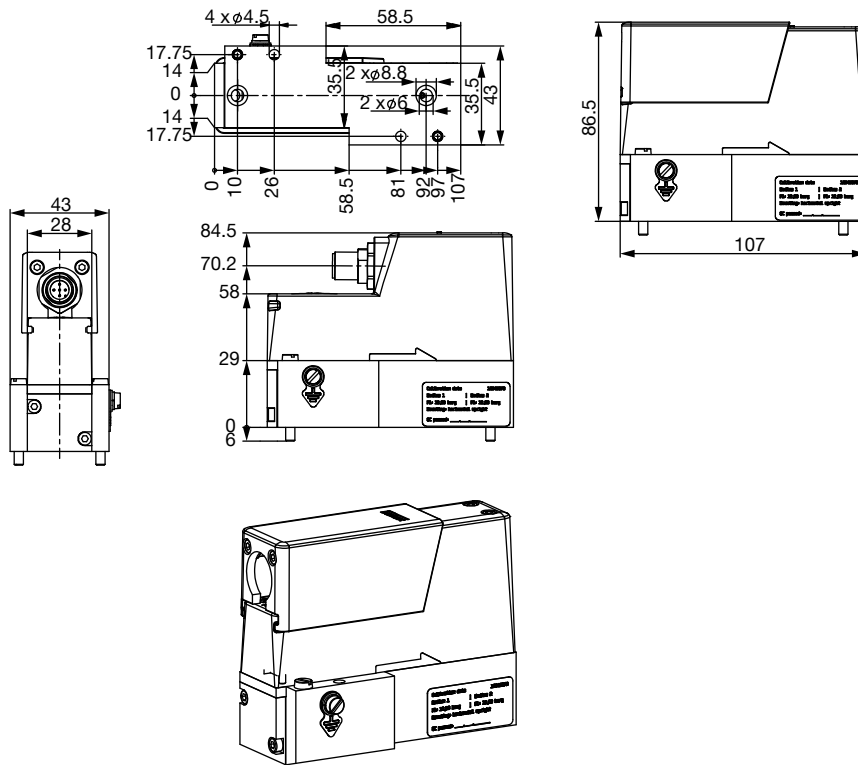
3.1. MFM or MFC with internal valve (Type 2871)



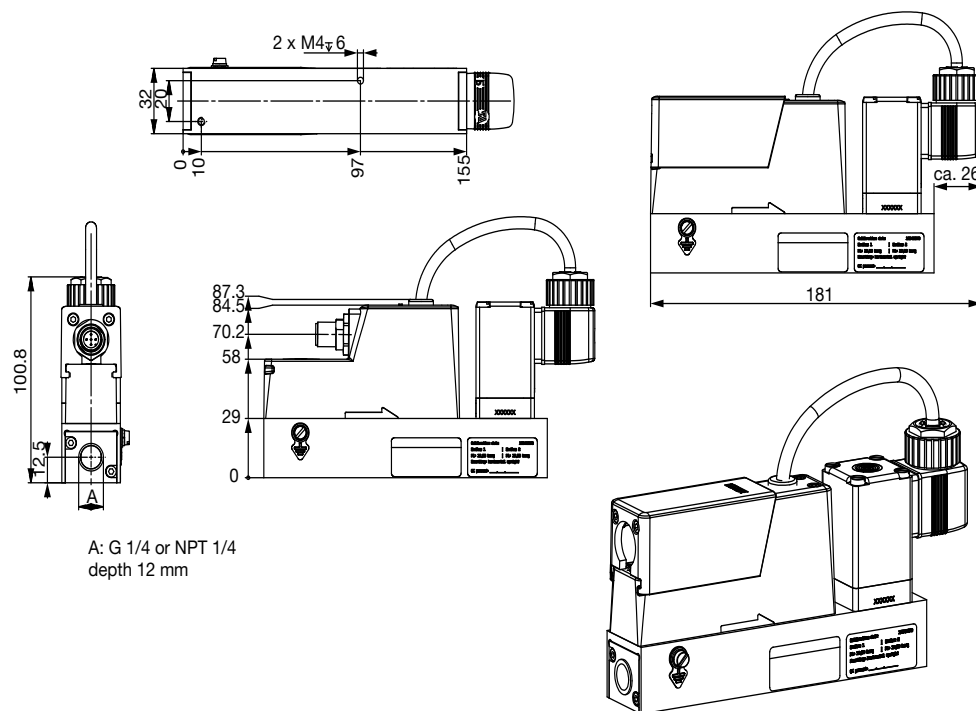
A: G 1/4 or NPT 1/4
depth 12 mm



3.2. MFM or MFC with internal valve (Type 2871), sub-base version

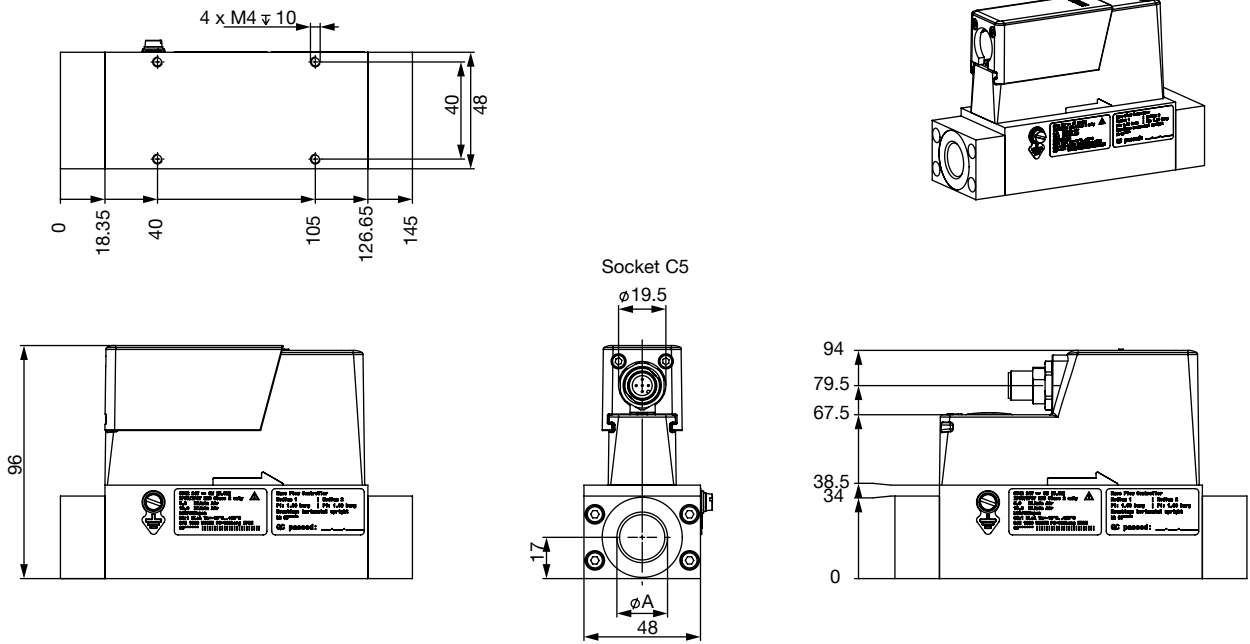


3.3. MFC with external valve (Type 2873)

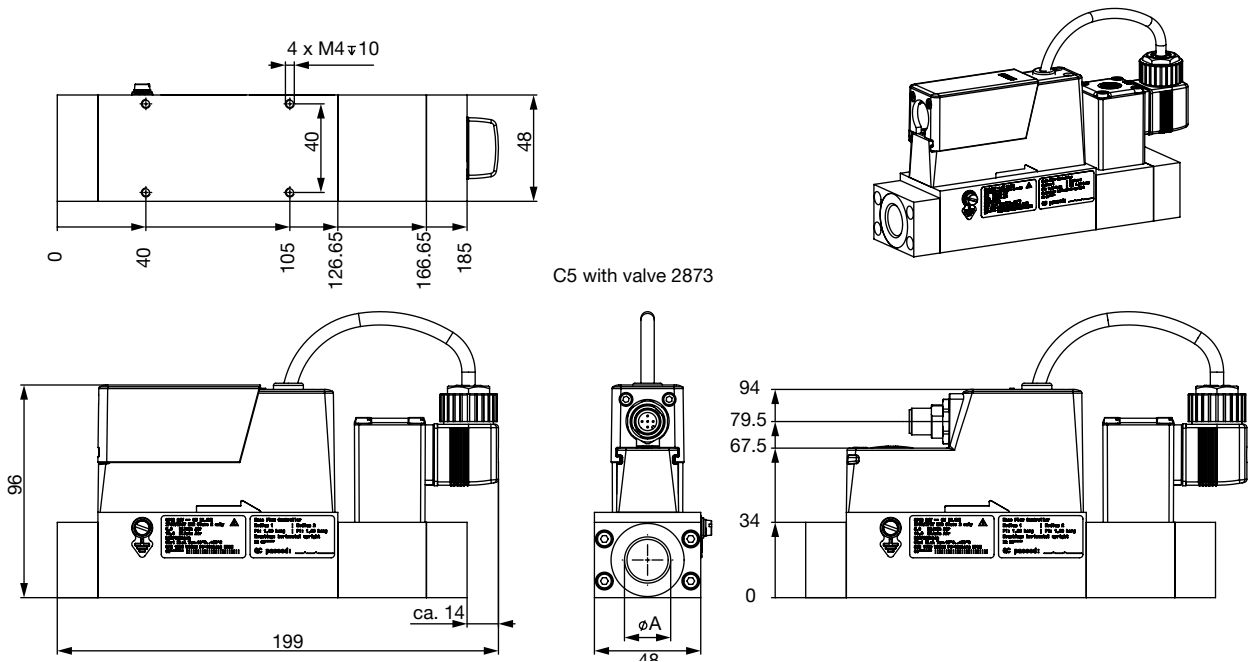


A: G 1/4 or NPT 1/4
depth 12 mm

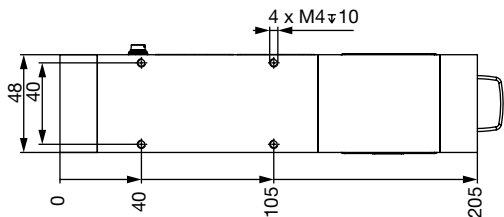
3.4. MFM for high nominal flow rates



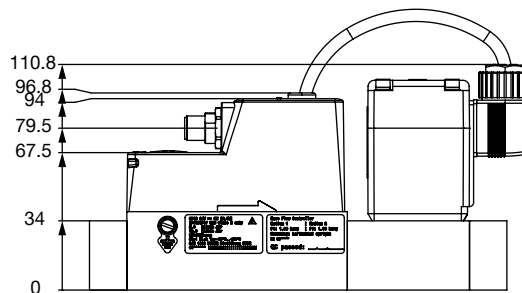
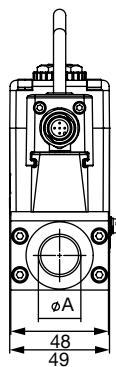
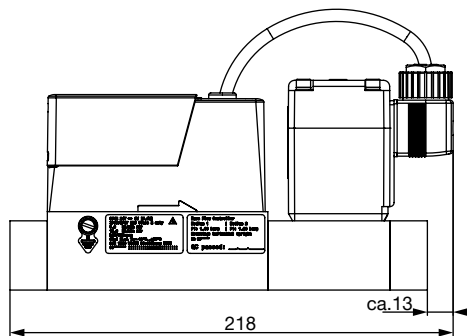
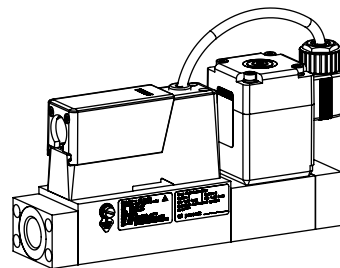
3.5. MFC with external valve (Type 2873) for high nominal flow rates



3.6. MFC with external valve (Type 2875) for high nominal flow rates

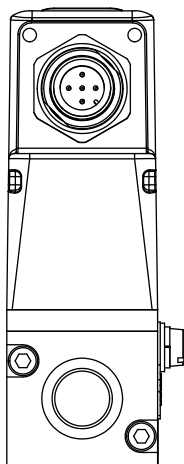


C5 with valve 2875



4. Device / Process connections

4.1. Pin Configuration



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

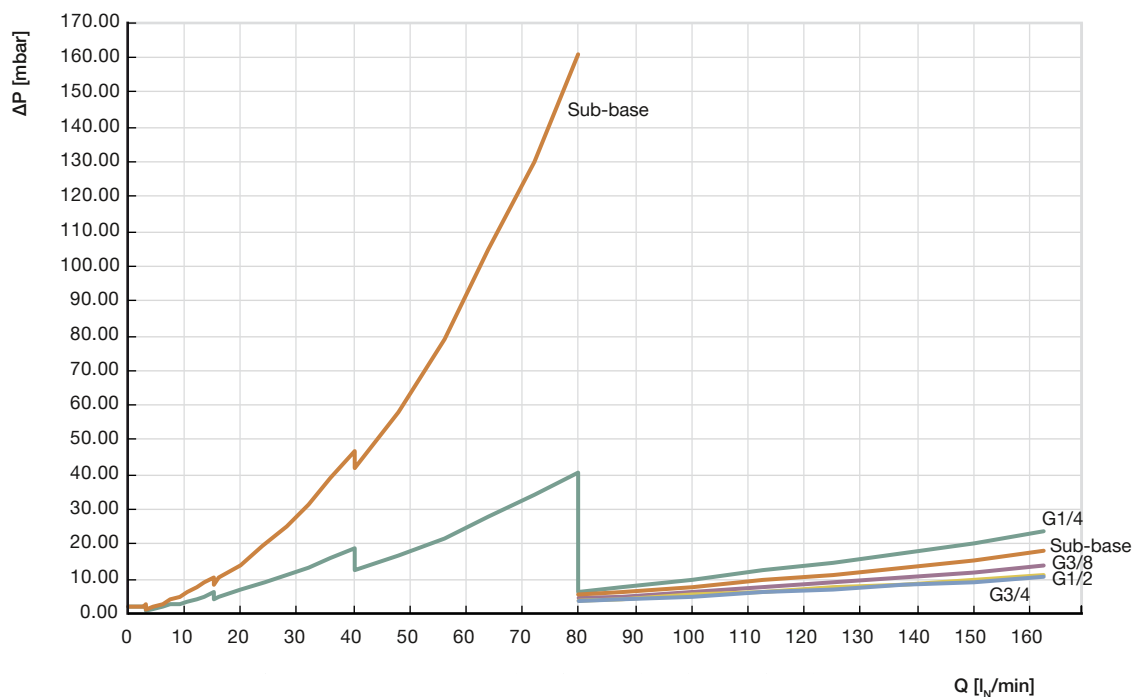
5. Performance specifications

5.1. Pressure loss diagram

Pressure Loss Diagram of the MFM

The diagram shows an example of the pressure loss characteristics when air flows through. To determine the pressure loss of another gas, the corresponding air equivalent must first be calculated and the basic fluidics used for the other gas taken into account.

Chip Sensor up to 160 l_N/min



5.2. Flow characteristic

Nominal flow range of typical gases

Note:

All values refer to 1.013 bara and 0 °C (Index N)

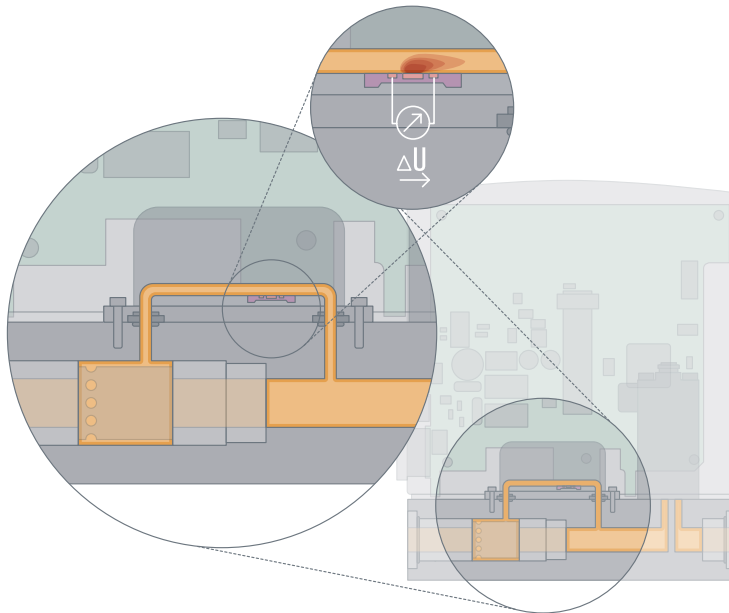
| Gas | Min. Q _{nom} [l _N /min] | Max. Q _{nom} [l _N /min] |
|----------------|---------------------------------------------|---------------------------------------------|
| Argon | 0.01 | 160 |
| Acetylene | 0.01 | 65 |
| Helium | 0.01 | 1000 |
| Carbon dioxide | 0.02 | 80 |
| Air | 0.01 | 160 |
| Methane | 0.01 | 160 |
| Oxygen | 0.01 | 160 |
| Nitrogen | 0.01 | 160 |
| Hydrogen | 0.01 | 1000 |
| Propane | 0.03 | 44 |

6. Product operation

6.1. 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.



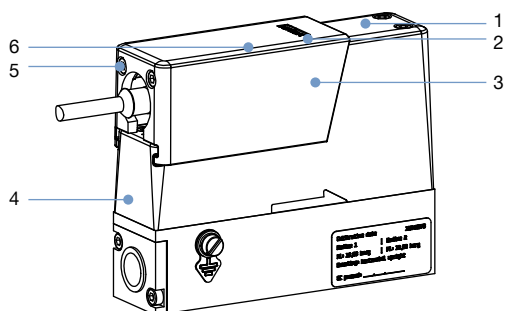
7. Product design and assembly

7.1. Product features

Measures to comply with ATEX requirements

Note:

Devices with ATEX conformity meet protection class IP65.

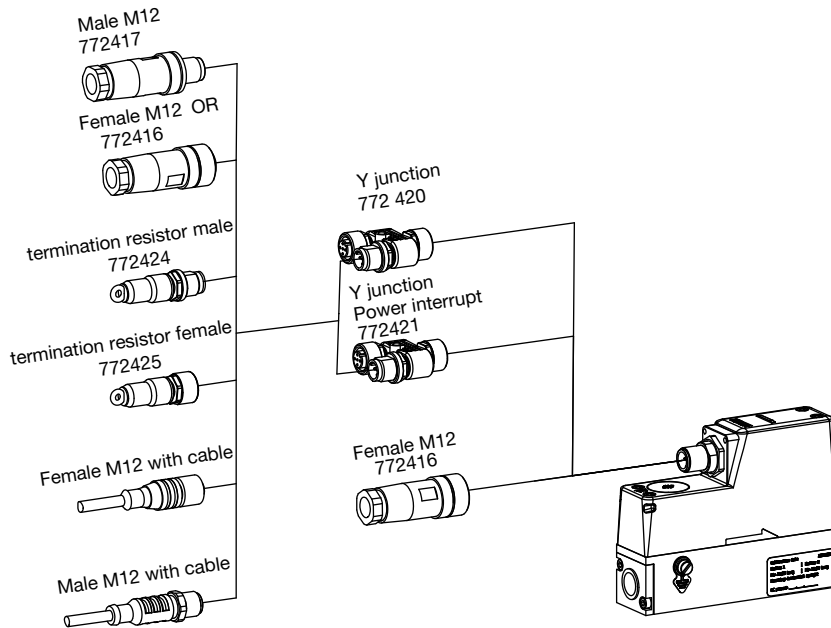


| No. | Description |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Standard requirements for cable glands are fulfilled for versions with external valve |
| 2 | LED display protected against mechanical stress |
| 3 | M12 plug achieves protection class IP65 and IP67 with and without mounted counterpart |
| 4 | IP protection under high mechanical stress |
| 5 | Screws prevent uncoupling of the M12 connection under tension |
| 6 | Impact protection cap prevents damage of the M12 plug and all connected elements if mechanical stress is applied. No particular ATEX sockets are required |

7.2. Product assembly

Note

The coding of the M12 plug (see “4.1. Pin Configuration” on page 8) and the housing limit the orientation of the Y or T-junctions. If you select and use your own junctions, please consider these limitations.



8. Product accessories

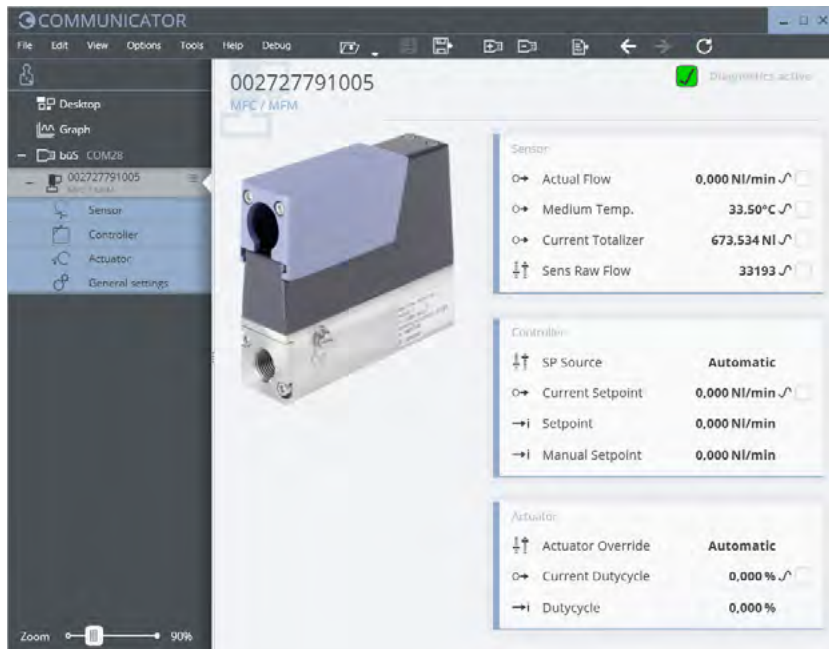
8.1. Bürkert Communicator Software

Note:

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

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 parametrisation of all connected field devices. An accessory part, the bÜS-stick serves as the interface between computer and process instruments (see "9.3. Ordering chart accessories" on page 13). It transfers "USB data" to "CAN data". The Communicator allows:

- Diagnosis
- Parametrization
- Registration and storage of process data
- To watch graph of process
- To update firmware of the bÜS device connected
- Guided re-calibration



Type 8742 connection with Bürkert Communicator software

The interface to the "Bürkert Communicator" software tool is based on CANopen. The appropriate bus termination is mandatory. For Type 8742, the terminating resistor on the bÜS-Stick should not be activated if the device is already integrated in a properly terminated bus network.

To connect the MFC / MFM with the "Bürkert Communicator" software tool, you need a bÜS-stick. The bÜS-stick sets contain the necessary accessories.

9. Ordering information

9.1. Bürkert eShop – Easy ordering and quick delivery

You would like to find your desired Bürkert product or spare part quickly? Our eShop is available for you around the clock! Register now and order easily and conveniently. Find out about articles, stocks, delivery times, individual prices and benefits from additional “MyBürkert”-functions.

Discover the many advantages of the Bürkert eShop now! ▶

9.2. Advice on product choice:




















Note:

The “[product questionnaire form](#)” on page 15 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 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 questionnaire form](#)” on page 15 to indicate the pressures directly before and after the MFC. 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 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.

9.3. Ordering chart accessories

| Description | Article no. |
|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| büS cable extension M12 0.1 m | 772492  |
| büS cable extension M12 0.2 m | 772402  |
| büS cable extension M12 0.5 m | 772403  |
| büS cable extension M12 1 m | 772404  |
| büS cable extension M12 3 m | 772405  |
| Power supply Type 1573 for rail mounting, 100 ... 240 V AC / 24 V DC, 1.25 A, NEC Class 2 (UL 1310) | 772438  |
| Power supply Type 1573 for rail mounting, 100 ... 240 V AC / 24 V DC, 1 A, NEC Class 2 (UL 1310) | 772361  |
| Power supply Type 1573 for rail mounting, 100 ... 240 V AC / 24 V DC, 2 A, NEC Class 2 (UL 1310) | 772362  |
| Power supply Type 1573 for rail mounting, 100 ... 240 V AC / 24 V DC, 4 A | 772363  |
| Connector M12, female, straight ^{1.)} | 772416  |
| Connector M12, male, straight ^{1.)} | 772417  |
| Connector M12, female, angled ^{1.)} | 772418  |
| Connector M12, male, angled ^{1.)} | 772419  |
| Y-junction | 772420  |
| Y-junction for connecting two separately powered segments of a büS network | 772421  |
| Termination resistor 120 Ohm M12 male | 772424  |
| Termination resistor 120 Ohm M12 female | 772425  |
| büS-Stick Set 1 (incl.. cable (M12 and Micro-USB) Stick with integrated terminating resistor, power supply and software) | 772426  |
| büS-Stick Set 2 (incl.. cable (M12 and Micro-USB) Stick with integrated terminating resistor) | 772551  |
| SIM card | on request |
| LabVIEW device driver | on request |
| EDS-File (CANopen) | Download from www.burkert.com |
| Software Bürkert Communicator | Download from www.burkert.com |

1.) 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.

Bürkert – Close to You

For up-to-date addresses
please visit us at
www.burkert.com.

DTS 1000236628 EN Version: P Status: RL (released | freigegeben | validé) printed: 06.09.2019



Product Enquiry Form - Mass Flow Controller

Thank you for your interest in our products! In order to provide you with optimum advice, please fill out the following form and send it to your **Bürkert representative** or e-mail address: info@burkert.com. All information submitted will of course be kept strictly confidential.

Please fill in the **required fields!** *

*Note: The interactive functions of this PDF may be restricted depending on the PDF reader used.

| Personal Information | | | |
|----------------------|--|-----------------|--|
| Company | | Contact person | |
| Customer no. | | Department | |
| Street | | Postcode / Town | |
| Telephone no. | | Email | |

| Delivery | | | |
|-----------------|-----------------|----------|------------------------|
| MFC Application | MFM Application | Quantity | Required delivery date |

| Medium data | | | |
|----------------------------|--|------|----|
| Type of gas or gas mixture | | | |
| Medium temperature | | °C / | °F |
| Ambient temperature | | °C / | °F |

| Fluidic data | | | |
|--------------------------------------------|------------------------------|--------------------------------|----------------------------------------|
| Flow range Q_{Nom} | Min. | Max. | unit |
| Inlet pressure at Q_{Nom} ^{1.)} | $p_1 =$ | barg ^{2.)} | |
| Outlet pressure at Q_{Nom} | $p_2 =$ | barg ^{2.)} | |
| Max. inlet pressure | $p_{1max} =$ | barg ^{2.)} | |
| Port connection | Compression fitting | Subbase | Vacuum fitting |
| | Thread: | G (DIN ISO 228/1) 1/4" 3/8" | NPT (ANSI B1.2) 1/2" 3/4" 1" |
| Installation | horizontal, valve upright | | vertical, upwards flow |
| | horizontal, valve horizontal | | vertical, downward flow ^{3.)} |

1.) Corresponds to the calibration pressure

2.) Please indicate all pressure values as overpressure to atmospheric pressure [barg] (g = relative pressure)

3.) Possible reduction of the setting range to 1:10 for a vertical downwards flow

| Material specifications | | |
|-------------------------|-----------|-----------------|
| Body | Aluminium | Stainless steel |
| Seals | FKM | EPDM |

| Electrical data | | | | |
|----------------------------------------------------------------------------------------|----------------|----------------|---------------------|------------------------|
| IP protection | Yes (IP65) | | No (IP20 or better) | |
| Control / Communication Note: Please choose one of the following options! | Normsignal | CANopen/büS | PROFIBUS DP | Industrial Ethernet |
| | 0 ... 5 V | CANopen | | PROFINET |
| | 0 ... 10 V | büS | | Ethernet IP |
| | 0 ... 20 mA | | | Modbus TCP |
| 4 ... 20 mA | | EtherCAT | | |
| Connection Note: Please choose one of the following options! | D Sub socket | M12 socket | D Sub socket | (RJ45 always standard) |
| | Terminal block | Terminal block | M12 socket | |

| Approvals / Conformities |
|---------------------------------|
| UL |
| ATEX II Cat. 3 G/D, IECEx |
| USP Class VI conformity |
| FDA conformity |
| EG 1935/2004 conformity |

| Additional Requirements / Comment |
|------------------------------------------|
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