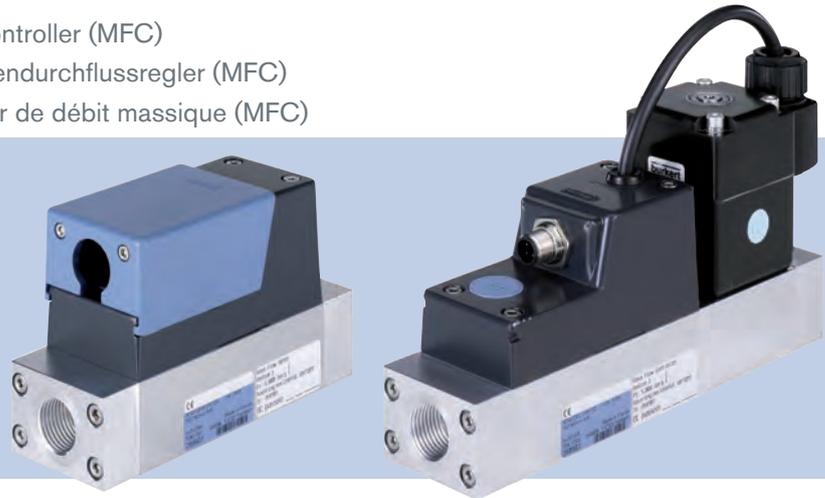


## Type 8746 büS / CANopen

Mass Flow Meter (MFM) / Mass Flow Controller (MFC)  
Massendurchflussmesser (MFM) / Massendurchflussregler (MFC)  
Débitmètre massique (MFM) / Régulateur de débit massique (MFC)



Operating Instructions (software A.14.00.00 and higher)

Bedienungsanleitung (Ab Softwareversion A.14.00.00)

Manuel d'utilisation (à partir de la version logicielle A.14.00.00)

We reserve the right to make technical changes without notice.  
Technische Änderungen vorbehalten.  
Sous réserve de modifications techniques.

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Operating Instructions 2105/04\_EU-ML 00810417 / Original EN

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## 1 THE OPERATING INSTRUCTIONS

The Operating Instructions describe the entire life cycle of the product. Please keep the Operating Instructions in a safe place, accessible to all users and any new owners.

### Important safety information.

- ▶ Read the Operating Instructions. If you do not understand the content of the Operating Instructions, then contact Bürkert.
- ▶ Pay particular attention to the chpt. [Basic safety information](#) and to the chpt. [Intended use](#).

### 1.1 Definition of the term product

The term "product" as used in the Operating Instructions, refers to one or several of the following devices:

- a Mass Flow Meter (MFM) Type 8746 bÜS / CANopen
- a Mass Flow Controller (MFC) Type 8746 bÜS / CANopen

### 1.2 Definition of the term bÜS

The term "bÜS" used in these Operating Instructions refers to the Bürkert system bus, that is based on the CANopen protocol.

For more information on bÜS, read the cabling guide available at [country.burkert.com](http://country.burkert.com).

For more information on CANopen which is related to the product, refer to the Operating Instructions "CANopen Network configuration" at [country.burkert.com](http://country.burkert.com).

### 1.3 About NAMUR and the NAMUR Recommendation NE 107

Standards committee for measurement and control technology (NAMUR) is an international association of users of automation systems for the process industry.

NAMUR recommendation (NE) 107: self-monitoring and diagnosis of field devices.

### 1.4 Symbols used



#### DANGER

Warns of an immediate danger.

- ▶ Failure to observe the warning results in death or in serious injuries.



#### WARNING

Warns of a potentially dangerous situation.

- ▶ Failure to observe the warning can result in serious injuries or in death.



#### CAUTION

Warns of a possible danger.

- ▶ Failure to observe the warning can result in moderate or minor injuries.

## NOTICE

### Warns of damage to property.

- ▶ Failure to observe the warning may result in damage to the product or system.



Indicates important additional information, tips and recommendations.



Refers to information in the Operating Instructions, or in other documents.

- ▶ Designates an instruction for risk prevention.
- Designates a work step that you must carry out.



Indicates a result.

**Menu** Designates a text of a user interface.

## 1.5 Validity of the Operating Instructions

The Operating Instructions are valid for the products with a software version A14.00.00 and higher.

To read out the version number of the product software, use the Bürkert Communicator software.

## 2 INTENDED USE

Improper use of the product may be a hazard to people, nearby equipment and the environment.

MFM Type 8746 büS / CANopen is used exclusively to measure the mass flow rate of clean and dry gases.

MFC Type 8746 büS / CANopen is used exclusively to measure and regulate the mass flow rate of clean and dry gases.

- ▶ Observe the data that is given in the contract documents, the Operating Instructions, on the Type label and on the calibration plate:
  - additional data
  - operating conditions
  - service conditions
- ▶ Only use the product for the fluids indicated on the Type label and in the calibration protocol.
- ▶ Only use the product indoors.
- ▶ Only use the product up to an altitude of 2000 m.
- ▶ Only use the product with external instruments that the product manufacturer recommends.
- ▶ Only use the product with components that the product manufacturer recommends.
- ▶ Operate the product carefully and ensure regular and professional maintenance.
- ▶ Operate the product only in perfect working order. Ensure appropriate storage, transport, installation and use.
- ▶ Only use the product for its intended purpose.

## 2.1 Product variants with ATEX certification



### **DANGER**

**Risk of explosion that is due to improper use of the product in potentially explosive areas.**

- ▶ Observe the specifications of the ATEX-conformity certificate.
- ▶ Observe the specifications in the ATEX supplement for Type 8746. The supplement is available at [country.burkert.com](http://country.burkert.com).

The ATEX certification is only valid if the product is used as described in the ATEX supplement.

If unauthorized changes are made to the product, then the ATEX certification becomes invalid.

## 3 BASIC SAFETY INFORMATION

This safety information does not take into account any contingencies or occurrences that may arise during installation, use and maintenance of the product.

The operating company is responsible for the respect of the local safety regulations including for the personnel safety.



**Risk of injury that is due to pressure in the installation or in the product.**

- ▶ Before working on the installation or product, cut the pressure. Vent and drain the pipes.

**Risk of injury from electric shocks.**

- ▶ Before working on the installation or product, switch off the power supply. Make sure that nobody can switch the power supply on.
- ▶ Observe all applicable accident protection and all applicable safety regulations for electrical equipment.

**Burn hazard and fire hazard that are due to hot surface of the product.**

- ▶ Do not touch the hot surface with bare hands.
- ▶ Wear safety gloves to touch the product.
- ▶ Keep the product away from any highly flammable materials or fluids.

**Risk of injury that is due to escape of the fluid.**

- ▶ Observe all applicable accident protection and all applicable safety regulations relating to the operating fluid used.

#### Various dangerous situations.

To avoid personal injury, obey the following instructions:

- ▶ Do not operate the product without its mesh filter.
- ▶ Only operate the product in the installation position given on the calibration plate.
- ▶ Make sure that the operating pressure of the MFM is not higher than the maximum calibration pressure that is given on the calibration plate.
- ▶ Make sure that the operating pressure of the MFC is not higher than the tight sealing pressure of the control valve.
- ▶ Only use the product for the fluid specified as the operating fluid in the calibration protocol.
- ▶ Only use agents that are stable with the product materials for cleaning and decontamination.  
Find the compatibility chart on our homepage:  
[country.burkert.com](http://country.burkert.com)  
In the event of any ambiguity please contact your local sales office.
- ▶ Do not make any modifications to the product and do not subject the product to mechanical stress.
- ▶ Protect the installation and the product from accidental actuation.
- ▶ Only trained personnel may perform installation work and maintenance work.
- ▶ After an interruption in the electrical supply or in the fluid supply, ensure a controlled restart of the process.
- ▶ Observe best industry practice.

#### NOTICE

##### Components or assemblies at risk from electrostatic charges.

The product contains electronic components which are susceptible to electrostatic discharge (ESD). Contact with electrostatically charged persons or objects endangers these components. In the worst case, they will become defective immediately or will fail when energised.

- To minimise or even avoid any damage caused by an electrostatic discharge, take all the precautions described in the EN 61340-5-1.
- Do not touch any of the live electrical components.

## **4 GENERAL INFORMATION**

### **4.1 Contact**

The name of the manufacturer is displayed as inset writing on the cover and the housing of the product.

To contact the manufacturer of the product, use the following address:

Bürkert SAS  
Rue du Giessen  
F-67220 TRIEMBACH-AU VAL

The addresses of our international sales offices are available on the internet at: [country.burkert.com](http://country.burkert.com)

### **4.2 Warranty**

The warranty is conditional on compliant use of the product in observance of the operating conditions specified in the Operating Instructions.

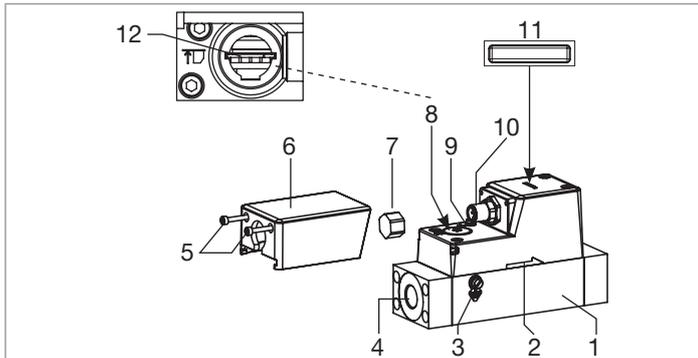
### **4.3 Information on the Internet**

Operating Instructions and datasheets for the product can be found online at: [country.burkert.com](http://country.burkert.com)

## 5 DESCRIPTION

### 5.1 Product variants

#### 5.1.1 Mass Flow Meter (MFM)



1. Base block

2. Flow direction

3. M4 screw for functional earth connection

4. Possible fluid connections:

- G-internal-threaded connections according to DIN ISO228/1
- NPT-internal-threaded connections according to ASME/ANSI B 1.20.1
- flange connection

5. M4 screws

6. Impact protection-cover. The impact protection-cover is always delivered, but it is only necessary to use it on an ATEX product.

7. M12 sealing-cap. The M12 sealing-cap is only delivered with an ATEX product.

8. Blind plug

9. M3 screw for functional earth connection

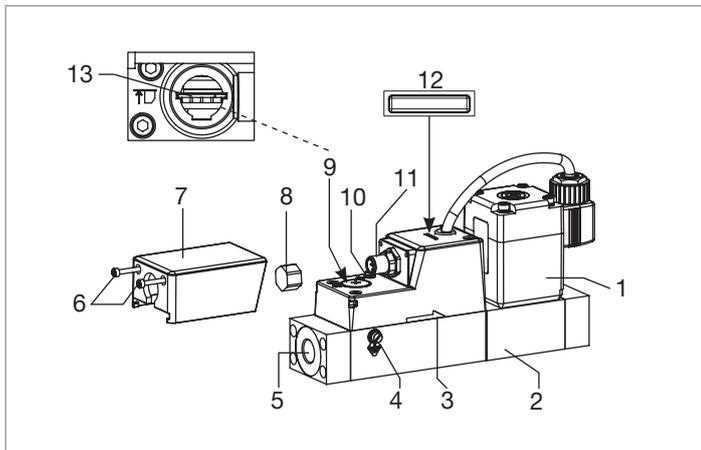
10. 5-pin M12 male connector

11. Product status indicator. The Indicator operates according to NAMUR NE 107.

12. Slot for the memory card

Fig. 1: Product variants of a Mass Flow Meter

### 5.1.2 Mass Flow Controller (MFC) with proportional valve



1. Base block

2. Proportional valve

3. Flow direction

4. M4 screw for functional earth connection

5. Possible fluid connections:

- G-internal-threaded connections according to DIN ISO228/1
- NPT-internal-threaded connections according to ASME/ANSI B 1.20.1
- flange connection

6. M4 screws

7. Impact protection-cover. The impact protection-cover is always delivered, but it is only necessary to use it on an ATEX product.

8. M12 sealing-cap. The M12 sealing-cap is only delivered with an ATEX product.

9. Blind plug

10. M3 screw for functional earth connection

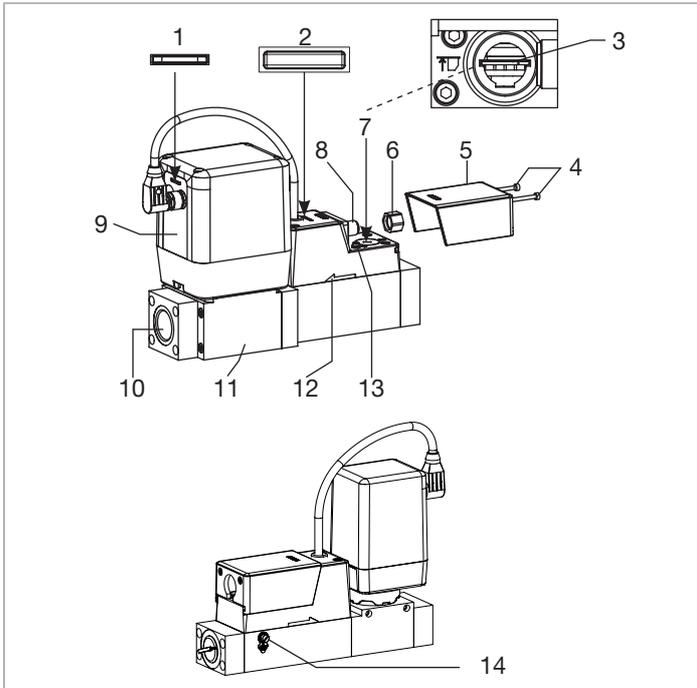
11. 5-pin M12 male connector

12. Product status indicator. The Indicator operates according to NAMUR NE 107.

13. Slot for the memory card

Fig. 2: Product variants of a Mass Flow Controller with proportional valve

### 5.1.3 Mass Flow Controller (MFC) with motor valve



1. Status LED of the motor valve
2. Product status indicator. The Indicator operates according to NAMUR NE 107.
3. Slot for the memory card

4. M4 screws
5. Impact protection-cover. The impact protection-cover is always delivered, but it is only necessary to use it on an ATEX product.
6. M12 sealing-cap. The M12 sealing-cap is only delivered with an ATEX product.
7. Blind plug
8. 5-pin M12 male connector
9. Motor valve
10. Possible fluid connections:
  - G-internal-threaded connections according to DIN ISO228/1
  - NPT-internal-threaded connections according to ASME/ANSI B 1.20.1
  - flange connection
11. Base block
12. Flow direction
13. M3 screw for functional earth connection
14. M4 screw for functional earth connection

Fig. 3: Product variants of a Mass Flow Controller with motor valve

## 5.2 Product status indicator

The product status indicator changes its colour based on the NAMUR recommendation NE 107. The colour of the product status indicator gives the following pieces of information:

- Whether product diagnostics are active or not. Diagnostics are active on the product and cannot be deactivated.

- If product diagnostics are active, then the product status indicator shows whether diagnostics events have been generated or not. If several diagnostics events have been generated, then the product status indicator shows the diagnostics event with the highest priority. Refer to [Tab. 1](#).

If the product status indicator flashes, then the product is selected in a man-machine interface such as the Bürkert Communicator software.

Tab. 1: Product status indicator in accordance with NAMUR NE 107, edition 2006-06-12, for active diagnostics

Colour according to NE 107	Colour code (for a PLC)	Diagnostics event according to NE 107	Meaning
Red	5	Failure, error or fault	MFM: Due to a malfunction of the product or its periphery, the measured values are not valid. MFC: Due to a malfunction of the product or its periphery, the measured values are not valid and the product cannot regulate any more.
Orange	4	Check function	The product is being worked on. <ul style="list-style-type: none"> <li>• MFM: The output signal is temporarily invalid.</li> <li>• MFC: The product cannot regulate temporarily.</li> </ul>
Yellow	3	Out of specification	The ambient conditions or process conditions for the product are outside the specified ranges. Product internal diagnostics point to problems in the product or with the process properties.
Blue	2	Maintenance required	→ Do the required maintenance operation. MFM: The product continues to measure. MFC: The product continues to regulate, but a function is temporarily restricted.
Green	1	-	Diagnostics are active and no diagnostics event has been generated. The MFC product variant operates in the normal operating mode or in <b>Stored set-point value</b> operating mode. Refer to <a href="#">chpt. 10.9 Normal operating mode (MFC)</a> and <a href="#">chpt. 10.11 Choose the source that gives the set-point value (MFC)</a> .

→ To solve a problem indicated by the product status indicator, refer to [chpt 12.1 Problems shown by the product status indicator](#).

### 5.3 Motor valve status LED

The colour and status of the motor valve status LED give the following pieces of information:

- Whether the motor valve faces a problem or not.
- Whether the motor valve is completely open or closed.

Tab. 2: Status of the motor valve depending on the colour of the status LED

Colour of the LED	Status of the LED	Status of the motor valve
-	LED out	Motor valve is not energised
white	LED lit	Motor valve operates normally
yellow	LED lit	Motor valve is completely open
	LED flashing. The colour alternates with the colour that indicates the position of the motor valve.	The ambient conditions or the process conditions for the motor valve are outside the specified ranges.
green	LED lit	Motor valve is closed
red	LED flashing. The colour alternates with the colour that indicates the position of the motor valve.	Error

### 5.4 Memory card

#### NOTICE

If the memory card is defective or lost, then buy a new memory card from your Bürkert sales office.

The product is delivered with a memory card that is inserted in the product.

When the product is energised, there are two possibilities:

- If product-specific data is stored on the inserted memory card, then the product adopts the data. At product delivery, the memory card contains product-specific data. To get a list of the stored data, refer to the Help for the Initiation file that can be downloaded from [country.burkert.com](http://country.burkert.com).
- If the inserted memory card is empty, the product loads its own data on the memory card. A new memory card is empty.

The data on the memory card can be transferred to another product with the same article number. For example, the data can be transferred from a defective product to a new product.

### 5.5 Control valve of an MFC

The MFC is equipped with one of the following control valve types:

- A direct-acting and normally-closed proportional valve.
- A motor-driven valve that is called motor valve. If de-energised, the motor valve remains in its latest position.

The control valve provides the sealing function when the following conditions are met:

- The product is used within the specified pressure range.
- The product is equipped with a valve seat seal that is made of a soft material such as FKM or EPDM.

#### **NOTICE**

**If the valve seat seal is made of a hard material such as PCTFE, then the control valve may not be tight.**

Products with a nominal valve diameter of 0.05 mm or 0.1 mm have a valve seat seal made of a hard material.

## **6 TECHNICAL DATA**

### **6.1 Conformity**

The product complies with the EU directives according to the EU declaration of conformity (if applicable).

### **6.2 Standards**

The applied standards, which verify conformity with the EU directives, can be found on the EU type examination certificate and/or the EU declaration of conformity (if applicable).

### **6.3 Operating conditions**



#### **WARNING**

**Risk of injury caused by pressure, fluid escape.**

Important product-specific data is indicated on the Type label and the calibration plate.

- ▶ Only use the product for the specified operating fluid.
- ▶ Do not exceed the specified calibration pressure.



#### **WARNING**

**Risk of injury from malfunction due to outdoor use.**

- ▶ Do not use the product in outdoor areas.

→ For the special operating conditions of product variants with ATEX certification, refer to the ATEX supplement for the product.

### 6.3.1 Mass Flow Meter

Tab. 3: Operating conditions of an MFM

Ambient temperature	-10 °C...+50 °C
Fluid temperature	<ul style="list-style-type: none"> <li>-10 °C...+70 °C</li> <li>-10 °C...+60 °C for oxygen</li> </ul>
Ambient humidity	< 95%, non-condensing
Protection class according to EN 60529	IP65 <sup>1)</sup> , IP67 <sup>1)</sup> If the following conditions are met: <ul style="list-style-type: none"> <li>Cables must be connected.</li> <li>Mating connectors must be plugged in and tightened.</li> </ul>
1) The IP-Code is determined by Bürkert. The IP-Code is not evaluated by UL.	
Operating pressure	Max. 22 bar

### 6.3.2 Mass Flow Controller with proportional valve

Tab. 4: Operating conditions of an MFC with proportional valve

Ambient temperature	<ul style="list-style-type: none"> <li>-10 °C...+50 °C</li> <li>UL-certified product variant: -10 °C...+40 °C</li> </ul>
Fluid temperature	<ul style="list-style-type: none"> <li>-10 °C...+70 °C</li> <li>-10 °C...+60 °C for oxygen</li> </ul>
Ambient humidity	< 95%, non-condensing
Protection class according to EN 60529	IP65 <sup>2)</sup> , IP67 <sup>2)</sup> If the following conditions are met: <ul style="list-style-type: none"> <li>Cables must be connected.</li> <li>Mating connectors must be plugged in and tightened.</li> </ul>
2) The IP-Code is determined by Bürkert. The IP-Code is not evaluated by UL.	
Operating pressure	Max. 10 bar Depends on the nominal diameter of the proportional valve

### 6.3.3 Mass Flow Controller with Type 3280 motor valve

Tab. 5: Operating conditions of an MFC with Type 3280 motor valve

Ambient temperature	<ul style="list-style-type: none"> <li>• -10 °C...+50 °C</li> <li>• UL-certified product variant: -10 °C...+40 °C</li> </ul>
Fluid temperature	<ul style="list-style-type: none"> <li>• 0 °C...+70 °C</li> <li>• 0 °C...+60 °C for oxygen</li> </ul>
Ambient humidity	< 95%, non-condensing
Protection class according to EN 60529	<p>IP54<sup>3)</sup></p> <p>If the following conditions are met:</p> <ul style="list-style-type: none"> <li>• Cables must be connected.</li> <li>• Mating connectors must be plugged in and tightened.</li> </ul>
<p>3) The IP-Code is determined by Bürkert. The IP-Code is not evaluated by UL.</p>	
Operating pressure	<p>Max. 22 bar</p> <p>Depends on the nominal diameter of the motor valve</p>

### 6.3.4 Mass Flow Controller with Type 3285 motor valve

Tab. 6: Operating conditions of an MFC with Type 3285 motor valve

Ambient temperature	<ul style="list-style-type: none"> <li>• -10 °C...+50 °C</li> <li>• UL-certified product variant: -10 °C...+40 °C</li> </ul>
Fluid temperature	<ul style="list-style-type: none"> <li>• 0 °C...+70 °C</li> <li>• 0 °C...+60 °C for oxygen</li> </ul>
Ambient humidity	< 95%, non-condensing
Protection class according to EN 60529	<p>IP50<sup>4)</sup></p> <p>If the following conditions are met:</p> <ul style="list-style-type: none"> <li>• Cables must be connected.</li> <li>• Mating connectors must be plugged in and tightened.</li> </ul>
<p>4) The IP-Code is determined by Bürkert. The IP-Code is not evaluated by UL.</p>	
Operating pressure	<p>Max. 22 bar</p> <p>Depends on the nominal diameter of the motor valve</p>

## 6.4 Product materials

Tab. 7: Product materials, common to all product variants

Product part	Material
Base block	<ul style="list-style-type: none"> <li>Aluminium</li> <li>Stainless steel 1.4305</li> </ul>
Housing	Painted die-cast aluminium
Seal	Refer to the Type label
Product status indicator	PMMA (non-ATEX product variant)
Parts in contact with the fluid (sensor)	1.4404, Al <sub>2</sub> O <sub>3</sub> , PPS GF40, epoxy resin, silicon, silicon nitride

Tab. 8: Specific materials of an MFC with proportional valve

Parts in contact with the fluid	1.4310, 1.4113, 1.4305
---------------------------------	------------------------

Tab. 9: Specific materials of an MFC with motor valve

Parts in contact with the fluid	1.4310, 1.4305, Al <sub>2</sub> O <sub>3</sub> , PPS GF40, PEEK
---------------------------------	---

## 6.5 Dimensions, weight

→ Refer to the data sheet of the related product.

## 6.6 Fluid data

### 6.6.1 Mass Flow Meter

Tab. 10: Fluid data, MFM

Calibration fluid	Operating gas or air
Mass flow-rate range (reference to N <sub>2</sub> (l <sub>N</sub> /min))	20...2500 l <sub>N</sub> /min
Exact range depends on the size of the product base-block and on the gas used. Refer to the datasheet that is related to the product Type.	
Measuring range	1:50 Larger measuring range available on request.
Repeatability	±0.1% of the full scale
Operating fluid	See Type label
Measurement accuracy, after 15 minute warm-up time and with the calibration fluid	± 1.5% <sup>5)</sup> of the measured value ± 0.3% <sup>5)</sup> of the full scale
Response time	< 500 ms

5) If the operating fluid is different from the calibration fluid, then the measurement accuracy can be lower. If the operating gas is nitrogen or oxygen, then the given measurement accuracy is correct. But if the operating gas is natural gas, then the measurement accuracy may be different because the composition of natural gas varies depending on the season and origin.

## 6.6.2 Mass Flow Controller with proportional valve

Tab. 11: Fluid data, MFC with proportional valve

Calibration fluid	Operating gas or air
Mass flow-rate range (reference to N2 ( $I_N$ /min))	20...1500 $I_N$ /min
Exact range depends on the size of the product base-block and on the gas used. Refer to the datasheet that is related to the product Type.	
Measuring range/closed-loop control range	1:50 Larger measuring range available on request.
Repeatability	$\pm 0.1\%$ of the full scale
Operating fluid	See Type label
Measurement accuracy, after 15 minute warm-up time and with the calibration fluid	$\pm 1.5\%^{(6)}$ of the measured value $\pm 0.3\%^{(6)}$ of the full scale
Settling time	< 500 ms

6) If the operating fluid is different from the calibration fluid, then the measurement accuracy can be lower. If the operating gas is nitrogen or oxygen, then the given measurement accuracy is correct. But if the operating gas is natural gas, then the measurement accuracy may be different because the composition of natural gas varies depending on the season and origin.

## 6.6.3 Mass Flow Controller with motor valve

Tab. 12: Fluid data, MFC with motor valve

Calibration fluid	Operating gas or air
Mass flow-rate range (reference to N2 ( $I_N$ /min))	20...2500 $I_N$ /min
Exact range depends on the size of the product base-block and on the gas used. Refer to the datasheet that is related to the product Type.	
Measuring range/closed-loop control range	1:50 Larger measuring range available on request.
Repeatability	$\pm 0.1\%$ of the full scale
Operating fluid	See Type label
Measurement accuracy, after 15 minute warm-up time and with the calibration fluid	$\pm 2\%^{(7)}$ of the measured value $\pm 0.5\%^{(7)}$ of the full scale
Settling time	< 5 s

7) If the operating fluid is different from the calibration fluid, then the measurement accuracy can be lower. If the operating gas is nitrogen or oxygen, then the given measurement accuracy is correct. But if the operating gas is natural gas, then the measurement accuracy may be different because the composition of natural gas varies depending on the season and origin.

### 6.6.4 Quality of the operating fluid

Use the operating fluid that is given on the product Type-label. The operating fluid must be clean and dry.



The gas or gas mixture must obey the quality criteria in 10.8. The quality criteria are given in standard ISO 8573-1, Compressed Air - Part 1: Contaminants and purity classes. The operating gas must obey the quality criteria to obey the following requirements:

- the necessary measurement accuracy of the product
- to meet the safety requirements
- to meet the closed-loop control accuracy of an MFC

For further information on the quality criteria, refer to ISO 8573-1.

Tab. 13: Quality criteria of the fluid

Criteria	Quality class	Value
Maximum particle size	2	1 $\mu\text{m}$
Maximum particle density	2	1 $\text{mg}/\text{m}^3$
Maximum dew point under pressure	4	3 $^{\circ}\text{C}$
Maximum oil concentration	1	0.01 $\text{mg}/\text{m}^3$

### 6.6.5 Pressure loss (MFM)

A Mass Flow Meter has a pressure loss that depends on the following parameters:

- the flow rate value
- the size of the product fluid-connections
- the type of the product fluid-connections
- the size of the product base-block
- the type of operating gas

→ Determine the pressure-loss value depending on whether the operating fluid is air or a gas other than air.

#### 6.6.6 Operating gas is air

If the operating gas is air, then read the pressure-loss value directly from the diagrams in [Fig. 4](#) or in [Fig. 5](#).

For example, if the flow rate through an MFM with 1/2" threaded fluid-connections is 1400  $\text{l}_\text{N}/\text{min}$  then the pressure loss for air, as given in [Fig. 4](#), is 140 mbar.

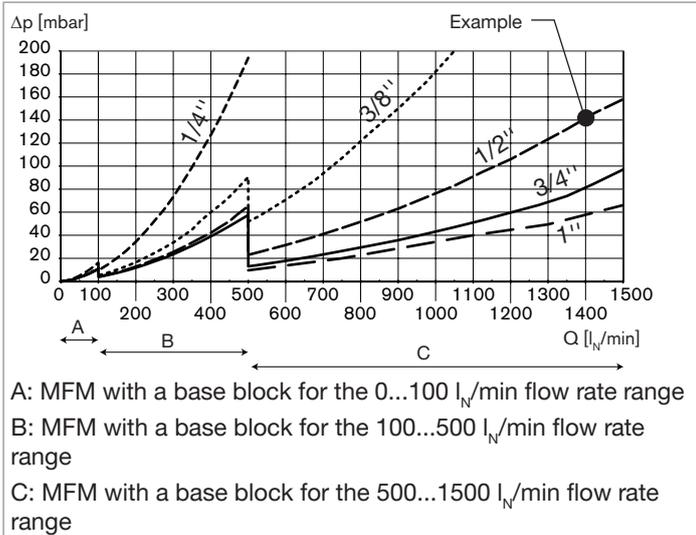
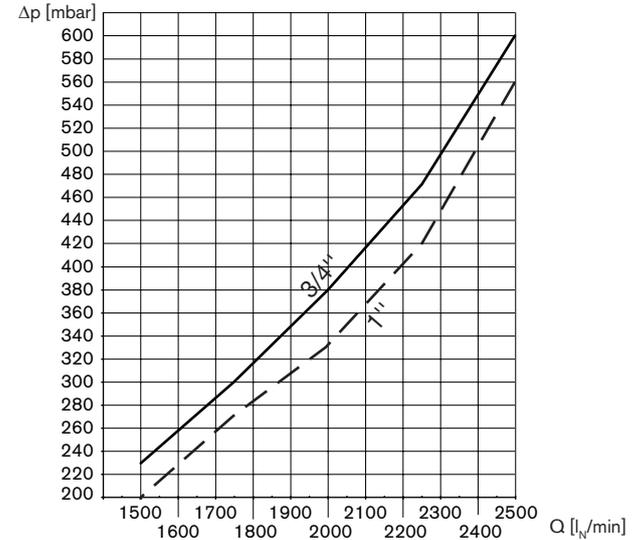


Fig. 4: Pressure loss diagram for air, MFM with a 250-µm mesh filter, flow rate ranges 0...100 l<sub>N</sub>/min, 100...500 l<sub>N</sub>/min, 500...1500 l<sub>N</sub>/min



MFM with a base block for the 1500...2500 l<sub>N</sub>/min flow rate range

Fig. 5: Pressure loss diagram for air, MFM with a 250-µm mesh filter, flow rate range 1500...2500 l<sub>N</sub>/min

## 6.6.7 Operating gas is not air

If the operating gas is not air, determine the pressure loss as follows:

1. Read the air pressure-loss  $\Delta p_{\text{air}}$  from the diagrams in [Fig. 4](#) or in [Fig. 5](#).
2. Calculate the pressure loss  $\Delta p_{\text{gas}}$  with the formula that is given in [Fig. 6](#).

$$\Delta P_{\text{Gas}} = \Delta P_{\text{air}} \cdot \sqrt{\frac{\rho_N^{\text{Gas}}}{\rho_N^{\text{air}}}}$$

$\Delta P_{\text{Gas}}$  = pressure loss of the operating gas

$\Delta P_{\text{air}}$  = pressure loss of air

$\rho_N^{\text{Gas}}$  = density of the operating gas at the standard conditions according to DIN 1343 ( $P_N = 1013.25$  mbar,  $T_N = 273.15$  K)

$\rho_N^{\text{air}}$  = density of air at the standard conditions according to DIN 1343 ( $P_N = 1013.25$  mbar,  $T_N = 273.15$  K)

Fig. 6: Formula to calculate the pressure loss in an MFM

Example for argon gas that flows through an MFM with 1/2" threaded fluid-connections:

1. If the flow rate is 1400 l<sub>N</sub>/min then the air pressure-loss  $\Delta p_{\text{air}}$  as given in [Fig. 4](#) is 140 mbar.
2. The pressure loss for argon gas at a flow rate of 1400 l<sub>N</sub>/min is 164.4 mbar as given by the calculation in [Fig. 7](#).

$$\Delta P_{\text{argon}} = 140 \text{ mbar} \cdot \sqrt{\frac{1.784}{1.294}} = 164.4 \text{ mbar}$$

Fig. 7: Calculation of the pressure loss for argon gas

## 6.7 Electrical data

### **WARNING**

- ▶ For UL-certified components, only use limited power circuits of "NEC Class 2".

Tab. 14: *Electrical data of an MFM*

Operating voltage	24 V DC $\pm 10$ %
Maximum power consumption	2 W
Communication interface	büS and CANopen. The communication type can be chosen with the Bürkert Communicator software.

Tab. 15: *Electrical data of an MFC*

Operating voltage	24 V DC $\pm 10$ %; residual ripple < 2 %
Maximum power consumption	Refer to the Type label of the product
Communication interface	büS and CANopen. The communication type can be chosen with the Bürkert Communicator software.

## 6.8 Markings

### **WARNING**

**Risk of injury caused by pressure, fluid escape.**

Important product-specific data is indicated on the Type label and on the calibration plate.

- ▶ Only use the product for the specified operating fluid.
- ▶ Do not exceed the specified calibration pressure.

### 6.8.1 Calibration plate

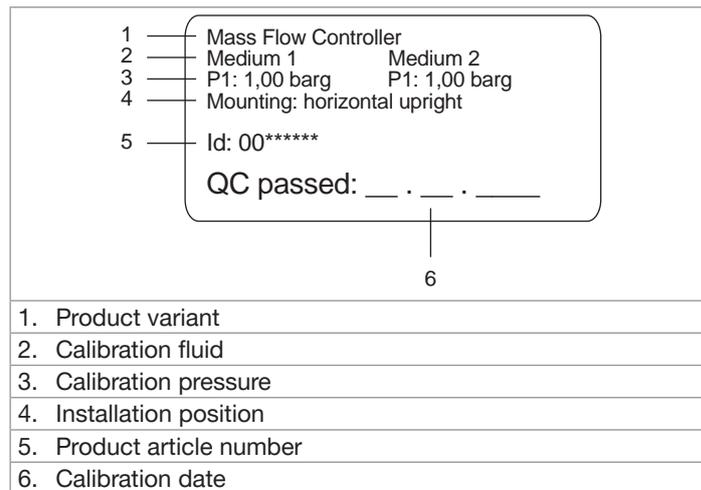
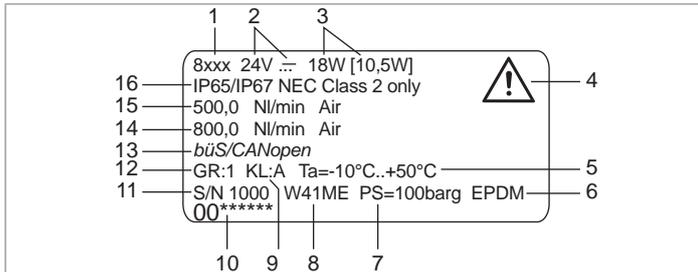


Fig. 8: *Description of the calibration plate*

### 6.8.2 Type label



1. Type of the product
2. Supply voltage, direct current
3. Consumption according to UL 61010-1 [proportional valve: typical consumption <sup>1)</sup> ; motor valve: power consumption <sup>1)</sup> to hold the position of the motor valve]
<sup>1)</sup> Conditions: ambient temperature 23 °C, nominal flow rate 100%, regulation for 30 minutes
4. Warning symbol: Observe the Operating Instructions delivered with the product.
5. Ambient temperature
6. Sealing material
7. Burst pressure
8. Manufacturing code
9. Class of the control valve according to the DVGW (Deutscher Verein des Gas- und Wasserfaches)

10. Product article number
11. Product serial number
12. Category of the product
13. Communication interface
14. Nominal flow rate (Qnominal), units and operating fluid (gas 2)
15. Nominal flow rate (Qnominal), units and operating fluid (gas 1)
16. IP-Code

Fig. 9: Description of the Type label (example)

### 6.8.3 Conformity marking, certification marking

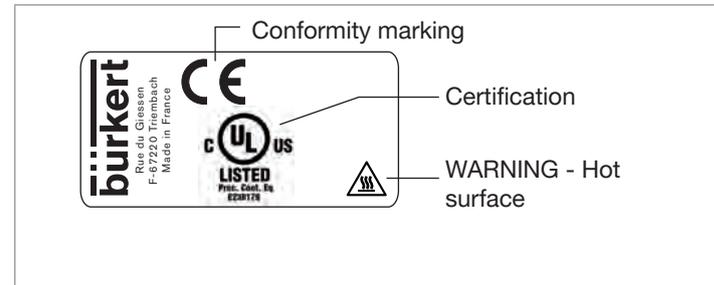


Fig. 10: CE marking and UL-certification



Find the description of the older markings on the product in the supplement at [country.burkert.com](http://country.burkert.com)

## 7 FLUID INSTALLATION

### 7.1 Safety instructions



#### DANGER

Risk of injury that is due to pressure in the installation and in the product.

- ▶ Before working on the installation or product, cut the pressure. Vent and drain the pipes.

Risk of injury from electric shocks.

- ▶ Before working on the installation or the product, switch off the power supply. Make sure that nobody can switch the power supply on.
- ▶ Observe all applicable accident protection and all applicable safety regulations for electrical equipment.

Risk of injury that is due to fluid escape.

- ▶ Observe all applicable accident protection and all applicable safety regulations relating to the operating fluid used.



#### WARNING

Risk of injury that is due to improper installation.

- ▶ Only trained personnel can carry out the installation. Personnel must use suitable tools.
- ▶ Secure the installation against unintentional actuation.
- ▶ Ensure a controlled restart after installation.

### NOTICE

Risk of breakage of a product variant with motor valve.

- Do not use the actuator housing of the motor valve as a lever arm.



Vibrations have an unwanted effect on the control valve of the MFC.

- ▶ Avoid severe vibrations.

### 7.2 Installation steps

1. Do the fluid installation depending on the fluid connections. Refer to the relevant chapter:
  - [chpt. 7.3 Product variant with G-internal-threaded connections](#)
  - [chpt. 7.4 Product with NPT-internal-threaded connections](#)
  - [chpt. 7.5 Product variant with flange connections.](#)
2. Do the electrical installation. Refer to [chpt. 8.](#)
3. Commission the product. Refer to [chpt. 9 Commissioning.](#)

### 7.3 Product variant with G-internal-threaded connections

For the connection to the process, the product is equipped with a threaded process connection plate according to DIN ISO 228/1.



#### WARNING

Risk of injury that is due to leakage.

- ▶ At a low mass flow-rate and a high pressure, make sure that the installation is tight. The tightness prevents incorrect measurements or the leakage of the operating fluid.

To make sure that the installation is tight, observe the following instructions:

- ▶ Use compression fittings. Mount the compression fittings, in a way that they are not subject to any stresses.
- ▶ Use pipes with a diameter that is adapted to the fluid connection of the product, and with a smooth surface.



If the compression fittings are not delivered with the product, then choose pipe fittings from another manufacturer. The pipe fittings must be adapted to the fluid connection of the product. Compression fittings for G-internal-threaded connections are available as accessories, see [Tab. 16](#). Also buy the seal for each fluid connection.

Tab. 16: Stainless steel compression fittings and related seals

Product internal-threaded connection in accordance with DIN ISO 228/1	Pipe diameter	Article number	
		Stainless steel compression fitting	Seal (1 piece)
G 1/4	6 mm	901 538	901 575
G 1/4	8 mm	901 540	
G 1/4	1/4"	901 551	901 579
G 1/4	3/8"	901 553	
G 3/8	8 mm	901 542	901 576
G 3/8	10 mm	901 544	
G 3/8	1/4"	901 555	901 580
G 3/8	3/8"	901 556	
G 1/2	10 mm	901 546	901 577
G 1/2	12 mm	901 548	
G 1/2	1/2"	901 557	901 581
G 1/2	3/4"	901 558	
G 3/4	12 mm	901 549	901 578
G 3/4	3/4"	901 559	901 582
G 1	On request		

#### Installation procedure



The procedure is given for the compression fittings available from Bürkert.

- If you use pipe fittings from another manufacturer, obey the instructions from this manufacturer.

No inlet section is required.

The connection to the pipe is explained for one side of the product. The same procedure applies on the other side of the product.

- Remove all dirt from the pipes and from the fluid carrying components of the installation.
- Cut the pipe squarely [1] and deburr [2]. See Fig. 11.

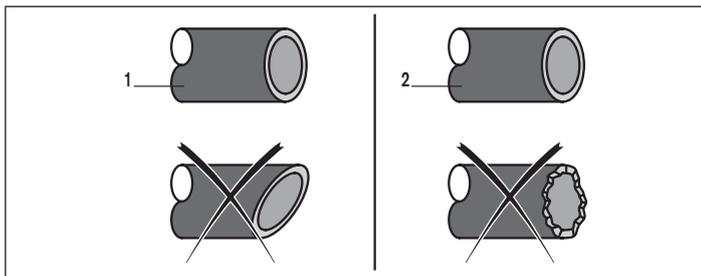


Fig. 11: Pipe cut and deburred

## NOTICE

### Malfunction due to contamination.

- ▶ If a contaminated operating fluid is used, then install a filter upstream of the product. The filter mesh-size must be smaller than 25 µm. The filter ensures problem-free functioning of the product. See chpt. 6.6 Fluid data.

- Remove the protective cap that closes the threaded connection.
- Observe the installation position that is given on the calibration plate or in the calibration protocol.

- Slide the nut [A] and then the ferrule onto the pipe. See Fig. 12.

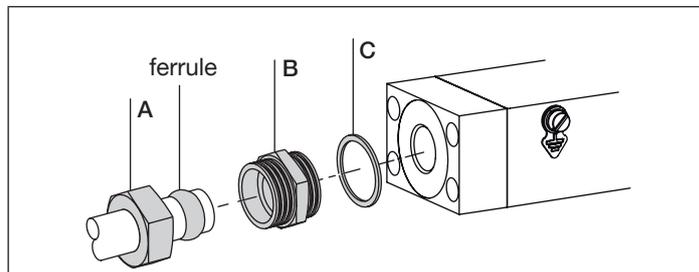


Fig. 12: Nut and ferrule on the pipe

- Place the seal [C] on the product fluid-connection. See Fig. 13.
- Screw the compression-fitting body [B] in the fluid connection. Tighten to a torque of 25...28 N·m, that is 18.44...20.65 lbf·ft. See Fig. 13.

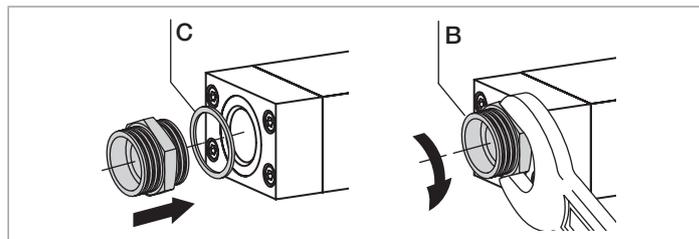


Fig. 13: Screw on the compression-fitting body

- Insert the pipe in the compression-fitting body and tighten the nut [A] by hand. See Fig. 14.

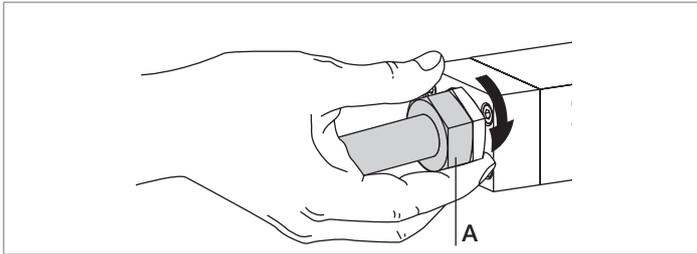


Fig. 14: Nut screwed by hand

- Tighten the nut with an open-end spanner to a torque of 25...28 N·m, that is 18.44...20.65 lbf·ft. See Fig. 15.

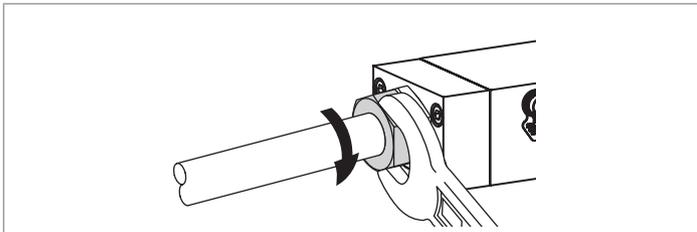


Fig. 15: Nut tightened with an open-end spanner

- Do the fluid connection on the other side of the product in the same way.

## 7.4 Product with NPT-internal-threaded connections



### WARNING

Risk of injury that is due to leakage.

- ▶ At a low mass flow rate and a high pressure, make sure that the installation is tight. The tightness prevents incorrect measurements or the leakage of the operating fluid.

To make sure that the installation is tight, observe the following instructions:

- ▶ Use compression fittings. Mount the compression fittings, in a way that they are not subject to any stresses.
- ▶ Use pipes with a diameter that is adapted to the fluid connection of the product, and with a smooth surface.

### Installation procedure

No inlet section is required.

- Remove all dirt from the pipes and from the fluid carrying components of the installation.
- Cut the pipe squarely [1] and deburr [2]. See Fig. 16.

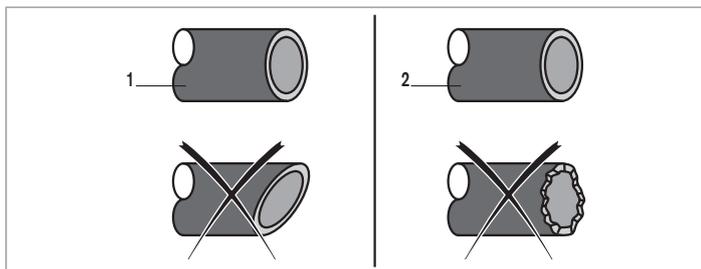


Fig. 16: Pipe cut and deburred

## NOTICE

### Malfunction that is due to contamination.

► If a contaminated operating fluid is used, then install a filter upstream of the product. The filter mesh-size must be smaller than 25 µm. The filter ensures problem-free functioning of the product. See chpt. 6.6 Fluid data.

- Observe the installation position that is given on the calibration plate or in the calibration protocol.
- Remove the protective cap that closes the threaded connection.
- Do the fluid connection on one side of the product.
- Obey the instructions that are given by the manufacturer of the fitting used.
- Obey the torques that are given by the manufacturer of the fitting used.
- Do the fluid connection on the other side of the product in the same way.

## 7.5 Product variant with flange connections



### WARNING

Risk of injury that is due to leakage.

At a low mass flow rate and a high pressure, make sure that the installation is tight. The tightness prevents incorrect measurements or the leakage of the operating fluid.



Vibrations have an unwanted effect on the control valve of the MFC.

- Avoid severe vibrations.

A product variant with flange connections is mounted on a process connection plate by the manufacturer. The process connection plate is fitted with fluid connections of various types:

- internal-threaded connections
  - external-threaded connections
  - clamp connections
  - ...
- Install the product depending on the fitted fluid connections.

## 8 ELECTRICAL INSTALLATION

### 8.1 Safety instructions



#### DANGER

Risk of injury from electric shocks.

- ▶ Before working on the installation or the product, switch off the power supply. Make sure that nobody can switch the power supply on.
- ▶ Observe all applicable accident protection and all applicable safety regulations for electrical equipment.



#### WARNING

Risk of ignition and risk of fire due to electrostatic discharge.

An electrostatic discharge of the product can ignite combustible gas vapours.

- ▶ To avoid a build up of electrostatic charge, connect the housing to the functional earth (FE). Use a green-and-yellow cable that is as short as possible. And the cable cross-section must be at least equal to the cross section of the power-supply cable..



#### WARNING

Risk of injury from electromagnetic fields.

If the functional earth (FE) is not attached, then the requirements of the EMC directive are not met.

- ▶ Connect the housing to the functional earth (FE). Use a green-and-yellow cable that is as short as possible. And the cable cross-section must be at least equal to the cross section of the power-supply cable.

#### NOTICE

Requirements for the proper function of the product.

- ▶ Use a power supply unit with sufficient power.
- ▶ Use shielded büS cables, shielded CANopen cables or shielded DeviceNet cables. The cable shielding can be either a braid shielding or a foil shielding.
- ▶ For an MFC pay attention to the maximum permissible residual ripple on the operating voltage. The residual ripple is given in chpt. [6.7 Electrical data](#).

### 8.2 Additional documentation

- For more information on büS, read the cabling guide available at [country.burkert.com](http://country.burkert.com).
- For more information on CANopen that is related to the product, refer to the Operating Instructions "CANopen Network configuration" at [country.burkert.com](http://country.burkert.com).

- Product description file and object description for the related product Type (download from [country.burkert.com](http://country.burkert.com)).
- ATEX supplement for Type 8746 (download from [country.burkert.com](http://country.burkert.com)).
- Product-specific help in the Bürkert Communicator software.
- bÜS-driver for LabVIEW on request.
- Supplement with the description to the product status indicator for software versions prior to A.08, available at [country.burkert.com](http://country.burkert.com).

## 8.3 Wiring the product

### 8.3.1 With bÜS extension cables from Bürkert

#### NOTICE

##### Requirements for the correct operation of the product.

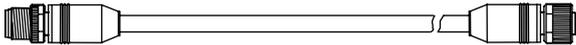
- ▶ Refer to the cabling guide that is available in English and German at [country.burkert.com](http://country.burkert.com)

To wire the product, you can use bÜS extension cables from Bürkert. The available bÜS extension cables are listed in [Tab. 18](#).

Tab. 17: Accessories: bÜS extension cables

Item	Article number
bÜS extension cable with 5-pin M12 connectors, 0.1 m	772492

Item	Article number
bÜS extension cable with 5-pin M12 connectors, 0.2 m	772402
bÜS extension cable with 5-pin M12 connectors, 0.5 m	772403
bÜS extension cable with 5-pin M12 connectors, 1 m	772404
bÜS extension cable with 5-pin M12 connectors, 3 m	772405



- If the impact protection-cover is fitted, then loosen the 2 screws of the impact protection-cover with a 2.5-mm hex key. Remove the impact protection-cover.
- If the product is an ATEX variant, then remove the M12 sealing cap.
- Screw the mating female connector to the 5-pin male connector, to the torque given by the manufacturer of the mating female connector.
- Do the functional earthing of the product. Refer to [chpt 8.4](#).

### 8.3.2 With bÜS cables from Bürkert

#### NOTICE

##### Requirements for the correct operation of the product.

- ▶ Refer to the cabling guide that is available in English and German at [country.burkert.com](http://country.burkert.com)

To wire the product, you can use bÜS cables from Bürkert. And you can use mating female connectors from Bürkert. Refer to [Tab. 18](#).

Tab. 18: Accessories: bÜS cables and female connectors

Item	Article number
bÜS cable, 50 m	772413
bÜS cable, 100 m	772414
Straight 5-pin M12 female connector	772416
Bent 5-pin M12 female connector	772418

If you use a bÜS cable from Bürkert, then observe the signals of the conductors as given in [Tab. 19](#).

Tab. 19: Signals of the bÜS cable conductors

Colour of the bÜS cable conductor	Signal
red	24 V DC
black	DGND
white	CAN_H
blue	CAN_L



If you use your own mating female connector, observe the following requirements for the correct operation of the product.

- Use a mating female connector with shield connection.
- Make sure that the bÜS cable passes through the mating female connector. The bÜS cable that is available from Bürkert has an external diameter of 8.2 mm.

- Wire the mating female connector. Observe the instructions given by the manufacturer of the mating female connector.
- Insert each conductor into the appropriate pin. Refer to [Fig. 17](#).

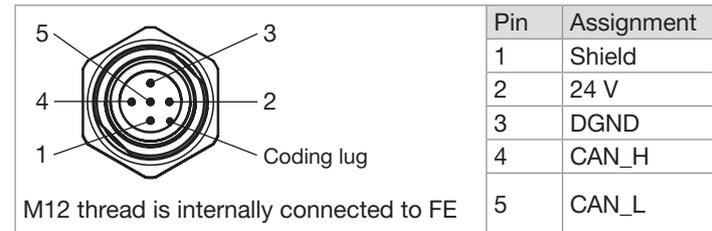


Fig. 17: bÜS /CANopen MFM, bÜS /CANopen MFC:Pin assignment, 5-pin M12 male connector (A coding)

- If the impact protection-cover is fitted, then loosen the 2 screws of the impact protection-cover with a 2.5-mm hex key. Remove the impact protection-cover.

- If the product is an ATEX variant, then remove the M12 sealing cap.
- Take a strand of the cable shielding and insert the strand into pin 1.
- Screw the mating female connector to the 5-pin male connector, to the torque given by the manufacturer of the mating female connector.
- Do the functional earthing of the product. Refer to chpt 8.4.

### 8.3.3 With CANopen cables

#### NOTICE

##### Requirements for the correct operation of the product.

- ▶ Use shielded CANopen cables. The cable shielding can be either a braid shielding or a foil shielding.

To wire the product, you can use mating female connectors from Bürkert. Refer to [Tab. 20](#).

Tab. 20: Accessories: female connectors

Item	Article number
Straight 5-pin M12 female connector	772416
Bent 5-pin M12 female connector	772418



##### Requirements for the correct operation of the product.

- Use a mating female connector with shield connection.
- Observe the specifications for the cable and conductors, that are given by the manufacturer of the mating female connector.

- Wire the mating female connector. Observe the instructions given by the manufacturer of the mating female connector.
- Insert each conductor into the appropriate pin. Refer to [Fig. 18](#).

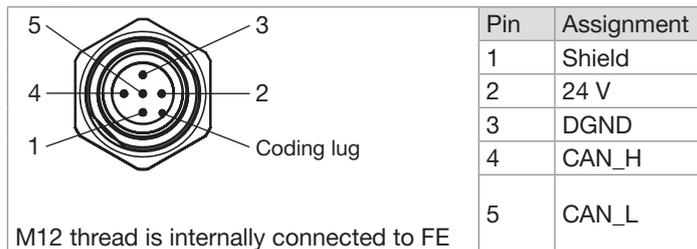


Fig. 18: bÜS /CANopen MFM, bÜS /CANopen MFC:Pin assignment, 5-pin M12 male connector (A coding)

- If the impact protection-cover is fitted, then loosen the 2 screws of the impact protection-cover with a 2.5-mm hex key. Remove the impact protection-cover.
- If the product is an ATEX variant, then remove the M12 sealing cap.
- Take a strand of the cable shielding and insert the strand into pin 1.
- Screw the mating female connector to the 5-pin male connector, to the torque given by the manufacturer of the mating female connector.
- Do the functional earthing of the product. Refer to chpt 8.4.

## 8.4 Connecting the functional earth

To do the functional earthing of the product, obey the following instructions:

- Use a green-and-yellow cable that is as short as possible. And the cable cross-section must be at least equal to the cross section of the power-supply cable.
- With a flat screwdriver of size 6.5 mm, loosen the M4 screw. Refer to [Fig. 19](#). Or loosen the M3 screw. Refer to [Fig. 20](#).

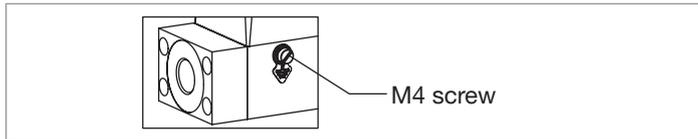


Fig. 19: Location of the M4 screw for the connection of the functional earth cable

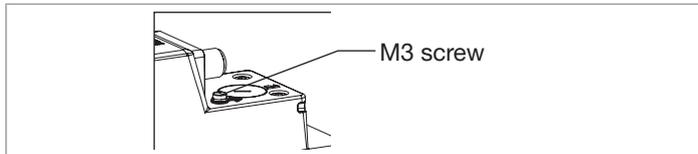


Fig. 20: Location of the M3 screw for the connection of the functional earth cable

- Attach the functional earth green-and-yellow cable with a cable lug, either to the M4 screw or to the M3 screw.
- Tighten the M4 screw to a torque of 1,8 N·m...2 N·m, that is 1,33 lbf·ft...1,47 lbf·ft, or tighten the M3 screw to a torque of 0,6 N·m...0,8 N·m, that is 0,44 lbf·ft...0,59 lbf·ft.

→ If an ATEX product variant is used in a potentially explosive area, then fit the impact protection-cover. Obey the following instructions:

1. Insert the locking hooks of the impact protection-cover in the notches of the housing. See [Fig. 21](#).

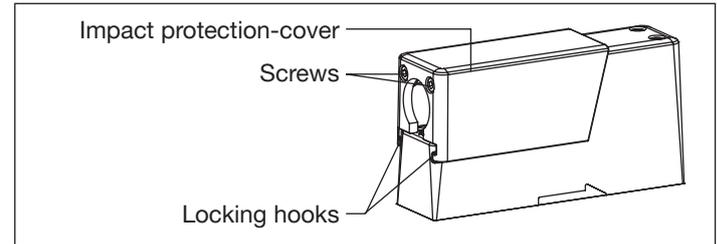


Fig. 21: Impact protection-cover, mounted

2. Tighten the screws of the impact protection-cover by hand.

## 9 COMMISSIONING

### 9.1 Safety instructions



#### WARNING

**Risk of injury from improper commissioning and operation.**

Improper commissioning and operation can lead to injuries and damage to the product and its environment.

- ▶ Before commissioning, make sure that the operating personnel are familiar with, and fully understand the content of the Operating Instructions.
- ▶ Observe the safety information and the intended use.
- ▶ Only properly trained personnel may commission the installation and the product.
- ▶ Only properly trained personnel may do the settings with the help of the Bürkert Communicator software.

### 9.2 Commissioning steps

1. Pressurise the pipes with operating fluid.
2. Flush the pipes with operating fluid at the calibration pressure and then vent them completely.
3. Energise the product.

✓ If product-specific data is stored on the inserted memory card, then the product adopts the data. To get a list of the stored data at product delivery, refer to the Help for the Initiation file that can be downloaded from [www.burkert.com](http://www.burkert.com).

✓ If the inserted memory card is empty, then the product loads its own data on the memory card. Possible problems related to the memory card are given in chpt. [12.3](#).

#### NOTICE

If the memory card is defective or lost, then buy a new memory card from your Bürkert sales office.

4. Choose between CANopen communication and büS communication. Refer to chpt. [10.5](#).
5. If you have an MFC product variant and if the operating fluid is not the calibration fluid or if the pressure conditions have changed, then run the Autotune function. See chpt. [10.10](#).
6. The product operates normally.

## 10 SETTING AND OPERATION

### 10.1 Safety instructions



#### DANGER

**Risk of injury that is due to pressure in the installation or in the product.**

- ▶ Before working on the installation or product, cut the pressure. Vent and drain the pipes.

**Risk of injury from electric shocks.**

- ▶ Before working on the installation or product, switch off the power supply. Make sure that nobody can switch the power supply on.
- ▶ Observe all applicable accident protection and all applicable safety regulations for electrical equipment.

**Burn hazard and fire hazard due to hot surface of the product.**

- ▶ Do not touch the hot surface with bare hands.
- ▶ Wear safety gloves to touch the product.
- ▶ Keep the product away from any highly flammable materials or fluids.

**Risk of injury that is due to escape of the fluid.**

- ▶ Observe all applicable accident protection and all applicable safety regulations relating to the operating fluid used.



#### WARNING

**Risk of injury that is due to improper operation.**

Improper operation can lead to injuries and damage to the product and its environment.

- ▶ The operating personnel must have read and understood the content of the Operating Instructions.
- ▶ Observe the safety information and the intended use.
- ▶ Only properly trained personnel may operate the installation and the product.
- ▶ Only properly trained personnel may do the settings with the help of the Bürkert Communicator software.

### 10.2 Functions

#### 10.2.1 Zero-point shut-off (MFC)

A zero-point shut-off ensures the sealing function of the control valve. The zero-point shut-off is activated if the following conditions occur simultaneously:

1. Set-point value < 2 % of nominal flow rate  $Q_{\text{nominal}}$  (with measuring range 1:50).
2. Measured value < 2 % of nominal flow rate  $Q_{\text{nominal}}$  (with measuring range 1:50).

✓ If the zero-point shut-off is active, then the PWM signal is set to 0% so that the control valve is completely closed.

## 10.2.2 Flush mode (MFC)

### NOTICE

If the control valve is fully open, then the internal product temperature increases. If the internal product temperature increases, then the product can be damaged.

- Do not let the control valve fully open for more than 10 minutes.

To open the control valve completely, send one of the following commands to the product:

- either an acyclic command
- or a cyclic command with the double nominal flow rate

## 10.3 Tools for doing settings



The MassFlowCommunicator is another PC software that is not compatible with the product. You cannot use the MassFlowCommunicator software to configure or operate the product.

Settings can be done with the Type 8920 Bürkert Communicator software.

- To connect the product to the Bürkert Communicator software, refer to chpt. 10.4.
- For general information about the Bürkert Communicator software, refer to the Type 8920 Operating Instructions.

## 10.4 Connect the product to the Bürkert Communicator software

To do the settings with the Type 8920 Bürkert Communicator software, do the following steps:

- Buy the USB-bÜS-interface set with article number 00772426 from Bürkert. See Fig. 22.

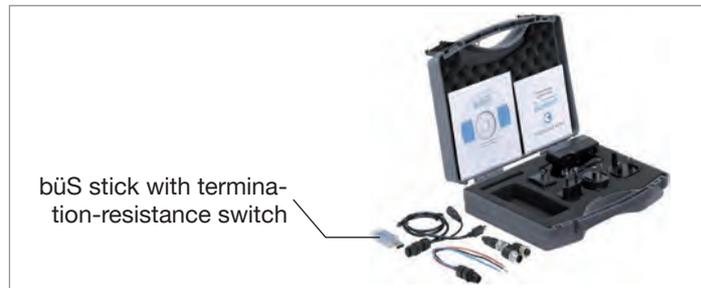


Fig. 22: USB-bÜS-interface set with article number 00772426

- Download the latest version of the Type 8920 Bürkert Communicator software from [country.burkert.com](http://country.burkert.com)
- During installation, the bÜS stick must not be inserted at the PC. Install the Bürkert Communicator software on a PC. Obey the installation recommendations given in the USB-bÜS-interface set.

Fig. 23 shows the electrical connection parts that are used from the USB-bÜS-interface set.

- Insert the micro-USB into the bÜS stick.
- Insert the appropriate power adapter into the AC/DC adapter.

- Connect the jack male-connector of the AC/DC-adaptor cable to the jack female-connector of the M12 female-connector cable.
- Connect the M12 female connector to the büS network.

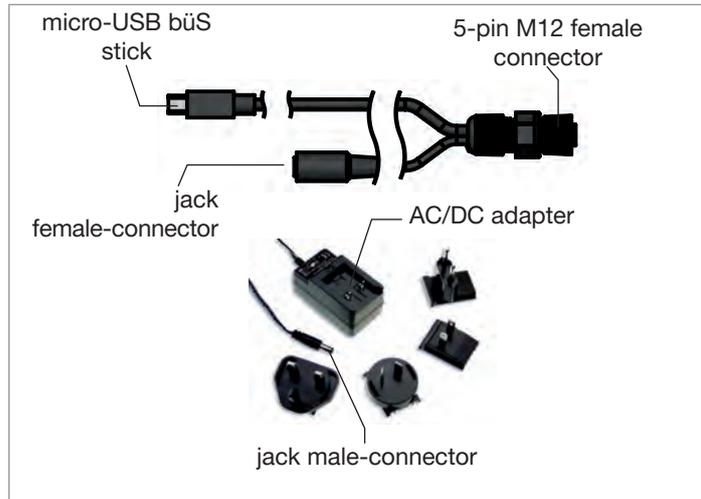


Fig. 23: Electrical connection parts of the USB-büS-interface set with article number 00772426

- If the product is connected to a büS network and is at a büS end, set the büS stick switch to "ON". The termination resistance that is integrated in the büS stick is then activated.
- Insert the büS stick into a USB port of the PC.

- Wait until the Windows pilot of the büS stick has been completely installed on the PC.
- Connect the AC/DC adapter to the power supply.
- Start the Bürkert Communicator software.
- Click on  in the Bürkert Communicator software to establish the communication between the Bürkert Communicator software and the product. A window opens.
- Select **büS stick**.
- Choose the port **Bürkert USB büS Stick**, click on **Finish** and wait until the product symbol appears in the list of devices.
- In the list of devices, click on the symbol related to the product: the menu structure for the product is displayed.

## 10.5 Setting the fieldbus communication, CANopen büS

On a product with a software version A. 14.00.00 and higher, you cannot use the switch for choosing the kind of digital communication (büS or CANopen) any more.

The possible operating modes of the digital communication are **büS** or **CANopen**. The default operating mode is user specific.

To change the operating mode of the digital communication, do the following:

- Connect the product to the Bürkert Communicator software. Refer to chpt. [10.4](#).
- In the Bürkert Communicator software, select the product.

→ Go to **General settings** -----> **Parameters** menu -----> **bÜS** -----> **Advanced** -----> **Bus mode**

→ Choose the operating mode of the digital communication.

→ Restart the product.

✓ The operating mode of the fieldbus is changed.

✓ If the operating mode of the fieldbus is bÜS, then the **CANopen status** is set to **Operational** and the PDO's are sent to bÜS.

✓ If the operating mode of the fieldbus is CANopen, then the **CANopen status** is set to **Pre-op** until the CANopen network master switches the product to **Operational**.

## 10.6 User-defined adjustment

At delivery the product is calibrated by the manufacturer.

With the Bürkert Communicator software, you can define an adjustment procedure with up to 32 calibration points.

The user-defined adjustment procedure is described in the product-specific Help of the Bürkert Communicator software.

→ To connect the product to the Bürkert Communicator software, refer to chpt. [10.4](#).

## 10.7 Increase the data transmission speed

If the data transmission speed is increased, then the product provides more cyclic process-data.

For example, the measured value of the mass flow-rate is available once every 100 ms by default. If the data transmission speed is increased, then the measured value of the mass flow-rate is available once every 10 ms.

→ If the data transmission speed is active simultaneously on several products in the network, then make sure that the bus load does not exceed 50%.

To increase the data transmission speed, do the following:

→ Energise the bus network.

→ Connect the product to the Bürkert Communicator software. Refer to chpt. [10.4](#).

→ In the Bürkert Communicator software, move the PC mouse over the bÜS-stick symbol in the list of devices. If the bus load is higher than 45%, then do not increase the data transmission speed.

→ If the bus load is less than or equal to 45%, then the data transmission speed can be increased. Do the following:

1. In the Bürkert Communicator software, select the product.

✓ The product status indicator flashes.

2. Go to **General settings** -----> **Diagnostics** -----> **Inhibit time**.

3. To increase the data transmission speed, click **Set diagnostic mode**. The function **Inhibit time** switches to **Set to default values**.

✓ The data transmission speed is increased.

→ To go back to the default data transmission speed, click **Set to default values**. The function **Inhibit time** switches to **Set diagnostic mode**.

### 10.8 Operating modes of an MFC

When energising the product for the first time, the product enters a short initialisation phase and then switches to the normal operating mode. The normal operating mode is described in chpt. 10.9.

The possible operating modes are described in [Tab. 21](#).

Tab. 21: Names of the operating modes of an MFC in the Bürkert Communicator software

Operating mode	Description
<b>Automatic</b>	Refer to chpt. 10.9
<b>Manual set-point value</b>	Refer to chpt. 10.11
<b>Stored set-point value</b>	Refer to chpt. 10.11
<b>Open-loop control mode</b>	Refer to chpt. 10.11
<b>Analyze system</b>	Refer to chpt. 10.11

→ To change the operating mode, change the source for the set-point values. Refer to chpt. 10.11.

The operating-mode is kept after a product restart, except when the product performs the function **Analyze system**.

### 10.9 Normal operating mode (MFC)

The normal operating mode is active when energising the product for the first time. [Fig. 24](#) shows the normal operating mode of an MFC.

#### NOTICE

If the valve seat seal is made of a hard material such as PCTFE, then the control valve may not be tight.

Products with a nominal valve diameter of 0.05 mm or 0.1 mm have a valve seat seal made of a hard material.

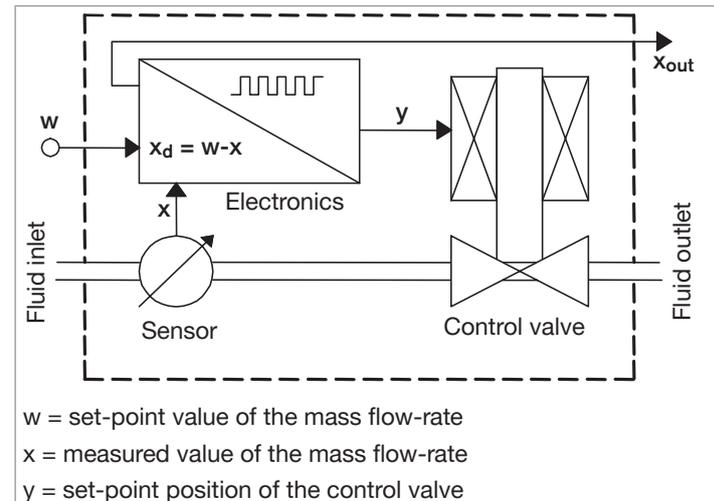


Fig. 24: Function diagram of the MFC with control valve

The sensor measures the mass flow-rate and compares the measured value  $x$  with the set-point value  $w$ . Then the product calculates the set-point position value  $y$  of the control valve. The set-point position value  $y$  determines the opening of the control valve. For example, if the set-point position value  $y$  is equal to 10%, then the opening of the control valve is 10%.

The set-point value  $w$  and the measured value of the flow rate are transmitted over the fieldbus. If different fieldbus participants simultaneously specify a set-point value for the product, then the last specified value is used.

- If the operating fluid is not the calibration fluid, then run the Autotune function. Refer to chpt. [10.10](#).
- If the pressure conditions have changed, then run the Autotune function. Refer to chpt. [10.10](#).
- To change the operating mode, change the source for the set-point values. Refer to chpt. [10.11](#).

## 10.10 Optimise the closed-loop control parameters (MFC)

The product is calibrated at the factory with the calibration fluid under the pressure conditions that are specified on the calibration protocol.

If the operating fluid is not the calibration fluid or if the pressure conditions have changed, then the closed-loop control parameters must be optimised. The function Autotune adapts the product to the new operating conditions.

When the Autotune is running:

- Do not interrupt the power supply to the MFC.
- Keep the supply pressure constant.



### WARNING

**Risk of injury that is due to flowing gas.**

While the Autotune function is running, the gas flow can be higher than the nominal flow.

- ▶ Before running the Autotune function, make sure that no danger can occur if the gas flow increases.

- Trigger the Autotune function with one of the following means:
  - over the fieldbus,
  - with the Bürkert Communicator software. To connect the product to the Bürkert Communicator software, refer to chpt. [10.4](#).
- ✔ The Autotune runs and the product status indicator is orange.
- ✔ The MFC temporarily stops regulating the flow rate in the pipe.
- ✔ When the function is completed, the product returns to its previous operating mode.
- ✔ If the function is completed successfully, then the optimised closed-loop control parameters are transferred to the hard memory of the product.

## 10.11 Choose the source that gives the set-point value (MFC)

The set-point value  $w$  can be set by different sources. You can choose which source is active at a time. The source for the set-point value can be changed during operation.

If you change the source for the set-point value, then the operating mode of the MFC is changed.

To change the source for the set-point value, change the setting of parameter **Set-point value source**. The setting of parameter **Set-point value source** can be changed either with the Bürkert Communicator software or by changing a device description object.

→ To connect the product to the Bürkert Communicator software, refer to chpt. [10.4](#).



The setting of the parameter **Set-point value source** is kept after a product restart, except when the product performs the function **Analyze system**.

The possible choices for the **Set-point value source** are:

- **Automatic**: the set-point value is set via the fieldbus. If different fieldbus participants simultaneously specify a set-point value for the product, then the last specified value is used.
- **Manual set-point value**: to manually give in a set-point value for testing purposes or to make sure that the set-point value is not overwritten by other fieldbus participants.
- **Stored set-point value**: to use a fixed set-point value ( $w$ ). If the product is restarted, then the fixed set-point value remains active.

- **Open-loop control mode**: to directly set the set-point position ( $y$ ) to the control valve. The value given in the menu **Actuator** -----> **Parameter** -----> **Actuating variable** is the set-point position ( $y$ ) that is used. A restart of the product sets the set-point position ( $y$ ) to zero.
- **Analyze system**: the product operates under the normal conditions of the **Automatic** operating mode according to a predefined chronological sequence with set-point values. Use the resulting diagram in combination with the graphical representation of process values to analyse the system with the Bürkert Communicator software.

## 10.12 Set-point values without communication (MFC)

The function makes it possible to specify the set-point values of an MFC even if the communication with the external set-point value provider (for example a PLC) is broken. If the function is used, then the set-point is kept constant.



By using the function, the fluid can continue to flow even if the communication is broken.

- ▶ Make sure that the process is safe when you use the function.

→ To use the function, refer to the related procedure in the product-specific help in the documentation of the initiation files (download at [country.burkert.com](http://country.burkert.com)).

## 11 MAINTENANCE

If no heavily contaminated fluids are used and if the product is operated according to the Operating Instructions, then the product is maintenance-free.

### 11.1 Maintenance for operation with heavily contaminated fluids



#### DANGER

**Risk of injury that is due to pressure in the installation and in the product.**

- ▶ Before working on the installation or product, cut the pressure. Vent and drain the pipes.

**Risk of injury from electric shocks.**

- ▶ Before working on the installation or product, switch off the power supply. Make sure that nobody can switch the power supply on.
- ▶ Observe all applicable accident protection and all applicable safety regulations for electrical equipment.

**Burn hazard and fire hazard due to hot surface of the product.**

- ▶ Do not touch the hot surface with bare hands.
- ▶ Wear safety gloves to touch the product.
- ▶ Keep the product away from any highly flammable materials or fluids.

**Risk of injury that is due to fluid escape.**

- ▶ Observe all applicable accident protection and all applicable safety regulations relating to the operating fluid used.



#### WARNING

**Risk of injury that is due to improper maintenance work.**

- ▶ Only trained personnel can do the maintenance work. Personnel must use suitable tools.
- ▶ Secure the installation against unintentional actuation.
- ▶ Ensure a controlled restart after maintenance.



#### WARNING

**If you open the housing, risk of injury from malfunction and risk of product failure.**

Sensitive product parts are used to measure the flow rate and to regulate the flow rate.

- ▶ Do not open the product housing.
- ▶ Only carry out the cleaning work and maintenance work on the product that are described in the Operating Instructions.
- ▶ Only the manufacturer can carry out further work and calibration.

If a heavily contaminated operating fluid is used, then do the following maintenance operations:

- At regular intervals inspect the stainless steel mesh-filter for contamination. Refer to chpt. [11.1.1](#).
- If the stainless steel mesh-filter is contaminated, then clean the mesh-filter or replace the mesh-filter with a new one, as described in chpt. [11.1.1](#). If you need spare parts, then refer to chpt. [13 Accessories /Spare Parts](#).

### 11.1.1 Inspect and clean the stainless steel mesh-filter

The inspection and possibly cleaning of the stainless steel mesh-filter must be done at regular intervals. The inspection frequency and cleaning frequency depend on the measured fluid.

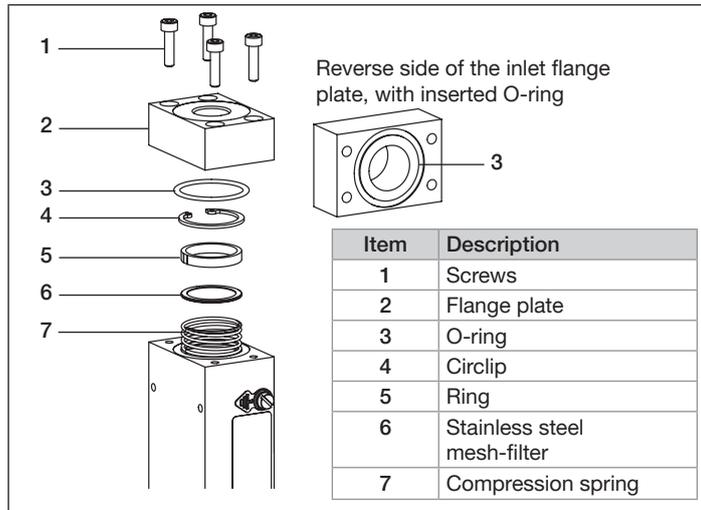


Fig. 25: Exploded view – Parts in contact with the operating fluid

To inspect and clean the mesh filter, do the following steps:

- Position the product upright with the fluid inlet at the top.
- With an hexagon key of size 3 mm, loosen the screws [1] and remove the flange plate [2]. The O-ring [3] remains in the

groove on the rear side of the flange plate.

- With a pair of tweezers, carefully remove the circlip [4] because the mesh filter [6] and the ring [5] will be pushed out by the compression spring [7].



- Do not clean the mesh filter with tap water.
- Clean the stainless steel mesh-filter [6] with acetone, isopropanol or compressed air.
- Dry the mesh filter.
- Before mounting the parts back, make sure that the fine side of the mesh filter [6] faces the flange plate [2]
- Push back the compression spring [7] together with the mesh filter [6] into the base block and secure them with the circlip [4].
- Make sure that the mesh filter and the O-ring are seated flat and not tilted.
- Insert the flange plate [2] and the screws [1].
- Tighten the screws to a torque of 2.8 N·m, that is 2.06 lbf·ft.

## 11.2 Cleaning and recalibration at the factory

If the product sensor is contaminated or damaged by operation, then the measured mass flow-rate could no longer correspond to the actual mass flow-rate.

- Send the product back to the manufacturer because the sensor must be replaced and recalibrated. Observe the return procedure given in chpt. [17 Returning the product](#).

## 11.3 Replace the memory card

To replace the memory card on the product, do the following:

- De-energise the product.
- With a 2.5-mm hex key, loosen the screws of the impact protection-cover and remove the impact protection-cover.
- Loosen and remove the wired 5-pin female connector.
- With a T30 hexalobular-internal screwdriver, open the blind plug.
- Remove the old memory card from its slot.
- Pay attention to the insertion direction of the memory card. Refer to in [Fig. 26](#).

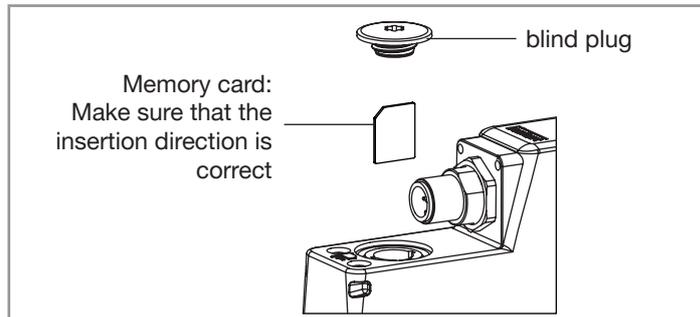


Fig. 26: Insertion direction of the memory card

- Grip the memory card with flat nose pliers and insert the memory card at an angle. See [Fig. 27](#). Apply pressure to overcome the counter force of the spring contact.

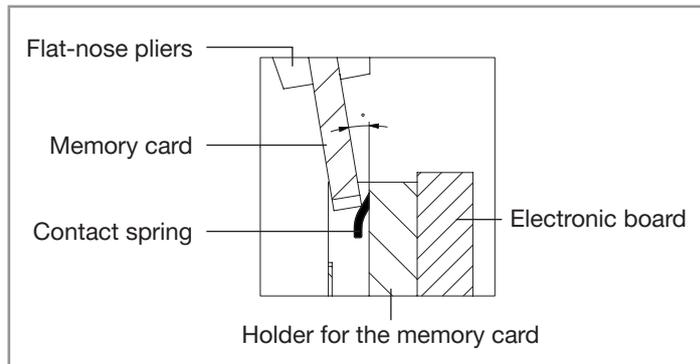


Fig. 27: Insertion of the memory card with flat-nose pliers

- After overcoming the force of the spring, insert the memory card vertically. See [Fig. 28](#).

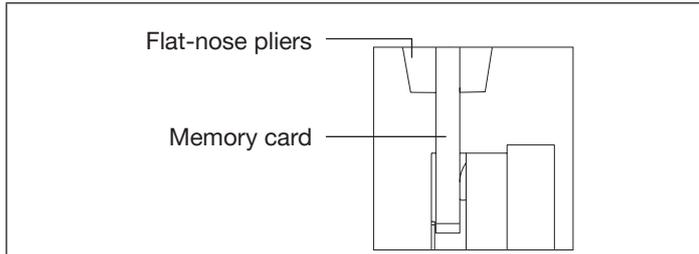


Fig. 28: Vertical insertion of the memory card

- With a T30 hexalobular-internal screwdriver, screw the blind plug to a torque of 2 N·m, that is 1.47 lbf·ft.
- Screw the wired 5-pin female connector.
- With a 2.5-mm hex key, screw back the impact protection-cover.
- Restart the product to write the product data on the new memory card.

## 12 TROUBLESHOOTING

### 12.1 Problems shown by the product status indicator

The product status indicator changes its colour based on the NAMUR recommendation NE 107 to show diagnostics events. If several diagnostics events have been generated, then the product status indicator shows the diagnostics event with the highest priority.

If the product is connected to a fieldbus, then the codes that are related to the product states are transmitted on the fieldbus. Refr to [chpt. 5.2](#).



The following chapters apply for products with software version A.08 and higher.

#### 12.1.1 Product status indicator is red (MFM)

Identify the cause to solve the problem:

1. The supply voltage is out of the error range. The product can be damaged.
  - Operate the product within the specifications. If the product status indicator is still red, then send the product back to Bürkert.
2. bÜS error or CANopen-bus error, for example a short circuit.
  - Make sure that the product is correctly wired.

3. The product is connected to büS, but cannot find any fieldbus participants.
  - Make sure that the product is correctly wired.
  - Operate the product with other fieldbus participants.
4. The product is connected to büS, but does not find the process value to be processed.
  - Make sure that you have correctly allocated the process value.
  - Check the assigned büS participant that is defective.
  - Make sure that the assigned büS participant provides the cyclic data.
5. The sensor, the internal memory or the product is defective.
  - Contact the manufacturer, because maintenance is needed.

### **12.1.2 Product status indicator is red (MFC)**

Identify the cause to solve the problem:

1. The supply voltage is out of the error range. The product can be damaged.
  - Operate the product within the specifications. If the product status indicator is still red, then send the product back to Bürkert.
2. Incorrect Autotune or Autotune aborted.
  - Make sure that the fluid flows through the product.
  - Do the Autotune again.
3. büS error or CANopen-bus error, for example a short circuit.
  - Make sure that the product is correctly wired.

4. The product is connected to büS, but cannot find any fieldbus participants.
  - Make sure that the product is correctly wired.
  - Operate the product with other fieldbus participants.
5. The product is connected to büS, but does not find the process value to be processed.
  - Make sure that you have correctly allocated the process value.
  - Check the assigned büS participant that is defective.
  - Make sure that the assigned büS participant provides the cyclic data.
6. The sensor, the internal memory or the product is defective.
  - Contact the manufacturer, because maintenance is needed.

### **12.1.3 Product status indicator is orange (MFM)**

Identify the cause:

1. The product is connected to büS and searches assigned fieldbus participants.
  - Wait until the product has found assigned fieldbus participants.
2. The product is connected to büS and is configured manually, but the product has no address.
  - Wait up to one minute until the product assigns its address.
3. A calibration is in progress.
  - Wait until the calibration is completed.

### 12.1.4 Product status indicator is orange (MFC)

Identify the cause:

1. The product is connected to büS and searches assigned fieldbus participants.
  - Wait until the product has found assigned fieldbus participants.
2. The product is connected to büS and is configured manually, but the product has no address.
  - Wait up to one minute until the product assigns its address.
3. A calibration is in progress.
  - Wait until the calibration is completed.
4. The Autotune is in progress.
  - Wait until the Autotune is completed.
5. The operating mode of the product is set to **Open-loop control mode**, **Manual set-point value** or **Analyze system**. Refer to chpt. [10.11](#).

### 12.1.5 Product status indicator is yellow (MFM)

Identify the cause:

1. One of the following values is out of specification. The sensor or the product can be damaged.
  - the fluid temperature
  - the product temperature

- the supply voltage
- Operate the product within the specifications. If the product status indicator is still yellow, then send the product back to Bürkert.
  2. Other fieldbus participants use the same node ID.
    - Assign an individual node ID to each fieldbus participant.

### 12.1.6 Product status indicator is yellow (MFC)

Identify the cause:

1. One of the following values is out of specification. The sensor or the product can be damaged.
  - the fluid temperature
  - the product temperature
  - the supply voltage
  - Operate the product within the specifications. If the product status indicator is still yellow, then send the product back to Bürkert.
2. The set-point position for the control valve has (almost) reached 100%. The set-point value cannot be reached.
  - Increase the inlet pressure or decrease the back pressure.
  - If the pressure drop in the pipe is too high, reduce the pressure drop.
  - If the filters that are installed in the pipe are dirty, clean the filters.

3. Other fieldbus participants use the same node ID.  
→ Assign an individual node ID to each fieldbus participant.

### **12.1.7 Product status indicator is blue**

Identify the cause:

1. There is an error in the calibration curve.  
→ Contact the manufacturer, because a maintenance operation is needed.
2. There is an internal memory error.  
→ Contact the manufacturer, because a maintenance operation is needed.

## **12.2 Problems shown by the status LED of the motor valve**

### **12.2.1 LED is red and flashes, LED is red and ON**

Identify the cause:

1. The fluid temperature or the ambient temperature is too high.  
→ Respect the maximum ambient temperature and the maximum fluid temperature.  
→ Restart the product to turn off the red blinking LED. To restart the product, de-energise then energise the product again.
2. A cable is broken.  
→ Make sure that the electrical connections between the product housing and the motor valve are not loose.

### **12.2.2 LED is yellow and flashes**

The ambient conditions or the process conditions for the motor valve are outside the authorized range.

- Operate the product in the authorized range.

## **12.3 Miscellaneous problems**

### **12.3.1 Product status indicator is off**

If the product status indicator is off, then the product is not energised. To solve this issue, do the following:

- Make sure that the product is correctly wired.
- Make sure that the voltage supply is 24 V DC.
- Make sure that the power supply source is working properly.

### **12.3.2 Product status indicator flashes**

If the product status indicator flashes, then the product is selected in the Bürkert Communicator software.

After 10 seconds, the product automatically returns to the previous status.

### **12.3.3 Product status indicator goes out periodically**

Identify the cause to solve the problem:

1. The power supply is intermittently dropping and the product restarts.  
→ Use a power supply with sufficient power output.

2. The voltage drop in the connecting cable is too high.

- Increase the cross-section of the cable
- Reduce the cable length.

### 12.3.4 Replacement product adopts none of the values from the defective product

Identify the cause to solve the problem:

1. The article number of the replacement product is different from the article number of the defective product.
  - Use a replacement product that has the same article number than the defective product. Values can only be transferred between products with the same article numbers.
2. The memory card is defective. The product could not write any values to the memory card.
  - Replace the memory card. Refer to chpt. [11.3](#).

### 12.3.5 Replacement product does not adopt all of the values from the defective product

The product description of the replacement product is different from the product structure of the defective product. Only the existing values of the defective product can be adopted by the replacement product.

- Use the Bürkert Communicator software to configure the new values of the replacement product.
- To connect the product to the Bürkert Communicator software, refer to chpt. [10.4](#).

### 12.3.6 Product does not adopt the values of an assigned bÜS participant

Identify the cause to solve the problem:

1. The value to be adopted is not correctly assigned in the product.
  - Assign the value to be adopted in the product using the Bürkert Communicator software.
  - To connect the product to the Bürkert Communicator software, refer to chpt. [10.4](#).
2. The value to be adopted is not supplied from the assigned bÜS participant.
  - Check the device of the assigned bÜS participant.

### 12.3.7 No mass flow rate (MFM)

The pipes are too large or not yet fully vented.

- Vent the pipes.
- Change the pipe diameter.

### 12.3.8 No mass flow rate (MFC)

Identify the cause to solve the problem:

1. The product is not in the normal operating mode. See chpt. [10.8](#). The product is possibly running one of the functions described in chpt. [10.10 Optimise the closed-loop control parameters \(MFC\)](#). If the product is not running one of the functions described in chpt. [10.10](#), then check the other possible causes of the problem.

2. The pipes are too large or not yet fully vented.

- Vent the pipes.
- Change the pipe diameter.

### **12.3.9 Unstable measured value (MFM)**

You have not connected the functional earth (FE) properly.

- To connect the functional earth, use a green-and-yellow cable that is as short as possible. And the cable cross-section must be at least equal to the cross section of the power-supply cable. Refer to chpt. [8.4](#).

### **12.3.10 Unstable measured value (MFC)**

Identify the cause to solve the problem:

1. You have not connected the functional earth (FE) properly.
  - To connect the functional earth, use a green-and-yellow cable that is as short as possible. And the cable cross-section must be at least equal to the cross section of the power-supply cable. Refer to chpt. [8.4](#).
2. The residual ripple on the voltage supply is too high.
  - Use a supply voltage that conforms to the technical data given in chpt. [6.7 Electrical data](#).
3. The product must compensate for irregularities in an unstable pressure supply caused, for example, by pumps.
  - Install a suitable pressure regulator in front of the product.
  - Install a buffer tank to absorb the pressure fluctuations.

### **12.3.11 Set-point value at 0 %, but operating fluid still flows (MFC)**

The operating pressure is above the tight sealing pressure of the control valve.

- Reduce the operating pressure.
- To eliminate the defect, return the product to the manufacturer.

### **12.3.12 Set-point value at 0 %, control valve is closed, no mass flow, but a non-zero mass flow rate is measured (MFC)**

Identify the cause to solve the problem:

1. The installation position of the product is incorrect.
  - Install the product in the position indicated on the calibration plate or in the calibration protocol.
  - Run the Autotune function to adapt to the operating conditions.
2. The operating fluid is different from the fluid specified during the calibration.
  - Use the specified operating fluid or send the product to the manufacturer for calibration with the new operating fluid.

### 12.3.13 Set-point value is not reached (MFC)

Identify the cause to solve the problem:

1. The mesh filter is clogged.
  - Clean or replace the mesh filter.
  - Run the Autotune function to adapt to the operating conditions.
2. The inlet pressure is too low.
  - Increase the inlet pressure to the calibration pressure value.
3. The outlet pressure is too high.
  - If the fluid connection pipes after the product are dirty, then clean them.

### 12.3.14 Motor is humming unusually (MFC with motor valve)

The gears or the motor are blocked.

- Send the product back to the manufacturer for repair.

## 13 ACCESSORIES /SPARE PARTS



### CAUTION

Risk of injury and risk of material damage that are due to unsuitable parts.

Incorrect accessories and unsuitable replacement parts can cause injuries and damage to the product and its environment.

- ▶ Only use original accessories and original spare parts from Bürkert.

### 13.1 Electrical accessories

Tab. 22: büS cables

Item	Article number
büS extension-cable with 5-pin M12 connectors, 0.1 m	772492
büS extension-cable with 5-pin M12 connectors, 0.2 m	772402
büS extension-cable with 5-pin M12 connectors, 0.5 m	772403
büS extension-cable with 5-pin M12 connectors, 1 m	772404
büS extension-cable with 5-pin M12 connectors, 3 m	772405



Cable assemblies can be made on request.

Tab. 23: Connectors

Item	Article number
5-pin M12 female connector	772416
Y junction	772420
Y junction for connecting 2 separately energised segments of a büS network	772421
5-pin M12 male connector	772417
5-pin M12 male connector with 120-Ohm termination resistor	772424
5-pin M12 female connector with 120-Ohm termination resistor	772425

Tab. 24: Other electrical accessories

Item	Article number
USB-büS-interface set (including power supply)	772426
USB-büS-interface set (without power supply)	772551
Memory card	On request

→ For further accessories, refer to the product datasheet.

## 13.2 Mesh filters

Tab. 25: Spare parts – Mesh filters

Item	Article number
Stainless steel mesh-filter, mesh size 250 µm	on request

## 13.3 Additional documentation and software

Tab. 26: Documentation and software

EDS file	Download from <a href="http://country.burkert.com">country.burkert.com</a>
Bürkert Communicator software	Download from <a href="http://country.burkert.com">country.burkert.com</a>

## 13.4 Compression fittings for a product variant with threaded fluid connections

Tab. 27: Stainless steel compression fittings and related seals

Product internal-threaded connection in accordance with DIN ISO 228/1	Pipe diameter	Article number	
		Stainless steel compression fitting	Seal (1 piece)
G 1/4	6 mm	901 538	901 575
G 1/4	8 mm	901 540	
G 1/4	1/4"	901 551	901 579
G 1/4	3/8"	901 553	
G 3/8	8 mm	901 542	901 576
G 3/8	10 mm	901 544	
G 3/8	1/4"	901 555	901 580
G 3/8	3/8"	901 556	

Product internal-threaded connection in accordance with DIN ISO 228/1	Pipe diameter	Article number	
		Stainless steel compression fitting	Seal (1 piece)
G 1/2	10 mm	901 546	901 577
G 1/2	12 mm	901 548	
G 1/2	1/2"	901 557	901 581
G 1/2	3/4"	901 558	
G 3/4	12 mm	901 549	901 578
G 3/4	3/4"	901 559	901 582
G1	On request		

## 14 DECOMMISSIONING

### 14.1 Safety instructions



#### DANGER

Risk of injury that is due to pressure in the installation and in the product.

- ▶ Before working on the installation or product, cut the pressure. Vent and drain the pipes.

Risk of injury from electric shocks.

- ▶ Before working on the installation or the product, switch off the power supply. Make sure that nobody can switch the power supply on.
- ▶ Observe all applicable accident protection and all applicable safety regulations for electrical equipment.



#### WARNING

Risk of injury from improper dismantling.

- ▶ Only trained personnel can dismantle the product. Personnel must use suitable tools.

Risk of injury from dangerous fluids.

- ▶ Before you disconnect pipes or valves, flush out dangerous fluids, release pressure in the pipes and drain.
- ▶ Observe all applicable accident protection and all applicable safety regulations relating to the operating fluid used.

## 14.2 Dismantling the product

- Relieve the operating fluid pressure in the installation.
- Flush the product with a neutral fluid (for example nitrogen)
- Relieve the flushing fluid pressure in the installation.
- De-energise the product.
- If the impact protection-cover is fitted, then loosen the screws of the impact protection-cover with a 2.5-mm hex key. Remove the impact protection-cover.
- Loosen and remove the M12 female connector.
- Disconnect the fluid connections. See [Fig. 29](#).

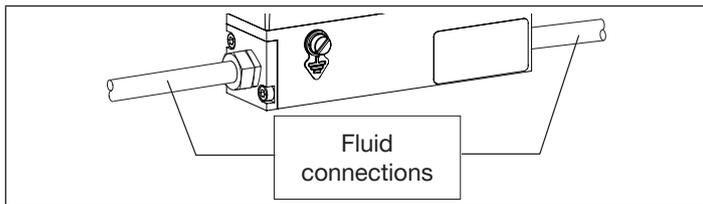


Fig. 29: Threaded fluid connections

- Remove the product.

## 15 TRANSPORT

### NOTICE

#### Transport damage.

If the product is not protected in transport, then the product can be damaged.

- Remove cables, connectors, product-external filters and installation equipment.
- Protect the electrical interfaces with protective plugs.
- Clean and vent contaminated products.
- Close the fluid connections with protective caps. Protective caps ensure protection and sealing.
- Pack the product in two suitable zip lock bags, to avoid any contamination during the transport.
- Transport the product in an impact-resistant package, protected from moisture and dirt.
- Avoid storage above or below the recommended storage temperature.

## 16 STORAGE, DISPOSAL

### NOTICE

Incorrect storage can cause damage to the product.

- Close fluid connections with protective caps.
- Store the product dry and dust-free in sealed zip lock bags.
- Storage temperature: -10...+70 °C.

Environmental damage that is due to parts contaminated by fluids.

- Dispose of the product and its packaging in an environmentally friendly manner.
- Comply with applicable environmental and disposal regulations.

## 17 RETURNING THE PRODUCT



No work or tests will be carried out on the product until a valid Contamination Declaration has been received.



To return a used product, a returns number is required.

→ To return a used product to Bürkert, contact your Bürkert sales office.





[www.burkert.com](http://www.burkert.com)