

Type 8742

Profibus Analogue

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

Massendurchflussmesser (MFM) / Massendurchflussregler (MFC)

Débitmètre massique (MFM) / Régulateur de débit massique (MFC)



Operating Instructions

Bedienungsanleitung

Manuel d'utilisation

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

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Operating Instructions 2206/02_EU-ML_00573731 / 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.

Please carefully read the Operating Instructions. Pay particular attention to the chapters [3 Basic safety instructions](#) and [2 Intended use](#).

- ▶ Read the Operating Instructions. If you do not understand the content of the Operating Instructions, contact Bürkert.

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 Type 8742 Profibus Mass Flow Meter (MFM)
- a Type 8742 Analogue Mass Flow Meter (MFM)
- a Type 8742 Profibus Mass Flow Controller (MFC)
- a Type 8742 Analogue Mass Flow Controller (MFC)

1.2 About Namur and Namur Recommendation NE107

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.

1.3 Symbols used



DANGER

The symbol warns of an immediate danger.

- ▶ Failure to observe the warning will result in fatal or serious injuries.



WARNING

The symbol warns of a potentially dangerous situation.

- ▶ Failure to observe the warning may result in serious or fatal injuries.



CAUTION

The symbol warns of a possible danger.

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

NOTICE

The symbol warns of damage to property.

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



The symbol indicates important additional information, tips and recommendations.



The symbol 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.

2 INTENDED USE

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

Type 8742 Profibus MFM or Type 8742 Analogue MFM is used exclusively to measure the mass flow rate of clean and dry gases.

Type 8742 Profibus MFC or Type 8742 Analogue MFC is used exclusively to control the mass flow rate of clean and dry gases.

- Observe the data in the contract documents, in 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 control.
- Only use the product for its intended purpose.

2.1 Variant with ATEX certification



DANGER

Risk of explosion in the event of 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 8742. The supplement is available at 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 INSTRUCTIONS

These safety instructions do 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. Make sure that nobody can switch the power 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:

- ▶ Do not operate the product without its mesh filter.
- ▶ Only operate the product in the installation position that is given on the calibration plate.
- ▶ Make sure the MFM operating-pressure is not higher than the operating pressure value on the product data-sheet.
- ▶ Make sure the MFC operating-pressure is not higher than the tight sealing pressure of the proportional 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.
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 the installation work and the 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 / 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 energized.

- 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.

4.2 Warranty

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

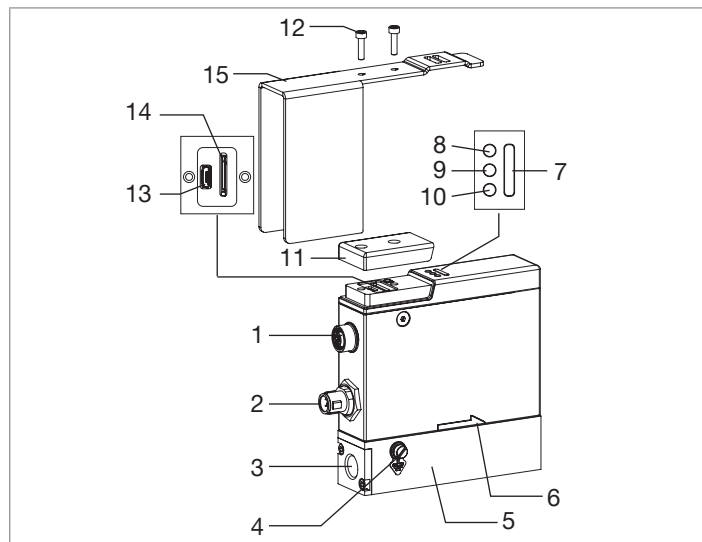
4.3 Information on the Internet

Operating Instructions and data sheets for the product can be found online at: country.burkert.com.

5 DESCRIPTION

5.1 Product variants

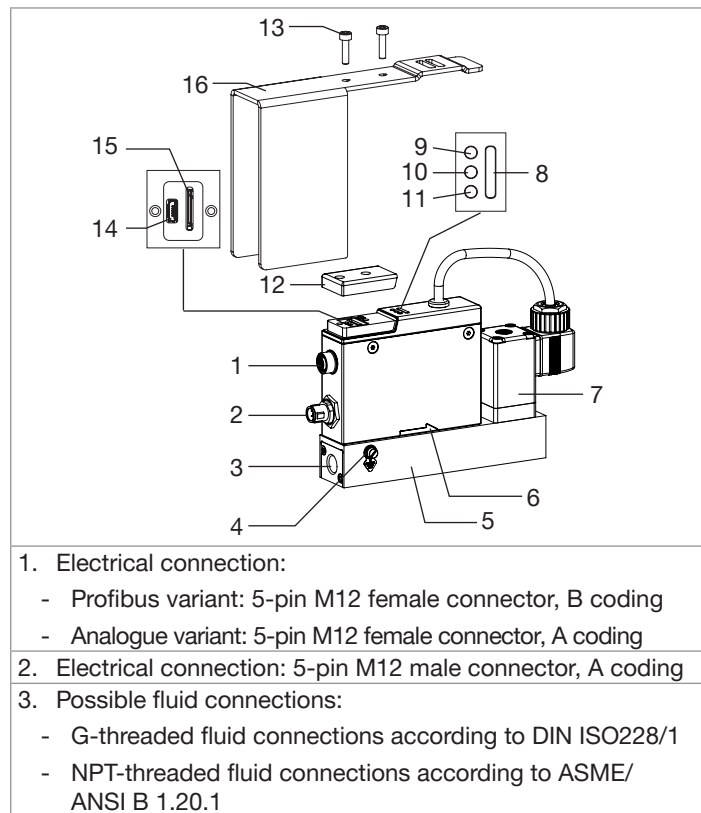
5.1.1 Mass Flow Meter (MFM)



- | |
|--|
| 1. Electrical connection: |
| - Profibus variant: 5-pin M12 female connector, B coding |
| - Analogue variant: 5-pin M12 female connector, A coding |
| 2. Electrical connection: 5-pin M12 male connector, A coding |
| 3. Possible fluid connections |
| - G-threaded fluid connections according to DIN ISO 228/1 |
| - NPT-threaded fluid connections according to ASME/ANSI B 1.20.1 |
| 4. M4 screw for functional earth connection |
| 5. Base block |
| 6. Flow direction |
| 7. Product status-Indicator. The indicator operates according to Namur NE 107. |
| 8. Not used |
| 9. Status indicator of the fieldbus communication |
| 10. Not used |
| 11. Cover |
| 12. M3 screw |
| 13. büS interface for the Bürkert Communicator software |
| 14. Slot for the memory card |
| 15. Impact protection-cover. The impact protection-cover is only delivered with an ATEX variant. |

Fig. 1: Mass Flow Meter, Profibus variant or Analogue variant

5.1.2 Mass Flow Controller (MFC)



| |
|--|
| 4. M4 screw for functional earth connection |
| 5. Base block |
| 6. Flow direction |
| 7. Proportional valve. The proportional valve can be built inside the product. |
| 8. Product status-indicator. The indicator operates according to Namur NE 107. |
| 9. Not used |
| 10. Status indicator of the fieldbus communication |
| 11. Not used |
| 12. Cover |
| 13. M3 screw |
| 14. büS interface for the Bürkert Communicator software |
| 15. Slot for the memory card |
| 16. Impact protection-cover. The impact protection-cover is only delivered with an ATEX variant. |

Fig. 2: Mass Flow Controller, Profibus variant or Analogue variant

5.2 Product status-indicator

The product has an indicator to display the product status. If more than one product status exist simultaneously, the product status with the highest priority is displayed.

Tab. 1: Description of the product status-indicator

| Indicator according to NE 107 | Colour code (for a PLC) | Description | 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 controlled operation is not possible. |
| Orange | 4 | Function check | Work is done on the product. <ul style="list-style-type: none"> • MFM: The output signal is temporarily invalid. • MFC: The controlled operation is temporarily not possible. |
| 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 control, but a function is temporarily restricted. |
| Green | 1 | Diagnostic active | No event has been generated. Status changes are shown in color. Messages are listed and possibly transmitted through any connected fieldbus. |
| White | 0 | Diagnostic inactive | The product is switched on. Status changes are not shown. Messages are not listed nor transmitted through any connected fieldbus. |

When the product status-indicator is blinking, a connection between the product and the Bürkert Communicator software is established.

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

5.3 Status indicator of the fieldbus communication

A Profibus variant has an indicator to show the status of the connection to the network.

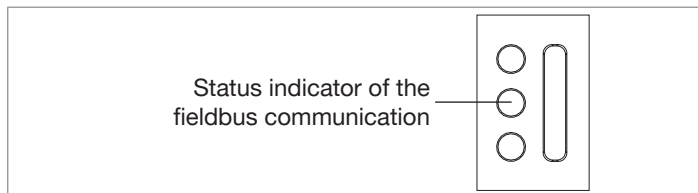


Fig. 3: Location of the status indicator of the fieldbus communication

Tab. 2: Description of the status indicator of the fieldbus communication

| Colour | Meaning |
|--------|---|
| green | Cyclic data is being exchanged between the product and the fieldbus master |
| red | No cyclic data is being exchanged between the product and the fieldbus master |

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.

At product start-up, there are two possibilities:

- If product-specific data is stored on the inserted memory card, 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.
- 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 bÜS-interface

Use the bÜS-interface for short-term servicing of the product. Over the bÜS-interface you can set the product parameters.

- To service the product, connect the bÜS-interface to a PC. The PC must be equipped with the Bürkert Communicator software which runs under Windows.

5.6 Bürkert Communicator software



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

The Type 8920 Bürkert Communicator is a PC-software and enables the following actions, for example:

- Setting the parameters of the product, for example the basic settings for the product start-up
- Running the diagnostics, and read the error memories for example
- Updating the product software
- Adjusting the user-defined calibration curve

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

- Buy the USB-büS-interface set with article number 00772551 from Bürkert.
- Download the latest version of the Type 8920 Bürkert Communicator software from country.burkert.com.
- Install the Bürkert Communicator software on a PC. During installation, the büS stick must not be inserted at the PC.
- Assemble the parts of the USB-büS-interface set. Refer to [Fig. 4](#).

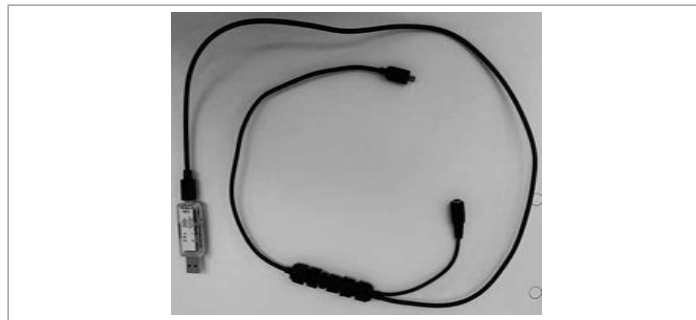



Fig. 4: Assembled parts of the USB-büS-interface set with article number 00772551

- Set the termination-resistance switch of the büS stick to ON.
- Insert the büS stick into a USB port of the PC.
- Energize the product. Refer to chapter 8 [Electrical installation](#).
- Insert the micro-USB connector into the büS-interface for the Bürkert Communicator software. The location of the büS-interface on the product is given in chapter 5.1 on page 10.
- Wait until the Windows pilot of the büS stick has been completely installed on the PC.
- 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 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.

5.7 Proportional valve of an MFC

The MFC is equipped with a direct acting, normally-closed solenoid valve.

The proportional 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 seat seal that is made of a soft material such as FKM or EPDM.

NOTICE

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

Products with a nominal valve diameter of 0.05 mm or 0.1 mm have a 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 from malfunction that is due to outdoor use.

- ▶ Do not use the product in outdoor areas.



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.

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

Tab. 3: Operating conditions of the product

| | |
|-------------------------------|---|
| Ambient temperature | |
| • Analogue variant | • -10 °C...+50 °C |
| • Profibus variant | • -10 °C...+50 °C |
| Fluid temperature | |
| • MFM | • -10 °C...+70 °C • -10 °C...+60 °C for oxygen |
| • MFC | • -10 °C...+70 °C • -10 °C...+60 °C for oxygen |
| Ambient humidity | < 95 %, non-condensing |
| IP-Code according to EN 60529 | IP65 ¹⁾ The cables must be connected, and the mating connectors must be plugged in and tightened. |
| Operating pressure | |
| • MFM | • Max. 10 bar |
| • MFC | • Max. 10 bar Depends on the nominal diameter of the solenoid valve |

1) The IP-Code is determined by Bürkert. The IP-Code is not evaluated according to UL 61010.

6.4 Markings



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.

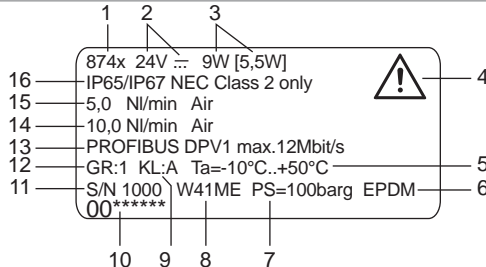
6.4.1 Calibration plate

| | |
|---|--|
| 1 | Mass Flow Controller |
| 2 | Medium 1 Medium 2 |
| 3 | P1: 1,00 barg P1: 1,00 barg |
| 4 | Mounting: horizontal upright |
| 5 | Id: 00***** QC passed: __ . __ . __ |
| 6 | |

| |
|---------------------------|
| 1. Type of the product |
| 2. Calibration fluid |
| 3. Calibration pressure |
| 4. Installation position |
| 5. Product article-number |
| 6. Calibration date |

Fig. 5: Description of the calibration plate

6.4.2 Type label

| | |
|---|------------------------|
|  <p>1 2 3</p> <p>16 874x 24V ... 9W [5,5W]</p> <p>15 IP65/IP67 NEC Class 2 only</p> <p>14 5,0 NI/min Air</p> <p>13 10,0 NI/min Air</p> <p>12 PROFIBUS DPV1 max.12Mbit/s</p> <p>11 GR:1 KL:A Ta=-10°C..+50°C</p> <p>10 S/N 1000 W41ME PS=100barg EPDM</p> <p>9 00*****</p> <p>8</p> <p>7</p> <p>4</p> <p>5</p> <p>6</p> | 1. Type of the product |
| 2. Supply voltage, direct current | |
| 3. Consumption according to UL 61010-1 [typical consumption ¹⁾] | |
| ¹⁾ 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 valve according to the DVGW (Deutscher Verein des Gas- und Wasserfaches) | |
| 10. Product article-number | |

| |
|---|
| 11. Serial number |
| 12. Category of the product |
| 13. Profibus variant: communication interface Analogue variant: input and output |
| 14. Nominal flow rate (Q _{nominal}), units and operating gas 2 |
| 15. Nominal flow rate (Q _{nominal}), units and operating gas 1 |
| 16. IP-Code |

Fig. 6: Description of the Type label (example)

6.4.3 Additional markings



Fig. 7: CE marking and UL certification

6.5 Mechanical data

Dimensions, weight: refer to data sheet of the product.

Tab. 4: Materials of the product

| | |
|---|---|
| Base-block material | <ul style="list-style-type: none"> Aluminium Stainless steel 1.4305 |
| Housing material | Aluminium |
| Sealing material | Refer to Type label |
| Product status-indicator | Polycarbonate |
| ATEX impact protection-cover | Stainless steel 1.4301 |
| MFC: Materials of the solenoid valve that are in contact with the fluid | 1.4310, 1.4113, 1.4305 |

6.6 Fluid data

| | |
|--|--|
| Calibration fluid | Operating fluid or air |
| Measurement range/control range | 1:50 Larger measurement range available on request. |
| Mass flow rate range (reference to N ₂ (I _N /min)) | |
| • measurement range 1:50 | • 0.025...160 I _N /min |
| • measurement range 1:20 | • 0.01...160 I _N /min |

| | |
|--|--|
| Measurement accuracy (after 1 minute warm-up time) | ±0.8 % ²⁾ of the measured value ±0.3 % ²⁾ of the full scale |
| Repeat accuracy | ±0.1 % of the full scale |
| MFM: response time | < 300 ms |
| MFC: settling time | < 300 ms |

2) If the operating fluid is different from the calibration fluid, the actual measurement accuracy might vary from the value stated in the data sheet. If the operating fluid is natural gas, the measurement accuracy depends on the composition of the natural gas, which can vary depending on the origin and season.

6.6.1 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 [Tab. 5](#). 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 precision of the product
- to meet the safety requirements
- to meet the control precision of an MFC

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

Tab. 5: Quality criteria of the fluid

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

6.6.2 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 operating gas

The pressure loss in an MFM can be either read from a diagram that is given by the MFM manufacturer, or calculated with a formula.

→ If the operating gas is air, read the pressure-loss value directly from the diagram in Fig. 8 or in Fig. 9. For example, if the flow rate through an MFM with 1/4" threaded fluid connections is 55 $\text{l}_\text{N}/\text{min}$ then the pressure loss Δp_{air} as given in Fig. 8 is 20 mbar.

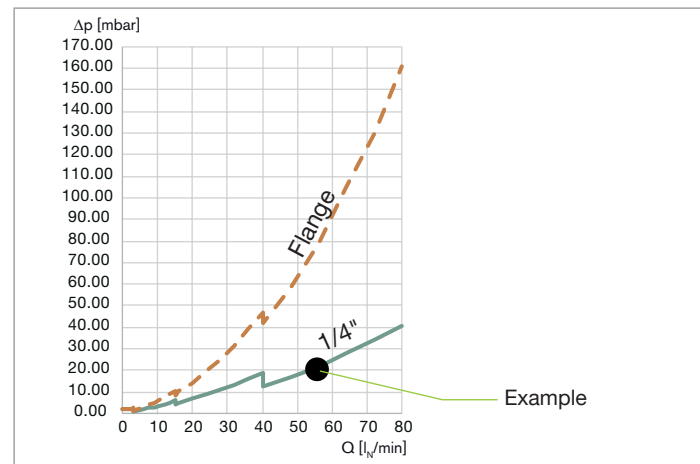


Fig. 8: Pressure loss diagram, MFM with a 25 μm mesh filter, for air, in the measurement range 0...80 $\text{l}_\text{N}/\text{min}$

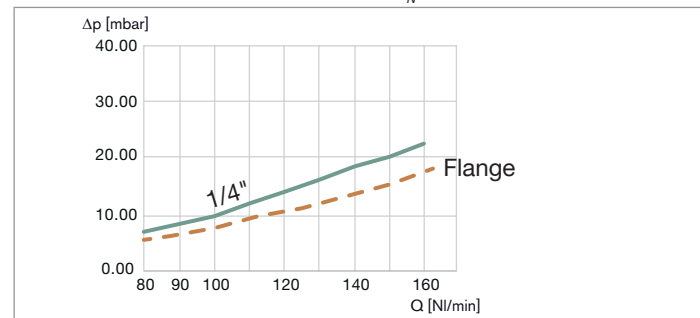


Fig. 9: Pressure loss diagram, MFM with a 250 μm mesh filter, for air, in the measurement range 80...160 $\text{l}_\text{N}/\text{min}$

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

1. Read the air pressure-loss ΔP_{air} from the diagram (approach $Q_{\text{gas}} = Q_{\text{air}}$).
2. Calculate the pressure loss ΔP_{gas} with the formula in Fig. 10.

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

ΔP_{Gas} = pressure loss of the operating gas

ΔP_{air} = pressure loss of air

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

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

Fig. 10: Formula to calculate the pressure loss in an MFM

Example for argon gas that flows through an MFM with 1/4" threaded fluid connections:

1. If the flow rate is $55 \text{ l}_N/\text{min}$ then the air pressure-loss ΔP_{air} as given in Fig. 9 is 20 mbar.
2. The pressure loss for argon gas at a flow rate of $55 \text{ l}_N/\text{min}$ is 27.6 mbar as given by the calculation in Fig. 11.

$$\Delta P_{\text{argon}} = 20 \text{ mbar} \cdot \sqrt{\frac{1.784}{1.294}} = 27.6 \text{ mbar}$$

Fig. 11: Calculation of the pressure loss for argon gas

6.7 Electrical data

6.7.1 Analogue variant

Tab. 6: Electrical data of an MFM

| | |
|--|--|
| Operating voltage | 24 V DC $\pm 10 \%$ (15 V DC $\pm 10 \%$ on request) |
| Maximum power consumption | 1 W |
| Digital input | |
| • 0...0.2 V | • to activate level 1 |
| • 1...4 V or open | • to activate level 2 |
| • 5...28 V | • to activate level 3 |
| Analogue output for the measured value | |
| • 0/4...20 mA | • Maximum loop impedance: 600 Ω at an operating voltage of 24 V DC (200 Ω at an operating voltage of 15 V DC); Resolution: 20 μA |
| • 0...5/10 V | • Maximum current: 20 mA Resolution: 10 mV |
| Relay output | Normally closed contact (break contact), free of potential |

Tab. 7: Electrical data of an MFC

| | |
|--|--|
| Operating voltage | 24 V DC $\pm 10\%$ (15 V DC $\pm 10\%$ on request); residual ripple $< 2\%$ |
| Maximum power consumption | Refer to the Type label |
| Set-point analogue input | |
| • 0/4...20 mA | • Maximum input impedance: 200 Ω Resolution: 5 μ A |
| • 0...5/10 V | • Minimum input impedance: 20 k Ω Resolution: 2.5 mV |
| Analogue output for the measured value | |
| • 0/4...20 mA | • Maximum loop impedance: 600 Ω at an operating voltage of 24 V DC (200 Ω at an operating voltage of 15 V DC); Resolution: 20 μ A |
| • 0...5/10 V | • Maximum current: 20 mA Resolution: 10 mV |
| Digital input | |
| • 0...0.2 V | • to activate level 1 |
| • 1...4 V or open | • to activate level 2 |
| • 5...28 V | • to activate level 3 |
| Relay output | Change-over relay with 1 normally closed contact (break contact) and 1 normally open contact (make contact). Both contacts are free of potential. |

6.7.2 Profibus variant

Tab. 8: Electrical data of an MFM

| | |
|---------------------------|--------------------|
| Operating voltage | 24 V DC $\pm 10\%$ |
| Maximum power consumption | 3 W |
| Communication interface | PROFIBUS-DP-V1 |

Tab. 9: Electrical data of an MFC

| | |
|---------------------------|---|
| Operating voltage | 24 V DC $\pm 10\%$; residual ripple $< 2\%$ |
| Maximum power consumption | Refer to the Type label |
| Communication interface | PROFIBUS-DP-V1 |

6.8 Communication interface: PROFIBUS-DP-V1

Tab. 10: PROFIBUS-DP-V1 data

| | |
|-----------------------|--|
| Acyclic communication | <ul style="list-style-type: none"> • DP-V1 Class 1 Read/Write • DP-V1 Class Alarm • DP-V1 Class 2 Read/Write/Data transport |
| Transmission speed | 9.6 kbit/s...12 Mbit/s, autodetect mode |

7 INSTALLATION

7.1 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 the product, switch off the power. Make sure that nobody can switch the power 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.

7.2 Installation steps

1. Do the fluid installation. Refer to chapter [7.4](#).
2. Do the electrical installation. Refer to chapter [8](#).
3. Start-up the product. Refer to chapter [9 Start-up](#).

7.3 Additional documentation

- Product-specific help in the Bürkert Communicator software
- Product description file and object description for the related product type must be downloaded from country.burkert.com.

7.4 Connection to a pipe

7.4.1 Product with G-threaded fluid connections



WARNING

Risk of injury that is due to leakage.

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

To make sure 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-threaded fluid connections are available as accessories, refer to [Tab. 11](#). Also buy the seal for each pipe fitting.

Tab. 11: Stainless steel compression fittings and related seals

| Threaded fluid connection in accordance with DIN ISO 228/1 | Pipe diameter | Article number | |
|--|---------------|-------------------------------------|----------------|
| | | Stainless steel compression-fitting | Seal (1 piece) |
| G 1/4 | 6 mm | 901538 | 901575 |
| G 1/4 | 8 mm | 901540 | |
| G 1/4 | 1/4" | 901551 | 901579 |
| G 1/4 | 3/8" | 901553 | |

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.



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

- Avoid severe vibrations.

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]. Refer to [Fig. 12](#).

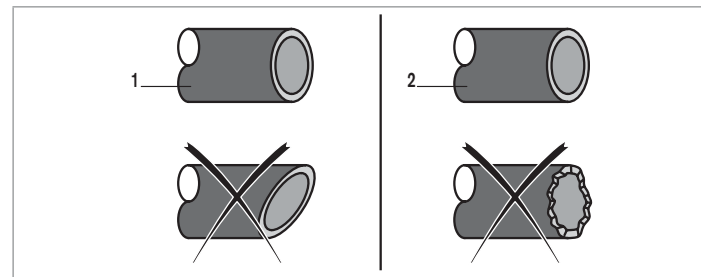


Fig. 12: Pipe cut and deburred

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. Refer to chapter 6.6 Fluid data.

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

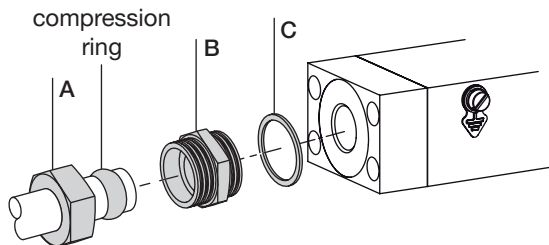


Fig. 13: Components of a compression fitting

- Slide the nut [A] and then the compression ring onto the pipe. Refer to Fig. 13.
- Place the seal [C] on the fluid connection of the product.
- Screw the compression-fitting body [B] in the fluid connection. Tighten to a torque of 25...28 Nm, that is 18.44...20.65 lbf-ft. Refer to Fig. 14.

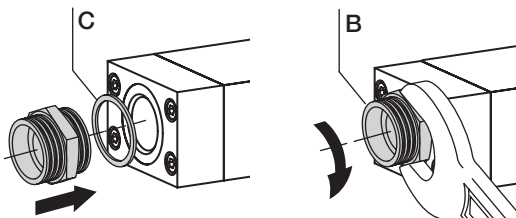


Fig. 14: Seal and compression-fitting body

- Insert the pipe in the compression-fitting body. Tighten the nut [A] by hand. Refer to Fig. 15.

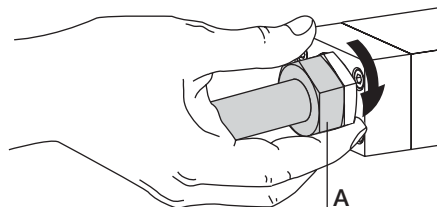


Fig. 15: Nut screwed by hand

- Tighten the nut with an open-end spanner to a torque of 25...28 Nm, that is 18.44...20.65 lbf-ft. Refer to Fig. 16.

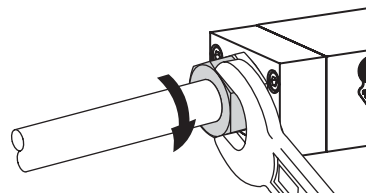


Fig. 16: Nut tightened with an open-end spanner

- Connect the second fluid connection to a pipe in the same way.

7.4.2 Product with NPT-threaded fluid connections


WARNING

Risk of injury that is due to leakage.

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

To make sure 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.

-  Vibrations have an unwanted effect on the proportional valve of the MFC.
- ▶ Avoid severe vibrations.

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]. Refer to [Fig. 17](#).

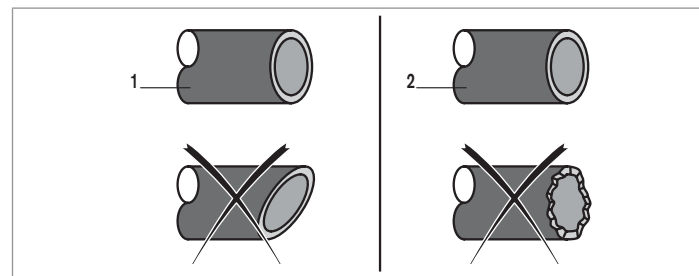


Fig. 17: Pipe cut and deburred

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. Refer to chapter [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 fluid connection.
- Connect a pipe to one of the fluid connections 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.
- Connect the second fluid connection to a pipe in the same way.

7.4.3 Product with flange fluid connections



WARNING

Risk of injury that is due to leakage.

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



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

- ▶ Avoid severe vibrations.

A product with flange fluid connections is mounted on a process connection plate by the manufacturer. The process connection plate is fitted with fluid connections of various types (threaded, clamp, ...).

→ 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. Make sure that nobody can switch the power on.
- ▶ Observe all applicable accident protection and all applicable safety regulations for electrical equipment.



WARNING

Risk of ignition and risk of fire that are 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 only shielded cables.
- ▶ Use a power supply with sufficient power.
- ▶ For an MFC pay attention to the maximum permissible residual ripple on the operating voltage (residual ripple < 2 %).

NOTICE

UL approved versions must be supplied in one of the following ways:

- ▶ "Limited Energy Circuit" (LEC), according to UL / IEC61010-1
- ▶ "Limited Power Source" (LPS), according to UL / IEC60950
- ▶ SELV / PELV with UL-approved overcurrent protection, designed according to UL / IEC61010-1, Table 18 (e.g. Block PM-0124-020-0)
- ▶ NEC Class 2 power supply unit

8.2 Wiring the Analogue variant

To wire the product, you can use mating male or female connectors from Bürkert. Refer to [Tab. 12](#).

Tab. 12: Accessories: male connector and female connector

| Item | Article number |
|-------------------------------------|----------------|
| Straight 5-pin M12 female connector | 772416 |
| Straight 5-pin M12 male connector | 772417 |



- Observe the specifications for the cable and conductors, that are given by the manufacturer of the mating male or female connector.
- Use cables with a cable shielding that is either a braid shielding or a foil shielding.

→ If your product is an MFM, wire the mating female connector according to the pin assignment of the M12 male connector in [Fig. 18](#).

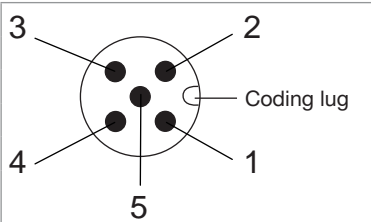
| | | Pin | Assignment |
|--|--|-----|--|
|  | | 1 | Not connected |
| | | 2 | 24 V |
| | | 3 | GND |
| | | 4 | Not connected |
| M12 thread is internally connected to FE | | 5 | Analogue output for the measured value |

Fig. 18: Analogue MFM: Pin assignment, 5-pin M12 male connector (A coding)

- If your product is an MFC, wire the mating female connector according to the pin assignment of the M12 male connector in [Fig. 19](#).

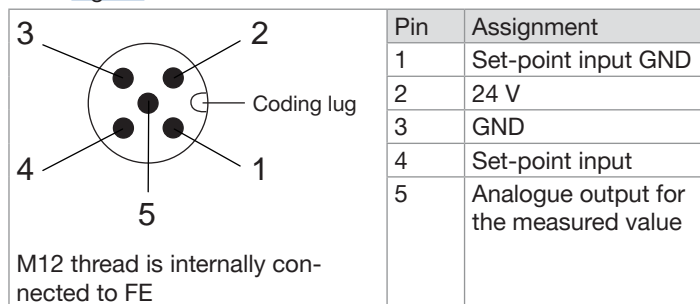


Fig. 19: Analogue MFC: Pin assignment, 5-pin M12 male connector (A coding)

- Observe the instructions that are given by the manufacturer of the mating female connector.
- Screw the mating female connector to the 5-pin male connector, to the torque that is given by the manufacturer of the mating female connector.
- Wire the mating male connector according to the pin assignment of the M12 female connector in [Fig. 20](#). Observe the instructions that are given by the manufacturer of the mating male connector.

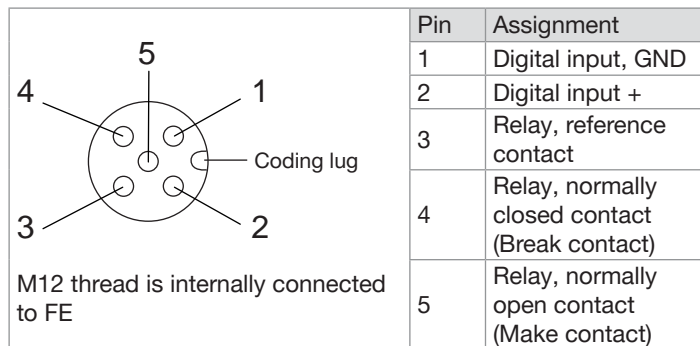


Fig. 20: Analogue MFM or Analogue MFC: Pin assignment, 5-pin M12 female connector (A coding)

- Screw the mating male connector to the 5-pin female connector, to the torque that is given by the manufacturer of the mating female connector.
- Do the functional earthing of the product. Refer to chapter [8.4](#).
- If an ATEX product is used in a potentially explosive area, then fit the impact protection-cover back if you have removed it.

8.2.1 Digital input

The 5-pin M12 female connector has a digital input. A digital input is used to remotely trigger a function. The following functions are available:

- MFC: Start the function autotune.
- MFC: Trigger the remote control of the actuator or trigger the control of the actuator by the product.
- MFM or MFC: Reset the totalizer for the active gas.
- MFM or MFC: Select which gas is active among 3 gases.

Tab. 13 shows the function that is assigned by default to the digital input of the 5-pin M12 female connector of an MFM or an MFC.

Tab. 13: Default assignment of the digital input of the 5-pin M12 female connector

| Analogue variant | Default assignment |
|------------------|--------------------|
| MFM | No assignment |
| MFC | Start autotune |

- To choose the function to be remotely triggered over the digital input, use the Bürkert Communicator software. Only one of the available functions can be associated to the digital input.
- To trigger the function associated to the digital input, activate the correct switching level. A function has 1, 2 or 3 possible switching levels. The possible switching levels are given in Tab. 14.

Tab. 14: Actions triggered by the switching levels

| Function | Switching levels | | |
|-----------------------------|--|---|--|
| | Level 1 | Level 2 | Level 3 |
| MFC: Start autotune | If activated, triggers the function | Not used | Not used |
| MFC: Actuator control | If activated, triggers the closing of the actuator | If activated, the product is in the normal operating mode | If activated, triggers the opening of the actuator |
| MFM or MFC: Reset totalizer | If activated, triggers the function | Not used | Not used |
| MFM or MFC: Gas selection | If activated, changes to gas number 2 | If activated, changes to gas number 1 | If activated, changes to gas number 3 |

- To activate a switching level, apply the voltage values that are given in Tab. 15 to the digital input.

Tab. 15: Voltage values associated to the switching levels

| Switching level | Voltage value |
|-----------------|---|
| Level 1 | Short-circuit the digital input with the digital-input ground |
| Level 2 | 1...4 V DC (alternatively: not connected) |
| Level 3 | 5...28 V DC |

8.2.2 Relay output

The 5-pin M12 female connector has a relay output. The switching of the relay can show one of the following event:

- MFC: The set-point value cannot be reached.
- MFC: The product is doing an Autotune.
- MFC: The **Set-point value source** has changed.
- MFM or MFC: A warning message has been generated. For example if the supply voltage is too high, then a warning message is generated.
- MFM or MFC: A failure message has been generated. For example if a sensor failure is detected, then a failure message is generated.

Tab. 16 shows the events that are assigned by default to the relay output of the 5-pin M12 female connector of an MFM or an MFC.

Tab. 16: Default assignment of the relay output of the 5-pin M12 female connector

| Analogue variant | Default assignment |
|------------------|---------------------------------------|
| MFM | No assignment |
| MFC | The set-point value cannot be reached |

→ To choose the events that are assigned to the relay output, use the Bürkert Communicator software. Several events can be associated to the relay output.

8.3 Wiring the Profibus variant

To wire the product, you can use mating male or female connectors from Bürkert. Refer to [Tab. 17](#).

Tab. 17: Accessories: male connector and female connector

| Item | Article number |
|--|----------------|
| Straight 5-pin M12 female connector | 772416 |
| Straight 5-pin M12 male connector (B coding) | 918198 |
| Straight 5-pin M12 female connector (B coding) | 918447 |
| Profibus* Y-piece | 902098 |
| Profibus T-piece | 918531 |
| Profibus termination resistor, male connector (B coding) | 902553 |



- Observe the specifications for the cable and conductors, that are given by the manufacturer of the mating female connector and by the manufacturer of the mating male connector.
- Use cables with a cable shielding that is either a braid shielding or a foil shielding.

→ To wire the mating female connector, refer to the pin assignment of the M12 male connector in [Fig. 21](#). Observe the instructions that are given by the manufacturer of the mating female connector.

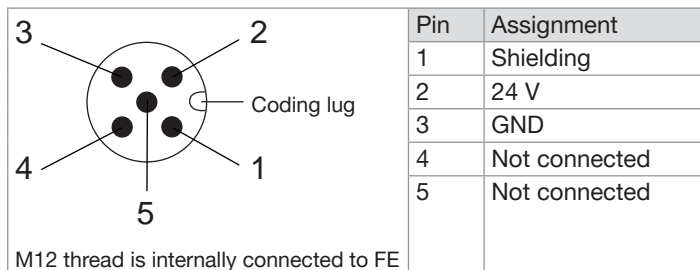


Fig. 21: Profibus MFM or Profibus MFC: Pin assignment, 5-pin M12 male connector (A coding)

- Screw the mating female connector to the 5-pin male connector, to the torque that is given by the manufacturer of the mating female connector.
- To wire the mating male connector, refer to the pin assignment of the M12 female connector in Fig. 22. Observe the instructions that are given by the manufacturer of the mating male connector.

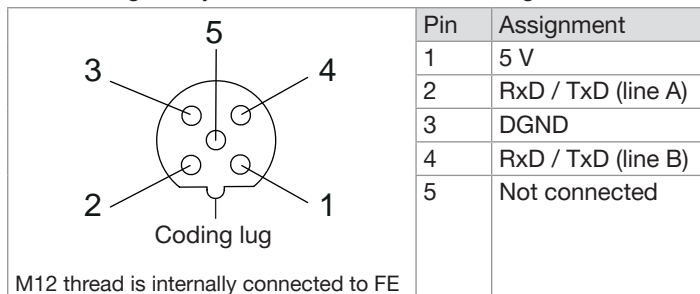


Fig. 22: Profibus MFM or Profibus MFC: Pin assignment, 5-pin M12 female connector (B coding)

- Screw the mating male connector to the 5-pin female connector, to the torque that is given by the manufacturer of the mating female connector.
- Do the functional earthing of the product. Refer to chapter 8.4.
- If an ATEX product is used in a potentially explosive area, then fit the impact protection-cover back if you have removed it.

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. 23.

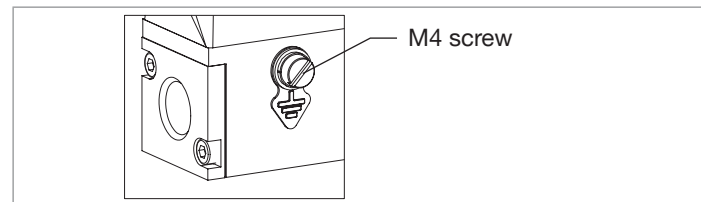


Fig. 23: Location of the M4 screw for the connection of the functional-earth cable

- Attach the functional-earth green-and-yellow cable to the M4 screw with a cable lug.
- With a flat screwdriver of size 6.5 mm, tighten the M4 screw to a torque of 1.8 Nm...2 Nm, that is 1.33 lbf-ft...1.47 lbf-ft.

9 START-UP

9.1 Safety instructions



WARNING

Risk of injury from improper operation.

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

- ▶ Before start-up, 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 change parameters with the help of the Bürkert Communicator software.

9.2 Start-up 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. Energize 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 country.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 [Tab. 22 on page 44](#).

NOTICE

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

4. If the product is an MFC and if the operating fluid is not the calibration fluid or if the pressure conditions have changed, then run the Autotune function. Refer to chapter [10.5 Optimising the control parameters \(MFC\)](#).
5. Regular operation.

10 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. Make sure that nobody can switch the power 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.



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 change parameters with the help of the Bürkert Communicator software.

10.2 User-defined calibration

At delivery the product is calibrated by the manufacturer.

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

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

10.3 Operating modes of an MFC

When energizing 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 chapter [10.4](#).

The possible operating modes are described in [Tab. 18](#).

Tab. 18: Names of the operating modes of an MFC in the Bürkert Communicator PC-software

| Operating mode | Description |
|---|---------------------------------------|
| Profibus variant: Automatic | Refer to chapter 10.4 |
| Analogue variant: Analog set-point value | Refer to chapter 10.4 |
| Manual set-point value | Refer to chapter 10.6 |
| Stored set-point value | Refer to chapter 10.6 |
| Open-loop control mode | Refer to chapter 10.6 |
| Analyze system | Refer to chapter 10.6 |

→ To change the operating mode, change the source for the set-point values. Refer to chapter [10.6](#).

10.4 Normal operating mode (MFC)

The normal operating-mode is active when energizing the product for the first time. Fig. 24. shows the normal operating-mode of an MFC.

NOTICE

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

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

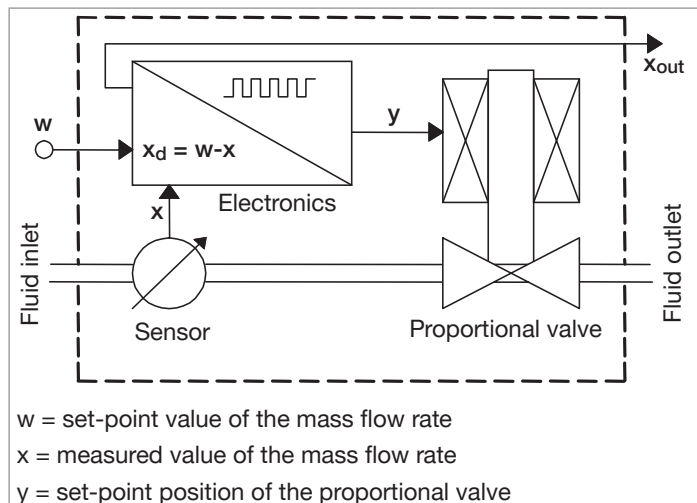


Fig. 24: Function diagram of the MFC

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 proportional valve. The set-point position value y determines the opening of the proportional valve. For example, if the set-point position value y is equal to 10 %, then the opening of the proportional valve is 10 %.

The transmission means of the set-point value w and the measured value of the flow rate depends on the product. Refer to chapter [10.4.1 Profibus variant](#) or to chapter [10.4.2 Analogue variant](#).

- To change the operating mode, change the source for the set-point values. Refer to chapter [10.6](#).
- If the operating fluid is not the calibration fluid then run the Autotune function. Refer to chapter [10.5 Optimising the control parameters \(MFC\)](#).
- If the pressure conditions have changed, then run the Autotune function. Refer to chapter [10.5 Optimising the control parameters \(MFC\)](#).

10.4.1 Profibus variant

After applying the operating voltage, the product enters a short initialisation phase and then switches to the normal operating mode. The normal operating mode of a Profibus variant is the **Automatic** operating mode. The set-point value is set via the fieldbus.

10.4.2 Analogue variant

After applying the operating voltage, the product enters a short initialisation phase and then switches to the normal operating mode. The normal operating mode of an Analogue variant is the **Analog set-point value** operating mode.

- The set-point value w is transmitted over the set-point analogue input according to the ranges in [Tab. 19](#).
- The measured value of the flow rate is transmitted over the analogue output according to the ranges in [Tab. 19](#).

Tab. 19: Analogue-input ranges and analogue-output ranges

| Analogue output range | Minimum value of the input ranges and output ranges | Maximum value of the input ranges and output ranges |
|-----------------------|---|---|
| 4...20 mA | 4 mA, $w = 0 \%$ | 20 mA, $w = 100 \%$ |
| 0...20 mA | 0 mA, $w = 0 \%$ | |
| 0...5 V | 0 V, $w = 0 \%$ | 5 V, $w = 100 \%$ |
| 0...10 V | | 10 V, $w = 100 \%$ |

10.5 Optimising the 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 then run the Autotune function.
- If the pressure conditions have changed, then run the Autotune function.

The function Autotune optimises the product for 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 from 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 no danger can occur if the gas flow increases.

→ Trigger the Autotune function:

- via the fieldbus (Profibus variant),
- via the digital input (analogue variant),
- or with the Bürkert Communicator software.

✓ The Autotune runs and the product status-indicator is orange.

✓ The flow rate control of the MFC is stopped.

✓ When the function is completed, the product returns to its previous operating mode.

✓ If the function is completed successfully, then the optimised control parameters are transferred to the hard memory of the product.

10.6 Specifying the source giving the set-point value (MFC)

The process set-point value 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 the parameter **Set-point value source** with the Bürkert Communicator PC-software.

On a Profibus variant you can alternatively change the related object. Refer to the related procedure in the product-specific help in the documentation of the initiation files. Download the initiation files and the related documentation at country.burkert.com.



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

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

- Profibus variant: **Automatic**: the set-point value is set via the fieldbus.
- Analogue variant: **Analog set-point value**: the set-point value is set via the analogue input.
- **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 the fixed set-point value remains active.
- **Open-loop control mode:** to directly set the set-point position (y) to the proportional valve. The value that is 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 in the normal operating mode but 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.

10.7 Zero-point shut-off (MFC)

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

1. Set-point value < 2 % of nominal flow rate Q_{nominal} (with measuring range 1:50)
2. Measured value < 2 % of nominal flow rate Q_{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 valve is completely closed.

10.8 Flush mode (Profibus MFC)

NOTICE

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

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

To open the valve completely:

- send an acyclic command to the product,
- or send a cyclic command with the double nominal flow rate.

10.9 Set-point values without communication (Profibus 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 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 the initiation files and the related documentation at 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 or in the product.

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

Risk of injury from electric shocks.

- ▶ Before working on the installation or he product, switch off the power. Make sure that nobody can switch the power 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 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.

There are sensitive parts in the product to control the flow and for measurement of 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 chapter [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 chapter [11.1.1](#). If you need spare parts, refer to chapter [13 Accessories / Spare Parts](#).

11.1.1 Inspecting and cleaning 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.

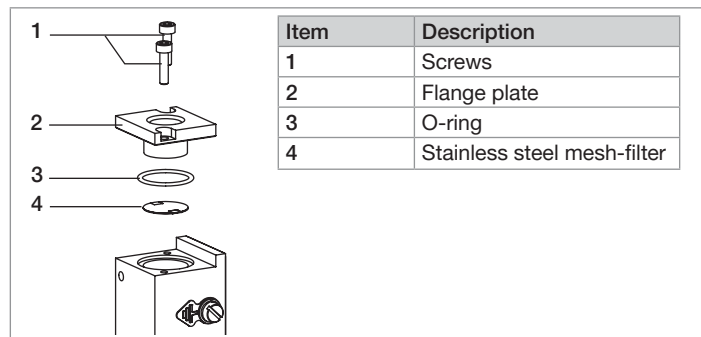


Fig. 25: Exploded view – Parts in contact with the operating fluid

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 2.5 mm, loosen the screws [1] and remove the flange plate [2].
- With a pair of tweezers, remove the O-ring [3] and the mesh filter [4].



- Do not clean the mesh filter with tap water.

- Clean the stainless steel mesh-filter [4] 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 [4] faces the flange plate [2].
- Mount the parts back in the correct order, as given in Fig. 25.
- 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].
- With an hexagon key of size 2.5 mm, tighten the screws to a torque of 1.2 Nm, that is 0.88 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 in chapter [17 Returning the product](#).

11.3 Replacing the memory card

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

- De-energize the product.
- With a TX8 key for hexalobular-internal screw loosen the screws of the cover. Remove the cover and, if fitted, the impact protection-cover.

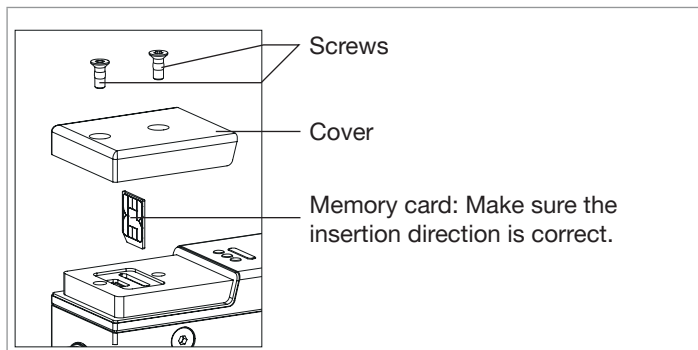


Fig. 26: Insertion direction of the memory card on a product Type 8742

- Remove the old memory card from its slot.
- Pay attention to the insertion direction of the memory card.

Fig. 27 shows the final position of the memory card in the product.

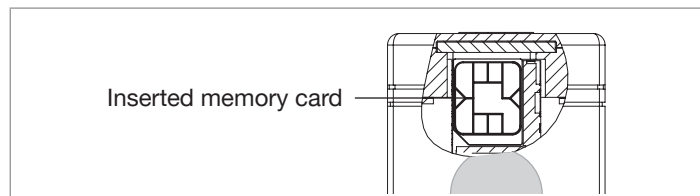


Fig. 27: Cross-sectional drawing of a product Type 8742

- Fit the cover back.
- If an ATEX product is used in a potentially explosive area, then fit the impact protection-cover back.
- With a TX8 key for hexalobular-internal screw, tighten the cover screws to a torque of 1.2 Nm, that is 0.9 lbf-ft.
- Restart the product to write the product data on the new memory card. Possible problems related to the memory card are given in [Tab. 22 on page 44](#).

12 TROUBLESHOOTING

12.1 Troubleshooting if the product status-indicator shows a problem

The product has an indicator to show the product status. The colour and status of the indicator change according to Namur NE 107. If more than one product status exist simultaneously, then the product status with the highest priority is displayed.

Tab. 20: Troubleshooting if a problem is shown by the product status-indicator

| Indicator according to NE 107 | Description | What to do? |
|-------------------------------|--|---|
| OFF | The product is not energised. | Energise the product. |
| Flashing (any colour) | Product is selected in the Bürkert Communicator software. | After 10 seconds, the product automatically returns to the previous status. |
| Green | The product is energised. | The product is in Automatic or Stored set-point value operating mode. refer to chapter 10.6 . |
| Red | Defective sensor. | The product must be repaired. Contact the manufacturer. |
| | Defective memory. | |
| | Defective product. | |
| | MFC: Incorrect Autotune. Autotune aborted. | Do the Autotune again. |
| | Supply voltage is out of the error range. The product can be damaged. | Operate the product within the specifications. |
| Orange | Profibus variant: No proper connection to the PLC | Check the wiring. Check the status of the PLC. |
| | MFC: Autotune in progress | - |
| | Calibration in progress | - |
| | MFC: Control loop disabled and direct specification of the set-point position to the valve because the parameter Set-point value source is set to Open-loop control mode . | - |

| Indicator according to NE 107 | Description | What to do? |
|-------------------------------|---|---|
| Orange | MFC: Manual set-point value or Open-loop control as set-point value source. | - |
| | MFC: Analyze system function active | - |
| Yellow | One of the following values is out of specification: <ul style="list-style-type: none"> the fluid temperature the product temperature the supply voltage | Operate the product within the specifications. If the product-status indicator is still yellow, send the product back to the manufacturer. |
| | MFC: The set-point position for the proportional valve has (almost) reached 100%. The set-point value cannot be reached. | Increase the inlet pressure or decrease the back pressure. Observe the permissible inlet pressure and the permissible 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. |
| Blue | Memory error. Error detected in the calibration curve. | Maintenance is needed – Contact the manufacturer. |

12.2 Troubleshooting of other problems

Tab. 21: Troubleshooting of other problems

| Problem | Possible cause | What to do? |
|--|---|---|
| The product status-indicator goes out periodically | The power supply is intermittently dropping. The product restarts. | Use a power supply with sufficient power output. |
| | The voltage drop in the connecting cable is too large. | Increase the cross-section of the cable. Reduce the cable length. |
| No mass flow rate | MFC: The set-point value is below the zero-point shut-off limit. | Increase the set-point value until it is higher than 2% of the nominal flow rate. |
| | MFC: The product is not in the normal operating mode. Refer to chapter 10.4 . | The product is possibly running one of the functions described in chapter 10.6 Specifying the source giving the set-point value (MFC) . If the product is not running one of the functions described in chapter 10.6 , then check the other possible causes of the problem. |
| | The pipes are too large or not yet fully vented. | Vent the pipes. Change the pipe diameter. |
| Unstable measured value | 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. |
| | MFC: 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. |
| | The residual ripple on the voltage supply is too high. | Use a supply voltage that conforms to the technical data given in chapter 6.7 Electrical data . |
| Set-point value at 0 % but operating fluid still flows | The operating pressure is above the tight sealing pressure of the proportional valve. | Reduce the operating pressure. To eliminate the defect, return the product to the manufacturer. |

| Problem | Possible cause | What to do? |
|--|---|--|
| Set-point value at 0 %, valve is closed, no mass flow, but a non-zero mass flow rate is measured | The installation position of the product is incorrect. | Install the product in the position indicated on the calibration plate or in the calibration protocol. And run the Autotune function to adapt to the operating conditions. |
| | 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. |
| Set-point value is not reached | The mesh filter is clogged. | Clean or replace the mesh filter. |
| | The inlet pressure is too low. | Increase the inlet pressure to the calibration pressure value. |
| | The outlet pressure is too high. | If the pipes after the product are dirty, then clean them. |

Tab. 22: Troubleshooting, memory card

| Problem | Possible cause | What to do? |
|--|--|--|
| The replacement product adopts none of the values on the memory card from the defective product | The article number of the replacement product is different from the article number of the defective product. | Values can only be transferred between products with the same article numbers. |
| | Memory card is defective - Product could not write any values to the memory card. | Replace the memory card. Refer to chapter 11.3 . |
| The replacement product does not adopt all of the values on the memory card 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. |

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 the original accessories and the original spare parts from Bürkert.

13.1 Electrical accessories

Tab. 23: Electrical accessories, Analogue variant

| Item | Article number |
|---|----------------|
| USB-büS-interface set, without power supply | 772551 |
| Straight 5-pin M12 female connector | 772416 |
| Straight 5-pin M12 male connector | 772417 |
| Memory card | On request |

Tab. 24: Electrical accessories, Profibus variant

| Item | Article number |
|--|----------------|
| USB-büS-interface set, without power supply | 772551 |
| Straight 5-pin M12 female connector | 772416 |
| Straight 5-pin M12 male connector (B coding) | 918198 |

| Item | Article number |
|--|----------------|
| Straight 5-pin M12 female connector (B coding) | 918447 |
| Profibus* Y-piece | 902098 |
| Profibus T-piece | 918531 |
| Profibus termination resistor, male connector (B coding) | 902553 |
| Memory card | On request |

→ For further accessories, refer to the product data-sheet.

13.2 Compression fittings for a product with threaded fluid connections

Tab. 25: Spare parts – Stainless steel compression fittings and related seals

| Threaded fluid connection in accordance with DIN ISO 228/1 | Pipe diameter | Article number | |
|--|---------------|-------------------------------------|----------------|
| | | Stainless steel compression fitting | Seal (1 piece) |
| G 1/4 | 6 mm | 901538 | 901575 |
| G 1/4 | 8 mm | 901540 | |
| G 1/4 | 1/4" | 901551 | 901579 |
| G 1/4 | 3/8" | 901553 | |

13.3 Mesh filters

Tab. 26: Spare parts – Mesh filters

| Item | Article number |
|---|----------------|
| MFC: Stainless steel mesh-filter, mesh size 25 µm | 676329 |

13.4 Additional software

Tab. 27: Documentation and software

| | |
|-------------------------------|---|
| Profibus variant: GSD file | Download from country.burkert.com |
| Bürkert Communicator software | Download from country.burkert.com |

14 DECOMMISSIONING

14.1 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 the product, switch off the power. Make sure that nobody can switch the power on.
- Observe all applicable accident protection and all applicable safety regulations for electrical equipment.



WARNING

Risk of injury from improper dismantling.

- Dismantling must only be performed by trained personnel using suitable tools.

Risk of injury from dangerous fluids.

- Before disconnecting pipes or valves, flush out dangerous fluids, release pressure in the pipes and drain.
- Observe the applicable accident protection and 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-energize the product.
- Remove the electrical wiring.
- Disconnect the fluid connections.
- Remove the product.

15 TRANSPORT

NOTICE

Transport damage.

If the product is not protected in transport, 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 °C...+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