MAN 1000581411 EN Version: C Status: RL (released | freigegeben) printed: 23.01.2025

Type 8744

Mass flow meter / Mass flow controller

Operating Instructions

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Operating Instructions 2501/01_GBen_00574749 / Original EN

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1 About this document

The document is an important part of the product and guides the user to safe installation and operation. The information and instructions in this document are binding for the use of the product.

- Before using the product for the first time, read and observe the whole safety chapter.
- Before starting any work on the product, read and observe the respective sections of the document.
- Keep the document available for reference and give it to the next user.
- Contact the Bürkert sales office for any questions.

Further information concerning the product at Products.

▸ Enter the article number from the type label in the search bar.

1.1 Symbols

DANGER!

Warns of a danger that leads to death or serious injuries.

WARNING!

Warns of a danger that can lead to death or serious injuries.

CAUTION!

Warns of a danger that can lead to minor injuries.

NOTICE!

Warns of property damage on the product or the installation.

Indicates important additional information, tips and recommendations.

Refers to information in this document or in other documents.

▸ Indicates a step to be carried out.

✓ Indicates a result.

Menü Indicates a software user-interface text.

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1.2 Terms and abbreviations

The terms and abbreviations are used in this document to refer to following definitions.

Device	Type 8744
MFM	Mass flow meter
MFC	Mass flow controller
büS	Bürkert system bus, a communication bus developed by Bürkert and based on the CANopen protocol
bar	Unit for relative pressure

1.3 Manufacturer

Bürkert Fluid Control Systems

Christian-Bürkert-Str. 13–17

D-74653 Ingelfingen

The contact addresses are available at Contact.

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2 Safety

2.1 Intended use

The device MFM is designed to measure the mass flow rate of clean and dry gases.

The device MFC is designed to measure and regulate the mass flow rate of clean and dry gases.

The permitted media are listed in Technical data [▶ 15].

Prerequisites for safe and trouble-free operation are proper transport, storage, installation, commissioning, operation and maintenance.

The instructions are part of the device. The device is intended exclusively for use within the scope of these instructions. Uses of the device that are not described in these instructions, the contractual documents or the type label can lead to severe personal injury or death, damage to the device or property and dangers for the surrounding area or the environment.

- Only trained and qualified personnel may install, operate and maintain the device. See qualification of persons in Safety instructions [▶ 7]
- Use the device only in conjunction with third-party devices and components recommended and authorized by Bürkert.
- Use the device only when it is in perfect condition.
- Only use the device indoors.
- Do not open the device.
- Do not use the device in high-vibration areas.

2.2 Safety instructions

Qualification of personnel working with the device

Improper use of the device can lead to serious personal injury or death. To avoid accidents when working with the device, the following minimum requirements must be met:

- Carry out work on the device within the scope of these instructions in a safety-compliant manner.
- Detect and avoid dangers when working on the device.
- Understand the instructions and implement the information contained therein accordingly.

Responsibility of the operator

The operator is responsible for observing the location-specific safety regulations, also in relation to personnel.

- Observe the general rules of technology.
- Install the device according to the regulations applicable in the respective country.
- The operator must make hazards arising from the location of the device avoidable by providing appropriate operating instructions.

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Electrostatically sensitive components and assemblies

The device contains electronic components that are susceptible to the effects of electrostatic discharging (ESD). Components that come into contact with electrostatically charged persons or objects are at risk. In the worst case scenario, these components will be destroyed immediately or fail after start-up.

- Meet the requirements specified by EN 61340-5-1 to minimise or avoid the possibility of damage caused by a sudden electrostatic discharge.
- Do not touch electronic components when the supply voltage is connected.

Electric shock due to electrical components

Touching live parts can result in severe electric shock. This can lead to serious personal injury or death.

- Before working on the device or system, switch off the power supply. Secure it against reactivation.
- Observe any applicable accident prevention and safety regulations for electrical devices.

Changes and other modifications, spare parts and accessories

Changes to the device, incorrect installation or use of non-approved devices or components create hazards that can lead to accidents and injuries.

- Do not make any changes to the device.
- Do not mechanically load the device.
- Observe the operating instructions of the device or component used.
- Only use the devices in conjunction with approved devices or components.

Spare parts and accessories that do not meet Bürkert's requirements may impair the operational safety of the device and cause accidents.

- To ensure operational safety, only use original parts from Bürkert.

Operation only after proper transport, storage, installation, start-up or maintenance.

Improper transport, storage, installation, start-up or maintenance endanger the operational safety of the device and can cause accidents. This can lead to serious personal injury or death.

- Only carry out works which are described in these instructions.
- Only carry out works using suitable tools.
- Have all other works carried out by Bürkert only.

Working on the device

Working on the device that has not been powered down, unauthorised switching on or uncontrolled start-up of the system can cause accidents. This can lead to serious personal injury or death.

- Only work on the device when it is not in use.
- Ensure that the device or system cannot be switched on unintentionally.
- Only start the process in a controlled manner following disruptions. Observe sequence:
  1. Apply supply voltage or pneumatic supply.
  2. Charge the device with medium.

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Technical limit values and media

Non-compliance with technical limit values or unsuitable media can damage the device and lead to leaks. This can cause accidents and seriously injure or kill people.

- Comply with limit values. See Technical data [▶ 15] and information on the type label.
- Only feed media into the media ports that are listed in the chapter Technical data [▶ 15].
- Observe the safety data sheet for the media used.

Medium under pressure

Medium under pressure can seriously injure people. In the event of overpressure or pressure surges, the device or lines can burst. Pneumatic lines that are defective or not securely fastened can come loose and swing around.

- Before working on the device or system, switch off the pressure. Vent or empty the lines.
- Adhere to the permitted pressure ranges of the medium.
- Comply with the permitted temperature ranges of the medium.

Hot surfaces and fire hazard

The surface of the device can become hot with fast-switching actuators or with hot media.

- Wear suitable protective gloves.
- Keep highly flammable substances and media away from the device.

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3 Product description

The device is used for ultimate precision in the feedback control of medium.

This document describes following variant:

- MFM büS/CANopen
- MFC büS/CANopen with proportional valve

3.1 Product overview

MFM

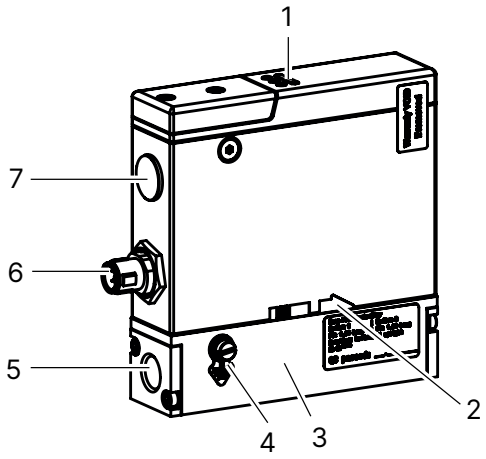

Fig. 1: Example of a variant MFM

1	Status indicator	2	Flow direction marking
3	Base block	4	Functional earth connection
5	Medium connection	6	Electrical connection
7	Not used		

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MFC with proportional valve

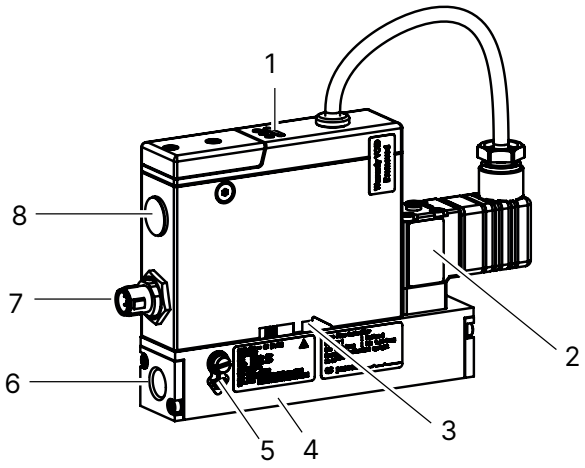

Fig. 2: Example of a variant MFC

1	Status indicator	2	Proportional valve
3	Flow direction marking	4	Base block
5	Functional earth connection	6	Medium connection
7	Electrical connection	8	Not used

3.2 Product identification

3.2.1 Type label

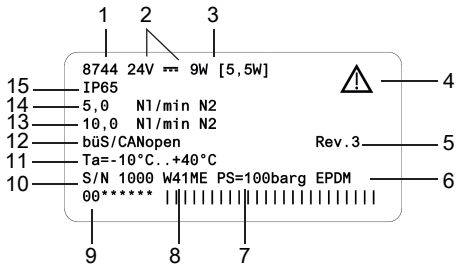

Fig. 3: Example of type label Type 8744

1	Type	2	Operating voltage
3	Power consumption	4	Note: Observe the operating instructions
5	Bürkert internal version	6	Sealing material
7	Maximum operating pressure	8	Manufacture code
9	Article number	10	Serial number
11	Ambient temperature	12	Protocol
13	Nominal mass flow rate (Q nominal), unit and operating gas 2	14	Nominal mass flow rate (Q nominal), unit and operating gas 1
15	Degree of protection		

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3.2.2 Calibration label

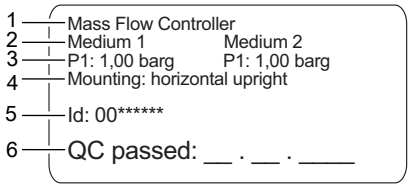

Fig. 4: Example of calibration label

1	Variant	2	Calibration medium
3	Calibration pressure	4	Installation position
5	Article number	6	Calibration date

3.2.3 Conformity marking

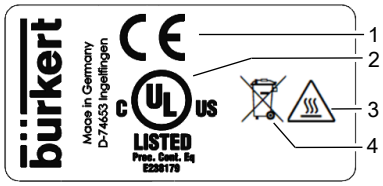

Fig. 5: Conformity label

1	CE marking	2	Certification marking for USA and/or Canada
3	Warning: hot surface	4	Indication for disposal

3.2.4 Symbols and markings on device

⏚	Earth terminal
⎓	Direct current

3.3 Display elements

3.3.1 Status indicator

The status indicator changes its colour based on the NAMUR recommendation NE 107. Refer to NAMUR mode [▶ 13].

The colour of the status indicator indicates:

- Whether device diagnostics are active or not. Diagnostics are active on the device and cannot be deactivated.
- If diagnostics are active, then the status indicator shows whether diagnostics events have been generated or not. If several diagnostics events have been generated, then the status indicator shows the diagnostics event with the highest priority.

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

- ▸ To solve a problem indicated by the status indicator, refer to Troubleshooting [▶ 40]

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3.3.2 NAMUR mode

The status indicator shows the status of the device and its peripherals, based on NAMUR recommendation 107 (NR 107).

If various alerts are present, the status indicator always shines in the colour of the highest prioritised alert (red = outage = highest priority).

Colour	Colour code	Status	Description
red	5	Failure, error or fault	Due to a malfunction in the device or its periphery, normal operation is not possible.
orange	4	Function check	Work is being carried out on the device, which means that normal operation is temporarily not possible.
yellow	3	Out of specification	The environment conditions or process conditions for the device are not within the specified range. Internal device diagnostics indicate problems within the device or with the process properties.
blue	2	Maintenance required	The device is in normal operation, although a function is briefly restricted. ▸ Service device
green	1	Diagnostics active	Device is running faultlessly, diagnostics are active.
white	0	Diagnostics inactive	Device is switched on, diagnostics are inactive.

Tab. 1: Status indicator according to NE 107

3.4 Functionality

3.4.1 Control valve

Applicable for: • MFC with proportional valve

The control valve is a direct-acting and normally-closed proportional valve.

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

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

If the valve seat seal is made of a hard material such as PCTFE, then the control valve may not be tight.
Valves with a seat size of 0.05 mm or 0.1 mm have a seat seal made of a hard material.

Unstable measured values may occur. Refer to Unstable measured value [▸ 44]

3.4.2 Memory card

If the memory card is defective or has been lost, contact your Bürkert sales office to purchase a new one.

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The device can be delivered with a memory card that is inserted in the device. When the device is energised, there are two possibilities:

- If the inserted memory card contains device-specific data, the device automatically adopts this data. At the time of delivery, the memory card is preloaded with device-specific information. To view the stored data, refer to the file **Device Description File**.
- If the inserted memory card is empty, the device saves its own data onto the card. A new memory card is empty.

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

To download the file **Device Description File**:

▸ Go to https://products.burkert.com/?type=8744

▸ Scroll down to Downloads > Software

Applicable for: • büS / CANopen variant

The büS/CANopen variant supports the config-client if no memory card is used.

▸ Activate this functionality in the Bürkert communicator under General settings > Parameter > Act as a configuration client > Yes.

For detailed information, refer to the "Software manual | Central configuration management" (this manual exists in several languages).

▸ Go to https://products.burkert.com/?type=8744

▸ Scroll down to Downloads > User Manuals

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4 Technical data

4.1 Standards and directives

The device complies with the valid EU harmonisation legislation.

The harmonised standards that have been applied for the conformity assessment procedure are listed in the current version of the EU Declaration of Conformity.

4.2 Operating conditions

MFM	
Ambient temperature	–10...+40 °C
Storage temperature	–10...+70 °C
Degree of protection (EN 60529 / IEC 60529)	IP65[1)]
Medium temperature	–10...+40 °C
Medium	Refer to the type label Clean and dry. Quality classes according to DIN ISO 8573-1.
Operating pressure	max. 10 bar
Relative ambient humidity	Max. 95% at 55 °C (non-condensing)
MFC with proportional valve	
Ambient temperature	–10...+40 °C
Storage temperature	–10...+70 °C
Degree of protection (EN 60529 / IEC 60529)	IP65[1)]
Medium temperature	–10...+40 °C
Medium	Refer to the type label Clean and dry. Quality classes according to DIN ISO 8573-1.
Operating pressure	max. 10 bar
Relative ambient humidity	Max. 95% at 55 °C (non-condensing)

1) When cables or plugs and sockets are connected correctly, verified by Bürkert, not evaluated by UL.

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4.3 Medium data

MFM	
Calibration medium	Nitrogen (N2)
Nominal flow range Q_{nom} (reference to N2 (l_N/min))	0.01...100 l_N/min
Turn-down ratio	1:20 (Q_{nom} < 0,025 l_N/min) 1:50 (Q_{nom} ≥ 0,025 l_N/min) others on request
Repeatability	±0.1% of the full scale
Measurement accuracy, after 30 minutes warm-up time	±0.8% of the measured value ±0.5% of the full scale If the medium deviates from the calibration medium, the actual measurement accuracy might vary from the value specified in the data sheet.
Response time	< 2 s

MFC with proportional valve	
Calibration medium	Nitrogen (N2)
Nominal flow range Q_{nom} (reference to N2 (l_N/min))	0.01...100 l_N/min
Turn-down ratio	1:20 (Q_{nom} < 0,025 l_N/min) 1:50 (Q_{nom} ≥ 0,025 l_N/min) others on request
Repeatability	±0.1% of the full scale
Measurement accuracy, after 30 minutes warm-up time	±0.8% of the measured value ±0.5% of the full scale If the medium deviates from the calibration medium, the actual measurement accuracy might vary from the value specified in the data sheet.
Response time	< 2 s

Quality of the medium

NOTICE!

The medium must obey the quality criteria to obey the following requirements:

- the necessary measurement accuracy of the device
- 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.

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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 °C
Maximum oil concentration	1	0.01 mg/m^3

Tab. 2: Quality criteria of the medium, ISO 8573-1, Compressed Air - Part 1: Contaminants and purity classes

4.3.1 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 device connections
- the type of the device connections
- the size of the device base-block
- the type of operating medium

▸ Determine the pressure-loss value depending on whether the medium is air or a gas other than air.

4.3.1.1 Medium is air or nitrogen

If the medium is air or nitrogen, read the pressure-loss value directly from the diagram in following figures. For example, if the flow rate through an MFM with 1/4" threaded connections is 55 l_N/min then the pressure loss ΔP_{Air} as given in following figure is 10 mbar.

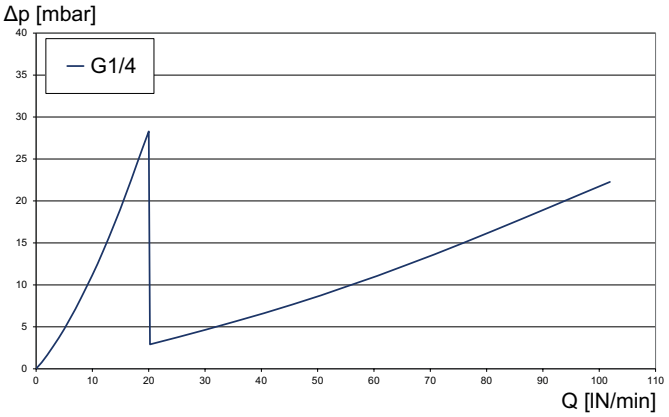

Fig. 6: Pressure loss diagram for air, MFM with a 25-µm mesh filter, flow rate range 0...100 l_N/min

4.3.1.2 Medium is not air or nitrogen

If the medium is not air or nitrogen, determine the pressure loss as follows:

▸ Read the air pressure-loss ΔP_{Air} from the diagram (approach $Q_{Gas} = Q_{Air}$).

▸ Calculate the pressure loss ΔP_{Gas} with the following formula.

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$$\Delta P_{Gas} = \Delta P_{Air} \cdot \sqrt{\frac{\rho_{N,Gas}}{\rho_{N,Air}}}$$

Fig. 7: Formula to calculate the pressure loss in an MFM

ΔP_{Gas}	Pressure loss of the medium
ΔP_{Air}	Pressure loss of air
$\rho_{N,Gas}$	Density of the medium at the standard conditions according to DIN 1343 (P_N = 1013.25 mbar, T_N = 273.15 K)
$\rho_{N,Air}$	Density of air at the standard conditions according to DIN 1343 (P_N = 1013.25 mbar, T_N = 273.15 K)

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

- If the flow rate is 55 l_N/min then the air pressure-loss Pair as given in Fig. 6 is 10 mbar.
- The pressure loss for argon gas at a flow rate of 55 l_N/min is 11,74 mbar as given by the following formula.

$$\Delta P_{Argon} = 10\,mbar \cdot \sqrt{\frac{1{,}784}{1{,}294}} = 11{,}74\,mbar$$

Fig. 8: Calculation of the pressure loss for argon gas

4.4 Electrical data

MFM büS/CANopen	
Operating voltage	24 V ⎓ ±10 %
Power consumption	< 2 W
Communication interface	büS and CANopen. The communication type can be selected with the Bürkert Communicator software.
Electrical connections	M12 plug 5-pin A-coding
Minimum temperature rating of the cable to be connected to the field wiring terminals:	75 °C

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MFC büS/CANopen	
Operating voltage	24 V ⎓ ±10 % residual ripple < 2 %
Power consumption	Refer to type label
Communication interface	büS and CANopen. The communication type can be selected with the Bürkert Communicator software.
Electrical connections	M12 plug 5-pin A-coding
Minimum temperature rating of the cable to be connected to the field wiring terminals:	75 °C

4.5 Mechanical data

MFM	
Dimensions	Refer to data sheet
Housing	Aluminium
Status indicator	Polycarbonate (PC)
Parts in contact with the medium	Stainless steel 316 (1.4401), 316L (1.4404, 1.4435), PCTFE, Seal (Refer to the type label)

MFC with proportional valve	
Dimensions	Refer to data sheet
Housing	Aluminium
Status indicator	Polycarbonate (PC)
Parts in contact with the medium	Stainless steel 316 (1.4401), 316L (1.4404, 1.4435), PCTFE, Seal (Refer to the type label) Valve: 1.4310, 1.4113, 1.4305

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5 Medium connection

Risk of injury or material damage when working on the device or system.

- Read and observe the chapter Safety [▶ 7] before working on the device or system.

5.1 Possible medium connections

- G-internal-threaded connections according to DIN ISO228/1
- NPT-internal-threaded connections according to ASME/ ANSI B 1.20.1
- Flange connection
- Connections with external-threaded vacuum fittings
- Connections with external-threaded compression fittings
- Tri-Clamp

5.2 Installation procedure

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 leakage of the medium.

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 diameter that is adapted to the medium connection of the device, and a smooth surface.

NOTICE!

Malfunction that is due to contamination.

▶If a contaminated medium is used, then install a filter upstream of the device. The filter mesh-size must be smaller than 25 µm. The filter ensures problem-free functioning of the device.

5.2.1 G-internal-threaded connections

The pipe fittings must be adapted to the medium connection of the device. Compression fittings are available as accessories. Refer to Spare parts and accessories [▶ 47]. Always complete with a seal for each medium connection.

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

- Follow the instructions provided by the manufacturer of the pipe fittings.

No inlet section is required.

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

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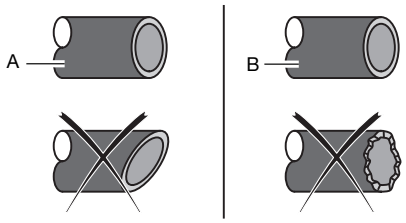

Fig. 9: Pipe cut and deburred

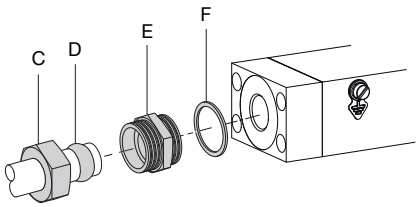

Fig. 10: Nut and ferrule on the pipe

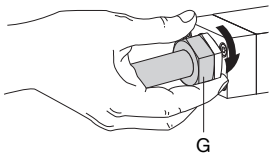

Fig. 11: Nut screwed by hand

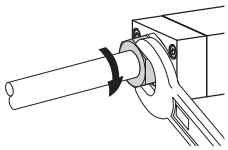

Fig. 12: Nut tightened with an open-end spanner

- Remove all dirt from the pipes and from the components of the installation that carry the medium.
- Cut the pipe squarely [A] and deburr [B].
- Remove the protective cap that closes the threaded connection.
- Slide the nut [C] and then the ferrule [D] onto the pipe.
- Place the seal [F] on the medium connection.
- Screw the compression-fitting body [E] in the medium connection. Tighten to a torque of 25...28 N·m (18.44...20.65 lbf·ft).
- Insert the pipe in the compression-fitting body. Tighten the nut [G] by hand.
- Tighten the nut with an open-end spanner to a torque of 25...28 N·m (18.44...20.65 lbf·ft).
- Proceed in the same way to connect the medium on the other side.

5.2.2 NPT-internal-threaded connections

The pipe fittings must be adapted to the medium connection of the device. Compression fittings are available as accessories. Refer to Spare parts and accessories [▶ 47]. Always complete with a seal for each medium connection.

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

- Follow the instructions provided by the manufacturer of the pipe fittings.

No inlet section is required.

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

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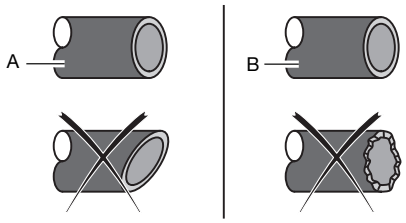

Fig. 13: Pipe cut and deburred

- Remove all dirt from the pipes and from the components of the installation that carry the medium.
- Cut the pipe squarely [A] and deburr [B].
- Remove the protective cap that closes the threaded connection.
- Slide the nut and then the ferrule onto the pipe.
- Connect the medium on one side of the device.
- 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.
- Proceed in the same way to connect the medium on the other side.

5.2.3 Flange connections

A variant with flange connections is mounted on a process connection plate by the manufacturer.

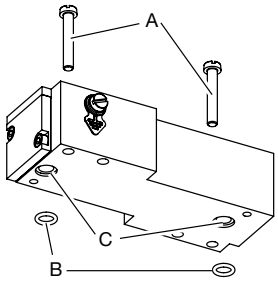

Fig. 14: Flange connection with screws and O-ring sealings

- Use the M4 screws [A] and O-ring sealings [B] delivered with the device.
- Place the O-ring sealings in the cavity [C] of the base block.
- Tighten the screws to a torque of 2,7...2,9 N·m (1,99...2,14 lbf·ft).

5.2.4 Connections with external-threaded vacuum fittings

- Remove the protective cap that closes the connection.
- Do the medium connection on one side of the device.
- Obey the instructions that are given by the manufacturer of the fitting used.
- **CAUTION! To avoid damage on the sealing of the medium connection, please make sure to lock the hexagonal part in place with a second wrench.**
  Obey the torques that are given by the manufacturer of the fitting used.
- Do the medium connection on the other side of the device in the same way.

5.2.5 Connections with external-threaded compression fittings

- Do the medium connection on one side of the device.
- Obey the instructions that are given by the manufacturer of the fitting used.

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- **CAUTION! To avoid damage on the sealing of the medium connection, please make sure to lock the hexagonal part in place with a second wrench.**
  Obey the torques that are given by the manufacturer of the fitting used.
- Do the medium connection on the other side of the device in the same way.

5.2.6 Tri-clamp connections

- Remove the protective cap that closes the threaded connection.
- Do the medium connection on one side of the device.
- Obey the instructions that are given by the manufacturer of the fitting used.
- Do the medium connection on the other side of the device in the same way.

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6 Electrical connection

Risk of injury or material damage when working on the device or system.

- Read and observe the chapter Safety [▶ 7] before working on the device or system.

6.1 Additional documentation

- For more information on büS, read the cabling guide that is available at country.burkert.com.
- For more information on CANopen that is related to the device, refer to the Operating Instructions "CANopen Network configuration" at country.burkert.com.
- Device description file and object description for the related Type (download from country.burkert.com).
- Device specific help in the Bürkert Communicator software.
- büS-driver for LabVIEW on request.

6.2 Wire the variant büS /CANopen

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

6.2.1 With büS extension cables from Bürkert

Requirements for the correct operation of the device.

- Refer to the cabling guide at country.burkert.com.

To wire the device, use büS extension cables from Bürkert.

- 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 device. Refer to Connect the functional earth [▶ 26]

6.2.2 With büS cables from Bürkert

Requirements for the correct operation of the device.

- Refer to the cabling guide at country.burkert.com.

To wire the device, büS cables and mating female connectors are available from Bürkert.

If a büS cable from Bürkert is used, then observe the signals of the conductors.

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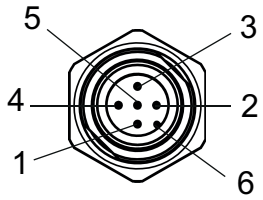
Colour of the büS cable conductor	Signal
red	24 V ⎓
black	GND
white	CAN_H
blue	CAN_L

Tab. 3: Signals of the büS cable conductors

NOTICE!

If an own mating female connector is used, then observe the following requirements for the correct operation of the device.

- 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.

5-pin M12 male connector (A coding)	Pin	Assignment
 M12 thread is internally connected to FE	1	Shield
	2	24 V ⎓
	3	GND
	4	CAN_H
	5	CAN_L
	6	Coding lug

Tab. 4: Pin assignment, 5-pin M12 male connector (A coding) of the device

- Wire the mating female connector. Observe the instructions that are given by the manufacturer of the mating female connector.
- Insert each conductor into the appropriate pin.
- 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 device. Refer to Connect the functional earth [▶ 26]

6.2.3 With CANopen cables

Requirements for the correct operation of the device.

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

To wire the device, mating female connectors are available from Bürkert.

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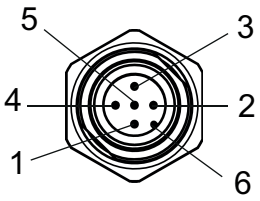
NOTICE!

Requirements for the correct operation of the device.

- 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.

5-pin M12 male connector (A coding)	Pin	Assignment
 M12 thread is internally connected to FE	1	Shield
	2	24 V ⎓
	3	GND
	4	CAN_H
	5	CAN_L
	6	Coding lug

Tab. 5: Pin assignment, 5-pin M12 male connector (A coding) of the device

- Wire the mating female connector. Observe the instructions that are given by the manufacturer of the mating female connector.
- Insert each conductor into the appropriate pin.
- 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 device. Refer to Connect the functional earth [▶ 26]

6.3 Connect the functional earth

WARNING!

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

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

- To avoid a build up of electrostatic charge, connect the housing to the functional earth.
- If the functional earth is not attached, then the requirements of the EMC directive are not met.

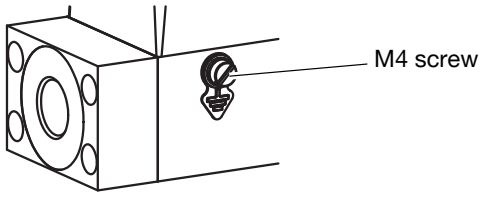


Fig. 15: Location of the M4 screw for the connection of the functional earth

- 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.
- With a flat screwdriver of size 6.5 mm, loosen the M4 screw.
- Attach the green-and-yellow cable to the M4 screw with a cable lug.
- Tighten the M4 screw to a torque of 1,8 N·m...2 N·m (1,33 lbf·ft...1,47 lbf·ft).

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7 Commissioning

Risk of injury or material damage when working on the device or system.

- Read and observe the chapter Safety [▶ 7] before working on the device or system.

7.1 Commissioning procedure

- Pressurise the pipes with medium.
- Flush the pipes with medium at the calibration pressure.
- Vent the pipes completely.
- Check if the memory card is inserted.
- Energise the device.
- If the device is an MFC, and the medium is not the calibration medium or the pressure conditions have changed, then run the Autotune function. Refer to Optimise the closed-loop control parameters [▶ 33]

✓ The device operates normally.

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8 Configuration with Bürkert Communicator

8.1 Setting tools

The MassFlowCommunicator is another PC software that is not compatible with the device. The MassFlowCommunicator software cannot be used to configure or operate the device.

Settings can be made with the Type 8920 Bürkert Communicator.

- Connect the device to the Bürkert Communicator. Refer to Connect to the Bürkert Communicator [▶ 28]
- For general information about the Bürkert Communicator, refer to the Type 8920 operating instructions.

8.2 Connect to the Bürkert Communicator

Applicable for:
- büS / CANopen variant

- Use the USB-büS-Interface set with article number 00772426.
- Download the latest version of the Type 8920 Bürkert Communicator from country.burkert.com.
- Install the Bürkert Communicator on a PC. During installation, the büS stick must not be inserted at the PC.
- Insert the micro-USB plug into the büS stick.
- Insert the appropriate power adapter into the AC/DC adapter.
- Connect the jack male-connector of the AC/DC-adapter cable to the jack female-connector of the M12 female-connector cable.
- Connect the M12 female connector to the büS network.
- If the device is connected to a büS network and is at a büS end, then 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.
- Click on  in the Bürkert Communicator to establish the communication with the device.
  ✓ A window opens.
- Select **Connect via USB (büs Stick)**.
- Select the port **Bürkert USB büS stick**, click on **Finish** and wait until the device symbol appears in the list of devices.
- In the navigation area, click on the symbol related to the device: The device menu appears.

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8.3 Functions

8.3.1 Shut-off threshold

Applicable for:	• MFC

A shut-off threshold ensures the sealing function of the control valve (except valve with PCTFE seat sealing). If the Used set-point value is below the shut-off threshold (**Controller** > **Parameter** > **Setpoint**), the control signal for the valve is set to 0%.

The Used set-point value depends on the setpoint source (**Controller** > **Parameter** > **Setpoint**).

Depending on the measuring span (**Sensor** > **Parameter**), the Used set-point value is set to zero:

Measuring span > 2%	limit=Measuring span - 1%
Measuring span <= 2%	limit=Measuring span * 0,5

Tab. 6: Decreasing setpoint

Measuring span > 2%	limit=Measuring span -0,5%
Measuring span <= 2%	limit=Measuring span * 0,75

Tab. 7: Increasing setpoint

When the shut-off threshold is deactivated (zero) and Used set-point value = 0 , the controller stays in closed loop control until Actual value flow (filtered only by x-filter control input) < Measuring span * 0,25

8.3.2 Flush mode

Applicable for:	• büS / CANopen variant

MFC: If the integrated valve is fully open, the internal device temperature increases. If the internal device temperature increases, the device 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 device.
- ▸ Or send a cyclic command with the double nominal flow rate.

8.4 Change of medium

With the Bürkert Communicator, it is possible to change the medium by using a LUA-Script which can be downloaded at country.burkert.com.

To perform the LUA-Script:

- ▸ Connect the device to the Bürkert Communicator software. Refer to Connect to the Bürkert Communicator [▸ 28]
- ▸ Select the device.
- ▸ Go to **File** > **Scripts**.

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- Browse the downloaded zip-File.

✓ The procedure of changing medium starts.

8.5 User-defined adjustment

At delivery the device is calibrated by the manufacturer.

With the Bürkert Communicator, it is possible to define an adjustment procedure with up to 32 calibration points.

This procedure is described in device specific **Documents and tools** in the Bürkert Communicator.

- Connect the device to the Bürkert Communicator. Refer to Connect to the Bürkert Communicator [▶ 28]

8.6 Zero point adjustment

It is possible to perform a zero point adjustment procedure to adapt the sensor characteristic curve to the current conditions (mounting/installation position, medium, operating pressure). The device will be calibrated in installation position in any case. It is possible to use another installation position. Afterwards a zero point adjustment procedure is necessary.

- Start the communication with the Bürkert Communicator. Refer to Connect to the Bürkert Communicator [▶ 28]
- Choose the device.
- Select **Sensor** > **Diagnostics** > **Start zero point adjustment**

✓ The procedure starts.

✓ The device switches the namur status to orange.

8.7 Set-point sources and operation modes

Applicable for: • MFC

The process set-point value can be set by different sources. It is possible to select which source is active at a time. The source for the set-point value can be changed during operation. If the source for the set-point value is changed, then the operation mode of the device is changed.

When energising the device for the first time, the device enters a short initialisation phase and then switches to the normal operation mode.

- Connect the device to the Bürkert Communicator. Refer to Connect to the Bürkert Communicator [▶ 28].
- Select the device.
- Go to **Controller** > **Parameter** > **Set-point value** > **Set-point value source**

The **Set-point value source** is kept after a restart, except when the selected set-point source is **Manual set-point value** or **Analyze system**.

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Set-point value source	Description	Operation mode
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	Normal operation mode (Closed-loop)
Stored setpoint	To use a fixed set-point value (w). If the device is restarted, then the fixed set-point value remains active.	Normal operation mode (Closed-loop)
Open-loop control mode	To directly set the set-point position (y) to the actuator. The value that is given in the menu Actuator > Parameter > Actuating variable is the setpoint position (y) that is used. A restart of the device sets the setpoint position (y) to zero.	Open-loop control mode
Analyze system	The device operates in the normal operation 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.	Analyse the system

Tab. 8: Set-point sources and operation modes

8.8 Increase the data transmission speed

Applicable for: • büS / CANopen variant

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

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

- If the data transmission-speed is active simultaneously on several devices 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 device to the Bürkert Communicator software. Refer to Connect to the Bürkert Communicator [▶ 28]
- 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 procedure:
- Select the device.
- Go to General settings > Parameter > PDO Configuration.
- To increase the data transmission-speed, change the inhibit time of the PDO to the desired value (min. 10 ms). Confirm the entry with Apply and Save.

  ✓ The data transmission-speed is increased.

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- To go back to the default data transmission-speed, click**Reset to default values**.

8.9 Operation modes

Applicable for: • MFC

When energising the device for the first time, the device enters a short initialisation phase and then switches to the normal operation mode.

Operating mode	Refer to
Variant büS/CANopen: **Automatic**	Normal operation mode [▶ 32]
Manual setpoint	Select the source that gives the set-point value [▶ 34]
Stored setpoint	Select the source that gives the set-point value [▶ 34]
Open-loop control mode	Select the source that gives the set-point value [▶ 34]
Analyze system	Select the source that gives the set-point value [▶ 34]

Tab. 9: Possible operating modes in the Bürkert Communicator software

- To change the operation mode, change the source for the set-point values. Refer to Select the source that gives the set-point value [▶ 34]

The operation mode is kept after a device restart, except when the device performs the function **Analyze system**.

8.10 Normal operation mode

Applicable for: • MFC

The normal operation mode is active when energising the device for the first time.

If the valve seat seal is made of a hard material such as PCTFE, then the control valve may not be tight.
Valves with a seat size of 0.05 mm or 0.1 mm have a seat seal made of a hard material.

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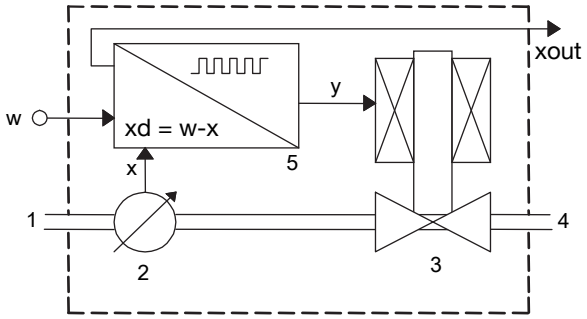

Fig. 16: Function diagram of the MFC with control valve

1	Medium inlet	2	Sensor
3	Control valve	4	Medium outlet
5	Electronics	x	measured value of the mass flow rate
y	set-point position of the pump	w	set-point value of the mass flow rate

The sensor measures the mass flow rate and compares the measured value x with the set-point value w. The device calculates the set-point position value y of the actuator.

- If the actuator is a control valve, then 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 transmission means of the set-point value w and the measured value of the flow rate depends on the device.

- ▸ If the operating conditions have changed, then optimise the closed-loop control parameters. Refer to Optimise the closed-loop control parameters [▸ 33]
- ▸ To change the operation mode, change the source for the set-point value. Refer to Select the source that gives the set-point value [▸ 34]

8.11 Optimise the closed-loop control parameters

Applicable for:	• MFC

The closed-loop control parameters of the device can be optimised for the current operating conditions with a function that is called Autotune.

- Run the Autotune function when the device is started for the first time.
- If the operating conditions have changed, then run the Autotune function.

If the device detects that the pipe is empty, then the Autotune function cannot be started.

When the Autotune is running:

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

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WARNING!

Risk of injury from flowing medium.

While the Autotune function is running, the mass flow rate value can be higher than the nominal flow rate value.

- ▸ Before running the Autotune function, make sure that no danger can occur if the mass flow rate value increases.

- ▸ Trigger the Autotune function with one of the following means:
- ▸ over the fieldbus (variant büS/CANopen),
- ▸ with the Bürkert Communicator. Refer to Connect to the Bürkert Communicator [▸ 28]

✓ The Autotune runs and the status indicator is orange.

✓ The MFC temporarily stops regulating the flow rate in the pipe.

✓ When the function is completed, the device 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 device.

8.12 Select the source that gives the set-point value

Applicable for: • MFC

The process set-point value can be set by different sources. It is possible to select which source is active at a time. The source for the set-point value can be changed during operation.

If the source for the set-point value is changed, then the operation mode of the device 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. Refer to Connect to the Bürkert Communicator [▸ 28]

On a büS/CANopen variant it is possible to alternatively change the related object. Refer to the related procedure in the device-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 when the device performs the function **Analyze system** or the set-point value source was set to manual set-point.

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

- Variant büS/CANopen: **Automatic**: the set-point value is set via the fieldbus.
- **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 setpoint**: to use a fixed set-point value (w). If the device is restarted, then the fixed set-point value remains active.
- **Open-loop control mode**: to directly set the set-point position (y) to the actuator. The value that is given in the menu **Actuator** > **Parameter** > **Actuating variable** is the setpoint position (y) that is used. A restart of the device sets the set-point position (y) to zero.
- **Analyze system**: the device operates in the normal operation 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.

8.13 Set-point values without communication

Applicable for: • büS / CANopen variant

The function makes it possible to specify the set-point values of the device 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 medium can continue to flow even if the communication is broken.

▸ Make sure the process is safe when the function is used.

▸ To use the function, refer to the related procedure in the specific help in the documentation of the initiation files. Download the initiation files and the related documentation at country.burkert.com

▸ The configuration is available under **Controller** > **Parameter** > **Setpoint** > **Advanced settings** > **Connection abort behaviour**

8.14 Changing between büS and CANopen mode

Applicable for: • büS / CANopen variant

To select the different digital communication modes (**büS** or **CANopen**), use the software Bürkert communicator.

▸ Connect the device to the Bürkert Communicator software. Refer to Connect to the Bürkert Communicator [▸ 28]

▸ Select the device.

▸ Go to **General settings** > **Parameter** > **büS** > **Advanced** > **Bus mode**

▸ Select the operating mode of the digital communication.

▸ Restart the device.

✓ The operating mode of the fieldbus is changed.

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

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

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9 Maintenance

If the device is operated according to the Operating instructions, then the device is maintenance-free.

Risk of injury or material damage when working on the device or system.

- Read and observe the chapter Safety [▶ 7] before working on the device or system.

9.1 Service tasks and intervals

The device is equipped with a stainless steel mesh-filter, which is located in the medium connection. If the device is exposed to a demanding environment or contaminated medium, the filter must be checked regularly. If necessary, the filter can be cleaned.

9.2 Inspect and clean the stainless steel mesh-filter

The inspection and possibly cleaning of the stainless steel meshfilter must be done at regular intervals. The inspection frequency and cleaning frequency depend on the measured medium.

If a contaminated medium is used, then clean the stainless steel mesh-filter immediately. If the stainless steel mesh-filter is contaminated, then replace it with a new one.

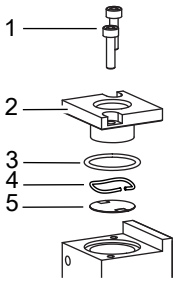

Fig. 17: Parts in contact with the medium

1	Screws	2	Flange plate
3	O-ring	4	Spring
5	Stainless steel mesh-filter		

- Position the device upright with the medium 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], the wave spring [4] and the mesh filter [5].
- **CAUTION! Do not clean the mesh filter with tap water.**Clean the stainless steel mesh-filter [5] with acetone, isopropanol or compressed air.
- Dry the mesh filter.
- **CAUTION! Before mounting the parts back, make sure that the fine side of the mesh filter [5] faces the flange plate [2]**
- Mount the parts back in the correct order.
- Make sure that the mesh filter and the O-ring are seated flat and not tilted.

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- Insert the flange plate [2] and the screws [1].
- Tighten the screws to a torque of 1.2 N·m (0,88 lbf·ft).

9.3 Calibration

The device is factory calibrated.

A regular check of the accuracy depends on the use and the individual requirements of the application. Mechanical wear, ageing of the materials, temperature changes, frequent use or contamination can affect the measuring accuracy over time. It is therefore advisable to calibrate measuring devices regularly to ensure precise measurement results at all times. The customer is responsible for determining the timing of the periodic inspection. We recommend checking the calibration after 12 months. If required, contact Bürkert for further information on calibrations and to arrange an appointment.

The calibration only applies to the primary measuring function of the measuring device. The secondary outputs are not covered by the calibration.

9.4 Replace the memory card

- De-energise the device.
- With a TX8 screwdriver loosen the screws of the cover. Remove the cover.

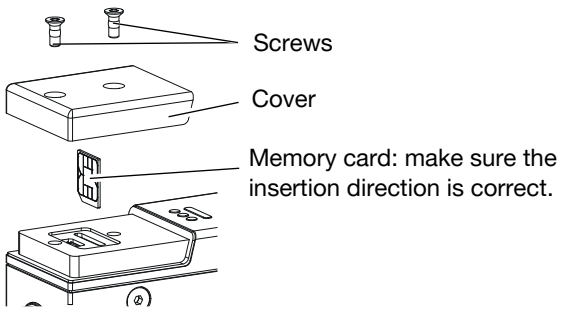

Fig. 18: Insertion direction of the memory card

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

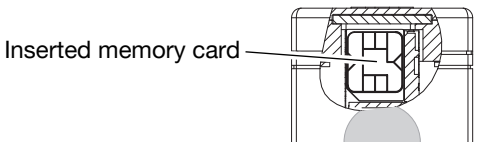

Fig. 19: Cross-sectional drawing

- With a TX8 screwdriver, screw the cover to a torque of 1.2 N·m (0.9 lbf·ft).
- Restart the device to write the data on the new memory card. Possible problems related to the memory card are given in Troubleshooting [▶ 40]

Applicable for:	• büS / CANopen variant

The büS/CANopen variant supports the config-client if no memory card is used.

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- Activate this functionality in the Bürkert communicator under **General settings** > **Parameter** > **Act as a configuration client** > **Yes**.

For detailed information, refer to the "Software manual | Central configuration management" (this manual exists in several languages).

- Go to https://products.burkert.com/?type=8744
- Scroll down to **Downloads** > **User Manuals**

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10 Troubleshooting

10.1 Status indicator is red

MFM büS/CANopen	
The supply voltage is out of the error range. The device can be damaged.	▸ Operate the device within the specifications. If the status indicator is still red, then send the device back to Bürkert.
büS error or CANopen-bus error, for example a short circuit.	▸ Make sure that the device is correctly wired.
The device is connected to büS, but cannot find any fieldbus participants.	▸ Make sure that the device is correctly wired. ▸ Operate the device with other fieldbus participants.
The device is connected to büS, but does not find the process value to be processed.	▸ Make sure that the process value is correctly allocated. ▸ Check the assigned büS participant that is defective. ▸ Make sure that the assigned büS participant provides the cyclic data.
The sensor, the internal memory or the device is defective.	▸ Contact the manufacturer, because maintenance is needed.
The device has been operated outside the temperature limits. The device can be damaged.	▸ Operate the device within the specification. If the status indicator is still red, then send the device back to Bürkert.

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MFC büS/CANopen	
The supply voltage is out of the error range. The device can be damaged.	▸ Operate the device within the specifications. If the status indicator is still red, then send the device back to Bürkert.
Incorrect Autotune or Autotune aborted.	▸ Make sure that the medium flows through the device. ▸ Check the Q_{nom} of the device. ▸ Start the Autotune again. After a restart of the device, the error will be reset.
büS error or CANopen-bus error, for example a short circuit.	▸ Make sure that the device is correctly wired.
The device is connected to büS, but cannot find any fieldbus participants.	▸ Make sure that the device is correctly wired. ▸ Operate the device with other fieldbus participants.
The device is connected to büS, but does not find the process value to be processed.	▸ Make sure that the process value is correctly allocated. ▸ Check the assigned büS participant that is defective. ▸ Make sure that the assigned büS participant provides the cyclic data.
The sensor, the internal memory or the device is defective.	▸ Contact the manufacturer, because maintenance is needed.
The device has been operated outside the temperature limits. The device can be damaged.	▸ Operate the device within the specification. If the status indicator is still red, then send the device back to Bürkert.

10.2 Status indicator is orange

MFM büS/CANopen	
The device is connected to büS and searches assigned fieldbus participant.	▸ Wait until the device has found assigned fieldbus participants.
The device is connected to büS and is configured manually, but has no address.	▸ Wait up to one minute until the device assigns its address.
A calibration procedure is in progress.	▸ Wait until the calibration procedure is completed.

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MFC büS/CANopen	
The device is connected to büS and searches assigned fieldbus participant.	▸ Wait until the device has found assigned fieldbus participants.
The device is connected to büS and is configured manually, but has no address.	▸ Wait up to one minute until the device assigns its address.
A calibration procedure is in progress.	▸ Wait until the calibration procedure is completed.
The Autotune is in progress.	▸ Wait until the Autotune is completed.
The operation mode of the device is set to **Open-loop control mode**, **Manual set-point value** or **Analyze system**.	▸ Refer to Select the source that gives the set-point value [▷ 34]

10.3 Status indicator is yellow

MFM büS/CANopen	
One of the following values is out of specification. The sensor or the device can be damaged. • the medium temperature • the device temperature • the supply voltage	▸ Operate the device within the specifications. If the status indicator is still yellow, then send the device back to Bürkert.
Other fieldbus participants use the same node ID.	▸ Assign an individual node ID to each fieldbus participant.

MFC büS/CANopen	
One of the following values is out of specification. The sensor or the device can be damaged. • the medium temperature • the device temperature • the supply voltage	▸ Operate the device within the specifications. If the status indicator is still yellow, then send the device back to Bürkert.
The set-point position for the actuator has (almost) reached 100%. The set-point value cannot be reached.	▸ Increase the inlet pressure or decrease the outlet pressure. ▸ If the pressure drop in the pipe is too high, then reduce the pressure drop. ▸ If the filters that are installed in the pipe are dirty, then clean the filters.
Other fieldbus participants use the same node ID.	▸ Assign an individual node ID to each fieldbus participant.

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10.4 Status indicator is blue

Cause	Solution
Error in the internal memory.	▸ Contact the manufacturer, because maintenance is needed.

10.5 Status indicator is off

Cause	Solution
The device is not energised.	▸ Make sure that the device is correctly wired. ▸ Make sure that the voltage supply is 24 V ⎓. ▸ Make sure that the power supply source is working properly.

10.6 Status indicator goes out periodically

Cause	Solution
The power supply is intermittently dropping and the device restarts.	▸ Use a power supply with sufficient power output.
The voltage drop in the connecting cable is too high.	▸ Increase the cross-section of the cable and reduce the cable length.

10.7 Replacement device adopts none of the values from the defective device

Cause	Solution
The article number of the replacement device is different from the article number of the defective device.	▸ Use a replacement device that has the same article number than the defective device. Values can only be transferred between devices with the same article numbers.
The memory card is defective. The device could not write any values to the memory card.	▸ Replace the memory card. Refer to Replace the memory card [▸ 38]

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10.8 Replacement device does not adopt all of the values from the defective device

Cause	Solution
The device description of the replacement device is different from the device structure of the defective device. Only the existing values of the defective device can be adopted by the replacement device.	▸ Use the Bürkert Communicator to configure the new values of the replacement device.

10.9 No mass flow rate

MFM	
The pipes are too large or not yet fully vented.	▸ Vent the pipes. ▸ Change the pipe diameter.
The flow-rate value is below the cut-off limit.	▸ If the cut-off limit is too high, decrease the value of the cut-off limit. Refer to Cut-off

MFC	
The device is not in the normal operation mode, refer to Operation modes [▸ 32]. The device is possibly running one of the functions described in Select the source that gives the set-point value [▸ 34]	▸ If the device is not running one of the functions described in Select the source that gives the set-point value [▸ 34], 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.
The flow-rate value is below the cut-off limit.	▸ If the cut-off limit is too high, decrease the value of the cut-off limit. Refer to Cut-off
The set-point value is lower than the zero-point shut-off limit.	▸ Increase the set-point value until it is higher than 2% of the nominal flow rate.

10.10 Unstable measured value

MFM	
Functional earth (FE) is not connected 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 Connect the functional earth [▸ 26]

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MFC	
Functional earth (FE) is not connected 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 Connect the functional earth [▸ 26]
The residual ripple on the voltage supply is too high.	▸ Use a supply voltage that conforms to the technical data given in Technical data [▸ 15]
The device must compensate for irregularities in an unstable pressure supply caused, for example, by pumps.	▸ Install a suitable pressure regulator in front of the device. ▸ Install a buffer tank to absorb the pressure fluctuations.
The controller is unstable.	▸ Run the Autotune function to adapt to the operating conditions. Refer to Optimise the closed-loop control parameters [▸ 33]

10.11 Set-point value at 0 %, but medium still flows

MFC büS/CANopen	
The connected actuator is a proportional valve and the operating pressure is above the tight sealing pressure of the proportional valve.	▸ Reduce the operating pressure. ▸ To eliminate the defect, return the device to the manufacturer

10.12 Set-point value at 0 %, no mass flow, but a non-zero mass flow rate is measured

MFC	
The installation position of the device is incorrect.	▸ Install the device as recommended in Medium connection [▸ 20] ▸ Run the Autotune function to adapt to the operating conditions. ▸ Perform a zero point adjustment described in Zero point adjustment [▸ 30]
The medium is different from the medium specified during the calibration.	▸ Use the specified medium or send the device to the manufacturer for calibration with the new medium.

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10.13 Set-point value is not reached

MFC with proportional valve	
The mesh filter is clogged.	▸ Clean or replace the mesh filter. ▸ Run the Autotune function to adapt to the operating conditions.
The inlet pressure is too low.	▸ Increase the inlet pressure to the calibration pressure value. ▸ Make sure that the pipe diameters and the pipe lengths are adapted.
The outlet pressure is too high.	▸ Make sure that the pipe diameters and the pipe lengths are adapted. ▸ If the medium connection pipes after the device are dirty, then clean them.

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11 Spare parts and accessories

Risk of injury and/or damage due to incorrect parts.

- Use only original accessories and original spare parts from Bürkert.

Order the parts directly on our eShop.

11.1 Electrical accessories

- For further accessories, refer to the data sheet.

büS/CANopen variant	
büS cable, 50 m	772413
büS cable, 100 m	772414
Straight 5-pin M12 female connector	772416
Bent 5-pin M12 female connector	772418
Y junction	772420
Y junction for connecting 2 separately energised segments of a büS network	772421
5-pin M12 male connector with 120-Ohm termination resistor	772424
5-pin M12 female connector with 120-Ohm termination resistor	772425
Memory card	On request
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

11.2 Compression fittings for a device with G-internal-threaded connections

The threaded pipe-connection plates of the device obey standard DIN ISO 228/1. If the pipe fittings are not delivered with the device, then choose pipe fittings that are adapted to the medium connection of the device. Also order the seal depending on the medium connection and the pipe diameter.

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Device 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	901538	901575 (Copper)
G 1/4	8 mm	901540	
G 1/4	1/4"	901551	901579 (Rubber steel)
G 1/4	3/8"	901553	

Tab. 10: Stainless steel compression fittings and related seals

11.3 Additional software

Bürkert Communicator	Download from country.burkert.com

Tab. 11: Documentation and software

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12 Uninstallation

12.1 Dismantling

- Relieve the medium pressure in the installation.
- Flush the device with a neutral medium (for example nitrogen)
- Relieve the flushing medium pressure in the installation.
- De-energise the device.
- Remove the electrical wiring.
- Disconnect the medium connections.
- Remove the device.

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13 Logistics

13.1 Transport and storage

- Protect the device against moisture and dirt in the original packaging during transportation and storage.
- Avoid UV radiation and direct sunlight.
- Protect connections from damage with protective caps.
- Observe permitted storage temperature.
- Remove cables, connectors, external filters and installation equipment.
- Clean and vent contaminated devices.

13.2 Return

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

- To return a used device to Bürkert, contact the Bürkert sales office. A return number is required.

13.3 Disposal

Environmentally friendly disposal

- Follow national regulations regarding disposal and the environment.
- Collect electrical and electronic devices separately and dispose of them as special waste.

Further information at country.burkert.com

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