

# Type 8756

Mass flow controller (MFC) for liquids with  
proportional valve analogue



Operating Instructions for specific variant

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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.

The illustrations in these instructions may vary depending on the product variant.

## 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.

**Menu** Indicates a software user-interface text.

## 1.2 Terms and abbreviations

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

Device	Type 8756
MFC	Mass flow controller
bar, bar (g)	Unit for relative pressure
bar abs	Unit for absolute pressure
Ex area	Potentially explosive atmosphere
Ex approval	Approval for potentially explosive atmosphere

## 1.3 Manufacturer

Bürkert SAS

20, rue du Giessen

67220 TRIEMBACH-AU VAL

FRANCE

The contact addresses are available at [Contact](#).



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## 2 Safety

### 2.1 Intended use

The device MFC is designed to measure and regulate the mass flow rate of liquids.

The permitted media are listed in [Technical data \[▶ 16\]](#).

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.
- ▶ Only use devices that are approved for this type of potentially explosive atmosphere. These devices are labelled with the ATEX label on the type label. When using, always observe the details on the type label and the instructions for the potentially explosive atmosphere included in the scope of delivery for the device.
- ▶ 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.

## 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 devices and components recommended or approved by Bürkert.

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, commissioning, or maintenance

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

- ▶ Observe all values and limits specified in these instructions to ensure the device's safety and functionality.
- ▶ Only carry out work described in these instructions.
- ▶ Only carry out work using suitable tools.
- ▶ All other work must be 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.

### 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** [▶ 16] and information on the type label.
- ▶ Only feed media into the media ports that are listed in the chapter **Technical data** [▶ 16].
- ▶ Observe the safety data sheet for the media used.

### Only use authorised devices in potentially explosive atmospheres

Devices that may be used in potentially explosive atmospheres are labelled with an Ex marking. Additional instructions with Ex labelling are included with these devices.

- ▶ Only use devices that are approved for use in a potentially explosive atmosphere.
- ▶ For use in potentially explosive atmospheres, observe the information on the device.
- ▶ For use in potentially explosive atmospheres, observe the additional instructions with Ex labelling.
- ▶ Do not use devices that do not have this Ex labelling and additional instructions in potentially explosive atmospheres under any circumstances.

### 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.

### 3 Product description

#### 3.1 Product overview

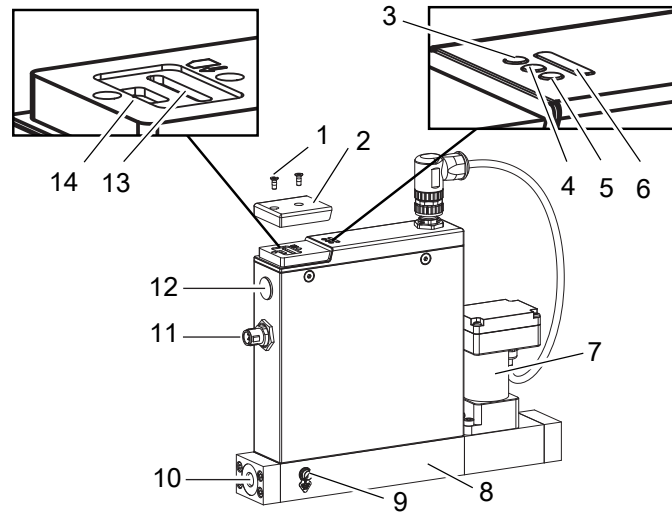


Fig. 1: Example of a variant

1 Screw	2 Cover
3 Not used	4 Not used
5 Not used	6 Status indicator
7 Actuator	8 Base block
9 Functional earth connection	10 Medium connection
11 Electrical connection	12 Electrical connection - M12
13 Slot for memory card	14 bus interface

## 3.2 Product identification

### 3.2.1 Type label

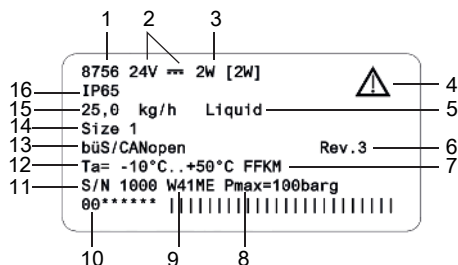


Fig. 2: Example of type label Type 8756

1 Type	2 Operating voltage
3 Power consumption	4 Note: Observe the operating instructions
5 Calibration medium	6 Bürkert internal version
7 Sealing material	8 Maximum operating pressure
9 Manufacture code	10 Article number
11 Serial number	12 Ambient temperature
13 Protocol	14 Size of the sensor
15 Nominal mass flow rate (Q nominal)	16 Degree of protection

### 3.2.2 Calibration label

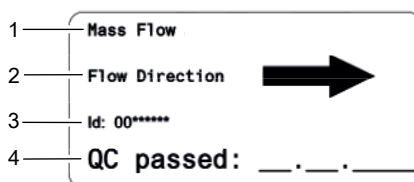


Fig. 3: Example of calibration label

1 Variant	2 Flow direction
3 Article number	4 Manufacturing date

### 3.2.3 Conformity marking

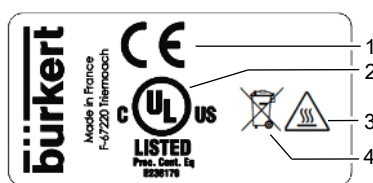


Fig. 4: Conformity label

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 \[▶ 37\]](#)

### 3.3.2 NAMUR mode

The status indicator shows the status of the device and its peripherals, based on NAMUR recommendation 107 (NE 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 signal	Description
Red	5	Failure	Due to a malfunction in the device or its periphery, normal operation is not possible.
Orange	4	Check function	Work is being carried out on the device, which means that normal operation is temporarily not possible.
Yellow	3	Out of specification	The environmental or process conditions for the device are outside the specified range. Internal device diagnosis indicate problems in the device or process characteristics.
blue	2	Maintenance required	The device is in normal operation, although a function is briefly restricted. ▶ Service device
Green	1	Diagnosis active	Device is running faultlessly, diagnosis are active.
White	0	Diagnosis passive	Device is switched on, diagnosis are inactive.

Tab. 1: Status indicator according to NE 107

## 3.4 Functionality

### 3.4.1 Service-büS interface

The Service-büS interface is used for short-term servicing of the device with the Bürkert Communicator.

The Bürkert Communicator runs under Windows. Refer to [Connect to the Bürkert Communicator \[▶ 30\]](#)

The USB-büS-Interface set, available as an accessory, is necessary. Refer to [Spare parts and accessories \[▶ 43\]](#)

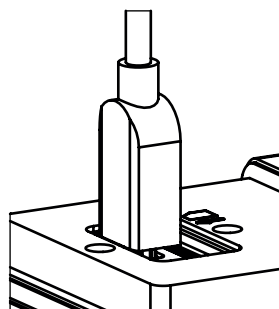


Fig. 5: büS stick, inserted in the related connector of the device

### 3.4.2 Control 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 \[► 40\]](#)

### 3.4.3 Memory card



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

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.

To download the file Device Description File:

- ▶ Access the page [Type 8756](#)
- ▶ Scroll down to **Downloads** > **Software**

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.

## 4 Technical data

### 4.1 Standards and directives

This product complies with the legal requirements applicable at the time of placing on the market and has been developed and tested in accordance with the relevant European directives/regulations and harmonized standards. The conformity is documented and, if necessary, supported by evidence. The EU Declaration of Conformity can be found behind the respective type on the home page [country.burkert.com](http://country.burkert.com)

### 4.2 Operating conditions

Ambient temperature	-10...+50 °C
Storage temperature	-10...+70 °C
Degree of protection (EN 60529 / IEC 60529)	IP65 <sup>1)</sup>
Altitude	Up to 2000 m above sea level
Medium temperature	-10...+60 °C, only in liquid state
Medium	Clean and homogeneous liquids
Operating pressure (inlet pressure)	max. 5 barg
Relative ambient humidity	Max. 95% at 55 °C (non-condensing)

### 4.3 Medium data

#### 4.3.1 Calibration conditions

Calibration medium	Water
Temperature of the calibration medium	25 °C
Calibration pressure	4 bar

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

### 4.3.2 Operating medium

Maximum particle size	10 µm
Minimum dynamic viscosity	0.3 mPa.s
Maximum dynamic viscosity	40 mPa.s, with reduced flow-rate range. Take the pressure loss into account. Refer to chapter Pressure loss.
Maximum back pressure	50% of the inlet pressure

### 4.3.3 Density measurement

Density range	0...5 kg/l
Measurement accuracy	±0.005 kg/l (for mass flow rate values higher than 1.5 kg/h)
Repeatability	±0.0025 kg/l (for mass flow rate values higher than 1.5 kg/h)

### 4.3.4 Temperature measurement

Temperature range	-10...60 °C
Measurement accuracy	±1.0 K (for mass flow rate values higher than 1.5 kg/h)
Repeatability	±0.5 K (for mass flow rate values higher than 1.5 kg/h)

### 4.3.5 Mass flow rate measurement

Mass flow rate range	Factory setting: 25 kg/h Minimum reducible to 4 kg/h
Control accuracy after 1 minute warm-up time	±0.5% of the measured value OR ±0.012 kg/h. Take the highest value into account.
Maximum measurement range	> 1:300 The measurement range is defined as the ratio of Qnominal of the device to Qmin. Qmin = 0.08 kg/h. Refer to following figure.
Settling time (t95%)	< 2 s, for water at 20 °C, without back pressure but with flow rate > 1 kg/h The settling time depends on the medium used.

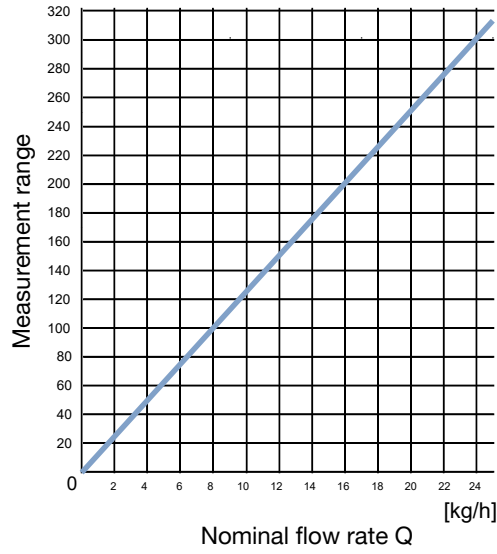


Fig. 6: Measurement range depending on nominal flow rate

### 4.3.6 Pressure loss

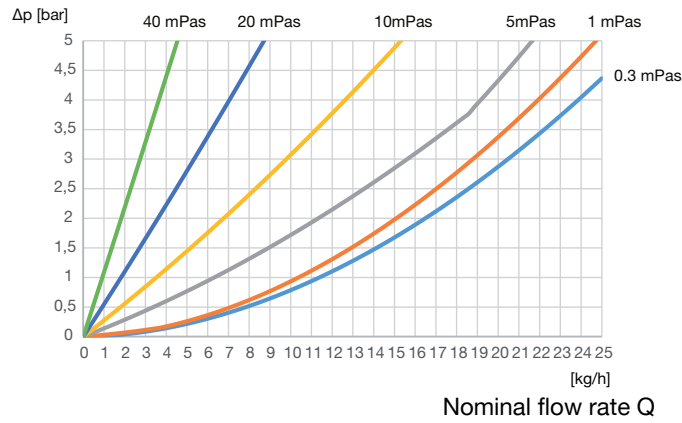


Fig. 7: Pressure loss diagram, MFC with proportional valve

## 4.4 Electrical data

Operating voltage	24 V $\overline{=}$ $\pm 10\%$ residual ripple < 2 %
Power consumption	< 18 W
Typical power consumption	10 W for water and at a flow rate of 25 kg/h
Analogue input for the measured value 0/4...20 mA	Maximum input impedance: 200 $\Omega$ Resolution: 5 $\mu$ A
Analogue input for the measured value 0...5/10 V	Minimum input impedance: 20 k $\Omega$ Resolution: 2,5 mV
Analogue output for the measured value 0/4...20 mA	Maximum loop impedance: 400 $\Omega$ at an operating voltage of 24 V $\overline{=}$ Resolution: 20 $\mu$ A
Analogue output for the measured value 0...5/10 V	Maximum current: 20 mA Resolution: 10 mV
Digital input	<ul style="list-style-type: none"> <li>• 0...0.2 V to activate level 1</li> <li>• 1...4 V or open to activate level 2</li> <li>• 5...28 V to activate level 3</li> </ul>
Relay output type	Change-over relay with 1 normally closed contact (break contact) and 1 normally open contact (make contact). Both contacts are free of potential
Maximum ratings	1 A, 30 V, 30 VA
Electrical connections	<ul style="list-style-type: none"> <li>• M12 plug 5-pin A-coding</li> <li>• M12 socket 5-pin A-coding</li> <li>• service bÜS interface</li> </ul>
Minimum temperature rating of the cable to be connected to the field wiring terminals:	75 °C

## 4.5 Mechanical data

Dimensions	Refer to data sheet <a href="#">Type 8756</a>
Base block	Stainless steel 316L
Housing	Painted aluminium, stainless steel
Seal	Refer to the type label
Status indicator	Polycarbonate
Parts in contact with the medium (sensor)	stainless steel 1.4404
Parts in contact with the medium	Stainless steel 303, stainless steel 434, stainless steel 301 The material depends on the equipped proportional valve

## 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
- Connections with external-threaded vacuum fittings
- Connections with external-threaded compression fittings
- Tri-Clamp

### 5.2 Installation procedure



#### CAUTION!

Risk of injury that is due to leakage.

- ▶ Use pipes with a diameter that is adapted to the medium connection of the device, and with 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 ensures problem-free functioning of the device. Refer to [Medium data \[▶ 16\]](#)

#### NOTICE!

Cavitation of gas in the liquid and degassing must be avoided.

- ▶ To avoid cavitation and degassing, make sure that the medium is an homogeneous liquid and that the pressure in the pipe is high enough.
- ▶ When installing the device in the pipe, observe the flow direction that is given on the calibration plate of the device.
- ▶ If a external pump is used, then install the pump upstream of the device.

#### NOTICE!

- ▶ Do not use any pump in the installation because the flow rate must not pulsate.

No inlet section and no outlet section for flow conditioning are required.

- ▶ We recommend to install the device in a horizontal pipe or in a vertical pipe as shown in the following figures.

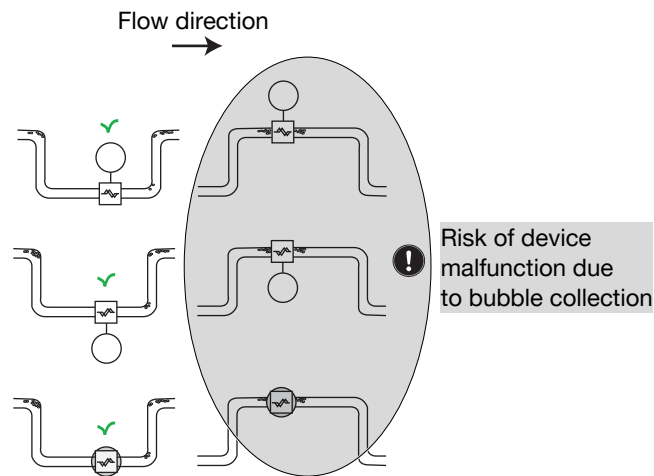


Fig. 8: Horizontal mounting positions

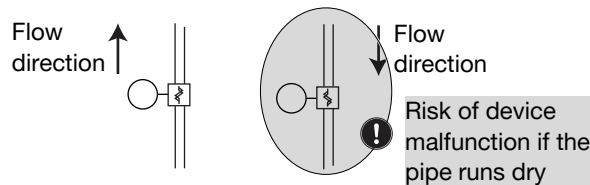


Fig. 9: Vertical mounting positions

### 5.2.1 G1/8"-internal-threaded 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.
- ▶ 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.

### 5.2.2 NPT1/8"-internal-threaded connections

- ▶ Do the medium connection 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.
- ▶ Do the medium connection on the other side of the device in the same way.

### 5.2.3 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.

## 5.2.4 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.
- ▶ **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.
- ▶ For the variant Alloy C22: screw the fitting in the base block and tighten it to a torque of 20 N·m.
- ▶ Do the medium connection on the other side of the device in the same way.

## 5.2.5 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.

## 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

Further documentation concerning the product:

- ▶ Access the page [Type 8756](#)
- ▶ Scroll down to **Downloads**
- ▶ Or enter the article number from the type label in the search bar.

### 6.2 Wire the variant Analogue



Requirements for the correct operation of the device.

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

#### NOTICE!

Requirements for the correct operation of the device.

- ▶ Use a mating female connector with shield-connection transfer at the union nut.
- ▶ Use a mating male connector with shield-connection transfer at the union nut.
- ▶ Use a mating male connector and a mating female connector that are in metal.
- ▶ Observe the specifications for the cable and conductors, that are given by the manufacturer of the mating female or male connector.

#### 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

5-pin M12 male connector	Pin	Assignment
	1	GND for the analogue output and the set-point input
	2	24 V $\equiv$
	3	GND
	4	Set-point input
	5	Analogue output for the measured value
	6	Coding lug

M12 thread is internally connected to FE

Tab. 2: Pin assignment, 5-pin M12 male connector (A coding) of the device

- ▶ Wire the mating female connector according to the pin assignment of the M12 male connector. Observe the instructions that are given by the manufacturer of the mating female connector.
- ▶ Connect the cable shielding to 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.

5-pin M12 female connector	Pin	Assignment
	1	GND for the digital input
	2	Digital input +
	3	Relay - Reference contact
	4	Relay - Normally closed contact (Break contact)
	5	Relay - Normally open contact (Make contact)
	6	Coding lug

M12 thread is internally connected to FE

Tab. 3: Pin assignment, 5-pin M12 female connector of the device

- ▶ Wire the mating male connector according to the pin assignment of the M12 female connector. Observe the instructions that are given by the manufacturer of the mating male connector.
- ▶ Connect the cable shielding to the mating male connector.
- ▶ Screw the mating male connector to the 5-pin female connector, to the torque given by the manufacturer of the mating male connector.
- ▶ Do the functional earthing of the device. Refer to [Connect the functional earth \[▶ 28\]](#)

## 6.2.1 Digital input

The 5-pin M12 female connector has a digital input. A digital input is used to remotely trigger a function.

### Available functions

- Reset the totalizer for the active medium.
- Start the function autotune.
- Trigger the remote control of the actuator or trigger the control of the actuator by the device.
- Select the set-point value.

#### Default assignment

##### Start autotune

- ▶ To select 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.

A function has up to 3 possible switching levels which may trigger different actions. The following table gives the actions that are associated to the switching levels, and how each level is activated.

### Digital input 1 inverted

Function	Level 1 "low" <sup>(2)</sup>	Level 2 "open" <sup>(3)</sup>	Level 3 "high" <sup>(4)</sup>
Start autotune	Starts Autotune	-	-
Set-point value source	Triggers Stored set-point active	-	Triggers Open-loop control mode
Reset totalizer	Resets the Totalizer	-	-
Actuator control	Opens the actuator completely	-	Closes the actuator
Close actuator	Closes the actuator	-	-
Open actuator	Opens the actuator completely	-	-

Tab. 4: Actions triggered by the switching levels

2) Digital input is connected to GND

3) Digital input is not connected (alternatively: 1..4 V  $\overline{\text{---}}$ )

4) Digital input is connected to +24 V  $\overline{\text{---}}$  (alternatively: 5...28 V  $\overline{\text{---}}$ )

## Digital input 1 not inverted

Function	Level 1 "low" <sup>(2)</sup>	Level 2 "open" <sup>(3)</sup>	Level 3 "high" <sup>(4)</sup>
Start autotune	-	-	Starts Autotune
Set-point value source	Triggers Open-loop control mode	-	Triggers Stored set-point active
Reset totalizer	-	-	Resets the Totalizer
Actuator control	Closes the actuator	-	Opens the actuator completely
Close actuator	-	Closes the actuator	Closes the actuator
Open actuator	-	-	Opens the actuator completely

Tab. 5: Actions triggered by the switching levels

### 6.2.2 Relay output

The 5-pin M12 female connector has a relay output.

The relay switching can show the following events:

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

#### Default assignment

The set-point value cannot be reached

- ▶ To select the events that are assigned to the relay output, use the Bürkert Communicator software. Several events can be associated to the relay output.

## 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.

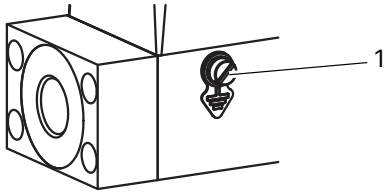


Fig. 10: Location of the M4 screw for the connection of the functional earth

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1 M4 screw

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- ▶ 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).

## 7 Commissioning

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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

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The operation of the device is tested at the factory with medium. Residual medium can remain in the device.

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

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- ▶ No zero adjustment is needed.
- ▶ Pressurise the pipes with medium.
- ▶ Make sure that the proportional valve is completely open.
- ▶ Flush the pipes with medium.
- ▶ Vent the pipes completely.
- ▶ Flush bubbles from the pipes. Refer to [Flush bubbles from the pipe \[▶ 31\]](#)
- ▶ Check if the memory card is inserted.
- ▶ Energise the device.
- ▶ Run the Autotune function. Refer to [Optimise the closed-loop control parameters \[▶ 34\]](#)

## 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. For general information about the Bürkert Communicator, refer to the operating instructions of Type 8920.


- ▶ Access the page [Type 8920](#)
- ▶ Scroll down to **Downloads** > **User Manuals**

### 8.2 Connect to the Bürkert Communicator

- ▶ Use the USB-büS-Interface set, article number 00772551.
- ▶ Download the latest version of the Type 8920 Bürkert Communicator.
- ▶ Access the page [Type 8920](#)
- ▶ Scroll down to **Downloads** > **Software**
- ▶ Install the Bürkert Communicator on a PC. During installation, the büS stick must not be connected to the PC.
- ▶ Assemble the parts of the USB-büS-Interface set.



Fig. 11: Assembled parts of the USB-büS-Interface set

- ▶ Set the termination-resistance switch of the büS stick to ON.
- ▶ Insert the büS stick into a USB port of the PC.
- ▶ Energise the device. Refer to [Electrical connection \[▶ 24\]](#)
- ▶ Insert the micro-USB connector into the büS interface of the device. Refer to [Product description \[▶ 10\]](#)
- ▶ Wait until the driver of the büS stick has been completely installed on the PC.
- ▶ 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.

## 8.3 Functions

### 8.3.1 Empty-pipe detection

To detect when the pipe is empty, the device monitors the density value of the liquid.

If the density value is lower than 0.2 kg/l, then the pipe is empty and there is a warning with the following means:

- The status indicator is yellow.
- An out-of-specification event is generated.

### 8.3.2 Bubble detection

The device detects when there are bubbles in the liquid.

If there are bubbles in the liquid, then there is a warning with the following means:

- The status indicator is yellow.
- An out-of-specification event is generated.
- ▶ Flush bubbles from the pipe. Refer to [Flush bubbles from the pipe \[▶ 31\]](#)

### 8.3.3 Cut-off

If the device measures a mass flow rate value that is under a set limit, then the device transmits a zero mass flow rate.

Cut-off limit	0.02 kg/h
Default value	

Set the cut-off limit with the Bürkert Communicator software:

- ▶ Connect the device to the Bürkert Communicator software. Refer to [Connect to the Bürkert Communicator \[▶ 30\]](#)
- ▶ In the Bürkert Communicator software, select the device.
  - ✓ The status indicator flashes.
- ▶ Select **Sensor** > **Parameter** > **Advanced** > **Limit on low cutoff**
- ▶ Set the cut-off limit in the range that is displayed.
  - ✓ The cut-off limit is set.

### 8.3.4 Flush bubbles from the pipe

To make sure that there are no bubbles in the pipe, do the following procedure:

- ▶ Make sure that the device is filled with medium.

- ▶ Connect the device to the Bürkert Communicator software. Refer to [Connect to the Bürkert Communicator \[▶ 30\]](#)
- ▶ Select the device.

**WARNING!**

**Risk of injury from flowing medium.**

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

- ▶ Before running the procedure, make sure that no danger can occur if the mass flow rate value increases.
- ▶ Select **Controller** > **Set-point value source** > Choose **Open-loop control mode**
  - ✓ The status indicator is orange.
  - ✓ A check-function event is generated.
- ▶ Select **Actuator** > **Actuating variable**
- ▶ Do the following sequence: set 100% > wait for 5 seconds > set 0% > wait for 5 seconds.
- ▶ Repeat the previous sequence 2 times.
- ▶ If the device still detects bubbles in the pipe, then contact Bürkert.
- ▶ Select **Controller** > **Set-point value source** > **Automatic**

## 8.4 Operation modes

When energising the device for the first time, the device enters a short initialisation phase and then switches to the normal operation mode. Refer to [Normal operation mode \[▶ 32\]](#)

- ▶ 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**.

## 8.5 Normal operation mode

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.

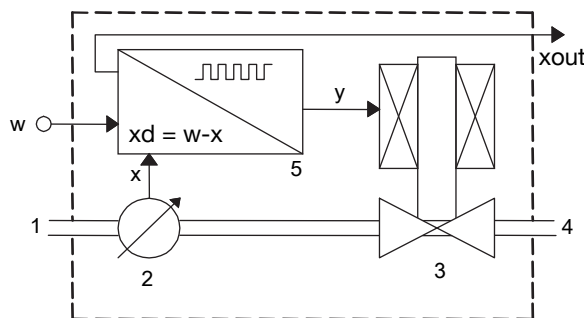


Fig. 12: Function diagram of the MFC with control valve

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 valve	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.

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

### 8.5.1 Analogue variant

If the device detects that the pipe is empty, then the device cannot regulate.

After applying the operating voltage, the device enters a short initialisation phase and then switches to the normal operation mode. The normal operation mode of a variant Analogue is the **Analog setpoint** operation mode.

- The set-point value  $w$  is transmitted over the set-point analogue input according to the ranges in the following table.
- The measured value of the flow rate is transmitted over the analogue output according to the ranges in the following table.

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, $w = 0\%$	20 mA, $w = 100\%$
0...5 V $\equiv$	0 V, $w = 0\%$	5 V, $w = 100\%$
0...10 V $\equiv$	0 V, $w = 0\%$	10 V, $w = 100\%$

Tab. 6: Analogue-input ranges and analogue-output ranges

## 8.6 Optimise the closed-loop control parameters

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 device.
- ▶ Keep the supply pressure constant.



### 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 digital input
  - ▶ with the Bürkert Communicator. Refer to [Connect to the Bürkert Communicator \[▶ 30\]](#)
- ✓ The Autotune runs and the status indicator is orange.
- ✓ The device 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.

## 8.7 Select the source that gives the set-point value

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 \[▶ 30\]](#)



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.

It is possible to alternatively change the related object. Refer to the file Device Description File.

- ▶ Access the page [Type 8756](#)
- ▶ Scroll down to **Downloads** > **Software**

## Possible choices for the parameter **Set-point value source**

<b>Analog set-point value source</b>	The setpoint value is set via the analogue input.
<b>Manual set-point value</b>	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.
<b>Stored setpoint</b>	To use a fixed set-point value (w). If the device is restarted, then the fixed set-point value remains active. Refer to <a href="#">Normal operation mode [▶ 32]</a>
<b>Open-loop control mode</b>	To directly set the set-point position (y) to the actuator. The value that is given in the menu <b>Actuator &gt; Parameter &gt; Actuating variable</b> is the setpoint position (y) that is used. A restart of the device sets the set-point position (y) to zero. Refer to <a href="#">Normal operation mode [▶ 32]</a>
<b>Analyze system</b>	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.

## 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 Replace the memory card

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

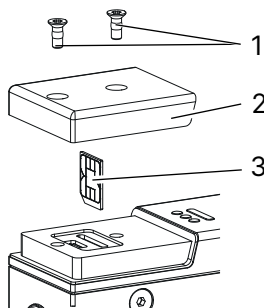


Fig. 13: Insertion direction of the memory card

1 Screws	2 Cover
3 Memory card: make sure the insertion direction is correct.	

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

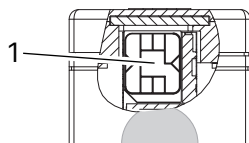


Fig. 14: Cross-sectional drawing

1 Inserted memory card
------------------------

- ▶ 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 \[▶ 37\]](#)

## 10 Troubleshooting

### 10.1 Status indicator is red

Cause	Solution
The supply voltage is out of the error range. The device can be damaged.	<ul style="list-style-type: none"> <li>▶ Operate the device within the specifications.</li> </ul> <p>If the status indicator does not change, then send the device back to Bürkert.</p>
The sensor, the internal memory or the device is defective.	<p>Maintenance is needed.</p> <ul style="list-style-type: none"> <li>▶ Contact the manufacturer.</li> </ul>
Incorrect Autotune or Autotune aborted. After a restart of the device, the error will be reset.	<ul style="list-style-type: none"> <li>▶ Make sure that the medium flows through the device.</li> <li>▶ Check the <math>Q_{nom}</math> of the device.</li> <li>▶ Start the Autotune again.</li> </ul> <p>After a restart of the device, the error will be reset.</p>

### 10.2 Status indicator is orange

Cause	Solution
A calibration procedure is in progress.	<ul style="list-style-type: none"> <li>▶ Wait until the procedure is completed.</li> </ul>
The Autotune is in progress.	<ul style="list-style-type: none"> <li>▶ Wait until the procedure is completed.</li> </ul>
The operation mode of the device is set to <b>Open-loop control mode</b> , <b>Manual set-point value</b> or <b>Analyze system</b> .	<p>Refer to <a href="#">Select the source that gives the set-point value [▶ 34]</a></p>

### 10.3 Status indicator is yellow



The yellow state is displayed for about 15 seconds after electrical power up. The device needs this time to reach the normal operation mode. After this initialisation the device will change to the green state.

Cause	Solution
<p>One of the following values is out of specification. The sensor or the device can be damaged.</p> <ul style="list-style-type: none"> <li>• the medium temperature</li> <li>• the device temperature</li> <li>• the supply voltage</li> </ul>	<ul style="list-style-type: none"> <li>▶ Operate the device within the specifications.</li> </ul> <p>If the status indicator does not change, then send the device back to Bürkert.</p>

Cause	Solution
The device has detected that the pipe is empty.	<ul style="list-style-type: none"> <li>▶ Vent the pipe.</li> <li>▶ Fill the pipe completely with medium.</li> </ul> Refer to <a href="#">Commissioning [▶ 29]</a>
The device has detected bubbles in the liquid.	<ul style="list-style-type: none"> <li>▶ Flush bubbles from the pipe.</li> </ul> Refer to <a href="#">Flush bubbles from the pipe [▶ 31]</a>
The set-point position for the actuator has (almost) reached 100%. The set-point value cannot be reached.	<ul style="list-style-type: none"> <li>▶ Increase the inlet pressure or decrease the output pressure.</li> <li>▶ Make sure that the medium viscosity is in the permitted range.</li> </ul> Refer to <a href="#">Technical data [▶ 16]</a> <ul style="list-style-type: none"> <li>▶ If the pressure drop in the pipe is too high, then reduce the pressure drop.</li> <li>▶ If the filters installed in the pipe are dirty, then clean the filters.</li> </ul>

## 10.4 Status indicator is blue

Cause	Solution
Error in the internal memory.	Maintenance is needed. <ul style="list-style-type: none"> <li>▶ Contact the manufacturer.</li> </ul>

## 10.5 Status indicator is off

Cause	Solution
The device is not energised.	<ul style="list-style-type: none"> <li>▶ Check the wiring.</li> <li>▶ Make sure that the voltage supply is 24 V <math>\overline{=}</math>.</li> <li>▶ Make sure that the power supply source is working properly.</li> </ul>

## 10.6 Status indicator flashes

Cause	Solution
The power supply source is not working properly.	<ul style="list-style-type: none"> <li>▶ Make sure that the power supply source is working properly.</li> </ul> After max. 10 seconds, the device automatically returns to the previous status.
The device is selected in the Bürkert Communicator.	After max. 10 seconds, the device automatically returns to the previous status.

## 10.7 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.

## 10.8 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 <a href="#">Replace the memory card [▶ 36]</a> .

## 10.9 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.

## 10.10 No mass flow rate

Cause	Solution
The pipes are too large or not yet fully vented.	▶ Vent the pipe. ▶ 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 <a href="#">Cut-off [▶ 31]</a> .

Cause	Solution
<p>The device is not in the normal operation mode, refer to <a href="#">Operation modes [▶ 32]</a>.</p> <p>The device is possibly running one of the functions described in <a href="#">Select the source that gives the set-point value [▶ 34]</a></p>	<ul style="list-style-type: none"> <li>▶ If the device is not running one of the functions described in <a href="#">Select the source that gives the set-point value [▶ 34]</a>, then check the other possible causes of the problem.</li> </ul>
<p>The set-point value is lower than the zero-point shut-off limit.</p>	<ul style="list-style-type: none"> <li>▶ Increase the set-point value until it is higher than 2% of the nominal flow rate.</li> </ul>

## 10.11 Unstable measured value

Cause	Solution
<p>Functional earth (FE) is not connected properly.</p>	<ul style="list-style-type: none"> <li>▶ To connect the functional earth, use a green-and-yellow cable that is as short as possible.</li> </ul> <p>the cable cross-section must be at least equal to the cross section of the power-supply cable. Refer to <a href="#">Connect the functional earth [▶ 28]</a></p>
<p>The residual ripple on the voltage supply is too high.</p>	<ul style="list-style-type: none"> <li>▶ Use a supply voltage that conforms to the technical data given in <a href="#">Technical data [▶ 16]</a></li> </ul>
<p>The device must compensate for irregularities in an unstable pressure supply caused, for example, by pumps.</p>	<ul style="list-style-type: none"> <li>▶ Install a suitable pressure regulator in front of the device.</li> <li>▶ Install a buffer tank to absorb the pressure fluctuations.</li> </ul>
<p>The controller is unstable.</p>	<ul style="list-style-type: none"> <li>▶ Run the Autotune function to adapt to the operating conditions.</li> </ul>
<p>Appearance of noise in the flow rate signal.</p>	<ul style="list-style-type: none"> <li>▶ Run the Autotune function to adapt to the operating conditions.</li> <li>▶ Use degassed medium.</li> <li>▶ Mount the device in the recommended installation position.</li> </ul> <p>Refer to <a href="#">Installation procedure [▶ 21]</a></p> <ul style="list-style-type: none"> <li>▶ Reduce the inlet pressure.</li> <li>▶ Contact the manufacturer.</li> </ul>

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

Cause	Solution
<p>The connected actuator is a proportional valve and the operating pressure is above the tight sealing pressure of the proportional valve.</p>	<ul style="list-style-type: none"> <li>▶ Reduce the operating pressure.</li> <li>▶ To eliminate the defect, return the device to the manufacturer.</li> </ul>

Cause	Solution
The operating mode of the device is set to <b>Open-loop control mode</b> , and the actuator is open because the digital input triggers the opening of the actuator.	<ul style="list-style-type: none"> <li>▶ Set the device to the normal operating mode.</li> </ul> Refer to Normal operating mode (MFC) and to <a href="#">Select the source that gives the set-point value [▶ 34]</a> . <hr/> <ul style="list-style-type: none"> <li>▶ Check the operation of the digital input.</li> </ul> Refer to <a href="#">Digital input [▶ 26]</a>

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

Cause	Solution
The installation position of the device is incorrect.	<ul style="list-style-type: none"> <li>▶ Install the device as recommended in <a href="#">Medium connection [▶ 21]</a></li> </ul> <hr/> <ul style="list-style-type: none"> <li>▶ Run the Autotune function to adapt to the operating conditions.</li> </ul>
There are bubbles in the sensor. The relay output of an Analogue variant can be parametered to switch when there are bubbles in the sensor.	<ul style="list-style-type: none"> <li>▶ Flush the device to remove the bubbles.</li> </ul>

### 10.14 Set-point value is not reached

Cause	Solution
The mesh filter is clogged.	<ul style="list-style-type: none"> <li>▶ Clean or replace the mesh filter.</li> </ul> <hr/> <ul style="list-style-type: none"> <li>▶ Run the Autotune function to adapt to the operating conditions.</li> </ul>
The outlet pressure is too high.	<ul style="list-style-type: none"> <li>▶ Make sure that the pipe diameters and the pipe lengths are adapted.</li> </ul> <hr/> <ul style="list-style-type: none"> <li>▶ If the medium connection pipes after the device are dirty, then clean them.</li> </ul>
The inlet pressure is too low.	<ul style="list-style-type: none"> <li>▶ Increase the inlet pressure to the calibration pressure value.</li> </ul> <hr/> <ul style="list-style-type: none"> <li>▶ Make sure that the pipe diameters and the pipe lengths are adapted.</li> </ul>

# 11 Uninstallation

## 11.1 Dismantling

- ▶ Relieve the medium pressure in the installation.
- ▶ Flush the device with distilled water.
- ▶ Relieve the flushing medium pressure in the installation.
- ▶ De-energise the device.
- ▶ Remove the mating female connectors and the mating male connectors.
- ▶ Disconnect the medium connections.

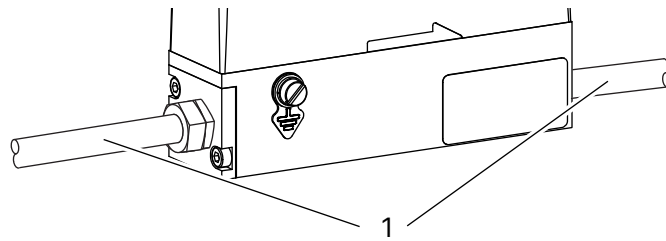


Fig. 15: Medium connections, for example internal-threaded connections

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### 1 Medium connections

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- ▶ Remove the device.

## 12 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](#).

### 12.1 Electrical accessories

- ▶ For further accessories, refer to the data sheet.

USB-büS-interface set, without power supply	772551
Straight 5-pin M12 female connector	772416
Straight 5-pin M12 male connector	772417
Bent 5-pin M12 female connector	772418
Memory card	on request
Connection cable with M12 male connector (A-coded) and free cable end, 5 m	566923
Connection cable with M12 male connector (A-coded) and free cable end, 10 m	571393
Connection cable with M12 female connector (A-coded) and free cable end, 5 m	560365
Connection cable with M12 female connector (A-coded) and free cable end, 10 m	563108
Bent 8-pin M12 male connector	775070

### 12.2 Additional software

Bürkert Communicator software	Download from <a href="https://country.burkert.com">country.burkert.com</a>
büS LabView-driver	Download from <a href="https://country.burkert.com">country.burkert.com</a>

## 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, if present, from damage with protective caps.
- ▶ Observe the permitted storage temperature.
- ▶ Remove cables, connectors, external filters and installation equipment.
- ▶ Clean and vent contaminated devices.

### 13.2 Return



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

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- ▶ 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](https://country.burkert.com)