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Type 8077

Oval gear volume flow sensor for low volume flow rates

Operating Instructions

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Technical documentation 2602/03_GBen_00567834_1279642635_1278618123 / 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.

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.

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1.2 Terms and abbreviations

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

Product	Flowmeter with oval rotors Type 8077

1.3 Manufacturer

Bürkert Fluid Control Systems

Christian-Bürkert-Str. 13–17

74653 Ingelfingen

GERMANY

The contact addresses are available at Contact.

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2 Safety

2.1 Intended Use

Use of the device that does not comply with the instructions could present risks to people, nearby installations and the environment.

The flowmeter type 8077 is intended to measure the flow rate of fluids, especially of viscous fluids.

- Use this device in compliance with the characteristics and the conditions of commissioning and use specified in the contractual documents and in this manual.
- Protect the device against electromagnetic interference, ultraviolet rays and, when installed outdoors, against the effects of climatic conditions.
- Only operate a device in perfect working order.
- Properly transport, store, install and operate the device.
- Only use the device as intended.

2.2 Basic safety information

This safety information does not take into account:

- any contingencies or occurrences that may arise during assembly, use and maintenance of the devices.
- the local safety regulations that the operator must ensure the staff in charge of installation and maintenance observe.

Risk of injury due to high pressure in the installation

Risk of injury due to electrical voltage

Risk of injury due to high temperatures of the fluid

Risk of injury due to the nature of the fluid

Various dangerous situations

To avoid injury take care:

- not to use the device for the measurement of gas flow rates.
- not to use this device in explosive atmospheres.
- not to use this device in an environment incompatible with the materials it is made.
- not to make any internal or external modifications to the device.
- not to subject the device to any mechanical stresses.
- to prevent any unintentional power supply switch-on.
- to ensure that installation and maintenance work are carried out by qualified, authorised personnel in possession of the appropriate tools.
- to guarantee a set or controlled restarting of the process after a power supply interruption.
- to observe the general technical rules.

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The device may be damaged by the fluid in contact with

- Systematically check the chemical compatibility of the component materials of the device and the fluids likely to come into contact with it (for example: alcohols, strong or concentrated acids, aldehydes, alkaline compounds, esters, aliphatic compounds, ketones, halogenated aromatics or hydrocarbons, oxidants and chlorinated agents).

Elements / Components sensitive to electrostatic discharges

- This device contains electronic components sensitive to electrostatic discharges. They may be damaged if they are touched by an electrostatically charged person or object. In the worst case scenario, these components are instantly destroyed or go out of order as soon as they are activate
- To minimise or even avoid all damage due to an electrostatic discharge, take all the precautions described in the standard EN 61340-5-1
- Also ensure that you do not touch any of the live electrical components.

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3 Description

3.1 Area of application

The device is intended to measure, thanks to its oval rotors, the flow rate of viscous fluids. It must be combined with a remote instrument (refer to data sheet of the type 8077) which converts the pulse frequency due to oval rotors rotation.

3.2 General description

3.2.1 Construction

The device is built of a fitting which includes oval rotors and of a cover including the electronic module with Hall effect sensor and Reed switch.

The oval rotors of the fitting contain magnets.

All the device versions provide an NPN transistor output and a Reed switch output.

The electrical connection is made by a 1 meter 5-wire cable.

3.2.2 Measuring principle

When the fluid flows through the pipe, the oval rotors which contain magnets turn. The displacement of magnets lead to a variation of magnetic field. The sensor measures the variation of the magnetic field and converts the signal into a frequency. The frequency is available at both the NPN transistor and Reed switch outputs.

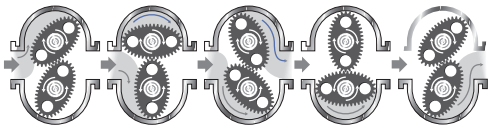

Fig. 1: Running/displacement of oval rotors

The remote instrument converts the frequency into a flow rate by using the correct K factor.

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3.3 Description of the engraving

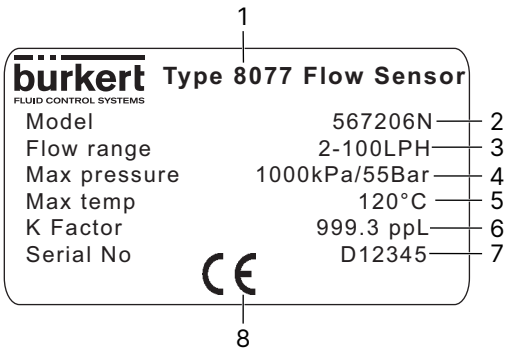

Fig. 2: Engraving of the device

1	Type	2	Article number
3	Flow rate measurement range	4	Maximum pressure
5	Maximum temperature	6	K factor (specific)
7	Serial number	8	CE marking

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3.4 Available versions

Process connection	Flow rate range		Materials			Max. pressure [1]	Order code [2]
	Viscosity > 5 mPa.s	Viscosity < 5 mPa.s	Meter body	Rotors / axis	Meter cover gasket		
G 1/8"	0.5...100 l/h	2...100 l/h	Aluminium	Stainless steel	FEP / PTFE	55 bar	567 202
			Stainless steel	Stainless steel	FEP / PTFE	55 bar	567 203
NPT 1/8"	0.5...100 l/h	2...100 l/h	Aluminium	Stainless steel	FEP / PTFE	55 bar	567 204
			Stainless steel	Stainless steel	FEP / PTFE	55 bar	567 205
G 1/4"	0.5...100 l/h	2...100 l/h	Stainless steel	Stainless steel	FEP / PTFE	55 bar	567 206
	15...500 l/h	40...500 l/h	Stainless steel	Stainless steel	FEP / PTFE	55 bar	567 207
	15...500 l/h for viscosity > 1 Pa.s		Stainless steel	Stainless steel	FEP / PTFE	55 bar	567 208
NPT 1/4"	0.5...100 l/h	2...100 l/h	Stainless steel	Stainless steel	FEP / PTFE	55 bar	567 209
	15...500 l/h	40...500 l/h	Stainless steel	Stainless steel	FEP / PTFE	55 bar 55 bar	567 210
	15...500 l/h for viscosity > 1 Pa.s		Stainless steel	Stainless steel	FEP / PTFE	55 bar	567 211

[1] High pressure versions available on request

[2] Other high viscosity versions available on request

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

4.2 Conditions of use

Ambient temperature	–15...+60 °C
Fluid temperature (operating)	
• Aluminium body	• –20...+80 °C
• stainless steel body	• –20...+120 °C
Air humidity	< 85 %, non condensated
Protection rating	IP67, IP66, NEMA 6
Storage temperature	–15...+60 °C

4.3 Conformity to the Pressure Equipment Directive

- ▸ Make sure that the device materials are compatible with the fluid.
- ▸ Make sure that the pipe DN is adapted for the device.
- ▸ Observe the fluid nominal pressure (PN) for the device. The nominal pressure (PN) is given by the device manufacturer.

The device conforms to Article 4, Paragraph 1 of the Pressure Equipment Directive 2014/68/EU under the following conditions:

- Device used on a pipe (PS = maximum admissible pressure, in bar; DN = nominal dimension of the pipe, in mm)

Type of fluid	Conditions
Fluid group 1, Article 4, Paragraph 1.c.i	DN ≤ 25
Fluid group 2, Article 4, Paragraph 1.c.i	DN ≤ 32 or PSxDN ≤ 1000
Fluid group 1, Article 4, Paragraph 1.c.ii	DN ≤ 25 or PSxDN ≤ 2000
Fluid group 2, Article 4, Paragraph 1.c.ii	DN ≤ 200 or PS ≤ 10 or PSxDN ≤ 5000

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4.4 Mechanical data

Part	Material
Meter body	• Aluminium • Stainless steel 316L (1.4401)
Rotors	Stainless steel 316L (1.4401)
Axis	Stainless steel 316L (1.4401)
Meter cover gasket	FEP / PTFE
Electronic module with tag plate	PP (20 % glass fiber) aluminium

4.5 Fluid data

Max. fluid pressure • Aluminium or stainless steel meter body	• 55 bar (550 bar on request)
Viscosity	1 Pa.s max. (higher on request)
Flow rate measuring range	depends on the version; see Available versions [▶ 10]
• Measurement deviation	
with standard K factor with specific factor	≤ ± 1 % of reading ≤ ± 0.5 % of reading
• Repeatability	≤ ± 0.03 % of reading
Max. size of particles	75 µm

4.6 Electrical data

Supply voltage	4.5...24 V DC
Transistor output • Type of output • Hall sensor max. intensity • Recommended load	 • Frequency on open collector, NPN, max. 25 mA, 4.5...24 V DC • 25 mA • 1.8 KW Pull up at 24 V DC
Reed switch output • Type • Max. switching voltage • Max. switching current • Max. operating current • Number of cycles (typical)	 • Frequency • 30 V DC • 0.5 A • 0.5 A • 500 x 10^6 cycles (at 10 V DC and 10 mA)
Electrical connection	5-wire cable, 1 m long

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4.7 Dimensions

Refer to the related datasheet at Type 8077

4.8 K factor (in pulse/l)

Flow rate range	Standard K factor (in pulse/l)
0.5...100 l/h	1000
15...500 l/h	400

In all cases, you can use these standard K factors

- To improve the measurement deviation, use the specific K factor, engraved on each device (see Description of the engraving [▶ 9]).

If the device is combined with an instrument which does not automatically convert the K factors, make the conversion using one of the following formulae:.

K factor in pulse/gallon US = K factor in pulse/l x 3,785 to obtain flow rate in gallon US / time unit

K factor in pulse/gallon UK = K factor in pulse/l x 4,546 to obtain flow rate in gallon UK / time unit

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5 Installation und Wiring

5.1 Safety instructions

DANGER!

Risk of injury due to electrical voltage

- Disconnect the electrical power source for all the conductors and isolate it before carrying out work on the system.
- Observe all applicable accident protection and safety regulations for electrical equipment.

DANGER!

Risk of injury due to high pressure in the installation

- Stop the circulation of fluid, cut off the pressure and drain the pipe before loosening the process connections.

DANGER!

Risk of injury due to high fluid temperatures

- Use safety gloves to handle the device.
- Stop the circulation of fluid and drain the pipe before loosening the process connections.

DANGER!

Risk of injury due to the nature of the fluid

- Respect the regulations on accident prevention and safety relating to the use of aggressive fluid.

WARNING!

Risk of injury due to non-conforming installation

- The electrical and fluid installation can only be carried out by qualified and authorized personnel with the appropriate tools.
- Install overload devices that are appropriate to the electrical installation.

WARNING!

Risk of injury due to unintentional switch on of power supply or uncontrolled restarting of the installation

- Take appropriate measures to avoid unintentional activation of the installation.
- Guarantee a set or controlled restarting of the process subsequent to the installation of the device.

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5.2 Installation instructions

NOTICE!

The oval rotors may be damaged if particles with diameter > 75 µm go into the fitting

- Install a strainer of 75 µm upstream and as close as possible to the device.

- Install a by-pass line on your installation to service the device and the strainer without stopping the process.

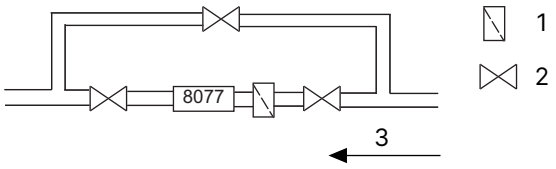

Fig. 3: Installation of a by-pass line

1 Strainer	2 Valve
3 Direction of flow	

- Install the device onto the pipe so that the shafts of the rotors are in a horizontal plane.

Seal the external threads of the fitting with a product compatible with the materials from which the device housing and the pipe are made.

- Screw the device onto the pipe.

5.3 Wiring

DANGER!

Risk of injury due to electrical voltage

- Disconnect the electrical power for all the conductors and isolate it before carrying out work on the device.
- Observe all applicable accident protection and safety regulations for electrical equipment.

Use a filtered and regulated electrical power supply.
Make sure the installation is equipotential.

Red wire	Power supply (+)
Black wire	Power supply (–)
White wire	NPN transistor output
Yellow or brown wire	Reed switch
Green wire	Reed switch

Tab. 1: Connection wire assignment

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5.3.1 Wiring the NPN transistor output and the Reed switch output

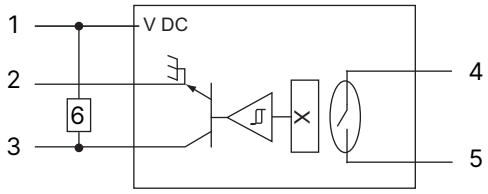

Fig. 4: Wiring of NPN transistor output and the Reed switch output

1	L+ (4,5...24 V DC) (red wire)	2	L- (black wire)
3	NPN transistor output (white wire)	4	Yellow or brown wire
5	Green wire	6	R = 1,8 kOhm pull-up at 24 V DC

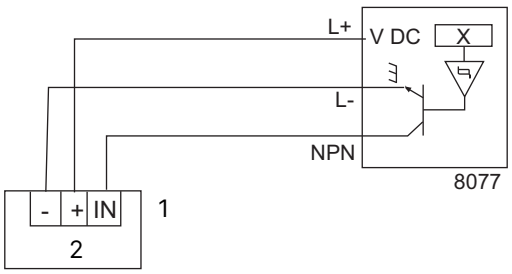

Fig. 5: Example for the connection of the NPN transistor output to a remote transmitter

1	IN = Pulse input on remote transmitter	2	Remote transmitter

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6 Commissioning

6.1 Safety instructions

WARNING!

Risk of injury due to nonconforming commissioning

Non conforming commissioning could lead to injuries and damage the device and its surroundings.

- Before commissioning, make sure that the staff in charge have read and fully understood the contents of the manual.
- In particular, observe the safety recommendations and intended use.
- The device/installation must only be commissioned by suitably trained operators.

Protect this device against electromagnetic interference, ultraviolet rays and, when installed outdoors, the effects of the climatic conditions.

The pipe must be full of liquid without air bubbles.

- Drain air from the pipe by gradually filling the pipe with fluid.
- Make sure the installation is tight.

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7 Maintenance and Troubleshooting

7.1 Safety instructions

DANGER!

Risk of injury due to high pressure in the installation

- Stop the circulation of fluid, cut off the pressure and drain the pipe before loosening the process connections.

DANGER!

Risk of injury due to electrical voltage.

- Shut down and isolate the electrical power source before carrying out work on the system.
- Observe all applicable accident protection and safety regulations for electrical equipment.

DANGER!

Risk of injury due to the nature of the fluid

- Respect the prevailing regulations on accident prevention and safety relating to the use of aggressive fluids.

DANGER!

Risk of injury due to high fluid temperatures

- Use safety gloves to handle the device.
- Stop the circulation of fluid and drain the pipe before loosening the process connections.
- Keep all easily flammable material and fluid away from the device.

WARNING!

Risk of injury due to non-conforming maintenance

- Maintenance must only be carried out by qualified and skilled staff with the appropriate tools.
- Guarantee a set or controlled restarting of the process, after a power supply interruption.

7.2 Maintenance of the strainer

- After the circulation of 200 litres of fluid, examine the strainer for particles. If necessary clean the strainer with a product compatible with the materials from which it is made.
- Regularly examine the strainer for good condition, in particular when the flow rate decreases. If necessary clean the strainer with a product compatible with the materials from which it is made.

7.3 Maintenance of the device

- Regularly examine the gasket and the oval rotors for good condition. Follow the instructions on Replace the rotors [▶ 19]

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Clean the device with a cloth slightly dampened with water or a cleaning liquid compatible with the materials the device is made of.

Your Bürkert supplier is at your disposal for any further information.

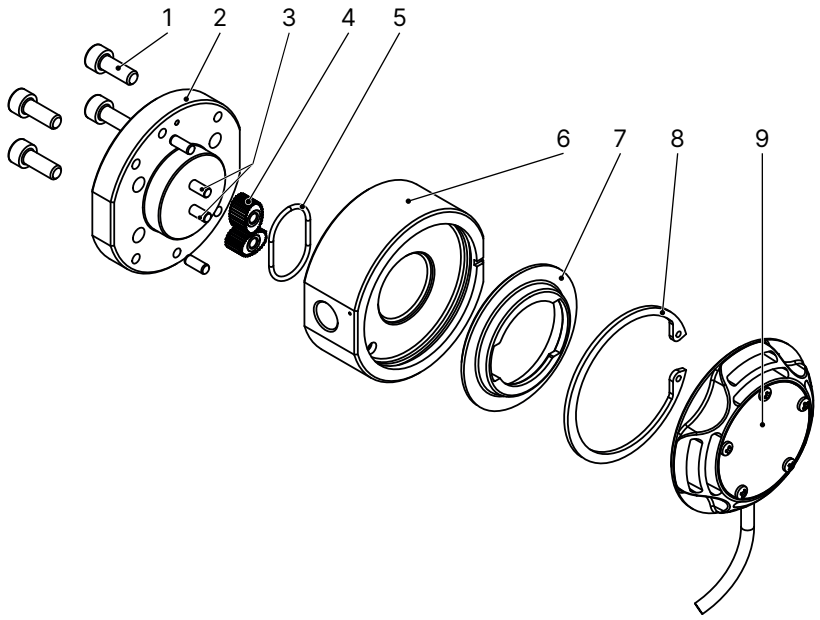

Fig. 6: Exploded view of the device

1	Screws	2	Cover
3	Rotor shafts	4	Rotors
5	Gasket	6	Body
7	Cam	8	Circlip
9	Electronic module		

7.4 Replace the rotors

Disassembly

- Ensure the fluid supply to the meter has been disconnected, and the line pressure has been released.
- Remove the screws and the cover.
- Remove the gasket and inspect; replace if damaged.
- Remove rotors, clean and inspect; replace if damaged.

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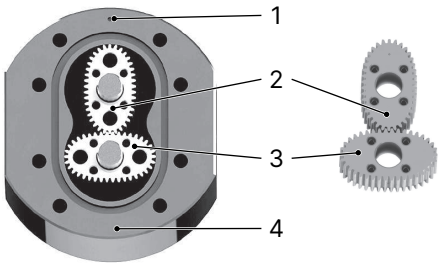

Fig. 7: Correct position of the rotors

1	Dimple	2	Active rotor (with magnet)
3	Neutral rotor (without magnet)	4	Body

Reassembly

- ▸ Identify the active rotor by running a metal object over the face (smooth side).

The neutral rotor is the other one (without magnet).

- ▸ Replace the active rotor :
- • nearest the dimple
- • smooth side in the body meter.
- ▸ Replace the neutral rotor at 90° to the active rotor (refer to the previous Figure).
- ▸ Lightly rotate the rotors by hand; they must turn freely.
- ▸ Install gasket.
- ▸ Replace the cover.
- ▸ Replace screws and fasten in an alternating pattern with a torque of 6.5 Nm.

7.5 Replace the cover with electronic module

The electronic module includes a Hall effect sensor and a Reed switch.

Disassembly

- ▸ Turn the electronic module counter-clockwise with an angle of about 90° to unlock it.
- ▸ Remove the electronic module.

Reassembly

- ▸ Place the electronic module in the cam .
- ▸ Turn the electronic module clockwise with an angle of about 90° to lock it.

The electronic module is locked with the complete device.

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7.6 If a problem occurs

Problem	Cause	Solution
Fluid does not flow through the device any more	Blocked device	▸ Remove and clean the oval rotors (see Replace the rotors [▸ 19]). ▸ Add a strainer of 75 µm upstream of the device.
	Blocked strainer (if present)	▸ Clean the strainer.
	Rotors damaged	▸ Replace the rotors (see Spare parts and accessories [▸ 22] and Replace the rotors [▸ 19]).
Reduced flow rate through the device	Strainer (if present) partially blocked	▸ Clean the strainer.
	Fluid too viscous	▸ Use rotors for fluids with a viscosity > 1000 mPa.s.
Incoherent measurement	Flow rate range not adapted	▸ Verify specifications, adjust the device or the flow rate (see Fluid data [▸ 12]).
	Air within the pipe	▸ Slowly drain air from the pipe.
	Friction due to an incorrect assembly of the device	▸ Verify the assembly of the rotors in the fitting (see Replace the rotors [▸ 19]).
No frequency output	Incorrect wiring of the outputs	▸ Make sure that the device has been wired correctly (seeWiring [▸ 15]).
	Hall sensor or Reed switch defective	▸ Replace the cover with electronic module (see Spare parts and accessories [▸ 22] and Replace the cover with electronic module [▸ 20])
	Rotors incorrectly mounted	▸ Disassemble the device and modify the position of the rotors (see Replace the rotors [▸ 19])
	Magnet damaged	▸ Replace the rotors (see Spare parts and accessories [▸ 22] and Replace the rotors [▸ 19])

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8 Spare parts and accessories

CAUTION!

Risk of injury and damage caused by the use of unsuitable parts

Incorrect accessories and unsuitable spare parts may cause injuries and damage the device and the surrounding area.

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

Spare part	Order code
Set of 2 oval rotors in stainless steel, flow rate range of 0.5...100 l/h	567 766
Set of 2 oval rotors in stainless steel, flow rate range of 15...500 l/h	567 767
FEP / PTFE seal range of 0.5...100 l/h	567 768
FEP / PTFE seal range of 15...500 l/h	567 769
Electronic module including Hall effect sensor and Reed switch	567 770

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9 Logistics

9.1 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.

9.2 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.

9.3 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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