bürkert
FLUID CONTROL SYSTEMS

Type 8222 ELEMENT neutrino

Conductivity meter
Leitfähigkeits-Messgerät
Conductivimètre

Operating Instructions (from serial number 3000)

Bedienungsanleitung (ab Seriennummer 3000)
Manuel d'utilisation (à partir du numéro de série 3000)

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Technische Änderungen vorbehalten.
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1. THE OPERATING INSTRUCTIONS

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

The Operating Instructions contain important safety information.

Failure to comply with these instructions can lead to hazardous situations.

- The Operating Instructions must be read and understood.

1.1. Symbols used

DANGER

Warns against an imminent danger.

- Failure to observe this warning results in death or in serious injury.

WARNING

Warns against a potentially dangerous situation.

- Failure to observe this warning can result in serious injury or even death.

CAUTION

Warns against a possible risk.

- Failure to observe this warning can result in substantial or minor injuries.

NOTICE

Warns against material damage.

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

Indicates additional information, advice or important recommendations.

Refers to information contained in these Operating Instructions or in other documents.

- Indicates an instruction to be carried out to avoid a danger, a warning or a possible risk.

→ Indicates a work step that you must carry out.

1.2. Definition of the term device

The term device that is used within these Operating Instructions refers to the conductivity meter Type 8222 ELEMENT neutrino.

1.3. Validity of the Operating Instructions

The Operating Instructions are valid for the Type 8222 ELEMENT neutrino devices with serial numbers equal to or higher than 3000.

2. INTENDED USE

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

The device is intended solely for the measurement of the conductivity of liquids.

- Use the device in compliance with the characteristics and start-up and use conditions specified in the contractual documents and in the Operating Instructions.
- Do not use the device for security applications.
- Store, transport, install and operate the device properly.
- Only operate a device in perfect working order.
- Only use the device as intended.

3. BASIC SAFETY INFORMATION

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

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

Risk of injury due to electrical voltage.

- If the device is installed either in a wet environment or outdoors, all the electrical voltages must be of max. 35 V DC.
- Before carrying out work on the system or the device, disconnect the electrical power for all the conductors and isolate it.
- All equipment connected to the device must be double insulated with respect to the mains according to the standard UL/EN 61010-1.
- Observe all applicable accident protection and safety regulations for electrical equipment.

Risk of injury due to pressure in the installation.

- Before any intervention in the installation, stop the circulation of fluid, cut off the pressure and drain the pipe.
- Before any intervention in the installation, make sure there is no pressure in the pipe.
- Observe the dependency between the fluid temperature and the fluid pressure.

Risk of burns due to high fluid temperatures.

- Use safety gloves to handle the device.
- Before opening the pipe, stop the circulation of fluid and drain the pipe.
- Before opening the pipe, make sure the pipe is completely empty.

Risk of injury due to the nature of the fluid.

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

Various dangerous situations

To avoid injury, observe the following instructions:

- Do not use the device in explosive atmospheres.
- Do not use the device in an environment incompatible with the device materials.
- Do not use fluid that is incompatible with the device materials. Find the compatibility chart on our homepage: country.burkert.com
- Do not subject the device to mechanical stress.
- Do not make any modifications to the device.
- Prevent any unintentional power supply switch-on.

Various dangerous situations

To avoid injury take care:

- Only qualified and skilled staff may carry out the installation and maintenance work.
- Ensure a defined or controlled restarting of the process after a power supply interruption.
- Observe the general technical rules.

NOTICE

Elements and components that are both sensitive to electrostatic discharges

The device contains electronic components that are sensitive to electrostatic discharges. The components may be damaged if they are touched by an electrostatically charged person or object. In the worst case scenario, the components are instantly destroyed or go out of order as soon as they are activated.

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

4. GENERAL INFORMATION

4.1. Contact

To contact the manufacturer of the device use following address:

Bürkert SAS

Rue du Giessen

BP 21

F-67220 TRIEMBACH-AU-VAL

The addresses of our international sales offices are available on the internet at: country.burkert.com

4.2. Warranty conditions

The condition governing the legal warranty is the conforming use of the device in observance of the operating conditions specified in the Operating Instructions.

4.3. Information on the internet

You can find the Operating Instructions and technical data sheets for the type 8222 ELEMENT neutrino at: country.burkert.com

5. DESCRIPTION

5.1. Device variants

The device is available in following variants:

- device variant with a G 3/4" external-threaded conductivity sensor
- device variant with a G 1 1/2" union nut

Electrical connection is made over one of following means:

- a 5-pin M12 male connector
- a 5-pin terminal block over a cable gland.

The device comprises following elements:

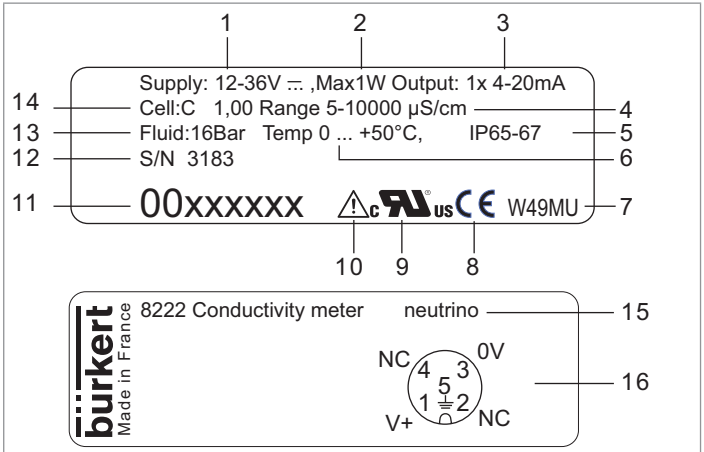
- A conductivity sensor with 2 electrodes that measures the liquid impedance in Ohm.
- A Pt1000 temperature probe which converts the temperature of the fluid into resistance (in Ω). The Pt1000 temperature probe is integrated in the conductivity sensor.
- An acquisition / conversion module of measured physical data. The module carries out following tasks:
  - acquisition of the impedance measured in Ohm
  - conversion of the measured impedance into conductivity units
  - acquisition of the resistance measured and conversion into temperature.

5.2. Conductivity sensor

The conductivity sensor is pined together with the electronic module and cannot be dismantled.

An alternating voltage is applied to the electrode terminals: the current measured is directly proportional to the conductivity of the liquid.

5.3. Type label



1.	Operating voltage
2.	Power consumption
3.	Output type
4.	Measuring range
5.	IP-Code
6.	Fluid temperature
7.	Manufacturing code
8.	Conformity marking
9.	Certification
10.	Warning: Before using the device, take into account the technical specifications described in these Operating Instructions
11.	Article number
12.	Serial number
13.	Nominal pressure of the fluid
14.	Constant of the measuring cell
15.	Type of the device and measured quantity
16.	Pin assignment of the electrical connection

Fig. 1: Type labels of the device (example)

6. TECHNICAL DATA

6.1. Conditions of use

Ambient temperature	–10...+60 °C
Air humidity	< 85%, without condensation
Operating condition	Continuous operation
Mobility of the device	Fixed device
Use	Indoor and outdoor. ▸ Protect the device against electromagnetic interference, ultraviolet rays and, when installed outdoors, the effects of the climatic conditions.
▪ IP-Code ▪ NEMA protection type *1) not evaluated by UL*	▪ IEC / EN 60529: IP67 [1] and IP65 [1] ▪ NEMA 250: 4X and 6P Mating connector must be wired and plugged, or cable gland must be wired and tightened. Cover of the connecting box must be fully tightened and locked
Degree of pollution	Degree 2 according to UL/EN 61010-1
Installation category	Category I according to UL/EN 61010-1
Maximum height above sea level	2000 m

6.2. Conformity to standards and directives

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

6.2.1. 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 size of the pipe, no unit)

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 bar
Fluid group 1, Article 4, Paragraph 1.c.ii	DN ≤ 25 or PSxDN ≤ 2000 bar
Fluid group 2, Article 4, Paragraph 1.c.ii	DN ≤ 200 or PS ≤ 10 bar or PSxDN ≤ 5000 bar

- Device used on a vessel (PS = maximum admissible pressure in bar; V = vessel volume in L)

Type of fluid	Conditions
Fluid group 1, Article 4, Paragraph 1.a.i	V >1 L and PSxV ≤ 25 bar.L OR PS ≤ 200 bar
Fluid group 2, Article 4, Paragraph 1.a.i	V >1 L and PSxV ≤ 50 bar.L OR PS ≤ 1000 bar
Fluid group 1, Article 4, Paragraph 1.a.ii	V >1 L and PSxV ≤ 200 bar.L OR PS ≤ 500 bar
Fluid group 2, Article 4, Paragraph 1.a.ii	PS >10 bar and PSxV ≤ 10000 bar.L OR PS ≤ 1000 bar

6.2.2. UL certification

Devices with variable key PU01 or PU02 are UL-certified devices and comply also with the following standards:

- UL 61010-1
- CAN/CSA-C22.2 n°61010-1

Identification on the device	Certification	Variable key
c UL us	UL-recognized	PU01

Identification on the device	Certification	Variable key
c UL us LISTED Measuring Equipment EXXXXXX	UL-listed	PU02

6.3. Materials

Table 1 : Materials without contact with the fluid, all device variants

Part	Material
Box / seals	stainless steel, PPS / EPDM
Cover / seal	PPS / EPDM
M12 male connector / Seal	PA66 / EPDM
Cable gland / Seal	PA66 / EPDM

Table 2 : Materials without contact with the fluid, device variant with a G 1 1/2" union nut

Part	Material
Union nut	▪ PVC ▪ PVDF on request

Table 3 : Materials in contact with the fluid, all device variants

Part	Material
Armature of the conductivity sensor	PVDF
Pt1000	stainless steel 1.4571 (316Ti)
Electrodes of the conductivity sensor C = 1	Graphite
Electrodes of the conductivity sensor C = 0.1 or C =0.01	Stainless steel 1.4571 (316Ti)

Table 4 : Materials in contact with the fluid, device variant with G 3/4" external-threaded conductivity sensor

Part	Material
Seal of the conductivity sensor	EPDM

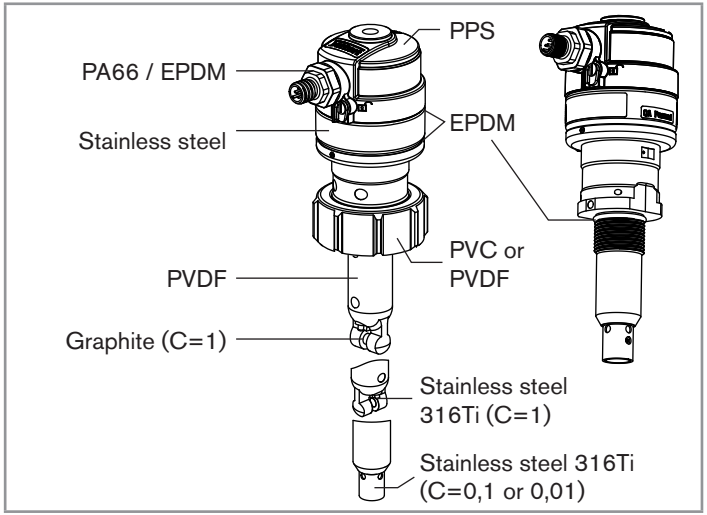


Fig. 2: Device materials

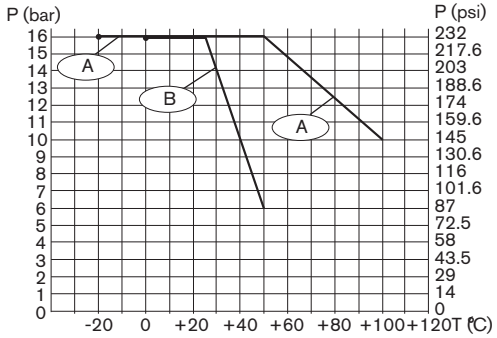
6.4. Dimensions

→ Refer to the data sheet of the device, available at: country.burkert.com

6.5. Fluid data

Process connection	
▪ Device variant with a G 3/4" external-threaded conductivity sensor	▪ Adapter with G 3/4" internal thread
▪ Device variant with a G 1 1/2" union nut	▪ Type S022 adapter or Type S022 fitting
Fluid pressure	
▪ Device variant with a G 3/4" external-threaded conductivity sensor *2) not evaluated by UL*	PN16 [2] The fluid pressure may be restricted by the fluid temperature and the material of the adapter used. Refer to Fig. 3 and Fig. 4.
▪ Device variant with a G 1 1/2" union nut *3) not evaluated by UL*	PN16 [3] The fluid pressure may be restricted by the fluid temperature, the material of the union nut and the material from which the Type S022 is made. Refer to Fig. 3, Fig. 5 and Fig. 6

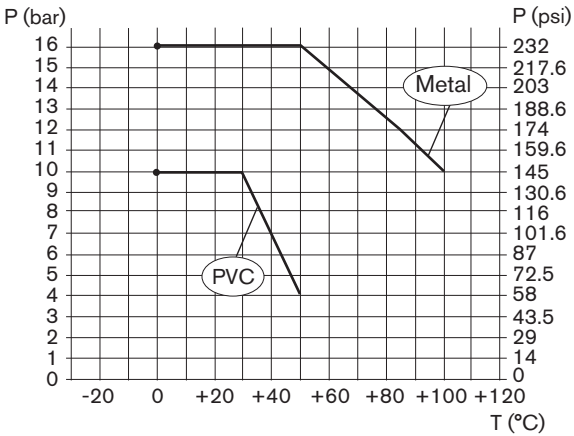
Fluid temperature	
▪ Device variant with a G 3/4" external-threaded conductivity sensor	The fluid temperature may be restricted by the fluid pressure and the material of the adapter used. Refer to Fig. 3 and Fig. 4.
▪ Device variant with a G 1 1/2" union nut	The fluid temperature may be restricted by the fluid pressure, the material of the union nut and the material of the Type S022 used. Refer to Fig. 3, Fig. 5 and Fig. 6
Conductivity measurement	
▪ Measurement range	▪ 0,05 µS/cm to 10 mS/cm
▪ Internal resolution	▪ 1 nS/cm
▪ Measuring error	▪ ±3 % of the measured value
Temperature probe	Pt1000 integrated in the conductivity sensor
Temperature measurement	
▪ Measurement range	▪ −40...+130 °C
▪ Accuracy	▪ ±1 °C
Temperature compensation	▪ Automatic (integrated Pt1000) according to the position of the selector on the electronic board (see chap. 9.3) ▪ Reference temperature = 25 °C



A: with a PVDF union nut or a G 3/4" external-threaded conductivity sensor;
B: with a PVC union nut

The measures have been made at an ambient temperature of 60 °C.

Fig. 3: Dependency between the fluid temperature and the fluid pressure, device variant with a PVC union nut, device variant with a PVDF union nut or device variant with a G 3/4" external-threaded conductivity sensor



The measurements have been made at an ambient temperature of 60 °C.

Fig. 4: Dependency between the fluid temperature and the fluid pressure, device variant with a G 3/4" external-threaded conductivity sensor and an adapter in PVC or metal

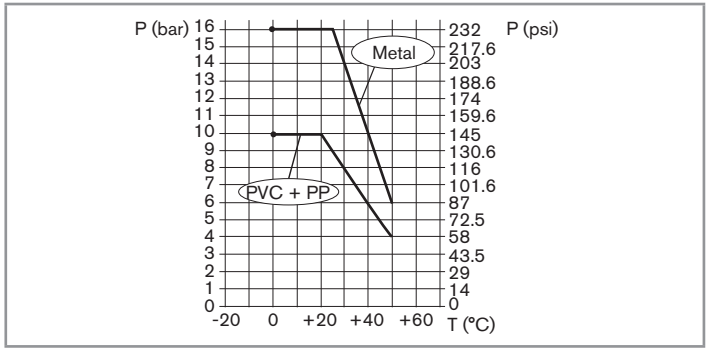


Fig. 5: Dependency between the fluid temperature and the fluid pressure, device variant with a PVC union nut, with Type S022 in metal, PVC or PP

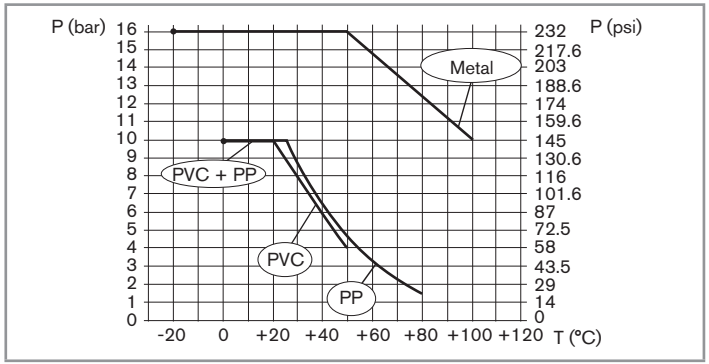


Fig. 6: Dependency between the fluid temperature and the fluid pressure, device variant with a PVDF union nut, with Type S029 in metal, PVC or PP

6.6. Electrical data

Operating voltage	▪ 12...36 V DC ▪ connection to main supply: permanent through external safety extra-low voltage (SELV) and through limited power source (LPS) ▪ filtered and regulated
Power consumption	≤ 25 mA (12...36 V DC)
Power source (not supplied)	▪ limited power source according to UL/EN 60950-1 standards ▪ or limited energy circuit according to UL/EN 61010-1, Paragraph 9.4
Protection against polarity reversal	yes
Protection against voltage spikes	yes
Current output	4...20 mA
▪ Accuracy	▪ ±1 % (0,16 mA)
▪ Response time (10 % - 90 %)	▪ 5 s
▪ Maximum loop impedance	▪ 1100 Ω at 36 V DC, 610 Ω at 24 V DC, 100 Ω at 12 V DC

6.7. Conductivity sensor

Conductivity sensor C=0,01 ▪ Measurement range ▪ Type of fluid	 ▪ 0,05...20 µS/cm ▪ ultra-pure water, pure water
Conductivity sensor C=0,1 ▪ Measurement range ▪ Type of fluid	 ▪ 0,5...200 µS/cm ▪ for example: pure water, industrial wastewater
Conductivity sensor C=1 ▪ Measurement range ▪ Type of fluid	 ▪ 0,005...10 mS/cm ▪ for example: industrial wastewater, wastewater

7. ASSEMBLY

7.1. Safety instructions

DANGER

Risk of injury due to electrical voltage.

- ▸ If the device is installed either in a wet environment or outdoors, all the electrical voltages must be of max. 35 V DC.
- ▸ Before carrying out work on the system or the device, disconnect the electrical power for all the conductors and isolate it.
- ▸ All equipment connected to the device must be double insulated with respect to the mains according to the standard UL/EN 61010-1.
- ▸ Observe all applicable accident protection and safety regulations for electrical equipment.

WARNING

Risk of injury due to nonconforming assembly.

- ▸ The device must only be assembled by qualified and skilled staff with the appropriate tools.

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

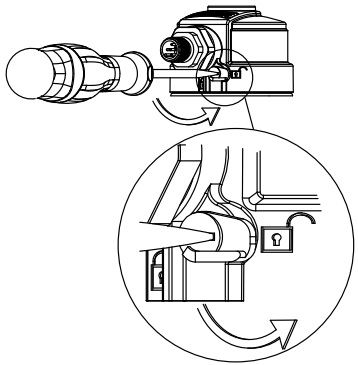
- ▸ Avoid unintentional activation of the installation.
- ▸ Guarantee a set or controlled restarting of the process subsequent to any intervention on the device.

7.2. Unscrew the cover on the connection box

NOTICE

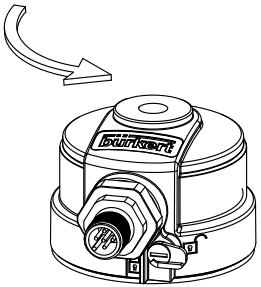
The tightness of the device is not guaranteed when the cover is removed.

- Take all the precautions to prevent the projection of liquid inside the housing.



The connection box is fitted with a locking system.

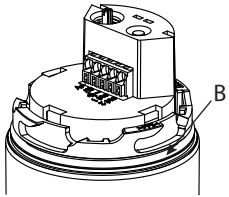
→ Using a screwdriver with a suitable head, turn the latch to the unlock position to unlock the connection box.



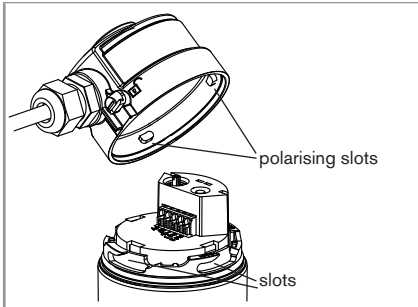
→ Unscrew the cover on the connection box by hand.

Fig. 7: Unscrewing the cover on the connection box

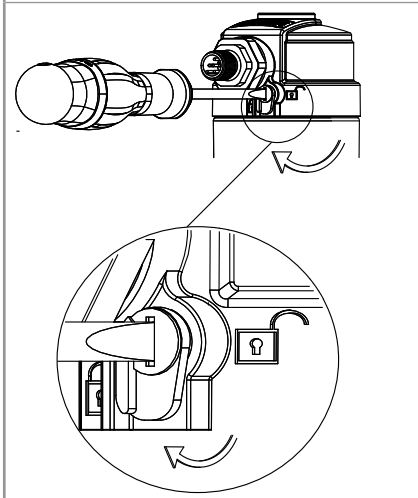
7.3. Fit the cover to the connection box



→ Check that seal "B" on the cover is in good condition. Replace it if necessary (see chap. 11 and chap. 10.3).



→ Position the polarising slots on the cover in the axis of the slots on the box: 3 positions are possible.



→ Tighten the cover on the connection box.

→ Using a screwdriver with a suitable head, turn the latch to the lock position to lock the cover.

Fig. 8: Fitting the cover on the connection box

8. INSTALLATION AND WIRING

8.1. Safety instructions

DANGER

Risk of injury due to pressure in the installation.

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

Risk of injury due to electrical voltage.

- If the device is installed either in a wet environment or outdoors, all the electrical voltages must be of max. 35 V DC.
- Before carrying out work on the system or the device, disconnect the electrical power for all the conductors and isolate it.
- All equipment connected to the device must be double insulated with respect to the mains according to the standard UL/EN 61010-1.
- Observe all applicable accident protection and safety regulations for electrical equipment.

Risk of injury due to the nature of the fluid.

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

Risk of injury due to the high temperature of the fluid.

- Use safety gloves to handle the device.

WARNING

Risk of injury due to nonconforming installation.

- The electrical and the fluid installation can only be carried out by qualified and skilled staff with the appropriate tools.
- Install appropriate safety devices (correctly rated fuse and/or circuit-breaker).
- Respect the assembly instructions for the fitting used or the adapter used.

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

- Avoid unintentional activation of the installation.
- Guarantee a set or controlled restarting of the process subsequent to any intervention on the device.

WARNING

Risk of injury if the dependency between the fluid pressure and the fluid temperature is not respected.

- Take into account the dependency between the fluid pressure and the fluid temperature for the device variant. Refer to chpt. 6.5.
- Observe the dependency between the fluid temperature and the fluid pressure for the fitting used or the adapter used. Refer to the related Operating Instructions.

8.2. Install onto the pipe

If the conductivity is measured in liquids containing solids that may leave deposits in the bottom of the pipe, use installation position 1 (see Fig. 9)

- The device variant with a G 1 1/2" union nut can be installed on a pipe by means of a Type S022 adapter or fitting.
- The device variant with a G 3/4" external-threaded conductivity sensor can be installed on a pipe or a tank wall by means of an internal threaded adapter.

8.2.1. Device variant with a G 1 1/2" union nut

→ Choose an appropriate position in the pipe to install the fitting. In Fig. 9, prefer mounting position “1” to install a device with conductivity sensor C=0,1 or C=0,01.

→ Install the adapter or the fitting on the pipe according to the Operating Instructions of the adapter or fitting used.

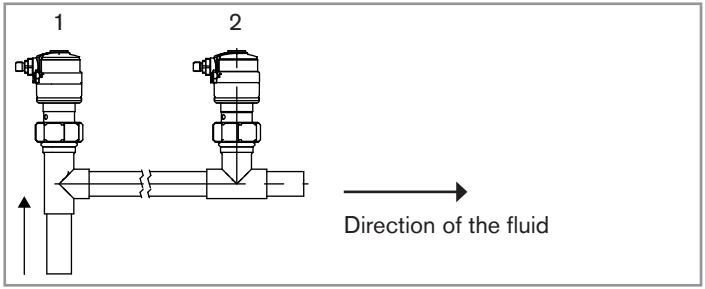
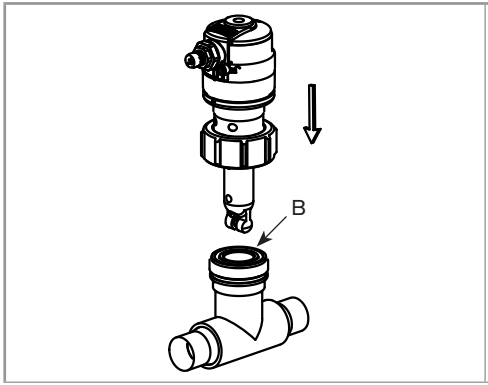


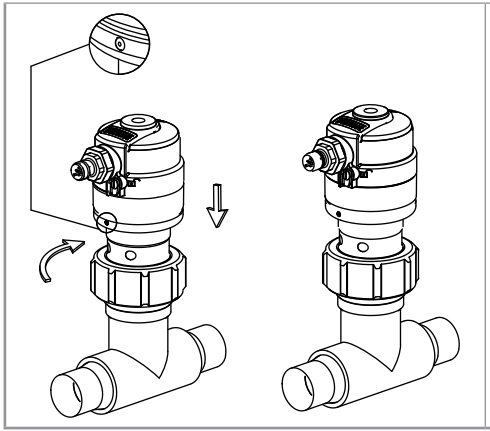
Fig. 9: Mounting positions of the fitting/device unit in the pipe

→ Install the device on the fitting (see Fig. 10).



→ Check that seal B is on the fitting and that it is not damaged. Replace the seal if necessary.

→ Carefully insert the device into the fitting.



→ Position the device in such a way that the markings (see zoom) located on either side of the electronics box are parallel to the pipe.

→ Tighten by hand the union nut G 1 1/2" on the fitting.

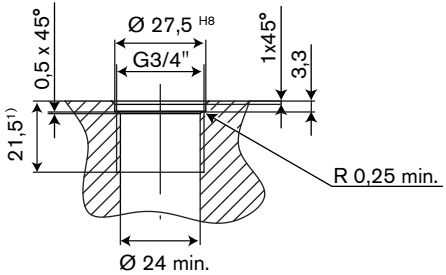
Fig. 10: Installation of the device into a fitting

8.2.2. Device variant with a G 3/4" external-threaded conductivity sensor

→ Check that the seal is on the external-threaded conductivity sensor.

→ Check the condition of the seal and replace it if necessary (see chap. 10.4)

→ Install the device on the pipe or the tank wall by means of an adapter that respects the threading jig from Fig. 11



[1)] minimal internal thread depth

Fig. 11: Threading jig for the adapter [mm]

→ Install the device into the adapter.

→ Position the device in such a way that the markings (see zoom in Fig. 10) located on either side of the electronics box are parallel to the pipe.

8.3. Electrical wiring

DANGER

Risk of injury due to electrical voltage.

- If the device is installed either in a wet environment or outdoors, all the electrical voltages must be of max. 35 V DC.
- Before carrying out work on the system or the device, disconnect the electrical power for all the conductors and isolate it.
- All equipment connected to the device must be double insulated with respect to the mains according to the standard UL/EN 61010-1.
- Observe all applicable accident protection and safety regulations for electrical equipment.

- Use a high-quality electrical power supply. The power supply must be filtered and regulated.
- Make sure the installation is equipotential.

8.3.1. Electrical connections

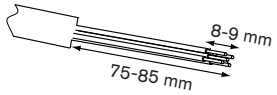
Device variant	Connection type
M12 male connector	5-pin M12 female connector (not provided) For the M12 female connector with article number 917116, use a shielded cable: ▪ diameter: 3...6.5 mm ▪ wire cross section: max. 0.75 mm²
5-pin terminal strip and cable gland	Shielded cable (not provided): ▪ diameter: 4...8 mm ▪ Wires in compliance with the specifications in Table 1

Table 5 : Specifications of the wires for a device variant with cable gland

Wire specifications	Dimensions
▪ Clamping area	0.14...1.5 mm²
▪ Single core H05(07) V-U	0.25...1.5 mm²
▪ Flexible wire H05(07) V-K	0.25...1.5 mm²
▪ With non-insulated end connection	0.25...1.5 mm²
▪ With insulated end connection	0.25...0.75 mm²

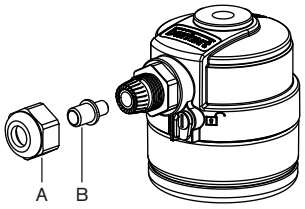
8.3.2. Device variant with cable gland

→ Select a cable that meets the specifications detailed in chap. "8.3.1. Electrical connections".

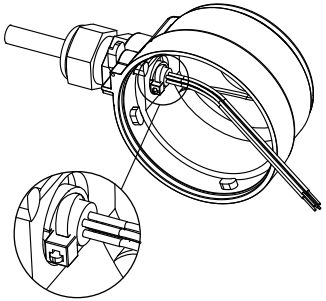


→ Strip 75 to 85 mm of the cable.
→ Expose 8 to 9 mm of the wires on the stripped cable.

Fig. 12: Stripping the cable and exposing the wires



→ Unscrew and remove the cable gland union nut [A].
→ Remove the stopper [B] from the cable gland.
→ Unscrew the cover on the connection box (see chap. 7.2)



→ Thread the cable through the cable gland union nut and the cable gland.

→ Pull the cable inside the box until the end of the stripped part of the cable sticks out of the cable gland by 5 to 6 mm.

→ Roll a cable clamp around the cable jacket (twice).

→ Tighten the cable clamp.

→ Pull the cable from the outside of the box to check that it is secure.

Fig. 13: Threading the cable into the cable gland

→ Tighten the cable gland.

→ Connect the 4...20 mA output (see Fig. 14).

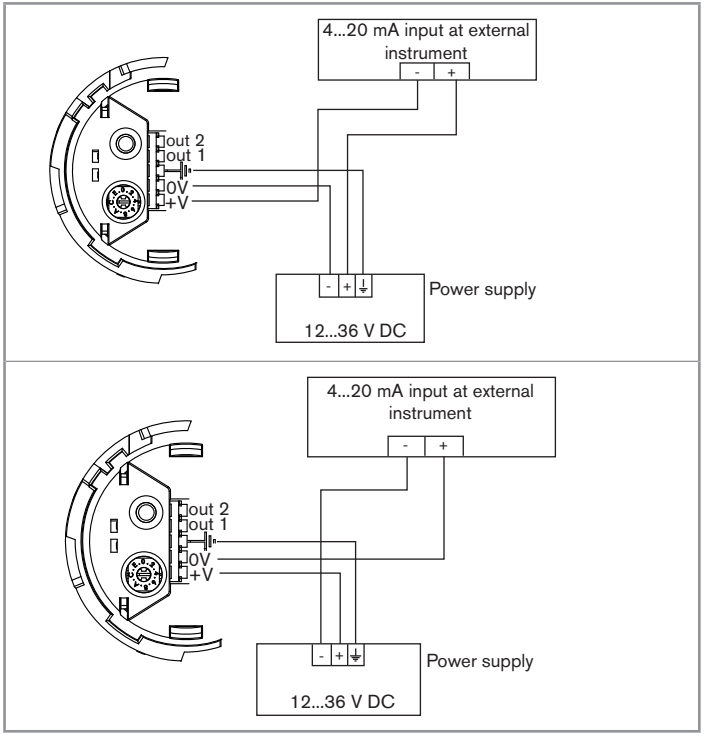
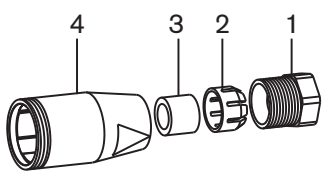


Fig. 14: Possible connections of the 4...20 mA current output on a device variant with cable gland

→ Fit the cover to the connection box (see chap. 7.3).

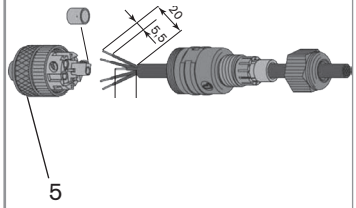
8.3.3. Assemble and wire the female connector, article number 917116

See chap. "11. Spare parts and accessories"



→ Unscrew the union nut [1] from the body [4].

→ Insert the cable into the union nut [1], the cable clamp [2] and the seal [3], and then into the body [4].



→ Strip 20 mm of the cable.

→ Cut the central wire (earth) so that its length is equal to 11.5 mm.

→ Expose 5.5 mm of the wires on the stripped cable.

→ Insert each wire into the appropriate pin. Refer to chpt. 8.3.4.

→ Screw the wired terminal block [5] to the body [4].

→ Tighten the connector union nut [1].

Fig. 15: M12 multi-pin connector (not provided)

8.3.4. Device variant with M12 male connector

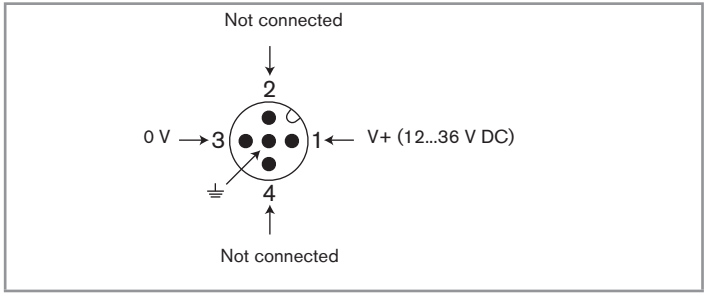


Fig. 16: Pin assignment of the M12 male connector

Pin of the M12 female connector available as an accessory (article number 438680)	Signal	Colour of the conductor
1	V+	brown
2	NC	white
3	0 V	blue
4	NC	black
5	⏚	green/yellow or grey

The M12 male connector is adjustable:

→ Unscrew the locknut.

→ Turn the male connector to the desired position, by 360° max. so as not to twist the cables inside the casing.

→ Tighten the locknut using a spanner, while keeping the male connector in the desired position.

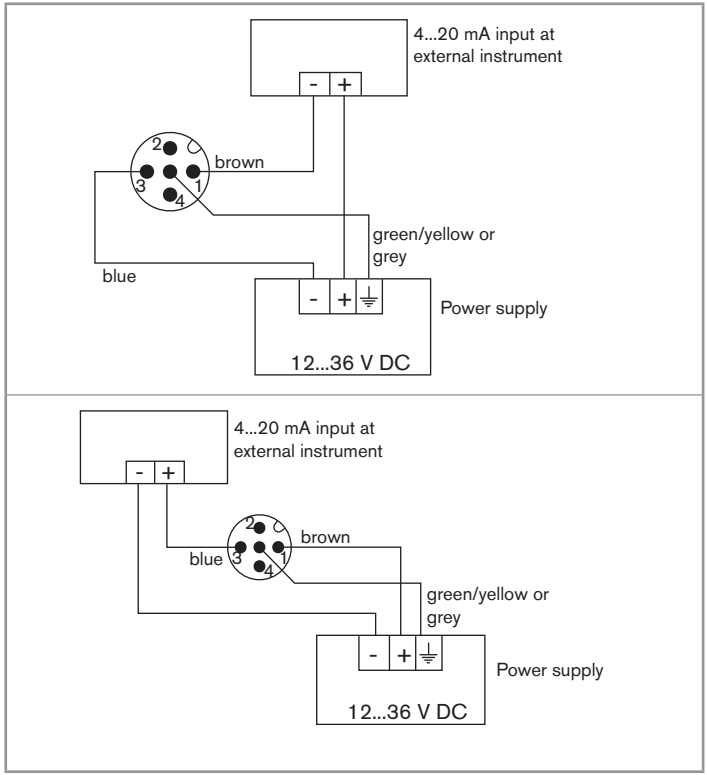


Fig. 17: Possible connections of the 4...20 mA current output on a device variant with M12 male connector

Internal wiring of the M12 male connector to the terminal strip

Terminal strip pins	Colour of the wire connecting the male connector to the terminal strip
V+	red
0 V	black
⏚	green
OUT1	grey
OUT2	orange

9. ADJUSTMENT AND START-UP

9.1. Safety instructions

DANGER

Risk of injury due to electrical voltage.

- If the device is installed either in a wet environment or outdoors, all the electrical voltages must be of max. 35 V DC.
- All equipment connected to the device must be double insulated with respect to the mains according to the standard UL/EN 61010-1.
- Observe all applicable accident protection and safety regulations for electrical equipment.

Risk of injury due to the nature of the fluid.

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

WARNING

Risk of injury due to nonconforming adjustment.

Nonconforming adjustment could lead to injuries and damage the device and its surroundings.

- The operators in charge of adjustment must have read and understood the contents of these Operating Instructions.
- In particular, observe the safety recommendations and intended use.
- The device/installation must only be adjusted by suitably trained staff.

WARNING

Danger due to nonconforming start-up.

Nonconforming start-up could lead to injuries and damage the device and its surroundings.

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

9.2. Elements used for adjustment

The connection box contains the following elements that are used for adjustment of the device:

- a selector of the conductivity range or temperature range associated with the 4...20 mA output
- a green LED to indicate that the device is energized
- a red LED to:
  - indicate the type of conductivity sensor that is fitted on the device (see chap. 9.3)
  - indicate a problem (see chap. 10.5)
- a push-button (not used).

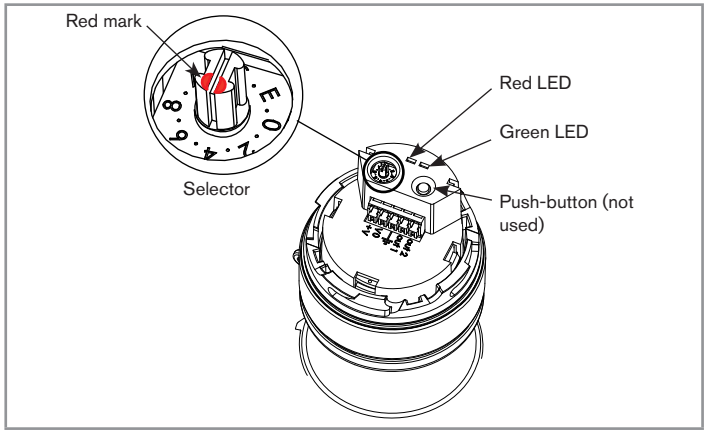


Fig. 18: Elements used for adjustment of the device

9.3. Choose the conductivity range or temperature range associated with the 4...20 mA output

The following procedure is valid for the devices with a series number equal or higher than 3000. See the name plate of the device.

Upon power-up and every ten seconds afterwards, the red LED flashes:

- once if the device is equipped with a conductivity sensor C=1
- twice if the device is equipped with a conductivity sensor C=0,1
- three times if the device is equipped with a conductivity sensor C=0,01

The selector (see Fig. 18) allows for choosing the conductivity range or temperature range associated with the 4...20 mA output . The following tables give, depending on the cell constant and on the position of the selector (from 0 to 9 and A to F, the uneven positions being marked by a full stop), the conductivity range or temperature range associated to the 4...20 mA output, the applied temperature compensation and the measuring range of the recommended conductivity.

The compensation graph “NaCl” is valid for the 10 to 90 °C temperature range and a concentration of 0,2 %.

Table 6 : Conductivity sensor C=0,01

Selector position	4...20 mA output range	Temperature compensation acc. to	Recommended conductivity measurement range
0 (default position)	0...20 µS/cm	NaCl	2...20 µS/cm
1	0...20 µS/cm	none	2...20 µS/cm
2	0...10 µS/cm	NaCl	1...10 µS/cm
3	0...10 µS/cm	none	1...10 µS/cm
4	0...5 µS/cm	NaCl	0,5...5 µS/cm
5	0...5 µS/cm	none	0,5...5 µS/cm
6	0...2 µS/cm	NaCl	0,2...2 µS/cm
7	0...2 µS/cm	none	0,2...2 µS/cm
8	0...1 µS/cm	ultra pure water	0,05...1 µS/cm
9	0...1 µS/cm	none	0,05...1 µS/cm
A	0...0,5 µS/cm	ultra pure water	0,05...0,5 µS/cm
B	0...0,5 µS/cm	none	0,05...0,5 µS/cm
C, D, E	0...0 µS/cm [4)]	-	-
F	–40...+130 °C	-	-

4) When these positions are selected, the 4...20 mA current output is not used. The value of the current output is always 4 mA.

Table 7 : Conductivity sensor C=0,1

Selector position	4...20 mA output range	Temperature compensation acc. to	Recommended conductivity measurement range
0 (default position)	0...200 µS/cm	NaCl	20...200 µS/cm
1	0...200 µS/cm	none	20...200 µS/cm
2	0...100 µS/cm	NaCl	10...100 µS/cm
3	0...100 µS/cm	none	10...100 µS/cm
4	0...50 µS/cm	NaCl	5...50 µS/cm
5	0...50 µS/cm	none	5...50 µS/cm
6	0...20 µS/cm	NaCl	2...20 µS/cm
7	0...20 µS/cm	none	2...20 µS/cm
8	0...10 µS/cm	NaCl	1...10 µS/cm
9	0...10 µS/cm	none	1...10 µS/cm
A	0...5 µS/cm	NaCl	0,5...5 µS/cm
B	0...5 µS/cm	none	0,5...5 µS/cm
C	0...2 µS/cm	NaCl	0,5...2 µS/cm
D	0...2 µS/cm	none	0,5...2 µS/cm
E	0...0 µS/cm [5)]	-	-
F	–40...+130 °C	-	-

5) When these positions are selected, the 4...20 mA current output is not used. The value of the current output is always 4 mA.

Table 8 : Conductivity sensor C=1

Selector position	4...20 mA output range	Temperature compensation acc. to	Recommended conductivity measurement range
0 (default position)	0...10 mS/cm	NaCl	1...10 mS/cm
1	0...10 mS/cm	none	1...10 mS/cm
2	0...5 mS/cm	NaCl	0,5...5 mS/cm
3	0...5 mS/cm	none	0,5...5 mS/cm
4	0...2 mS/cm	NaCl	0,2...2 mS/cm
5	0...2 mS/cm	none	0,2...2 mS/cm
6	0...1 mS/cm	NaCl	0,1...1 mS/cm
7	0...1 mS/cm	none	0,1...1 mS/cm
8	0...500 µS/cm	NaCl	50...500 µS/cm
9	0...500 µS/cm	none	50...500 µS/cm
A	0...200 µS/cm	NaCl	20...200 µS/cm
B	0...200 µS/cm	none	20...200 µS/cm
C	0...100 µS/cm	NaCl	10...100 µS/cm
D	0...100 µS/cm	none	10...100 µS/cm
E	0...50 µS/cm	NaCl	5...50 µS/cm
F	–40...+130 °C	-	-

→ Position the red mark of the selector on the desired range (see Fig. 18). In the example in Fig. 18, the selector is placed on position 5.

9.4. Check the cell constant of the conductivity sensor

Each conductivity sensor is delivered calibrated.

Take the temperature compensation into account.

The following procedure makes it possible to check the exactness of the device:

→ Prepare a calibration solution adapted to your process or the conductivity sensor (see chap. "11. Spare parts and accessories").

→ Place the conductivity sensor into the calibration solution.

→ Wait for the temperature to stabilise.

→ Check the exactness of the measured value transmitted by the transmitter to the acquisition system (PLC,...).

→ If necessary, correct the measure on the acquisition system (PLC, ...).

10. MAINTENANCE AND TROUBLESHOOTING

10.1. Safety instructions

DANGER

Risk of injury due to pressure in the installation.

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

Risk of injury due to electrical voltage.

- If the device is installed either in a wet environment or outdoors, all the electrical voltages must be of max. 35 V DC.
- Before carrying out work on the system, disconnect the electrical power for all the conductors and isolate it.
- All equipment connected to the device must be double insulated with respect to the mains according to the standard UL/EN 61010-1.
- Observe all applicable accident protection and safety regulations for electrical equipment.

Risk of injury due to the nature of the fluid.

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

Risk of injury due to the high temperature of the fluid.

- Use safety gloves to handle the device.

WARNING

Risk of injury due to nonconforming maintenance.

- Maintenance must only be carried out by qualified and skilled staff with the appropriate tools.
- Ensure that the restart of the installation is controlled after any interventions.

10.2. Clean the device

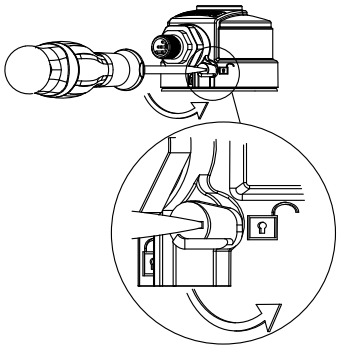
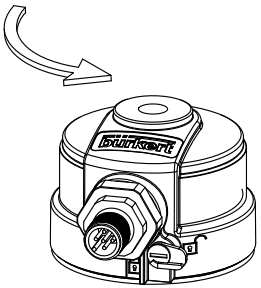
- During cleaning of the conductivity sensor, take care not to scratch its surface.
- Store the conductivity sensor dry.

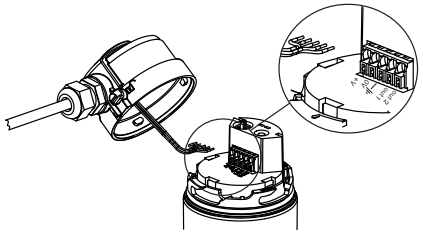
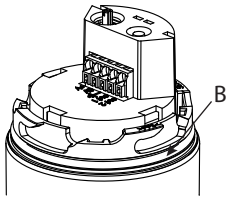
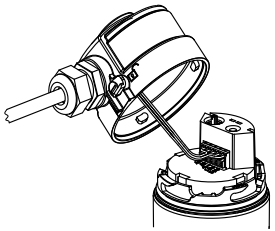
The device can be cleaned with a cloth dampened with water or a detergent compatible with the materials the device is made of.

→ Regularly check if the conductivity sensor is dirty; clean it if necessary using a compatible product.

Please feel free to contact your Bürkert supplier for any additional information.

10.3. Replace the cover seal on the connection box

	→ Using a screwdriver with a suitable head, turn the latch to the unlock position to unlock the connection box.
	→ Unscrew the cover by hand.

	→ On a device variant with cable gland, locate the colours of the wires connected to the terminal block. → Disconnect the wires from the terminal block by pressing the plugs on the terminal block with a screwdriver.
	→ Remove the worn seal "B" from the cover. → Put the new seal "B" in place in the cover.
	→ Reconnect the wires to the terminal block (for a device variant with M12 fixed connector, see table, chap. 8.3.4 for the references).

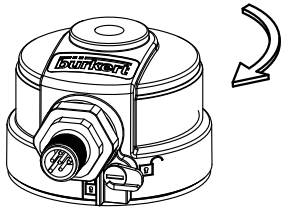
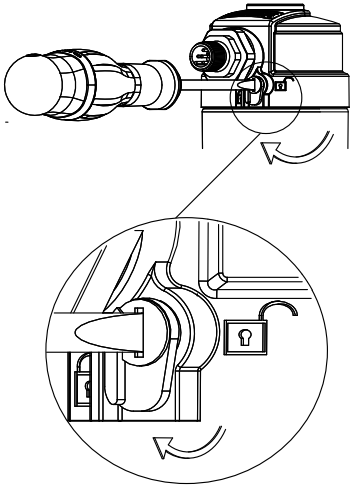
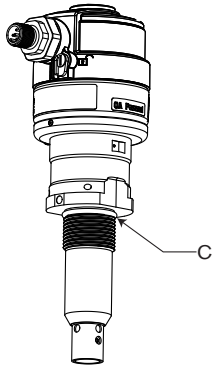
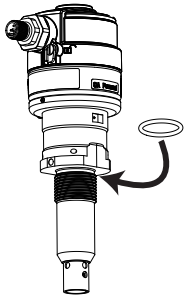
	→ Put the cover in place. → Fully tighten the cover by hand to guarantee tightness.
	→ Using a screwdriver with a suitable head, turn the latch to the lock position to lock the cover.

Fig. 19: Replacing the cover seal on the connection box

10.4. Replace the seal of the G 3/4" external-threaded conductivity sensor

	→ Remove the worn seal "C" without damaging the groove nor the threads.
	→ Put the new seal "C" in place in the groove.

10.5. If you encounter problems

Red LED status	4...20 mA output value	Possible cause	Recommended action
flashes (once per second)	4...20 mA	Fluid temperature outside the operating range (–20...+100 °C).	→ Check the fluid temperature. → Put the fluid temperature back to within the operating range (–20...+100 °C).
ON	22 mA	▪ Connection with temperature probe interrupted. ▪ Parameters of the device cannot be read.	→ Power off the device. → Power on the device. → If the fault persists, contact your Bürkert retailer.
flashes (once to three times every 10 s)	4 mA, whatever the measured conductivity value or temperature value.	The position of the selector of the electronic board may be incorrectly set.	→ Adjust the position of the selector depending on the fluid conductivity range or the fluid temperature range. Refer to chap. 9.3.
flashes (once to three times every 10 s)	20 mA, whatever the measured conductivity value or temperature value.	The position of the selector of the electronic board may be incorrectly set.	→ Adjust the position of the selector depending on the fluid conductivity range or the fluid temperature range. Refer to chap. 9.3.

11. SPARE PARTS AND ACCESSORIES

CAUTION

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

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

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

Spare part	Article number
EPDM seal for the G 3/4" external-threaded conductivity sensor	561955
EPDM seal for the tightness between the cover and the housing	561752

Accessories	Article number
5-pin female M12 connector, to be wired	917116
5-pin female M12 female connector, moulded on shielded cable (2 m)	438680
Calibration solution, 300 ml, 5 µS	440015
Calibration solution, 300 ml, 15 µS	440016
Calibration solution, 300 ml, 100 µS	440017
Calibration solution, 300 ml, 706 µS	440018
Calibration solution, 300 ml, 1413 µS	440019

12. PACKAGING, TRANSPORT

NOTICE

Damage due to transport

Transport may damage an insufficiently protected device.

- Transport the device in shock-resistant packaging and away from humidity and dirt.
- Do not expose the device to temperatures that may exceed the admissible storage temperature range.
- Protect the electrical interfaces using protective plugs.

13. STORAGE

NOTICE

Poor storage can damage the device.

- Store the device in a dry place away from dust.
- Storage temperature: –10...+60 °C.

14. DISPOSAL

→ Dispose of the device and its packaging in an environmentally-friendly way.

NOTICE

Damage to the environment caused by products contaminated by fluids.

- Keep to the existing provisions on the subject of waste disposal and environmental protection.

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