bürkert
FLUID CONTROL SYSTEMS

Type 8202
ELEMENT

pH- or redox-meter
pH- oder Redox-Messgerät
pH- ou redox-mètre

Operating Instructions
Bedienungsanleitung
Manuel d'utilisation

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1 ABOUT THE OPERATING INSTRUCTIONS

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

The Operating Instructions contains important safety information.

Failure to comply with these instructions can lead to hazardous situations. Pay attention in particular to the chapters "Basic safety information" and "Intended use".

▸ Irrespective of the device variant, the Operating Instructions must be read and understood.

1.1 Definition of the word "device"

The word "device" used within these Operating Instructions refers to the Type 8202 ELEMENT pH-meter and redox-meter.

1.2 Validity of the Operating Instructions

The Operating Instructions are valid for the Type 8202 ELEMENT pH-meter and redox-meter, version V2, .

Mention V2 is given on the device Type-label. Refer to chpt. 5.4.

1.3 Symbols used

DANGER

Warns against an imminent danger.

▸ Failure to observe this warning can result 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.

Advice or important recommendations.

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

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▸ Indicates an instruction for risk prevention.

→ Indicates a work step that you must carry out.

✔ Indicates a result.

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 Type 8202 ELEMENT pH-meter and redox-meter is intended for the measurement of one of the following physical quantities:

- the pH in clean liquids or liquids containing solids, sulphides or proteins.
- the oxidation reduction potential in clean liquids or liquids containing solids, sulphides or proteins which may present low conductivity.

▸ 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.

▸ Only operate a device in perfect working order.

▸ Store, transport, install and operate the device properly.

▸ 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 device.

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

⚠

Risk of injury due to electrical voltage.

▸ Before carrying out work on the system or the device, disconnect the electrical power for all the conductors and isolate it.

▸ 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 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.

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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
- Only qualified and skilled staff may carry out the installation and maintenance work.
- Ensure a defined or controlled restart 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 disabled as soon as they are activated.
- To minimise or even avoid any damage caused by 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.

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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 Type 8202 at: country.burkert.com

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5 DESCRIPTION

5.1 Area of application

The device is intended solely for the measurement of:

- the pH in clean liquids or liquids containing solids, sulphides or proteins.
- or the oxidation reduction potential ("ORP") in clean liquids or liquids containing solids, sulphides or proteins which may present low conductivity.

Thanks to two fully adjustable transistor outputs, the device can be used to switch a solenoid valve, activate an alarm and, thanks to one or two 4...20 mA current outputs, establish one or two control loops.

5.2 Construction of the 8202

The device comprises:

- a module for measuring process values, comprising:
  - a pH or Redox ("ORP") sensor measuring a potential difference (PD) in mV
  - a Pt1000 temperature sensor built in the holder of the pH or Redox ("ORP") sensor, measuring a resistance.
- an acquisition / conversion module for the process values measured:
  - measured PD acquisition in mV
  - conversion of the measured PD into pH units (for a device with pH sensor only)
  - acquisition of the resistance measured and conversion into temperature
- an electrical housing which can include a display module. The display module has a navigation button used to read and/or configure the parameters of the device. The display module is available as an accessory (see chpt. 11).

One device variant with two transistor outputs and a 4...20 mA output operates on a 2-wire system and requires a power supply of 14...36 V DC. For such a device variant, electrical connection is done via an M12, 5-point, male fixed connector.

One device variant with two transistor outputs and two 4...20 mA outputs operates on a 3-wire system and requires a power supply of 12...36 V DC. For such a device variant, electrical connection is done via an M12, 5-point, male fixed connector and an M12, 5-point, female fixed connector.

5.3 pH or Redox ("ORP") probe

The device can be fitted with a standard probe 120 mm long, measuring the pH or the oxidation reduction potential ("ORP").

It is screwed into a holder with the built-in Pt1000 temperature probe.

- The pH probe is a glass membrane with variable sensitivity according to the pH. When the pH probe is immersed in a solution, a difference in potential is formed, due to the hydrogen ions (H+), between the glass membrane and the solution. This difference in potential, measured in relation to a reference electrode, is directly proportional to the pH value (59.16 mV per pH unit at 25 °C).
- When a Redox ("ORP") probe is immersed in a solution, an exchange of electrons occurs based on the oxidizing and reducing effects of an electrolyte. The resulting voltage is the oxidation reduction potential ("ORP").

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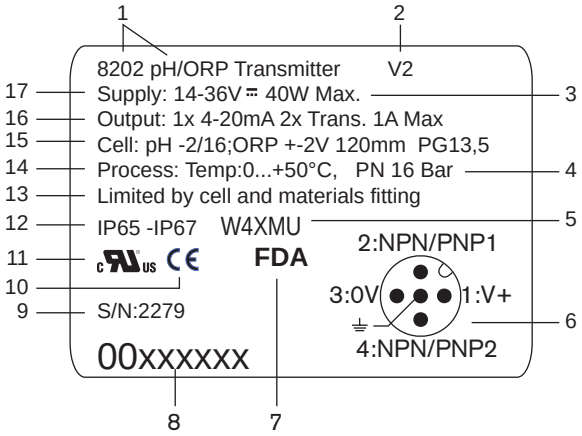
5.4 Type label



1. Type of the device, measured quantity
2. Device version
3. Maximum power consumption
4. Nominal pressure of the fluid. The nominal pressure that is given on the Type label of a Type 8202 ELEMENT device is valid for a device without probe.
5. Manufacturing code
6. Pin assignment of the electrical connection
7. Certification
8. Article number
9. Serial number
10. Conformity marking
11. Certification
12. IP-Code
13. The fluid temperature and the fluid pressure are limited by the probe used and by the materials of the fitting used
14. Temperature range of the fluid. The temperature range that is given on the Type label of a Type 8202 ELEMENT is valid for a device without probe.
15. Specifications of the probe
16. Specifications of the outputs
17. Operating voltage

Fig. 1: Type label of the device Type 8202 ELEMENT (example)

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6 TECHNICAL DATA

6.1 Conditions of use

Ambient temperature	–10...+60 °C, without pH probe or redox probe
Air humidity	< 85%, without condensation
Use	Indoor and outdoor ▸ Protect the device against electromagnetic interference, ultraviolet rays and, when installed outdoors, the effects of the climatic conditions.
IP-Code *1) not evaluated by UL*	IP67 [1)] and IP65 [1)] according to IEC / EN 60529 Mating connectors must be wired, plugged, and tightened. Housing lid must be fully tightened and locked
Operating condition	Continuous operation
Equipment mobility	Fixed device
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 and/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 piping (PS = maximum admissible pressure; DN = nominal diameter of the pipe)

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

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- Device used on a vessel (PS = maximum admissible pressure)

Type of fluid	Conditions
Fluid group 1, Article 4, Paragraph 1.a.i	PS ≤ 200 bar
Fluid group 2, Article 4, Paragraph 1.a.i	PS ≤ 1000 bar
Fluid group 1, Article 4, Paragraph 1.a.ii	PS ≤ 500 bar
Fluid group 2, Article 4, Paragraph 1.a.ii	PS ≤ 1000 bar

6.2.2 UL certification

The 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 US	UL recognized	PU01
c UL us LISTED Measuring Equipment EXXXXXX	UL listed	PU02

6.3 Dimensions of the device

→ Please refer to the technical data sheets regarding the device, available at: country.burkert.com

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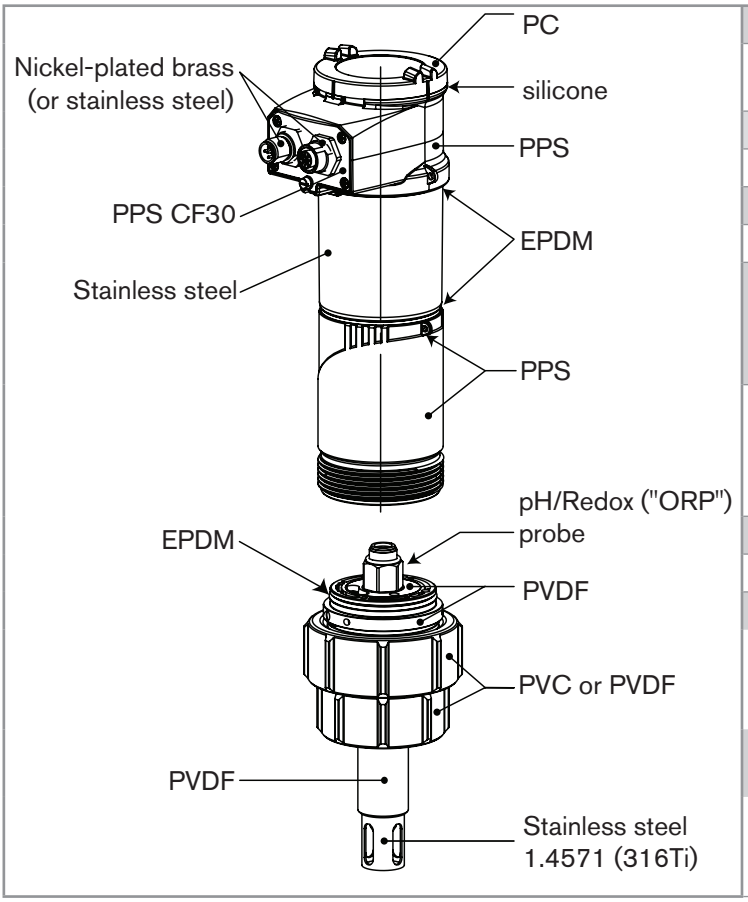
6.4 Mechanical data



Part	Material
Housing	stainless steel 316L 1.4404, PPS
Housing seals	EPDM
Housing lid	PC
Housing-lid seal	silicone
Display module	PC, PBT
M12 male connector, M12 female connector	▪ nickel-plated brass ▪ stainless steel, on request
Support plate of the M12 male connector or M12 female connector	PPS CF30
Screws	stainless steel
Nut	PVC or PVDF
Parts in contact with the fluid	
▪ Sensor holder	▪ PVDF, stainless steel 1.4571 (316Ti)
▪ Seal of the sensor holder	▪ EPDM
▪ pH probe or Redox probe	▪ refer to the Operating Instructions of the probe

Fig. 2: Materials used in the Type 8202 ELEMENT pH and redox-meter (without the probe)

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6.5 Fluid data

Pipe diameter	DN25 to DN110 (DN15 to DN20 under specific conditions)
Type of fitting	Type S022
Nut between the 8202 and the fitting	G 1 1/2" internal thread
Fluid temperature	The fluid temperature may be restricted by the probe used. Refer to the related Operating Instructions. The fluid temperature may be restricted by the fluid pressure, the material of the nut and the material of the fitting used.
▪ with a PVDF nut (see also Fig. 3 and Fig. 5)	▪ −20...+130 °C
▪ with a PVC nut (see also Fig. 3 and Fig. 4)	▪ 0...+50 °C
Fluid pressure *2) not evaluated by UL*	PN16 [2)] The fluid pressure may be restricted by the fluid temperature, the material of the nut and the material of the fitting used. Refer to Fig. 3, Fig. 4 and Fig. 5. The fluid pressure may also be restricted by the probe used. Refer to the related Operating Instructions.
pH measurement	
▪ Measurement range	▪ −2...16 pH or −580....+580 mV
▪ Resolution	▪ 0.001 pH or 0.1 mV
▪ Measurement deviation	▪ ±0.02 pH or 0.5 mV
▪ Recommended min. divergence of the pH range associated to the 4...20 mA signal	▪ 0.5 pH unit or 30 mV (eg: range 6,7...7,2 pH or −20...+10 mV associated to the 4...20 mA output current)
Redox potential measurement	
▪ Measurement range	▪ −2000...+2000 mV
▪ Resolution	▪ 1 mV
▪ Measurement deviation	▪ ±3 mV
▪ Recommended min. divergence of the redox potential range associated to the 4...20 mA signal	▪ 50 mV (eg: range 1550...1600 mV associated to the 4...20 mA output current)
Temperature measurement	
▪ Measurement range	▪ −40...+130 °C
▪ Resolution	▪ 0.1 °C
▪ Measurement deviation	▪ ±1 °C
▪ Recommended min. divergence of the temperature range associated to the 4...20 mA signal	▪ 10 °C (eg: range +10...+20 °C associated to the 4...20 mA output current)
Temperature probe	Pt1000 integrated in the sensor holder
Temperature compensation	Automatic (integrated Pt1000), Reference temperature = +25 °C

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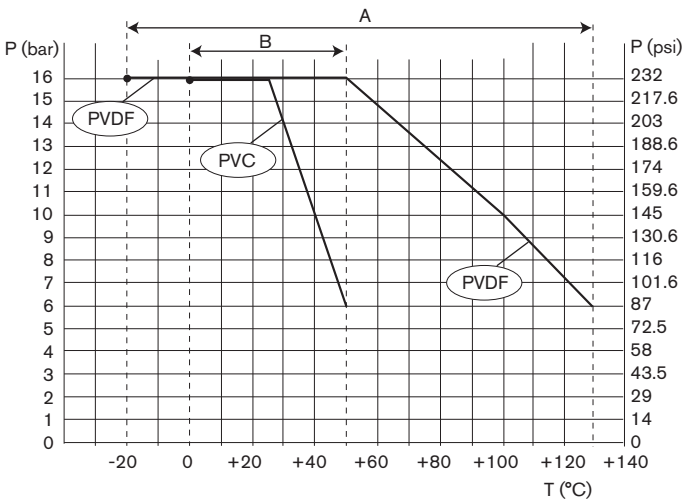


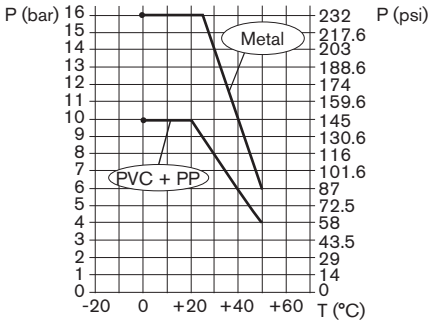
- A: application range of a 8202 with a PVDF nut
- B: application range of a 8202 with a PVC nut

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

P = Fluid pressure

T = Fluid temperature

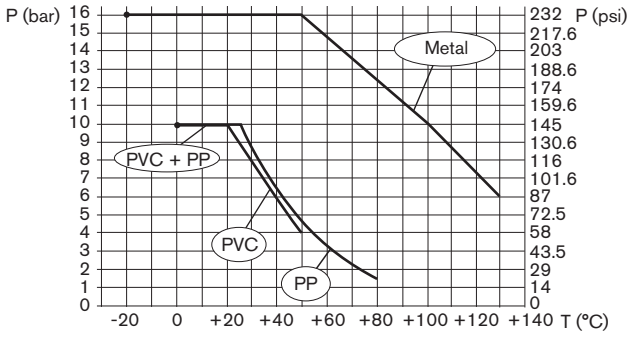
Fig. 3: Dependency between the fluid temperature and the fluid pressure, Type 8202 without probe, with a PVC nut or PVDF nut



P = Fluid pressure

T = Fluid temperature

Fig. 4: Dependency between the fluid temperature and the fluid pressure, Type 8202 without probe, with a PVC nut, and a Type S022 in metal, PVC or PP



P = Fluid pressure

T = Fluid temperature

Fig. 5: Dependency between the fluid temperature and the fluid pressure, Type 8202 without probe, with a PVDF nut and a Type S022 in metal, PVC or PP

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6.6 Electrical data

Operating voltage	
▪ Device variant with 3 outputs	▪ 14...36 V DC ▪ connection to main supply: permanent through external safety extra-low voltage (SELV) and through limited power source (LPS) ▪ filtered and regulated
▪ Device variant with 4 outputs	▪ 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 source (not supplied)	▪ limited power source according to UL/EN 60950-1 standard ▪ or limited energy circuit according to UL/EN 61010-1, Paragraph 9.4
Current consumption	
▪ Device variant with 3 outputs	▪ 25 mA max. (at 14 V DC)
▪ Device variant with 4 outputs	▪ 5 mA max. (at 12 V DC)
Current consumption, with loads on the transistors	1 A max.
Power consumption	40 W max.
Protection against polarity reversal	yes
Protection against voltage spikes	yes
Transistor output	polarized
▪ type	▪ NPN or PNP. Through wiring and through software setting
▪ NPN output	▪ 1...36 V DC, 700 mA max. (or 500 mA max. if 2 transistor outputs are wired)
▪ PNP output	▪ supply voltage, 700 mA max. (or 500 mA max. if 2 transistor outputs are wired)
▪ protection	▪ galvanically insulated, protected against overvoltages, polarity reversals and short-circuits
Current output	4...20 mA, sink or source through wiring and through software setting, 22 mA to indicate a fault (software setting)
▪ Response time (10...90%)	▪ 150 ms (default value)
▪ Device variant with 1 current output	▪ maximum loop impedance: 1100 Ω at 36 V DC, 610 Ω at 24 V DC, 180 Ω at 14 V DC
▪ Device variant with 2 current outputs	▪ maximum loop impedance: 1100 Ω at 36 V DC, 610 Ω at 24 V DC, 100 Ω at 12 V DC

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6.7 Data of connectors and cables

Number of fixed connectors	Type of connectors
1 male M12 fixed connector	5-pin female M12 connector (not supplied). For the M12 connector with article number 917116, use a shielded cable: ▪ diameter: 3...6.5 mm ▪ wire cross section: max. 0.75 mm²
1 male M12 fixed connector and 1 female M12 fixed connector	5-pin female M12 connector (not supplied) and 5-pin male M12 connector (not supplied). For the M12 connector with article number 917116, use a shielded cable: ▪ diameter: 3...6.5 mm ▪ wire cross section: max. 0.75 mm²

6.8 pH/Redox ("ORP") probe

The pH or redox ("ORP") probe must satisfies the following specifications:

- combined probe;
- length: 120 mm;
- with PG 13.5 head;
- with an S7/S8 fixed connector;
- without temperature probe.

The specifications of the probe can be found in the Operating Instructions of the probe used.

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7 ASSEMBLY

7.1 Safety instructions

DANGER

Risk of injury due to electrical voltage.

- Before carrying out work on the system or the device, disconnect the electrical power for all the conductors and isolate it.
- Observe all applicable accident protection and safety regulations for electrical equipment.

WARNING

Risk of injury due to non-conforming 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 restart of the installation.

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

7.2 Removing the housing lid

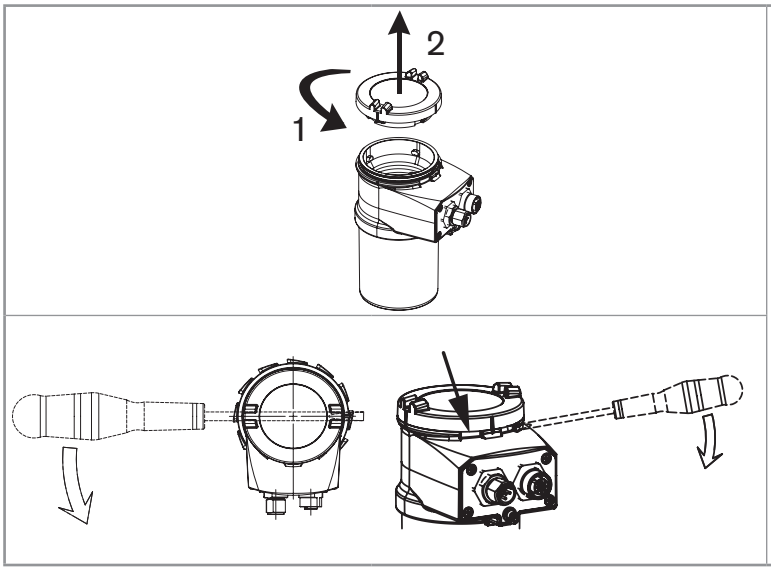
NOTICE

The tightness of the device is not guaranteed when the housing lid is removed.

- Prevent the projection of liquid inside the housing.

The device may be damaged if a metal component comes into contact with the electronics.

- Prevent contact of the electronics with a metallic item.



→ [1] Turn the housing lid counterclockwise with an angle of about 15° to unlock it.

→ [2] Remove the housing lid.

If the housing lid grips to the housing:

→ Use an appropriate tool to unlock the housing lid, taking care not to scratch the glass.

→ Insert an apropriate tool into the groove of the housing.

→ Lever the housing lid up.

Fig. 6: Removing the housing lid

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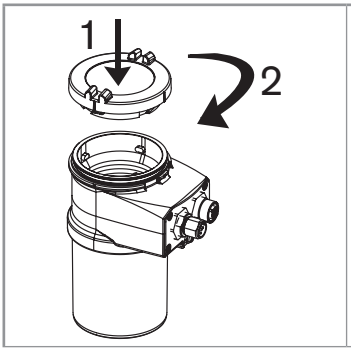
7.3 Mounting the housing lid



→ Check that there is a seal on the housing and that it is not damaged. Replace the seal if necessary.

→ Grease the seal if necessary, using a component compatible with the seal material.

→ [1] Set the housing lid to ensure that the 4 grooves of the housing lid match with the 4 pins of the housing.

→ [2] Turn the housing lid clockwise with an angle of about 15° to lock it.

Fig. 7: Closing the housing lid

7.4 Mounting the display module

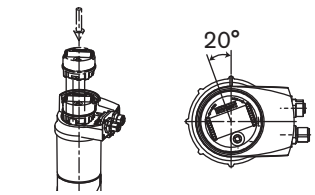
NOTICE

The tightness of the device is not guaranteed when the housing lid is removed.

▸ Prevent the projection of liquid inside the housing.

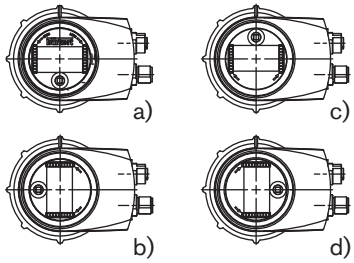
The device may be damaged if a metal component comes into contact with the electronics.

▸ Prevent contact of the electronics with a metallic item.

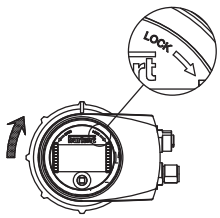


→ Remove the housing lid. Refer to chpt. 7.2.

→ Set the display module at an angle of about 20° in relation to the desired position.



→ The display module can be mounted in 4 different positions, at 90° intervals.



→ Fully push in the display module and turn clockwise to lock it.

Fig. 8: Mounting the display module

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7.5 Dismounting the display module

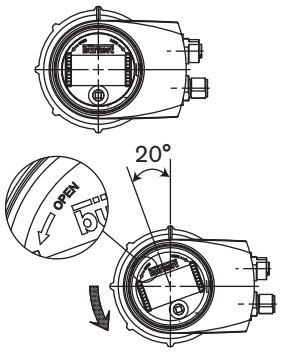
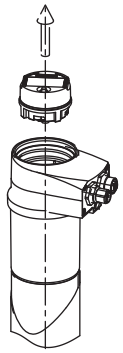
	→ Remove the housing lid if necessary. Refer to chpt. 7.2. → Turn the display module by ca. 20° counterclockwise. Once unlocked, the display module is raised slightly by the spring action.
	→ Remove the display module from its housing.

Fig. 9: Dismounting the display module

7.6 Install the pH or redox probe into the holder (without fluid)

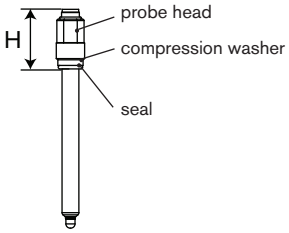
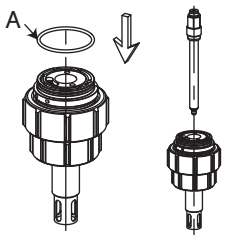
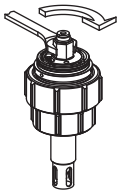
	Following instructions are valid for a Bürkert probe. If you use a probe from another supplier, respect the related instructions. → Remove the protective plugs → Check that dimension H on the probe is between 34 mm and 46 mm. If necessary, adjust the height of the compression washer.
	→ At first use, apply water or soapy water on the "A" seal. → Insert the seal into the groove on the holder. → Insert the probe with its seal into the holder from above.
	→ With a suitable wrench, tighten the probe head to a torque of max. 2 N·m.

Fig. 10: Mounting the probe into the holder (without fluid)

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7.7 Mounting the electronic module to the sensor holder (without fluid)

→ Make sure that the pH or redox probe is mounted into the sensor holder. Refer to chpt. 7.6.

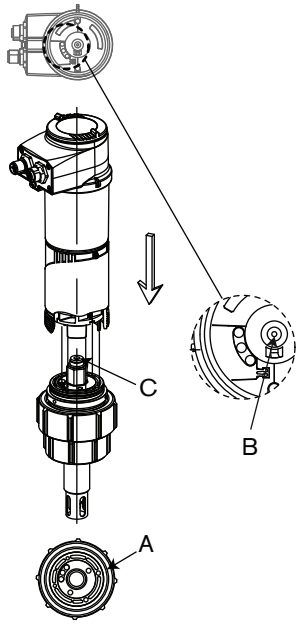
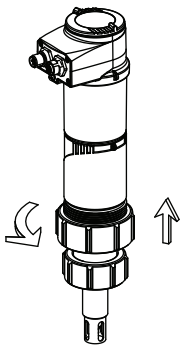
	→ Make sure that seal "A" on the holder is in good condition. Replace it if necessary. Refer to chpt. 11. → Clean connectors "B" and "C" for connection of the pH/redox probe with alcohol to avoid measurement errors. → Insert the electronic module into the holder, making sure the polarising slots are correctly positioned. → Apply slight vertical pressure to engage the seal.
	→ Fasten the electronic module and the holder together by tightening the G2" nut. → Tighten the G2" nut by hand only, until it stops turning, to ensure good electrical contact.

Fig. 11: Mounting the electronic module to the holder (without fluid)

→ Mount the display module. Refer to chpt. 7.4.

→ Calibrate the device. Refer to chpt. 9.12.4.

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8 INSTALLATION AND WIRING

8.1 Safety instructions

Risk of injury due to electrical voltage.

- Before carrying out work on the system or the device, disconnect the electrical power for all the conductors and isolate it.
- 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 shall 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 high 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.

WARNING

Risk of injury due to non-conforming installation.

- The electrical and 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 installation instructions for the fitting used.

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

- Avoid unintentional activation of the installation.
- Guarantee a defined or controlled restart of the process after any intervention on the device.

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8.2 Installing a device on the pipe

DANGER

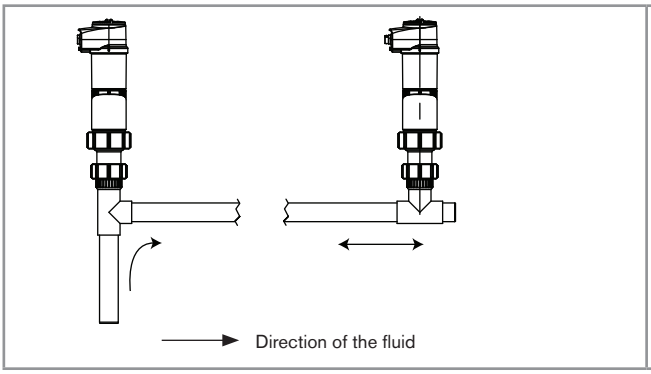
Risk of injury due to high pressure in the installation.

- 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.

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.

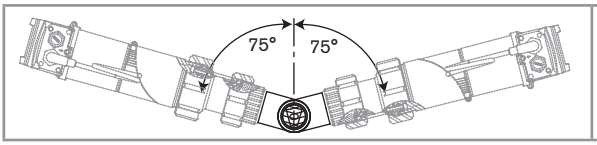
If a pH/redox ("ORP") probe (with PG 13.5 head, 120 mm long and without temperature probe) from a supplier other than Bürkert is used, follow the relevant instructions on installation in the pipe.



→ Choose an appropriate position in the pipe to install the fitting.

→ Fit the pipe with a fitting with G 1" ½ external threaded sensor connection with respect to the instructions delivered with the fitting.

Fig. 12: Mounting positions of the device in the pipe



→ Fit the fitting at an angle of ±75° max. to the vertical in order to ensure the good operation of the pH/redox ("ORP") probe.

Fig. 13: Angle to the vertical

The probe must always be immersed in the fluid to prevent it drying out.

→ Fit the display module. Refer to chpt. 7.4.

→ Calibrate the device. Refer to chpt. 9.12.

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→ Once the device has been calibrated, remove the electronic module from the sensor holder as shown Fig. 14.

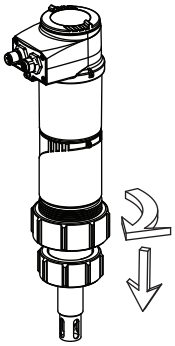
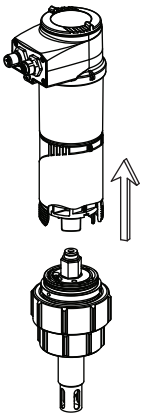
	→ Unscrew the nut of the electronic module.
	→ Remove the electronic module by pulling it straight out. There may be a resistance due to the seal.

Fig. 14: Removing the electronic module from the sensor holder

→ Install the holder with its probe on the fitting as shown in Fig. 15.

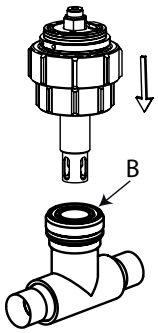
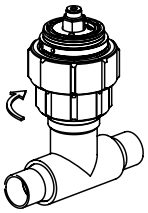
	→ Check the presence and the condition of seal B on the fitting. Replace the seal if necessary. → Insert the holder with its probe carefully into the fitting.
	→ Tighten the nut on the fitting by hand. → Charge the pipe to check the tightness of the assembly.

Fig. 15: Installing the sensor holder with its probe on a fitting

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→ If the sensor holder is tight, insert the electronic module back onto the sensor holder as shown in Fig. 16.

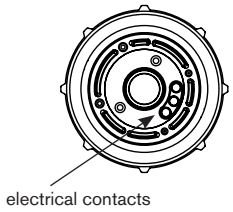
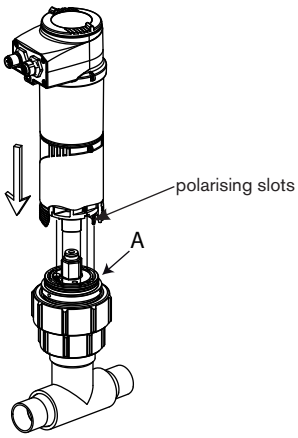
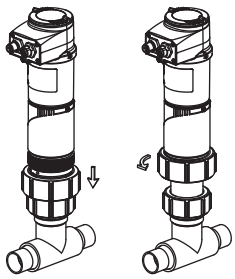
	→ Check that the electrical contacts are in good condition and clean them with a brush if necessary.
	→ Check that seal "A" on the holder is in good condition. Replace it if necessary. Refer to chpt. 11 and chpt. 10.4. → Insert the electronic module into the holder, making sure the polarising slots are correctly positioned.
	→ Apply slight vertical pressure to engage the seal. → Fasten the electronic module and the holder together by tightening the G2" nut. → Tighten the G2" nut, until it stops turning, to ensure good electrical contact with the temperature probe.

Fig. 16: Mounting the electronic module to the sensor holder, after installation of the holder on a fitting

→ Wire the device according to instructions in chpt. 8.3.

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8.3 Wiring

DANGER

Risk of injury due to electrical voltage.

- Before carrying out work on the system or the device, disconnect the electrical power for all the conductors and isolate it.
- 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.

- Use a high-quality electrical power supply. The power supply must be filtered and regulated.
- Make sure the installation is equipotential. Refer to chpt. 8.3.2.
- Protect the power supply of the device with a 100 mA time-delay fuse and a switch.
- Protect the power supply of each transistor output with a 750 mA fuse.
- Once the device is wired, set the “HWMode” parameter depending on the wiring carried out, sink/NPN or source/PNP. Refer to chpt. 9.11.8.

8.3.1 Assembling the male or female connector (accessories)

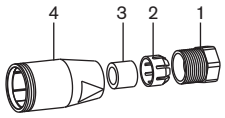
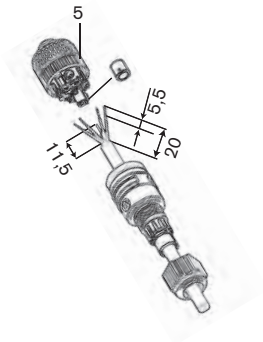
	→ Unscrew the nut [1] on the body [4]. → Insert the cable into the nut [1], the cable clamp [2] and the seal [3], and then into the body [4].
	→ Strip 20 mm of the cable. → Cut the central wire (earth) so that its length is equal to 11.5 mm. → Expose 5.5 mm of the wires on the stripped cable. → Insert each wire into the appropriate pin on the terminal block [5]. Refer to chpt. 8.3.3 and 8.3.4. → Tighten the terminal block [5] wired to the body [4]. → Tighten the connector nut [1].

Fig. 17: M12 multi-pin connector (not provided)

8.3.2 Making the installation equipotential

To ensure the equipotentiality of the installation (power supply - device - medium):

→ Connect together the various earth spots in the installation to eliminate the potential differences that may occur between different earthes.

→ Observe faultless grounding of the shield of the power supply cable. Refer to Fig. 18 and Fig. 19.

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→ If the device is installed on plastic pipes, earth together the metallic equipment such as pumps or valves, that is as close as possible to the device. Refer to Fig. 19.

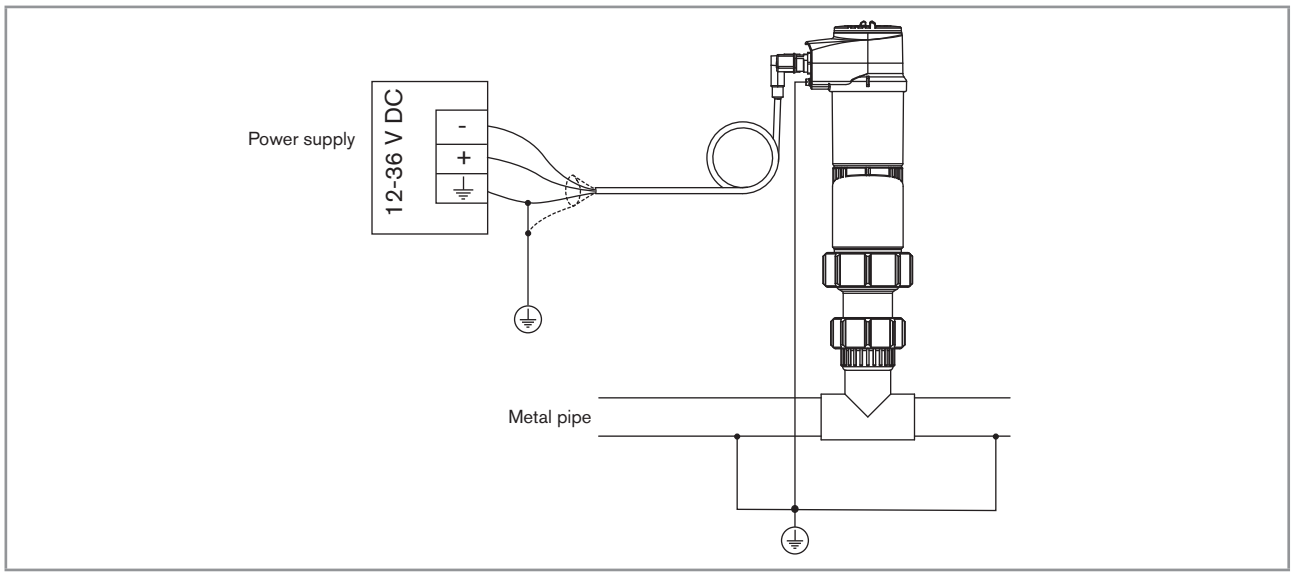

Fig. 18: Equipotentiality skeleton diagram with pipes in metal

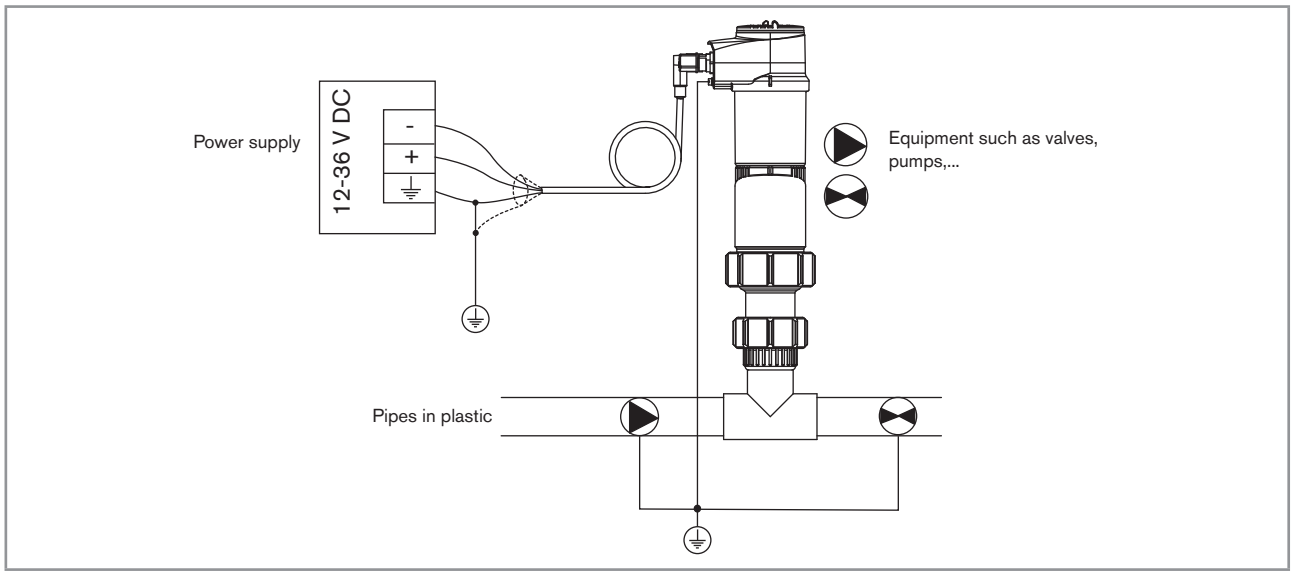

Fig. 19: Equipotentiality skeleton diagram with pipes in plastic

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8.3.3 Wiring a device variant with a single M12 fixed connector

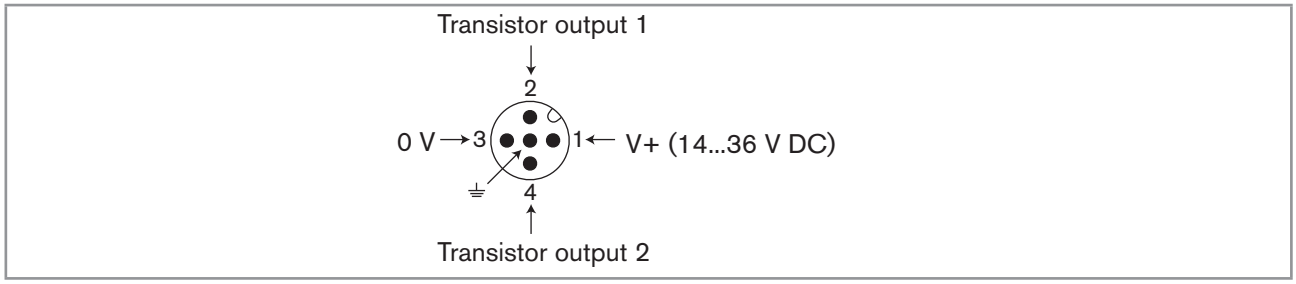

Fig. 20: Pin assignment of the fixed connector on a device variant with a single M12 fixed connector

Pin for the female M12 connector available as an accessory (article number 438680)	Colour of the wire
1	brown
2	white
3	blue
4	black
5	green/yellow or grey

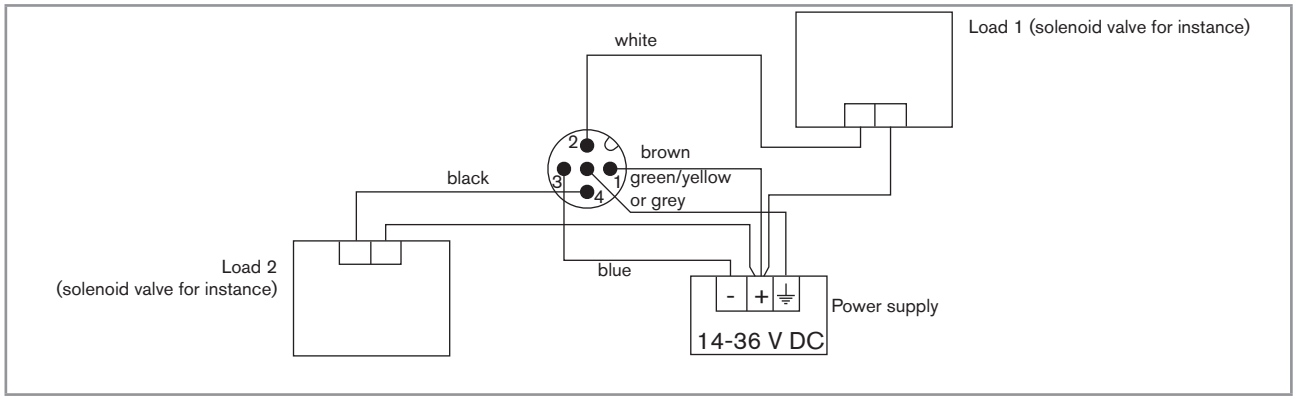

Fig. 21: NPN wiring of both transistor outputs (software setting "NPN/sink", see chpt. 9.11.8), of a device variant with 1 M12 fixed connector

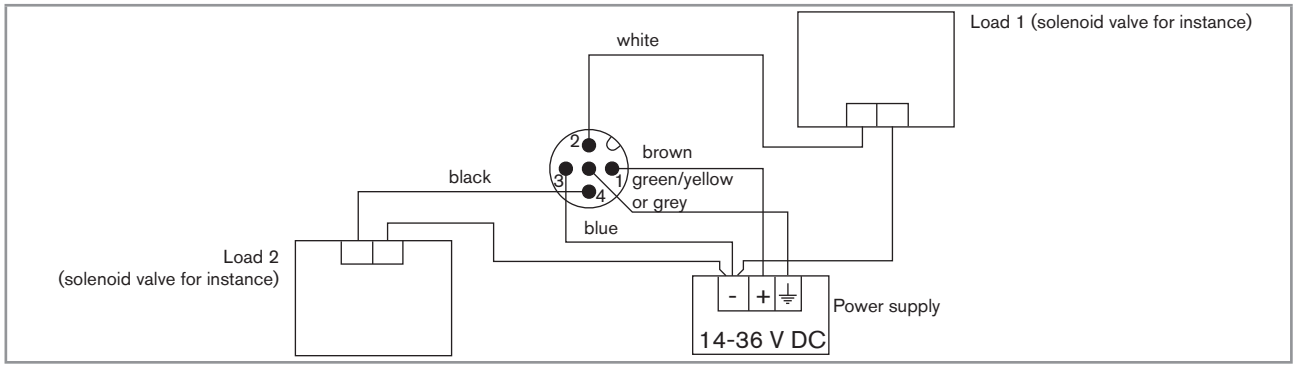

Fig. 22: PNP wiring of both transistor outputs (software setting "PNP/source", see chpt. 9.11.8), of a device variant with 1 M12 fixed connector

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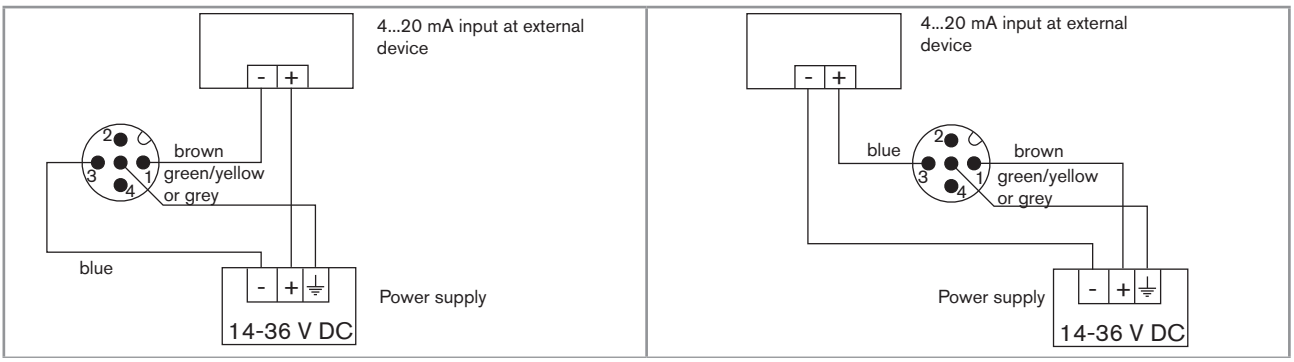

Fig. 23: Possible wirings of the current output (whatever the software setting, "NPN/sink" or "PNP/source", see chpt. 9.11.8), of a device variant with 1 M12 fixed connector

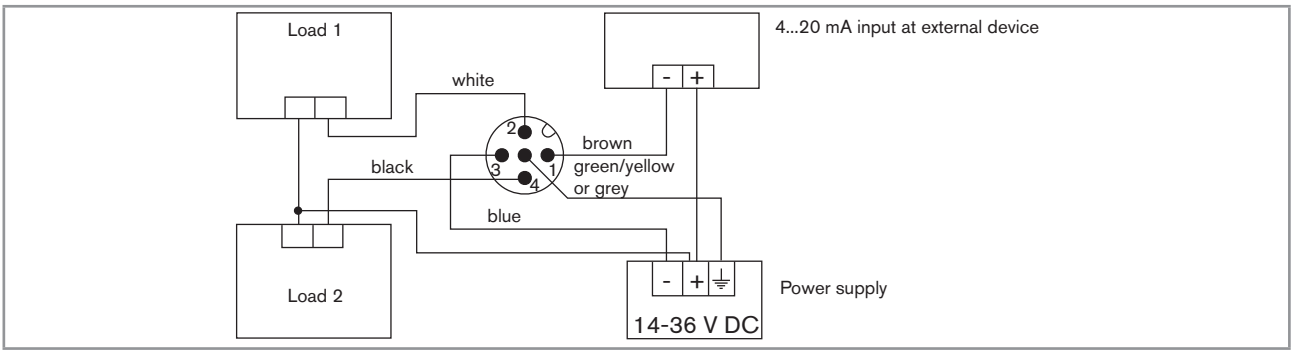

Fig. 24: NPN wiring of both transistor outputs and wiring the current output in sinking mode (software setting "NPN/sink", see chpt. 9.11.8), of a device variant with 1 M12 fixed connector

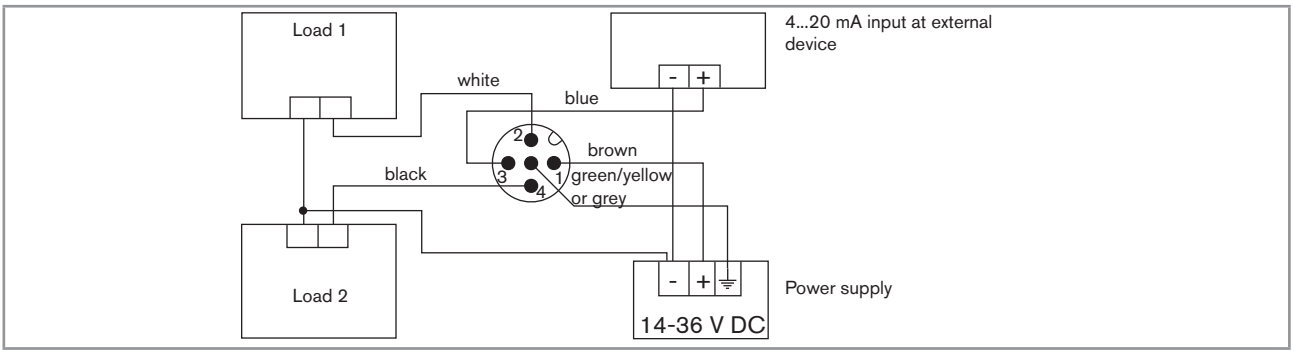

Fig. 25: PNP wiring of both transistor outputs and wiring the current output in sourcing mode (software setting " PNP/source", see chpt. 9.11.8), of a device variant with 1 M12 fixed connector

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8.3.4 Wiring a device variant with 2 M12 fixed connectors

Fig. 26: Pin assignment of the male and female M12 fixed connectors

Connect the power supply for the device to the male fixed connector; the supply is then transferred internally to pins 1 and 3 of the female fixed connector in order to ease wiring of the load to the female fixed connector.

Pin of the M12 female cable available as an accessory (article number 438680)	Colour of the wire
1	brown
2	white
3	blue
4	black
5	green/yellow or grey

Pin of the M12 male cable available as an accessory (article number 559177)	Colour of the wire
1	brown
2	white
3	blue
4	black
5	green/yellow or grey

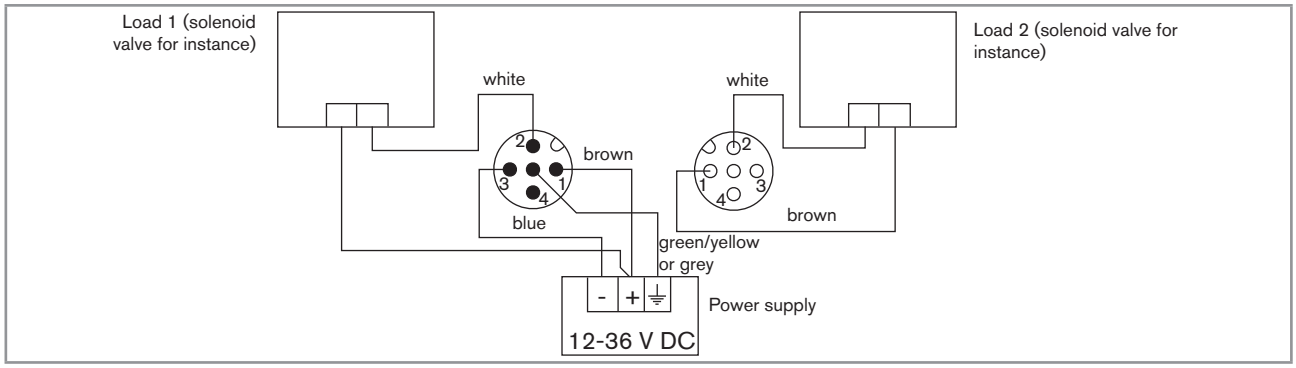

Fig. 27: NPN wiring of both transistor outputs of a device variant with 2 fixed connectors (software setting "NPN/sink", see chpt. 9.11.8)

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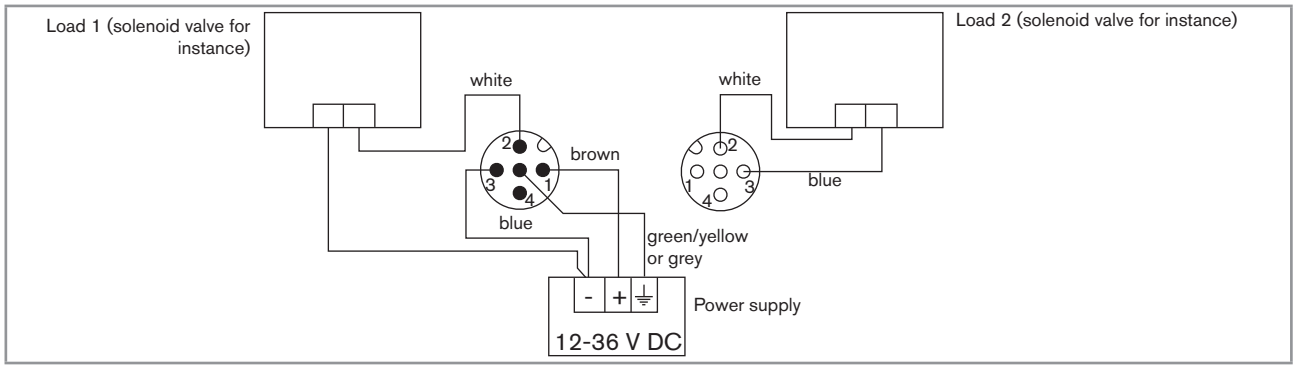

Fig. 28: PNP wiring of both transistor outputs of a device variant with 2 fixed connectors (software setting "PNP/source", see chpt. 9.11.8)

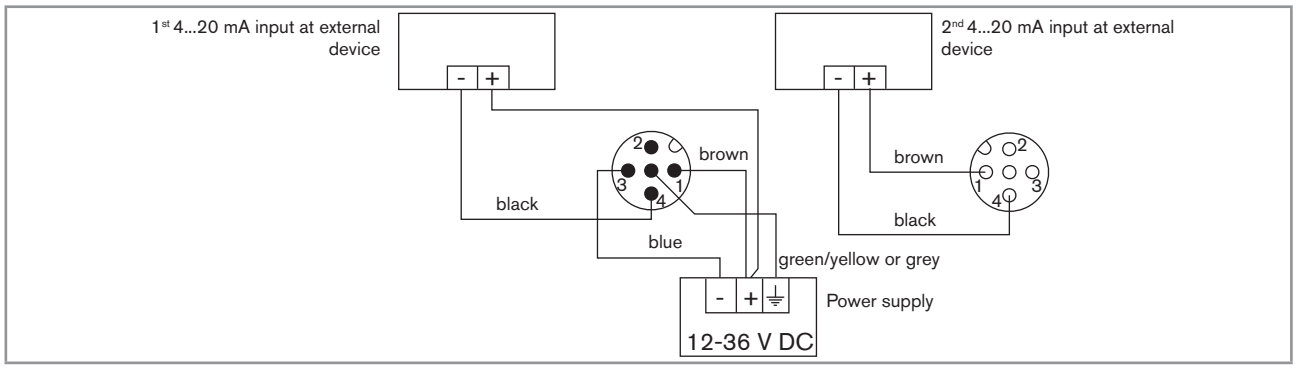

Fig. 29: Wiring of both current outputs in sinking mode, on a device variant with 2 fixed connectors (software setting "NPN/sink", see chpt. 9.11.8)

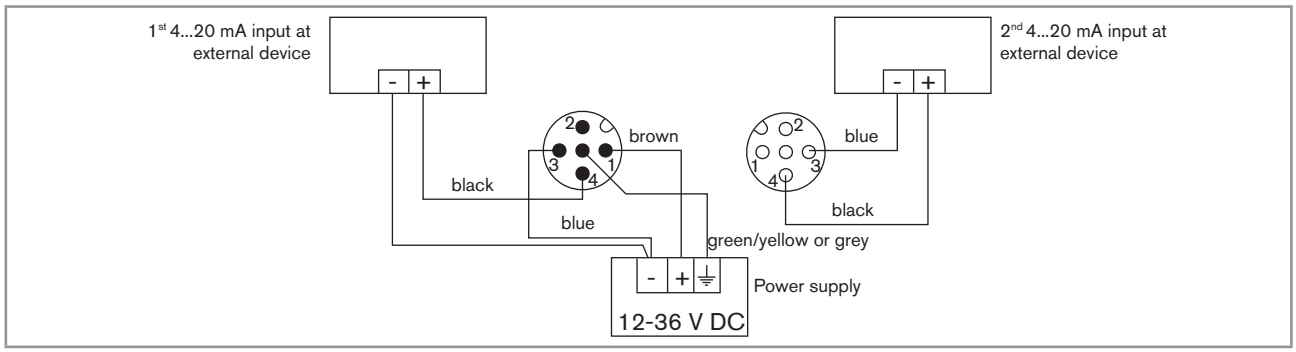

Fig. 30: Wiring of both current outputs in sourcing mode, on a device variant with 2 fixed connectors (software setting "PNP/source", see chpt. 9.11.8)

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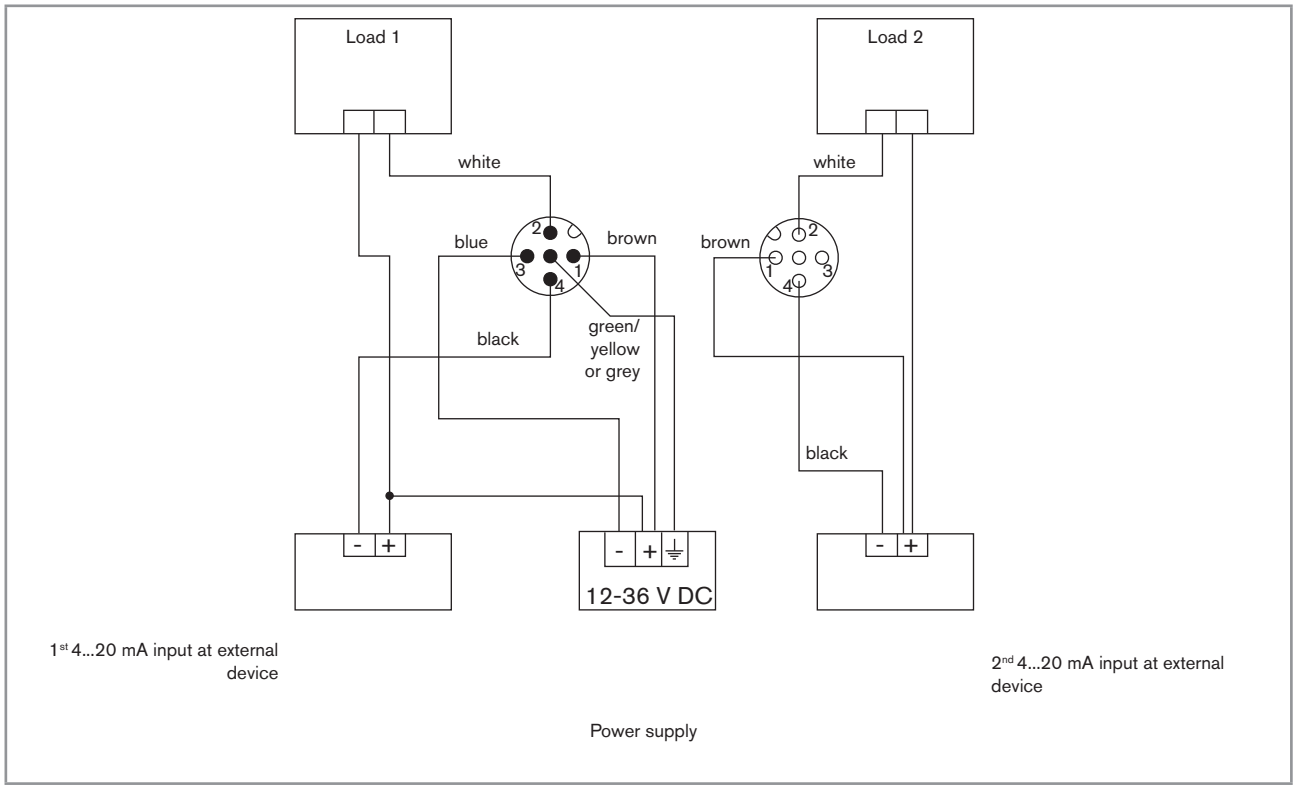

Fig. 31: NPN wiring of both transistor outputs and wiring of both current outputs in sinking mode, on a device variant with 2 fixed connectors (software setting "NPN/sink", see chpt. 9.11.8)

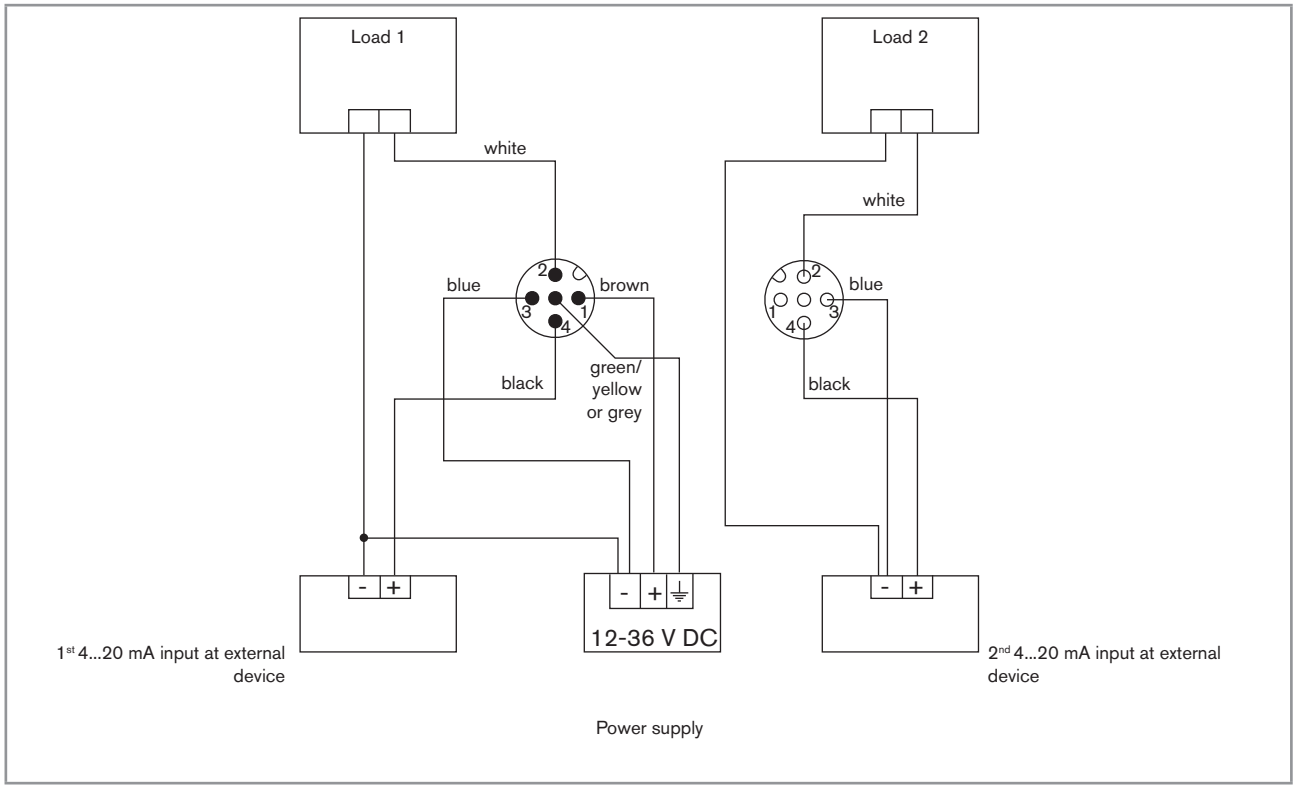

Fig. 32: PNP wiring of both transistor outputs and wiring of both current outputs in sourcing mode, on a device variant with 2 fixed connectors (software setting "PNP/source", see chpt. 9.11.8)

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9 ADJUSTMENT AND START-UP

- The settings can only be done on a device with a display module.
- Do not remove the display module while making the settings on the device.

9.1 Safety instructions

WARNING

Risk of injury due to non-conforming adjustment.

Non-conforming 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 the 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 non-conforming start-up.

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

- Before start-up, calibrate the pH/Redox ("ORP") sensor. Refer to chpt. 9.12.4.
- 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 Knowing the operating levels

The device has 2 operating levels:

Process level

This level is used:

- to read the measured values of 2 measurable variables selected in the Parameters menu,
- to read both the lowest and highest values of the chosen measurable variable, that have been measured by the device since the power-up of the device or since the latest reset (this feature is not active by default),
- to reset both the lowest and highest values of the chosen process value, if the feature has been activated,
- to read the current values emitted on the 4...20 mA outputs.
- to get the state of the device and of the pH/Redox ("ORP") sensor with the icons.

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Configuration level

This level comprises 5 menus:

Menu title	Relevant icon
"Param": see chpt. 9.11	
"Calib": see chpt. 9.12	
"Diagnostic": see chpt. 9.13	
"Test": see chpt. 9.14	
"Info": see chpt. 9.15	

9.3 Using the navigation button

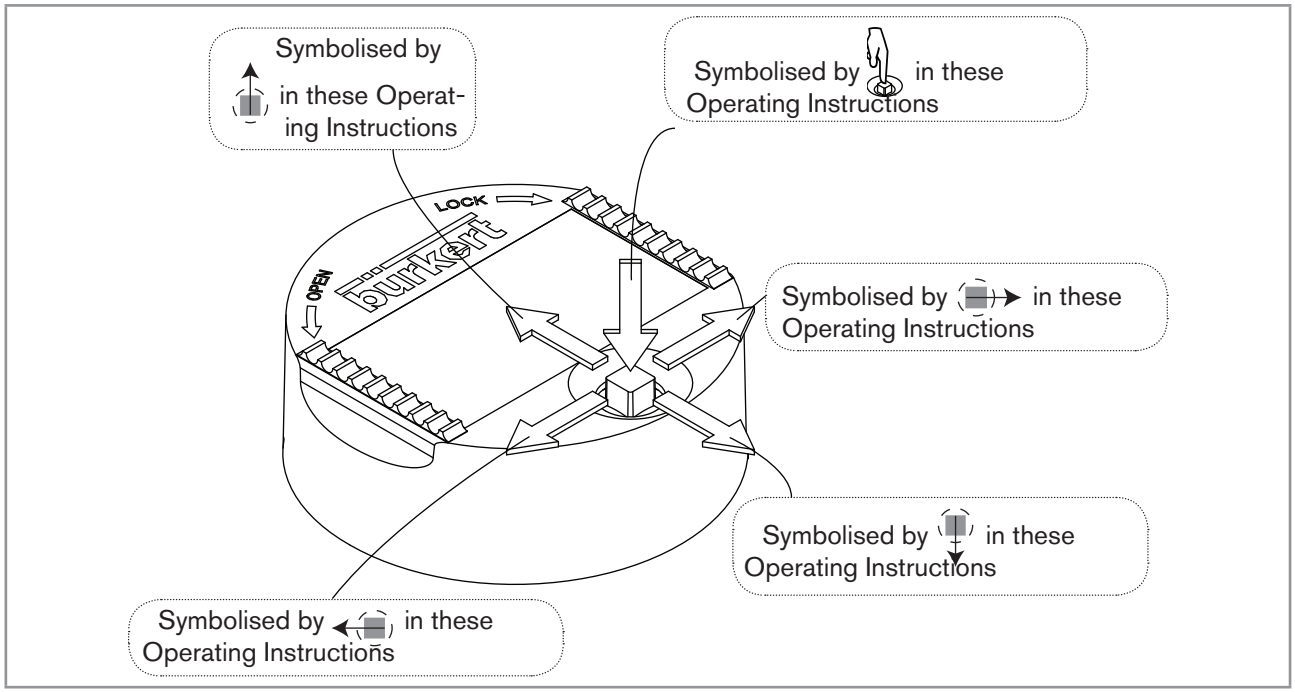

Fig. 33: Using the navigation button

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You want to...	Press...
...browse in Process level	▪ next screen: ▪ previous screen:
▪ ...access the Configuration level ▪ ...display the Param menu	for at least 2 sec., from any screen of the Process level
...browse in the menus of the Configuration level	▪ next menu: ▪ previous menu:
...access the menu displayed	
...browse in the menu functions	▪ next function: ▪ previous function:
...select the highlighted function	
...browse in the dynamic functions bar (MEAS, BACK, ABORT, OK, YES, NO)	▪ next function: ▪ previous function:
...confirm the highlighted dynamic function	
...modify a numerical value	
- increment the figure selected	-
- decrement the figure selected	-
- select the previous figure	-
- select the next figure	-
- allocate the "+" or "–" sign to the numerical value	- to the extreme left of the numerical value then until the desired sign is displayed
- move the decimal point	- to the extreme right of the numerical value then until the decimal point is in the desired place

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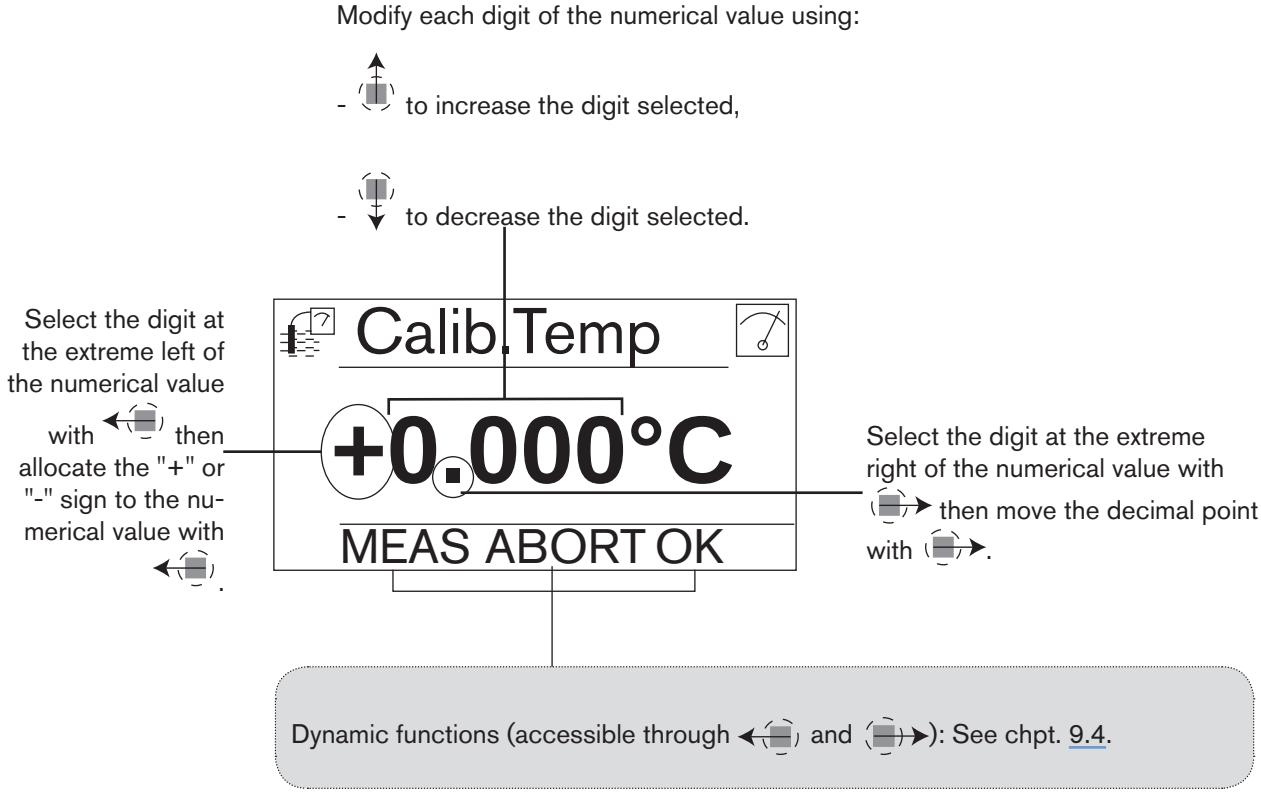
9.4 Using the dynamic functions

You want to...	Choose...
...go back to the Process level, without validating the modifications made	dynamic function "MEAS"
...validate the input	dynamic function "OK"
...go back to the parent menu	dynamic function "BACK"
... abort the current operation and go back to the parent menu	dynamic function "ABORT"
...answer the question asked	dynamic function "YES" or "NO"

9.5 Entering a numerical value (example)



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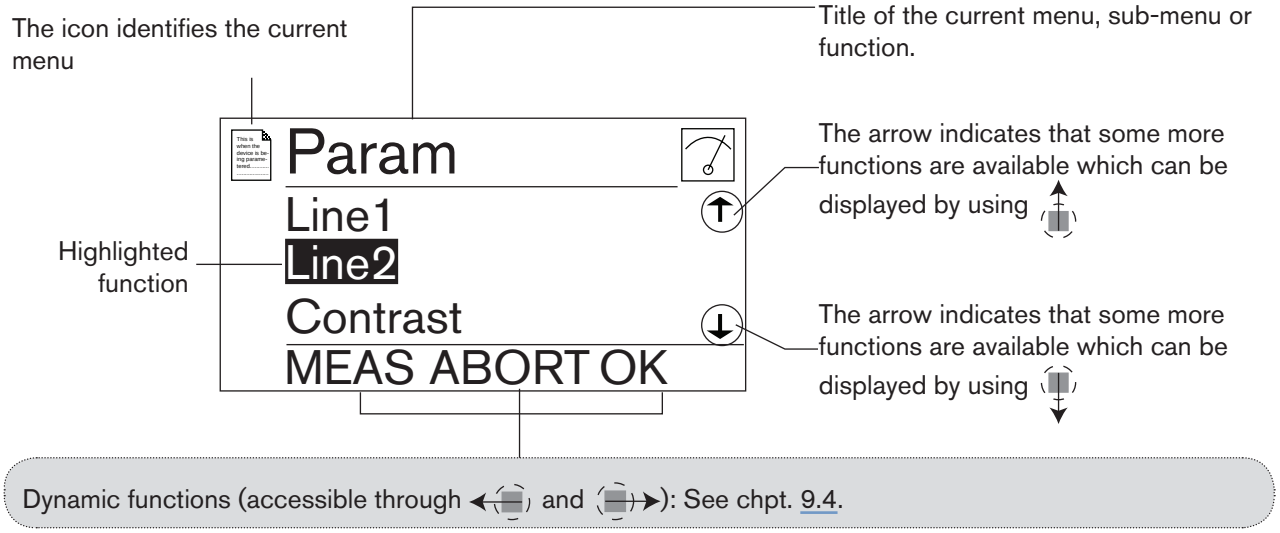
9.6 Browsing in a menu (example)



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9.7 Knowing the display

The display module is only equipped on some device variants. It can be ordered as an accessory.

9.7.1 Knowing the icons and LEDs

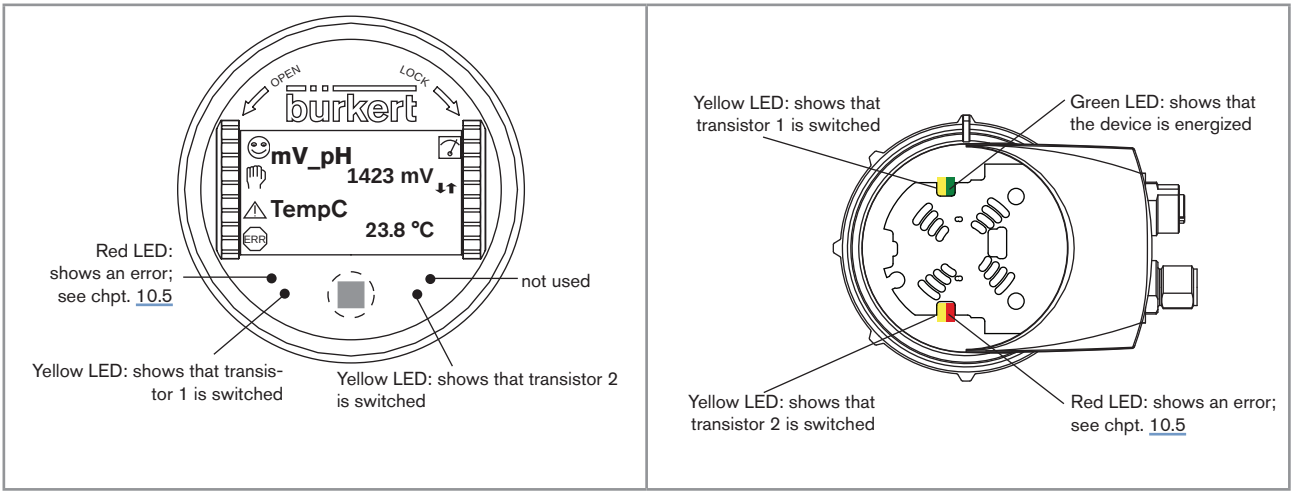

Fig. 34: Position of the icons and description of the LEDs with or without display module

The LEDs of the display module are duplicated on the electronic board that is located under the display module: these LEDs can only be seen if the device has no dispaly module.

Icon	Possible cause and alternatives
	Probe in good condition and fluid temperature within the set range. If the monitoring of the impedance on the electrodes and/or the fluid temperature has been activated, the alternative icons in this position are: ▪ , associated with ⚠: see chpt. 9.13.2, 9.13.3, 9.15.1 and 10.5 ▪ , associated with ERR: see chpt. 9.13.2, 9.13.3, 9.15.1 and 10.5
	The device is measuring. The alternative icons in this position are: ▪ HOLD flashing: HOLD mode activated (see chpt. 9.12.1) ▪ T: running check that the outputs are working and behaving correctly (see chpt. 9.14.2 and 9.14.3)
	"maintenance" message; see chpt. 9.12.4, 9.15.1 and 10.5
⚠	"warning" message; see chpt. 9.11.10, 9.12.4 9.13.2, 9.13.3, 9.15.1 and 10.5
ERR	"error" message; see chpt. 9.13.2, 9.13.3, 9.15.1 and 10.5

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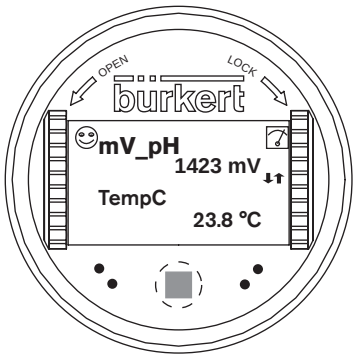
9.7.2 Knowing the display at the power-up of the device

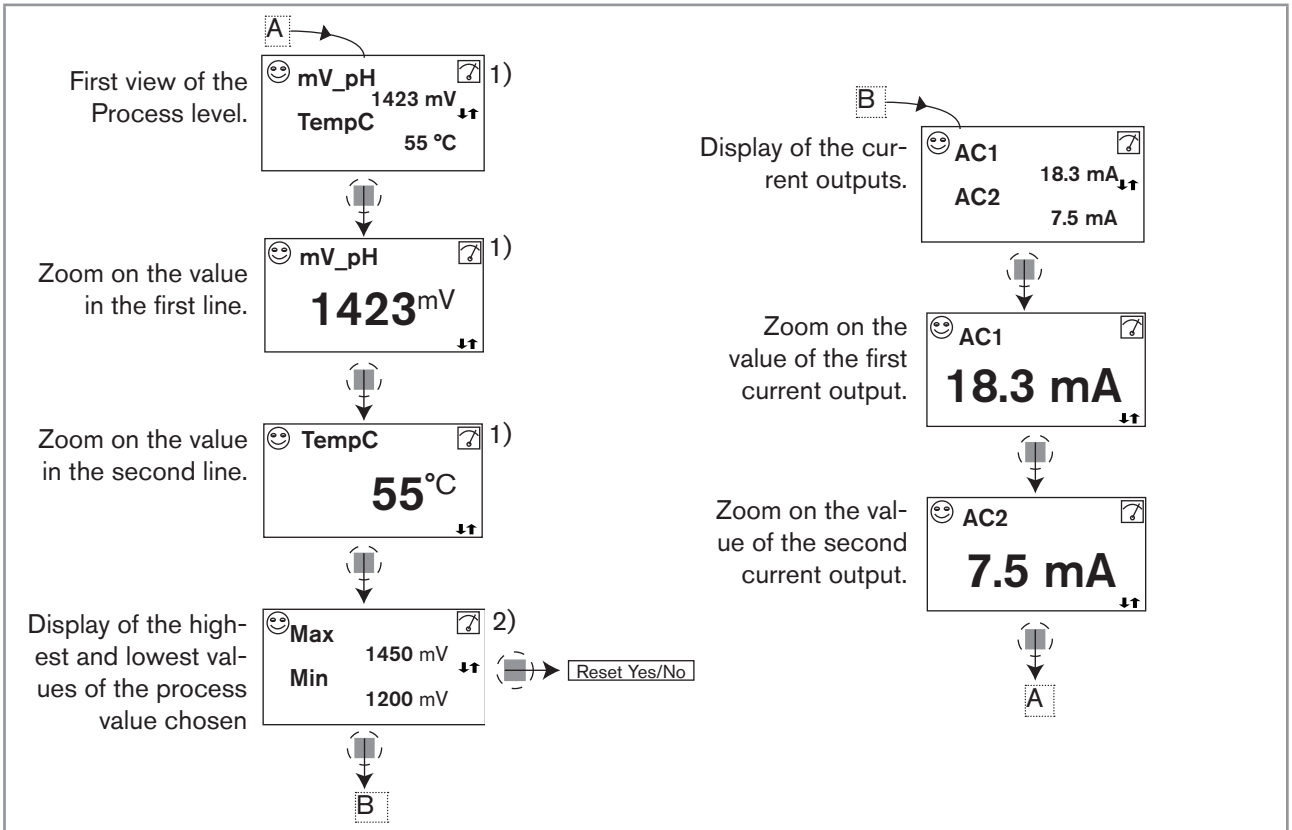
When the device is powered up or the display module mounted on the electronic module, the display indicates the software version of the display module. The display then shows the first screen of the Process level:



See chpt. 9.11.5 and 9.11.6 to choose the data to be displayed in the Process level.

Fig. 35: Display indications after power-up of the device

9.8 Knowing the Process level



[1] To choose the process values to be displayed see chpt. 9.11.5

[2] The display of the lowest and highest values in the Process level is deactivated by default. To activate the feature and choose the process values see chpt. 9.11.3

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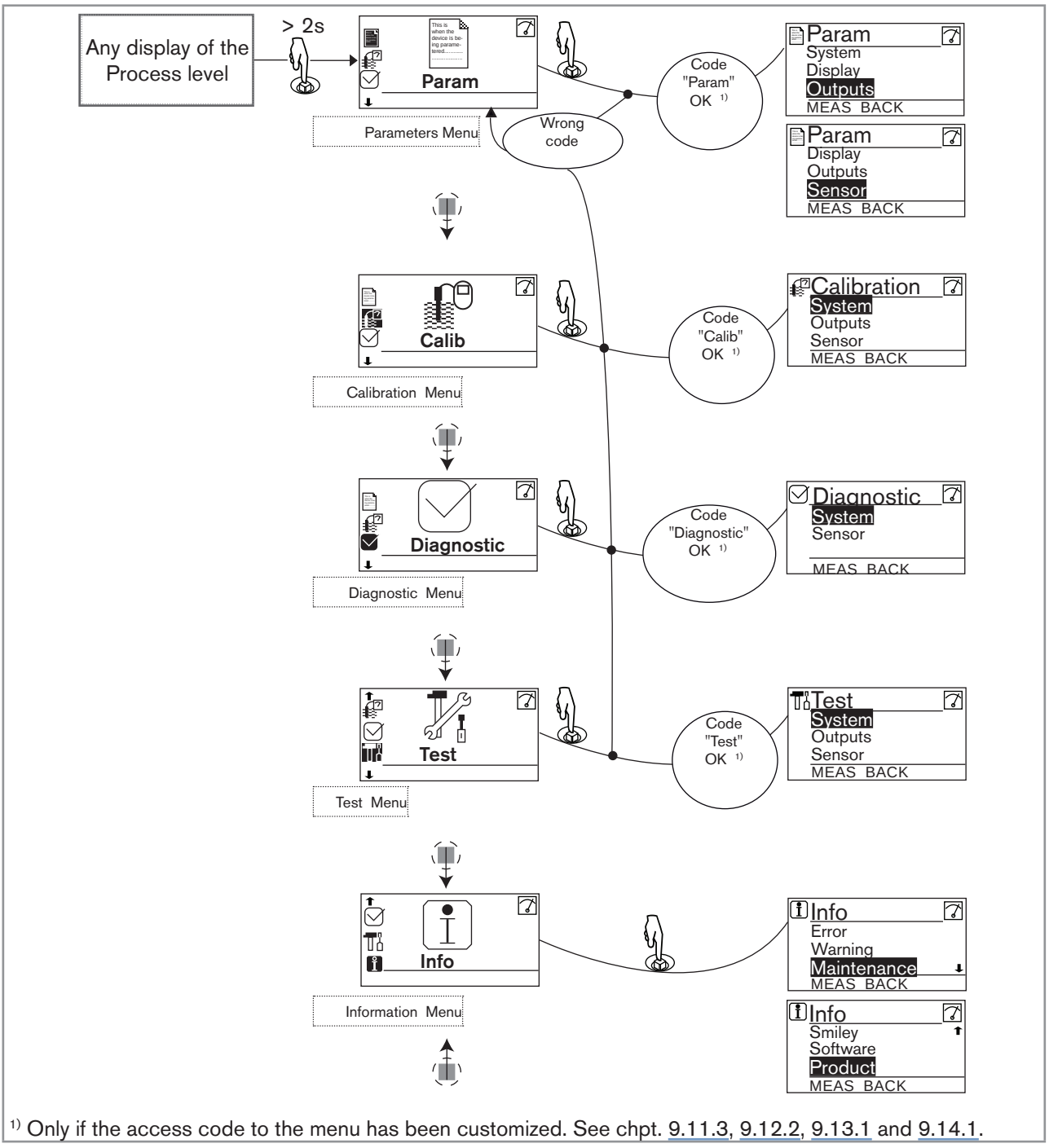
9.9 Accessing the Configuration level



1) Only if the access code to the menu has been customized. See chpt. 9.11.3, 9.12.2, 9.13.1 and 9.14.1.

→ See chpt. 9.10 for the detailed menu functions.

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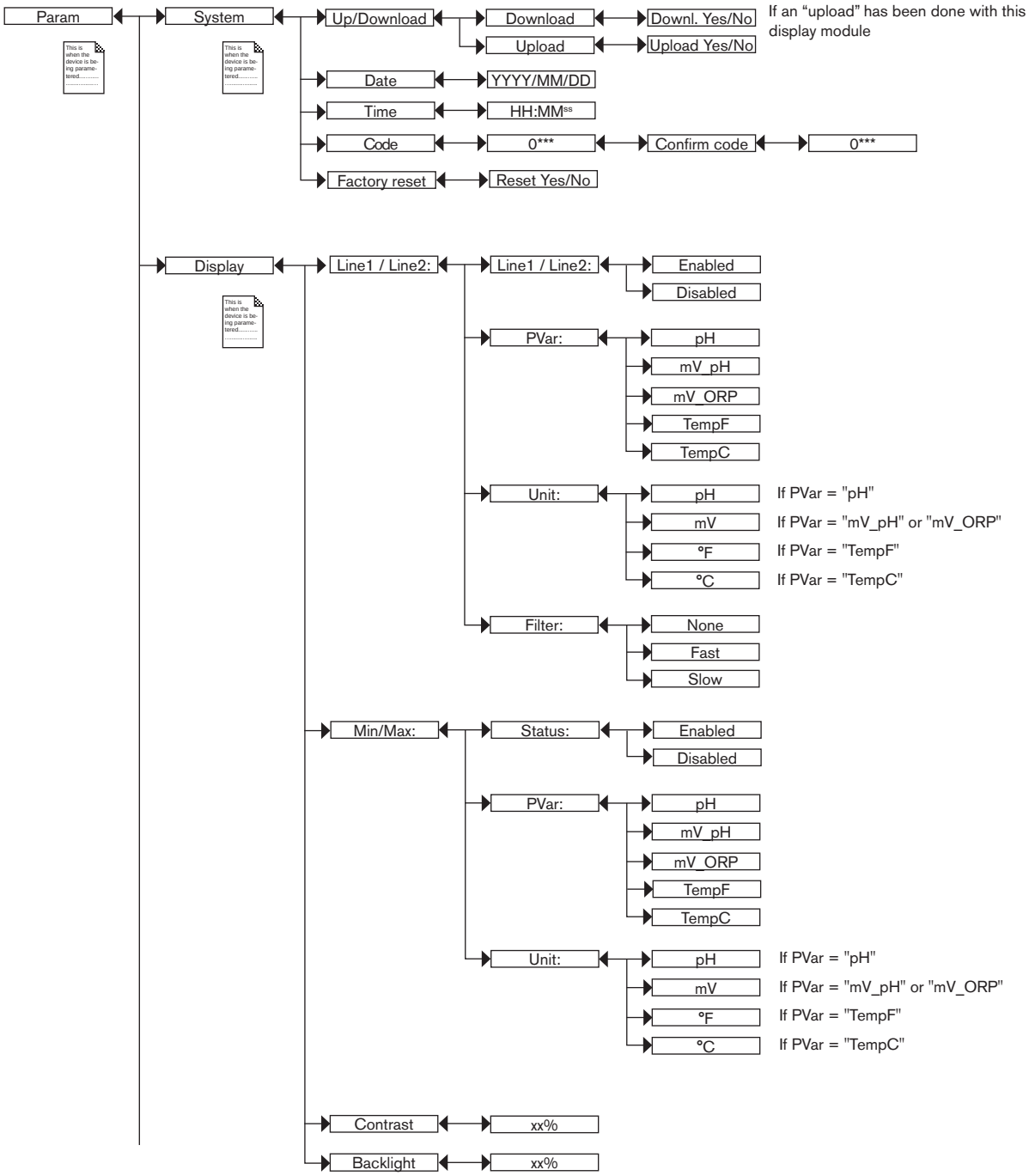
9.10 Knowing the structure of the menus on the Configuration level

See chpt. 9.9 to access the Configuration level.



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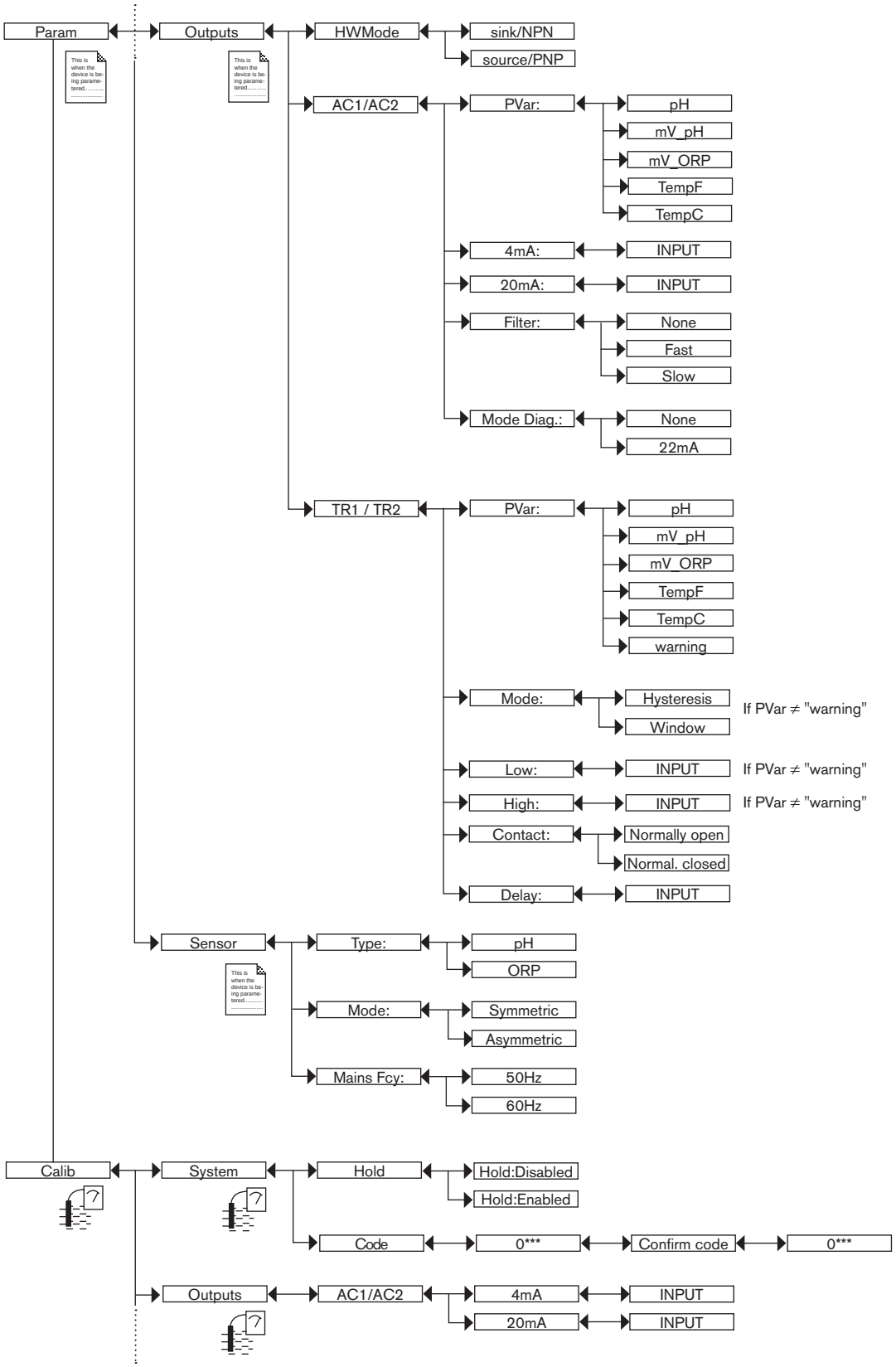

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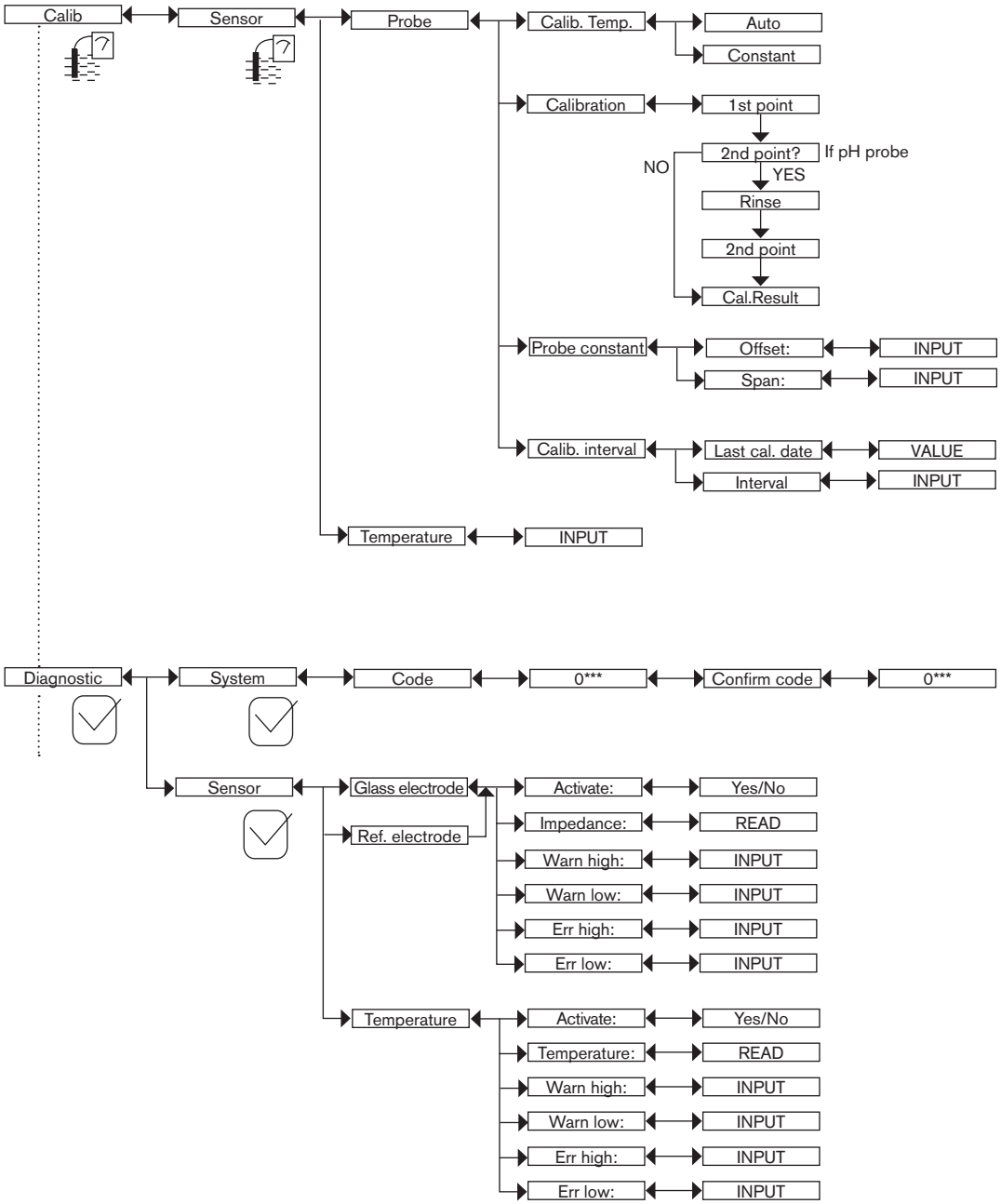

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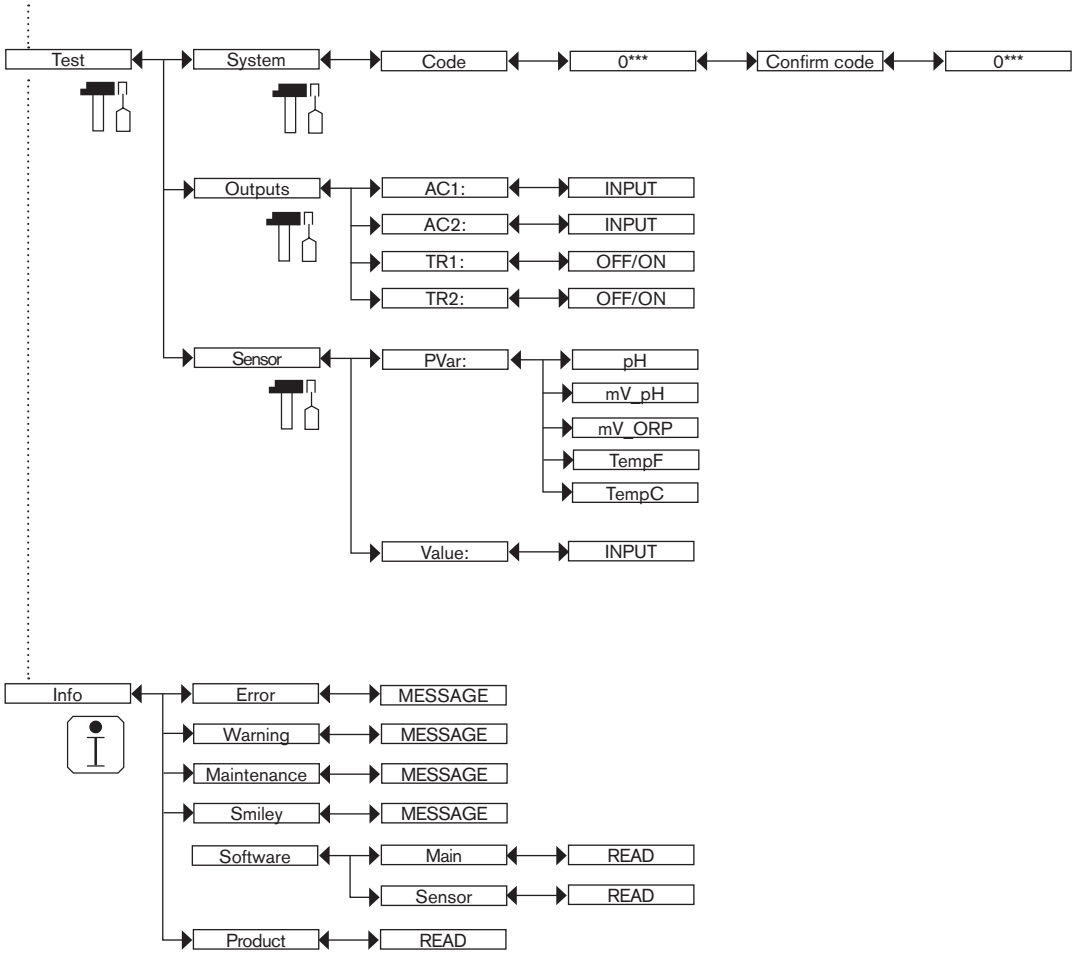

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9.11 Knowing the Parameters Menu

9.11.1 Transferring data from one device to another

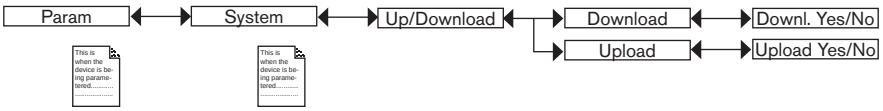
See chpt. 9.9 to access the Parameters menu.

This function is only possible with a display module with software version V2.

→ On the device, check the software version in the menu "Info -> Software -> Main".

- The software version of the display module is displayed when the display module is powered up.

- Function "DOWNLOAD" is only present if an "UPLOAD" has been successfully carried out.
- Never interrupt a data transfer else the device could be damaged.



The following data can be transferred from one device to another device of the same type:

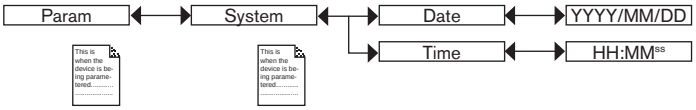
- user set data of the PARAM menu (except the date, the time, the contrast and brightness levels for the display),
- user set data of the DIAGNOSTIC menu,
- the TDS factor set in the menu Calib -> Sensor -> Probe -> Cell cst TDS,
- the periodicity of calibrations set in the menu Calib -> Sensor -> Probe -> Calib interval,
- the access codes to the menus.

DOWNLOAD: transfer the data previously uploaded into the display module using the "UPLOAD" function. The parameters transferred are used by the device as soon as the message "Download OK" is displayed.

UPLOAD: upload data from the device to the display module.

9.11.2 Setting the date and time

See chpt. 9.9 to access the Parameters menu.



DATE: set the date (input format: year/month/day in the form YYYY/MM/DD)

TIME: set the time (input format: hours:minutes^{seconds})

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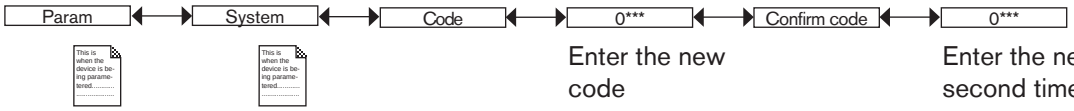
9.11.3 Modifying the PARAM menu access code

See chpt. 9.9 to access the Parameters menu.



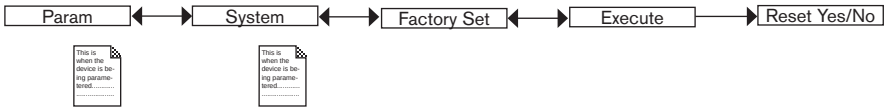
If the default code (0000) is entered, the code will not be requested to access the menu.

9.11.4 Restoring the default parameters of the Process level and the outputs

See chpt. 9.9 to access the Parameters menu.

The following data can be restored to their default values:

- user set data of the PARAM menu (except the date, the time, the contrast and brightness levels for the display),
- user set data of the DIAGNOSTIC menu,
- the periodicity of calibrations set in the menu Calib -> Sensor -> Probe -> Calib interval,
- the access codes to the menus.



→ Choose “Yes” to restore the default values.

→ Choose “No” to keep the set values.

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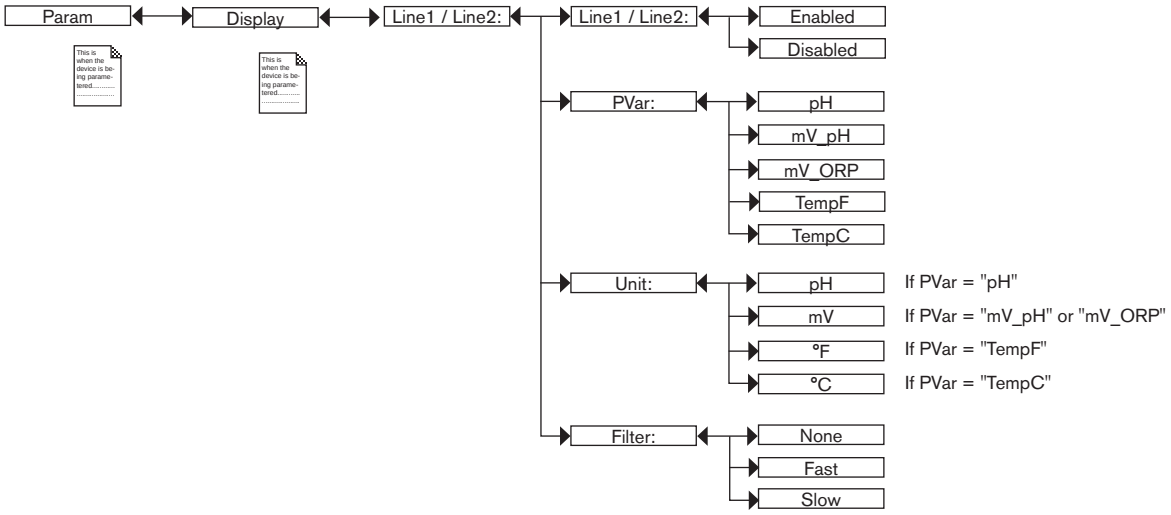
9.11.5 Setting the data displayed in the Process level

See chpt. 9.9 to access the Parameters menu.

WARNING

Risk of injury due to wrong adjustment.

- Before setting the parameters for the display, choose the type of probe mounted on the device. Refer to chpt. 9.11.11.



PVAR: choose the process value to be displayed in the line selected.

UNIT: choose the unit for the process value displayed.

FILTER: choose the filter level for the measurement values displayed on the line selected. Three filter levels are proposed: "slow", "fast" or "none".

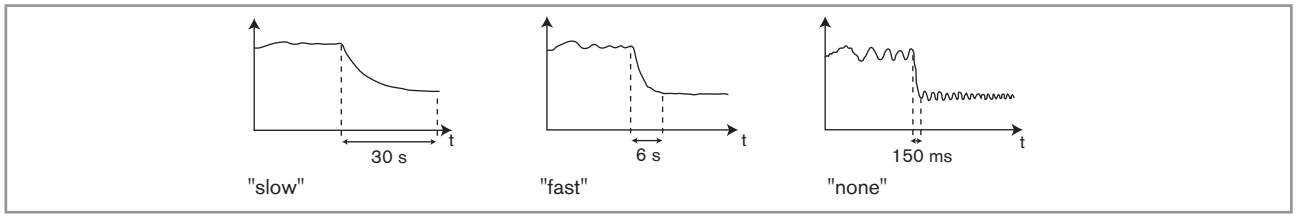


Fig. 36: Filter curves

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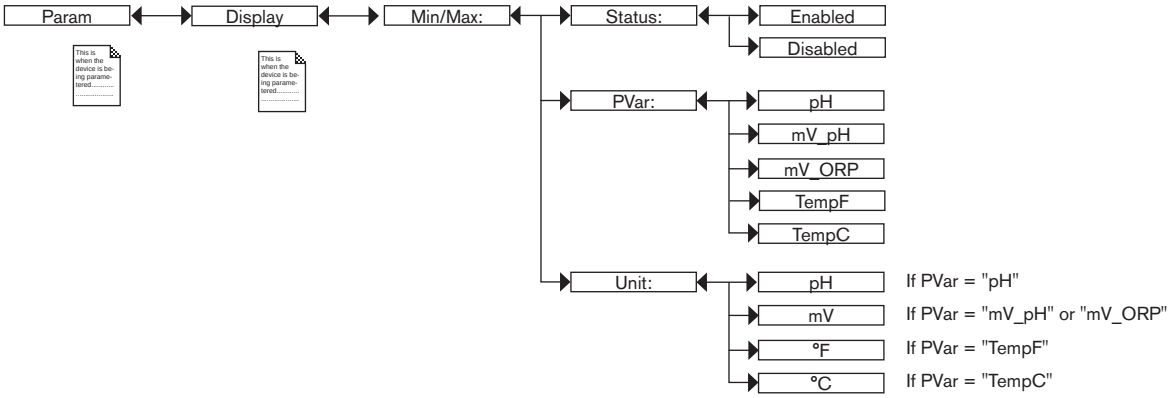
9.11.6 Displaying the lowest and highest values measured

See chpt. 9.9 to access the Parameters menu.

WARNING

Risk of injury due to wrong adjustment.

- Before setting the parameters for the display, choose the type of probe mounted on the device. Refer to chpt. 9.11.11.



STATUS: choose to display (choice “Enabled”) or not display (choice “Disabled”) the highest and lowest measured values (of the measurable variable chosen in PVAR hereafter) since the latest reset or the power-up of the device.

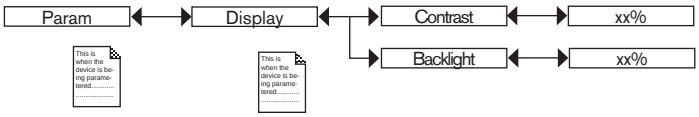
PVAR: choose the measurable variable which highest and lowest measured values are displayed in the Process level.

UNIT: choose the preferred unit in which the lowest and highest measured values are displayed.

9.11.7 Setting the display contrast and brightness

See chpt. 9.9 to access the Parameters menu.

On a device variant with a single M12 fixed connector and if the power supply is lower than 16 V, do not increase the backlight over 14 %, to not influence the 4...20 mA current output.



→ Set each percentage using and .

CONTRAST: Choose the display contrast level (as a %).

BACKLIGHT: Choose the light intensity of the display (as a %).

These settings only affect the display module. They are not factored in during a device data UPLOAD. Refer to chpt. 9.11.1.

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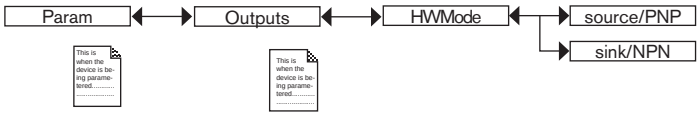
9.11.8 Choosing the output wiring mode

See chpt. 9.9 to access the Parameters menu.



The setting has no effect on a device variant with one fixed connector, if the sole current output is wired. Refer to Fig. 23 in chpt. 8.3.3.

The wiring mode is the same for all outputs.

→ If "sink/ NPN" is set, wire the current outputs in sinking mode and the transistor outputs in NPN.

→ If "source/ PNP" is set, wire the current outputs in sourcing mode and the transistor outputs in PNP.

See chpt. "8.3 Wiring".

9.11.9 Setting the parameters of the current outputs

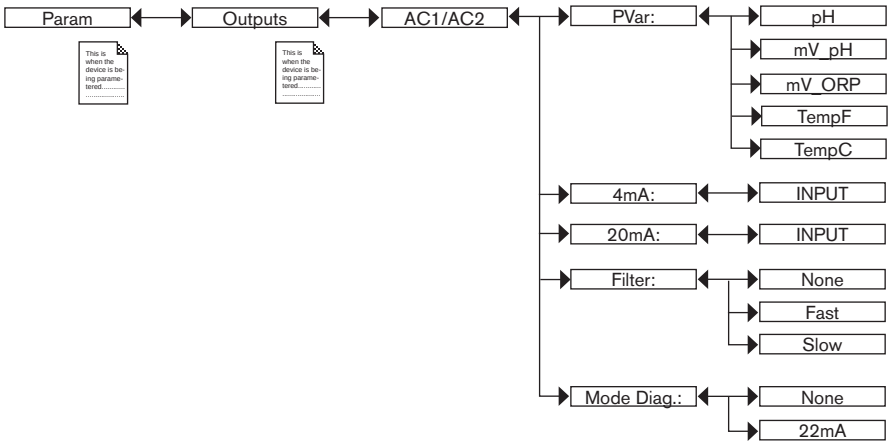
See chpt. 9.9 to access the Parameters menu.

WARNING

Risk of injury due to wrong adjustment.

- Before setting the parameters for the display, choose the type of probe mounted on the device. Refer to chpt. 9.11.11.

The 2nd current output "AC2" is only available on a device variant with 2 fixed connectors.



PVAR: choose a process value associated with current output 1 or current output 2 respectively.

Functions "4mA" and "20mA" are used to define the measurement range for the process value associated with the current on the 4...20 mA output.

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P_1 and P_2 are the values associated with a current of 4 mA or 20 mA respectively:

If P_1 is higher than P_2, the signal is inverted and the range P_1–P_2 corresponds to the range for the 20...4 mA current.

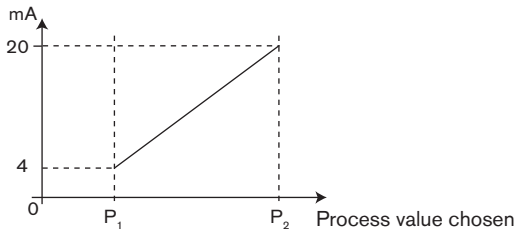

Fig. 37: 4...20 mA current depending on the process value selected

4mA: choose the value of the process value (previously selected), associated with a current of 4 mA , for each current output.

20mA: choose the value of the process value (previously selected), associated with a current of 20 mA , for each current output.

FILTER: choose the level of damping for the fluctuations of the current value for each current output. Three damping levels are proposed: "slow", "fast" or "none". The damping for the current outputs is similar to the damping of the display (see Fig. 36, chpt .9.11.5).

MODE DIAG: choose to emit a current of 22 mA on the current output selected when an "error" event related to diagnostics (see chpt. 9.13.2 and 9.13.3) is generated by the device or allow the current output to operate normally (choose "none").

An "error" event linked to a malfunction of the device is always indicated by the generation of a 22 mA current, whatever the adjustment made in the function "MODE DIAG.".

See also chpt. "10.5 Solving a problem".

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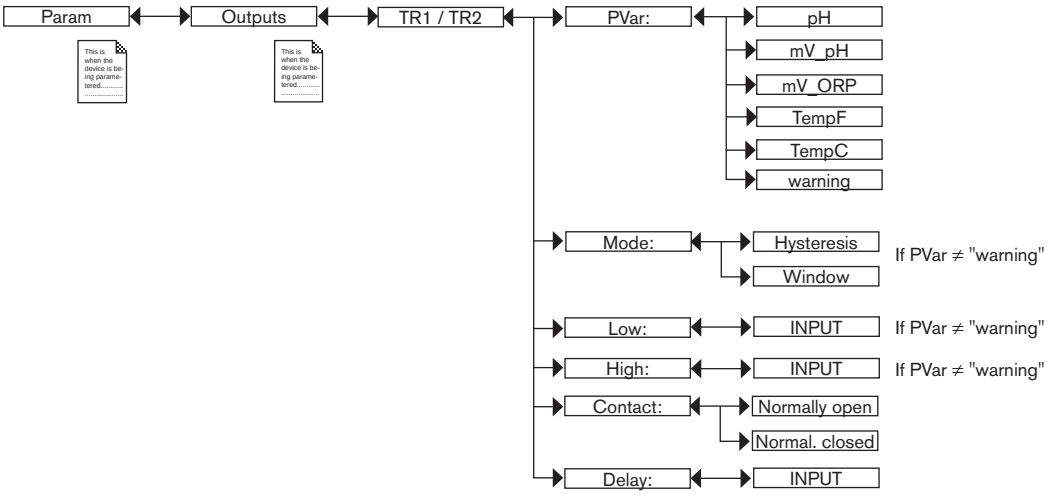
9.11.10 Setting the parameters of the transistor outputs

See chpt. 9.9 to access the Parameters menu.

WARNING

Risk of injury due to wrong adjustment.

- Before setting the parameters for the display, choose the type of probe mounted on the device. Refer to chpt. 9.11.11.



PVAR: choose a process value associated with transistor output 1 or transistor output 2 respectively or associate the generation of a "warning" event (see chpt. 9.12.4, 9.13.2, 9.13.3 and 9.15.1) to transistor output 1 or transistor output 2 respectively.

If the selected transistor output is linked to the "warning" event, the transistor switches as soon as such an event is generated by the device.

See also chpt. "10.5 Solving a problem".

MODE: choose the operating mode for transistor output 1 or transistor output 2 (see Fig. 38 and Fig. 39).

LOW: enter the low switching threshold value for transistor output 1 or transistor output 2 (see Fig. 38 and Fig. 39).

HIGH: enter the high switching threshold value for transistor output 1 or transistor output 2 (see Fig. 38 and Fig. 39).

CONTACT: choose the type of off-position (normally open, NO, or normally closed, NC) for transistor output 1 or transistor output 2 (see Fig. 38 and Fig. 39).

DELAY: choose the value of the time delay prior to switching for each transistor output.

Switching only occurs if one of the thresholds, high or low (functions "High" or "Low"), is exceeded for a duration longer than this time delay. The time delay before switching is applicable to both output thresholds.

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Hysteresis operating

The change of status is done when a threshold is detected (increasing measured value: threshold high (function High) to be detected; decreasing measured value: threshold low (function Low) to be detected).

Fig. 38: Hysteresis operating

Window operating

The change of status occurs whenever one of the thresholds is detected.

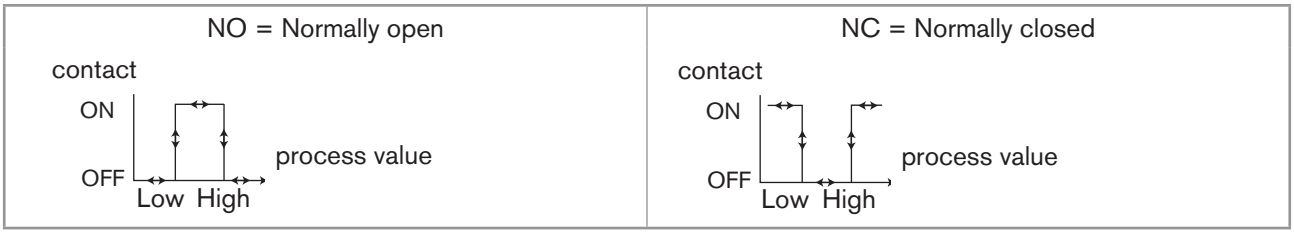
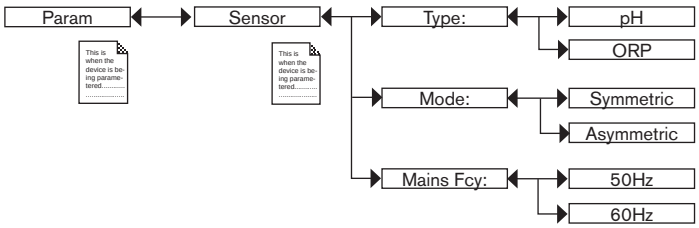


Fig. 39: Window operating

9.11.11 Setting the sensor parameters

The monitoring (see chpt. 9.13.2) of the redox ("ORP") sensor is impossible if the measurement mode is set to "asymmetrical".

See chpt. 9.9 to access the Parameters menu.



TYPE: choose the type of sensor used, pH or Redox ("ORP" choice)

MODE: choose the type of measurement, symmetrical (differential) or asymmetrical.

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Symmetrical measurement

The symmetrical measurement is a differential measurement: in this type of measurement, the stainless steel ring on the sensor holder is used as a reference.

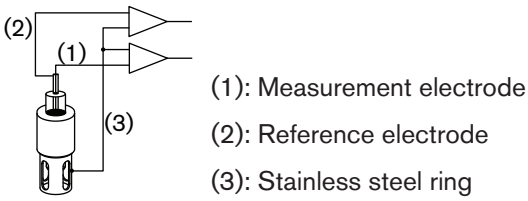


Fig. 40: Schematic diagram of symmetrical measurement

Asymmetrical measurement

In the asymmetrical measurement, the measurement is done in relation to the reference electrode.

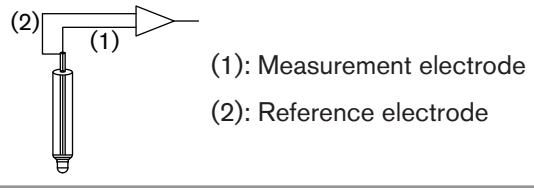


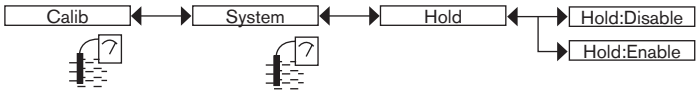
Fig. 41: Schematic diagram of asymmetrical measurement

MAINS FCY: choose the frequency of your mains electricity, 50 or 60 Hz. This frequency is filtered by the device to ensure stable measurements.

9.12 Knowing the Calibration menu

9.12.1 Activating/deactivating the Hold function

See chpt. 9.9 to access the Calibration menu.



If the mode "Hold" is activated and if there is a power interruption, then, when the device restarts, the mode "Hold" is automatically deactivated.

The mode "Hold" is used to carry out maintenance work without interrupting the process.

To activate the mode HOLD:

→ access the "HOLD" function;

→ choose "enabled" and confirm by "OK".

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To deactivate the mode HOLD:

→ access the "HOLD" function;

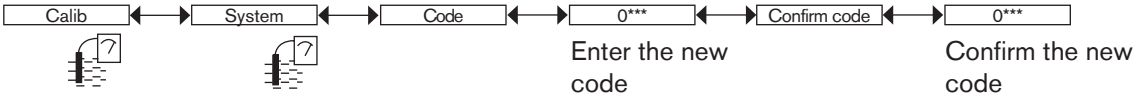
→ choose "disabled" and confirm by "OK".

In practice, when the device is in mode "Hold":

- the HOLD icon is displayed in place of the icon;
- the current emitted on each 4...20 mA output is fixed at the value of the last measurement of the physical parameter associated with each output;
- each transistor output is fixed at the status acquired at the moment the Hold function is activated;
- the device is in Hold mode until the HOLD function is deactivated.

9.12.2 Modifying the Calibration menu access code

See chpt. 9.9 to access the Calibration menu.

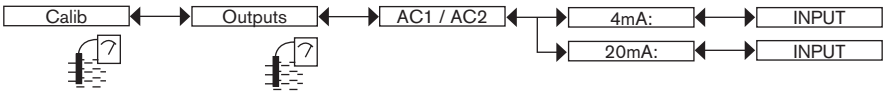


If the default code (0000) is entered, the code will not be requested to access the menu.

9.12.3 Adjusting the current outputs

See chpt. 9.9 to access the Calibration menu.

On a device variant with a single M12 fixed connector and if the power supply is lower than 16 V, before adjusting the current output, make sure the backlight is lower as 14 %. Refer to chpt. 9.11.7.



4mA: adjust the current output 1 or current output 2 for 4 mA.

When the "4mA" function is selected, the device generates a current of 4 mA : measure the current emitted by the 4...20 mA output using a multimeter and enter the value given by the multimeter in the function "AC1.4mA" or "AC2.4mA".

20mA: adjust the current output 1 or current output 2 for 20 mA.

When the "20mA" function is selected, the device generates a current of 20 mA: measure the current emitted by the 4...20 mA output using a multimeter and enter the value given by the multimeter in the function "AC1.20mA" or "AC2.20mA".

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9.12.4 Calibrating the pH sensor

DANGER

Risk of injury due to electrical voltage

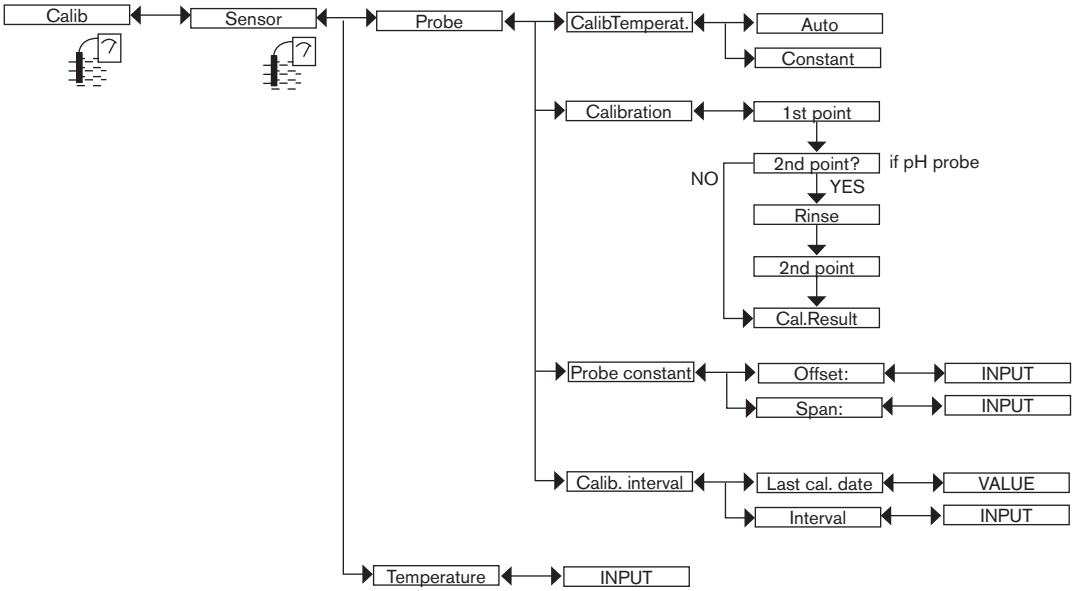
▸ Observe all applicable accident protection and safety regulations for electrical equipment.

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.

See chpt. 9.9 to access the Calibration menu.

Before calibrating the sensor, choose the type of probe mounted on the device. Refer to chpt. 9.11.11.



CALIB TEMPERAT.: choose the type of temperature compensation for the calibration process: either the temperature measured (select "Auto") or a fixed value (select "constant" then enter reference temperature).

→ Calibrate the sensor using one of the following methods:

- *CALIBRATION*: calibrate the pH sensor in 1 or 2 points (see details hereafter). A calibration process updates the last calibration date ("Last cal. date" function of the CALIB INTERVAL sub-menu hereafter).
- *PROBE CONSTANTS*: enter the offset and/or span values indicated on the pH sensor certificate, if supplied. This input replaces a calibration made by the "Calibration" function above but does not update the last calibration date ("Last cal. date" function of the CALIB INTERVAL sub-menu hereafter).

CALIB INTERVAL: read the date of the last calibration (function "Last cal. date") and set the periodicity of calibrations, in days (function "Interval"): the device generates a "maintenance" event by displaying the icon and a "warning" event, each time a calibration is due. Set function "Interval" to "0000 days" to ignore the function.

- The "warning" event may be associated with one or other or both transistor outputs. Refer to chpt. 9.11.10.
- See also chpt. "10.5 Solving a problem".

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Calibrate the pH sensor ("Calibration" function in the "Probe" menu)

- The pH sensor can be calibrated according to a 1-point or a 2-point procedure.

- In order not to interrupt the process, activate the HOLD function. Refer to chpt. 9.12.1.
- Before each calibration, correctly clean the electrode with a suitable product.
- In a 2-point calibration, the buffer solutions used must be at the same temperature.
- Set the periodicity of calibrations in the "Interval" function in the sub-menu CALIB INTERVAL (see above): each time a calibration is due, the device generates a "maintenance" event and a "warning" event.

1-point calibration

The 1-point calibration procedure is used for quick calibration by adjusting the offset of the measurement graph with a buffer respectively a calibration solution with a known pH (to calibrate a pH sensor: see page 59)

2-point calibration

The 2-point calibration procedure is used for the precise calibration of the offset and the gradient ("span") of the sensor measurement graph.

This operation requires 2 buffer solutions: in general a first solution with a pH of 7 and a second solution with a pH very close to that of the process value to be measured (see page 59).

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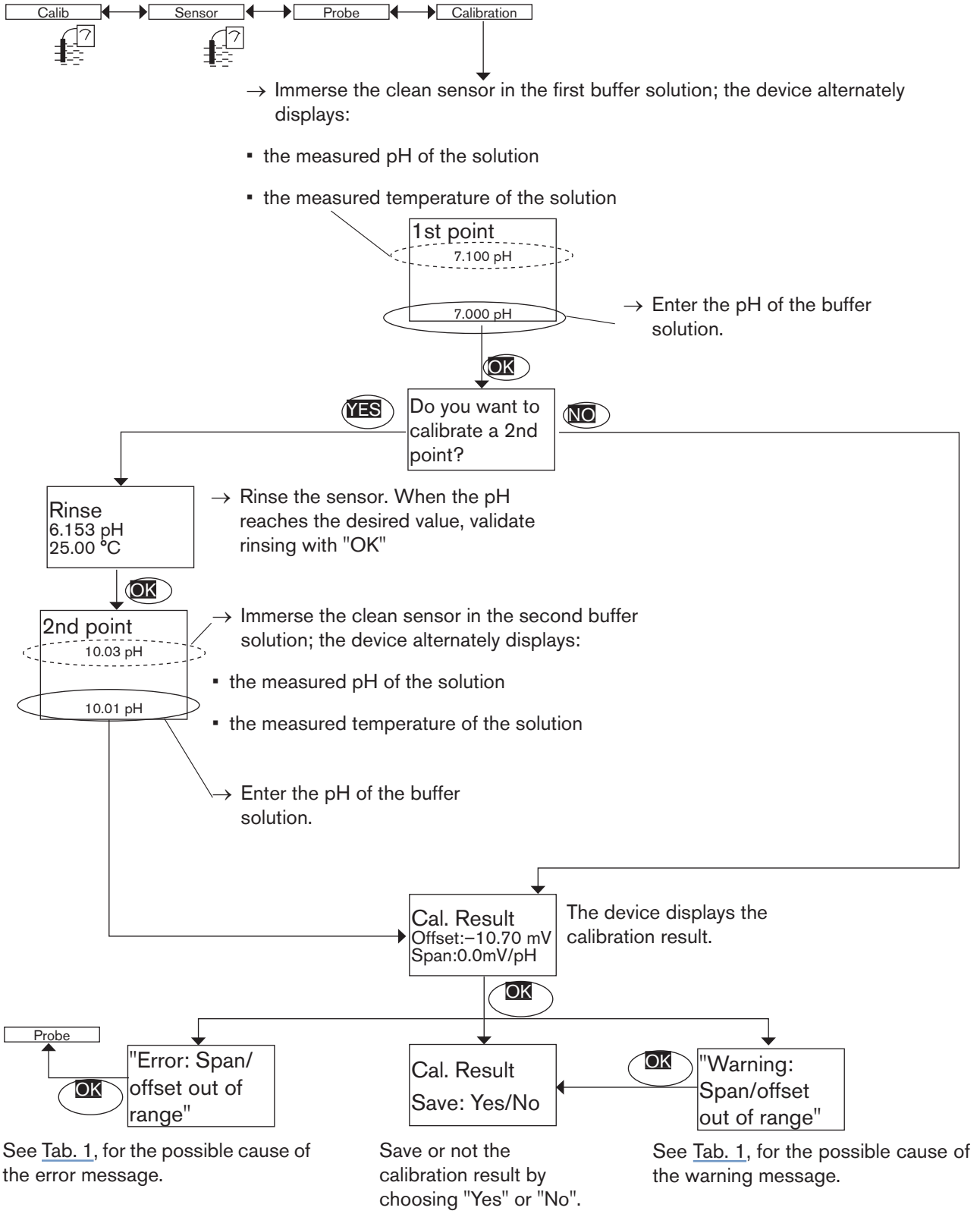
Detailed procedure for the 1- or 2-points calibration of the pH probe



See Tab. 1, for the possible cause of the error message.

Save or not the calibration result by choosing "Yes" or "No".

See Tab. 1, for the possible cause of the warning message.

At the end of calibration of the pH sensor, two types of messages may be displayed:

Tab. 1 : Warning and error messages during pH sensor calibration

Message	"span" value	"offset" value	Possible cause	Recommended action
"Warning:Span/ offset out of range"	50 mV/pH < span < 53 mV/pH or 63 mV/pH < span < 65 mV/pH	−60 mV < Offset < −35 mV or 35 mV < Offset < 60 mV	Error in the buffer solution.	→ Use the correct buffer solution.
			The probe has reached halfway in its lifespan	→ The values can be saved or not.
"Error:Span/ offset out of range"	< 50 mV/pH or > 65 mV/pH	< −60 mV or > 60 mV	The probe must be replaced.	→ Replace the probe. → Calibrate the device again when the new probe is in place

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9.12.5 Calibrating the Redox- ("ORP"-) sensor

DANGER

Risk of injury due to electrical voltage

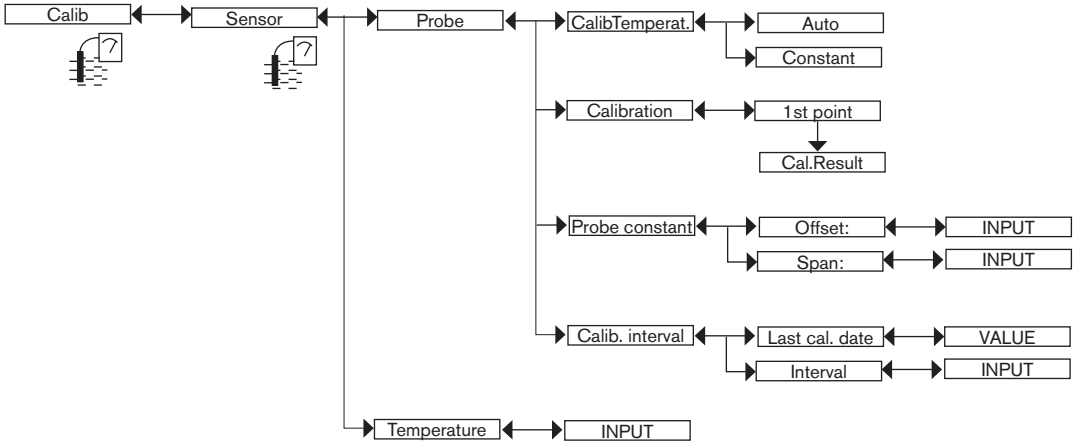
- Observe all applicable accident protection and safety regulations for electrical equipment.

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.

See chpt. 9.9 to access the Calibration menu.

Before calibrating the sensor, choose the type of probe mounted on the device. Refer to chpt. 9.11.11.



CALIB TEMPERAT.: choose the type of temperature compensation for the calibration process: either the temperature measured (select "Auto") or a fixed value (select "constant" then enter reference temperature).

→ Calibrate the sensor using one of the following methods:

- *CALIBRATION*: calibrate the Redox ("ORP") sensor in 1 point (see page 63). A calibration process updates the last calibration date ("Last cal. date" function of the CALIB INTERVAL sub-menu hereafter).
- *PROBE CONSTANTS*: enter the offset and/or span values indicated on the Redox ("ORP") sensor certificate, if supplied. This input replaces a calibration made by the "Calibration" function above but does not update the last calibration date ("Last cal. date" function of the CALIB INTERVAL sub-menu hereafter).

CALIB INTERVAL: read the date of the last calibration (function "Last cal. date") and set the periodicity of calibrations, in days (function "Interval"): the device generates a "maintenance" event by displaying the icon and a "warning" event, each time a calibration is due. Set function "Interval" to "0000 days" to ignore the function.

- The "warning" event may be associated with one or other or both transistor outputs. Refer to chpt. 9.11.10.
- See also chpt. "10.5 Solving a problem".

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Calibrate the Redox ("ORP") sensor ("Calibration" function in the "Probe" menu)

- The Redox ("ORP") sensor can be calibrated according to a 1-point procedure.

- In order not to interrupt the process, activate the HOLD function. Refer to chpt. 9.12.1.
- Before each calibration, correctly clean the electrode with a suitable product.
- Set the periodicity of calibrations in the "Interval" function in the sub-menu CALIB INTERVAL (see heretofore): each time a calibration is due, the device generates a "maintenance" event and a "warning" event.

1-point calibration

The 1-point calibration procedure is used for quick calibration by adjusting the offset of the measurement graph with a buffer respectively a calibration solution with a known oxidation reduction potential ("ORP").

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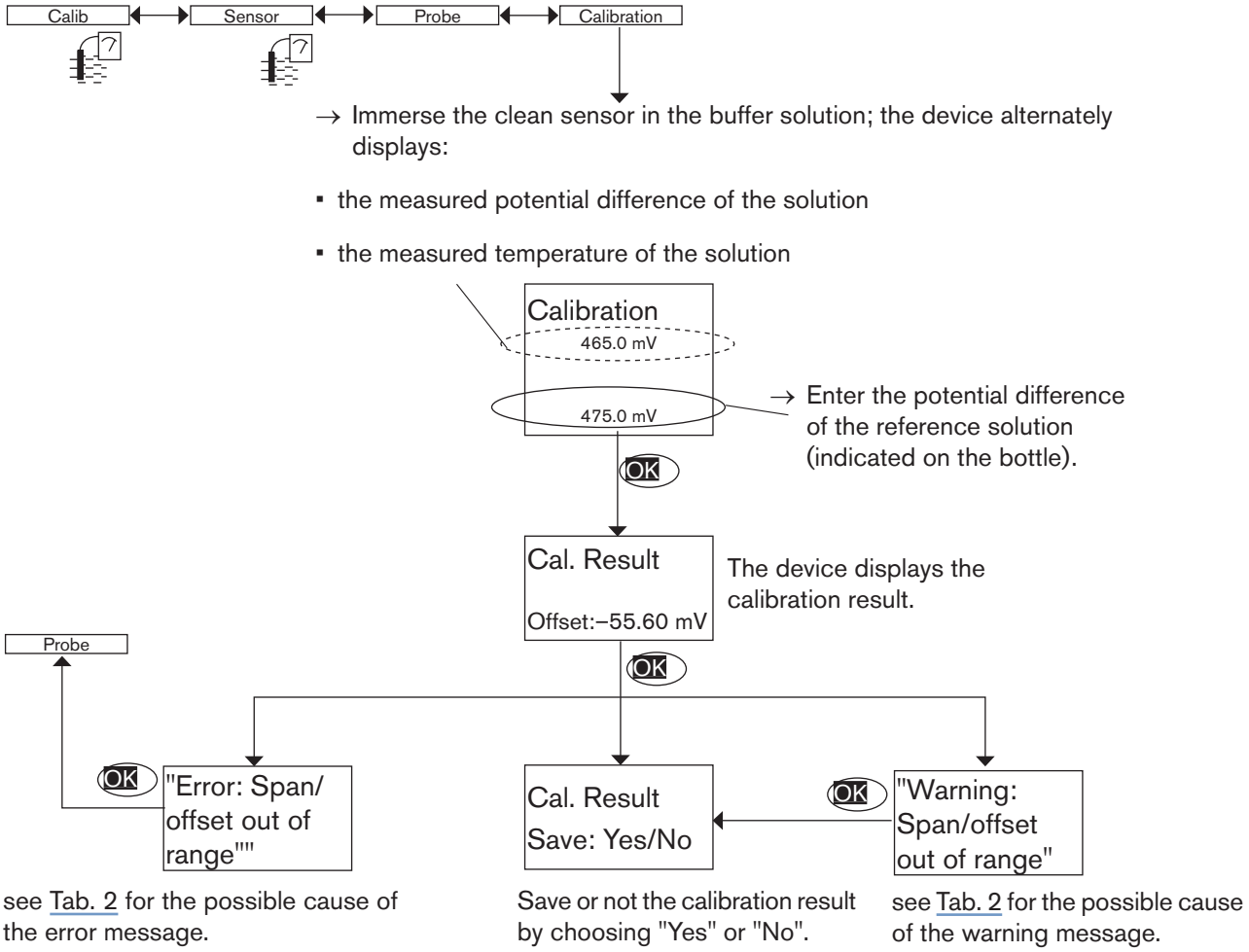
Detailed procedure for the 1-point calibration of the oxidation reduction potential ("ORP") sensor



At the end of calibration of the oxidation reduction potential ("ORP") probe, two types of message may be displayed:

Tab. 2 : Warning and error messages when calibrating an oxidation reduction potential ("ORP") probe

Message	"offset" value	Possible cause	Recommended action
warning: "Warning:Span/ offset out of range"	–60 mV < Offset < –35 mV or 35 mV < Offset < 60 mV	Error in the buffer solution.	→ Use the correct buffer solution.
		The probe has reached halfway in its lifespan	→ The values can be saved or not.
error: "Error:Span/ offset out of range"	< –60 mV or > 60 mV	The probe must be replaced.	→ Replace the probe. → Calibrate the device again when the new probe is in place

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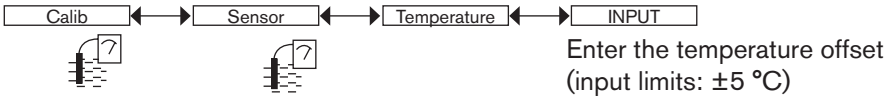
9.12.6 Entering an offset for the temperature measurement

See chpt. 9.9 to access the Calibration menu.

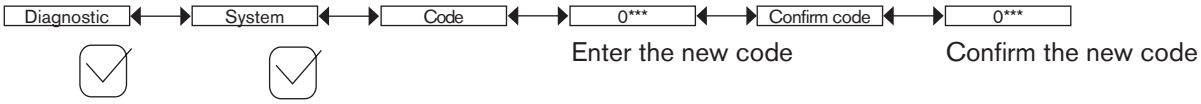
The temperature transmitted by the Pt1000 probe may be corrected. This correction value is the temperature offset.



9.13 Knowing the Diagnostic menu

9.13.1 Modifying the Diagnostic menu access code

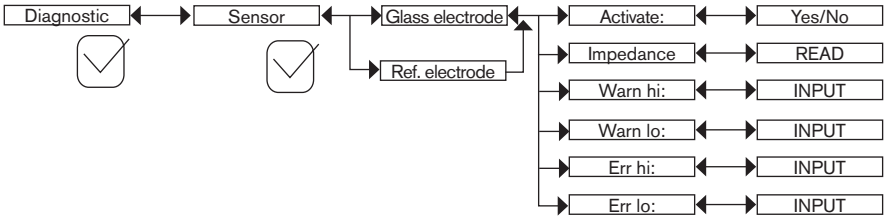
See chpt. 9.9 to access the Diagnostic menu.



If the default code (0000) is entered, the code will not be requested to access the menu.

9.13.2 Monitoring the condition of the probe

See chpt. 9.9 to access the Diagnostic menu.



Too low or too high an impedance value of one or the other electrode of the measuring probe may indicate that the probe is broken or used.

Tab. 3 : Possible combinations of electrode monitoring depending on the measurement mode, symmetrical or asymmetrical

Measurement mode (see chpt. 9.11.11)	Monitoring of the impedance			
	pH probe		Redox ("ORP") probe	
	Glass electrode	Reference electrode	Glass electrode	Reference electrode
Symmetrical	Possible	Possible	Impossible	Possible
Asymmetrical	Possible	Impossible	Impossible	Impossible

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To be warned when an electrode has too low or too high an impedance:

→ activate monitoring on this electrode in the function "activate", then

→ set an impedance range (in MΩ for the pH electrode and in kΩ for the reference electrode of the pH/redox ("ORP") probe) outside of which the device generates a "warning" event and displays the ☹ and ⚠ icons.

→ set an impedance range (in MΩ for the pH electrode and in kΩ for the reference electrode of the pH/redox ("ORP") probe) outside of which the device generates an "error" event and displays the ☹ and ERR icons.

When the device generates a "warning" or "error" event:

→ go into the "Info" menu to read the cause of the event generation.

→ and/or go into the "Sensor" function of the Diagnostic menu to read the impedance values for each electrode in order to identify the cause of an out of range impedance.

→ if necessary, clean then recalibrate the measurement probe or replace it.

- The "warning" event may also be associated with one or other or both transistor outputs. See chpt. 9.11.10, function "Output.TR1" or "Output.TR2".
- The "error" event may also be associated with one or other or both current outputs. See chpt. 9.11.9, function "Output.AC1" or "Output.AC2".
- See also chpt. "10.5 Solving a problem"..

ACTIVATE: choose whether or not to activate monitoring of the impedance of the selected electrode.

IMPEDANCE: read the impedance measured of the selected electrode.

WARN HI: enter the impedance value above which a "warning" event is generated.

WARN LO: enter the impedance value below which a "warning" event is generated.

ERR HI: enter the impedance value above which an "error" event is generated.

ERR LO: enter the impedance value below which an "error" event is generated.

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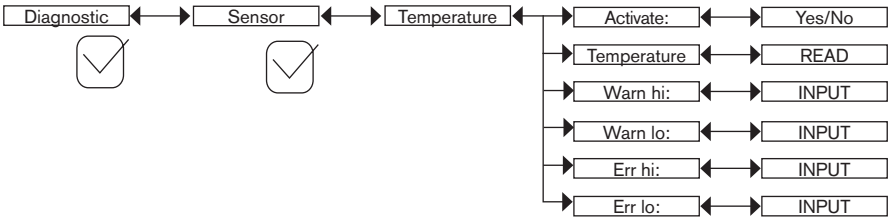
9.13.3 Monitoring the fluid temperature

See chpt. 9.9 to access the Diagnostic menu.

The function allows for monitoring the fluid temperature and configure the behaviour of the device if the parametered ranges are exceeded.

A malfunction in your process or the built-in temperature probe may be indicated either by too low or too high a fluid temperature or by an incorrect temperature measurement.



To be warned when the fluid temperature is too low or too high:

→ activate monitoring of the fluid temperature in the function "activate", then

→ set a temperature range (in °C) outside of which the device generates a "warning" event and displays the and ⚠ icons.

→ set a temperature range (in °C) outside of which the device generates an "error" event and displays the and ERR icons.

When the device generates a "warning" or "error" event:

→ go into the "Info" menu to read the cause of the event generation.

→ and/or go into the "Sensor" function of the Diagnostic menu to read the measured temperature value.

→ then check whether the built-in Pt1000 is working correctly by measuring a fluid with a known temperature. If the Pt1000 is faulty, return the device to Bürkert.

→ if the Pt1000 is not the cause of the problem, check the process.

- The "warning" event may also be associated with one or other or both transistor outputs. See chpt. 9.11.10, function "Output.TR1" or "Output.TR2".
- The "error" event may also be associated with one or other or both current outputs. See chpt. 9.11.9, function "Output.AC1" or "Output.AC2".
- See also chpt. "10.5 Solving a problem".

ACTIVATE: choose whether or not to activate monitoring of the fluid temperature.

TEMPERATURE: read the fluid temperature measured in real time through the built-in Pt1000.

WARN HI: enter the fluid temperature value above which a "warning" event is generated.

WARN LO: enter the fluid temperature value below which a "warning" event is generated.

ERR HI: enter the fluid temperature value above which an "error" event is generated.

ERR LO: enter the fluid temperature value below which an "error" event is generated.

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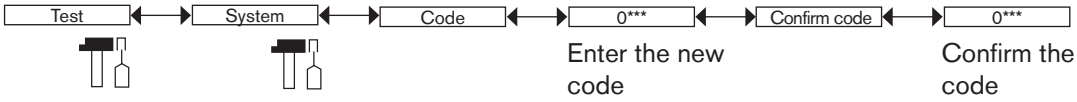
9.14 Knowing the Test menu

9.14.1 Modifying the Test menu access code

See chpt. 9.9 to access the Test menu.

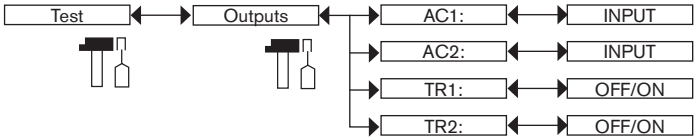


If the default code (0000) is entered, the code will not be requested to access the menu.

9.14.2 Checking the outputs functions

See chpt. 9.9 to access the Test menu.

- Make sure that the mode "Hold" is deactivated. Refer to chpt. 9.12.1.
- The T icon is displayed in place of the icon as soon as the check for the correct working of an output has started. During the check the related output does not react according to the measured physical value.



AC1: check that current output 1 is working correctly by entering a current value and then selecting "OK".

AC2: check that current output 2 is working correctly by entering a current value and then selecting "OK".

TR1: check that transistor output 1 is working correctly by selecting the status of the transistor ("ON" or "OFF") then "OK".

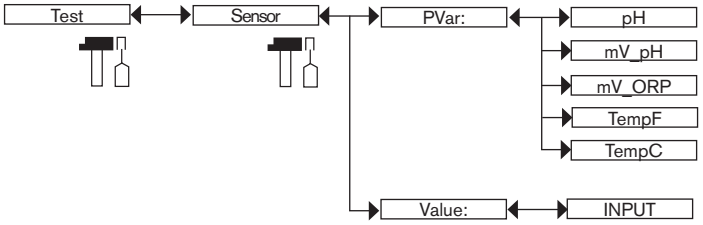
TR2: check that transistor output 2 is working correctly by selecting the status of the transistor ("ON" or "OFF") then "OK".

9.14.3 Checking the outputs behaviour

See chpt. 9.9 to access the Test menu.

- Make sure that the mode "Hold" is deactivated. Refer to chpt. 9.12.1.
- The T icon is displayed in place of the icon as soon as the check for the correct working of an output has started. During the check the related output does not react according to the measured physical value.

The feature allows for simulating the measurement of the process value to check if the outputs are correctly configured.



PVAR: choose the process value to be tested.

VALUE: enter a process value selected from the "PVAR" function above to check output behaviour.

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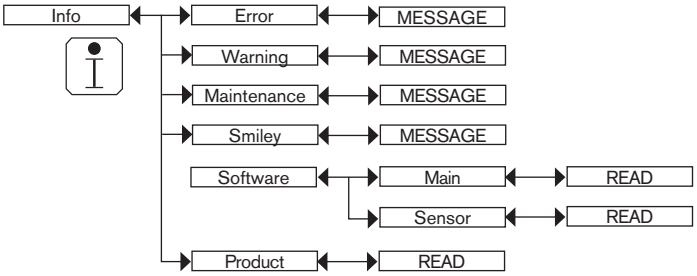
9.15 Knowing the Information menu

9.15.1 Reading the cause of events linked to icons

See chpt. 9.9 to access the Info menu.



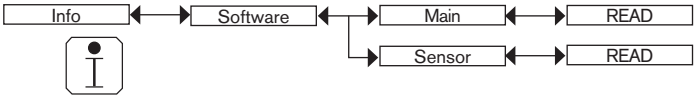
The function allows for reading a short description of the reason why the following icons are displayed by the device:

- ERROR:
- WARNING:
- MAINTENANCE:
- SMILEY: or

See also chpt. "10.5 Solving a problem".

9.15.2 Reading the software versions

See chpt. 9.9 to access the Info menu.

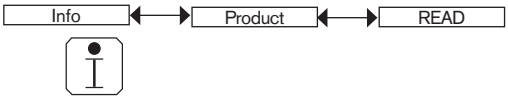


The function allows for reading:

- the software version of the acquisition / conversion board ("Main") for the measurable variables,
- the software version of the sensor ("Sensor").

9.15.3 Reading some identification informations of the device

See chpt. 9.9 to access the Info menu.



The function allows for reading some of the informations that are on the name plate of the device:

- the type of the device,
- the serial number,
- the article number.

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10 MAINTENANCE AND TROUBLESHOOTING

10.1 Safety instructions

DANGER

Risk of injury due to electrical voltage.

- Before carrying out work on the system or the device, disconnect the electrical power for all the conductors and isolate it.
- 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 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.

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.

WARNING

Risk of injury due to non-conforming 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 Cleaning the device

- Activate the HOLD function (see chpt. 9.12.1) in the Calibration menu in order not to interrupt the process during cleaning.
- Always use a cleaning product compatible with the materials from which the device is made.

→ Clean device with a cloth dampened with water or a detergent compatible with the materials the device is made of.

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

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10.2.1 Cleaning the pH/Redox ("ORP") probe

Refer to the Operating Instructions delivered with the probe used.

10.3 Replacing the probe

DANGER

Risk of injury due to electrical voltage.

- Before carrying out work on the system or the device, disconnect the electrical power for all the conductors and isolate it.
- 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 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.

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.

NOTICE

The device loses the IP65 and IP67 protection ratings when dismounted.

- Protect the inside of the dismounted device.

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→ Remove the probe as shown in Fig. 42.

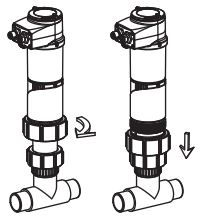
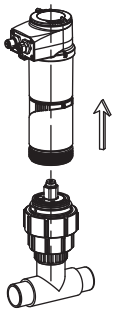
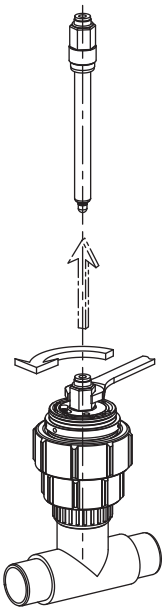
	→ Unscrew the nut between the sensor holder and the electronic module.
	→ Remove the electronic module by pulling it straight out. There may be a slight resistance due to the seal.
	→ Unscrew the probe using a suitable wrench. → Remove it carefully from the holder. → Clean any fluid projections on the electrical contacts on the holder.

Fig. 42: Removing the probe from the holder

→ Fit a new probe into the holder as shown in chpt. 7.6.

→ Charge the pipe to check that the mounting is tight.

→ Refit the electronic module to the holder as shown in chpt. 7.7

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10.4 Replacing the seal of the sensor holder

DANGER

Risk of injury due to electrical voltage.

- Before carrying out work on the system or the device, disconnect the electrical power for all the conductors and isolate it.
- 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.

The seal can be replaced without dismounting the holder from the pipe. Refer to Fig. 43.

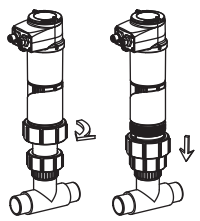
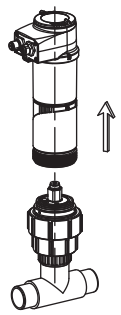
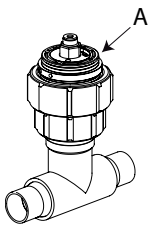
	→ Unscrew the nut between the sensor holder and the electronic module.
	→ Remove the electronic module by pulling it straight out. There may be a slight resistance due to the seal.
	→ Remove the used seal "A" from the holder. → Place the new seal "A" into the groove of the holder.

Fig. 43: Replacing the seal of the sensor holder

→ Charge the pipe to check that the mounting is tight.

→ Refit the electronic module to the holder as shown in Fig. 16 of chpt. 8.2.

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10.5 Solving a problem

Red LED	Current output	Transistor output	Icon	Message displayed in the Info menu	Possible cause	Recommended action
ON	22 mA	depending on thresholds	ERR + ☺	"E:Sat. ORP Stage" "E:Sat. pH Stage"	The pH or redox ("ORP") value is not being correctly measured due to the saturation of the input stage of the measuring board.	→ Check the correct wiring of the earth points. → Check the equipotential surfaces of the installation.
ON	22 mA	depending on thresholds	ERR + ☺	"Sensor not found"	The connection to the measurement module is interrupted.	→ Switch the power supply off then on again. → If the error persists, return the device to Bürkert.
ON	22 mA	depending on thresholds	ERR + ☺	"S EE Fact Read"	Factory data is lost. The device continues to measure but with a bad accuracy.	→ Switch the power supply off then on again. → If the error persists, return the device to Bürkert.
ON	22 mA	depending on thresholds	ERR + ☺	"S EE User Read" "S EE User Write"	User data for the sensor is lost (eg. type of sensor).	→ Switch the power supply off then on again. → Check the sensor parameters in all the "Sensor" menus then save them again. → If the error persists, return the device to Bürkert.
ON	22 mA	depending on thresholds	ERR + ☺	"S PT Missing"	The connection to the Pt1000 probe is lost. The temperature is displayed in the Process level with "+++++°C/°F".	→ Check that the nut between the sensor holder and the electronic module is correctly screwed. → If the error persists, return the device to Bürkert.
ON	22 mA	depending on thresholds	ERR + ☺	"S PT Regulation"	The fluid temperature is not being correctly measured. The process is stopped.	→ Switch the power supply off then on again. → If the error persists, return the device to Bürkert.
ON	22 mA	depending on thresholds	ERR + ☺	"TR COM Measure"	The acquisition/conversion module of the process values is faulty. The process is stopped.	→ Switch the power supply off then on again. → If the error persists, return the device to Bürkert.

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Red LED	Current output	Transistor output	Icon	Message displayed in the Info menu	Possible cause	Recommended action
ON	22 mA	depending on thresholds	ERR + ☺	"TR EE Fact Read" "TR EE User Read"	Parameter reading error.	→ Switch the power supply off then on again. → If the error persists, set the device back to the default settings (chpt. 9.11.4). → If the error persists, return the device to Bürkert.
ON	22 mA	depending on thresholds	ERR + ☺	"TR EE UserWrite"	Parameter saving error.	→ Switch the power supply off then on again. → Save the settings again. → If the error persists, set the device back to the default settings (chpt. 9.11.4). → If the error persists, return the device to Bürkert.
OFF	4...20 mA	depending on thresholds	⚠ + ☺	"S Diff pH ORP" "S Buff Diff pH" "S Buff Diff ORP"	The pH or redox ("ORP") value is not being correctly measured due to the saturation of the input stage of the measuring board (common mode).	→ Check the wiring. → Check the equipotential surfaces of the installation.
OFF	4...20 mA	depending on thresholds	⚠ + ☺	"S RTC Reinit"	The date and time are lost because the device has not been powered up for at least 5 days. The message is only displayed at the first powering up.	→ Set the date and time (see chpt. 9.11.2). → Energize the device for at least 4 hours so that the date and time are battery fed for 5 days.

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Red LED	Current output	Transistor output	Icon	Message displayed in the Info menu	Possible cause	Recommended action
ON	22 mA [1]	depending on thresholds	ERR + ☹	"E:Impedance Ref"	The impedance of the reference electrode is out of range. The message is displayed if the monitoring of the impedance of the reference electrode has been activated, depending on the set thresholds ERR LO and ERR HI (see chpt. 9.13.2).	→ Go into the "Sensor" function of the Diagnostic menu to read the impedance value of the reference electrode (chpt. 9.13.2). → If necessary, clean then recalibrate the measurement sensor or replace it.
ON	22 mA [1]	depending on thresholds	ERR + ☹	"E:Imped.Glass	The impedance of the pH electrode is out of range. The message is displayed if the monitoring of the impedance of the pH electrode has been activated, depending on the set thresholds ERR LO and ERR HI (see chpt. 9.13.2).	→ Go into the "Sensor" function of the Diagnostic menu to read the impedance value of the pH electrode (chpt. 9.13.2). → If necessary, clean then recalibrate the measurement sensor or replace it.
ON	22 mA [1]	depending on thresholds	ERR + ☹	"E:Temperature"	The fluid temperature is out of range. The message is displayed if the monitoring of the fluid temperature has been activated, depending on the set thresholds ERR LO and ERR HI (see chpt. 9.13.3).	→ Go into the "Sensor" function of the Diagnostic menu to read the measured fluid temperature (chpt. 9.13.3). → If necessary, check whether the built-in Pt1000 is working correctly by measuring a fluid with a known temperature. → If the Pt1000 is faulty, return the device to Bürkert. → If the Pt1000 is not the cause of the problem, check the process.

[1] if the MODE DIAG function of the "Output.AC1" or "Output.AC2" menu is set to "22mA" (see chpt. 9.11.9); else, the current output delivers a standard current between 4 and 20 mA

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Red LED	Current output	Transistor output	Icon	Message displayed in the Info menu	Possible cause	Recommended action
OFF	4...20 mA	Switched [2]	⚠ + ☹	"W:Impedance Ref"	The impedance of the reference electrode is out of range. The message is displayed if the monitoring of the impedance of the reference electrode has been activated, depending on the set thresholds WARN LO and WARN HI (see chpt. 9.13.2).	→ Go into the "Sensor" function of the Diagnostic menu to read the impedance value of the reference electrode (chpt. 9.13.2). → If necessary, clean then recalibrate the measurement sensor or replace it.
OFF	4...20 mA	Switched [2]	⚠ + ☹	"W:Imped. Glass"	The impedance of the pH electrode is out of range. The message is displayed if the monitoring of the impedance of the pH electrode has been activated, depending on the set thresholds WARN LO and WARN HI (see chpt. 9.13.3).	→ Go into the "Sensor" function of the Diagnostic menu to read the impedance value of the pH electrode (chpt. 9.13.3). → If necessary, clean then recalibrate the measurement sensor or replace it.
OFF	4...20 mA	Switched [2]	⚠ + ☹	"W:Temperature"	The fluid temperature is out of range. The message is displayed if the monitoring of the fluid temperature has been activated, depending on the set thresholds WARN LO and WARN HI (see chpt. 9.13.3).	→ Go into the "Sensor" function of the Diagnostic menu to read the measured fluid temperature (chpt. 9.13.3). → If necessary, check whether the built-in Pt1000 is working correctly by measuring a fluid with a known temperature. → If the Pt1000 is faulty, return the device to Bürkert. → If the Pt1000 is not the cause of the problem, check the process.

[2] If the "PVAR" function of the "Output.TR1" and/or "Output.TR2" menus is set to "warning" (see chpt. 9.11.10); else, the transistor outputs are operating depending on the set thresholds.

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Red LED	Current output	Transistor output	Icon	Message displayed in the Info menu	Possible cause	Recommended action
OFF	4...20 mA	Switched [2]		"M:Calib. Date"	A calibration is due. The periodicity of the calibrations is set within the "INTERVAL" function of the "CALIB INTERVAL" menu (see chpt. 9.12.4).	→ Calibrate the sensor (chpt. 9.12.4).

[2] If the "PVAR" function of the "Output.TR1" and/or "Output.TR2" menus is set to "warning" (see chpt. 9.11.10); else, the transistor outputs are operating depending on the set thresholds.

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11 SPARE PARTS AND ACCESSORIES

CAUTION

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

Incorrect accessories 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
Seal in EPDM, Ø 46x2 mm, for the sensor holder	**559169**

Accessory	Article number
Display module	**559168**
Set with 2 opaque housing-lids, with seals: - 1 screw housing-lid with 1 EPDM seal - 1 quarter turn closing housing-lid with 1 silicone seal	**560948**
Set with 2 transparent housing-lids, with seals: - 1 screw housing-lid with 1 EPDM seal - 1 quarter turn closing housing-lid with 1 silicone seal	**561843**
pH probe, 0...14 pH, 0...+80 °C, 0...6 bar, FLATRODE pH 120 mm	**561025**
pH probe, 0...14 pH, −10...+60 °C, 0...6 bar, LOGOTRODE pH 120 mm	**427114**
pH probe, 0...14 pH, 0...+130 °C, 0...6 bar, UNITRODE PLUS pH 120 mm	**560376**
pH probe, 0...14 pH, 0...+130 °C, 0...16 bar, CERATRODE pH 120 mm	**418319**
pH probe, 0...14 pH, −10...+40 °C, 0...6 bar, PLASTRODE pH 120 mm	**560377**
ORP probe, −2000...+2000 mV, 0...+80 °C, 0...6 bar, FLATRODE Redox 120 mm	**561027**
ORP probe, −2000...+2000 mV, −10...+50 °C, 0...6 bar, LOGOTRODE Redox 120 mm	**560379**
ORP probe, −2000...+2000 mV, 0...+130 °C, 0...6 bar, UNITRODE Redox 120 mm	**560378**
Storage solution for pH/ORP probe (KCl 3M), 500 ml	**418557**
Buffer solution, 500 ml, pH = 4.01	**418540**
Buffer solution, 500 ml, pH = 7	**418541**
Buffer solution, 500 ml, pH = 10.01	**418543**
Reference solution, ORP = 475 mV, 500 ml	**418 555**
Set of Cleaning solution for pH/ORP probes, 3x500 ml	**560949**
5-pin female M12 connector, to be wired	**917116**
5-pin female M12 female connector, moulded on shielded cable (2 m)	**438680**
5-pin male M12 connector, to be wired	**560946**
5-pin male M12 connector, moulded on shielded cable (2 m)	**559177**

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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 of the device without probe: −10...+60 °C.
- ▸ Storage temperature of the device with probe: refer to the Operating Instructions delivered with the probe used.

14 DISPOSAL OF THE DEVICE

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

NOTICE

Damage to the environment caused by parts contaminated by the fluid.

- ▸ Comply with the national and/or local regulations which concern the area of waste disposal.

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