bürkert
FLUID CONTROL SYSTEMS

Type 8202
ELEMENT

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

MAN 1000111231 EN Version: D Status: RL (released | freigegeben) printed: 19.01.2015

Operating Instructions

Bedienungsanleitung
Manuel d'utilisation

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Operating Instructions 1203/3_EU-ML_560329 _Original_FR

Contents

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1. ABOUT THIS MANUAL

This manual describes the entire life cycle of the device. Please keep this manual in a safe place, accessible to all users and any new owners.

This manual contains important safety information.

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

- This manual must be read and understood.

1.1. Symbols used

DANGER

Warns you against an imminent danger.

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

WARNING

Warns you against a potentially dangerous situation.

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

CAUTION

Warns you against a possible risk.

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

NOTE

Warns you against material damage.

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

Indicates additional information, advice or important recommendations.

Refers to information contained in this manual or in other documents.

→ Indicates a procedure to be carried out.

1.2. Validity of the manual

The manual describes the devices from V2 software version of the acquisition / conversion module for the measured process values.

Check this sofware version on the device in the menu Info -> Software -> Versions -> Main.

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2. INTENDED USE

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

- The 8202 transmitter is intended solely for the measurement of:
  - the pH in clean liquids or liquids containing solids, sulphides or proteins.
  - or the oxidation reduction potential in clean liquids or liquids containing solids, sulphides or proteins which may present low conductivity.
- This device must be protected against electromagnetic interference, ultraviolet rays and, when installed outdoors, the effects of climatic conditions.
- This device must be used in compliance with the characteristics and commissioning and use conditions specified in the contractual documents and in the user manual.
- Requirements for the safe and proper operation of the device are proper transport, storage and installation, as well as careful operation and maintenance.
- Only use the device as intended.

2.1. Restraints

Observe any existing restraints when the device is exported.

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3. BASIC SAFETY INFORMATION

This safety information does not take into account:

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

Danger due to high pressure in the installation.

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

Danger due to electrical voltage.

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

Danger due to high fluid temperatures.

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

Danger due to the nature of the fluid.

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

Various dangerous situations.

To avoid injury take care:

- to prevent any unintentional power supply switch-on.
- to carry out the installation and maintenance work by qualified and skilled staff with the appropriate tools.
- to guarantee a set or controlled restarting of the process after a power supply interruption.
- to use the device only if in perfect working order and in compliance with the instructions provided in the user manual.
- to observe the general technical rules during the planning and use of the device.
- not to use this device in explosive atmospheres.
- not to use this device in an environment incompatible with the materials from which it is made.
- not to make any external modifications to the device. Do not paint or varnish any part of the device.
- not to use fluid that is incompatible with the materials of which the transmitter is made.
- not to subject the device to mechanical loads (e.g. by placing objects on top of it or by using it as a step).

NOTE

The device may be damaged by the fluid in contact with.

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

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NOTE

Elements / Components sensitive to electrostatic discharges

- This device contains electronic components sensitive to electrostatic discharges. They may be damaged if they are touched by an electrostatically charged person or object. In the worst case scenario, these components are instantly destroyed or go out of order as soon as they are activated.
- To minimise or even avoid all damage due to an electrostatic discharge, take all the precautions described in the EN 61340-5-1 and 5-2 norms.
- Also ensure that you 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 branches can be found on the Internet at: www.burkert.com

4.2. Warranty conditions

The condition governing the legal warranty is the conforming use of the 8202 in observance of the operating conditions specified in this manual.

4.3. Informations on the internet

You can find the user manuals and technical data sheets regarding the type 8202 at: www.burkert.com

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5. DESCRIPTION

5.1. Area of application

The 8202 transmitter is intended solely for the measurement of:

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

Thanks to two fully adjustable transistor outputs, the transmitter 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. General description

5.2.1. Design

The 8202 transmitter comprises:

- a module for measuring process values, comprising:
  - a pH or Redox sensor measuring a potential difference (PD) in mV
  - a Pt1000 temperature sensor built in the holder of the pH or Redox 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 transmitter with pH sensor only)
  - acquisition of the resistance measured and conversion into temperature
- a display module with browse button used to read and/or configure the parameters of the device. The display module is available as an accessory.

One version of the 8202 transmitter 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 version, electrical connection is done via an M12, 5-point, male fixed connector.

One version of the 8202 transmitter 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 version, electrical connection is done via an M12, 5-point, male fixed connector and an M12, 5-point, female fixed connector.

5.2.2. pH or Redox probe

The transmitter 8202 can be fitted with a standard probe 120 mm long, measuring the pH or the oxidation reduction potential.

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 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.

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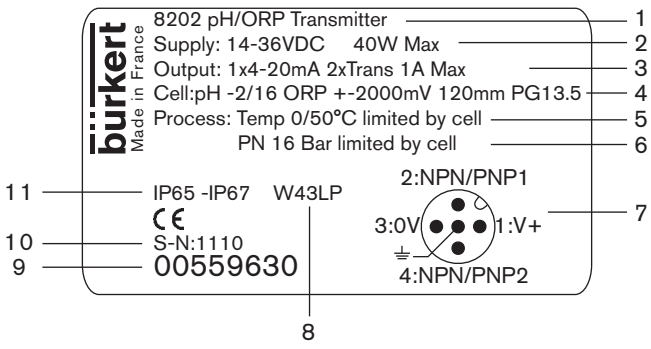
5.3. Description of the name plate



1. Type of transmitter and parameter measured
2. Electrical power supply and power consumption
3. Output specifications
4. Sensor specifications
5. Temperature range of the fluid, without sensor
6. Nominal pressure of the fluid, without sensor
7. Allocation of the pins on the M12 fixed connectors
8. Construction code
9. Order code
10. Serial number
11. Protection rating

Fig. 1 Name plate on the 8202 transmitter

5.4. Available versions

The following versions of the 8202 pH transmitter are available. These references include the electronic module and the sensor holder including the Pt1000.

The pH/Redox sensor, the display module and the fitting for connection to the process should be ordered separately. For the pH/Redox sensor and the display module, see the list of accessories in Chapter 11

Voltage supply	Outputs	Electrical connection	Sensor	Nut material	UL	Order code
14-36 V DC	2 transistors + 1 x 4-20 mA	Male 5-pin M12 fixed connector	without	PVC	no	**559630**
					yes	**559634**
				PVDF	no	**559632**
					yes	**559636**
12-36 V DC	2 transistors + 2 x 4-20 mA	Male 5-pin M12 fixed connector + female 5-pin M12 fixed connector	without	PVC	no	**559631**
					yes	**559635**
				PVDF	no	**559633**
					yes	**559637**

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6. TECHNICAL DATA

6.1. Conditions of use

Ambient temperature	-10 to +60 °C (without pH or Redox probe)
Air humidity	< 85 %, non condensated
Protection rating	IP65 and IP67 with connectors plugged in and tightened and electronic module cover fully screwed down

6.2. Conformity to standards and directives

The device conforms to the CE directives through the following standards:

- EMC: EN 61000-6-2, EN 61000-6-3
- Vibration: EN 60068-2-6
- Shock: EN 60068-2-27
- Pressure: complying with article 3 of §3 from 97/23/CE directive. Acc. to the 97/23/CE pressure directive, the device can only be used in the following cases (depending on max. pressure, pipe diameter and fluid):

Type of fluid	Conditions
Fluid group 1, §1.3.a	only DN25
Fluid group 2, § 1.3.a	DN ≤ 32 or DN > 32 and PNxDN ≤ 1000
Fluid group 1, § 1.3.b	DN ≤ 25 or DN > 25 and PNxDN ≤ 2000
Fluid group 2, § 1.3.b	DN ≤ 125

The UL devices conform to the following standards:

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

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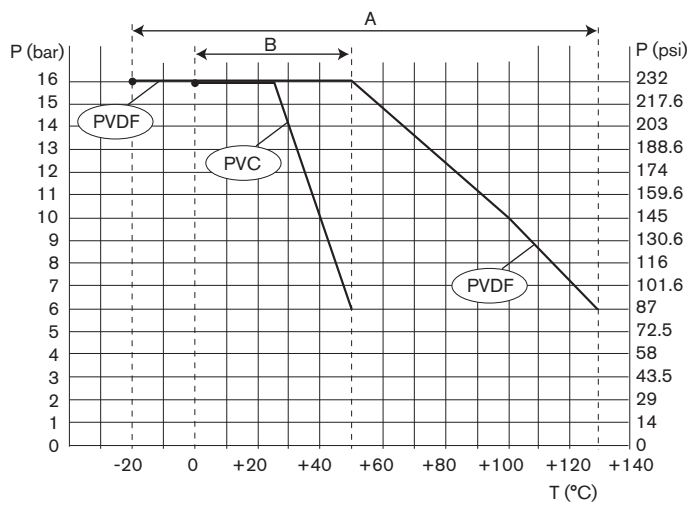
6.3. General technical data

6.3.1. Mechanical data



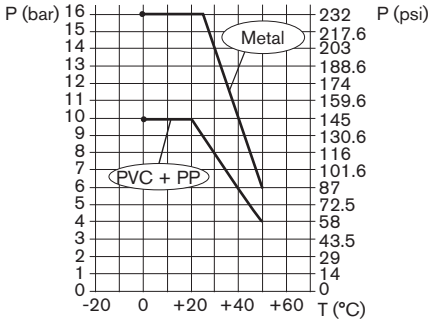
- A: application range of a 8202 with a PVDF nut
- B: application range of a 8202 with a PVC nut

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

P = Fluid pressure

T = Fluid temperature

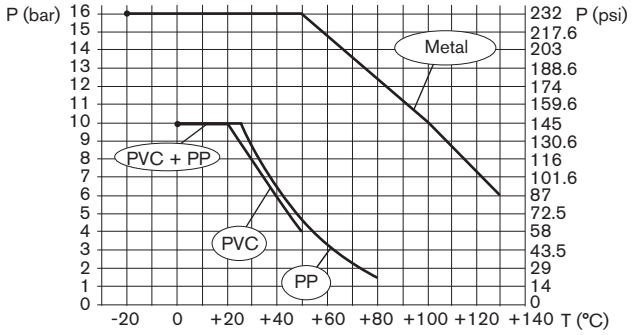
Fig. 2 Fluid temperature / pressure dependency of the 8202 (without the probe) with a PVC or PVDF nut



P = Fluid pressure

T = Fluid temperature

Fig. 3 Fluid temperature / pressure dependency of the 8202 (without the probe) with a PVC nut and a metal, PVC or PP S022 adapter



P = Fluid pressure

T = Fluid temperature

Fig. 4 Fluid temperature / pressure dependency of the 8202 (without the probe) with a PVDF nut and a metal, PVC or PP S022 adapter

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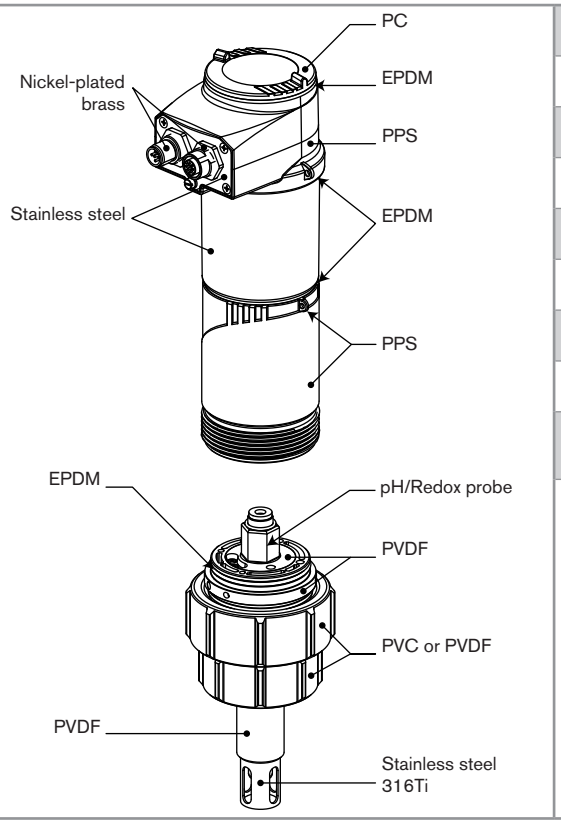

Part	Material
Box / seals	stainless steel, PPS / EPDM
Cover / seal	PC / EPDM
Display module	PC / PBT
M12 fixed connector	nickel-plated brass
Fixed connector holder	stainless steel 1.4404 (316L)
Screws	stainless steel
Nut	PVC or PVDF
Sensor holder / seal (in contact with the fluid)	PVDF, stainless steel 1.4571 (316Ti) / EPDM
pH or Redox probe	refer to the related manual

Fig. 5 Materials used in the transmitter 8202 (without the probe)

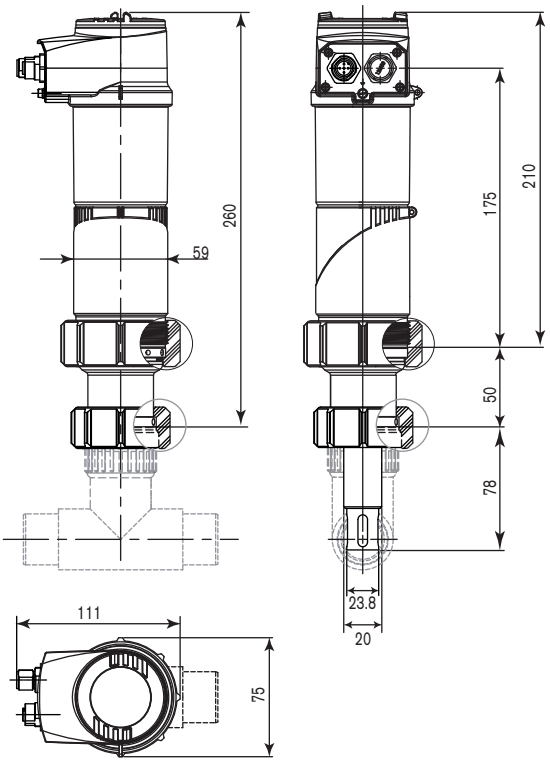

Fig. 6 Dimensions of transmitter 8202 [mm]

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6.3.2. General technical data

Pipe diameter	DN25 to DN110 (DN15 to DN20 under specific conditions)
Type of fitting	Adapter S022
Nut between the 8202 and the fitting	G 1 1/2" internal thread
Max. fluid temperature ▪ with a PVDF nut (see also Fig. 2and Fig. 4) ▪ with a PVC nut (see also Fig. 2 and Fig. 3)	The fluid temperature may be restricted by the probe used (see the related instruction manual), by the pressure of the fluid and the material of the adapter S022 ▪ -20 to +130 °C ▪ 0 to +50 °C
Max. fluid pressure	PN16 The fluid pressure may be restricted by the probe used (see the related instruction manual), by the temperature of the fluid and the material of the adapter S022 (see Fig. 2, Fig. 3 and Fig. 4)
pH measurement ▪ Measurement range ▪ Resolution ▪ Accuracy ▪ Recommended min. divergence of the pH range associated to the 4-20 mA signal	 ▪ -2 to 16 pH or -580 to +580 mV ▪ 0.001 pH or 0.1 mV ▪ ±0.02 pH or 0.5 mV ▪ 0.5 pH unit or 30 mV (eg: range 6,7 to 7,2 pH or -20 mV to +10 mV associated to the 4-20 mA output current)
Redox potential measurement ▪ Measurement range ▪ Resolution ▪ Accuracy ▪ Recommended min. divergence of the redox potential range associated to the 4-20 mA signal	 ▪ -2000 mV to +2000 mV ▪ 1 mV ▪ ±3 mV ▪ 50 mV (eg: range 1550 to 1600 mV associated to the 4-20 mA output current)
Temperature measurement ▪ Measurement range ▪ Resolution ▪ Accuracy ▪ Recommended min. divergence of the temperature range associated to the 4-20 mA signal	 ▪ -40 °C to +130 °C ▪ 0.1 °C ▪ ±1 °C ▪ 10 °C (eg: range 10 to 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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6.3.3. Electrical data

Power supply ▪ Version with 3 outputs ▪ Version with 4 outputs	 ▪ 14-36 V DC, filtered and regulated ▪ 12-36 V DC, filtered and regulated
Characteristics of the power source (not supplied) of the UL versions	▪ limited energy source (in accordance to UL 61010-1, paragraph 9.3) ▪ or Class 2 source (in accordance to standards 1310/1585 and 60950-1)
Current consumption ▪ Version with 3 outputs ▪ Version with 4 outputs	 ▪ 25 mA max. (at 14 V DC) ▪ 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
Protection against short circuits	yes, transistor outputs
Transistor output	NPN (/sink) or PNP (/source) (depending on software setting), open collector, 700 mA max., 0.5 A max. per transistor if both transistor outputs are wired. NPN output: 0.2-36 V DC PNP output: supply voltage
Current output ▪ Response time (10 % - 90 %) ▪ Version with 1 current output ▪ Version with 2 current outputs	4-20 mA, sink ("NPN sink") or source ("PNP source") (depending on software setting) ▪ 150 ms (default value) ▪ max. loop impedance: 1100 Ω at 36 V DC, 610 Ω at 24 V DC, 180 Ω at 14 V DC ▪ max. loop impedance: 1100 Ω at 36 V DC, 610 Ω at 24 V DC, 100 Ω at 12 V DC

6.3.4. 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 order code 917116, use a shielded cable: ▪ diameter: 3 to 6.5 mm ▪ wire cross section: max. 0.75 mm^2

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Number of fixed connectors	Type of connectors
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 order code 917116, use a shielded cable: ▪ diameter: 3 to 6.5 mm ▪ wire cross section: max. 0.75 mm²

6.3.5. pH/Redox probe

The pH or redox 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 manual of the probe used.

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7. ASSEMBLY

7.1. Safety instructions

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 restarting of the installation.

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

7.2. Unscrewing the cover

NOTE

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

- Prevent the projection of liquid inside the housing.

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

- Prevent contact of the electronics with a metal component (screwdriver, for example).

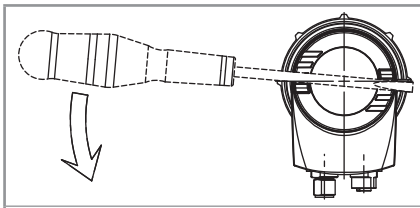	→ To unscrew the cover, use your hand or a tool which can be used as a lever, taking care not to scratch the glass.
	→ Turn the cover until fully unscrewed.

Fig. 7 Unscrewing the cover

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7.3. Mounting the cover

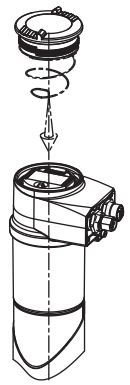
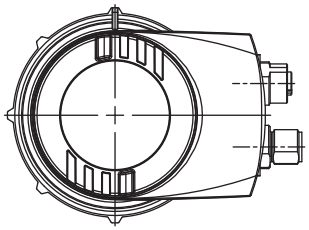
	→ Check that there is a seal on the cover and that it is not damaged. Replace it if necessary. → Grease the seal if necessary, using a component compatible with the seal material.
	→ Fully tighten by hand to guarantee tightness.

Fig. 8 Fitting the cover

7.4. Mounting the display module

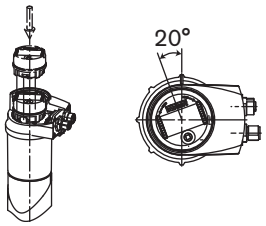
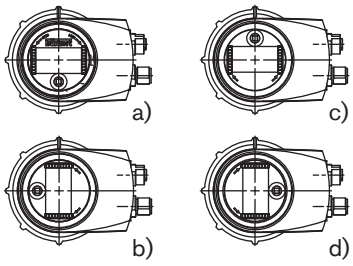
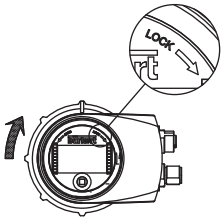
	→ Unscrew the cover (see chapter 7.2). → Set the display module at an angle of ca. 20° in relation to the desired position.
	→ The module can be mounted in 4 different positions, at 90° intervals.
	→ Fully push in the module and turn to the right to lock it.

Fig. 9 Mounting the display module

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7.5. Removing the display module

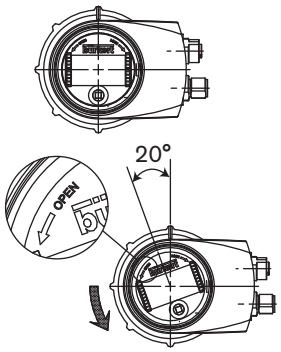
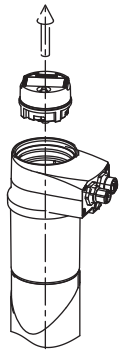
	→ Unscrew the cover if necessary (see chapter 7.2). → Turn the module by ca. 20° to the left. Once unlocked, the module is raised slightly by the spring action.
	→ Remove the module from its housing.

Fig. 10 Removing the display module

7.6. Mounting the probe into the holder (without fluid)

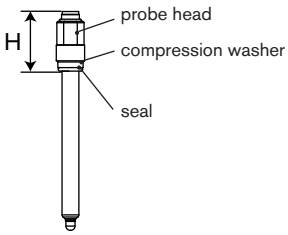
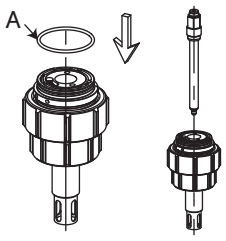
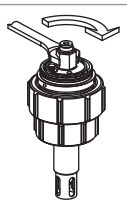
	Following instructions are valid for a Bürkert probe. If you use a probe from another supplier, respect the related instructions. → Remove the protective plugs → Check that dimension H on the probe is between 34 and 46mm. If necessary, adjust the height of the compression washer.
	→ At first use, apply 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.
	→ Tighten the probe head using a suitable wrench.

Fig. 11 Mounting the probe into the holder (without fluid)

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

→ Check that the probe is mounted into the sensor holder (see chapter 7.6).

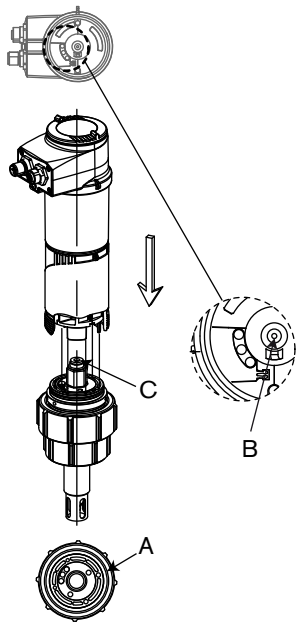
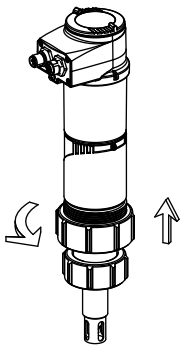
	→ Check that seal "A" on the holder is in good condition. Replace it if necessary (see Chap. 11) → Clean connectors "B" and "C" for connection of the pH/redox probe with alcohol to avoid measurement errors. → Insert the electronic module into the holder, making sure the polarising slots are correctly positioned. → Apply slight vertical pressure to engage the seal.
	→ Fasten the electronic module and the holder together by tightening the nut. Tighten the G 2" nut by hand only, until it stops turning, to ensure good electrical contact.

Fig. 12 Mounting the electronic module to the holder (without fluid)

→ Mount the display module (see chap. 7.4) to calibrate the transmitter.

→ Calibrate the transmitter (see chap. 9.12.4).

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8. INSTALLATION AND COMMISSIONING

8.1. Safety instructions

DANGER

Risk of injury due to high pressure in the installation.

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

Risk of injury due to electrical voltage.

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

Risk of injury due to high fluid temperatures.

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

Risk of injury due to the nature of the fluid.

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

WARNING

Risk of injury due to 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 assembly instructions for the fitting used.

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

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

WARNING

Danger due to nonconforming commissioning.

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

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

NOTE

Risk of damage to the device due to the environment

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

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8.2. Installation onto the pipe

DANGER

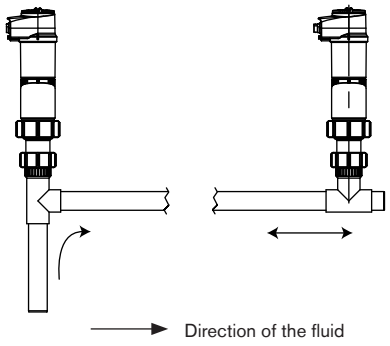
Risk of injury due to high pressure in the installation.

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

Risk of injury due to the nature of the fluid.

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

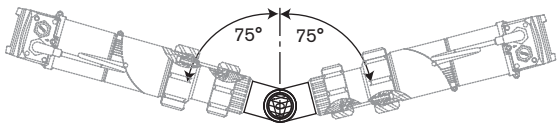
If a pH/redox probe (with PG 13.5 head, 120 mm long and without temperature probe) from a supplier other than Bürkert is used, follow the relevant instructions on installation in the pipe.



→ 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. 13 Mounting positions in the pipe

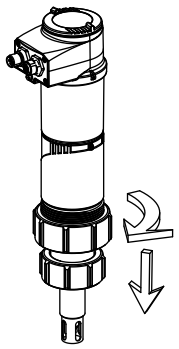


→ Fit the fitting at an angle of ±75° max. to the vertical in order to ensure the good operation of the pH/redox probe.

Fig. 14 Angle to the vertical

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

→ Once the transmitter has been calibrated, remove the electronic module from the sensor holder as shown Fig. 15.



→ Unscrew the nut between the electronic module and the sensor holder.

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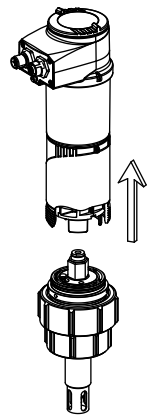
	→ Remove the electronic module by pulling it straight out. There may be a resistance due to the seal.

Fig. 15 Remove the electronic module from the sensor holder

→ Install the holder with its probe on the fitting as shown in Fig. 16.

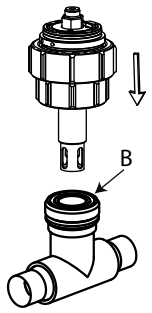
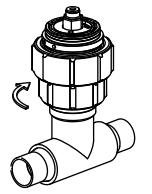
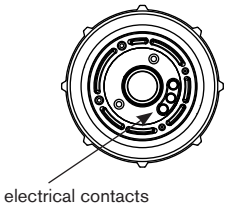
	→ Check the presence and the condition of seal B on the fitting. Replace the seal if necessary. → Insert the holder with its probe carefully into the fitting.
	→ Tighten the nut on the fitting by hand. → Charge the pipe to check the tightness of the assembly.

Fig. 16 Installing the sensor holder with its probe on a fitting

→ If the sensor holder is tight, insert the electronic module back onto the sensor holder as shown in Fig. 17.

	→ Check that the electrical contacts are in good condition and clean them with a brush if necessary.

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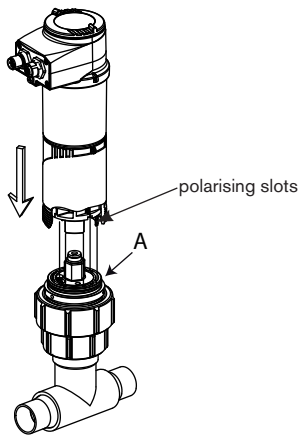
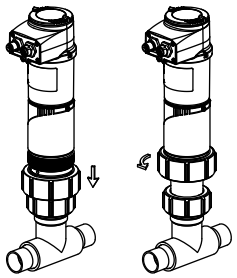
	→ Check that seal "A" on the holder is in good condition. Replace it if necessary (see chap. 11 and chap. 10.4). → Insert the electronic module into the holder, making sure the polarising slots are correctly positioned.
	→ Apply slight vertical pressure to engage the seal. → Fasten the electronic module and the holder together by tightening the nut. Tighten the G 2" nut by hand only, until it stops turning, to ensure good electrical contact with the temperature probe.

Fig. 17 Mounting the electronic module to the sensor holder, after installation of the holder on a fitting

8.3. Electrical wiring

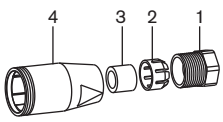
DANGER

Risk of injury due to electrical voltage.

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

- **Use a high quality electrical power supply (filtered and regulated).**
- **Make sure the installation is equipotential. See chap. 8.3.2.**

8.3.1. Assembling the male or female connector (accessories: see chap. 11)

	→ 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].

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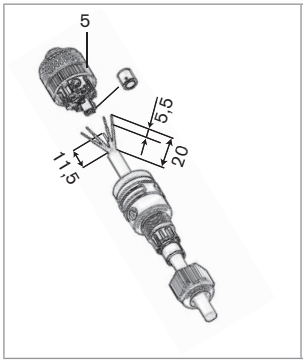

→ Strip 20 mm of the cable.

→ 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] (see chap. 8.3.3 and 8.3.4).

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

→ Tighten the connector nut [1].

Fig. 18 M12 multi-pin connector (not provided)

8.3.2. Equipotentiality of the installation

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.

→ Special attention has to be paid if the device is installed on plastic pipes because there is no direct earthing possible. Proper earthing is performed by earthing together the metallic devices such as pumps or valves, that are as close as possible to the device.

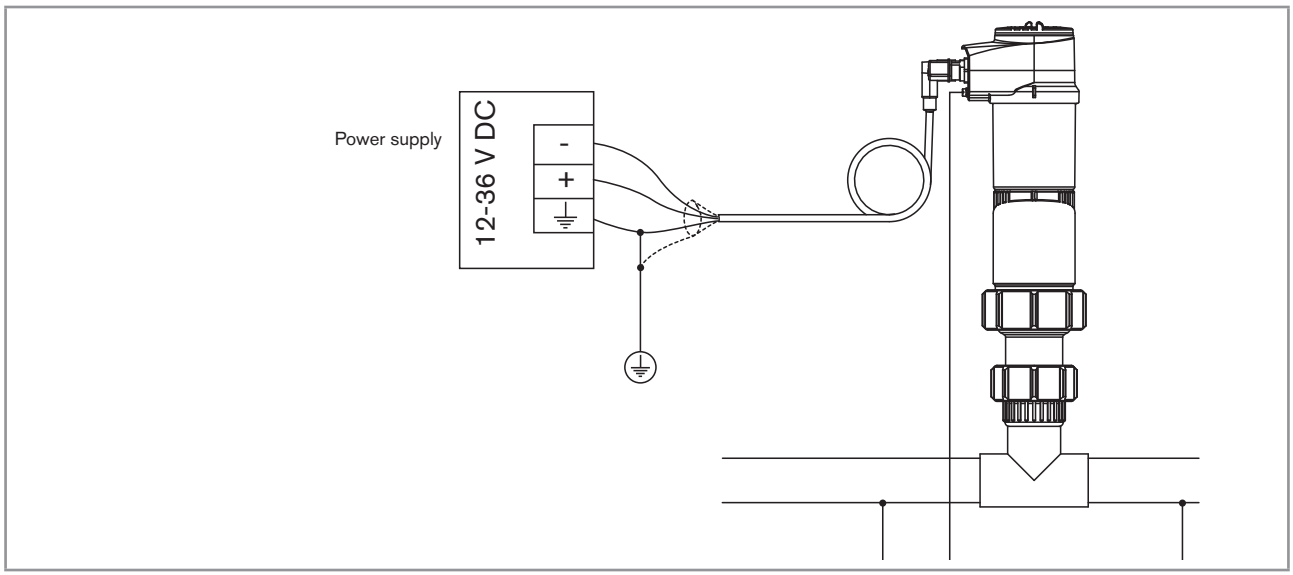

Fig. 19 Equipotentiality skeleton diagram with pipes in metal

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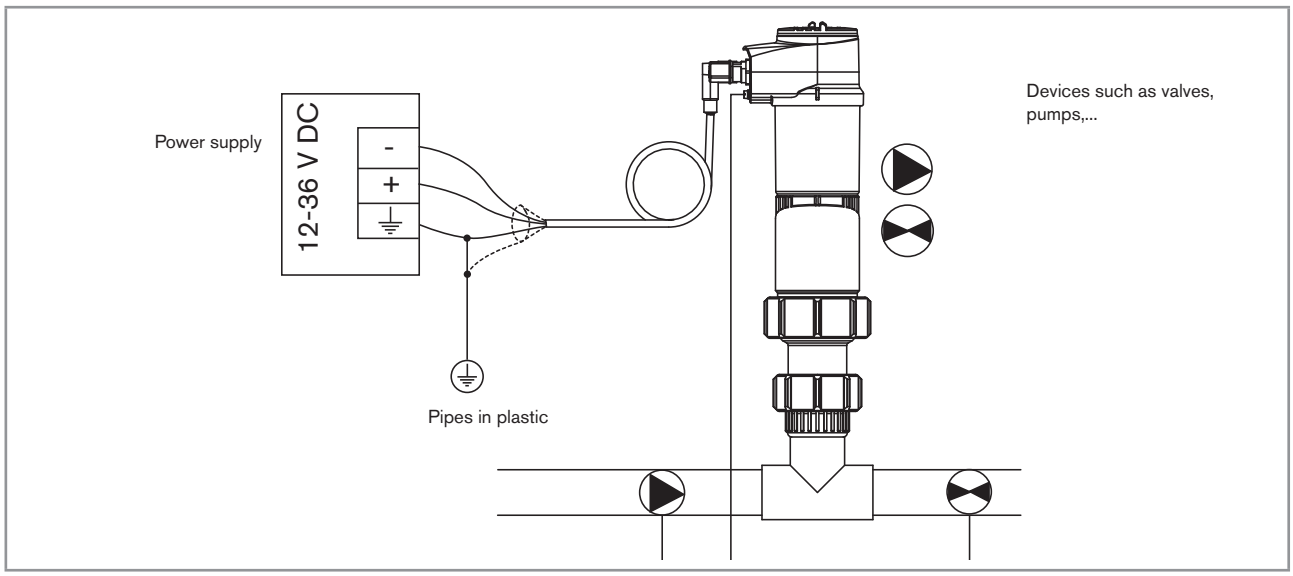

Fig. 1 Equipotentiality skeleton diagram with pipes in plastic

8.3.3. Wiring a version with a single M12 fixed connector

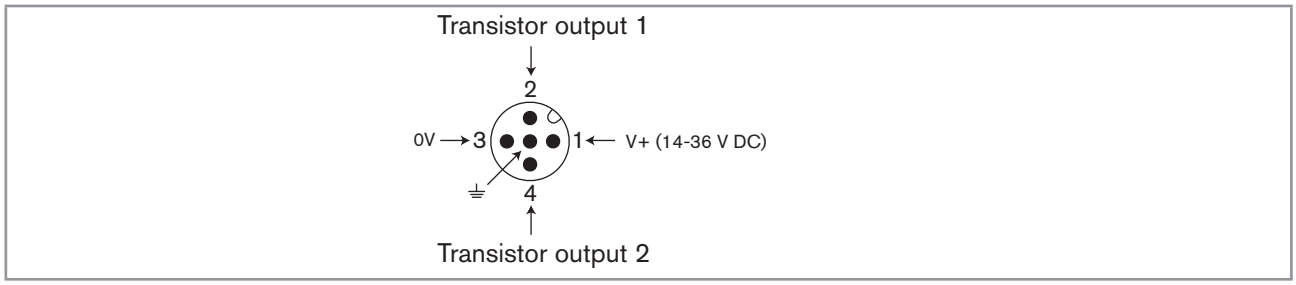

Fig. 20 Pin assignment of the fixed connector on a version with a single M12 fixed connector

Pin for the female M12 connector available as an accessory (order code 438680)	Colour of the wire
1	brown
2	white
3	blue
4	black
5	grey

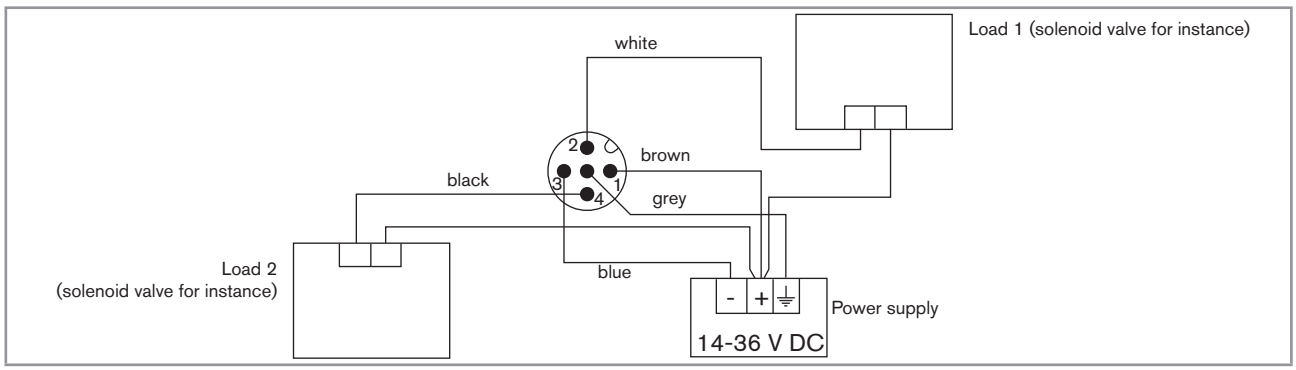

Fig. 21 NPN wiring of both transistor outputs (software setting "NPN/sink", see chap. 9.11.8), of a version with 1 M12 fixed connector

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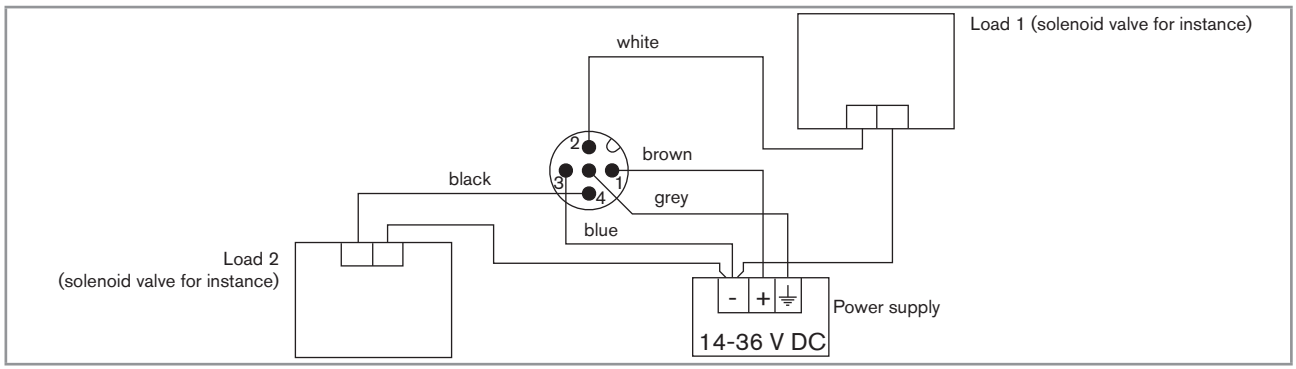

Fig. 22 PNP wiring of both transistor outputs (software setting "PNP/source", see chap. 9.11.8), of a version with 1 M12 fixed connector

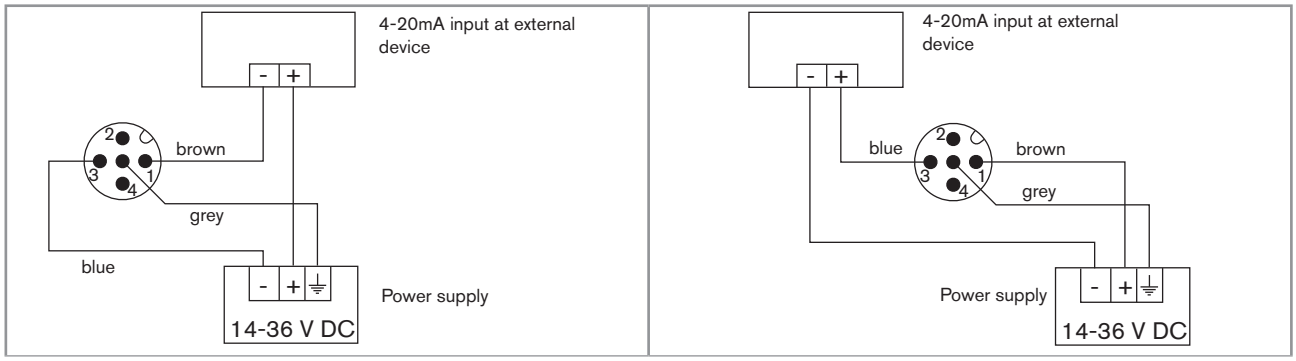

Fig. 23 Possible wirings of the current output (whatever the software setting, "NPN/sink" or "PNP/source", see chap. 9.11.8), of a version with 1 M12 fixed connector

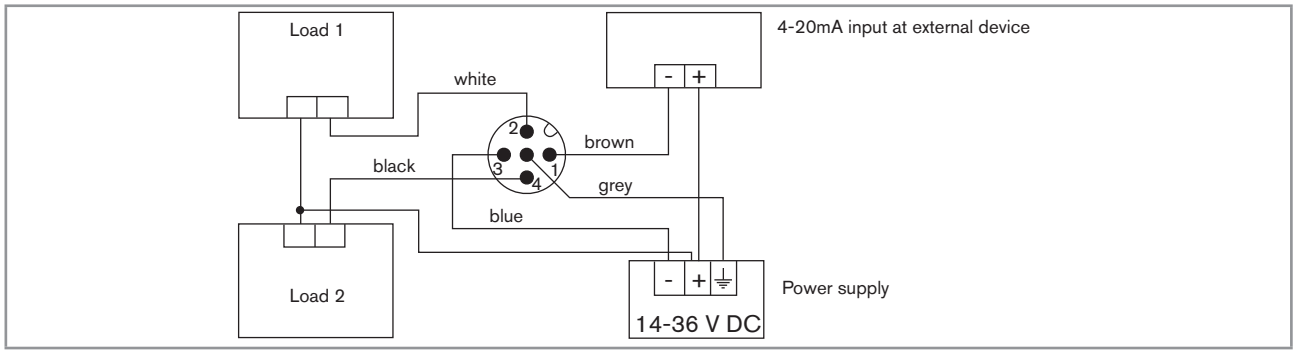

Fig. 24 NPN wiring of both transistor outputs and wiring the current output in sinking mode (software setting "NPN/sink", see chap. 9.11.8), of a version with 1 M12 fixed connector

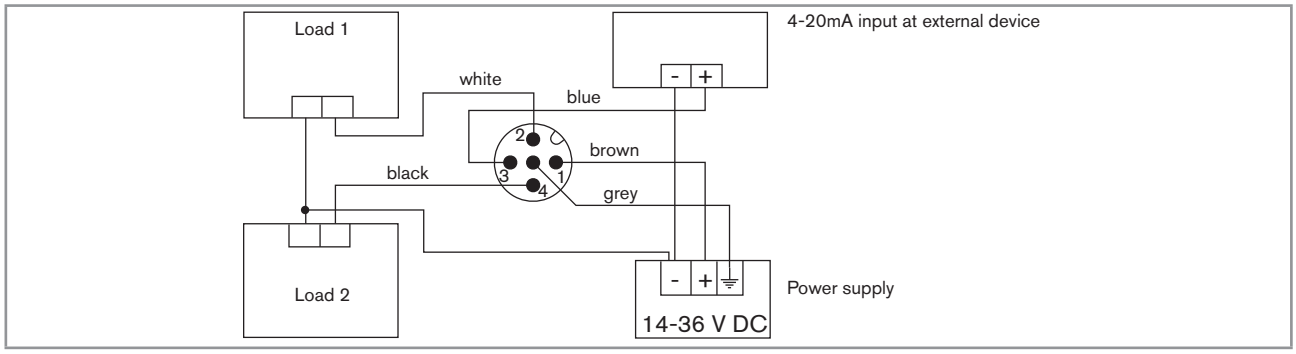

Fig. 25 PNP wiring of both transistor outputs and wiring the current output in sourcing mode (software setting " PNP/source", see chap. 9.11.8), of a version with 1 M12 fixed connector

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8.3.4. Wiring a version with 2 M12 fixed connectors

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

Connect the power supply for the transmitter 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 (order code 438680)	Colour of the wire
1	brown
2	white
3	blue
4	black
5	grey

Pin of the M12 male cable available as an accessory (order code 559177)	Colour of the wire
1	brown
2	white
3	blue
4	black
5	grey

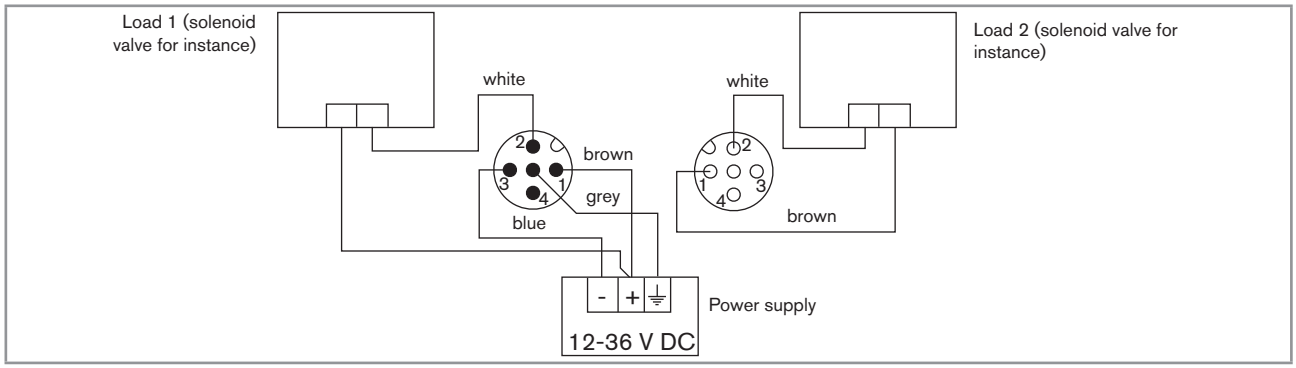

Fig. 27 NPN wiring of both transistor outputs of a version with 2 fixed connectors (software setting "NPN/sink", see chap. 9.11.8)

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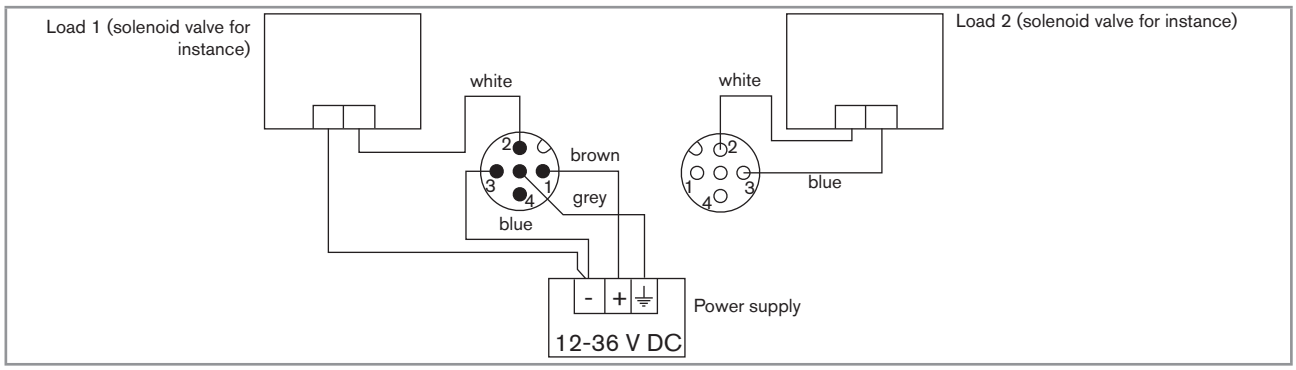

Fig. 28 PNP wiring of both transistor outputs of a version with 2 fixed connectors (software setting "PNP/source", see chap. 9.11.8)

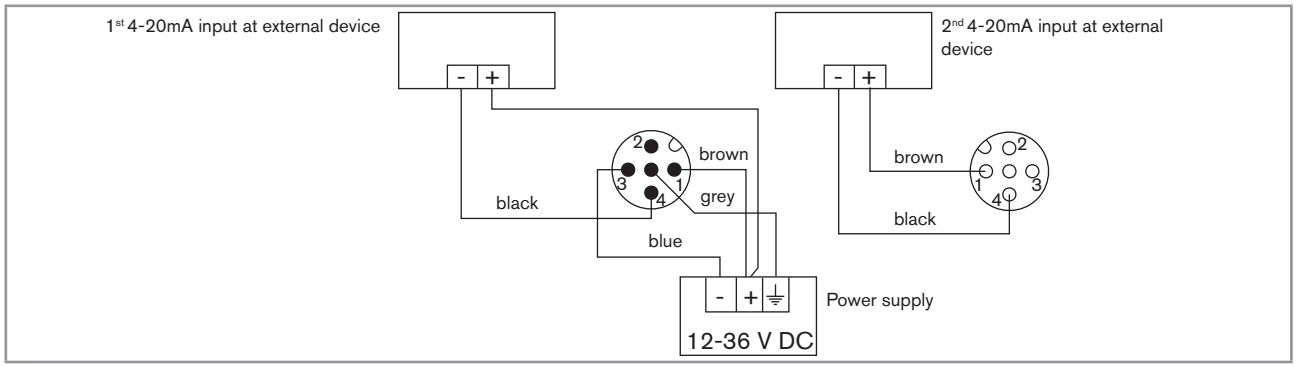

Fig. 29 Wiring of both current outputs in sinking mode, on a version with 2 fixed connectors (software setting "NPN/sink", see chap. 9.11.8)

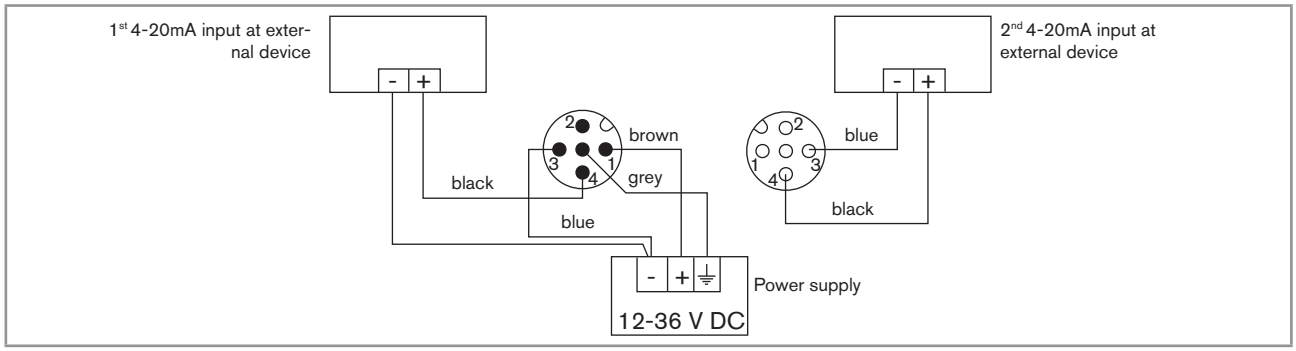

Fig. 30 Wiring of both current outputs in sourcing mode, on a version with 2 fixed connectors (software setting "PNP/source", see chap. 9.11.8)

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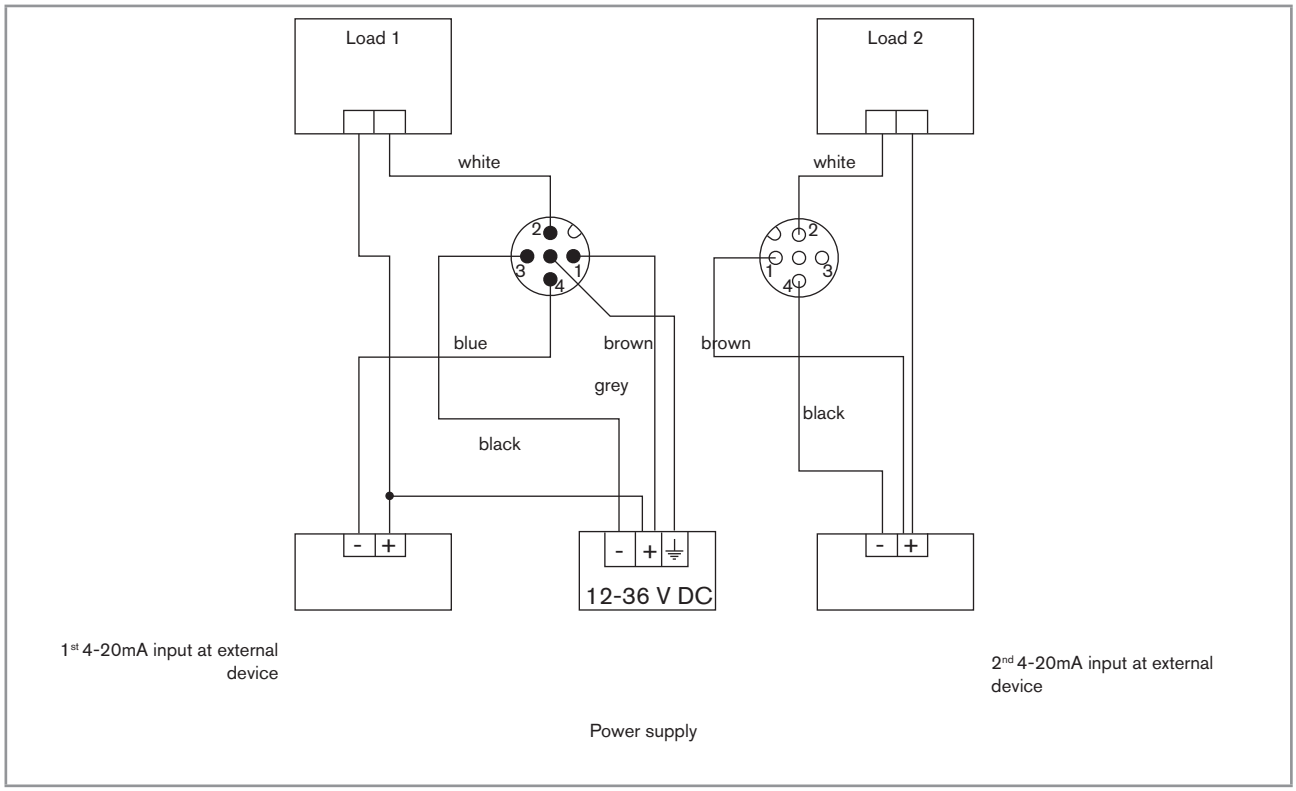

Fig. 31 NPN wiring of both transistor outputs and wiring of both current outputs in sinking mode, on a version with 2 fixed connectors (software setting "NPN/sink", see chap. 9.11.8)

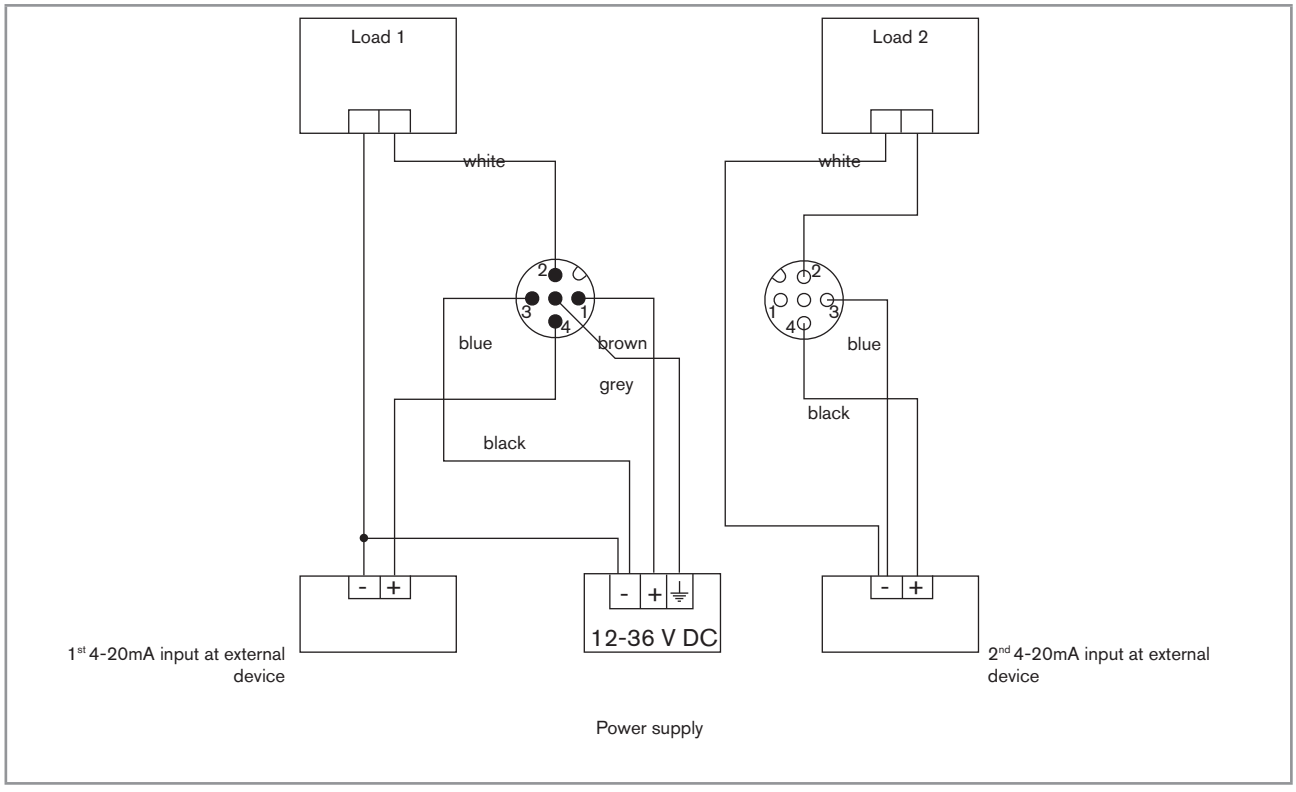

Fig. 32 PNP wiring of both transistor outputs and wiring of both current outputs in sourcing mode, on a version with 2 fixed connectors (software setting "PNP/source", see chap. 9.11.8)

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9. OPERATING AND FUNCTIONS

9.1. Safety instructions

WARNING

Risk of injury due to nonconforming adjustment.

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

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

9.2. Functions

The device has 2 operating levels:

Read level

This level is used:

- to read the measured values of 2 process values selected in the Parameters menu,
- to read both the lowest and highest values of the chosen process value, that have been measured by the device 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.

Settings level

This level comprises 5 menus:

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

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9.3. Using the navigation key

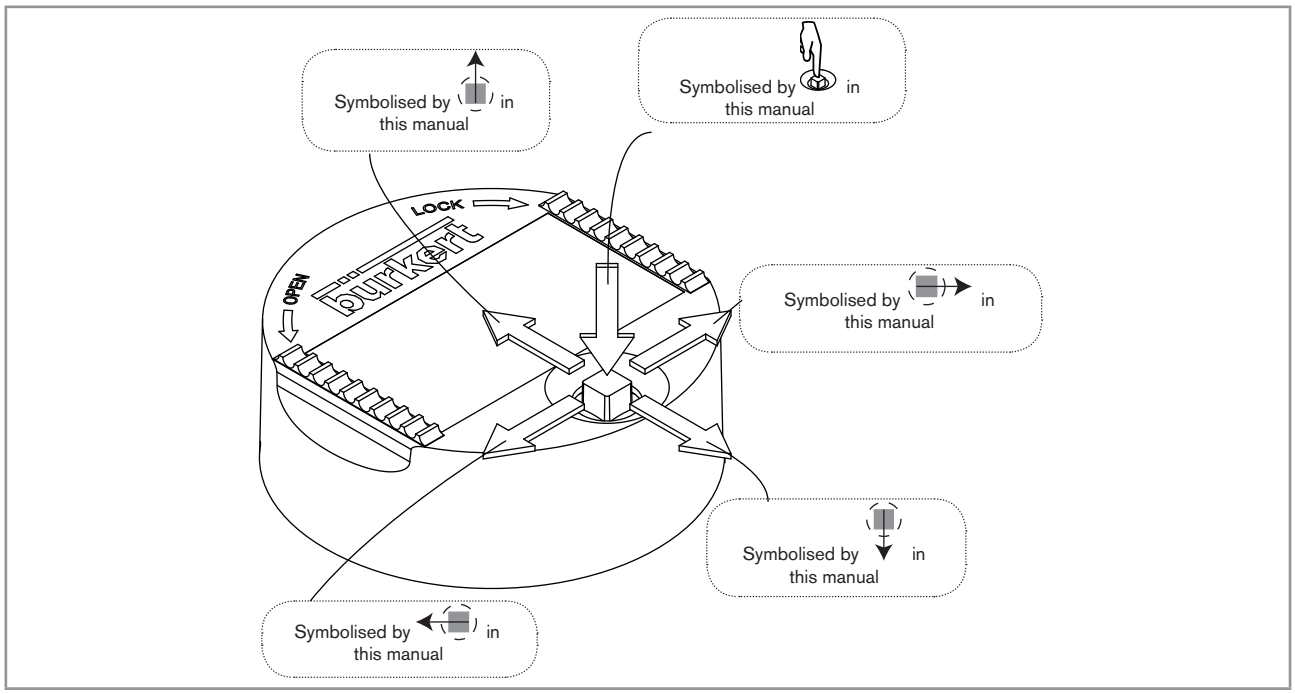

Fig. 33 Using the navigation button

You want to...	Press...
...browse in Read level	▪ next screen: ▪ previous screen:
▪ ...access the Settings level ▪ ...display the Param menu	for at least 2 sec., from any screen of the Read level
...browse in the menus of the Settings level	▪ next menu: ▪ previous menu:
...access the menu displayed	
...browse in the menu functions	▪ next function: ▪ previous function:
...select the highlighted function	

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You want to...	Press...
...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

9.4. Using the dynamic functions

You want to...	Choose...
...go back to the READ 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"

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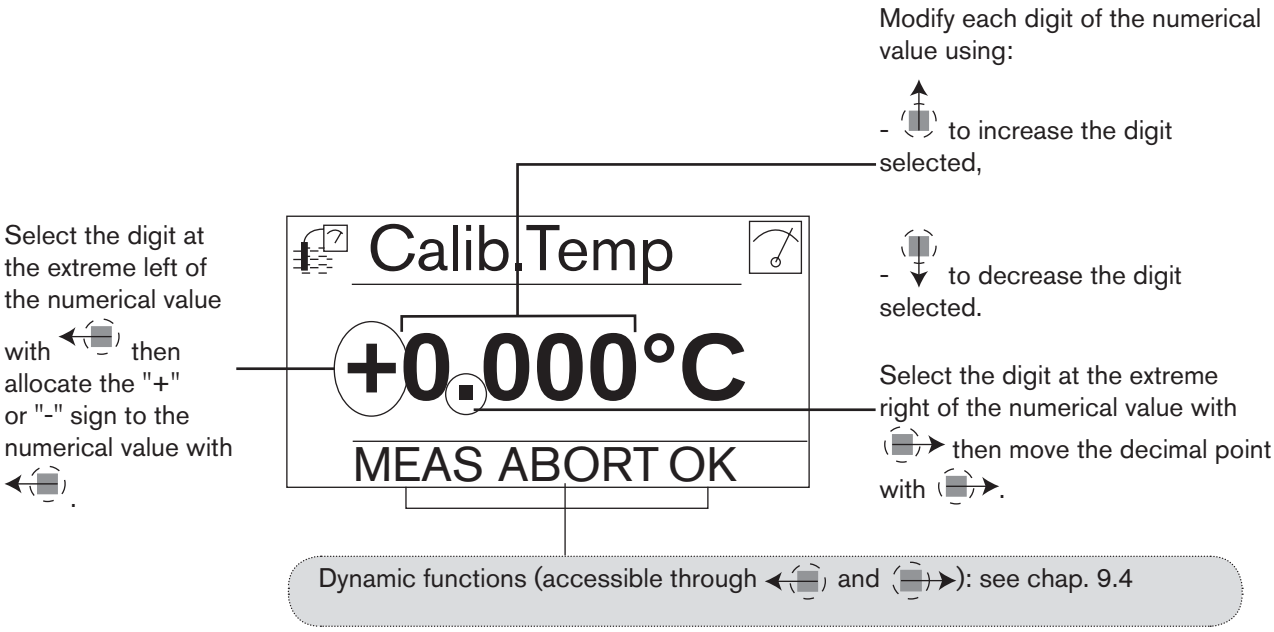
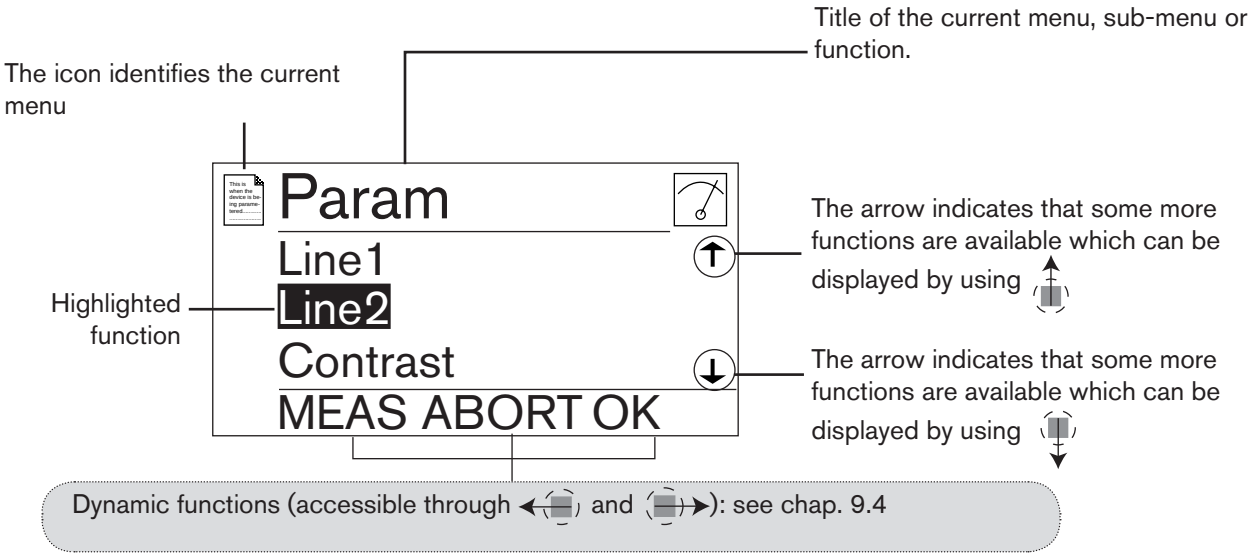
9.5. Example for the input of a numerical value



9.6. Example for browsing in a menu



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9.7. Description of the display

9.7.1. Description of icons and LEDs

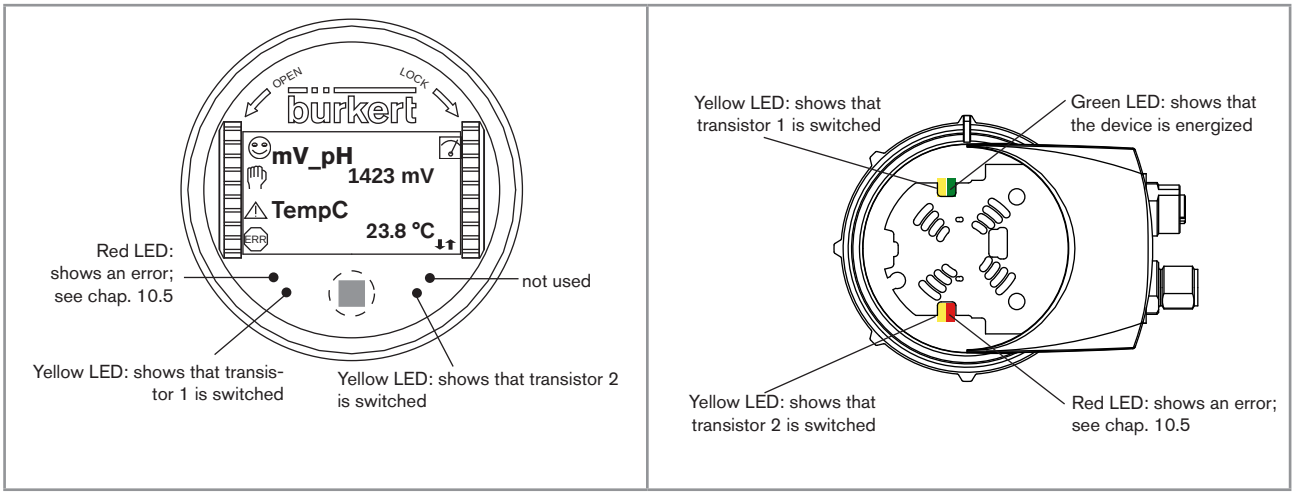

Fig. 34 Position of the icons and description of the LEDs

The LEDs of the display module are duplicated on the electronic board that is located under the display module: these LEDs become visible when the transmitter is not equipped with the display 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 chap. 9.13.2, 9.13.3, 9.15.1 and 10.5 ▪ , associated with : see chap. 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 chap. 9.12.1) ▪ T: running check that the outputs are working and behaving correctly (see chap. 9.14.2 and 9.14.3)
	"maintenance" message; see chap. 9.12.4, 9.15.1 and 10.5
	"warning" message; see chap. 9.11.10, 9.12.4 9.13.2, 9.13.3, 9.15.1 and 10.5
ERR	"error" message; see chap. 9.13.2, 9.13.3, 9.15.1 and 10.5

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9.7.2. When switching on the device

When the device is switched on or the display module mounted on the electronic module, the display indicates the software version of the display.

The display then shows the first screen in READ level:

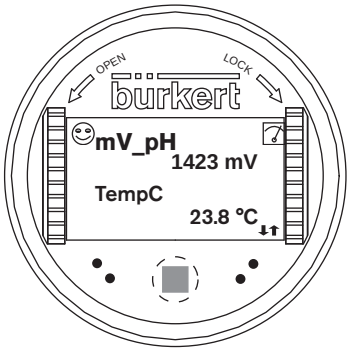
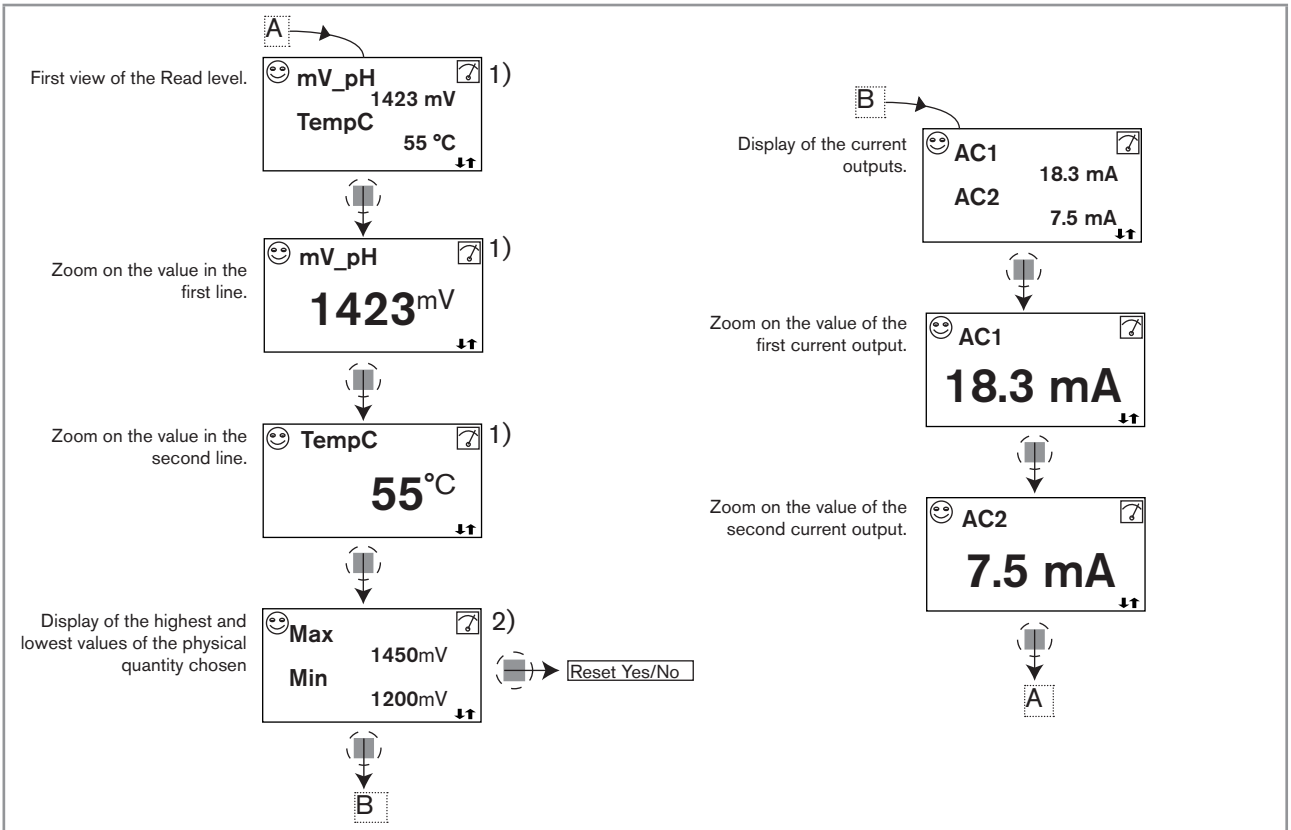


Fig. 35 Display indications when powering on the device

9.8. Read level



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

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

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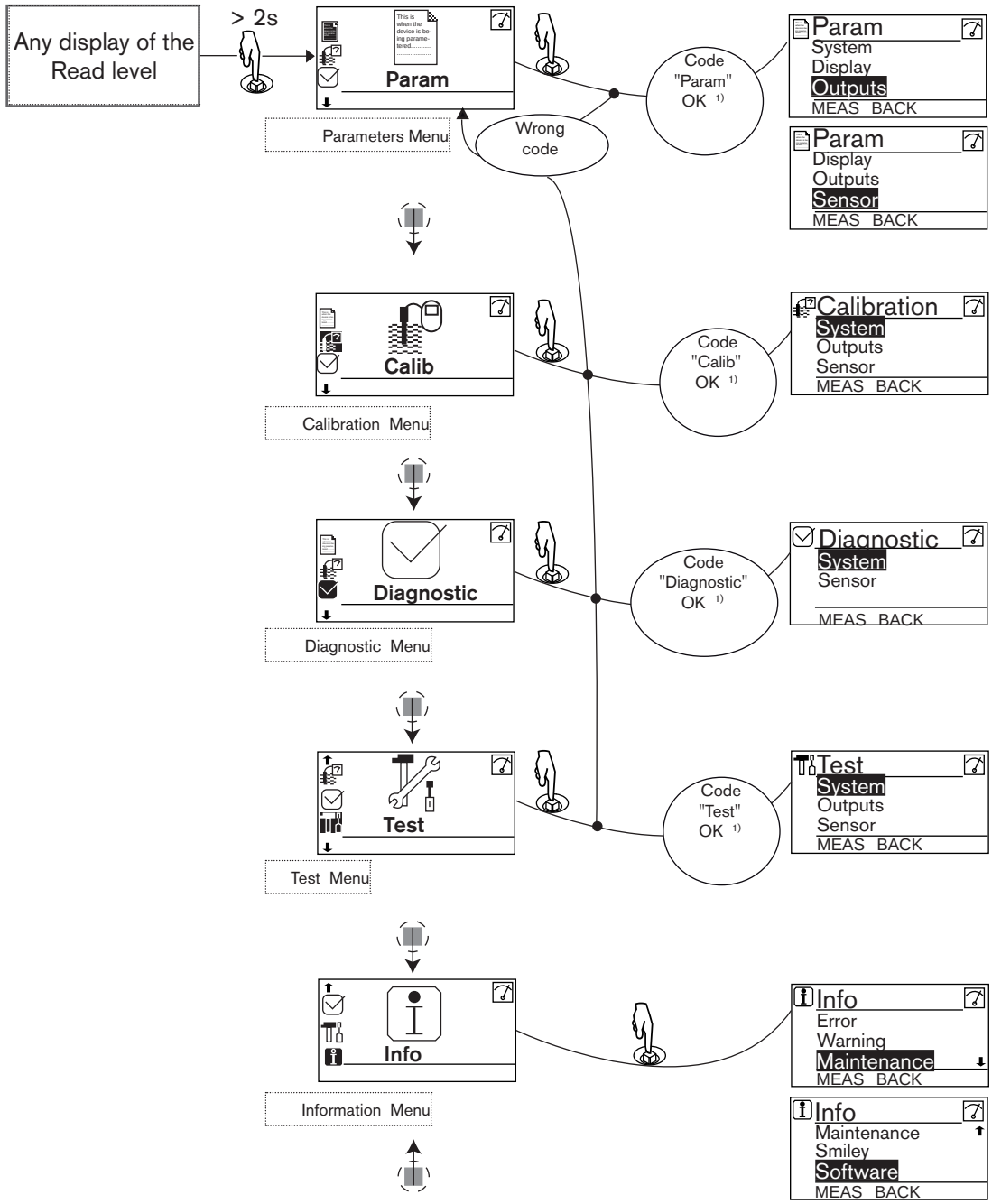
9.9. Accessing the Settings level



1) Default code "0000"

→ See chap. 9.10 for the detailed menu functions

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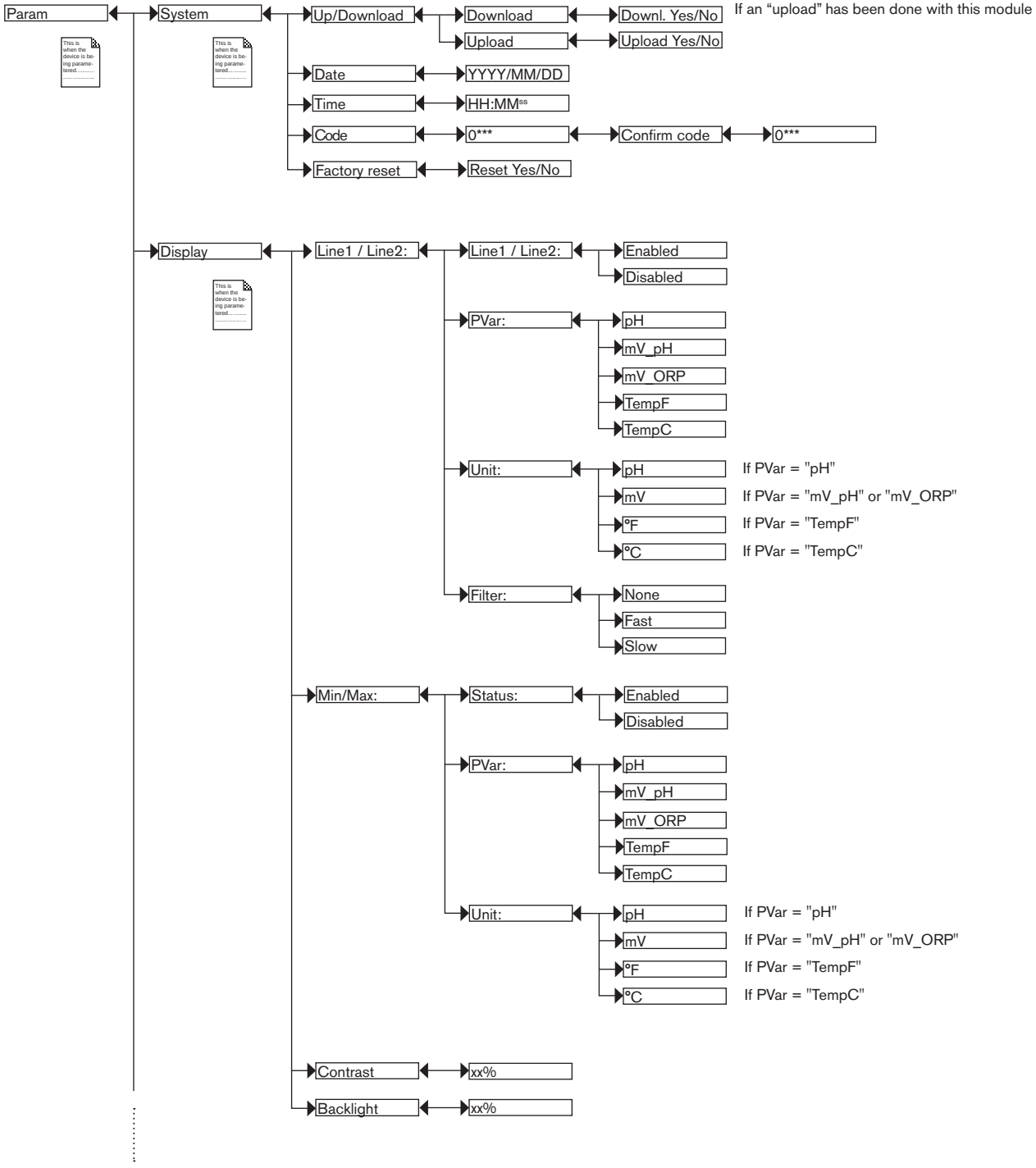
9.10. Menu structure of the Settings level

See chap. 9.9 to access the Settings level.



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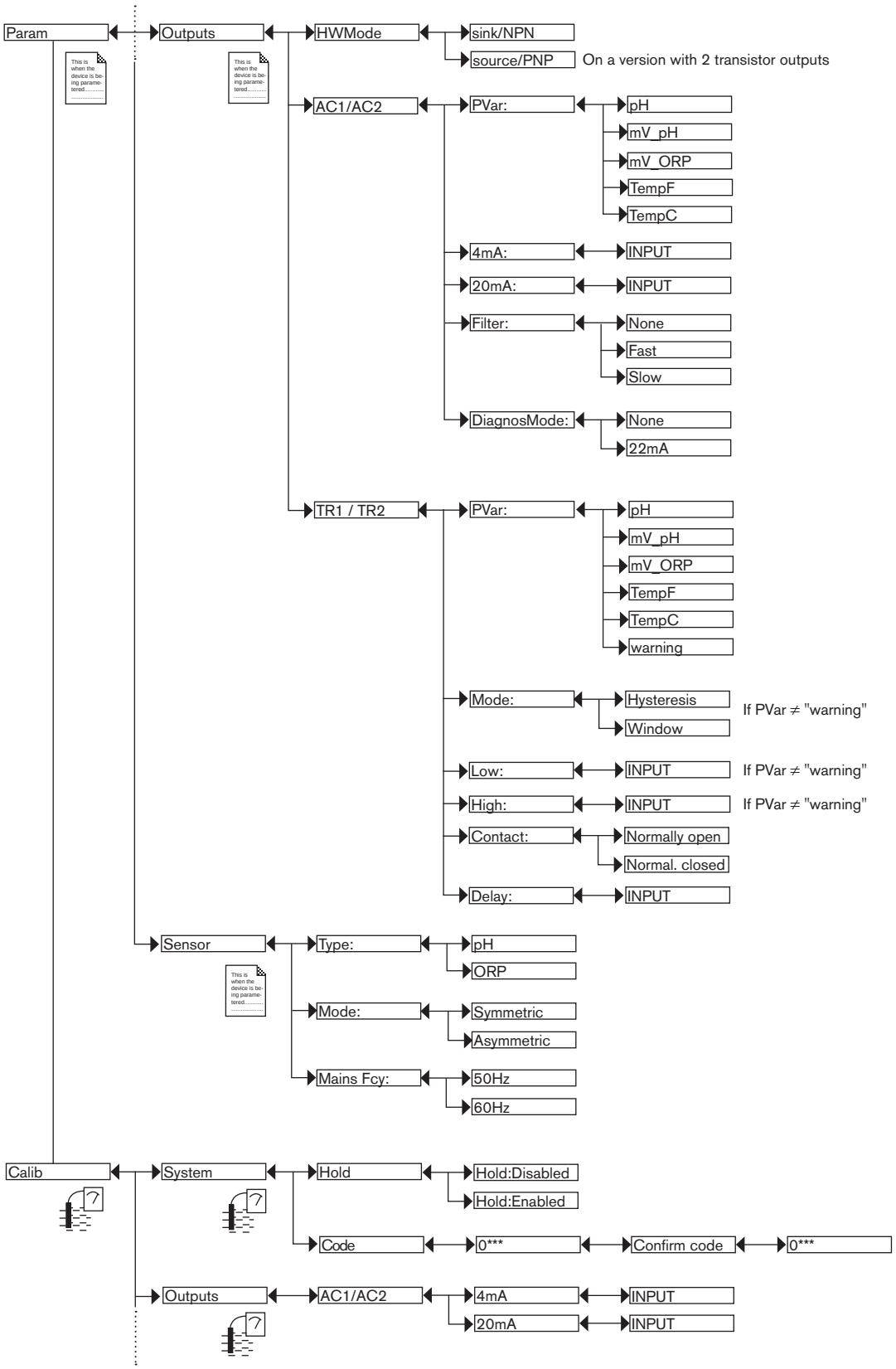

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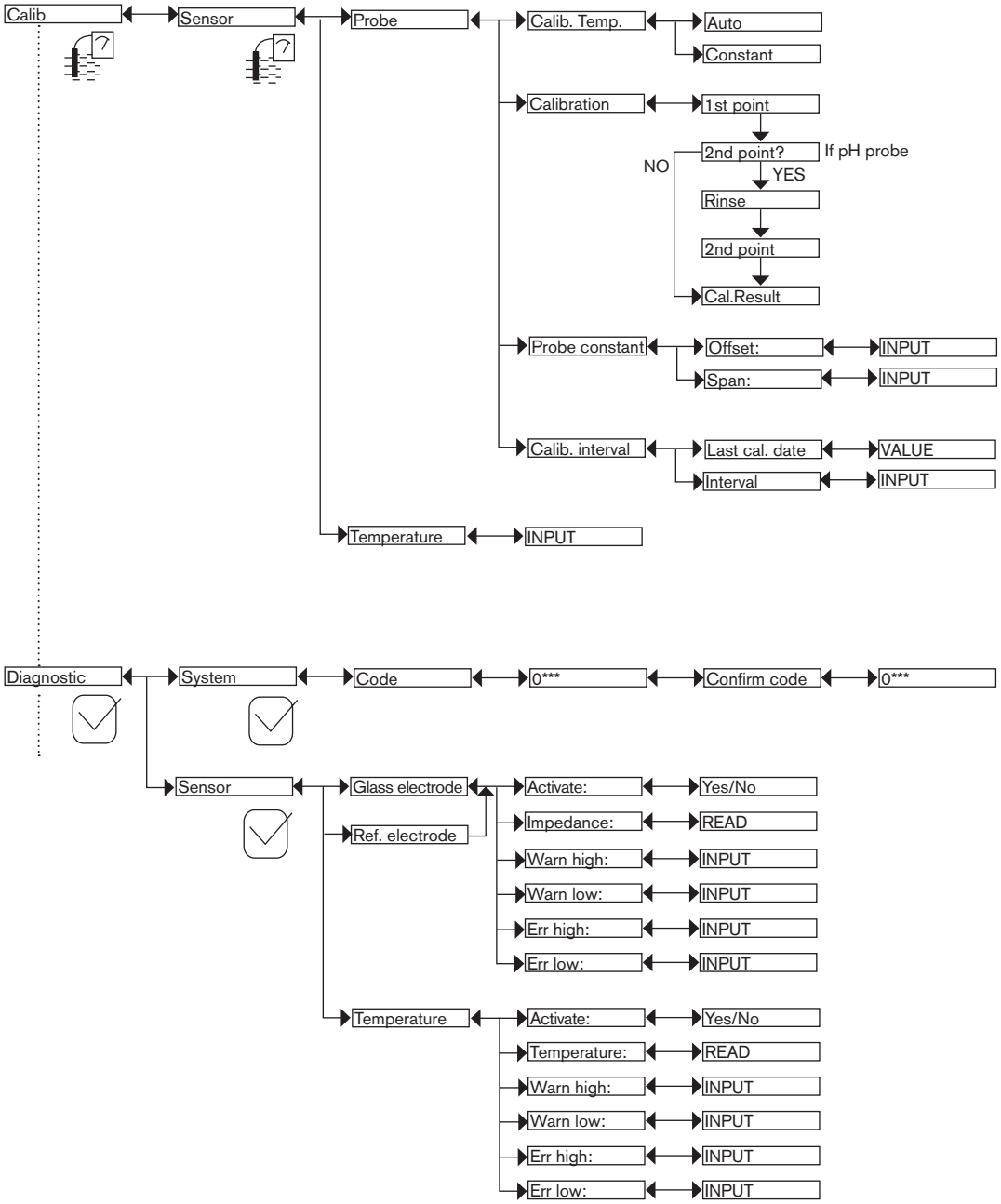

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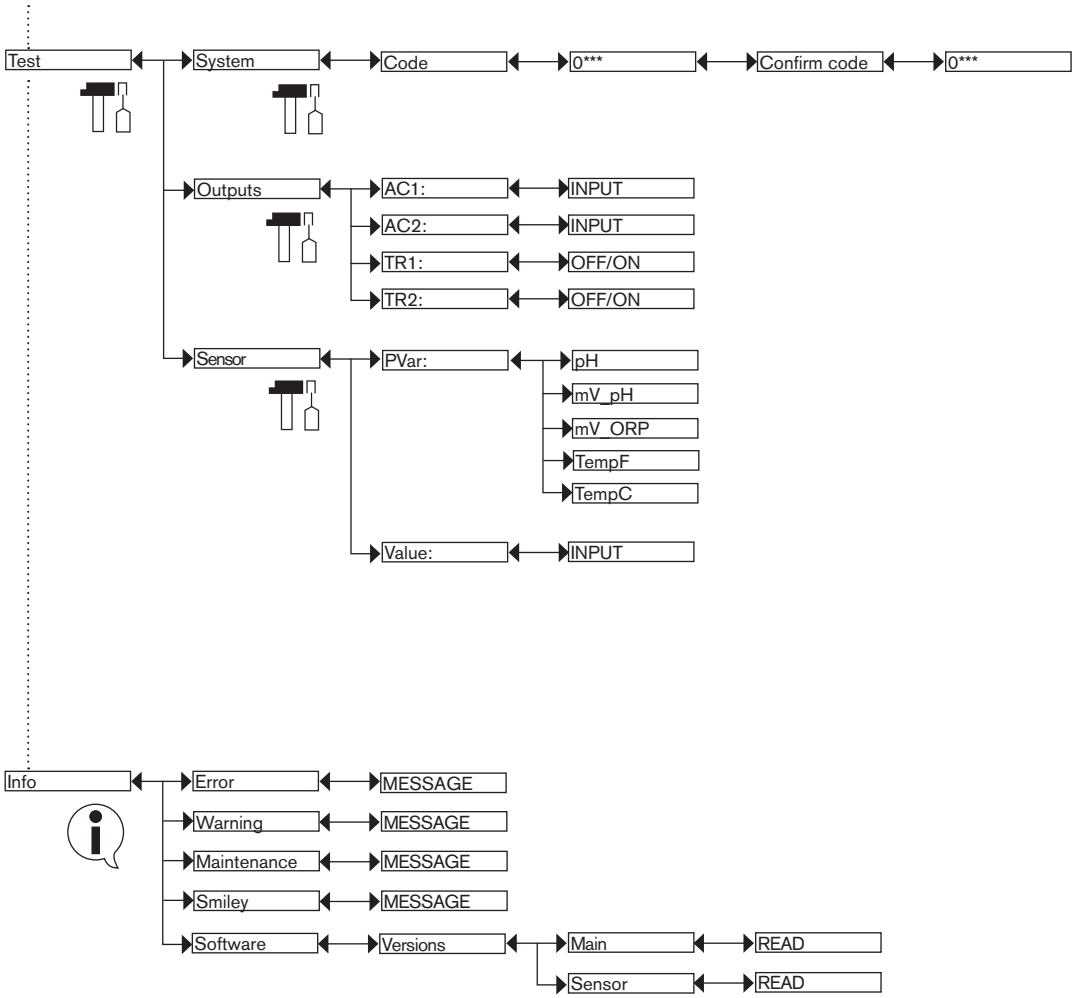


9.11. Parameters Menu

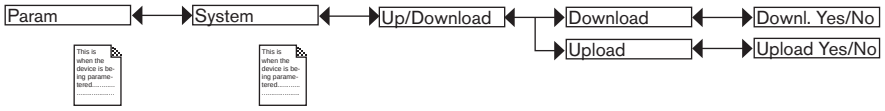
9.11.1. Transferring data from one device to another

See chap. 9.9 to access the Parameters menu.

The function is only possible with a display module with software version V2 and a transmitter with a V2 software version of the acquisition / conversion module for the measured process values.

- On the transmitter, check the sofware version of the acquisition / conversion module for the measured process values in the menu Info -> Software -> Versions -> Main.
- The software version of the display module is displayed when the display module is energized.

- The “DOWNLOAD” function is only available if an UPLOAD has been successfully performed.
- Never interrupt an upload or download procedure else the transmitter may be damaged.



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

- user settings in the menu PARAM (except the date, the time, the contrast level and the brightness of the display),
- user settings in the menu DIAGNOSTIC,
- the access codes to the menus.

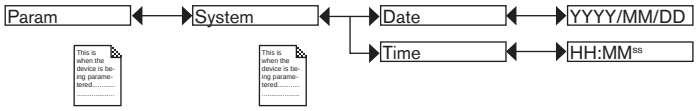
DOWNLOAD: transfer the data previously uploaded into the display module using the UPLOAD function.

The parameters transferred are used by the device as soon as the message “Download OK” is displayed.

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

9.11.2. Setting the date and time

See chap. 9.9 to access the Parameters menu.

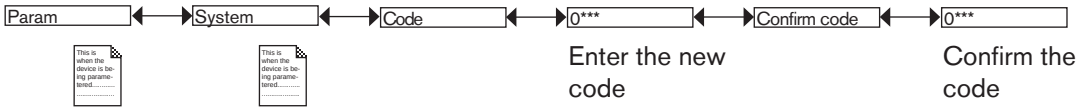


DATE: set the date (input format: year/month/day in the form YYYY/MM/DD)

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

9.11.3. Modifying the PARAM menu access code

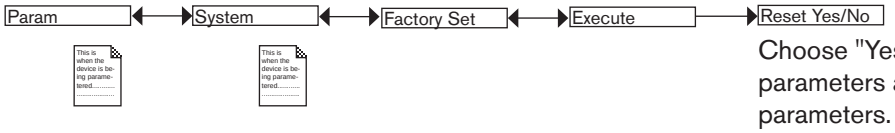
See chap. 9.9 to access the Parameters menu.



Default access code to the Parameters menu: 0000.

9.11.4. Restoring the default parameters of the Read level and the outputs

See chap. 109 to access the Parameters menu.



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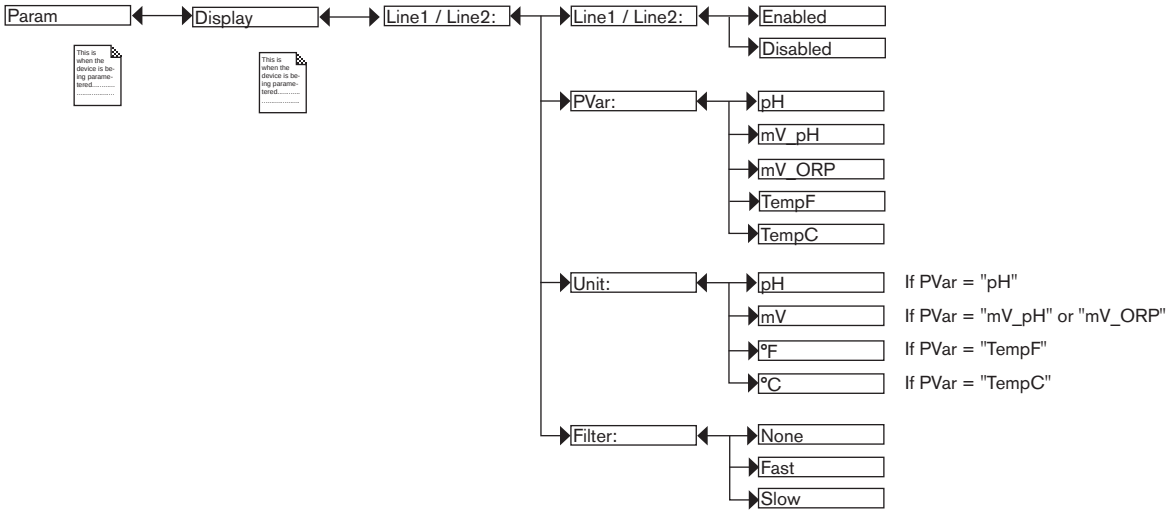
9.11.5. Setting the data displayed in the READ level

See chap. 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 (see chap. 9.11.11) mounted on the transmitter.



PVAR: choose the process value to be displayed in the line selected. The possible choices depend on the selected sensor type, whether pH or ORP.

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 shows the 3 filter curves.

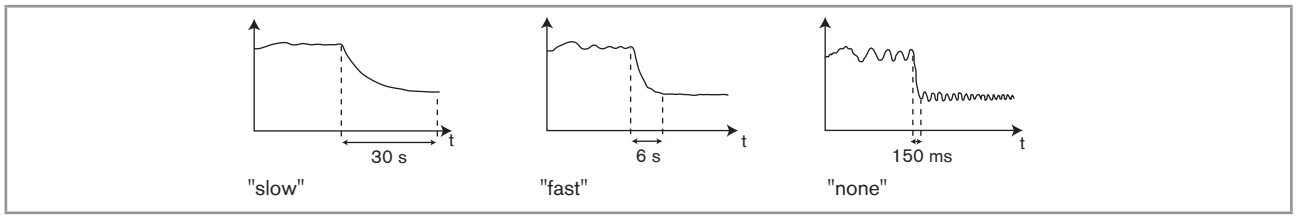


Fig. 36 Filter curves

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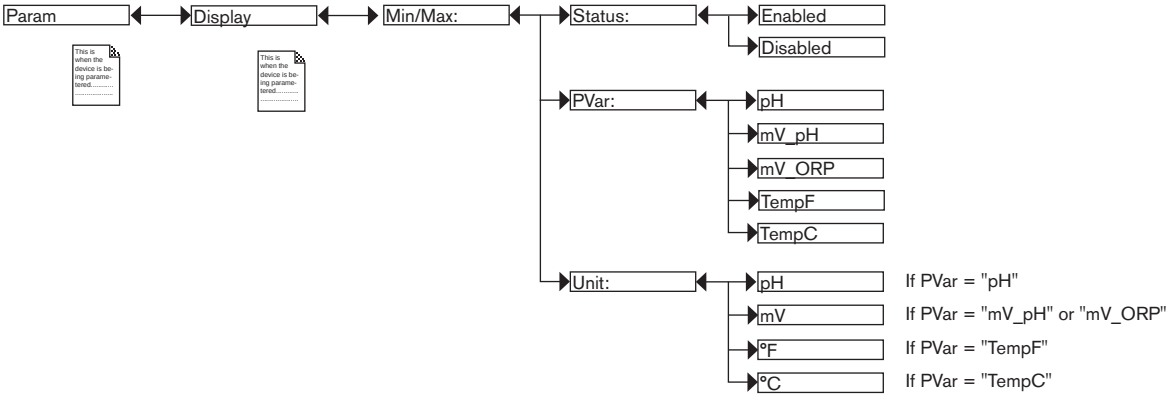
9.11.6. Displaying the lowest and highest values measured

See chap. 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 (see chap. 9.11.11) mounted on the transmitter.



STATUS: choose to display (choice “Enabled”) or not display (choice “Disabled”) the highest and lowest measured values (of the process value chosen in PVAR hereafter) since the latest reset.

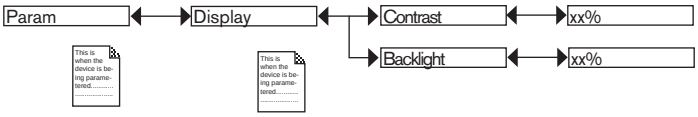
PVAR: choose the process value which highest and lowest measured values are displayed in the Read level.

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 chap. 9.11.1 to access the Parameters menu.

On a version with one M12 fixed connector, do not increase the default setting of the display brightness (parameter "Backlight").



Set each percentage using and .

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

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

These settings only affect the display module. They are not factored in during a device data UPLOAD (see chap. 9.11.1).

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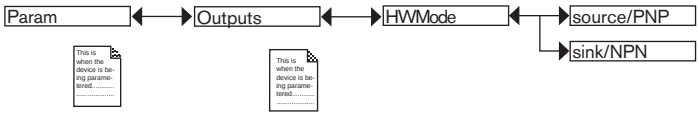
9.11.8. Choosing the output wiring mode

See chap. 9.9 to access the Parameters menu.



The setting has no effect on a version with one fixed connector, if the sole current output is wired. See Fig. 23.

The wiring mode is the same for all outputs.

If you choose "sink NPN", the current outputs must be wired in sinking mode and the transistor outputs in NPN mode.8.3

If you choose "source PNP", the current outputs must be wired in sourcing mode and the transistor outputs in PNP mode.

See the wiring for the outputs in chap. 8.3.

9.11.9. Setting the parameters of the current outputs

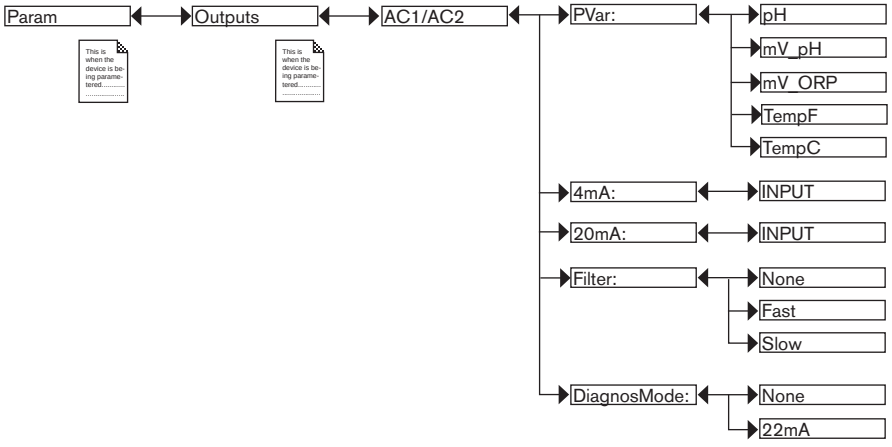
See chap. 9.9 to access the Parameters menu.

WARNING

Risk of injury due to wrong adjustment.

- Before setting the parameters for the outputs, choose the type of probe (see chap. 9.11.11) mounted on the transmitter.

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



PVAR: choose a process value associated with current output 1 or current output 2 respectively. The possible choices depend on the selected sensor type, whether pH or ORP.

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.

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.

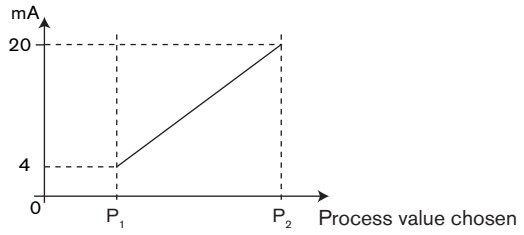


Fig. 37 4-20 mA current depending on the process value selected

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.

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

See also "If you encounter problems" in chap. 10.5.

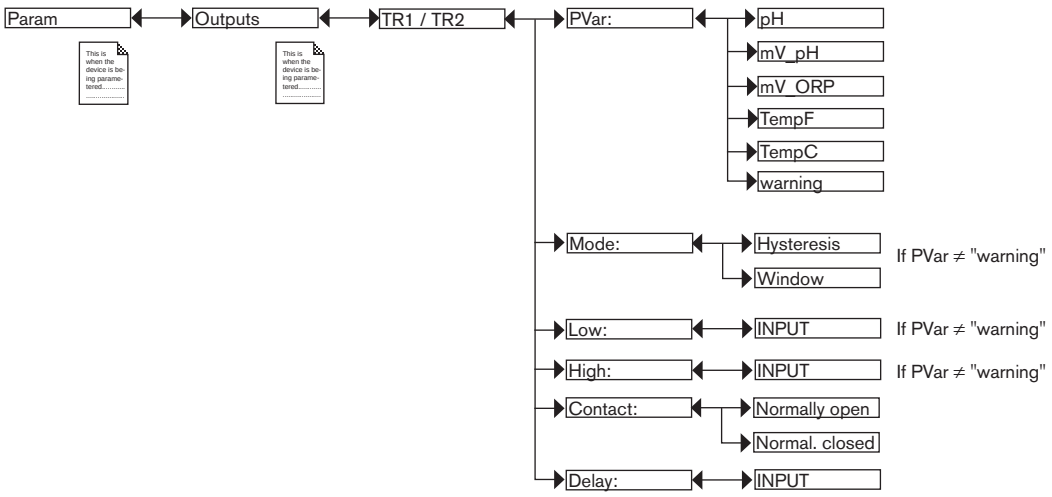
9.11.10. Setting the parameters of the transistor outputs

See chap. 9.9 to access the Parameters menu.

WARNING

Risk of injury due to wrong adjustment.

- Before setting the parameters for the outputs, choose the type of probe (see chap. 9.11.11) mounted on the transmitter.



PVAR: choose a process value associated with transistor output 1 or transistor output 2 respectively or associate the generation of a "warning" event (see chap. 9.12.4, 9.13.2, 9.13.3 and 9.15.1) to transistor output 1 or transistor output 2 respectively. The possible choices depend on the selected sensor type, whether pH or ORP.

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If the selected transistor output is linked to the "warning" event, the transistor switches as soon as such an event is generated by the transmitter. See also "If you encounter problems", at chap. 10.5

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.

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).

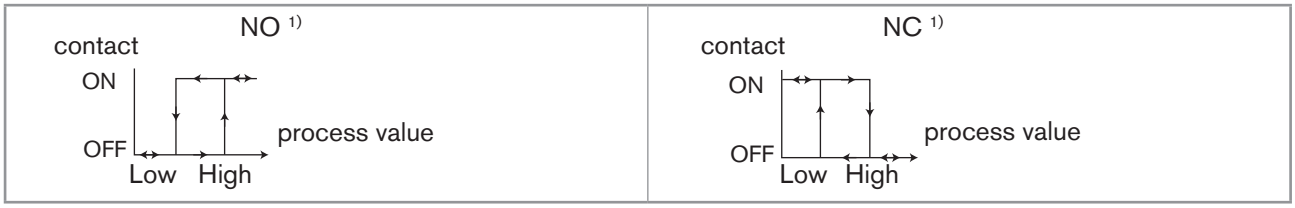

Fig. 38 Hysteresis operating

NO = Normally open ; NC = Normally closed

Window operating

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

Fig. 39 Window operating

1) NO = Normally open ; NC = Normally closed

9.11.11. Setting the sensor parameters

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

See chap. 9.9 to access the Parameters menu.

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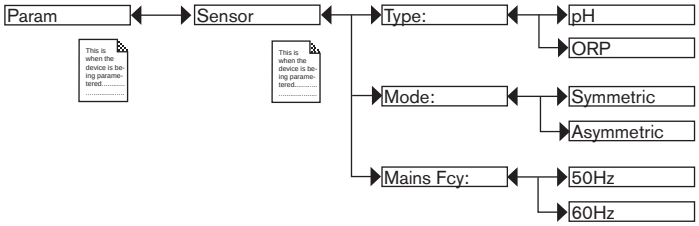


TYPE: choose the type of sensor used, pH or Redox ("ORP" choice)

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

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.

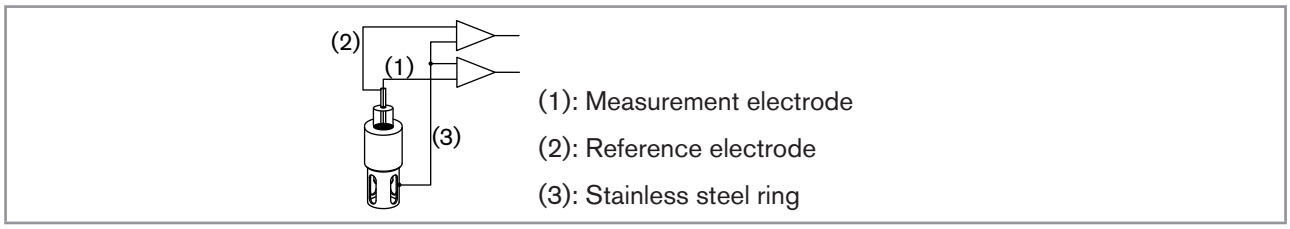


Fig. 40 Schematic diagram of symmetrical measurement

Asymmetrical measurement

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

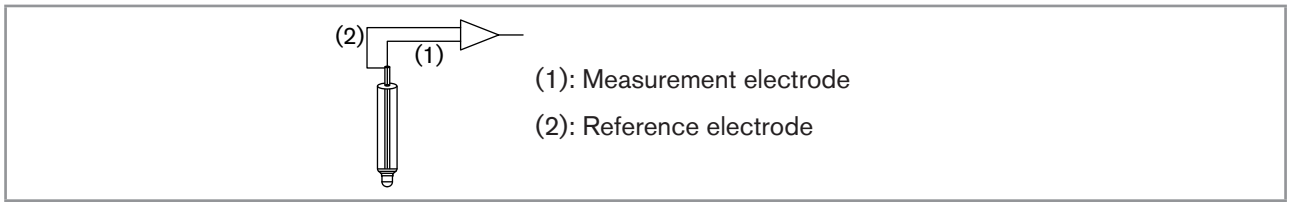


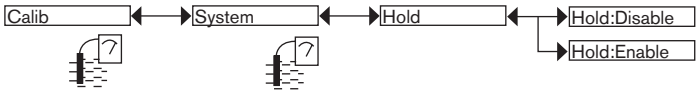
Fig. 41 Schematic diagram of asymmetrical measurement

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

9.12. Calibration menu

9.12.1. Activating/deactivating the Hold function

See chap. 9.9 to access the Calibration menu.



The Hold mode is automatically deactivated when the transmitter restarts after a power interruption, if the Hold mode was activated at the moment of the power cut off.

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

To activate the HOLD mode:

→ enter the "HOLD" function;

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→ choose "enabled";

→ validate by "OK".

In practice, when the device is in Hold mode:

- 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 process value 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.

To deactivate the HOLD mode:

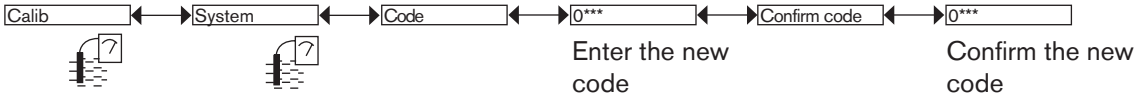
→ enter the "HOLD" function;

→ choose "disabled";

→ validate by "OK".

9.12.2. Modifying the Calibration menu access code

See chap. 9.9 to access the Calibration menu.



Default access code to the Calibration menu: 0000.

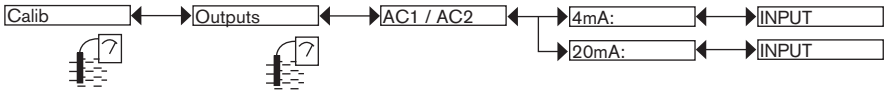
9.12.3. Adjusting the current outputs

WARNING

Risk of injury due to non-conforming adjustment.

- Make sure the Hold mode is disabled (see chap. 9.12.1).

See chap. 9.9 to access the Calibration menu.



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

When the "4mA" function is selected, the transmitter 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 transmitter 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 sensor

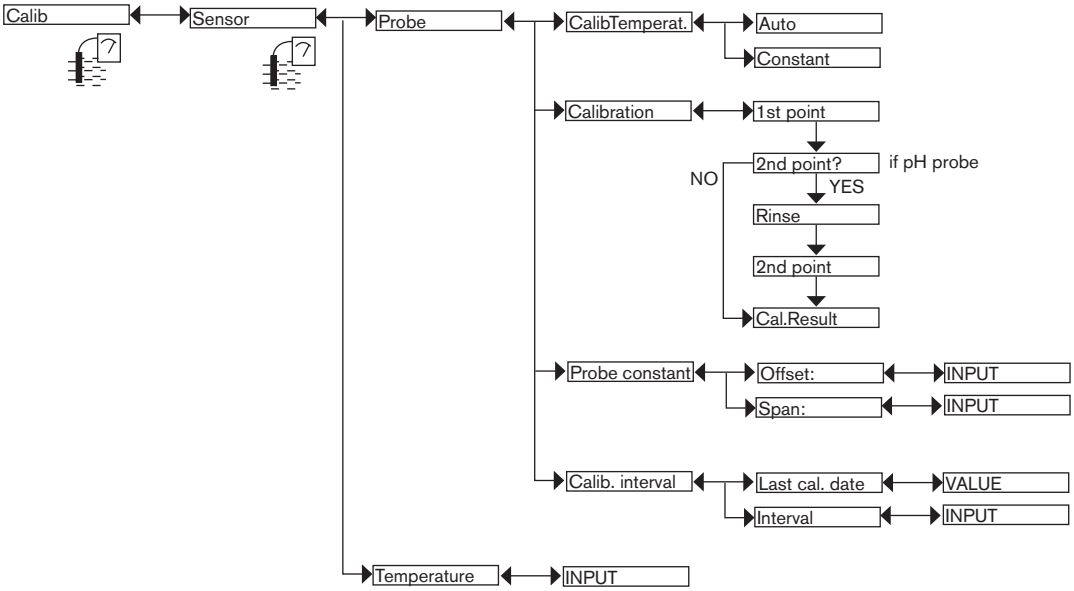
DANGER

Risk of injury due to electrical voltage
- Observe all applicable accident protection and safety guidelines for electrical equipment.

Risk of injury due to the nature of the fluid.
- Respect the regulations on accident prevention and safety relating to the use of aggressive fluids.

See chap. 9.9 to access the Calibration menu.

Choose the type of probe (see chap. 9.11.11) the transmitter is fitted with before calibrating the sensor.



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 or the Redox sensor in 1 point. See details on following pages. 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 / Redox 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 transmitter 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 (see chap. 9.11.10).
- See also "If you encounter problems" at chap. 10.5

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

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

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- In order not to interrupt the process, activate the HOLD function (see chap. 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 previous page): each time a calibration is due, the transmitter 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 54) respectively a known oxidation reduction potential (to calibrate a Redox sensor: see page 53).

2-point calibration

The 2-point calibration procedure for a pH sensor 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 54.

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

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 transmitter again when the new probe is in place

Table 1: Warning and error messages during pH sensor calibration

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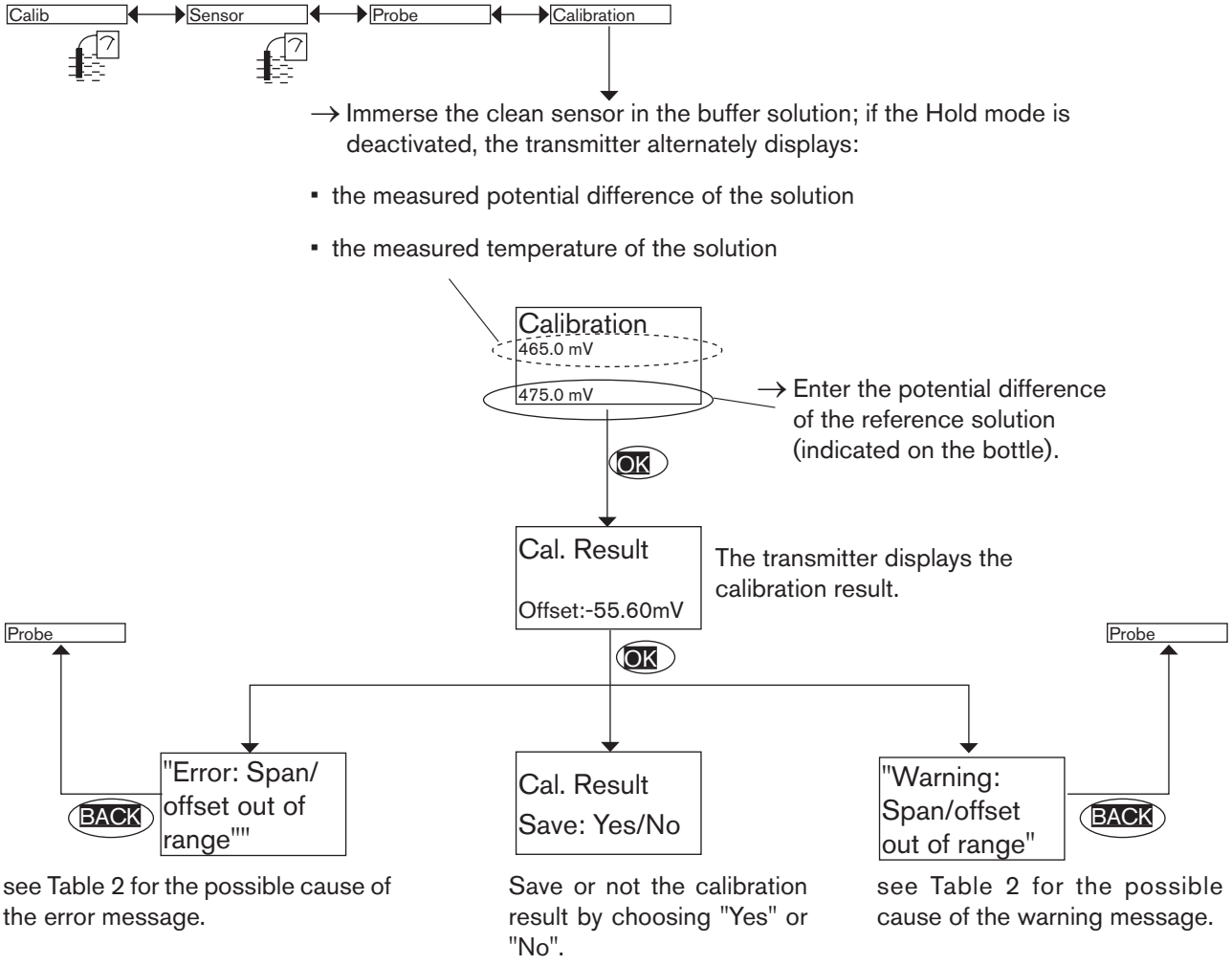
Detailed procedure for the 1-point calibration of the oxidation reduction potential sensor



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

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 transmitter again when the new probe is in place

Table 2: Warning and error messages when calibrating an oxidation reduction potential probe

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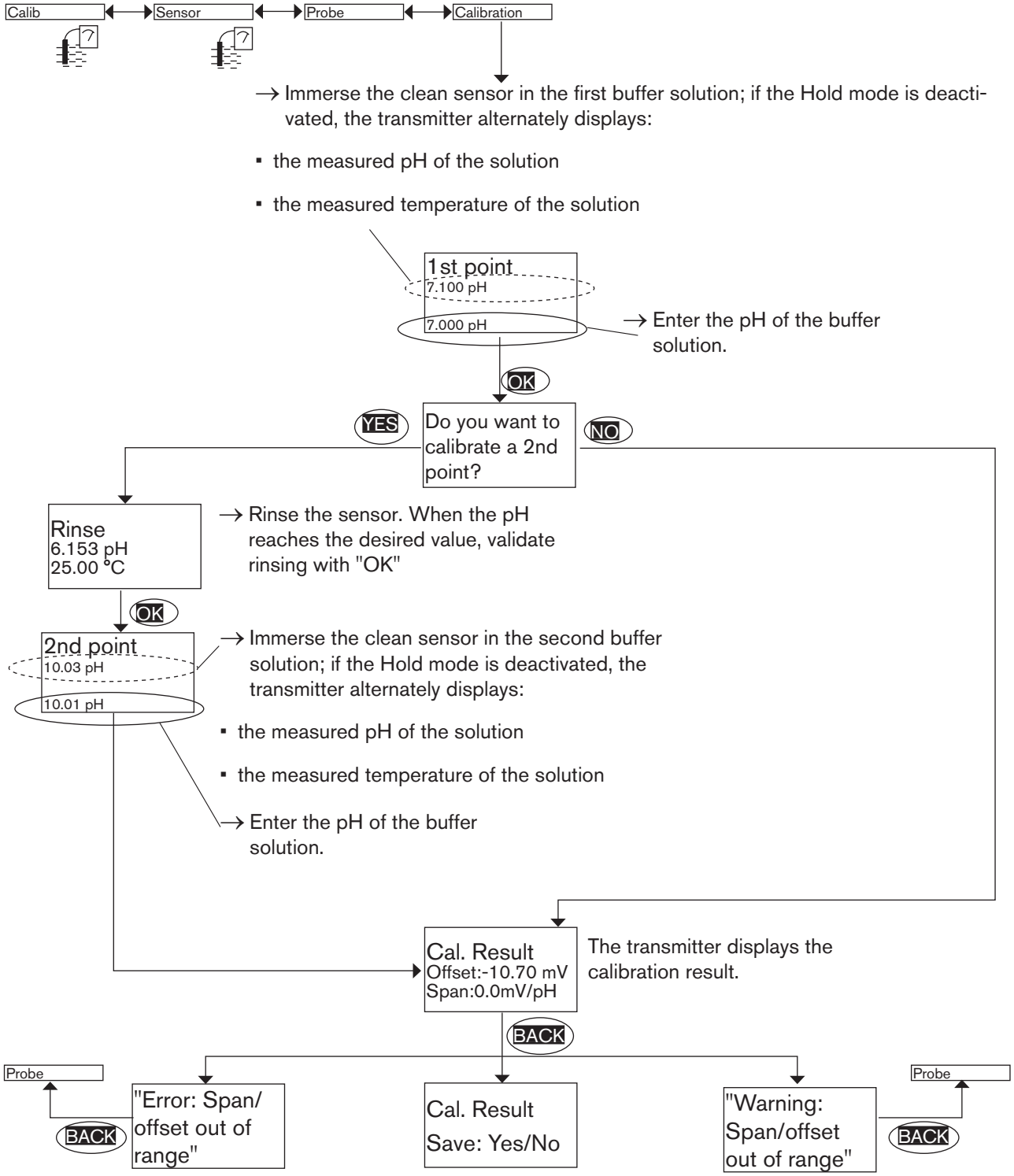
Detailed procedure for the 1- or 2-point calibration of the pH probe



seeTable 1, page 52, for the possible cause of the error message.

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

see Table 1, page 52, for the possible cause of the warning message.

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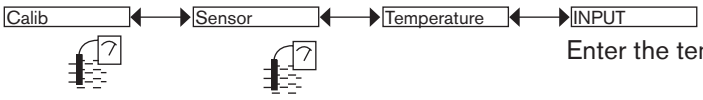
9.12.5. Entering an offset for the temperature measurement

See chap. 9.9 to access the Calibration menu.

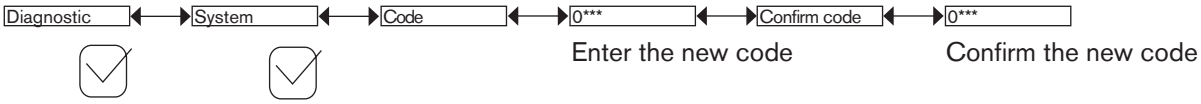
The temperature transmitted by the Pt1000 probe may be corrected. This correction value is the temperature offset.



9.13. Diagnostic menu

9.13.1. Modifying the Diagnostic menu access code

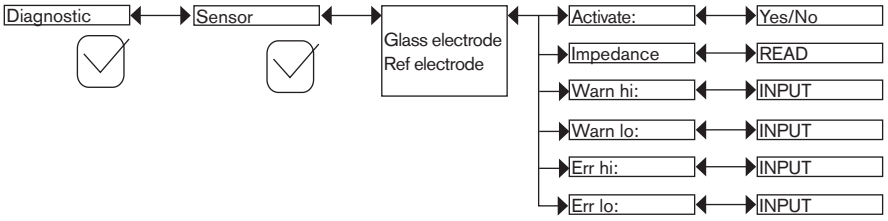
See chap. 9.9 to access the Diagnostic menu.



Default access code to the Diagnostic menu: 0000.

9.13.2. Monitoring the condition of the probe

See chap. 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.

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

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

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/ORP probe) outside of which the transmitter 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/ORP probe) outside of which the transmitter generates an "error" event and displays the ☹ and ERR icons.

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When the transmitter 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 chap. 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 chap. 9.11.9, function "Output.AC1" or "Output.AC2".
- See also "If you encounter problems" at chap. 10.5

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.

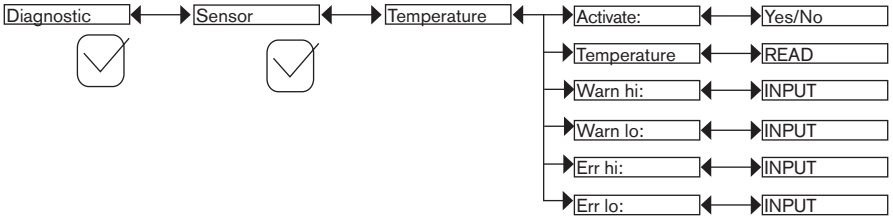
ERR LO: enter the impedance value below which an "error" event is generated.

9.13.3. Monitoring the fluid temperature

See chap. 9.9 to access the Diagnostic menu.

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.

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



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 transmitter generates a "warning" event and displays the and ⚠ icons.

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

When the transmitter 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.

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→ 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 chap. 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 chap. 9.11.9, function "Output.AC1" or "Output.AC2".
- See also "If you encounter problems" at chap. 10.5

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.

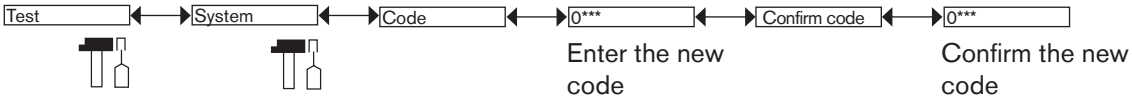
ERR HI: enter the fluid temperature value above which an "error" event is generated.

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

9.14. Test menu

9.14.1. Modifying the Test menu access code

See chap. 9.9 to access the Test menu.

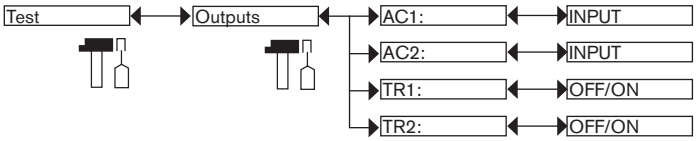


Default access code for the Test menu: 0000.

9.14.2. Checking the outputs functions

See chap. 9.9 to access the Test menu.

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".

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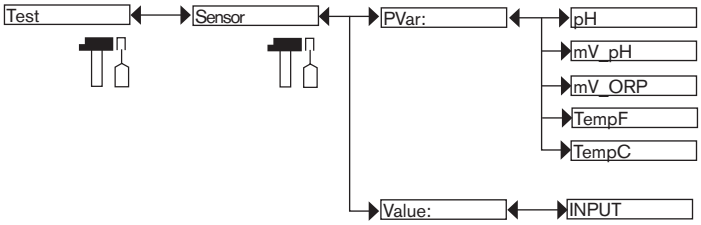
TR2: check that transistor output 2 is working correctly by selecting the status of the transistor ("ON" or "OFF") then "OK".

9.14.3. Checking the outputs behaviour

See chap. 9.9 to access the Test menu.

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.

9.15. Information menu

9.15.1. Reading the cause of events linked to icons

See chap. 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 transmitter:

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

See also "If you encounter problems" at chap. 10.5

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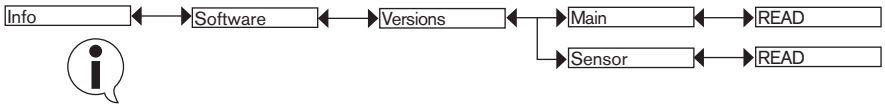
9.15.2. Reading the software versions

See chap. 9.9 to access the Info menu.



The function allows for reading the software version ("Main") of the acquisition / conversion board for the process values and of the sensor board ("Sensor").

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10. MAINTENANCE AND TROUBLESHOOTING

10.1. Safety instructions

DANGER

Risk of injury due to high pressure in the installation.

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

Risk of injury due to electrical voltage.

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

Risk of injury due to high fluid temperatures.

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

Risk of injury due to the nature of the fluid.

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

WARNING

Risk of injury due to 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 of the transmitter

The device can be cleaned 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..

10.2.1. Cleaning of the pH/ORP probe

Refer to the instruction manual delivered with the probe used.

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10.3. Replacing the probe

DANGER

Risk of injury due to high pressure in the installation.

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

Risk of injury due to electrical voltage.

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

Risk of injury due to high fluid temperatures.

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

Risk of injury due to the nature of the fluid.

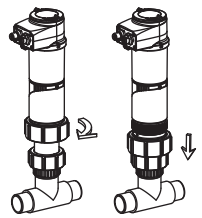
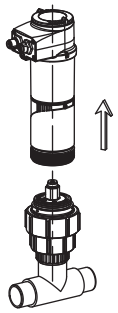
- Respect the regulations on accident prevention and safety relating to the use of aggressive fluids.

NOTE

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

- Protect the inside of the dismounted transmitter.

→ Remove the probe as shown below.

	→ 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.

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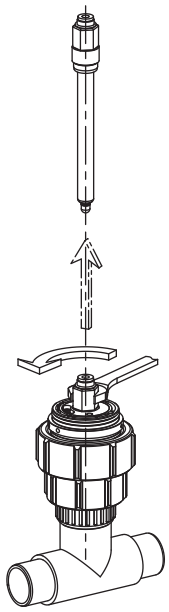
	→ Unscrew the probe using a suitable wrench. → Remove it carefully from the holder. → Clean any fluid projections on the electrical contacts on the holder.

Fig. 42 Removing the probe from the holder

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

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

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

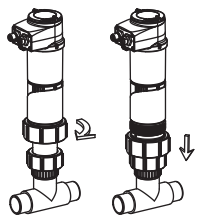
10.4. Replace the seal of the sensor holder

DANGER

Risk of injury due to electrical voltage.

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

The seal can be replaced without dismounting the holder from the pipe.

	→ Unscrew the nut between the sensor holder and the electronic module.

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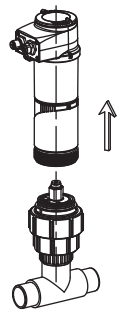
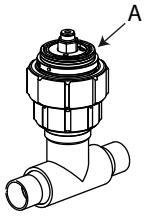
	→ Remove the electronic module by pulling it straight out. There may be a slight resistance due to the seal.
	→ Remove the used seal "A" from the holder. → Place the new seal "A" into the groove of the holder.

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. 17of chap. 8.2.

10.5. Troubleshooting

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 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" "S EE Fact Write"	Factory data is lost. The process continues but the accuracy of the device is modified.	→ 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 + ☺	"S EE User Read"	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.
				"S EE User Write"		
ON	22 mA	depending on thresholds	ERR + ☺	"S PT Missing"	The connection to the Pt1000 probe is lost.	→ 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 + ☺	"S RTC Clock"	The clock is faulty. The process continues.	→ Return the device to Bürkert if the clock is essential.
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"	Parameter reading error.	→ Switch the power supply off then on again. → If the error persists, set the device back to the default settings (chap. 9.11.4). → If the error persists, return the device to Bürkert.
				"TR EE User Read"		
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 (chap. 9.11.4). → If the error persists, return the device to Bürkert.
OFF	4-20 mA	depending on thresholds	⚠ + ☺	"S Buff Diff ORP" "S Buff Diff pH" "S Buff pH ORP"	The pH or redox 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 chap. 9.11.2). → Energize the transmitter 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 chap. 9.13.2).	→ Go into the "Sensor" function of the Diagnostic menu to read the impedance value of the reference electrode (chap. 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 chap. 9.13.2).	→ Go into the "Sensor" function of the Diagnostic menu to read the impedance value of the pH electrode (chap. 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 chap. 9.13.3).	→ Go into the "Sensor" function of the Diagnostic menu to read the measured fluid temperature (chap. 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 DIAGNOSMODE function of the "Output.AC1" or "Output.AC2" menu is set to "22 mA" (see chap. 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 chap. 9.13.2).	→ Go into the "Sensor" function of the Diagnostic menu to read the impedance value of the reference electrode (chap. 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 chap. 9.13.3).	→ Go into the "Sensor" function of the Diagnostic menu to read the impedance value of the pH electrode (chap. 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 chap. 9.13.3).	→ Go into the "Sensor" function of the Diagnostic menu to read the measured fluid temperature (chap. 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 chap. 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 chap. 9.12.4).	→ Calibrate the sensor (chap. 9.12.4).

[2] If the "PVAR" function of the "Output.TR1" and/or "Output.TR2" menus is set to "warning" (see chap. 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 and unsuitable replacement parts may cause injuries and damage the device and the surrounding area.

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

Spare part	Orde code
Seal in EPDM, Ø 46x2 mm, for the sensor holder	559169

Accessory	Order code
Display module	559168
Black blank cover with EPDM seal	560948
Transparent cover with EPDM 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	418555
Cleaning solution set 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

12. PACKAGING, TRANSPORT

NOTE

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.

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13. STORAGE

NOTE

Poor storage can damage the device.

- Store the device in a dry place away from dust.
- Storage temperature of the device without probe: -10 to +60°C.
- Storage temperature of the device with probe: refer to the instruction manual delivered with the probe used.

14. DISPOSAL OF THE PRODUCT

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

NOTE

Damage to the environment caused by products contaminated by fluids.

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

Note:

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

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