S200 Open

User Manual

AQUALABO

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Contents

1 General information

1.1 General overview

This technical manual contains instructions for installing, commissioning, maintaining and repairing the S200 Open measurement and monitoring device.

Please follow the safety instructions and notes in bold print at all times!

1.2 Notes in bold print

Titles in bold print, alerts and warnings have the following meaning, in this technical manual:

Important:

This alert is used in the event of non-compliance with functional or operating instructions, or when the recommended procedures or misinterpretation of these instructions may cause an accident or injury.

Warning:

This entry is used in the event of non-compliance with functional or operating instructions, or when the recommended procedures or misinterpretation of these instructions may damage the equipment.

Note:

This section is used to highlight key points.

1.3 Warranty

The manufacturer shall ensure the operational safety and reliability of the system when, and only when, the following conditions have been met:

- Installation, connection, adjustment, maintenance and repairs are carried out exclusively by qualified and authorized expert staff.

- Only original spare parts are used for repairs.

- The measuring and monitoring device shall be used in accordance with the information and instructions set out in this manual.

Warning:

The warranty shall not apply if the device is not used as intended.

Note:

Wear parts are not under warranty (see table at end of manual).

1.4 Electrical connection

Warning:

Only use the power supply specified on the nameplate to run the S200 measurement and monitoring device!

The device is delivered to run, by default, on a 230V/50Hz or 110V/50Hz power supply.

1.5 Safety Instructions

S200 Open measuring and monitoring devices are manufactured and tested according to standards DIN EN 61010-1 / VDE 0411-1. This device left the factory in good condition. In order to maintain this condition, and to ensure the safety during use, the user must comply with the information and warnings given in this manual. If it is suspected that operating in total safety is no longer possible, we recommend that you turn off the device and disable it to prevent any accidental operation.

Follow these instructions:
- if the system shows visible signs of deterioration
- if the system is apparently no longer operational
- after an extended period of storage under poor conditions.

1.6 Damage due to transport

We carefully pack the S200 Open measuring and monitoring devices for transport. Please check that the content of the delivery is complete and in good condition. Any damage due to transport **must be reported immediately** (carrier).

The device must never be exposed to temperatures outside the range of -20 to +70°C (transport and intermediate storage).

Subject to technical amendments. Subject to changing the assembly of components.

2 Technical data

2.1 General overview

Article	Adjustment ranges
Power supply unit	230 V/AC ± 10 % (50/60Hz) 117 V/AC ± 10 % (50/60Hz)
Power consumption	16 VA
Level of protection	IP 65
Fuse (device)	80 mAT (230V) 160 mAT (117V)
Electrical properties of the contact relay Max. direct current/max. start-up current Rated voltage/max. switching voltage Max AC switching capability to direct current	 6A/16A 250VAC, 24VDC 6A 6A
Operating temperature	-20° to 50°C
Permissible storage temperature	-20°C to +65°C
Permissible humidity	Max. 90% to +40°C (non-condensing)
Device dimensions	166 x 161 x 73.5 mm (l x h x d)
Weight	Approx. 1.1 kg

Warning:

Unit fuse of 16A max.

2.2 Variable measurements

Measured variable	Measuring and monitoring tools	Resolution
pH	0.00 - 14.00 pH	0.01 pH
Conductivity at 4 electrodes	0,0 - 200,0 µS/cm 0 – 2000 µS/cm 0 – 20,00 mS/cm 0,0 – 200,0 mS/cm Salinity: 0 – 85.00 g/kg TDS KCl : 0-9999 ppm	0,1µS/cm 1 µS/cm 0,01 mS/cm 0,1 mS/cm 0.01 g/kg
ORP	-1000 – 1000 mV	1 mV
Input current:	0/4 to 20 mA	Charge of 0.01 mA / 50 Ω
Turbidity TSS	0.00 to 50.00 NTU 0.0 to 200.0 NTU 0 to 1,000 NTU 0 to 4,000 NTU 0-4500 mg/L	ModBus digital sensor from 0.01 to 1 NTU. 1mg/L
TSS	0.00-50.00g/L 0-4000 FAU 0.0-100.0% transmission	0.01 g/L 1 FAU 0.1 %

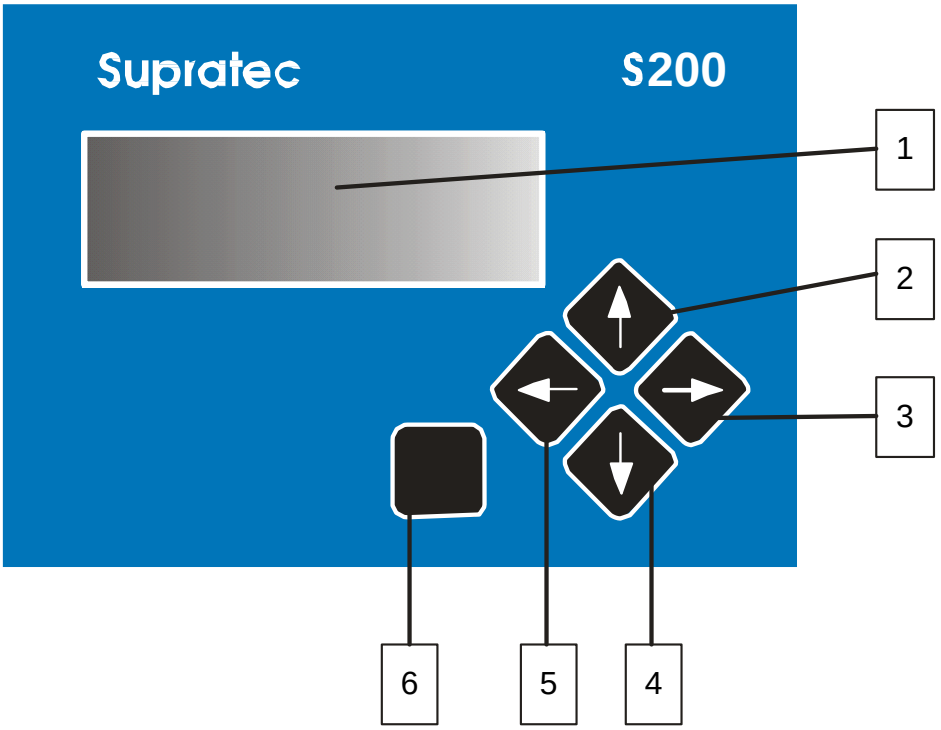
3 Description

The S200 Open measuring and monitoring device is easy to use.

Equipment:

- Backlit display
- Cursor-controlled operation with only 5 keys
- Browser menu in plain text
- Up to 6 different settings simultaneously (depending on the type of code)
- Password protected access
- Ease of integration into process technology via the existing Modbus RTU
- Connection for digital probes, including power supply
- 2 digital outputs for controlling frequency metering pumps
- 3 relay outputs
- 2 digital inputs, switching input or frequency input
- 2 electrically insulated ModBus RTU interfaces
- 2 electrically insulated 0/4 - 20mA outputs
- Up to 4 adjustable individual PI controls (depending on the type of code)
- Retroactive control via an additional 0/4-20 mA analog input
- Real-time clock with backup battery
- Additional housing for sensors

4 Operation



4.1 Controls

(1) Display Backlit LCD screen with 4 lines of 20 characters each

(2) Key  Cursor control/Numerical value increase

(3) Key  Choice confirmation/Function change

(4) Key  Cursor control/Numerical value decrease Choice of operating menu

(5) Key  Value backup/Return to level 1 menu

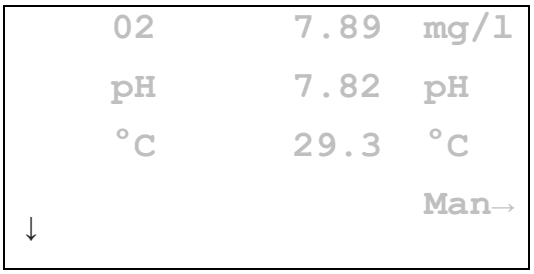
(6) Key 

Cancel input without saving/Return to the home screen.

4.2 Display

4.2.1 Graphic symbol

4.2.1.1 Main screen for visualization of measurements and related units:



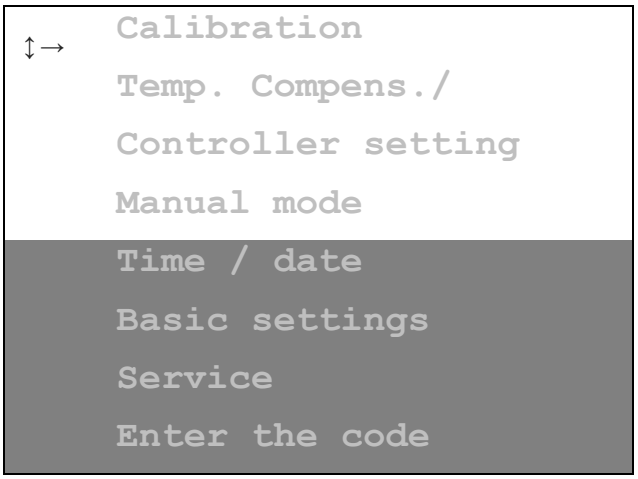
Note:
The example display may differ depending on the device's configuration.

The displayed graphic symbols indicate which keys are available to operate the device.

↓ This indicates that you can switch to the operating level using the appropriate key.

→ This indicates that the command function switches from manual to automatic by pressing the key.

4.2.1.2 Visualization:



Grey area ⇔ area of the menu not visible on the 4-line screen.

Note:
Grey area of the menu not visible on the 4-line screen.

↕ Indicates that the cursor can be moved up or down using the cursor keys.

→ The additional arrow on the right indicates that a sub-menu or input of numeric values can be selected.

Note:
In the instructions for use, the following line appears above the menu window, as follows:

/Service/LCD Display/

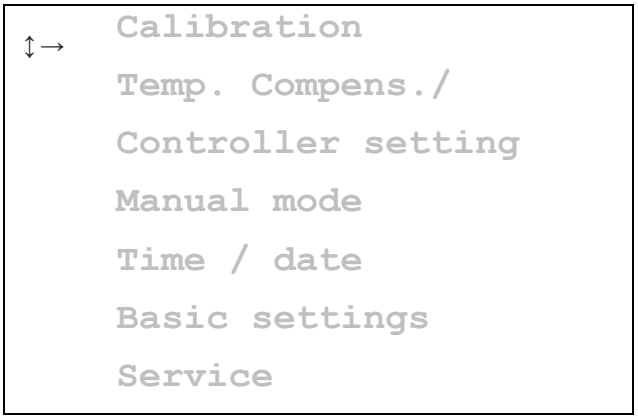
This line enables users to easily find this menu item in the device.

/Service/LCD Display/: This means that the selected sub-menu is "Service".

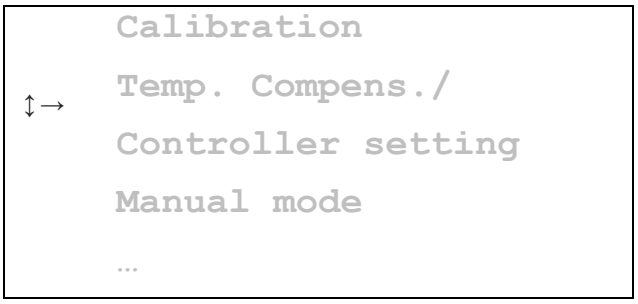
/Service/**LCD Display/**: This means that an additional sub-menu has been selected.

4.2.2 General menu:

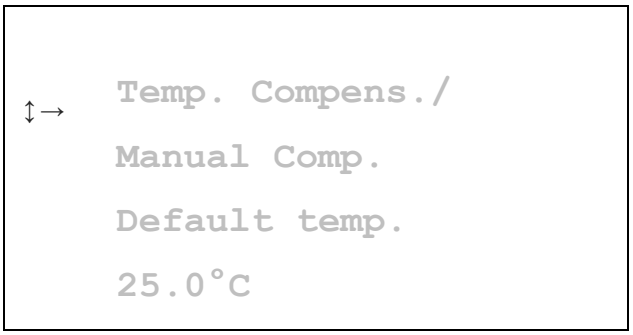
From the main screen (real-time display of measurements), the DOWN arrow gives access to the General menu. The list of items accessible from the General menu is as follows:



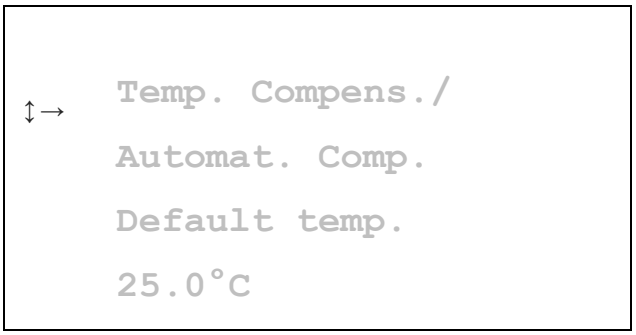
4.2.3 Example of access to a sub-menu, selection of "Temperature Compensation" menu



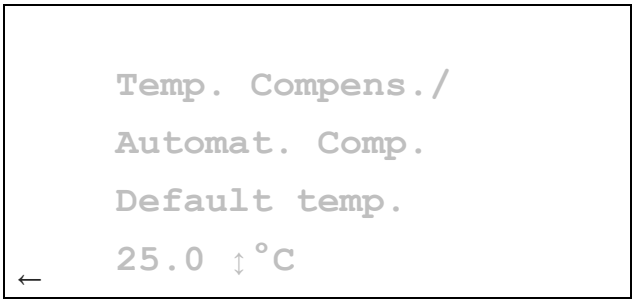
Use the key to select the "temperature compensation" sub-menu.



Use the key to switch the temperature compensation mode from automatic to manual. If the temperature is compensated automatically, Pt100 / Pt1000 is used.



Use the key to select the settings input.



↕ A flashing arrow indicates you are in input mode. Use the arrow keys - up or down - to change the numeric value.

← This indicates that the cursor key - left arrow - is used to complete the input and the value is saved.

Note:

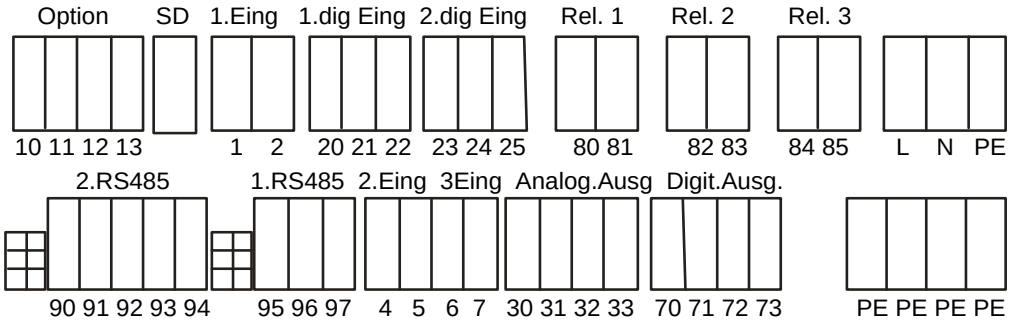
The information entered can be canceled at any time by pressing the ESC key. The old value is retained.

5 Installation

	WARNING
	Potential risk of electrocution: Always shut off power to the equipment when connecting it. The lower part of the housing, protective cover of the housing may only be removed after switching off the device.

	CAUTION
	Potential damage to the device: The internal electronic components of the device may be damaged by static electricity which in turn may adversely affect its performance and function. Discharge static electricity from your body before working on the equipment.

5.1 Assignment of terminals



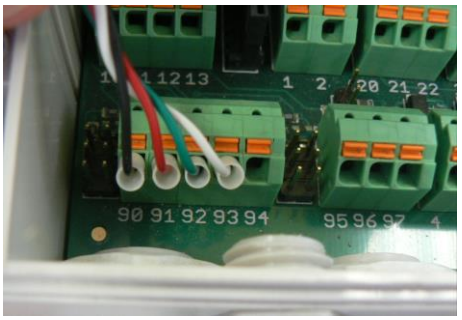
Eing. = input *Ausg. = output*

5.1.1 Assignment of pins

Function	Terminals	Description
Power supply voltage	L/N/PE	230 V/AC ± 10 % (50/60 Hz)
PE distribution block	PE, PE, PE, PE	PE distributor
Digital input 1	20+21+22	Digital input 21/22 (contact without potential) Electronic contact, 12V power supply voltage 20/-22

Digital input 2	23+24+25	Digital input 24/25 (contact without potential) Electronic contact, 12V power supply voltage +23/-25
Analog output 1 0 / 4-20 mA max. load 500Ω	30+31	-30/+31
Analog output 2 0 / 4-20 mA max. load 500Ω	32+33	-32/+33
Digital output 1 Max. load 200 mA / 30V	70+71	Digital output for electronic monitoring Dosing pumps
Digital output 2 Max. load 200 mA / 30V	72+73	Digital output for electronic monitoring Dosing pumps
Switching from output relay 1	80+81	Potential-free contact
Switching from output relay 2	82+83	Potential-free contact
Switching from output relay 3	84+85	Potential-free contact

Union	**Terminals**	**Description**
Modbus RS485 interface for connecting digital probes 12VDC power supply voltage	90+91+92+93+94	90 = 0 V, 91 = +12 V, 92 = B, communication 93 = A, communication
Modbus RS485 interface for communication with the management system	95+96+97	95 = B 96 = A 97 = shielding

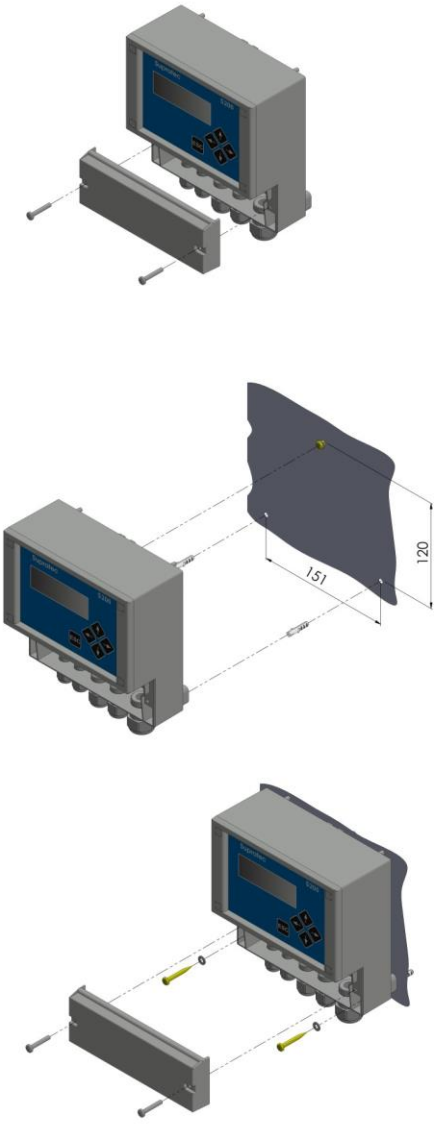


Detailed view of the terminal box: connection area for digital sensors

5.2 Setting up the equipment:

5.2.1 Description of the wall mounting:

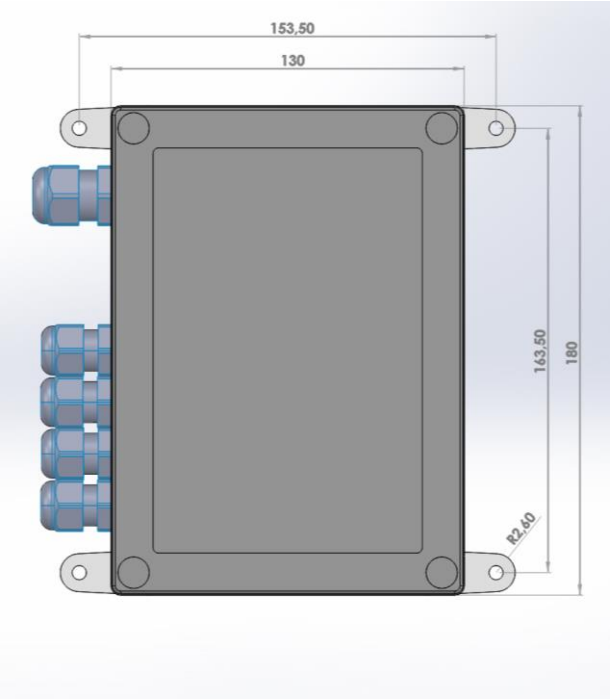
5.2.1.1 S200 transmitter display



	WARNING
	Risk of bodily injury: Only qualified personnel is authorized to undertake the operations of setting up the equipment on its support.

	Improper fastening = risk of equipment falling, deterioration of equipment and risk for operators.

5.2.1.1 Connection box 1 to 4 sensors (option): 4020 connection box



Technical Characteristics: IP66; IK 08

General configuration and use:
The 4020 connection unit can deploy from 2 to 4 DIGISENS digital sensors remotely. A single cable, supplied with the housing (standard length: 1 meter), connects this module to the S200 transmitter via its "digital input" unit. This cable provides the communication link and transfer of electrical energy (12VDC).

This terminal box has 5 side inputs by cable gland of which 4 are numbered and dedicated to sensors.

The sensors are connected separately via a detachable 6-contact plug-base combination inside the housing, in order to facilitate the connection / disconnection operation.

	WARNING
	Risk of bodily injury: Only qualified personnel is authorized to undertake the operations of setting up the equipment on its support.

	Improper fastening = risk of equipment falling, deterioration of equipment and risk for operators.

6 Access and display

6.1 How to use menus

All settings are accessible via a menu. Changing a defined value (for example).

Note:
This manual includes all available menu items. Depending on the selected code (see the specific "Codes" paragraph), all menu items cannot be displayed, and/or, all menu items cannot be selected.

6.1.1 Codes

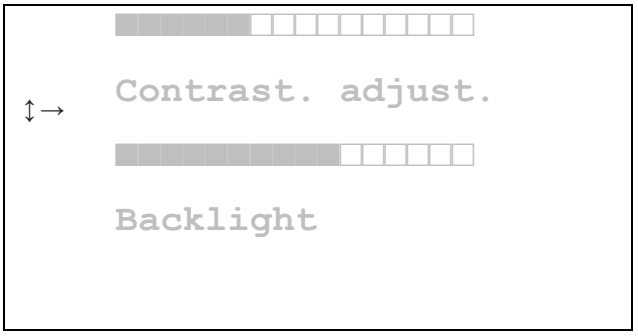
There are 3 access levels to provide access using codes that protect the device from unauthorized operation.

A) Code A - 00: all entries are locked, except codes B, C and D
B) Code B - 15: user code
C) Code C - 55: maintenance code
D) Code D - NN: code for factory service

6.2 LCD display adjustments

6.2.1 Contrast adjustment

From the general menu, SERVICE sub-menu then, display setting:



The contrast level of the LCD display can be adjusted.

Note:

It may not be possible to adjust the contrast too high or too low.
Please adjust the contrast as follows:

Press the ESC key in, keep it in while pressing ESC to increase contrast.

To decrease contrast, press the  **key while pressing at the same time.**
This function may need to be adjusted after a factory reset.

6.2.2 Adjusting the backlight

The intensity of the backlight can be changed using the "backlight" menu.

Note:
Backlight intensity: it should be as bright as required. A backlight that is too bright reduces the useful life of the display.

6.3 Display - Loss of communication

If communication with a Modbus RS485 digital sensor is lost, the parameter display, e.g. oxygen in mg/L for an OPTOD sensor, will flash until communication is restored.

7 Use of measurements provided by a Modbus RS485 sensor

7.1 OPTOD digital optical sensor for measuring dissolved oxygen

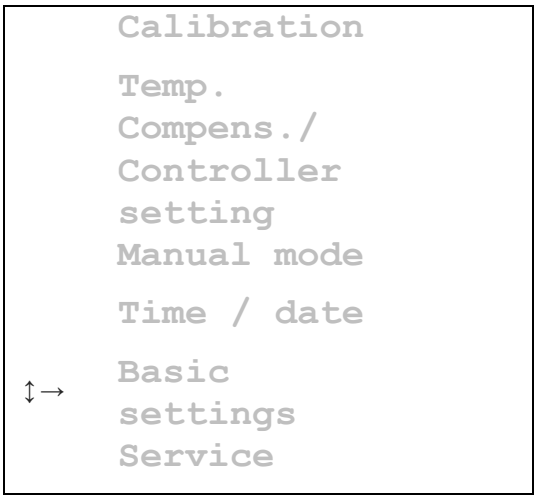
MODBUS RTU

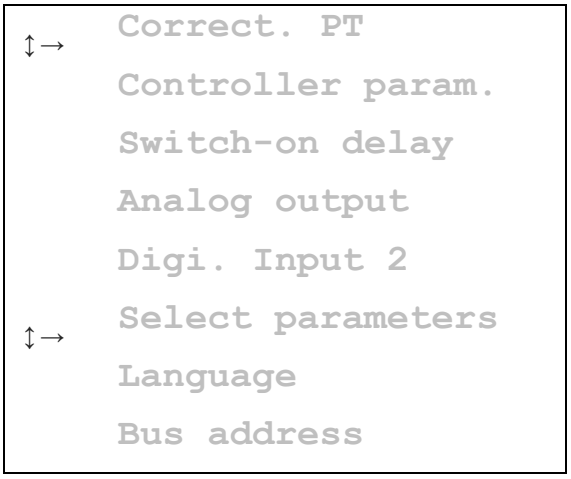
7.1.1 Reminder of connection to the terminal:

Assignment of terminals		
Color of wires	**Operation**	**Union**
Black	Ground	Terminal 90
Red	DC 12V +	Terminal 91
Green	RS485 - (B)	Terminal 92
White	RS485 + (A)	Terminal 93

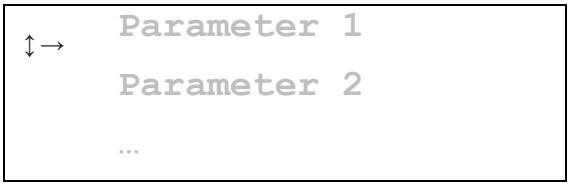
7.1.2 Setting / configuring of displayed measurements

The operator has access to the range of parameters from a digital sensor such as the OPTOD from the BASIC SETTINGS sub-menu.





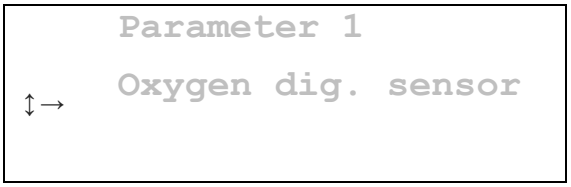
The SELECT PARAMETERS leads to the list of active parameters from 1 to 6. These are the 6 usable display areas on the screen.



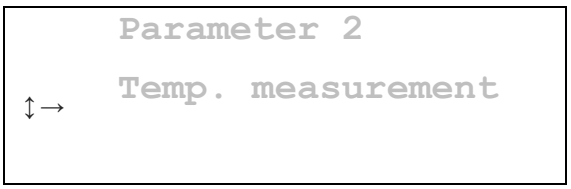
Selecting one of the six parameters leads to a list of choices:

- No measurement
- Temperature measurement
- Turbidity measurement
- Oxygen digital sensor
- MES-Turb. measurement
- pH digital sensor.

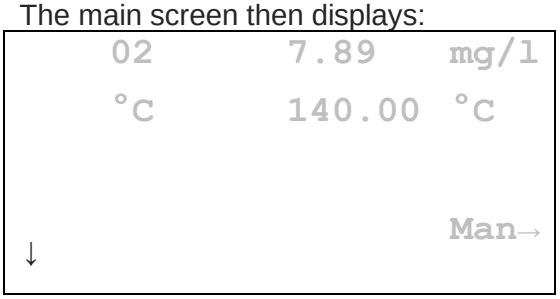
In this case, the temperature or oxygen will be selected as these 2 parameters are delivered by the OPTOD sensor.



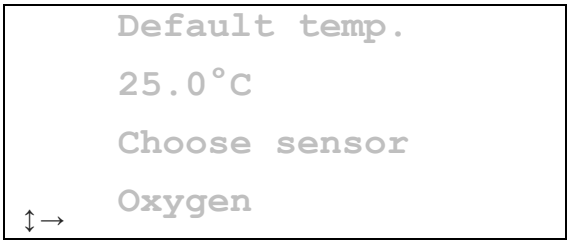
Note that these two parameters can be viewed simultaneously by configuring parameters 1 and 2.



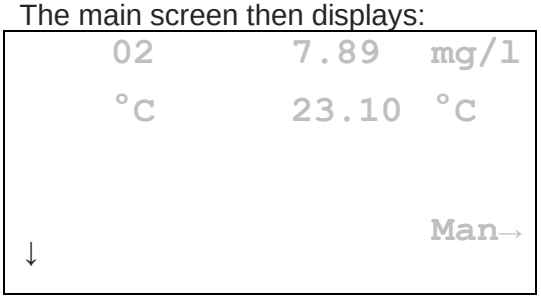
The main screen then displays:



The temperature value from OPTOD is displayed after activating the TEMP COMPENS. menu.

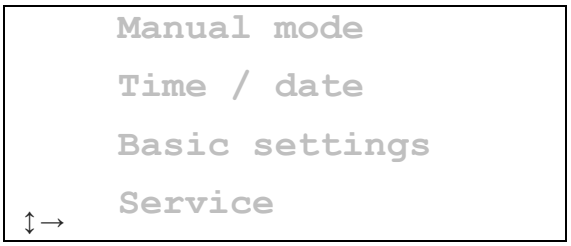


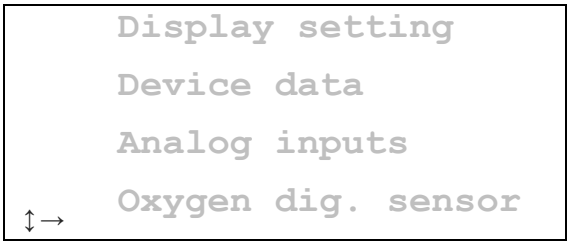
The main screen then displays:



7.1.3 Sensor information

The operator has access to information on the connected sensor from the main SERVICE menu.





Pressing the right arrow on the OX. DIGITAL SENSOR line gives access to the following information:

- Sensor serial number
- Software version
- Hardware version
- Instant measurements of all available parameters for the sensor in question. In the case of the OPTOD sensor: temperature, oxygen as a saturation %, oxygen in mg/L, and oxygen in ppm.

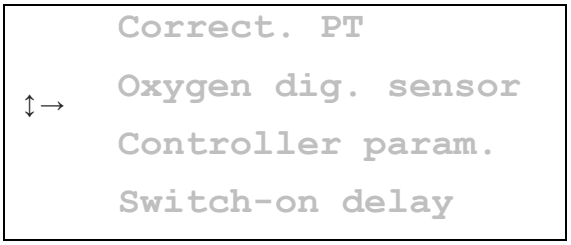
7.1.4 Oxygen measurement configuration

The dissolved oxygen content expressed in mg/L, for a given solution, depends on the temperature of the liquid, salinity and atmospheric pressure if that solution is in contact with the atmosphere.

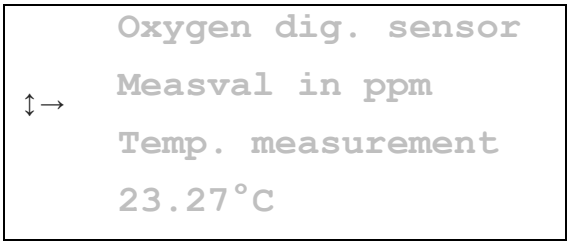
In terms of temperature, the OPTOD sensor generally uses its own temperature measurement.

The sensor does not have this information for the other two parameters: salinity and atmospheric pressure. They must therefore be provided by the S200 Open device.

The BASIC ADJUSTMENT submenu, from the main menu, provides access to the oxygen digital sensor configuration.



The first line MEASURE. VALUE on this screen lets you select units for the dissolved oxygen parameter by choosing the unit: %saturation, mg/L or ppm

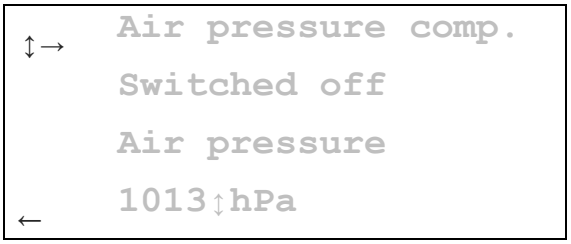


The operator may activate/deactivate the oxygen measurement compensation parameters on the lower levels of the same screen.

The choices are therefore repeated:

- EXT.TEMP.COMPENS.: definite temperature value to apply an external temperature compensation; 25.0 °C by default,
- AIR PRESS. COMPENS.: helps adjust the external compensation value for atmospheric pressure (hPa)
- SALINITY COMP.: known salinity value for the solution studied in g/kg

For example, in the case of atmospheric pressure configuration, the screen displays the following:



The second line represents compensation activation/deactivation: OFF / ON.

By accessing the fourth line, the operator can adjust the pressure value (icon ↕: using the Up or Down arrows).

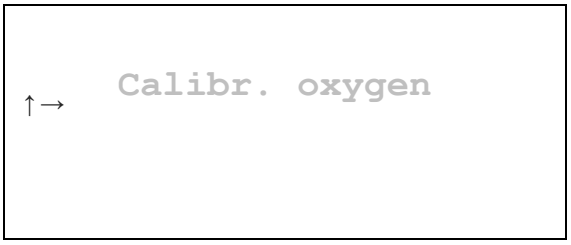
7.1.5 Calibration methods

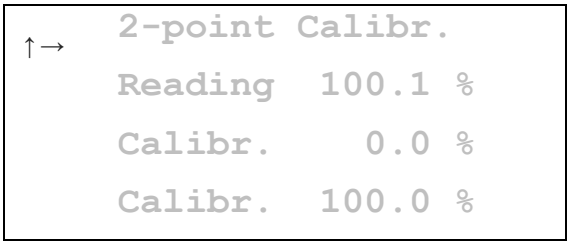
The S200 Open offers two calibration methods, as a saturation %, for the oxygen probe:

- Calibration of the final value (calibration at one point – 100%)
  This method allows the probe to be calibrated quickly. It is a standard method.
- Two-point calibration (0 and 100%)

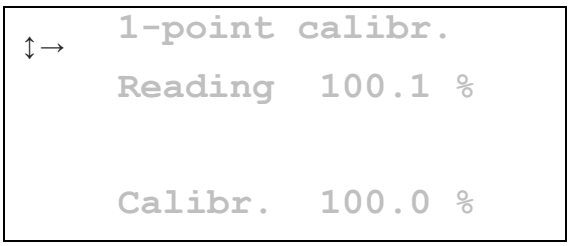
  This two-point method calibrates the zero point and the probe slope. This is a more complex and exact method because a “zero-point solution” is also required.

Select the different calibration methods using the menu: CALIBRATION



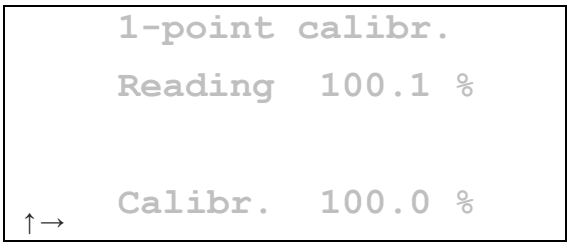


Use the right arrow to select the method.

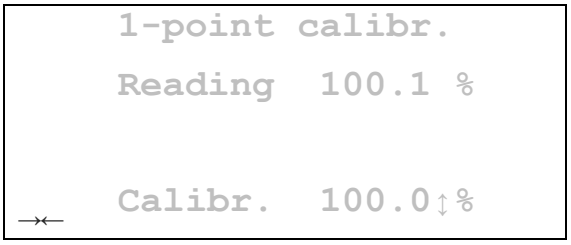


7.1.6 One-point calibration sequence

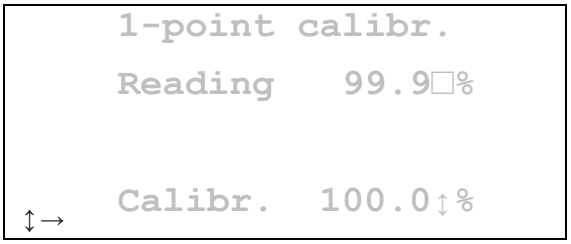
The one-point calibration of the OPTOD sensor is performed by positioning the pre-cleaned sensor in the air above the water surface to create steam-saturated air conditions (100% oxygen saturation).



When the cursor is located on the CALIBR. 100.0 % line, the right arrow is used to start the calibration sequence.



Pressing the right and left arrows simultaneously will start the measurement sequence.



A square symbol □ flashes on and off during the measurement sequence.
After this sequence, the down arrow allows you to view the updated slope value.

7.1.7 Two-point calibration

A sodium sulfite solution (concentration < 2 % by weight) is used as the zero point calibration solution for the two-point calibration sequence. The general condition of the sensor must be checked before starting the sequence.

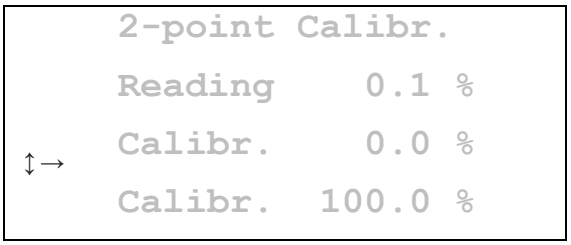
Note:

The oxygen probe must be checked periodically (depending on the proportion of impurities present). It is important to rinse the probe and pellet before each check. Organic deposits on the active pellet, such as mud or biofilm, may result in measurement errors. These deposits can be removed by carefully using hot soapy water and a sponge. Never use an abrasive cleaner.

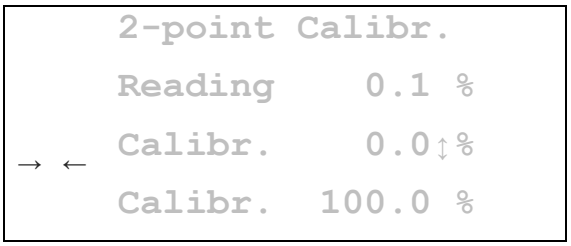
7.1.8 Calibration of zero point – detailed procedure

The sodium sulfite solution must be ready for calibration.

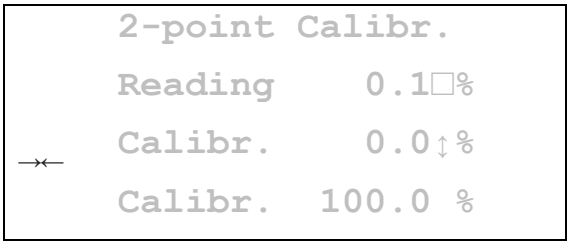
1. Remove the probe from the original liquid medium, rinse it and check for any deposit of dirt/contamination as described, where applicable.
2. Immerse the probe in a container filled with sodium sulfite solution.
3. Keep stirring slowly to ensure local gas exchange at the OPTOD's active membrane.
4. Wait until the value is stabilized.
5. Use the  or  arrow key to select the CALIBR 0.0% line.



6. Use the right arrow to start the sequence.



7. Pressing the right and left arrows simultaneously will start the measurement sequence.



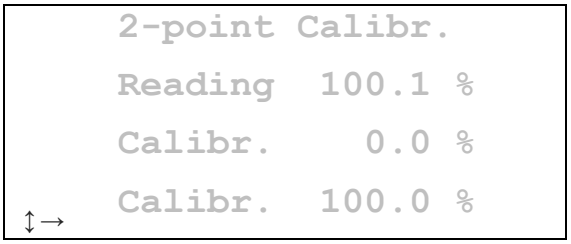
A flashing square behind the displayed value indicates that the automatic calibration process is in progress. This display turns off when zero point calibration is complete.

8. Thoroughly rinse the probe with clear water and wipe the sensor.

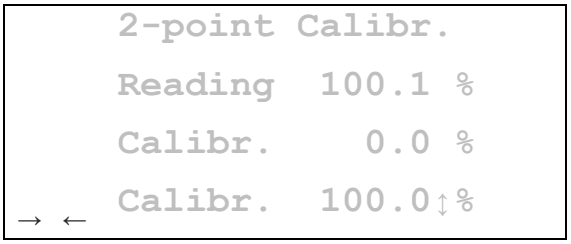
7.1.9 Calibration of the final point - detailed procedure

The second point calibration is performed with 100% oxygen saturation. It is carried out by placing the probe in the air-saturated water, or in the air saturated with steam. In this second case, the sensor may be placed about 2 cm above the surface of the water.

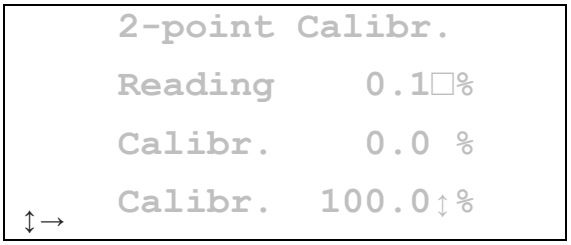
1. Use the  or  arrow key to select the CALIBR 100.0% line.



2. Use the right arrow to start the sequence.



3. Pressing the right and left arrows simultaneously will start the measurement sequence.



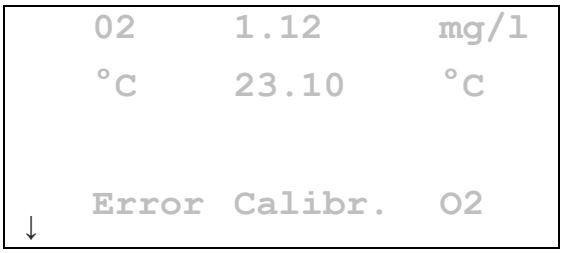
A flashing square behind the displayed value indicates that the automatic calibration process is in progress. This display turns off when the calibration is complete.

Once the two-point calibration sequence is complete, pressing the DOWN arrow displays the coefficients, zero point and slope, calculated by the sensor during both stages.

7.1.10 Error calibration – message

If, however, due to a manipulation error, the calibration sequence led to the creation of erroneous coefficients, a message to that effect will be repeated on the main screen.

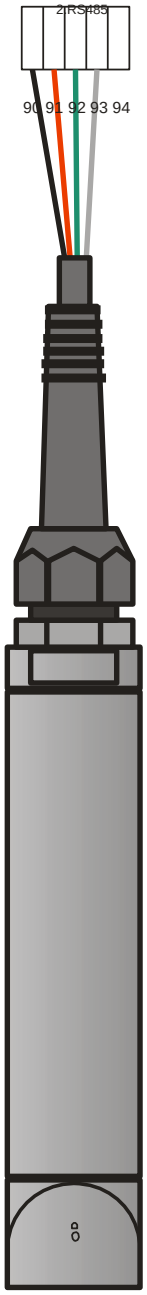
The main screen then displays:



7.2 Digital sensor for measuring nephelometric turbidity

Assignment of terminals		
Color of wires	**Operation**	**Connection**
Black	Ground	Terminal 90
Red	DC 12V +	Terminal 91
Green	RS485 - (B)	Terminal 92
White	RS485 + (A)	Terminal 93

MODBUS RTU

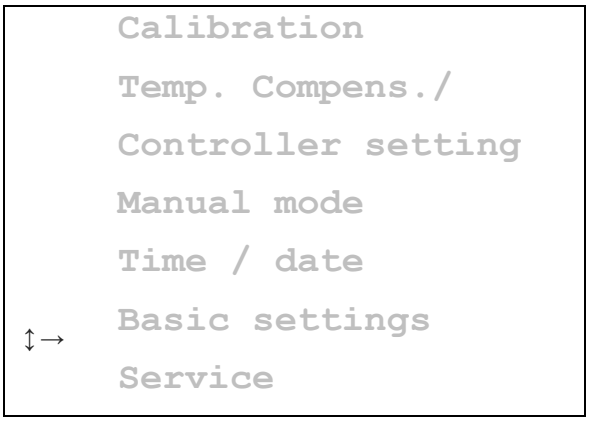


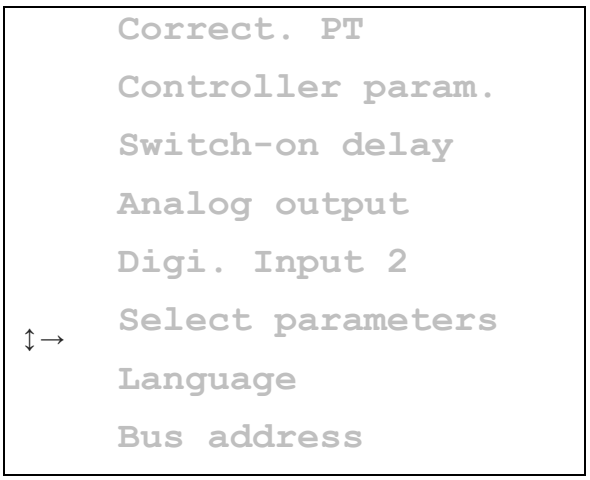
7.2.1 General information about the turbidity probe

Turbidity sensors are optical sensors. The sensor measurement principle is based on the IR light method dispersed at 90° (ISO 7027). The measurement is carried out in the infrared range. This sensor may age during operation which results in sensor drift. These influences are offset by calibration.
The sensor is calibrated in the factory, so there is no need to perform calibration during initial commissioning. The sensor shall be cleaned at regular intervals, during operation, depending on the level of contamination of the liquid studied.

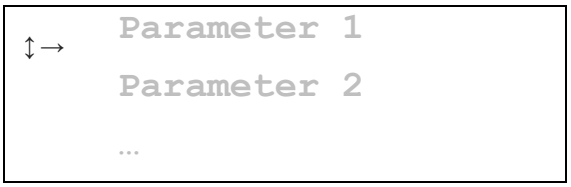
7.2.2 Setting / configuring of displayed measurements

The operator has access to the choice of parameters coming from a digital sensor in the BASIC ADJUSTMENT submenu.





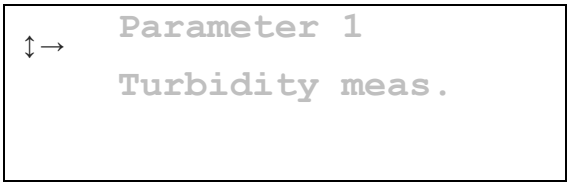
The SELECT PARAMETERS choice leads to the list of active parameters from 1 to 6. These are the 6 usable display areas on the screen.



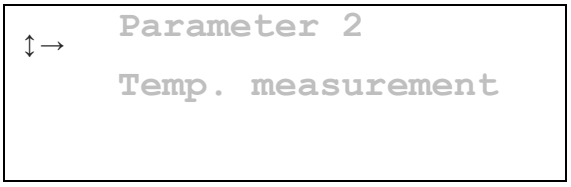
Selecting one of the six parameters leads to a list of choices:

- No measurement
- Temperature measurement
- Turbidity measurement
- Oxygen digital sensor
- MES-Turb. measurement
- pH digital sensor.

In this case, temperature or turbidity will be selected as these 2 parameters are delivered by the sensor.

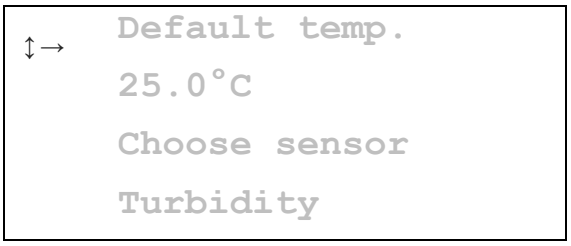


Note that these two parameters can be viewed simultaneously by configuring parameters 1 and 2.



The main screen then displays:

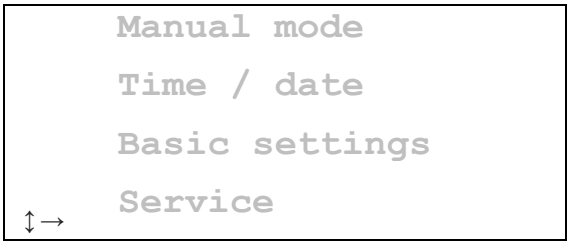
The temperature value from the turbidity sensor is displayed after activation in the TEMP. COMPENS. menu.

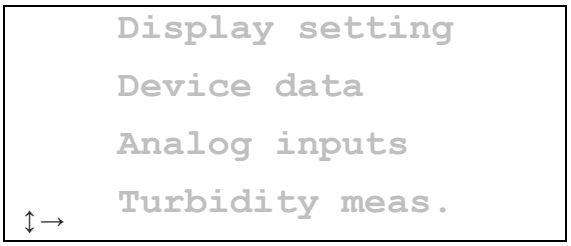


The main screen then displays:

7.2.3 Sensor information

The operator has access to information on the connected sensor from the main SERVICE menu.



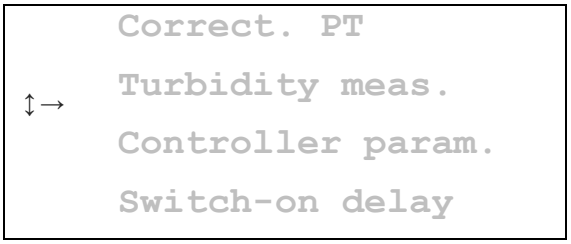


Pressing the right arrow in the TURBIDITY MEASUREMENT LINE gives access to the following information:

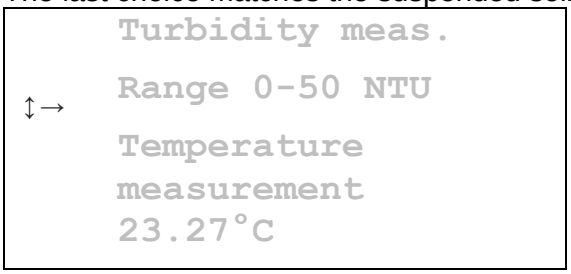
- Sensor serial number
- Software version
- Hardware version
- Instant measurements of all available parameters for the sensor in question.

7.2.4 Configuration of the nephelometric turbidity measurement

The BASIC ADJUSTMENT submenu provides access to the digital nephelometric turbidity sensor configuration. In this case, the sensor work range is selected from among the four provided.



The first RANGE line on this screen allows you to select the measurement range from the 5 available.
The first 4 choices match the nephelometric turbidity measurement (0-50, 0-200, 0-1000 or 0-4000 NTU).
The last choice matches the suspended solids measurement (unit: 0 to -4500 mg/L)



Note:

After having selected the measurement range and in the event of overstepping when the S200 device returns to measurement mode, the measurement will remain frozen in the form of a series of 9s (e.g. 999.9). In this case, return to the menu so as to select the measurement range and opt for a wider range.

7.2.5 Method for calibrating nephelometric turbidity

As noted above, the nephelometric turbidity sensor has 4 measurement ranges, with separate calibration coefficients, all calibrated using the menu: CALIBRATION. The calibration sequence for the 0-200 NTU range is described below.

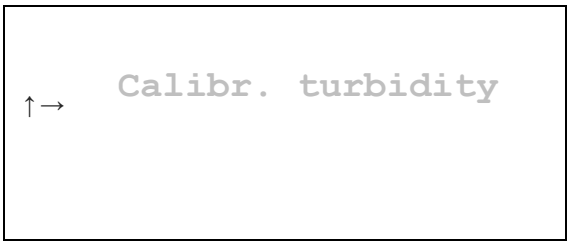
Note:

The turbidity probe must be checked periodically (depending on the proportion of impurities present). It is important to rinse the probe before each check. Organic deposits on the probe, such as mud or biofilm, may result in measurement errors. These deposits can be carefully removed using hot soapy water and a soft sponge. Never use an abrasive cleaner. Limestone deposits can be removed using a dilute hydrochloric acid solution (max . 5%).

7.2.5.1 Calibration of zero point – detailed procedure

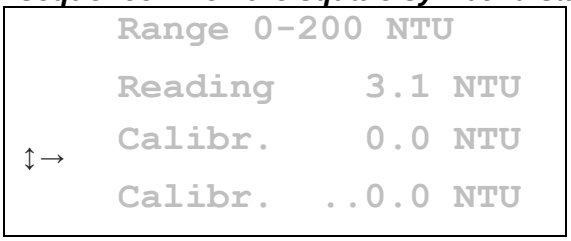
Operating conditions:
The sensor is placed in distilled water for this calibration step. The total absence of bubbles on the active part of the sensor (optical part) will be checked.

Select CALIBRATION in the general menu:



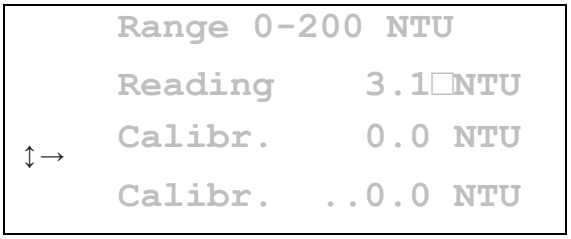
Note:

When accessing the Calibration menu, a square symbol □ flashes the time required for the device to collect useful data from the given sensor. The operator can start the calibration sequence when the square symbol disappears.



Use the right arrow, on the first accessible line, to activate the calibration sequence.

Pressing the right and left arrows simultaneously will start the measurement sequence.



A square symbol □ flashes on and off during the calibration sequence.

When the first calibration stage has been completed, remove the distilled water sensor and wipe it.

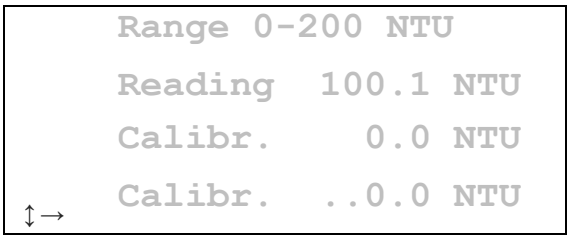
7.2.5.2 Calibration of the second point - detailed procedure

Operating conditions:

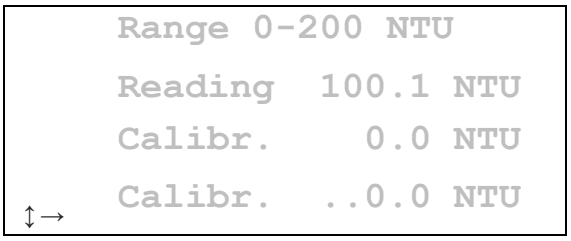
The second point is calibrated in an aqueous suspension of formazine with constant stirring.

To calibrate the turbidity sensor, use a reference solution in the median area of the given measuring range, such as a 100 NTU reference solution for the 0-200 NTU range.

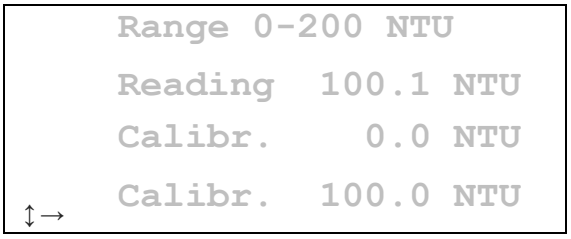
Use the DOWN arrow key to select the second CALIBR. 0.0 NTU line.



Use the right arrow to start the sequence.

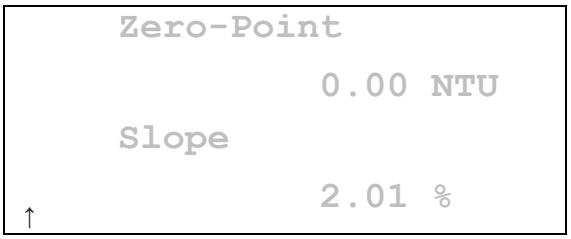


Use the UP arrow to adjust the digital display to the value of the aqueous formazine suspension used, for example, 100.0 NTU.
Once the suspension is perfectly uniform, pressing the right and left arrows simultaneously will start the measurement sequence.



Again, a flashing square behind the displayed value indicates that the automatic calibration process is in progress. This display turns off when the calibration is complete.

Once the two-point calibration sequence is complete, pressing the DOWN arrow displays the coefficients, zero point and slope, calculated by the sensor during both stages.



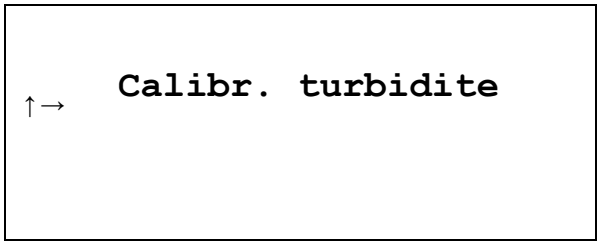
7.2.5.3 Suspended solids sample calibration method

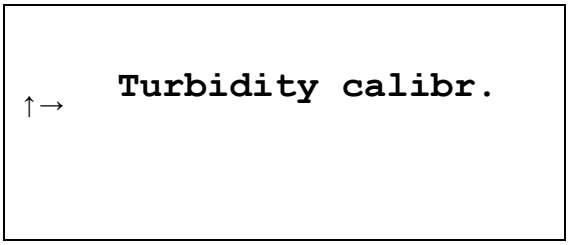
The nephelometric turbidity sensor can also measure suspended solids. A sample of suspended solids can be calibrated when the 0-4500mg/L range is active.

This calibration sequence is performed in three steps. The last step is time-delayed. The reference value in terms of concentration of solids is obtained by laboratory analysis of the sample (dry weight).

7.2.5.4 Suspended matter, first point calibration - detailed procedure

The sensor is placed in clear water for this calibration step. We will check that there are absolutely no bubbles on the active part of the sensor (optical part).
Select CALIBRATION in the general menu:





Note:
When accessing the Calibration menu, a square symbol □ flashes the time required for the device to collect useful data from the given sensor. The operator can start the calibration sequence when the square symbol disappears.

Gamme 0-4500 mg/L	Range 0-4500 mg/L
Lecture 1 mg/L	Reading 1 mg/L
↕→ Calib.1 0 mg/L	↕→ Calib.1 0 mg/L
Calib.2 4500 mg/L	Calib.2 4500 mg/L

Use the right arrow on the first accessible line to enable the calibration sequence.

Simultaneously pressing the right and left arrows begins the measurement sequence.

Gamme 0-4500 mg/L	Range 0-4500 mg/L
Lecture 1□mg/L	Reading 1□mg/L
↕→ Calib.1 0 mg/L	↕→ Calib.1 0 mg/L
Calib.2 4500 mg/L	Calib.2 4500 mg/L

A square symbol □ flashes during the calibration sequence. It represents the exchange of information between the master device and the sensor.

When the first calibration step is complete, remove the sensor from the clear water and wipe it clean.

7.2.5.5 Suspended solids, calibration of the second point - procedure in detail

Operating conditions:

The second point is calibrated in a sample of suspended solids with constant stirring. This natural sample of suspended solids must match the range accessible by the 0-4500mg/L sensor.

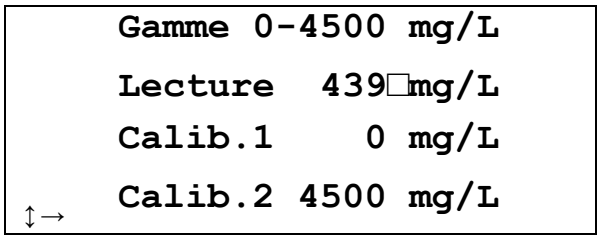
Use the DOWN arrow key to select the second line CALIB.2.

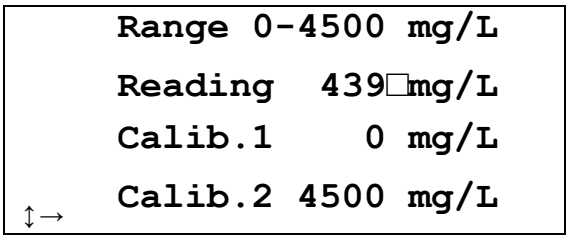
Use the right arrow to start the sequence.

Gamme 0-4500 mg/L	Range 0-4500 mg/L
Lecture 439 mg/L	Reading 439 mg/L
Calib.1 0 mg/L	Calib.1 0 mg/L
↕→ Calib.2 4500 mg/L	↕→ Calib.2 4500 mg/L

Note:
The default value 4500mg/L cannot be modified. It is the maximum value of measurable concentration. At this stage, the actual concentration of suspended matter is not known. The sensor stores the signal obtained in the sample while stirring.

Once the suspension is totally uniform, pressing the right and left arrows simultaneously will start the measurement sequence.





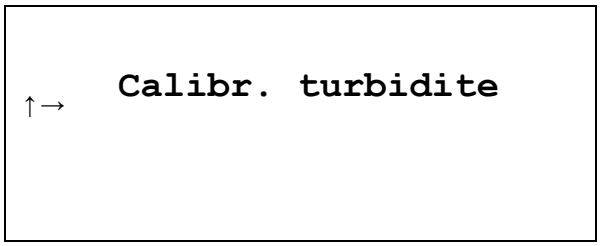
Again, a flashing square behind the displayed value indicates that the automatic calibration process is in progress. This display turns off when the calibration is complete.
Once the two-point calibration sequence is complete. The operator can return to the main screen using the ESC key.

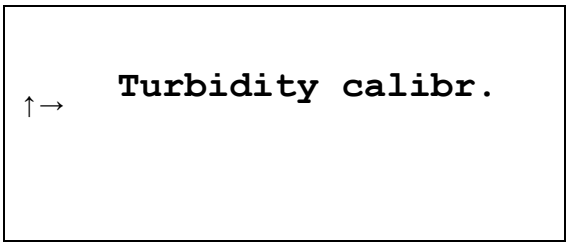
The sensor is removed from the sample, rinsed with clear water and held on standby. The sample is sent to the laboratory for analysis.

Note:
The measurement in mg/L displayed on the screen is temporary. The sample previously used with the sensor must be analyzed in the laboratory to determine its dry weight and thus determine the actual concentration of suspended solids (for example: 560 mg/L).

7.2.5.6 Suspended matter, third stage, reference data: dry weight - detailed procedure

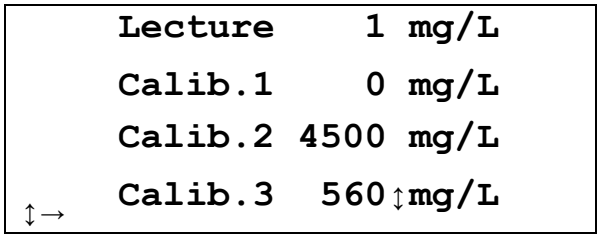
The laboratory analysis result for the sample, expressed as the concentration of solids in mg/L, shall be transmitted to the sensor to finalize the calibration sequence. For this purpose, the operator returns to the calibration menu of the turbidity sensor.

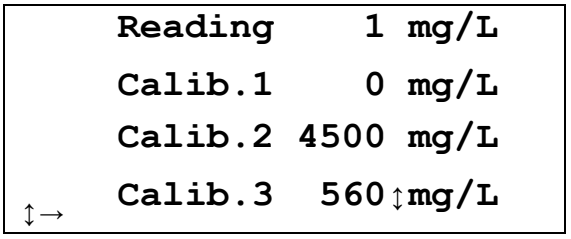




Note:
When accessing the Calibration menu, a square symbol □ flashes the time required for the device to collect useful data from the given sensor. The operator can start the calibration sequence when the square symbol disappears.

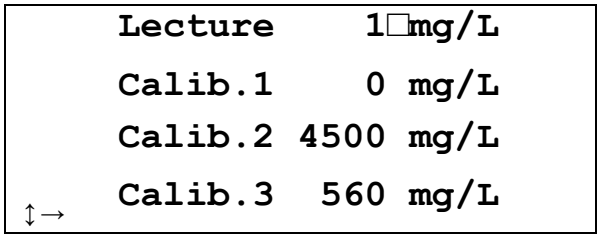
The DOWN arrow enables you to go down to the CALIB line. 3. This line is accessible with the right arrow.

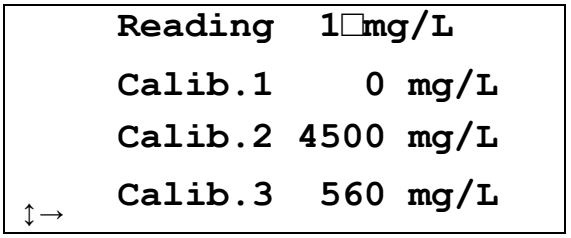




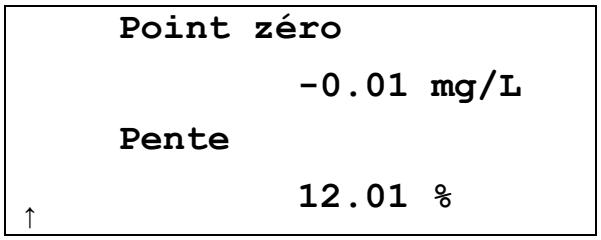
The UP / DOWN arrows are then used to adjust the reference concentration value obtained in the laboratory (e.g. 560 mg/L)

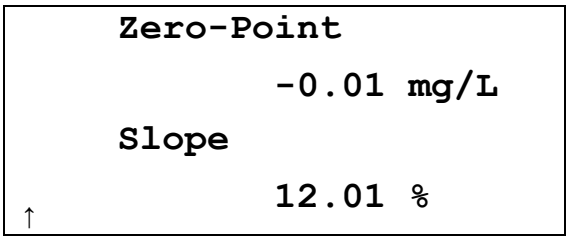
Once the reference value has been adjusted on the screen, pressing the right and left arrows simultaneously will start the sequence of communication with the sensor. A square symbol ☐ flashes on the MEASUREMENT line during the exchange of information between the master and the sensor.





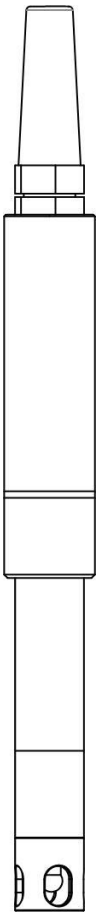
The square symbol will disappear when this third calibration step has been performed. Use the DOWN arrow to see the coefficients (zero point and slope).





The sensor calibration in terms of suspended solids, based on a representative sample of the fluid, is complete. The ESC button brings back the main screen.
The measurement of suspended matter is now active. This data is representative of the medium analyzed if its physical-chemical and optical characteristics remain stable.

7.3 Digital sensor for measuring pH and temperature



Assignment of terminals		
Color of wires	**Operation**	**Connection**
Black	Ground	Terminal 90
Red	DC 12V +	Terminal 91
Green	RS485 - (B)	Terminal 92
White	RS485 + (A)	Terminal 93

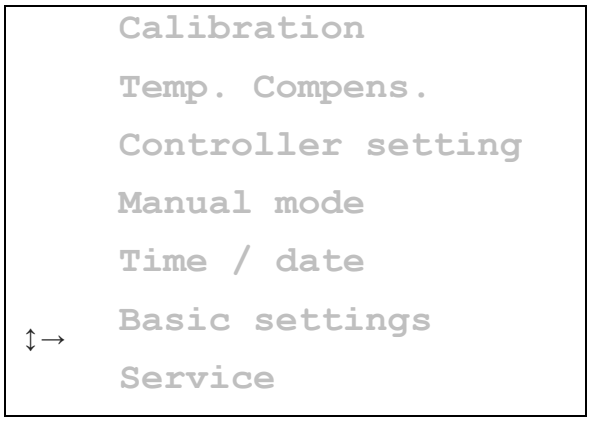
7.3.1 General information about the sensor

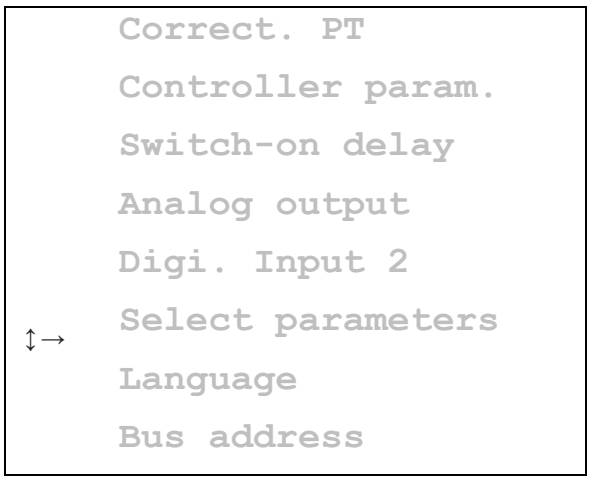
The pH/temperature sensor operates according to an electro-chemical principle. A measurement of difference in potential between two electrodes is used to access the pH value (acidity/basicity) of the aqueous solution studied.

There is a glass electrode that senses hydronium ions (H^+, H_2O) and an electrode that represents the gelated saline reference system. The gelated system is in constant contact with the liquid studied. The saline gel gradually deteriorates. This phenomenon leads to a gradual shift of the reference system. Operators therefore have to regularly calibrate to readjust their measuring device to standard solutions buffered to known pH.
The sensor is calibrated in the factory, so there is no need to perform calibration during initial commissioning. The sensor shall be cleaned at regular intervals, during operation, depending on the level of contamination of the liquid studied.

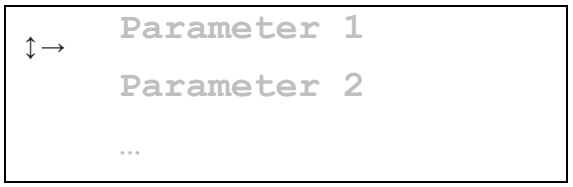
7.3.2 Setting / configuring of displayed measurements

The operator has access to the choice of parameters coming from a digital sensor in the BASIC ADJUSTMENT submenu.





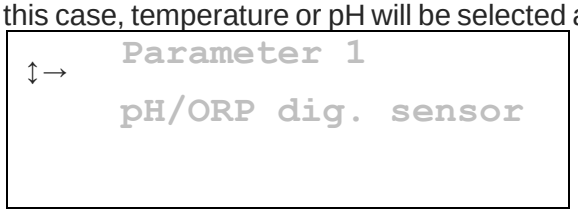
The SELECT PARAMETERS choice leads to the list of active parameters from 1 to 6. These are the 6 usable display areas on the screen.



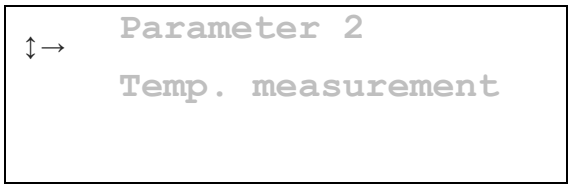
Selecting one of the six parameters leads to a list of choices:

- No measurement
- Temperature measurement
- Turbidity measurement
- Oxygen digital sensor
- Conductivity dig. measurement
- pH digital sensor.

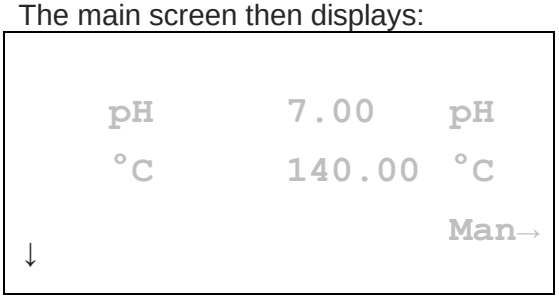
In this case, temperature or pH will be selected as these 2 parameters are delivered by the sensor.



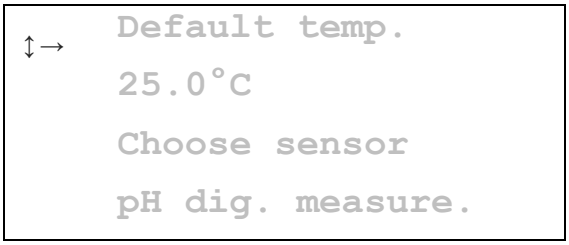
Note that these two parameters can be viewed simultaneously by configuring parameters 1 and 2.



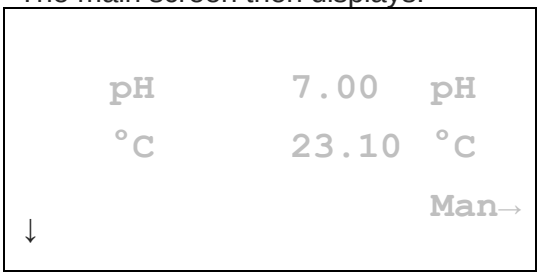
The main screen then displays:



The temperature value from the pH sensor is displayed after activation in the TEMP. COMPENS. menu.

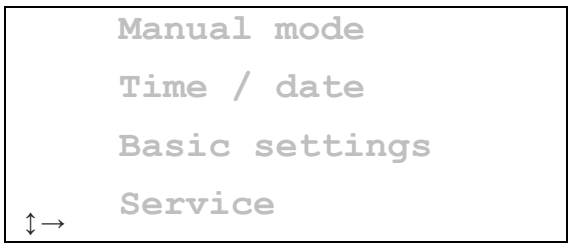


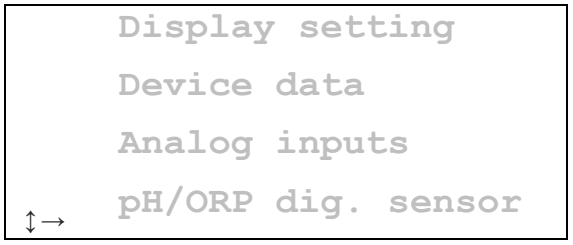
The main screen then displays:



7.3.3 Sensor information

The operator has access to information on the connected sensor from the main SERVICE menu.





Pressing the right arrow in the pH/ORP dig. sensor gives access to the following information:

- Sensor serial number
- Software version
- Hardware version
- Instant measurements of all available parameters for the sensor in question.

7.3.4 Method for calibrating the pH parameter

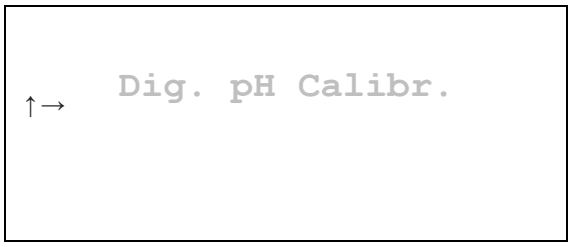
Note:

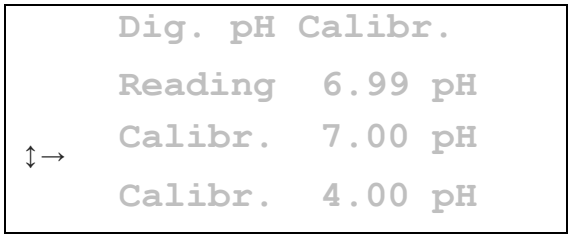
The pH probe must be checked periodically (depending on the proportion of impurities present). It is important to rinse the probe before each check. Organic deposits on the probe, such as mud or biofilm, may result in measurement errors. These deposits can be carefully removed using hot soapy water and a soft sponge. Never use an abrasive cleaner. Limestone deposits can be removed using a dilute hydrochloric acid solution (max . 5%).

7.3.4.1 pH calibration – detailed procedure

Operating conditions:
For this calibration stage, the sensor is placed in a pH 4, 7 or 9 fresh buffer solution. We will check that there are no bubbles under the strainer on the active parts of the sensor (glass electrode and point of contact with the gelated reference system).

Select CALIBRATION in the general menu:

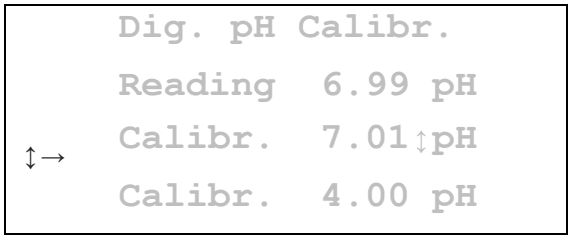




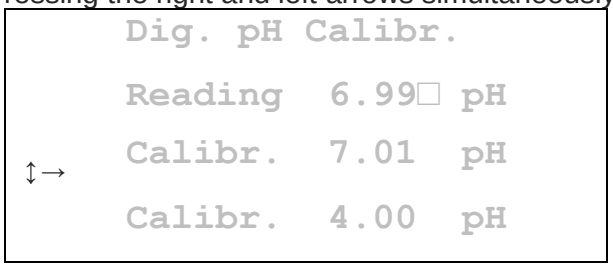
Note:

When accessing the Calibration menu, a square symbol □ flashes the time required for the device to collect useful data from the given sensor. The operator can start the calibration sequence when the square symbol disappears.

Use the right arrow, on the first accessible line, to activate the calibration sequence. The default pH value suggested for the first buffer solution is 7.00.
However, operators may use the UP/DOWN arrows to adjust to the value generally indicated on the buffer solution flask for a given temperature.



Pressing the right and left arrows simultaneously will start the measurement sequence.



A square symbol □ flashes on and off during the calibration sequence.

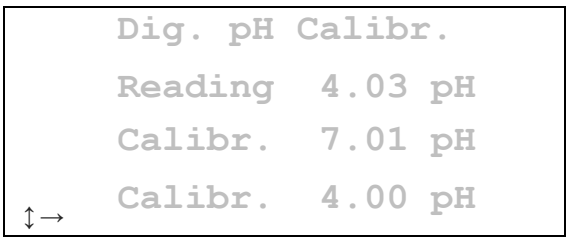
When the first calibration stage is finished, remove the sensor from the buffer solution, rinse with clear water and dry the body, without touching the glass ball.

7.3.4.2 Calibration of the second point - detailed procedure

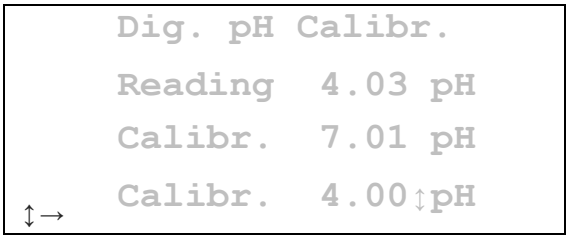
Operating conditions:

The calibration of the second point is carried out in a different buffer solution to the first.

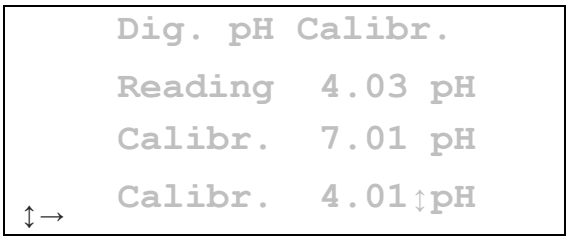
Use the DOWN arrow key to select the second line: CALIB.2



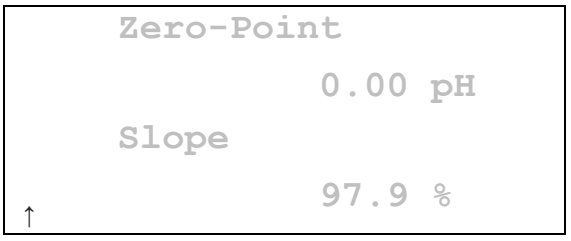
Use the right arrow to start the sequence.



Use the UP/DOWN arrows again to adjust the digital display to the value of the given buffer solution. The default value is set at 4.00 pH.
Once the measurement has been stabilized, pressing the right and left arrows simultaneously will start the measurement sequence.



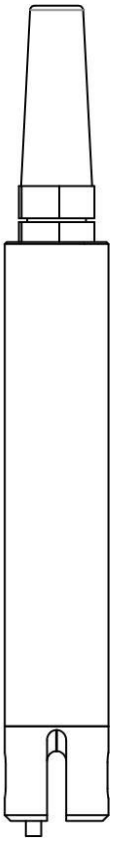
Again, a flashing square to the right of the displayed value indicates that the automatic calibration process is in progress. This display turns off when the calibration is complete.
Once the two-point calibration sequence is complete, pressing the DOWN arrow displays the coefficients, zero point and slope, calculated by the sensor during both stages..



NOTE: Although the proposed calibration is based on the pH 4 and then pH 7 buffer solutions, the user can adjust the pH reference values to perform a two-point pH4 and then pH9-type sequence.

7.4 Digital 4-electrode sensor for measuring conductivity and temperature

Assignment of terminals		
Color of wires	**Operation**	**Connection**
Black	Ground	Terminal 90
Red	DC 12V +	Terminal 91
Green	RS485 - (B)	Terminal 92
White	RS485 + (A)	Terminal 93



7.4.1 General information about the turbidity probe

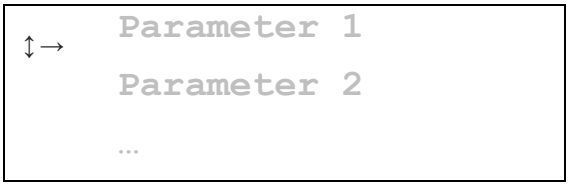
The conductivity/temperature sensor operates according to an electro-chemical principle. The capacity of the aqueous solution studied to conduct an electric current is recorded using ionic species in the solution.

For a 4-electrode sensor, there are two pairs of electrodes, one graphite and the other platinum.
The sensor is calibrated in the factory, so there is no need to perform calibration during initial commissioning. During the operation, the sensor must be cleaned at regular intervals to maintain a measurement-conducive surface state on the electrodes.

7.4.2 Setting / configuring of displayed measurements

The operator has access to the choice of parameters coming from a digital sensor in the BASIC ADJUSTMENT submenu.

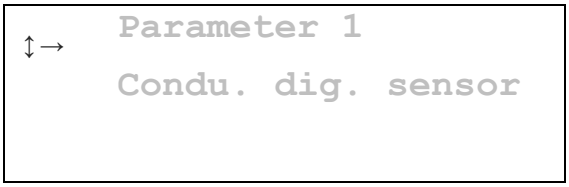
The SELECT PARAMETERS choice leads to the list of active parameters from 1 to 6. These are the 6 usable display areas on the screen.



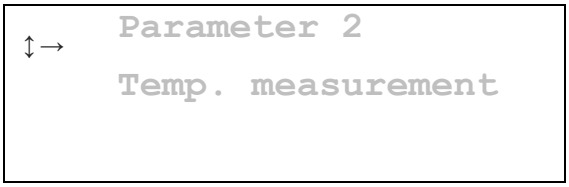
Selecting one of the six parameters leads to a list of choices:

- No measurement
- Temperature measurement
- Turbidity measurement
- Oxygen digital sensor
- Conductivity dig. sensor
- pH digital sensor.

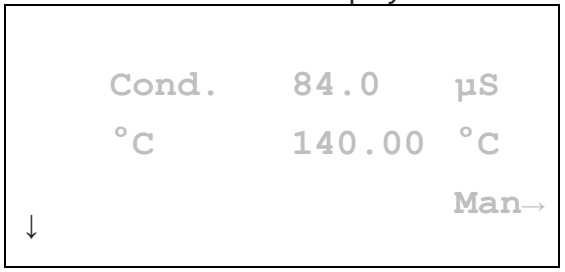
In this case, temperature or conductivity will be selected as these 2 parameters are delivered by the sensor.



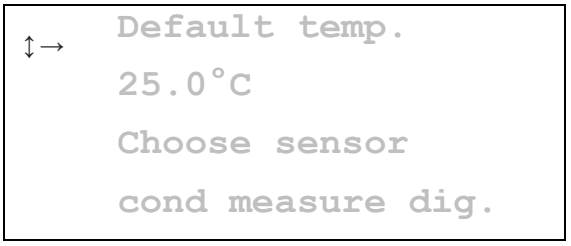
Note that these two parameters can be viewed simultaneously by configuring parameters 1 and 2.



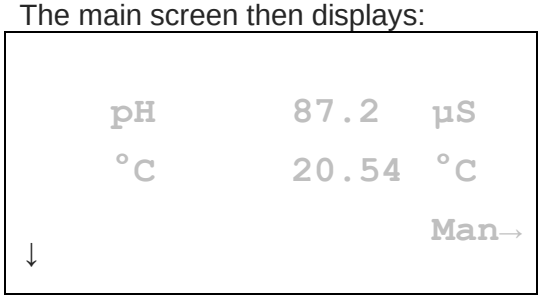
The main screen then displays:



The temperature value from the conductivity digital sensor is displayed after activation in the TEMP. COMPENS. menu.

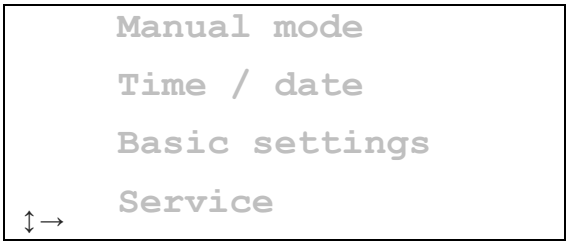


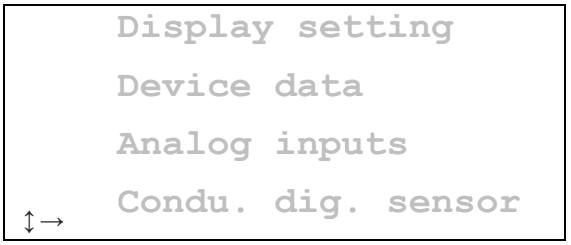
The main screen then displays:



7.4.3 Sensor information

The operator has access to information on the connected sensor from the main SERVICE menu.





Pressing the right arrow in the Condu. Dig. Sensor line gives access to the following information:

- Sensor serial number
- Software version
- Hardware version
- Instant measurements of all available parameters for the sensor in question.

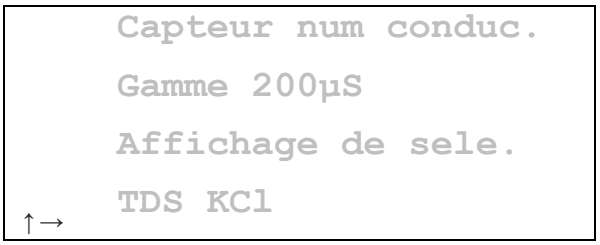
7.4.4 Selecting the displayed parameter, conductivity/salinity/TDS-KCl

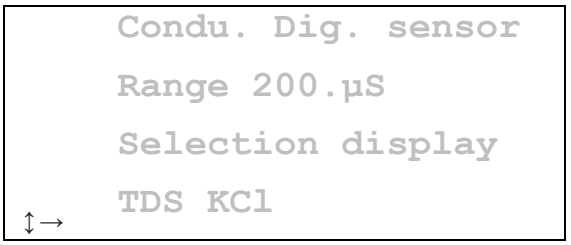
The 4-electrode conductivity sensor not only delivers conductivity and temperature but also offers two parameters deduced from the conductivity: salinity (unit: g/kg) and dissolved salt concentration expressed as potassium chloride TDS-KCl (unit: ppm).

The user can choose to view one of these 3 parameters (conductivity, salinity, or TDS-KCl). This is selected from the sub-menu of the digital conductivity sensor accessible in the BASIC SETTING/DIGITAL CONDUC. SENSOR menu.

The first accessible line represents the choice of the conductivity sensor's operating range. The second line enables you to choose the display of the main setting (conductivity) or the deduced settings (salinity or TDS-KCl). The display selection line is accessed using the RIGHT-HAND SIDE arrow. The RIGHT-HAND SIDE arrow allows you to scroll down the list of 3 choices:

- Conductivity,
- Salinity,
- TDS-KCl.





- This selection affects the display on the main screen as well as the configuration of the analog outputs (0/4-20mA) including that of the controller, for example the value and the set point unit.

Although the displayed setting is salinity or TDS-KCl, the calibration remains that of the main setting i.e. condctivity in the active range.

7.4.5 Method for calibrating the conductivity parameter

Note:

The conductivity probe must be checked periodically (depending on the proportion of impurities present). It is important to rinse the probe before each check. Organic deposits on the probe, such as mud or biofilm, may result in measurement errors. These deposits can be carefully removed using hot soapy water and a soft sponge. Never use an abrasive cleaner. Limestone deposits can be removed using a dilute hydrochloric acid solution (max . 5%).

7.4.5.1 Conductivity calibration – detailed procedure

Definition of the active range:

The conductivity sensor has four working ranges that allow you to better tailor the conductivity expected in the observed fluid.

Ranges available:
0 - 200 µS/cm (default active range)
0 - 2000 µS/cm
0 - 20 mS/cm
0 - 200 mS/cm

Each range has its own set of coefficients. The calibration is thus performed for the active range. The range is chosen from the four available in the submenu: BASE/CONDU. DIG. SENSOR SETTING The range line is accessed using the right-hand side arrow. This same arrow is used to scroll through the ranges.

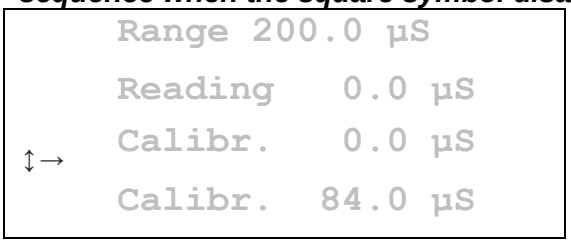
Operating conditions:

The calibration of a conductivity range is performed in two stages. Potassium chloride (KCl) standard aqueous solutions are used.
The total lack of bubbles in the active parts in the sensor's head slot will be checked.

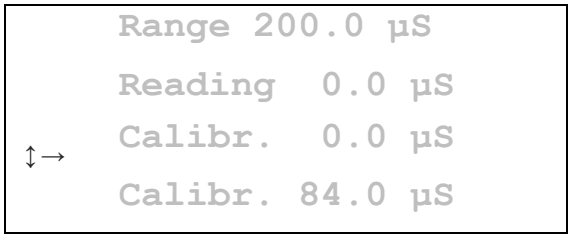
Select CALIBRATION in the general menu:

Note:

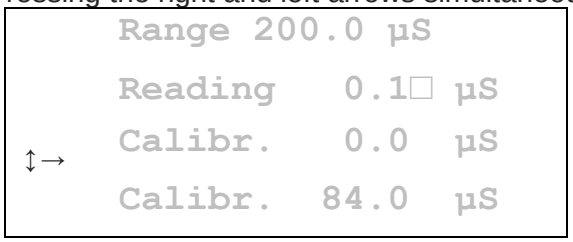
When accessing the Calibration menu, a square symbol □ flashes the time required for the device to collect useful data from the given sensor. The operator can start the calibration sequence when the square symbol disappears.



Use the right arrow, on the first accessible line, to activate the calibration sequence. The default conductivity value proposed for the first step is 0.0µS/cm. This step is performed with a sensor that has been cleaned, wiped and left in the open air.



Pressing the right and left arrows simultaneously will start the measurement sequence.



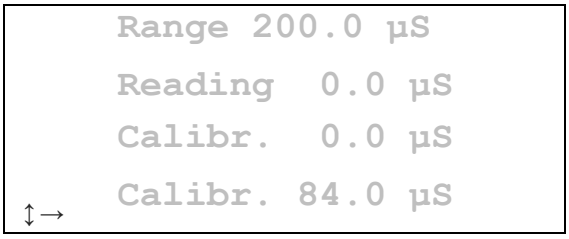
A square symbol □ flashes on and off during the calibration sequence. When the first calibration stage has been completed, immerse the sensor directly into the appropriate standard solution. For example, a potassium chloride solution will be used for the 0-200µS range, 84µS/cm at 25°C.

7.4.5.2 Calibration of the second point - detailed procedure

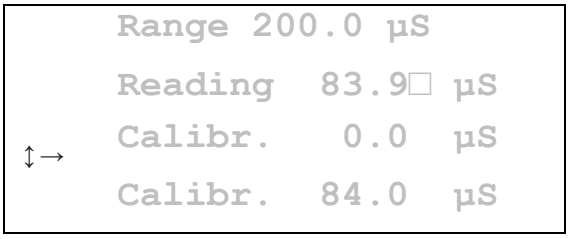
Operating conditions:

The second point is calibrated in an aqueous solution of potassium chloride whose concentration is suitable for the given range. For example, a potassium chloride solution will be used for the 0-200µS range, 84µS/cm at 25°C.

Use the DOWN arrow key to select the second line: Calibr.

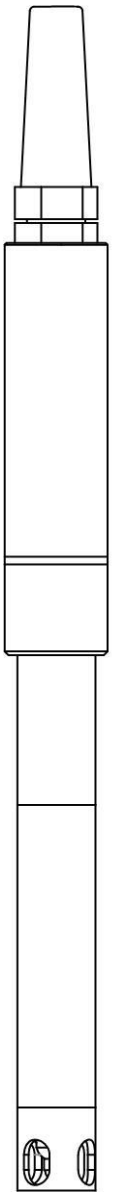


Use the right arrow to start the sequence.
Use the UP/DOWN arrows to adjust the digital display to the value of the given standard solution (e.g. 84 µS)
Once the measurement has been stabilized, pressing the right and left arrows simultaneously will start the measurement sequence.



Again, a flashing square to the right of the displayed value indicates that the automatic calibration process is in progress. This display turns off when the calibration is complete.
Once the two-point calibration sequence is complete, pressing the DOWN arrow displays the coefficients, zero point and slope, calculated by the sensor during both stages..

7.5 Digital sensor for measuring ORP



Assignment of terminals		
Color of wires	**Operation**	**Connection**
Black	Ground	Terminal 90
Red	DC 12V +	Terminal 91
Green	RS485 - (B)	Terminal 92
White	RS485 + (A)	Terminal 93

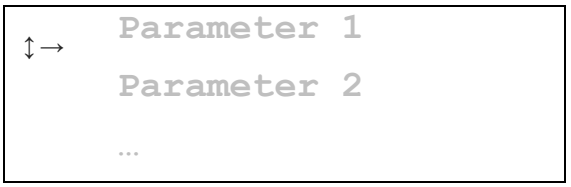
7.5.1 General information about the ORP sensor

The ORP potential/temperature sensor operates according to an electro-chemical principle. The potential difference is observed between two electrodes. This information indicates the ability of species in aqueous solution to give or receive electrons. The system uses a noble metal (platinum) electrode and a reference electrode immersed in a saline gel.
The sensor is calibrated in the factory, so there is no need to perform calibration during initial commissioning. During the operation, the sensor must be cleaned at regular intervals to maintain a measurement-conducive surface state on the platinum ring. The exchange area between the solution studied and gelated reference system must also be cleaned.

7.5.2 Setting / configuring of displayed measurements

The operator has access to the choice of parameters coming from a digital sensor in the BASIC ADJUSTMENT submenu.

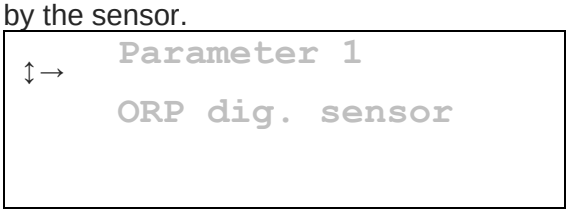
The SELECT PARAMETERS choice leads to the list of active parameters from 1 to 6. These are the 6 usable display areas on the screen.



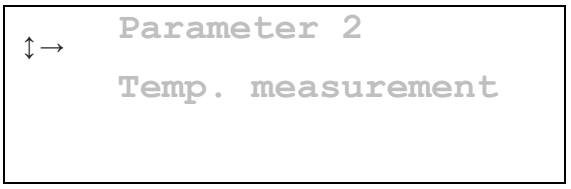
Selecting one of the six parameters leads to a list of choices:

- No measurement
- Temperature measurement
- Turbidity measurement
- Oxygen digital sensor
- Conductivity dig. sensor
- pH digital sensor
- ORP digital sensor

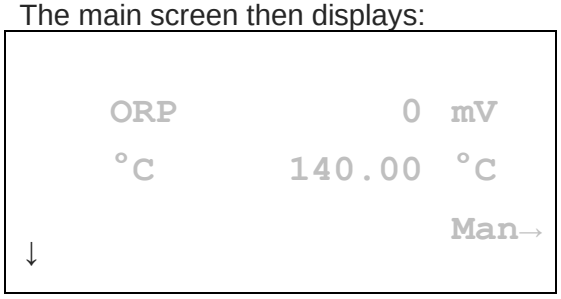
In this case, temperature or ORP potential will be selected as these 2 parameters are delivered by the sensor.



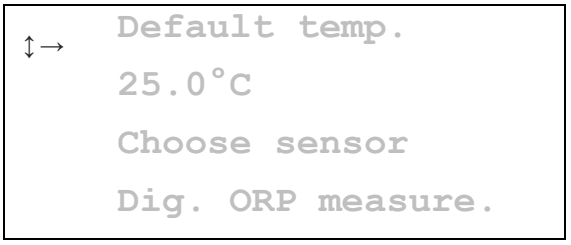
Note that these two parameters can be viewed simultaneously by configuring parameters 1 and 2.



The main screen then displays:



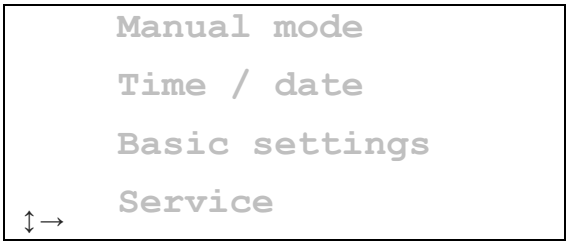
The temperature value from the ORP sensor is displayed after activation in the TEMP. COMPENS. menu.

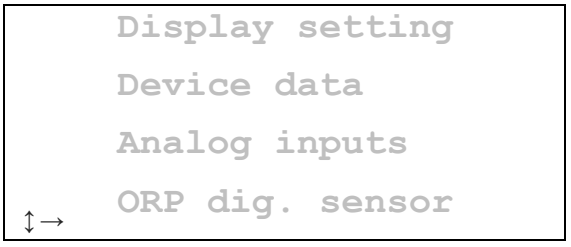


The main screen then displays:

7.5.3 Sensor information

The operator has access to information on the connected sensor from the main SERVICE menu.





Pressing the right arrow in the ORP dig. sensor gives access to the following information:

- Sensor serial number

- Software version
- Hardware version
- Instant measurements of all available parameters for the sensor in question.

7.5.4 Method for calibrating the ORP parameter

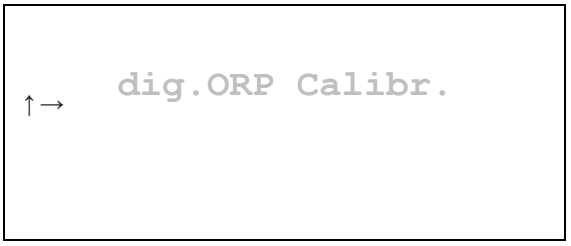
Note:

The ORP sensor must be checked periodically (depending on the proportion of impurities present). It is important to rinse the probe before each check. Organic deposits on the probe, such as mud or biofilm, may result in measurement errors. These deposits can be carefully removed using hot soapy water and a soft sponge. Never use an abrasive cleaner. Limestone deposits can be removed using a dilute hydrochloric acid solution (max . 5%).

7.5.4.1 Conductivity calibration – detailed procedure

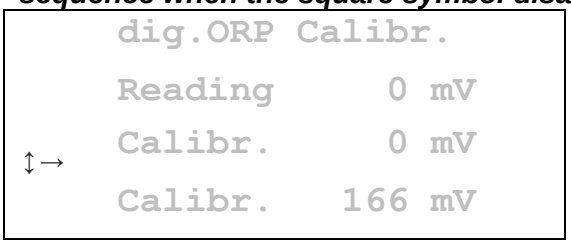
Operating conditions:

ORP potential is calibrated in two stages. For this purpose, a specific aqueous standard will be used.
The total lack of bubbles in the active parts located under the sensor's head strainer will be checked. The operator can unscrew this strainer during equipment maintenance operations.
Select CALIBRATION in the general menu:

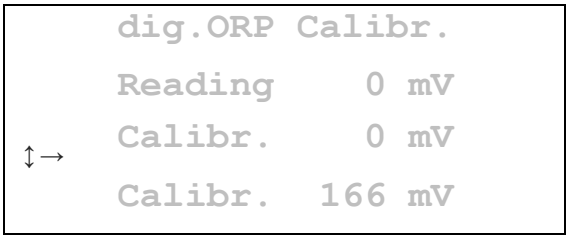


Note:

When accessing the Calibration menu, a square symbol □ flashes the time required for the device to collect useful data from the given sensor. The operator can start the calibration sequence when the square symbol disappears.



Use the right arrow, on the first accessible line, to activate the calibration sequence. The ORP value is set and equal to zero (0 mV). This step is performed electronically within the sensor.



Pressing the right and left arrows simultaneously will start the measurement sequence.
A square symbol ☐ flashes on and off during the calibration sequence.

When the first calibration step is complete, immerse the sensor directly in the suitable standard solution, for example, a standard solution at 240mV (potassium hexacyanoferrate).

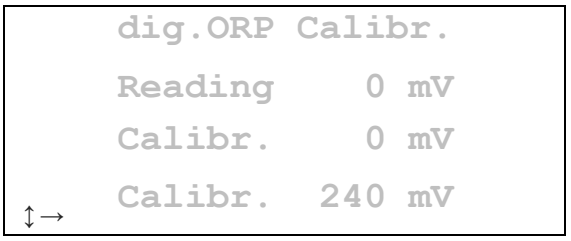
Note:
The calibration sequence of the ORP potential sensor only becomes valid after the two steps, electronic zero and ORP standard solution measurement.

An incomplete sequence may generate erroneous coefficients and affect the related measurement.

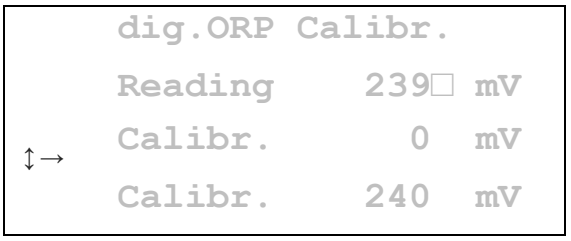
7.5.4.2 Calibration of the second point - detailed procedure

Operating conditions:

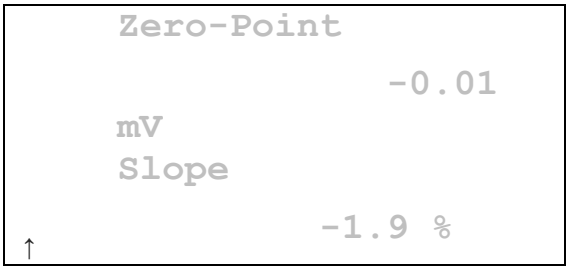
Use the DOWN arrow key to select the second line: Calibr.



Use the right arrow to start the sequence.
Use the UP/DOWN arrows to adjust the digital display to the value of the given standard solution (e.g. 240 mV)
Once the measurement has been stabilized, pressing the right and left arrows simultaneously will start the measurement sequence.

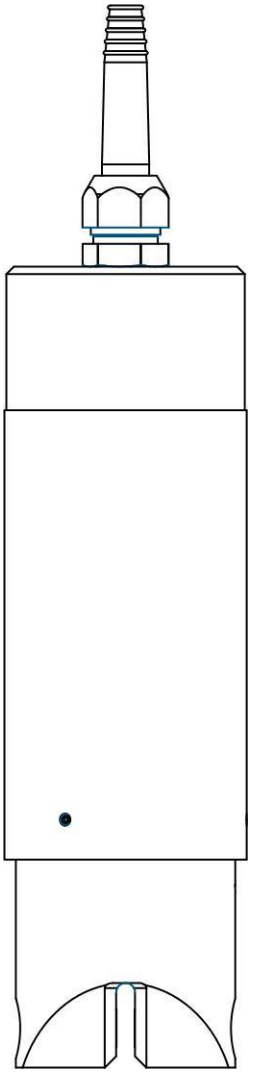


Again, a flashing square to the right of the displayed value indicates that the automatic calibration process is in progress. This display turns off when the calibration is complete.
Once the two-point calibration sequence is complete, pressing the DOWN arrow displays the coefficients, zero point and slope, calculated by the sensor during both stages.



7.6 Digital sensor for measuring suspended solids, turbidity and sludge blanket

Allocation of terminals		
Wire color	**Operation**	**Connector**
Black	Ground	Terminal 90
Red	DC 12V +	Terminal 91
Green	RS485 - (B)	Terminal 92
White	RS485 + (A)	Terminal 93



7.6.1 General information about the suspended solids sensor

7.6.1.1 General information on the sensor:

This optical sensor measures the infra-red radiation transmitted through the liquid studied. An optical path of 5mm is set by the geometry of the measuring zone and fork-shaped sensor head.

7.6.1.2 Sludge blanket measurement:

The infra-red radiation optical sensor delivers a signal as a percentage (range 0-100%) so that the value delivered decreases from a 100% transmission in clear water.

7.6.1.3 Measurement of turbidity under attenuation (FAU unit):

The optical sensor measures the transmission of light, 180° compared to the infra-red light source. Turbidity is measured using an aqueous suspension of formazin as standard. The measurement range is 0-4000 FAU.

7.6.1.4 Measurement of suspended solids

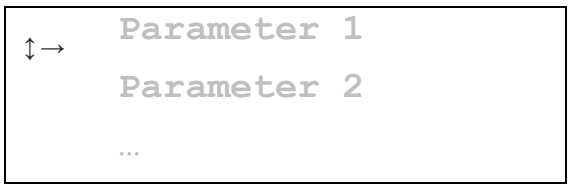
The sensor delivers a concentration of suspended solids, unit G/L, based on two points of measures. A solution devoid of suspended matter "Clear water" and an actual sample of loaded fluid. The concentration of solids in this sample is determined in the laboratory (dry weight).

The sensor is calibrated at the factory for all available parameters (temperature, sludge blanket, turbidity, suspended solids), so there is no need to perform a calibration during its initial commissioning. When in operation, the sensor must be cleaned at regular intervals in order to keep the surface of the optical glass in a condition conducive to measuring.

7.6.2 Setting / Configuring the measurements displayed

The operator has access to the choice of parameters coming from a digital sensor in the BASIC SETTINGS sub-menu.

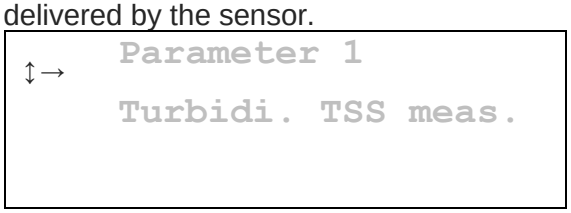
Choosing SELECT. PARAMETERS leads to the list of parameters that can be enabled from 1 to 6. They represent 6 usable display areas on the screen.



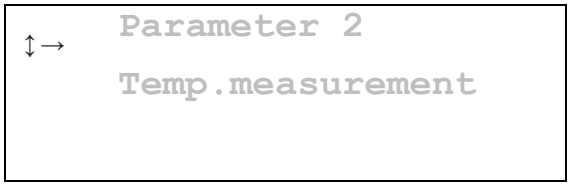
Selecting one of the six parameters leads to a list of choices:

- No measurement,
- Temperature measurement,
- Turbidity measurement,
- Digital Ox. sensor,
- Turbidi. TSS measurement,
- pH digital sensor,
- ORP potential digital sensor (ORP),
- Conductivity digital sensor.

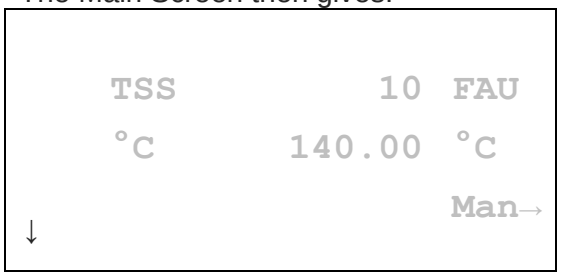
In this case, we will choose temperature or Turbidi. TSS since these 2 parameters are delivered by the sensor.



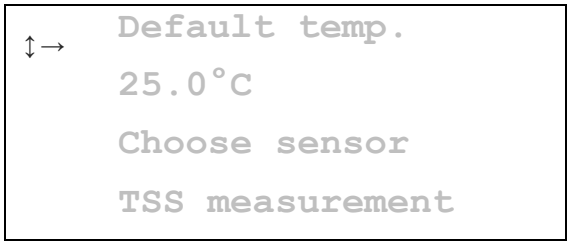
It should be noted that these two parameters can viewed simultaneously when configuring parameters 1 and 2.



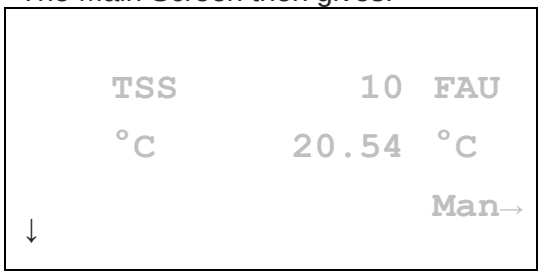
The Main Screen then gives:



The temperature value coming from the suspended solids sensor is displayed after activation in the TEMP. COMPENS. menu

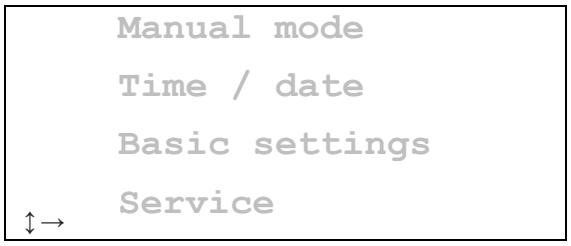


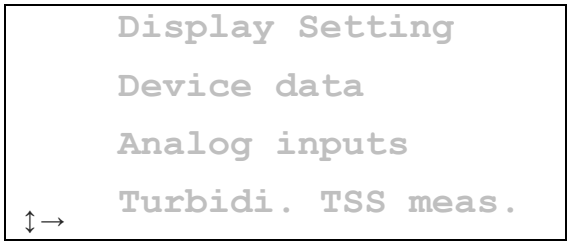
The Main Screen then gives:



7.6.3 Sensor information

The operator has access to information on the connected sensor from the main SERVICE menu.





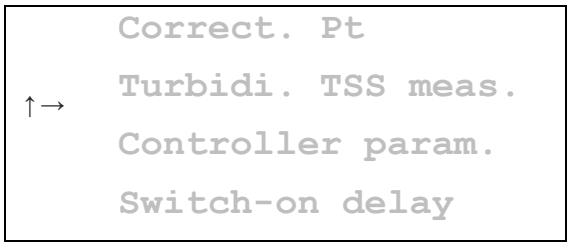
Pressing the right arrow on the ORP digital sensor line gives access to the following information:

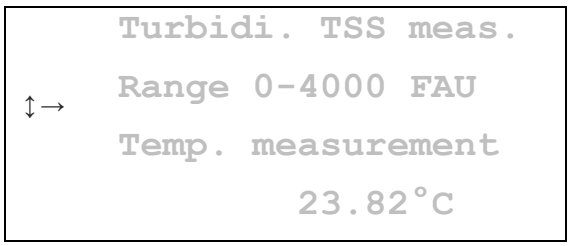
- Sensor serial number,
- Software version,
- Hardware version,
- Instantaneous measures of all the parameters available for the given sensor. In this case:
    - Temperature in °C,
    - Sludge blanket as a %,
    - Concentration of suspended solids in g/L,
    - Turbidity expressed in FAU.

7.6.4 Detailed configuring of the display

As indicated previously, the suspended solids sensor provides access to three separate settings (sludge blanket as a %, concentration of suspended solids in g/L, turbidity in FAU), which can be displayed on the main screen. This choice also gives access to the related calibration sequence.

The operator has access to the of the Turbidi. TSS meas. sensor's detailed configuration from the main BASIC SETTINGS menu.





Clicking the right arrow on the RANGE line lets you choose the parameter:

- Range 0-4000 FAU, measurement of turbidity under attenuation,
- Range 0-50.00 g/L, measurement of suspended solids,
- Range 0-100%, measurement of sludge blanket.

7.6.5 Method of calibrating the sludge blanket parameter

Note:

The turbidity, sludge blanket, and suspended solids sensor, must be checked periodically (depending on the level of impurities). It is important to rinse the probe before each verification. Organic deposits on the probe, such as mud or biofilm may cause measurement errors. These deposits can be removed by carefully washing in hot soapy water and wiping with a soft sponge. Never use abrasive cleaner. The calcium carbonate deposits can be removed using a diluted solution of hydrochloric acid (to a max. of 5%).

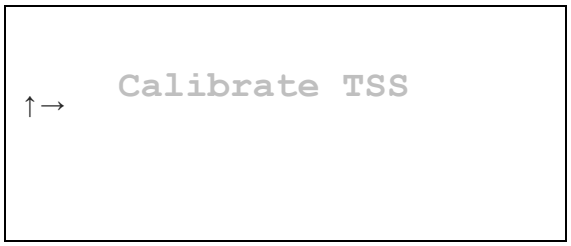
7.6.5.1 Calibration of sludge blanket - procedure in detail

The calibration of the sludge blanket parameter is accessible if the parameter is displayed, the operator having enabled the range 0-100%

Operating conditions:

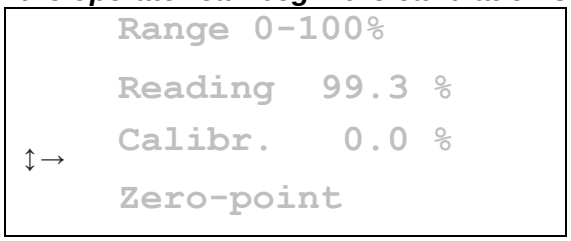
The sludge blanket is calibrated in a single step in the clear water.
We will that there are absolutely no bubbles on the glass which constitutes the optical measurement zone at the head of the sensor. During maintenance operations on equipment the operator has to remove deposits and bubbles blocked in the fork without, nonetheless, scratching the surface of optical glass.

Choose CALIBRATION from the general menu:

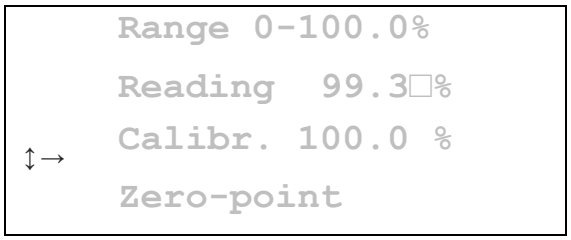


Note:

When accessing the Calibration menu, a square symbol □ flashes the time required for the device to collect useful data from the given sensor. When the square symbol disappears, the operator can begin the calibration sequence.



Use the right arrow on the first accessible line to enable the calibration sequence. The reference value ,initially displayed (0.0%), is adjusted to 100.0% using the UP arrow.
Simultaneously pressing the right and left arrows begins the measurement sequence.
A square symbol ☐ flashes during the calibration sequence.



When the ☐ symbol disappears the calibration sequence is complete. The user can view the offset value (zero-point), expressed as a %, on the lower line.

7.6.6 Method to calibrate the turbidity parameter under attenuation

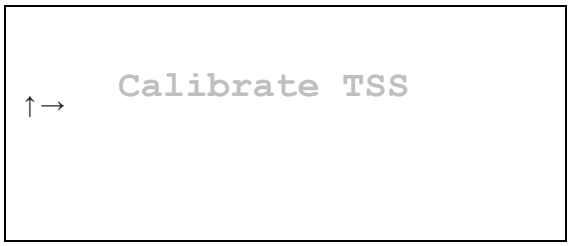
In this case, the operator has chosen to view turbidity, on the screen, by selecting the range 0-4000 FAU (General Menu / BASIC SETTINGS / Turbidi. TSS measurement).

7.6.6.1 Calibration of turbidity - procedure in detail

Operating conditions:

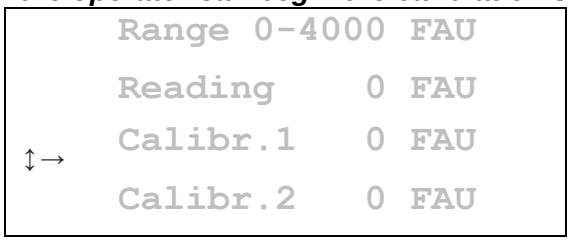
Turbidity is calibrated in two steps. First of all, the sensor, carefully cleaned beforehand, is immersed in clear water, then, in the second stage, we will use an aqueous suspension of formazin under constant stirring.

Choose CALIBRATION from the general menu:



Note:

When accessing the Calibration menu, a square symbol □ flashes the time required for the device to collect useful data from the given sensor. When the square symbol disappears, the operator can begin the calibration sequence.



Use the right arrow, on the first accessible CALIBR.1 line, to access the calibration sequence. The reference value is set (0 FAU).

Simultaneously pressing the RIGHT and LEFT arrows begins the measurement sequence.

A square symbol ☐ flashes during the calibration sequence. This icon disappears when the calibration is completed.

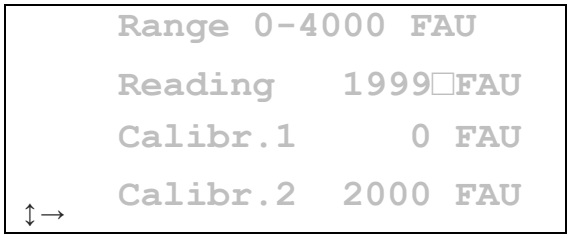
7.6.6.2 Calibration of the second point - procedure in detail

The second point is calibrated using a known aqueous suspension of turbidity formazin and selected according to the range of turbidity expected in the fluid to be analyzed.

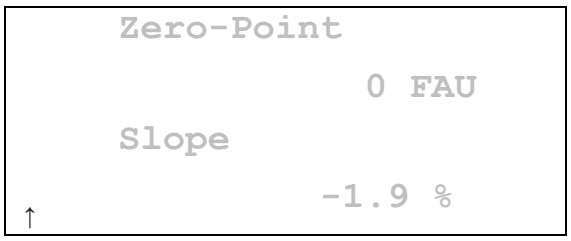
Use the RIGHT arrow, on the CALIBR.2 line, to access it and then the UP/DOWN arrows to adjust the reference value.

Simultaneously pressing the right and left arrows begins the measurement sequence.

A square symbol ☐ flashes during the calibration sequence. This icon disappears when the calibration is completed.



Once the calibration sequence, for both points, is complete, pressing the DOWN arrow allows you to view the coefficients, zero-point and slope, calculated by the sensor during the two steps.



7.6.7 Method to calibrate the suspended solids parameter

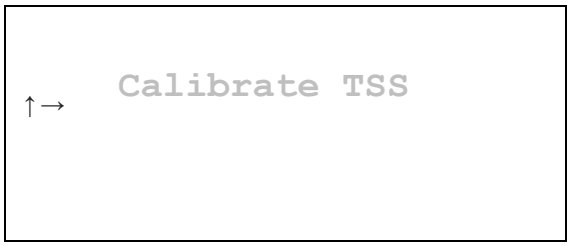
In this case, the operator has selected to view the concentration of suspended solids on the screen, by selecting the range 0-50 g/L (General Menu / BASIC SETTINGS / Turbidi. TSS-measurement).

7.6.7.1 Calibration of the suspended solids measurement - procedure in detail

Operating conditions:
The suspended solids measurement is calibrated in three steps.

First of all, the sensor, carefully cleaned beforehand, is immersed in water clear.
Then, we will use a representative sample of the aqueous medium observed to save a reference signal.
Finally, the representative sample is analyzed in the laboratory in order to obtain the actual concentration of matter (dry weight of a sample of known volume).

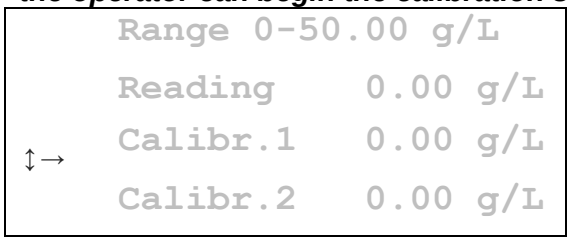
Choose CALIBRATION from the general menu:



Note:

When accessing the Calibration menu, a square symbol □ flashes the time required for the device to collect useful data

from the given sensor. When the square symbol disappears, the operator can begin the calibration sequence.



Use the right arrow, on the first accessible CALIBR.1 line, to access the calibration sequence. The reference value is set (0.00 g/L).

Simultaneously pressing the RIGHT and LEFT arrows begins the measurement sequence.

A square symbol ☐ flashes during the calibration sequence. This icon disappears when the calibration is completed.

7.6.7.2 Calibration of the second point - procedure in detail

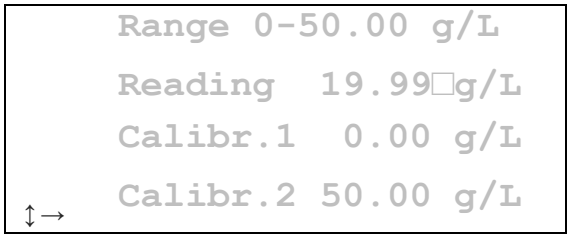
The second point is calibrated using a sample taken from the fluid observed so that it is chemically and temporally representative of the process.

This sample, under constant stirring, is measured using the sensor while its concentration of suspended matter is not known at this time.

Use the RIGHT arrow, on the CALIBR.2 line, to access and display the concentration value by default. This value, set at 50.00g/L, represents the maximum concentration of material measurable by the sensor.

Simultaneously pressing the RIGHT and LEFT arrows begins the measurement sequence which collects and saves an uncorrected signal value in the sensor.

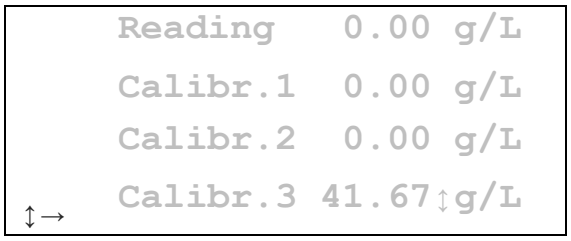
A square symbol ☐ flashes during the calibration sequence. This icon disappears when the calibration is completed.



Once the two-step measurement sequence is complete, the sensor is removed and the sample of suspended solids is sent for laboratory analysis.

The operator can exit the CALIBRATION menu to return to the main screen. The measurement of solids in suspension, which is then displayed, is not usable at this stage however.

Once the laboratory analysis has been performed, the operator can complete the calibration sequence by, once again, accessing the CALIBRATION menu. CALIBR. line 3 can then be filled in with the actual concentration of matter value.
The UP/DOWN arrows allow you to adjust the numeric concentration value.



Simultaneously pressing the RIGHT and LEFT arrows begins the calculation sequence which combines the previously collected signal value with the concentration value resulting from the laboratory analysis and adjusted on screen on the CALIBR. 3 line.

A square symbol ☐ flashes during the calibration sequence. This icon disappears when the sensor has performed the suspended solids measurement calculation coefficient update operation.

The operator sees the new coefficients on the last two lines of the screen page.

At the end of the 3 steps, the suspended solids measurement sensor is now operational. It provides a concentration value in g/L. This data is representative of the medium analyzed if its physical-chemical and optical characteristics remain stable.

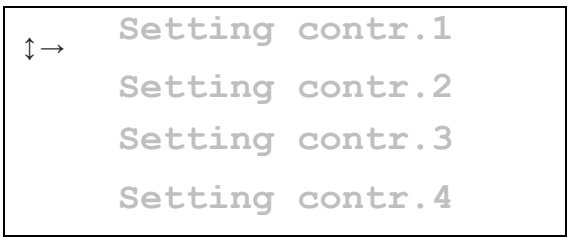
8 Controller adjustments

8.1 Allocation of controller values

Up to four individual controllers can be assigned to different values.

One or more controllers can be enabled in the BASIC/CONTROL PARAM. ADJUSTMENT submenu.

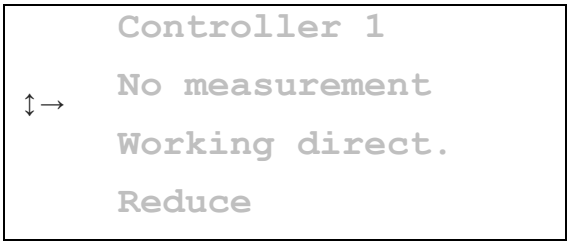
The operator then has 4 choices.



An initial choice allows the operator to define the measurement related to this controller.

- Temperature measurement
- Turbidity measurement
- Ox. digital sensor
- MES-Turb. measurement
- pH digital sensor
- No measurement.

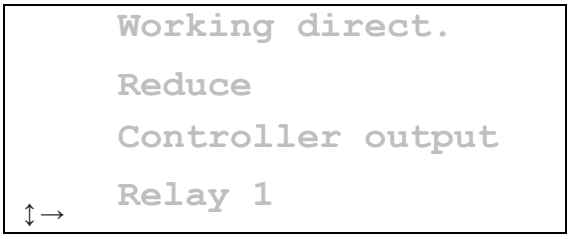
8.2 Controller action direction



The controller action direction shall be determined using the REDUCE/INCREASE adjustment. For example, REDUCE indicates that the controller is running when the value is greater than the pre-determined set point. As a result, the value decreases (lower value).

8.3 Assignment of controller output

The controller output signal may be assigned to various actuators (relay, etc.).

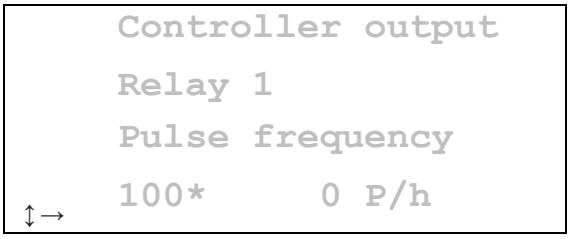


The operator may choose: relay 1, relay 2, digital output 1, digital output 2, analog output 1 or analog output 2.

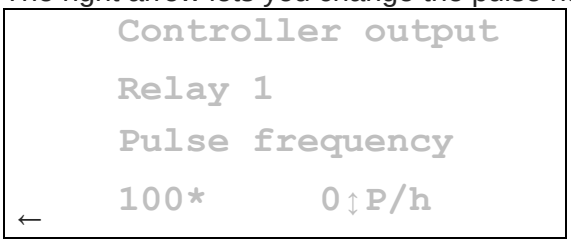
Choosing a relay is equivalent to setting up an ON / OFF control.

8.4 Pulse frequency

The controller output is switched so as to pulse the frequency by means of the pulse setting. A 0 p/h setting allows the controller to switch for controller pulse intervals. The numerical value such as 36 p/h indicates that 3,600 pulses/hour are released at 100% of dosage capacity.



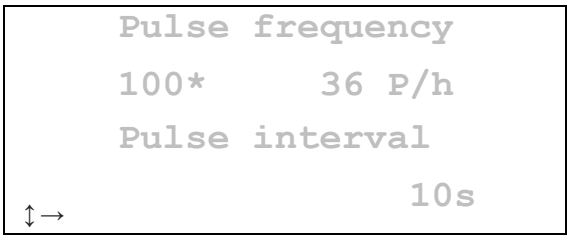
The right arrow lets you change the pulse numerical value.



8.5 Checking the pulse frequency

The pulse interval time setting determines the total pulse interval time. A controlled variable of 50% indicates that the pulses and interval time are of equivalent duration when the value is set to 10 sec., in this case, it would return to 5 seconds.
A controlled variable of 0 % indicates no pulse.

A controlled variable of 100% indicates no interval.

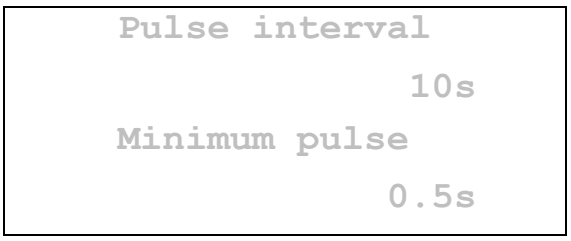


8.6 Minimum pulse

The "Minimum pulse" setting determines the shortest pulse time for a pulse interval controller. This is particularly important for the widest actuators, since shorter pulses cannot be processed.

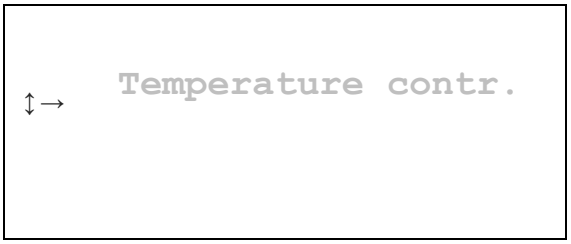
Note:

The minimum pulse time shall not exceed 25% of the pulse interval time.

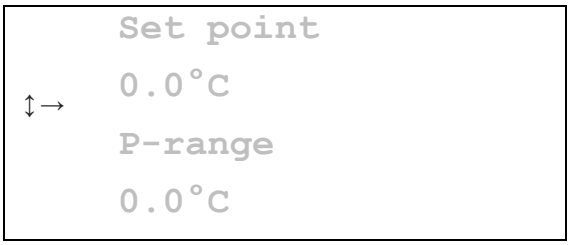


8.7 Controller parameter settings

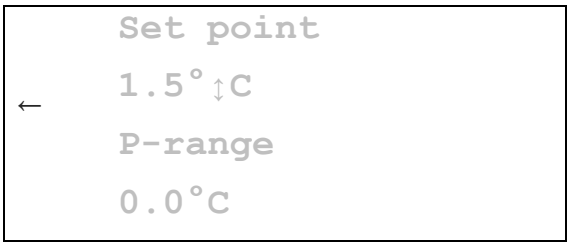
Select the CONTROLLER SETTING function in the main menu.



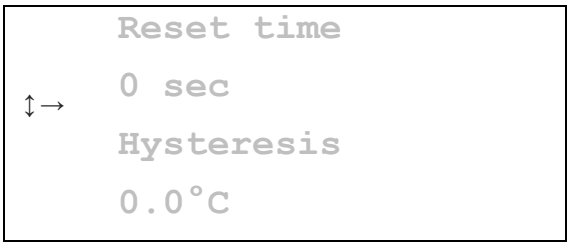
The right arrow gives access to the setting details. The example described below represents the temperature parameter.

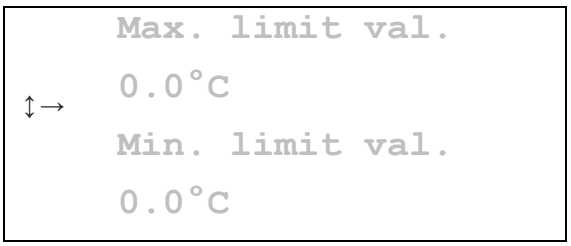


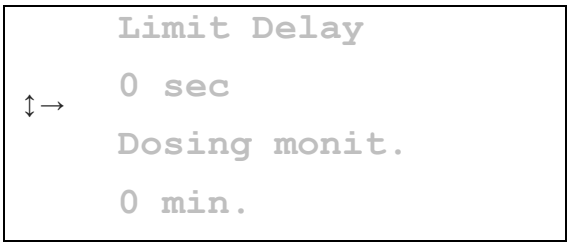
Each item can be changed, right arrow then up or down, to set a numerical value.



Once the quantity is changed, adjusted to the desired value, the left arrow validates and accesses a controller setting item in the list. The available adjustable items are shown below.







8.7.1 Standard point adjustment

Value to be defined for the selected measurement, example temperature in °C.

8.7.2 Proportional band (P band)

Note:
When a proportional band of 0.00 is set, the controller operates like an ON/OFF controller without the proportional action.

The proportional band setting determines the monitoring range of the proportional controller. If the differential between the adjustment point reaches the size of the proportional band, the control operates with a controlled variable of 100%.

8.7.3 Integral action time (integral gain)

Note:

When an integral action time of 0 sec. is defined, checking operates like a proportional monitor, as long as a P band has been determined.

When adjusting the integral action time, the PI check monitoring rate is defined.

8.7.4 Hysteresis

If the controller is used like an ON/OFF controller, the hysteresis parameter can be used to adjust a default dead band around the set point.

Example:
Set point = 7.0°C
Hysteresis = 0.5°C

The hysteresis range of 0.5 is evenly distributed around the set point. The controller becomes enabled at 6.75°C and disabled at 7.25°C.

The differential is therefore 0.5°C = hysteresis

8.7.5 Max./min. limit value

The threshold setting monitors the maximum deviation of the actual value. When you reach the predetermined limits, the alarm relay is activated and a related message appears in the status bar.

The alarm message and display may be delayed for an adjustable time.

8.7.6 Alarm period

Once the predetermined limit values have been reached, the alarm message is delayed until the scheduled time. If you set the numerical value to 0 sec, the alarm message appears immediately (without delay).

8.7.7 Dosage monitoring

If dosing is performed with 100% capacity for a longer period than the set dosing time, dosing will be interrupted and an alarm message will appear. Once the predetermined limits have been reached, the alarm relay is activated and a related message appears in the status bar.

The alarm message must be confirmed by switching from **Automatic** to **Manual Operating** mode. If you set the numerical value to 0 min, the alarm message appears immediately (without delay).

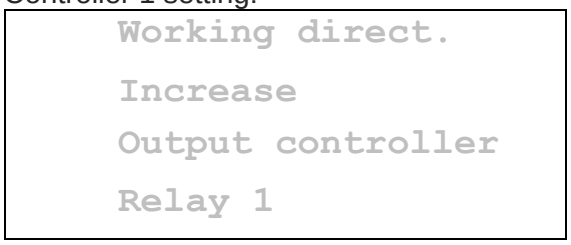
8.8 Example of configuration for a single temperature control

The controller outputs can be used to maintain a parameter between two threshold values, for example, if you wish to maintain a temperature between 15 and 20 degrees, you can proceed as follows:

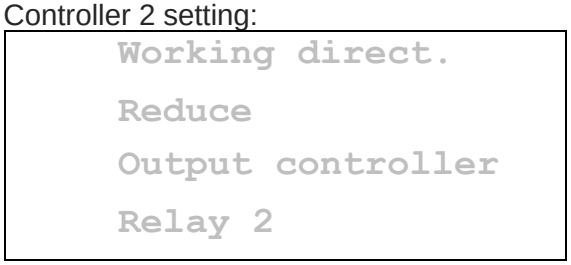
The temperature setting is assigned to controllers 1 and 2.

The direction of operation is set to "increase" for controller 1 and to "reduce" for controller 2. Controller 1 will be linked to relay 1 and controller 2 to relay 2.

Controller 1 setting:

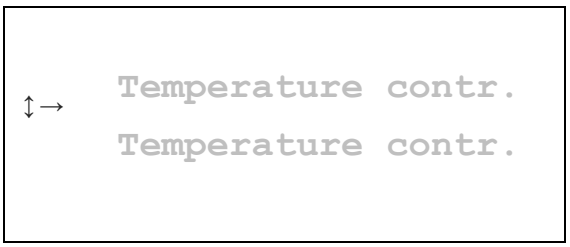


Controller 2 setting:

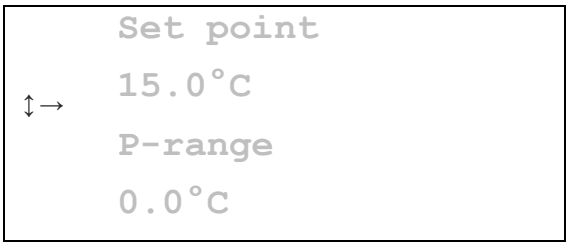


The other "PARAMETERS CONTROLLER" menu items can be left as default in the case of ON/OFF output.

Then the threshold values have to be set for each controller in the "CONTROLLER SETTING" menu of the main menu.
Select the first line of the menu (matching controller 1)



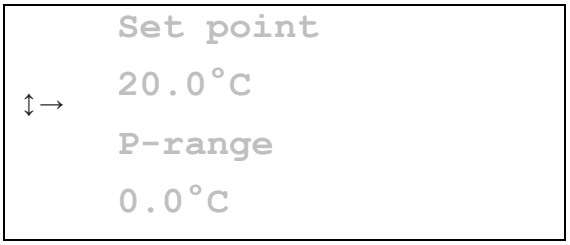
Set the threshold value of controller 1 to 15°C.



As the direction of operation of controller 1 is configured to increase, the output will be active (closed relay) for a temperature below 15.0°C.

Return to the "CONTROLLER SETTING" menu, select the second line (matching controller 2)

Set the threshold value of controller 2 to 20°C.



As the direction of operation of controller 2 is configured to reduce, the output will be active (closed relay) for a temperature above 20.0°C.

This configuration makes it possible by connecting a heater to relay 1 (closed for a temperature lower than 15°C) and a cooler to relay 2 (closed for a temperature greater than 20°C) to maintain the temperature between 15°C and 20°C.

8.9 Example of configuration for control with hysteresis

8.9.1 Introduction

Controller outputs can be used to perform an action, e.g. to activate a pump, according to a threshold value with deactivation at a different value.

The case of an activated pump with a low pH value and disabled at another value greater than the first will be detailed below.

Note that the relays available on the device are Normally Open (NO).

In this case, the hardware configuration is based on the use of a single relay (e.g. No.1).

In addition, relay 3 can be used to warn that the measurement is in an extreme situation.

8.9.2 Expected operation:

A low pH measurement value (V1) triggers a pump that injects a base solution to raise the pH value. The pump is stopped when the pH measurement crosses a V2 threshold, greater than V1.

In the example:

V1 = 6.4 pH

V2 = 7.2 pH

Difference between the two values = 0.8 pH

8.9.3 Detail of the display/transmitter setup steps:

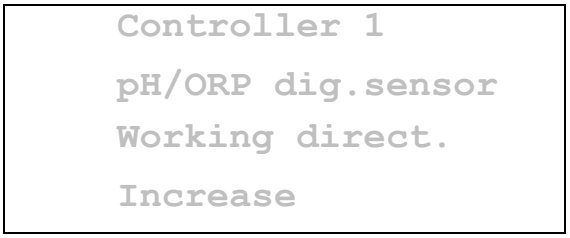
8.9.3.1 Step 1: linking of the controller and measured parameter

The pH parameter is assigned to controller 1.

In the case of controller 1, you access the following menu:

BASIC SETTING / PARAMETER CONTROLLER/CONTR. SETTING 1

Use the right arrow to access the first active line and choose between "no measurement" and "pH/ORP dig.sensor".

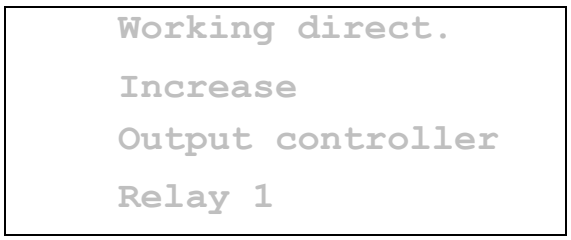


8.9.3.2 Step 2: direction of operation

In this menu, the DOWN arrow is used to determine the direction of operation. In our case, we will choose "increase", using the RIGHT arrow.

8.9.3.3 Step 3: identification of the relay associated with the controller

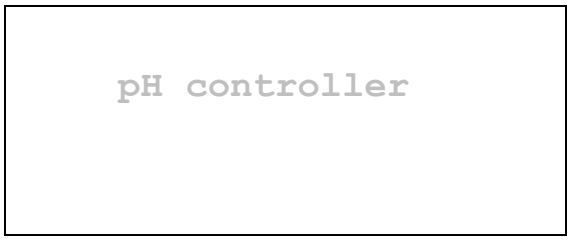
In this menu, the DOWN arrow is used to determine the associated relay. In our case, we will choose "Relay 1", using the RIGHT arrow.



NOTE: The other "PARAMETERS CONTROLLER" menu items can be left as default in the case of ON/OFF output.

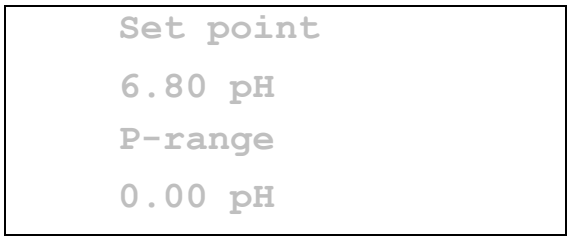
8.9.3.4 Step 4: set point

Then the set point value has to be set equidistant from the two target values V1 and V2.
In our example, the set point is set to 6.8 pH. Thus, select the second line (matching controller 1) in the "CONTROLLER SETTING" menu of the main menu.



Set the threshold value (⇔ set point) of controller 1.

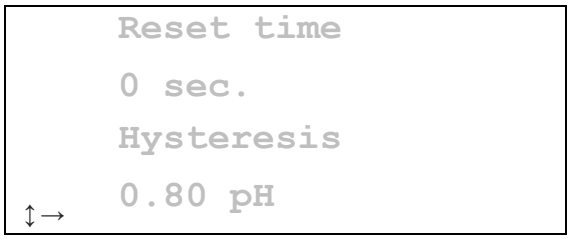
The right arrow is used to access the line and then the UP and/or DOWN arrows to set the numerical value of the set point. In our example, the value is 6.80 pH.



8.9.3.5 Stage 5: hysteresis

Adjust the hysteresis value (⇔ deviation between the two target values V1 and V2).

In our example, the value is 0.80 pH.

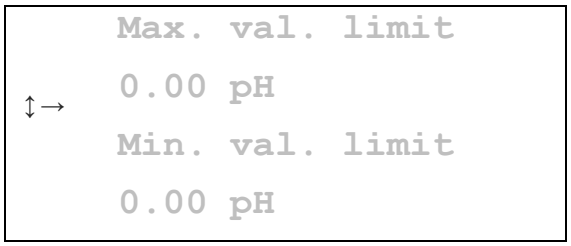


8.9.3.6 Step 6: using limit values (optional setting)

For each controller, you can set high and low limits that match critical situations of the observed parameter, in this case pH. If the measurement exceeds these limits (⇔ system outside the normal operating range), relay 3 (⇔ alarm relay) will be closed. This situation is accompanied by a text message on the device screen (e.g. Contr.1 value limit).

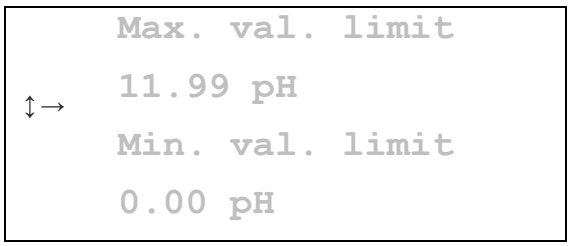
NOTE: The default values "Max. val. limit" and "Min. val. limit" are zero.

In the CONTROLLER SETTING/pH CONTROLLER menu, the DOWN arrow is used to visualize the "Max. val. limit" and "Min. val. limit" lines



NOTE: The default values "Max. val. and "Min. val. limit" limit" are zero.

The right arrow is used to access the line and then the UP and/or DOWN arrows to set the numerical value of the maximum limit. In our example, the value is 11.99 pH.



You proceed in the same way to determine a minimum limit value. In our example, the value is 3.49 pH.

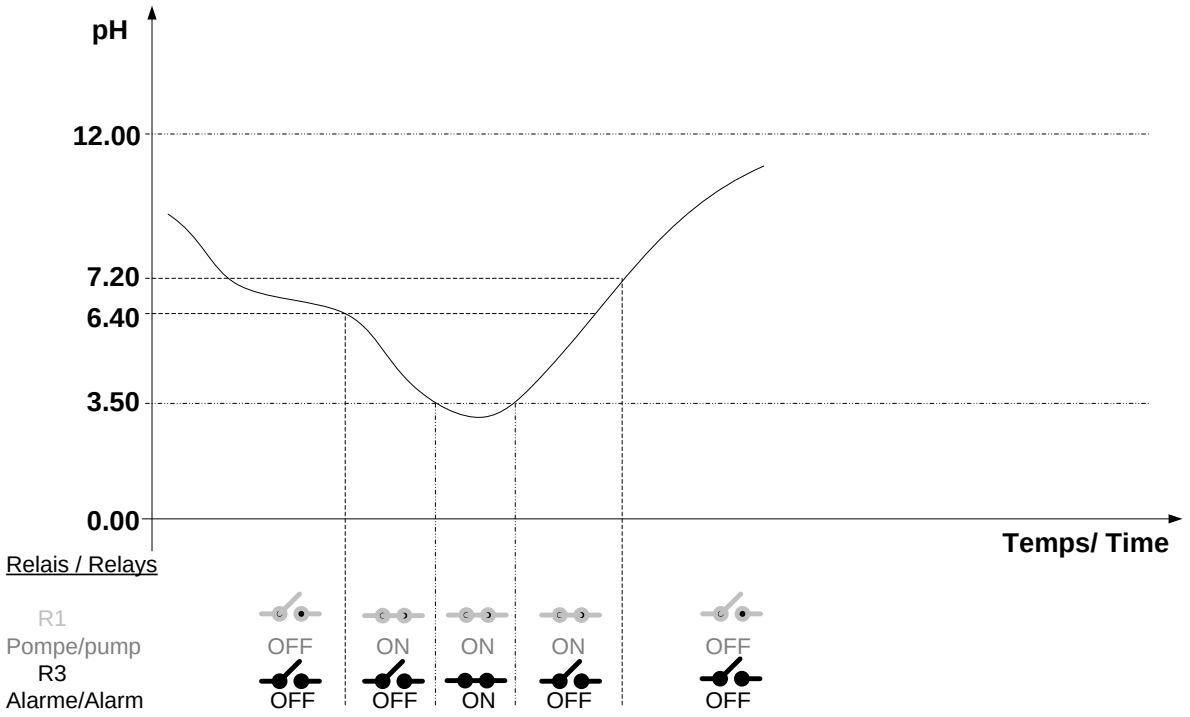
↕→	Max. val. limit 11.99 pH Min. val. limit 3.49 pH

8.9.3.7 Assessment: overall visualization

The drawing below shows the condition of two relays available on the S200, according to the pre-detemined configuration and depending on the pH measurement.

In our example, relay 1 activates the pump on a range between 6.4 and 7.2 pH. Relay 3 manages an alarm if the pH measurement should be outside 3.50-12.00 area.

Relay 2 is not used.



8.10 Configuration example for control using an analog output

8.10.1 Introduction

One of the controller's outlets may be used to provide a progressive control signal from a device on a proportional band.

The scenario of a device enabled as per the current value of a 4-20mA loop will be detailed below.

It should be noted that the 4-20mA analog output used, in this case, is no longer associated with a displayed parameter.

In addition, relay 3 continues to be used to warn that the measurement is in an extreme situation.

8.10.2 Expected operation:

The current generated on the 4-20mA loop increases as the measurement moves away from the set point. In this example, a ORP measurement range (0-1000mV) is associated with the 4-20mA range.

8.10.3 Detail of the display/transmitter setup steps:

8.10.3.1 Step 1: analog output 0/4-20mA, definition of the scope of the range

Choose BASIC SETTING then ANALOG OUTPUT from the main menu.

↕→ Sortie analog.1 Sortie analog.2	↕→ Analog. Output 1 Analog. Output 2

The analog output 1 is then selected with a current range of 4 to 20 mA without any associated measurement.

Pas de Mesure ↕→ Gamme 4-20mA	No measurement ↕→ Range 4-20mA

8.10.3.2 Step 2: linking of the controller and measured parameter

The ORP parameter is assigned to controller 1.

In the case of controller 1, you access the following menu:

BASIC SETTING / PARAMETER CONTROLLER/CONTR. 1

Use the right arrow to access the first active line and choose between "no measurement" and "ORP dig.sensor".

Controleur 1 ↕→ Capteur num ORP Sens direct Augmenter	Controller 1 ↕→ ORP dig.sensor Working direct. Increase

8.10.3.3 Step 3: direction of operation

In this menu, the DOWN arrow is used to determine the direction of operation on the next line. In our case, we will choose "increase", using the RIGHT arrow.

8.10.3.4 Step 4: identification of the output associated with the controller

In this menu, the DOWN arrow is used to access the next line. In our case, we will choose "analog output 1", using the RIGHT arrow.

Sens direct Augmenter Controleur sortie Sortie analogique 1	Working direct. Increase Output controller Analog output 1

NOTE: The other aspects of the "CONTROLLER PARAM." can be left in the default state.

8.10.3.5 Step 5: set point

Then set the set point value. In this case, a ORP measurement at 1000mV must match the low level of the current in the loop. Thus, select the second line (matching the ORP controller) in the "CONTROLLER SETTING" menu of the main menu.

↕→ Controleur ORP	ORP Controller

Adjust the set point value.

The right arrow is used to access the line and then the UP and/or DOWN arrows to set the numerical value of the set point. In our example, the value is 1000mV.

	Point de consigne
↕→	**1000 mV**
	P-gamme
	0.00 mV

Set point
1000 mV
P-range
0.00 mV

8.10.3.6 Step 6: proportional bandwidth

Set the proportional bandwidth. In our example, 1000mV to reach 20mA for an ORP measurement of 0mV.

	Point de consigne
↕→	**1000 mV**
	P-gamme
	1000 mV

	Set point
	1000 mV
	P-range
	1000 mV

8.10.3.7 Step 7: using limit values (optional setting)

For each controller, you can set high and low limits that match critical situations of the observed parameter, in this case ORP. If the measurement exceeds these limits (⇔ system outside the normal operating range), relay 3 (⇔ alarm relay) will be closed. This situation is accompanied by a text message on the device screen (e.g. Contr.1 value limit).

NOTE: The default "Max. val. limit" and "Min. val. limit" values *are zero.*

In the CONTROLLER SETTING/pH CONTROLLER menu, the DOWN arrow is used to view the "Max. val. limit" and "Min. val. limit" lines.

	Limit val. Max
↕→	**0.00 mV**
	Limit val. Min
	0.00 mV

	Max. val. limit
↕→	**0.00 mV**
	Min. val. limit
	0.00 mv

NOTE: The default "Max. val. limit" and "Min. val. limit" values *are zero.*

The right arrow is used to access the line and then the UP and/or DOWN arrows to set the numerical value of the maximum limit. In our example, the value is set to 900 mV to warn when the measurement is high and close to the set point.

	Limit val. Max
↕→	**900 mV**
	Limit val. Min
	0.00 mV

	Max. val. limit
↕→	**900 mV**
	Min. val. limit
	0.00 mV

You proceed in the same way to determine a minimum limit value.

8.10.3.8 Summary

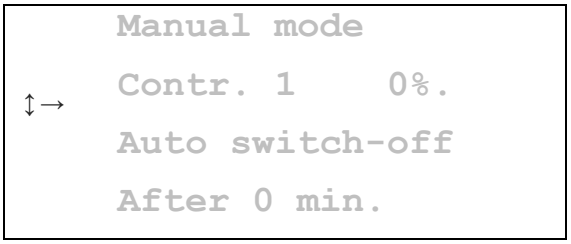
This configuration of the proportional band 4-20mA analog output, 1000 to 0 mV is checked using a multimeter connected to the current loop. We obtain, for example, 12, 1mA for an ORP measurement of 500mA.

8.11 Manual operating mode

Manual mode is switched to automatic on the main display screen for measurements by pressing the right arrow.

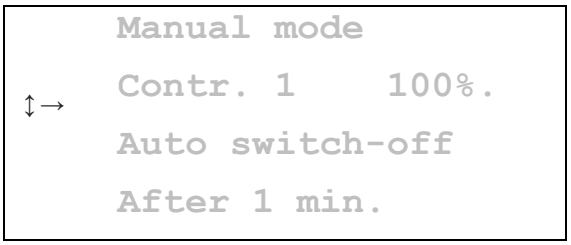
8.11.1 Manual controller mode

The manual mode allows you to act on the controller outputs by neutralizing the settings defined for automatic operation.



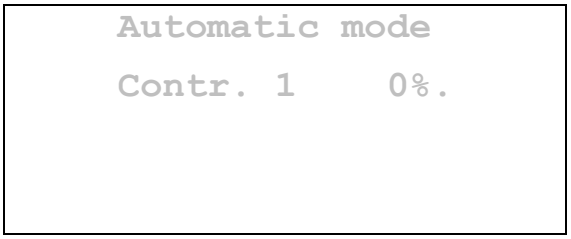
The variables managed by the controller can be set in the controller's manual settings. Each controller can be set separately. The output signal provided for the controller is managed directly, such as the relay, analog output, etc.
The preset monitoring type for the controller is used for monitoring, pulse frequency or pulse intervals.

For example, the action of a single, normally open relay is managed in manual mode, by adjusting to 100% for a period of X minutes when closed.



The adjustable “automatic stop” time indicates a override stop at the scheduled time. The predetermined variable is then set at 0%.

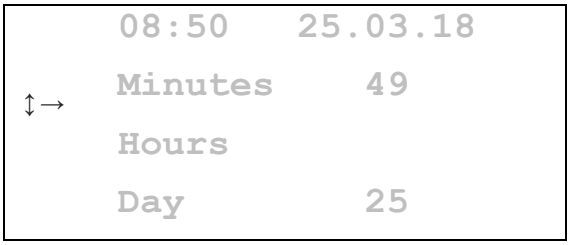
8.11.2 Automatic controller mode



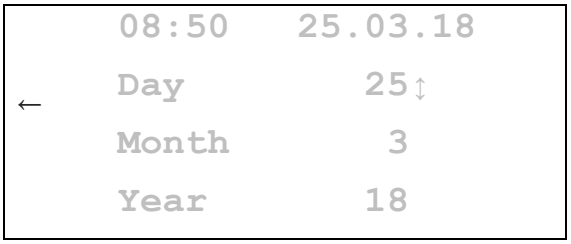
When the controller is in automatic mode, the current controlled variable.

8.12 Date and time

The date and time settings are available in the main menu to adjust the clock built into the device in real time.

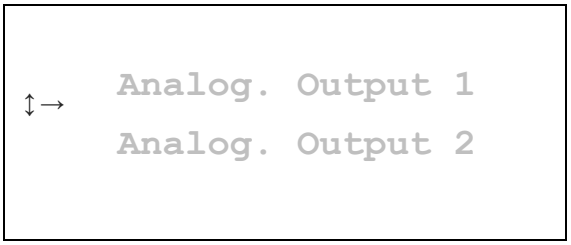


Each item can be changed to make the adjustment (minutes, hours, days, months, year).



8.13 Analog outputs

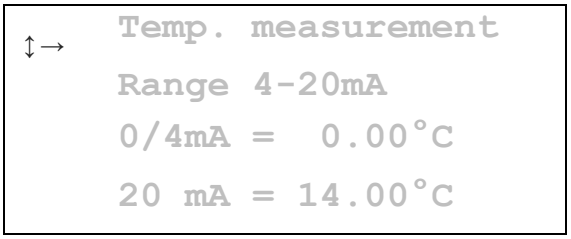
The S200 measurement and monitoring device enables all measurement values to be output as standard current signals of 0/4-20mA according to standard DIN IEC 60381-1. You can adjust the output type at this location. BASIC ADJUSTMENT has to be chosen from the main menu and then ANALOG OUTPUT.



8.13.1 Assignment of measured values

Advancing through the menus:
BASIC ANALOG / ANALOG OUTPUT / ANALOG OUTPUT1

If analog output 1 is used to transfer the temperature measurement, the following screen will be obtained:



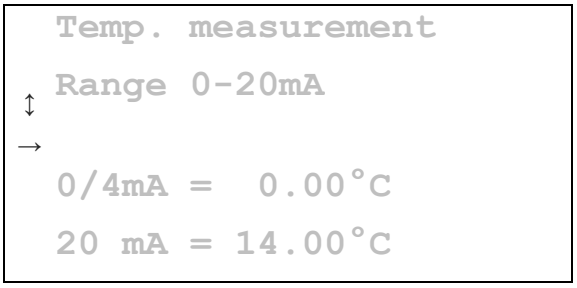
Various parameters can be assigned to analog outputs, such as temperature measurement and an accessible parameter with a digital sensor.

When the analog output is used as a controller, the "No Measurement" setting must be selected here.

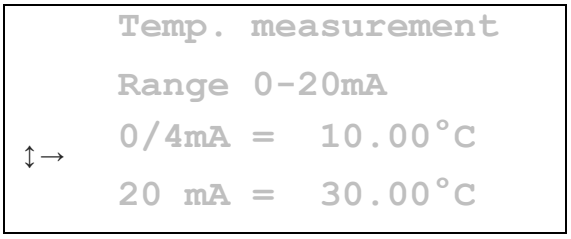
8.13.2 Definition of current active range

The RANGE line allows you to switch between two current range choices:

- Conventional 4-20 mA
- Extended 0-20mA.



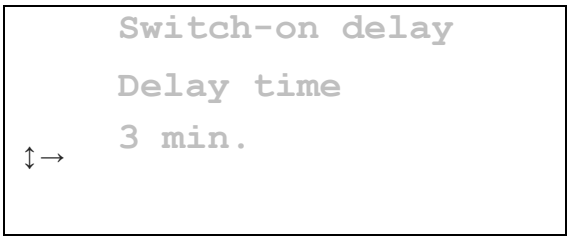
8.13.3 Setting the range



Lines 3 and 4 of this screen determine the values of the parameter, e.g. temperature, associated with the low and high limits of the output current range.

8.14 Power on delay

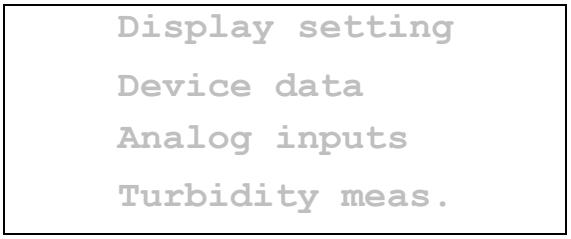
This function is accessible in the menu:
BASIC ADJUSTMENT/ SWITCH-ON DELAY



Device operation can be offset as a result of loss of power. The time adjustment range is from 0 to 60 minutes.

8.15 Service menu

The SERVICE menu is accessible directly in the main menu. It provides key information on the device, connected digital sensor, and analog inputs.



Note: Refer to the specific paragraph for the display setting.

8.15.1 Device data

This submenu provides access to three key items for the device:

- Serial number
- Software version
- Hardware version.

8.15.2 Analog inputs

How analog inputs operate can be checked here.

8.15.3 Measurement from a digital sensor

For example, as the device is associated with a digital nephelometric turbidity sensor, this TURBIDITE MEASUREMENT submenu provides:

- Serial number
- Software version
- Hardware version
- All measurements provided by the given sensor.

8.15.4 Deleting data / return to factory settings

The DELETE DATA menu allows you to restore the factory settings (reset).

Pressing the down and right arrows simultaneously resets the device.

8.16 Languages

The language is chosen in the BASIC SETTING / LANGUAGES sub-menu.

9 Initial commissioning

9.1 Checking the hardware installation

Warning:

Before connecting the power supply to the device, check the supply voltage with respect to the data plate and compare them.
Check the wiring of the device with respect to the wiring diagram.

9.2 Basic settings of the equipment

Firstly, set the display language for the various menus.

Note that the BASIC SETTING submenu is accessible only after you have entered the Level 3 code, see CODES paragraph.

Refer to the specific paragraphs, using the contents, to define the read and displayed parameters, as well as the entire configuration of the controller, analog outputs, etc.

9.3 External connection module

The 90-94 housing is used for the connection of digital sensors for 12VDC power supply and RS485 communication. When the S200 device is associated with several sensors, the sensor connection area can be moved out of the S200 box into an external module (JUNCTION BOX 4020). This external module is then connected to the S200 via a hard-wired connection (energy and communication).

10 Maintenance and servicing

10.1 General overview

Be sure to use only a damp cloth to clean the casing. The use of strong, caustic or abrasive cleaning agents (acid cleaners, etc.) is not recommended!
The S200 measurement and monitoring device is easy to service, but ensure that a qualified technician checks it and performs maintenance at regular intervals.

Please contact us for any other questions regarding our measurement, monitoring and metering system.

10.2 Cleaning and calibration of probes

Depending on the water quality, the probes should be cleaned at intervals of 1 to 6 months (or sooner if required). Calibration is required according to the type of probe.

Warning:

Disable the metering function before removing the probes.

11 Alarm messages

11.1 List of error messages

Alarm message	Cause	Activity	Solution
Limit value of controller 1	The lower or upper limit value of controller 1 has been exceeded/fallen below	Alarm relay switches	Check the measurement and monitor
Limit value of controller 2	The lower or upper limit value of controller 2 has been exceeded/fallen below	Alarm relay switches	Check the measurement and monitor
Limit value of controller 3	The lower or upper limit value of controller 3 has been exceeded/fallen below	Alarm relay switches	Check the measurement and monitor
Limit value of controller 4	The lower or upper limit value of controller 4 has been exceeded/fallen below	Alarm relay switches	Check the measurement and monitor
Monitoring the metering of controller 1	Controller 1 operated in a control value of 100 % for a period exceeding the metering monitoring time.	Controller 1 is switched off and the alarm relay switched	Check the measuring and monitoring; confirm the message by briefly switching to manual mode.
Monitoring the metering of controller 2	Controller 2 operated in a control value of 100 % for a period exceeding the metering monitoring time.	Controller 2 is switched off and the alarm relay switched	"
Monitoring the metering of controller 3	Controller 3 operated in a control value of 100 % for a period exceeding the metering monitoring time.	Controller 3 is switched off and the alarm relay switched	"
Monitoring the metering of controller 4	Controller 4 operated in a control value of 100 % for a period exceeding the metering monitoring time.	Controller 4 is switched off and the alarm relay switched	"
Delayed start-up	Turning on the S200 power supply	Start-up of the controller will be delayed for the set period of time	"
External stop of the controller	Digital input 1 of terminal 21/22 has been switched	The controller is stopped	If digital input 1 is not switched, the controller will work again
Calibrat. error. O2	An error occurred while calibrating the oxygen digital sensor	The controller function remains active, the wrong calibration value is accepted	Repeat calibration or replace probe
Calibrat. error. NTU	An error occurred while calibrating the turbidity digital sensor	The controller function remains active, the wrong calibration value is accepted	Repeat calibration or replace probe

12 MODBUS RTU

The S200 measurement and control device is equipped with a Modbus RTU interface.
This piece of equipment has an RS 485 interface.

Shielding = Terminal 97

A = + Terminal 96
B = - Terminal 95

12.1 Shielding

The use of shielded cables provides high protection against electromagnetic interference, especially high frequencies. However, the effectiveness of the shield depends on the careful installation of the cable.
The shielding is located near the main ModBus.

12.2 Communication parameters

Transmission speed:	9,600 bps
Data bits:	8
Start-up bits:	1
Shutdown bits:	1

Parity: none

12.3 MODBUS functions used

The following MODBUS functions are used:
- 04 (0x04) Querying registry values - max. reading 40 registers
- 06 (0x06) Single registry writing - writing 1 register.

12.4 MODBUS S200 registry list

Register Decimal Address	Description	Unit	Value range (INT16)	Position decimal point	R/W
0	Measuring value pH	pH	-200…1600	xx.xx	R
1	Measuring value ORP	mV	-1500...+1500	xxxx	R
2	Measuring POT - measurement	mg/L	0... 500	xxx.x	R
3	Measuring value temperature	°C	-3000…14000	xxx.xx	R
4					
5	Measuring conductivity	µS mS	0... 2000	measuring range	R
6	Measuring value temperature conductivity sensor	°C	-3000... 14000	xxx.xx	R
7					
8					
9	Measuring flow measuring water	L/h	0 - 120	xxx	R
10	Measuring active chlorine	mg/L	0... 500	x.xx	R
11					
12					
...					

...					
80	Measuring temperature turbidity digital sensor	°C	-3000... 14000	xxx.xx	R
81	Parameter 1 turbidity digital sensor	NTU	0…4000	xxxx	R
82	Parameter 2 turbidity digital sensor	FNU	0…40000	xxxx.x	R
83	Parameter 3 turbidity digital sensor	mg/L	*0-4500*	xxxx	R
84	Selected measuring turbidity	/	0…4000	measuring range	R
…					
86	Measuring temperature O_2 digital sensor	°C	-3000... 14000	xxx.xx	R
87	Parameter 1 O_2 digital sensor	%sat.	0…2000	xxx.xx	R
88	Parameter 2 O_2 digital sensor	mg/L	0…2000	xx.xx	R
89	Parameter 3 O_2 digital sensor	ppm	0…2000	xx.xx	R
90	Selected measuring O_2	/		measuring range	R
…					
92	Measuring temperature turbidity TSS digital sensor	°C	-3000... 14000	xxx.xx	R
93	Parameter 1 TSS digital sensor	%	0…1000	xxx.x	R
94	Parameter 2 TSS digital sensor	g/L	0…5000	xx.xx	R

95	Parameter 3 TSS digital sensor	FAU	0…4000	xxxx	R
96	Selected measuring turbidity TSS digital sensor	/		measuring range	R
…					
98	Measuring temperature pH/ORP digital sensor	°C	-3000... 14000	xxx.xx	R
99	Measuring pH digital sensor	pH	0…1400	xx.xx	R
100	Measuring ORP digital sensor	mV	-1000…+1000	xxxx	R
…					
…					
104	Measuring temperature ORP digital sensor	°C	-3000... 14000	xxx.xx	R
…					
106	Measuring ORP digital sensor	mV	-1000…+1000	xxxx	R
…					
110	Measuring temperature conductivity digital sensor	°C	-3000... 14000	xxx.xx	R
111	Parameter 1 conductivity digital sensor	µS/cm ; mS/cm	0…2000	measuring range	R
112	Parameter 2 conductivity digital sensor	g/kg	0…8500	xx.xx	R

113	Parameter 3 conductivity digital sensor	ppm	0…9999	xxxx	R
114	Selected measuring conductivity digital sensor	µS/cm ; mS/cm	0... 2000	measuring range	R
…					

Note:
To read register 0 (pH measurement value), select the ModBus 3001 registry. The address of ModBUS is incremented by +1 at a time.

13 Sensor - Actuator bus (MODBUS RTU)

The S200 measurement and monitoring device is equipped with a sensor - actuator bus. The Modbus RTU protocol is used.
This piece of equipment has an RS 485 interface.
Shielding = Terminal 94

A = + Terminal 93

B = - Terminal 92

+12V = terminal 91
0V = terminal 90

A max. load of 200mA is allowed for a 12V power supply.

13.1 Shielding

The use of shielded cables provides high protection against electromagnetic interference, especially high frequencies. However, the effectiveness of the shield depends on the careful installation of the cable.

The shielding is located near the main ModBus.

13.2 Communication parameters

Transmission speed: 9,600 bps

Data bits: 8
Start-up bits: 1

Shutdown bits: 1
Parity: none

14 Appendix

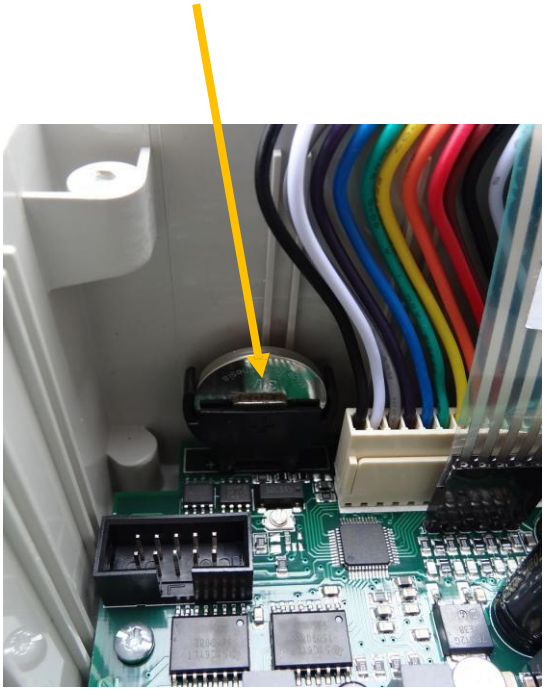
14.1 What to do in the event of a power failure

If there is a power failure, the unit keeps its last operating state. Once power is restored, the device continues to operate with all previous settings.

14.2 Battery

The S200 measurement and monitoring device is equipped with a battery so that the internal clock continues to operate even when there is no power supply. The battery must be replaced if, for example, the date or time changes abruptly (lithium battery CR 2032)

Fig. 13.2-1: View of the electronic board with the housing lid open



15 Spare parts and wear parts

15.1 Wear parts

Article	Reference
CR 2032 type battery	

16 Electrical connection

16.1 Assignment of terminals

No.	Post	Function
L	L	Power supply (see nameplate) *Warning*: The voltage on the nameplate must be complied with.
N	N	
PE	PE	
PE	PE	PE terminal block
PE	PE	
PE	PE	
PE	PE	
1	⊥	Measurement input 1, e.g. pH measurement
2	+	
4	⊥	Measurement input 2, e.g. ORP or 0/4-20 mA measurement with internal jumper
5	+	
6	⊥	Pt 100 or Pt 1000 temperature sensor connection
7	+	
10		Add-on module connection Please see the module description for more information about assignment.
11		
12		
13		
20	+ 12V	Digital input 1 - pulse input or switching input Contact closed = controller shutdown 21 22
21	⊓	
22	⊥	
23	+ 12V	Digital input 2 - pulse input or switching input 24 25
24	⊓	
25	⊥	
30	⊥	Analog output 1 0/4...20 mA (500Ω load)
31	+	
32	⊥	Analog output 2 0/4...20 mA (500Ω load)
33	+	
70		Digital output 1 max. 200mA / 30V e.g. For monitoring a membrane metering pump
71		
72		Digital output 2 max. 200mA / 30V e.g. For monitoring a membrane metering pump
73		

No.	Terminal	Function
80 81		Relay 1
82 83		Relay 2
84 85		Relay 3
90 91 92 93 94	0 V + 12 V B A 	Power supply for bus devices 12V DC 200mA Sensor - Actuator - Bus 2. RS 485 Interface (Modbus RTU)
95 96 97	B A 	1. RS 485 Interface (Modbus RTU)

17 Hotline-Aftersales Service contact details

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