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
Input current:	0/4 to 20 mA	Charge of 0.01 mA / 50 Ω
Oxygen	0.00 mg/l to 20.00 mg/l 0% to 200%	ModBus digital sensor: 0.1 mg/l and 1%.
Turbidity	0.00 to 50.00 NTU 0.0 to 200.0 NTU 0 to 1,000 NTU 0 to 4,000 NTU	ModBus digital sensor from 0.01 to 1 NTU.

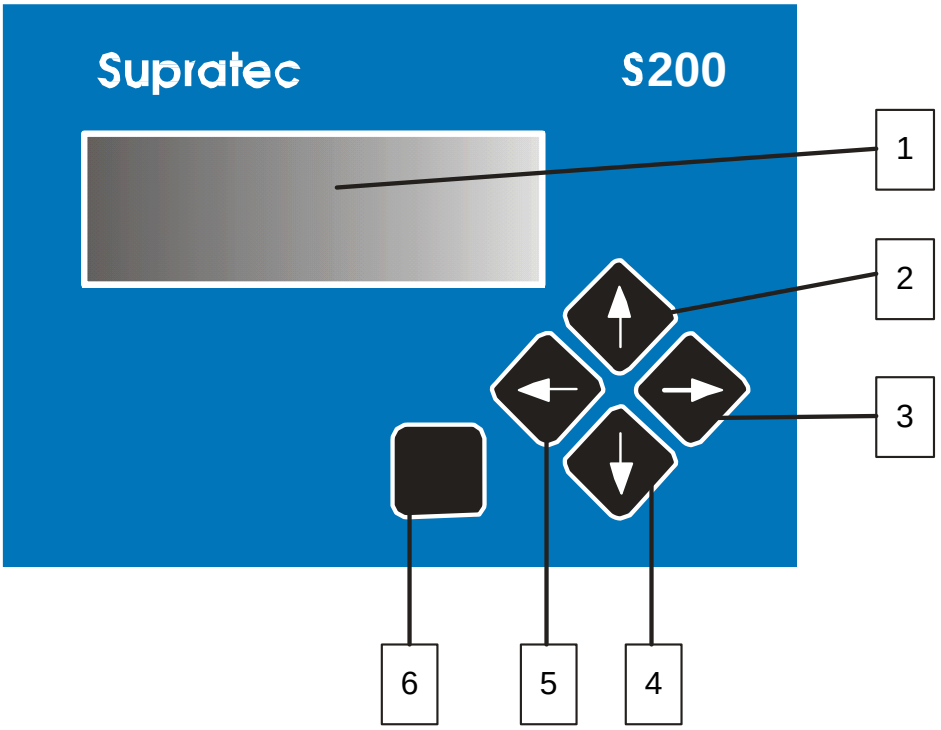
3 Description

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

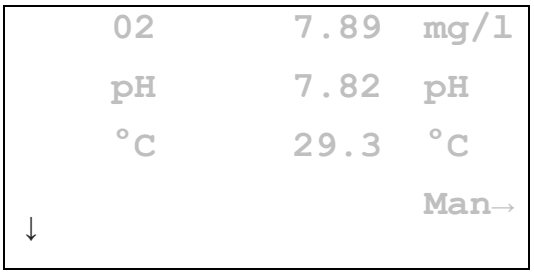
(6) Key 

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:



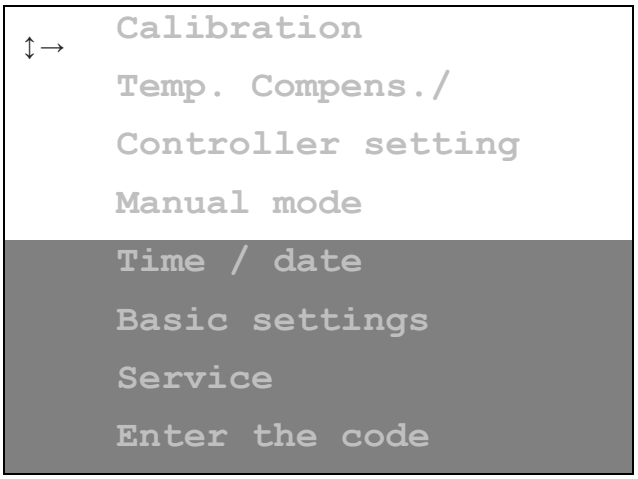
Note:
The example display may differ depending on the device's configuration.

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/

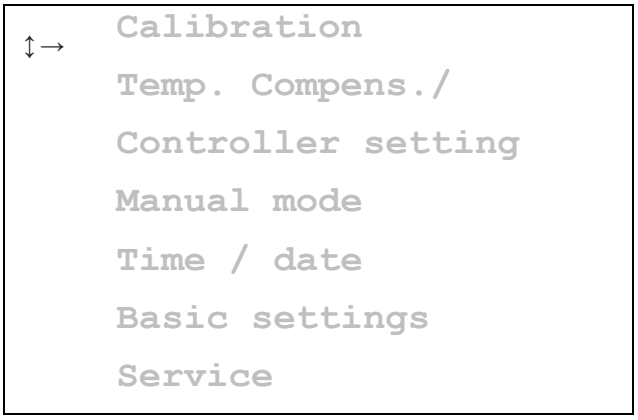
This line enables users to easily find this menu item in the device.

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

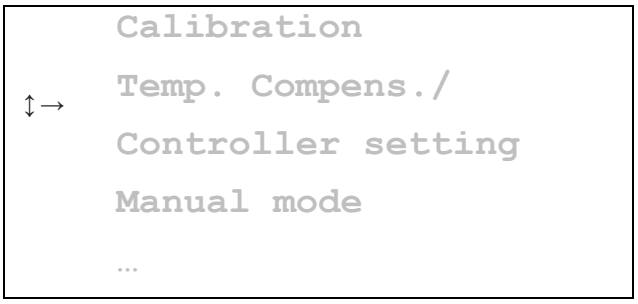
/Service/**LCD Display/**: This means that an additional sub-menu has been selected.

4.2.2 General menu:

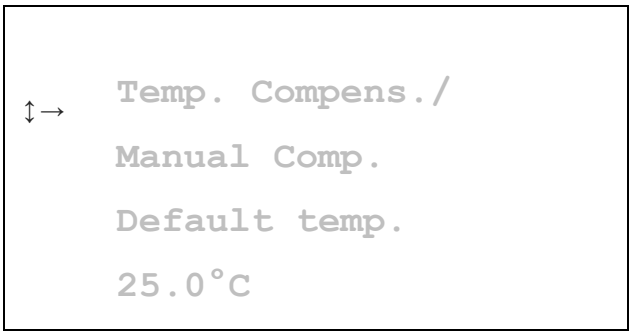
From the main screen (real-time display of measurements), the DOWN arrow gives access to the General menu. The list of items accessible from the General menu is as follows:



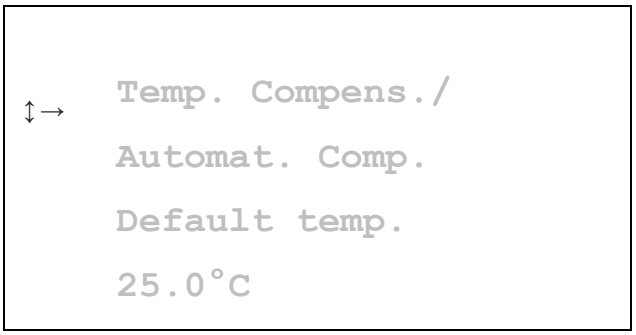
4.2.3 Example of access to a sub-menu, selection of "Temperature Compensation" menu



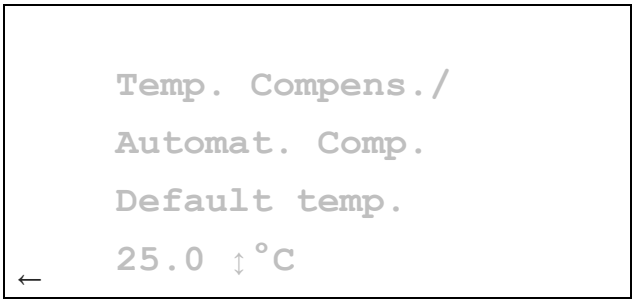
Use the key to select the "temperature compensation" sub-menu.



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.

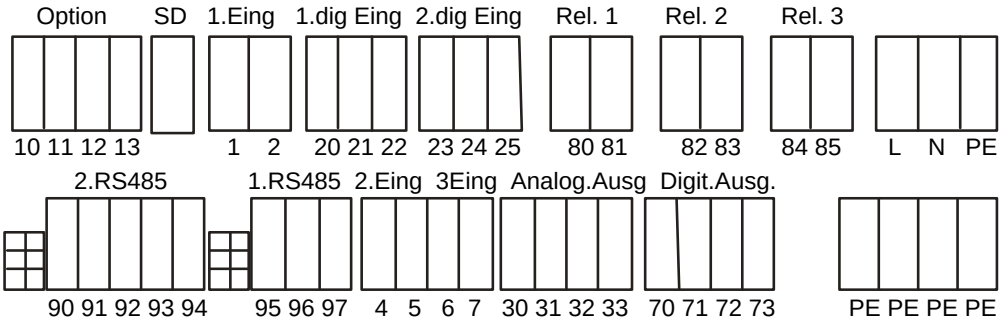
← This indicates that the cursor key - left arrow - is used to complete the input and the value is saved.

Note:

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

5 Installation

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	95+96+97	95 = B 96 = A

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

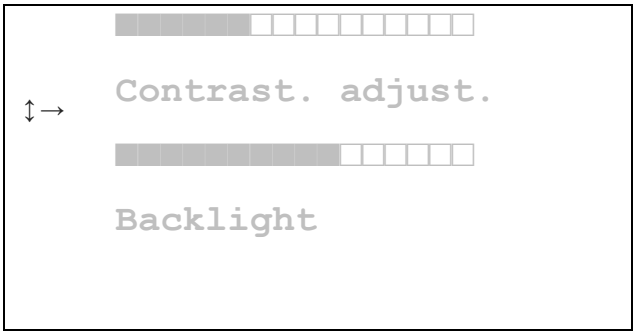
There are 3 access levels to provide access using codes that protect the device from unauthorized operation.

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

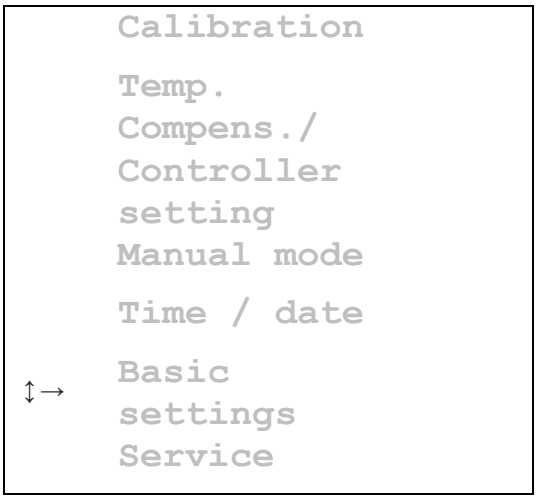
MODBUS RTU

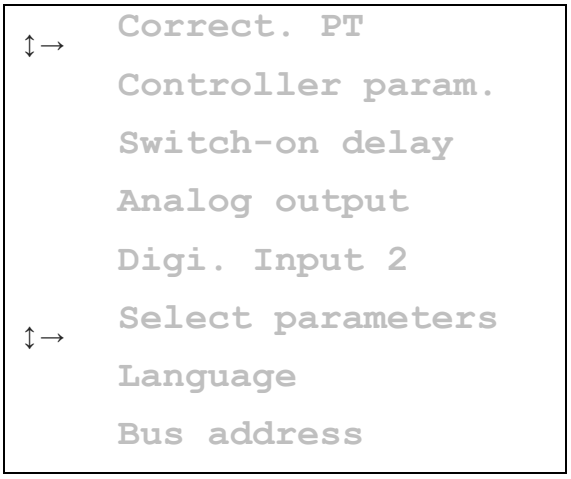
7.1.1 Reminder of connection to the terminal:

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

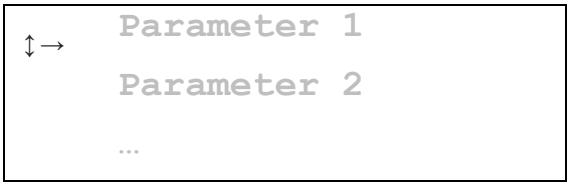
7.1.2 Setting / configuring of displayed measurements

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





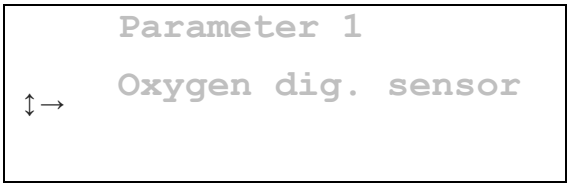
The SELECT PARAMETERS leads to the list of active parameters from 1 to 6. These are the 6 usable display areas on the screen.



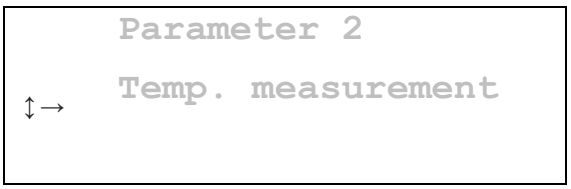
Selecting one of the six parameters leads to a list of choices:

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

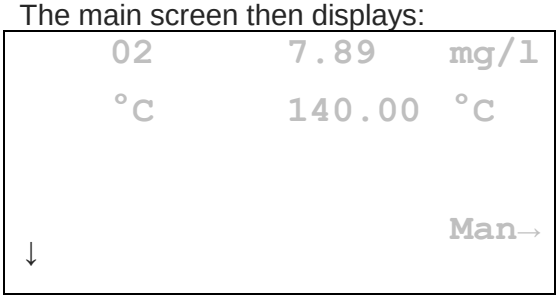
In this case, the temperature or oxygen will be selected as these 2 parameters are delivered by the OPTOD sensor.



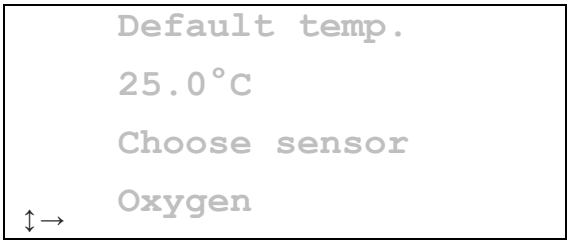
Note that these two parameters can be viewed simultaneously by configuring parameters 1 and 2.



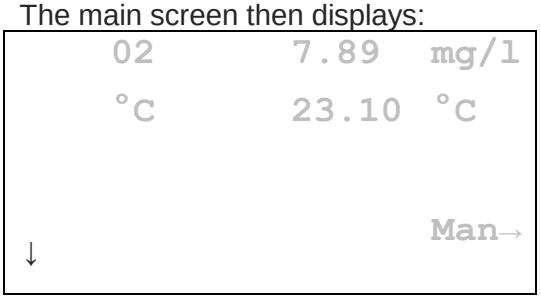
The main screen then displays:



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

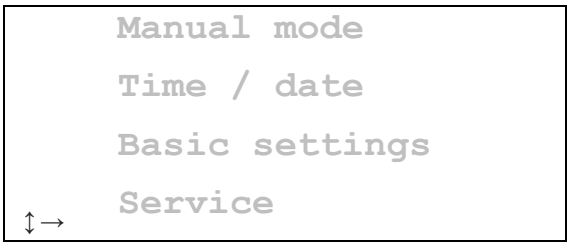


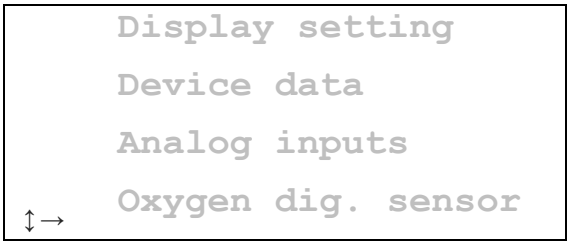
The main screen then displays:



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.

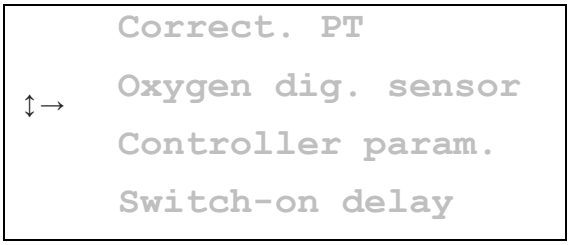
7.1.4 Oxygen measurement configuration

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.

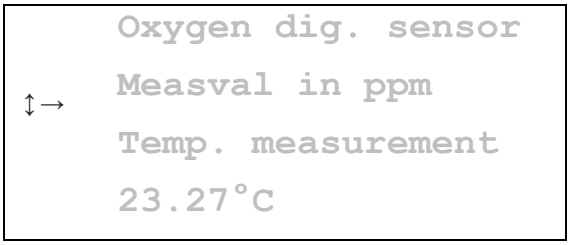
In terms of temperature, the OPTOD sensor generally uses its own temperature measurement.

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

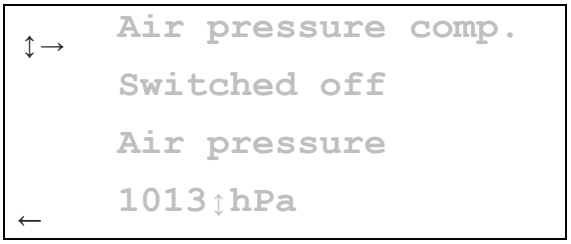


The operator may activate/deactivate the oxygen measurement compensation parameters on the lower levels of the same screen.

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).

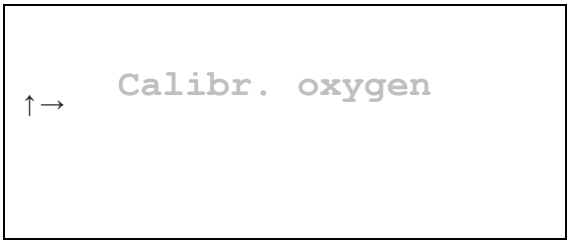
7.1.5 Calibration methods

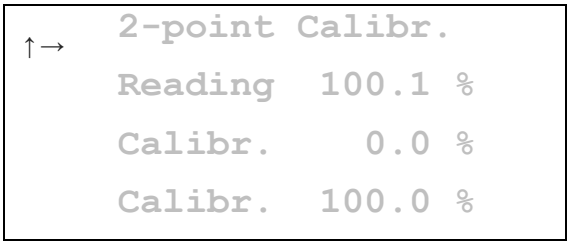
The S200 Open offers two calibration methods, as a saturation %, for the oxygen probe:

- 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%)

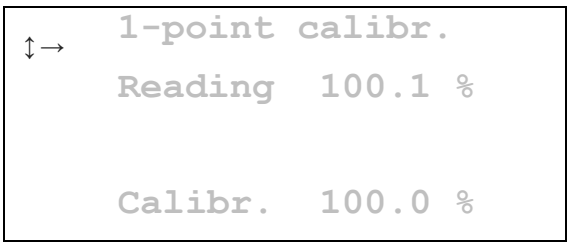
  This two-point method calibrates the zero point and the probe slope. This is a more complex and exact method because a “zero-point solution” is also required.

Select the different calibration methods using the menu: CALIBRATION



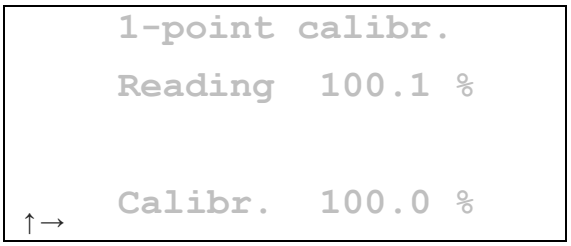


Use the right arrow to select the method.

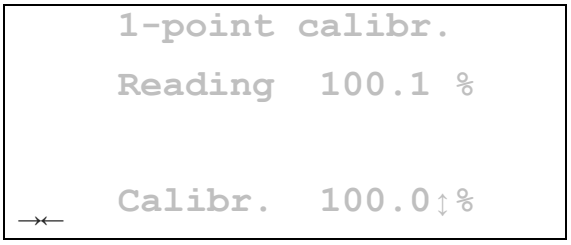


7.1.6 One-point calibration sequence

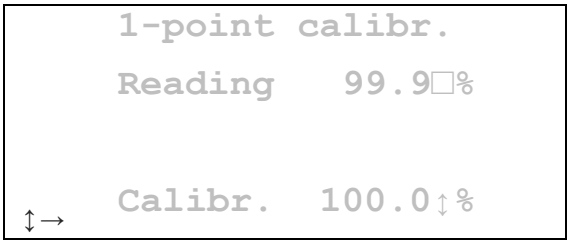
The one-point calibration of the OPTOD sensor is performed by positioning the pre-cleaned sensor in the air above the water surface to create steam-saturated air conditions (100% oxygen saturation).



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.

```
      2-point Calibr.
      Reading     0.1 %
↕→    Calibr.     0.0 %
      Calibr.   100.0 %
```

6. Use the right arrow to start the sequence.

```
      2-point Calibr.
      Reading     0.1 %
→ ←   Calibr.     0.0↕%
      Calibr.   100.0 %
```

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

```
      2-point Calibr.
      Reading     0.1□%
→←    Calibr.     0.0↕%
      Calibr.   100.0 %
```

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-point Calibr.
     Reading  100.1 %
     Calibr.    0.0 %
     Calibr.  100.0 %
↕→
```

2. Use the right arrow to start the sequence.

```
     2-point Calibr.
     Reading  100.1 %
     Calibr.    0.0 %
     Calibr.  100.0↕%
→ ←
```

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

```
     2-point Calibr.
     Reading    0.1□%
     Calibr.    0.0 %
     Calibr.  100.0↕%
↕→
```

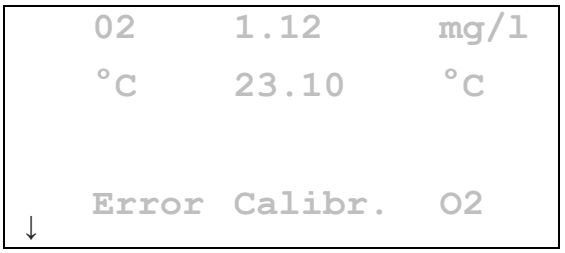
A flashing square behind the displayed value indicates that the automatic calibration process is in progress. This display turns off when the calibration is complete.

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.

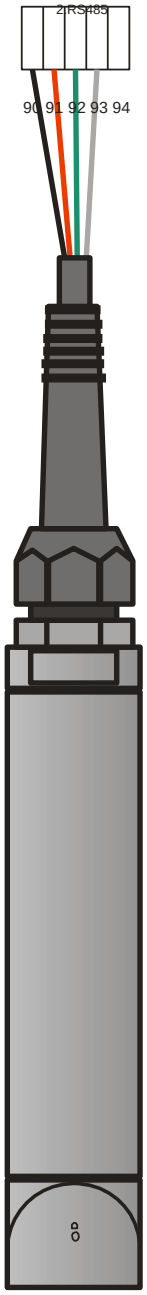
The main screen then displays:



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

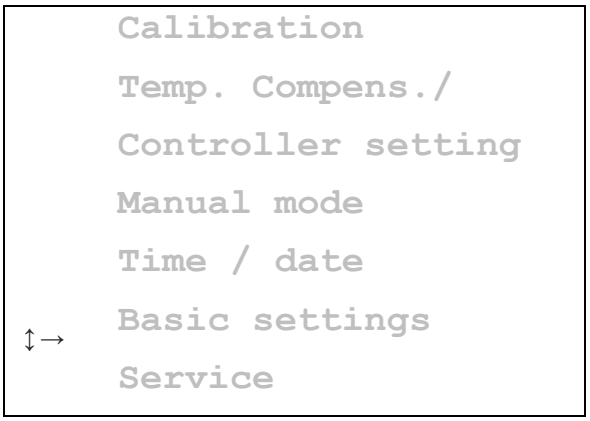


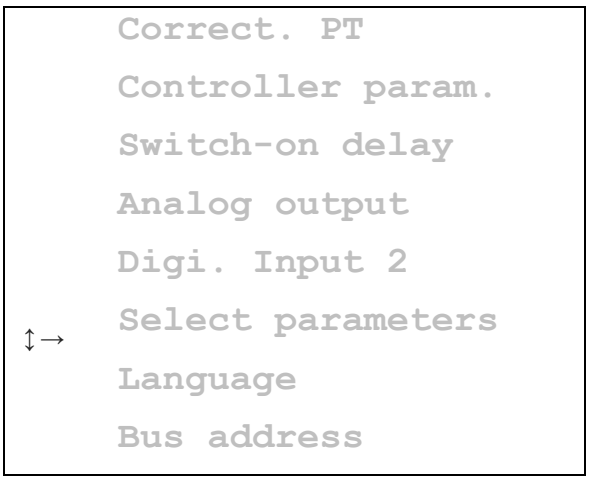
7.2.1 General information about the turbidity probe

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.

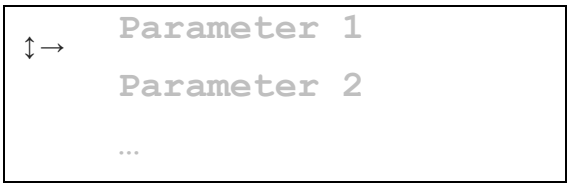
7.2.2 Setting / configuring of displayed measurements

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





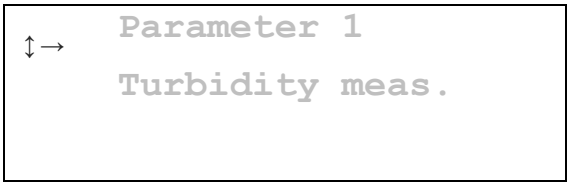
The SELECT PARAMETERS choice leads to the list of active parameters from 1 to 6. These are the 6 usable display areas on the screen.



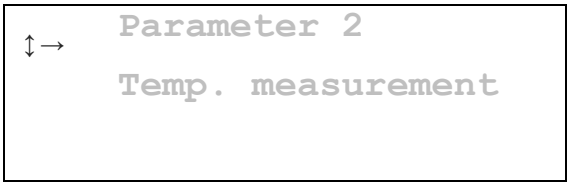
Selecting one of the six parameters leads to a list of choices:

- 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.

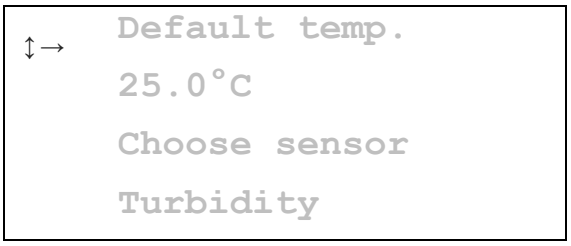


Note that these two parameters can be viewed simultaneously by configuring parameters 1 and 2.



The main screen then displays:

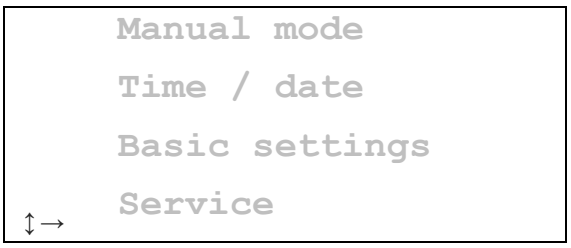
The temperature value from the turbidity sensor is displayed after activation in the TEMP. COMPENS. menu.

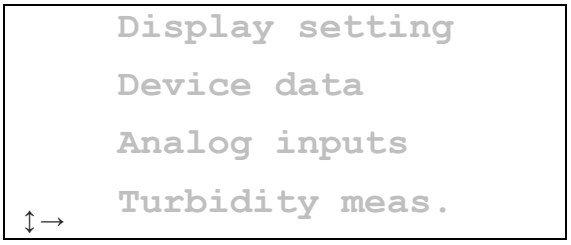


The main screen then displays:

7.2.3 Sensor information

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



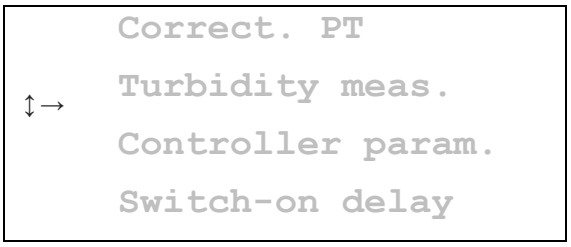


Pressing the right arrow in the TURBIDITY MEASUREMENT LINE gives access to the following information:

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

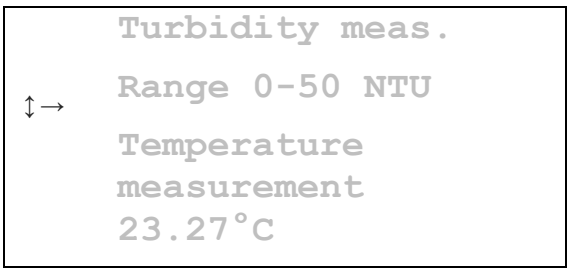
7.2.4 Configuration of the nephelometric turbidity measurement

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 is used to select the range of measurement from among the 4 available:

0-50; 0-200; 0-1,000 or 0-4,000 NTU



Note:

After selecting the measurement range and in the event of excess when the S200 Open device returns to Measurement Mode, the measurement will remain frozen on the screen. In this case, and if the measurement remains frozen, return to the measurement range selection menu to choose 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.

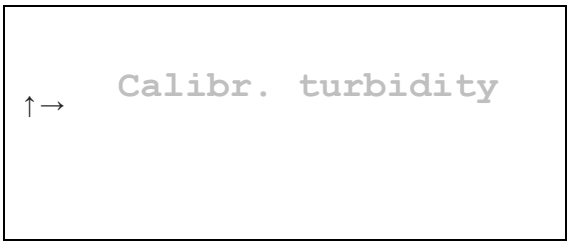
Note:

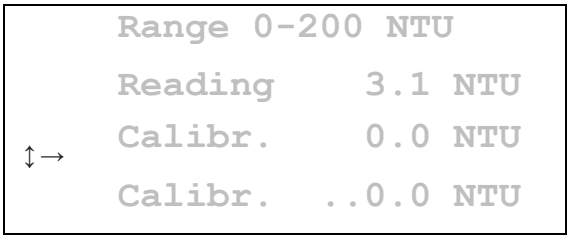
The turbidity probe must be checked periodically (depending on the proportion of impurities present). It is important to rinse the probe before each check. Organic deposits on the probe, such as mud or biofilm, may result in measurement errors. These deposits can be carefully removed using hot soapy 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.

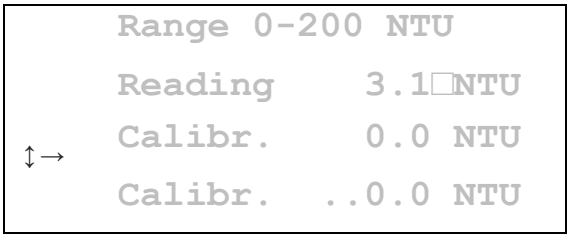
Select CALIBRATION in the general menu:





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.

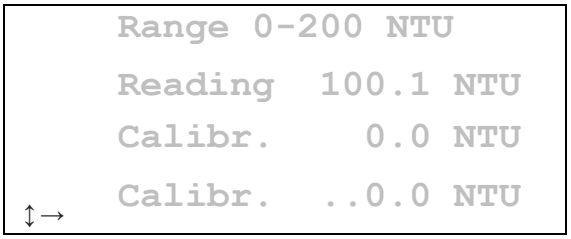
7.2.5.2 Calibration of the second point - detailed procedure

Operating conditions:

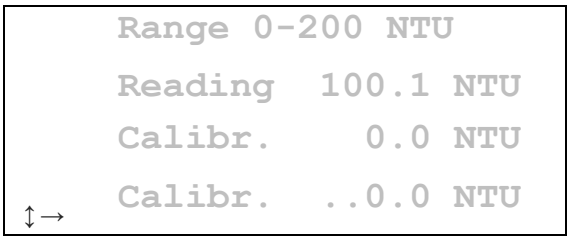
The second point is calibrated in an aqueous suspension of formazine with constant stirring.

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.

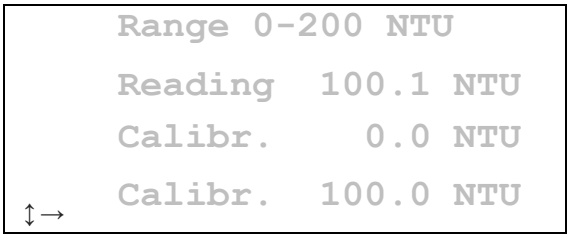
Use the DOWN arrow key to select the second CALIBR. 0.0 NTU line.



Use the right arrow to start the sequence.

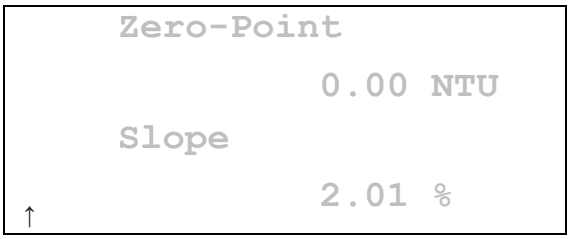


Use the UP arrow to adjust the digital display to the value of the aqueous formazine suspension used, for example, 100.0 NTU.
Once the suspension is perfectly uniform, pressing the right and left arrows simultaneously will start the measurement sequence.



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..



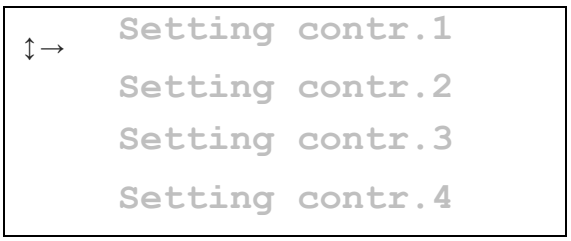
8 Controller adjustments

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.

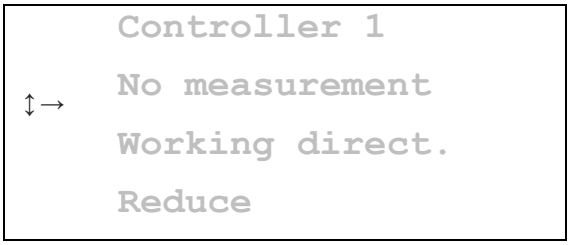
The operator then has 4 choices.



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.

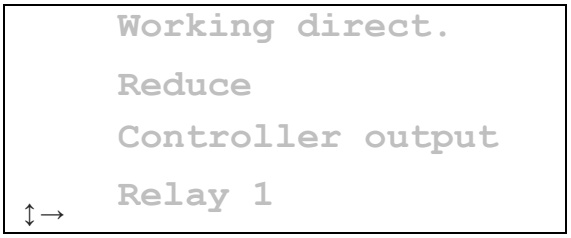
8.2 Controller action direction



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

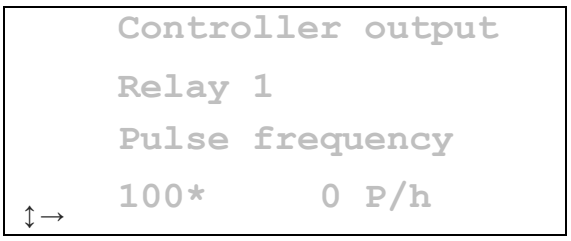
The controller output signal may be assigned to various actuators (relay, etc.).



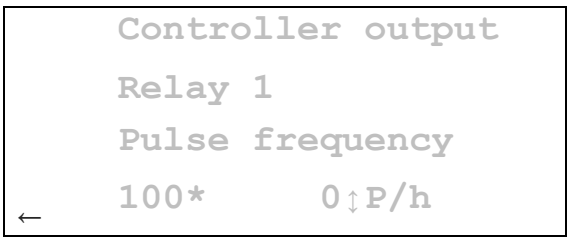
The operator may choose: relay 1, relay 2, digital output 1, digital output 2, analog output 1 or analog output 2.

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.



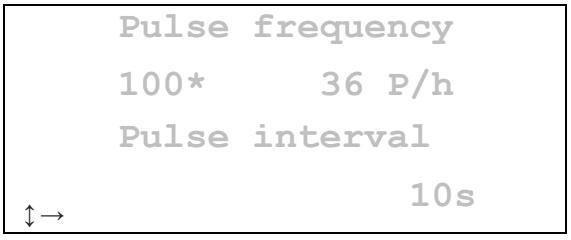
The right arrow lets you change the pulse numerical value.



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.

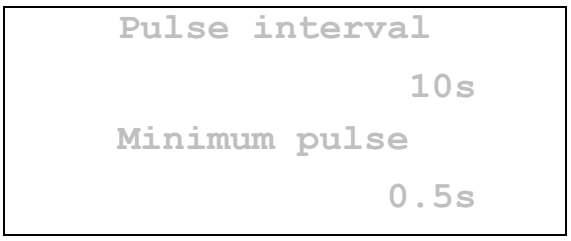


8.6 Minimum pulse

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.

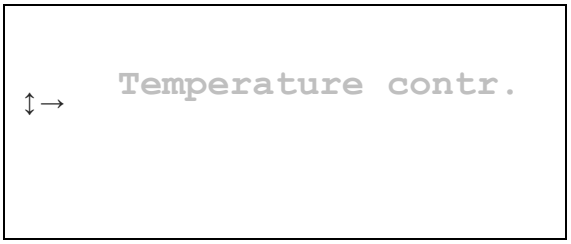
Note:

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

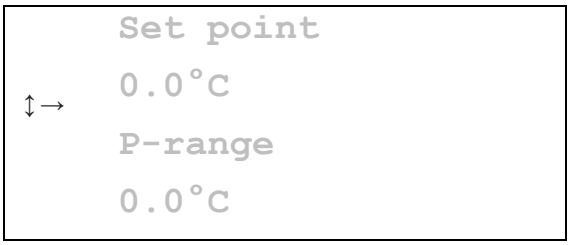


8.7 Controller parameter settings

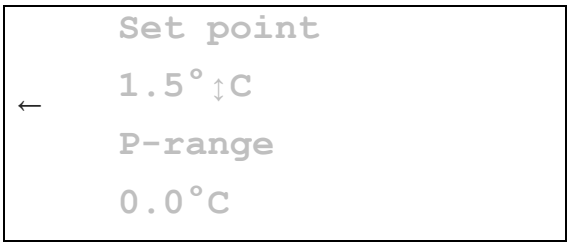
Select the CONTROLLER SETTING function in the main menu.



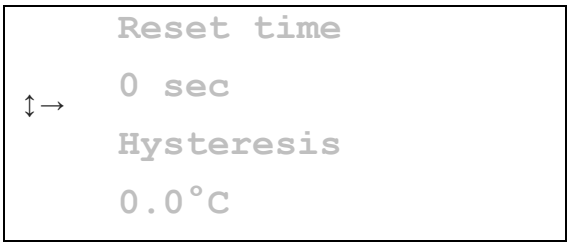
The right arrow gives access to the setting details. The example described below represents the temperature parameter.

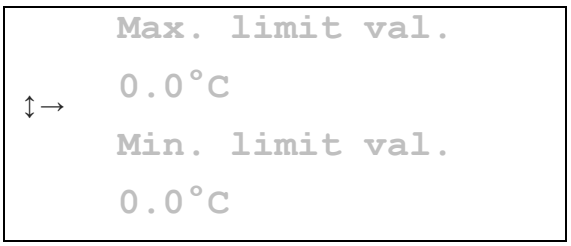


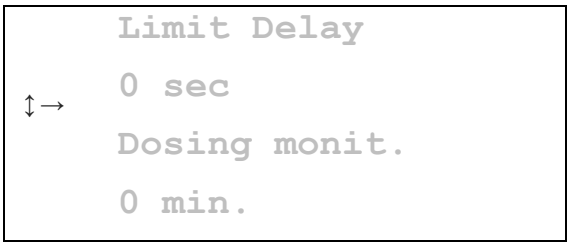
Each item can be changed, right arrow then up or down, to set a numerical value.



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.

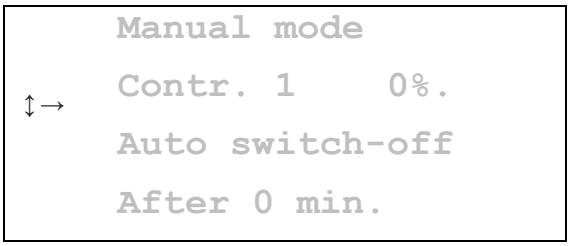
The alarm message must be confirmed by switching from **Automatic** to **Manual Operating** mode. If you set the numerical value to 0 min, the alarm message appears immediately (without delay).

8.8 Manual operating mode

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

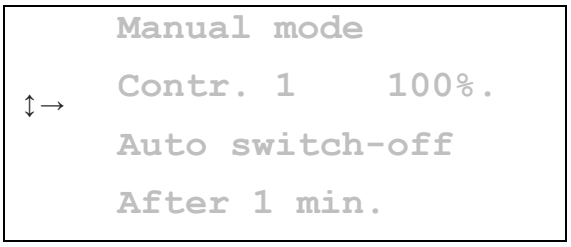
8.8.1 Manual controller mode

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



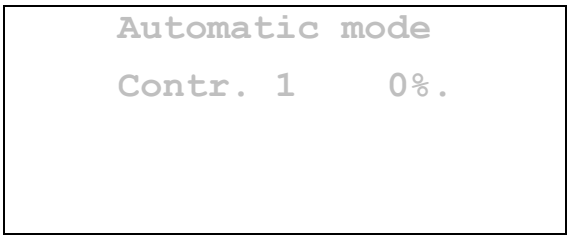
The variables managed by the controller can be set in the controller's manual settings. Each controller can be set separately. The output signal provided for the controller is managed directly, such as the relay, analog output, etc.
The preset monitoring type for the controller is used for monitoring,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

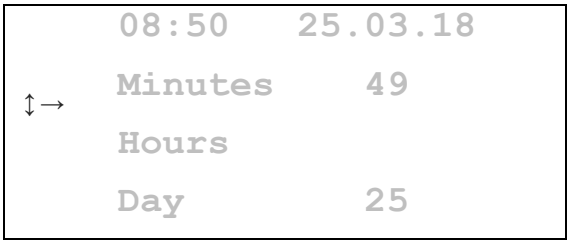
8.8.2 Automatic controller mode



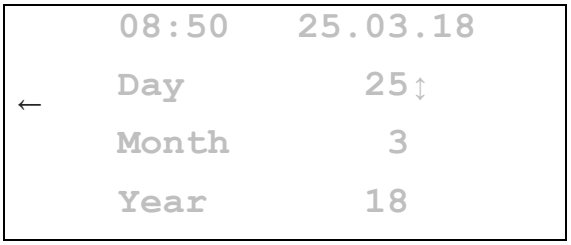
When the controller is in automatic mode, the current controlled variable.

8.9 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.

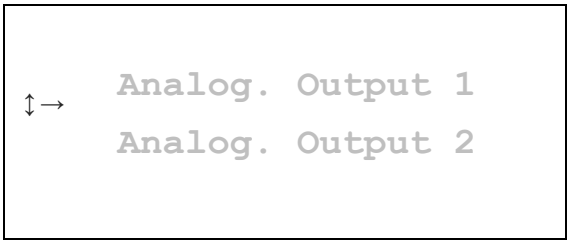


Each item can be changed to make the adjustment (minutes, hours, days, months, year).



8.10 Analog outputs

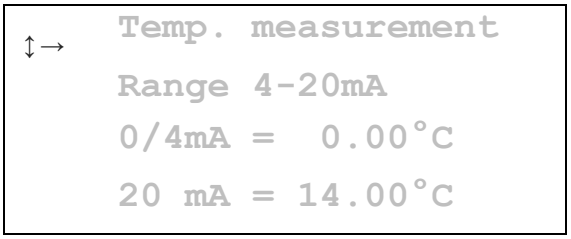
The S200 measurement and monitoring device enables all measurement values to be output as standard current signals of 0/4-20mA according to standard DIN IEC 60381-1. You can adjust the output type at this location. BASIC ADJUSTMENT has to be chosen from the main menu and then ANALOG OUTPUT.



8.10.1 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:



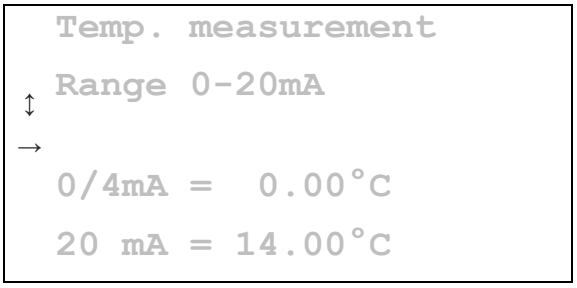
Various parameters can be assigned to analog outputs, such as temperature measurement and an accessible parameter with a digital sensor.

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

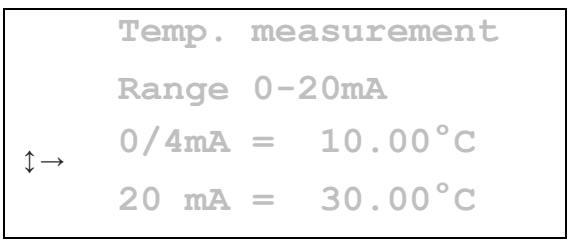
8.10.2 Definition of current active range

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

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



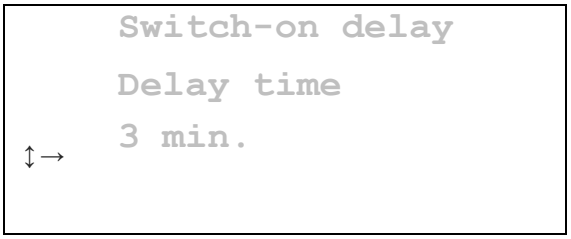
8.10.3 Setting the range



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.

8.11 Power on delay

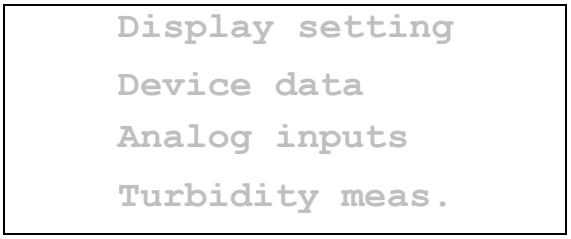
This function is accessible in the menu:
BASIC ADJUSTMENT/ SWITCH-ON DELAY



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

8.12 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.

8.12.1 Device data

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

- Serial number
- Software version
- Hardware version.

8.12.2 Analog inputs

How analog inputs operate can be checked here.

8.12.3 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.

8.12.4 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.

8.13 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.

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

Registry	Description	Unit	Range of values	Position of decimal point	R/W
0	pH measuring value	pH	-200…1,600	xx.xx	R
1	ORP measuring value	mV	-1,500/+1,500	xxxx	R
2	POT Measurement - Measurement	mg/L	0.500	xxx.x	R
3	Temperature value measurement	°C	-3,000…14,000	xxx.xx	R
4					
5	Conductivity measurement	µS mS	0 2000	Measurement range	R
6	Temperature value measurement Conductivity sensor	°C	-3000 14000	xxx.xx	R
7					
8					
9	Measurement of flowrate water	L/h	0 ±120	xxx	R
10	Active chlorine measurement	mg/l	0,500	x.xx	R
11					
12					
...					
...					
37	Digital sensor turbidity measurement	°C	-3000 14000	xxx.xx	R
38	Turbidity measurement	NTU	0 4000	Measurement range	R
...					
41	O2 digital sensor temperature measurement	°C	-3000 14000	xxx.xx	R
...					
43	O2 digital sensor measurement	%	0 2000	xxx.xx	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

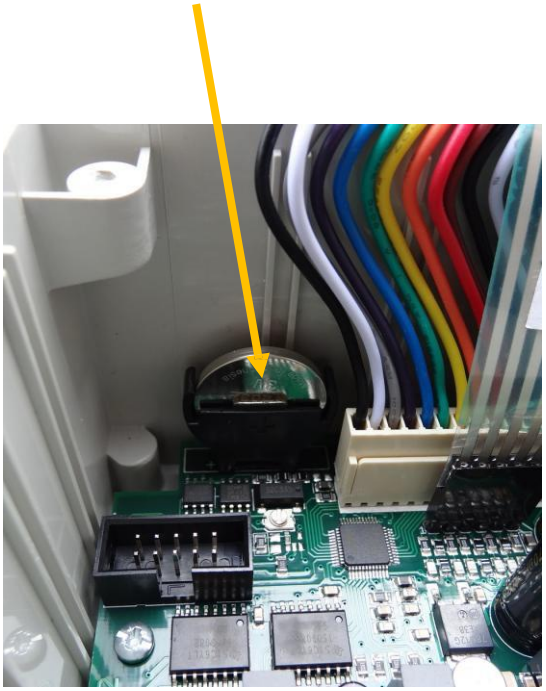
14.1 What to do in the event of a power failure

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. Redox 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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