

S200 WCS

User Manual



AQUALABO

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1 General information

1.1 General overview

This technical manual contains instructions for installing, commissioning, maintaining and repairing the S200 WCS 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 WCS 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 WCS 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 \pm 10 % (50/60Hz) 117 V/AC \pm 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

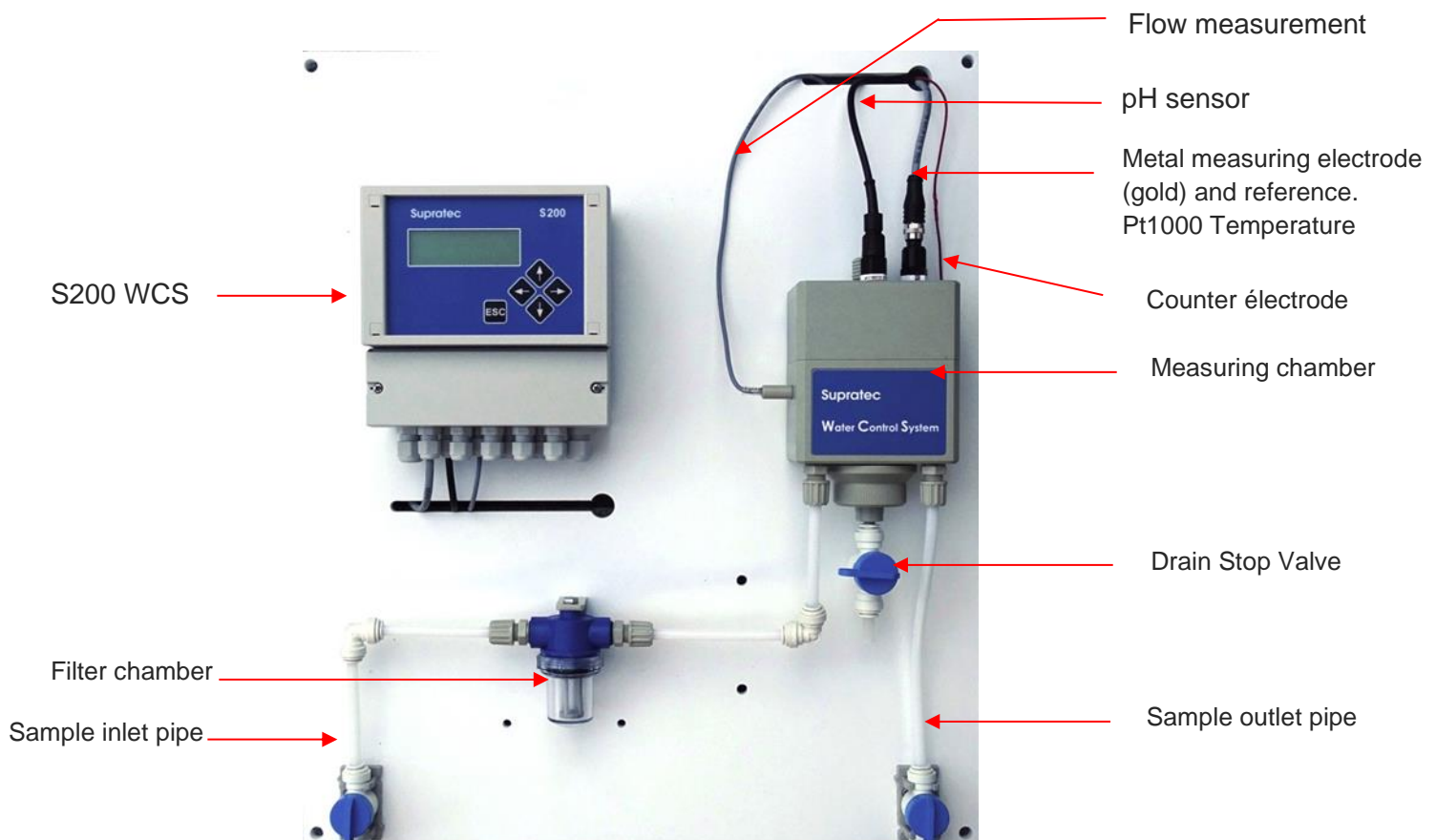
Measured variable	Measurement and control range	Resolution
pH	-2.00 pH ... 16.00 pH	0.01 mV/input resistance >5x10 ¹¹ Ω
Redox	-1500 mV ...+1500 mV	1 mV/input resistance >1x10 ⁶ Ω
Temperature	-30 °C...+140 °C	0.1 °C / PT100/ Pt1000 switchable
Current input:	0/4 mA...20 mA	0.01 mA / 50 Ω load
Chlorine (active)	0.00 mg/l... 5.00 mg/l.	0.01 mg/l.
Chlorine (total)	0.00 mg/l... 5.00 mg/l.	0.01 mg/l.
Chlorine dioxide	0.00 mg/l... 5.00 mg/l.	0.01 mg/l.
Ozone	0.000 mg/l... 1.000 mg/l.	0.001 mg/l.

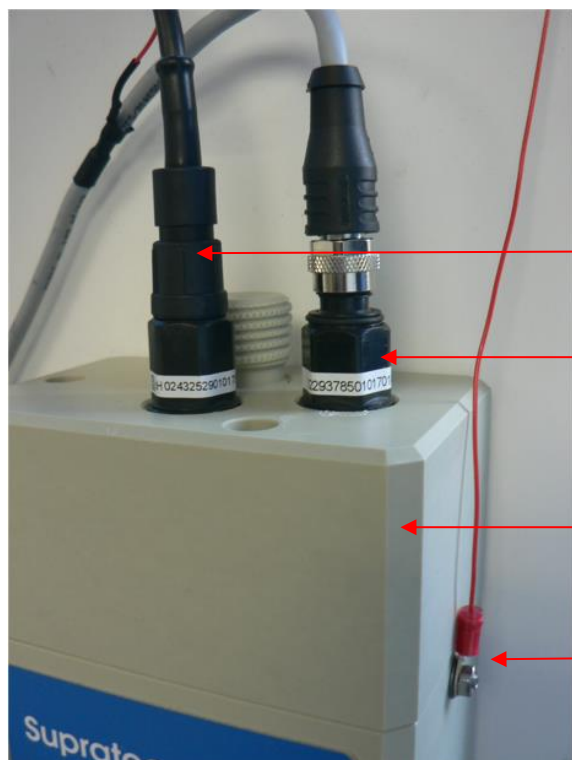
3 Description

The S200 WCS 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
- 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





pH sensor: special pH glass and reference

Metal measuring electrode (gold) and reference.

Pt1000 Temperature sensor

Measuring chamber

Counter electrode

Counter electrode

Metal measuring electrode

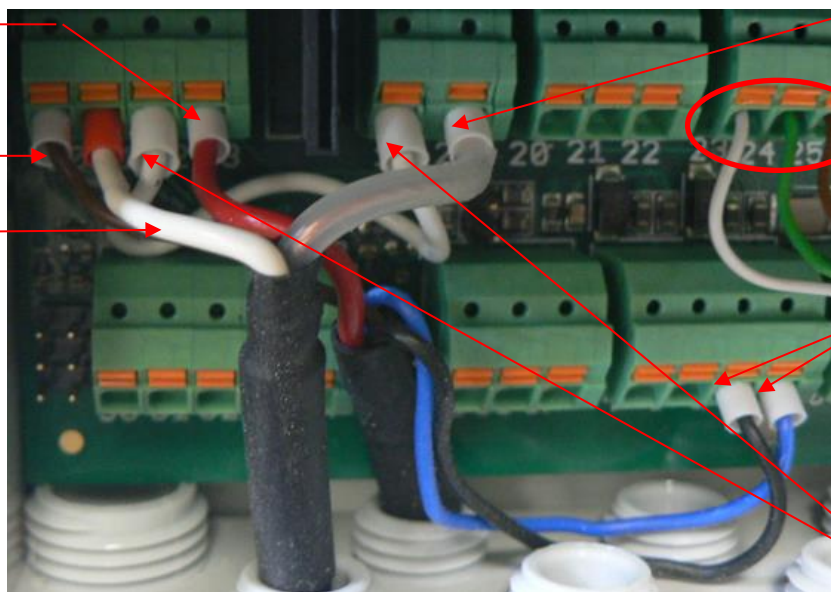
pH reference

pH glass/measure

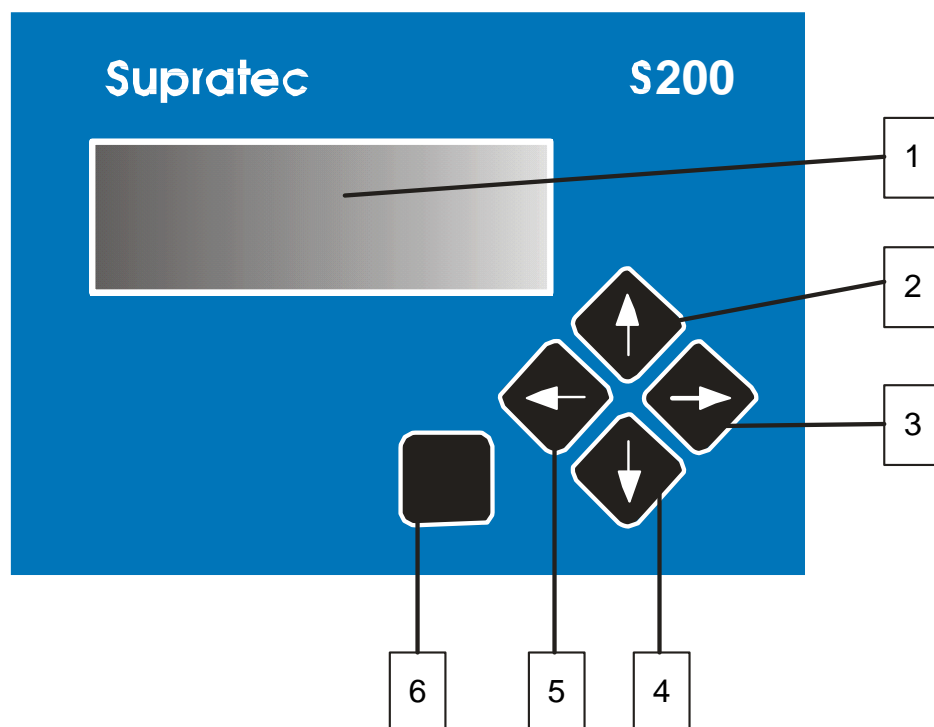
Flow

Temperature Pt1000






Reference jumper



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:

02	7.89	mg/l
pH	7.82	pH
°C	29.3	°C
↓		Man→

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:

↕→	Calibration
	Temp. Compens./
	Controller setting
	Manual mode
	Time / date
	Basic settings
	Service
	Enter the code

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/

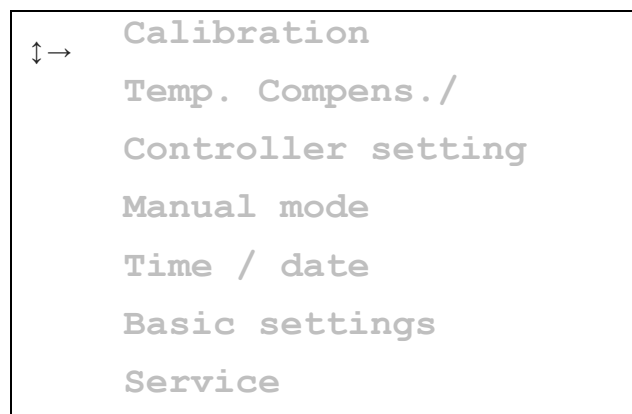
This line enables users to easily find this menu item in the device.

/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


```

Calibration
↕→ Temp. Compens./
Controller setting
Manual mode
...
  
```

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


```

↕→ Temp. Compens./
Manual Comp.
Default temp.
25.0°C
  
```

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

```

↕→ Temp. Compens./
Automat. Comp.
Default temp.
25.0°C
  
```

Use the  key to select the settings input.


```

Temp. Compens./
Automat. Comp.
Default temp.
← 25.0 ↕ °C
  
```


↑ 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:

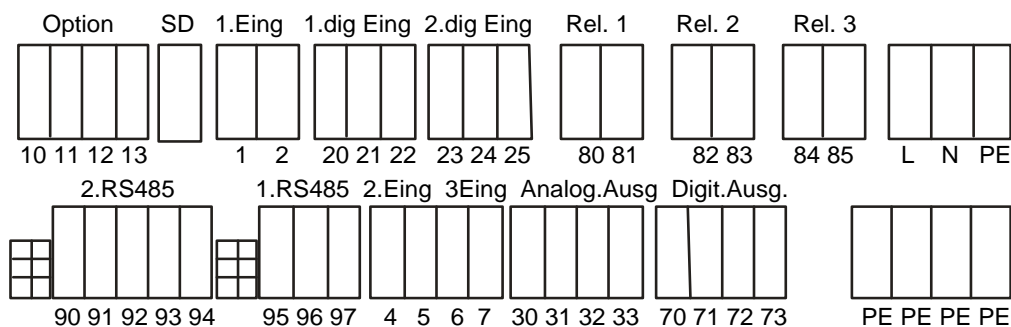
The information entered can be canceled at any time by pressing the  key.
The old value is retained.

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
	<p>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.</p> <p>Discharge static electricity from your body before working on the equipment.</p>

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 \pm 10 % (50/60 Hz)
PE distribution block	PE, PE, PE, PE	PE distributor
Analog output 1 0 / 4-20 mA max. load 500 Ω	30+31	-30/+31
Analog output 2 0 / 4-20 mA max. load 500 Ω	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

	WARNING
	<p>Risk of bodily injury: Only qualified personnel is authorized to undertake the operations of setting up the equipment on its support.</p> <p>Improper fastening = risk of equipment falling, deterioration of equipment and risk for operators.</p>

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

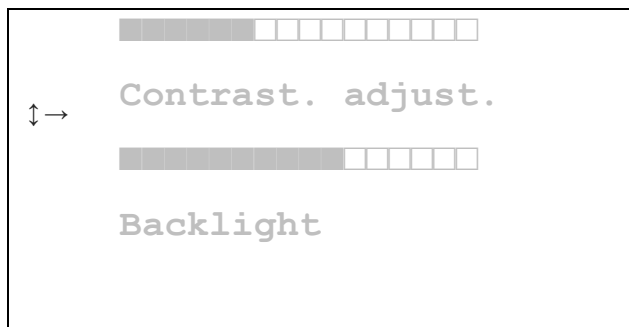
There are 3 access levels to provide access using codes that protect the device from unauthorized operation.

- 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 Flow graph bar display

The flow through the measuring cell should be set between 40 and 120 l / h. The flow rate is limited to 120 l / h in the measuring cell. S200 WCS measures the flow and compensate for the fluctuations.

Users should set the flow so that the indicator bar is in the middle.

There's an indication of flow on the screen by small black block, the flow should be between 40-120L/h (3-5 black block).

So we need to adjust the flow in order to keep 3-5 black block shown on the screen.

If the flow indicator in the display of the S200 is in the middle, then approx. 60 l / h of water will flow through the measuring cell.

If this is too much for user, then he can return the sample water with the circulation pump.

This is what many customers do when, for example, we measure in hot water.

If we generally reduce the flow, then we have too long a dead time when using a long sample water pipe.



6.4 pH sensor calibration



Terminal assignment		
Wire	Function	Connection
Shielding	Reference electrode	Terminal 1
Inner conductor	pH- electrode	Terminal 2

Reference of pH electrode: 202101SU

☛/Calibration/Calibration pH/

```

Reading  7.21 pH
Recog.  buffer sol.
          7.00 pH |
☛▶Start calibr.▶&☛
  
```

Note:

The pH probe must be checked periodically. A buffer solution is used for this. If there are deviations exceeding 0.2 pH, a calibration of the pH probe should be carried out. Two different buffer solutions with a difference of at least 2 pH are required for the calibration. pH 7 and pH 4 have become a standard for this, for example.

6.4.1 Calibration process with buffer solution for pH probe

Buffer solutions, such as pH 4. and pH 7, must be ready for the calibration.

1. If the pH probe is used for control, the S200 control must be switched off before removing the pH probe.
2. Temperature compensation - adjust according to the temperature of the buffer solution.
3. Remove the pH probe.



Note:

To remove the probe, the plug-in connection of the pH probe must be disconnected. It is important to ensure that no moisture can penetrate into the plug-in connection.

4. Dry the pH probe with a soft paper towel before calibrating it.
5. Select the menu "Calibrate pH" as shown above.
6. Immerse the probe in the first buffer solution, for example pH 7.



Note:

The probe must be immersed deep enough so that the diaphragm (small round dot on the glass shaft) is also immersed in the buffer solution.

7. The buffer solution recognized by the S200 is indicated in the display. Observe the display of the pH value until the value has stabilized.
8.  - Press and hold the key. Press  in addition to activate the calibration of the pH probe.
9. Rinse the probe with water and dry it with a soft paper towel.
10. Immerse the probe in the second buffer solution pH 4.

Note:

The probe must be immersed deep enough so that the diaphragm (small round dot on the glass shaft) is also immersed in the buffer solution.

11. The buffer solution recognized by the S200 is indicated in the display. Observe the display of the pH value until the value has stabilized.
12.  - Press and hold the key. Press  in addition to activate the calibration of the pH probe.
13. Rinse the probe with water and dry it with a soft paper towel.
14. Install the pH-probe.
Adjust the temperature compensation back to the original value.
If the control was turned off, turn it on again.

Note:

The S200 recalculates the probe of the slope and the zero point deviation after each calibration.

6.4.1.1 Interrogating the slope/zero point of the pH probe

The current slope and zero point deviation of the pH probe are displayed in the calibration menu.

6.4.1.2 Explanation slope of pH probe

A pH probe delivers a defined voltage per pH at 25°C. A new probe releases a maximum of 59.2 mV/pH at 25°C.

During operation, the slope of the probe is reduced over time. The displayed slope of the probe is only recalculated after the calibration. As soon the slope falls below 50mV/pH, the probe must not be used any longer. In case of a slope error, this error is displayed in the status display in the start menu.

Note:

It is important for the calibration process that you ensure that the temperature compensation is set to the correct buffer solution temperature.

6.4.1.3 Explanation zero point pH probe

Physically, the zero point of a new pH probe is 0 mV.

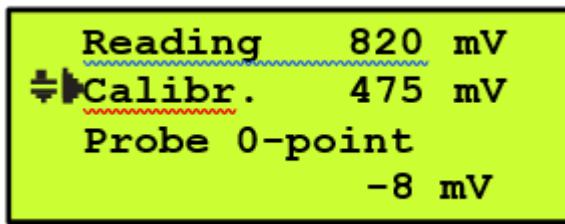
This value can vary by +/- 25mV. During operation, the zero point changes in a positive or negative direction. The zero point is recalculated during the next calibration. If the deviation of the zero point exceeds +/- 58mV, the probe must not be used any longer. In case of a zero point error, this error is displayed in the status display in the start menu.

6.5 Calibration Redox (Redox)



Terminal assignment		
Wire	Function	Connection
Shielding	Reference electrode	Terminal 4
Inner conductor	ORP electrode	Terminal 5

☛/Calibration/Calibration ORP/



Note:

The Redox (ORP) probe must be checked periodically. A buffer solution is used for this, e.g. 475 mV. If there are deviations exceeding +/- 10mV, a calibration of the Redox probe should be carried out.

This calibration is a one point calibration. To do this you need a Redox buffer solution. As standard, 475 mV has proven, for example.

6.5.1 Calibration process with buffer solution for Redox probe

The buffer solution, such as 475 mV, must be ready for the calibration.

1. If the Redox probe is used for control, the S200 control must be switched off before removing the Redox probe.
2. Remove the Redox probe.




Note:

To remove the probe, the plug-in connection of the redox probe must be disconnected. It is important to ensure that no moisture can penetrate into the plug-in connection.

3. Dry the Redox electrode with a soft paper towel before calibrating it.
4. Select the menu "Calibrate ORP" as shown above.
5. Immerse the probe in the buffer solution.

Note:

The probe must be immersed deep enough so that the diaphragm (small round dot on the glass shaft) is also immersed in the buffer solution.

6. Observe the display of the Redox (mV) value until the value has stabilized.
7.  - Press the key and select the entry function. If necessary, adjust the value of the buffer solution. Activate the calibration by pressing the  key and in addition .
8. Rinse the probe with water and dry it with a soft paper towel.
9. Reinstall the Redox probe.
If the control was turned off, turn it on again.

Note:

The S200 recalculates the zero point deviation after each calibration.

6.5.1.1 Checking the slope/zero point of the Redox probe

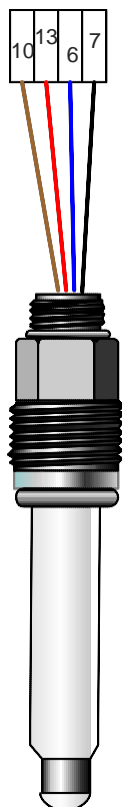
The current zero point deviation of the Redox probe is displayed in the calibration menu.

6.5.1.2 Explanation zero point Redox probe

Physically, the zero point of a new Redox probe is 0 mV.

This value can vary by +/- 25mV. During operation, the zero point changes in a positive or negative direction. The zero point is recalculated during the next calibration. If the deviation of the zero point exceeds +/- 58mV, the probe must not be used any longer. In case of a zero point error, this error is displayed in the status display in the start menu.

6.6 Calibration chlorine/chlorine dioxide/ozone (valve...)



Connection terminals Chlorine sensor		
Cable	Function	Connection
Brown	Measuring electrode	Terminal 10
Red	Counter electrode	Terminal 13
Blue	Pt 1000	Terminal 6
Black	Pt 1000	Terminal 7

Reference of Special Metal electrode: 204103SU

☛/Calibration/Calibrate chlorine/ (example: chlorine)

Reading	0.45 mg/l.
☛Calibr.	0.50 mg/l.
Slope probe	35 mV
Probe 0-point	0 mV

Note:

The chlorine/chlorine dioxide/ozone probe must be checked periodically. To check the probe, use a comparative measurement, e.g. according to the DPD method. If there are deviations exceeding +/- 0.10 mg/l, a calibration of the probe is required.

A deviation of the measuring value is possible after an automatic probe cleaning process, since the probe has been newly polarized, which can result in a temporarily higher measuring value.

If a calibration of pH or redox value is required, this calibration should be carried out first.

After pH or Redox have been calibrated, wait for at least 15 minutes before calibrating the chlorine/chlorine dioxide/ozone probe. During this time, the sample water must flow through the valve again.




This calibration is a one point calibration.

6.6.1 Calibration process when using comparison measurement

1. After flushing with about 250 ml of water, open the sampling tap on the valve and take a water sample.
2. Carry out a comparative measurement.
If the deviation is less than 0.10 mg/l, no calibration is required.

Note:

Do not carry out a calibration if the concentration is lower than 0.10 mg/l.

3. Press the key  and select the input function. If necessary, adjust the value for the comparative measurement.
4. Activate the calibration process by pressing the  key and in addition .

Note:

The S200 recalculates the slope and the zero point deviation after each calibration.

6.6.1.1 Checking the slope/zero point of the chlorine/chlorine dioxide/ozone probe

The current slope/zero point deviation of the probe is displayed in the calibration menu.

6.6.1.2 Explanation 'Slope of probe'

The slope of the probe is a theoretical value, and is within a range of 5 mV and 100 mV. The stored value is 35 mV. If the slope of the probe is outside the range, the probe should be cleaned manually.

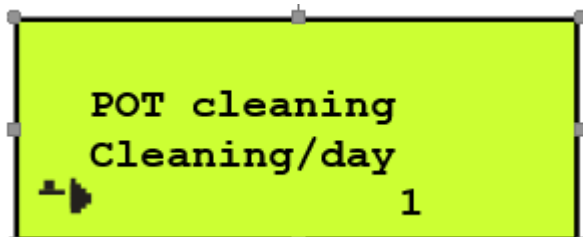
If necessary, the surface of the gold ring is to be cleaned.

6.6.1.3 Explanation 'Zero point of probe'

The zero point of the chlorine/chlorine dioxide/ozone probe is at 0 mV.

6.6.2 Automatic cleaning of the chlorine/chlorine dioxide/ozone probe

☰/Basic setting/POT cleaning



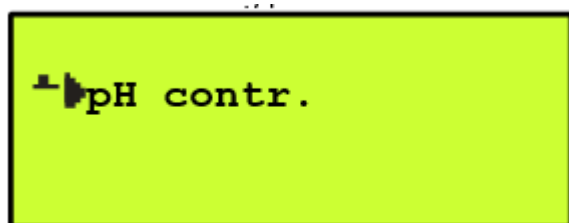
Note: When set to 0, the cleaning feature is deactivated.
A maximum 4 cleaning processes can be carried out per day.
The start of the cleaning is controlled by the internal clock.
The first cleaning/day will be carried out at 0:00.

Note:

After a cleaning was carried out, the measuring value is slightly higher due to the new polarization of the probe.

6.7 Controller settings

☰/Controller setting/pH contr./



Note:

This display is only an example. Depending on the number of the used controllers, this menu will be different.

Set point	
☰	7.30 pH
P-band	
	0.40 pH
Int. action time	
	0 sec.
Hysteresis	
	0.00 pH
Limit value max.	
	8.00 pH
Limit value min.	
	6.00 pH
Alarm delay	
	500 sec.
Dosing monitor.	
	50 min.

6.7.1 Set point settings

You can set the desired set point for the selected measurement in this menu.
Set the desired value, e.g. 7.30 pH.

6.7.2 Proportional band (P-share)

Note:

If a proportional band of 0.00 pH is set, the controller works as On-Off controller/controller without proportional action.

The setting for the proportional band determines the control range of the proportional controller. If the difference between the set point reaches the size of the proportional band, the control works with a controlled variable of 100 %.

6.7.3 Integral action time (Integral gain)

Note:

If an integral action time of 0 sec. is set, the control works as a proportional controller, provided a P-band has been set.

With the setting for the integral action time, the control rate of the PI control is set.

6.7.4 Hysteresis

If the controller is operated as On-Off controller, it is possible to use the hysteresis setting to set a default dead band around the set point.

Example:

Set point = 7.00 pH

Hysteresis = 0.50 pH

The hysteresis range of 0.50 pH is distributed evenly around the set point. The controller turns on at 6.75 pH and off at 7.25 pH.

The difference corresponds to 0.50 pH = hysteresis.

6.7.5 Limit value max./min.

With the threshold setting it is possible to monitor the maximum deviation of the actual value. When reaching the set limits, the alarm relay is activated and a corresponding message is displayed in the status display.

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

6.7.6 Alarm delay time

When reaching the set limit values, the alarm message is delayed for the set time. If you set the numerical value 0 sec., the alarm message is displayed immediately (no delay).

6.7.7 Dosing monitoring

If the metering is carried out with a capacity of 100% for a longer time than the set dosing time monitoring, the metering is interrupted and an alarm message is displayed. The alarm relay is activated and a corresponding message is displayed in the status display. This alarm message must be confirmed by switching from **Automatic** to **Manual operation**. If you set the numerical value 0 min., the alarm message is displayed immediately (no delay).

6.8 Manual operation mode

6.8.1 Manual controller mode

☐/Manual mode/

Manual mode	
☐Contr.1	0 %
Contr.2	0 %
Contr.3	0 %
Contr.4	0 %
Auto <u>switchoff</u>	
after	0 min.

The controlled variables of the controller can be set in the manual controller settings. This setting can be made for each controller separately. The output signal provided for the controller is controlled directly, e.g. relay, analog output, etc.

The control type preset for the controller is used for control, e.g. pulse frequency or pulse interval.

The adjustable time "Auto switch off" means there will be a forced switch off after the set time has elapsed. The set-controlled variable is then set to 0 %.

6.8.2 Automatic controller mode

☐/Manual mode/

Contr.1	45 %
Contr.2	15 %
Contr.3	0 %
Contr.4	0 %

When the controller is in the automatic mode, the current controlled variable for each controller can be read.

6.9 Time and date

☐/Time/Date/

11:36 28.07.15	
☐Minutes	34
Hours	11
Day	28
Month	7
Year	15

Note:

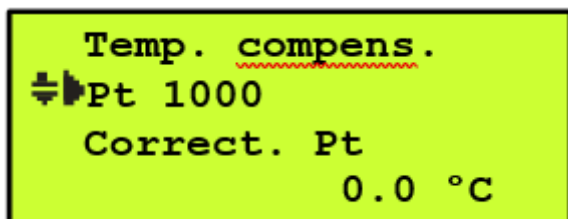
In this menu, the integrated real-time clock can be set.

6.10 Temperature compensation

In case of different measurements, the measuring signal is dependent on the temperature. The S200 measurement and control device compensates the measured values to a reference temperature of 25°C. The temperature compensation takes place automatically if a temperature sensor is used and the automatic mode for the temperature compensation is enabled.

6.10.1 Correction temperature sensor

☛/Basic settings/Correct. Pt/



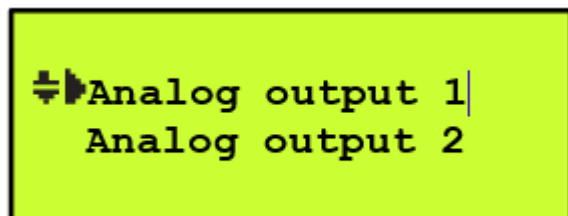
It is possible to connect different temperature sensors to the S200. You can choose between the Pt 100 and the Pt 1000.

The zero point error of the Pt 100/Pt 1000 temperature sensor can be corrected by +/- 5°C.

6.11 Analog outputs

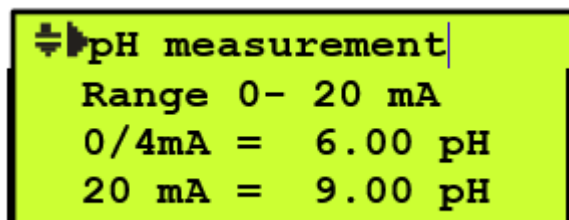
The S200 measurement and control device allows an output of all measuring values as standard current signals 0/4-20mA to DIN IEC 60381-1. You can adjust the type of output here.

☛/Basic settings/Analog outputs/



6.11.1 Assigning measured values

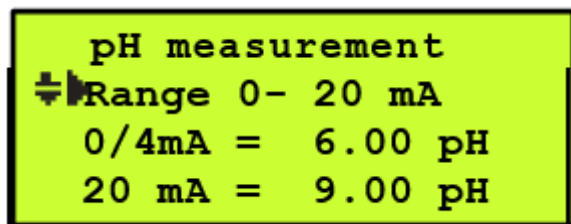
☛/Basic settings/Analog outputs/Analog output 1



It is possible to assign different parameters to the analog outputs, such as pH measurement or redox measurement, etc. If the analog output is used as a controller, the setting "No measurement" is to be selected here.

6.11.2 Current range 0/4mA

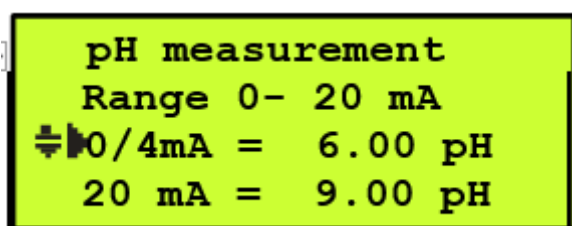
☛/Basic settings/Analog outputs/Analog output 1



A current range 0-20 mA or 4-20 mA is to be set.

6.11.3 Setting the range

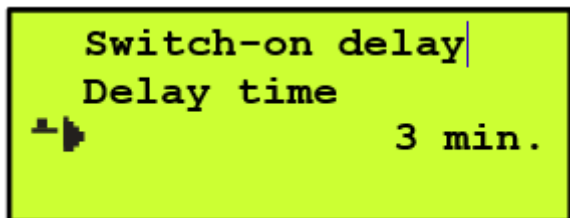
☛/Basic settings/Analog outputs/Analog output 1



Set the beginning (0/4 mA) and end (20mA) of the analog output range.

6.12 **Switch-on delay**

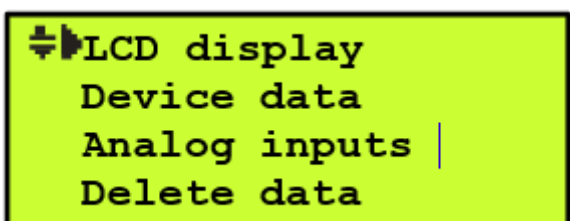
☛/Basic settings/Switch-on delay



In case of a power failure, the control is delayed for the adjustable time. Setting the delay to 0 minutes means that the delay time is deactivated.

6.13 **Service**

☛/Service/



This menu provides all important data about your device.
For the setting of the LCD display, see (7.1.)

6.13.1 Device data

You can retrieve specific data in the menu “Device data”, for example the serial number, the software version and the date of manufacture.

6.13.2 Analog inputs

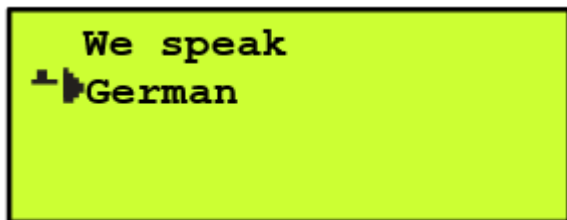
The function of the analog inputs can be checked here.

6.13.3 Delete data / Factory settings

In this menu item, you can restore the factory settings (reset).

6.14 Languages

☰/Basic settings/Language



At present (August 2015) the following languages are available:

- German
- English
- French

Other languages are in preparation.

7 Initial commissioning

7.1 Checking the hardware installation

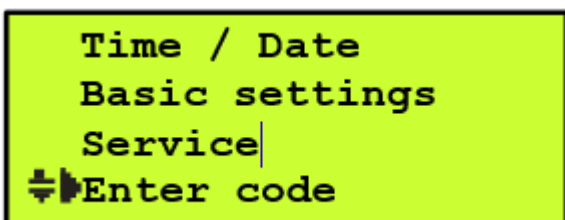
Warning:

Before connecting the supply voltage to the device, check the supply voltage against the data on the rating plate and compare these.

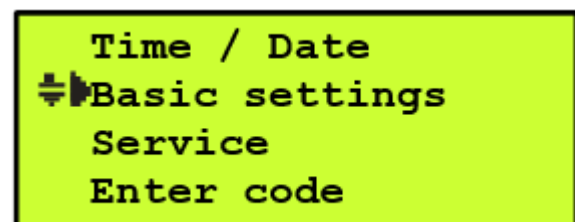
Check the wiring of the device against the wiring diagram.

7.2 Basic device settings

After switching on, select the function "Enter code". Code "Level 3" is required for the basic settings of the device.



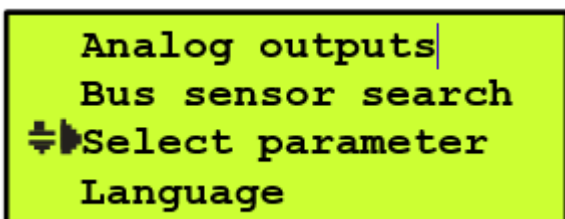
After entry of the code, select the function "Basic settings".



7.2.1 Parameters / Reading assignment

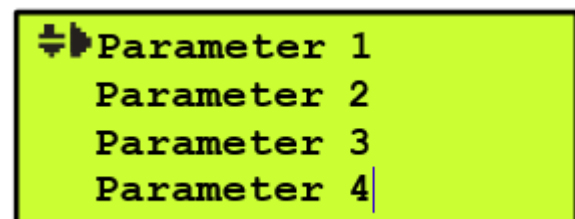
Select the function "Select parameters".


➡/Basic settings/



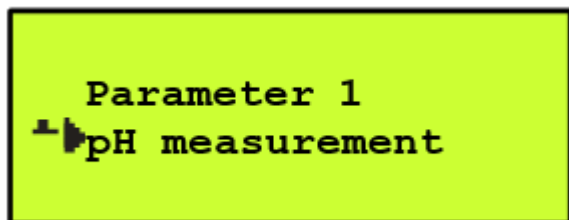
Depending on the device version (order size), up to six parameters can be selected.

➡/Basic settings/Select parameter



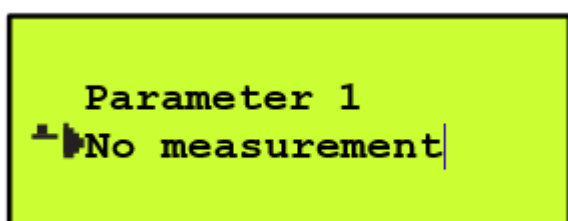
Assign the required reading to parameter 1, e.g. pH measurement or temperature.
Use the  key to select the desired reading assignment.

▼/Basic settings/Select parameter/Parameter 1/

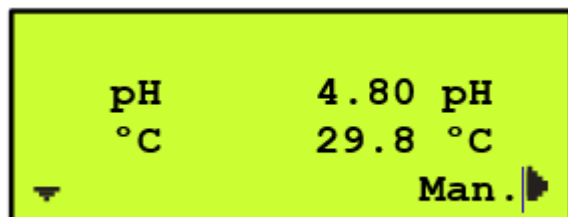


If a parameter is not to be used, select "No measurement".

▼/Basic settings/Select parameter/Parameter 1/



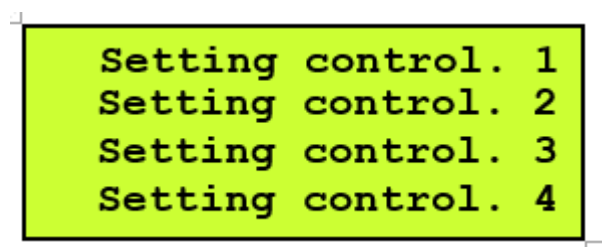
According to the number of selected parameters, what is indicated in the display will be different, for example two parameters (pH and temperature).



7.2.2 Controller reading assignment

Depending on the degree of expansion, up to four separate controllers can be assigned to the different readings.

▼/Basic settings/Control param./




E.g. select "Setting contr. 1"

☛/Basic settings/Control param./Setting control.1/

```

Controller 1|
☛pH measurement
Control direction
Reduce
    
```

Use the  key to select the desired measuring value allocation.
If a parameter is not used, select the reading assignment "No measurement"..
For additional control settings, see chapter "Controller settings".

7.2.3 Direction of control action

☛/Basic settings/Control param./Setting control.1/

```

Controller 1
pH measurement
Control direction
☛Reduce
    
```

The direction of the controller action is determined with the setting "Control direction". For example, "Reduce" means that the controller is running when the reading exceeds the adjusted set point. As a result, the reading is going down (lower value).


7.2.4 Assignment of the control output

The output signal of the controller can be assigned to various actuators (relays, etc.).

☛/Basic settings/Control param./Setting control.1/

```

Control direction
Reduce
Controller output|
☛Relay 1
    
```

The output signal of the controller is assigned with the  key, e.g. relay 1, relay 2, digital output 1, digital output 2, analog output 1 or analog output 2.

7.2.5 Pulse frequency

☛/Basic settings/Control param./Setting control.1/

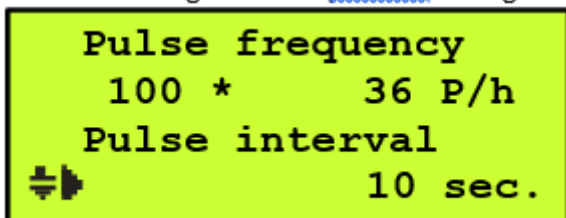
```

Controller output
Relay 1
Pulse frequency
☛ 100 *      36 P/h
    
```

The controller output is switched to pulse frequency via the pulse frequency setting. A setting of 0 p/h switches the controller to pulse interval controller. The numerical value, e.g. 36 p/h, means that 3600 pulses/hour are released at 100% dosing capacity.

7.2.6 Pulse interval control

☛/Basic settings/Control param./Setting control.1/



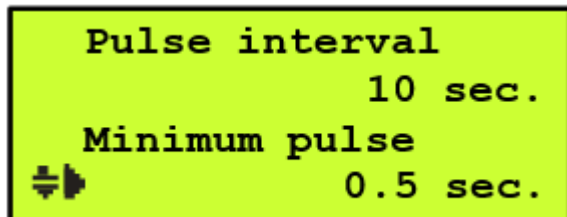
With the setting of the pulse interval time, the total pulse interval time is determined. Given a controlled variable of 50%, this means pulse and interval time are of equal length if the value is set to 10 sec. In this case, it would be 5 seconds.

A controlled variable of 0% means that there is no pulse.

A controlled variable of 100% means that there is no interval.

7.2.7 Minimum pulse

☛/Basic settings/Control param./Setting control.1/



The setting “Minimum pulse” determines the smallest pulse width for a pulse interval controller. This is in particular important for larger actuators, as short pulses cannot be processed.

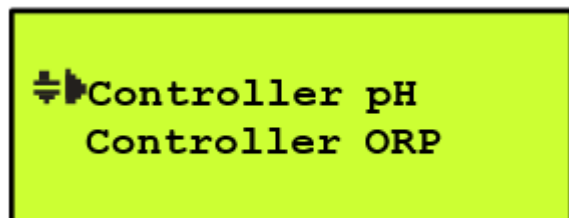
Note:


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

7.2.8 Setting of control parameters

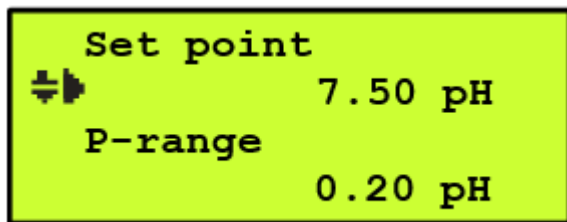
Select the function “Controller setting” in the main menu.

☛/Controller setting/



Use the  key to select the desired controller setting.

☛/Controller setting/Setting control.1/



The complete setting of the controller is described in the chapter "Controller settings".

7.2.9 Calibration of probes

Finally, the connected probes are to be calibrated according to the calibration instructions. Please continue reading under section (6.4).

8 Maintenance and servicing

The housing may only be wiped with a damp cloth; the use of sharp, caustic or abrasive cleaning agents (acid cleaners, lyes, etc.) is not permitted!

The S200 measuring and control device is easy to maintain, but should be checked and serviced by a trained technician at regular intervals.

Please contact us if you have any further questions regarding our measuring, control and dosing system.

8.1 Cleaning and calibrating the probes

Depending on the water quality, the probes must be cleaned at intervals of 1 to 6 months (or earlier, if required). A recalibration is required depending on the type of probe.

Warning:

Deactivate the dosing function before removing the probes.

9 Alarm messages

9.1 List of error messages

Alarm message	Cause	Activity	Remedy
Slope of pH probe	pH measurement Slope of probe < 50mV	Controller function remains active, faulty calibration value is accepted	Recalibrate or replace the probe
Error zero point pH	pH measurement Zero point deviation > ±58mV	Controller function remains active, faulty calibration value is accepted	Recalibrate or replace the probe
Zero point error ORP	Redox measurement: Zero point deviation > ±58mV	Controller function remains active, faulty calibration value is accepted	Recalibrate or replace the probe
Limit value controller 1	Upper or lower limit value of controller 1 has been exceeded/fallen short of	Alarm relay switches	Check the measurement and control
Limit value controller 2	Upper or lower limit value of controller 2 has been exceeded/fallen short of	Alarm relay switches	Check the measurement and control
Limit value controller 3	Upper or lower limit value of controller 3 has been exceeded/fallen short of	Alarm relay switches	Check the measurement and control
Limit value controller 4	Upper or lower limit value of controller 4 has been exceeded/fallen short of	Alarm relay switches	Check the measurement and control
Dosing monitoring controller 1	Controller 1 has worked with 100% control value for a time exceeding the set dosing monitoring time.	Controller 1 is turned off, and the alarm relay switches	Check measurement and control; confirm the error message by briefly switching to the manual mode.
Dosing monitoring controller 2	Controller 2 has worked with 100% control value for a time exceeding the set dosing monitoring time.	Controller 2 is turned off, and the alarm relay switches	"
Dosing monitoring controller 3	Controller 3 has worked with 100% control value for a time exceeding the set dosing monitoring time..	Controller 3 is turned off, and the alarm relay switches	"
Dosing monitoring controller 4	Controller 4 has worked with 100% control value for a time exceeding the set dosing monitoring time.	Controller 4 is turned off, and the alarm relay switches	"
Switch-on delay	Switching the power supply of the S200 on	Switching on of the controller will be delayed by the adjustable delay time	
External controller stop	Digital input 1 terminal 21/22 is switched	The controller is stopped	If digital input 1 is not switched, the controller will work again

10 MODBUS RTU

The S200 measuring and control device is equipped with a Modbus RTU interface.
The hardware is a RS 485 interface.

Shielding = terminal 97

A = + Terminal 96

B = - Terminal 95

10.1 Shielding

The use of shielded cables offers a high protection against electromagnetic interference, especially against high frequencies. However, the effectiveness of the shielding is dependent on a careful installation of the cable.

The shielding is placed near the ModBus master.

10.2 Communication parameters

Baud rate: 9600 bps

Data bits: 8

Start bits: 1

Stop bits: 1

Parity: no

10.3 Used MODBUS functions

The following MODBUS functions are used:

- 04 (0x04) Read Input Registers – reading of max. 40 register
- 06 (0x06) Write Single Register – writing 1 register

10.4 List of Modbus register S200

Register	Description	Unit	Value range	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
9	Measuring flow measuring water	L/h	0 - 120	xxx	R
10	Measuring active chlorine	mg/L	0... 500	x.xx	R

Note:

To read register 0 (measured value pH), the MODBUS register 30001 must be selected. The MODBUS address is shifted by +1 at a time.

11 Sensor – Actuator Bus (MODBUS RTU)

The S200 measuring and control device is equipped with a sensor - actuator bus.

The MODBUS RTU protocol is used.

The hardware is a 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 the 12V power supply.

11.1 Shielding

The use of shielded cables offers a high protection against electromagnetic interference, especially against high frequencies. However, the effectiveness of the shielding is dependent on a careful installation of the cable.

The shielding is placed near the ModBus master.

11.2 Communication parameters

Baud rate:	9600 bps
Data bits:	8
Start bits:	1
Stop bits:	1
Parity:	no

12 Annex

12.1 What to do in case of a power failure

In case of a power failure, the unit maintains the last operating state. Once the power is restored, the device continues to work with all previous settings.

12.2 Battery

The **S200** measuring and control device has a battery so that the internal clock keeps running if no voltage is connected. The battery must be replaced if, for example, the time or date changes suddenly (lithium CR 2032).

View on board, housing cover open



13 Electrical connection

No.	Terminal	Function
L	L	Power input (see nameplate) <i>Warning:</i> The voltage specified on the nameplate must be observed.
N	N	
PE	PE	
PE	PE	Terminal block PE
PE	PE	
PE	PE	
PE	PE	
1		Measuring input 1, e.g. measurement pH
2	+	
4		Measuring input 2, e.g. measurement redox or 0/4-20 mA with internal jumper
5	+	
6		Connection temperature sensor Pt 100 or Pt 1000
7	+	
10		Connection extension module Please refer to the module description for details about the assignment.
11		
12		
13		
20	+ 12V	Digital input 1 - pulse input or switch input Contact closed = controller stop
21		
22		
23	+ 12V	Digital input 2 - pulse input or switch input
24		
25		
30		Analog output 1 0/4....20 mA (load 500Ω)
31	+	
32		Analog output 2 0/4....20 mA (load 500Ω)
33	+	
70		Digital output 1 max. 200mA / 30V e.g. for control of a diaphragm metering pump
71		
72		Digital output 2 max. 200mA / 30V e.g. for control of a diaphragm metering pump
73		

14 Hotline-Aftersales Service contact details

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