



# pH Sensor XR1

## Manual



## Type

<b>Name of product:</b>	SENECT® pH Sensor XR1
<b>Type:</b>	PH-410-XR1-SC
<b>Art.-No.:</b>	2200
<b>Producer:</b>	SENECT GmbH & Co. KG An 44 – No. 11 76829 Landau / Germany

### **Important note:**

Please read this manual carefully and store it so that you can use it later. Read the warning and safety notes attentive.

Further information and latest software releases or documents can be downloaded from:

[www.senect.de](http://www.senect.de)

© SENECT GmbH & Co. KG - FW00.90

## Table of contents

Type .....	2
Table of contents .....	3
Used symbols and wording .....	4
General Security Notes .....	5
Intended use .....	6
Getting started .....	7
Scope of delivery .....	7
Installation and start-up .....	7
Maintenance and cleaning .....	9
Cleaning .....	9
Maintenance .....	10
Lifetime .....	11
Calibration .....	12
Calculating CO <sub>2</sub> .....	14
Technical data .....	17
Information about the correct disposal .....	18
Guarantee .....	19

## Used symbols and wording

	<p><b><i>DANGER!</i></b> Warning of life threatening dangers.</p> <p><b><i>WARNING!</i></b> Warning of possible life threatening and / or severe irreversible injuries.</p> <p><b><i>ATTENTION!</i></b> Warning of possible medium or slight injury.</p>
	<p><b><i>ATTENTION!</i></b> Follow the notes to avoid damage of equipment.</p>
	<p><b><i>NOTE!</i></b> Further information for the use of the device.</p>
	<p><b><i>NOTE!</i></b> Further information for the use of the device.</p>

## General Security Notes

The pH Sensor XR1 is an electronic unit for the measurement of the pH value of water and must be used in combination with SENECT control units.

Since it is an electronic product the common prerequisites for a safe instrument usage must be fulfilled. The



corresponding control unit must be operated with 230 V AC (~50 Hz). Ensure that all cables are installed safely so that no obstacles for persons are built and all. Mount all cables and electric devices protected against direct environmental impacts like overheating by direct sunlight and water.



Even if the products are protected against spray water, the product's lifetime will be elongated, if it is mounted on a protected place. The pH Sensor XR1 uses 24 V DC supply voltage which is therefore not of danger for persons.

For many applications a ground fault circuit interrupter (interrupting current  $\leq 30$  mA) is required by law. Inform yourself about the valid legislation.

The operating temperature of the device must be between 0°C and +40°C. It is not allowed to modify the sensor, to open the housing or to insert anything into the housing.

The pH Sensor XR1 is designed to be operated by professional users. However, it can be operated by children of the age of at least 8 years and persons with limited physical, sensorial or cognitive ability, if they are supervised and trained in the usage of the instrument, so that no dangers or threats can result of the operation.

Please store this manual. We suggest the storage a copy of the manual in the vicinity of the device.

Technical and optical changes of this manual are subject to alterations.



**Warning:** Before starting any maintenance work, unplug all electrical devices in the water.

## Intended use

With the pH Sensor XR1, the pH value of water can be determined in the range between pH 4 and pH 10 at a temperature ranging from 0°C to +40°C. The resolution of the sensor signal is 0.01 pH units. The pH Sensor XR1 must be used in combination with SENECT control units.

The pH Sensor XR1 is designed for the use in industrial aquaculture facilities.

## Getting started

### Scope of delivery

- 1 x pH Sensor XR1 Electronic interface
- 1 x pH Sensor XR1 Electrode
- 1 x pH Calibration-set (pH 4 and pH 10)
- 1 x Manual

### Note



Please check directly after delivery, that the package is not destroyed or damaged or was opened before. Please check also, that all parts as listed above are included. If anything is missing or broken, please contact us as soon as possible within 14 days. Unfortunately, we cannot accept later information of damage, which happened during the transport.

### Installation and start-up



Choose a place for the electronic interface of the XR1 which is clean, dry and protected from direct sunlight. Ensure that all cables are placed safely and all regulations are fulfilled.

1. Connect the cable of the electrode with the electronic sensor interface (BNC-plug).
2. Connect the blue marked plug of the cable with your control unit at one of the sensor input ports. Your SENECT control unit will automatically recognize the sensor and starts the measurement.
3. Remove the cap of the electrode and rinse it with tap water.
4. Pour a small amount of the calibration solution in another vessel and dip the sensor tip into the solution and move it gently.

If the pH value displayed with your control unit is close to the value of the calibration solution ( $\pm 0,1$  pH-units), you can directly install the electrode. If the deviation is larger, please calibrate the sensor (see chapter calibration)

5. Mount the electrode at the measurement location. The electrode shaft including the active glass tip must be submerged and placed into the water flow. The electrode must be mounted vertical (angle  $> 80^\circ$ ).

For the mounting of the electrode, flow through measurements cells can be used. If the electrode shall be placed at an open water surface, it can be mounted on a buoy e.g. made of Styrofoam. Please consider here, that the

electrode must be in a place with low to moderate currents to deliver correct measurement results. If the current is too large ( $> 50 \text{ cm / s}$ ) the measurements are likely to be disturbed.

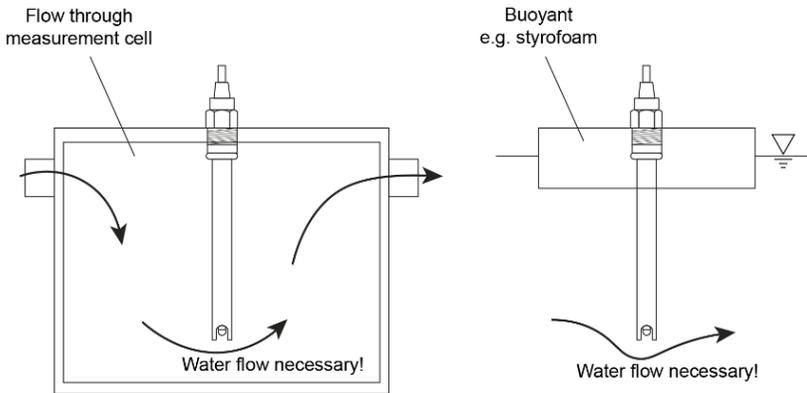


Fig. 1: Mounting possibilities for the electrode.

## Maintenance and cleaning

The pH electrode must never run dry – not during the usage and storage. At deliver, a silicone cap filled with 3 M KCL solution is on the electrode. If you do not use the electrode, put the filled cap on.

### Cleaning



The active glass part of the electrode must not be cleaned with abrasive or aggressive cleaning

agents (e.g. scouring milk). Scratches on the glass part can damage the electrode.

However, dirt on the glass must be removed. Use therefore a water-dipped soft paper towel and rinse the electrode with clean water. If the contamination cannot be removed, you can use the following cleaning agents:

For chalk or metalhydroxide coatings:	Diluted hypochloric acid (1-3%)
For fatty or oily contamination:	Organic solvents (e.g. ethanol) or tenside containing solvents (e.g. dishwashing agents)
For protein contamination:	Pepsin in diluted hypochlorid acid

### Maintenance



Under normal conditions (clean water, stable and not extreme pH values), a check every 14 days is recommended, and if necessary a new calibration must be performed.

Since the electrode loses its salts with usage, the signal may drift with time so that you should clean the electrode and calibration it again.

### Lifetime

All pH electrodes have a limited lifetime. A specific lifetime cannot be determined since it depends on the environmental conditions during the use e.g. temperature, pH, etc. This may range from days to years. Therefore, we cannot publish respectable lifetime estimates.



The storage of the electrodes should be in a dry room between  $-5$  and  $+30^{\circ}\text{C}$  and not last longer than 6 months. The electrode must be stored in 3 M KCl solution. If the electrode felt dry, it may be reactivated by storing it 24 h in 3 M KCl solution.



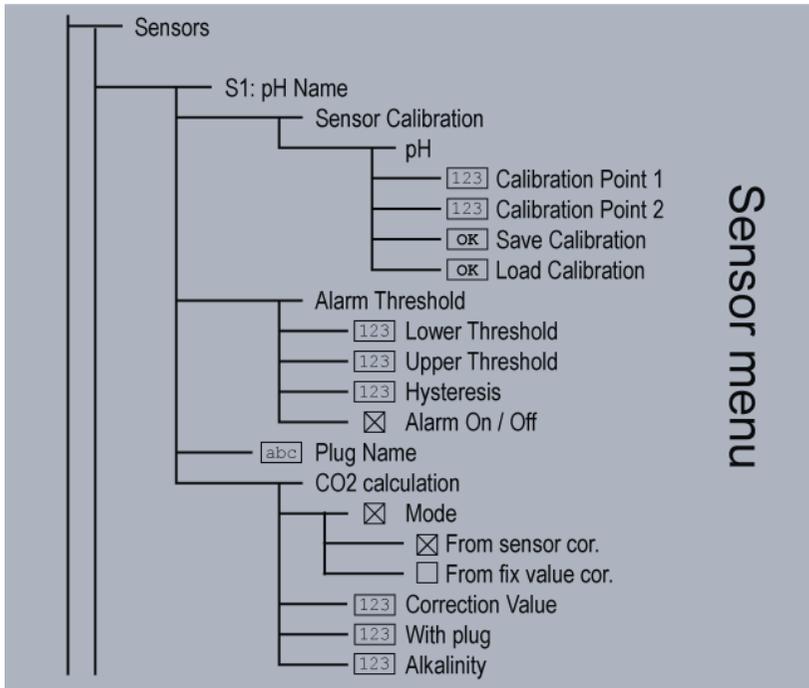
Avoid the contact to inorganic cleaning agents like acetone or chloroform. This may damage the membrane. Steam disinfection can also damage the sensor.

Depending on the used firmware of your control unit, the menu can change. Please refer therefore to the current manual which can be found on [www.senect.de](http://www.senect.de).



Calibration

1. Rinse the electrode under clean tap water and dip the electrode into a vessel containing the pH 4 calibration solution.
2. Choose in the menu of your control unit the pH sensor (**Sensors / Sx: pH**) and select **“Sensor Calibration / pH / Calibration Point 1”**.



3. Select the pH value of your calibration solution (here: pH = 4.00) and stir the electrode gently until the displayed raw signal value (in digits) is nearly constant. If it is constant validate this calibration point by pressing **OK**. Alternatively, the control units confirms this calibration point automatically after 120 s.

Tip: In case you work with another calibration solution, you can change the pH value by using the cursor keys.

4. Rinse the electrode with tap water again and dip it into a vessel containing the pH 10 calibration solution. Select in the menu „**Sensor calibration / pH / Calibration Point 2**“ and wait until the displayed value is stabilized. Then press **OK** or wait 120 s.
5. If the calibration worked select „**Save calibration**“.

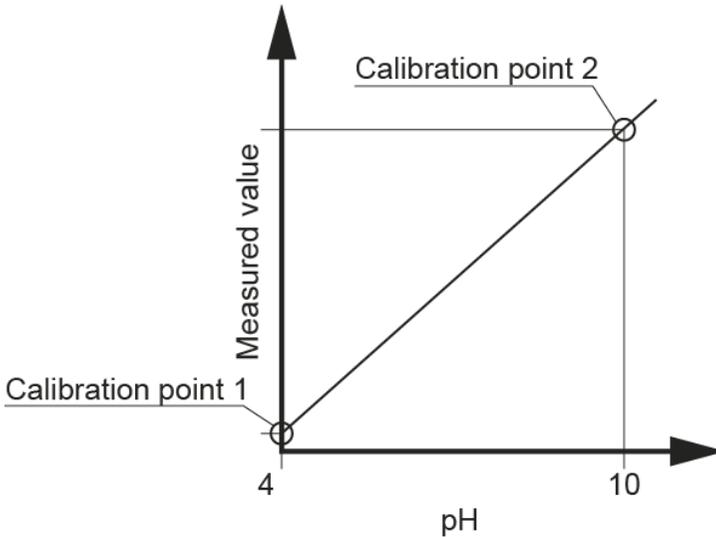


Fig. 1: Calibration curve with two calibration point.

**Tipp:** It is also possible to load old calibrations. There you can also see the calibration coefficients.

*The calibration should be carried out at the same temperature like in the measured water.*



## Calculating CO<sub>2</sub>

Based on the chemical equilibrium reaction between alkalinity, carbon dioxide (CO<sub>2</sub>) and temperature, it is possible to calculate one of the parameters, if the other two

are known. The two most fluctuating parameters of this equation can be measured easily with SENECT sensors, while the alkalinity changes over longer periods and must be determined with other methods, e.g. photometrically determined.

To use the CO<sub>2</sub>-calculation, you need to set it up correctly.

1. Select the **mode**:

If you have a temperature sensor (or any other SENECT sensor with temperature, e.g. the oxygen sensor O2S) select **“From sensor value”**. Then the temperature value for the calculation of the carbon dioxide concentration is based on actual temperature measurements.

Select under **“With plug”** the plug, where the temperature sensor is plugged in.

In case you do not have a temperature sensor, you can select **“From fix value”** and insert under **“Correction Value”** the temperature, which will be used for the calculation.

2. Insert the alkalinity

Select **“Alkalinity”** and insert here the alkalinity value of your water in mg / l. Alternatively, you will see automatically the degree of hardness in °dH.

The calculation of the carbon dioxide is based on the following publication:

Wurts, W. A. and Durborow, R.M.: *“Interactions between pH, Carbon Dioxide, Alkalinity and Hardness in Fish Ponds”*, SARC Publication No. 464, 1992

## Technical data

Dimensions electrode:	Ø 12 mm, length: 120 mm
Cable length interface:	5 m
Cable length electrode:	1 m
Voltage:	24 V DC
Power consumption:	<< 1 W
Temperature range:	0° to 40 °C
Max. pressure:	6 bar
Range:	pH 4 to pH 10
Precision:	< 2% FS
Response time:	T <sub>90</sub> < 30s
Ingress protection:	IP68 (electrode)

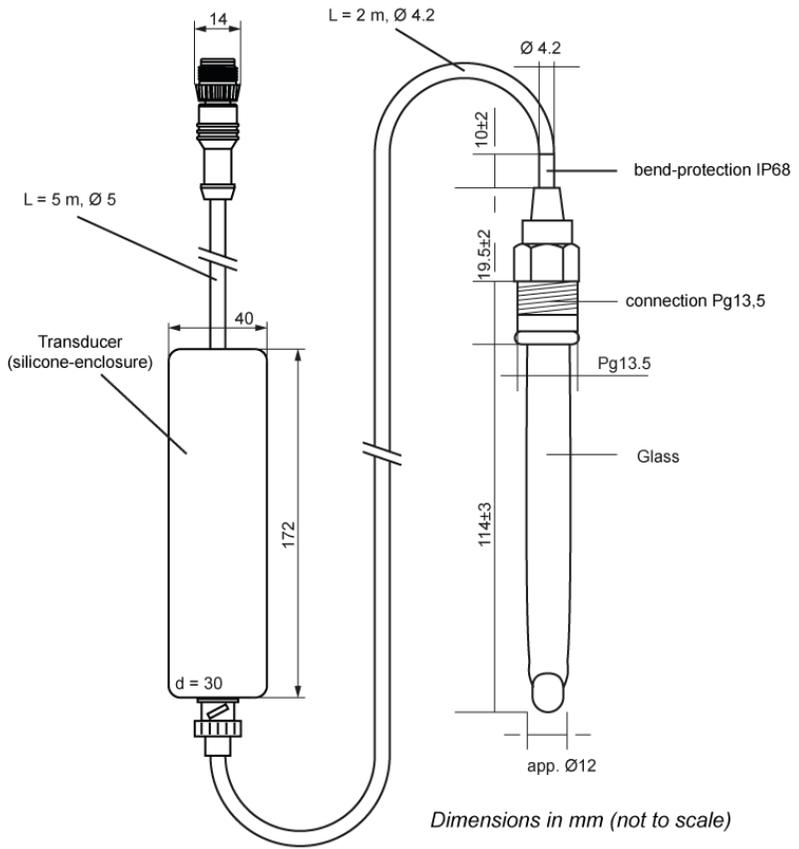


Fig. 2: Sketch of the pH Sensor XR1.

## Information about the correct disposal



Your device is well packed at delivery. Please dispose the packaging material accordingly to the regulations in your country.

Do not throw the product in the casual litter bin. Make sure you are informed about the local disposal regulations and dispose your product accordingly. Alternatively, you can also send the product back to the producer.

The SENECT GmbH & Co. KG is member of the Stiftung Elektro-Altgeräte Register and the products are registered (WEEE-Reg.-Nr.: DE37193510).

## Guarantee



Please check at delivery of your device, that all parts are delivered completely and that they function correctly. In case of any claims, contact us immediately per email or phone ([info@senect.de](mailto:info@senect.de) or +49-6341 - 95 95 210). Please describe your claim as detailed as possible so that we can provide a solution as fast as possible. The product has a guarantee of 1 year and a warranty of 2 years. Furthermore, the § 377 HBG (German law) is valid.