

7 NEX



pH - Cond - PC

INSTRUCTION MANUAL

NEX

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1. Introduction

XS Instruments, globally recognized as a leading brand in the field of electrochemical measurements, has developed this new line of portable instruments, manufactured entirely in Italy, finding the perfect balance between performance, attractive design, and ease of use.

The robustness and integrity of the case, the compact dimensions that allow for one-handed use, and the practical carrying case make this instrument ideal for measurements directly in the field.

The innovative high-definition graphic display shows all necessary information, such as the measurement, temperature, buffers used for the last calibration, and stability status, to offer the user an exceptional measurement experience.

Anyone can use these instruments thanks to the instructions that appear directly on the display. Calibration is guided step-by-step, and the instrument's configuration menu is intuitive and easy to navigate. In low-light conditions, the full-screen measurement display can be activated.

pH calibrations of up to 3 points can be performed using the USA and NIST buffer series. It is also possible to use user-defined values. To facilitate reading the pH value, three different signal stability levels can be selected, or the HOLD function can be activated, which locks the measurement when the signal is sufficiently stable.

It is also possible to perform a guided calibration using a pH simulator.

Using the ORP parameter, you can adjust the offset of a redox sensor using a known standard value.

The instrument automatically recognizes 5 conductivity standard solutions, and one can be entered manually.

A total of 100 values can be saved in the instrument's non-volatile memory.

The ideal solution for an accurate and precise measurement is to use an *XS Instruments* device with an electrochemical sensor from the extensive *XS Sensor* range and to perform calibrations using certified *XS Solution* calibration solutions.

2. Safety Information

Definitions of Warning Words and Symbols

The safety information contained in this manual is of the utmost importance to prevent personal injury, damage to the instrument, malfunctions, or incorrect results due to failure to comply with it. Read this manual carefully in its entirety and ensure you are familiar with the instrument before putting it into operation and beginning to work with it. This manual must be kept near the instrument so that the operator can consult it when necessary. Safety instructions are indicated by warning symbols:

**Warning**

This symbol indicates a potential risk and warns you to proceed with caution

**Warning**

This symbol draws attention to a potential hazard **due to electric current**.

**Caution**

The instrument must be used in accordance with the instructions in the user manual. Read the instructions carefully.

**Notice**

This symbol draws attention to possible damage to the instrument or individual instrument parts.

**Notes**

This symbol highlights further information and tips.

Additional documents providing safety information

The following documents can provide the operator with additional information to work with the measuring system safely:

- operating manual for electrochemical sensors;
- safety data sheets for buffer solutions and other maintenance solutions (e.g. storage solution);
- specific product safety notes.



Intended use

This instrument is designed exclusively for electrochemical measurements, both in the laboratory and directly in the field. Pay special attention to the technical specifications listed in the INSTRUMENT SPECIFICATIONS / TECHNICAL DATA table; any other use outside these specifications is to be considered unauthorized.

This instrument has been manufactured and tested in accordance with EN 61010-1 safety standards for electronic instruments and left the factory in perfect technical and safety condition (see the test report included in each package). The proper functioning of the device and the safety of the operator are guaranteed only if all standard laboratory safety regulations are respected and if all the specific safety measures described in this manual are followed.

Essential requirements for safe use

The proper functioning of the device and the safety of the operator are guaranteed only if all the following instructions are followed:

- the instrument may only be used in accordance with the specifications mentioned above;
- the instrument must be operated exclusively under the environmental conditions specified in this manual;
- the only part of the instrument that can be opened by the user is the battery compartment.

Do not carry out any other operations unless explicitly authorised by the manufacturer.



Unauthorised use

The instrument must not run if:

- it is visibly damaged (e.g. due to transportation);
- it has been stored for a long period of time under adverse conditions (exposure to direct light, heat sources or environments saturated with gases or vapours) or in environments with conditions different from those mentioned in this manual.



Maintenance of the device

When used correctly and in a suitable environment, the instrument does not require any special maintenance procedures. It is recommended to occasionally clean the instrument case with a damp cloth and a mild detergent. This operation must be carried out with the instrument switched off, and only by qualified and authorised personnel. The housing is made of ABS/PC (acrylonitrile butadiene styrene/polycarbonate). This material is sensitive to certain organic solvents, such as toluene, xylene and methyl ethyl ketone (MEK).



If liquids enter the housing, they could damage the instrument. If the device is not to be used for an extended period, cover the BNC connectors with the protective cap provided. Do not open the instrument housing: it contains no parts that can be maintained, repaired or replaced by the user. If you experience any problems with the instrument, please contact your local distributor. We recommend using only original spare parts. Contact your local distributor for further information. The use of non-original spare parts may lead to malfunction or permanent damage to the instrument. Furthermore, the use of spare parts not guaranteed by the supplier may be dangerous for the user. For the maintenance of electrochemical sensors, please refer to the documentation included in their packaging or contact the supplier.

Responsibilities of the instrument owner

The person who owns and uses the instrument, or authorises its use by others, is the owner of the instrument and, as such, is responsible for the safety of all users of the instrument and of third parties. The instrument owner must inform users about the safe use of the instrument in the workplace and the management of potential risks, whilst also providing the necessary protective equipment. When using chemicals or solvents, follow the manufacturer's safety data sheets.



3. Instrument Specifications



Parameters

pH 7

pH 7 NEX: pH, mV, ORP,

COND 7

COND 7 NEX: EC, TDS, Sal, Temp

PC 7

PC 7 NEX: pH, mV, ORP, EC, TDS, Sal, Temp

Technical Specifications

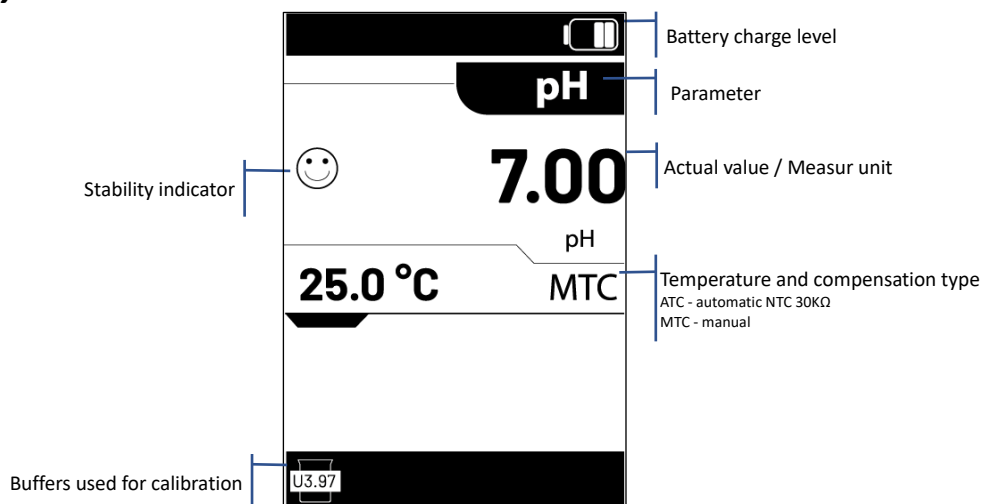


	7 NEX Series
pH	pH 7 NEX - PC 7 NEX
Measuring Range	0...14
Resolution / Accuracy	0.1, 0.01 / ± 0.02
Calibration points and recognized buffers	AUTO: 1...3 / USA, NIST CUS: 2 user-defined values
Buffer indication	Yes
Calibration report	Yes
DHS sensor recognition	Yes
Stability criteria	Low – Nor – High
mV	pH 7 NEX - PC 7 NEX
Range / Resolution	Range: - 1000...+ 1000 / Resolution: 1 mV
ORP	pH 7 NEX - PC 7 NEX
Calibration points	1 value / 475 mV
Conductivity	COND 7 NEX - PC 7 NEX
Range / Resolution	0.00 – 20.00 – 200.0 – 2000 μ S / 2.00 – 20.00 – 200.0 mS Automatic range
Calibration points and recognized buffers	1...5 / 84, 1413 μ S, 12.88, 111.8 mS, 1 user-defined value
Reference temperature	15...30 °C
Temperature coefficient	0.00...10.00 %/°C
TDS	COND 7 NEX - PC 7 NEX
Measuring range	0.1 mg/l...200 g/l
Conversion factor	Linear (0.4 ... 1)
Salinity	COND 7 NEX - PC 7 NEX
Measuring range	0.1 ppm ... 100 ppt
Temperature	
Measuring range	0.0...100.0 °C
Resolution / Accuracy	0.1 / ± 0.5 °C
Temperature compensation ATC (NTC 30K Ω) and MTC	0...100 °C
Data Logger	
Mode	Manual
Internal memory	100 measurements, non-circular memory
System	
Display	High-definition TFT, backlit
HOLD function	Yes, on all parameters

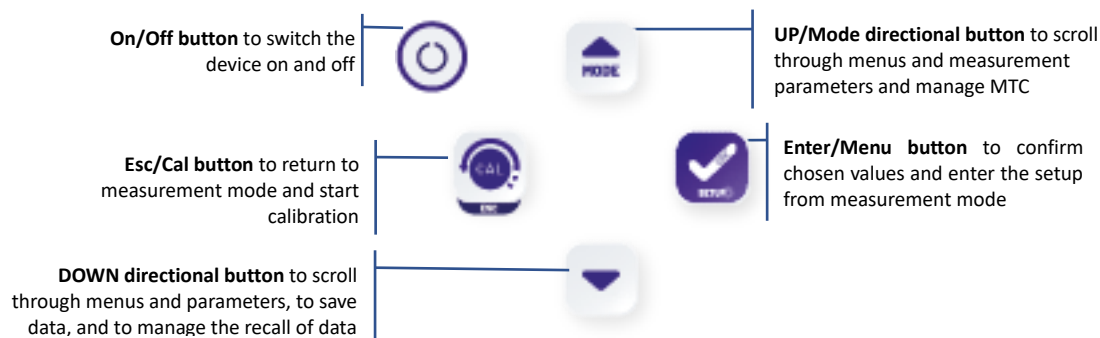
Power off	Yes
Sleep mode	Off / 1–20 min
IP protection	IP 65
Power supply	3 AA 1.5 V batteries
Sound level during standard operation	< 80 dB
Operating environmental conditions	0...+ 60 °C
Maximum permissible humidity	< 95% non-condensing
Maximum operating altitude	2000 m
Instrument dimensions	160 x 75 x 45 mm
System weight	320 g
Relevant Standards	EMC 2014/30/EU RoHS 2011/65/EU EN 61326-1 EN 61010-1

4. Instrument Description

Display



Keypad



5. Installation

Supplied Components

The instrument is always supplied in its own carrying case.

The version without a sensor always includes:

Instrument with batteries, 1 m S7/BNC connection cable, NT55 temperature probe, buffer solutions in single-dose bottles and/or sachets, screwdriver, beaker, electrode holder—for *multi-parameter only*—quick manual, and test report. Versions with the sensor(s) already included are also available. Contact your local distributor to be updated on the correct composition of the sales kit.



Commissioning

- The device leaves the factory ready to be used by the user.
- The batteries are already included.

Power On

Switch on the system by pressing the  button. The display initially shows the NEX logo along with the device model and software version. Then, the settings for the most important parameters and any information regarding the DHS sensor will appear.

Batteries Replacement

The device operates on 3x1.5 V AA batteries. To replace them:

1. Switch off the device.
2. Turn the device over so the display is facing down, ensuring you protect the display and keypad with a cloth.
3. Using the screwdriver provided, unscrew the 4 screws on the cover.
4. Slide the cover off; the screws are captive.
5. Remove the 3 used batteries and insert the new ones. Ensure the polarity is correct.
6. Reinsert the cover and tighten the 4 screws.



Instrument Transport

The instrument is always supplied with a dedicated carrying case. Use only the original case to transport the instrument. If you need to purchase a replacement, contact your local distributor. The interior of the case is shaped to accommodate the instrument and the sensors whilst they are still connected.



Button Functions

Button	Press	Function
	Short	Press to switch the device on or off.
	Short	In measurement mode, press to scroll through the different parameters: • pH 7 NEX: pH → mV → ORP • COND 7 NEX: EC → TDS → Sal • PC 7 NEX: pH/EC → pH → mV → ORP → EC → TDS → Sal In the setup and sub-setup menus, press to scroll. In the setup submenus, press to change the value. In memory recall mode, press to scroll through the saved values. In MTC and customer calibration mode, press to change the value.
	Long press (3s)	In measurement mode, press and hold to change the temperature in MTC mode (manual compensation, without probe). When the value starts flashing, the user can change the temperature value by entering the correct one. Confirm with  .

	Short	In calibration, setup, or memory recall mode, press to return to measurement mode.
	Long press (3s)	In measurement mode, press and hold to start calibration.
	Short	In measurement mode, press to enter setup. In the setup menus, press to select the desired program and/or value. During calibration, press to confirm the value.
	Long press (3s)	In measurement mode, press and hold to access full-screen display. Press again to return to the standard display.
	Short	In measurement mode, press to save the data. In the setup and sub-setup menus, press to scroll. In setup submenus, press to change the value. In memory recall mode, press to scroll through the saved values. In MTC and customer calibration mode, press to change the value. In measurement mode, press to recall saved data.
	Long press (3s)	In measurement mode, press to recall saved data.

IMPORTANT:

- When Sleep mode is active (by default after one minute of inactivity), press any button to reactivate the display backlight.
- Only at this point do the buttons regain their function.



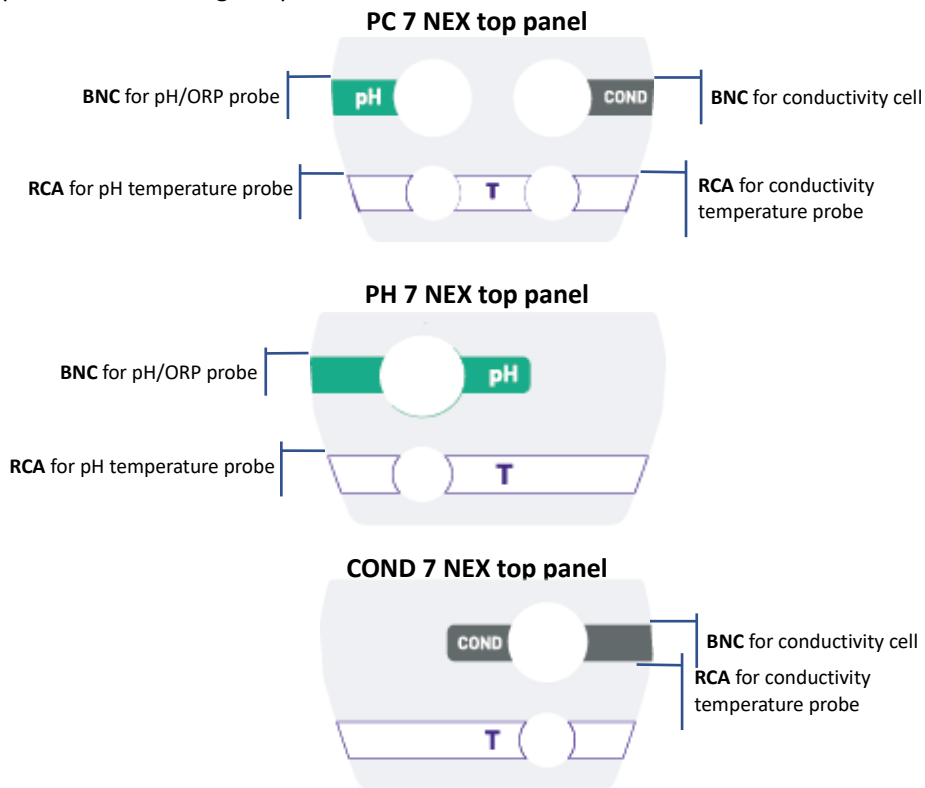
Inputs/Outputs Connection

Use only original accessories guaranteed by the manufacturer.

If necessary, contact your local distributor.

The BNC connectors are protected by a plastic cap at the time of sale.

Remove the cap before connecting the probes.



READ THE MANUAL BEFORE CONNECTING PROBES OR PERIPHERALS DEVICES

Symbols and icons on the display



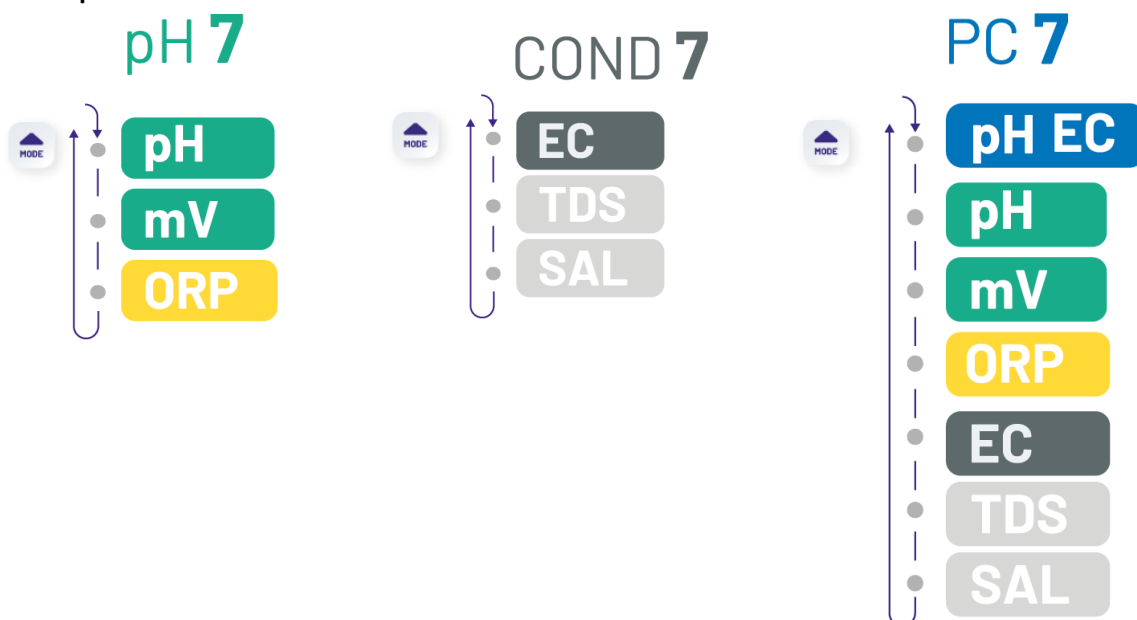
Symbol	Description	Symbol	Description
65	Number of measurements stored in Data Logger mode on the instrument's memory.		Battery charge indicator.
PX	pH calibration performed with a simulator.	HOLD	HOLD mode, reading locked when stable.
	Measurement stability indicator.		

6. How the Device Works



- After switching on, the instrument enters measurement mode with the last parameter used.
- To scroll through the different parameter screens, press the button; the current measurement parameter is shown in the bar at the top right of the display

Sequence of parameters in measurement mode:



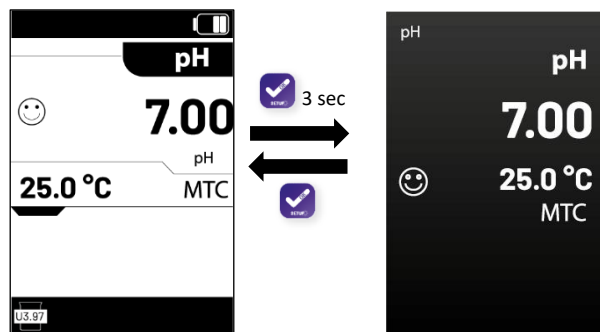
Note: Pressing the button after the last parameter causes the instrument to automatically restart from the first.

On the measurement screens for **pH**, **ORP**, and **Conductivity** parameters, press and hold the button for 3 seconds to start calibrating the active parameter.



Full-screen View

To get a clearer view of the measured value, in measurement mode (excluding the pH/EC screen on the multiparameter), press and hold the  button for 3 seconds to activate full-screen view. Press again to return to the standard view.



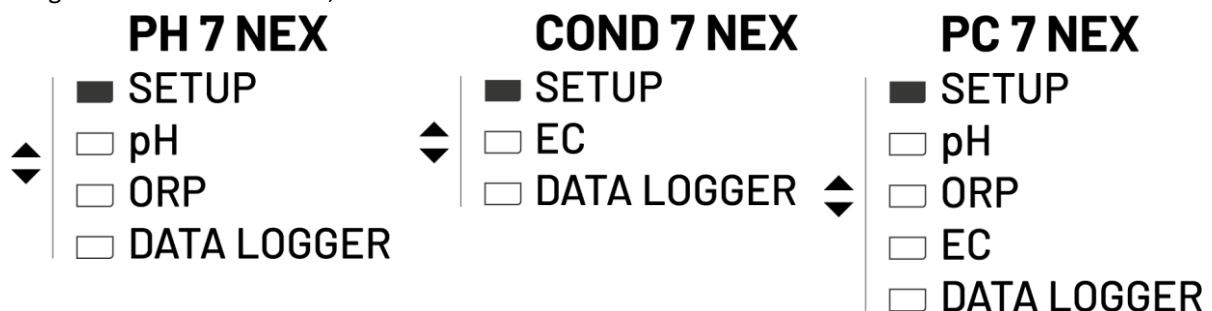
Sleep Mode

When Sleep mode is active (see *the Instrument Configuration Menu section*), the display brightness is reduced to a minimum, significantly saving battery power. To exit Sleep mode and return the display to normal brightness, press any key. Once the display brightness has been restored, the buttons regain their function (see *the Button Functions section*).

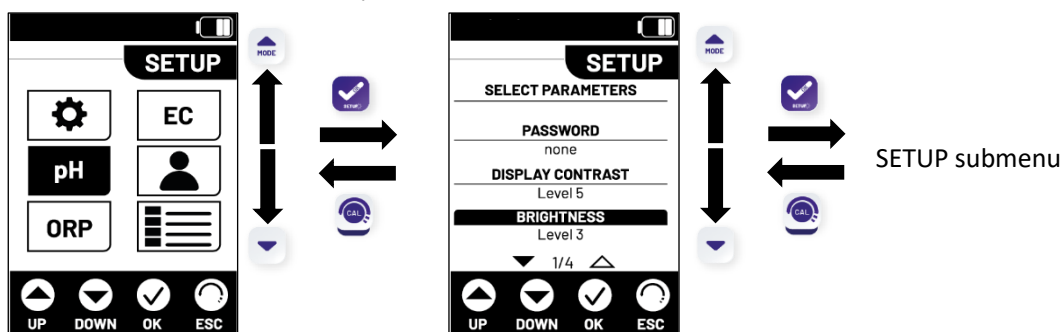


7. Setup Menu

- In measurement mode, press the  button to enter **SETUP** mode, select the parameter you wish to change using the directional buttons, and confirm with .



- Within the selected menu, move between the different programs using the directional buttons and press the  button to access the submenu you wish to edit.
- Use the  and  buttons to select the desired option or change the numerical value, then confirm with .
- Press the  button to return to the previous menu.



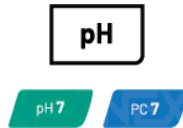
Setup Menu Structure

GENERAL SETTINGS



SELECT PARAMETERS PC 7
 DISPLAY CONTRAST
 BRIGHTNESS
 SLEEP MODE
 READING WITH HOLD
 TEMPERATURE MEASUREMENT UNIT
 AUTO OFF
 RESET SETTING

pH SETTINGS



CALIBRATION BUFFER SELECTION
 RESOLUTION
 CALIBRATION DATA
 SET STABILITY CRITERIA
 PX SIM CALIBRATION
 TEMPERATURE CALIBRATION
 RESET SETTINGS

ORP SETTINGS



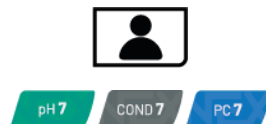
CALIBRATION DATA
 PX SIM CALIBRATION
 TEMPERATURE CALIBRATION
 RESET SETTING

EC SETTINGS



CELL CONSTANT
 CALIBRATION SOLUTION
 CALIBRATION DATA
 REFERENCE TEMPERATURE
 TEMPERATURE COEFFICIENT
 TDS FACTOR
 TDS U.M.
 SALINITY U.M.
 TEMPERATURE CALIBRATION
 RESET SETTING

DATA LOGGER



DELETE MEMORY

8. ATC – MTC Temperature Measurement

pH 7 COND 7 PC 7



- **ATC:** Direct measurement of the sample temperature for all parameters is carried out via the NTC 30KΩ probe, which can be either integrated into the sensor (electrode and/or cell) or external.
- **MTC:** If no temperature probe is connected, the value must be adjusted manually: press and hold the  button for 3 seconds until the value starts flashing; then adjust it using the directional buttons and press  to confirm.

9. pH parameter

pH

pH 7 PC 7

On this series of devices, you can use pH sensors with an integrated temperature probe or connect two different sensors. Connect the pH electrode to the green BNC connector. Connect the temperature probe to the RCA/CINCH T connector below. The instrument can also recognize the DHS sensor, an innovative electrode capable of storing calibration data so it can be used immediately on any other compatible instrument.

Setup for the pH Parameter

- In measurement mode, press  to access the **SETUP** menu.
- Use the directional buttons and confirm with  to access the **PH SETTINGS** menu .
- Use the directional buttons to move to the program you wish to access and press .

Setup Menu Structure for pH Parameter

The table below shows the structure of the setup menu for the pH parameter; for each program, the options available to the user and the default value are listed:

Program	Description	Options	Factory settings
	CAL BUFFER SELECTION	USA – NIST – User	USA
	RESOLUTION	0.1 – 0.01	0.01
	CALIBRATION DATA	VIEW	VIEW
	SET STABILITY CRITERIA	LOW – MED – HIGH	MED
	PXSIM CAL	START	START
	TEMPERATURE CAL	-	-
	RESET SETTINGS	NO - YES	NO

CAL BUFFER SELECTION (Buffer Family Selection)

- Access this setup to select the buffer family to be used for calibrating the pH electrode.
- By using buffers with automatic recognition, you can perform **1- to 3-point** calibration lines. **During calibration,** press  to exit and save the calibration points set so far.
- The instrument automatically recognizes 2 buffer families (**USA, NIST**); furthermore, the user can perform a **manual** calibration of up to 2 points using customizable values.
- **USA** buffers: 1.68 - 4.01 - 7.00* - 10.01 - Default setting -
- **NIST** buffers: 1.68 - 4.00 - 6.86* - 9.18

*The neutral point is always required as the first point

- In measurement mode, a series of beakers at the bottom left of the display, each containing a buffer value, indicates the solutions used for the last calibration, whether automatic or manual.



RESOLUTION (Measurement Resolution)

Access this menu to select the desired resolution for the pH reading:

- 0.1
- 0.01 – default setting –

CALIBRATION DATA (Calibration data for pH parameter)

Access this menu to view information about the last calibration performed.

A report appears on the display showing TEMPERATURE and SLOPE % for each range and OFFSET mV

Note: The instrument only accepts calibrations with pH electrodes having a Slope % between 80–120 %.



SET STABILITY CRITERIA (pH measurements stability criteria)

To ensure a reading is accurate, it is recommended to wait for the measurement to stabilise, indicated by the icon



. Access this menu to modify the measurement stability criteria:

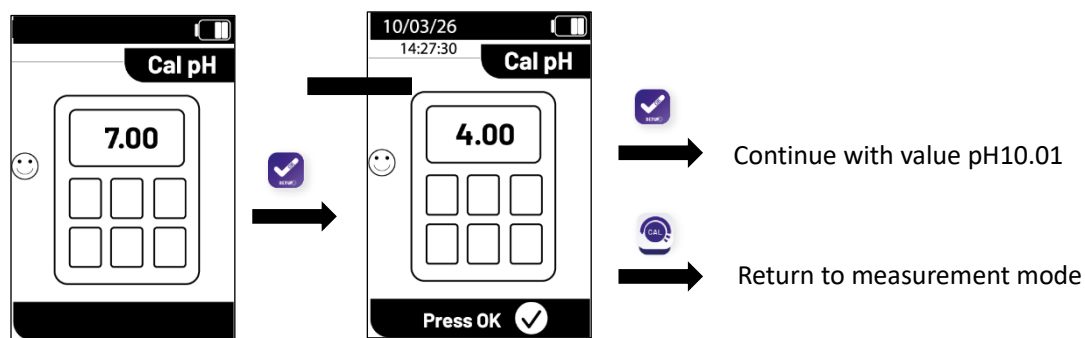
- **LOW:** Select this option to display the stability icon even under conditions of low stability. Readings within 1.2 mV.
- **MEDIUM** -default setting- readings within 0.6 mV.
- **HIGH:** Select this option to display the stability icon only when the measurement is highly stable, with readings within 0.3 mV.

Note: In the **GENERAL SETTINGS** menu  -> **READING WITH HOLD**, the user can choose to freeze the reading on the display once stability has been reached.

PXSIM CAL (Automatic Calibration with Simulator)

Access this setup menu to start instrument calibration using the **XS PX SIM** pH/mV simulator (cod.50111312 - Contact your local distributor for information). The instrument automatically requests the values pH 7.00 / pH 4.01 / pH 10.01. Use the low-impedance simulator, connected with the appropriate BNC/BNC cable, to perform

automatic calibration. Press  to move to the next value,  to save the calibrated values up to that point and return to measurement mode.



The **PX** next to the beakers indicates that the calibration was performed not with a pH electrode but with a simulator.

TEMPERATURE CAL (Temperature Probe Calibration)

All instruments in this series are pre-calibrated for accurate temperature readings. However, if there is a noticeable difference between the measured and actual temperatures (usually due to a probe malfunction), you can adjust the offset by ± 5 °C. After connecting the temperature probe, use the  and  buttons to correct the temperature offset value and confirm with .

RESET SETTINGS (pH Parameter Reset)

If the instrument is not performing optimally or incorrect calibrations have been performed, confirm

YES with the  button to reset all pH menu parameters to their default settings.

IMPORTANT: Restoring to factory settings does **NOT** delete stored data.



Automatic pH Calibration

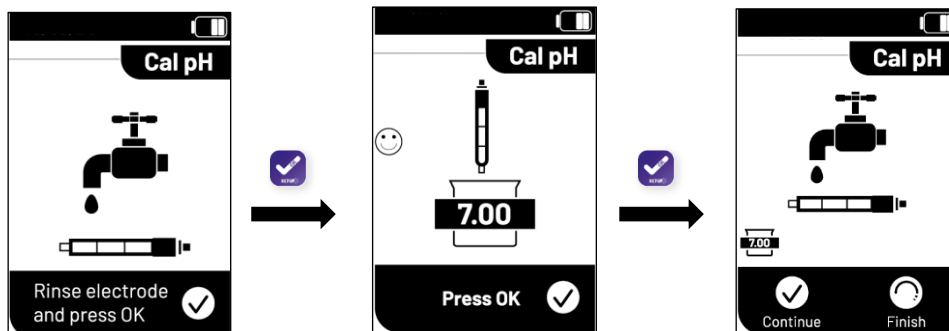
Example of three-point calibration using USA-type buffers (7.00 / 4.01 / 10.01)

- In pH measurement mode, press and hold the  button for 3 seconds to enter calibration mode.

Rinse the electrode with distilled water and gently dab with a paper towel .

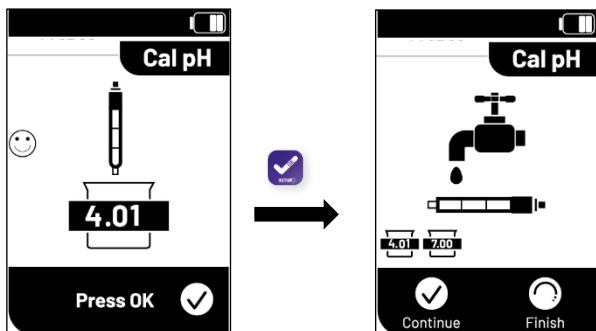
- Press  and dip the electrode in the pH 7.00 buffer (as indicated by the beaker on the display).
- When the  appears, confirm the first point by pressing the .

The actual measured value flashes on the display, and the pH 7.00  beaker icon then appears in the bottom left corner, indicating that the instrument is calibrated to the neutral point.



- Remove the electrode, rinse with distilled water, and gently dab with a paper towel .
- Press  to continue calibration and dip the electrode in the pH 4.01 buffer. All the pH values that the instrument can recognize scroll through the display.
- When the beaker stabilizes at pH 4.01 and the  icon appears, confirm by pressing the .

The actual measured value flashes on the display, and then the pH 4.01  beaker icon appears next to the pH 7.00 beaker, indicating that the instrument is calibrated in the acid range.



For a two-point calibration line, press  to complete the calibration process and return to measurement mode.

- Remove the electrode, rinse with distilled water, and gently dab with a paper towel .
- Press  to continue calibration and dip the electrode in the pH 10.01 buffer. All the pH values that the instrument can recognize will scroll through the display.
- When the beaker stabilizes at pH 10.01 and  appears, confirm by pressing the  button.
The transition from an acidic to a basic pH may take a few extra seconds to stabilize.
The actual measured value flashes on the display; subsequently, the icon for the pH 10.0 beaker appears next to the pH 7.00 and pH 4.01 beakers, indicating that the instrument is also calibrated in the alkaline range.
- Once the third calibration point is complete, the calibration report appears automatically; then press  to return to measurement mode.

Note: Electrode calibration is essential for the quality and accuracy of a measurement. Therefore, ensure that the buffers used are new, uncontaminated, and at the same temperature. To ensure accurate results, the instrument manufacturer recommends using **XS Solution** buffer solutions and **XS Sensor** pH electrodes. Contact your local distributor for supplies.



WARNING: Before proceeding with calibration, carefully consult the safety data sheets for the substances involved: Calibration buffer solutions.

pH electrode storage solution.

Filling solution for pH electrodes.



Carefully reading the safety data sheets for the solutions used helps to eliminate residual risks associated with skin contact, ingestion, inhalation, or eye contact with these substances, which may cause possible but unlikely minor harm.

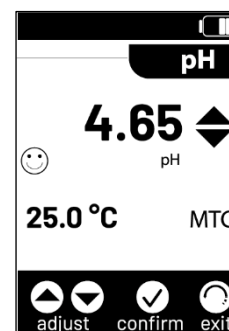
Calibration with manual values

Example of two-point calibration at pH 6.79 and pH 4.65 (DIN 19267)

- Access the **pH SETTINGS** menu  and select **CAL BUFFER SELECTION -> User**; return to measurement and switch to **pH** mode.
- Hold down the  button for 3 seconds to enter calibration mode.
- Rinse the electrode with distilled water and gently dab it with a paper towel .
- Press  and dip the electrode in the first buffer solution (e.g. pH 6.79).
- Wait for the pH value on the display to stabilize; when the icon  appears, use the  and  buttons to adjust the value by entering the buffer value.

Note: Check the buffer value according to the temperature.

- When the  icon reappears, press the  button to confirm the first point; the display will flash the actual measured value and show the beaker icon with the entered buffer value (the letter “U” indicates “user value, entered manually”).
- Remove the electrode, rinse it with distilled water, and gently dab it with a paper towel .
- Press  to continue calibration and dip the sensor in the next buffer (e.g. pH 4.65).
- Wait for the pH value on the display to stabilize; when the  icon appears, use the  and  buttons to adjust the value by entering the buffer's value.
- When the  icon reappears, press the  button to confirm the second point; the actual measured value flashes on the display.
- Once the second calibration point is complete, the process ends automatically with the calibration report being displayed. Press  to return to measurement mode.



Note: If you are working with manual temperature compensation (MTC), update the value before calibrating the instrument.

Perform a pH measurement

In measurement mode, press the  button to scroll through the parameter screens until **pH** is activated. (See section “How the device works”):

- Connect the electrode to the instrument's pH/ORP BNC connector (green band).
- Connect the temperature sensor to the corresponding RCA connector. If the user is not using an electrode with a built-in temperature probe or an external 30KΩ NTC probe, it is recommended to manually update the temperature value (MTC).
- Remove the electrode from its tube, rinse with distilled water, and gently dab it with a paper towel.
- Check for and remove any air bubbles in the membrane bulb by shaking it vertically (as with a clinical thermometer). If present, open the side cap.

- Dip the electrode in the sample while keeping it in gentle motion.
- Only consider the measurement accurate when the stability icon appears . To eliminate any errors due to user interpretation, you can use the “HOLD” function (see the **GENERAL SETTINGS** section  → **READING WITH HOLD**), which allows you to lock the reading as soon as it stabilises.
- Once the measurement is complete, rinse the electrode with distilled water and store it in the appropriate storage solution (STORAGE). Never store the sensors in any type of water or in a dry state.

The use of the wide range of XS Sensor electrodes is preferred and is the solution recommended by the manufacturer for highly accurate analyses. Carefully read the instructions and recommendations for use and maintenance, which are always included inside the XS Sensor electrode packaging.



Sensors with DHS technology

Electrodes equipped with DHS technology can store a calibration line in their memory. The calibrated sensor is automatically recognized by any instrument capable of DHS recognition and acquires its calibration.

- Connect the DHS electrode to the instrument's BNC and RCA connectors.
- The device automatically recognizes the chip; the DHS sensor calibration report, including the identification number and batch, appears on the display.
- Once the DHS electrode is recognized, the active calibration on the instrument becomes that of the sensor.
- The DHS icon next to the sensor symbol on the display indicates that the connection was successful.
- If the calibration is satisfactory (check the calibration data in the pH -> Calibration Data menu), the electrode is ready to begin measurements. Otherwise, recalibrate the electrode; the data will be updated automatically.
- The DHS electrode calibrated with a pH 7 NEX or PC 7 NEX device is ready for use on any pH meter capable of DHS recognition, and vice versa.
- When the electrode is disconnected, a message on the display informs the user that the sensor has been deactivated; the instrument reverts to its previous calibration, and no data is lost!
- The DHS electrode does not require batteries, and if used on pH meters not equipped with chip recognition, it functions as a standard analog electrode.

Note: As this is a digital pH measurement, only consider the readings accurate when measuring the **pH** parameter.

10. mV Parameter



- In measurement mode, press  and move to the **mV** parameter.
- The display shows the pH sensor's reading in mV.
- Consider the reading accurate only when the stability icon  appears.

Note: This measurement is recommended for assessing the sensor's efficiency.

11. ORP parameter (Oxidation-Reduction Potential)

ORP



On this series of devices, ORP sensors can be used to measure the oxidation-reduction potential. Connect the Redox electrode to the BNC connector marked in green; if necessary, connect the temperature probe to the RCA/CINCH Temp connector, which is also marked with a green background. You can calibrate the sensor offset by performing automatic calibration at a preset point. The instrument automatically recognizes the **475 mV / 25 °C Redox** solution; contact your local distributor to purchase it.

The instrument can correct the sensor offset by ± 75 mV.

Setup for the ORP parameter

- In measurement mode, press  to access the **SETUP** menu.
- Use the arrow buttons and confirm with  to access the **ORP SETTINGS** menu .
- Use the directional buttons to navigate to the program you wish to access and press .

Setup menu structure for the ORP parameter

The table below shows the structure of the setup menu for the ORP parameter; for each program, the options available to the user and the default value are shown:

Program	Description	Options	Factory settings
	CALIBRATION DATA	VIEW	VIEW
	PXSIM CAL	START	START
	TEMPERATURE CAL	-	-
	RESET SETTING	NO – YES	NO

CALIBRATION DATA (Calibration data for ORP parameter)

Access this menu to view information about the last calibration performed. A report showing TEMPERATURE and mV OFFSET appears on the display.

PXSIM CAL (Automatic Calibration with Simulator)

Access this setup menu to start instrument calibration using the **XS PX SIM** pH/mV simulator (cod.50111312 - Contact your local distributor for information). The instrument automatically requests the value 475 mV.

Use the low-impedance simulator, connected with the appropriate BNC/BNC cable, to perform automatic calibration. Press  to confirm and return to measurement mode. The  indicates that the calibration was performed not with an ORP electrode but with a simulator.

TEMPERATURE CAL (Temperature Probe Calibration)

All instruments in this series are pre-calibrated to ensure accurate temperature readings. However, if there is a noticeable difference between the measured temperature and the actual temperature (usually due to a probe malfunction), you can adjust the offset by ± 5 °C. After connecting the temperature probe, use the  and  buttons to correct the temperature offset value and confirm with .

RESET SETTINGS (Reset of the ORP parameter)

If the instrument is not working optimally or incorrect calibrations have been performed, confirm **YES** with the  button to reset all parameters in the ORP menu to their default settings.

IMPORTANT: Restoring factory settings does **NOT** delete stored data.

Automatic ORP Calibration

Automatic calibration with 475 mV solution

- In **ORP** measurement mode, press and hold the  button for 3 seconds to enter calibration mode.
- Rinse the electrode with distilled water and gently dab it with a paper towel.
- Press  and immerse the electrode in the 475 mV Redox buffer solution.
- When the  appears, confirm by pressing .
- The actual measured value flashes on the display, and the calibration report appears shortly thereafter.
- Press the  button to return to measurement mode.

WARNING: Before proceeding with sensor calibration, carefully consult the safety data sheets for the substances involved:



- Redox standard solutions.
- Redox electrode storage solution.
- Filling solution for Redox electrodes.

IMPORTANT: The ability to immediately access and manage all information regarding sensor calibration and status allows the user to work while maintaining high quality standards. The use of ORP XS Sensor electrodes is preferred and is the solution recommended by the manufacturer to achieve highly accurate analyses. The manufacturer offers a wide range of sensors to cover various fields of application.

12. Conductivity Parameter

EC

COND 7

PC 7

On the **COND 7 NEX** and **PC 7 NEX** instruments, connect the conductivity probe to the grey-coloured BNC connector and, if applicable, the temperature probe to the grey-coloured RCA/CINCH Temp connector. Conductivity is defined as the ability of ions contained in a solution to conduct an electric current. This parameter provides a quick and reliable indication of the quantity of ions present in a solution.

Setup for the Conductivity parameter

- In measurement mode, press  to access the **SETUP** menu.
- Use the arrow buttons and confirm with  to access the **EC SETTINGS**  menu.
- Use the directional buttons to navigate to the program you wish to access and press .

Setup menu structure for the Conductivity parameter

The table below shows the structure of the setup menu for the conductivity parameter; for each program, the options available to the user and the default value are listed:

Program	Description	Options	Factory Settings
	CELL CONSTANT	0.1 - 1 - 10	1
	CALIBRATION SOLUTION	STANDARD - USER	STANDARD
	CALIBRATION DATA	VIEW	VIEW
	REFERENCE TEMPERATURE	15.0...30.0 °C	25 °C
	TEMPERATURE COEFFICIENT	0.00...10.00 %/°C	1.91 %/°C
	TDS FACTOR	LINEAR	LINEAR 0.71
	TDS U.M.	(mg/l – g/l) – (ppm – ppt)	mg/l – g/l
	SALINITY U.M.	(ppm – ppt) – (mg/l – g/l)	ppm – ppt
	TEMPERATURE CAL	-	-
	RESET SETTING	NO – YES	NO

CELL CONSTANT (Cell constant selection)

Choosing the right conductivity cell is a decisive factor in obtaining accurate and reproducible measurements.

For two-electrode sensors, one of the key parameters to consider is using a sensor with the correct cell constant for the solution being analyzed.

Contact your local dealer for information on the different conductivity cells supplied by the manufacturer.

The following table correlates the sensor's cell constant with the measurement range and the standard against which calibration is preferred:

2 rings cell	C = 0.1	C = 1	C = 10
Standard (25 °C)	84 µS	1413 µS	111.8 mS
Ideal measurement range	0 – 500 µS	500 – 5000 µS	5 – 50 mS

Access this setup menu to select the cell constant for the sensor you are using:

- **0.1**
- **1** -default setting-
- **10**

For each of the 3 selectable cell constants, the instrument stores the calibrated points. Selecting the cell constant automatically recalls the previously performed calibration points.

CALIBRATION SOLUTION (Calibration Method)

Access this setup menu to select automatic or manual recognition of the standards to be used for calibration:

- **AUTOMATIC:** -default- the device automatically recognizes the following standards
84 μ S/cm, 1413 μ S/cm, 12.88 mS/cm, and 111.8 mS/cm.
- **CUSTOM:** the device can be calibrated to a point with a manually entered value.

Note: To obtain accurate results, it is advisable to calibrate the device using standards close to the theoretical value of the solution to be analysed. Temperature compensation in conductivity measurement should not be confused with pH compensation.

- In a conductivity measurement, the value shown on the display is the conductivity calculated at the reference temperature. Thus, the effect of temperature on the sample is corrected.
- In pH measurement, however, the display shows the pH value at the displayed temperature. In this case, temperature compensation involves adjusting the electrode's slope and offset to the measured temperature.



CALIBRATION DATA (Calibration data for conductivity parameter)

Access this menu to obtain information on the last calibration performed. The display shows a report including temperature and the updated cell constant for each range

Note: The instrument accepts only calibrations with a maximum tolerance of 40 % of the nominal value of the cell constant.



REFERENCE TEMPERATURE (Select the reference temperature)

The conductivity measurement is highly temperature dependent. If the temperature of a sample increases, its viscosity decreases, leading to an increase in ion mobility and measured conductivity, even though the concentration remains constant. For each conductivity measurement, the reference temperature must be specified; otherwise, the result is without value. Generally, the reference temperature is 25 °C or, less commonly, 20 °C.

This device measures conductivity at the actual temperature (ATC or MTC) and then converts it to the reference temperature using the selected correction factor:

- Access this setup menu to set the temperature at which the conductivity measurement is to be referenced.
- The device can measure conductivity from **15 to 30 °C**. The factory setting is **25 °C**, which is correct for most analyses.

TEMPERATURE COEFFICIENT (Temperature Compensation Factor)

It is important to know the temperature dependence (percentage change in conductivity per °C) of the sample being measured:

- Access this menu to change the temperature compensation factor.
- The default setting is 1.91 %/°C, which is suitable for most analyses.

Press the  button and use the arrow buttons to enter the new coefficient. Confirm with .

Compensation coefficients for special solutions and groups of substances are listed in the following table:

Solution	(%/°C)	Solution	(%/°C)
NaCl Saline solution	2.12	1.5 % Hydrofluoric acid	7.20
5 % NaOH solution	1.72	Acids	0.9 - 1.60
Diluted ammonia solution	1.88	Bases	1.7 – 2.2
10 % hydrochloric acid solution	1.32	Salts	2.2–3.0
5 % Sulfuric acid solution	0.96	Drinking water	2.0

Compensation coefficients for calibration standards at different temperatures for $T_{(ref)} = 25\text{ °C}$ are shown in the following table:

°C	0.001 mol/l KCl (147 µS)	0.01 mol/l KCl (1413 µS)	0.1 mol/l KCl (12.88 mS)
0	1.81	1.81	1.78
15	1.92	1.91	1.88
35	2.04	2.02	2.03
45	2.08	2.06	2.02
100	2.27	2.22	2.14

To determine the calibration coefficient of a particular solution, the following formula is applied:

$$tc = 100 \times \frac{C_{T2} - C_{T1}}{C_{T1}(T_2 - 25) - C_{T2}(T_1 - 25)}$$

Where tc is the temperature coefficient to be calculated, C_{T1} and C_{T2} are the conductivity at temperature 1 (T_1) and temperature 2 (T_2).

Every result with a “corrected” temperature is subject to an error caused by the temperature coefficient. The better the temperature correction, the smaller the error. The only way to eliminate this error is to not use the correction factor, instead acting directly on the sample temperature.

Select 0.00 %/°C as the temperature coefficient to disable compensation. The displayed Conductivity value refers to the temperature measured by the probe and is not related to a reference temperature.

TDS FACTOR (TDS conversion factor)

Access this menu to change the conversion factor from conductivity to TDS:

- **Linear 0.4...1.00** – default setting **0.71** –

TDS U.M. (TDS units of measurement)

Access this menu to select which units of measurement to use for TDS detection:

- **mg/l – g/l** – default setting –
- **ppm – ppt**

SALINITY U.M. (salinity units of measurement)

Access this menu to select which units of measurement to use for salinity detection:

- **ppm – ppt** -default setting-
- **mg/l – g/l**

TEMPERATURE CAL (Temperature Probe Calibration)

All instruments in this series are pre-calibrated for accurate temperature readings. However, if there is a noticeable difference between the measured and actual temperatures (usually due to a probe malfunction), you can adjust the offset by $\pm 5\text{ °C}$. After connecting the temperature probe, use the  and  buttons to correct the temperature offset value and confirm with .

RESET SETTINGS (Reset of the EC Parameter)

If the instrument is not working optimally or incorrect calibrations have been performed, confirm YES using the  button to reset all EC menu parameters to their default settings.

IMPORTANT: Restoring factory settings does **NOT** delete stored data.

Automatic Conductivity Calibration

Example of single-point calibration (1413 µS/cm) using a two-ring sensor with cell constant 1

- In **EC** measurement mode, press and hold the  button for 3 seconds to enter calibration mode.
- Rinse the cell with distilled water and gently dab it with a paper towel . Fill with a few ml of standard solution.
- Press  and dip the sensor in the 1413 µS/cm standard, stirring gently and ensuring there are no air bubbles in the cell.
- All the conductivity values that the instrument can automatically recognize will alternate in the beaker.

- When the value stabilises at 1413 and the 😊 icon appears, confirm by pressing the ✓ button.
- The actual measured value flashes on the display, followed by the calibration report showing the cell constant for each range. Press the ✓ button to return to measurement mode.
- *Single-point calibration is sufficient if measurements are taken within the measurement range. For example, the 1413 $\mu\text{S}/\text{cm}$ standard solution is suitable for measurements between approximately 500 and 5000 $\mu\text{S}/\text{cm}$*
- **To calibrate the instrument at multiple points, once you have returned to measurement mode, repeat all calibration steps.**
The beaker for the new calibration point will be added alongside the previous one. It is advisable to start the calibration with the least concentrated standard solution and then proceed in order of increasing concentration.
- When a previously calibrated point is recalibrated, the previous calibration is overwritten and the cell constant is updated.
- For each cell constant, the instrument stores the calibration, so that users employing multiple sensors with different constants are not required to perform calibration each time.

Important: Conductivity standard solutions are more vulnerable to contamination, dilution, and the direct influence of CO_2 than pH buffers, which, thanks to their buffering capacity, tend to be more resistant. Furthermore, a slight change in temperature, if not properly compensated for, can have a significant effect on accuracy.



Therefore, pay particular attention to the conductivity cell calibration process to ensure accurate measurements. Always rinse the cell with distilled water before calibration and when switching from one standard solution to another to prevent contamination. Replace standard solutions frequently, especially those with low conductivity. Contaminated or expired solutions can affect the accuracy and precision of the measurement.

WARNING: Before proceeding with calibration, carefully consult the safety data sheets for the substances involved:



- Calibration buffer solutions.

Calibration with Manual Value

Example: Calibration at 10.00 $\mu\text{S}/\text{cm}$ using a two-ring sensor with a cell constant of 0.1

- Access the **EC SETTINGS** menu  and select **CELL CONSTANT** → **0.1** and **CALIBRATION SOLUTION** → **User**, then return to measurement mode and switch to **EC** mode.
- Press and hold the  button for 3 seconds to enter calibration mode.
- Rinse the cell with distilled water and gently dab it with a paper towel .
- Fill with a few mL of standard solution, press the ✓ button and immerse the sensor in the 10.00 $\mu\text{S}/\text{cm}$ conductivity standard.
- Wait for the conductivity value on the display to stabilize; when the 😊 icon appears, use the  and  buttons to adjust the value by entering that of the standard solution (e.g. 10.00 $\mu\text{S}/\text{cm}$).
Note: Check the buffer value at the given temperature.
- When the icon 😊 reappears, confirm the calibration point by pressing the ✓ button.
- The calibration report automatically appears on the display. Press the ✓ button to return to measurement mode.
- The beaker icon appears in the bottom left corner with the buffer value entered (the letter “U” stands for “user value, entered manually”).
- For each cell constant, the instrument stores the calibration so that users employing multiple sensors with different constants are not required to recalibrate each time.

Important: Always rinse the cell with distilled water before calibration and when switching from one standard solution to another to avoid contamination. Replace standard solutions frequently, especially those with low conductivity. Contaminated or expired solutions may affect the accuracy and precision of the measurement.



Perform a Conductivity Measurement

- Access the **EC SETTINGS** menu  to check the calibration and verify and, if necessary, update the reading parameters; press  to return to measurement mode.
- Press  to scroll through the different parameter screens until the **EC** parameter is activated. Connect the conductivity cell to the instrument's BNC connector for Cond (grey) and the temperature sensor to the corresponding RCA connector. If the user is not using a cell with a built-in temperature probe or an external NTC 30KΩ, it is advisable to manually update the temperature value (MTC).
- Remove the cell from its tube, rinse with distilled water, and gently dab it.
Be careful not to scratch the electrodes.
- Immerse the sensor in the sample; the measuring cell and any relief holes must be completely immersed. Keep the sensor gently stirred and shake it lightly to remove any air bubbles that could affect the measurement.
- Consider the measurement accurate only when the stability icon appears .

For a highly accurate measurement, the instrument uses five different measurement scales and two units of measurement (µS/cm and mS/cm) depending on the value; the scale change is performed automatically by the device.

- Once the measurement is complete, rinse the cell with distilled water. The conductivity sensor does not require special maintenance; the main aspect is to ensure that the cell is clean. The sensor must be rinsed with plenty of distilled water after each analysis, and if it has been used with water-insoluble samples, clean it by immersing it in ethanol or acetone before performing this operation.

Never clean it mechanically, as this would damage the electrodes and compromise their functionality. For short periods, store the cell in distilled water; for long periods, store it in a dry place.

13. Other measurements carried out with the conductivity cell

COND 7

PC 7

The conductivity measurement can be converted to **TDS** and **Salinity** parameters:

- In measurement mode, press the  button to scroll through the various parameters: **TDS -> Salinity**.
- These parameters use the Conductivity calibration; therefore, refer to the previous section to calibrate the sensor.

TDS Parameter

Total Dissolved Solids (TDS) correspond to the total weight of solids (cations, anions, and undissociated substances) in one Liter of water. Traditionally, TDS is determined using a gravimetric method, but a simpler and faster method involves measuring Conductivity and converting it to TDS by multiplying it by the TDS conversion factor.

Access the **EC SETTINGS** menu  --> **TDS FACTOR** to select the conversion factor; the default setting is 0.71, suitable for samples with average conductivity.

Salinity

Typically, the 1978 UNESCO definition is used for this parameter, which specifies the use of the unit of measurement psu (Practical Salinity Units), corresponding to the ratio between the conductivity of a seawater sample and that of a standard KCl solution consisting of 32.4356 g of salt dissolved in 1 kg of solution at 15 °C. The ratios are dimensionless, and 35 psu is equivalent to 35 g of salt per kg of solvent. Therefore, approximately 1 psu is equivalent to 1 g/l of salt, and considering the density of water, this is equivalent to 1 ppt.

The 1966b UNESCO definition may also be used, which provides that salinity in ppt is expressed with the following formula: $S_{ppt} = -0.08996 + 28.2929729R + 12.80832R^2 - 10.67869R^3 + 5.98624R^4 - 1.32311R^5$

Where R = Sample conductivity (at 15 °C) / 42.914 mS/cm (Conductivity of Copenhagen Seawater Standard).

14. Data Logger Function



This series of devices allows for the manual recording of up to 100 measurements (Value + temperature), which can then be recalled and viewed on the display. Once the memory is full, the values are NOT overwritten. In measurement mode, next to ⁶⁵ , the number of measurements stored for that parameter appears.

Using the Data Logger Function

In measurement mode for the parameter of interest, press the button to capture the value and corresponding temperature. At the bottom right of the display, next to ⁶⁵ , the number of measurements saved for the active parameter appears.

Retrieving saved data

- In measurement mode, for the parameter of interest, press and hold the button for 3 seconds to access **RECALL MEMORY** mode and view the stored data for that specific parameter on the display.
- Use the and buttons to scroll through the various data pages.
- Press to exit and return to measurement mode.

Deleting saved data

- To delete the data stored in the instrument memory, access the **DATA LOGGER SETTINGS** setup menu → **DELETE MEMORY** and select the **YES** option using the .

15. Instrument Configuration Menu



- In measurement mode, press to access the **SETUP** menu.
- Use the arrow buttons and press to access the **GENERAL SETTINGS** menu .
- Use the arrow buttons to move to the program you wish to access and press .

Setup menu structure for the Configuration menu

The table below shows the structure of the setup menu for the instrument's general settings; for each program, the options available to the user and the default value are shown:

Program	Description	Options	Factory Settings
	SELECT PARAMETERS*	YES – NO for each parameter	YES
	DISPLAY CONTRAST	LEVEL 1...9	LEVEL 5
	BRIGHTNESS	OFF – LEVEL 1...4	LEVEL 2
	SLEEP MODE	OFF – ON (1...20 min)	ON (1 min)
	READING WITH HOLD	YES – NO	NO
	TEMPERATURE UNIT	°C - °F	°C
	AUTO OFF	YES - NO	NO
	RESET SETTING	YES - NO	-

* Feature available only for **PC 7 NEX**

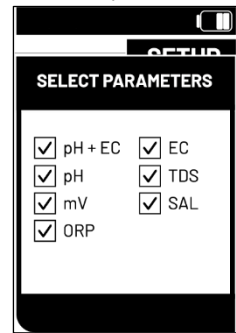
SELECT PARAMETERS

Access this menu to select which parameters to display or hide in measurement mode. By default, no parameters are hidden.

- Use the  button to flag the parameters you wish to keep active and display in measurement mode.

- **If you uncheck the box, the parameter will NOT be displayed in measurement mode.**

Example: For a specific period, the user is only interested in viewing and using the pH, mV, and EC parameters. Access the “**SELECT PARAMETERS**” menu and use the  button to deselect the remaining parameters. Return to measurement mode by pressing ESC.



DISPLAY CONTRAST (Display Contrast Management)

Access this setup menu to adjust the 9 display contrast levels:

Level 1 (low contrast) -> **Level 9** (high contrast).

The instrument is set by default to a medium contrast level (level 5).

BRIGHTNESS (Display Brightness Control)

Access this setup menu to adjust the 5 display brightness levels:

Off (no brightness) -> **Level 4** (maximum brightness).

The instrument is set by default to a medium brightness level (level 2).

Note: For outdoor use, especially on sunny days, it is advised to set the brightness to “Off”.

SLEEP MODE (Display mode with minimum brightness)

Access this setup menu to manage the device’s standby mode:

- **OFF:** Sleep mode disabled, brightness always on.
- **ON (1...20 min):** Use the directional buttons to select how many minutes of keyboard inactivity will trigger standby mode. By default, it activates after one minute.

Note: To exit standby mode and return the display to normal brightness, press any button.

READING WITH HOLD (Activating the HOLD function)

Access this setup menu to enable or disable the **HOLD** stability criteria:

- **NO:** -default option- The reading is not held.
- **YES:** When this option is enabled, the reading is locked on the display as soon as it reaches stability.

To unlock and restart the measurement until the next stabilization, press .

TEMPERATURE UNIT (Temperature measurement unit)

Access this setup menu to select the temperature unit of measurement. Use:

- °C -default-
- °F

AUTO OFF

Access this setup menu to enable or disable the instrument’s auto-shutdown:

- **YES:** The instrument switches automatically after **20 minutes** of inactivity.
- **NO** – default option – The instrument remains on at all times, even when not in use.

RESET SETTING (General Reset)

Access this setup menu to restore the instrument to its factory settings.

IMPORTANT: Restoring factory settings does not delete stored data.

NOTE: The screenshots shown in this manual may not match the version of the instrument you purchased.



16. Warranty

Warranty Period and Limitations

- The manufacturer of this device offers the end user of the new device a three-year warranty from the date of purchase, provided the device is maintained and used in accordance with best practices.
- During the warranty period, the manufacturer will repair or replace any defective components.
- This warranty applies only to the electronic components and does not apply if the product has been damaged, used incorrectly, exposed to radiation or corrosive substances, if foreign materials entered the product, or if modifications not authorized by the manufacturer have been made.

17. Disposal



This equipment is subject to regulations for electronic devices.
Dispose of it in accordance with current local regulations.