Pyxis®

SP-710 Water Multimeter

PTSA, pH, ORP, Conductivity, F/T-Cl, Temp.

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USER MANUAL

SP-710 Water Multimeter
User Manual

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Rev. 3.03

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Warranty Information

Confidentiality

The information contained in this manual may be confidential and proprietary and is the property of Pyxis Lab, Inc. Information disclosed herein shall not be used to manufacture, construct, or otherwise reproduce the goods described. Information disclosed herein shall not be disclosed to others or made public in any manner without the express written consent of Pyxis Lab, Inc.

Standard Limited Warranty

Pyxis Lab warrants its products for defects in materials and workmanship. Pyxis Lab will, at its option, repair or replace instrument components that prove to be defective with new or remanufactured components (i.e., equivalent to new). The warranty set forth is exclusive and no other warranty, whether written or oral, is expressed or implied.

Warranty Term

The Pyxis warranty term is thirteen (13) months ex-works. In no event shall the standard limited warranty coverage extend beyond thirteen (13) months from original shipment date.

Warranty Service

Damaged or dysfunctional instruments may be returned to Pyxis for repair or replacement. In some instances, replacement instruments may be available for short duration loan or lease.

Pyxis warrants that any labor services provided shall conform to the reasonable standards of technical competency and performance effective at the time of delivery. All service interventions are to be reviewed and authorized as correct and complete at the completion of the service by a customer representative, or designate. Pyxis warrants these services for 30 days after the authorization and will correct any qualifying deficiency in labor provided that the labor service deficiency is exactly related to the originating event. No other remedy, other than the provision of labor services, may be applicable.

Repair components (parts and materials), but not consumables, provided during a repair, or purchased individually, are warranted for 90 days ex-works for materials and workmanship. In no event will the incorporation of a warranted repair component into an instrument extend the whole instrument's warranty beyond its original term.

Warranty Shipping

A Repair Authorization (RA) Number must be obtained from Pyxis Technical Support before any product can be returned to the factory. Pyxis will pay freight charges to ship replacement or repaired products to the customer. The customer shall pay freight charges for returning products to Pyxis. Any product returned to the factory without an RA number will be returned to the customer. To receive an RMA you can generate a request on our website at https://pyxis-lab.com/request-tech-support/.

Pyxis Technical Support

Contact Pyxis Technical Support at +1 (866) 203-8397, service@pyxis-lab.com, or by filling out a request for support at https://pyxis-lab.com/request-tech-support/.

1 Introduction

The Pyxis SP-710 is a handheld multimeter that measures five key parameters as well as colorimetric Free and Total Chlorine. It is a cuvette-less device. Less than 5 mL water sample is needed to fill the two sample cells for the measurement.

- PTSA (Pyrene Tetrasulfonic acid Tetra Sodium)
- Conductivity
- TMB Free and Total Chlorine
- Temperature
- pH
- ORP

1.1 Main Features

The SP-710 includes the following features:

- Breakthrough technology combining PTSA with conductivity and pH/ORP in a single rugged meter
- PTSA measurement uses custom signal processing algorithms to compensate for sample color and turbidity interference
- Wireless and independent use of pH/ORP module
- Modular pH/ORP module design with extra-large junction capacity providing increased service life
- Replaceable battery in pH/ORP module
- Easy replacement of the pH/ORP module without the need to disassemble the main module
- Customization and firmware upgrades via wireless connection to **uPyxis®** Mobile/Desktop App
- Long battery life with 10,000+ readings
- Self-diagnosis during calibrations

2 Specifications

Table 1. SP-710 Specifications

Item	Specification*
Part Number (P/N)	50352
PTSA Range	0–300 ppb
PTSA Precision	±1% or ±1 ppb
Conductivity Range †	1–15000 µS/cm
Conductivity Resolution	±1% or ±1 µS/cm
TMB Free and Total Chlorine Range	0.02–2.2 ppm
TMB Free and Total Chlorine Resolution	±0.01
Temperature Range	32–160 °F (0–71 °C)
Temperature Resolution	±0.2 °F (±0.1 °C)
pH Range †	0–14
pH Resolution	±0.01
ORP Range	±1500 mV
ORP Resolution	±1 mV
pH/ORP Module ‡	Wireless and replaceable
Typical Main Module Sensor Life	5 years
Typical pH/ORP Module Sensor Life	1 year
Display	Color LCD, visible under direct sunlight
Main Module Power Supply	4 AA alkaline batteries
pH/ORP Module Power Supply	1 ER14250 lithium thionyl chloride battery
Typical Battery Life	10,000 readings
Dimension (L × W × H)	8.19 × 3.15 × 1.77 inch (208 × 80 × 45 mm)
Weight§	1.15 lbs (520 g)
Operational Temperature	32–104 °F (0–40 °C)
Storage Temperature	-4–140 °F (-10–50 °C)
Enclosure Rating	IP67
Regulation	CE

* With Pyxis's continuous improvement policy, these specifications are subject to change without notice.
† With Automatic Temperature Compensation (ATC)
‡ Replacement recommended every 9–12 months
§ Batteries excluded

3 Unpacking Instrument

Remove the instrument and accessories from the shipping container and inspect each item for any damage that may have occurred during shipment. It is possible that the pH/ORP cell seal can open in shipment, which may result in pH/ORP Storage Solution on the outer shell of the device. This will not cause any damage. Simply wipe down the device with wet cloth and towel dry. Verify that all items listed on the packing slip are included. If any items are missing or damaged, please contact Pyxis Customer Service at service@pyxis-lab.com. During shipping and storage after production, a sponge wetted with the pH/ORP Storage Solution is placed in the pH/ORP cell seal. This sponge may be removed and discarded. Some pH/ORP Storage Solution may dry and form white crystals in the surrounding areas of the sample cells. Please rinse the sample cells with a water sample before use.

3.1 Standard Accessories

- Quick-Start Guide
- Four (4) AA alkaline batteries
- Pyxis pH/ORP Storage Solution — 70 mL P/N: 63900
- Bluetooth/USB Adapter for Desktop P/N: MA-NEB
- User Manual available online at https://pyxis-lab.com/support/

3.2 Optional Accessories

The following optional accessories can be ordered from Pyxis Customer Service (order@pyxis-lab.com) or Pyxis E-Store at https://pyxis-lab.com/shop/.

Table 2.

Accessory Name	Part Number P/N
Replacement pH/ORP Module — Bluetooth	50315
Battery for pH/ORP Module	50778
Pyxis pH/ORP Storage Solution — 70 mL	63900
Pyxis Carrying Case for SP-710	50725
Pyxis 100 ppb PTSA + 1000 µS/cm (KCl) Combined Standard — 500 mL	21004
Pyxis 200 mV ORP Calibration Standard — 500 mL	57020
Pyxis pH 4-7-10 Calibration Combination Kit — 500 mL ea	57007
Pyxis 1000 µS/cm Conductivity Calibration Standard — 500 mL	57008
Pyxis TMB Free Chlorine Dropper Kit — 230 Tests	63901
Pyxis TMB Total Chlorine Dropper Kit — 230 Tests	63902
Pyxis TMB Chlorine Secondary Standard — 1.0 ppm Solution — 125mL	21038
Pyxis Handheld Cleaning Kit	SER-02

4 Installation

4.1 Main Module Battery Installation

The main module of the SP-710 is powered by four AA alkaline batteries. Typical battery life is 10,000 measurements or 6 months. When the battery capacity is critically low, the SP-710 displays a ”LOW BATTERY” warning for five seconds and then automatically turns off.

The SP-710 does not turn itself on automatically after the new battery installation. To turn on the SP-710 after new battery installation, press the **OK** key momentarily and release.

The SP-710 has a calendar timer. To prevent the calendar from being reset to the default date and time (01/01/1970, 00:00:00), install the four new batteries within four minutes after the old batteries are removed from the battery compartment. The SP-710 date and time is synchronized automatically when connected with **uPyxis®** Mobile or Desktop App.

The SP-710 battery compartment, shown in Figure 1, is on the back side of the instrument. Batteries are held in place by a cover secured with two Phillips-head screws.

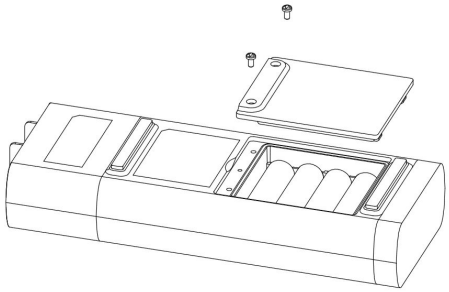

Figure 1. The SP-710 battery compartment

Use the following procedure to install new batteries:

1. Remove the battery compartment cover by loosening the two screws.
2. Remove the old batteries and dispose of them properly.
3. Following the positive and negative terminal signs in the compartment bottom, snap four new AA alkaline batteries firmly into the battery holder.
4. Replace the battery compartment cover and ensure that the sealing O-ring is lying flat on the battery holder.
5. Fasten the two screws.

    ∗**NOTE**∗ *Failure to properly seat the O-ring may result in water damage to the SP-710.*

4.2 pH/ORP Module Battery Installation

The new pH/ORP module has a lithium thionyl chloride battery (3.7V-ER14250) installed. When the battery capacity is critically low and the main module displays a LOW BATTERY warning, replace the ER14250 battery. Use the following procedure to install a new battery:

1. Unsnap the pH/ORP module from the top of the main module.
2. Remove the battery compartment cover by using a coin or flat-head screwdriver to turn the cover counterclockwise.
3. Remove the old battery and dispose of it properly.
4. Following the orientation of the battery as shown in Figure 2, put a new ER14250 battery into the compartment.
5. Fasten the compartment cover by turning it clockwise.
6. Snap the pH/ORP module back atop the main module.

    ∗**NOTE**∗ *Failure to properly fasten the cover may result in battery short-circuit and damage.*

Figure 2. Proper orientation of the ER14250 battery

5 Instrument Overview

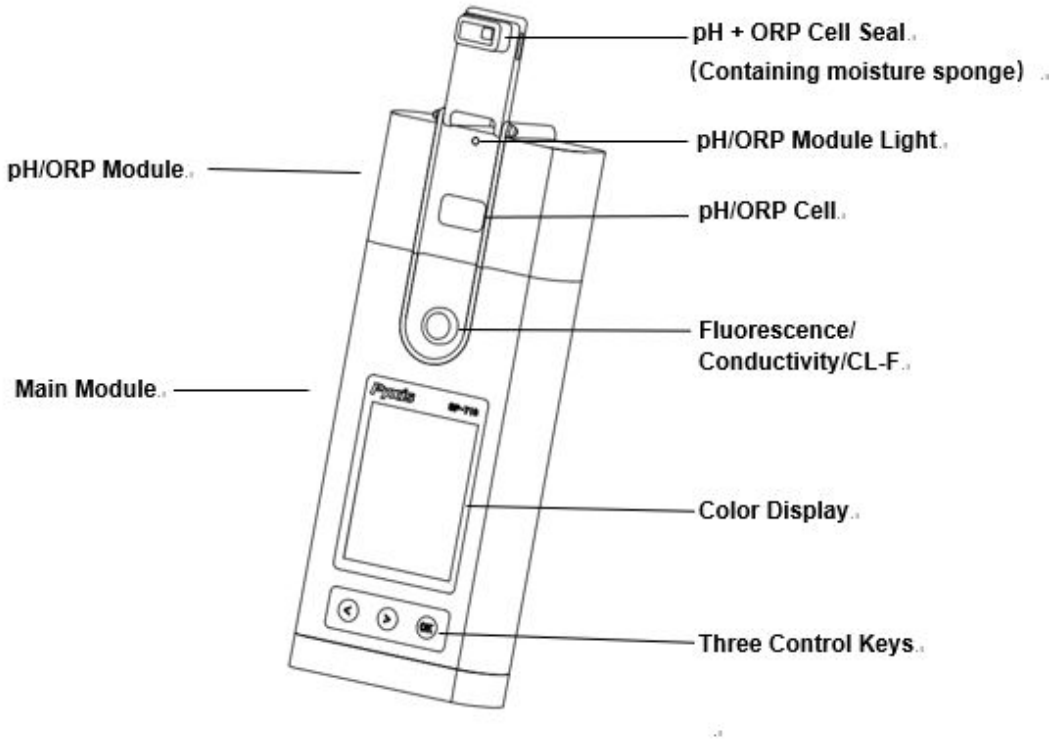

Figure 3.

5.1 pH/ORP Cell Dual-Function Seal

The SP-710 pH/ORP rubber seal serves two purposes:

1. The seal contains a magnet which when opened to flush position will power on the pH/ORP module.
2. When the SP-710 is in storage, the seal maintains a moist environment for the electrodes.

For vigorous field use, it is recommended to utilize a rubber-band to secure the pH/ORP Cell Dual-Function Seal to prevent loss of pH/ORP Storage Solution. The sponge soaked with the pH/ORP Storage Solution in the pH/ORP Cell Dual-Function Seal helps prolong the life of the pH/ORP module. It may be discarded if desired, but pH/ORP Storage Solution must be maintained in the unit cell at all times during non-use. Please fill the pH/ORP cell with 1 mL of Pyxis pH/ORP Storage Solution (P/N: 63900) at all times when not using the pH/ORP cell.

Figure 4. pH/ORP Cell Dual-Function Seal in the open position

5.2 Control Keys

The SP-710 has three control keys, as shown in Figure 3. The left (<), right (>), and ok (OK) keys are used to launch actions indicated on the LCD display directly above the keys. The labels above the keys indicate the function associated with each key and functions can be changed in different operation modes.

∗**NOTE**∗ *The LCD display is not a touch-enabled device.*

5.3 Main Module On/Off

To turn on the SP-710: Press OK momentarily and release.

To turn off the SP-710: Press and hold OK for about three seconds. Release OK when the LCD display turns off. The SP-710 turns itself off after 30 seconds without user interaction detected. This is done to conserve battery life.

∗**NOTE**∗ *This auto-time off setting may be customized by the user as desired through the* ***uPyxis®*** *Mobile or Desktop App.*

5.4 pH/ORP Module On/Off

The module is turned on by rotating the pH/ORP cell seal to touch the front face of the module as seen in Figure 5. A sealed magnet within the rubber seal will trigger the module power circuit. The pH/ORP module will turn itself off when either commanded by the main module or automatically based on the default or customized idle time limit setting. The purpose for this design is to extend battery life.

If pH/ORP measurement is not needed, the module does not need to be turned on.

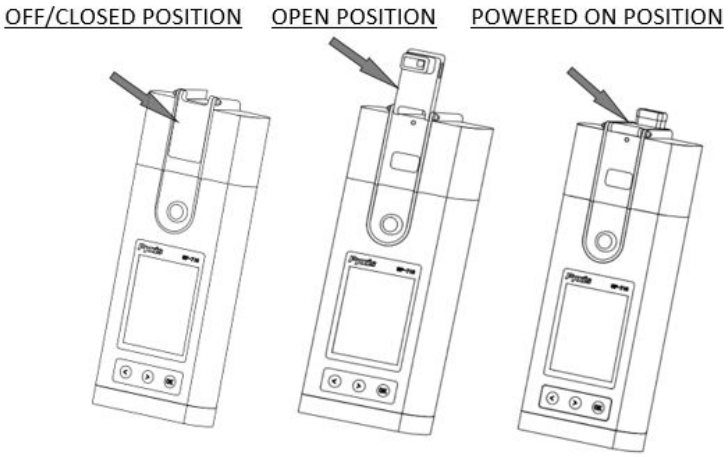

Figure 5.

6 Measurement

6.1 PTSA and Conductivity Measurement

6.1.1 Measurement Procedure

When powered on, the SP-710 will default to the PTSA and conductivity measurement mode. The water sample can be transferred to the main module sample cell using a pipette or filled directly from a faucet, sample bottle, or sample valve.

> ∗**NOTE**∗ *Special care should be taken when pouring the sample into the cell to avoid air bubble entrainment, which can interfere with reading accuracy.*

Before beginning a measurement, use the sample water to rinse the main module sample cell at least three times. Allow 5–10 seconds for the SP-710 to stabilize. The values will be displayed in **white with a blue background** if a stable value is reached (Figure 6). For a sample with conductivity in the range of 100 to 6000 µS/cm, the measured value should be stabilized in the range of 98–102 to 5940–6060 µS/cm, respectively. For a sample containing 100 ppb PTSA, the measured PTSA should be stabilized within the range of 98–102 ppb.

> ∗**NOTE**∗ *The time required to reach a stable reading may be slightly longer if the water sample temperature is significantly different than the environmental temperature at which the SP-710 had been equilibrated (stored).*

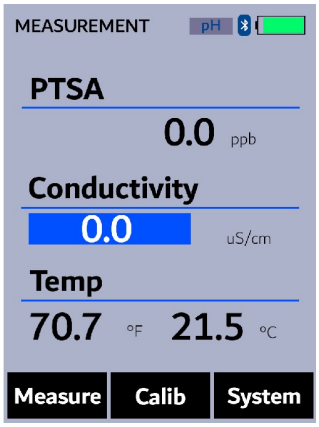

Figure 6.

6.1.2 Temperature Compensation

The displayed conductivity value is automatically compensated to the nominal value at the reference temperature 25 °C using the sample temperature measured. The commonly used linear correction equation is used:

$$Conductivity\ at\ 25\ °C = \frac{Conductivity\ at\ T_{measured}}{1 + 0.02(T_{measured} - 25)} \quad (1)$$

where $T_{measured}$ is the sample temperature in °C.

6.1.3 High Color and Turbidity Warning

The SP-710 has extra channels to measure sample turbidity and color to automatically compensate sample color and turbidity interference. If sample turbidity and color values determined are too high, a PTSA measurement warning will be displayed. In such a case, the user should filter the sample for PTSA measurement.

6.2 TMB Free and Total Chlorine Measurement

The SP-710 offers Free and Total chlorine methods based on the USEPA-accepted tetramethylbenzidine (TMB) chemistry. Pyxis also offers Free and Total chlorine reagent in a 30 mL, easy-to-use dropper bottle which is sufficient for up to 230 individual tests. This unique liquid reagent contains the TMB reagent for free or total chlorine, a pH buffer, and a polymeric binder. See the **Optional Accessories** section for ordering details. When three drops of these liquid reagents are administered into the sample cell of the SP-710, the TMB reagent rapidly reacts with free or total chlorine present to develop a stable, yellow-colored solution. The SP-710 measures the absorbance value of the resulted yellow solution to determine the free or total chlorine concentration.

6.2.1 Measurement Procedure

Follow the steps below to measure free and total chlorine:

1. Power on the SP-710 by pressing (OK). Allow 5–10 seconds for the SP-710 to stabilize.
2. Press **Measure** (<) as needed to highlight **Chlorine** in the selection menu.
3. Press (OK) to launch the **CHLORINE MEASUREMENT** screen (Figure 7).
4. Rinse the main module sample cell three times with the sample to be tested. Fill the sample cell with the sample.
5. Press **Zero** (<). **ZERO** will then appear on the top-left corner of the display (Figure 8).
6. Prepare the developed sample:
   (a) Add 3 drops of Free or Total Chlorine reagent into the sample cell (Figure 9).
   (b) Draw out the sample water and reagent from the sample cell using the disposable pipette to provide mixing.
   (c) Once the sample has been drawn into the reagent pipette, shake the pipette or squeeze the sample back into the sample cell allowing the reagent to fully dissolve. A yellow color should develop if chlorine is present.
7. Press **Timer** (>). A 2-minute timer will begin.
8. The SP-710 will continuously display the free or total chlorine concentration as the timer counts down (Figure 10). If the real-time readings remain steady, press **Stop** (>) to stop measurement timer early or wait for the 2-minute timer to end.
9. Record the final value as ppm Free or Total Chlorine.

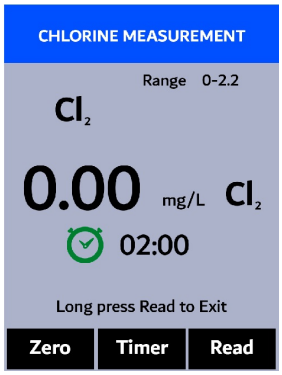

Figure 7.

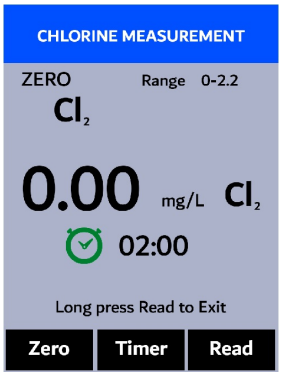

Figure 8.

Figure 9.

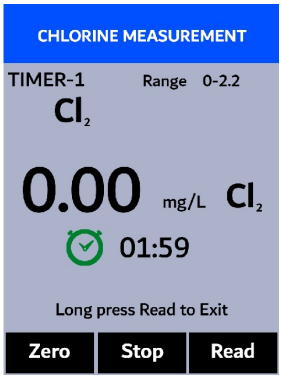

Figure 10.

6.3 Temperature Measurement

The SP-710 has two platinum RTDs located in the main module sample cell and the pH/ORP sample cell. The temperature sensors are individually calibrated in the factory and do not need to be calibrated during use. The temperature values measured are used in the conductivity temperature compensation and in converting the measured cell potential to the pH value at the sample temperature.

6.4 pH/ORP Measurement

6.4.1 Measurement Procedure

Follow the steps below to measure pH and ORP:

1. Rotate the pH/ORP cell seal to touch the front face of the module as seen in Figure 5. This is to power on the module. The indicator light of the module will be green and flashing when powered on. After the module is turned on, the seal can be positioned anywhere desired.

   ∗**NOTE**∗ *If the module battery capacity is low, the indicator light will flash red.*

2. Press **Measure** (<) as needed to highlight **pH/ORP** in the selection menu.

3. Press OK to launch the **pH/ORP MEASUREMENT** screen.

4. The main module of the SP-710 will automatically connect after the pH/ORP module has been powered up.

5. Rinse the pH/ORP sample cell three times with the sample to be tested. Fill the sample cell with the sample.

6. The pH and ORP values will be updated every two seconds on the SP-710 main module display. The values will be displayed in white with a blue background once a stable value is reached (Figure 11).

   ∗**NOTE**∗ *If the pH/ORP module powers off or was not powered on to begin with (see step 1) an instruction message will be promoted on the screen showing how to turn on the pH/ORP module (Figure 12).*

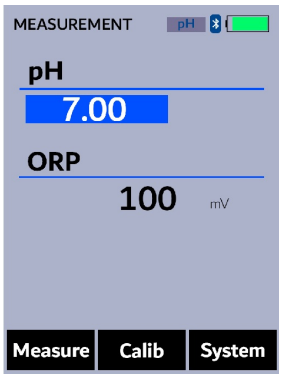

Figure 11.

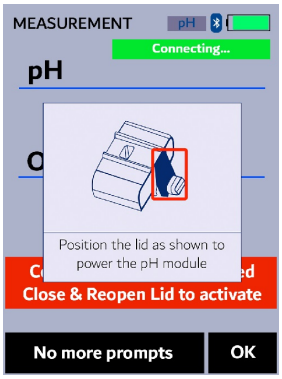

Figure 12.

6.4.2 Erroneous Values

An erroneous pH value could be obtained if the module has been stored dry without the protection of pH/ORP Storage Solution for a long period of time. In this case, please fill the module cell with pH/ORP Storage Solution to wet the electrode and allow it to soak for 30 minutes before use. If the pH/ORP Storage Solution is not available, please use the sample water to hydrate the electrode for at least 30 minutes.

6.4.3 pH Measurement Principle

The SP-710 pH/ORP module uses the standard electrochemical cell for the pH measurement. The cell consists of a glass electrode and an Ag/AgCl reference electrode. Potassium chloride (KCl) electrolyte filling gel is sealed in the Ag/AgCl electrode. The amount of reference electrolyte in the pH/ORP module is significantly larger than that used in a common laboratory pH electrode. This reduces the chance of the filling solution being diluted or contaminated and increases the electrode life.

The pH value is calculated from the measured cell potential (EMF in mV):

$$pH = \frac{EMF}{S(T) + pH_o} \tag{2}$$

$$S(T) = 0.1986(T + 273.15) \tag{3}$$

$S(T)$ in the above equation is the calibration slope, where T is temperature in degrees Celsius. $S(T)$ has a theoretical value of 59.17 mV at 25 °C. pH_o is the calibration intercept. The calibration slope, $S(T)$, at the nominal temperature 25 °C and the intercept, pH_o, are determined in the two-point or three-point calibration procedure. pH_o is determined as well in the singe-point pH 7.00 calibration. The temperature value measured by the pH/ORP module is used in the above equation to calculate the pH value at the sample temperature.

> ∗**NOTE**∗ *The temperature compensation involved in the pH value calculation is quite different from that in the conductivity measurement. The temperature-compensated conductivity value is a would-be value at the reference temperature 25 °C, while the pH value displayed by the SP-710 is the true pH value at the sample temperature.*

6.4.4 ORP Measurement Principle

The SP-710 measures the sample ORP with the platinum electrode and the Ag/AgCl reference electrode in the pH/ORP cell. The pH measurement and the ORP measurement share the same reference electrode. **Reporting an ORP value without specifying the reference scale has no meaning**. The value displayed by the SP-710 depends on the ORP value of the ORP standard used in the calibration. If the ORP value of the standard is referenced to the Standard Hydrogen Electrode (SHE), the ORP value reported by the SP-710 is SHE-based, i.e., in the unit of Eh. If the ORP value of the standard is referenced to the Ag/AgCl (3M KCl) electrode, the ORP value reported by the SP-710 is referenced to the same, commonly noted as (Ag/AgCl, 3M KCl).

The ORP electrode is calibrated using the Zobell's standard using the value of 221 mV at 25 °C before shipping. **The default ORP scale of the SP-710 before a user calibration is the Ag/AgCl (3M KCl)**. If the SP-710 is exposed to an extremely high (> +600 mV) or extremely low (< -200 mV) ORP sample, rinsing the pH/ORP cell excessively when switching to measure a lower or higher redox buffer capacity sample is necessary. The dissolved oxygen in the sample can contribute to the ORP value measured. To measure a sample that has not be equilibrated with the ambient air, a slow and small upward drifting to more positive ORP value is normal. For a typical cooling water sample treated with oxidizing biocides, a ±20 mV accuracy and ±10 mV precision can be expected.

7 Calibration

7.1 PTSA Calibration (Two-Point with Zero)

1. Rinse the main module sample cell three times with DI water. Fill the sample cell with DI water.

   ∗**NOTE**∗ *In emergency, "non-PTSA" water, such as city water, may be used, but re-calibrate using DI water for the zero step as soon as it is available.*

2. Power on the SP-710 by pressing (OK). Allow 5–10 seconds for the SP-710 to stabilize.
3. The unit is actively reading and displaying both PTSA and Conductivity. The values will be very low if DI water is used; conductivity value is not critical but PTSA value should be near zero. A low non-zero value (e.g. 0.2 or 0.4, etc.) is not problematic.
4. Press **Calib** (>) as needed to highlight **PTSA** in the selection menu.
5. Press (OK) to launch the **PTSA CALIBRATION** screen (Figure 13).
6. Press **Zero** (<) to start the zero (blank) calibration.
7. If the calibration succeeds, a checkmark (✔) and instructions for the slope calibration will appear (Figure 14).
8. Rinse the main module sample cell three times with the desired PTSA standard. Fill the sample cell with the desired PTSA standard.
9. Press **Cycle** (<) to cycle between the PTSA standards 100, 200, and 300 ppb (it repeats). Ensure the value selected matches the desired PSTA standard in the sample cell.
10. Press **Slope** (>) to start the slope calibration.
11. If the calibration succeeds, a checkmark (✔), a "Calibration Success" message will appear (Figure 15). Otherwise, a warning message is displayed.
12. Calibration is now complete. Press **Exit** (OK) to return to measurement mode.

    ∗**NOTE**∗ *If **Exit** is pressed before the second checkmark appears, the calibration will not be completed and must be re-done.*

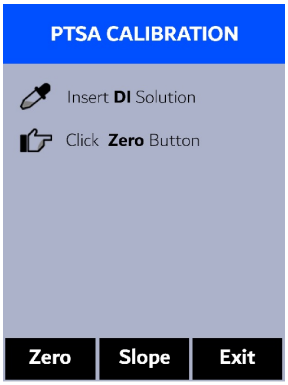

Figure 13.

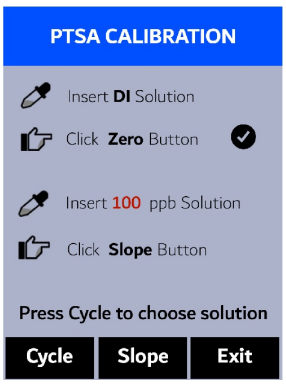

Figure 14.

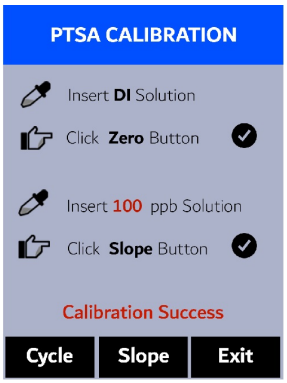

Figure 15.

7.2 Combined PTSA and Conductivity Calibration

The following steps will calibrate both conductivity at 1000 µS/cm and PTSA at 100 ppb using Pyxis 100 ppb PTSA + 1000 µS/cm (KCl) Combined Standard (P/N: 21004):

1. Rinse the main module sample cell three times with the Combined Standard. Fill the sample cell with the Combined Standard.
2. Power on the SP-710 by pressing (OK). Allow 5–10 seconds for the SP-710 to stabilize.
3. Press **Calib** (>) as needed to highlight **Cond** in the selection menu.
4. Press (OK) to launch the **COMBINED CALIBRATION** screen (Figure 16).
5. Press **Calib** ((OK)) to confirm the desired calibration.
6. The display updates as shown in Figure 17 and the user can choose one of three options:
   (a) Press (OK) to start the calibration, **or**
   (b) Press **Cancel** (<) to return to the **COMBINED CALIBRATION** screen, **or**
   (c) Press **Exit** (>) to abandon calibration entirely.
7. Once calibration begins, the SP-710 reads the sample and displays the value in the **Measured** section. A slight variance from the target is acceptable.
8. If successful, a checkmark (✔) will appear next to the conductivity measurement.
9. After a second, another checkmark (✔) will appear next to the PTSA measurement.
10. Finally, the message "Calibration Success" will appear towards the bottom of the display (Figure 18).
11. Calibration is now complete, long press **Calib** ((OK)) to return to measurement mode.

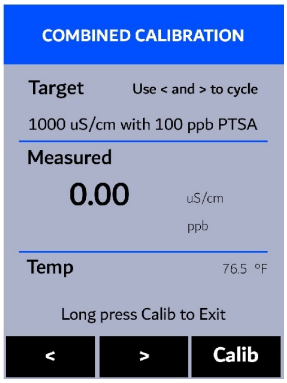

Figure 16.

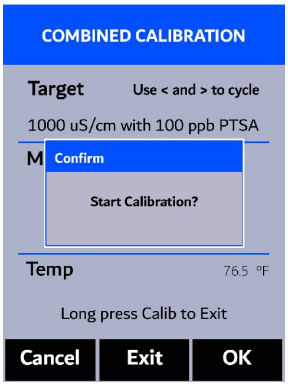

Figure 17.

Figure 18.

7.3 Conductivity Calibration

7.3.1 Conductivity Calibration (500, 1000, 2500, or 5000 µS/cm)

1. Rinse the main module sample cell three times with the desired conductivity standard. Fill the sample cell with the desired conductivity standard.
2. Power on the SP-710 by pressing (OK). Allow 5–10 seconds for the SP-710 to stabilize.
3. Press **Calib** (>) as needed to highlight **Cond** in the selection menu.
4. Press (OK) to launch the **COMBINED CALIBRATION** screen.
5. Press (>) to launch the **CONDUCTIVITY CALIBRATION** screen.
6. Use (<) and (>) to cycle to the desired calibration. The standard conductivity selections are 500, 1000, 2500, or 5000 µS/cm. For other conductivity values, see the **User-Defined Conductivity Calibration** section.

   ∗**NOTE**∗ *To exit the calibration procedure entirely, long press **Calib** (OK)*
7. Press **Calib** (OK) to confirm the specific conductivity calibration desired.
8. The display updates as shown in Figure 19 and the user can choose one of three options:
   (a) Press (OK) to start the calibration, **or**
   (b) Press **Cancel** (<) to return to the **CONDUCTIVITY CALIBRATION** screen, **or**
   (c) Press **Exit** (>) to abandon calibration entirely.
9. Once calibration begins, the SP-710 reads the sample and displays the value in the **Measured** section. A slight variance from the target is acceptable.
10. The message "Calibration Success" will appear towards the bottom of the display (Figure 20).
11. Calibration is now complete, long press **Calib** (OK) to return to measurement mode.

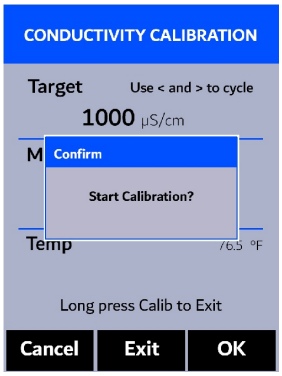

Figure 19.

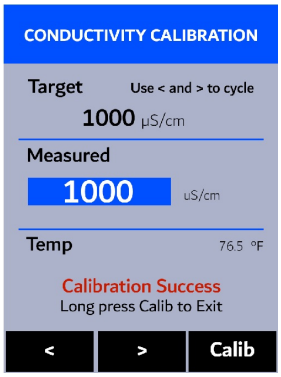

Figure 20.

7.3.2 User-Defined Conductivity Calibration

1. Rinse the main module sample cell three times with the desired conductivity standard. Fill the sample cell with the standard.
2. Power on the SP-710 by pressing (OK). Allow 5–10 seconds for the SP-710 to stabilize.
3. Press **Calib** (>) as needed to highlight **Cond** in the selection menu.
4. Press (OK) to launch the **COMBINED CALIBRATION** screen.
5. Press (<) to launch the **USER DEFINED CALIBRATION** screen (Figure 21).
6. Use **-** (<) and **+** (>) to adjust the target conductivity value as desired. Holding a key down scrolls the values at a faster rate.
7. Press **Set** (OK) to confirm the target conductivity value.

   ∗**NOTE**∗ *To exit the calibration procedure entirely, long press **Calib** (OK)*
8. Press **Calib** (OK) to confirm the specific conductivity calibration desired.
9. The display updates as shown in Figure 22 and the user can choose one of three options:
   (a) Press (OK) to start the calibration, **or**
   (b) Press **Cancel** (<) to return to the **USER DEFINED CALIBRATION** screen, **or**
   (c) Press **Exit** (>) to abandon calibration entirely.
10. Once calibration begins, the SP-710 reads the sample and displays the value in the **Measured** section. A slight variance from the target is acceptable.
11. The message "Calibration Success" will appear towards the bottom of the display (Figure 23).
12. Calibration is now complete, long press **Calib** (OK) to return to measurement mode.

Figure 21.

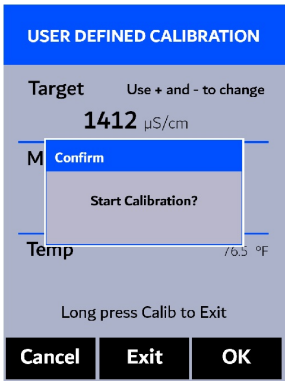

Figure 22.

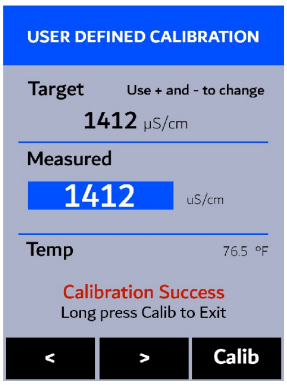

Figure 23.

7.4 TMB Free and Total Chlorine Calibration

7.4.1 Calibration Check using Pyxis TMB Chlorine Secondary Standard

Figure 24. TMB Chlorine Secondary Standard 1 ppm

The TMB Chlorine method has been calibrated prior to shipping; there is no need to calibrate unless a calibration check indicates that the method needs to be re-calibrated. The following steps are used to carry out a calibration check using a Pyxis TMB Chlorine Secondary Standard 1.0 ppm:

1. Fill the main module sample cell with the TMB Chlorine Secondary Standard solution and allow to soak for 15 minutes.
2. After 15 minutes of soaking, use a pipe-cleaner brush or Q-Tip to gently clean the internal walls of the sample cell.
3. Rinse the sample cell three times with deionized (DI) water. Fill the sample cell with DI water.
4. Power on the SP-710 by pressing (OK). Allow 5–10 seconds for the SP-710 to stabilize.
5. Press **Measure** (<) as needed to highlight **Chlorine** in the selection menu.
6. Press (OK) to launch the **CHLORINE MEASUREMENT** screen (Figure 25).
7. Press **Zero** (<). **ZERO** will appear on the top-left corner of the display (Figure 26).
8. Rinse the sample cell three times with the TMB Chlorine Secondary Standard solution. Fill the sample cell with the standard.
9. Press **Read** (OK) and record the value.
10. If the measured chlorine value is outside the range of 1.0 ±0.01, either:
    (a) Follow the procedure in the **Slope Calibration using Pyxis TMB Chlorine Secondary Standard** section, or
    (b) Follow the procedure in the **Slope Calibration using User-Defined TMB Chlorine Standard** section, or
    (c) Contact service@pyxis-lab.com for pricing on factory calibration services.

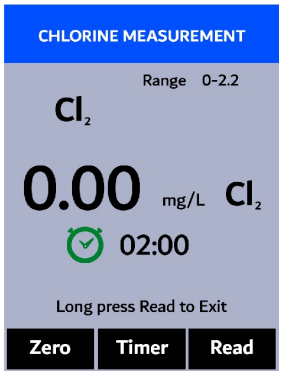

Figure 25.

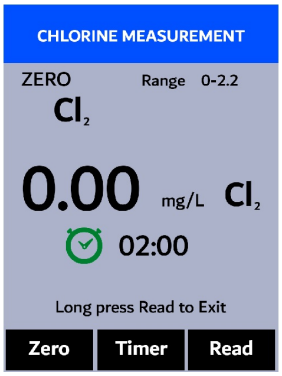

Figure 26.

7.4.2 Blank (Zero) Calibration

The TMB Chlorine method has a non-zero intercept value in the calibration equation. A proper non-zero intercept value has been calibrated prior to shipping. The following steps are used to carry out a reagent blank calibration which changes this non-zero intercept value:

1. Power on the SP-710 by pressing (OK). Allow 5–10 seconds for the SP-710 to stabilize.
2. Press **Measure** (<) as needed to highlight **Chlorine** in the selection menu.
3. Press (OK) to launch the **CHLORINE MEASUREMENT** screen (Figure 27).
4. Rinse the main module sample cell three times with deionized (DI) water. Fill the sample cell with DI water.
5. Press **Zero** (<). **ZERO** will appear on the top-left corner of the display (Figure 28).
6. Prepare the developed blank-zero sample:
   (a) Add 3 drops of Free or Total Chlorine reagent into the sample cell (Figure 29).
   (b) Draw out the DI water and reagent from the sample cell using the disposable pipette to provide mixing.
   (c) Once the sample has been drawn into the reagent pipette, shake the pipette or squeeze the sample back into the sample cell allowing the reagent to fully dissolve.
7. Press **Timer** (>). A 2-minute timer will begin.
8. The SP-710 will continuously display the free or total chlorine concentration as the timer counts down (Figure 30). If the real-time readings remain steady, press **Stop** (>) to stop measurement timer early or wait for the 2-minute timer to end.
9. Press **Cal** (>) to launch the **CHLORINE CALIBRATION** screen (Figure 31).
10. Press **Blank** (<) to start blank calibration.
11. The message "**Blank calibration success**" will appear on the bottom of the display (Figure 32).
12. Calibration is now complete. Long press **Default** (OK)to return to the **CHLORINE MEASUREMENT** screen.

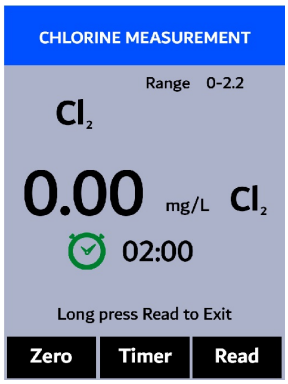

Figure 27.

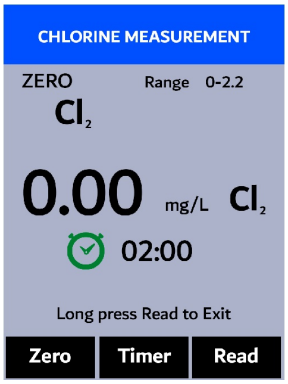

Figure 28.

Figure 29.

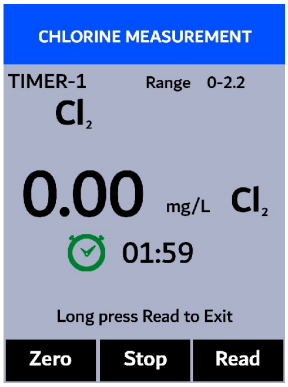

Figure 30.

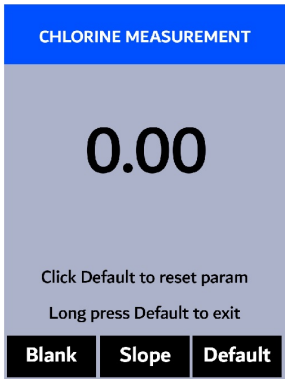

Figure 31.

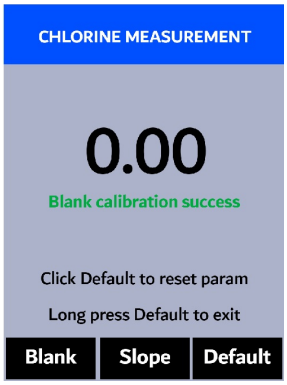

Figure 32.

7.4.3 Slope Calibration using Pyxis TMB Chlorine Secondary Standard

The TMB Chlorine method has been calibrated prior to shipping; there is no need to calibrate unless a calibration check (see the **Calibration Check using Pyxis TMB Chlorine Secondary Standard** section) indicates that the method needs to be re-calibrated. The following steps are used to carry out a slope calibration using the Pyxis TMB Chlorine Secondary Standard 1.0 ppm:

> ***NOTE*** *It is recommended to have a chlorine concentration between 0.33 ppm and 2.2 ppm.*

1. Power on the SP-710 by pressing (OK). Allow 5–10 seconds for the SP-710 to stabilize.
2. Press **Measure** (<) as needed to highlight **Chlorine** in the selection menu.
3. Press (OK) to launch the **CHLORINE MEASUREMENT** screen (Figure 33).
4. Rinse the main module sample cell three times with deionized (DI) water. Fill the sample cell with DI water.
5. Press **Zero** (<). **ZERO** will appear on the top-left corner of the display (Figure 34).
6. Rinse the sample cell three times with Pyxis TMB Chlorine Secondary Standard. Fill the sample cell with the standard.
7. Press **Read** ((OK)).
8. Press **Cal** (>) to launch the **CHLORINE CALIBRATION** screen (Figure 35).
9. Press **Slope** (>).
10. Use **+** (<) and **-** (>) to adjust the chlorine concentration to the value of 1.00 ppm (Figure 36).
11. Press **Calib** ((OK)) to start slope calibration.
12. The message "**Slope calibration success**" will appear on the bottom of the display (Figure 37).
13. Calibration is now complete. Long press **Calib** ((OK)) to return to the **CHLORINE MEASUREMENT** screen.

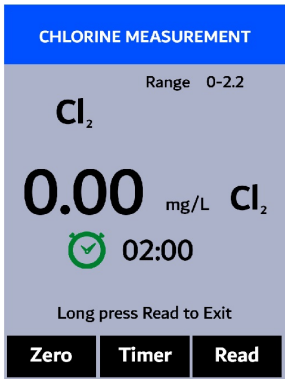

Figure 33.

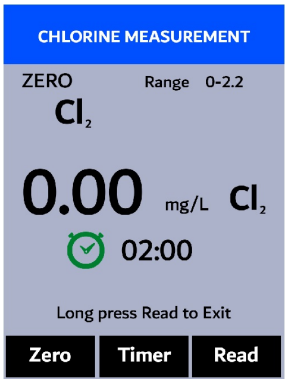

Figure 34.

Figure 35.

Figure 36.

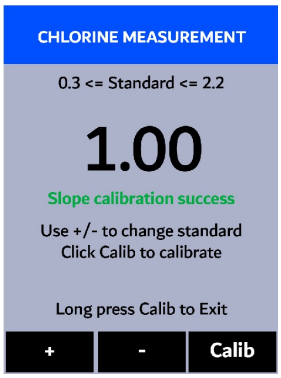

Figure 37.

7.4.4 Slope Calibration using User-Defined TMB Chlorine Standard

The TMB Chlorine method has been calibrated prior to shipping; there is no need to calibrate unless a calibration check (see the **Calibration Check using Pyxis TMB Chlorine Secondary Standard** section) indicates that the method needs to be re-calibrated. The following steps are used to carry out a slope calibration using a solution of known free or total chlorine concentration:

1. Power on the SP-710 by pressing (OK). Allow 5–10 seconds for the SP-710 to stabilize.
2. Press **Measure** (<) as needed to highlight **Chlorine** in the selection menu.
3. Press (OK) to launch the **CHLORINE MEASUREMENT** screen (Figure 38).
4. Rinse the main module sample cell three times with the known chlorine solution. Fill the sample cell with the solution.
5. Press **Zero** (<). **ZERO** will appear on the top-left corner of the display (Figure 39).
6. Prepare the developed blank-zero sample:
   (a) Add 3 drops of Free or Total Chlorine reagent into the sample cell.
   (b) Draw out the solution and reagent from the sample cell using the disposable pipette to provide mixing.
   (c) Once the sample has been drawn into the reagent pipette, shake the pipette or squeeze the sample back into the sample cell allowing the reagent to fully dissolve.
7. Press **Timer** (>). A 2-minute timer will begin.
8. The SP-710 will continuously display the free or total chlorine concentration as the timer counts down (Figure 40). If the real-time readings remain steady, press **Stop** (>) to stop measurement timer early or wait for the 2-minute timer to end.
9. Press **Cal** (>) to launch the **CHLORINE CALIBRATION** screen (Figure 41).
10. Press **Slope** (>).
11. Use **+** (<) and **-** (>) to adjust the chlorine concentration to the value of the known chlorine solution (Figure 42).

12. Press **Calib** (OK) to start slope calibration.
13. The message "**Slope calibration success**" will appear on the bottom of the display (Figure 43).
14. Calibration is now complete. Long press **Calib** (OK) to return to the **CHLORINE MEASUREMENT** screen.

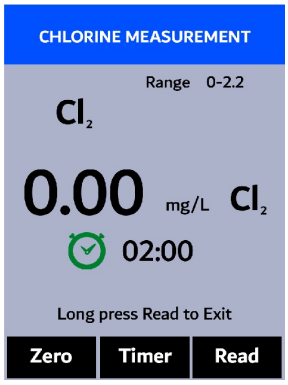

Figure 38.

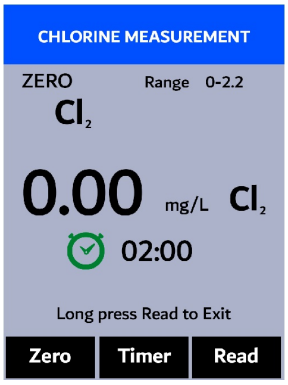

Figure 39.

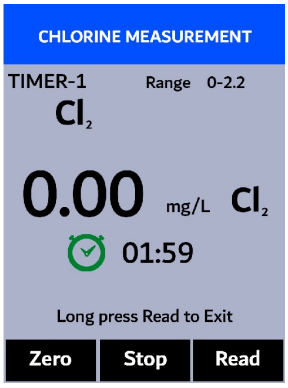

Figure 40.

Figure 41.

Figure 42.

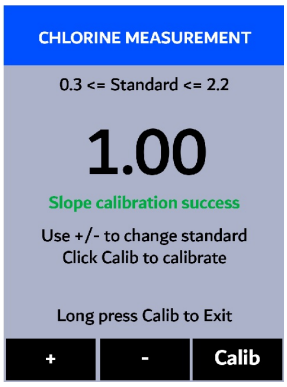

Figure 43.

7.4.5 Restore Default Chlorine Calibration Parameters

Pressing the **Default** (OK) during any of the chlorine calibration procedures will copy the default calibration intercept and slope to the working intercept and slope, respectively. This button action is to restore the working calibration parameters to the original, factory-loaded calibration parameters for both free and total chlorine.

7.5 pH Calibration

The SP-710 is designed to provide a flexible calibration procedure. The user can start with the one-point pH7 calibration and progressively add a two- and three-point calibration with the pH4 and pH10 buffers. This allows the user to choose a procedure based on the need of measurement accuracy and the target pH range. Follow the steps below to conduct either a one-point, two-point, or three-point pH calibration:

1. Power on the SP-710 by pressing (OK).
2. Rotate the pH/ORP cell seal to touch the front face of the module as seen in Figure 4. This is to power on the module. The indicator light of the module will be green and flashing when powered on. After the module is turned on, the seal can be positioned anywhere desired.

   ∗**NOTE**∗ *If the module battery capacity is low, the indicator light will flash red.*

3. Press **Calib** (>) as needed to highlight **pH** in the selection menu.
4. Press (OK) to launch the **pH CALIBRATION** screen.
5. The main module of the SP-710 will automatically connect after the pH/ORP module has been powered up.

7.5.1 One-Point Calibration

6. Rinse the pH/ORP sample cell three times with the pH7 buffer. Fill the sample cell with the pH7 buffer.
7. Allow 5–10 seconds for the pH measurement to stabilize and the padlock (🔒) to appear.
8. Press **pH7** (< or >) to start a one-point calibration.
9. If the calibration succeeds, a checkmark (✔) and a ”pH7 Calibration success!” message will appear (Figure 44). Otherwise, a warning message is displayed.
10. After a successful one-point calibration, choose one of two options:
    (a) Press **Next** (< or >) to proceed to a two- or three-point calibration, **or**
    (b) Press **Exit** (OK) to end the calibration process at a one-point calibration.

7.5.2 Two-Point Calibration

11. Choose either the pH4 or pH10 buffer for a two-point calibration.
12. Rinse the pH/ORP sample cell three times with the chosen buffer. Fill the sample cell with the chosen buffer.
13. Allow 5–10 seconds for the pH measurement to stabilize and the padlock (🔒) to appear.
14. Press **Calib** (< or >) to start a two-point calibration.
15. If the calibration succeeds, a checkmark (✔) and a ”pH4 Calibration success!” or a ”pH10 Calibration success!” message will appear (Figure 45). Otherwise, a warning message is displayed.
16. After a successful two-point calibration, choose one of two options:
    (a) Press **Next** (< or >) to proceed to a three-point calibration, **or**
    (b) Press **Exit** (OK) to end the calibration process at a two-point calibration.

7.5.3 Three-Point Calibration

17. Use the remaining buffer (either the pH4 or pH10) for a three-point calibration.
18. Rinse the pH/ORP sample cell three times with the remaining buffer. Fill the sample cell with the remaining buffer.
19. Allow 5–10 seconds for the pH measurement to stabilize and the padlock (🔒) to appear.
20. Press **Calib** (< or >) to start a three-point calibration.
21. If the calibration succeeds, a checkmark (✔), a ”pH4 Calibration success!” or a ”pH10 Calibration success!” message, and a ”Completed!” message will appear (Figure 46). Otherwise, a warning message is displayed.
22. After a successful three-point calibration, press **Exit** (< , > , or OK) to return to measurement mode.

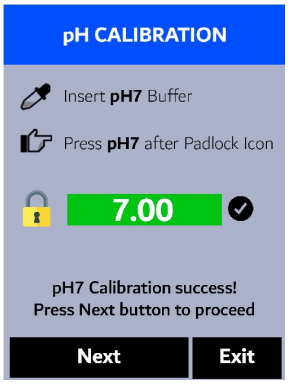

Figure 44.

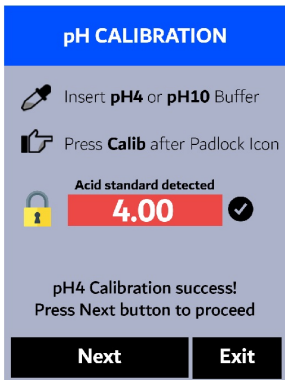

Figure 45.

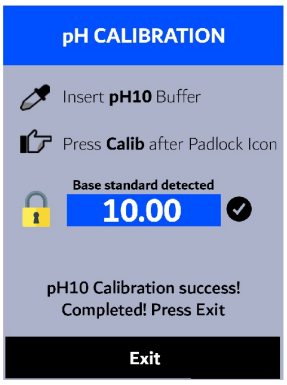

Figure 46.

7.6 ORP Calibration

The ORP scale of the SP-710 depends on the ORP scale of the calibration standard. For example, if the value of 220 mV for the common Zobell's standard at 25 °C is entered in the above calibration, the ORP value reported by the SP-710 after calibration is referenced to the Ag/AgCl(3M KCl) scale. This is because the value of 220 mV is based on the Ag/AgCl(3M KCl) reference electrode. If the value entered in the above calibration is 429 mV, the ORP value reported by the SP-710 is referenced to the SHE, because the value of 429 mV at 25 °C for the Zobell's standard is SHE based.

The values in the following table can be used to convert the Ag/AgCl reference electrode-based ORP value to the SHE-based ORP value. To obtain the SHE-based ORP value, add the number in the table to the corresponding Ag/AgCl reference electrode-based value. To use the table, the temperature of the standard solution measured by the SP-710 must be used.

Table 3.

Temperature °F (°C)*	Ag/AgCl (1M KCl)	Ag/AgCl (3M KCl)	Ag/AgCl (saturation KCl)
68 (20)	+234	+213	+202
77 (25)	+231	+209	+199
86 (30)	+228	+205	+196

* Use the temperature measured by the SP-710.

Follow the steps below to carry out an ORP calibration:

1. Power on the SP-710 by pressing (OK).
2. Rotate the pH/ORP cell seal to touch the front face of the module as seen in Figure 4. This is to power on the module. The indicator light of the module will be green and flashing when powered on. After the module is turned on, the seal can be positioned anywhere desired.

   ∗**NOTE**∗ *If the module battery capacity is low, the indicator light will flash red.*

3. Press **Calib** (>) as needed to highlight **ORP** in the selection menu.
4. Press (OK) to launch the **ORP CALIBRATION** screen.
5. The main module of the SP-710 will automatically connect after the pH/ORP module has been powered up.
6. Use **+** (<) and **-** (>) to adjust the ORP value to match the ORP standard used (Figure 47).
7. Press **Calib** ((OK)). The message "Calibration Success" will appear on the display (Figure 48).
8. Calibration is now complete. Long press **Calib** ((OK)) to return to measurement mode.

Figure 47.

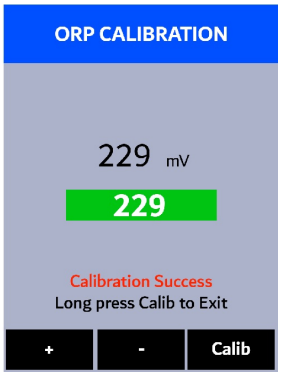

Figure 48.

8 Device Information and Diagnosis

The **DEVICE INFORMATION** screen is launched when **System** (OK) is pressed in the measurement mode. This screen contains the device serial number, software version, and hardware version (Figure 49). The battery life as a percentage and the MAC addresses for main module also shown.

Press **Diagnosis** (<) to launch the **SYSTEM DIAGNOSIS** screen where raw measurement data are displayed (Figure 50). The information has no use for normal operation, but instead is used for device troubleshooting. Provide an image of both the **DEVICE INFORMATION** screen and the **SYSTEM DIAGNOSIS** screen when you contact Pyxis (service@pyxis-lab.com) for troubleshooting your device or call +1 (866) 203-8397.

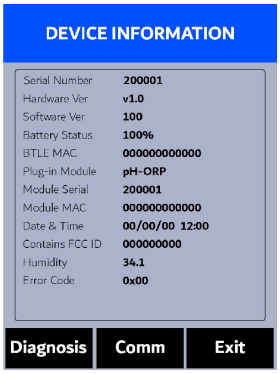

Figure 49.

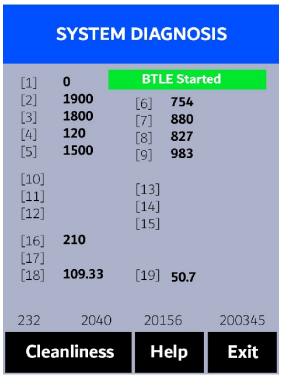

Figure 50.

8.1 Main Module Sample Cell Cleanliness Check

The SP-710 is designed to provide reliable and accurate measurement on PTSA and TMB Free and Total Chlorine. Heavy fouling will prevent the light from reaching the sensor, resulting in inaccurate readings. It is suggested that the SP-710 be checked for fouling and cleaned on a monthly basis. Heavily contaminated waters may require more frequent cleanings. Cleaner water sources with less contamination may not require cleaning for several months. The SP-710 is designed to carry out a Cleanliness Check as described below:

1. Power on the SP-710 by pressing (OK).
2. Press **System** ((OK)) to launch the **DEVICE INFORMATION** screen.
3. Press **Diagnosis** ((<)) to launch the **SYSTEM DIAGNOSIS** screen.
4. Allow 5–10 seconds for the message in the top-right corner of the display change from **Starting BTLE...** to **BTLE Started**
5. Press **Cleanliness** ((<)). An instruction prompt appears to ask the user to put DI water into the main module sample cell (Figure 51).
6. Pour DI water into the main module sample cell.
7. Press **Confirm** ((<), (>), or (OK)). The instruction prompt will disappear and the SP-710 displays a countdown toward the bottom of the display.
8. Once the Cleanliness Check is completed a **Clean** message (Figure 52) or **Sample cell fouled** message (Figure 53) will appear towards the bottom of the display.
9. Cleanliness check is now complete. Press **Exit** ((OK)) to return to measurement mode.

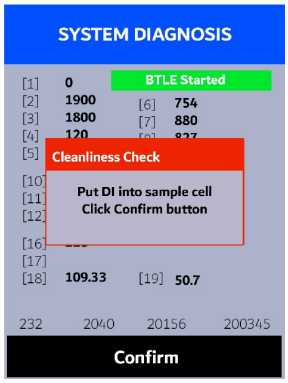

Figure 51.

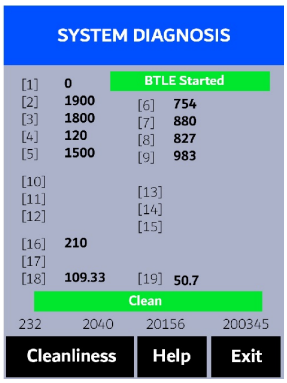

Figure 52.

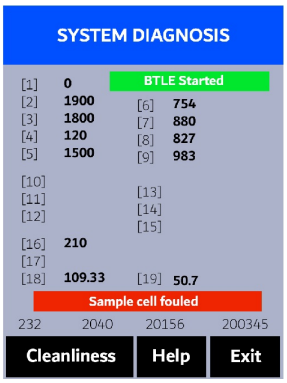

Figure 53.

8.2 Bluetooth Connection to Devices

The SP-710 uses a built-in Bluetooth Low Energy Connection (BTLE) to connect wirelessly to a smart phone via the **uPyxis®** Mobile App, to a computer via the included Bluetooth Adapter (P/N: MA-NEB) and the **uPyxis®** Desktop App, or to nearby Pyxis inline probe with the Pyxis Inline Bluetooth Adapter (P/N: MA-WB) connected between the Pyxis inline probe and controller. To allow the SP-710 to connect via Bluetooth with other devices, follow the steps below:

1. Power on the SP-710 by pressing (OK).
2. Press **System** ((OK)) to launch the **DEVICE INFORMATION** screen.
3. Press **Diagnosis** ((<)) to launch the **SYSTEM DIAGNOSIS** screen.
4. Allow 5–10 seconds for the message in the top-right corner of the display change from **Starting BTLE...** to **BTLE Started** (Figure 50).
5. Choose to connect via one of two options:
   (a) The **uPyxis®** Mobile App (see the **Use with uPyxis® Mobile App** section), or
   (b) The **uPyxis®** Desktop App (see the **Use with uPyxis® Desktop App** section).

8.2.1 Calibrate an ST-500 Series Probe with the SP-710 via Bluetooth

The SP-710 can be used to verify the result of an inline Pyxis ST-500 Series probe by measuring the sample water taken from the inline probe sample line. The SP-710 can then be used to calibrate the inline probes over the Bluetooth connection. To calibrate an inline probe, follow the steps below:

1. Power on the SP-710 by pressing (OK).
2. Press **System** ((OK)) to launch the **DEVICE INFORMATION** screen.
3. Press **Comm** ((>)) to launch the **COMMUNICATION** screen (Figure 54).
4. Press **Scan** ((<)) to begin scanning for Bluetooth devices.
5. Discoverable devices will begin to populate on the display with their name and MAC-Address (Figure 55).
6. If more than one device appears in the **Device list**, press **»** ((>)) to cycle through the devices.
7. If no devices or the incorrect device appear in the **Device list**, press **Scan** ((<)) to re-scan for discoverable devices.
8. Press **Connect** ((OK)) to begin pairing to the selected probe.
9. When the connection is established, the SP-710 displays the latest PTSA measurement from the connected probe (Figure 56).
10. Fill the main module sample cell with the same sample water that the probe is measuring.
11. Press **Read** ((>)) to see PTSA measurement from the SP-710along with the probe measurement (Figure 57).
12. Press **Calib** ((OK)) to begin probe PTSA calibration.
13. The SP-710 will take the probe PTSA measurement three times to verify the calibration (Figure 58).

> ∗**NOTE**∗ *It takes about one minute for the probe to approach the calibrated reading and the three verifying readings may not be exactly the same as the value measured by the SP-710. Press* ***Read*** *((>)) again to take more readings from the probe, if necessary.*

14. If the calibration is successful, a ”Verify calibration - OK” message will appear on the top of the display (Figure 59).
15. Calibration is now complete. Long press **Calib** (OK) to return to measurement mode.

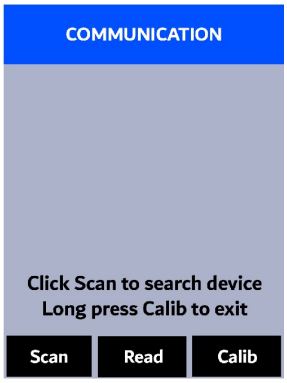

Figure 54.

Figure 55.

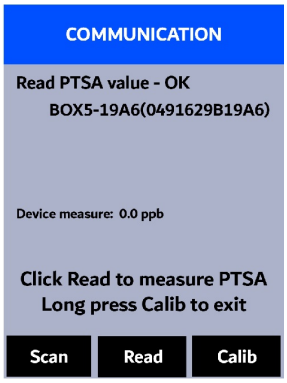

Figure 56.

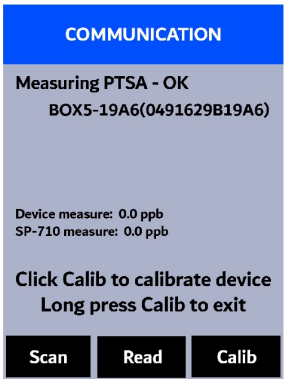

Figure 57.

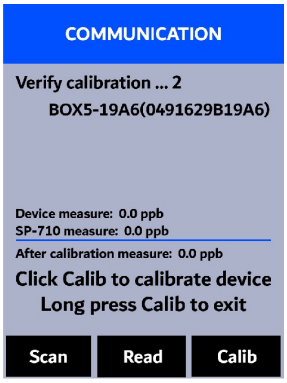

Figure 58.

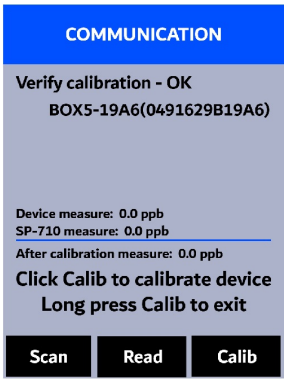

Figure 59.

8.3 Factory Reset

Use the following steps to restore all device parameters to factory default:

1. Power on the SP-710 by pressing (OK).
2. Press **System** ((OK)) to launch the **DEVICE INFORMATION** screen.
3. Press **Diagnosis** ((<)) to launch the **SYSTEM DIAGNOSIS** screen.
4. Allow 5–10 seconds for the message in the top-right corner of the display change from **Starting BTLE...** to **BTLE Started**.
5. Press **Help** ((>)) to launch the **HELP** screen (Figure 60).
6. Press **Factory Reset** ((<) or (>)). The display updates as shown in Figure 61 appear and the user can choose one of three options:
   (a) Press (OK) to start the factory reset, **or**
   (b) Press **Cancel** ((<)) to return to the **HELP** screen, **or**
   (c) Press **Exit** ((>)) to abandon the factory reset entirely.
7. After a successful factory reset, the message "Factory reset done." will appear on the display.
8. Press **Exit** ((OK)) to return to measurement mode.

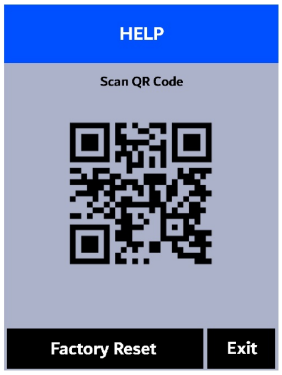

Figure 60.

Figure 61.

9 Use with uPyxis® Mobile App

9.1 Download uPyxis® Mobile App

Download **uPyxis®** Mobile App from **Apple App Store** or **Google Play**.

Figure 62.

9.2 Connecting to uPyxis® Mobile App

Connect the SP-710 to a mobile smart phone according to the following steps:

1. Follow the steps in the **Bluetooth Connection to Devices** section to make the SP-710 discoverable.
2. Open **uPyxis®** Mobile App.
3. On **uPyxis®** Mobile App, pull down to refresh the list of available Pyxis devices.
4. If the connection is successful, the SP-710 and its Serial Number (SN) will be displayed (Figure 63).
5. Press on the **SP-710 image**.

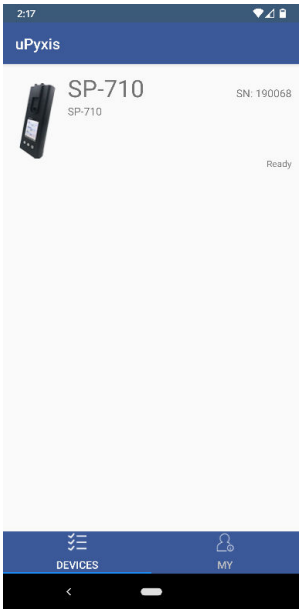

Figure 63.

9.3 System Screen

From the **System** screen, users can change the **Device Name**, find the **Serial Number**, **Hardware Version**, and **Firmware Version**, as well as update the firmware of the SP-710 by pressing **Check Update**. If a firmware update is available, press **Get Firmware**. Once the new firmware is downloaded, press **Upgrade Firmware**.

> ∗**NOTE**∗ *The firmware update process takes some time and will require the SP-710 to stay within range (approximately 10 ft without obstructions) for the entire duration of the update.*

Once the update is complete, the SP-710 will reboot which will disconnect the SP-710 from the **uPyxis®** Mobile App.

Figure 64.

9.4 Setting Screen

When connected, the **uPyxis®** Mobile App will default to the **Setting** screen. From the **Setting** screen, the user can set the **Power off time** and **Screen off time** in seconds.

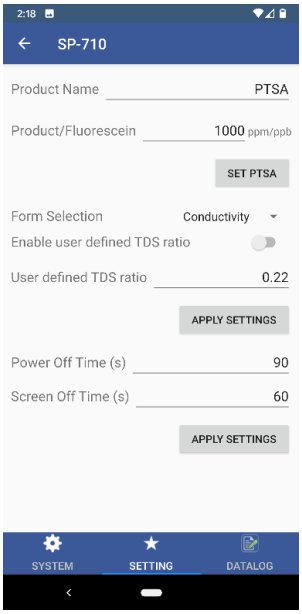

Figure 65.

9.5 Datalog Screen

From the **Datalog** screen, the user can view and export the internal log files of the SP-710 by pressing **Read Datalogs** and selecting the desired datalog (these are separated by month). The SP-710 will then populate any relevant log event from the selected datalog which can be viewed in more detail by pressing **Read Record** or exported as a CSV document by pressing **Export/Share**.

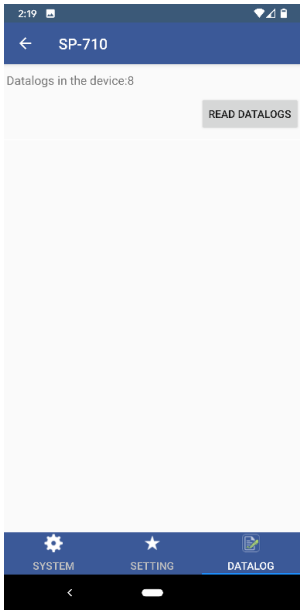

Figure 66.

10 Use with uPyxis® Desktop App

10.1 Install uPyxis® Desktop App

Download the latest version of **uPyxis®** Desktop software package from: https://pyxis-lab.com/upyxis/ this setup package will download and install the Microsoft.Net Framework 4.5 (if not previously installed on the PC), the USB driver for the USB-Bluetooth adapter (MA-NEB), the USB-RS485 adapter (MA-485), and the main **uPyxis®** Desktop application. Double click the **uPyxis.Setup.exe** file to install.

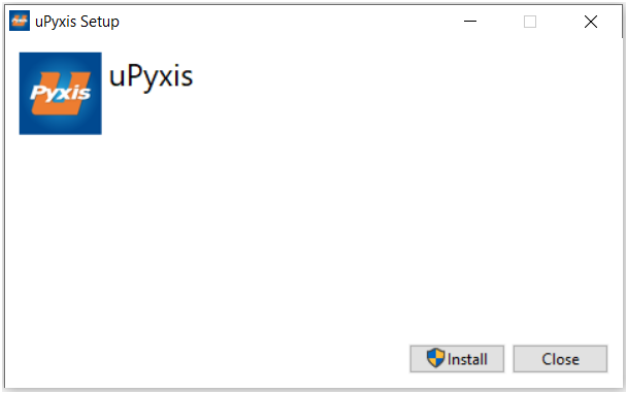

Figure 67.

Click **Install** to start the installation process. Follow the screen instructions to complete the USB driver and uPyxis installation.

10.2 Connecting to uPyxis® Desktop App

Connect the SP-710 to a Windows computer using a Bluetooth/USB adapter (P/N: MA-NEB) according to the following steps:

1. Follow the steps in the **Bluetooth Connection to Devices** section to make the SP-710 discoverable.
2. Plug the Bluetooth/USB adapter into a USB port in the computer.
3. Launch **uPyxis®** Desktop App.
4. On **uPyxis®** Desktop App, click Device → **Connect via USB-Bluetooth** (Figure 68).
5. If the connection is successful, the SP-710 and its Serial Number (SN) will be displayed in the left pane of the **uPyxis®** window.

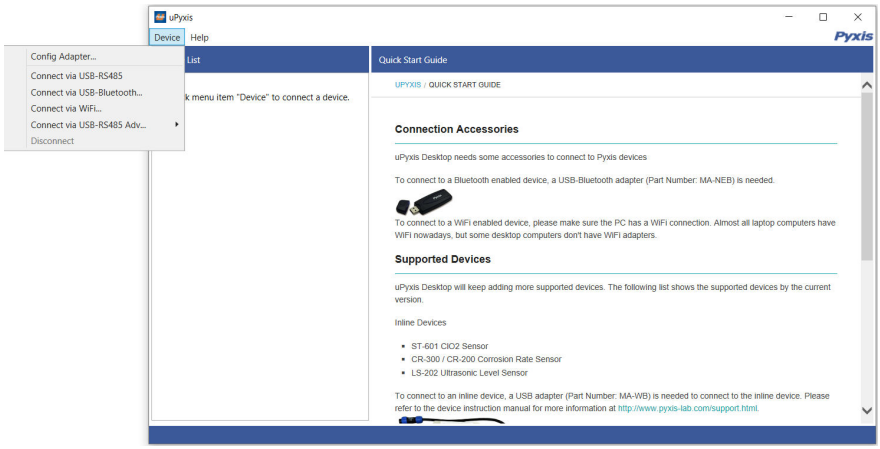

Figure 68.

10.3 System Screen

Once connected to the device, a picture of the device will appear on the top-left corner of the window and the **uPyxis®** Desktop App will default to the **System** screen. From the **System** screen, users can upgrade the firmware by selecting an appropriate firmware file (contact service@pyxis-lab.com for these firmware files) and clicking **Upgrade Firmware**.

> ∗**NOTE**∗ *The firmware update process takes some time and will require the SP-710 to stay within range (approximately 10 ft without obstructions) for the entire duration of the update.*

Once the update is complete, the SP-710 will reboot which will disconnect the SP-710 from the **uPyxis®** Mobile App.

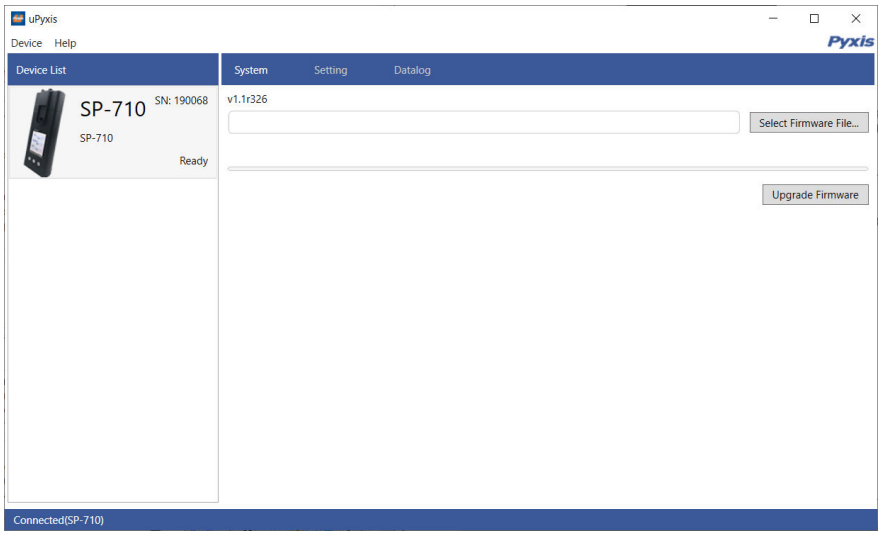

Figure 69.

10.4 Setting Screen

From the **Setting** screen, the user can set the **Power off time** and **Screen off time** in seconds.

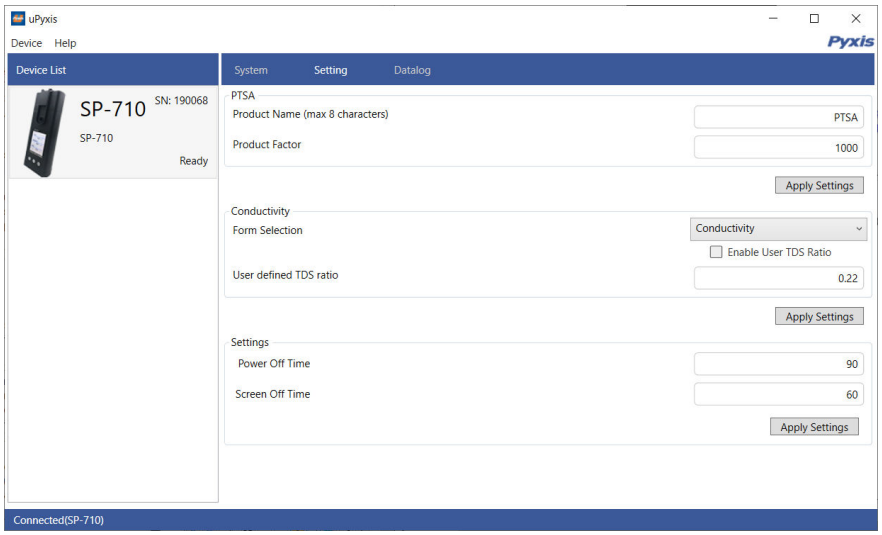

Figure 70.

10.5 Datalog Screen

From the **Datalog** screen, the user can view, delete, and export the internal log files of the SP-710 by clicking **Read Datalog List** and selecting the desired datalog (these are separated by month). The SP-710 will then populate any relevant log event from the selected datalog which can be viewed in more detail by clicking **Read Datalog**, deleted by clicking **Delete**, or exported by clicking **Export as .CSV File**.

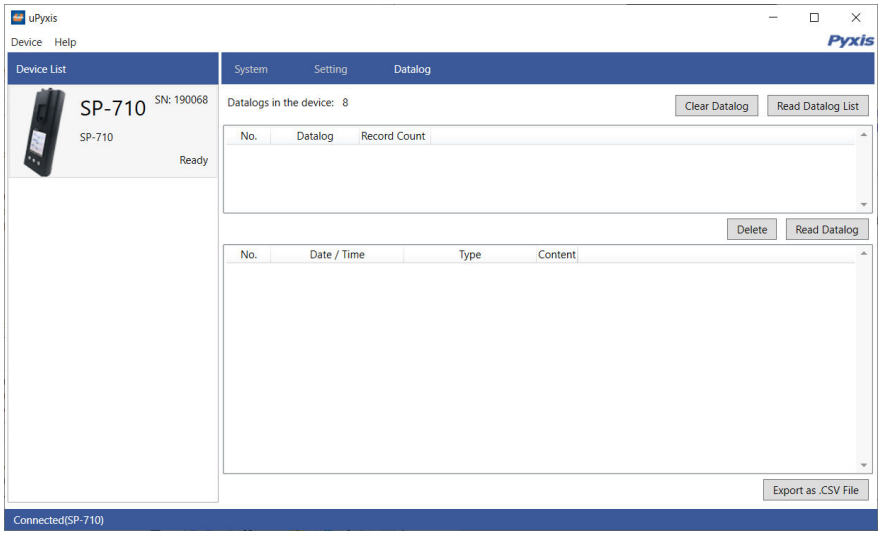

Figure 71.

11 Device Maintenance and Precaution

11.1 Maintenance Best Practices

For greatly increased working life of the SP-710 follow the list of maintenance best practices below:

- Rinse the SP-710 with tap water or DI water after measurement and remove residual water using a paper towel.
- Maintain 1 mL of pH/ORP Storage Solution in the pH/ORP cell at all times when the SP-710 is not being used.
- Close the pH/ORP cell seal firmly to keep the pH/ORP cell wet. Use rubber-band to ensure cell cap remains closed for aggressive handling.
- On a monthly basis, or as needed, conduct a chemical cleaning using Pyxis SER-02 Handheld Cleaning Solution of the main module cell to remove deposition or film development.
- Use a Q-tip to gently clean the inside of the main module cell to remove any deposits that may have attached to the optical and electrode surfaces.
- Completely soak the main module cell for one hour before a measurement if the SP-710 has not been used in more than two weeks.
- Do not expose the SP-710 to an extreme high or low temperature condition such as leaving the SP-710 inside an unattended automobile. The pH electrode can survive a few short exposures to 0 °F (-18 °C) or 140 °F (60 °C), but repeated extreme low and high temperature cycling will damage the pH electrode.

11.2 Methods to Cleaning the SP-710

A light deposit on quartz glass inside the conductivity cell can be cleaned by a Q-tip. Aged heavy deposition, especially iron oxide deposited, can be removed using a cleaning solution that is capable of removing iron, such as the Pyxis Handheld Device Cleaning Solution Kit (P/N: SER-02) available from Pyxis online E-Store https://pyxis-lab.com/product/handheld-device-cleaning-kit/.

Figure 72. Handheld Device Cleaning Solution Kit

To clean the SP-710 pour cleaning solution into the main module sample cell for 10 minutes. Rinse the sample cell with distilled water and use the Cleanliness Check (see the **Main Module Sample Cell Cleanliness Check** section) to confirm that the SP-710 is clean. Repeat the process as needed until the Cleanliness Check shows **Clean**.

11.3 Storage

When the pH/ORP cell is not in use, fill the cell with 1 mL of Pyxis pH/ORP Storage Solution (P/N: 63900) and ensure the pH/ORP cell seal is closed completely. The pH/ORP cell seal maintains a moist environment for the electrodes. For vigorous field use, it is recommended to utilize a rubber-band to secure the pH/ORP cell seal to prevent loss of pH/ORP Storage Solution.

Do not expose the SP-710 to an extreme high or low temperature condition such as leaving the SP-710 inside an unattended automobile.

> ∗**NOTE**∗ *Repeated extreme low and high temperature cycling will damage the pH electrode.*

11.4 pH/ORP Module Replacement

Figure 73. pH/ORP Module

The pH/ORP module in the SP-710 can be replaced when the original module reaches the end of its working life. Pyxis offers a 6-month warranty on the pH/ORP module. Pyxis recommends replacing the module at a frequency of every 9–12 months as a best practice. Order a replacement pH/ORP module (P/N: 50315) from Pyxis at order@pyxis-lab.com. If the module is turned on for 20 minutes a day, the module battery can last for about a year. The module indicator light will flash red if the module battery is low. Each replacement pH/ORP module will be shipped with a COC (Certificate of Calibration). The COC also includes an assigned Bluetooth MAC-Address for the new module. This MAC-Address will appear as an available device to pair the SP-710 main module to per the instructions below.

11.4.1 Replacement Procedure

Follow the instructions below to install the replacement module:

1. Power off the SP-710 by holding OK.
2. Remove any liquid from both the conductivity/chlorine cell and the old pH/ORP cell.
3. Detach the old pH/ORP module by pulling the module away from the main module.
4. Remove the battery from the old pH/ORP module to prevent it from re-pairing to the SP-710.
5. Dispose of the old module. If the removed battery still has charge, it can be saved for future use.
6. Attach the new pH/ORP module to the main module as shown in Figure 74.
7. To Bluetooth pair the main module with the new pH/ORP module, continue to the **Bluetooth Pairing** section below.

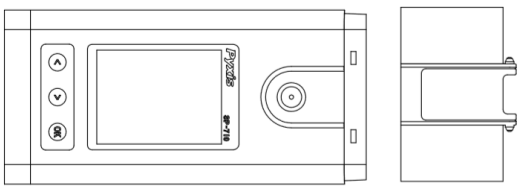

Figure 74.

11.4.2 Bluetooth Pairing

1. Power on the SP-710 by pressing (OK).
2. Press **System** ((OK)) to launch the **DEVICE INFORMATION** screen.
3. Press **Comm** ((>)) to launch the **COMMUNICATION** screen (Figure 75).
4. Press **Scan** ((<)) to begin scanning for Bluetooth devices.
5. Discoverable devices will begin to populate on the display with their name and MAC-Address (Figure 76).

   ∗**NOTE**∗ *To verify pairing to the correct pH/ORP module, the MAC-Address of the pH/ORP module can be found in its provided COC (Certificate of Calibration).*

6. If more than one device appears in the **Device list**, press **»** ((>)) to cycle through the devices.
7. If no devices or the incorrect device appear in the **Device list**, press **Scan** ((<)) to re-scan for discoverable devices.
8. Press **Pair** ((OK)) to begin pairing to the selected device.
9. If pairing is successful, the message ”Pair Success!” will appear in the top-left corner of the display (Figure 77).
10. Bluetooth pairing is complete. Long press **Pair** ((OK)) to return to measurement mode.

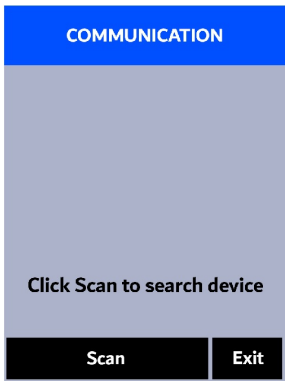

Figure 75.

Figure 76.

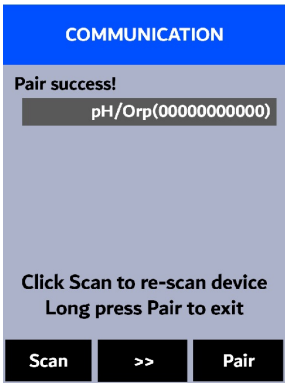

Figure 77.

12 Regulatory Approval

United States

The SP-710 sensor has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in an installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Canada

This device complies with Industry Canada license exempt RSS standard(s).Operation is subject to the following two conditions: (1)this device may not cause interference, and (2)this device must accept any interference, including interference that may cause undesired operation of the device. Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1)l'appareil ne doit pas produire de brouillage, et (2)l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible.

13 Contact Us

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