Pyxis®

SP-505 Water Multimeter

Conductivity, Turbidity, pH, ORP, Temp., Free & Total DPD Chlorine

Pyxis Lab® Inc.
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USER MANUAL

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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. The 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 the 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 Material Authorization (RMA) 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-505 is a uniquely designed handheld multimeter that measures seven key parameters. It is a cuvette-less device. Less than 5 mL water sample is needed to fill either of the two sample cells for proper measurement. The measurable parameters are:

- Turbidity (ISO-7027 / InfraRed)
- Conductivity
- pH
- ORP
- Temperature (°C & °F)
- Free DPD Chlorine
- Total DPD Chlorine

1.1 Main Features

The SP-505 includes the following features:

- Turbidity (ISO-7027), Conductivity, Chlorine and pH/ORP measurement in a single, rugged meter
- pH/ORP/Conductivity/Temp/Turbidity (ISO-7027)/Free & Total DPD Chlorine
- Wireless and independent use of pH/ORP module
- Modular pH/ORP 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-505 Specifications

Item	SP-505
P/N	50355
Conductivity	1~15,000 µS/cm with ATC. ±1% or ±1µS/cm precision
pH	0.00 ~ 14.00 with ATC ±0.01pH Unit Precision
ORP	± 1,500 mV ±1mV
Temperature	0 ~ 70 ℃ (32~160°F) ±0.1 ℃(±0.18°F)
Turbidity (ISO-7027)	0-100NTU ±0.1NTU
Free & Total Chlorine (DPD)	0.00 ~ 10.00 ppm ±0.01ppm
Storage Temperature	-20 °C ~ 60° C (-4~140°F)
Operational temperature	0° C ~ 40° C (32~104°F)
Sensor Module	pH/ORP, Replaceable, Bluetooth 5.0, Replaceable Battery 3.7V
Typical Module Senor life	pH/ORP – 18 Months
	Conductivity / Turbidity / Chlorine - 5 years
Protection Grade	IP67, Fully Dust and Waterproof
Regulation	CE / RoHS / UKCA
Display	Color LCD, visible under direct sunlight
Power Supply – Main Body	(4) AA Alkaline Batteries
Typical Battery Life	10,000 Readings
Data Storage & Transfer	8GB Data Storage w/Timestamp Bluetooth® Upload via uPyxis2.0 APP
Dimension (L x W x H)	208 x 80 x 45 mm (8.19 x 3.15 x 1.77 inches)
Weight	520 g (1.15 lbs.) w/out batteries

* With Pyxis's continuous improvement policy, these specifications are subject to change without notice.

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 Cap Seal can open in shipment, which may result in pH/ORP Storage Solution (white crystal deposits) on the outer shell of the device. This will not cause any damage. Simply wipe down the device with wet cloth and then 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 Cap 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

- One SP-505 Multimeter P/N: 50355
- Pyxis pH/ORP Storage Solution – 70 mL P/N: 63960
- Bluetooth/USB Adapter for Desktop P/N: MA-NEB
- Four (4) AA alkaline batteries
- Quick-Start Guide
- 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. Optional Accessories

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	63960
Pyxis Carrying Case for SP-505	MA-700
Pyxis 200 mV ORP Calibration Standard — 500 mL	57020
Pyxis pH 4-7-10 Calibration Combination Kit — 500 mL each	57007
Pyxis 1000µS Conductivity Calibration Standard — 500 mL	57008
Pyxis 100NTU Formazine Calibration Standard — 500 mL	57010
Pyxis DPD Free Chlorine Powder Pillow 10 mL (100 pk)	31002
Pyxis DPD Total Chlorine Powder Pillow 10 mL (100 pk)	31014
Pyxis DPD Chlorine Secondary Standard — 1.0 ppm Solution — 125 mL	21039
Pyxis DPD Chlorine Secondary Standard — 2.0 ppm Solution — 125 mL	21040

4 Installation

4.1 Main Module Battery Installation

The main module of the SP-505 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-505 displays a ”LOW BATTERY” warning for five seconds and then automatically turns off.

The SP-505 does not turn itself on automatically after the new battery installation. To turn on the SP-505 after new battery installation, press the **OK** key momentarily and release.

The SP-505 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-505 date and time is synchronized automatically when connected with **uPyxis®** Mobile or Desktop App.

The SP-505 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.

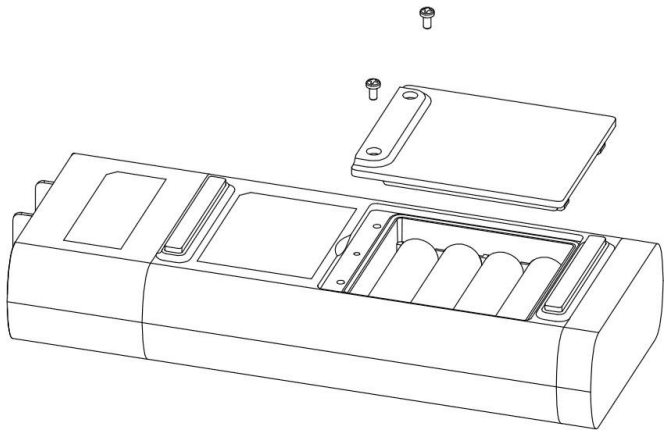

Figure 1. The SP-505 battery compartment

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 Oring 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-505.*

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

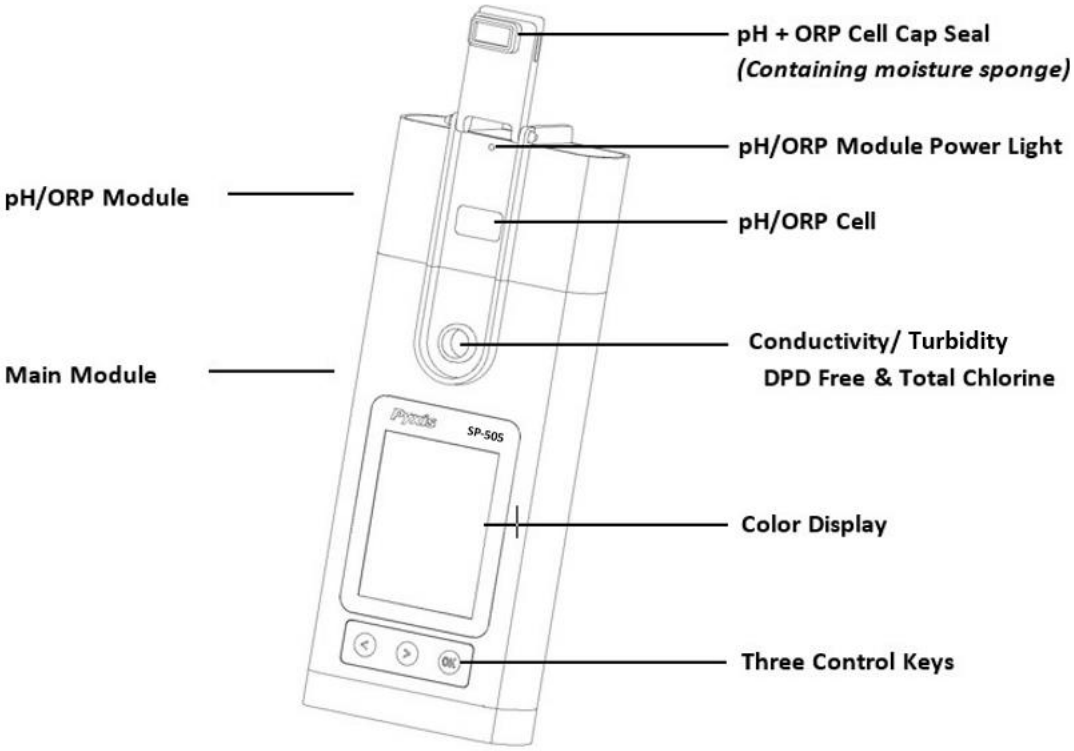

Figure 3

5.1 pH/ORP Cell Cap Seal

When the SP-505 is in storage, the pH/ORP Cell Cap Seal seals the pH/ORP cell, maintaining a moist environment for the electrodes. For vigorous field use, it is recommended to utilize a rubber-band to secure the pH/ORP Cell Cap Seal to prevent loss of pH/ORP Storage Solution.

The sponge soaked with the pH/ORP Storage Solution in the pH/ORP Cell Cap 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.

For proper storage please fill the pH/ORP cell with 1 mL of Pyxis pH/OR Storage Solution (P/N: 63900) at all times when not using the pH/ORP cell.

Figure 4. pH/ORP Cell Cap Seal in the open position

5.2 Control Keys

The SP-505 has three control keys, as shown in Figure 5. 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.*

Figure 5.

5.3 Main Module On/Off

To turn ON the SP-505: Press (OK) momentarily and release.

To turn OFF the SP-505: Press and hold (OK) for about three seconds. Release (OK) when the LCD display turns off. The SP-505 turns itself off after 30 seconds without user interaction detected. This is done to conserve battery life.

NOTE *The auto-time off setting will come preset from the Pyxis factory to screen off time and power off time of the unit after 3 and 5 minutes respectively to conserve battery life. This feature may be customized by the user as desired through the* ***uPyxis®*** *Mobile or Desktop App. See section 9.3 for details.*

5.4 pH/ORP Module On/Off

The pH/ORP module has a built-in Bluetooth chip. It can be turned on by the main SP-505 module via Bluetooth communication. The pH/ORP module will turn itself off when either commanded by the main module or automatically based on the idle (screen off) time limit program when main module is not in pH/ORP measurement mode. See Section 9.3 on how to alter these time limits for your convenience.

6 Measurement

6.1 Switch Measurement Mode

The SP-505 has three major measurement modes: Conductivity/Turbidity mode, DPD free and total chlorine mode and pH/ORP mode. The left (<) keys are used to switch between the modes.

When powered on, the SP-505 defaults to Conductivity/Turbidity mode (Figure 6). Press **Measure** (<) as needed to switch the device to alternate measurement options (Figure 7), then press (OK) to start the related measurement selected.

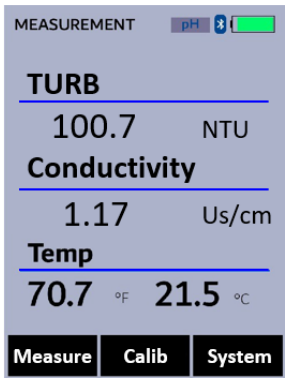

Figure 6. Conductivity/Turbidity mode

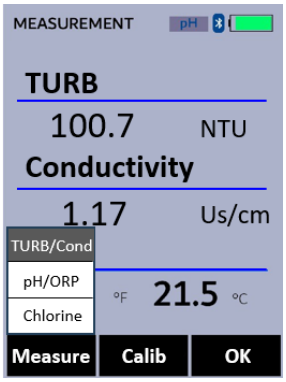

Figure 7. Alternate selection menu

6.2 Conductivity / Turbidity Measurement

6.2.1 Measurement Procedure

When powered on, the SP-505 will default to the Conductivity/Turbidity mode. If the SP-505 does not default start in this mode, follow the instructions in the **Switch Measurement Mode** section to switch back to Conductivity/Turbidity mode. A water sample should be transferred to the conductivity/turbidity cell using a disposable pipette, or the cells can be filled slowly from a sample bottle.

> ***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 cell at least three times. Allow 5–10 seconds for the SP-505 to reach stabilize.

> ***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-505 had been equilibrated (stored).*

6.2.2 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:

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

where $T_{measured}$ is the sample temperature in °C. The default value of conductivity temperature compensating factor is 0.02 which means 2% per °C.

NOTE *This factor can be changed to be to any value between 0.00% to 9.99 % / °C via the **uPyxis®** App. Changing the factor to 0.00 % / °C will disable the temperature compensation.*

6.3 DPD Free and Total Chlorine Measurement

The SP-505 free and total chlorine methods are based on the USEPA-accepted N, N-diethyl-p-phenylenediamine (DPD) chemistry. The free chlorine (CL-F) powder pillow reagent and total chlorine (CL-T) powder pillow reagent dissolve and react with free chlorine and total chlorine in the water sample to form a pink solution. SP-505 measures the absorbance value of the resulted pink solution to determine the free chlorine and total chlorine concentration as DPD.

NOTE *Both Pyxis Lab DPD or HACH DPD 10 mL free and total chlorine reagent powder pillows may be used for this test method.*

Follow the steps below to measure free and total chlorine:

1. Press **Measure** (<) to show selection menu.
2. Press **Measure** (<) as needed to highlight **Chlorine** in the selection menu (Figure 8).
3. Press OK to launch the **SELECT METHOD** screen (Figure 9).
4. Use < and > to cycle to the desired chlorine method.
5. Press OK to select the desired chlorine method and launch the **CHLORINE MEASUREMENT** screen (Figure 10).
6. Rinse the conductivity/chlorine sample cell three times with the sample to be tested. Fill the sample cell with the sample.
7. Press **Zero** (<). **ZERO** will then appear on the top-left corner of the display.
8. Prepare the developed sample:

(a) Add 10 mL of the sample water into the 10 mL sample vial provided.

(b) Add one free chlorine or total chlorine powder pillow to the 10 mL sample vial (Figure 12).

(c) Cap the 10 mL sample vial and invert several times to fully mix the reagent and sample.

(d) The developed sample should be pink if either species of chlorine is present in the sample.

9. Use a portion of the developed sample to rinse the conductivity/chlorine sample cell once. Fill the sample cell with the remaining developed sample (Figure 13).
10. Press **Timer** (>). A 1-minute timer for free chlorine or 3-minute timer for total chlorine will begin.
11. The SP-505 will continuously display the free or total chlorine concentration as the timer counts down. Record the final value after timer stops.

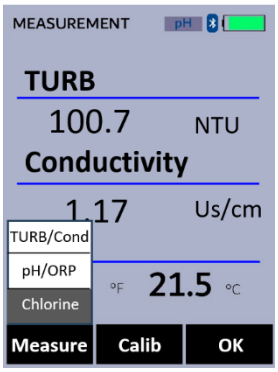

Figure 8 – Select Chlorine Test

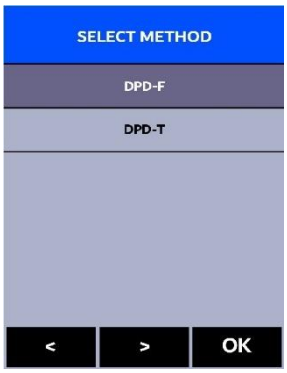

Figure 9 – Select Test Method

Figure 10 – Chlorine Measure

Figure 11. Pyxis's free and total chlorine powder pillows

Figure 12. Add DPD powder to sample.

Figure 13. Fill sample cell with developed sample

6.4 Temperature Measurement

The SP-505 has two platinum RTD's (Resistance Temperature Detectors), one located in the conductivity cell and one in the pH/ORP cell. These temperature sensors are individually calibrated in the Pyxis 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 of the sample temperature. The temperature on the display is obtained from the conductivity cell RTD.

6.5 pH/ORP Measurement

6.5.1 Measurement Procedure

Follow the steps below to measure pH and ORP:

1. Press **Measure** (>) to switch to the pH/ORP measurement mode. This will automatically power on the pH/ORP module. The indicator light of the module will be green and flashing when powered on. The main module of the SP-505 will automatically connect after the pH/ORP module has been powered up.

2. Once connected, the background color of **pH** indicator on top-right corner of the display will change from gray to blue and the indicator light on the pH/ORP module itself will be change from green to blue and flashing. The prompt message is also changed from Connecting... to Measuring... .

3. Once the measurements are completed, the values will be displayed, and the prompt message will disappear.

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

5. The pH and ORP values will be updated every two seconds on the SP-505 main module display. The values will be displayed in white with a blue background once a stable value is reached (Figure 14).

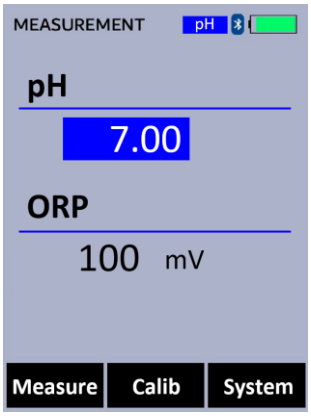

Figure 14. Display pH and ORP values

6.5.2 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.

6.5.3 pH Measurement Principle

The SP-505 pH/ORP module uses the standard electrochemical cell for the pH measurement. The cell consists of a glass electrode and 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-505 is the true pH value at the sample temperature.*

6.5.4 ORP Measurement Principle

The SP-505 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-505 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-505 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-505 is referenced to the same, commonly noted as (Ag/AgCl, 3M KCl).

The ORP electrode is calibrated with the Zobell's standard using the value of 221 mV at 25 °C before shipping. **The default ORP scale of the SP-505 before a user calibration is the Ag/AgCl (3M KCl)**. If the SP-505 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 been 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 $\pm$20 mV accuracy and $\pm$10 mV precision can be expected.

7 Calibration

7.1 Conductivity Calibration

The conductivity, turbidity and pH/ORP measurements can be calibrated separately using the corresponding standards.

7.1.1 Standard Calibration (500, 1,000, 2,500, or 5,000 µS)

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-505 by pressing (OK). Allow 5–10 seconds for the SP-505 to stabilize.
3. Press **Calib** (>) to display calibration selection menu.
4. Press **Calib** (>) as needed to highlight **Cond** (conductivity) calibration in the selection menu (Figure 15).
5. Press (OK) to launch the **CONDUCTIVITY CALIBRATION** screen.
6. Use (<) or (>) to cycle to the desired calibration, for example, 1,000 µS (Figure 16). The standard conductivity selections are 500, 1000, 2,500, and 5,000 µS.

   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 16 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-505 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 18).
11. Calibration is now complete, long press **Calib** (OK) to return to Conductivity mode.

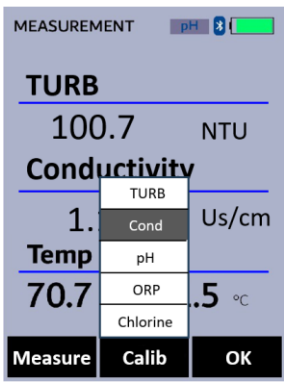

Figure 15.

Figure 16.

Figure 17.

Figure 18.

7.1.2 User-Defined Calibration

1. Rinse the conductivity sample cell three times with the desired conductivity standard. Fill the sample cell with the standard.
2. Power on the SP-505 by pressing (OK). Allow 5–10 seconds for the SP-505 to stabilize.
3. Press **Calib** (>) to display calibration selection menu.
4. Press **Calib** (>) as needed to highlight **Cond** (conductivity) calibration in the selection menu (Figure 19).
5. Press (OK) to start the calibration procedure.
6. Press (<) or (>) to select the **USER DEFINED CALIBRATION** screen (Figure 20).
7. Use **-** (<) and **+** (>) to adjust the target conductivity value as desired. Holding a key down scrolls the values at a faster rate.
8. Press **Set** (OK) to confirm the target conductivity value.

   NOTE *To exit the calibration procedure entirely, long press* ***Calib*** *(OK)*
9. Press **Calib** (OK) to confirm the specific conductivity calibration desired.
10. The display updates as shown in Figure 21 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.
11. Once calibration begins, the SP-505 reads the sample and displays the value in the **Measured** section. A slight variance from the target is acceptable.
12. The message "**Calibration Success**" will appear towards the bottom of the display (Figure 22).
13. User-Defined Calibration is now complete, long press **Calib** (OK) to return to Conductivity mode.

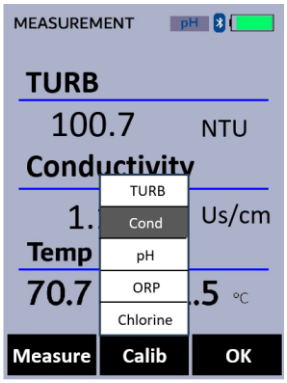

Figure 19.

Figure 20.

Figure 21.

Figure 22.

7.2 Turbidity Calibration

Turbidity calibration has been rigorously performed before leaving the factory. If calibration is required, users can perform a two-point calibration after confirming the cleanliness of the main module sample cell, refer to Conductivity/Turbidity/Chlorine Sample Cell Cleanliness Check section. Turbidity calibration requires DI water and Turbidity Calibration Standard Solutions. Follow the steps below to carry out a turbidity calibration.

1. Rinse the main module sample cell three times with deionized (DI) water. Fill the sample cell with DI water.
2. Power on the SP-505 by pressing (OK). Allow 5–10 seconds for the SP-505 to stabilize.
3. Press **Calib** (>) to display calibration selection menu. **Turb** (turbidity) calibration is highlighted by default in the selection menu.
4. Press (OK) to lunch the turbidity calibration screen (Figure 23).
5. Press **Zero** (<) to start zero calibration. If the zero calibration succeeds, a checkmark (✔) will appear (Figure 24). Zero calibration complete. Otherwise, a warning message is displayed.
6. Press **Cycle** (<) to cycle to the desired turbidity calibration standard, for example, 100 NTU (Figure 24). The standard conductivity selections are 20, 50, and 100 NTU.

   NOTE *To exit the calibration procedure entirely, long press* ***Calib*** *(OK)*
7. Rinse the main module sample cell three times with the chosen calibration standard. Fill the sample cell with the chosen buffer.
8. Allow 5–10 seconds for the turbidity measurement to stabilize. The values will be displayed in white with a blue background once a stable value is reached.
9. Press **Slope** (>) to start the calibration, **or**
   Press **Exit** (>) to abandon calibration entirely
10. If the slope calibration succeeds, a checkmark (✔) and a "**Calibration Success**" message will appear towards the bottom of the display (Figure 25).
11. Turbidity calibration is now complete, long press **Exit** (OK) to return to Conductivity/Turbidity mode.

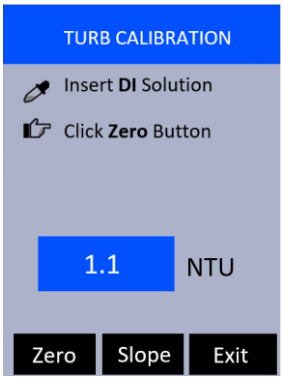

Figure 23.

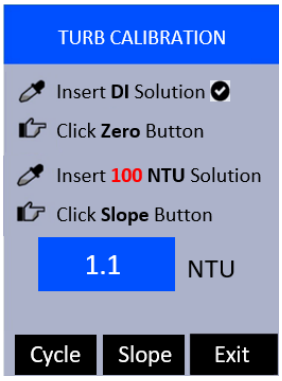

Figure 24.

Figure 25.

7.2 DPD Free and Total Chlorine Calibration

7.2.1 Calibration Check using Pyxis DPD Chlorine Secondary Standard

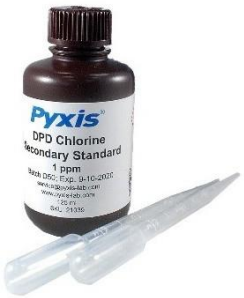

Figure 26. DPD Chlorine Secondary Standard 1 ppm

The DPD 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 DPD Chlorine Secondary Standard (either 1.0 ppm or 2.0 ppm):

1. Fill the main module sample cell with the DPD Chlorine Secondary Standard solution and allow to soak for 15 minutes.

   NOTE *This solution not only serves as a secondary calibration standard, but also as a sample cell cleaner having a pH of 4.0.*

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-505 by pressing (OK). Allow 5–10 seconds for the SP-505 to stabilize.
5. Press **Measure** (<) as needed to highlight **Chlorine** in the selection menu (Figure 27).
6. Press (OK) to launch the **CHLORINE MEASUREMENT** screen.
7. Press **Zero** (<). **ZERO** will appear on the top-left corner of the display.
8. Rinse the main module sample cell three times with the Pyxis DPD 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 standard value range in the certificate provided with the DPD Chlorine Secondary Standard, either:

(a) Follow the procedure in the **Slope Calibration using Pyxis DPD Chlorine Secondary Standard** section, or

(b) Follow the procedure in the **Slope Calibration using User-Defined DPD Chlorine Standard** section, or

(c) Contact service@pyxis-lab.com for pricing on factory calibration services.

7.2.2 Blank (Zero) Calibration

The DPD 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-505 by pressing (OK). Allow 5–10 seconds for the SP-505 to stabilize.
2. Press **Calib** (>) to display calibration selection menu.
3. Press **Calib** (>) as needed to highlight **Chlorine** calibration in the selection menu (Figure 27).
4. Press (OK) to launch the **CHLORINE CALIBRATION** screen (Figure 28).
5. Press **Blank** (<) to start the blank (zero) calibration.
6. Rinse the main module sample cell three times with deionized (DI) water. Fill the sample cell with DI water.
7. Press **Zero** (< or >). The message "**Zero Succeed**" will appear on the bottom of the display (Figure 29).
8. Prepare the developed blank-zero sample:
   (a) Add 10 mL of DI water into the 10 mL sample vial provided.
   (b) Add one free chlorine to the 10 mL sample vial.
   (c) Cap the 10 mL sample vial and invert several times to fully mix the reagent and DI water.
   (d) The developed blank-zero sample is now ready for measurement.
9. Use a portion of the blank-zero sample to rinse the main module sample cell once. Pour the remaining blank-zero sample into the sample cell.
10. Press **Timer** (< or >). A 120-second timer will begin. The SP-505 will continuously display the chlorine concentration as the timer counts down.
11. After the timer stops, press **Calib** (< or >).
12. The message "**Blank calibration success**" will appear on the bottom of the display (Figure 30).
13. Blank calibration is complete. Press **Return** to return to the **CHLORINE CALIBRATION** screen.

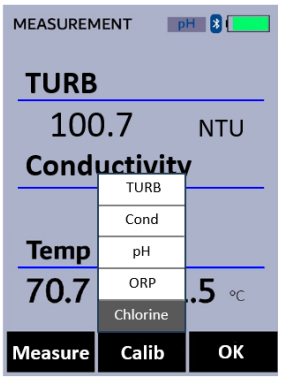

Figure 27.

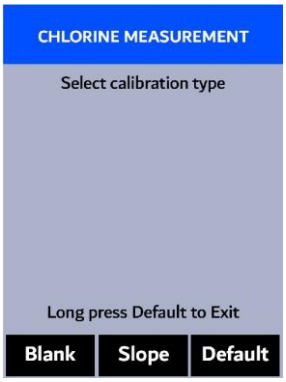

Figure 28.

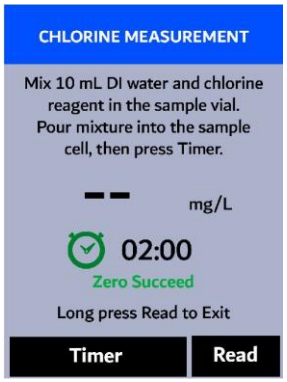

Figure 29.

Figure 30.

7.2.3 Slope Calibration using Pyxis DPD Chlorine Secondary Standard

The DPD Chlorine method has been calibrated prior to shipping; there is no need to calibrate unless a calibration check (see the **Calibration Check using Pyxis DPD 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 DPD Chlorine Secondary Standard (1.0 ppm):

1. Power on the SP-505 by pressing (OK). Allow 5–10 seconds for the SP-505 to stabilize.
2. Press **Calib** (>) to display calibration selection menu.
3. Press **Calib** (>) as needed to highlight **Chlorine** calibration in the selection menu (Figure 31).
4. Press (OK) to launch the **CHLORINE CALIBRATION** screen (Figure 32).
5. Press **Slope** (>).
6. Use < and > to cycle to the desired secondary standard (Figure 33).
7. Press (OK) to start the slope calibration using Pyxis DPD Chlorine Secondary Standard.
8. Rinse the main module sample cell three times with deionized (DI) water. Fill the sample cell with DI water.
9. Press **Zero** (< or >). The message "**Zero Succeed**" will appear on the bottom of the display (Figure 34).
10. Rinse the main module sample cell three times with Pyxis DPD Chlorine Secondary Standard. Fill the sample cell with the standard.
11. Press **Read** (< or >).
12. Press **Calib** (< or >). The message "**Slope calibration success**" will appear on the bottom of the display (Figure 35).
13. Slope calibration is complete. Press **Return** (OK) to return to the **CHLORINE CALIBRATION** screen.

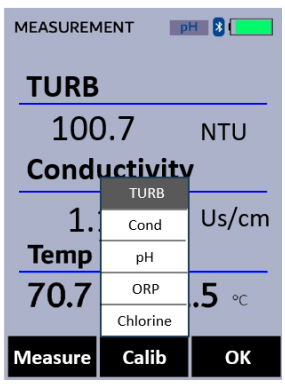

Figure 31.

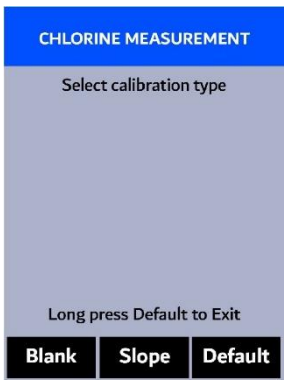

Figure 32.

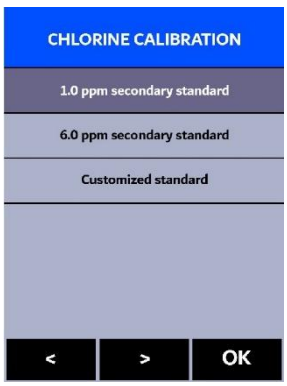

Figure 33.

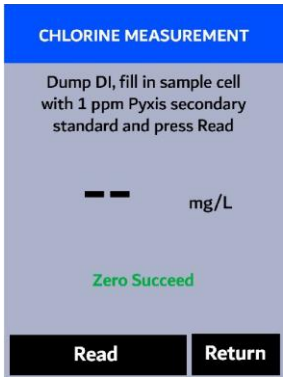

Figure 34.

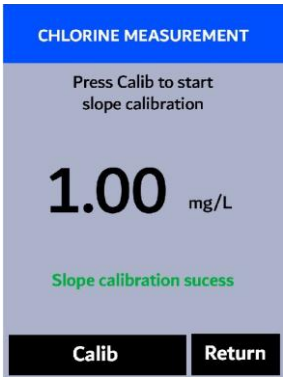

Figure 35.

7.2.4 Slope Calibration using User-Defined DPD Chlorine Standard

The DPD Chlorine method has been calibrated prior to shipping; there is no need to calibrate unless a calibration check (see the **Calibration Check using Pyxis DPD 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:

> ∗**NOTE**∗ *It is recommended to have a chlorine concentration between 1.0 ppm and 2.0 ppm.*

1. Power on the SP-505 by pressing (OK). Allow 5–10 seconds for the SP-505 to stabilize.
2. Press **Calib** (>) to display calibration selection menu.
3. Press **Calib** (>) as needed to highlight **Chlorine** calibration in the selection menu (Figure 36).
4. Press (OK) to launch the **CHLORINE CALIBRATION** screen (Figure 37).
5. Press **Slope** (>).
6. Use (<) and (>) to cycle to "**Customized standard**" (Figure 38).
7. Press (OK) to start the slope calibration using Pyxis DPD Chlorine Secondary Standard.
8. Rinse the sample cell three times with the known chlorine solution. Fill the sample cell with the solution.
9. Press **Zero** (< or >). The message "**Zero Succeed**" will appear on the bottom of the display (Figure 39).
10. Prepare the developed standard:
    (a) Add 10 mL of the known chlorine solution into the 10 mL sample vial provided.
    (b) Add one free chlorine or total chlorine powder pillow to the 10 mL sample vial.
    (c) Cap the 10 mL sample vial and invert several times to fully mix the reagent and sample.
    (d) The developed standard should be pink if either species of chlorine is present in the sample.

11. Use a portion of the developed standard to rinse the main module sample cell once. Pour the remaining developed standard into the sample cell.
12. Press **Timer** (< or >). A 120-second timer will begin. The SP-505 will continuously display the chlorine concentration as the timer counts down.
13. After the timer stops, press **Calib** (< or >).
14. Use **-** (<) and **+** (>) to adjust the chlorine concentration to the value of the known chlorine solution.
15. Press **Calib** (OK). The message "**Slope calibration success**" will appear on the bottom of the display (Figure 40).
16. Slope calibration is complete. Press **Return** (OK) to return to the **CHLORINE CALIBRATION** screen.

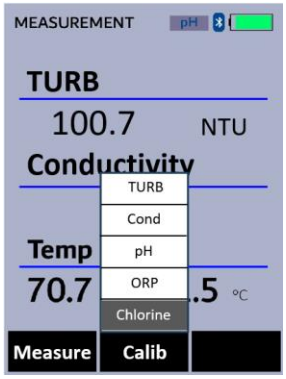

Figure 36.

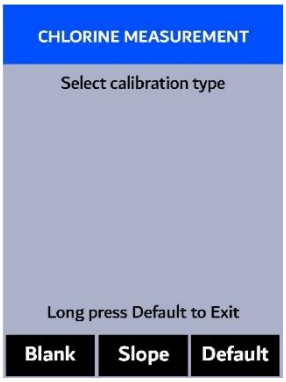

Figure 37.

Figure 38.

Figure 39.

Figure 40.

7.2.5 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 action is to restore the working calibration parameters to the original, factory-loaded calibration parameters for both free and total chlorine.

7.3 pH Calibration

The SP-505 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-505 by pressing (OK).
2. Press **Measure** (<) to switch to the pH/ORP measurement mode. This will automatically power on the pH/ORP module. The indicator light of the module will be green and flashing when powered on. The main module of the SP-505 will automatically connect after the pH/ORP module has been powered up.
3. Once connected, the background color of **pH** indicator on top-right corner of the display will change from gray to blue and the indicator light on the pH/ORP module itself will change from green to blue and flashing. The prompt message is also changed from Connecting... to Measuring...
4. Once the measurements are completed, the values will be displayed and the prompt message will disappear (Figure 41).
5. Press **Calib** (>) to display calibration selection menu.
6. Press **Calib** (>) as needed to highlight **pH** calibration in the selection menu (Figure 42).
7. Press (OK) to start the calibration procedure.

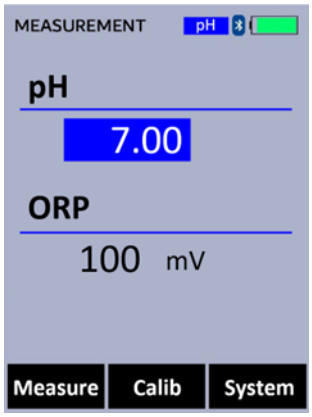

Figure 41.

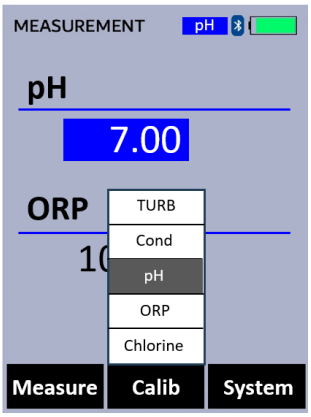

Figure 42.

7.3.1 One-Point Calibration

8. Rinse the pH/ORP sample cell three times with the pH7 buffer. Fill the sample cell with the pH7 buffer.
9. Allow 5–10 seconds for the pH measurement to stabilize and the padlock (🔒) to appear.
10. Press **pH7** (< or >) to start a one-point calibration.
11. If the calibration succeeds, a checkmark (✔) and a "pH7 Calibration success!" message will appear (Figure 43). Otherwise, a warning message is displayed.
12. 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.

7.3.2 Two-Point Calibration

13. Choose either the pH4 or pH10 buffer for a two-point calibration.
14. Rinse the pH/ORP sample cell three times with the chosen buffer. Fill the sample cell with the chosen buffer.
15. Allow 5–10 seconds for the pH measurement to stabilize and the padlock (🔒) to appear.
16. Press **Calib** (< or >) to start a two-point calibration.
17. If the calibration succeeds, a checkmark (✔) and a "pH4 Calibration success!" or a "pH10 Calibration success!" message will appear (Figure 44). Otherwise, a warning message is displayed.
18. 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.

7.3.3 Three-Point Calibration

19. Use the remaining buffer (either the pH4 or pH10) for a three-point calibration.
20. Rinse the pH/ORP sample cell three times with the remaining buffer. Fill the sample cell with the remaining buffer.
21. Allow 5–10 seconds for the pH measurement to stabilize and the padlock (🔒) to appear.
22. Press **Calib** (< or >) to start a three-point calibration.
23. If the calibration succeeds, a checkmark (✔), a "pH4 Calibration success!" or a "pH10 Calibration success!" message, and a "Completed!" message will appear (Figure 45). Otherwise, a warning message is displayed.
24. After a successful three-point calibration, press **Exit** (< , > , or OK) to return to pH/ORP mode.

Figure 43.

Figure 44.

Figure 45.

7.4 ORP Calibration

The ORP scale of the SP-505 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-505 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-505 is referenced to the Standard Hydrogen Electrode (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-505 must be used.

Table 5. Addition Factor to convert Ag/AgCl to SHE (Standard Hydrogen Electrode) ORP value

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-505.

Follow the steps below to carry out an ORP calibration:

1. Power on the SP-505 by pressing (OK).
2. Press **Measure** (>) to switch to the pH/ORP measurement mode. This will automatically power on the pH/ORP module. The indicator light of the module will be green and flashing when powered on. The main module of the SP-505 will automatically connect after the pH/ORP module has been powered up.
3. Once connected, the background color of **pH** indicator on top-right corner of the display will change from gray to blue and the indicator light on the pH/ORP module itself will be change from green to blue and flashing. The prompt message is also changed from Connecting... to Measuring...
4. Once the measurements are completed, the values will be displayed and the prompt message will disappear (Figure 46).
5. Press **Calib** (>) to display calibration selection menu.
6. Press **Calib** (>) as needed to highlight **ORP** calibration in the selection menu (Figure 47).
7. Press (OK) to launch the **ORP CALIBRATION** screen (Figure 48).
8. Use **+** (<) and **-** (>) to adjust the ORP value to match the ORP standard used.
9. Press **Calib** (OK). The message "**Calibration Success**" will appear on the display (Figure 49).
10. ORP calibration is complete. Long press **Calib** (OK) to return to pH/ORP mode.

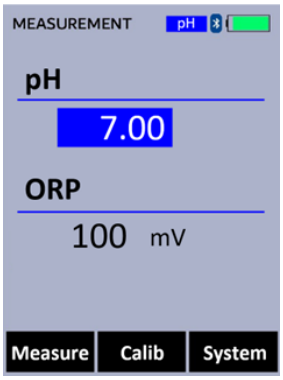

Figure 46.

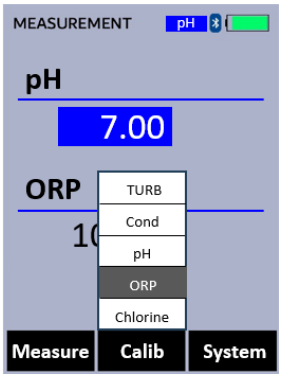

Figure 47.

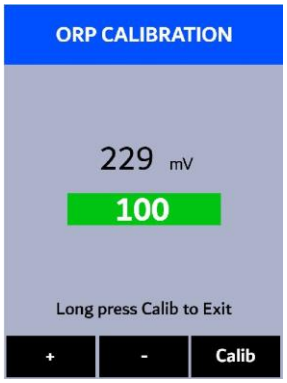

Figure 48.

Figure 49.

8 Device Information and Diagnosis

The **DEVICE INFORMATION** screen is launched when **System** (OK) is pressed in either the Conductivity or pH/ORP measurement mode. This screen contains the device serial number, software version, and hardware version (Figure 50). The battery life as a percentage and the MAC addresses for main module and pH/ORP module (after pair) are also shown.

Press **Diagnosis** (<) to launch the **SYSTEM DIAGNOSIS** screen where raw measurement data are displayed (Figure 51). 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 50.

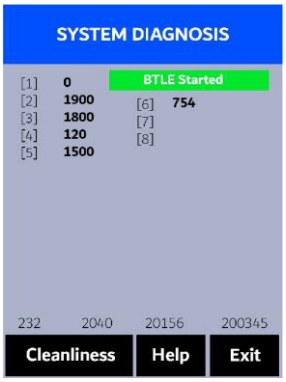

Figure 51.

8.1 Conductivity/Turbidity/Chlorine Sample Cell Cleanliness Check

The SP-505 is designed to provide reliable and accurate measurement of DPD Free and Total Chlorine. Heavy fouling will prevent the light from reaching the sensor, resulting in inaccurate readings. It is suggested that the SP-505 be checked for fouling and cleaned on a monthly basis. Heavily contaminated water may require more frequent cleaning. Cleaner water sources with less contamination may not require cleaning for several months. The SP-505 is designed to carry out a Cleanliness Check as described below:

1. Power on the SP-505 by pressing (OK).
2. Press **System** ((OK)) to launch the **DEVICE INFORMATION** screen.
3. Press **Diagnosis** ((<)) to launch the **SYSTEM DIAGNOSIS** screen.
4. Press **Cleanliness** ((<)). An instruction prompt appears to ask the user to put DI water into the main module sample cell (Figure 52).
5. Pour DI water into the main module sample cell.
6. Press **Confirm** ((<) , (>) , or (OK)). The instruction prompt will disappear and the SP-505 displays a countdown toward the bottom of the display.
7. Once the Cleanliness Check is completed a **Clean** message (Figure 53) or **Sample cell fouled** message (Figure 54) will appear towards the bottom of the display.
8. Press **Exit** ((OK)) to return to the **DEVICE INFORMATION** screen.

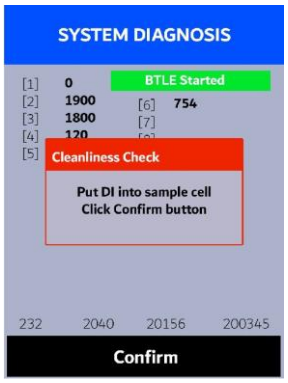

Figure 52.

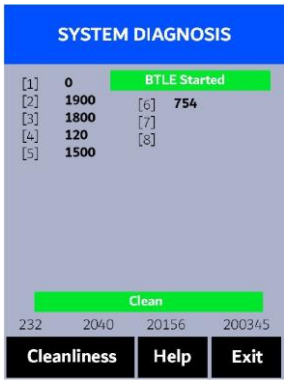

Figure 53.

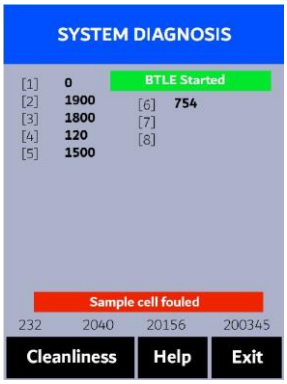

Figure 54.

8.2 Bluetooth Connection to Devices

The SP-505 uses a built-in Bluetooth Low Energy Connection (BTLE) to connect wirelessly to a smart phone via the **uPyxis®** Mobile App or to a computer via the included Bluetooth Adapter (P/N: MA-NEB) and the **uPyxis®** Desktop App. To allow the SP-505 to connect via Bluetooth with other devices follow the steps below:

1. Power on the SP-505 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 54).
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).

8.3 Factory Reset

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

1. Power on the SP-505 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 53).
6. Press **Factory Reset** ((<) or (>)). The display updates as shown in Figure 56 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 Conductivity mode.

Figure 55.

Figure 56.

9 Use with uPyxis 2.0® Mobile App

9.1 Download uPyxis2.0® Mobile App

Download **uPyxis2.0®** Mobile App from **Apple App Store** or **Google Play**.

Figure 57.

9.2 Connecting to uPyxis® Mobile App

Connect the SP-505 to a mobile smart phone according to the following steps:

1. Open **uPyxis2.0®** Mobile App.
2. On **uPyxis2.0®** Mobile App, click **Scan Bluetooth** button to scan the available Pyxis Bluetooth devices
3. If the connection is successful, the SP-505 and its Serial Number (SN) will be displayed (Figure 59).
4. Click the Connect button under SP-505 to connect to it.

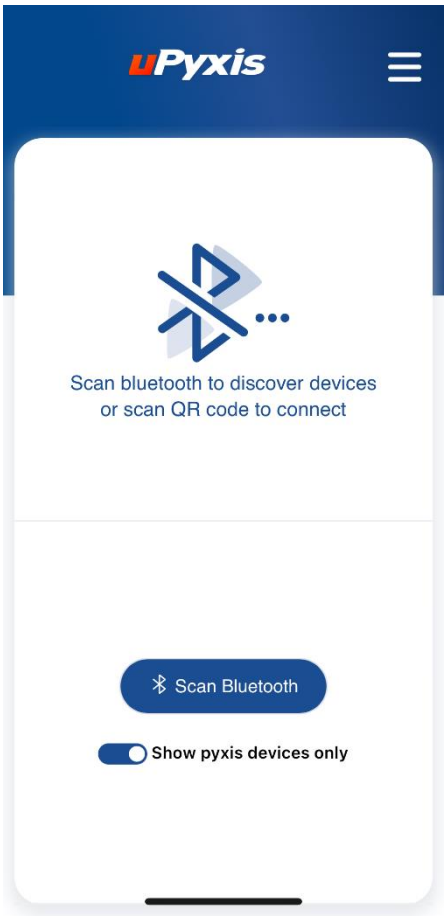

Figure 58.

Figure 59.

9.3 Configuration Screen

When connected, the **uPyxis2.0®** Mobile App will default to the **Configuration** screen. From the **Configuration** screen, users can change the **Device Name**, find the **Serial Number**, **Hardware Version**, and **Firmware Version**. The user can also set the **Power off time** and **Screen off time** in seconds.

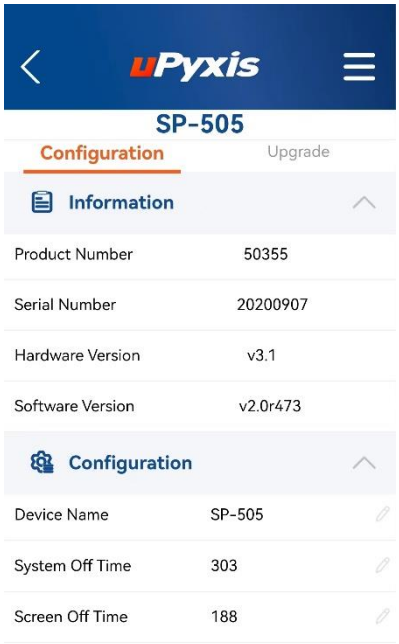

Figure 60.

9.4 Upgrade Screen

From the **Upgrade** screen, users can update the firmware of the SP-505 by pressing **Check Update** button. If a firmware update is available, press **Download**. Once the new firmware is downloaded, press **Upgrade**.

> ***NOTE*** *The firmware update process takes some time and will require the SP-505 to stay within range (approximately 10 ft without obstructions) for the entire duration of the update.*

Once the update is complete, the SP-505 will reboot which will disconnect the SP-505 from the **uPyxis2.0®** Mobile App.

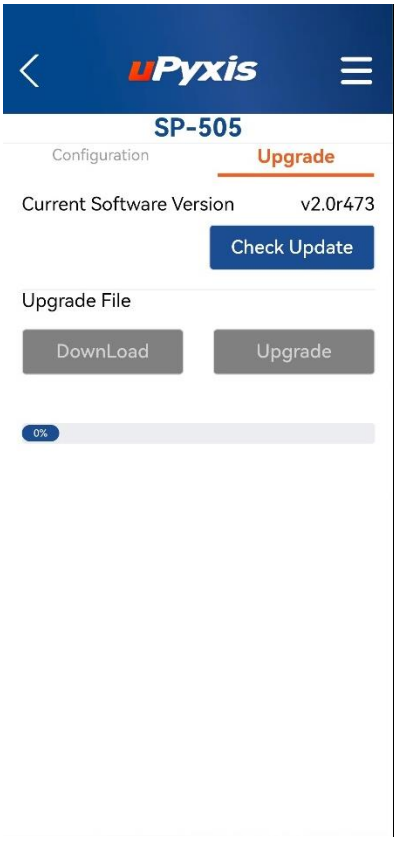

Figure 61.

9.5 Datalog Screen

IMPORTANT NOTE The Datalog function is still in software development. Please check with service@pyxis-lab.com for updates.

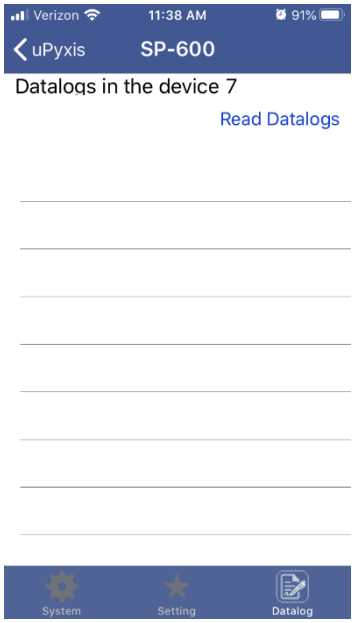

Figure 62.

10 Device Maintenance and Precaution

10.1 Maintenance Best Practices

For greatly increased working life of SP-505 follow the list of best maintenance practices below:

- Rinse the SP-505 with tap water or DI water after measurement and remove residual water using a paper towel.
- Always Maintain 1 mL of pH/ORP Storage Solution in the pH/ORP cell when the SP-505 is not being used.
- Close the pH/ORP Cell Cap 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-505 has not been used in more than two weeks.
- Do not expose the SP-505 to an extreme high or low temperature condition such as leaving the SP-505 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.

10.2 Methods to Cleaning the SP-505

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 eStore/Catalog https://pyxis-lab.com/product/handheld-device-cleaning-kit/

Figure 63. Handheld Device Cleaning Solution Kit

To clean the SP-505 pour cleaning solution into the main module cell for 10 minutes. Rinse the cell with distilled water and use the Cleanliness Check (see the **Conductivity/Turbidity/Chlorine Sample Cell Cleanliness Check** section) to confirm that the SP-505 is clean. Repeat the process as needed until the Cleanliness Check shows Clean.

10.3 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 Cap Seal is closed completely. The pH/ORP Cell Cap Seal seals the pH/ORP cell, maintaining a moist environment for the electrodes. For vigorous field use, it is recommended to utilize a rubber-band to secure the pH/ORP Cell Cap Seal to prevent loss of pH/ORP Storage Solution.

Do not expose the SP-505 to a extreme high or low temperature conditions such as leaving the SP-505 inside an unattended automobile.

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

10.4 pH/ORP Module Replacement

Figure 64. pH/ORP Module

The pH/ORP module of the SP-505 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 9–18 months as a best practice and level of use. Order a replacement pH/ORP module (P/N: 50315) from Pyxis at order@pyxis-lab.com or via the Pyxis Estore at https://www.pyxis-lab.com/product/ph-orp-module/ . If the module is turned on for 20 minutes a day, the pH/ORP 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-505 main module to per the instructions below.

10.4.1 Replacement Procedure

Follow the instructions below to install the replacement module:

1. Power off the SP-505 by holding OK.
2. Remove any liquid from both the main module sample 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-505.
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 65.
7. To Bluetooth pair the main module with the new pH/ORP module, continue to the **Bluetooth Pairing** section below.

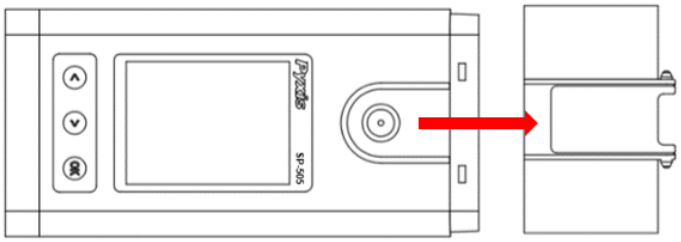

Figure 65.

10.4.2 Bluetooth Pairing

1. Power on the SP-505 by pressing (OK).
2. Press **System** ((OK)) to launch the **DEVICE INFORMATION** screen.
3. Press **Comm** ((>)) to launch the **COMMUNICATION** screen (Figure 66).
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 67).

   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 appears on 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 68).
10. Bluetooth pairing is complete. Long press **Pair** ((OK)) to return to Conductivity/Turbidity mode.

Figure 66.

Figure 67.

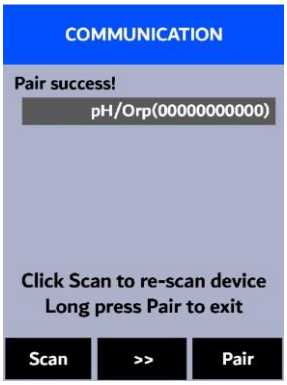

Figure 68.

11 Regulatory Approval

United States

The SP-505 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 i s 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 su ivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique s ubi, même si le brouillage est susceptible.

12 Contact Us

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