SP-900 Portable Water Analyzer
Operation Manual

Rev. B

Firmware version 1.17

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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 in the course of 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.

Shipping

A Repair Authorization Number (RA) must be obtained from the Technical Support (service@pyxis-lab.com) 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.

1 General Description

Specification

- Colorimeter Wavelength: 365, 420, 455, 525, 560, 570, and 630nm
- Turbidity Excitation Wavelength: White LED/90 degree scattering
- Fluorescence Excitation Wavelength: 365 nm LED
- Fluorescence Emission Wavelength: 410 nm
- Wavelength Accuracy: ±1 nm
- Absorbance Reproducibility: 0.005 au in the range of 0 to 1.0 au (3sigma)
- Absorbance Linearity Range: 0 to 1.0 au
- Fluorescence Reproducibility: 1 ppb PTSA (3 sigma)
- Fluorescence Detection Limit: 1 ppb
- Turbidity Reproducibility: 2 NTU (3 sigma)
- Turbidity Detection Limit: 2 NTU
- Battery: 4 AA alkaline
- Typical Battery Life: 2 months
- Display: Graphical LCD 192x128 pixels, visible under direct sunlight
- Instrument Dimension: L 265mm W 88mm H 62mm
- Instrument Weight: 600 g without batteries
- Storage Temperature Range: 0 to 140 °F (-18 to 60 °C)
- Operation Temperature Range: 40 to 120 °F (4 to 49 °C)
- Humidity: 85% at 106 °F (41 °C)
- Environmental: IP67, dustproof and waterproof

Note:

1. Specifications are subject to change without notice with Pyxis' continuous development.

1.1 Pyxis Major Features

The Pyxis SP-900 analyzer shown in Figure 1 is a combination of photometer and fluorometer. It provides colorimetric measurements at 6 LED wavelengths, fluorometric measurement of fluorescent tracer PTSA, and nephelometric turbidity measurement using a white LED as the excitation source. Pyxis SP-900 is pre-calibrated for colorimetric measurements of analytes common in industrial water treatment and other

water testing in the laboratory or in the field, such as chlorine, phosphate, iron, and copper. Main features include:

- Pyxis is pre-calibrated for measuring PTSA (pyrenetetrasulfonic acid) in the range of 0 to 300 ppb. The fluorescence PTSA measurement is automatically compensated for sample color and turbidity interference.

- Specially designed for water treatment companies, PTSA measurement displays product concentration in ppm along with the product name, or PTSA in ppb. The user can choose a product name from a user-defined dropdown list of 5 product names.

- Automatically select the primary wavelength according to the method selected and switches to the secondary wavelength to extend the primary measurement range.

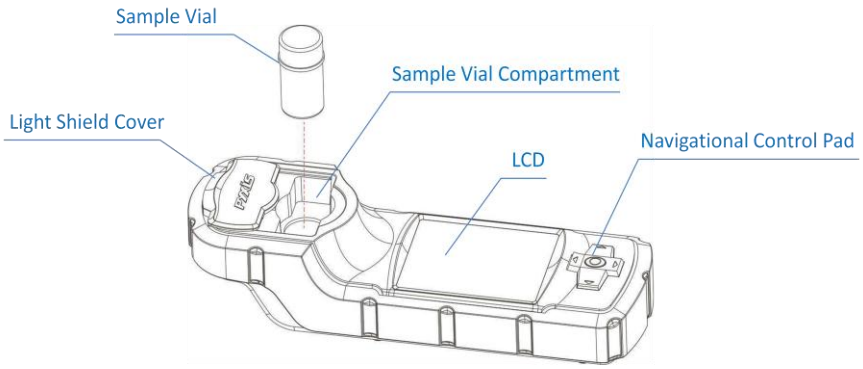

Figure 1 Insert the Sample Vial

- Display a concentration-time profile curve during the last time period in a colorimetric measurement. The user can terminate the timing process and take a reading if the displayed concentration reaches a plateau before completing the predefined time period.

- The user can update the calibration parameter of any pre-calibrated colorimetric method by testing a standard solution first and then following a setup procedure to update the calibration parameters.

1.2 Unpackaging the Instrument

Remove the instrument and accessories from the shipping container and inspect each item for any damage that may have occurred during shipping. 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.

1.3 Standard Accessories

- Sample Vials – two 10 ml, round, 0.78 inch (20 mm) pathlength, glass vials, which can be used for all measurements including turbidity and fluorescence measurements.
- 4 AA alkaline batteries
- Instrument Manual, also available from www.pyxis-lab.com

1.4 Optional Accessories

- Silica desiccant gel pack
- 100 ppb PTSA standard in a 500 ml brown plastic bottle

1.5 Sample Vial Compartment

The sample vial compartment is shown in Figure 1, along with a 10-ml sample vial. When the sample vial is inserted into the sample vial compartment, the triangular mark on the sample vial should be aligned approximately with the 6 o'clock position of the sample vial compartment or any position consistently.

The sample vial compartment should be kept clean. A small amount foreign material could significantly affect turbidity and fluorescence measurement results. Use a soft cloth or lint free paper tissue to clean sample vial compartment periodically. Remove debris, scale, and deposit promptly.

1.6 Light Shield Cover

The light shield cover is shown in Figure 2. The light shield cover can be conveniently slid between the open and closed positions. The light shield cover is held firmly at the rest positions by permanent magnets.

The light shield cover should be in the closed position during storage, transportation, and measurements, especially during the turbidity and fluorescence measurements. When turned on, Pyxis SP-900 carries out self-diagnosis including checking the performance of a variety of optical devices. The light shield door shall be at the closed position to shield interference from ambient light during self-diagnosis.

Care should be taken to avoid water or debris being trapped in the track of the light shield door.

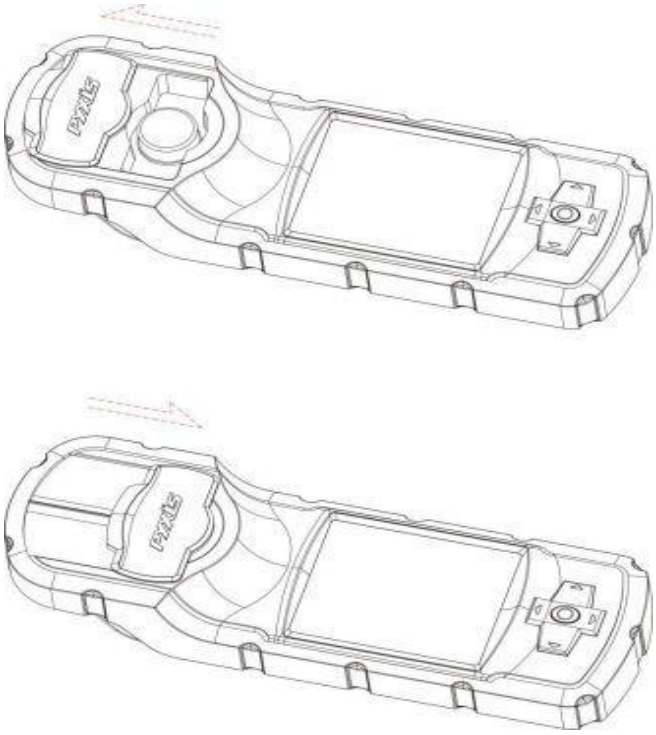

Figure 2 Open and Close the Light Shield Cover

Warning

Magnetic sensitive devices, including but not limited to, credit cards, watched, hard disks, should be keep at a distance of at least 2 inches from the Light Shield Door to avoid possible damage and/or loss of information recorded.

2 Start Pyxis SP-900

2.1 Battery Installation

Pyxis SP-900 is powered by four AA-size alkaline batteries. Do not use rechargeable nickel cadmium (NiCad) batteries or any AA-size lithium batteries. A set of batteries typically lasts for two months. When the batteries capacity is low, Pyxis SP-900 will prompt a LOW BATTERY warning. Replace all four batteries to resume operation of Pyxis SP 900 after the battery warning.

The Pyxis SP-900 battery compartment, shown in Figure 3, is on the back side of the instrument. Insert a small pad underneath the screen area to make the back surface level when the instrument is turned upside down. Install batteries as followings:

1. Remove the battery compartment cover by loosening four screws.
2. Insert four batteries into the battery holder as shown in Figure 3. Make sure the positive battery polarity marker (+) is aligned with the positive marker (+) on the battery holder.
3. Replace the battery compartment cover, making sure that the sealing O-ring is lying flat on the battery holder and tighten the four screws.

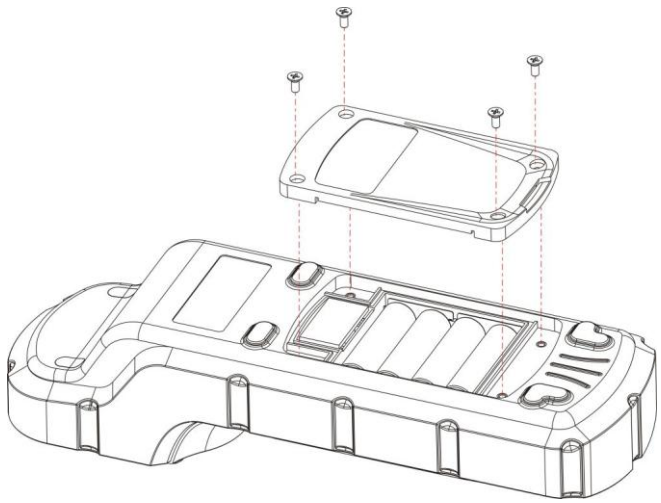

Figure 3 Replace Batteries

2.2 Description of the Navigational Control Pad

The Pyxis SP-900 navigational control pad consists of five keys as shown in Figure 1. The left, right, up, and down keys are navigational keys that are used to select an icon, a button, or other items in various pages. The center key is the OK key. Press the OK key on a selected item to launch the action associated with the selected item. The OK

key is also used to accept the current selection, like the return key in a computer keyboard.

2.3 Turning On Pyxis SP-900

To turn on SP-900, press and hold on the OK key for 3 seconds, and release the OK key when the LCD is lit.

After new batteries installation, Pyxis SP-900 will be automatically turned on, and its LCD backlight will be on. You can navigate the main page menu and launch an operation by pressing on an icon. If battery voltage is too low for the instrument to work properly, Pyxis SP-900 will show a low battery warning message for 5 seconds and turn off automatically. If this happens, replace all four batteries.

2.4 Main Page

Pyxis SP-900 provides intuitive icon menu-assisted user operations. On the main page, eight major feature groups are illustrated as below:

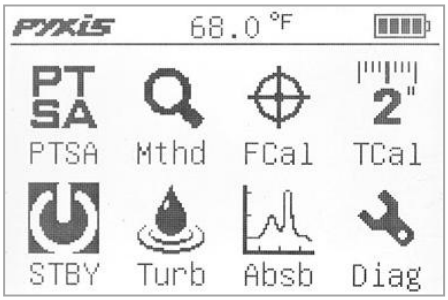

Figure 4 Main Menu

A brief description of each feature group is given in Table 1.Detailed operation instructions can be found in the following chapters.

Table 1 Feature Groups on Main Menu

No.	Title	Description
1	PTSA	PTSA measurement
2	Mthd	Colorimetric measurement methods
3	FCal	Calibration routine for PTSA
4	TCal	Calibration routine for turbidity
5	STBY	Standby, changes SP-900 to a low power mode
6	Turb	Turbidity measurement
7	Absb	Absorbance measurements
8	Diag	Diagnosis

2.4 Turning Off Pyxis SP-900

Turn Pyxis SP-900 off by navigating to STBY icon and press the OK key.

2.5 On Screen Keyboard

Pyxis SP-900 provides an on-screen keyboard when user input is needed. If the cursor is moved to an input field, the on-screen keyboard will be automatically displayed. The on-screen keyboard allows numeric number or text input. The number can be an integer or a decimal number. The text can consist of alphabetic letters, spaces, and numbers.

The keyboard has a backspace key that can be used to delete characters in the input field. After typing in all characters, press the return key to release the cursor, allowing the cursor to be moved to other items in the page using the navigation keys

2.6 Pyxis SP-900 Auto Power Off

Pyxis SP-900 automatically turns itself off after 2 minutes with no-key activity, except for during a measurement. Pressing and holding the OK key for 3 seconds will wake up the instrument, and return to the original page if it has any measurement data.

2.7 Auto LCD Power Saving

During a colorimetric method measurement, Pyxis SP-900 automatically turns LCD backlight off after 30 seconds with no-key activity. Pressing any key will turn on the LCD backlight. Under normal ambient lighting condition, icons and other contents shown on Pyxis SP-900 LCD are readable without backlight being on.

3 PTSA Measurement

3.1 PTSA Measurement

1. Fill the 10 ml sample vial with the test solution and tightly cap the sample vial.
2. Place the sample vial into the sample vial compartment and slide the light shield cover to the closed position.
3. Press the **PTSA** on the main page. Pyxis SP-900 will start to measure the PTSA concentration in the sample.
4. Pyxis SP-900 will display the PTSA concentration in ppb as PTSA.

A list of five product names as the alternative concentration form other than PTSA can be created. After the setup, a product name in a dropdown list can be selected. The PTSA result is the displayed according to the selected product name. After each PTSA measurement, the default product will be at the top of the user defined product name list. If no alternative product names are set up, Pyxis SP-900 will display the PTSA result in ppb as PTSA.

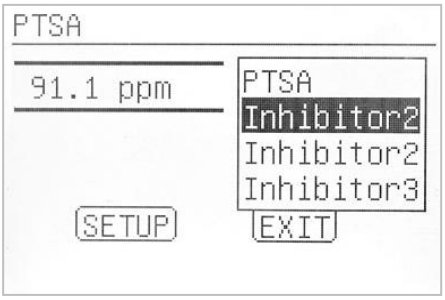

Figure 5 PTSA Measurement

During the fluorescence measurement to determine the PTSA concentration, Pyxis SP-900 checks the sample turbidity. If the sample turbidity value detected is greater than 40 NTU, Pyxis SP-900 will display a warning. For best results, the sample should be filtered if turbidity exceeds 40 NTU.

Sample color causes a lower PTSA concentration to be measured. Pyxis SP-900 automatically compensates for sample color. If the sample color is too intense, Pyxis SP-900 will display a warning.

For best results, ensure that the sample vial is clean. Wipe off water on the outside wall of the sample vial using a lint-free tissue paper. Fill the sample vial to the 10 ml mark. If the sample contains air bubbles, tap the sample vial gently to remove the bubbles before placing the sample vial to sample vial compartment.

3.2 PTSA Product Setup

The PTSA product setup page (Figure 6) is displayed when the **SETUP** button in the PTSA result page is pressed. In this page, five product names and the corresponding conversion factors can be input. The conversion factor is determined according to the PTSA concentration in the products. For example, if the product contains 0.1% PTSA and you want to display the product concentration in ppm or mg/L, the conversion factor is 1000. If the product contains 0.05% PTSA, the conversion factor is 500.

When the product setup page is launched, a cursor bar is at the first location of the product name input field. Pressing the OK key moves the cursor to the keyboard. A number or a letter can be highlighted using the navigational keys. Press the highlighted letter or number to select and place it in the input field (Figure 6).

If the uppercase key is highlighted, the letter selected will be shown as uppercase in the input field, as shown in Figure 6. In the uppercase mode, selecting the decimal place key (the dot) will place a space in the product name field.

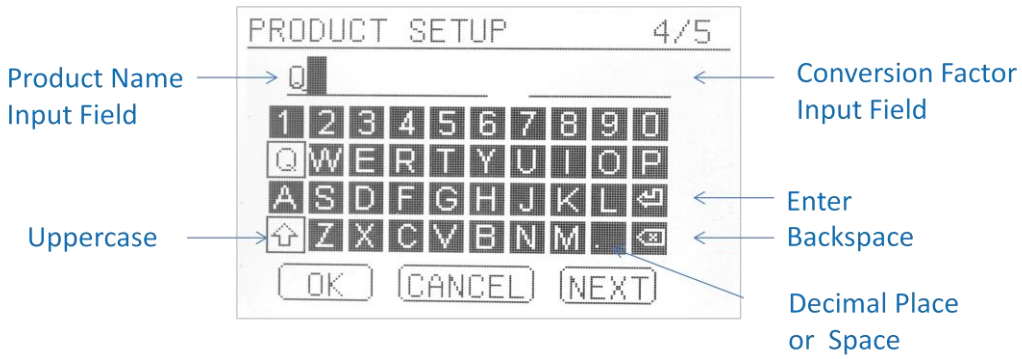

Figure 6 Product Setup

A total of 10 characters can be input to the product name input field. When a product name input is completed, press the enter key in the keyboard first and then RIGHT navigational key to move the cursor to the first location of the conversion factor input field on the right. Press the OK key and the cursor will be moved to the keyboard. Use the navigational keys to select a number. When finishing inputting the conversion factor, press the OK key. The cursor will be then moved to the buttons shown in the bottom of the page.

A letter or a number in the input fields can be deleted using the BACKSPACE key.

Press the **NEXT** button to launch a new product name input page. SP-900 will store up to 5 user defined product names.

3.3. PTSA calibration

Deionized water (DI) as the blank calibration solution and the 100 ppb PTSA calibration standard solution are needed.

1. Press the **FCal** icon to launch the calibration page.

2. Follow the message prompts, insert the DI blank into the sample vial compartment and press the OK key.
3. Follow the message prompts, and insert the 100 ppb standard into the sample vial compartment and press the OK key.
4. Press the OK key to return to the main page.

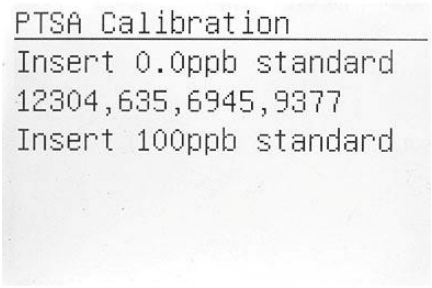

Figure 7 PTSA Calibration

If calibration fails, the followings should be checked:

- The DI blank is being contaminated.
- The 100 ppb PTSA standard solution is decayed or being contaminated.
- The light shield cover is not in the closing position.
- The sample vial compartment is blocked with debris, water, or other materials.

The 100 ppb standard solution shall be stored in a brown or black opaque bottle. Exposing the PTSA standard to light will cause the standard losing the PTSA concentration. Many substances, such as quaternary amine cause a negative interference. Many other substances such laundry detergents that contain optical brightener will cause a significant positive interference.

4 Colorimetric Measurement

4.1 Supported Methods

A wide range of colorimetric methods is supported by the Pyxis SP-900 analyzer and the number of them keeps increasing with continuous development of Pyxis. See corresponding Hach® methods in Appendix A.

Table 2 List of Supported Colorimetric Methods

Abbreviated Method Name	Method Name	Description	Range
CL-F	F-Chlorine	Free chlorine, DPD method	2.2 ppm
CL-T	T-Chlorine	Total chlorine, DPD method	2.2 ppm
CuBi	Cu_Bicinch	Bicinchoninate, EPA approved for reporting wastewater analysis	5.0 ppm
DEHA	DEHA	Method for N,N-diethylhydroxylamine and other oxygen scavengers	0.5 ppm
CaMg	CaMg	Calmagite method for calcium and magnesium	4.00 ppm as $CaCO_3$
FePh	Fe_phenanth	Total iron using 1,10-phenanthroline, USEPA approved for reporting wasterwater analysis	3.00 ppm
FeZi	FeZine	FerroZine method	1.300 ppm
FeTp	FeTptz	Total iron using TPTZ	1.80 ppm
MoHR	Mo_HighRange	High range molybdate	40.0 ppm
MoLR	Mo_LowRange	Low range molybdate using ternary complex method	3.0 ppm
NO2H	NO2H	High range nitrite, ferrous sulfate method	150 ppm as NO_2
NO2L	NO2L	Low range nitrite, diazotization method, USEPA approved for reporting wastewater and drinking water analysis	0.350 ppm as NO_2
PMoV	OPO4-MoV	Reactive phosphate using molybdovanadate method	30.0 ppm as PO_4
OPO4	OPO4	Reactive phosphate using ascorbic acid molybdenum blue method, USEPA accepted for wastewater analysis	2.5 ppm as PO_4
OrgP	Phosphonate	UV digestion and ascorbic acid reduction molybdenum blue method	7.1 ppm as PBTC
PAmi	OPO4-Amino	Reactive phosphate, amino	30.0 ppm

Abbreviated Method Name	Method Name	Description	Range
		acid reduction method	
ClO2	ClO2-DPD	DPD method, USEPA accepted for reporting drinking water analysis	5.00 ppm
ClO2D	ClO2Direct	Direct method for chlorine dioxide	35.0 ppm
SiHR	SiHR	High range silica	75.0 ppm as SiO_2
SiLR	SiLR	Low range silica	1.60 ppm as SiO_2
AZOL	Azole	UV digestion for tolyltriazole and benzotriazole	16.0 ppm
SO4	SO4	Barium sulfate turbdimetric method	70.0 ppm
POLY	Polymer	Turbidimetric method for anionic polymeric dispersant	13.0 ppm as PAA
FeMo	FeMo	Total iron method for water containing molybdate	1.80 ppm

4.2 Select a Method

Move the icon focus to the method icon **MthD** using the navigational (left, right, up, or down) keys. Press OK on the icon to launch the first method selection page. The methods shown on the top row of the page are the most frequently selected methods.

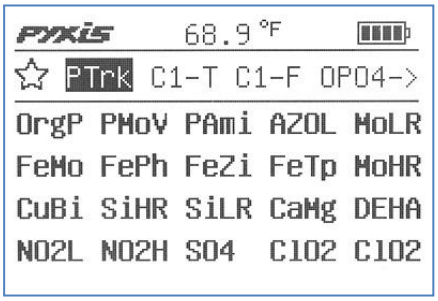

Figure 8 Method Selection

The followings are the operations associated with this page:

1. Use the navigational keys and the OK key to select and launch a method.
2. Press the arrow icon → at the end of the favorite methods row to return to the main page. Press the arrow icon at the lower right corner of the page to display the second method selection page if the device is loaded with more than 23 methods.

Note: Methods shown in the method selection pages include Hach© equivalent methods and Pyxis specific advanced methods. The table in Appendix A provides a

brief description of Pyxis method names and their corresponding Hach® program number. Hach® reagents for 10 ml sample can be used for the test.

4.3 Single Timing Step Method

Most of colorimetric methods have only one timing step. As an example, in the DPD total chlorine method, it takes three minutes for the DPD powder reagent to completely react with chlorine in the water sample. The DPD total chlorine method has a single three-minute timing step. Figure 9 shows the main page of a method with a single timing step.

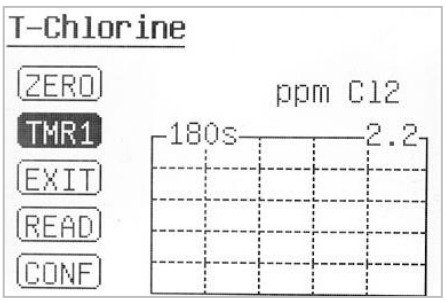

Figure 9 Single Timer Method

4.4 Single-Vial Procedure

1. Place the sample vial filled with the water sample in the Pyxis SP-900 sample vial compartment and press the **ZERO** button. Pyxis SP-900 will display the page shown in Figure 9.
2. Take the sample vial out and add the reagent to the sample vial.
3. Place sample vial back into the sample vial compartment and press the timer button **TMR1**. Pyxis SP-900 will start to monitor the reaction between the reagent and the species you want to measure in the water sample. The concentration is shown in the chart as a function of time (Figure 10).
4. When the timer reaches the preset time and the reaction is complete, the value of concentration will be shown on the top right corner of the page.
5. The rate of the reaction is often faster than the standard pre-set time, which will become apparent from the concentration-time plot. You can press the **STOP** button to stop the timer and terminate the timing step. The last read concentration value will be displayed on the top right corner of the page after you terminate the timing step.

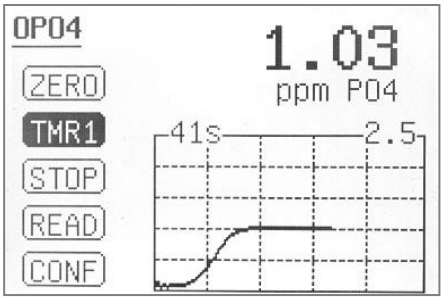

Figure 10 Concentration as a Function of Time

4.5 Two-Vial Methods

Some colorimetric methods require using two vials. The water sample is added to two identical vials. One vial is being used to zero the colorimeter, referred as to the prepared blank. A reagent is added to the other vial, referred as to the prepared sample. The absorbance value is determined from the prepared sample.

If the method requires two or more reagents, the prepared blank could be the resulting solution after one or more reagents have been added to the sample.

The following procedure is typical for two-vial methods:

1. Place the prepared blank into the Pyxis SP-900 sample vial compartment and press the **ZERO** button to zero the instrument.
2. Place the prepared sample into the Pyxis SP-900 sample vial compartment and press the **TMR1** button to start the method timer.
3. When the timing step is completed, the measured concentration will be displayed on the top of the page. The timing step could be terminated earlier by pressing **STOP** button.
4. Optionally, Pyxis SP-900 can be re-zeroed using the prepared blank after the timing step is completed or terminated. The blank reading will be subtracted from the measured concentration value, and the displayed concentration value on the top-right corner will be updated. This step is optional. It is only necessary if the prepared blank changes its color during the timing period.
5. Optionally, the prepared sample vial can be put back and read again by pressing the **READ** button if the blank is re-zeroed after the timing step is completed or terminated. A new concentration value based on the last absorbance value measured will be calculated and displayed.

4.6 Multiple Timing Steps

Some colorimetric methods have two or three timing steps. Pyxis SP-900 shows a count-down timer for the timing steps before the last timing step (Figure 11). During these timing steps, one or more reagents are added to the sample, or operations such as swirling the vial to mix the reagent and the sample are being performed. These

methods usually use one vial for the prepared blank and the other for the prepared sample.

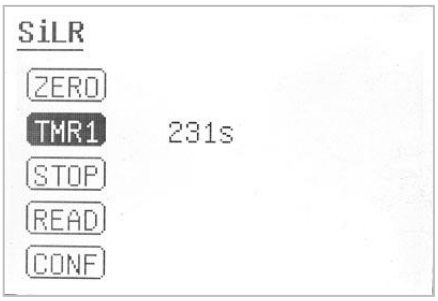

Figure 11 Multiple Timer Method

In order to show the concentration-time curve as shown in Figure 10 during the last timing step, Pyxis SP-900 must be zeroed using the prepared blank before the last timing step. Thus, the last timer button will not be selectable until Pyxis SP-900 has been zeroed using the prepared blank. Multi-timing step Hach® methods require zeroing the colorimeter using the prepared blank after the last timing step is completed. Pyxis SP-900 can optionally be re-zeroed using the prepared blank after the last timing step. The blank value measured will be subtracted from the concentration value measured at the end of the last timing step. Optionally, the **READ** button could be pressed to read the prepare sample again.

The following procedure is typical for methods having two-timing steps:

1. Press the **TMR1** button to start the first timer. Complete the necessary operations to prepare the blank and the sample.
2. Place the prepared blank into the Pyxis SP-900 sample vial compartment and press the **ZERO** button.
3. Place the prepared sample into the Pyxis SP-900 sample vial compartment and press the **TMR2** button to start the second timer. Pyxis SP-900 will display the measured concentration as a function of time as shown in Figure 10.
4. When the timing step is completed, the measured concentration will be displayed on the top right of the screen. The timing step could be terminated earlier by pressing **STOP** button.
5. Optionally, Pyxis SP-900 can be re-zeroed using the prepared blank after the timing step is completed or terminated. The blank reading will be subtracted from the measured concentration value, and the displayed concentration value on the top-right corner will be updated. This step is optional. It is only necessary if the prepared blank changes its color during the timing period.

4.7 Advanced Methods

Pyxis SP-900 provides 6 LED wavelengths and can measure absorbance values at multiple LED wavelengths. Consequently, Pyxis SP-900 can provide many predefined advanced methods that traditionally require complex and often expensive lab testing procedures.

Low range, direct reading chlorine dioxide, 0 to 35.0 ppm

The maximum absorption bank of aqueous chlorine dioxide is around 360nm. Pyxis SP-900 has a 365nm UV LED and can be used to directly measure chlorine dioxide. It offers a much lower detection limit (0.2 ppm) than direct methods available from other portable colorimeters having only light sources in the visible range.

Select **ClO2D** in the method selection page and carry out the following steps to measure chlorine dioxide:

1. Place a vial filled with deionized water into the vial compartment and press the **ZERO** button to zero Pyxis SP-900.
2. Discard the deionized water and fill the same vial with the sample. Place the vial into the vial compartment and press **READ** button to read. The measured chlorine dioxide concentration will be displayed in the top of the method page.

Turbdimetric Anionic Polymer Method

1. Add polymer reagent 1 to 10 ml sample and inverse the sample vial 5 times to mix the reagent with the sample. Place the sample via to the sample vial compartment.
2. Press on **ZERO**.
3. Add polymer reagent 2 and press on **TMR1** to start the five minutes timer.
4. Gently inverse the sample via for 10 times and place the sample vial to the sample vial compartment.
5. Polymer concentration will be measured and displayed when the five minute timer is reached. The polymer concentration is shown as ppm PAA (polyacrylic acid) equivalent.

4.8 Method Setup and Calibration

Press the SETUP button in the method result page to launch the method setup and calibration page.

4.8.1. Set up the method parameters

Press the **FORM** button to select a concentration form from the list of forms that are available for this specific method (Figure 12).

Press the **UNIT** button to select a concentration unit among the list of ppb, ppm, mg/L, and ug/L (Fihure 13).

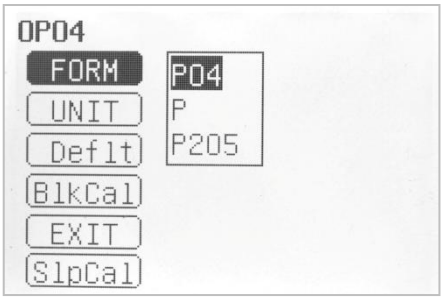

Figure 12 Method Form Selection

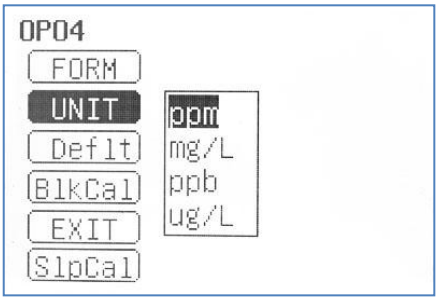

Figure 13 Method Unit Selection

4.8.2. Slope Calibration

If the method has been calibrated prior to shipping, there is no need to calibrate unless a calibration check indicates that the method needs a calibration. The following steps are used to calibration a method:

1. Use a calibration standard of known concentration. Follow the steps required by the method and note the value reported by SP-900.
2. If the measured value differs from the known standard value, Press the **CONFG** button to launch the method configuration page.
3. Press the slope calibration button **SlpCal**. A numeric keyboard will be displayed.
4. Enter the concentration value and press the OK key on the enter key in the numeric keyboard to return to the configuration page.
5. Press the **EXIT** button. Press the OK key to accept the calibration or other key to cancel the calibration.

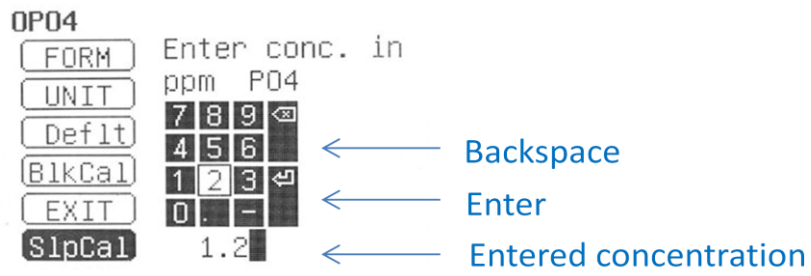

Figure 14 Slope Calibration

For best results, the concentration of the standard solution should be less than the maximum concentration for the method (table 2) and greater than the half of the maximum concentration. For example to calibrate total chlorine, the chlorine concentration in the standard solution should be between 1.1 and 2.2 ppm.

The corresponding calibration parameters will be updated and saved in the memory as the working calibration parameter set. Note that this set of calibration parameters are not the same as the default set. You can use **RSM_DEFAULT** button to copy the default calibration parameters to the working set.

4.8.3. Reagent Blank Calibration

Some methods have a non-zero intercept value in the calibration equation. For these methods, a proper non-zero intercept value is pre-loaded in SP-900 prior to shipping. The following steps are used to carry out a reagent blank calibration:

1. Follow the normal steps to carry out a measurement on a deionized water sample.
2. Press the **CONFG** button to launch the method configuration page.
3. Press the reagent blank calibration button **BlKCal**.
4. Press the OK key to save when exiting from the configuration page or press other keys to cancel.

4.8.4. Resume to Default Calibration Parameters

Pressing the **RSM_Default** button will copy the default calibration intercept and slope to the working intercept and slope, respectively. If the default calibration parameters were created prior to shipping, this button action is to restore the working calibration parameters to the original factory loaded calibration parameters.

5 Turbidity Measurement

5.1 Operation

Follow the following steps to measure turbidity:

1. Fill the 10 ml sample vial to above the 10 ml mark.
2. Insert the sample vial to the sample vial compartment.
3. Slide the light shield cover to the closed position.
4. Press the **Turb** Icon in the main page to launch the turbidity measurement.

5.2 Turbidity Calibration

1. Fill the 10 ml sample vial to above 10 ml mark with the deionized water.
2. Insert the sample vial to the sample vial compartment.
3. Slide the light shield cover to the closed position.
4. Press the **TCal** button on the turbidity result page to launch the calibration (Figure 15). Press the OK key to measure the deionized water
5. Fill the 10 ml sample vial to above 10 ml mark with the 100 NTU formazin standard. Insert the sample vial to the sample vial compartment.
6. Press the OK key to measure the 100 NTU standard.
7. Press the OK key to return to the main page.

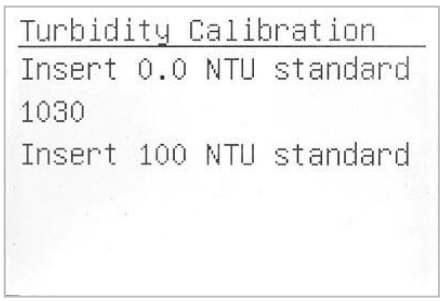

Figure 15 Turbidity Calibration

6 Absorbance Measurement

The following steps are used to measure the absorbance values of a sample:

1. Press the **Absb** icon to launch the absorbance measurement page.
2. Place a vial filled with the blank sample in the sample vial compartment. Press the **ZERO** button to zero the method.
3. Place a vial filled with the sample in the sample vial compartment. Press the **READ** button to read absorbance. The absorbance values of first 6 wavelengths (table 3) will be shown. Press the **READ** button again to show the absorbance values of the last three wavelengths.

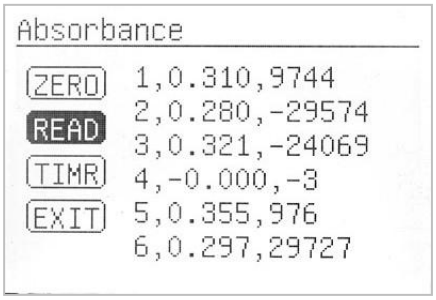

Figure 16 Absorbance Measurement

Press **EXIT** to return to the main page. Timing function for absorbance measurement may not be available for some models.

Table 3 Wavelength of each channel

Channel	Wavelength (nm)
1	560
2	570
3	630, high gain
4	525, high gain
5	455
6	525
7	365
8	630
9	420

Note that the absorbance values measured with Pyxis SP-900 is generally smaller than those measured with a spectrophotometer equipped with a monochromatic light source or detector. The Pyxis SP-900 absorbance values should, however, linearly correlate with the absorbance values measured with the spectrophotometer. Thus for any colorimetric system, Pyxis SP-900 absorbance follows Lambert-Beer law.

7 Maintenance

Use a soft cloth or lint free paper tissue to clean the sample vial compartment periodically. Remove debris, scale, and deposit promptly.

Although Pyxis SP-900 is protected from water damage, it is a good practice to avoid water entering the sample vial compartment and becoming trapping underneath the navigational control pad. Deposits left behind when the water is evaporated could affect Pyxis performance.

Pyxis SP-900 should be stored in the temperature range of 0 to 140 °F (-18 to 60 °C) and relative humidity less than 85% at 106 °F (41 °C). Do not leave the Pyxis SP-900 in a parked vehicle. The temperature inside a parked vehicle can reach above 150 °F in summer and -20 °F in winter. Exposing the Pyxis SP-900 to extreme temperature or humidity will cause a gradual decay in performance of fluorescence measurements and require more frequent calibrations.

During storage and transportation, do not leave a sample vial in the sample vial compartment. Close the lid of the sample vial compartment during storage and transportation.

Replace batteries when the Pyxis SP-900 displays a warning message indicating LOW BATTERY voltage. Remove batteries from Pyxis SP-900 battery compartment if Pyxis SP-900 is going to be placed in storage for a long period time.

When the Pyxis SP-900 is shipped, a desiccant pack is included in the desiccant compartment underneath the cover of the battery compartment. It is recommended that a new desiccant pack is replaced each time the batteries are replaced.

8 Troubleshooting

The Pyxis SP-900 will prompt a warning message if it detects an abnormal condition or operation. On screen prompts direct the user to take appropriate corrective actions in most cases.

If an unspecific error occurs or Pyxis SP-900 cannot be turned on, reboot the instrument by taking a battery out of the battery holder and reinstall the battery.

If the Pyxis SP-900 has been idle for more than two months and cannot be turned on, replace all four batteries with four new AA alkaline batteries.

A diagnostics page can be launched by press the **Diag** icon in the main page. The software version and its associated hash code can be found in the diagnosis page. Contact Pyxis professionals at service@pyxis-lab.com and provide with following information to ensure high quality technical support.

Table 4 Contact Information

Items	Note
Contact Name	
Phone	
Email	
Customer Name	
Product Number (P/N)	Can be found on the product label on back of product
Serial Number (S/N)	Can be found on the product label on back of product
Firmware version	Can be found in diagnosis page
Problem Description	Capture warning message if applicable

Appendix A. Pyxis Method and Hach® Method Number (PRMP) Cross Reference

Abbreviated Method Name	Method Name	Corresponding Hach © method
CL-F	F-Chlorine	Chlorine, Free, DPD, PRMP 9
CL-T	T-Chlorine	Chlorine, Totoal, DPD, PRMP 9
CuBi	Cu_Bicinch	Copper, Bicinchoninate, PRMP 20
DEHA	DEHA	DEHA, Iron Reduction Method for Oxygen Scavengers, PRMP 25
CaMg	CaMg	Calcium and Magnesium: Calmagite Colorimetric Method, PRMP 30
FePh	Fe_phenanth	Iron, 1,10 phenanthroline, PRMP 33
FeZi	FeZine	Iron, FerroZine, PRMP 37
FeTp	FeTptz	Iron, TPTZ, PRMP 39
MoHR	Mo_HighRange	Molybdenum, High Range, Mercaptoacetic Acid, PRMP 44
MoLR	Mo_LowRange	Molybdenum, Low Range, Ternary Complex, PRMP 47
NO2H	NO2H	Nitrite, High Range, Ferrous Sulfate, PRMP 59
NO2L	NO2L	Nitrite, Low Range, Diazotization, PRMP 60
PMoV	OPO4-MoV	Phosphorus, Reactive, Molybdovanadate, GRMP 77
OPO4	OPO4	Phosphorus, Reactive, Orthophosphate Ascorbic Acid, GRMP 79
OrgP	Phosphonate	Phosphonates, Persulfate UV Oxidation, PRMP 80
PAmi	OPO4-Amino	Phosphorus, Reactive, Amino Acid, GRMP 85
ClO2	ClO2-DPD	Chlorine Dioxide, DPD, PRMP 112
ClO2D	ClO2Direct	Direct Pyxis
SiHR	SiHR	Silica, High Range, Silicomolybdate, PRGM 89
SiLR	SiLR	Silica, Low Range, Heteropoly Blue, PRMP 90
AZOL	Azole	Benzotriazole, UV Photolysis, PRMP 3
SO4	SO4	Sulfate. PRMP 7
POLY	Polymer	Turbidimetric method for anionic polymers
FeMo	FeMo	Iron, for cooling water with molybdenum-based treatment, PRMP 38
Cr6	Cr6	Hexavalent chromium, 1,5-Diphenylcarbohydrzaide Method, PRMP 13
NH3S	NH3Sal	Ammonia Salicylate Method, PRMP 64
MnL	MnLow	Low Range Manganese PAN Method, PRMP 43
MnH	MnHigh	High Range Manganese, Periodate Oxidation Method, PRMP 41
BLCH	Bleach	Direct Method measuring sodium hypochlorite concentration
NH2C	NH2Cl	Indophenol Method for MonoChloramine, PRMP 110
CrT	CrTot	Alkaline Hypobromite Oxidation Method for Total

		Chromium, PRMP 15
Al	Alumi	Aluminon Method for Aluminum, PRMP 1
F	Floride	SPADNS 2 Method for Fluoride, PRMP 27
CuL	CuPorp	Porphyrin Method for Copper, PRMP 22
Zn	Zinc	Zincon Method for Zinc, PRMP 97
S2-	Sulfide	Methylene Blue Method for Sulfide, PRMP 93
CN	Cyanide	Pyridine-Pyrazalone Method for Cyanide, PRMP 23
N2H2	H2H2	P=Dimethylaminobenzaldehyde Method for Hydrazine, PRMP 31
Cl2H	Cl2High	High Range DPD Chlorine, No sample change needed