

SP-380 Handheld Dual Fluorometer PTSA and Fluorescein Operational Manual

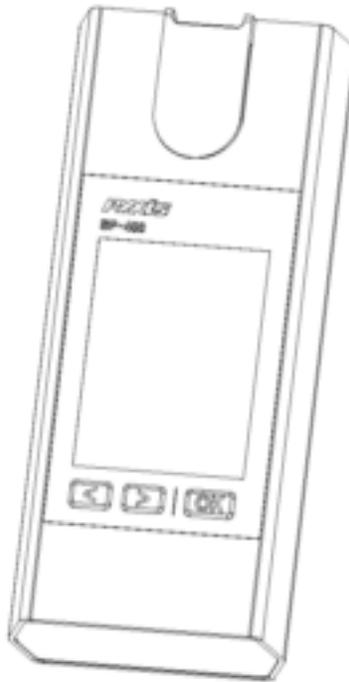


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Confidentiality

The information contained in this manual may be confidential and proprietary and is the property of Pyxis Lab. Information disclosed herein shall not be used to manufacture, construct, or otherwise reproduce the goods disclosed herein. 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 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

1.1. Specification

PTSA	
Measurement Range	0 to 300 ppb
Excitation Wavelength	365 nm LED
Emission Wavelength	410 nm
Wavelength Accuracy	± 1 nm
Resolution	1 ppb
Accuracy	± 1% or ± 1 ppb
Calibration Solution Point	0, 100, and 200 ppb
Fluorescein	
Measurement Range	0 to 60
Excitation Wavelength	470 nm LED
Emission Wavelength	520 nm
Wavelength Accuracy	± 1 nm
Resolution	0.1 ppb
Accuracy	± 1% or ± 1 ppb
Calibration Solution Point	0, 50, 250, and 500 ppb
Temperature	
Measurement Range	32-160 °F
Resolution	0.1 °F
Accuracy	± 1% of Reading
Compensation Method	Automatic to 25 °C
Others	
Battery	9V Alkaline Battery
Typical Battery Life	3200 Readings (480 mAh Battery)
Display	320 x 240 TFT-LCD, Visible Under Direct Sunlight
Dimension	L160 x W74 x H33 (mm)
Weight	310g (Without Battery)
Temperature Range	40 to 160 °F (4 to 41 °C)
Humidity	85% at 106 °F (41 °C)
Environmental	IP67, Dustproof and Waterproof

1.2. Pyxis SP-380 Major Features

The Pyxis SP-380 analyzer simultaneously measures the concentration of fluorescent tracer PTSA and the concentration of fluorescent tracer fluorescein of a water sample.

Main features include:

- Pyxis SP-380 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.
- Pyxis SP-380 is pre-calibrated for measuring fluorescein in the range of 0 to 20 ppb.
- Large color graphic screen that can be read on direct sunlight.

1.3. 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.

1.4. Standard Accessories

- Quick Instruction Guild
- 9V alkaline battery
- Full instrument manual is available from www.pyxis-lab.com

1.5. Optional Accessories

- Carrying case for SP-380
- 100 ppb PTSA standard in a 500 ml brown plastic bottle
- 10 ppb fluorescein standard in a 500 ml brown plastic bottle

1.6. Light Shield Cover

The light shield cover is shown in Figure 1. It should be in the closed position during PTSA and fluorescein measurement.

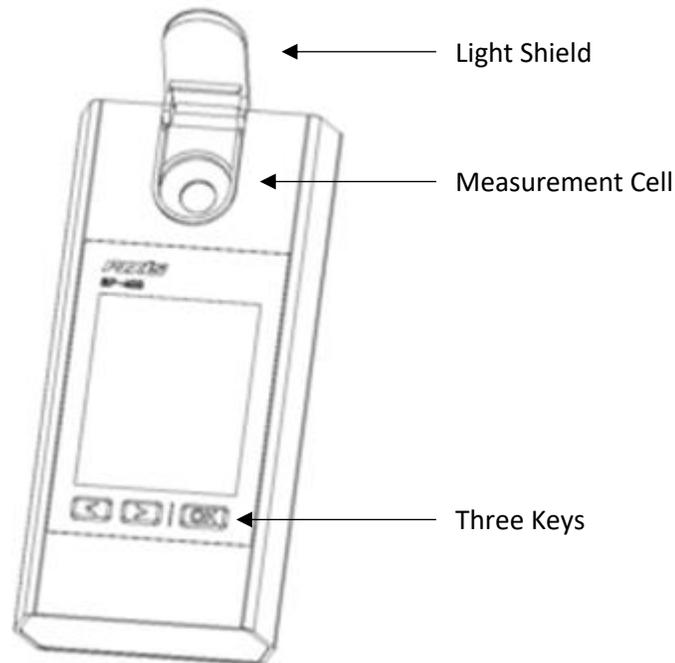


Figure 1 Light Shield in the Open Position

2. Starting SP-380

2.1. Battery Installation

Pyxis SP-380 is powered by a 9V alkaline battery. Do not use rechargeable nickel cadmium (NiCad) batteries or any 9V lithium battery. A typical 9V battery lasts for two months and enables about 3000 measurements. When the battery capacity is low, Pyxis SP-380 will prompt a LOW BATTERY warning for 5 seconds and turn off automatically. Replace the battery to resume operation of Pyxis SP-380 after the battery warning. After new battery installation, Pyxis SP-380 will be automatically turned on to the measurement mode.

The Pyxis SP-380 battery compartment, shown in Figure 2, is on the back side of the instrument. Install batteries as followings:

1. Remove battery compartment cover by loosening the two screws.
2. Make sure that the smaller circular terminal (positive) of the battery is aligned with the hexagonal socket (positive) of the battery holder, the hexagonal socket (negative) of the battery with the circular terminal of the holder. Snap the battery firmly into the batter holder.
3. Replace the batter compartment cover, making sure that the O-ring is seated lying flat on the battery holder and retighten the two screws.

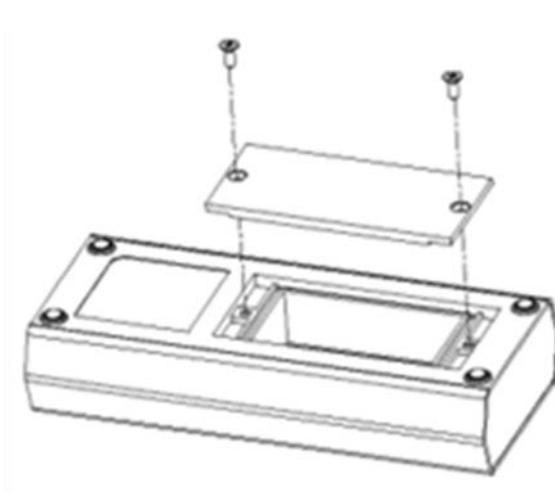


Figure 2 Battery Install

2.2. Description of the Control Keys

The Pyxis SP-380 has three keys as shown in Figure 3. The left (<), right (>) and **OK** keys are used to launch an action indicated on the screen right above the keys. The action associated with each key could be different in different operation modes.

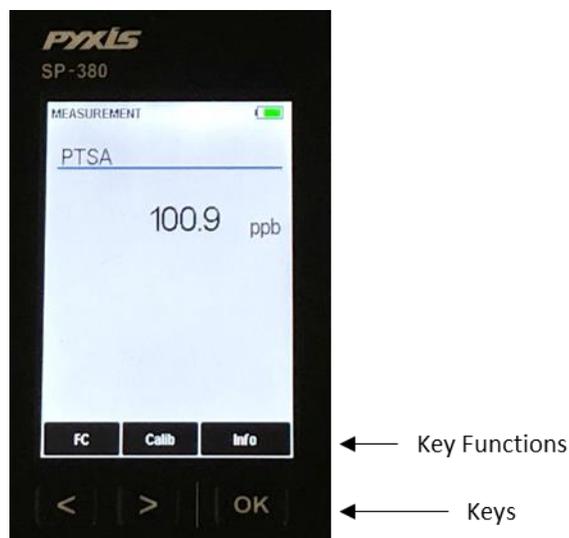


Figure 3 Keys and Functions

2.3. Turning On/Off SP-380

To turn on SP-380, press and hold on the **OK** key for 3 seconds, and release the **OK** key when the LCD is lit.

To turn off SP-380, press and hold on the **OK** key for 3 seconds, and release the **OK** key when the LCD is off. SP-380 will turn itself off after 60 seconds without user interaction through the keys.

3. PTSA and Fluorescein Measurement

When turned on, SP-380 will be in the measurement mode as shown in Figure 3. The water sample can be transferred to the measurement cell with using a pipette. SP-380 can also directly take a water sample from a faucet or sample valve port. The light shield needs to be in the closed position in order to measure PTSA and fluorescein.

Allow a few seconds for SP-380 to reach a stable PTSA and fluorescein readings. For a sample containing 100 ppb PTSA, the measured PTSA should be stabilized within the range of 98 to 102 ppb. For a sample containing 10.0 ppb fluorescein, the measured fluorescein should be stabilized within the range of 9.8 to 10.2 ppb.

SP-380 does not need to be turned off between measurements of two samples. Rinsing the measurement cell a few times is recommended.

4. Calibration

SP-380 fluorescence PTSA measurement and fluorescein measurement can be calibrated separately. To calibrate PTSA measurement requires the 100 ppb or 200 ppb PTSA standard solution. A standard with fluorescein value 10 ppb or 20 ppb can be used to calibrate fluorescein.

4.1. PTSA Calibration Process

1. Rinse sample cell with DI water and with it near full, close the light shield. In emergency, “non-PTSA” water, such as city water, may be used, but re-calibrate using DI water for the zero set step as soon as it is available.
2. Power on by a press of **OK** key. Allow 5-10 seconds for meter to stabilize.
3. A Screen similar to Figure 4 appears. The unit is actively reading and displaying both PTSA and fluorescein. The values will be very low if DI water is used; PTSA and fluorescein should be near zero. A low non-zero value (e.g. 0.2 or 0.4, etc.) is not problematic.



Figure 4

4. Press **Calib** (>) to start PTSA calibration.
5. Figure 5, the first screen of the PTSA (alone) calibration, appears.



Figure 5

6. Press **Zero** labeled key (<) to set the zero point.
7. After successful zero set, a checkmark symbol will appear next to “**Press Zero Button**” to confirm success. The screen will also update to show the Slope steps, as in Figure 6. The Cycle command replaces Zero on the black bar and the possible PTSA selection is displayed in red. The default is 100 ppb.

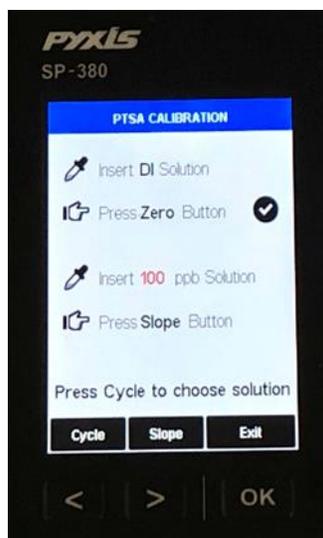


Figure 6

8. Rinse the sample cell out thoroughly (twice) with the desired PTSA standard and with the measurement cell near full, close the light shield. (If the screen darkens, promptly press any key to re-set the timer for auto shutdown. The key pressed does not perform its activity, only re-sets timer. The screen then re-lights.)
9. If the 100 ppb PTSA default is not the desired PTSA for calibration, press the **Cycle** labeled key (<) to cycle between the PTSA standards 100-200-300 ppb (it repeats). The value in red will update as the setting is changed. If the default of 100 is desired then the use of **Cycle** (<) is not required. Ensure the value selected matches the standard actually present.
10. Press the **Slope** labeled key (>) to set the slope of the standard desired and complete PTSA calibration.
11. If calibration is successful, the screen will update with a second checkmark for the Slope setting as in Fig. 7, and the message Calibration Succeed will appear.

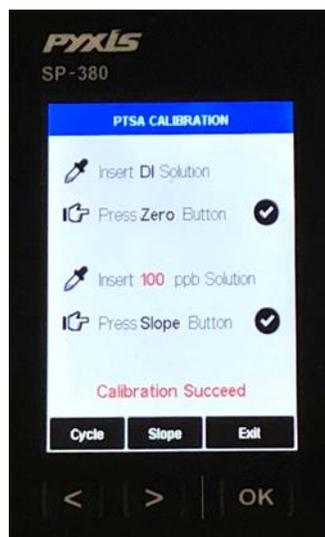


Figure 7

12. Press the **Exit** labeled key (**OK**) to return to the basic read screen. The screen will be similar to Fig. 3. Slight variance in the PTSA value is not problematic. If Exit is done before the second checkmark appears, the calibration will not be completed and must be re-done. After a successful calibration, the unit does not automatically return to the read (Measurement) mode. If Exit is held down too long the unit will power down rather than returning to the read mode.

Quick Tips

- If the 100 ppb PTSA concentration (the default) is the desired calibration and it is what has been added to the measurement cell for the slope (step 9), then the key presses from the beginning, including the power on, are: **OK**, **<**, **<**, {refill with PTSA standard}, **>**, then after completion, Exit to return to Measurement Mode.
- If screen darkens, the timer will shortly power down the meter. Press on any will reset the timer, but this press does not perform any activity other than timer restart. The next key press needed must still be done after this timer re-set press. The timer is set to help maximize battery life. After the key press to set the zero point, there is 40 seconds to rinse and refill the measurement cell with PTSA standard (and close the light shield), before the next key press of either “**Cycle**” (**<**) to change PTSA setting or “**Slope**” (**>**) to execute the final part of the calibration.

- After returning to read mode after calibration, rinse several times with the first sample. The unit will continue to read the sample values without any further key presses if it has not powered off. If there are no key presses for 20 seconds the screen will darken (40 sec. in a calibration mode), and after another 20 seconds without key activity will power down. If you have multiple samples a quick press on OK or the other keys will keep the timer going, giving you time to add the next one. To ensure accurate results and avoid sample carry-over/contamination, rinse at least twice with the next sample before closing light shield (it's smart to include rinsing the inside surface of the light shield.)
- Always rinse the unit with clean water after use and dry by clean tissue or paper towel. Be gentle handling the open light shield.

4.2. Fluorescence Calibration Process

1. Rinse sample cell with DI water and with it near full, close the light shield. In emergency, “non-fluorescein” water, such as city water, may be used, but recalibrate using DI water for the zero step as soon as it is available.
2. Power on by a press of OK key. Allow 5-10 seconds for meter to stabilize.
3. A Screen similar to Figure 3 appears. The unit is actively reading and displaying fluorescein. The value will be very low if DI water is used; fluorescein should be near zero. A low non-zero value (e.g. 0.1 or 0.2, etc.) is not problematic.
4. Press **Calibration** labeled key (<).
5. Figure 8, the first screen of the fluorescein (alone) calibration, appears.



Figure 8

6. Press **Zero** labeled key (<) to set the zero point.
7. After successful zero set, a checkmark symbol will appear next to “**Click Zero Button**” to confirm success. The screen will also update to show the Slope steps, as in Figure 9. The Cycle command replaces Zero on the black bar and the possible fluorescein selection is displayed in red. The default is 50 ppb.



Figure 9

8. Rinse the sample cell out thoroughly (twice) with the 50 ppb fluorescein standard and with the measurement cell near full, close the light shield. (If the screen darkens, promptly press any key to re-set the timer for auto shutdown. The key pressed does not perform its activity, only re-sets timer. The screen then relights.)
9. Press the **Slope** labeled Key (>) to set the slope of the standard desired and complete low-range fluorescein calibration.
10. If calibration is successful, the screen will update with a second checkmark for the Slope setting as in figure 10, and the message **Click continue to start mid-range calibration**.



Figure 10

11. Press the **Continue** labeled key (>) to continue middle range fluorescein calibration, the screen will also update to show the second Slope step, as in Figure 11. The possible fluorescein selection is displayed in red. The default is 250 ppb. If middle range and high range fluorescein calibration are not required, press the **Exit** labeled key (OK) any keys to exit. return to the basic read screen. The screen will be similar to Fig. 3. Slight variance in the fluorescein value is not problematic. If Exit is done before the second checkmark appears, the low range calibration will not be completed and must be re-done. After a successful calibration, the unit does not automatically return to the read (Measurement) mode. If Exit is held down too long the unit will power down rather than returning to the read mode.



Figure 11

12. Rinse the sample cell out thoroughly (twice) with the 250 ppb fluorescein standard and with the measurement cell near full, close the light shield. (If the screen darkens, promptly press any key to re-set the timer for auto shutdown. The key pressed does not perform its activity, only re-sets timer. The screen then re-lights.)
13. Press the **Slope** labeled key (>) to set the slope of the standard desired and complete middle-range fluorescein calibration.
14. If calibration is successful, the screen will update with a third checkmark for the Slope setting as in Fig. 12, and the message Calibration Succeed will appear.



Figure 12

15. Press the **Continue** labeled key (>) to continue high range fluorescein calibration, the screen will also update to show the third Slope step, as in Figure 13. The possible fluorescein selection is displayed in red. The default is 500 ppb. If high range fluorescein calibration is not required, press the **Exit** labeled key (OK) any keys to exit return to the basic read screen. The screen will be similar to Fig. 3. Slight variance in the fluorescein value is not problematic. If Exit is done before the third checkmark appears, the middle range calibration will not be completed and must be re-done. After a successful calibration, the unit does not automatically return to the read (Measurement) mode. If Exit is held down too long the unit will power down rather than returning to the read mode.



Figure 13

16. Rinse the sample cell out thoroughly (twice) with the 500 ppb fluorescein standard and with the measurement cell near full, close the light shield. (If the screen darkens, promptly press any key to re-set the timer for auto shutdown. The key pressed does not perform its activity, only re-sets timer. The screen then re-lights.)
17. Press the **Slope** labeled key (>) to set the slope of the standard desired and complete high-range fluorescein calibration.
18. If calibration is successful, the screen will update with a fourth checkmark for the Slope setting as in Fig. 14, and the message Calibration Succeed will appear.



Figure 14

19. Press the **Exit** labeled key (**OK**) any keys to exit return to the basic read screen. The screen will be similar to Fig. 3. Slight variance in the fluorescein value is not problematic. If Exit is done before the fourth checkmark appears, the high range calibration will not be completed and must be re-done. After a successful calibration, the unit does not automatically return to the read (Measurement) mode. If Exit is held down too long the unit will power down rather than returning to the read mode.

Quick Tips

1. If the 50 ppb fluorescein concentration (the default) is the desired calibration and it is what has been added to the measurement cell for the slope (step 9), then the key presses from the beginning, including the power on, are: **OK**, **<**, **<**, {refill with FLUORESCHEIN standard}, **>**, then after completion, press Exit key to return to Measurement Mode.
2. If screen darkens, the timer will shortly power down the meter. Any key press will reset the timer, but this press does not perform any activity other than timer restart. The next key press needed must still be done after this timer re-set press. The timer is set to help maximize battery life. After the key press to set the zero point, there is 40 seconds to rinse and refill the measurement cell with fluorescein standard (and close the light shield), before the next key press of either “**Cycle**” (**<**) to change fluorescein setting or “**Slope**” (**>**) to execute the final part of the calibration.

3. After returning to read mode after calibration, rinse several times with the first sample. The unit will continue to read the sample values without any further key presses if it has not powered off. If there are no key presses for 20 seconds the screen will darken (40 sec. in a calibration mode), and after another 20 seconds without key activity will power down. If you have multiple samples a quick press on OK or the other keys will keep the timer going, giving you time to add the next one. To ensure accurate results and avoid sample carry-over/contamination, rinse at least twice with the next sample before closing light shield (it's smart to include rinsing the inside surface of the light shield.)
4. Always rinse the unit with clean water after use and dry by clean tissue or paper towel. Be gentle handling the open light shield.

5. Device Information and Diagnosis

The device information is shown when the Info labeled OK key in the measurement mode is pressed momentarily (Figure 3). The screen contains the device serial number, software version, and hardware version (Figure 15). The battery life as a percentage and the standard that were used in the last calibration are also shown.

Press the diagnosis labeled key to switch to the diagnosis screen where raw measurement data are displayed (Figure 16). The information has no use for normal operation. Please provide an image of both the device information screen and the diagnosis screen when you contact Pyxis (service@pyxis-lab.com) for troubleshooting your device.



Figure 15

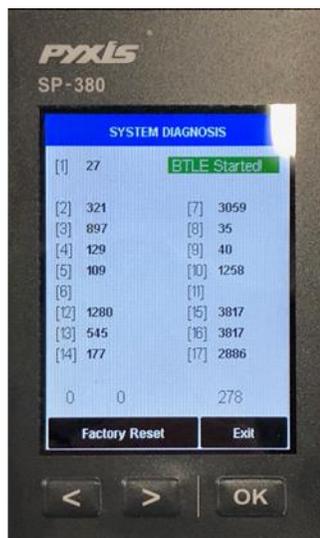


Figure 16

6. Wireless Connection

Pyxis SP-380 can be connected to a smart phone or a computer via WIFI or Bluetooth for upgrading the device software. SP-380 can be wirelessly paired with other Pyxis devices for exchanging data. In the normal operation modes, the wireless function is turned off. If you want to explore the SP-380 wireless functions, please contact Pyxis Lab Inc. (service@pyxis-lab.com)