Pyxis®

HW-400 Portable Sugar Thin-Juice Analyzer

User Manual

Water Professionals Deserve Better Tools.

www.pyxis-lab.com

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Warranty Information

Confidentiality

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

Standard Limited Warranty

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

Warranty Term

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

Warranty Service

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

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

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

Warranty Shipping

A Repair 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://www.pyxis-lab.com/request-return-or-repair/

Pyxis Technical Support

Contact Pyxis Technical Support at +1 (866) 203-8397 service@pyxis-lab.com for support.

1 Introduction

The HW-400 is a handheld fluorometer designed to directly measure Sugar (Thin Juice) contamination in condensate carried over from the multiple effect evaporators in a sugar plant production process. The unit utilizes near UV light to directly measure fluorescence representative units displayed as ppm Sugar. Pure glucose sugar does not fluoresce at any significant amount, however the raw sugar, also referred to as "Thin Juice" processed in the multiple effect evaporators fluoresces blue/green light when excited by a near UV light source. The fluorometer in HW-400 is designed to detect the raw sugar fluorescence to monitor possible sugar thin-juice carryover into boiler condensate.

Because all sugar processing facilities may differ in fluorescent signal ratio to Thin-Juice content, the HW-400 is factory calibrated by Pyxis Lab using Synthetic Sugar (Thin-Juice) Calibration Standard Solutions and is capable of measuring this value in a range of 10 to 500ppm in this scale of detection. The unit may be field calibrated using Pyxis Synthetic Calibration Standards as outlined in this operation manual and the device readings may be correlated to onsite test validated samples to determine site specific values of residual Thin-Juice.

1.1 Main Features

The Pyxis HW-400 is an ultraviolet handheld fluorometer. It measures sugar thin juice fluorescence in a water sample and includes the following features:

- Used to monitor boiler condensate in a sugar processing facility with high sensitivity for early detection
- Direct Pour Design – No Cuvettes Necessary
- No Reagents – Direct Reading
- Reading as Sugar ppm (Fluorescent Representative Units)
- Simple Maintenance and Calibration using Pyxis Synthetic Sugar (Thin-Juice) Calibration Standard Solutions
- Self-Cleanliness Diagnostics for Preventative Sample Cup Cleaning
- High-Turbidity Warning for dirty samples, indicating dilution is required

2 Specifications

Table 1. HW-400 Specifications

Item	Specification*
Part Number (P/N)	52219
Target	Raw Sugar-Multiple Forms
Range[(2)]	10-500ppm
LDL	10ppm
Reproducibility	≤1.5% or 10ppm
Accuracy	±3%
Method	Ultraviolet fluorescence
Operational Temperature	32.8–104 °F (1–40 °C)
Storage Temperature	19.4–140 °F (-7–60 °C)
Humidity	85% No-condensation under 40℃
Display	320×240 TFT-LCD, visible under direct sunlight
Enclosure Rating	IP67
Main Module Power Supply	4 AA alkaline batteries
Dimension (L × W × H)	6.69 × 3.15 × 1.77 inch (170 × 80 × 45 mm)
Weight †	0.88 lbs (400 g)
Regulation	CE, ROSH
Calibration[(3)]	Calibrated by using Synthetic Standard

(1) *With Pyxis's continuous improvement policy, these specifications are subject to change without notice.* † *Batteries excluded*

(2) *The measurement value depends on the composition of organic matter and the water sample. Site specific correlation to the device value and actual ppm of Raw Sugar (Thin-Juice) is required.*

(3) *Device can be calibrated using Pyxis Synthetic Sugar Calibration Standard*

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. 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@pyxislab.com.

3.1 Standard Accessories

- Four (4) AA alkaline batteries
- MA-NEB (1) USB Bluetooth Adapter for Laptop or PC use with uPyxis Desktop
- User Manual available online at https://pyxis-lab.com/support/

3.2 Optional Accessories

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

Table 2.

Accessory Name	Part Number
Pyxis Carrying Case for HW-400	50725
SUGAR-200 *(Synthetic Sugar Thin Juice Calibration Standard Solution - 200ppm -500mL Bottle)*	21037
SUGAR-400 *(Synthetic Sugar Thin Juice Calibration Standard Solution - 400ppm -500mL Bottle)*	36054
Pyxis Handheld Cleaning Kit	SER-02

4 Installation

4.1 Battery Installation

The HW-400 is powered by four AA alkaline batteries. Typical battery life lasts for 10,000 measurements or 10 months. When the battery capacity is critically low, the HW-400 will display a 'LOW BATTERY' warning for 5 seconds and then automatically turn off.

NOTE *Do not use rechargeable nickel cadmium (NiCad) or lithium batteries.*

Replace the batteries to resume operation of the HW-400 after the battery warning. The HW-400 will automatically turn on in the measurement mode after new batteries are installation.

The HW-400 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.

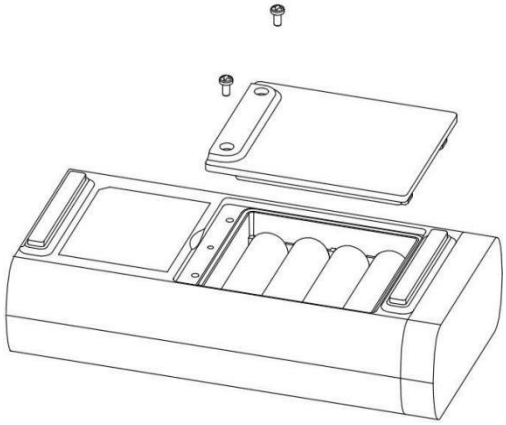

Figure 1. The HW-400 battery compartment

Install batteries using the following steps:

1. Remove the battery compartment cover by loosening the two screws.
2. Remove old batteries and dispose of them properly.
3. Following the positive and negative terminal signs in the compartment bottom, snap four new AA alkaline batteries firmly into the battery holder.
4. Replace the battery compartment cover and ensure that the sealing O-ring is lying flat on the battery holder.
5. Fasten the two screws.
   NOTE *Failure to properly seat the O-ring may result in water damage to the HW-400.*

5 Instrument Overview

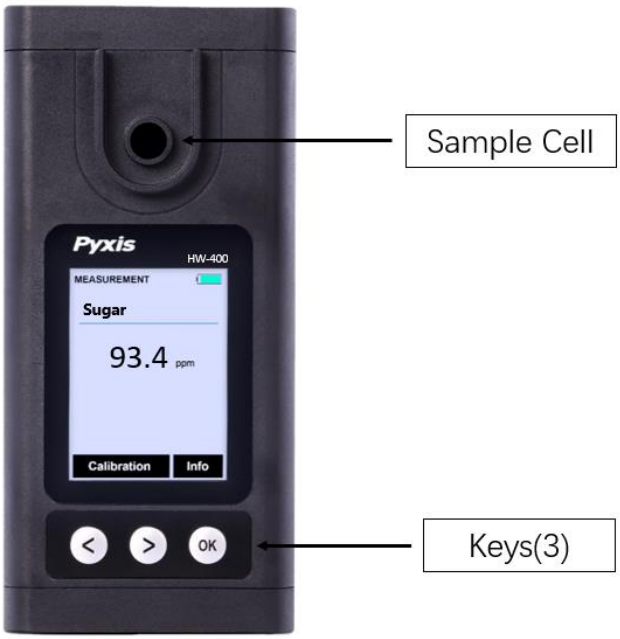

Figure 2.

5.1 Control Keys

The HW-400 has three control keys, as shown in Figure 2. 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.

5.2 Main Module On/Off

To turn on the HW-400: Press OK momentarily and release.

To turn off the HW-400: Press and hold OK for about three seconds. Release OK when the LCD display turns off. The HW-400 turns itself off after 60 seconds without user interaction detected. This is done to conserve battery life.

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

6 Measurement

6.1 Sugar Measurement

When powered on, the HW-400 will default to the Sugar measurement mode. A water sample should be transferred to the sample cell using a disposable pipette, or the cell can be filled slowly from a sample bottle.

NOTE *Special care should be taken when adding 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 sample cell at least three times. Allow 5–10 seconds for the HW-400 to stabilize. The values will be displayed in if a stable value is reached (Figure 3).

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 HW-400 had been equilibrated (stored).*

NOTE *The maximum range of measurement of the HW-400 is 500ppm as SUGAR. For samples containing levels above this value, the sample should be carefully diluted with deionized (DI) water to a level <500ppm prior to testing. The value displayed should then be multiplied by the dilution factor for the final SUGAR value in ppm.*

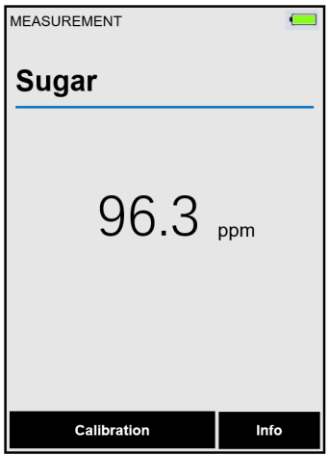

Figure 3.

6.2 High Color and Turbidity Warning

The HW-400 has extra channels to measure sample turbidity and color to automatically compensate sample color and turbidity interference. If sample turbidity and color values determined are too high, a warning will be displayed. In such a case, the user should filter the sample for SUGAR measurement.

7 Calibration

Sugar calibration for the HW-400 requires deionized (DI) water and a standard solution. SUGAR calibration uses 200 ppm SUGAR standard solution (see the **Optional Accessories** section).

7.1 Sugar Calibration

1. Rinse the sample cell three times with DI water. Fill the sample cell with DI water..
2. Power on the HW-400 by pressing(OK). Allow 5-10 seconds for the HW-400 to stabilize.
3. Press **Calibration** (< or >) to launch the **SUGAR CALIBRATION** screen (Figure 4).
4. Press **Zero** (<) to start the zero (blank) calibration.
5. If the calibration succeeds, a checkmark (✔) and instructions for the slope calibration will appear (Figure 5).
6. Rinse the sample cell three times with the desired SUGAR standard. Fill the sample cell with the desired SUGAR standard.
7. Press **Cycle** (<) to cycle between the SUGAR standards 200 and 400 ppm (it repeats). Ensure the value selected matches the desired SUGAR standard in the sample cell.
8. Press **Slope** (>) to start the slope calibration.
9. If the calibration succeeds, a checkmark (✔), a "Calibration Success" message will appear (Figure 6). Otherwise, a warning message is displayed.
10. Calibration is now complete. Press **Exit** (OK) to return to measurement mode.

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

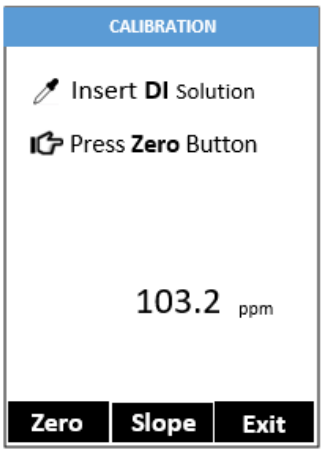

Figure 4.

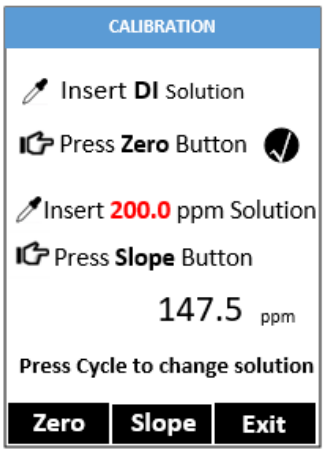

Figure 5.

Figure 6.

8 Device Information and Diagnosis

The **DEVICE INFORMATION** screen is launched when **Info** (OK) is pressed in the measurement mode. This screen contains the device serial number, software version, and hardware version (Figure 7). The battery life as a percentage and the MAC addresses for main module also shown.

Press **Diagnosis** (< or >) to launch the **SYSTEM DIAGNOSIS** screen where raw measurement data are displayed (Figure 8). 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.

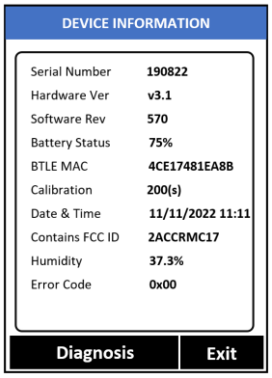

Figure 7.

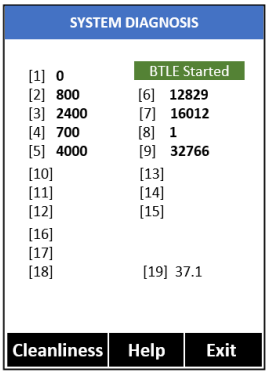

Figure 8.

8.1 Sample Cell Cleanliness Check

The HW-400 is designed to provide reliable and accurate measurement on Sugar. Heavy fouling will prevent the light from reaching the sensor, resulting in inaccurate readings. It is suggested that the HW-400 be checked for fouling and cleaned on a monthly basis. Heavily contaminated waters may require more frequent cleanings.
Cleaner water sources with less contamination may not require cleaning for several months. The HW-400 is designed to carry out a Cleanliness Check as described below:

1. Power on the HW-400 by pressing(OK) .
2. Press **Info** (OK) to launch the **DEVICE INFORMATION** screen.
3. Press **Diagnosis** (< or >) to launch the **SYSTEM DIAGNOSIS** screen.
4. Allow 5–10seconds for the message in the top-right corner of the display change from **Starting BTLE...** to **BTLE Started**
5. Press **Cleanliness** (<). An instruction prompt appears to ask the user to put DI water into the sample cell (Figure 9).
6. Pour DI water into the sample cell.

7. Press **Confirm** (< , > or OK). The instruction prompt will disappear and the HW-400 displays a countdown toward the bottom of the display.
8. Once the Cleanliness Check is completed a **Clean** message (Figure 10) or **Sample cell fouled** message (Figure 11) will appear towards the bottom of the display.
9. Cleanliness check is now complete. Press **Exit** (OK) to return to measurement mode.

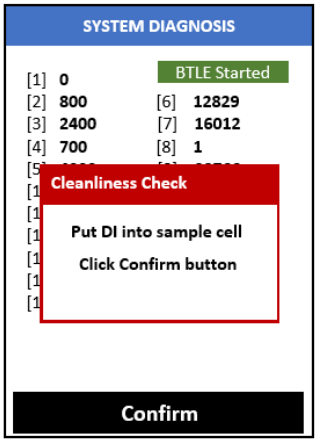

Figure 9.

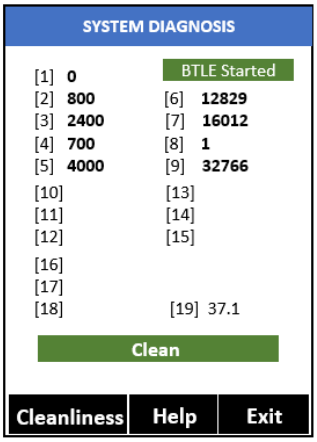

Figure 10.

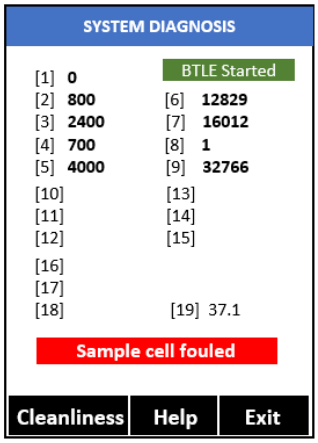

Figure 11.

8.2 Bluetooth Connection to Devices

The HW-400 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 HW-400 to connect via Bluetooth with other devices follow the steps below:

1. Power on the HW-400 by pressing(OK).
2. Press **Info** (OK) to launch the **DEVICE INFORMATION** screen.
3. Press **Diagnosis** (< or >) 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 8).
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 HW-400 by pressing(OK).
2. Press **Info** (OK) to launch the **DEVICE INFORMATION** screen.
3. Press **Diagnosis** (< or >) 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 12).
6. Press **Factory Reset** (< or >). The display updates as shown in Figure 13 appear and the user can choose one of three options:
   (a) Press (OK) to start the factory reset, **or**
   (b) Press **Cancel** (<) to return to the **HELP** screen, **or**
   (c) Press **Exit** (>) to abandon the factory reset entirely.
7. After a successful factory reset, the message “Factory reset done.” will appear on the display.
8. Press **Exit** (OK) to return to measurement mode.

Figure 12.

Figure 13.

9 Use with uPyxis® Mobile App

9.1 Download uPyxis® Mobile App

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

Figure 14.

9.2 Connecting to uPyxis® Mobile App

Connect the HW-400 to a mobile smart phone according to the following steps:

1. Follow the steps in the **Bluetooth Connection to Devices** section to make the HW-400 discoverable.
2. Open **uPyxis®** Mobile App.
3. On **uPyxis®** Mobile App, pull down to refresh the list of available Pyxis devices.
4. If the connection is successful, the HW-400 and its Serial Number (SN) will be displayed (Figure 15).
5. Press on the **HW-400 image**.

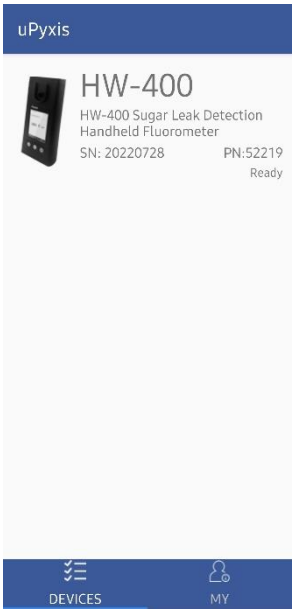

Figure 15.

9.3 Setting Screen

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

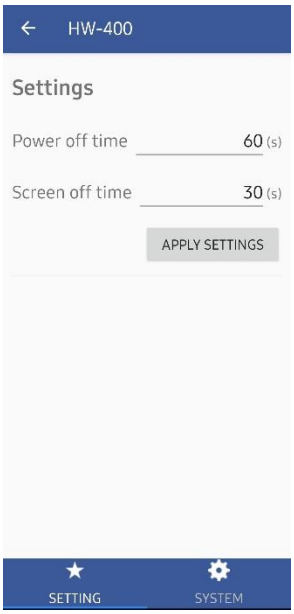

Figure 16.

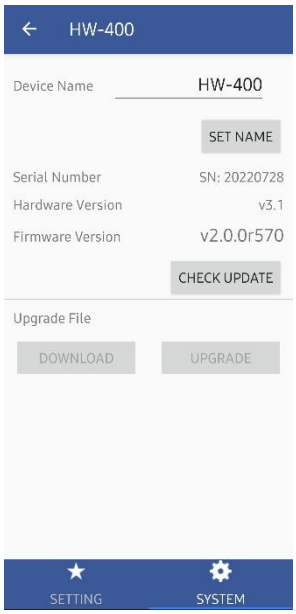

Figure 17.

9.4 System Screen

From the **System** screen, users can change the **Device Name**, find the **Serial Number**, **Hardware Version**, and **Firmware Version**, as well as update the firmware of the HW-400 by pressing **Check Update**. If a firmware update is available, press **Download**. Once the new firmware is downloaded, press **Upgrade**. See Figure 17.

NOTE *The firmware update process takes some time and will require the HW-400 to stay within range (approximately 10 ft without obstructions) for the entire duration of the update.*

Once the update is complete, the HW-400 will reboot which will disconnect the HW-400 from the **uPyxis®** Mobile App.

10 Use with uPyxis® Desktop App

10.1 Install uPyxis® Desktop App

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

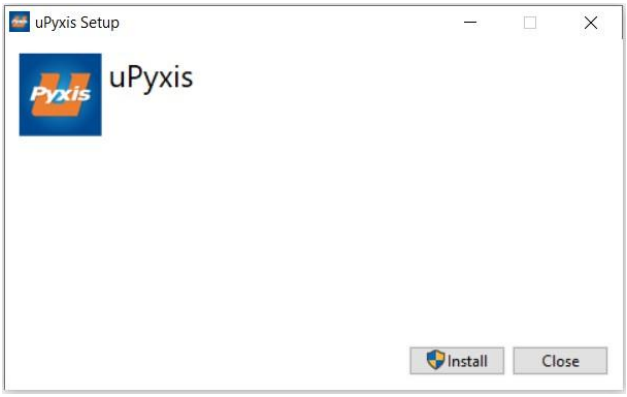

Figure 18.

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

10.2 Connecting to uPyxis® Desktop App

Connect the HW-400 to a Windows computer using the MA-NEB Bluetooth/USB adapter provided according to the following steps:

MA-NEB

1. Follow the steps in the **Bluetooth Connection to Devices** section to make the HW-400 discoverable.
2. Plug the Bluetooth/USB adapter into a USB port in the computer.
3. Launch **uPyxis®** Desktop App.
4. On **uPyxis®** Desktop App, click Device ⟶ **Connect via USB-Bluetooth** (Figure 19).
5. If the connection is successful, the HW-400 and its Serial Number (SN) will be displayed in the left pane of the **uPyxis®** window.

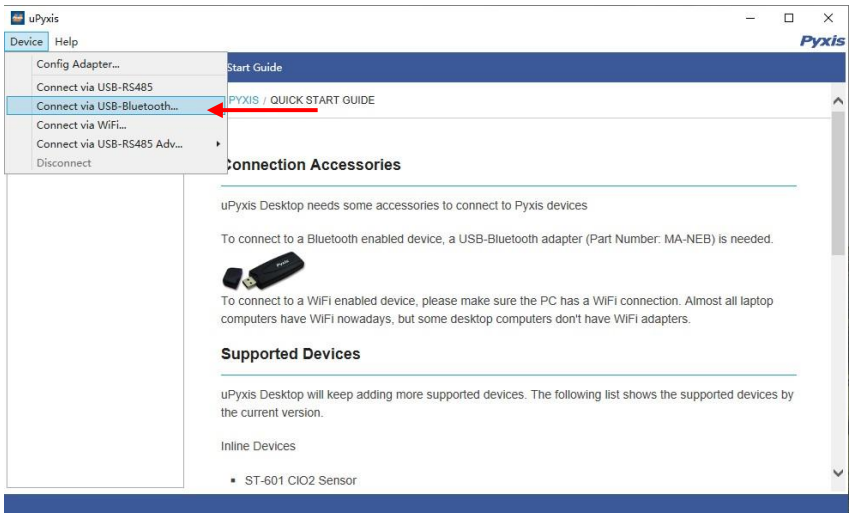

Figure 19.

10.3 System Screen

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

NOTE *The firmware update process takes some time and will require the HW-400 to stay within range (approximately 10 ft without obstructions) for the entire duration of the update.*

Once the update is complete, the HW-400 will reboot which will disconnect the HW-400 from the **uPyxis®** Mobile App.

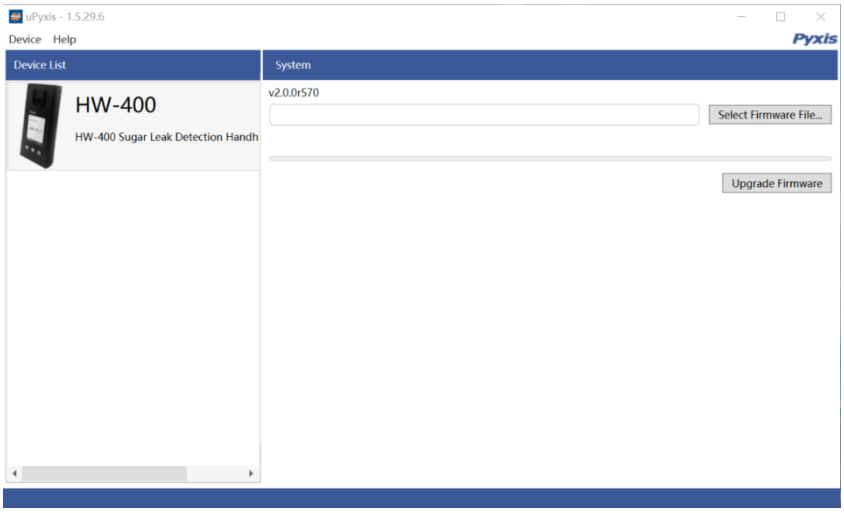

Figure 20.

11 Device Maintenance and Precaution

11.1 Maintenance Best Practices and Quick Tips

For greatly increased working life and ease of use of the HW-400 follow the list of maintenance best practices and quick tips below:

- Rinse the sample cell at least three times with the desired solution before turning on.
- After a successful calibration, the unit does not automatically return to the measurement mode. If Exit is held down too long the unit will power down rather than returning to the measurement mode.
- After returning to measurement 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, and after another 20 seconds without key activity will power down. The press of any key while the screen is dark will reset the timer and the screen will re-light. (This press will not step along the calibration process; the next press needed will still be required in the sequence).
- Always rinse the unit with clean water after use and dry by clean tissue or paper towel.

11.2 Methods for Cleaning the HW-400

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

Figure 23. Handheld Device Cleaning Solution Kit

To clean the HW-400 pour cleaning solution into the sample cell for 10 minutes. Rinse the sample cell with distilled water and use the Cleanliness Check (see the **Sample Cell Cleanliness Check** section) to confirm that the HW-400 is clean. Repeat the process as needed until the Cleanliness Check shows **Clean**.

11.3 Storage

Do not expose the HW-400 to an extreme high or low temperature condition such as leaving the HW-400 inside an unattended automobile.

12 Contact Us

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