



ST-606 Acidified Sodium Chlorite Sensor

Inline Acidified Sodium Chlorite ASC (0-1200ppm) NaClO₂ (254nm) Sensor



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**USER
MANUAL**

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Warranty Information

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Standard Limited Warranty

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

Warranty Term

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

Warranty Service

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

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

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

Warranty Shipping

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

Pyxis Technical Support

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

1 Introduction

The Pyxis ST-606 inline sensor is uniquely designed to measure the real-time concentration of Acidified Acidified Sodium Chlorite – ASC (NaClO₂) in clean water free of suspended solids, turbidity, and color. The ST-606 sensor measures the optical density of the ASC solution using a near UV light source. The sensor has a built-in reference light source and a reference light detector in addition to the main light source and main light detector. The ST-606 sensor can be connected to any device that accepts an isolated or non-isolated 4–20mA input or RS-485 Modbus. As with all Pyxis inline sensors, the ST-606 sensor can be wirelessly accessed via Bluetooth5.0 when used in conjunction with the MA-WB Bluetooth/USB Adapter or PowerPACK Series Auxiliary Box and the **uPyxis® 2.0** Mobile or Desktop App. Directions on this wireless calibration capability are included in this manual.

Primary Installation Format

The primary method is to install the sensor in-line in piping format. This method should ideally be in a vertical line run to avoid chlorine dioxide gas bubble interference. This can be done with the standard ST-001 Inline Tee Assembly (3/4" FNPT) provided with sensor. Pyxis also offers 2" and 3" inline tee assemblies as an accessory option if required.

Teflon Tube Installation Format

The second method is to install the sensor in-line using the unique ¼-inch OD (7 mm OD) clear Teflon tubing adapter 6 inches in length. This tubing can be passed "THROUGH" the optical channel to allow for use of the sensor with smaller line sizes.

NOTE For enhanced ambient light interference prevention, Pyxis recommends users apply black electrical tape or shrink wrap to allow sample darkening prior to and after the optical channel as seen in Figure 3.

1.1 Main Features

The ST-606 sensor includes the following features:

- Can be conveniently connected to the suction or discharge side of the Acidified Sodium Chlorite pump in both inline Tee (ST-001) or ¼-inch Teflon tubing format with using a union; both included with sensor.
- Can be wirelessly calibrated using Acidified Sodium Chlorite concentration standards with the **uPyxis® 2.0** Mobile or Desktop App via a MA-WB Bluetooth/USB adapter or PowerPACK Series Auxiliary Box.
- Diagnostic information (sensor tubing fouling and failure modes) can be communicated to digital displays via Modbus RTU.
- Offers an expanded range and a temperature signal communicated via 2-channel 4–20mA outputs and a RS-485 output, Modbus RTU.
- Easy to remove from the system for cleaning and calibration without the need for any tools.

2 Specifications

Table 1. ST-606 Specifications

| Specification* | ST-606 |
|------------------------------------|---|
| Part Number (P/N) | 59433 |
| Acidified Sodium Chlorite Range | 0 - 1200 ppm |
| Acidified Sodium Chlorite | ±10 ppm |
| Acidified Sodium Chlorite Accuracy | ±2% of reading or 10 ppm, whichever is greater |
| Temperature Output Range | 4 mA: 32 °F (0 °C), 20 mA: 212 °F (100 °C) |
| Method | UV Absorbance |
| Calibration | Two-point calibration against user created standard solutions |
| Outputs | 2x 4–20mA Analog Output, RS-485 Digital Output with Modbus protocol |
| Installation | ¼-inch OD (7 mm) Teflon ST-001 tee assembly with ¾-inch female socket & NPT threaded ports |
| Cable Length | 5 ft Bulkhead 7-Pin w/Adapters & 5ft flying lead w/Adapter |
| Power Supply | 22–26 VDC, 2W |
| Dimension (L x D) | 6.8 × 1.44 inch (172.7 x 36.6mm) |
| Weight | 0.37 lbs. (170 g) |
| Material | CPVC |
| Operational Temperature | 40–120 °F (4–49 °C) |
| Storage Temperature | 20–140 °F (-7–60 °C) |
| Pressure | Up to 100 psi (0.7 MPa) |
| Enclosure Rating | IP67 |
| Regulation | CE, RoHS, UKCA |

* 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 shipping. Verify that all accessory items are included. If any item is missing or damaged, please contact Pyxis Lab Customer Service at service@pyxis-lab.com.

3.1 Standard Accessories

- One ST-001 Tee Assembly $\frac{3}{4}$ -inch NPT (1x Tee, O-ring, and Nut) (P/N: ST-001)
- Shipped with ST-600 Series Tee Oring Kit Bleach Compatible (P/N:VIT-KIT)
- One MA-1100 - 7-Pin Flying Leads Cable with Male Adapter (5ft) (P/N: 50747)
- Clear Teflon Tubing $\frac{1}{4}$ -inch OD (6") for Teflon Tube Install Method
- User Manual available online at <https://pyxis-lab.com/support/>

3.2 Optional Accessories

Table 2

| Accessory Name | P/N |
|---|----------|
| Pyxis Probe Cleaning Kit <i>(Includes Sensor Cleaner 500mL + Accessories)</i> | SER-01 |
| ST-001 <i>(Pyxis inline Tee Assembly $\frac{3}{4}$-inch – Replacement)</i> | 50704 |
| ST Series -2inch Tee Assembly <i>(Pyxis inline Tee Assembly 2-inch)</i> | 50756 |
| ST Series -3inch Tee Assembly <i>(Pyxis inline Tee Assembly 3-inch)</i> | 50775 |
| ST-002 Tee Plug <i>(Plug Insert for ST-001 Allows Sensor Removal)</i> | ST-002 |
| ST-600 Series Bleach Grade Tee O-ring Kit <i>(ST-600 series tee O-ring Kit – Replacement compatible with strong oxidizers)</i> | VIT-KIT |
| MA-WB Bluetooth/USB Adapter <i>(Pyxis Bluetooth/USB Adapter for 7Pin Pyxis Sensors)</i> | MA-WB |
| PowerPACK-1 <i>(Single Chanel Auxiliary Power Supply w/Bluetooth for Pyxis Sensors)</i> | MA-BLE-1 |
| PowerPACK-4 <i>(Four Chanel Auxiliary Power Supply w/Bluetooth for Pyxis Sensors)</i> | MA-BLE-4 |
| MA-1100 <i>(24' Flying Lead Cable for 7Pin Pyxis Sensors)</i> | MA-1100 |
| MA-C10 <i>(10' Extension Cable for 7Pin Pyxis Sensors)</i> | 50738 |
| MA-C50 <i>(50' Extension Cable for 7Pin Pyxis Sensors)</i> | 50705 |

4 Installation

4.1 In-line Piping Installation Format

The primary method is to install the probe in-line in CPVC piping format. This method should ideally run in a vertical line to avoid chlorine dioxide gas bubble interference. This can be done with the standard ST-001 Inline Tee Assembly (3/4-inch FNPT) provided with each sensor containing the bleach-compatible oring kit (P/N VIT-KIT). Pyxis also offers 2-inch and 3-inch inline tee assemblies as an accessory option if required.



Figure 1. ST-606 Sensor w/ST-001 Inline Tee Assembly for Piping Installations

4.2 Teflon Tubing Installation Format

The second method is to install the sensor in-line using the unique ¼-inch OD (7mm OD) clear Teflon tubing adapter 6 inches in length. This tubing can be passed “THROUGH” the optical channel allowing to use the sensor with smaller feed line installations. Users can use conventional ¼-inch OD compression fittings to connect desired inlet and outlet to the ST-605 sensor in this format. As with the inline pipe installation method, Pyxis recommends installation on a vertical run, ideally on the suction side.

NOTE For enhanced ambient light interference prevention, Pyxis recommends users to apply black electrical tape or shrink wrap to allow sample darkening prior to and after the optical channel as seen in Figure 2.



Figure 2. ST-606 Sensor Clear Teflon Tube Adapter for Tubing Installations

4.3 Wiring

Follow the wiring tables below to connect the ST-606 probe to a receiving controller.

NOTE: If an insufficient wattage is available from the connected controller (i.e. 2W), Pyxis recommends the **PowerPACK Series Auxiliary Power & Bluetooth Communication Adapters** highlighted in the **Optional Accessories** section of this manual. If a separate DC power supply other than that from the controller is used, make sure that the output from the power supply is rated for 22-26 VDC @ 65mA. Detailed wiring diagrams for common controllers are available from www.pyxis-lab.com.

Table 2

| Wire Color | Designation |
|------------|-------------------------------------|
| Red | 24 V + |
| Black* | 24 V- Power Ground and 4-20mA- |
| White | 1# 4-20 mA + for NaClO ₂ |
| Green | 2# 4-20 mA + for Temperature |
| Blue | RS-485 A |
| Yellow | RS-485 B |
| Clear | Shield, earth ground |

NOTE 4-20mA- and the 24V DC- are internally connected.

4.4 Connecting via Bluetooth to a Mobile Device

An MA-WB Bluetooth/USB adapter (P/N: MA-WB) can be used to connect a ST-606 sensor to a smart device with the **uPyxis®2.0** Mobile App. The power should be sourced from a 24 VDC power terminal of a connected controller. If a controller is not available, please purchase a Pyxis PowerPack-1 (P/N: MA-BLE-1) or PowerPack-4 (P/N: MA-BLE-4) auxiliary power supply with Bluetooth, or an alternative 24 V power supply that can directly connect to the ST-606 sensor with proper cable connectors from Pyxis.

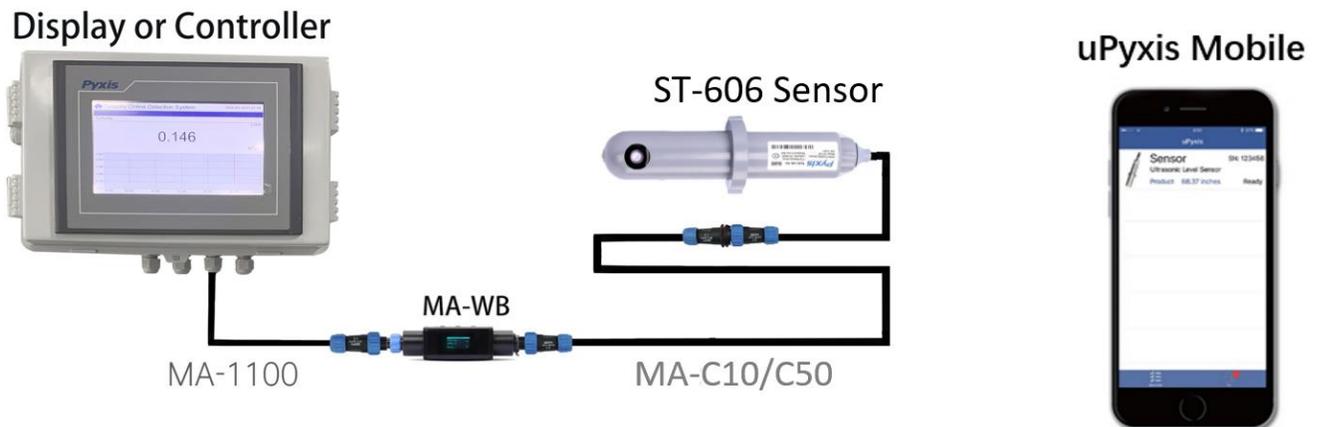


Figure 3. MA-WB Bluetooth connection to 7-Pin Pyxis sensor and uPyxis 2.0 Mobile App

5 Setup and Calibration with uPyxis2.0® Mobile App

The ST-606 sensor can be calibrated in a two-point (zero + slope) procedure using a deionized (DI) water sample and a user created standard solutions.

IMPORTANT NOTE *Direct sunlight or indoor light on the ST-606 sensor should be avoided although it is not necessary to completely shield the ST-606 sensor from the ambient light during both the zero point and slope calibrations.*

5.1 Download and Connect to the uPyxis® 2.0 Mobile App



Install the MA-WB Bluetooth adapter as outlined in Figure 3.



Download **uPyxis®** Mobile App from [Apple App Store](#) or [Google Play](#). Turn ON the Bluetooth in the smart device being used. Please do not pair your devices Bluetooth to uPyxis, the app will do the pairing. Open the uPyxis app on the device. Click the **Scan Bluetooth** button to scan the available Pyxis Bluetooth devices. The discovered devices will be listed as shown in *Figure 4*. This may take up to one minute.

Tap the discovered ST-606 sensor to connect to the sensor. The uPyxis app will identify the sensor type if multiple Pyxis sensors are discovered in the scan.

As shown in *Figure 5*, uPyxis will default to the **Trend Chart** page after connected to the sensor via the MA-WB Bluetooth adapter. The measurement value will be displayed as a line graph to show the real-time trend.

Tap **Configuration** in the top of the app page to launch the configuration page. Five functional tabs of each are available on this page: Information, Configuration, Calibration, 4-20mA Span and Diagnosis.

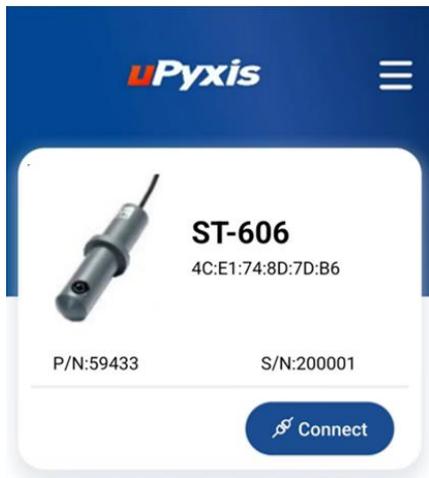


Figure 4.



Figure 5.

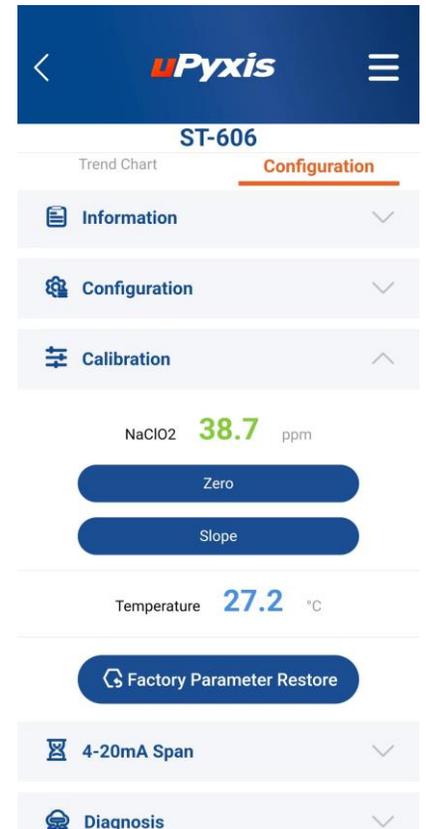


Figure 6.

5.2 NaClO₂ Calibration via uPyxis 2.0 Mobile App

Single Point (In-Situ) NaClO₂ Calibration

If you have confirmed the ST-606 sensor is clean by using the Cleanliness Check Function of the Diagnostic tab within uPyxis 2.0 (see section 5.4), users may conduct an in-situ slope calibration of NaClO₂ while the sensor is in operation. Users can tap **Slope CALIBRATION** and enter the NaClO₂ value, then hit confirm.

NOTE *If the sensor is dirty, it must be removed for proper optical channel cleaning with the Pyxis Probe Cleaning Solution (P/N SER-01) prior to conducting sensor calibration. Confirmation of sensor cleanliness with the uPyxis 2.0 APP Cleanliness Check Function is required before proceeding to sensor calibration.*

See instructional video here <https://www.youtube.com/watch?v=hFmk2znyvjs&pp=ygUlChI4aXMqbWE%3D>

Two-Point (Beaker) Calibration

***IMPORTANT NOTE*:** *For best results, the ST-606 sensor should be calibrated in a completely light-proof environment by covering the beaker with a towel.*

After confirming sensor cleanliness as outlined above, place the sensor into a beaker containing deionized (DI) water, then tap **ZERO CALIBRATION** in the uPyxis app. Please allow sufficient time (a few minutes) for the sensor to stabilize before performing the calibration.

After completing the zero calibration, place the sensor into a known calibration standard solution (10 -1200 ppm) and tap **SLOPE CALIBRATION** in the uPyxis app. Enter the NaClO₂ concentration in the dialog window as in *Figure 7*.



Figure 7.

5.3 Adjusting the 4-20mA Span via uPyxis 2.0 Mobile App

From the Pyxis factory, the 4–20mA output of the ST-606 sensor is scaled as follows:

| Unit of Measure | 4mA Value | 20mA Value |
|-----------------|-----------|------------|
| NaClO2 | 0 ppm | 1200 ppm |
| Temperature | 32°F | 212°F |

Users may alter the output scale using **4-20mA Span** to change the NaClO2 value corresponding to the 20mA output (Figure 8).

NOTE The 20mA value span adjustment may only be equal to or lower than the upper range detection limit of the sensor.

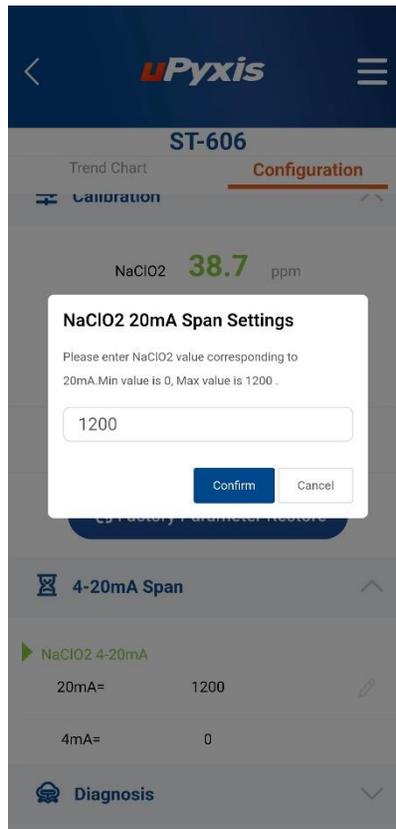


Figure 8 – Adjust 20mA Setting for NaClO2

5.4 Diagnosis & Cleanliness check

To perform a sensor diagnosis and cleanliness check, first insert the sensor into a beaker of DI water or clean tap water and cover the sensor with a towel to protect from ambient light. Select the **Diagnosis Condition** which defines the fluid type that the ST-606 sensor is currently measuring, then click **Cleanliness Check**. If the sensor is clean, a green **Clean** message will be shown. If the sensor is severely fouled, a red **Dirty** message will be shown. In this case, follow the procedure in the **Methods to Cleaning the ST-606 Sensor** section of this manual. From the **Diagnosis** screen, you view and take a screen shot of the diagnosis condition data values. This feature may be used for technical support when communicating with service@pyxis-lab.com

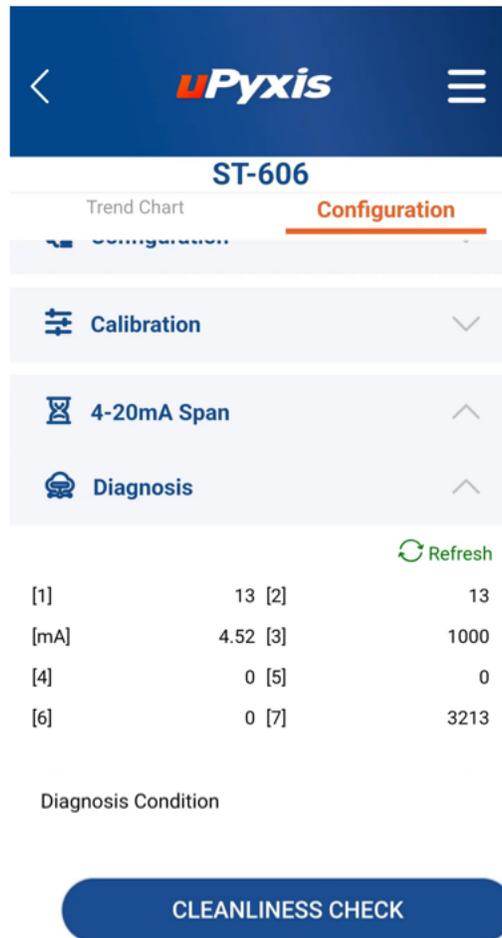


Figure 9.

6 Setup and Calibration with uPyxis® Desktop App

6.1 Install uPyxis® Desktop App

1. Download and install uPyxis Desktop APP from <https://upyxis.pyxis-lab.com.cn/release/pc/uPyxis.Setup-latest.zip>
2. Connect a USB Type-C cable to the port at the bottom of the MA-WB and to the USB port of the laptop or computer. This will provide power to the MA-WB from the laptop/computer. Connect the MA-WB to the ST-606 sensor. The MA-WB Bluetooth adapter will boost the 5V of the regular USB to 24V to power the sensor for use with uPyxis Desktop.



MA-WB Bluetooth Adapter – Bottom USB-C

Display or Controller

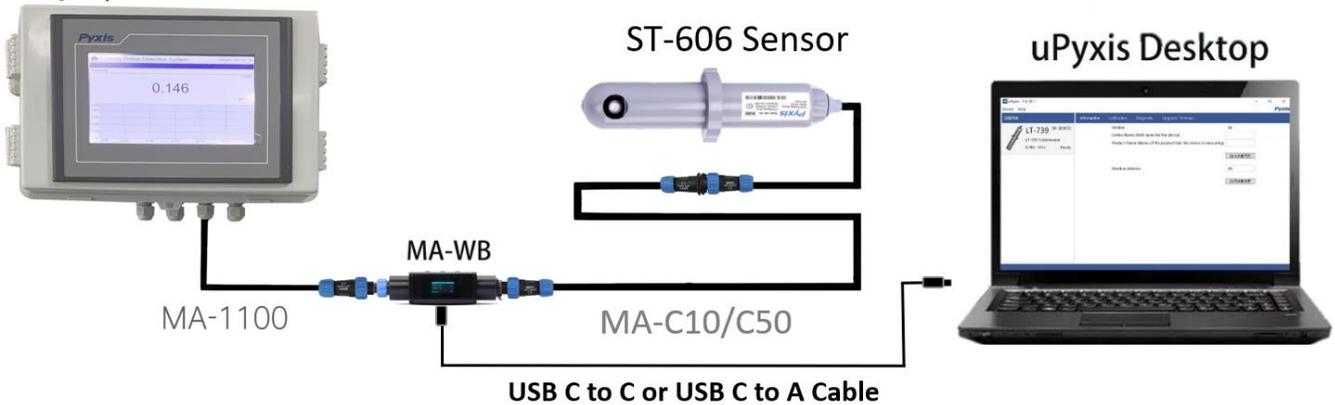
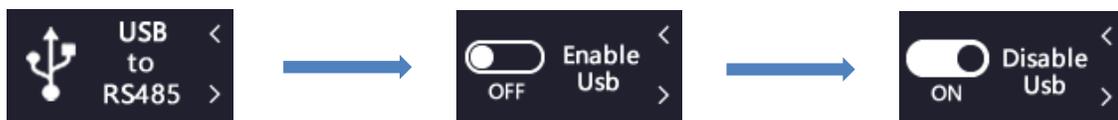


Figure 10 – 7-Pin Pyxis Sensor / MA-WB / USB-C Cable connected to uPyxis Desktop

3. Set the MA-WB to operate in USB Mode by following the steps below.
 - a. Once the MA-WB screen is powered Press ◀ or ▶ until you arrive at (USB to RS485) screen.
 - b. Press the **OK** Button.
 - c. Follow Prompts below to Enable USB feature. Once enabled, you may connect to uPyxis.



4. Open the desktop uPyxis APP.
5. Click Device to launch the connection option menu.
6. Select Connect via USB-RS485 (Figure 11).
7. Select the Comm Port to make a connection. Normally only one Comm port is identified by uPyxis (Figure 12). If more than one Comm port listed in the selection dropdown, you may try to select each one to see if a connection can be made. Alternatively, you may use the Windows Device Manager to identify the Comm Port that the Pyxis USB adapter is using.

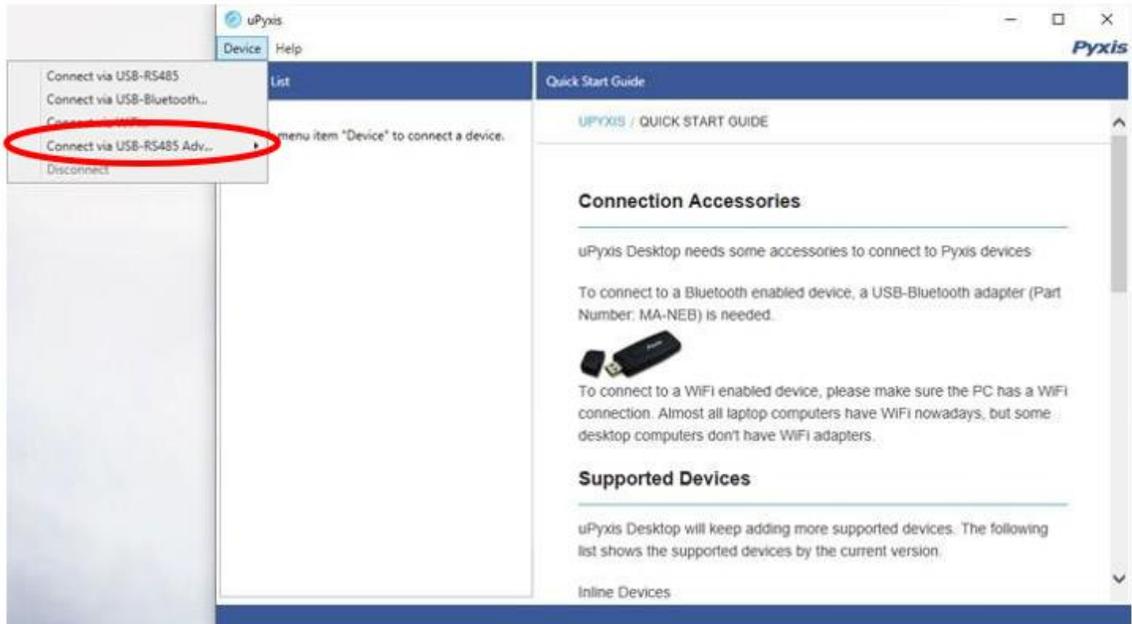


Figure 11. Connection Options

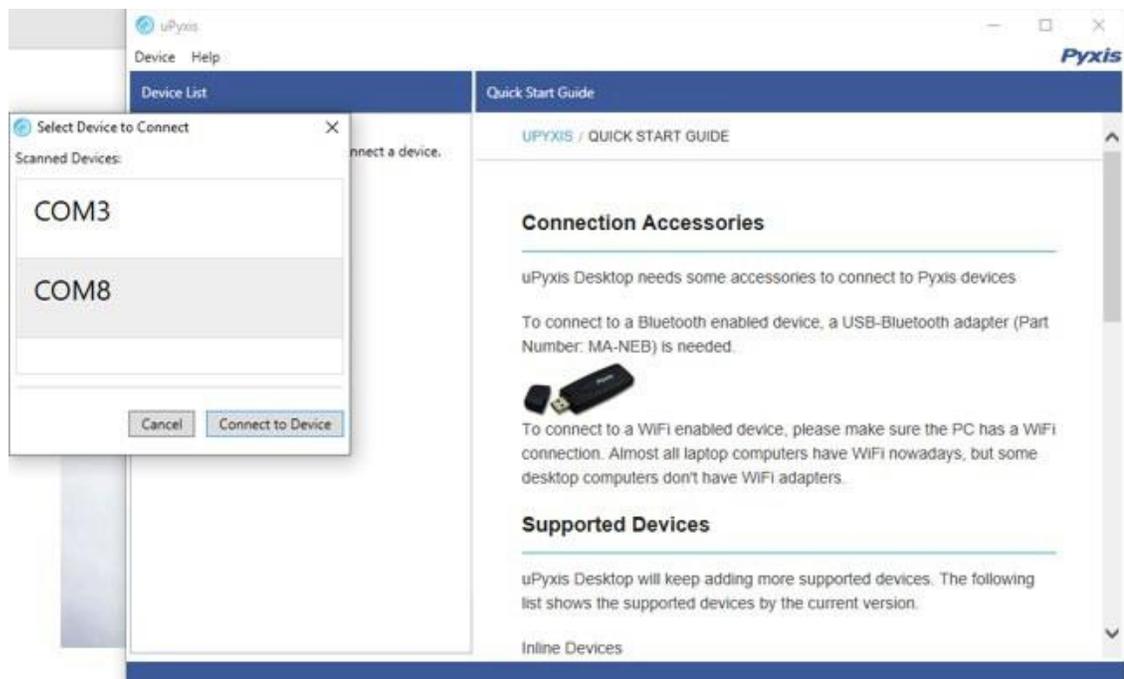


Figure 12. Select a Comm port

6.2 Information 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 **Information** screen. On the **Information** screen you can set the information description for **Device Name**, **Product Name**, and **Modbus Address**, then click **Apply Settings** to save.

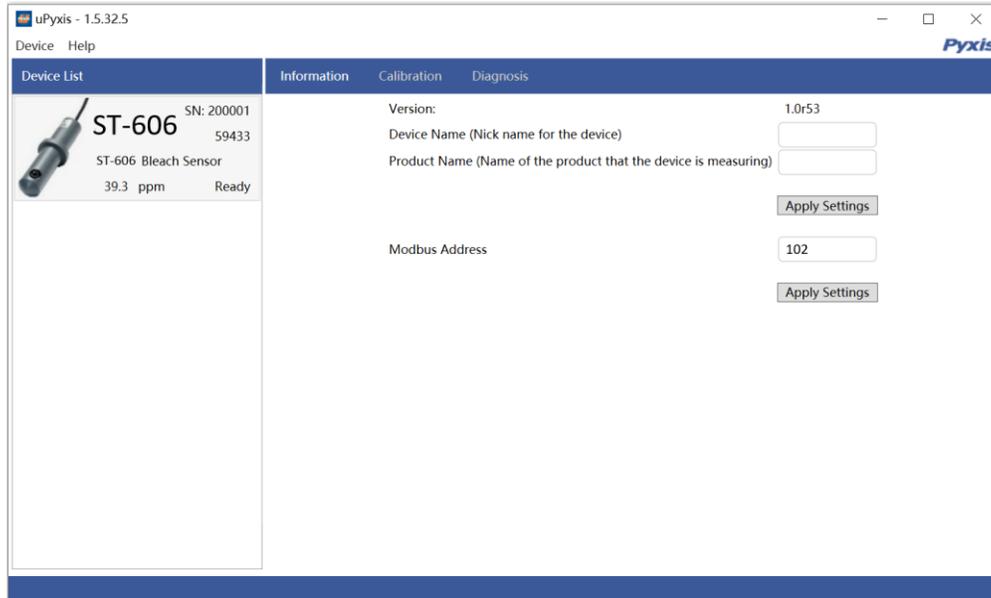


Figure 13.

6.3 Calibration Screen

To calibrate the device, click on **Calibration**. On the **Calibration** screen there are three calibration tabs, **Zero Calibration**, **Slope Calibration**, and **4-20mA Span**. The screen also displays the reading of the device. The reading refresh rate is every 4 seconds.

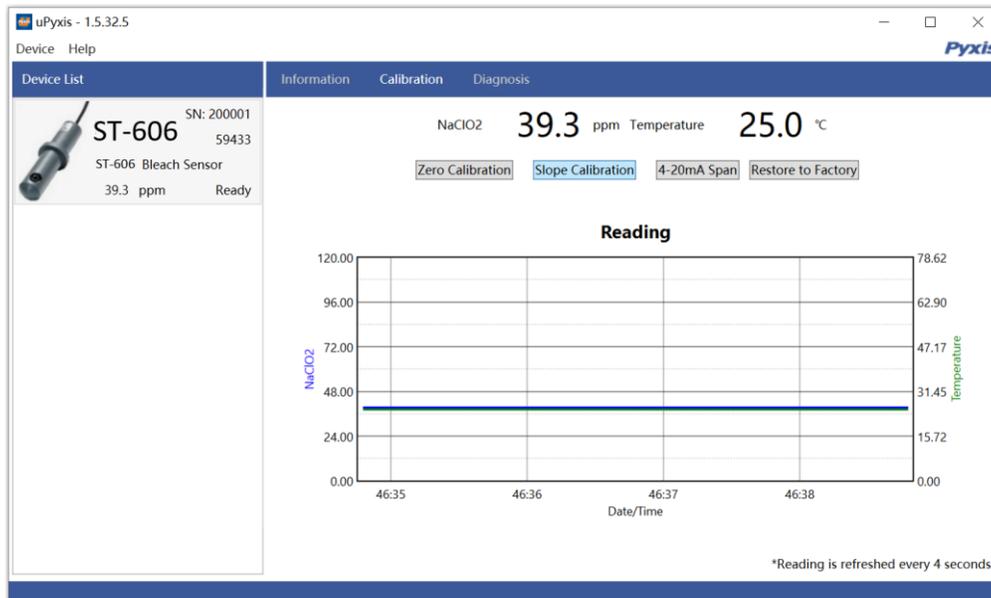


Figure 14.

6.4 NaClO₂ Calibration via uPyxis Desktop App

Single Point (In-Situ) NaClO₂ Calibration

If you have confirmed the ST-606 sensor is clean by using the Cleanliness Check Function of the Diagnostic tab within uPyxis 2.0 (see section 6.5), users may conduct an in-situ slope calibration of NaClO₂ while the sensor is in operation. Users can tap **Slope CALIBRATION** and enter the NaClO₂ value, then hit confirm.

NOTE *If the sensor is dirty, it must be removed for proper optical channel cleaning with the Pyxis Probe Cleaning Solution (P/N SER-01) prior to conducting sensor calibration. Confirmation of sensor cleanliness with the uPyxis 2.0 APP Cleanliness Check Function is required before proceeding to sensor calibration.*

See instructional video here <https://www.youtube.com/watch?v=hFmk2znyvjs&pp=ygUIcHI4aXMgbWE%3D>

Two-Point (Beaker) Calibration

IMPORTANT NOTE: *For best results, the ST-606 sensor should be calibrated in a completely light-proof environment by covering the beaker with a towel.*

After confirming sensor cleanliness as outlined above, place the sensor into a beaker containing deionized (DI) water, then tap **ZERO CALIBRATION** in the uPyxis app. Please allow sufficient time (a few minutes) for the sensor to stabilize before performing the calibration.

After completing the zero calibration, place the sensor into a known calibration standard solution (10 - 1200 ppm) and tap **SLOPE CALIBRATION** in the uPyxis app. Enter the NaClO₂ concentration in the dialog window as in *Figure 15*.

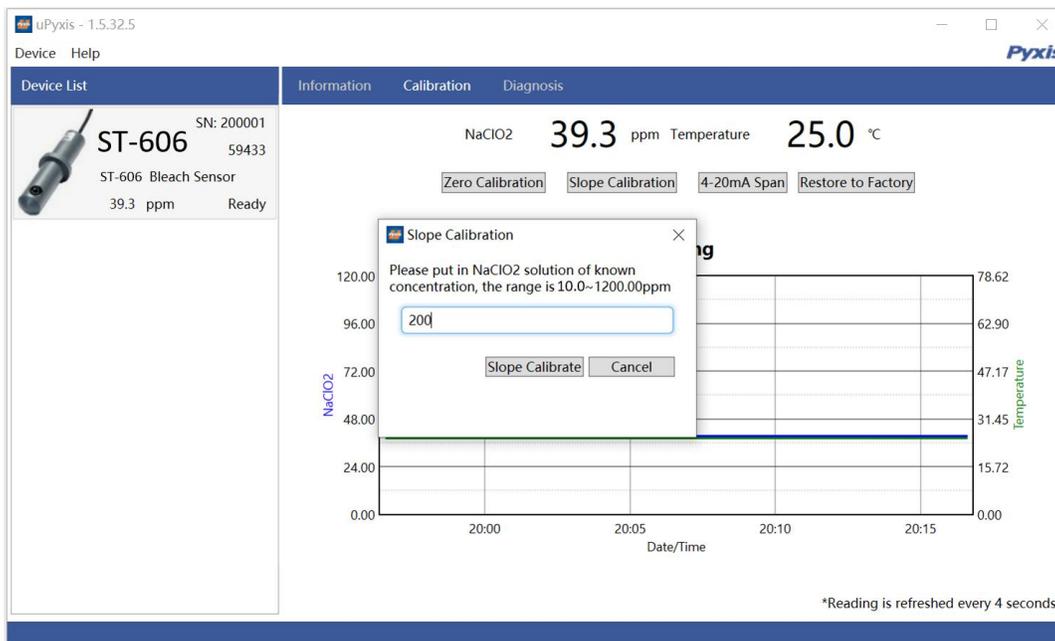


Figure 15.

6.5 Diagnosis & Cleanliness Check

To perform a sensor diagnosis and cleanliness check, first insert the sensor into a beaker of DI water or clean tap water and cover the sensor with a towel to protect from ambient light. Select the **Diagnosis Condition** which defines the fluid type that the ST-606 sensor is currently measuring, then click **Cleanliness Check**. If the sensor is clean, a green **Clean** message will be shown. If the sensor is severely fouled, a red **Dirty** message will be shown. In this case, follow the procedure in the **Methods to Cleaning the ST-606 Sensor** section of this manual. From the **Diagnosis** screen, you view and take a screen shot of the diagnosis condition data values. This feature may be used for technical support when communicating with service@pyxis-lab.com.

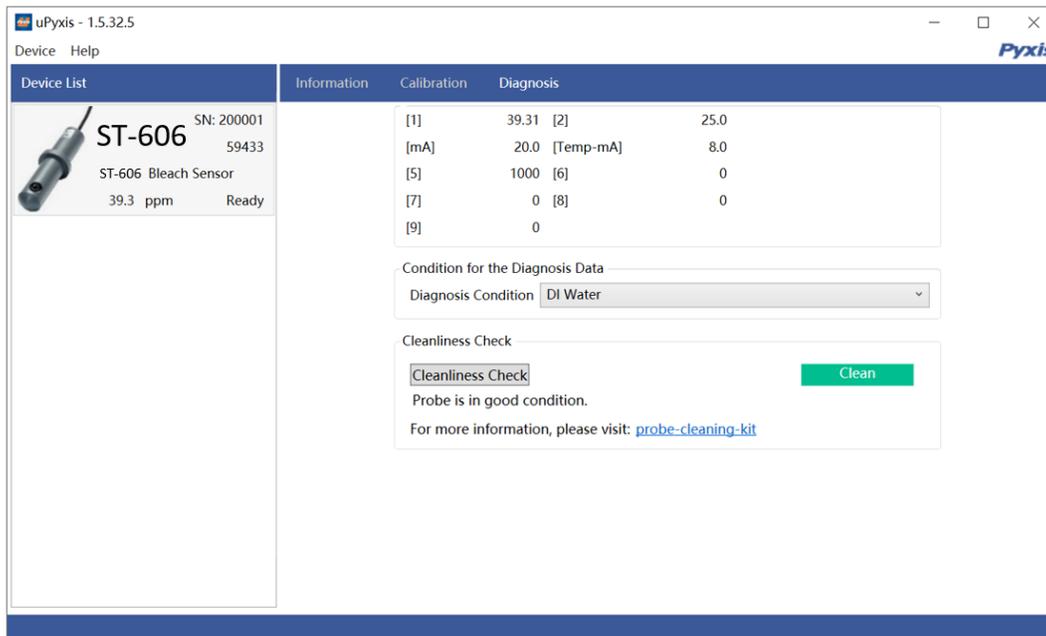


Figure 16.

7 Outputs

7.1 4–20mA Output Setup

The 4–20mA output of the ST-606 sensor should be scaled as outline below.

| Unit of Measure | 4mA Value | 20mA Value |
|--------------------|-----------|------------|
| NaClO ₂ | 0 ppm | 1200 ppm |
| Temperature | 32°F | 212°F |

7.2 Adjusting 4–20mA Span

Users may adjust the output scale using 4–20mA Span to change the NaClO₂ value corresponding to the 20mA output via uPyxis®. For the uPyxis® Desktop App, click **4-20mA Span** found on the **Calibration Screen**, shown in Figure 17.

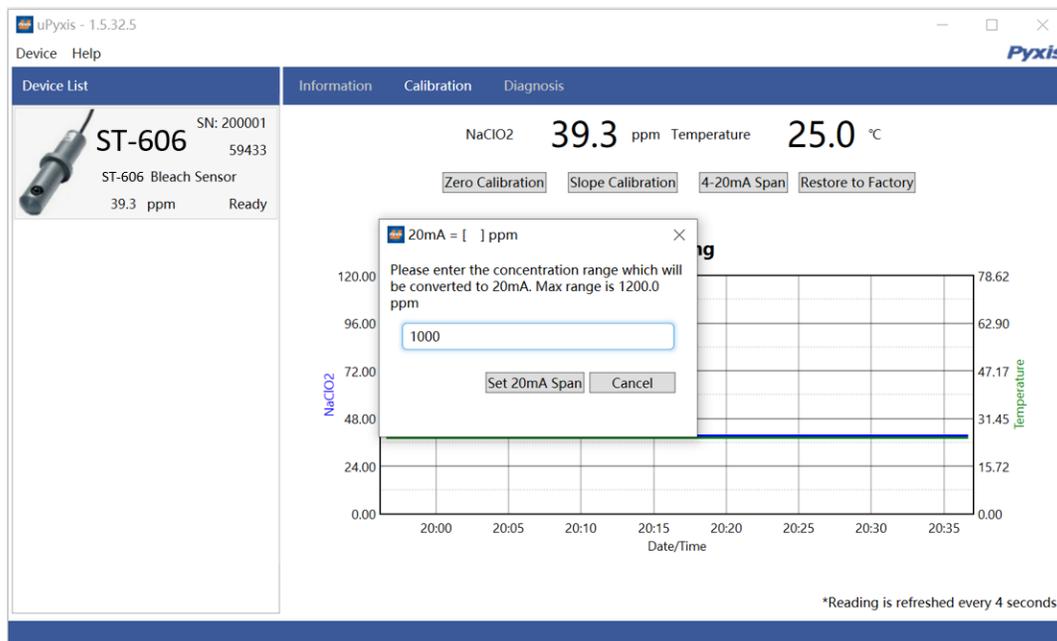


Figure 17.

7.3 Communication using Modbus RTU

The ST-606 sensor is configured as a Modbus slave device. In addition to the NaClO₂ value, many operational parameters, including warning and error messages, are available via a Modbus RTU connection. Contact Pyxis Lab Customer Service (service@pyxis-lab.com) for more information.

8 Sensor Maintenance and Precaution

The ST-606 sensor is designed to provide reliable and continuous Acidified Sodium Chlorite readings when installed moderately “clean” waters of tap quality. Although the optics are compensated for the effects of moderate fouling, heavy fouling will prevent the light from reaching the sensor, resulting in low readings and the potential for product overfeed if the ST-606 sensor is used as part of an automated control system. When used to control product dosing, it is suggested that the automation system be configured to provide backup to limit potential product overfeed, for example by limiting pump size or duration, or by alarming if the pumping rate exceeds a desired maximum limit.

The ST-606 sensor is designed to be easily removed, inspected, and cleaned if required. It is suggested that the ST-606 sensor be checked for fouling and cleaned/calibrated on a monthly basis.

8.1 Methods to Cleaning the ST-606 Sensor

Any equipment in contact with water is subject to many potential foulants and contaminants. Our inline sensor cleaning solutions below have been shown to remove most common foulants and contaminants. A small, soft bristle brush, Q-Tips cotton swab, or soft cloth may be used to safely clean the sensor housing and the quartz optical sensor channel. These components and more come with a Pyxis Lab **Inline Probe Cleaning Solution Kit** (P/N: SER-01) which can be purchased at our online Estore/Catalog <https://pyxis-lab.com/product/probe-cleaning-kit/>

To clean the ST-606 sensor, soak the lower half of the sensor in 100 mL inline sensor cleaning solution for 10 minutes. Rinse the ST-606 sensor with distilled water and then check for the flashing blue light inside the ST-606 sensor quartz tube. If the surface is not entirely clean, continue to soak the ST-606 sensor for an additional 10 minutes. Use the small, soft bristle brush and Q-Tips cotton swabs as necessary to remove any remaining contaminants in the ST-606 sensor quartz tube.



Figure 18. Inline Probe Cleaning Solution Kit

8.2 Storage

Avoid long term storage at temperature over 100 °F. In an outdoor installation, properly shield the ST-606 sensor from direct sunlight and precipitation.

9 Troubleshooting

If the ST-606 sensor output signal is not stable and fluctuates significantly, make an additional ground connection — connect the clear (shield, earth ground) wire to a conductor that contacts the sample water electrically such as a metal pipe adjacent to the ST-606 tee.

Carry out routine calibration verification against a qualified Acidified Sodium Chlorite standard. After properly cleaning the ST-606 sensor, carry out the zero-point calibration with distilled water and slope calibration using the qualified Acidified Sodium Chlorite standard.

10 Contact Us

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