

HM-500 Series Inline Oil in Water Fluorometer Probes User Manual



April 16, 2020
Rev. 4.42

Pyxis Lab, Inc.
1729 Majestic Dr. Suite 5
Lafayette, CO 80026 USA
www.pyxis-lab.com

Table of Contents

| | | |
|-----------|---|-----------|
| 1 | Introduction | 2 |
| 1.1 | Main Features | 3 |
| 2 | Specifications | 3 |
| 3 | Unpacking Instrument | 4 |
| 3.1 | Standard Accessories | 4 |
| 3.2 | Optional Accessories | 5 |
| 4 | Installation | 6 |
| 4.1 | Piping | 6 |
| 4.2 | Wiring | 7 |
| 4.3 | Connecting via Bluetooth | 7 |
| 4.4 | Connecting via USB | 8 |
| 5 | Setup and Calibration with uPyxis® Mobile App | 8 |
| 5.1 | Download uPyxis® Mobile App | 9 |
| 5.2 | Connecting to uPyxis® Mobile App | 9 |
| 5.3 | Calibration Screen and Reading | 10 |
| 5.4 | Diagnosis Screen | 11 |
| 5.5 | Device Info Screen | 12 |
| 6 | Setup and Calibration with uPyxis® Desktop App | 12 |
| 6.1 | Install uPyxis® Desktop App | 12 |
| 6.2 | Connecting to uPyxis® Desktop App | 13 |
| 6.3 | Information Screen | 13 |
| 6.4 | Calibration Screen | 14 |
| 6.5 | Diagnosis Screen | 15 |
| 7 | Communication using Modbus RTU | 16 |
| 8 | Sensor Maintenance and Precaution | 17 |
| 8.1 | Methods to Cleaning the HM-500 Series Probe | 17 |
| 8.2 | Storage | 18 |
| 9 | Troubleshooting | 18 |
| 10 | Contact Us | 18 |

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 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 HM-500 Series probe measures the concentration of multiple oils in water utilizing fluorescence methodology at 365 nm wavelength and 410 nm excitation. The HM-500 Series probe is uniquely designed with extra photo-electric components that also monitor the color and turbidity of the sample water. This proprietary feature enables the HM-500 Series probe to automatically compensate for color and turbidity in the water sample eliminating interference commonly associated with real-world samples. The HM-500 Series probes have a short fluidic channel and can be easily cleaned. The fluidic and optical arrangement of the HM-500 Series probe are designed to overcome shortcomings associated with other fluorometers that have a distal sensor surface or a long, narrow fluidic cell. Traditional inline fluorometers are susceptible to color/turbidity interference and fouling and can also be very difficult to clean. These unique features of the HM-500 Series probe provide a level of accuracy far greater than conventional inline oil in water sensors and also enables the user to conduct inline sensor cleanliness diagnostics as a predictive value.

Oil is a complex mixture of organic compounds. The term “oil” can be referred to as a range of different classes of chemical compounds, such as vegetable oil and petroleum oil. Almost all oil substances fluoresce under UV or near UV excitation in a different degree because invariably, all oil contains aromatic or other fluorescent compounds. Oil-in-water analysis by fluorescence is a widely used field-testing method but is fundamentally different from other wet chemistry methods, which are highly accurate but extremely time consuming and done off-line. Commonly used alternative methods include the following:

1. EPA 1664 gravimetric method measures the amount of oil extracted to a solvent by weight.
2. The Infrared method (ASTD D7678) measures the absorption of oil extracted to cyclohexane in the range of 1370–1380 cm^{-1} by methyl group in the oil, using an IR spectrophotometer to qualify the oil concentration.

Due to the HM-500 Series probe utilizing the fluorescent signature of the oil in water, the concentrations initially measured by the probe for a given water sample “may” agree with each other in a relative sense, but this is not always a guarantee. The HM-500 Series is designed to be calibrated to agree with the oil-in-water concentration from a given oil type determined by commonly used methods. The calibration of the HM-500 Series probe should be initially done by the user with an actual prepared oil-in-water standard, within the detection range of the sensor itself. Once calibrated to the prepared oil-in-water standard, the HM-500 Series probe can be used to “measure” a synthetic Pyxis Oil-In-Water Secondary Standard Solution to determine its “equivalent value”. This secondary standard and its equivalent value can then be used in the future for sensor calibrations, as a more stable and easier method of sensor calibration versus preparing the actual oil-in-water standard each time. Details are explained on this process in the calibration sections of this manual.

Each HM-500 Series probe is also provided with the standard ST-001 Tee Assembly for rapid installation in commonly used piping platforms. The ST-001 has two 3/4” female NPT ports in both threaded and straight socket formats. Pyxis Lab also offers 2” and 3” Tee formats for larger inline installations as well as the MA-102S Submersion Adapter for submersed applications. The HM-500 Series probe offers both 4–20mA and RS-485 Modbus outputs for rapid connection to any microprocessor controller; PLC or DCS. When used with the MA-WB Bluetooth Adapter, the HM-500 Series probe may be accessed wirelessly for cleaning and calibration using the **uPyxis**® Mobile or Desktop App. Alternatively, if power supply is limited from the receiving controller, users may utilize a Pyxis PowerPack auxiliary box. PowerPack is offered in both 1- and 4-channel platforms providing 24 VDC power supply to any Pyxis inline probe as well as 4–20mA signal passthrough and Bluetooth connectivity to all Pyxis probes connected. See the **Unpacking Instrument** section for details.

1.1 Main Features

The HM-500 Series probe includes the following main features:

- Easy calibration and Cleanliness Check using **uPyxis®** Mobile or Desktop App
- Automatic compensation for turbidity up to 150 NTU and color created by up to 10 ppm iron or equivalent to 10 ppm iron/humic acid
- Diagnostic information (probe fouling, color or turbidity over range, failure modes) are available in **uPyxis®** App or via Modbus RTU
- Easy removal from the system for cleaning & calibration without the need for any tools
- Wireless access via a MA-WB Bluetooth Adapter or PowerPack and **uPyxis®** App
- Easy inline installation using ST-001 Tee Assembly provided
- MA-102S Submersion Adapter Kit available for submersed application

2 Specifications

| Specifications* | HM-500 | HM-510 | HM-520 |
|--------------------------------------|---|----------|---------|
| P/N | 52101 | 52102 | 52106 |
| Range (ppm) [†] | 0.1–10 | 0.5–1000 | 0.5–100 |
| Accuracy | 0.1 ppm or ≤3% of reading | | |
| Method | UV-Fluorescence | | |
| Excitation/Emission Wavelengths (nm) | 365/410 | | |
| Calibration | Initial calibration with a user-prepared and verified oil-in-water solution, subsequent calibrations with Pyxis OIW-500 Secondary Standard (P/N: 21036) | | |
| Outputs | 4–20mA analog output, RS-485 digital output with Modbus protocol | | |
| Installation | ST-001 Tee Assembly with 3/4" female socket & NPT threaded ports | | |
| Cable Length | 5 ft with IP67 connectors | | |
| Power Supply | 22–26 VDC, 65 mA | | |
| Dimension inch (mm) | Length: 6.8 (172.7), Body Diameter: 1.44 (36.6) | | |
| Weight lbs (g) | 0.37 (170) | | |
| Material | CPVC | | |
| Operational Temperature °F (°C) | 40–104 (4–40) | | |
| Storage Temperature °F (°C) | 20–140 (-7–60) | | |
| Pressure psi (MPa) | Up to 100 (0.7) | | |
| Enclosure Rating | IP67 | | |
| Regulation | CE | | |

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

[†] The oil-in-water concentration range is based on a marine diesel oil standard.

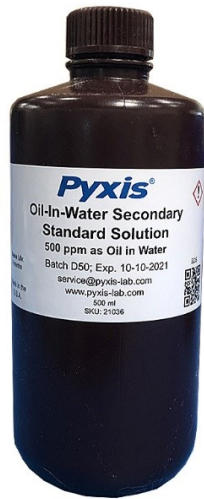


Figure 1. Oil-in-Water Secondary Standard (OIW-500)

| Specification | Oil-in-Water Secondary Standard (OIW-500) |
|---------------|---|
| P/N | 21036 |
| Oil in Water* | 500 ppm |
| Container | 16 oz/500 mL Nalgene Amber Narrow Mouth Sample Bottle |
| Shelf Life | 6 months |
| Net Volume | 510±10 mL |
| Net Weight | 510±10 g |

* Pyxis OIW-500 is a synthetic standard which will read 500 ppm by a factory calibrated HM-510 probe. This product must be diluted for use with HM-500 and HM-520 inline probes to measure within their range. Once the HM-500 Series probe is calibrated to a known oil-in-water standard, you may use the equivalent value of the prepared oil-in-water secondary standard for future sensor calibrations. See calibration sections for details.

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

- ST-001 Tee Assembly 3/4" NPT (1x Tee, O-ring, and Nut) P/N: ST-001
- 7-Pin Female Adapter/Flying Leads Cable (2 ft) P/N: MA-1100
- User Manual available online at www.pyxis-lab.com/support.html

3.2 Optional Accessories

The following optional accessories can be purchased via your Regional Sales contact or Pyxis Customer Service at order@pyxis-lab.com.















|  PYXIS INLINE SENSOR ACCESSORIES - SELECT*A*GUIDE  | | |
|---|-------------|---|
| Accessory Name/Description | Part Number | Photo |
| Pyxis OIW-500 <i>(Synthetic Oil in Water Secondary Standard 500ppm/500mL)</i> | 21036 |  |
| 0.75" NPT Inline Sensor Tee Assembly <i>(All ST Series Sensors)</i> | 50704 |  |
| 2.0" NPT Inline Sensor Tee Assembly <i>(All ST Series Sensors)</i> | 50756 | |
| 3.0" NPT Inline Sensor Tee Assembly <i>(All ST Series Sensors)</i> | 50775 | |
| ST-002 Inline Sensor Removal PLUG <i>(Allows ST Sensor Removal)</i> | ST-002 |  |
| ST Series Sensor Tee Replacement O-Ring <i>(All ST Series Tee's)</i> | MA-150 |  |
| ST Series Submersion Adapter Kit <i>(Submersible Kit for all ST-Series Sensors)</i> | MA-102S |  |
| MA-WB Bluetooth Adapter for All ST Series Sensors <i>(4-20mA & RS-485)</i> | MA-WB |  |
| MA-485 USB Adapter for All ST Series Sensors <i>(4-20mA RS-485)</i> | MA-485 |  |
| Bluetooth PC to Handheld Adapter <i>(For uPyxis Firmware Updates)</i> | MA-NEB |  |
| PowerPack 1 <i>(Single Channel Power Supply w/Bluetooth)</i> | MA-BLE-1 |  |
| PowerPack 4 <i>(Four Channel Power Supply w/Bluetooth)</i> | MA-BLE-4 |  |
| MA-1100 <i>(24' Flying Lead Cable for All ST Sensors)</i> | MA-1100 |  |
| MA-C10 <i>(10' Extension Cable for All ST Sensors)</i> | 50738 |  |
| MA-C50 <i>(50' Extension Cable for All ST Sensors)</i> | 50705 | |

Figure 2.

4 Installation

4.1 Piping

The provided ST-001 Tee Assembly can be connected to a pipe system through the 3/4" female ports, either socket or NPT threaded. To properly install the HM-500 Series probe into the ST-001 Tee Assembly, follow the steps below:

1. Insert the provided O-ring into the O-ring groove on the tee.
2. Insert the HM-500 Series probe into the tee.
3. Tighten the tee nut onto the tee to form a water-tight, compression seal.

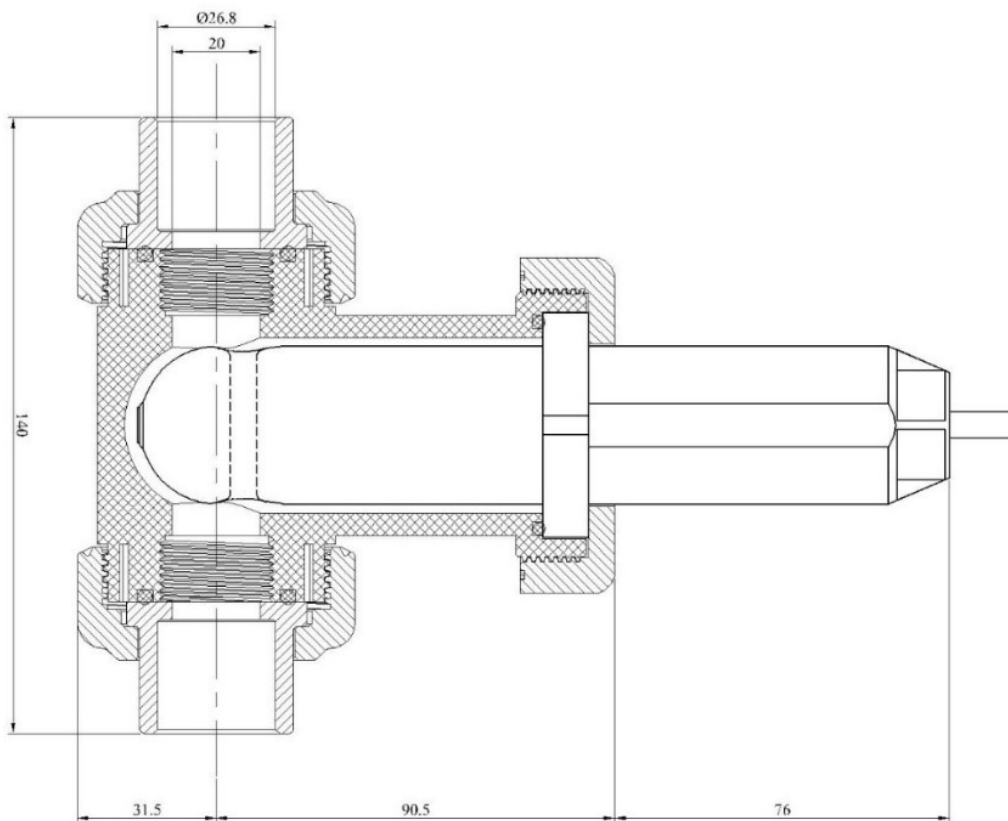


Figure 3. Dimension of the HM-500 Series probe and the ST-001 Tee Assembly (mm)

4.2 Wiring

If the power ground terminal and the negative 4–20mA terminal in the controller are internally connected (non-isolated 4–20mA input), it is unnecessary to connect the 4–20mA negative wire (green) to the 4–20mA negative terminal in the controller. 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.

NOTE *The negative 24V power terminal (power ground) and the negative 4–20mA terminal on the HM-500 Series probe are internally connected.*

Follow the wiring table below to connect the HM-500 Series probe to a controller:

| Wire Color | Designation |
|------------|----------------------|
| Red | 24V + |
| Black | 24V Power ground |
| White | 4–20mA + |
| Green* | 4–20mA - |
| Blue | RS-485 A |
| Yellow | RS-485 B |
| Clear | Shield, earth ground |

* Internally connected to the power ground

4.3 Connecting via Bluetooth

A Bluetooth adapter (P/N: MA-WB) can be used to connect a HM-500 Series probe to a smart phone with the **uPyxis®** Mobile App or a computer with the **uPyxis®** Desktop App. The power should be sourced from a 24 VDC power terminal of a controller. If a controller is not available, the user may also use Pyxis PowerPACK-1 or PowerPACK-4 as an alternative to both an external power supply and a Bluetooth adapter. PowerPACK from Pyxis Lab offers external power, Input/Output signal, and Bluetooth connectivity.



Figure 4. Bluetooth connection to HM-500 Series probe

4.4 Connecting via USB

A USB-RS485 adapter (P/N: MA-485) can be used to connect a HM-500 Series probe to a computer with the uPyxis® Desktop app.

NOTE Using non-Pyxis USB-RS485 adapters may result in permanent damage of the HM-500 Series probe communication hardware.

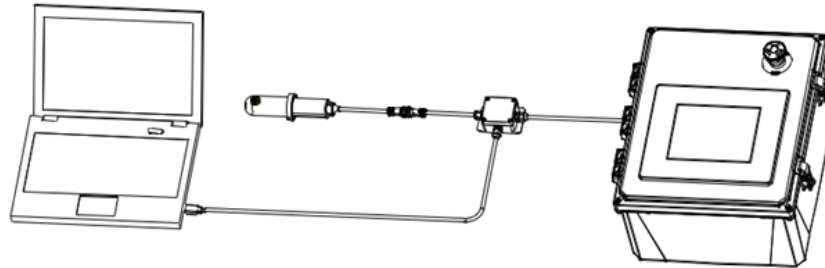


Figure 5. USB connection to HM-500 Series probe

5 Setup and Calibration with uPyxis® Mobile App

The HM-500 Series probe should be initially calibrated with a two-point (zero + slope) procedure using a deionized (DI) water sample (zero) and a prepared solution (slope) containing the actual oil-in-water desired. For the most accurate measurement in low range concentrations of oil-in-water, the two-point calibration is required. The HM-500 Series probe can be also calibrated by a one-point procedure while in service. However, a Cleanliness Check of the HM-500 Series probe should be conducted first to determine if the sensor is clean enough to be calibrated (see either the **Mobile Diagnosis Screen** section or the **Desktop Diagnosis Screen** section).

NOTE Direct sunlight or indoor light on the HM-500 Series probe should be avoided, although it is not necessary to completely shield the HM-500 Series probe from the ambient light during both the zero and slope calibrations.

5.1 Download uPyxis® Mobile App

Download **uPyxis®** Mobile App from [Apple App Store](#) or [Google Play](#).



Figure 6.

5.2 Connecting to uPyxis® Mobile App

Turn on Bluetooth on your mobile phone (**Do not pair the phone Bluetooth to the HM-500 Series probe**). Open **uPyxis®** Mobile App. Once the app is open the app will start to search for the sensor. Once the **uPyxis®** Mobile App connects to the sensor, press the **HM-500 Series probe**.

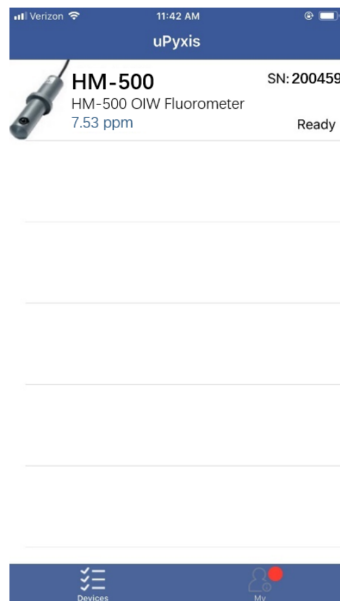


Figure 7.

5.3 Calibration Screen and Reading

When connected, the uPyxis® Mobile App will default to the **Calibration** screen (Figure 8). From the **Calibration** screen, you can perform calibrations by pressing on **Zero Calibration**, **Slope Calibration**, and **4–20mA Span**. Follow the screen instructions for each calibration step.

5.3.1 Required Initial Slope Calibration

For the first calibration, it is required to prepare an oil-in-water calibration solution using the desired oil with a concentration within the range of the HM-500 Series probe being used (i.e. HM-500 should be calibrated with a user-prepared, oil-in-water solution between 1 and 10 ppm). The user-prepared, oil-in-water calibration solution can be made by mixing a sample of the oil with DI water to develop a known ppm level. The concentration of this solution should be verified by standard wet chemistry methods or using Pyxis HM-900 Handheld Oil-in-Water Analyzer.

****NOTE*** If the user wants to measure a different oil, then use this calibration procedure for the first calibration of the new desired oil.*

5.3.2 General Slope Calibration

The slope value of the HM-500 Series probe can be calibrated in two ways:

1. By preparing an oil-in-water calibration solution as described in the **Required Initial Slope Calibration** section, or
2. By using the Pyxis Oil-in-Water Secondary Standard (OIW-500) described below.

As an alternative to preparing a real oil-in-water calibration standard for future calibrations, the Pyxis OIW-500 synthetic Oil-in-Water Secondary Standard (P/N: 21036) can be used. OIW-500 components are highly stable and far easier to use for rapid calibration compared to a real oil-in-water solution. The OIW-500 calibration standard offers a 500 ppm equivalent oil-in-water concentration recognized by the fluorescent signature of the HM-500 Series probe. Due to the different oil-in-water concentration ranges in the HM-500 Series probes, follow the guidelines below to properly prepare the OIW-500 solution for each probe:

- HM-500: Prepare a 5 ppm oil-in-water solution by mixing 198 mL of DI Water with 2 mL of OIW-500.
- HM-510: No preparation required. Use OIW-500 without modification.
- HM-520: Prepare a 50 ppm oil-in-water solution by mixing 180 mL of DI Water to 20 mL of OIW-500.

****NOTE*** For the HM-500 probe, it is recommended to prepare a 5 ppm oil-in-water solution prior to each calibration. At this low concentration, the solution has a reduced long-term stability and shelf-life.*

Once a OIW-500-based solution is prepared, submerge the HM-500 Series probe in the prepared solution and use the **Calibration** screen of the uPyxis® Mobile App to read the current ppm value from the probe. Record this ppm value. This ppm value should be used as the slope calibration value for future calibrations when using the prepared OIW-500 Secondary Standard (Figure 9).

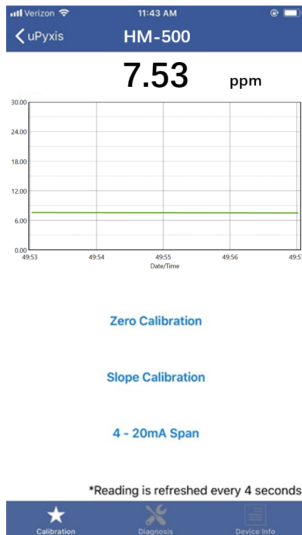


Figure 8. Calibration screen

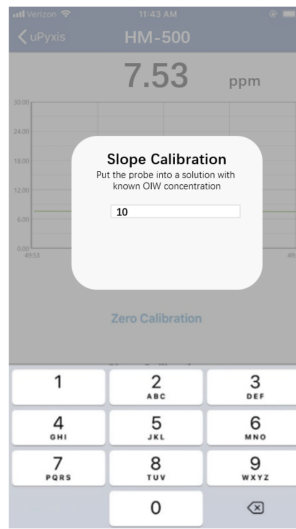


Figure 9. Slope Calibration

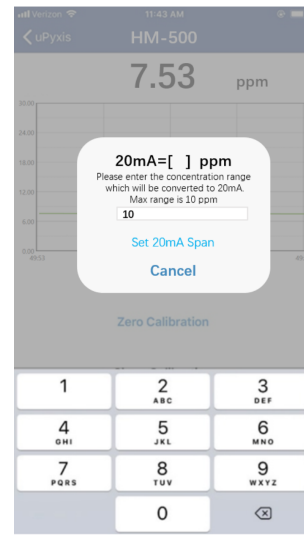


Figure 10. 4-20mA Span

5.4 Diagnosis Screen

From the **Diagnosis** screen, you can set the diagnosis condition as well as **Export & Upload**. This feature may be used for technical support when communicating with service@pyxis-lab.com.

To perform a probe Cleanliness Check, first select the **Diagnosis Condition** (Figure 11) which defines the fluid type that the HM-500 Series probe is currently measuring, then press **Cleanliness Check**. If the probe is clean, a green **Clean** message will be shown (Figure 12). If the probe is partially fouled, a yellow **Becoming Dirty** message will be shown. If the probe is severely fouled, a red **Dirty** message will be shown. In this case, follow the procedure in the **Methods to Cleaning the HM-500 Series Probe** section of this manual.

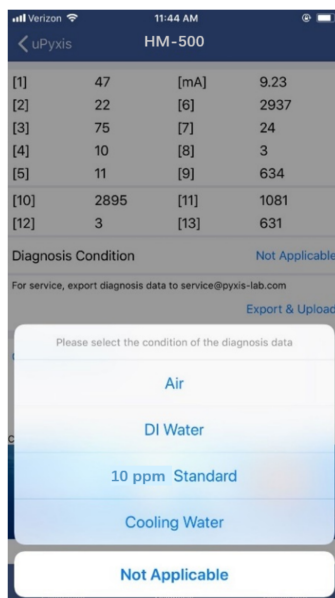


Figure 11.

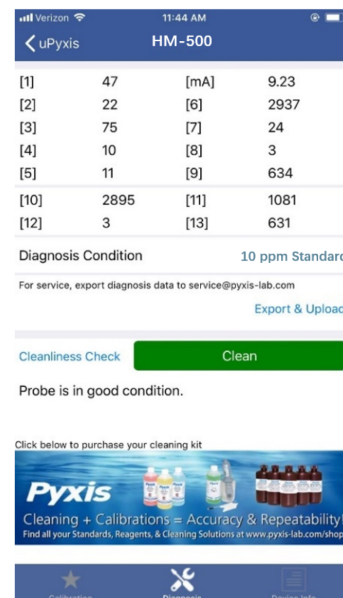


Figure 12.

5.5 Device Info Screen

From the **Device Info** screen. You can name the Device or Product.

6 Setup and Calibration with uPyxis® Desktop App

The HM-500 Series probe should be initially calibrated with a two-point (zero + slope) procedure using a deionized (DI) water sample (zero) and a prepared solution (slope) containing the actual oil-in-water desired. For the most accurate measurement in low range concentrations of oil-in-water, the two-point calibration is required. The HM-500 Series probe can be also calibrated by a one-point procedure while in service. However, a Cleanliness Check of the HM-500 Series probe should be conducted first to determine if the sensor is clean enough to be calibrated (see either the **Mobile Diagnosis Screen** section or the **Desktop Diagnosis Screen** section).

**NOTE* Direct sunlight or indoor light on the HM-500 Series probe should be avoided, although it is not necessary to completely shield the HM-500 Series probe from the ambient light during both the zero and slope calibrations.*

6.1 Install uPyxis® Desktop App

Download the latest version of **uPyxis®** Desktop software package from: <http://www.pyxis-lab.com/support.html> 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.

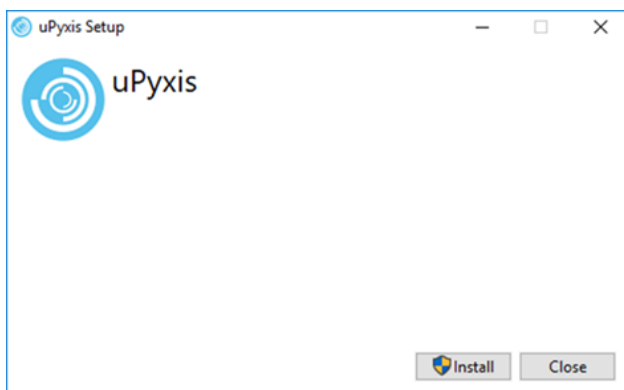


Figure 13.

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

6.2 Connecting to uPyxis® Desktop App

When the **uPyxis®** Desktop App opens, to find your device, click on **Device**, then **Connect via USB-RS485**.

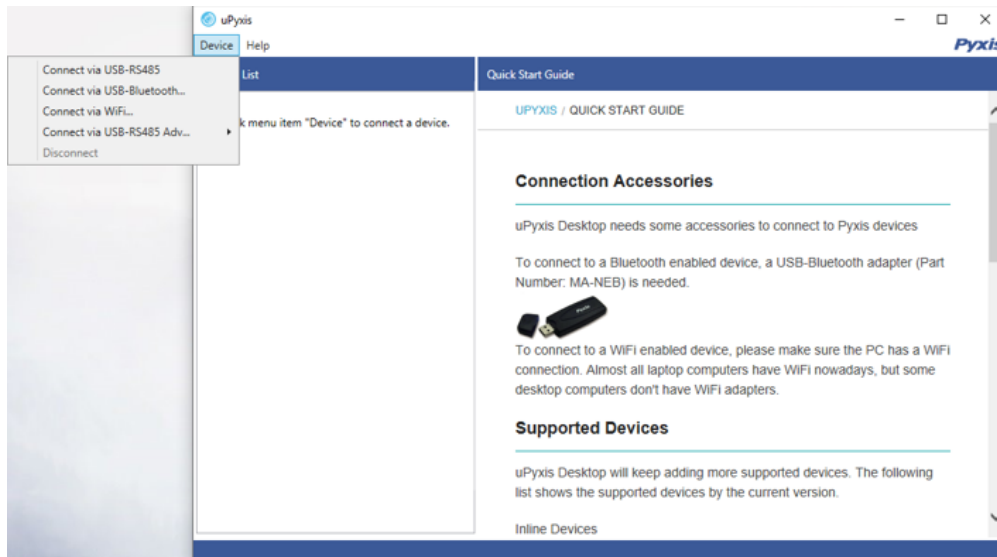


Figure 14.

6.3 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** and **Product Name**, then click **Set** to save.

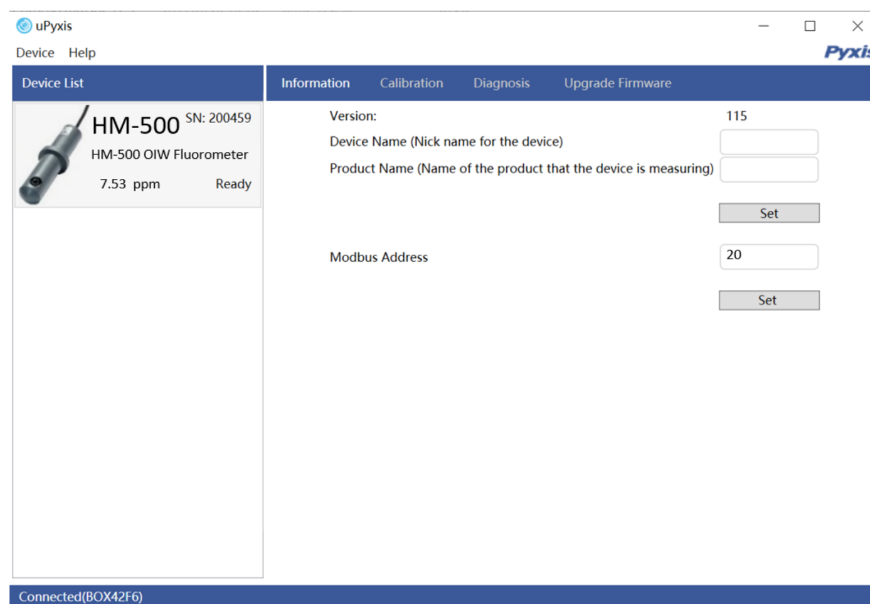


Figure 15.

6.4 Calibration Screen

To calibrate the device, click on **Calibration**. On the **Calibration** screen there are three calibration buttons, **Zero Calibration**, **Slope Calibration**, and **4–20mA Span**. Follow the screen instructions for each calibration step. The screen also displays the reading of the device. The reading refresh rate is every 4 seconds.



Figure 16.

6.4.1 Required Initial Slope Calibration

For the first calibration, it is required to prepare an oil-in-water calibration solution using the desired oil with a concentration within the range of the HM-500 Series probe being used (i.e. HM-500 should be calibrated with a user-prepared, oil-in-water solution between 1 and 10 ppm). The user-prepared, oil-in-water calibration solution can be made by mixing a sample of the oil with DI water to develop a known ppm level. The concentration of this solution should be verified by standard wet chemistry methods or using Pyxis HM-900 Handheld Oil-in-Water Analyzer.

NOTE *If the user wants to measure a different oil, then use this calibration procedure for the first calibration of the new desired oil.*

6.4.2 General Slope Calibration

The slope value of the HM-500 Series probe can be calibrated in two ways:

1. By preparing an oil-in-water calibration solution as described in the **Required Initial Slope Calibration** section, or
2. By using the Pyxis Oil-in-Water Secondary Standard (OIW-500) described below.

As an alternative to preparing a real oil-in-water calibration standard for future calibrations, the Pyxis OIW-500 synthetic Oil-in-Water Secondary Standard (P/N: 21036) can be used. OIW-500 components are highly stable and far easier to use for rapid calibration compared to a real oil-in-water solution. The OIW-500 calibration standard offers a 500 ppm equivalent oil-in-water concentration recognized by the fluorescent

signature of the HM-500 Series probe. Due to the different oil-in-water concentration ranges in the HM-500 Series probes, follow the guidelines below to properly prepare the OIW-500 solution for each probe:

- HM-500: Prepare a 5 ppm oil-in-water solution by mixing 198 mL of DI Water with 2 mL of OIW-500.
- HM-510: No preparation required. Use OIW-500 without modification.
- HM-520: Prepare a 50 ppm oil-in-water solution by mixing 180 mL of DI Water to 20 mL of OIW-500.

NOTE For the HM-500 probe, it is recommended to prepare a 5 ppm oil-in-water solution prior to each calibration. At this low concentration, the solution has a reduced long-term stability and shelf-life.

Once a OIW-500-based solution is prepared, submerge the HM-500 Series probe in the prepared solution and use the **Calibration** screen of the **uPyxis®** Mobile App to read the current ppm value from the probe. Record this ppm value. This ppm value should be used as the slope calibration value for future calibrations when using the prepared OIW-500 Secondary Standard (Figure 17).

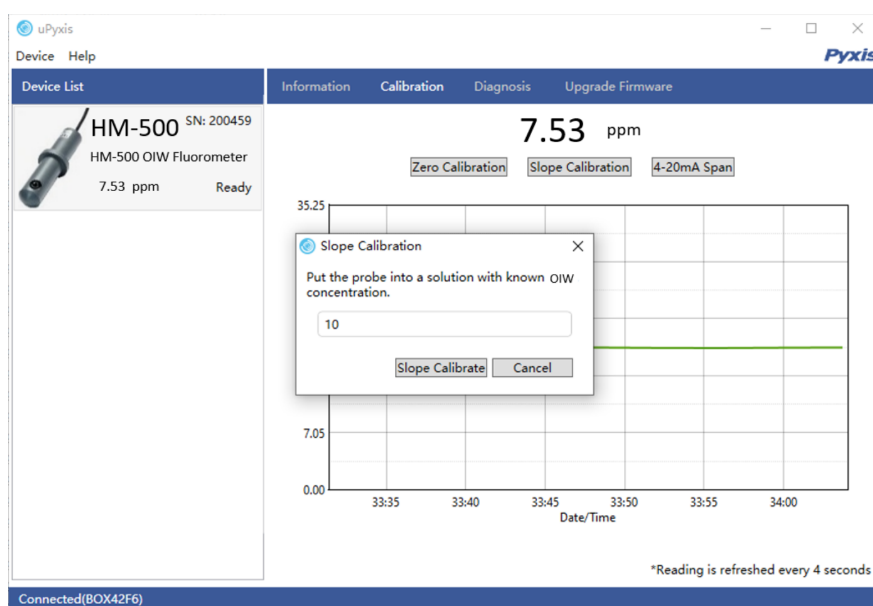


Figure 17. Slope Calibration

6.5 Diagnosis Screen

After the device has been calibrated and installation has been completed, to check diagnosis, click on **Diagnosis**. When in the **Diagnosis** screen you can view the Diagnosis Condition of the device. This feature may be used for technical support when communicating with service@pyxis-lab.com.

To perform a probe Cleanliness Check, first select the **Diagnosis Condition** (Figure 18) which defines the fluid type that the HM-500 Series probe is currently measuring, then click **Cleanliness Check**. If the probe is clean, a green **Clean** message will be shown (Figure 19). If the probe is partially fouled, a yellow **Becoming Dirty** message will be shown. If the probe is severely fouled, a red **Dirty** message will be shown. In this case, follow the procedure in the **Methods to Cleaning the HM-500 Series Probe** section of this manual.

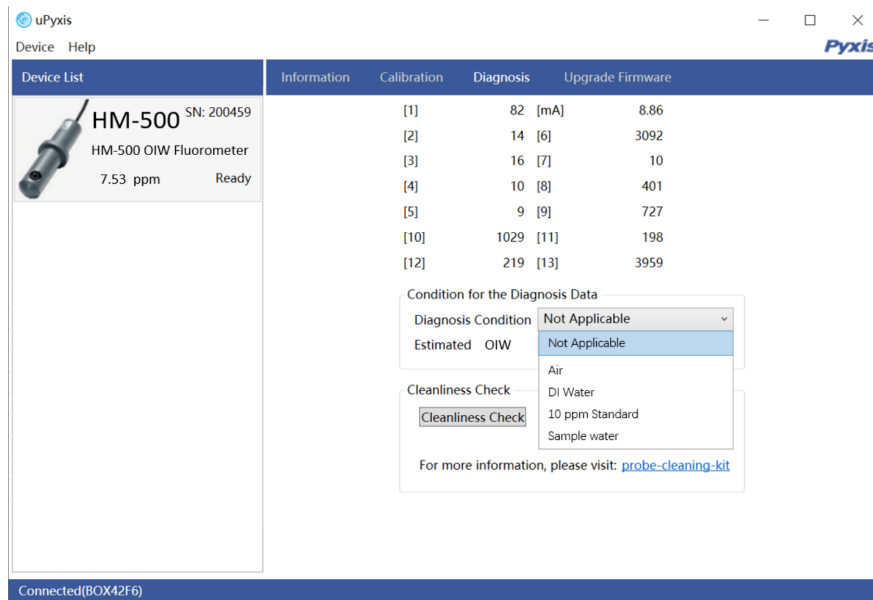


Figure 18.

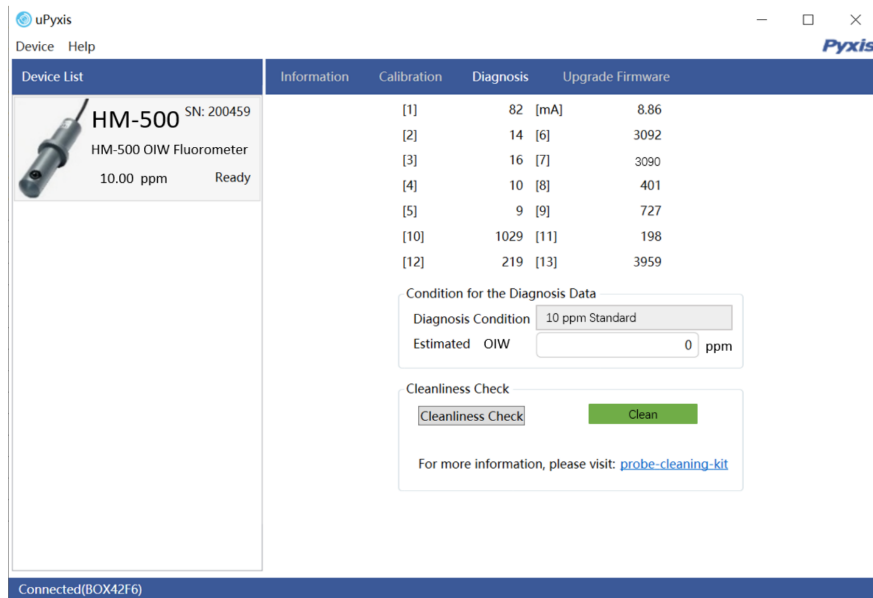


Figure 19.

7 Communication using Modbus RTU

The HM-500 Series is configured as a Modbus slave device. In addition to the ppm oil-in-water value, many operational parameters including warning and error messages are available via a Modbus RTU connection. Contact Pyxis Lab Technical Service (service@pyxis-lab.com) for more information.

8 Sensor Maintenance and Precaution

The HM-500 Series probe is designed to provide reliable and continuous oil-in-water readings even when installed in moderately contaminated industrial waters. 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 HM-500 Series probe 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 HM-500 Series probe is designed to be easily removed, inspected, and cleaned if required. It is suggested that the HM-500 Series probe be checked for fouling and cleaned/calibrated 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 need to clean the HM-500 Series probe can be determined by the Cleanliness Check using either the **uPyxis®** Mobile App (see the **Mobile Diagnosis Screen** section) or the **uPyxis®** Desktop App (see the **Desktop Diagnosis Screen** section).

8.1 Methods to Cleaning the HM-500 Series Probe

Any equipment in contact with industrial systems is subject to many potential foulants and contaminants. A small, soft bristle brush, Q-Tips cotton swab, or soft cloth may be used to safely clean the probe housing and the quartz optical sensor channel. Deposits inside the probe quartz tube can be cleaned using a prepared detergent-based cleaning solution and hot water. Prepare 200 mL of hot water (55–60 °C) with 10 mL of industrial degreasing detergent.

To clean the HM-500 Series probe, soak the lower half of the probe in 100 mL of the prepared cleaning solution for 10 minutes and gently scrub the quartz optical sensor channel. Rinse the HM-500 Series probe with distilled water and then check for the flashing blue light inside the HM-500 Series probe quartz tube. Use the Cleanliness Check via **uPyxis®** Mobile App (see the **Mobile Diagnosis Screen** section) or **uPyxis®** Desktop App (see the **Desktop Diagnosis Screen** section) to confirm that the HM-500 Series probe is clean. Repeat the process as needed until the Cleanliness Check shows **Clean**.



Figure 20. Cleaning of HM-500 Series Probe

8.2 Storage

Avoid long term storage at temperature over 140 °F. In an outdoor installation, properly shield the HM-500 Series probe from direct sunlight and precipitation.

9 Troubleshooting

If the HM-500 Series probe 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 HM-500 Series tee.

10 Contact Us

Pyxis Lab, Inc

1729 Majestic Dr. Suite 5

Lafayette, CO 80026 USA

www.pyxis-lab.com

Phone: +1 (866) 203-8397

Email: service@pyxis-lab.com