Pyxis®

POWERPACK^PRO

PowerPACK Pro-5 Bluetooth® Auxiliary Adapter

Additional Power Budget & Wireless Communication with Local Display

USER MANUAL

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Warranty Information

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The Pyxis warranty term is thirteen (13) months from original shipment from Pyxis. The Pyxis warranty term for replacement components is six (6) months from original shipment from Pyxis. In no event shall the standard limited warranty coverage extend beyond this timeline from original shipment date.

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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.

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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 [Request Return or Repair - Pyxis Lab, Inc. (pyxis-lab.com)](https://pyxis-lab.com)

Pyxis Technical Support

Contact Pyxis Technical Support at +1 (866) 203-8397 or by emailing service@pyxis-lab.com

1. Introduction

The Pyxis PowerPACK Pro-5 intelligent adapter is uniquely designed to provide additional power budget and multiple communication methods to drive Pyxis inline sensors to a receiving microprocessor controller or PLC with limited power supply. This auxiliary adapter has a built-in power supply with 24-Watt capability and supports up to five Pyxis sensors connected simultaneously.

The PowerPACK Pro-5 offers multiple communication platforms in both wireless and wired format to fit any application need. The wireless communication methods include Bluetooth® 5.0, LoRa and Wi-Fi and the wired communication methods include Modbus TCP, Modbus RS-485, 4-20mA output and USB-C. Users can choose the appropriate communication method according to the distance and application need. The PowerPACK Pro-5 is provided with a 2.4-inch display allowing users to configure any desired communication parameter as well as offering sensor reading, calibration manually or connection to the uPyxis 2.0 mobile or desktop apps.
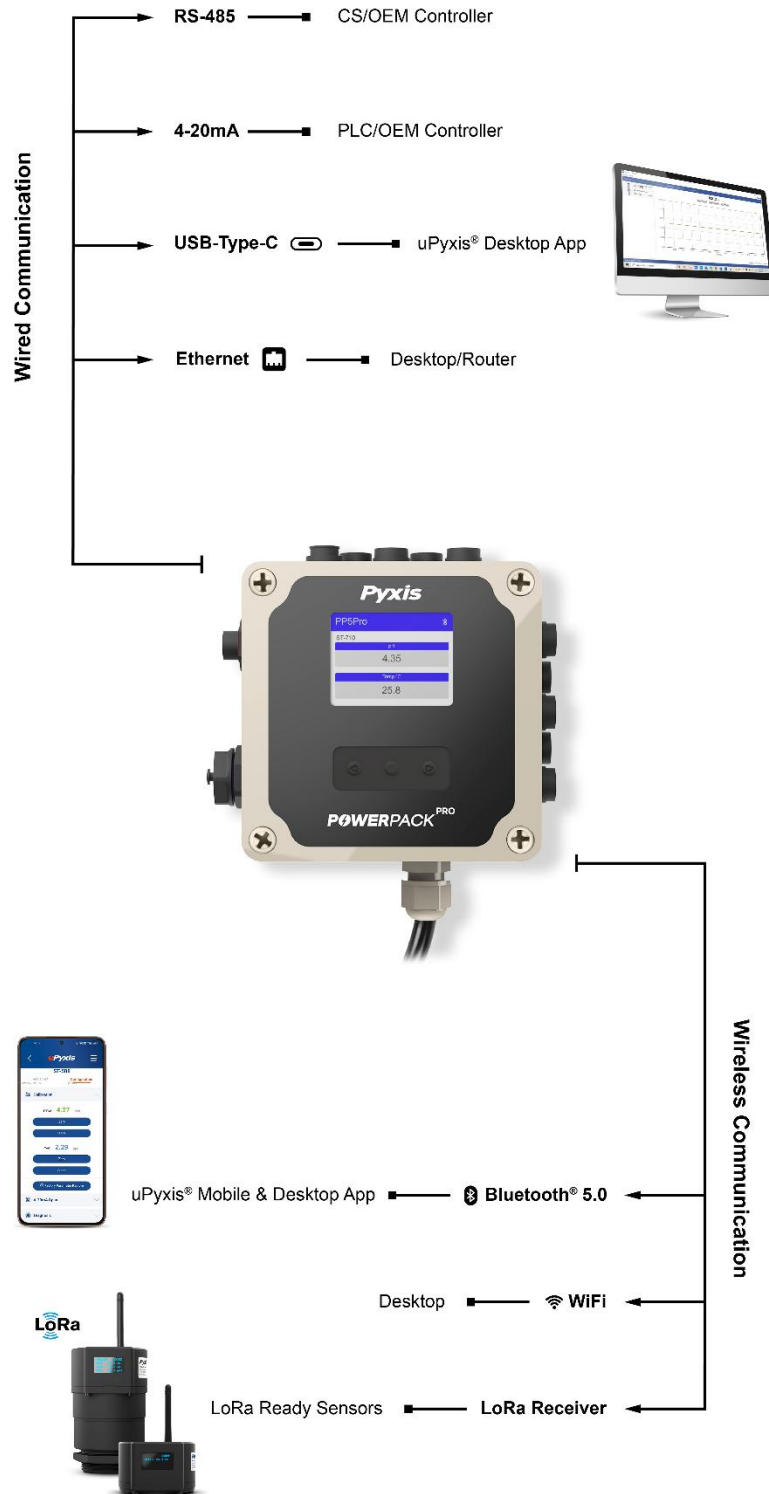
The PowerPACK Pro-5 intelligent adapter can be utilized in 100VAC to 240VAC power format, with direct outlet plug-in design. Each input is specifically designed for direct connection to standard (7-Pin) Pyxis inline sensors and output is designed to be connected to the CS-FNS-2.6P (6-Pin) flying lead cable provided with the PowerPACK Pro-5 unit, then terminated to the receiving controller (see PowerPACK Pro-5 Cable Interface section for details). Conversion adapters for Pyxis 8-Pin sensors are also available allowing this device to be used with all Pyxis sensor formats.

Features

- Power supply and connection of up to 5 Pyxis Sensors

- Local color 2.4-inch color display of sensor readings

- 4-20mA signal output of up to 5 Pyxis Sensors to any controller (max of 10x 4-20mA outputs)

- Broad range external power input (100-240V AC)

- ABS enclosure with IP-54 protection

- USB-C for Firmware Upgrade & uPyxis Desktop and uPyxis 2.0 Mobile for applicable devices

- Sensor reading can be remotely accessed via Modbus TCP and Modbus RS485 (Modbus RTU)

- Wi-Fi (in development)

- LoRa Receiver (in development)

- Bluetooth® Version 5.0 for wireless sensor diagnosis, cleaning and configuration via uPyxis® APP

1.1 Specifications

Items	PowerPACK Pro-5
P/N	MA-PS-5
Power Input	100-240V AC (50/60Hz) w/3.0 AMP Fuse
Power Output	24V DC, 24W
Display	2.4" Color 320 x 240 Resolution
USB	1 x USB for sensor firmware updating
Communication	Up to 10x 4-20mA Outputs from Pyxis sensors Ethernet Port - RJ45 (10MB/s) Bluetooth® 5.0 Wi-Fi *(in development)* LoRa Receiver*(in development)* 1xRS-485 (Modbus RTU) *NOTE* All communication methods can be processed in parallel without conflict*
7-Pin Sensor Connection	Direct to PowerPACK – No Conversion Needed
8-Pin Sensor Connection	Requires CC-78M Conversion Adapter Cable – *Sold Separately See Optional Accessories*
Signal Input Adapter *(7-Pin Female)*	Up to 10x 4-20mA & RS-485 *(from Pyxis sensor output)*
Signal Output Adapter *(7-Pin Male)*	Up to 10x 4-20mA *(maximum 2x 4-20mA per sensor)*
Analog Output Cable *(4-20mA Outputs Only)*	CS-FNS-2.6P (6-Wire) Flying Lead Cable(s) with 7-Pin Female Adapter Provided *(1.5m/4.9ft)*
Digital Output Cable *(RS-485 Output Only)*	CR-MR-2.6P (2-Wire) Flying Lead Cable with 2-Pin Female Adapter Provided *(1.5m/4.9ft)*
Enclosure Material	ABS
Enclosure Rating	IP54
Storage Temperature	32 - 122 °F (0 - 50° C)
Operational Temperature	32 - 122 °F (0 - 50° C)
Dimension	4.9" H x 4.9" W x 2.9" D
Weight	Approximately 1500 g
Certificates	CE / RoHS / UKCA / ETL

NOTE *Specifications are subject to change without notice.*

1.2 Unpacking the PowerPACK Pro-5

Remove the instrument and accessories from the shipping container and inspect each item for any damage that may have occurred during shipping. Verify that all items listed on the packing slip are included. If any items are missing or damaged, please contact Pyxis Customer Service at service@pyxis-lab.com

1.3   Standard Accessories

- One **PowerPACK Pro-5** (P/N: MA-PS-5)

- Includes Four CS-FNS-2.6P

  6-Wire Flying Lead Cable (s) w/7-Pin Female Adapter for 4-20mA – 1.5m / 4.9ft - (P/N: 10891)

- Includes One CR-MR-2.6P

  2-Wire Flying Lead Cable w/2-Pin Male Adapter for RS-485 – 1.5m / 4.9ft -(P/N: 16297)

1.4   Optional Accessories

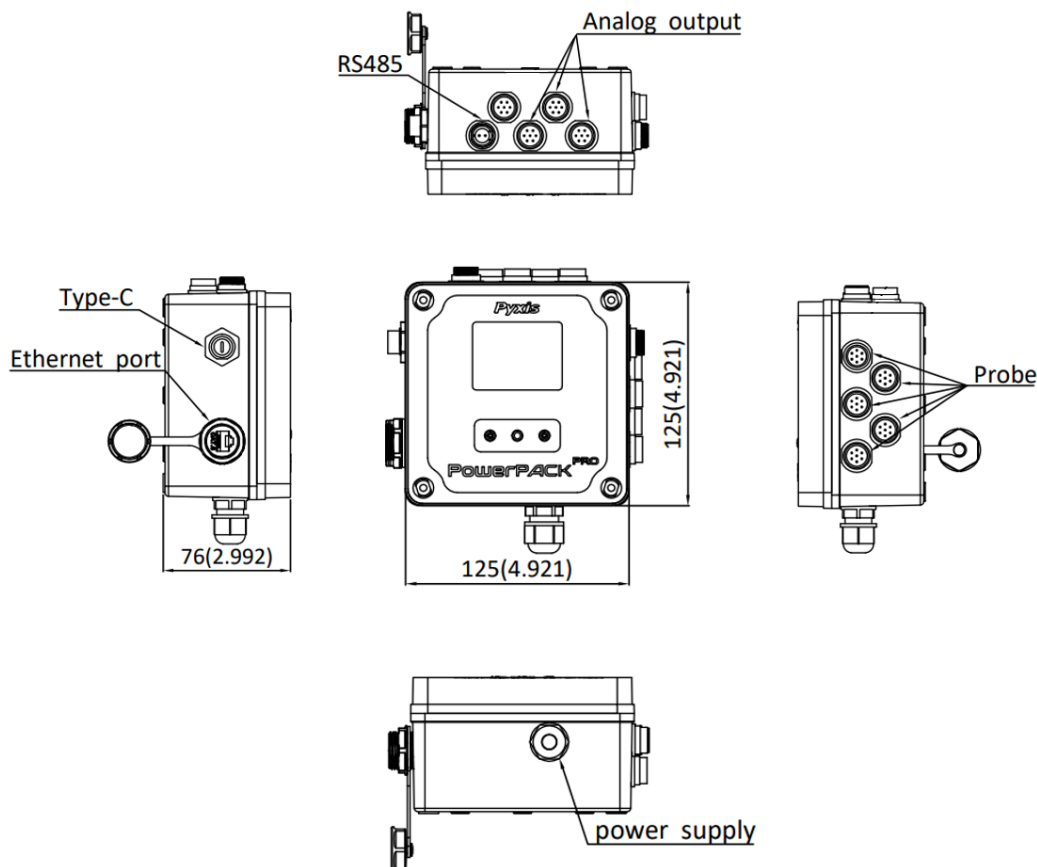| Accessory Name	P/N
CC-78 *(7Pin Male to 8Pin Male Adapter for 8 Pin Pyxis Probes)*	50771
CS-FNS-2.6P *(6-Wire Flying Lead Cable (s) w/7-Pin Female Adapter for 4-20mA – 1.5m / 4.9ft)*	10891
CR-MR-2.6P *(2-Wire Flying Lead Cable w/2-Pin Male Adapter for RS-485 – 1.5m / 4.9ft)*	16297

2. Dimension

Figure 1. PowerPACK Pro-5 Dimension -mm(inch)
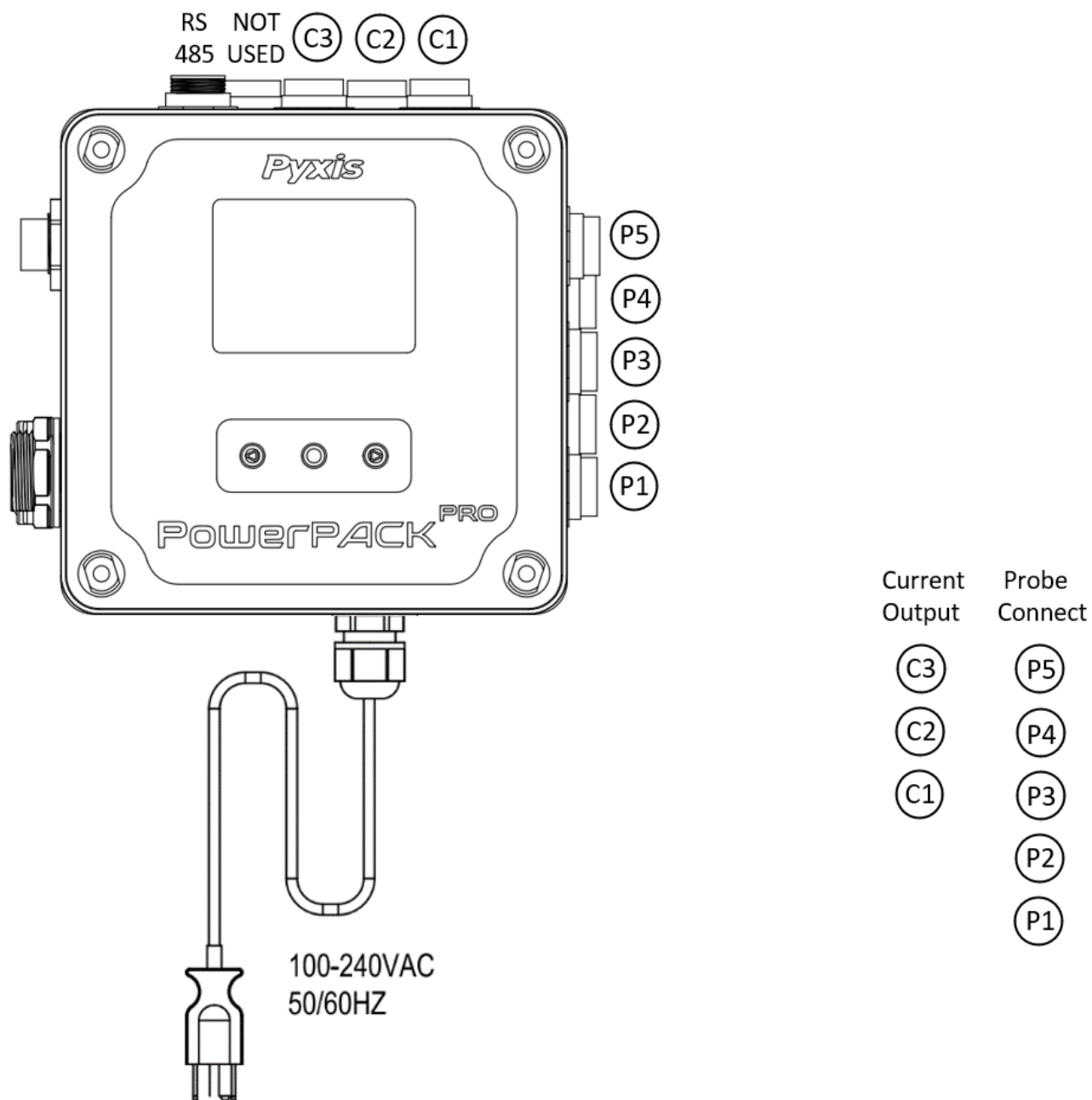
3. Electrical Connection

Figure 2.

RS-485 Output *(TOP LEFT 2-PIN ADAPTER)*

Cable Provided	Description
CR-MR-2.6P (P/N 16297)	Flying Lead Cable / 2Pin Male
Wire Color	**Designation**
Blue	RS-485 A
Yellow	RS-485 B

NOTE Contact Pyxis Lab for Modbus Register Details on the Sensors utilized in RS-485.

C1 4-20mA Current Output *(TOP RIGHT 7-PIN ADAPTER)*

Cable Provided	Description
CS-FNS-2.6P (P/N 10891)	Flying Lead Cable / 7Pin Female
Wire Color	**Designation**
Black	4-20mA - Common
White	#1 4-20 mA+ Corresponding Pyxis probe 1
Green	#2 4-20 mA+ Corresponding Pyxis probe 1
Blue	#1 4-20 mA+ Corresponding Pyxis probe 2
Yellow	#2 4-20 mA+ Corresponding Pyxis probe 2
Silver	Earth Ground

C2 4-20mA Current Output *(TOP RIGHT 7-PIN ADAPTER)*

Cable Provided	Description
CS-FNS-2.6P (P/N 10891)	Flying Lead Cable / 7Pin Female
Wire Color	**Designation**
Black	4-20mA - Common
White	#1 4-20 mA+ Corresponding Pyxis probe 3
Green	#2 4-20 mA+ Corresponding Pyxis probe 3
Blue	#1 4-20 mA+ Corresponding Pyxis probe 4
Yellow	#2 4-20 mA+ Corresponding Pyxis probe 4
Silver	Earth Ground

C3 4-20mA Current Output *(TOP RIGHT 7-PIN ADAPTER)*

Cable Provided	Description
CS-FNS-2.6P (P/N 10891)	Flying Lead Cable / 7Pin Female
Wire Color	**Designation**
Black	4-20mA - Common
White	#1 4-20 mA+ Corresponding Pyxis probe 5
Green	#2 4-20 mA+ Corresponding Pyxis probe 5
Blue	Not used
Yellow	Not used
Silver	Earth Ground

IMPORTANT NOTE *Please refer to the utilized Pyxis sensor user manual for the corresponding 4-20mA #1 and #2 (if applicable) details when determining corresponding PowerPACK PRO-5 output signal alignment. (i.e. ST-765SS-FCL Sensor = 4-20mA #1 Oxidizer / 4-20mA #2 pH). Contact service@pyxis-lab.com for support.*

P1 – P5 Pyxis Sensor Plug-In *(SIDE RIGHT 7-PIN ADAPTER)*

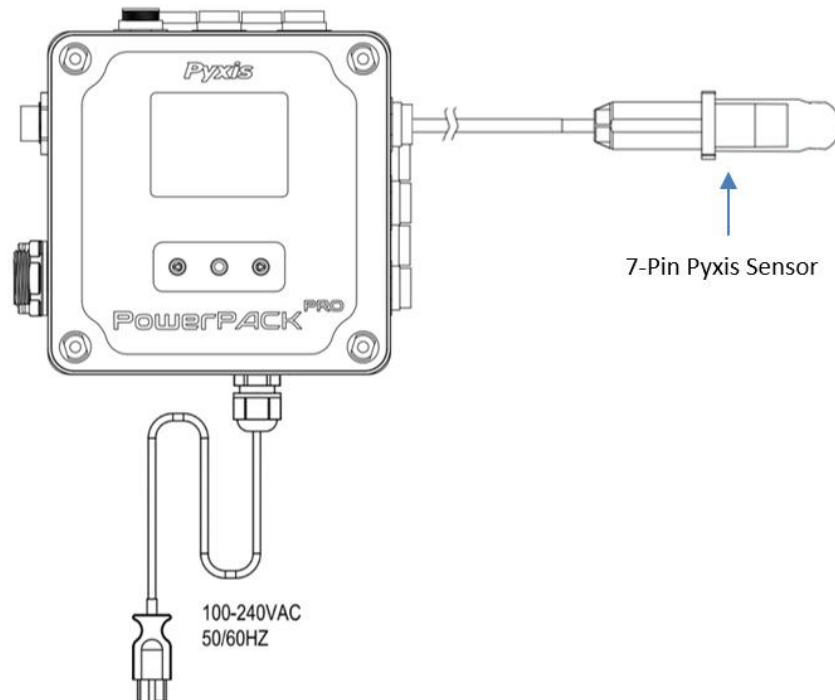For Pyxis 7-Pin Sensors, Connect directly to PowerPACK Pro-5

7-Pin Pyxis Sensor

100-240VAC
50/60HZ

Figure 3.

For Pyxis 8-Pin Sensors, using the **CC-78M** Conversion Adapter to connect to PowerPACK 5Pro.

CC-78M
7-Pin to 8-Pin
Conversion Adapter

8-Pin Pyxis Sensor

100-240VAC
50/60HZ
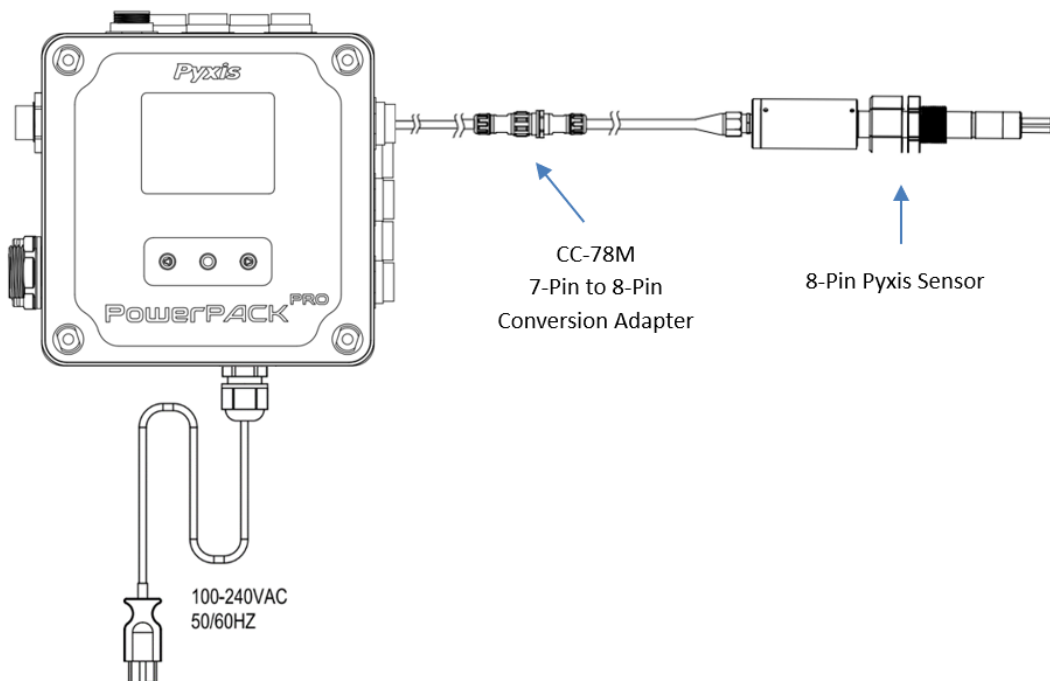
Figure 4.

4. Quick Start-up Procedure

4.1 Keys

◄►   **Up / Down key** - Select different parameters or

              - adjust displayed values or

              - change page in **main screen**

●   **OK key** - Confirm parameter changes or

              - enter the **settings menu** from the **main screen**

4.2 Device Power-up & Sensor Scanning

When PowerPACK Pro-5 is powered on, a scanning screen will be displayed. In this screen, the PowerPACK Pro-5 will automatically do a scan and display a list of available (connected) Pyxis sensors. ***NOTE*** *To stop scanning, please press the* ● *button; to continue scanning, please press the* ◄ *button; to restart the scanning, please press the* ► *button.*
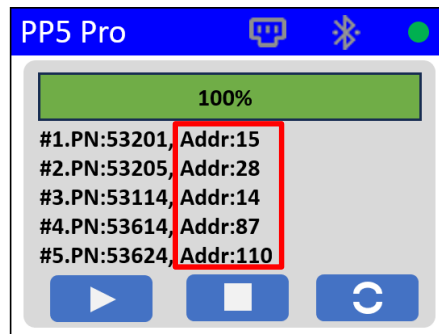
Figure 5. Scanning Screen

IMPORTANT NOTE* *RS-485 Bus Conflict* It is critical to ensure that each slave device (Pyxis sensor) in an RS-485 network has a unique Modbus address (Addr). If connecting multiple Pyxis sensors of the same model (P/N) to the PowerPACK Pro-5, an address conflicts* <u>will</u> *occur. They should be identified and resolved promptly by modifying the duplicate addresses to ensure that each device can correctly respond to the host's (PowerPACK Pro-5) requests. Therefore, if multiple sensors of the same model are connected, see section 5.1.2 Reassigning Slave Address.*

When the scanning progress reaches 100%, the PowerPACK Pro-5 will automatically jump to the main screen.
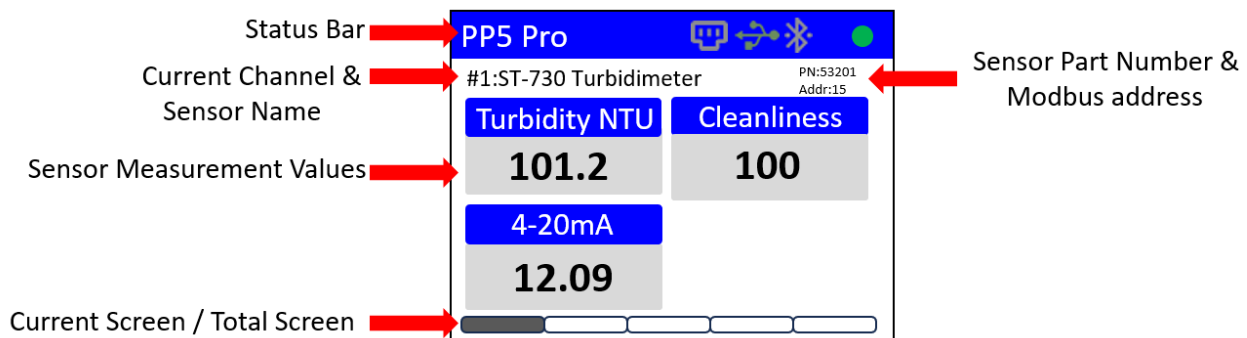

Figure 6. Main Screen

4.3 Status Bar Symbols

Symbol	Description
⌨	**Ethernet,** this icon flashing indicates that the Ethernet configuration is being updated. Please wait until it stops flashing before accessing Ethernet.
✳	**Bluetooth,** allows communication with **uPyxis®** mobile & **uPyxis®** desktop. This icon turns **green** when connected to **uPyxis®**
⇌	**USB**, appears when connected to PC
●	**Run Status**, ● flashing indicates that the PowerPACK-Pro is operating normally

4.4 Hiding the Sensor Reading

Main Screen ⟹ **Setup Menu** ⟹ **Monitor**

Users can hide the sensor readings by disabling the monitoring mode.

Monitor
◉ NO
○ YES

After disabling the monitoring mode, the main screen will be shown as below.
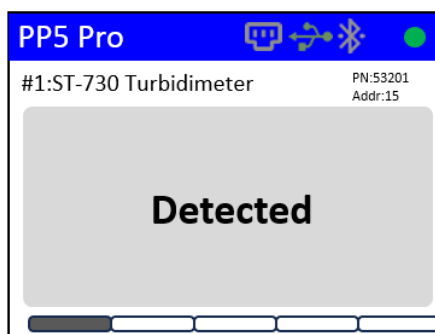
Figure 7.

4.5 Sensor Cleanliness Check

For **Pyxis optical sensors**, the PowerPACK Pro-5 displays a cleanliness index on the main screen, as shown in figure 6. To ensure accurate measurements and stable operation, it is essential to regularly check the cleanliness index of the sensor. A cleanliness index of **79 or higher** indicates that the sensor is clean, while a value **below 79** suggests that cleaning is required.

4.6 Ethernet Settings

Main Screen ⟹ **Setup Menu** ⟹ **Ethernet**

This section describes the functionality of the device in both **TCP Server** and **TCP Client** modes. The PowerPACK Pro-5 can switch between these roles based on configuration settings, enabling flexible network communication for various applications.
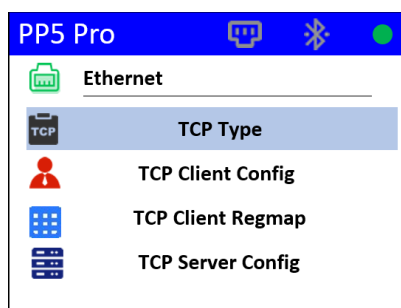
Figure 8 shows the **Ethernet menu**.

Figure 8.

The default Ethernet Settings for PowerPACK Pro-5 are as follows:

TCP Type:	TCP Server
IP Address:	192.168.0.7
Subnet Mask:	255.255.255.0
Gateway IP:	192.168.0.1

4.6.1 TCP Server Configuration

In Modbus TCP, communication follows a **request-response** pattern, where the client sends a request to the server, and the server processes it and returns a response. This section demonstrates how to set up the PowerPACK Pro-5 as a TCP server, with the computer acting as a TCP client that sends requests to the PowerPACK Pro-5, and the PowerPACK Pro-5 responds with sensor data.

Setting Procedure:

1.   Navigate to **Ethernet Menu** and select **TCP Type**.

2.   Select **TCP Server** in the options box.
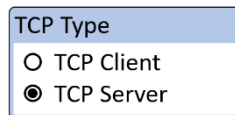
3.   Select **TCP Server Config** from the **Ethernet menu.**
4.   Select the Method for Obtaining IP Addresses. ***NOTE*** *Generally users keep the default TCP server Settings.*
●   If you choose the **Static IP**, you need to set the **IP**, **Subnet Mask**, **Gateway IP** and **Port** manually, as shown in figure 9.
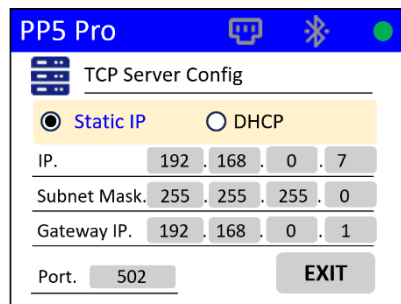

Figure 9.

●   If you choose **DHCP**, you only need to enter the **Port** number.

     The IP address obtained via DHCP will be displayed on the device information screen

5.   Connect the PowerPACK Pro-5's RJ-45 port to your computer using an Ethernet cable.

6.   Click on **Ethernet Properties** and select **Internet Protocol Version 4 (TCP/IPv4)** → **Properties**

7.   Choose **Use the following IP address**:
IP Address: 192.168.0.x
This is the IP address set for the client. The "x" represents a specific number, typically between 1 and 254. It must be different from the PowerPACK Pro-5's IP to ensure uniqueness on the network .

Subnet Mask: 255.255.255.0

Gateway: 192.168.0.1
It must be the same as the PowerPACK Pro-5's gateway IP(192.168.0.1), indicating they are on the same local network and can communicate through the same gateway.
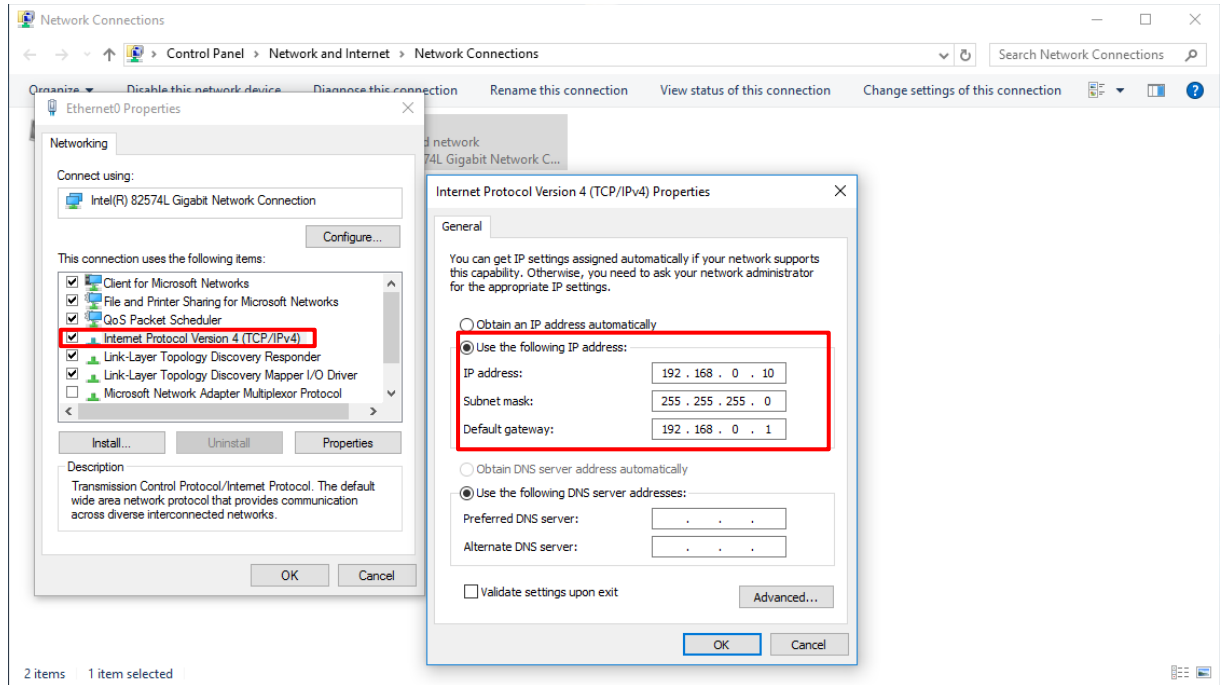
Figure 10.

8. To validate the Modbus TCP communication, here used **Modbus Poll** as an example. Click on **Connection** and select **Modbus TCP/IP.** Please enter the IP address and port number of the PowerPACK Pro-5 to ensure that the PC can send a request to the PowerPACK Pro-5, as shown in Figure 11.
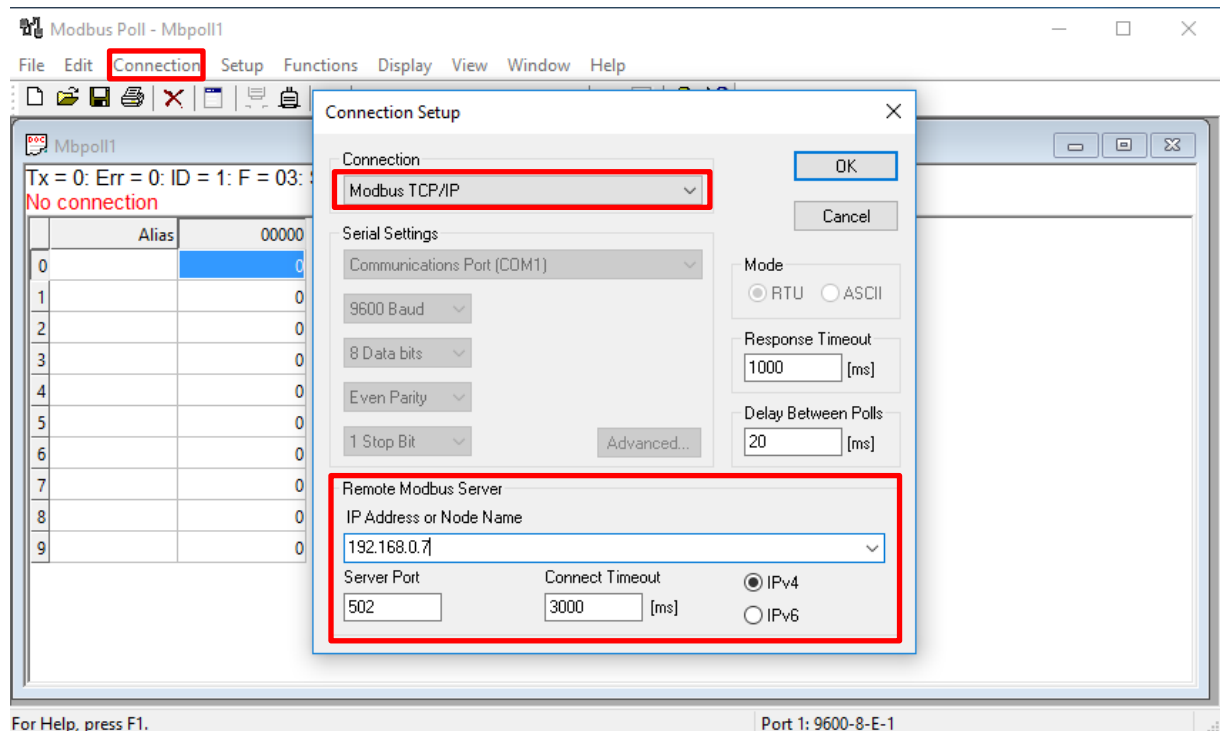

Figure 11.

9. View the sensor reading by accessing the specified register address (please refer to Pyxis Sensor Modbus Communication Manual).
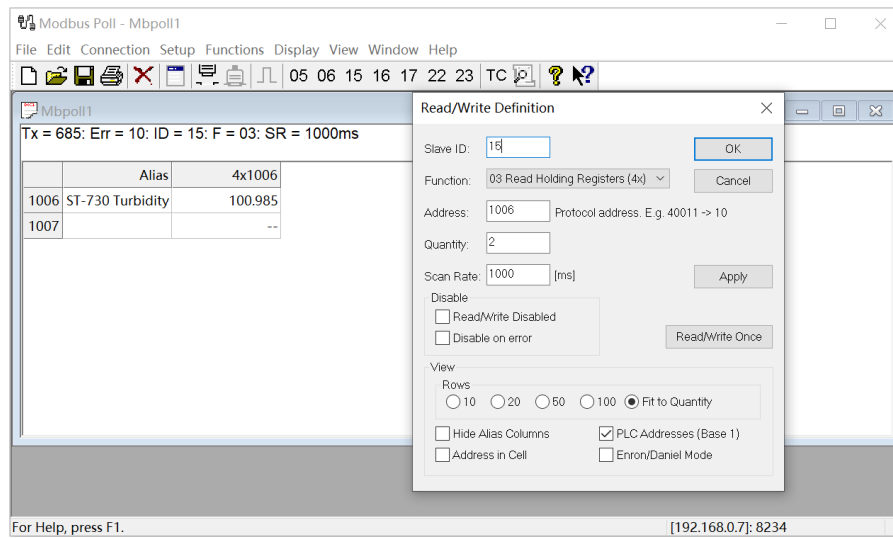

Figure 12.

4.6.2 TCP Client Configuration

In Modbus TCP, communication follows a **request-response** pattern, where the client sends a request to the server, and the server processes it and returns a response. This section demonstrates how to set up the PowerPACK Pro-5 as a TCP client, with the computer acting as a TCP server. In this setup, the PowerPACK Pro-5 sends requests to the computer, and the computer responds with the requested sensor data.

1.   Navigate to **Ethernet menu** and select **TCP type**

2.   Select **TCP Client** in the options box
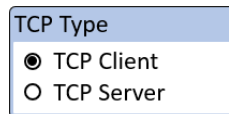
3.   Select **TCP Client Config** from the **Ethernet menu.**

4.   In **TCP Client Config** screen, You need to manually set the IP addresses for both the server and the client. ***NOTE*** Make sure the PowerPACK Pro-5's IP is different from the computer's IP .Subnet *Mask and Gateway IP should keep default.*
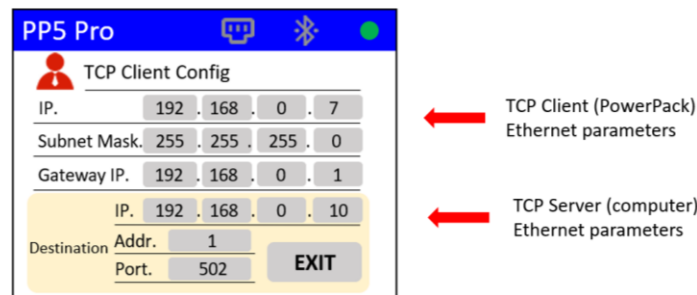

Figure 13

5.   Connect the PowerPACK Pro-5's RJ-45 port to your computer using an Ethernet cable.

6.   Click on **Ethernet Properties** and select **Internet Protocol Version 4 (TCP/IPv4)** → **Properties**

7.   Choose **Use the following IP address** and enter IP address, subnet mask and default gateway.
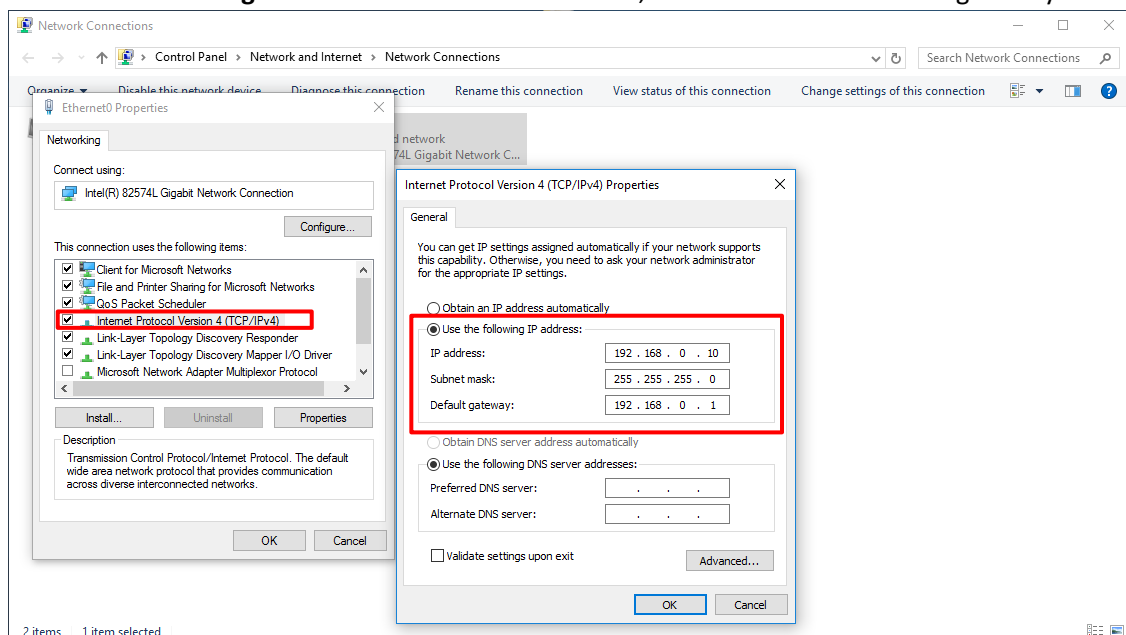

Figure 14

8. To validate the Modbus TCP communication, here used **Modbus Slave** as an example. Click on **Connection** and select **Modbus TCP/IP.** Please enter the IP address and port number of the PC to ensure that the PowerPACK Pro-5 can send a request to the PC, as shown in Figure 15.
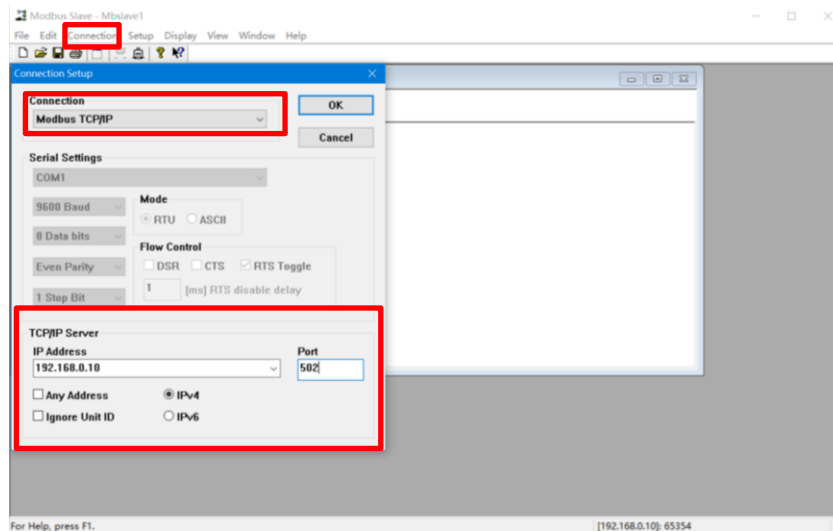

Figure 15

9. Select **TCP Client Register Map** from the **Ethernet Menu.** This page shows the register address which will be accessed in Step 10

Figure 16

10. View the sensor reading by accessing the specified slave address - 1 (refer to figure 13,) and register address (please refer to figure 16 - TCP Client Regmap).
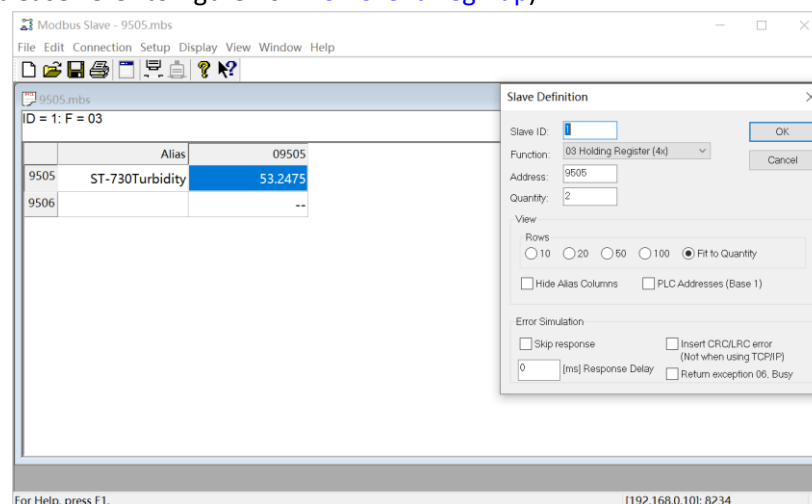

Figure 17

4.7 Device Information

Main Screen ⟹ **Setup Menu** ⟹ **Device Info**

This screen shows the current **Ethernet** communication parameters. Please follow these settings when using **Modbus TCP** , *see Section 4.6.*
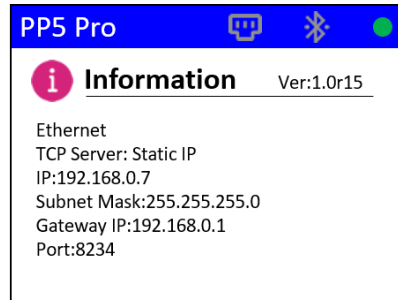

Figure 18.

4.8 Upgrading the PowerPACK Pro-5 Firmware

To upgrade the firmware of the PowerPACK Pro-5, please follow the steps below carefully.

1. Disconnect the **PowerPACK Pro-5** from its power source. Ensure that the device is completely powered off.

2. Press and hold all three buttons, then reconnect the device to the power source. This allows the **PowerPACK Pro-5** to enter boot mode, as shown in figure19.
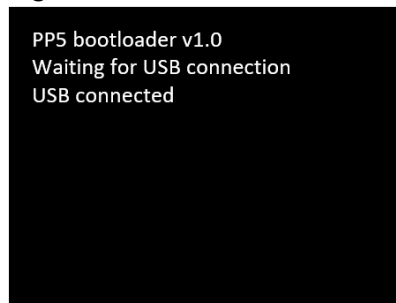

Figure 19.

3. Connect a USB Type-C cable to the port on the left side of the **PowerPACK Pro-5** and to the USB port of the PC. If the USB connection is detected, the boot screen will display "USB connected".

4. Open "This PC" on your computer, and you will find that the **PowerPACK Pro-5** has generated a virtual USB drive named "PyxisBoot".

5. Delete the old files inside the "PyxisBoot" drive and copy the target firmware file (file format: **POWERPACK PRO-5PRO_FirmwareVersion.bin**) to the "PyxisBoot", as shown in figure 20 and figure 21.
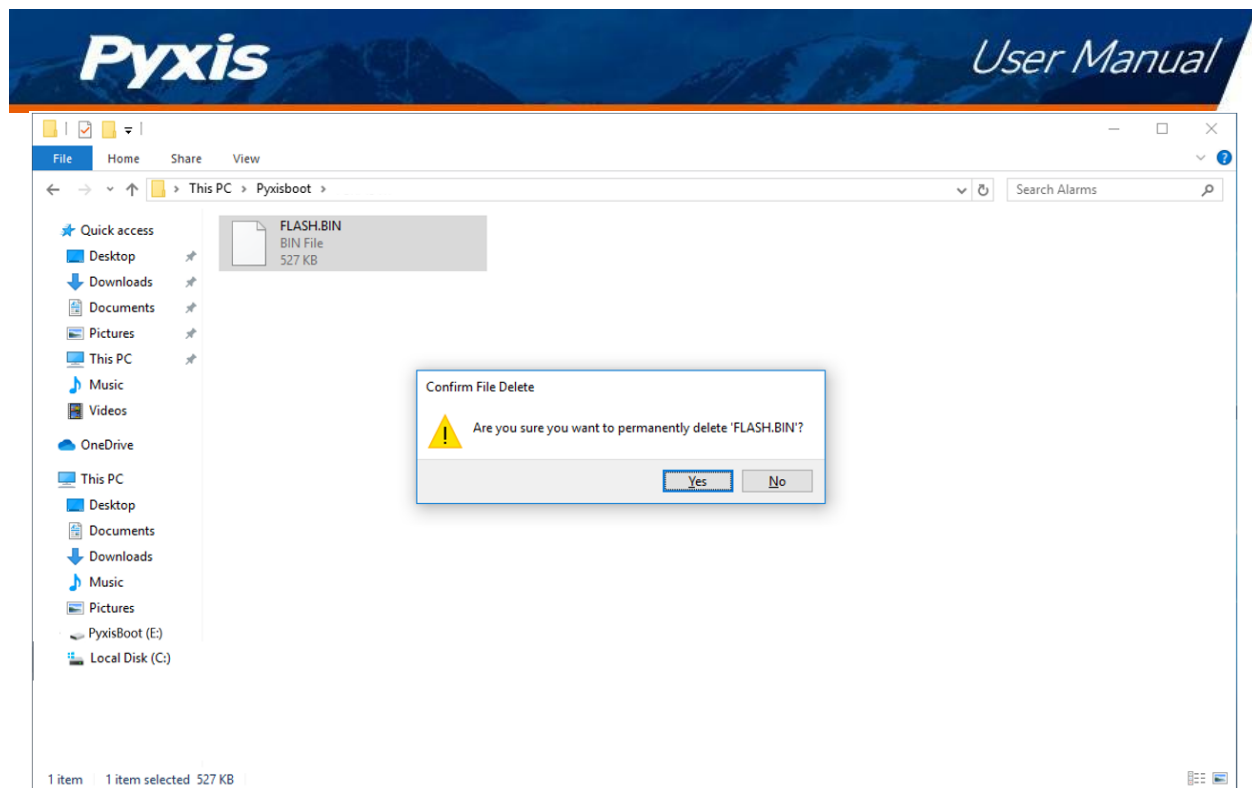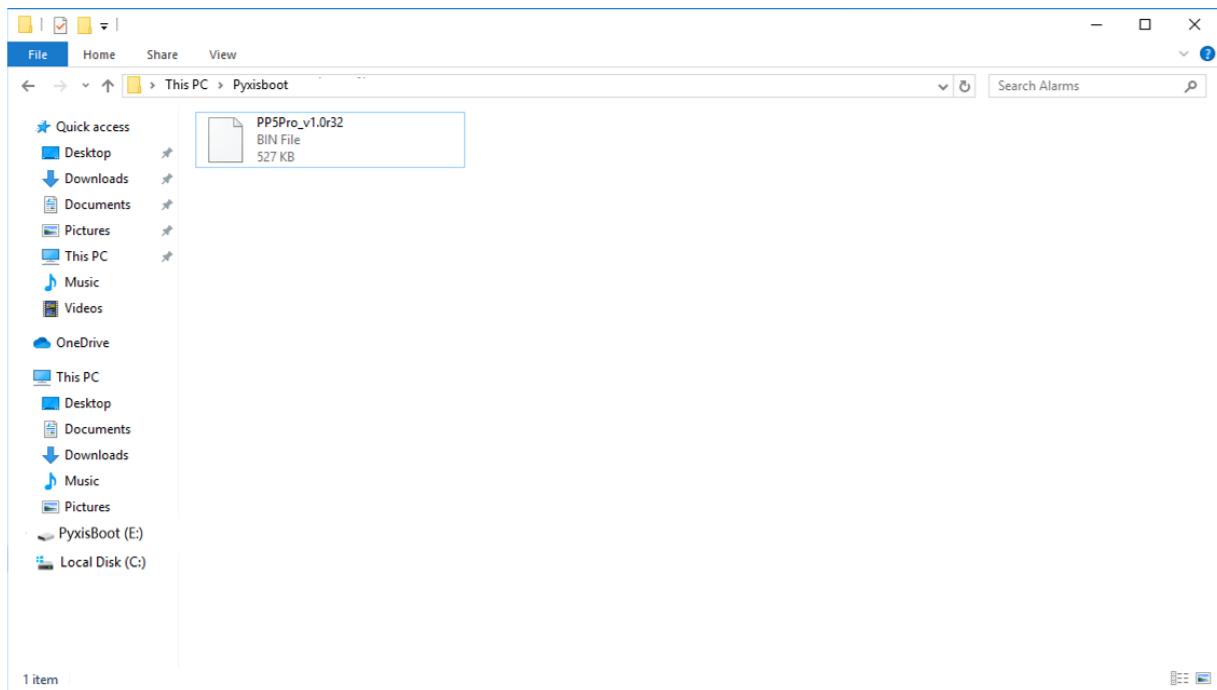
Figure 20.

Figure 21.

6. Once the firmware is copied to the root directory of "PyxisBoot", the **PowerPACK Pro-5** will automatically complete the upgrade and load the new program. You can now safely disconnect USB cable.

5. Sensor Setup & Calibration Using Local Display

5.1 Sensor Configuration

Main Screen ⟹ **Setup Menu** ⟹ **Probe Option** ⟹ **Select Sensor#** ⟹ **Configuration**

The PowerPack Pro-5 provides a calibration feature, allowing each channel's sensor to be independently configured and calibrated.
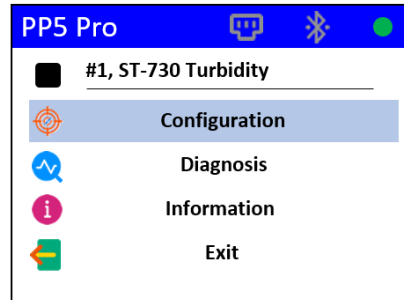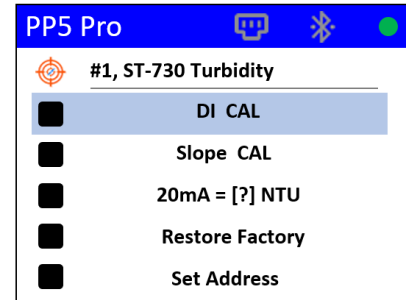

Figure 22.

Figure 23.

5.1.1 Sensor Calibration, 4-20mA Span & Restore Default Calibration Parameters

Here uses the ST-730 sensor as an example, users can perform calibrations by selecting **DI CAL** and **Slope CAL**. Follow the sensors specific user-manual for each calibration step.

The user can change the turbidity value corresponding to the 20mA output by selecting **20mA = [?]NTU**. *NOTE* *The 20mA value span adjustment may only be equal to or lower than the upper range detection limit of the sensor.*

If an abnormal reading of the sensor is caused by improper calibration, users can restore the sensor to the factory calibration parameters by selecting **Restore Factory.**

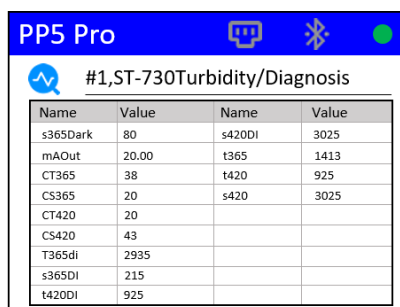### 5.1.2 Assign a Specified Modbus Address for the Sensor

For some special applications, users need to assign a new Modbus address to the sensor. For example, if you have two ST-730 sensors, you will need to assign a different Modbus address to one of them.

1. Connect one of the two ST-730 sensors to PowerPack Pro-5.

2. Navigate to **Sensor Configuration Screen** and select **Set Address**, as shown in **figure 20**.

3. Set a new Modbus address and confirm *(*NOTE* The Modbus address must be between 1 to 240, and <u>cannot</u> be used with other sensors). If the address is set successfully, the message "**Succeed**" will appear on the screen.*

4. Address assignment is now complete. Power-off the PowerPack Pro-5 and connect two ST-730 sensors .

5. Power-on the PowerPack Pro-5 and wait PowerPack Pro-5 do a scan.

5.2 Sensor Diagnosis

Main Screen ⟹ **Setup Menu** ⟹ **Probe Option** ⟹ **Select Sensor#** ⟹ **Diagnosis**

The PowerPack Pro-5 controller supports displaying the raw measurement data of the sensor in use. The information has no use for normal operation, but instead is used for sensor troubleshooting. This feature may be used for technical support when communicating with service@pyxis-lab.com.

PP5 Pro			
#1,ST-730Turbidity/Diagnosis			
Name	Value	Name	Value
s365Dark	80	s420DI	3025
mAOut	20.00	t365	1413
CT365	38	t420	925
CS365	20	s420	3025
CT420	20		
CS420	43		
T365di	2935		
s365DI	215		
t420DI	925		

Figure 24.

5.3 Sensor Information

Main Screen ⟹ **Setup Menu** ⟹ **Probe Option** ⟹ **Select Sensor#** ⟹ **Information**

This screen contains the **PN** (part number),SN(serial number), **Addr**(Modbus slave address) and **Ver**(software version) of the current channel sensor.

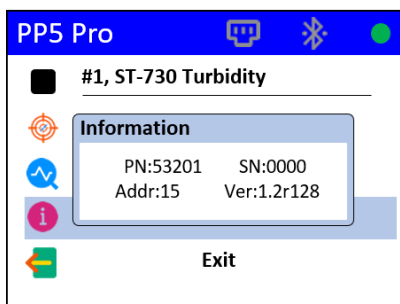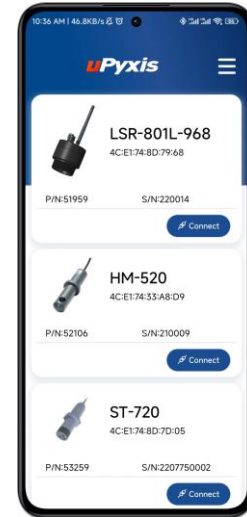| PP5 Pro	
#1, ST-730 Turbidity	
Information	
PN:53201	SN:0000
Addr:15	Ver:1.2r128
Exit	

Figure 25.

6. Sensor Setup & Calibration with uPyxis® 2.0 Mobile App

6.1 Download the uPyxis 2.0 Mobile App

Download and install the **uPyxis2.0** app from **Apple Store** or **Google Play**.

6.2 Connecting to the uPyxis 2.0 Mobile App

Turn on the **Bluetooth 5.0®** on in your mobile device.
NOTE *Do not pair the phone's Bluetooth to the device, the uPyxis 2.0 App will do the pairing.*

Open uPyxis 2.0 Mobile App. Click "**Scan Bluetooth**" button and the App will start to search for Pyxis devices. Click the **Connect** button under **PPOWERPACK PRO-5 (**PowerPACK Pro-5**)** to connect to it.
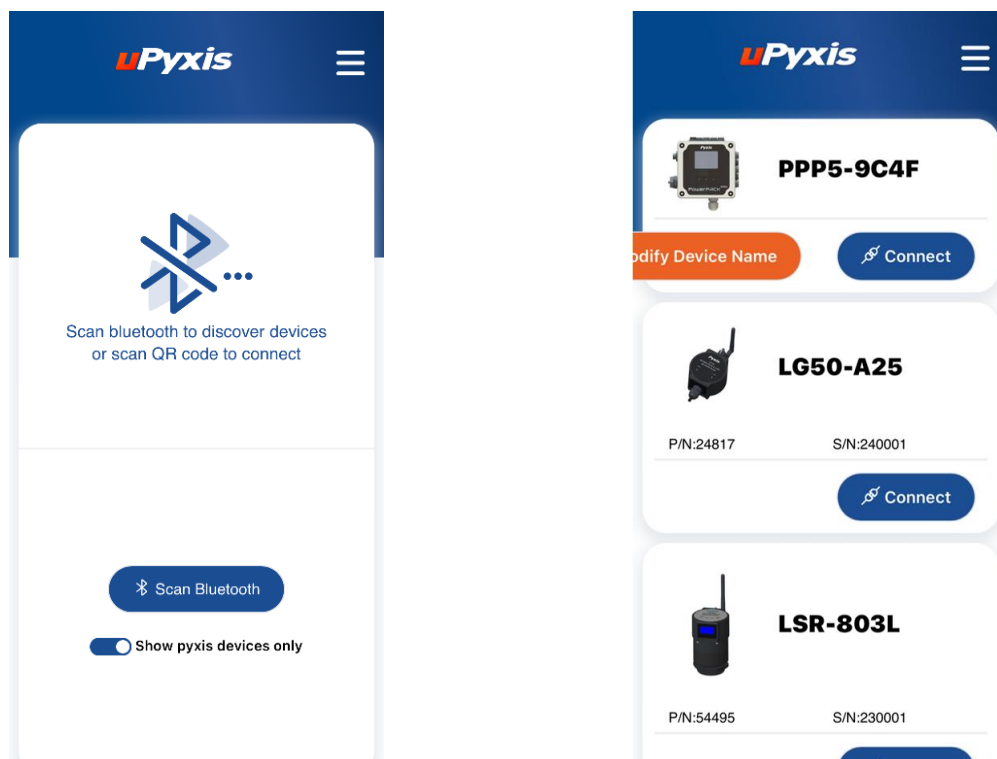

Figure 26.

Once connected to PowerPACK Pro-5, the uPyxis 2.0 App will do a Bluetooth scan and display a list of available sensors. ***NOTE*** *To stop scanning, please press the* ▣ *icon; to continue scanning, please press the* ⟳ *icon; to restart the scanning, please press the* ▶ *icon. When the scanning progress reaches 100%, select the sensor you want to connect to.*
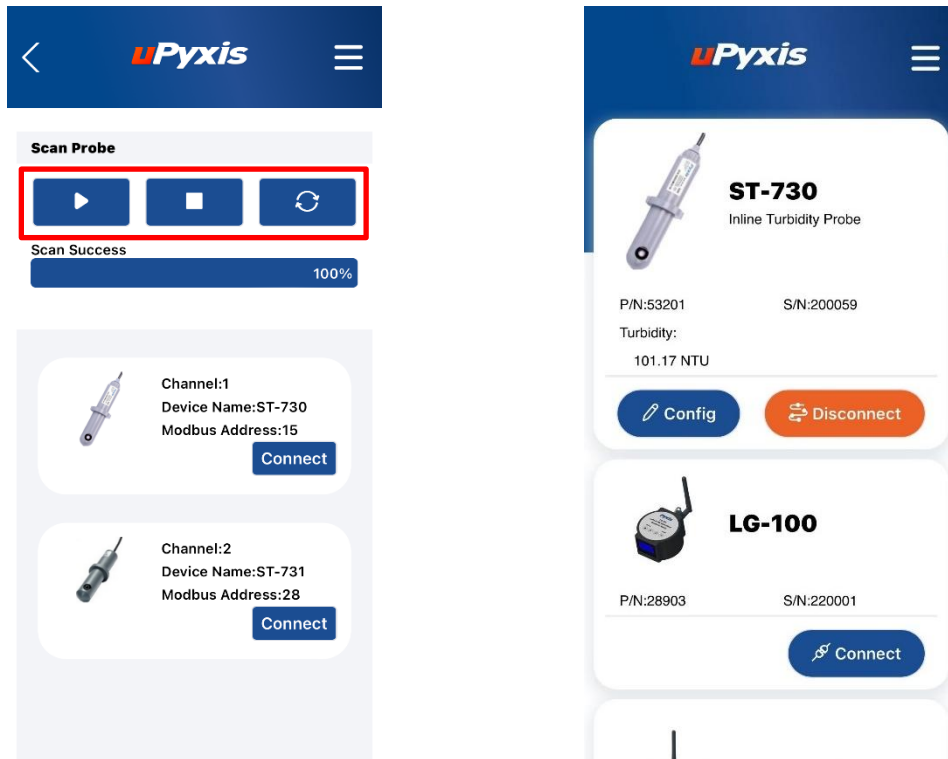

Figure 27.

7. Sensor Setup & Calibration with uPyxis® Desktop App

The use of PowerPACK Pro-5 with the uPyxis Desktop App is still under active development. Once complete, this section will be updated with use instructions. Please contact service@pyxis-lab.com for updates.

8. Communication Using Modbus RTU

The PowerPACK Pro-5 is configured as a Modbus slave device. When PowerPACK Pro-5 establishes communication with the sensor, it will act as an intermediary, relaying the sensor data through the **Modbus RTU protocol**. Please refer to the corresponding sensor register table to access the sensors via a Modbus RTU connection. Contact service@pyxis-lab.com to obtain the latest version of the Pyxis Sensor Modbus Communication Manual.

9. Contact Us

Contact us if you have any questions about the use or maintenance of the PowerPACK Pro-5.

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Revision History

Version	Date	Description
V1.0	2024.8	Draft
V1.01	2024.9	Initial release.
V1.02	2024.11	Added section 5: *Sensor Setup & Calibration Using Local Display.* Expanded Section 4.2 (***MPORTANT NOTE***)
V1.03	2025.3	Add 4.4: *Sensor Cleanness Check.* Add section 4.8 *Upgrading the PowerPack Pro-5.* Rewrote section 4.6. Corrected power supply specification from 30W to 24W.