Sentek IoT

Installation + Setup Procedure
and
App Installation Manual

Version: 1.0

Date: July 2023

Sentek

Please Read This Manual Before Installing the Sentek IoT DTU

This manual is created to provide the knowledge to install the **Sentek IoT** quickly and correctly.

Reading this manual will assist you with the choice of the right tools and procedures. It should save you time and ensure the correct installation of the DTU and probe.

Please test the **App and Sentek IoT DTU** before installing it in the field.

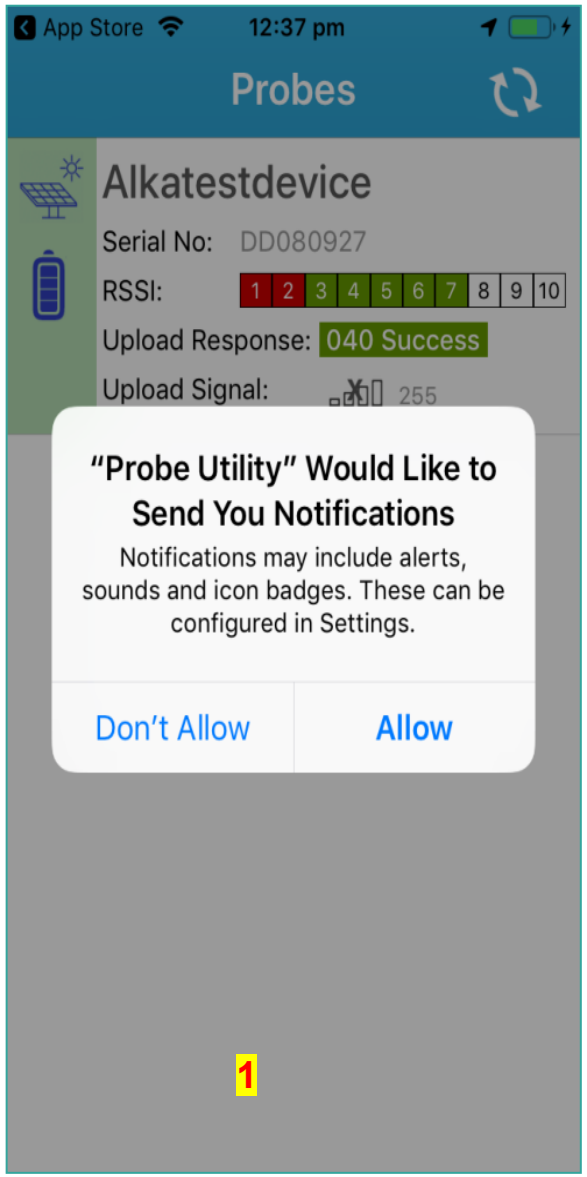
Installing Sentek Probe Utility App iOS

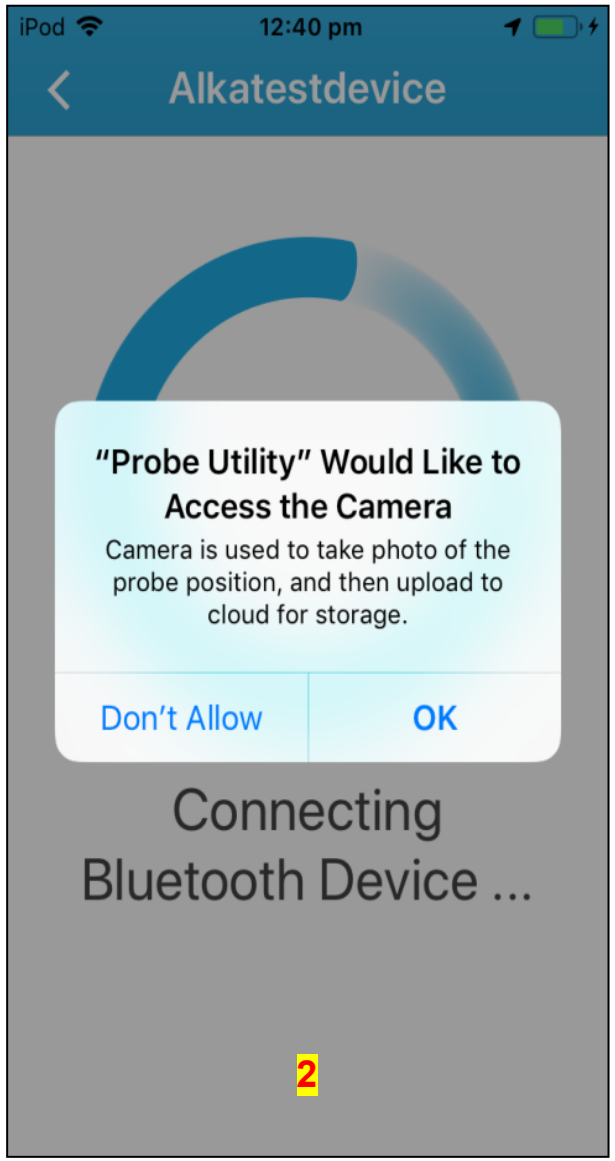
Sentek

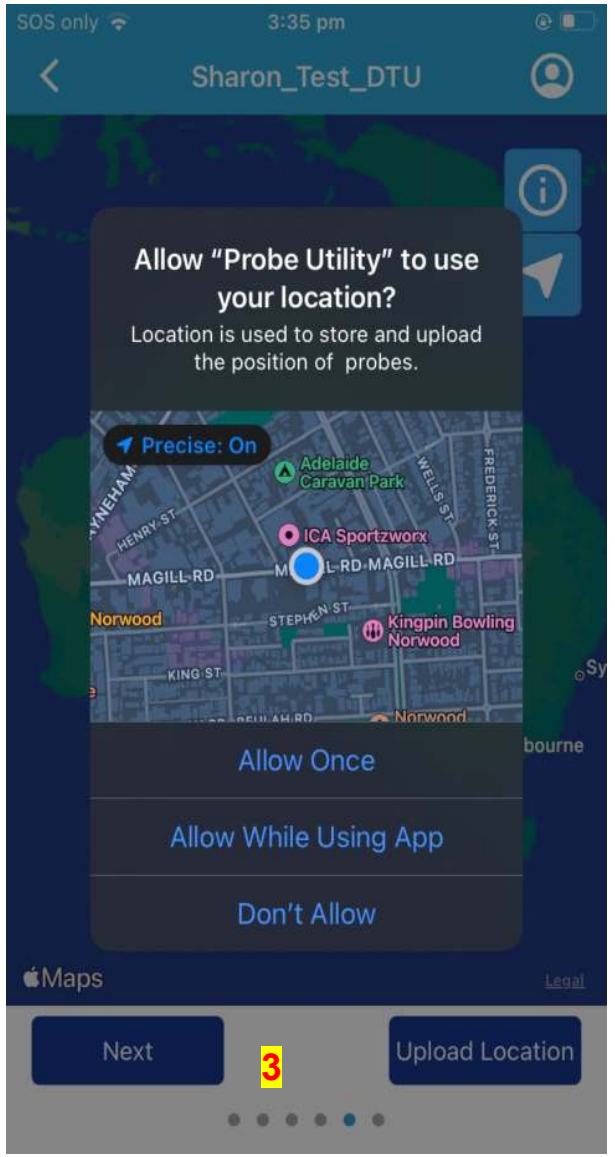
How to install the Sentek Probe Utility App

1. On your iPhone, open the **App Store.**
2. To install the **Sentek Probe Utility** app, sign in with your Apple ID or create one.
3. To search for apps by name, tap **Search**, then type the name of the app: Sentek Probe Utility.
4. Tap **GET,** then tap **INSTALL**.
5. Once the application has finished installing, it shows up on the Home screen of your iPhone. (Probe Utility)

Permission







Allow the App to send notifications, access the camera and location on the mobile device.

Main-Screen Showing Probe Information

This screen provides you with the Probe information.

For Example, The cloud symbol is used to indicate that a file or data is in the process of being uploaded to the cloud or remote server.

App Build information refers to your App's version and Build number.

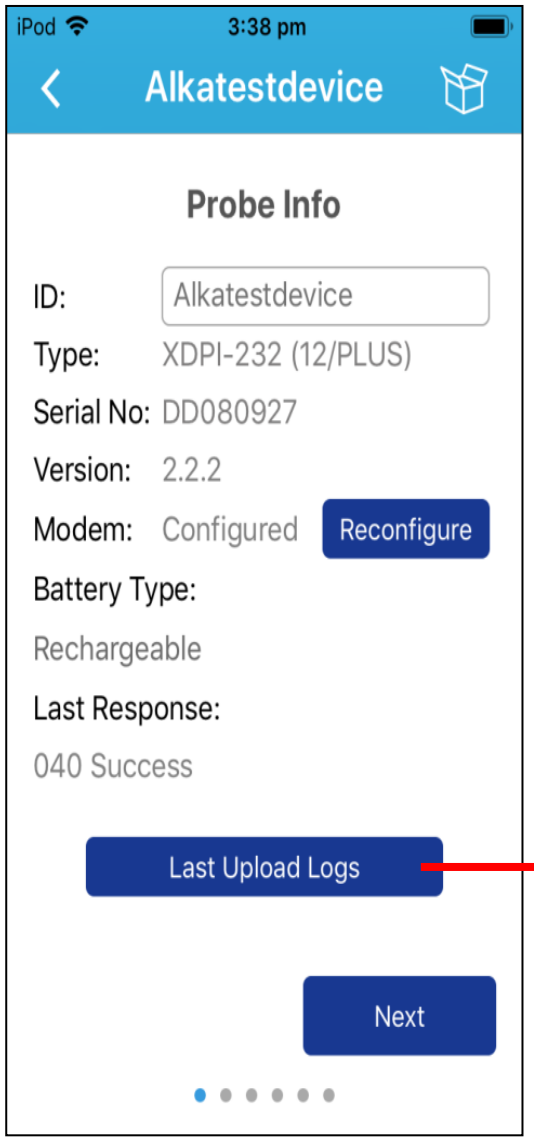
Icon Name	Description
Logger ID	The Logger ID is used to supply the IrriMAX database Logger ID. The logger ID can be up to 16 alpha-numeric characters and underscore. It cannot be blank. The default is the probe's serial number.
Serial No:	The serial number is unique on your device for identification and warranty purposes.
RSSI (Received Signal Strength Indicator) :	The RSSI helps to identify the Signal strength between the Sentek IoT and the phone in which the App is running. The stronger the signal, the better the quality of the connection. A low RSSI value may indicate a weak or poor-quality signal, resulting in slower data transfer rates or other connectivity issues. In this case, the phone should be moved closer to the DTU.
Upload Response	The Last Response displays the status at the end of the most recent upload or attempt to upload.
Upload Signal	The Upload Signal indicates the cellular signal strength. Refer to **Appendix A** for further information.)

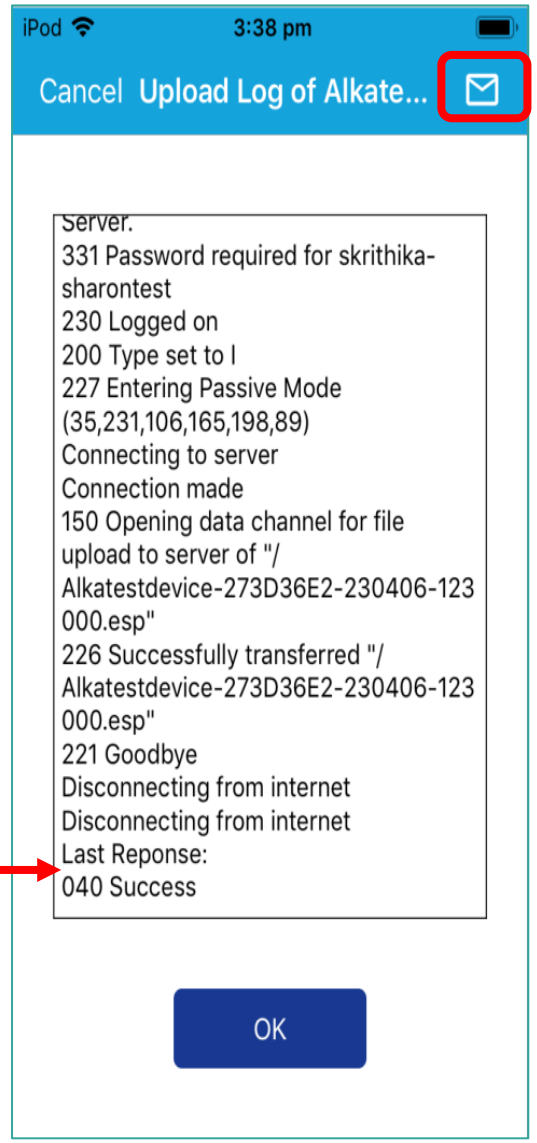
Main-Screen Showing Probe Information

Solar Voltage 	This shows the solar voltage as measured by a Sentek IoT.
Battery Voltage 	This shows the battery voltage as measured by a Sentek IoT.
Upload Signal 	The Upload Signal indicates the cellular signal strength. The upload response and signal strength details cannot be matched when the app processes the data. Once the upload is completed, the cloud symbol disappears, and the upload response and signal will show the values for the completed upload.
Scan 	The scan icon starts rotating when scanning for DTU-connected probes and stops once the scan is complete.
Upload Data 	The cloud icon appears on the screen when the modem is active /on.

Battery status	
	This indicates the battery status while it is charging.
	This indicates the battery is faulty.

Probe Info



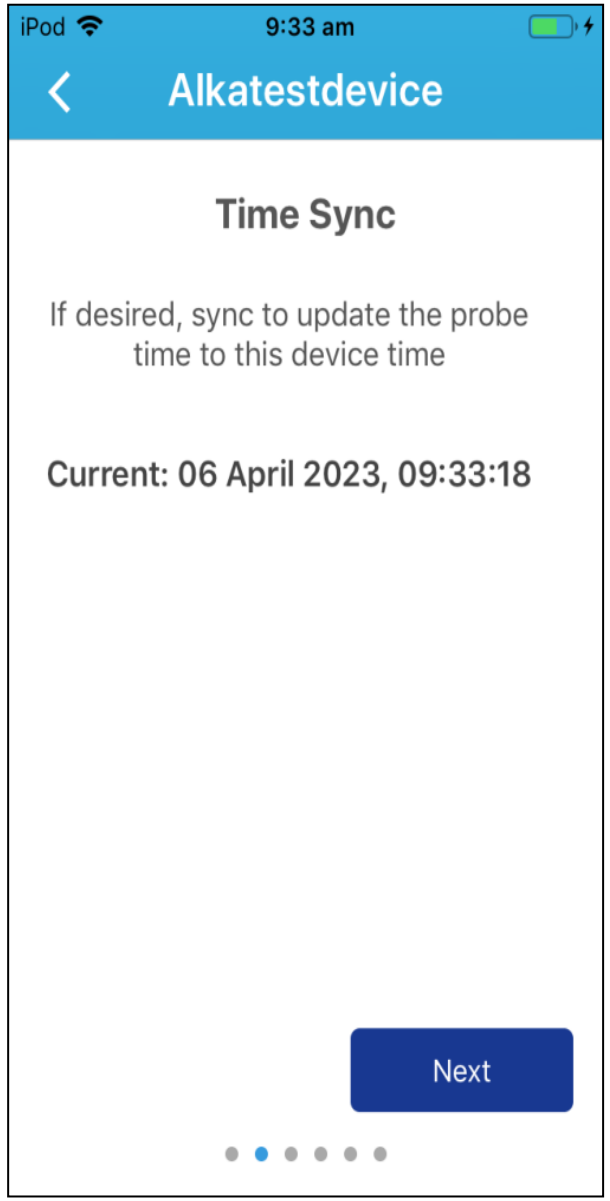


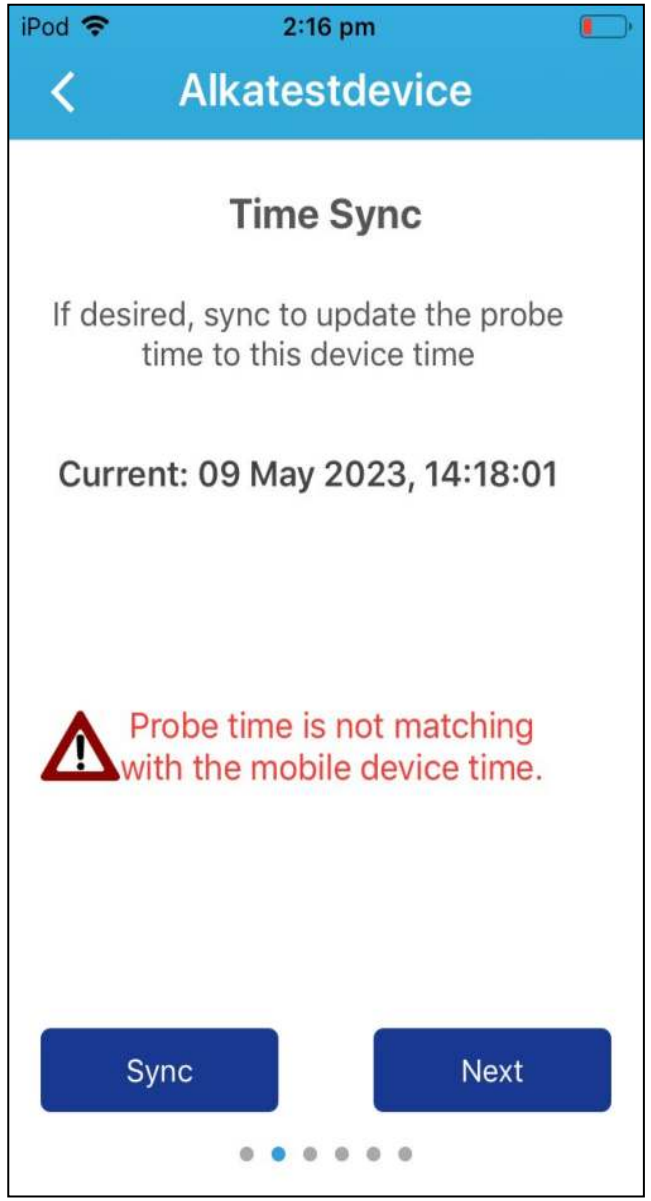
Click **Next** to move to the next slide or you can swipe the app screen.

Value	Description
ID	This name is used to supply the IrriMAX database Logger ID. The default is the probe's serial number. The logger ID can be up to 16 alpha-numeric characters and underscore. It cannot be blank. By clicking on the Logger ID, it can be edited or changed as per the user's preferences.
Type	This is the type of probe connected to the DTU.
Serial Number	This shows the serial number of the probe
Version	This is the version of the firmware in the probe.
Modem	This shows the status of the modem.
Reconfigure Button	This button allows the modem to be reconfigured.
Battery Type	This will always be Rechargeable for a Sentek IoT.
Last Responses	This is the result of the recent or last attempt to upload to the Internet.
Last Upload Logs	This is used to view the last upload log from the modem.

Use this Email button to send upload log information to support@sentek.com.au or yourself.

Time Synchronization



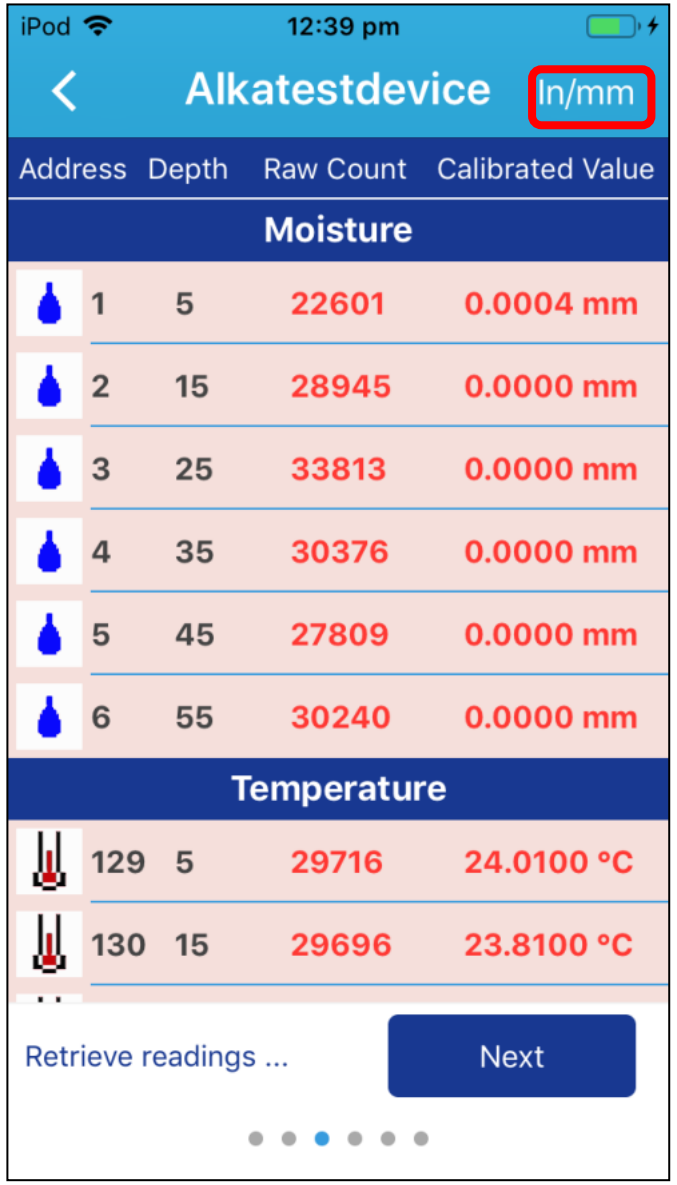


The Sentek IoT automatically updates your probe time. The clock screen shows the probe's date and time. By default, the date and time are visible on the Lock Screen and set based on your location.

The **Sync** button updates the probe time if you are in a different time zone. It allows the App to set the probe time to the device time.

Click **Next** to move to the next screen.

Sensor Test



This section provides you with information about the configuration values.

- **Address**: This displays the sensor address for each sensor.
- **Depth**: This provides the depth of each sensor.
- **Raw Count:** This displays the raw count for each sensor.
- **Calibrated Value**: After applying the calibration equation, this displays the converted sensor value.
- **In/mm**: To change the unit in In/mm you can click on in/mm at the top-right corner of your screen.

Click **Next** to move to the next slide.

Sensors symbols and addresses:

Moisture sensor addresses start at 1

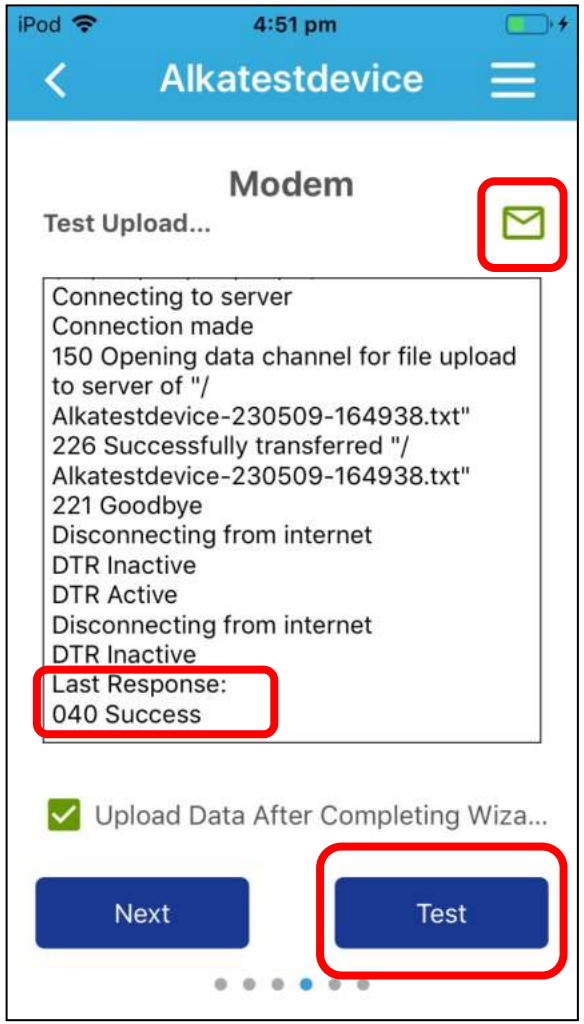
Salinity sensors start at 65

Temperature sensor at 129

Click **Next** to move to the next screen.

Modem

This section provides you with information about the Modem and its responses.



- **Test**: The Test button initiates a connection to the Internet but does not upload any readings.

Note: The Sentek IoT and probe should not be deployed in the field until a successful test.

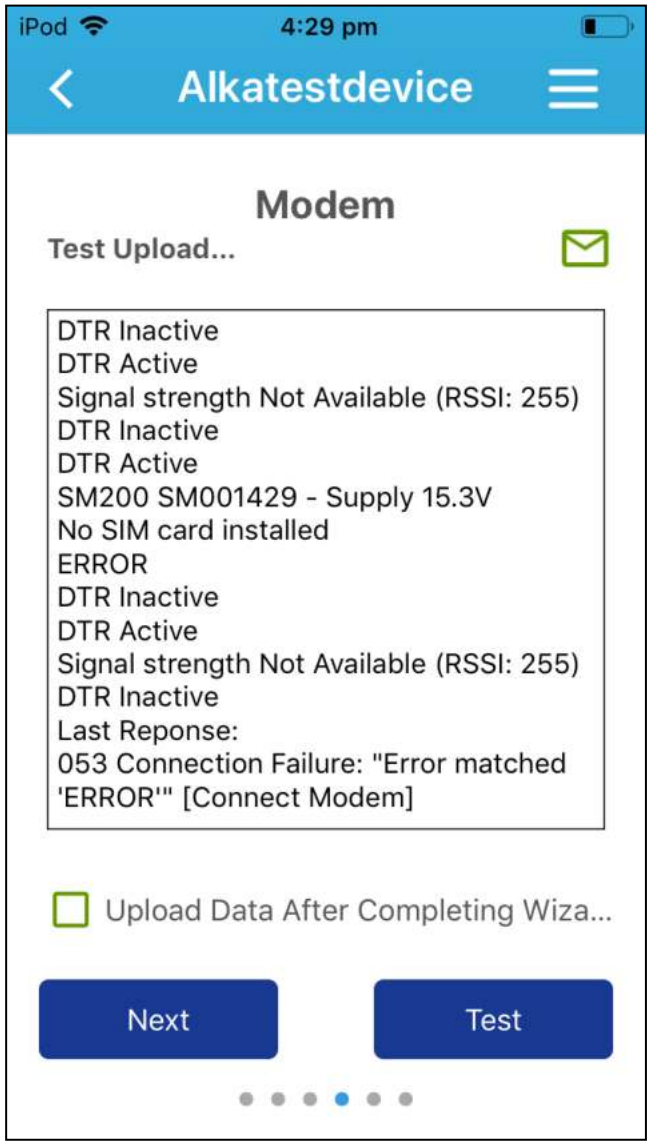
- **Upload Data After Completing Wizard**: This test uploads data in the probe when exiting the wizard. Once you tick the check box and complete the wizard, the app is redirected to the scan screen, where the cloud icon flashes to indicate data upload.

The user can verify that the data has been successfully uploaded to IrriMAX Live with the success code 040.

- **Email icon**: Tapping on the **email icon** will open the app's email interface, where users can compose new email messages to support@sentek.com.au and send their issues.

Click **Next** to move to the next screen.

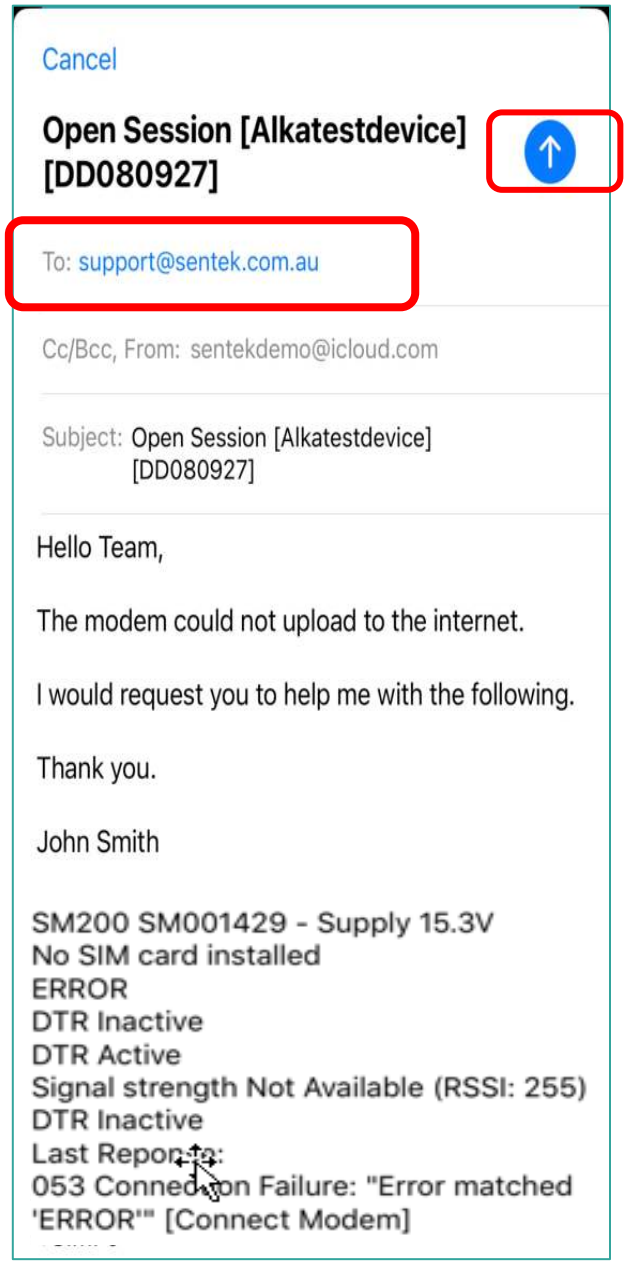
Scenario – No SIM Card



If you encounter a 053 Connection Failure error while performing a test upload, it could be due to network connectivity issues or a missing SIM card, as shown in the image.

Click **Next** to move to the next screen.

Modem

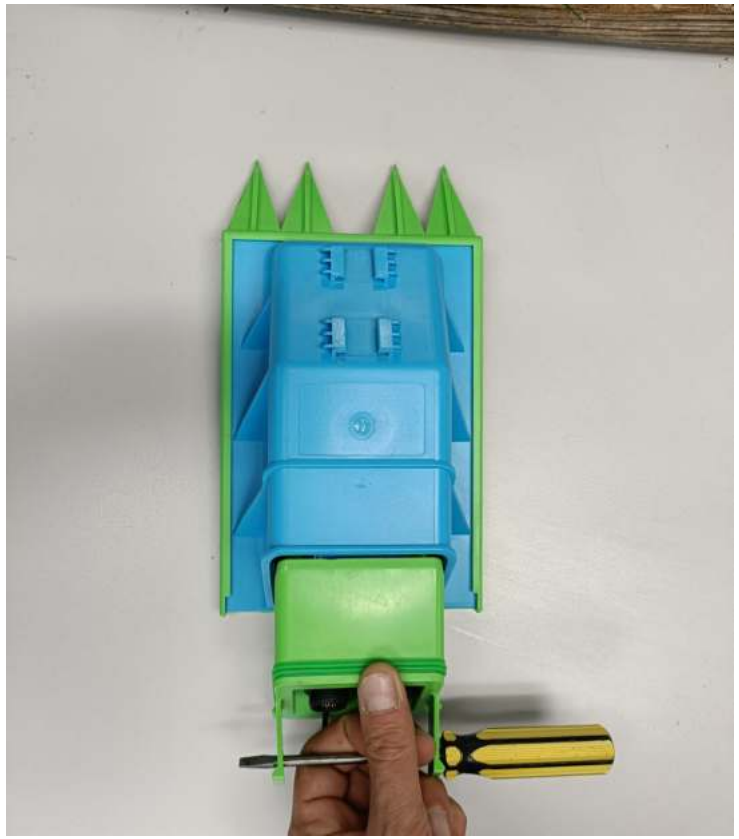


Steps to send an email to support.

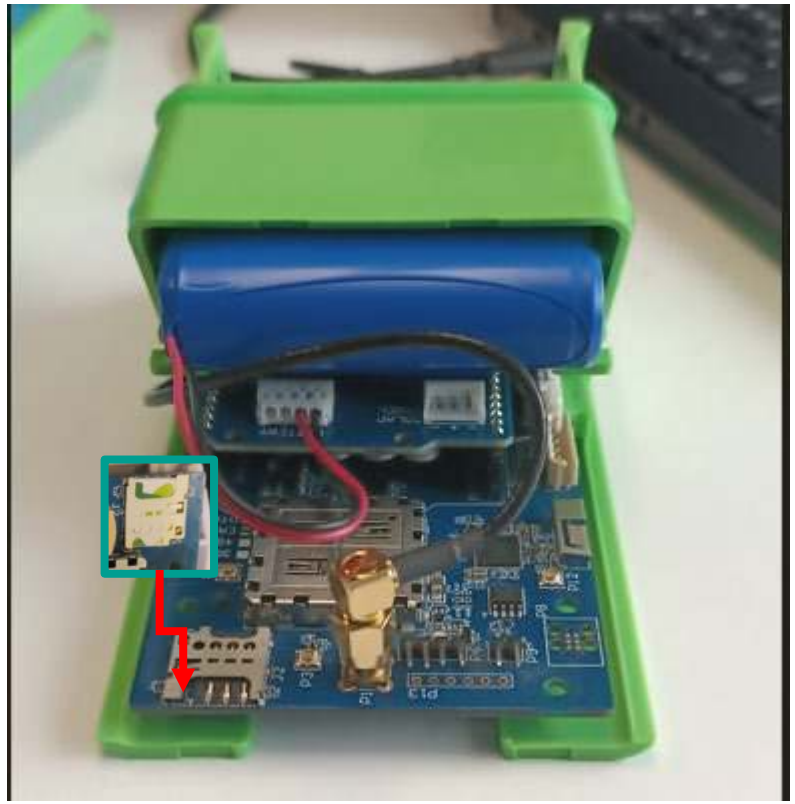
- Click on the email icon to start composing an email.
- In the "**To**" field, *support@sentek.com.au* will be auto-filled.
- In the "**Subject" field,** the user's Logger ID and Serial number will be auto-filled.
- The error message will be included in the "**Body**". The user can provide more detailed information about the issue or question.
- Review your email to ensure that it is clear.
- Click the **Send** button to send the email to the support team.

Inserting own sim card

Ensure the **DTU** box is disconnected from the probe and antenna cables when opening the **DTU**.

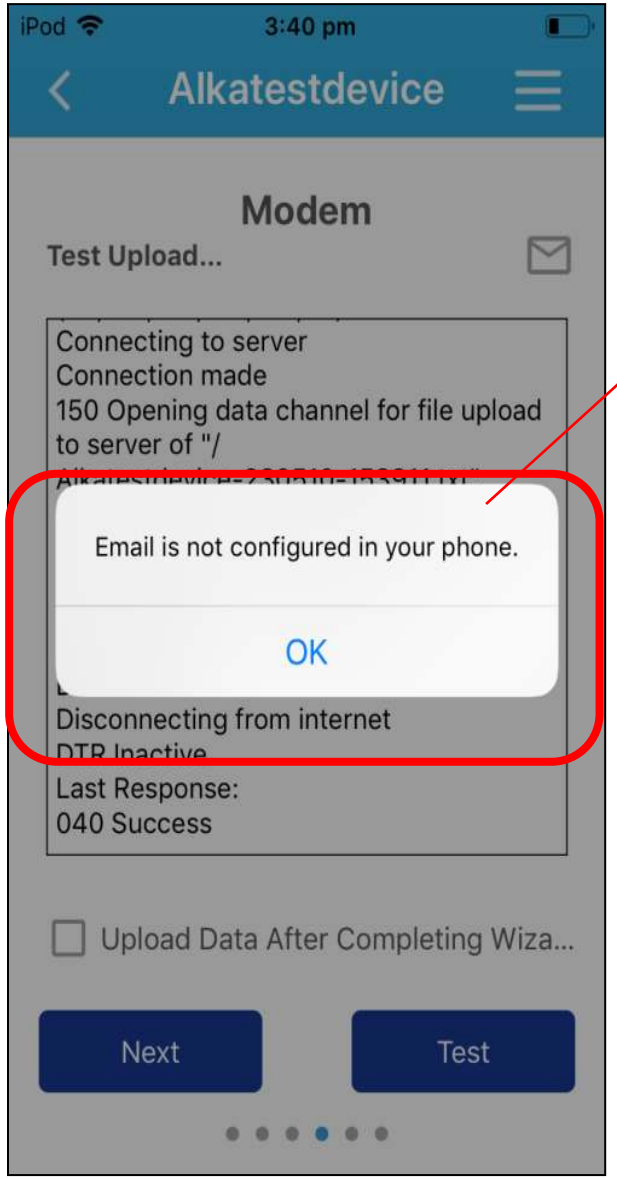


Carefully remove the cover or casing from the **DTU** box using a screwdriver.



Insert the **sim card** into the **sim holder**.

If email cannot be sent from the iPhone



In case you receive the following error while sending an email to support, please follow the step-up process by clicking on the link below:

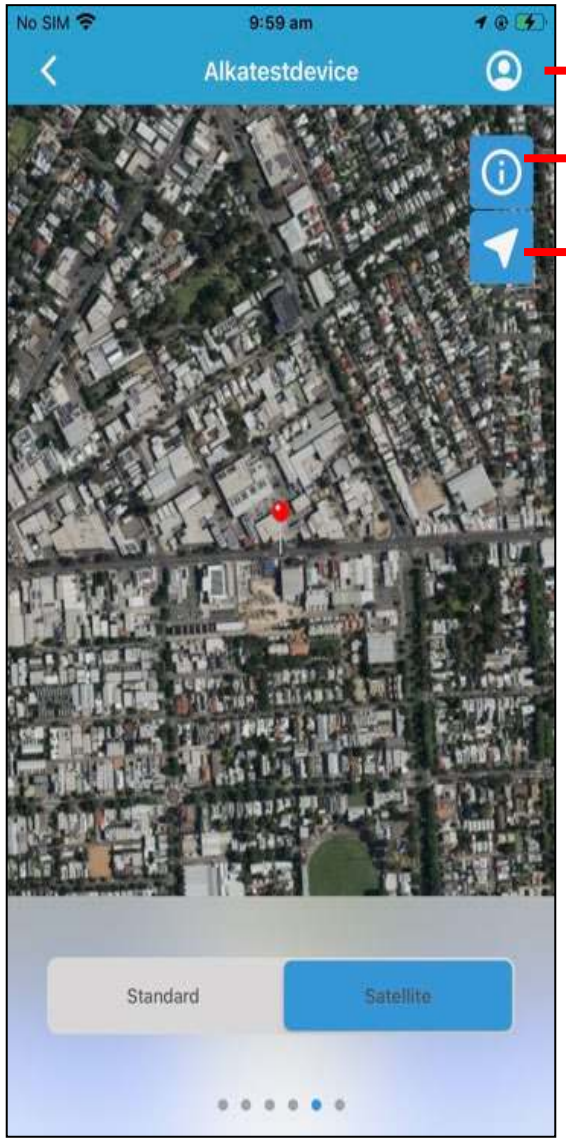
https://support.apple.com/en-au/HT211082

Test/Upload Result Codes

053	**Connection Failure**	Modem not responding to commands, or could not connect to internet (see note below)
054	**Server Error**	Problem communicating with FTP server.
041	**Success (No Data)**	No new data to upload. This occurs when the user ticks the option to upload data after completing the wizard, and there is no data to upload.

To learn about the test and upload code, please click on the link *https://sentektechnologies.com/download/sentek-plus-all-in-one-compact-manual-v1-1/*

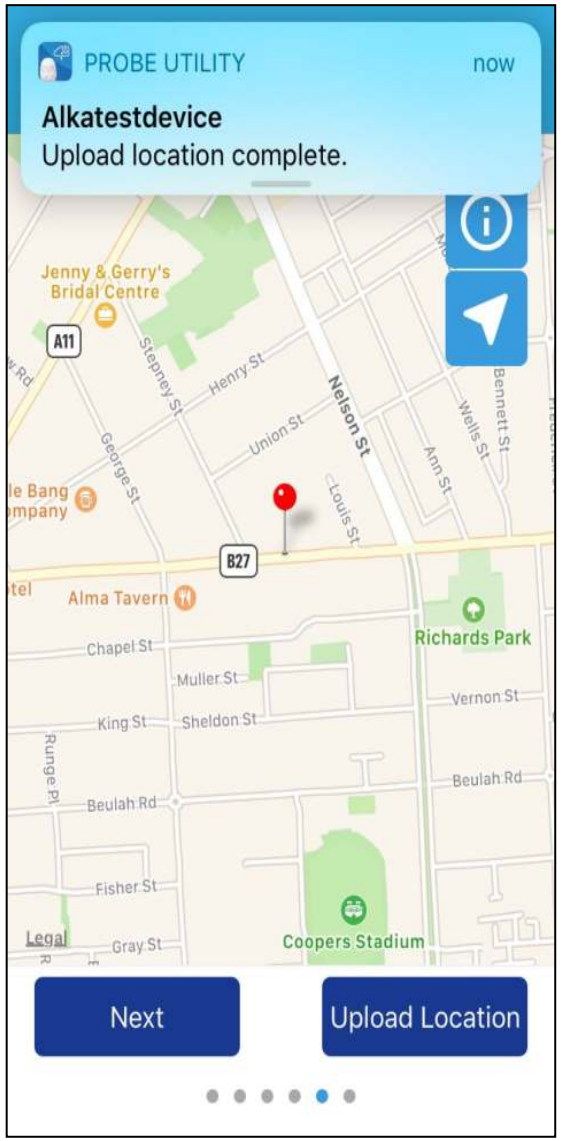
Upload Location



Tap to enter your IrriMAX Live account login details.

Tap to change the map view (Standard/Satellite)

Tap to recenter the position.



This section provides information on how to upload your Probe's location directly to your IrriMAX Live account.

Enter IrriMAX Live account login details to upload the location.

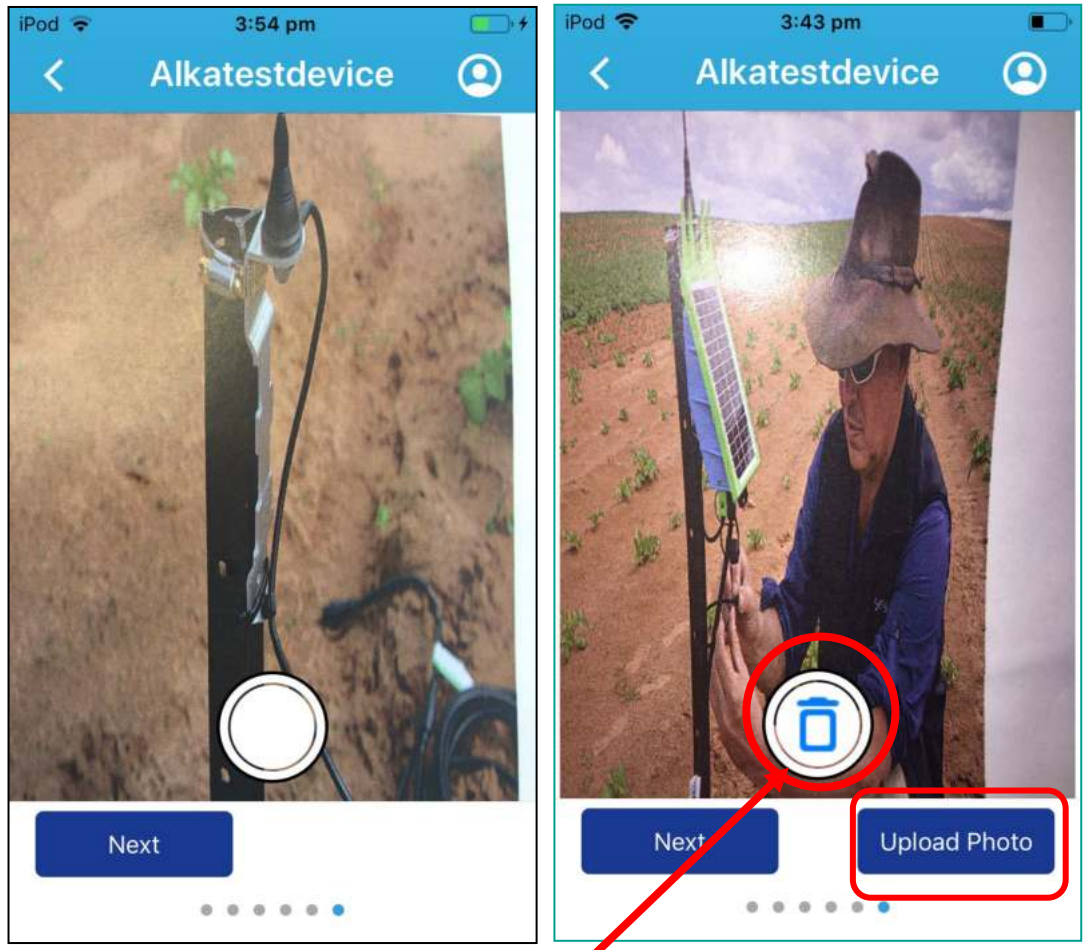
- Tap and hold the pin until you see it appear under your finger and drop it to your desired location.

Click **Upload Location** to upload the probe's location or skip to the next screen.

Once the location is successfully uploaded, you get a notification at the top of the screen.

Click **Next** to move to the next slide.

Upload Photo



This section provides information on directly uploading the photo into your IrriMAX Live Account.

You can follow these simple steps to upload a photo directly into your IrriMAX Live Account.

- Take a photo of the probe or location you want to upload using your mobile device's camera.
- Then, tap the Upload Photo button at your screen's bottom right.

Note: Once the database is created, the photo can be viewed on IrriMAX Live.

The photo will be added to your IrriMAX Live Account's database after the upload. You can then view the photo within the IrriMAX Live platform.

Discard Photo –If you are unhappy with the photo, click the **Discard Photo** icon to delete the image.

Upload Photo (continued)

The app displays a notification message when the photo has been uploaded.

Appendix A – Probe Utility App (Upload Signal)

RSSI (Received signal strength indicator)	Condition
No Signal	
0 Bars	
1 Bar	
2 Bars	
3 Bars	
4 Bars	

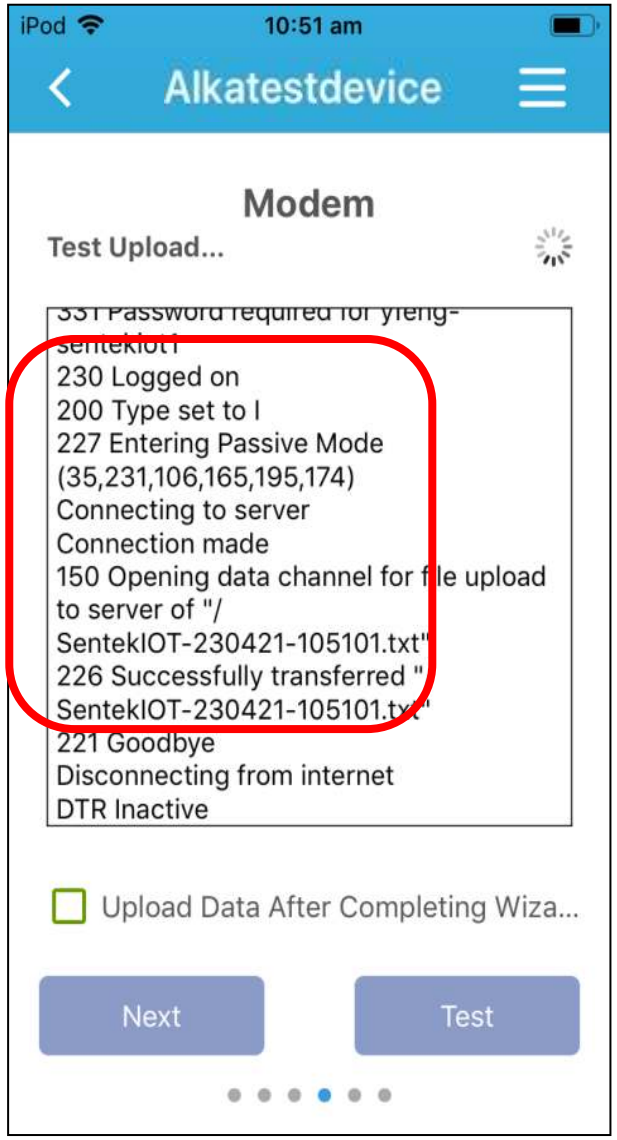
The Probe Utility App identifies the modem's upload signal in the DTU.

- If you receive 2 bars or more, the signal quality is considered good.
- If you receive only 1 bar, it indicates a weak signal. Despite the weak signal, the Data Terminal Unit (DTU) will still attempt to upload data, but there may be occasional failures in the upload process.

Modem last upload response code

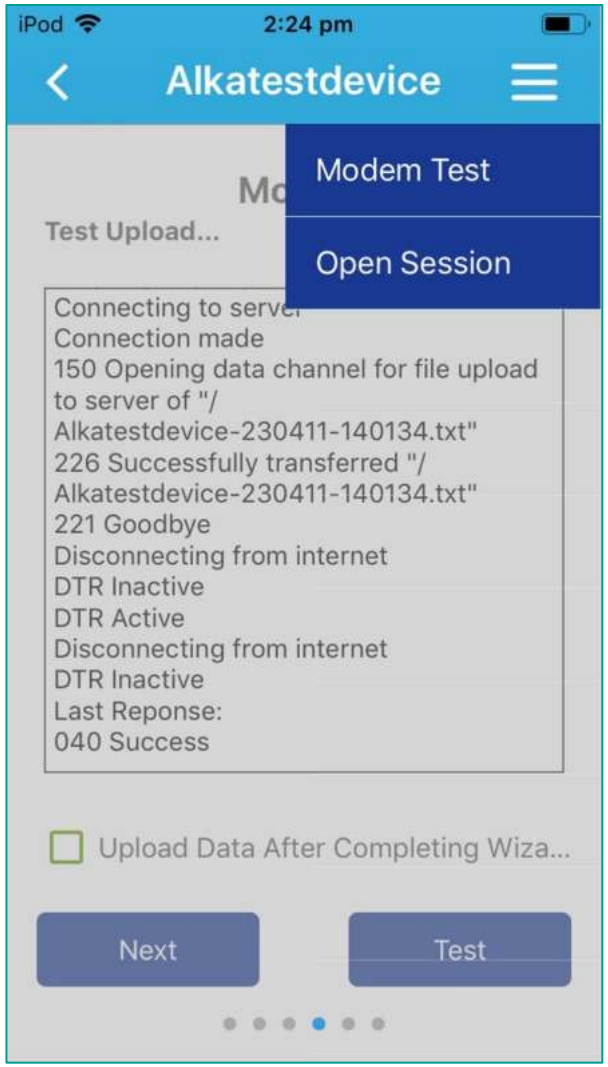
Last response	Description
040-049	**Success**
041	**No Data**
042	**Upload Cancelled by User**
050-079	**Failure**
080	**Modem In Use**
081-082	**Uploading**
083-099	**Failure**
000-039	**Check**
199	**Initialising** (Shown upon first power on, before and while Sentek IoT communicates with probe).
198	No Probe Found (**Shown in Grey**) After initialisation if no probe was found.

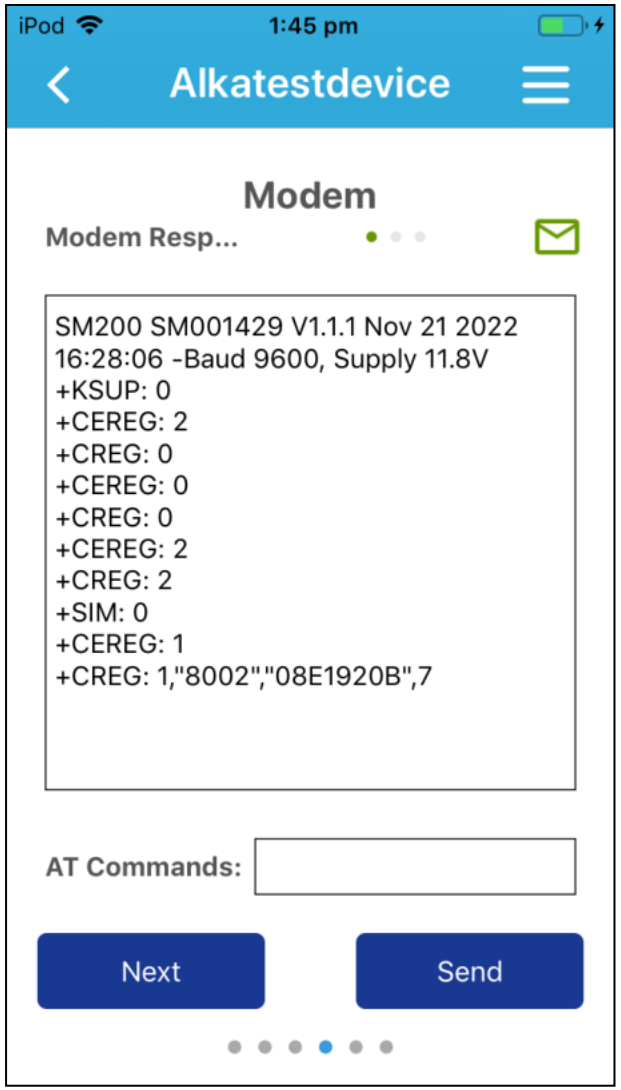
Server Upload Codes (FTP server)



Upload Code	Description
230	User logged in, proceed.
200	The requested action has been successfully completed.
227	Entering Passive Mode
150	File status okay; about to open data connection.
226	Closing data connection. Requested file action successful.
221	Service closing control connection. GoodBye
220	Welcome to IrriMAX Live

Modem

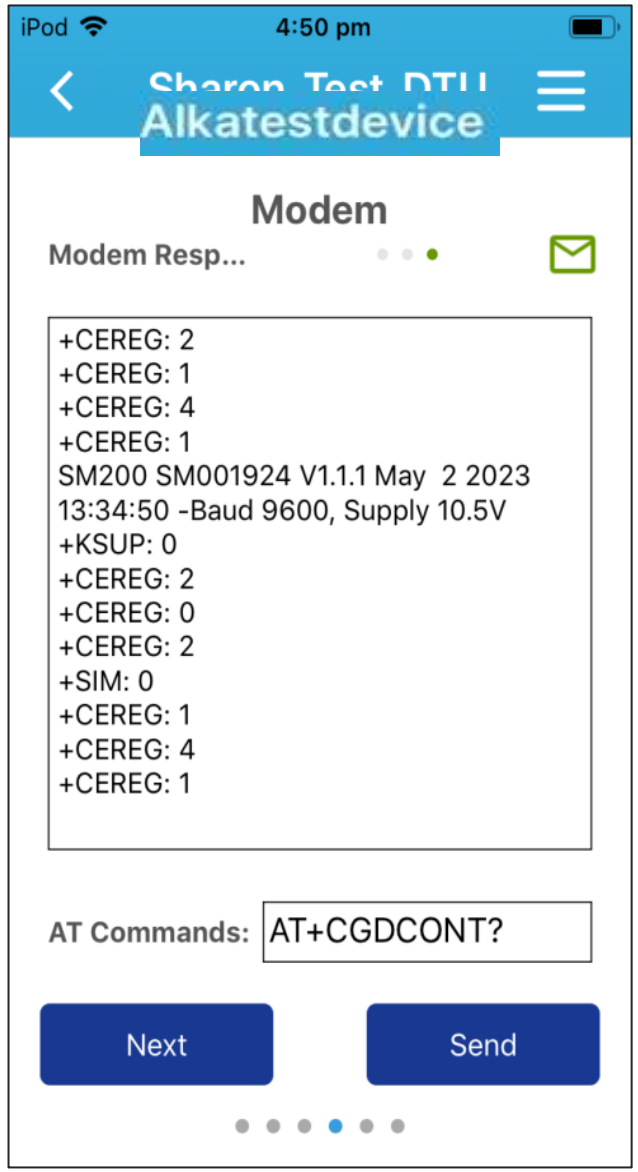


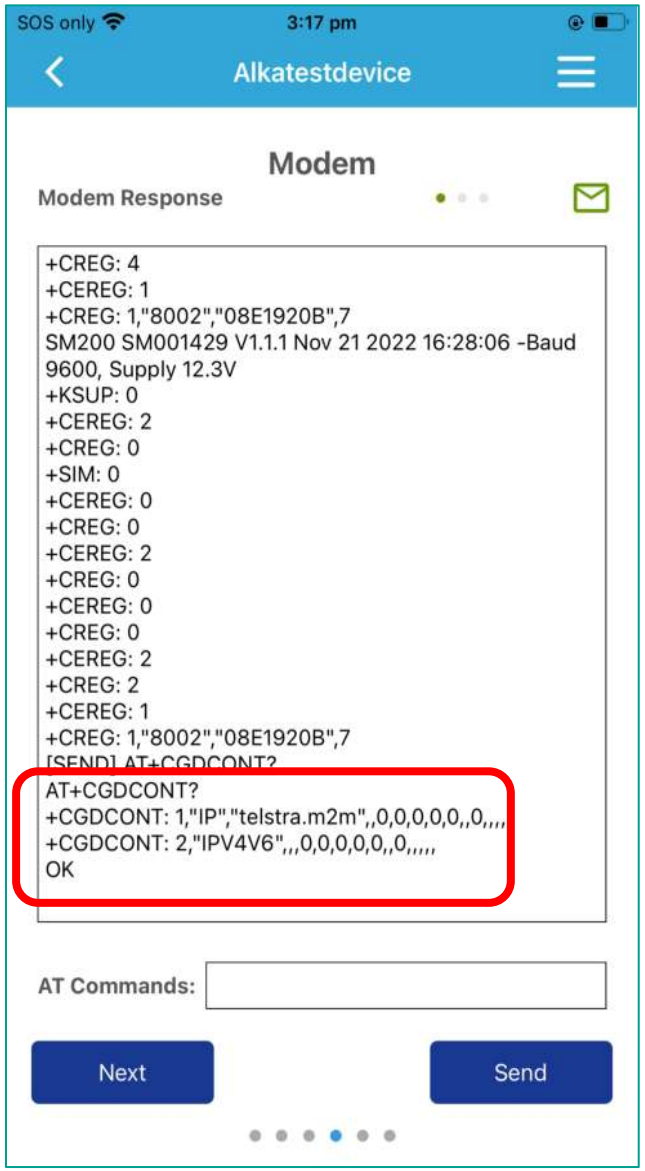


Open session - This turns the modem on and allows the sending of AT commands to the modem.

Modem Test – This option returns to the Modem Test mode allowing for a Test upload to be initiated.

Querying the APN in the Sentek IoT





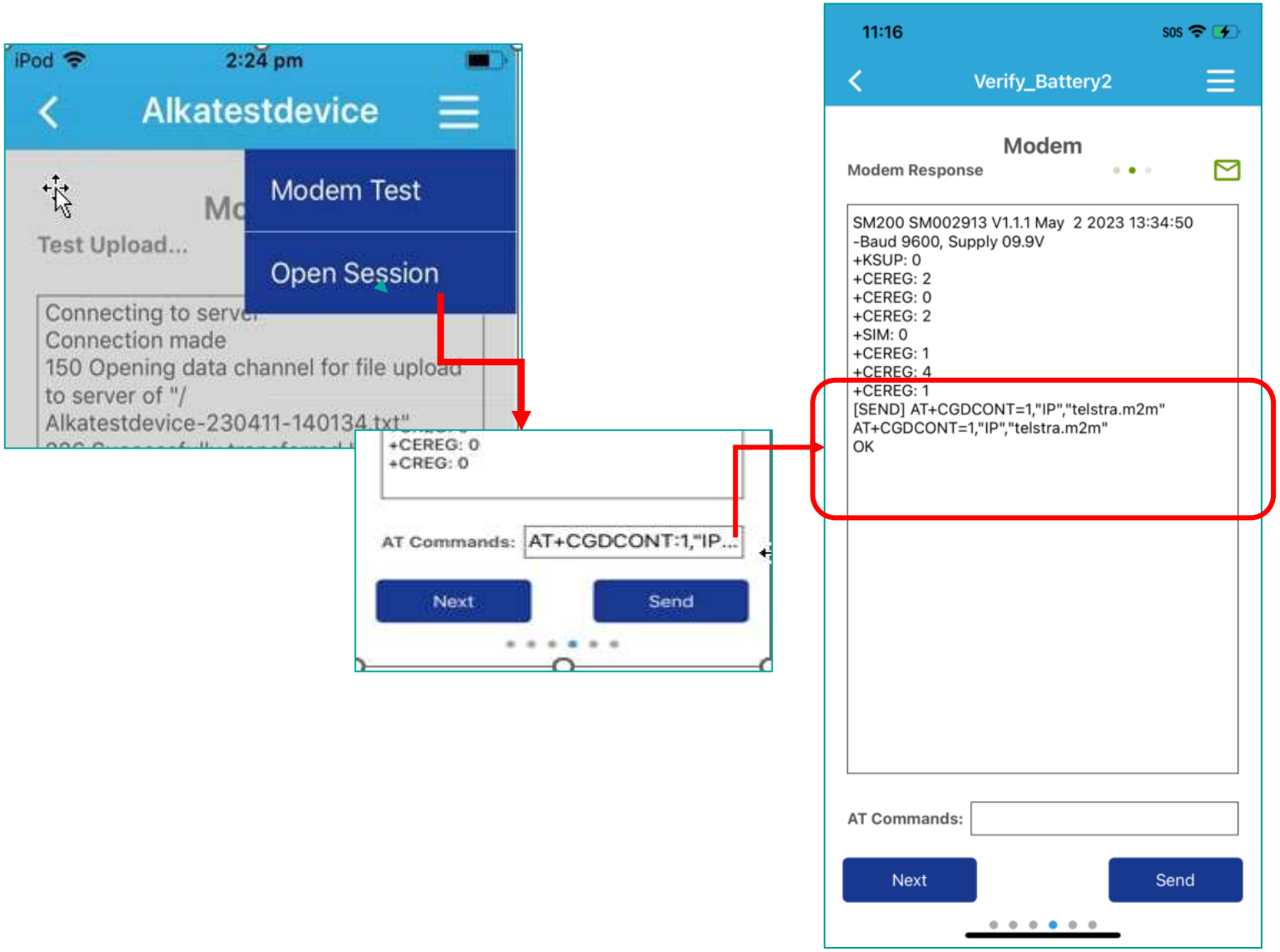
AT Command for Writing APN

Used to query the APN currently set in the modem. The response should be in the form

AT+CGDCONT?

+CGDCONT:1, "IP","<APN>"

Setting APN via the Probe Utility App's Open Session



The Probe Utility App allows you to conveniently set an Access Point Name (APN) using the "**Open Session**" feature. This feature enables you to turn on the modem and send AT commands directly to the modem for configuration.

Step 1: Accessing Open Session

1.Launch the Probe Utility App on your device.
2.Navigate to Modem Tab.
3.Navigate to the "Open Session"

Step 2: Sending AT Commands

1.In the "Open Session" interface, locate the AT Commands input box.
2.Enter the specific AT command to set the desired APN. In this example, **telstra.m2m** is the APN for the cellular service provider "M2M One**.**
3.Click the "**Send**" button to execute the AT command.

Note: Suggest mentioning the AT commands can only be sent after +KSUP: X message is received.

Step 3: Verifying APN Configuration

1.Once you have sent the AT command, verify that the APN has been correctly set.
2.You can check the APN settings on your device to ensure they match the configuration.

Connecting all the Equipment

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Connect the Cable to the Probe and the new Sentek IoT

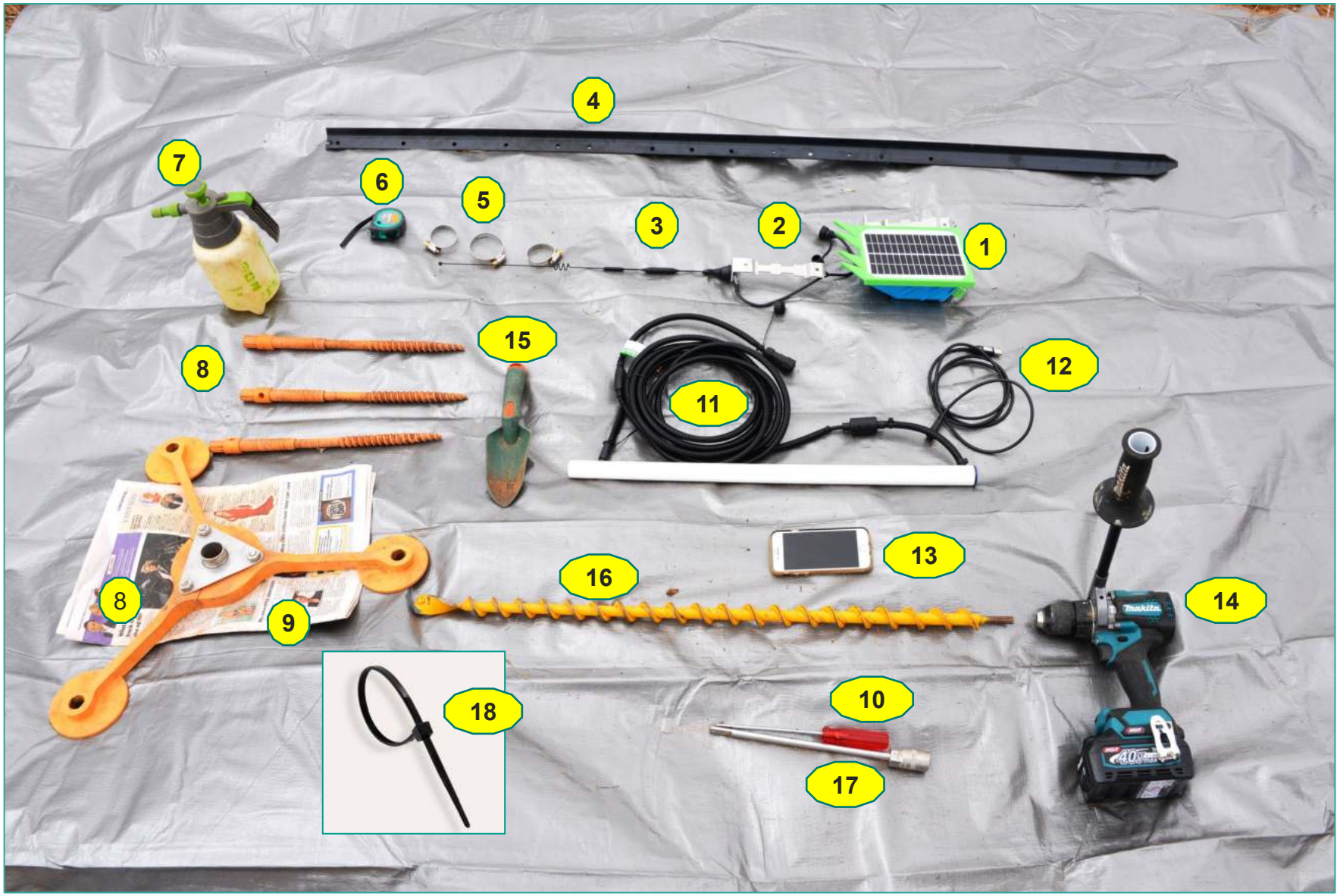
Drill & Drop Probe

iPhone with **Probe Utility** App installed

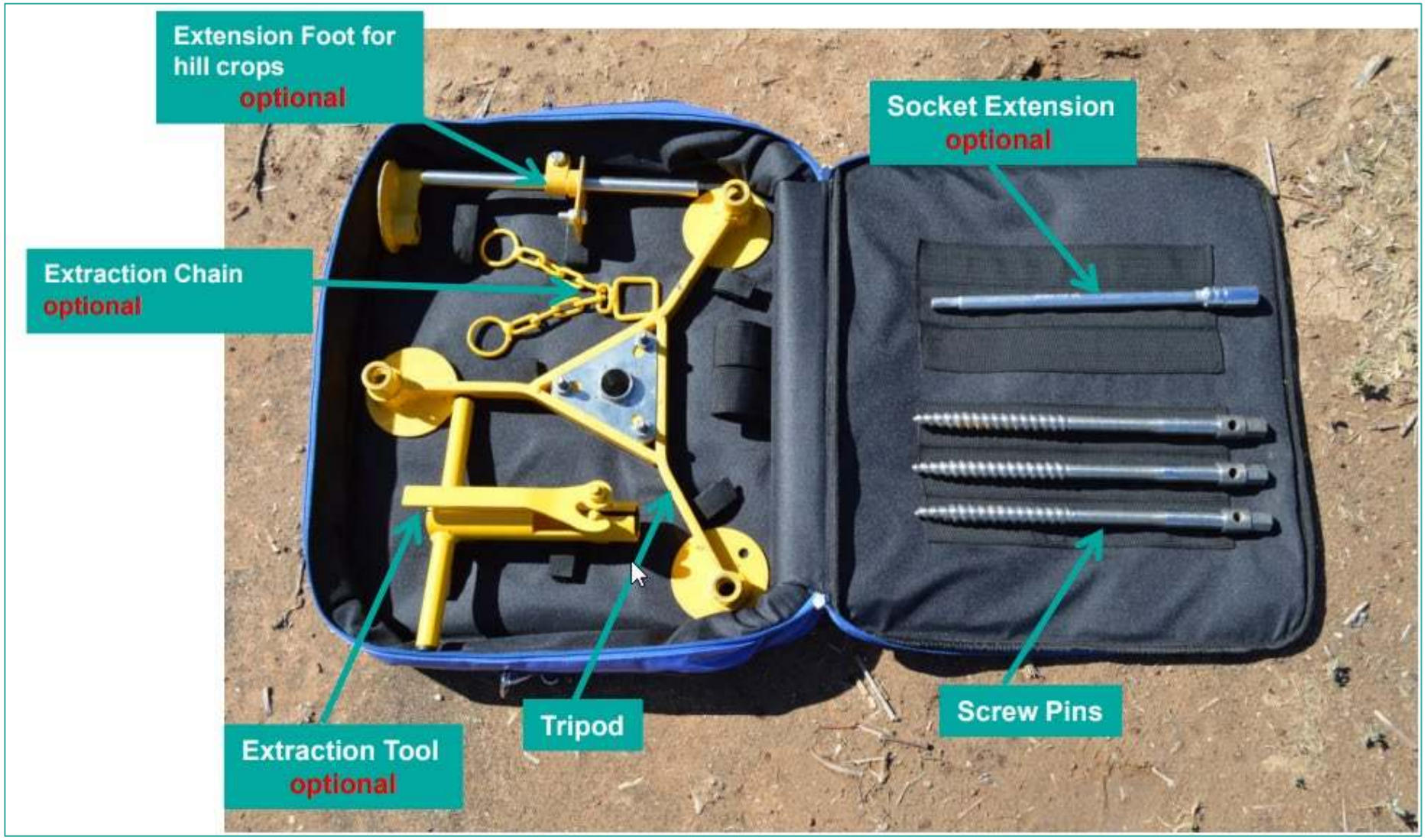
Sentek IoT with External Antenna

Installation Tools for Sentek IoT

1. Sentek IoT
2. Mounting Bracket
3. High Gain Antenna
4. Star Dropper
5. Hose Clamp
6. Measuring tape
7. Pressurised Water Bottle
8. Tripod with Screw Pins
9. Newspaper
10. Screwdriver
11. Drill & Drop Probe
12. USB Cable
13. iPhone
14. Battery Drill
15. Trowel
16. Tapered Auger
17. Socket for Screw Pins
18. Cable Ties



Tool Kit


Extension Foot for hill crops
optional
Socket Extension
optional
Extraction Chain
optional
Extraction Tool
optional
Tripod
Screw Pins

High-gain antenna and cable

A high-gain antenna excels in signal transmission, significantly enhancing crop monitoring capabilities in areas with limited connectivity.

Or

Elevating the entire DTU (including the antenna) can improve connectivity by achieving better signal reception.

Steps for European regions in case of using different cellular type

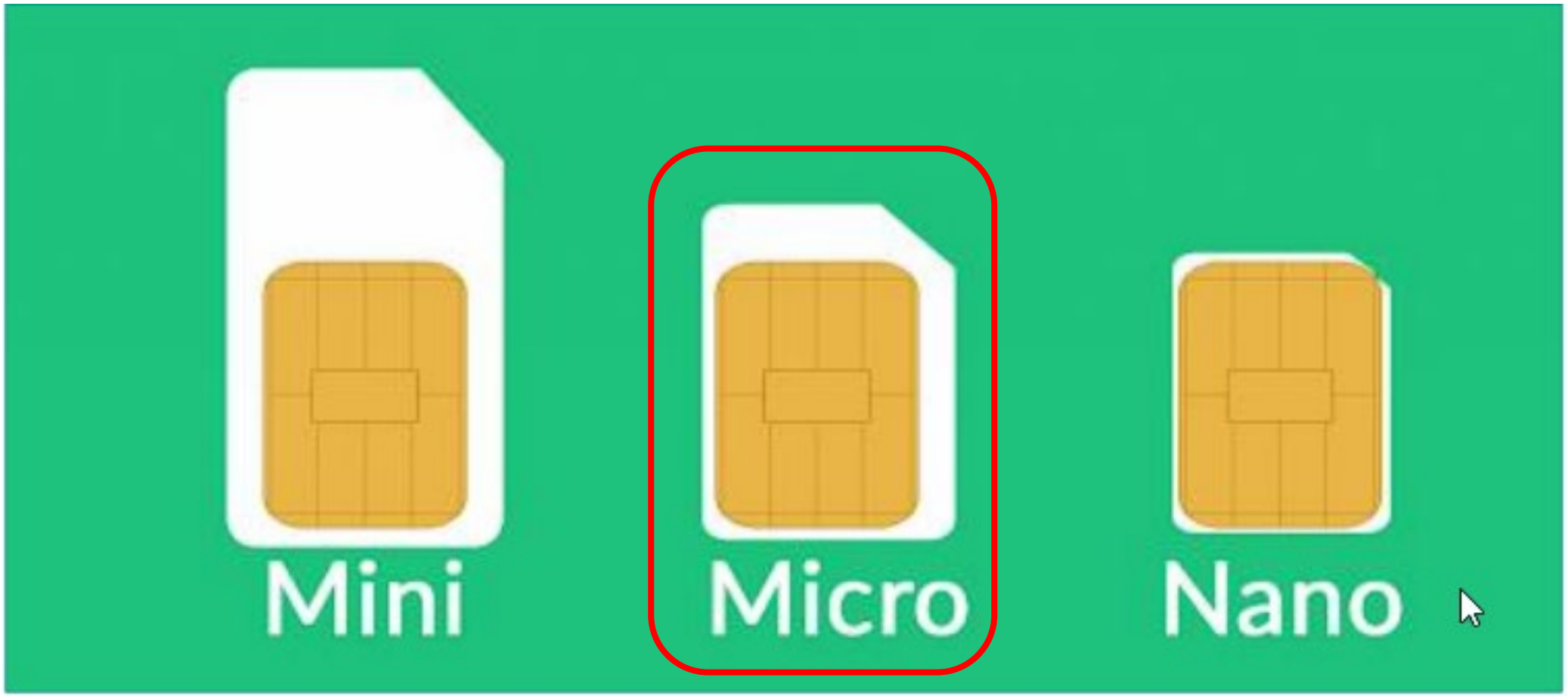
Insert SIM card into the SIM card holder

The chosen module is based on the network type as below ;

i) HL7800 – 4G AU and 4G US
ii) HL7802 – 2G and CAT-M (Europe)
iii) HL7650 – 3G and CAT-1 (Optus)

The modem comes with the module option marked.

SIM Card



Buy the right SIM card = 1 MB/month (recommended)
Use the right size SIM card(**Micro Sim**)

Field Installation

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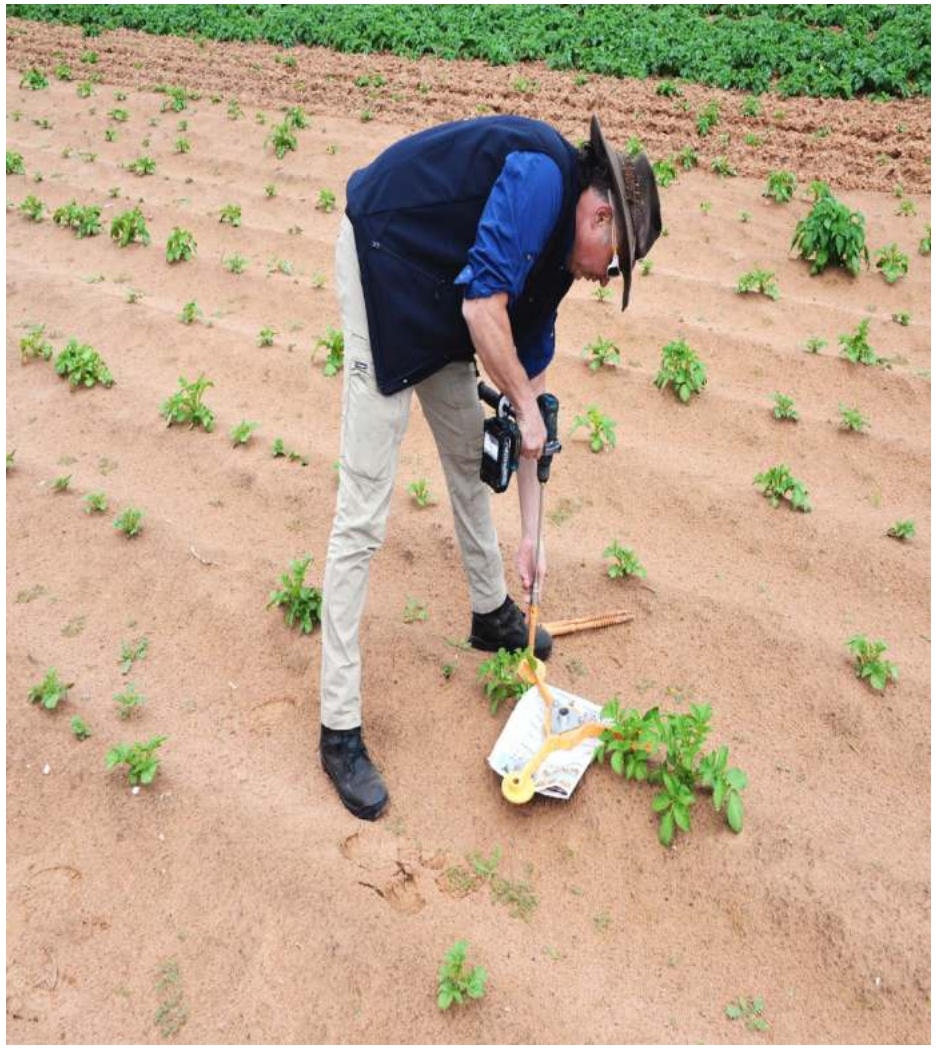
Tripod Installation



Place two sheets of newspaper beneath the Stabilisation Tripod. This allows easy removal of the augured soil later.

Ensure the tripod is accurately set up and centred over the designated installation site.

Quality of the Drilled Hole for Probe Insertion

Sentek Stabilisation Tripod is essential for achieving accurate readings with the tapered auger. Without using the tripod, there may be an air gap between the probe and the soil, leading to incorrect readings and inaccurate measurements of irrigation. Therefore, use the tripod to ensure the drilled hole's quality is good.

Preparation for Probe Installation.

- Insert the probe carefully into the hole, pushing it all the way down until the top of the probe is level with the soil surface.
- The first sensor will now be located at a 5cm depth.

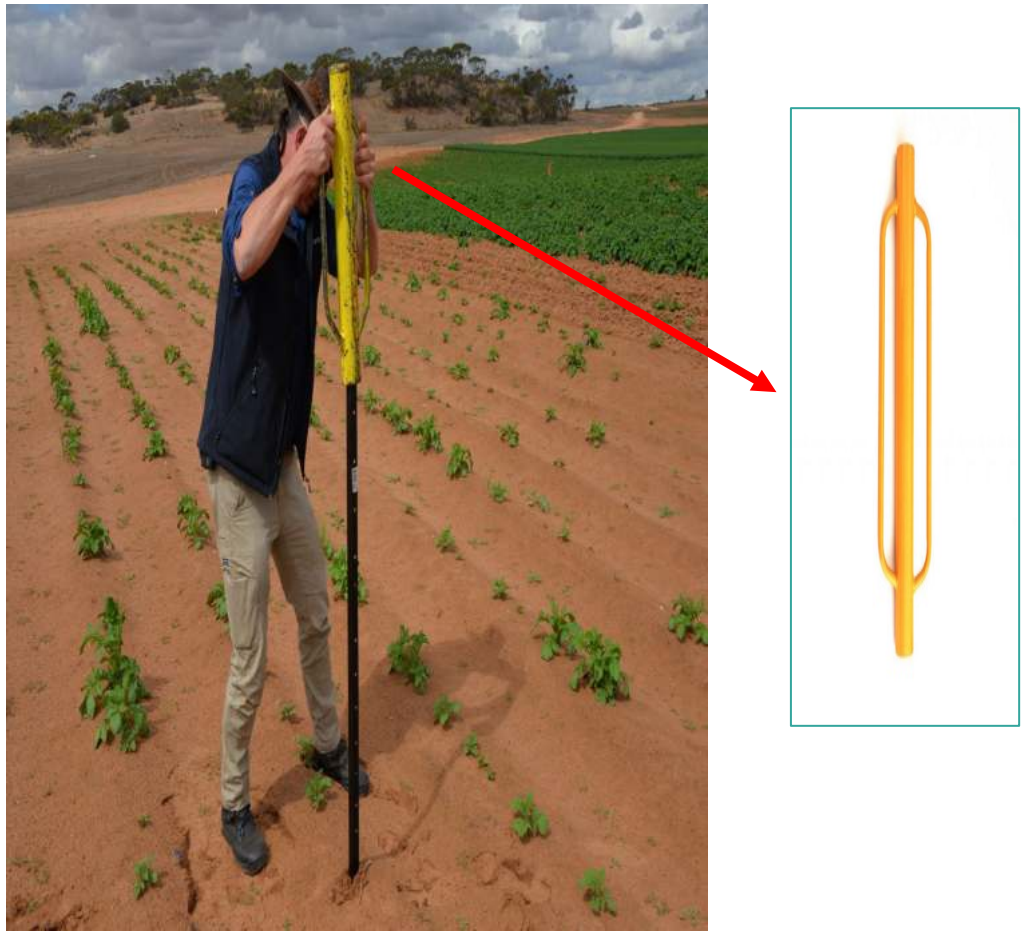
Probe Installation Completed

The (almost) completed installation of the probe should appear as follows: The probe must be in firm contact with the soil, and you should not be able to push it further by hand.

Note: Please ensure that the channel for the cable is filled with soil.

Installing the Star Dropper

Place Star Dropper on the ground about 1-2 meters from Probe.



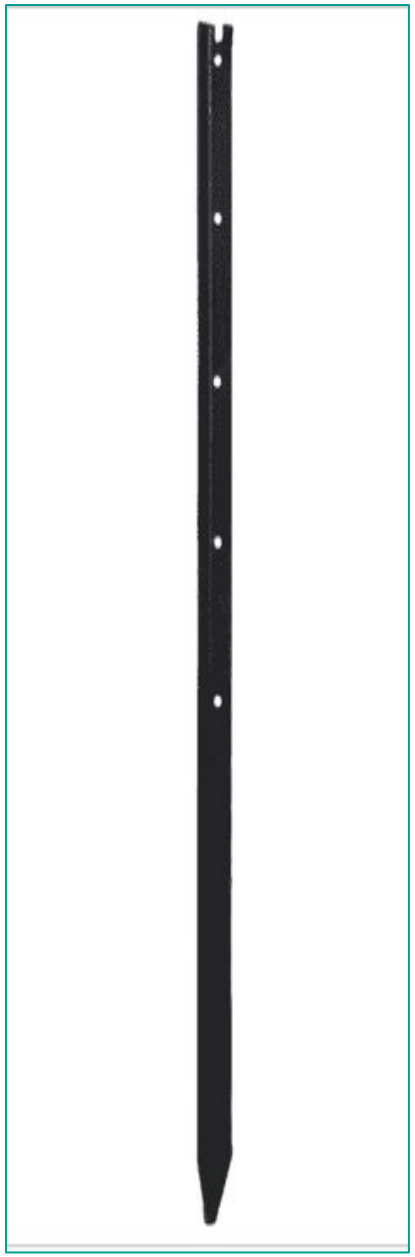
Use the Rammer to install the star dropper in the ground.
Important - A minimum height recommended for the star dropper must be **1- 2 m** above the ground.

Measuring the height of the star dropper

Ensure the star dropper is centerer and aligned straight.

Use a level to ensure the pole is perfectly vertical and positioned at a recommended height of **1 meter** above the ground.

Recommended Installation



Star Dropper

Aluminium Pole

Solar Panel

North-facing panels provide the highest energy output in the southern hemisphere due to the abundance of sunlight directed from the north. Conversely, south-facing panels are preferred in the northern hemisphere for the same reason.

The Sentek IoT has a fixed solar panel angle suitable for most mid to low latitudes. High latitudes should consider adjusting the angle for optimal performance.
Regularly inspect and ensure the solar panels are correctly oriented and angled. External factors like winds and birds can cause the panels to shift from their ideal position, decreasing efficiency.

Steps to Place New Sentek IoTon the Mounting Bracket

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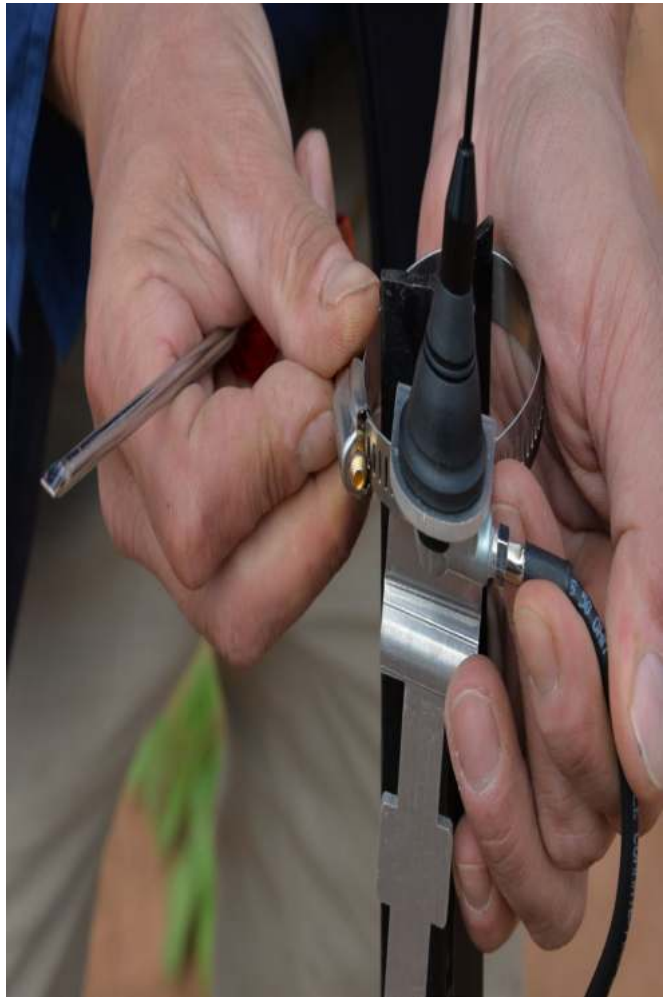
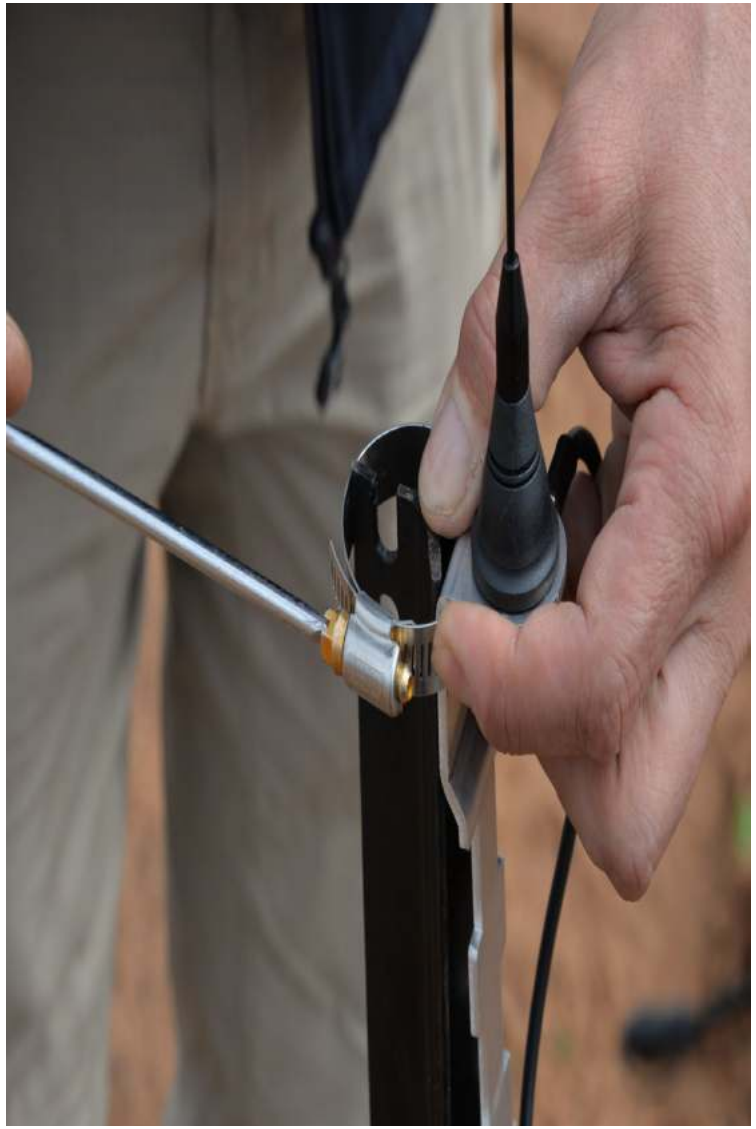
Installing the Mounting bracket and Hose clamp



- Place the mounting bracket on the star dropper base.
- Determine where to tie the Sentek IoTat a minimum height of 1 m off the ground.
- Use a Hose clamp to fit the mounting bracket to the Star Dropper.

Installing the Mounting bracket and Hose clamp



Tighten the hose clamp via thumbscrews to secure the Sentek IoTposition using a screwdriver.

Secure the end of the bracket with a cable tie to the star dropper

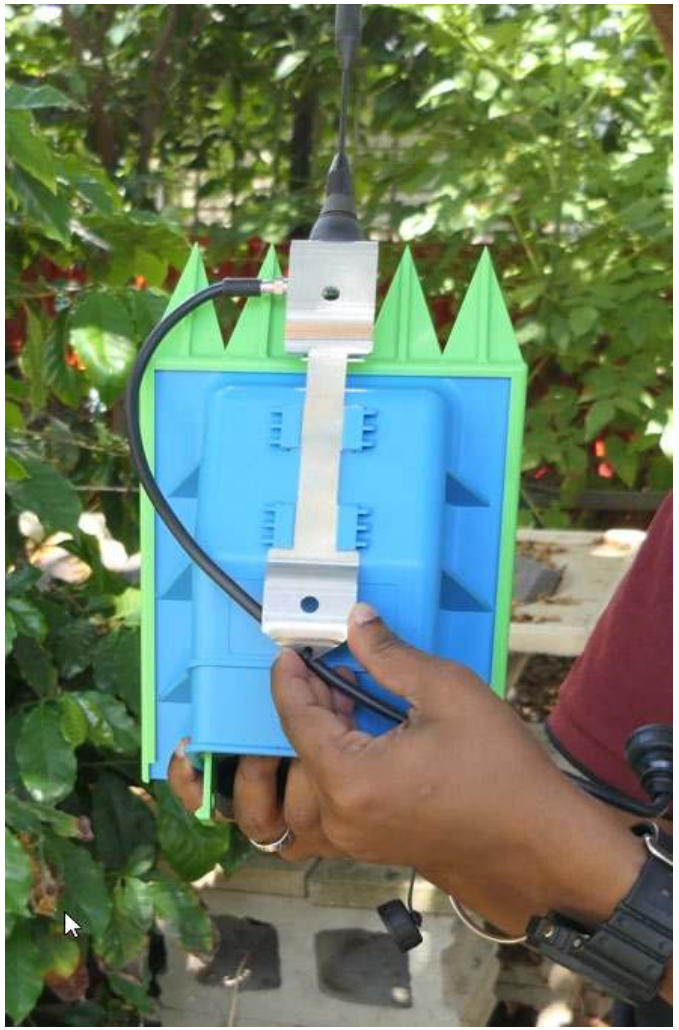
Plugging cables into the connector

If practical, mount and wire the Sentek IoThousing, solar panel and antenna onto the mounting bracket before field installation.

Plugging cables into the connector.

Drill & Drop probes with 14Pin connector (‘brickless’)

Placing the Sentek IoT on the mounting brackets



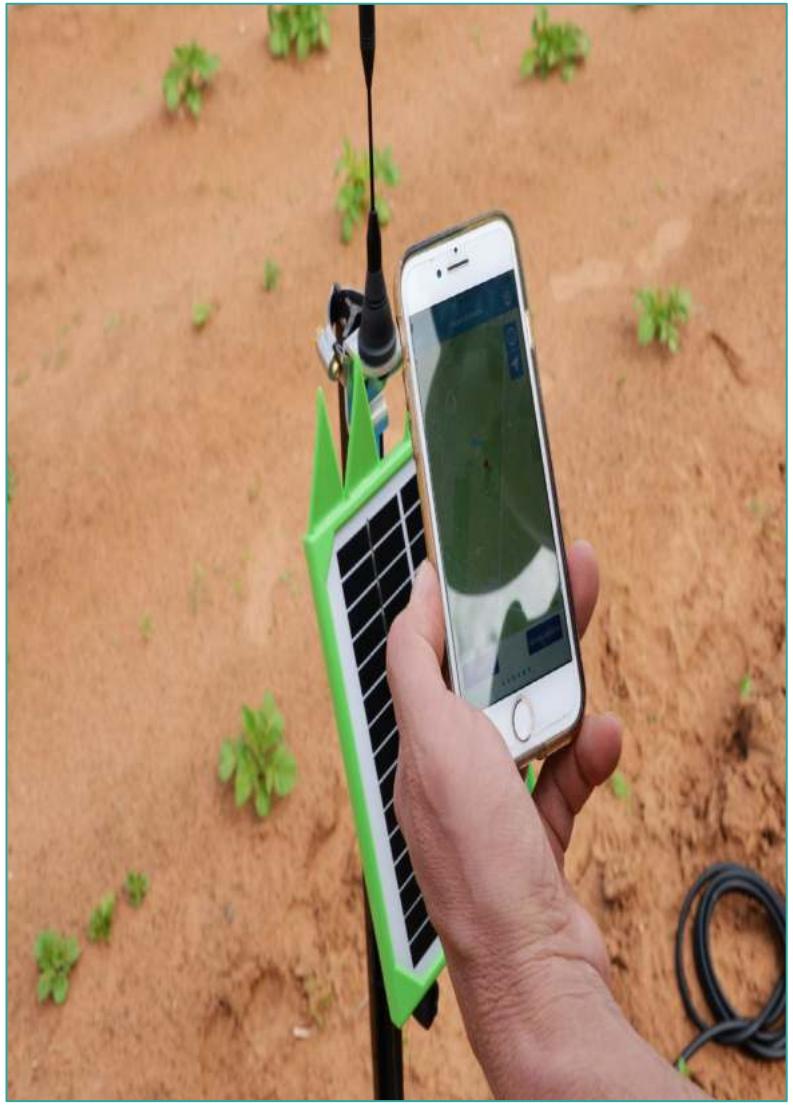
Fixing the mounting bracket on the star dropper is essential.

In our example, we used a hose clamp and cable ties to securely attach the mounting bracket to the star dropper. This made placing the Sentek IoT easier during installation.

Final Look

This is the Data Transmission Unit (housing containing modem, battery and solar charger board).
A check on the orientation and angle of the solar panel should be performed regularly. Winds, birds etc., can move the panel from its ideal position reducing its efficiency.

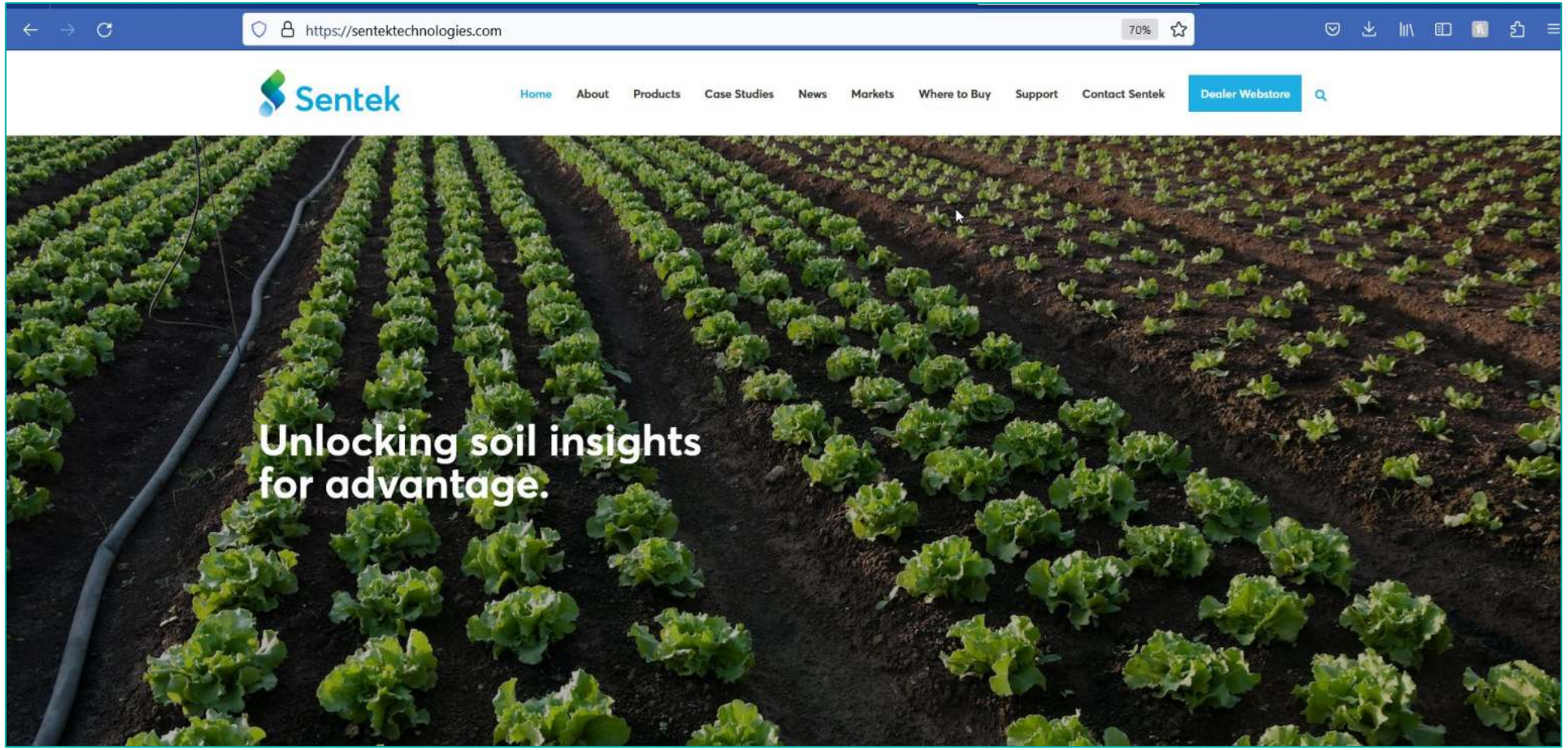
Getting Connected to the Application (Sentek Probe Utility)



Connecting with Pconfig

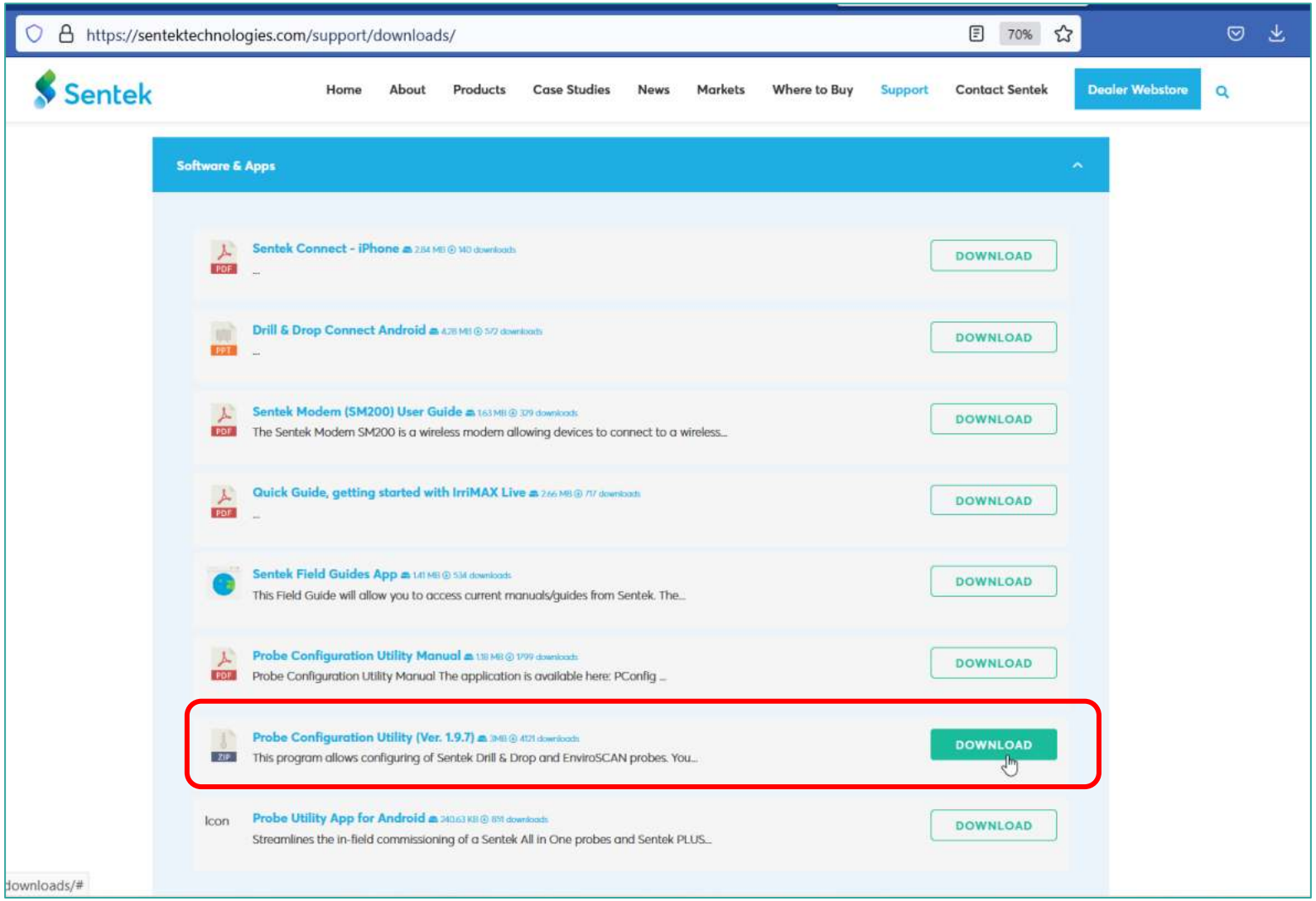
Sentek

Go to the Sentek Webpage



https://sentektechnologies.com/

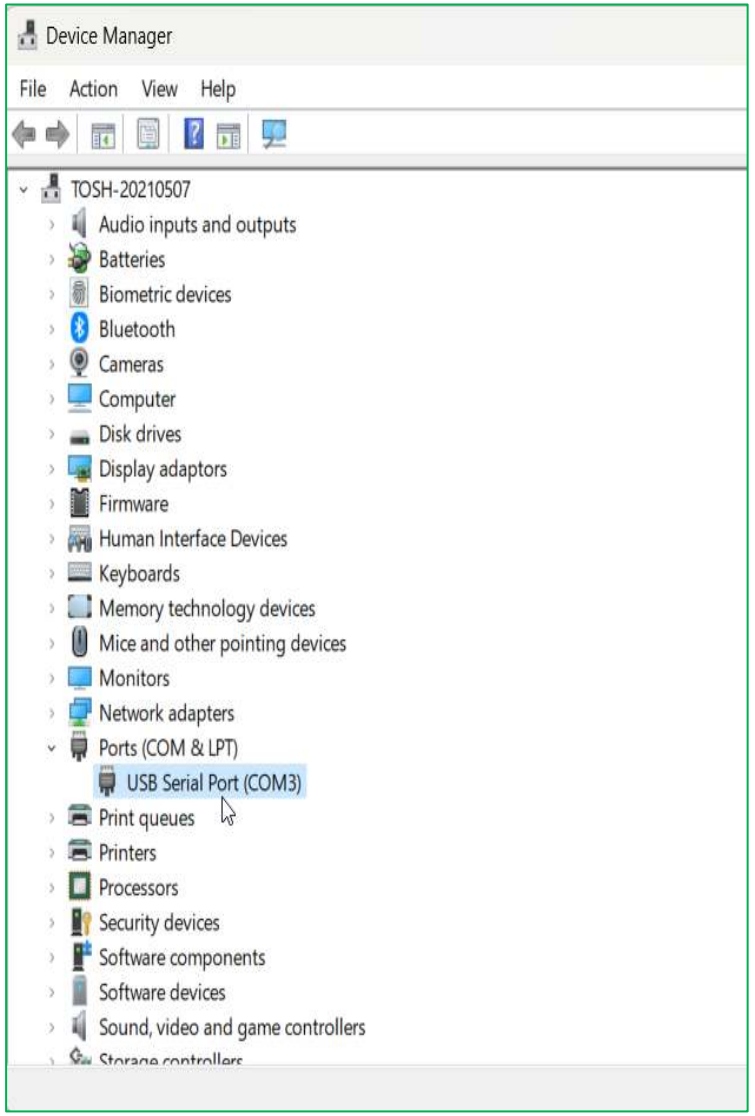
Download & Install the Probe Utility Software



Once downloaded and installed, the configuration software will appear on the desktop with the following icon.

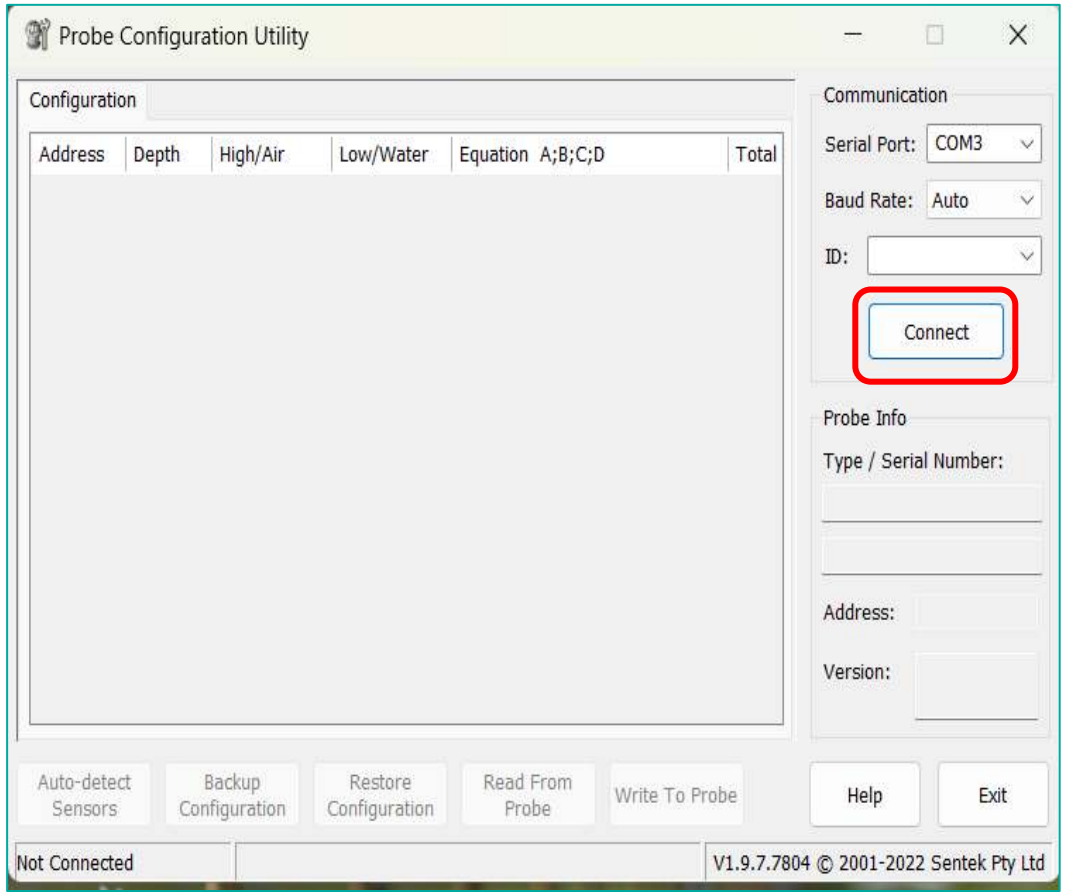
To identify the COM port on your Computer

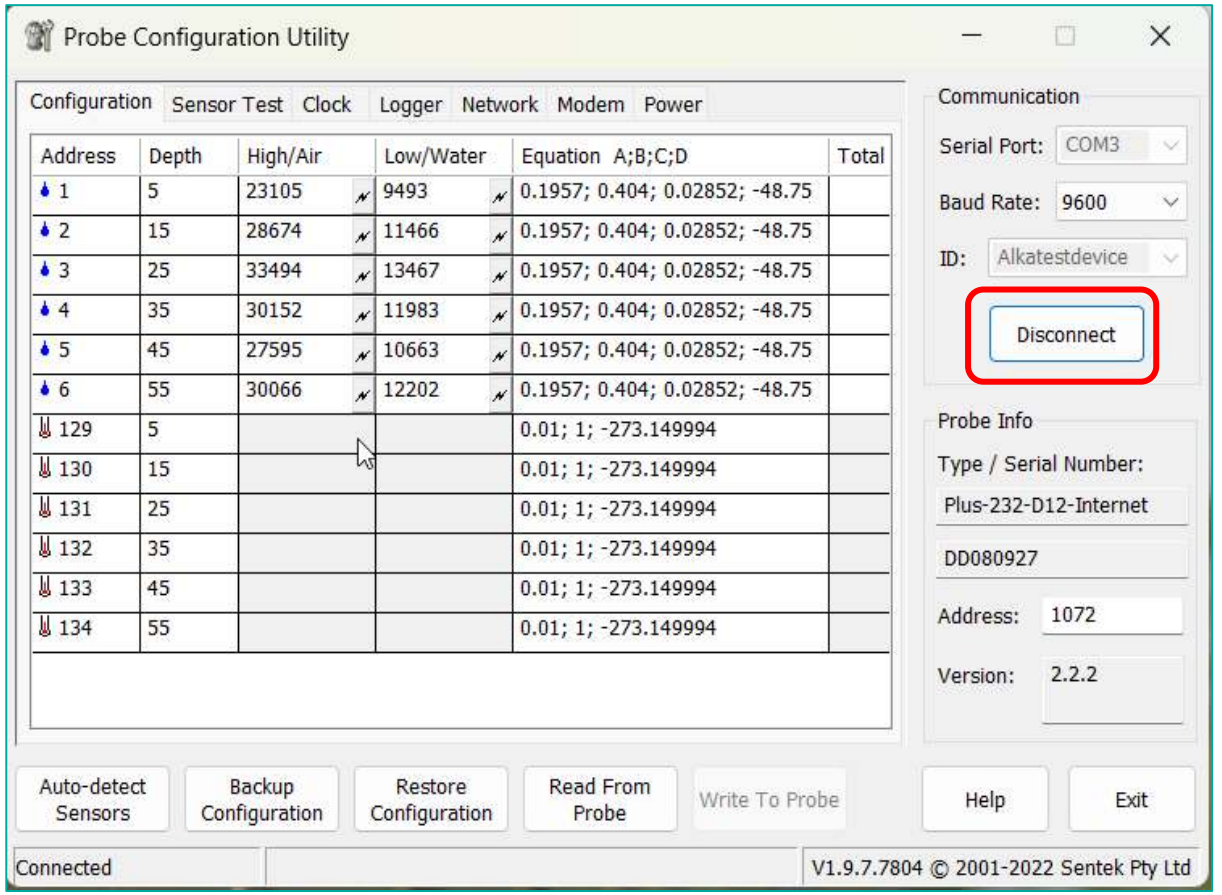
Right – Click on the **Windows logo** and select **Device Manager.**



To ensure the cable is connected to the computer and probe, Navigate to the **Device Manager** and locate it Under Ports (COM&LPT).

Main Probe Config



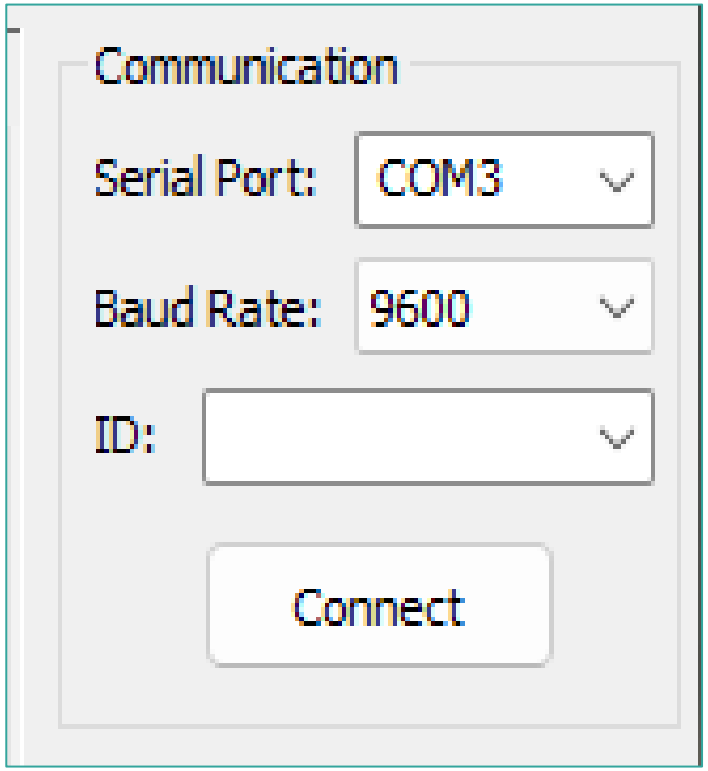


Once connected, this button will change to "Disconnect," enabling disconnection upon clicking.

This window comprises tabbed pages, the serial port communication controls group, the probe information group, buttons common to all areas, and the status line.

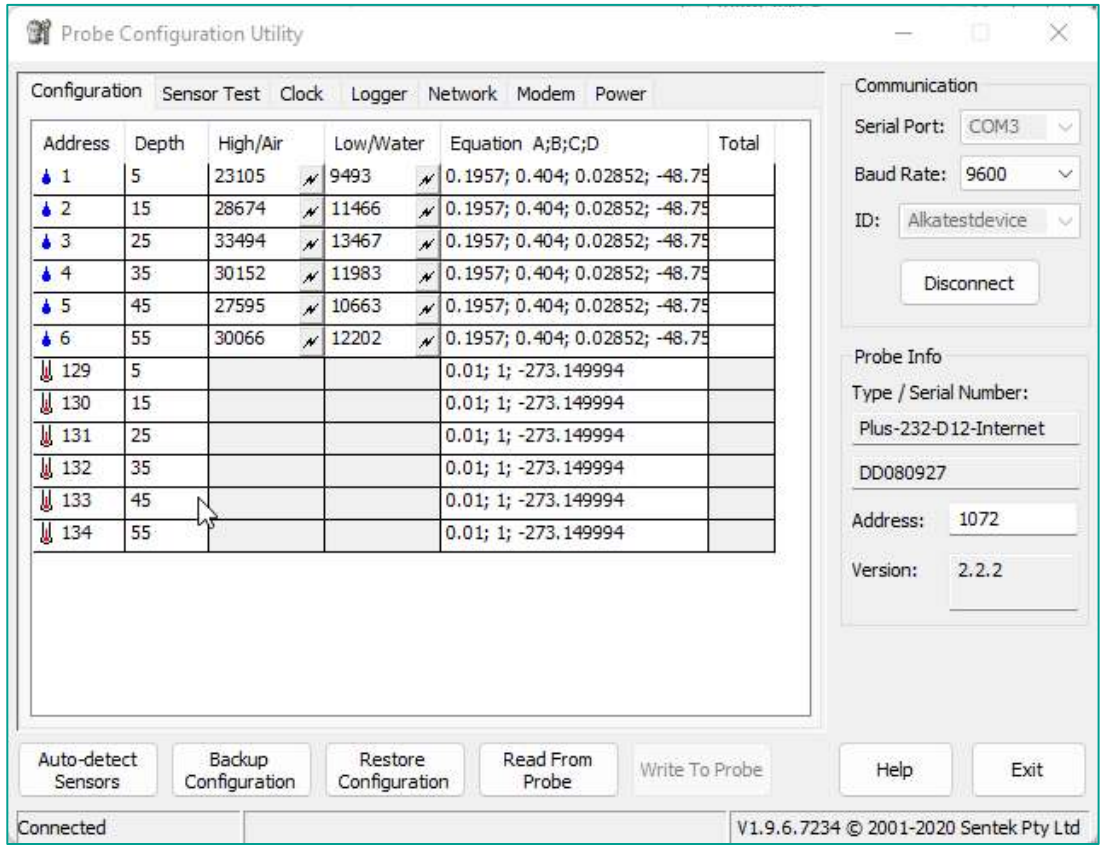
Tabbed pages are specific to each probe and display relevant information, such as the probe type, after the probe is connected.

Main Probe Config (Communication Group)



Value	Description
Serial Port	It displays a drop-down list of available serial ports. Type or select the one to which the probe is connected.
Baud Rate	It displays a drop-down list of available baud rates when connecting to the probe. The baud rate is the rate at which information is transferred in a communication channel. **Note**: We suggest using **Auto Baud** unless the baud rate is known to you. The typical baud rate should be 9600 to give the fastest connection and change to Auto if not working.
Connect /Disconnect	Clicking this button when not connected will attempt to establish communication with the probe at the specified Serial Port and Baud Rate. Once connected this button will change to "Disconnect" and allows disconnection when clicked.

Probe Configuration Utility - Configuration Tab



Address: Displays the sensor address for each sensor.

Depth : It provides the Depth of each sensor. This is value is provided by the user at the time of configuration.

High/Air : Displays the high/air counts of the sensor

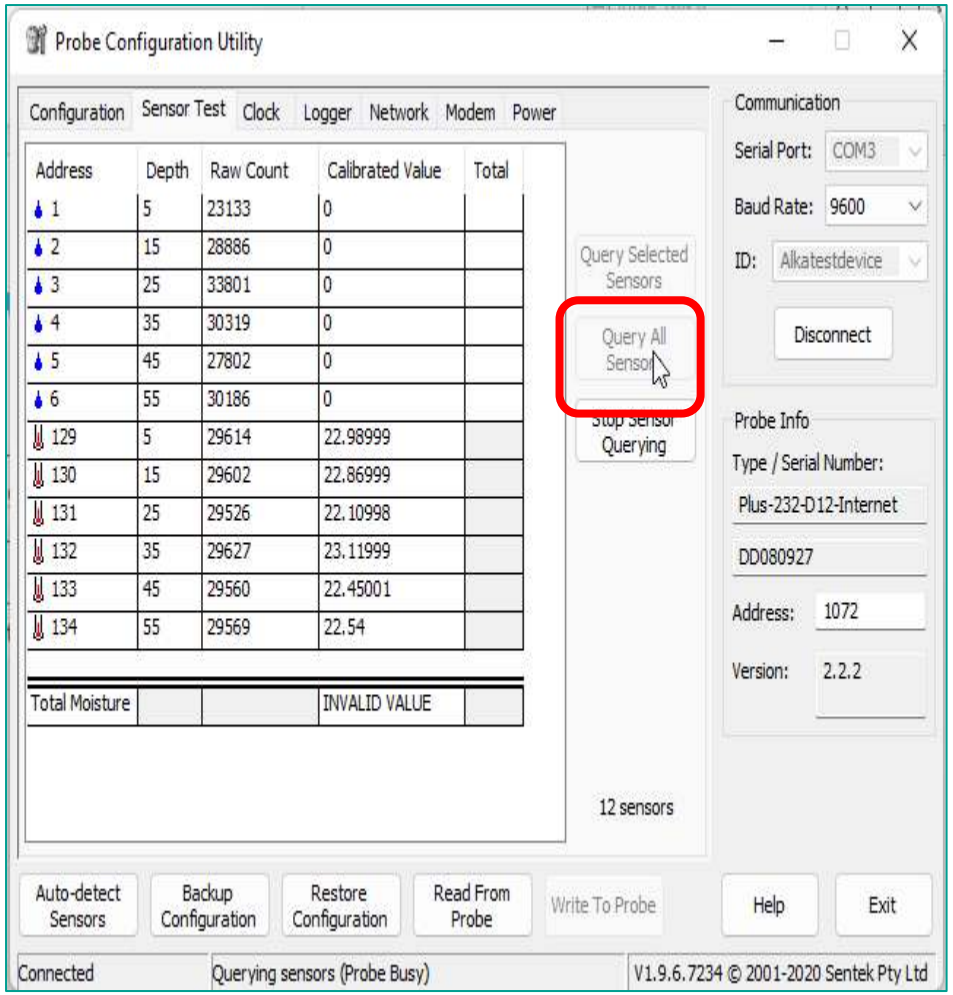
Low/Water : Displays the low counts of the sensors.

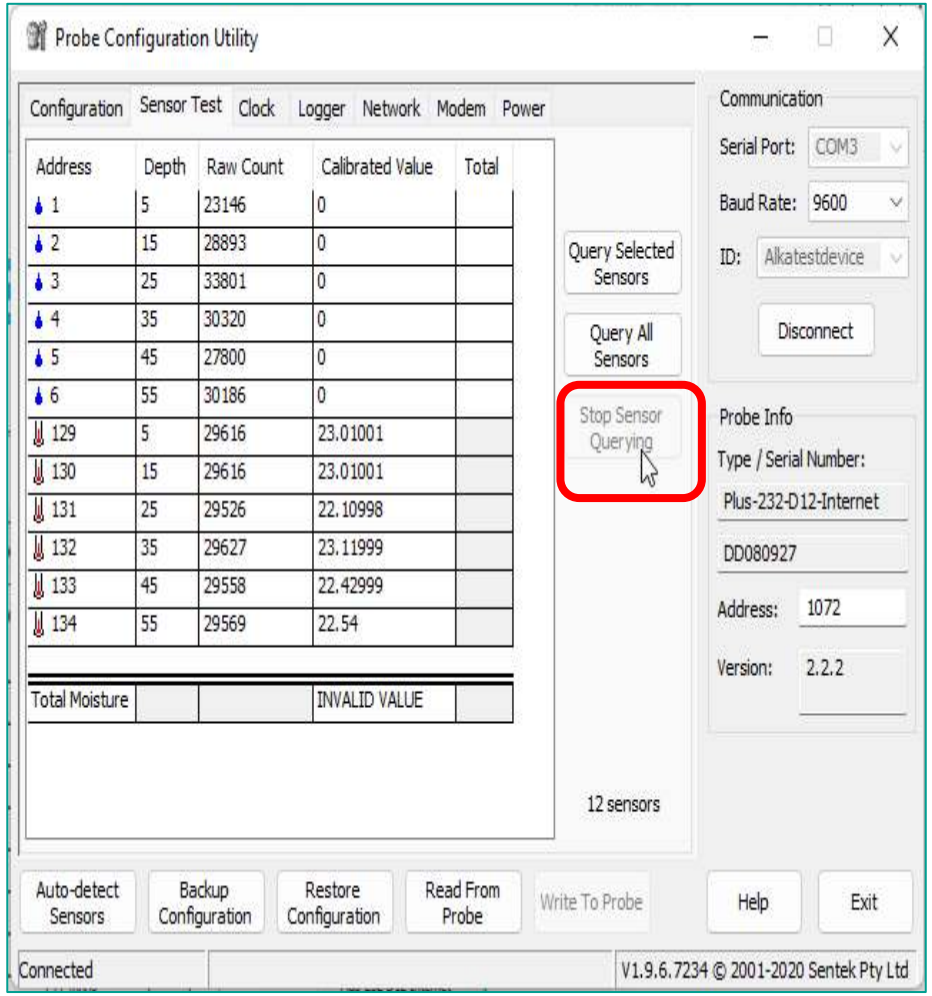
Equation A;B;C& D : It is the calibration equation. (It displays the coefficients for each sensor.)

The configuration page is for displaying and editing the sensor configuration.

Sensor Test

The two buttons, ‘Query Selected Sensors’ / ‘Query All Sensors’ and the button ‘Stop Sensor Querying’, start and stop sensor querying, respectively. During sensor querying, the raw count and moisture values are continuously retrieved from the probe and displayed in the list.

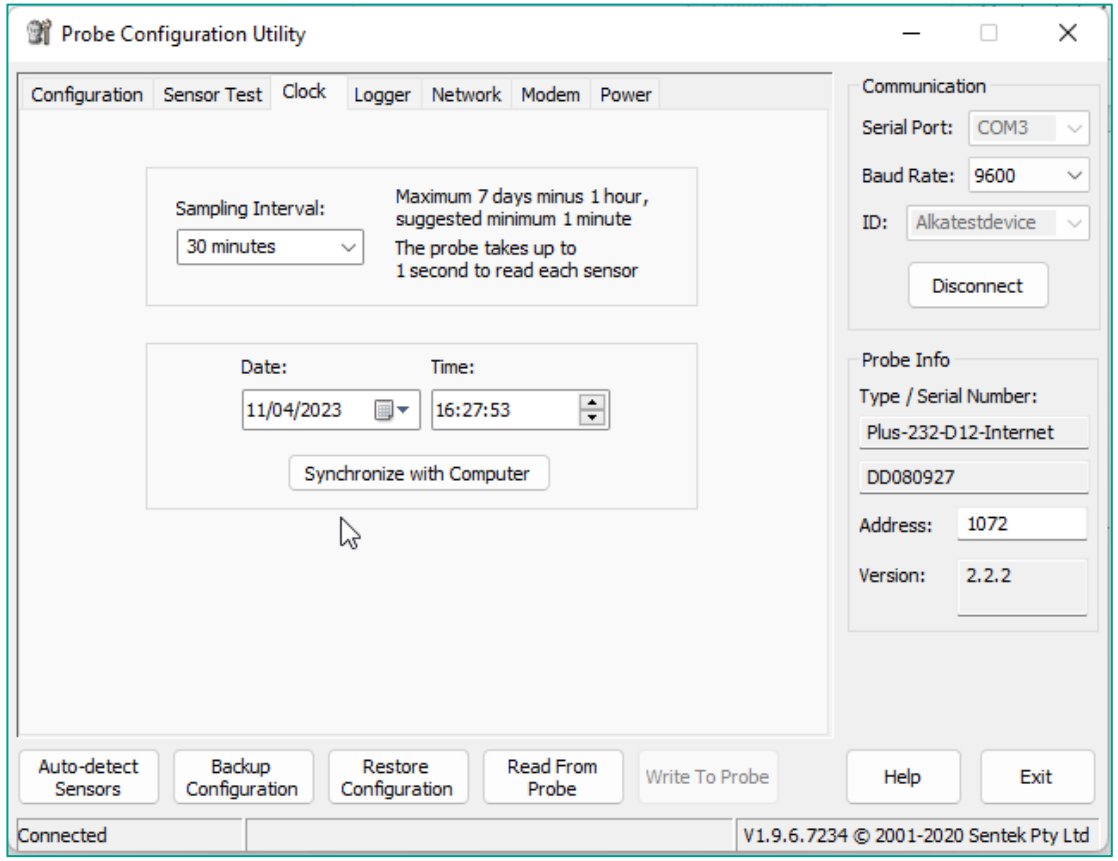




When calibrated value is “0” it indicates it is not installed in the water or soil. If it has not been placed in soil and water or just being in the air, there will be a difference in Calibrated Value. E.g.., left on a tabletop or floor.

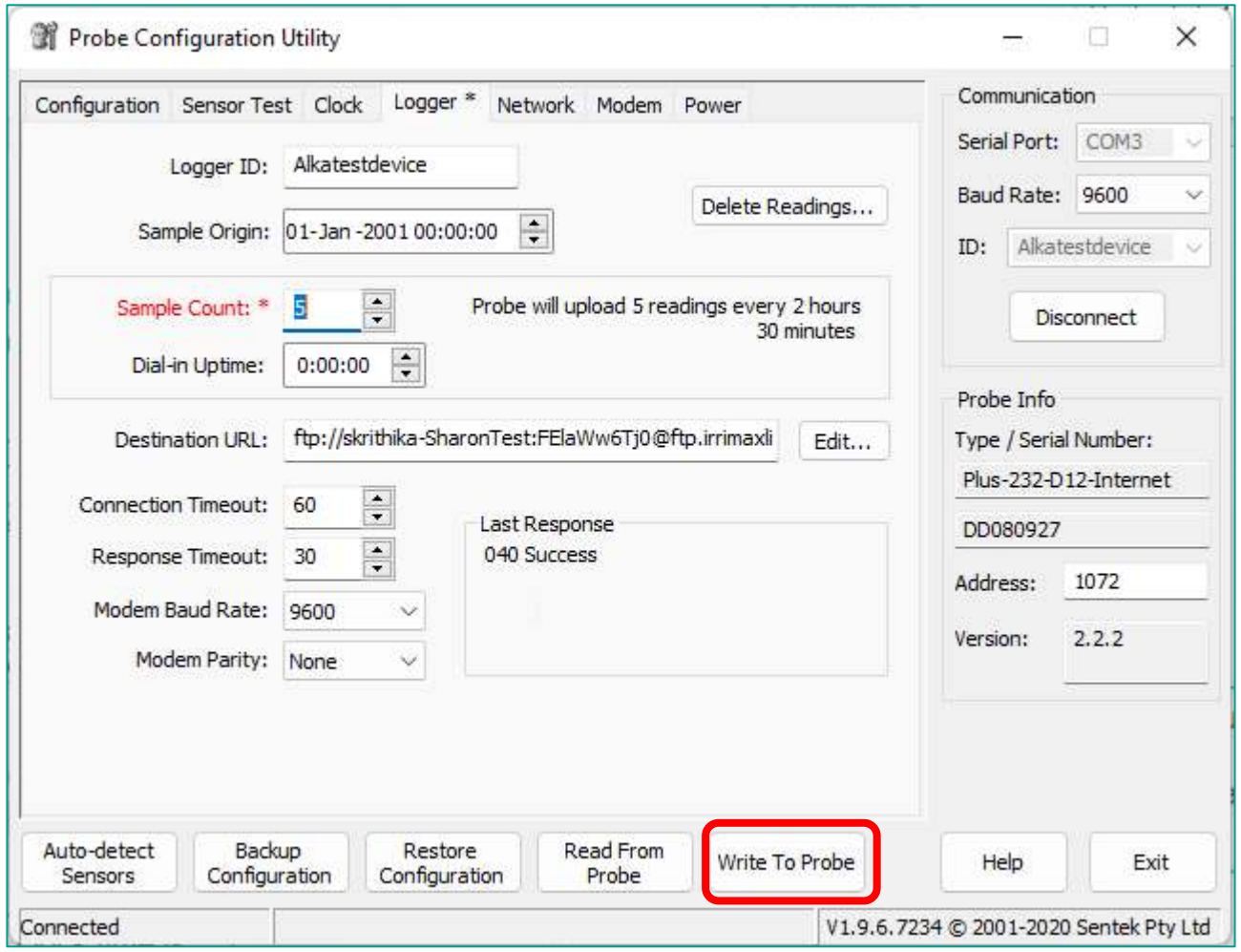
Clock Tab

The Clock page is for displaying and changing the probe's sampling interval and clock time.



- A Sample Interval can be set and then the probe will be scheduled to take readings at these regular intervals.
- Date/Time - Select the desired date and time or click "Synchronize with Computer" to use the current time from the computer's clock.

Logger Tab



This page displays when PConfig is connected to a probe with logging capabilities.

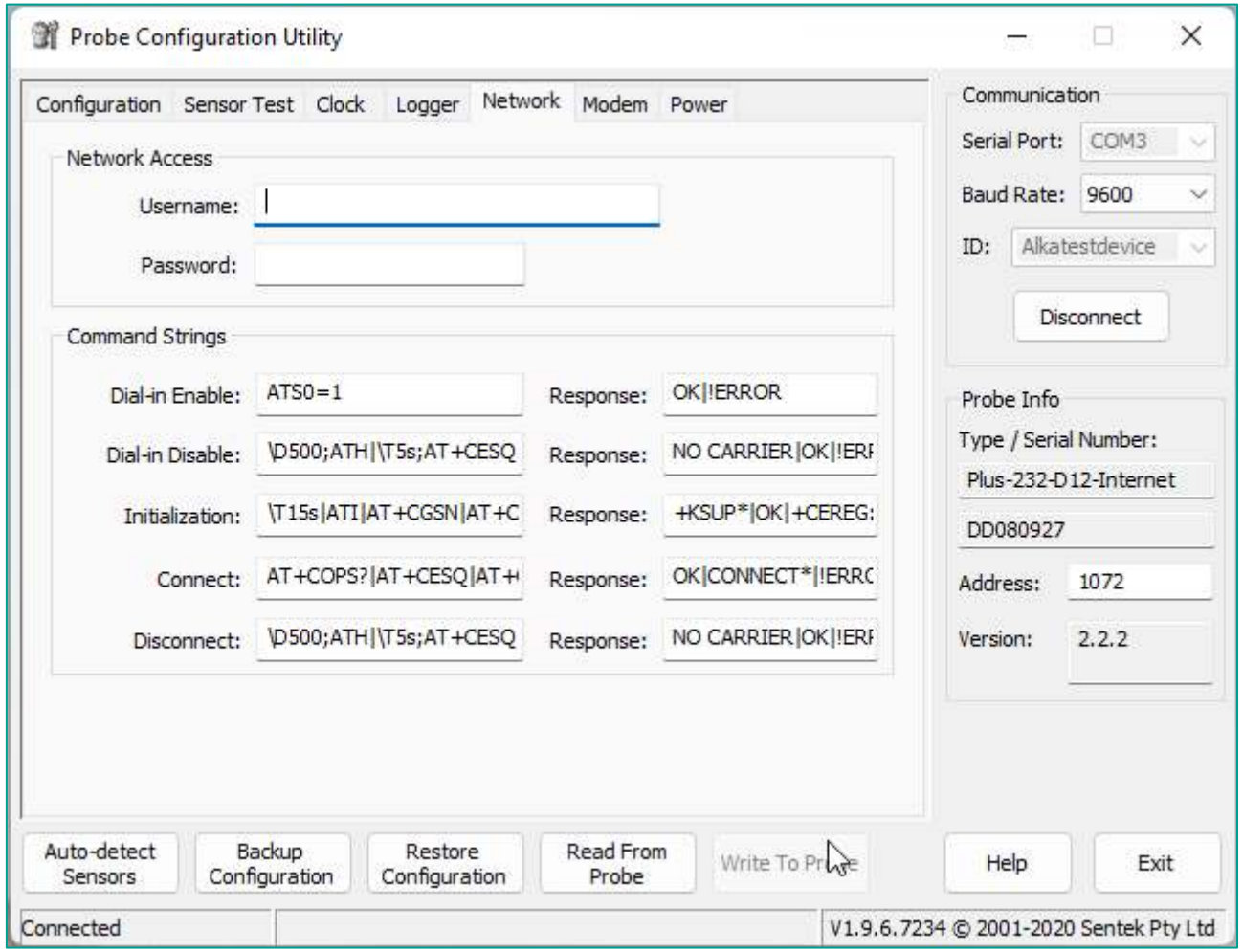
Logger ID - This name is used to supply the IrriMAX database Logger ID. The default is the probe's serial number. The logger ID can be up to 16 alpha-numeric characters and underscore. It cannot be blank.

Note: Taking a Backup Configuration of the previous crop is always recommended before making the changes.

Once the changes are made in any of the sections, ensure to save the changes. The new settings will not take effect until the "**Write to Probe"** button is pressed.

Also, the * asterisk indicates there is a change in the section.

Network Tab

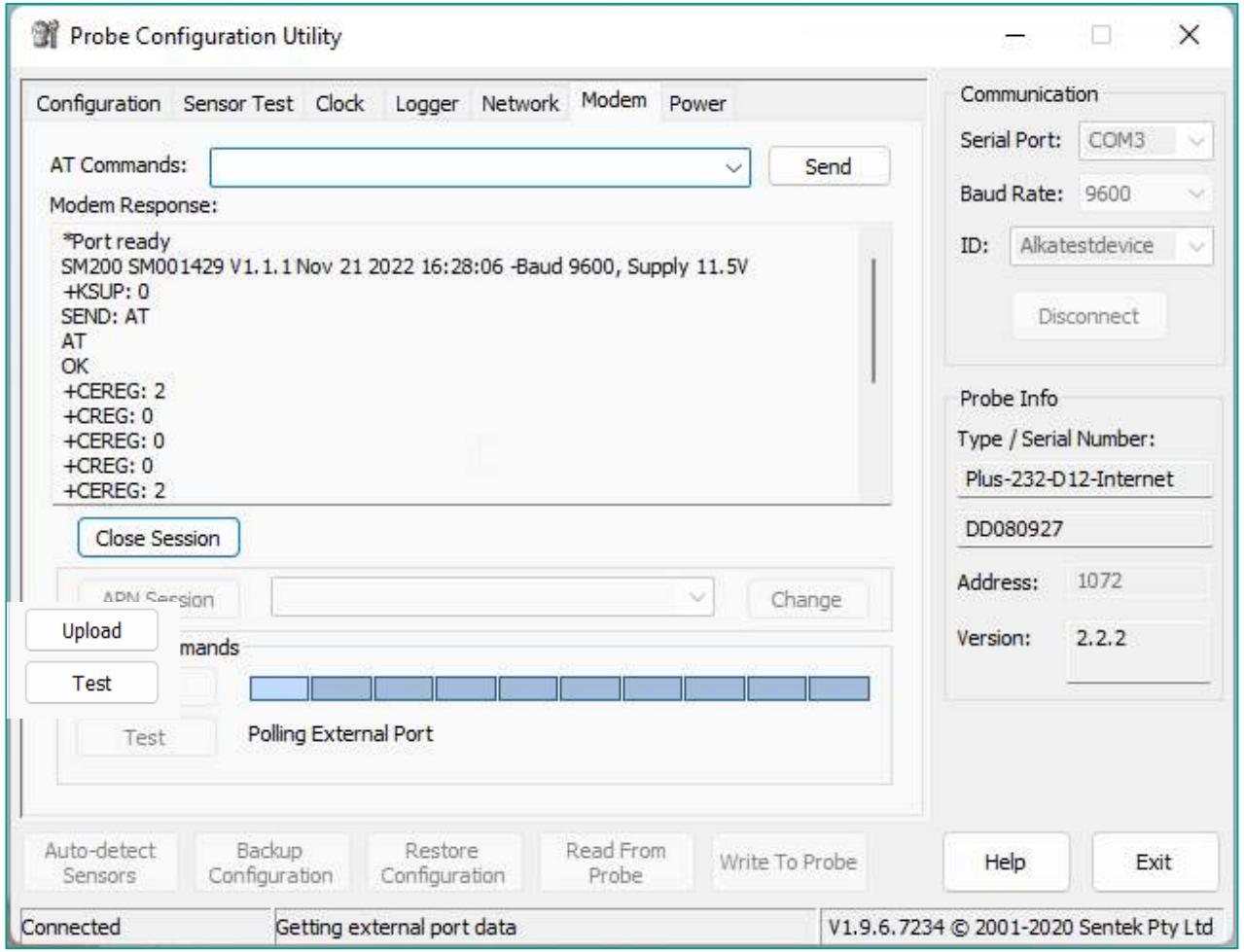


This section contains the Network information for the Sentek IoT automatically set by the Probe Utility App.

The Network Access doesn't need to be modified or provided network access. (E.g., The Username and Password) until suggested by the network provider/ carrier.

Note: Please only make changes in the 'Networks' tab once you receive guidance from the carrier or **Sentek tech staff** to ensure proper configuration.

Modem Tab



The open session turns on the modem and allows it to send **AT commands** to the modem to communicate with the probe.

Note: It is advisable to "**open session**" when filing an incident report using \show details.

Server commands:

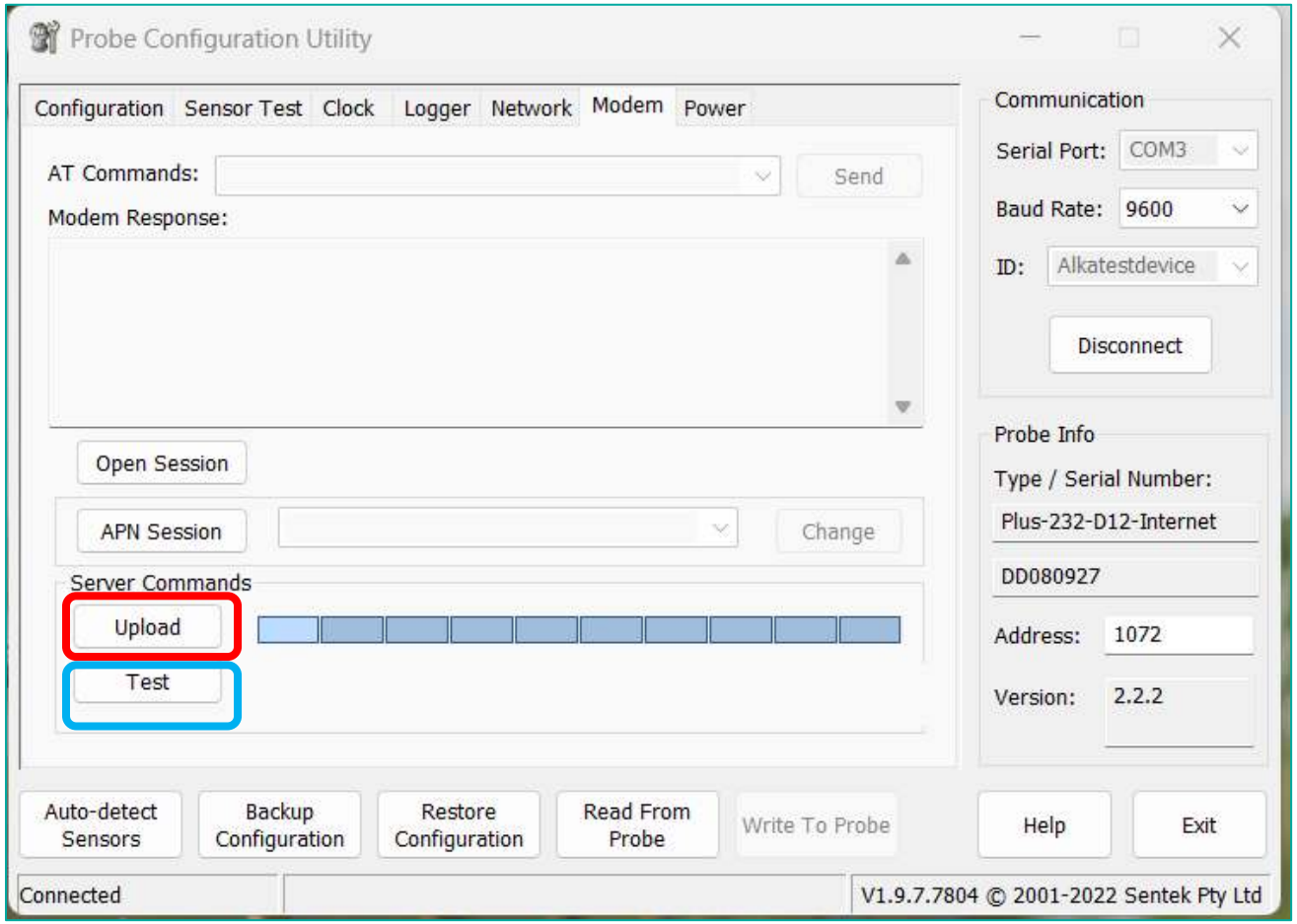
Upload: It Uploads the reading of the probe to the server.

.

Test: This button initiates a connection to the Internet but does not upload any readings.

Note: Only after a successful test the probe and modem should be deployed in the field.

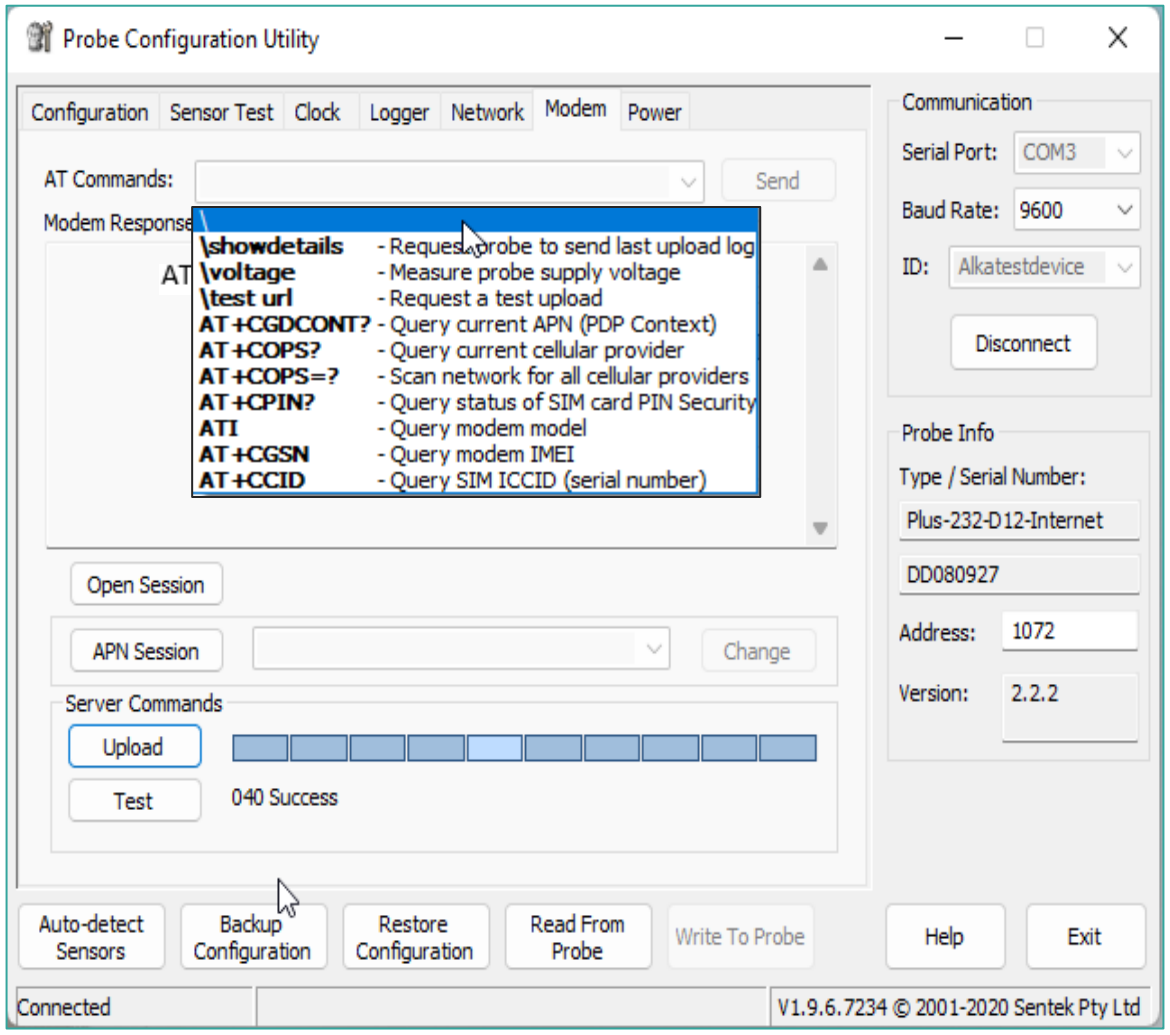
Modem Tab



Upload - Readings in the probe's memory are uploaded. Upload is only used to upload field data immediately.

Test - This button initiates a connection to the Internet but does not upload any readings.

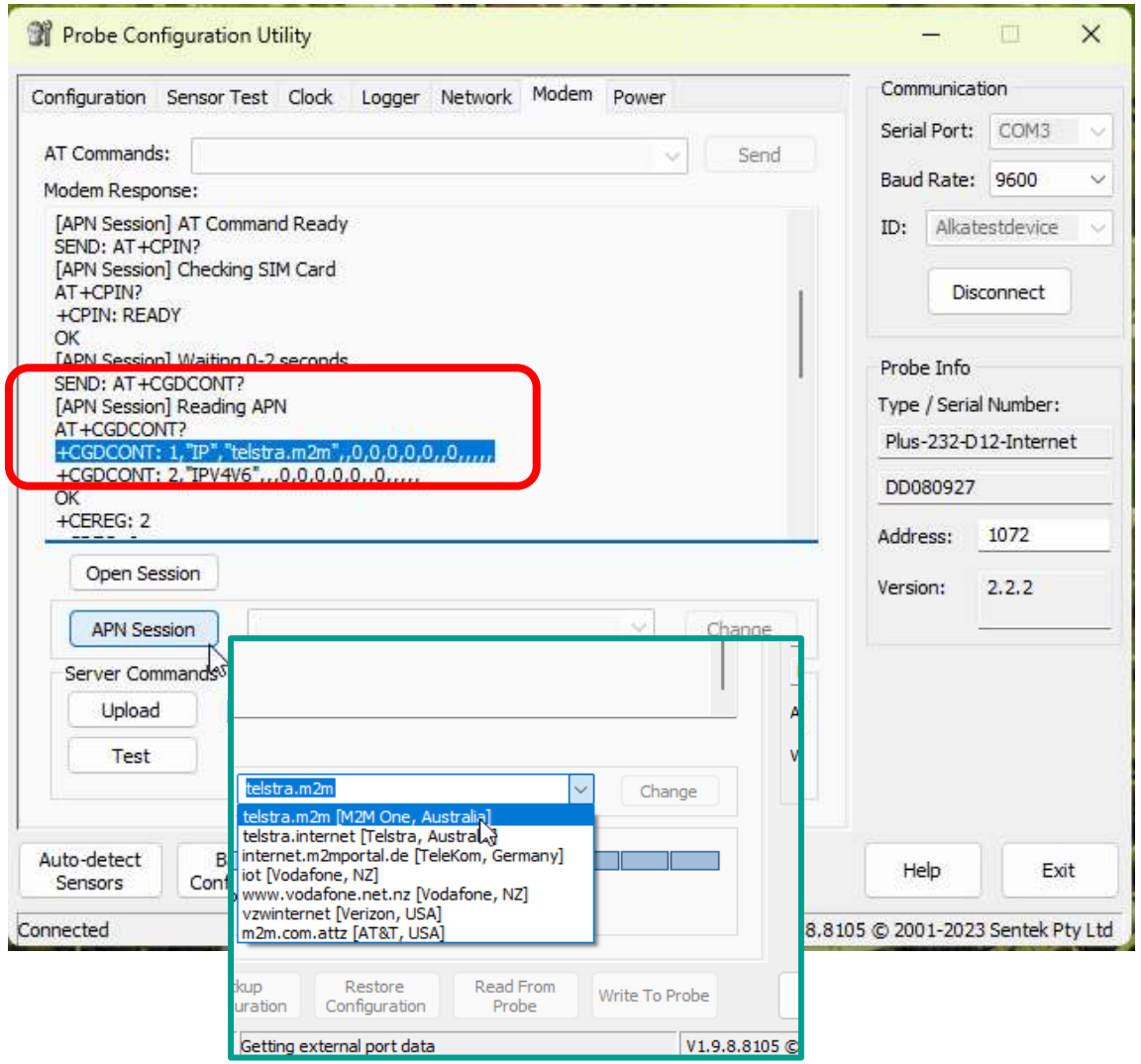
AT Commands



List of Commands pinned in the AT commands drop-down.

AT+CEREG: It displays the network registration status.
\show details: This command helps you to view
the complete log report.
AT+COPS: It Identifies the available mobile networks.
AT+CGDCONT: This command helps you to
identify your APN network.
AT+CPIN: This is used to query and enter a PIN code.
ATI : It is used for Data Card control identification.
AT+CGSN- This returns the product (modem) IMEI serial number.

APN Session



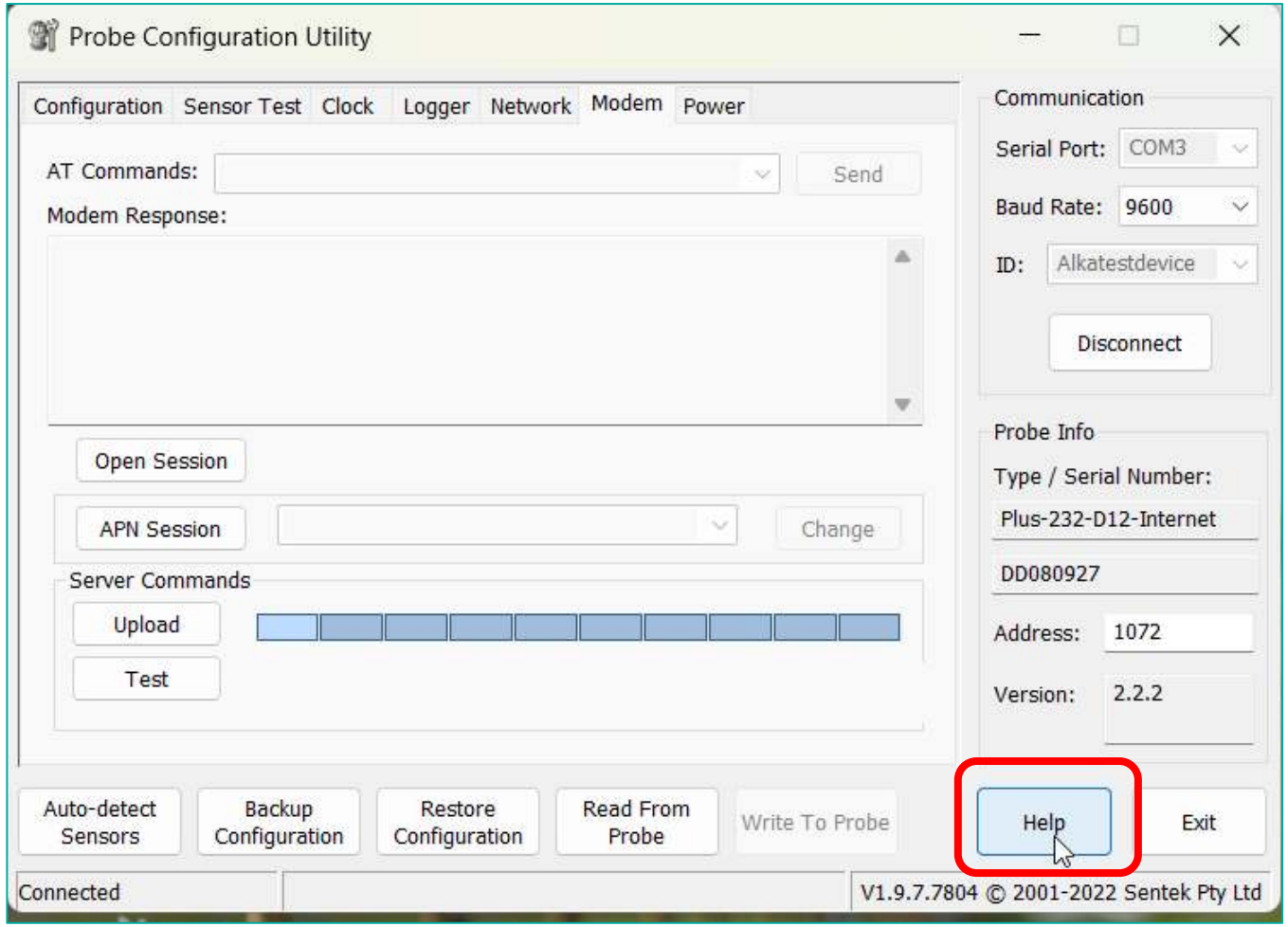
APN session is the function to the set the APN to the device to ensure that it is set in the correct format and saved within the modem settings.

It is not advised to add new APN setting unless you have obtained the correct APN from your network carrier.

To check existing APN setting.

- Click the APN Session.
- Check the response to AT+CGDCONT?
- To change the APN, select from a predefined list or you can edit in the APN within the list box.

PConfig Help

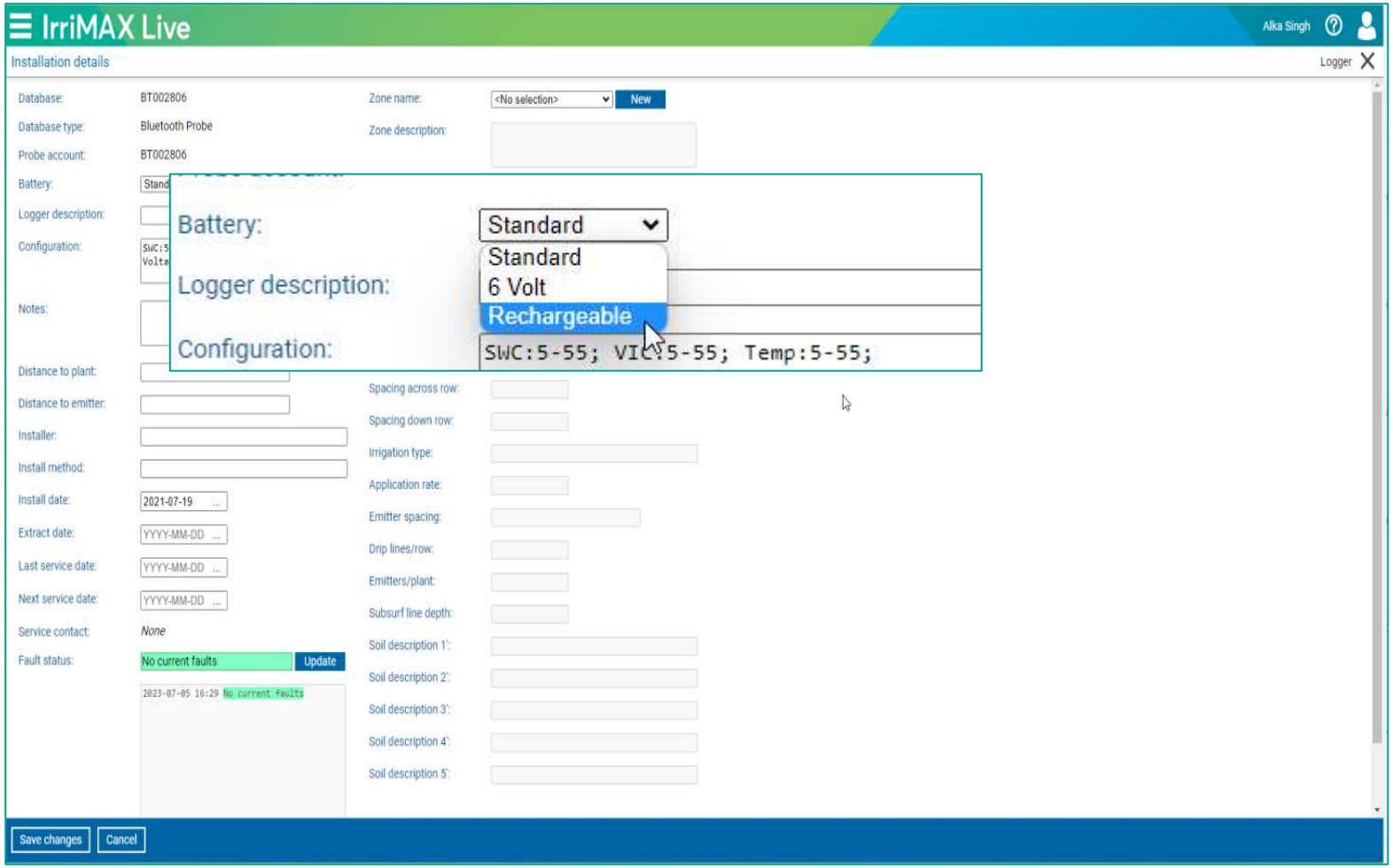


For more detailed information on PConfig, please Click the **Help** Button.

IrriMAX Live -
Battery Status

Sentek

Installation Details



To update the battery status to "**Rechargeable**" using the Installation details section, follow these steps:

1.Access the Installation details section of **IrriMax Live**. This involves logging into the **IrriMAX Live** and navigating the **Installation details** section.

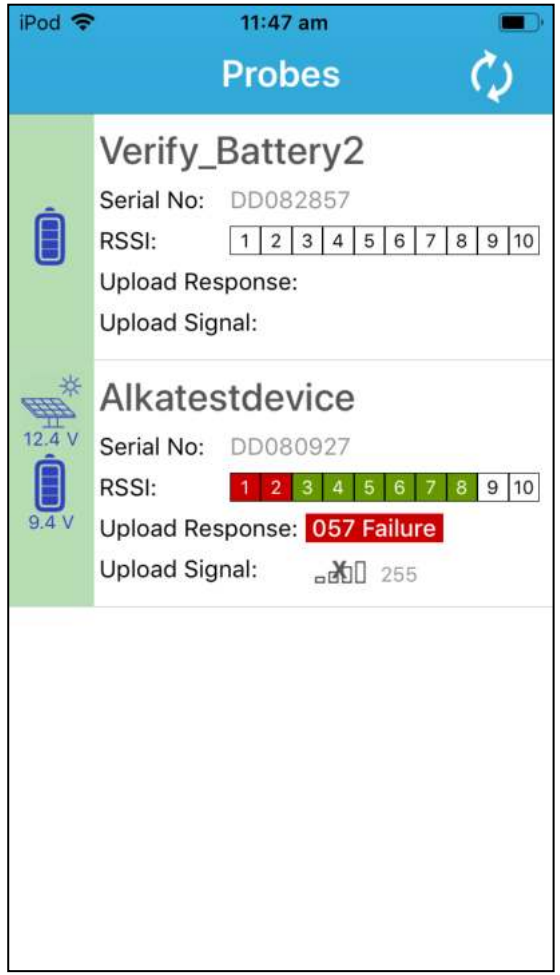
2.Locate the **Battery** dropdown menu within the installation details. This is where you can change the battery status to **Rechargeable**.

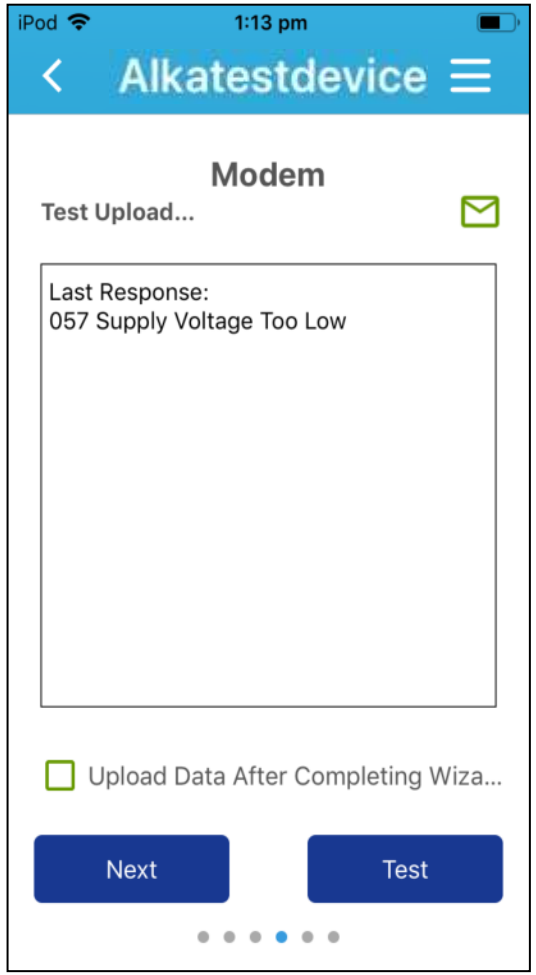
3.Confirm the selection by **Save changes**.

Following these steps, you can update the battery status to "rechargeable" using the installation details section in the IrriMax Live.

Note: This functionality will be available once the probe has successfully uploaded the data and IrriMAX LIVE has completed the database creation process.

Low Battery App Alert





The steps to follow if you receive a low battery alert.

- Verify that the solar panel is receiving good sunlight.
- Ensure that there are no obstructions casting shadows on the solar panel.
- Optimise the positioning and angle of the solar panel for maximum sunlight exposure.
- Monitor the solar panel performance and sunlight exposure over time.

Low Battery Voltage Alert

On the Installation Details page, choose the Rechargeable option for the Battery.

By selecting this option, IrriMAX Live will provide a "low voltage" alert whenever the battery voltage falls below 9.5 Volts.

Dimension and Requirement

Sentek

Product Details

Mounting Bracket holder

Clip Holders

Specification

- **Mechanical Requirements**: Size of the Solar panel (80mm x 40mm)
  Size of the DTU box (80mm x 40mm x 60mm)

- **Power Requirements**: Battery life of 4 years under standard conditions (30-minute sampling, 3-hour uploads in a good signal strength area)

- **Power Supply**: 11.1V Rechargeable Supply
  15.3V Solar Panel
  Battery Peak Current = 2A

Glossary

This glossary defines terms and abbreviations relevant to Sentek IoT.

Terms	Description
Rechargeable battery	
DTU	Data Transmission Unit (housing containing modem, battery and solar charger board
IoT	The Internet of Things (IoT) is a network of interconnected devices and other objects embedded with sensors, software, and network connectivity.