Drill & Drop Bluetooth® Probe Manual

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Sentek

Legal

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Statement of Compliance

FCC Compliance statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Information to user

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instructions, it may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the distance between the equipment and the receiver.
- Connect the equipment to outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCCID: 2ARQB-BLUETOOTH

EMC approvals

The Drill & Drop system complies with the following specifications:

FCC Part 15 Subpart C
Radio Frequency Devices – Intentional Radiators

AS/NZS 4268:2017
Radio equipment and systems – Short range devices-Limits and methods of measurement.

2014/53/EU – Radio Equipment Directive (RED)

EN 62479: 2010 (For article 3.1a)
Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz).

ETSI EN 301 489-1 V2.2.0 (2017-03) (For article 3.1b)
Common technical requirement.

ETSI EN 301 489-17 V3.2.0 (2017-03) (For article 3.1b)
Specific conditions for 2,4 GHz wideband transmission systems, 5GHz high performance RLAN equipment and 5,8 GHz Broadband Data Transmitting Systems.

ETSI EN 300 328 V2.2.0 (2017-11) (For article 3.2)
Electromagnetic compatibility and Radio spectrum Matters (ERM). Wideband transmission systems and

Data transmission equipment operating in the 2.4 GHz band. Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive.

RoHS

EN 50581:2012
Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

Marking

The above EMC approvals allow the product to be marked CE, RCM, and FCC.

Modifications

Any modifications to any part of the equipment or to any peripherals may void the EMC compliance of the equipment.

Radio Interference

The probe is not to be operated in free air as it may cause interference to radio communication devices. Installation of all sensors completely below ground (not including the battery cap and antenna) is required.

Contents

Product Overview

Note:
Throughout this document the Sentek Drill & Drop Connect application is referred to as "The App".
The term mobile device means an Android phone or tablet, or an Apple iOS phone or tablet.

This manual supports the Sentek Drill & Drop™ Bluetooth® probe. The probe incorporates a Bluetooth Low Energy device that communicates using a Sentek proprietary GATT Profile that can communicate with a Sentek application on a mobile device.

The probe comes in five sensor configurations of 1, 3, 6, 9 or 12 sensors (10, 30, 60, 90 or 120cm), all moisture sensors or all TriSCAN sensors, together with a temperature sensor on each sensor.

The probe electronics are encapsulated in the probe rod which is integrated with a battery and a wireless Bluetooth antenna in the probe head.

Bluetooth Probe head incorporating battery compartment, antenna, and serial number

This probe has similar functionality to other Sentek Drill & Drop Probes such as SDI-12 Series III or Sentek RS232/485 Series III probes.

References

Sentek Drill & Drop Installation Manual

Sentek Drill & Drop Probe Manual

TriSCAN Agronomic User Manual

Features

Probe

The sensors are encapsulated inside the probe rod:

- 1, 3, 6, 9 or 12 moisture sensors, or
  1, 3, 6, 9 or 12 moisture and salinity sensors
- Every sensor has an associated temperature sensor
- Sensors are spaced at 10 cm intervals, with the first sensor and its temperature sensor centred at 5 cm below the base of the top cap
- Probe length 10 cm (4 inches), 30 cm (12 inches), 60 cm (24 inches), 90cm (32 inches) or 120 cm (48 inches)
- Preconfigured with all sensors Air/Water normalised and calibration coefficients pre-set

Cables

- Probe cables are not required because all communications are via Bluetooth wireless communication.
- A mobile device charging/USB cable is needed

Sentek Connect App

To communicate with the Sentek Bluetooth probe requires the Sentek Connect App. There is a version for both Android (Drill & Drop Connect), available on Google Play, and iOS (Sentek Connect), available on the Apple App Store.

App Navigation

Warning!
You cannot complete configuring the App until you have an IrriMAX Live account/username. See *Additional Information – IrriMAX Live Setup*.

Once the App is installed (see *Additional Information – Proprietary Sentek Application*) the installed launch icon is present on the Apps screen

Tapping this launch icon opens the App to the Scanned and Devices screen which is composed with a standard Android header followed by:

 Download/Upload icon

 Rotating icon, which is actively scanning probes (when rotating)

 menu option icon

The status screen of each probe follows.

Download/Upload icon

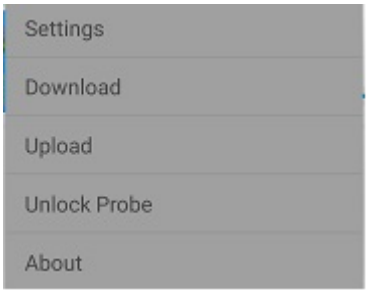
Tapping the download/uploading icon initiates downloading and uploading (based on Setting options). The Status line for each probe is dynamically updated as the operation progresses. At completion of each probe the App sends a notification tone.

Rotating circle icon

Tapping the rotating circle icon will start (rotating) or stop (not rotating) the scanning of each probe's status, particularly the RSSI signal strength.

Settings icon

Tapping the menu icon opens the menu for configuring the global parameter for the App.

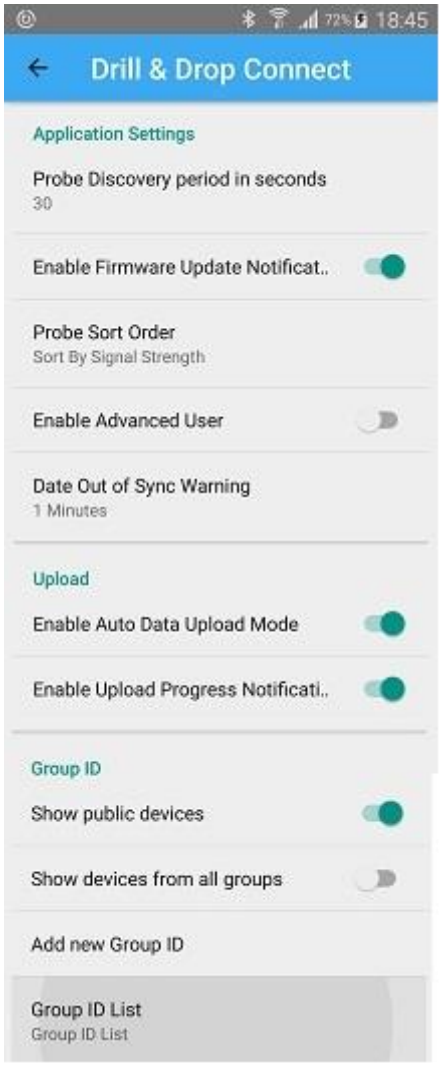


Options are:

- Settings
  See description in the *Settings Parameters* section
- Download
  Performs the same function as the download part when using the download/uploading icon
- Upload
  Performs the same function as the upload part when using the download/uploading icon. If there is no Internet connectivity at download time the data can be manually uploaded later
- Unlock Probe
  Unlock Probe allows the restoration of a lost or forgotten Group ID. See *Unlock Probe* section
- About
  Provides details of the application version.

Settings Parameters

This screen shows the App default settings:



Probe Discovery period in seconds

Default 30 seconds. May be reduced to speed up time waiting to find a single device. A longer time will allow more chance of finding more devices but may increase mobile device battery use.

Enable Firmware Update notification

The App contains a copy of the most recent firmware and, if different to the firmware in the probe, will prompt to update the probe firmware to this version. The update can be declined.

Probe Sort Order

Select "Sort by Signal" to show the closest probe at the top of the probe list. Using "Sort by name" may be appropriate if there are many probes in the list (e.g. a distributor setting up many probes in their office) as it prevents the scanned probe order jumping around. The "No Sort" adds new probes at the bottom of the list.

Enable Advanced User

When disabled the RSSI field is a scaled number 1 to 10, when enabled the more signal strength is in "dB".

Date Out of Sync Warning

The default is 1 minute. The probe date and time vary by a few seconds a day, this option allows a bit of leeway. The probe does not automatically adjust for "Daylight Saving", this warning will appear when the App device changes to "Daylight Saving time".

Units

This option changes the displayed units in Sensor Test. The default is Metric.

- Metric
  Sensor depths are shown in cm, Moisture readings are shown in mm (mm per 100mm), and Temperature readings are shown in degrees Celsius.
- Imperial
  Sensor depths are shown in inches, Moisture readings are shown in inches (inches per 4 inches), and Temperature readings are shown in Fahrenheit.

Enable Upload Progress Notification

Enabled - When the update is complete a Notification tone is sounded. The notification sound can be changed in the device settings, e.g. Android Settings > Sounds and vibration > Notification sound.

Disabled - No Notification sound when update or Field Test completes.

Show public devices

When manufactured a probe is placed in the Public Group. Any user can see probes in the Public Group.

Generally, each probe is assigned a Group ID during initial configuring, or during Probe Reconfigure.

Enabled - new probes are visible and set to Group ID "None".

Disabled - only probes in non-public groups will be shown.

Show devices from all groups

Enabled - All devices are displayed in the Scanned probes list, but only devices in the Group ID list that are ticked can be accessed. You may need to Unlock probes that you can see but cannot access.

The Scanned Probes list entry background is grey for Probes in that are not in or not enabled in the Group ID list.

Disabled - Only the devices in the Group ID list that are ticked are displayed.

Add new Group ID

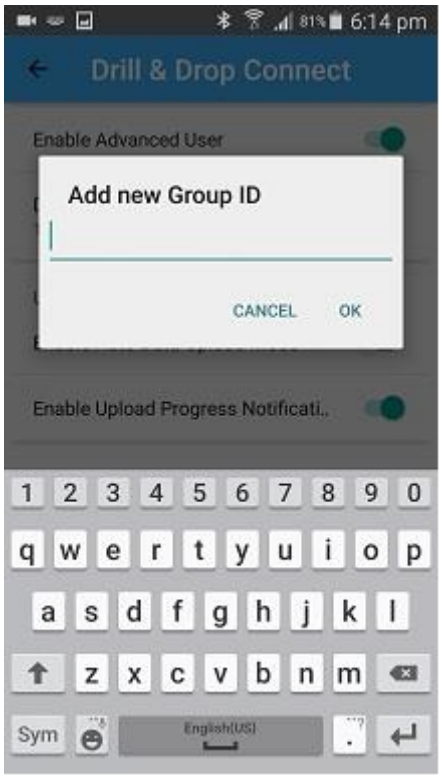
Note:
The Group ID is the primary level of security preventing accidental access to the probe from unauthorised people. Only an App that includes this Group ID can access the Probe details. Depending on the importance of security the Group ID may be a cryptic value or just the owner/farm name. During initial setup the Probe serial number is proposed for its Group ID.

Tapping Add new Group ID opens the Data entry screen.

Tap the empty field for Group ID and use the keyboard to enter the new Group ID, then tap OK.

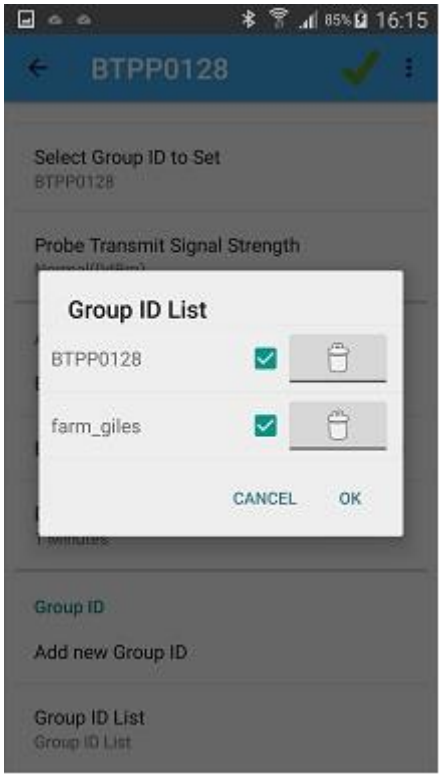
If it was incorrectly entered it can be removed using the Group ID list.

See also *Show devices from all groups*.



Group ID List

This Group ID list shows all Group IDs known to this App.



If the Group ID check box is cleared, the probe will not appear in the scanned probes list.

If the Group ID delete icon is tapped the icon changes to a Plus sign and Tapping OK removes this Group ID from the list.

Caution:
It is recommended to document a copy of this Group ID in case it needs to be re-Added. Alternatively use the mobile device feature to back up the settings (including Group ID) for all their Apps, which can then be restored.

Unlock Probe

This feature is used to gain App access to a probe when its Group ID is not known.

Example 1: A probe has been set up on one mobile device – this device is then subsequently lost, stolen or destroyed – so a second device is used, but user cannot remember the Group ID that was used to set up the Group ID on the first device.

Example 2: A second person (e.g. an agronomist employed by the owner) must interact with the probe but doesn't know the Group ID assigned by the person who initially setup the probe and is for whatever reason unable to obtain the information from them e.g. the owner is on holiday and can't be contacted.

Example 3: To avoid helping thieves who have stolen their neighbour's probe unlocking it. Protocol process and Security code is put in place to avoid Sentek inadvertently becoming complicit in probe theft.

Sentek Staff are the only people to have access to the process that generates the unlock code.

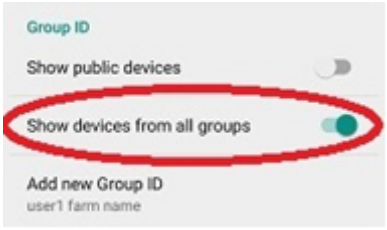
Steps to Unlock the Group ID on a probe

Contact Sentek Technical Support (email is best) – and inform them of the Probe serial number. You can get the probe serial number from the top of the top cap, the label inside the probe top cap or the Probe summary display on an App that can display the probe summary.

This example is showing a probe not in the Group ID list. It has a grey background and only appears when Show devices from all groups is enabled.

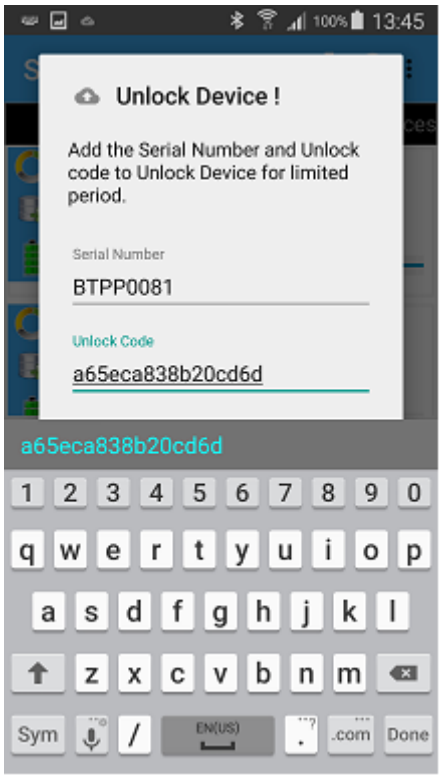
Sentek Tech Support will quickly provide (email) you with an unlock code using their secure unlock code generation process.

Wait for the response from Sentek. Then on main App screen tap  menu icon and tap Settings and Enable "Show devices from all groups", then return to Main App screen.



On the App screen tap  menu icon and tap Unlock Probe.

On the Unlock Device screen tap the serial number field and use keyboard to enter the serial number, then enter the Unlock code and tap Done.



Then tap the Unlock Device (this example used a fabricate code).

When the Unlock fails the message area is in Red. A successful Unlock Message is in Green is <Serial number> is unlocked for 7 days, Tap OK to return to main App screen. The probe will be unlocked. Until this period expires the probe summary will be highlighted in a Yellow/Orange colour indicating it is in the unlocked state. The user can then enter the Group ID as per the normal method of setting or changing the Group ID.

Devices display

Swipe left or tapping the Devices option shows all probes that have ever been connected to this App. It shows the most recent status and number of days since the last successful download.

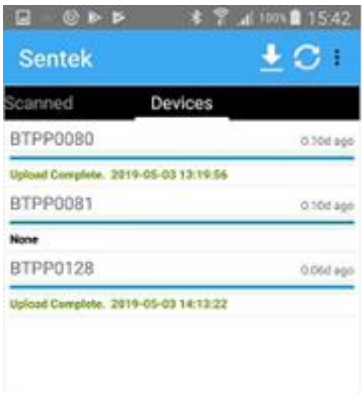
The sorting works by grouping probes into three groups which are group sorted in order shown.

a) Those that have not been downloaded within 10 days (Sorted by downloaded time oldest to newest)

b) Those that have been downloaded within 10 days (Sorted by upload time newest to oldest)

c) Those that have not been download for over 10 days. (Sorted newest to oldest)

The sort mechanism prioritises the devices that need to be downloaded at the top, while putting those they have not been downloaded for a considerable time at the bottom. The devices in between are those that have been downloaded and are then sorted by uploaded time; typically the same as downloaded time when Auto Upload is enabled.



Scanned Probes display

This is the primary entry point for maintaining probes.

Swiping right or tapping the Scanned header displays all the probes this App currently has access to (matching Group ID). They are displayed in *Probe Sort Order* (see *Settings Parameters*).

This displays the current status of the probe:

Background colour:
White – active and accessible
Grey – visible but not accessible (Show device from all groups is Enabled)
Yellow – probe will remain Unlocked for 7 days

Probe name: Default is serial number; it may be changed during probe configuring e.g. farm field name or crop name

Serial Number: Assigned during manufacture. It matches the serial number printed on the top cap and internal label.

MAC address – unique hardware number for this probe
(only displayed when Settings option Enable Advanced User is Enabled.

Updated: Date and time of when the probe was last seen during scanning.

RSSI (Received Signal Strength Indicator): the value is 1 through 10 or dB when Advanced User is enabled (see *Settings Parameters*).
Probes that are close to the App device display higher numbers or lower -dB value. RSSI in red is marginal and communication may fail.

Note:
If you have many probes the recommended sort order is "Sort by Signal", so the nearest probe displays first.

Progress Bar - changes from grey to coloured as download or upload progresses to 100% complete.

Most recent download or upload status e.g. Scanning; 46% of downloaded of 1304 pages.

 Three segment circle

Grey - process not yet done
Yellow - probe configured
Green (Download successful)
Blue (upload successful/field tested)

Yellow is the default indicator for all un-configured probes.

Yellow + Green = Configured.

Yellow + Green + Blue = Configured and Field Tested.

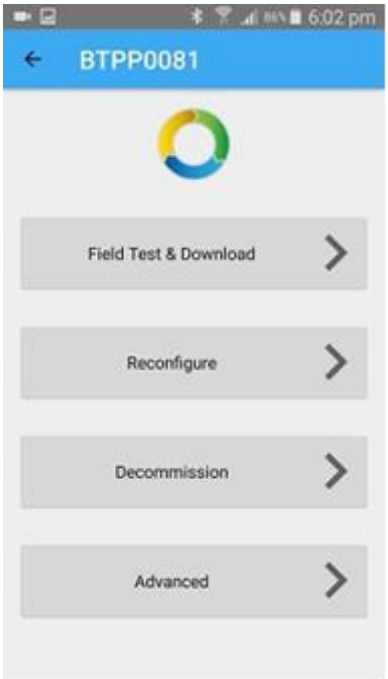
Note:
The circle is replaced by a large "P" while sensor readings are being taken. The "P" is probably never seen because sampling takes less than 1 second.

 Status indicating probe has new data to download

 Probe Battery capacity: 4 Green bars fully operational, 2 Orange bars battery marginal (change battery soon), 1 Red bar samples not being taken (change battery immediately)

DFU icon - "Device Firmware Update" should never appear - contact Sentek Technical support.

Tapping anywhere in this probe's scanned display starts a sequence of screens showing:



Field Test & Download

The App goes through the Sequence:

Time Sync: Allow the App to set the probe time to the App time (Sync or skip)

Note:
The probe may vary by a few seconds per day. Settings > *Date Out of Sync Warning* allows an adjustment above default of 1 minute.

Next: Continuous reading of sensors and display their current Calibrated value

Next: Summary of Field Test progress

Reconfigure

Update firmware in probe (skip or Start)

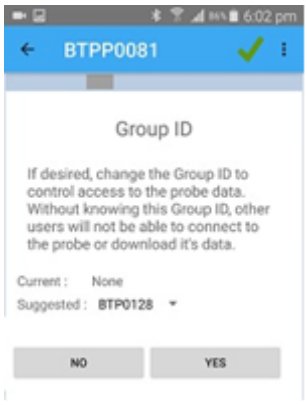
Next: Probe name: Default is serial number, alternatively the farm field location or unique crop identifier e.g. South paddock or Potato1.

Probe name is alpha numeric and underscore and is 16 characters maximum.

Note:
The probe name is the IrriMAX Live probe name, within in the IrriMAX Live account of the username.

Next: Group ID

This is a level of privacy (only those knowing the Group ID can see the probe. Initially "Public/None" is the default and available to any user. Unless you want Group ID None/Public, you should add a new group ID using Settings before setting the Group ID for this probe.

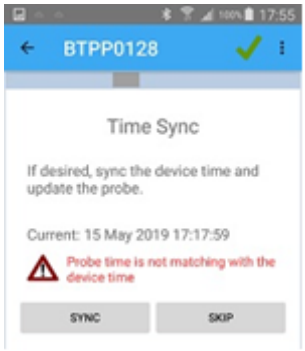


Note:
It is recommended you or your distributor selects a Group ID unique to you or to each of their customers.

Next: Time Sync

Allow the App to set the probe time to the App time (Sync or Skip).

Advanced mode allows you to set probe to any time.



Next: IrriMAX Live

The IrriMAX Live Username and Password must match your existing IrriMAX Live account. If the values are incorrect IrriMAX Live rejects the message "Request was unsuccessful. Unknown user or wrong password".

If IrriMAX Live acknowledges the username and password are valid and you tap Next the App displays the Probe Agreement informing you that you are liable for IrriMAX Live data charges. If you disagree you cannot upload data to IrriMAX Live.

Sample Interval: You can change the Current interval to suggested ones between 1 minute and 12 hours. For reasonable battery life it is recommended to set 15-minute sampling. Battery life will be reduced with intervals less than 15 minutes.

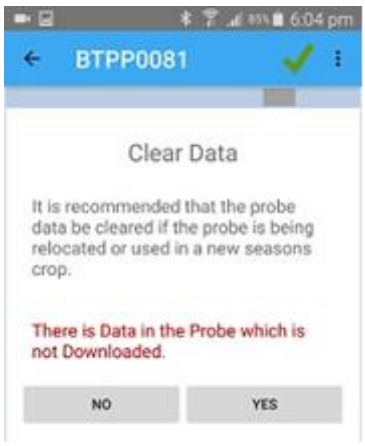
Next: Clear Data.

Sentek suggests to Clear Data because often test samples are taken while the probe is not installed in the ground, so this ensures the data is clear without any invalid air/water values.

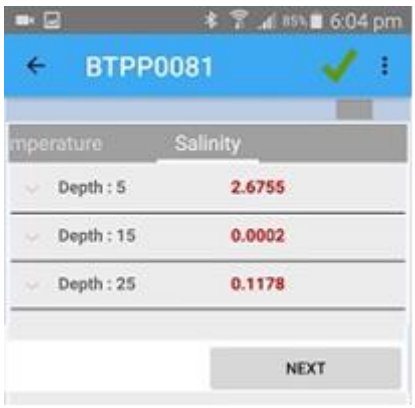
If the probe has been moved to a new location it may be appropriate to upload the last of data for the previous location.

Alternatively, some users may choose to set the start date on the IrriMAX Live Probe account, so it graphs from the installed in ground date and does not remove the other data.

It is Recommend Download then Upload valid data before clearing existing data.



Continuous sampling of sensor reading is displayed until Next is tapped. You can swipe to move between sensor types or tap the headings. The sensor type background changes to colour while the sensors are being sampled.



Next: Final configuration Progress is shown. There is a tick against successful step and a cross against steps that need attention.

Tapping OKAY acknowledges the reconfigure and returns to the Probe summary screen. Tapping Reconfigure restart the Reconfigure process from the beginning.

Decommission

Decommissioning is normally used before the probe is moved to another location. It prevents unwanted sampling by setting the sample interval to 0. The probe must be reconfigured for the next location.

Advanced

When Advanced option is tapped the Advanced summary screen appears for the selected probe

The tick at the top changes from

- Orange while connecting
- Black while Updating probe settings in the App
- Green when the state shows Connected

State row

Displays text "Connecting" then "Updating" then "Connected" plus the battery icon. This Battery icon changes to a "P" for a few seconds while the App is sampling the probe.

Signal row

Shows the RSSI signal strength indication 1 to 10 or dB. This is similar to the main App RSSI but is the connection signal strength.

Current probe date and time

This opens a screen where any date and time in the Probe can be set manually by scrolling current values up and down, or sync with the mobile device date and time.

Update Firmware

This reports if Firmware versions in Probe and the App are the same, or it opens a screen with options to update the probe firmware to the version in the App (older or newer).

It is always recommended to use the Configure/Reconfigure wizard to update the firmware as it will handle retries if there is a failure during the update process and will also maintain the probe time once the update has completed.

See section *Additional Information – Probe Firmware Updates*.

Sensor Test

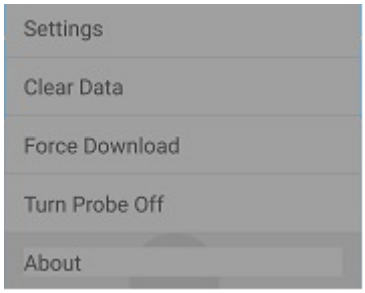
This opens a screen where continuous sampling can be Started or Stopped. It also allows setting Air and Water Normalisation counts plus setting of Calibration Coefficients ABCD. See sections *Normalisation* and *Changing the Calibration Information* and *Sensor Test*.

Download data

This option download data from the probe to the App. The status display shows the Status Scanning, Downloading data, Download complete.

Advance Menu options

Advanced menu icon  has options to change Probe Settings plus some of the same functions of the main App menu



Settings
See below (*Settings*).

Clear Data
This option is the same as in the App settings option.

Force Download
Forces the App to download ALL data from the probe. Normally the App will only download data from where it believes it has already downloaded. If the user were to delete data from the phone manually but not upload it, you could use this to re-download the data from the probe (provided that the data is still in the probe).

e.g. someone backs up their app settings using Google, buys a new phone and installs the app. The App settings (along with the current knowledge of last download) will be restored, but not the actual probe data. If they had forgotten to upload some of the probe data this option allows them to download the data again.

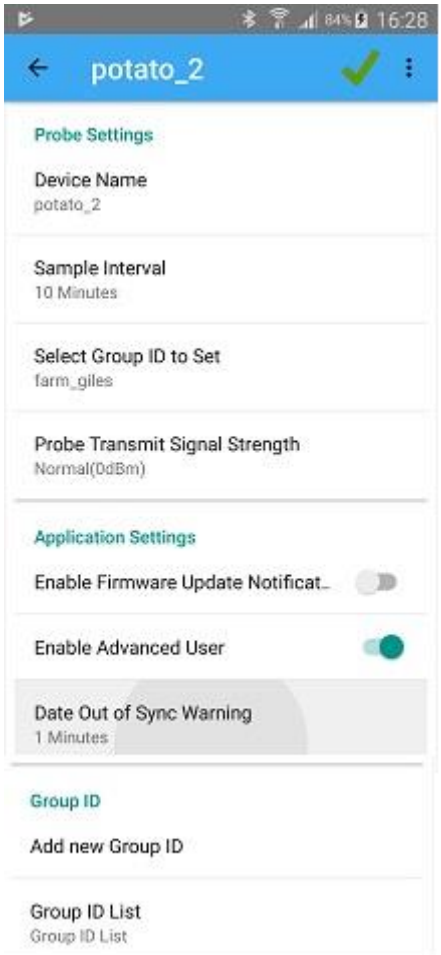
Turn Probe Off
This option is used where it is required to turn off the Bluetooth radio due to potential interference issues, e.g. during air transport or regulatory requirements as required by FCC in the USA. It may also be needed where there are a many of probes in storage causing too much radio traffic causing issues for low end Bluetooth mobile devices. For best battery performance, it is recommended to decommission the probe, so it stops measuring the sensor and leave the battery in place.

Used before moving the probe to a new location. It asks for the battery to be removed. When the battery is reinstalled, the probe should be reconfigured for the new location.

About
This includes probe firmware details, Application version and build date

Settings

This option displays the Probe and relevant App Settings:



- Device name
  You can change the Probe name.
- Sample interval
  You can change the Probe sample Interval.
- Select Group ID to Set
  You can change the Probe's Group ID.
- Probe Transmit Signal Strength
  When the High or Highest setting is selected, this will make the probe transmit a stronger Bluetooth signal, with resultant increase in operating distance. The Probe battery life will be shorter with this option enabled. For example, when using the Highest setting (+8dBm) the battery life of a 120cm TriSCAN probe with 30-minute sampling will be reduced by 40% from 3.5 years to 2.1 years.

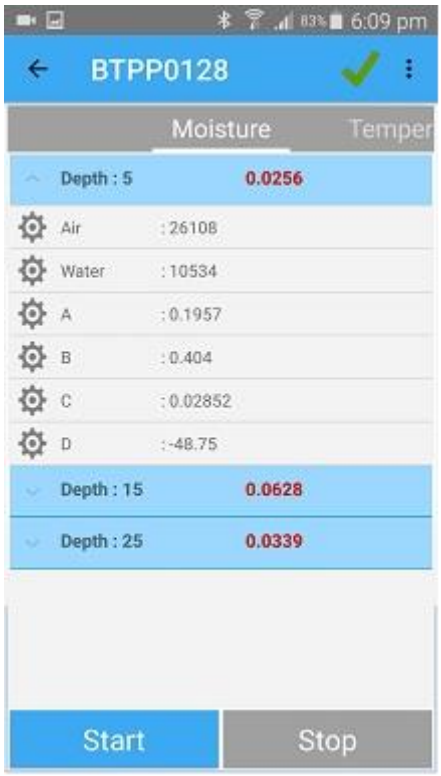
The Application settings and Group ID options are replicated here from the main App Settings. This provides quick access to those settings without having to disconnect from the probe.

Advanced Mode Sensor Test options

Caution:

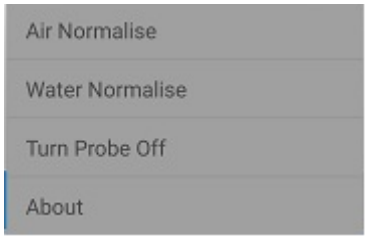
If any sensor displays a red triangle it means the probe is not normalised. Either Air is 65535 or Water is 0 or Water is greater than Air. As probes are normalised during manufacture this should not happen. The problem should be investigated by a Sentek trained or authorised person.

When Sensor Test is tapped the Sensor details for all depths are displayed.



Normalise

Tapping the menu icon opens the Normalisation menu. This menu is only available when the advanced user option is enabled in the App settings, it is not available when the sensor test is running.



- Air Normalise
  The whole probe must be held by the top cap, with all sensors in the air, clear of any objects with at least 10cm gap.
  Air Normalisation is performed on all sensors of moisture and salinity on a probe.

- Water Normalise
  Ensure the top cap is tightly closed. The whole probe must be fully immersed in a water container deep enough to hold every sensor and the top cap. The probe sensor must be at least 10cm from the edge of the container.
  Water Normalisation is performed on all sensors of moisture and salinity on a probe.

- Turn Probe Off
- About

Sensor depth options

The options are:

- Tap the headings or Swipe left or right to display Moisture, Temperature and Salinity values.
- Tap Start to continuously sample and display calibrated sensor reading. Tap Stop to terminate sampling.

Warning!
If no sensor measurements are taken, or they stop, then the battery charge is probably too low or fallen out.

Important note, batteries can sample fine at a specific sample rate (e.g. 15 minutes) but may drop suddenly when performing sensor test causing it to only take a few measurements then stop.

- Tap the down arrow next to Depth to open the Air & water raw counts and calibration coefficients. Tap the up arrow to hide these values.
- Tap each field to allow changing the current value of Air, Water, A, B, C, D. See sections below *Normalisation* and *Changing the Calibration Information*

Normalisation

The normalisation process is necessary to adjust for any variances occurring during the production of the sensor. Normalisation standardises the sensor response within a range bounded by 2 extremes, air and water.

Warning!
Probes are supplied configured and pre-normalised in air and water. Modifying this information stored in the Drill & Drop probe may result in incorrect readings being sent to IrriMAX Live.

Note:
Air and water normalisation can only be performed for all sensors (not individually).
The standard Sentek normalisation container is not suitable for Drill & Drop probes and cannot be used for water normalisation. A water container long enough to fully cover all sensors at the same time is required.

To Change a current value
Tap the desired field to display the popup to change the field value. Then tap the current value field to open the numeric keypad. Enter the new value and tap SET.

Changing the Calibration Information

The sensor coefficients A, B, C and D values can be altered in the App.

Moisture sensor A, B and C values should only be changed to reflect the characteristics of the soil in which the probe is installed. See the Sentek Calibration Manual for further information.

Temperature sensors AB constants are pre-set to show values in degrees Celsius. It is not recommended to change the A and B constants as this will conflict with the temperature compensation algorithm. To show the temperature readings on the App in Fahrenheit change the Units setting to Imperial.

To Change a current value
Use the same steps as done for Normalization above.

Sensor Test

The App provides the ability to test the sensors – refer to the Sentek App wizard for further details.

Bluetooth Communication

To communicate with the Sentek App the user must be within 5 metres of the probe, when installed appropriately with the battery cap above ground level. Installing below ground level will reduce the operating distance and may not work at all.

The probe and App communicate using Bluetooth V4.0 Low Energy protocol. With normal use the probe battery should last up to 3 years.

Each probe continually broadcasts an "advertising" message every second and the App identifies the probe via this message.

While the App is communicating with probes, downloading and uploading data, its battery is discharging. A typical download/upload cycle could use 1% of battery capacity.

The Bluetooth probe stores samples. These are downloaded from the probe by the App. The App can then upload the data, using the Internet, to IrriMAX Live (via the users account).

Each probe can store about 2000 readings. Typical readings take 1k-2k Bytes i.e. up to 2M Bytes per probe, so mobile device memory is not normally restricted.

Installation Guide

Physical installation at the desired field location is described in the Drill and Drop Installation Manual.

Details of setup and configuration of the probe our outlined in the Probe Setup Wizard incorporated into the Proprietary Sentek App provided.

Maintenance Guidelines

Apart from the top cap, allowing battery access, the probe cannot be disassembled. All sensors and electronics are encapsulated within the probe rod.

Technical Specifications

Protocol

Bluetooth requirements:	4.0 or later (Bluetooth Low Energy)

Storage

A probe can accumulate about 2000 readings before the oldest readings are overwritten. This should be over 30 days with 30-minute sampling.

Sensors

Sensors are measured starting from the top sensor, e.g. 5 cm, 15 cm, 25 cm.

Moisture

Resolution:	1:10,000
Variation:	0.03% CV

TriSCAN

Resolution:	1:3,000
Variation:	0.2% CV

Note:
The Drill & Drop Bluetooth probe uses the latest salinity model for the TriSCAN sensors. As such the VIC readings may differ from older Drill & Drop Probes. Please see the latest documentation for TriSCAN sensors on how to interpret VIC readings

Temperature

Range (operating):	-20 °C to +60 °C
Resolution:	0.3 °C
Accuracy:	±2 °C at 25 °C

Supply

Battery Chemistry:	Lithium Ion
Size:	AA
Voltage:	3.6 V
Battery life:	3.5 years of continuous operation **

Note:
1.5 V AA cells are not suitable

** with a 120 cm / 4 ft TriSCAN probe using default 30-minute sample interval and 2 downloads per day from one mobile device.

Additional Information

Minimum Battery Specifications

To achieve the best from your new probe it has been shipped with a high current 3.6 V lithium-ion AA size battery. Should it need replacing it should be replaced with a similar high current 3.6 V lithium-ion battery. A low current battery may work but will report a low battery condition earlier. 1.5 V AA batteries will not work. Replacement batteries may be ordered through Sentek.

When a Low Battery state is detected, it remains low until either the battery falls below the sensor measurement limit and then

1. Recovers, which can be due to temperature returning from subzero temperatures, or a new battery installed.
2. A sensor test is performed, and the battery is able to maintain a good condition. 5 sensor measurements will be taken to verify the battery state.

When replacing a low battery, insert the new battery and perform a field test. This will perform sensor measurements and verify the status of the new battery and if as per 2 above will clear the low battery condition. Without performing sensor test the low battery condition will be cleared automatically when the next sample is taken.

Proprietary Sentek Application

Navigate to the Google Play store and search for "Sentek connect", scan the QR code or use the link below to download the Sentek app to your Android mobile device.

https://play.google.com/store/apps/details?id=au.com.sentek.connect.complete

Minimum specification for supported Mobile Devices

- Android Mobile Device with operating system version 4.3 or later (Equivalent to a Samsung S4), recommend Android 6.0 and above.
- To upload data to IrriMAX Live directly via mobile/cellular network – the mobile device should have a SIM and mobile phone data plan. Alternative you can use your Wi-Fi network that has internet capability.

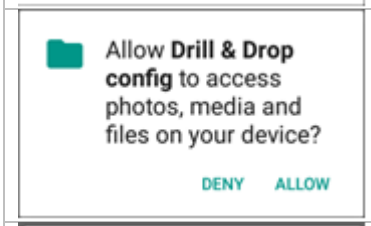
The Sentek App can upload the data as soon as mobile coverage is available (provided the data option is enabled).

Note:
By default Android devices will use a Wi-Fi connection in preference to the mobile data plan.

Android OS

On Installation the Sentek App icon will be added to the home screen and is also available in the application drawer.

To complete the installation the user must accept the permissions requested after installation of the App. Not accepting all requested permissions will prevent the App from performing correctly.

	Enables GPS location services on your mobile device for use by Bluetooth communication
	Allows Sentek App to write to the mobile device internal memory. This is where the app stores the data files downloaded from the probe. These in turn can be uploaded to an IrriMAX Live account.
	Enables Bluetooth on the mobile device so the App can interact with the Sentek wireless probes

IrriMAX Live Setup

When a Sentek Drill & Drop Bluetooth probe is sold an IrriMAX Live subscription account is setup by Sentek. There are three options:

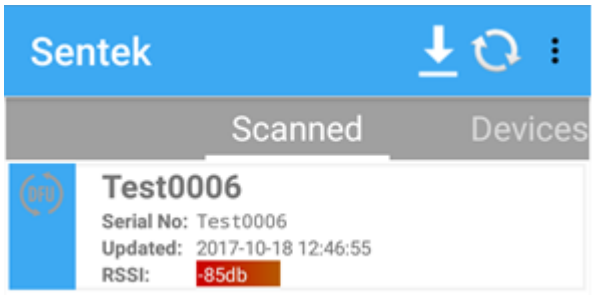
1. IrriMAX Live, 12 Month Probe Subscription, Setup Product Number: 08997
   An IrriMAX Live group previously setup for your distributor/dealer with their business name.
2. IrriMAX Live, 12 Month Probe Subscription Product Number: 08998
   When a probe is ordered a Probe account and username are created. The username and password are emailed to you, and must be user when registering this user name in the App
   The logger ID will be created during the first Upload from App to IrriMAX Live.
   If you want to use the Internet you must purchase a SIM card for the mobile device and register with an Internet Service Provider, with a Data plan. Your distributer may organise this when ordering the probe from Sentek. Alternatively, you can use Wi-Fi (in your office) and delay App uploads until you return to your office.
3. IrriMAX Live, Sub Domain Setup Product Number: 08990
   The Sub domain option allows customisation of colours of the IrriMAX Live page header.

Probe Firmware Updates

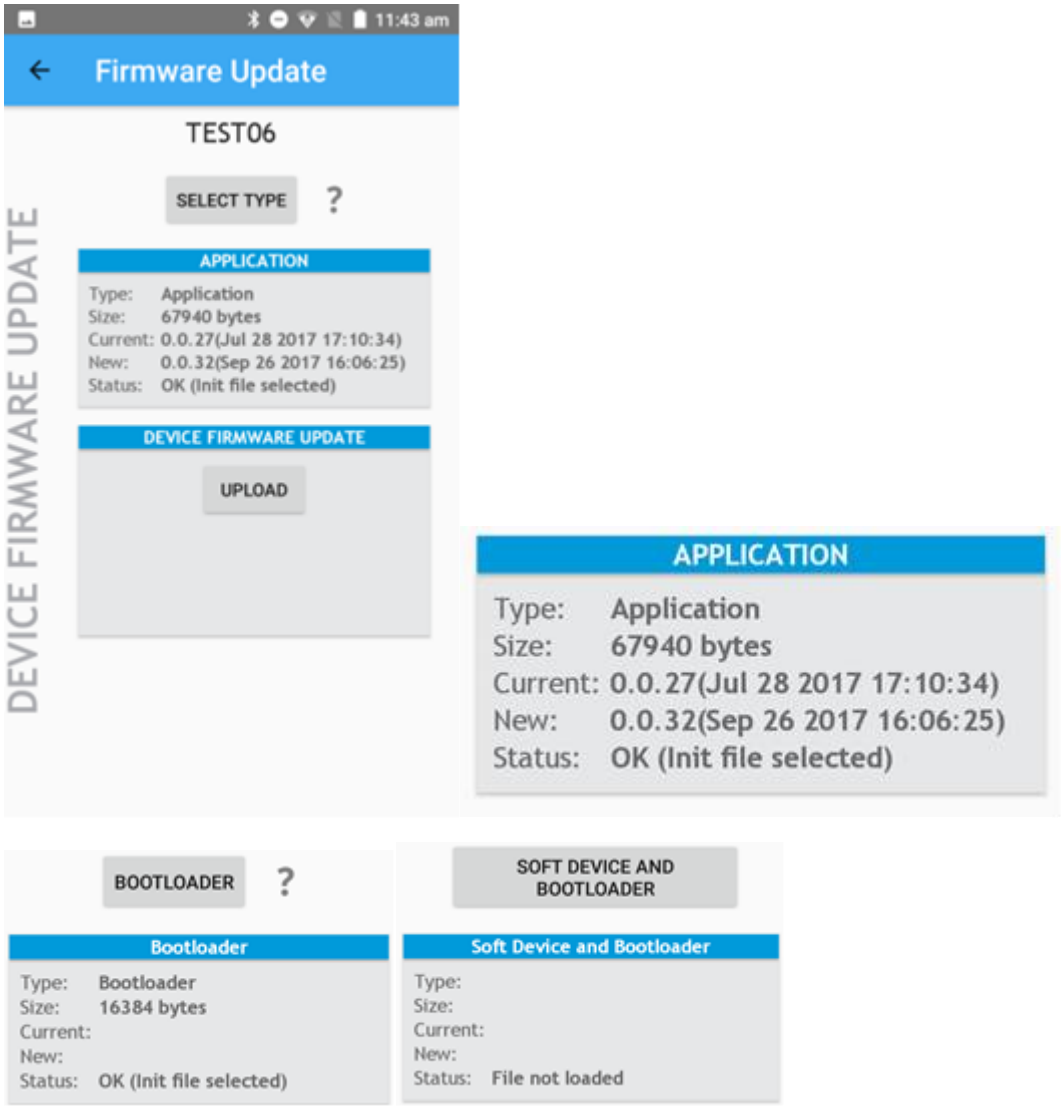
The App contains a firmware image version coinciding with the App version. Normally during the Configure/Reconfigure wizard the App will identify if the probe firmware needs updating and suggest updating the firmware. See section *Enable Firmware Update notification*.

Advanced mode contains an alternative method of updating the firmware. This can be used when a new firmware version is supplied by Sentek, but not part of the App Install.

If, after attempting firmware update, the Scanned probe details show DFU mode (instead of the three-segment circle) signal strength may be low interrupting the upgrade – try moving closer to the probe. Select the probe in DFU mode (as shown) to establish a connection – you will be taken directly to the DFU mode screen where you will need to select the "Upload" option again as shown below. When the Upgrade completes successfully – you will be notified – exit the DFU mode by selecting the escape/back button on your android device.



Before leaving the probe – make sure the probe is not in DFU mode as Shown. Start the app if necessary and check that the probe is **NOT** showing DFU icon in the scanned page.



The default update type is "Application" as can be seen enlarged above. On advice by Sentek you may need to select an alternative type of update. Options are:

Application – This will install the firmware associated with the Sentek Application installed on the mobile device (This is the default firmware update component.)

Bootloader – This will update the software that performs firmware updates.

Soft Device and Bootloader – This will update the Bluetooth library and Bootloader. Selecting this option will remove the firmware application requiring it to be updated also.

Troubleshooting

This section assumes that the person is trained in installation and configuring Sentek probes.

Symptom or error message	Possible cause	Possible solution
Probe Stops sampling or battery status icon shows orange or red bars	Battery is flat/discharged	Replace the battery
Connection timed out (or was lost) Please check the device is on and within a5m (15 foot) range or click on restart Bluetooth	The probe signal is too low to maintain a reliable connection. Or Android App has been put to sleep in the background due to screen timeout or switching apps.	Move closer to the probe. Note: if a second App is trying to communicate at the same time, then the connection cannot be made until the other App disconnects from the probe. Probes will always automatically disconnect after 10 minutes of use.
Upload Error Occurred. Response code not 200. Response code 401	Incorrect probe account. Another user has assigned the probe to their IrriMAX Live account.	Reconnect to the probe to obtain the latest probe account; or re-assign the probe back to your account. NOTE: if a new probe account is created without completing the (re)configure wizard, then re-assigning the IrriMAX Live account will be required to upload data.
 Sensor miss-configured Air or Water value should not be default. This occurs when trying to set Air less than Water or Water greater than Air	Probe normalization incorrectly changed from factory pre-sets	Contact Sentek for further support. Configuration could be manually re-entered if necessary.
Request was unsuccessful Unknown user or password	IrriMAX user and password are not valid	Check that you have a valid IrriMAX Live username and password.
Unfortunately Drill & Drop Connect has stopped	Error in the App	Tap OK and App should continue at same point as was current
Entered Unlock code does not match with Serial number	Incorrectly entered Unlock Code	Review the code supplied by Sentek and correct the entry

Glossary

Bluetooth Smart (name superseded by Bluetooth Low Energy)

Bluetooth Smart devices include only a single-mode low energy Bluetooth v4.0 radio. e.g. Sentek Bluetooth probes Bluetooth Smart Ready

Bluetooth Smart Ready (name superseded by Bluetooth)

Devices implementing Bluetooth v4.0 dual mode radio. They can connect to the billions of Bluetooth devices already in use today including Bluetooth Smart devices. e.g. Android phones.

Bluetooth Low Energy

Bluetooth Low Energy devices include only a single-mode low energy Bluetooth v4.0 radio. e.g. Sentek Bluetooth probes

Android version

Android version 4.3 is the minimum version compatible with Sentek Bluetooth probes. It is the program in Android phones and Android Tablets.

Normalize

A step performed before delivery that adjust each sensor air and water counts to take in account minor variations on electronic variations.

Pre-configured probe

The Bluetooth is pre-configured before delivery with each sensor's Ari and Water normalized, depth set and Calibration Coefficients ABCD preset.

Calibration coefficients

The ABC coefficients specify the soil profile equation (see Agronomic User Manual). The D coefficient specifies the correction to calibrated moisture value, adjusted for temperature.

Raw count

The value calculated by the probe firmware based on the soil moisture content (somewhere between normalized air and water counts)

Calibrated Value

The value calculated by the probe from the raw count, passed through a calculation using the calibration coefficients ABCD.

Download

Download transfer of sensor data to the App

Upload

Upload transfer of data from App to IrriMAX Live

Probe Administrator

The Probe Administrator is a Sentek trained or authorised person responsible for configuring all the probes for an individual customer (end user). Typically, a Sentek Distributor.

RSSI (Received Signal Strength Indicator)

This is the probes signal strength as detected by the App. Closer probes have a higher signal strength.

MAC Address

MAC Address "Media Access Control Address". The MAC address is manufactured into every network device and therefore cannot be changed.

GATT

GATT is an acronym for the Generic Attribute Profile, and it defines the way that two Bluetooth Low Energy devices transfer data back and forth using concepts called Services and Characteristics.

Battery

The probe battery is a high current Lithium-ion 3.6V AA battery. With normal use it should last up to 3 years. When the battery is becoming marginal it may continue sampling at 15-minute intervals while the field Test consecutive samples may fail, leaving the battery icon with orange or red bars. A 1.5V AA battery will not work in the probe.