

# Drill & Drop Probe Manual

For Bluetooth probes, Series II Interface probes and Series III probes

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Manual Rev 1.8 (2025-09-03)

## Statement of Compliance

### FCC note of compliance and statement of liability

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the 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 and, if not installed and used in accordance with the instructions, 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 to correct the interference by one or more of the following measures:

- Reorientation or relocation of the receiving antenna.
- Connection of the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consultation with the dealer or an experienced radio/TV technician.

### EMC approvals – Sentek Drill and Drop Bluetooth

The Drill & Drop Bluetooth probe is in compliance with all the applicable essential requirements, and other provisions of the Union Harmonization Legislation:

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

The following harmonised standards and technical specifications have been applied:

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.

AS/NZS 4268:2017

### EMC approvals – Sentek Drill and Drop Series III RS232, RS485

The Drill & Drop Series III RS232, RS285 probe is in compliance with all the applicable essential requirements, and other provisions of the Union Harmonization Legislation:

2014/30/EU – EC EMC Directive

The following harmonised standards and technical specifications have been applied:

EN 61326-1: 2013

Electrical equipment for measurement, control and laboratory use – EMC requirements. Part 1: General requirements.

FCC Part 15 Subpart B of the FCC Rules

Radio Frequency Devices – Unintentional Radiators

AS/NZS CISPR 32:2015

## EMC approvals – Sentek Drill and Drop Series III SDI-12

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The Drill & Drop Series III SDI12 system is in compliance with the following specifications:

CISPR 11:2010 Ed 5.1

Industrial Scientific and Medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics – Limits and methods of measurement

IEC 6132601:2012 Ed 2

Electrical equipment for measurement, control and laboratory use – EMC requirements. Part 1: General requirements.

FCC Part 15 Subpart B

Radio Frequency Devices – Unintentional Radiators

## EMC approvals – Sentek Drill and Drop Series II (interface box)

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The Drill & Drop system is in compliance with the following specifications:

FCC Part 15 Subpart B

Radio Frequency Devices – Unintentional Radiators

CISPR 11:2010 Ed 5.1

Industrial Scientific and Medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics – Limits and methods of measurement

IEC 6132601:2012 Ed 2

Electrical equipment for measurement, control and laboratory use – EMC requirements. Part 1: General requirements.

## RoHS

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EN 50581:2012

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

## Marking

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The above EMC approvals allow the product to be marked CE, C-tick and FCC.

## Modifications

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

## Radio Interference

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The probe is not to be operated in free air as it may cause interference to radio communication devices.

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## Product Overview

This manual covers the physical characteristics of Drill & Drop probe and it should be used in combination with the appropriate Sentek Hardware manual for which the probe is configured i.e. Sentek MULTI, Sentek PLUS, Sentek SDI-12 or RS232/485 Modbus, Sentek Bluetooth.

The Sentek Drill & Drop probe range has various options:

- **Drill & Drop Bluetooth**  
This probe is fully encapsulated and requires a Bluetooth Low Energy compatible device to test, configure or download data from the probe e.g. Android phone or tablet, Apple iPhone or iPad
- **Drill & Drop Series III**  
This probe has all the interface and electronics encapsulated in the probe rod with a 5m cable split into two connectors, one for probe test, configuring and programming with the other connector for data transmission.
- **Drill & Drop, interface Series II**  
This probe has the sensors encapsulated in the probe rod, with a permanent cable to an encapsulated Sentek Interface box (the "Brick"). The interface box has a 5 m attached data cable. The interface box has a connector for a Probe configuration cable. This cable is used by the Sentek Probe Configuration Utility (PConfig) to do probe test, configuring and programming.

Probes come in different lengths from 10 cm (Single Point Sensor) to 120 cm (12 sensors) – see table in *Features* section. The Single Point Sensor is available as SDI-12 only.

Probes can be configured for various Sentek data transmission units (DTU) Sentek MULTI, Sentek PLUS, Sentek Compact, or third-party loggers (SDI-12 and Modbus)

## References

Drill & Drop Installation Manual

Sentek Probe Configuration Utility

TriSCAN Agronomic User Manual

Sentek SDI-12 Series III Probe Interface Manual

Sentek Drill & Drop Bluetooth Probe Manual

RS232/485 MODBUS Series II Hardware Manual

Sentek MULTI Hardware Manual

Sentek PLUS Hardware Manual

Sentek PLUS All-in-One & Sentek Compact Hardware Manual

Sentek SOLO Hardware Manual

## Features

Sentek Drill & Drop probes are a fully sealed soil probe, designed for insertion into the ground, to measure soil water content, temperature and optionally, salinity.

The sensors and electronics are encapsulated in the probe plastic with a resin to prevent water intrusion and to strengthen the probe.

The probe itself is tapered, allowing for a fast and simple undisturbed installation in a majority of soil types using the Sentek tapered auger. This is important as the special installation technique provides high quality data measurements from the true soil profile, not from a surrounding slurry.

The sensors inside the Drill & Drop probe use capacitance (FDR) technology.

Drill & Drop probes can be completely buried and come in a range of cabled and cable-free options.

| Probe Length                            | 10 cm / 4"  | 30 cm / 12"                                     | 60 cm / 24"                                     | 90 cm / 36"                                     | 120 cm / 48"                                    |
|---|---|---|---|---|---|
| Number of Sensors                       | 1   | 3   | 6   | 9   | 12  |
| Outer Probe Diameter<br>Top:<br>Bottom: | 24.5*, 30 mm<br>24*, 27.5 mm                                | 30 mm<br>28.75 mm                               | 30 mm<br>27.5 mm                                | 30 mm<br>26.25 mm                               | 30 mm<br>25 mm                                  |
| Connection Protocols<br>Available       | SDI-12<br><br>Sentek<br>Bluetooth                           | SDI-12<br>RS232<br>RS485<br>Sentek<br>Bluetooth | SDI-12<br>RS232<br>RS485<br>Sentek<br>Bluetooth | SDI-12<br>RS232<br>RS485<br>Sentek<br>Bluetooth | SDI-12<br>RS232<br>RS485<br>Sentek<br>Bluetooth |
| Resolution                              | Moisture = 1:10,000 Salinity = 1:3,000 Temperature = 0.3 °C |   |   |   |   |
| Moisture Variation                      | 0.03% CV  |   |   |   |   |
| Temperature Accuracy                    | ±2 °C at 25 °C  |   |   |   |   |
| Operating Temperature                   | -20 °C to +60 °C  |   |   |   |   |

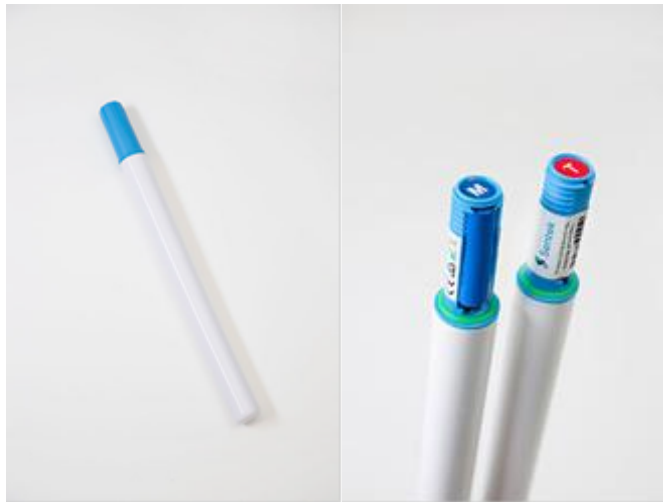
\* SDI-12 Single Sensor dimensions

### Drill & Drop Bluetooth Probe

The Bluetooth probe incorporates a Bluetooth Low Energy device that communicates using a Sentek proprietary GATT Profile that can communicate with a Sentek application in a mobile device.

The probe comes in five sensor configurations of 1, 3, 6, 9 or 12 sensors (10, 30, 60, 90 or 120 cm), 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.



Once the battery is installed in the probe and the probe is configured, it starts sampling the sensors and continuously advertises its presence to allow a Bluetooth mobile device to connect, configure and download data.

The App can be downloaded from the App Store for iOS devices or the Play Store for Android devices. The App can configure, test, and download data from the probe. With a suitable Internet connection, the downloaded data can be uploaded by the App to IrriMAX Live.

Probe cables are not required, because all communications are via Bluetooth using the App.

The section *Sentek Bluetooth Technical Specifications* describes the time before readings will be overwritten and expected battery life.

For further information see Sentek Drill & Drop Bluetooth Probe Manual.

## Drill & Drop Series III Probe

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The Series III probe consists of a probe rod with integrated electronics and associated cables. Two probe types are available RS232/RS485 or SDI-12:

- RS232 communication to a Sentek PLUS DTU
- RS485 communication to a Sentek MULTI DTU
- RS232 or RS485 to a third-party Modbus logger
- SDI-12 communications to a third-party SDI-12 logger.

For further information see the appropriate Sentek SDI-12 Series III Probe Interface Manual or RS232/485 MODBUS Series II Hardware Manual.

**Notes:**

The Sentek Compact DTU is considered equivalent to the Sentek PLUS DTU.

At present Sentek SOLO is not supported on Series III probes

## SDI-12 probes



The SDI-12 probe consists of the probe rod, containing both the interface and sensors, with a top connector attached to a 5.0 m cable, with a 3-pin connector. The 30 cm tail has a 3-pin connector to connect to the 5.0 m cable and bare wires suitable for connection to a third-party logger.

The SDI-12 probe can also be supplied with a permanently wired cable into the side of the probe.

Although the SDI-12 probe comes fully configured, the configuration can be changed with PConfig, using the SDI-12 protocol, connected through a special PConfig programming cable plugged into the 5.0 m cable connector.

The cable has an attached label showing the wire colours, the probe serial number and an indicator of sensor type; Moisture (M) or TriSCAN (T).

### Note:

The sensor type is indicated by the non-punched out coloured letter at the label edge.



Moisture probe label



TriSCAN (salinity) probe label

The Serial number is also present on side entry probes. The square QR bar code allows a mobile device to scan and take you to the IrriMAX Live web site.

## RS232/RS485 probes



The RS232/RS485 probe is preconfigured with the firmware appropriate to the DTU to which it will be connected i.e. Sentek PLUS, Sentek MULTI, Modbus RS232 or RS485 third party loggers.

You can change the probe type (RS232 or RS485) by uploading new firmware into the probe.

The probe rod contains the sensors and the DTU interface. It has a permanently attached 5.0 m cable. The cable incorporates a noise suppressing ferrite, with the cable end split into two connectors. The 14-pin connector is for DTU communication and the 3-pin connector for PConfig configuration, Test, and firmware update.

The top of the probe shows the probe serial number. The Cable has a label attached showing the serial number, an identification of the probe configuration; RS232 with PLUS and RS485 with MULTI or Modbus RS232 or RS485; and an indicator of sensor type; Moisture (M) or TriSCAN (T).



Generic probe label before marking interface type and punching out non-sensor type.



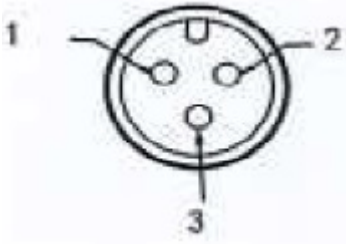
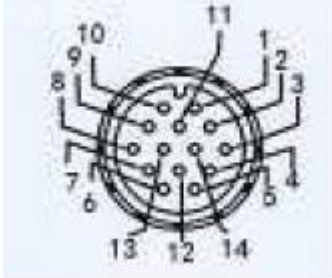
DTU and PConfig Connector cable





Sentek DTU connectors are prewired to use the appropriate pins.

Third party Modbus loggers must be wired as appropriate for RS485 or RS232 operation.

**Caution:**  
RS485 Modbus probes are shipped with a short tail cable which has the wires connecting A & T1 joined (pins 13/14) and B & T2 joined (pins 10/12). For multi-drop Modbus RS485 situations probes not at the end of the cable run must have these two joins disconnected.

| 3-pin connector (PConfig)   |        |        |       | 14-pin connector (to DTU)  |        |            |          |
|---|--------|--------|-------|--|--------|------------|----------|
|   |        |        |       |   |        |            |          |
|  |        |        |       |  |        |            |          |
| Colour  | Pin No | Signal | Usage | Colour   | Pin No | Signal     | Usage    |
| White   | 1      | TRX    | TTL   | Red  | 1      | +V         | Power    |
| Red   | 2      | TTX    | TTL   | Black  | 2      | 0V         | Power    |
| Green   | 3      | Gnd    | TTL   | Brown  | 3      | Switch Out | RS232    |
|   |        |        |       | Orange **  | 4      | TTX        | reserved |
|   |        |        |       | Yellow   | 5      | CTS        | RS232    |
|   |        |        |       | Green  | 6      | DTR        | RS232    |
|   |        |        |       | Blue   | 7      | TX         | RS232    |
|   |        |        |       | Purple   | 8      | RX         | RS232    |

|                      |  |      |          |     |       |       |    |   |       |      |    |     |          |                     |    |    |       |                    |    |   |       |                      |    |    |       |
|----------------------|--|------|----------|-----|-------|-------|----|---|-------|------|----|-----|----------|---------------------|----|----|-------|--------------------|----|---|-------|----------------------|----|----|-------|
|                      | <table><tr><td>Grey</td><td>9</td><td>RTS</td><td>RS232</td></tr><tr><td>White</td><td>10</td><td>B</td><td>RS485</td></tr><tr><td>Pink</td><td>11</td><td>TRX</td><td>reserved</td></tr><tr><td>Light Green / Black</td><td>12</td><td>T2</td><td>RS485</td></tr><tr><td>Light Blue / Black</td><td>13</td><td>A</td><td>RS485</td></tr><tr><td>Light Yellow / Black</td><td>14</td><td>T1</td><td>RS485</td></tr></table> <div><p><b>** Warning!</b></p><p>The 14-pin connector cable orange wire (pin 4) <b>must not</b> be connected on a Plus/Compact DTU. This is to prevent damage to the PConfig programming cable electronics. It is not connected within a 14-pin to 7-pin conversion cable.</p><p>If you manually wire a 14-pin connector with bare wire tail into a 7-pin Buccaneer DTU connector the orange wire <b>must not</b> be connected.</p><p>See section <i>Wiring the Series II Interface box Cable</i>.</p></div> | Grey | 9        | RTS | RS232 | White | 10 | B | RS485 | Pink | 11 | TRX | reserved | Light Green / Black | 12 | T2 | RS485 | Light Blue / Black | 13 | A | RS485 | Light Yellow / Black | 14 | T1 | RS485 |
| Grey                 | 9  | RTS  | RS232    |     |       |       |    |   |       |      |    |     |          |                     |    |    |       |                    |    |   |       |                      |    |    |       |
| White                | 10   | B    | RS485    |     |       |       |    |   |       |      |    |     |          |                     |    |    |       |                    |    |   |       |                      |    |    |       |
| Pink                 | 11   | TRX  | reserved |     |       |       |    |   |       |      |    |     |          |                     |    |    |       |                    |    |   |       |                      |    |    |       |
| Light Green / Black  | 12   | T2   | RS485    |     |       |       |    |   |       |      |    |     |          |                     |    |    |       |                    |    |   |       |                      |    |    |       |
| Light Blue / Black   | 13   | A    | RS485    |     |       |       |    |   |       |      |    |     |          |                     |    |    |       |                    |    |   |       |                      |    |    |       |
| Light Yellow / Black | 14   | T1   | RS485    |     |       |       |    |   |       |      |    |     |          |                     |    |    |       |                    |    |   |       |                      |    |    |       |
|                      | <p>14-Wire tail for Modbus loggers (wire colours are in above table)</p>    |      |          |     |       |       |    |   |       |      |    |     |          |                     |    |    |       |                    |    |   |       |                      |    |    |       |
|                      | <p>Series III Plus/MULTI probes are shipped with a Sentek DTU containing a 14-pin connector. Conversion cables are available to connect a Series III probe to an earlier Sentek DTU.</p>  <ul style="list-style-type: none"><li>• MULTI 14way to 4way part #61239</li><li>• Plus 14way to 7way part #61238</li></ul>   |      |          |     |       |       |    |   |       |      |    |     |          |                     |    |    |       |                    |    |   |       |                      |    |    |       |

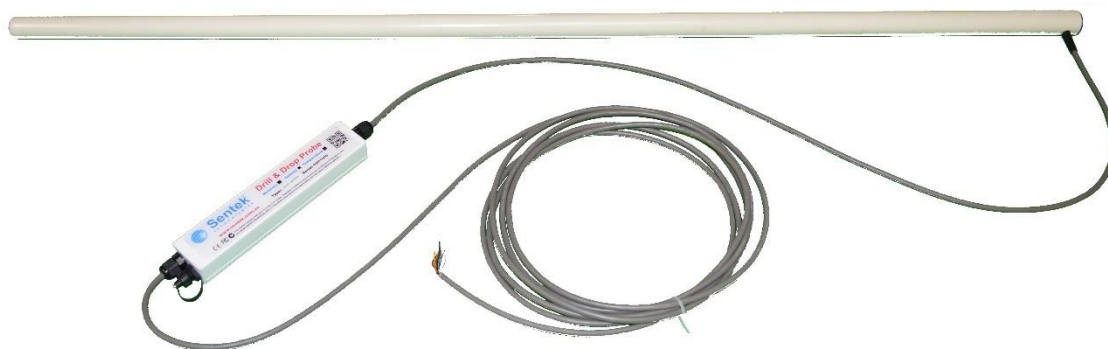
## Drill & Drop Series II Probe

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The Series II probe features a probe, with integrated sensor electronics, permanently wired to an encapsulated interface box (the "Brick"). Featuring a 3-pin connector (for configuration and firmware updates) the interface box is available in two types:

- RS232 communications for a Sentek Plus, Compact DTU, Solo, or Modbus
- RS485 communications for a Sentek MULTI DTU, or Modbus

For further information see the RS232/485 MODBUS Series II Hardware Manual and Additional Information – Wiring the Series II Interface box Cable.



## Installation Guide

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

**Note:**

All Drill & Drop probes are preconfigured and do not need Auto-detect sensors, set depths, or normalise sensors.

### Configuring SDI-12 Series III probes

This SDI-12 probe is configured through the on-probe SDI-12 connector. You must use the SDI-12 Programming cable.

1. Unplug the SDI-12 logger from the probe cable (if needed).
2. Plug the SDI-12 programming cable into the 3-pin connector on the probe cable.
3. Plug the USB connector on the Probe programming cable into a USB port on your computer. The probe is powered through the USB 5V supply.
4. Run PConfig on your computer, select Baud rate Auto, or 1200, and connect to the relevant USB COM port. PConfig connects at 1200 baud and uses SDI-12 communication protocol.
5. If the probe will be used in a multi-drop (a series of probes on one SDI-12 cable), change the SDI 12 probe address to a unique address for each probe, i.e. 0-9, A-Z and a-z. Consult your SDI-12 logger installation instructions for any constraints.

**Caution:**

PConfig does not support multi-drop, so disconnect other probes from the SDI-12 cable while configuring each probe.

### Configuring PLUS, MULTI or Modbus probes

For full setup description see the appropriate:

- Sentek Plus Hardware Manual
  - Sentek All-in-One and Sentek Compact Hardware Manual
  - Sentek MULTI Hardware Manual
  - Modbus third party logger documentation
1. If not already connected, plug the "14-pin DTU Connector cable" into the DTU (or Modbus third party logger). You may need a conversion cable if you have an earlier style Sentek DTU.



DTU Connector cable, Conversion cable, Modbus cable

2. Plug the probe Programming cable into the "3-pin Connector cable" and into a USB port on your computer.

3. Ensure the DTU (or logger) is powered on.
4. Run PConfig on your computer and connect to the USB COM port.
5. Set required parameters in the PConfig:
  - a. Synchronise Interface clock to computer clock
  - b. Enter Upload URL (preconfigured on IrriMAX Live configurations)
  - c. Sample interval (preconfigured to 30 minutes on IrriMAX Live configurations)
  - d. Sample upload count (preconfigured to 6, for upload every 3 hours)
  - e. Ensure you have the SIM card in the DTU modem, the Network tab APN matches the SIM card service provider, and if required the SIM PIN.
6. Verify the probe is operational by performing
  - a. PConfig Query All Sensors test, showing the expected number and types of sensors
  - b. PConfig Modem Test, expect a last response of 040 Success.

## Usage Guide

### Sentek Probe Configuration Utility

**Warning!**

Probes are supplied pre-normalised. Modifying normalisation information stored in the Drill & Drop probe may result in incorrect sensor readings.

The Probe Configuration Utility (PConfig) is provided to configure probe interfaces with depth location, normalisation values (air and water counts) and calibration information for each sensor installed on the probe. This information is stored in non-volatile memory and is used to produce the calculated value (value that has been processed via the interfaces calibration formula) from each sensor on the probe.

It is not necessary to configure the sensors or normalise Drill & Drop probes as they are sold fully preconfigured and normalised. An optional Drill & Drop PConfig cable is available if needed.

See the Probe Configuration Utility manual or its online help for further information.

### Plus/MULTI/Compact DTU

The sampling interval, Web URL address etc. in the interface must be setup during commissioning the probe.

### Setting the SDI-12 Address

Drill & Drop SDI-12 probes are preconfigured to SDI-12 address 0.

If multiple probes are on the one SDI-12 bus it will be necessary to use either your SDI-12 logger or PConfig to change the SDI-12 address of the probe in the range "0" to "9", "A" to "Z" and "a" to "z".

**Note:**

For SDI-12 probes, PConfig Sensor Test tab page only shows the calibrated value.

### About the SDI-12 Communication

See the Sentek Drill & Drop SDI-12 Series III Probe Manual for a description of SDI-12 communication to a Sentek probe.

## Maintenance Guidelines

### Storage

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When not installed in soil, Drill & Drop probes should be stored in a sheltered environment, shielded from extreme temperatures, direct sunlight, and high humidity.

Probes should be stored flat to avoid warping of the probe shape. Leaning probes against a wall for an extended period should be avoided.

Some bend in a Drill & Drop probe is acceptable and should not interfere with the installation of the probe in the majority of soil types. A general guide for an acceptable bend is 5mm of deflection for a 120cm probe; i.e. probe laid on a true straight edge, with no part of the probe more than 5mm from the reference edge.

### Cable

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Corroded, shorting and broken wires can affect the operation of the equipment. Regular inspection of the cabling for damage from insects, animals or machinery should be carried out. If necessary, the cabling can be elevated or buried away from potential damaging elements.

Sentek recommends protecting exposed cable with some form of conduit.

### Connectors

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The connectors fitted to Drill & Drop probes are designed to resist dust and moisture when installed and connected correctly. The connectors will lose their water resistance when not used correctly.

To avoid cross threading the locking ring, be sure that the two halves of the connectors are pushed flat all the way together before screwing them tight.

Ensure sealing caps are used on each connector when disconnected.

### Service Schedule

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#### 12 months

Check connector pins for signs of corrosion or moisture

Check cables for damage to outer sheath and wires

Ensure all cables are neat

# Sentek Bluetooth Technical Specifications

All sensors and electronics are encapsulated within the probe rod. The probe rod cannot be disassembled, apart from accessing the battery in the top cap.

## 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.

The table below is a guide to the time before samples are overwritten for various sample intervals. Existing data must be downloaded before this time is exceeded to avoid data loss.

| Sampling Interval | Logging Time |
|-------------------|--------------|
| 1 minute          | 1.3 days     |
| 5 minutes         | 6.7 days     |
| 15 minutes        | 20.1 days    |
| 30 minutes        | 40.3 days    |
| 1 hour            | 80.3 days    |
| 2 hours           | 156 days     |
| 4 hours           | 295 days     |
| 6 hours           | 422 days     |

## 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 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       |

### Warning!

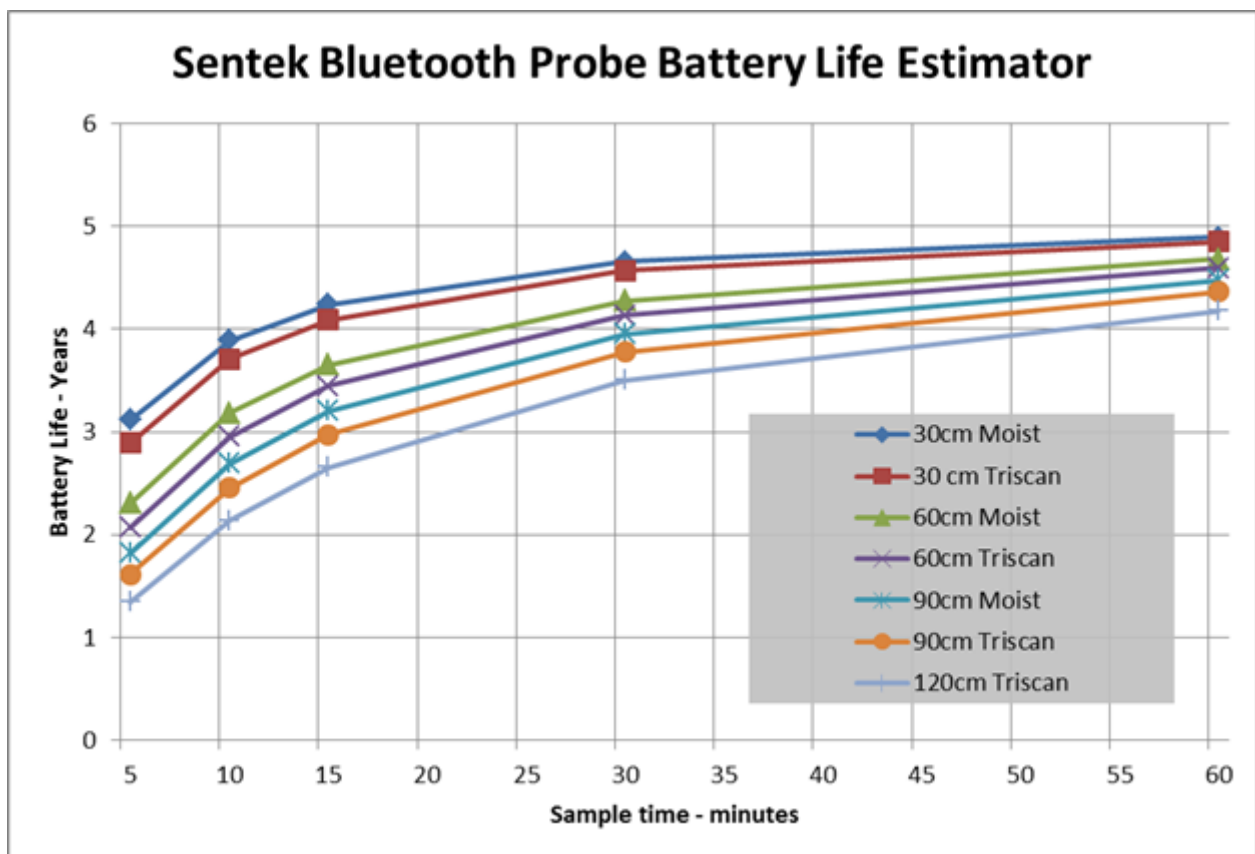
For reliable operation the Sentek supplied high current Lithium-Ion battery should be used.  
1.5 V AA cells are not suitable

## Battery Life

The following graph shows the typical battery life (in years) for the Bluetooth Probe 3.6V Lithium-ion battery. As shown TriSCAN probes have slightly shorter battery life than moisture only probes. The greatest effect is the number of sensors (probe length). The default sample rate is 30 minutes, which is suitable for most applications.

An example is:

3.5 years of continuous operation for a 120 cm / 4 ft TriSCAN probe using default 30-minute sample interval and 2 downloads per day from one mobile device.



## Series III RS232/RS485 Technical Specifications

### Interface Protocols

|       |  |
|-------|--|
| RS232 | Plus, Compact<br>Modbus  |
| RS485 | MULTI<br>Modbus  |
| TTL   | PConfig, Firmware Wizard<br>1200, 2400, 9600 (default), 19200 and 38400 baud |

### Sensors

All sensors and electronics are encapsulated within the probe rod.

#### Moisture

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

#### TriSCAN

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

**Note:**

The Series III RS232/RS485 probes use 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

#### Voltage

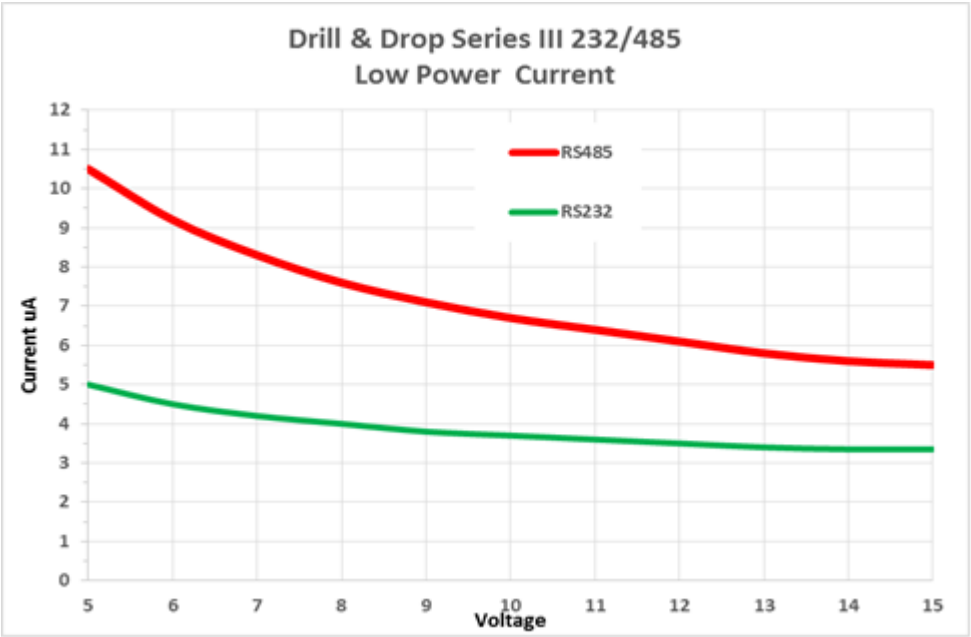
|          |           |
|----------|-----------|
| Nominal: | 12 V (DC) |
| Minimum: | 5 V (DC)  |
| Maximum: | 15 V (DC) |

#### Current consumption and Time to sample

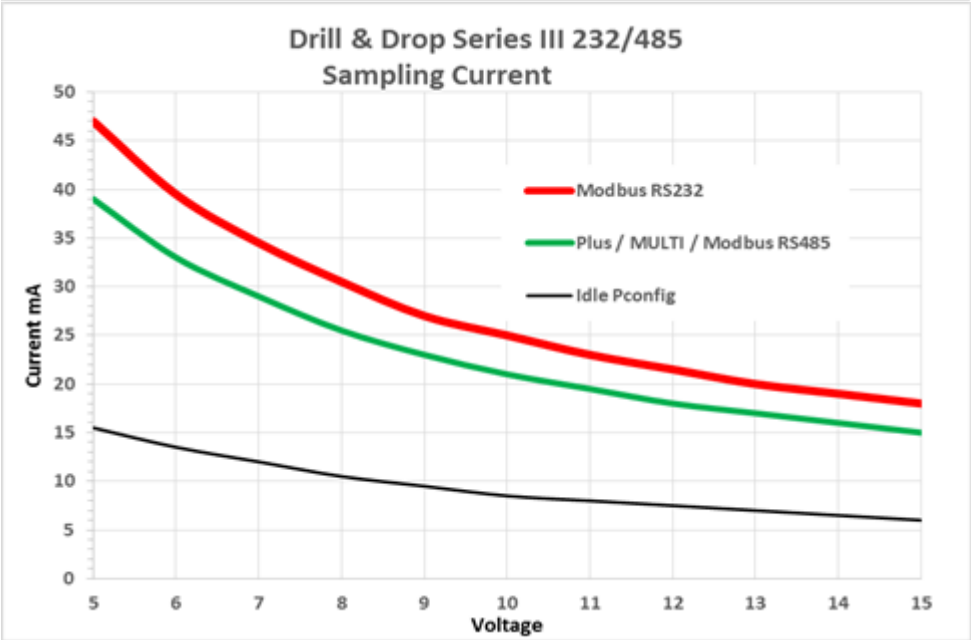
The following graphs show the Low power and sampling current. The sampling current may be combined with the measurement time graph to estimate energy consumption.

Mode: Series III RS232/RS485

RS232/RS485 Low power current

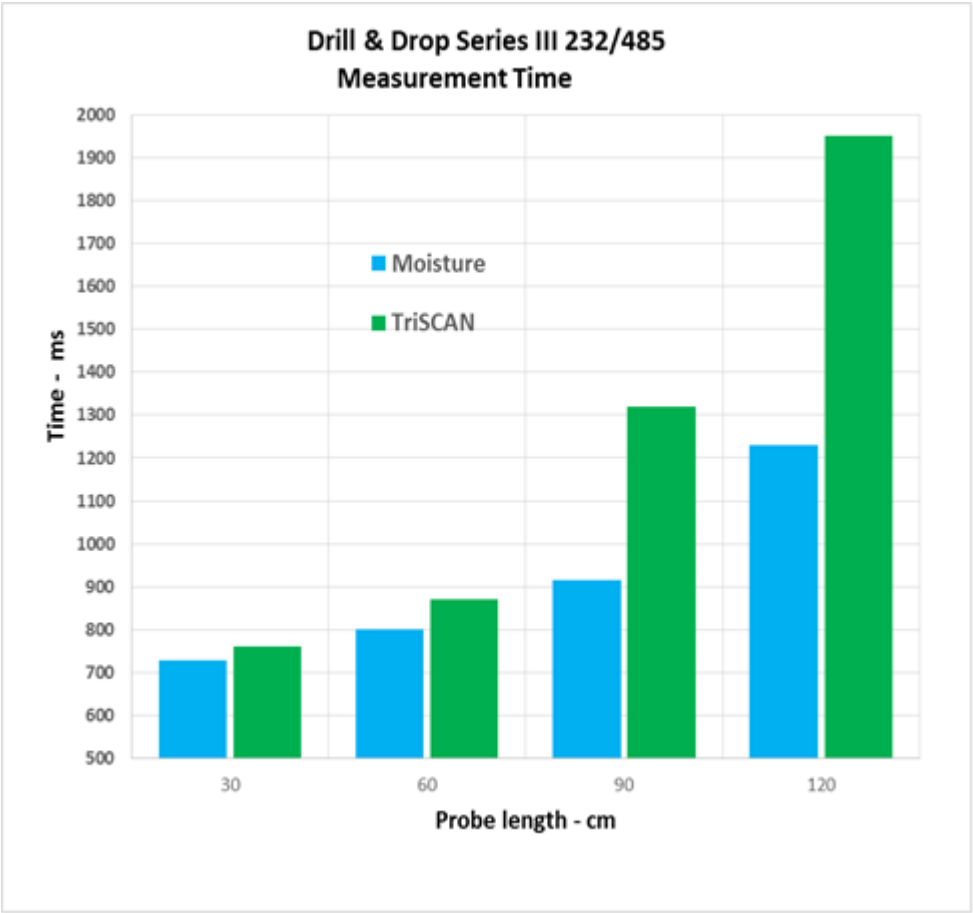


RS232/RS485 Sampling Current



Mode: Series III RS232/RS485

RS232/RS485  
Measurement time



# Series III SDI-12 Technical Specifications

## Protocol

SDI-12 Protocol:

Version 1.3

## Sensors

All sensors and electronics are encapsulated within the probe rod.

### Moisture

Resolution: 1:10,000

Variation: 0.03% CV

### TriSCAN

Resolution: 1:3,000

Variation: 0.2% CV

### Temperature

Range (operating): -20 °C to +60 °C

Resolution: 0.3 °C

Accuracy: ±2 °C at 25 °C

## Measurement time

Sensors are measured starting from the bottom sensor (3, 6, 9 or 12).

Typical time to sample sensors is shown in the table below.

| SDI-12<br>Command | Sensor type                | Measurement Time (ms) |       |       |       |        |
|-------------------|----------------------------|-----------------------|-------|-------|-------|--------|
|                   |                            | 10 cm                 | 30 cm | 60 cm | 90 cm | 120 cm |
| C!                | Moisture                   | 514                   | 742   | 768   | 1278  | 1872   |
| C1!               | Salinity                   | 539                   | 817   | 930   | 1539  | 2244   |
| C2!               | Temperature                | 24                    | 72    | 174   | 306   | 468    |
| M!                | Moisture values 1 – 9      | 514                   | 742   | 768   | 1278  | 1404   |
| M1!               | Moisture values 10 – 12    | x                     | x     | x     | x     | 868    |
| M2!               | Salinity values 1 – 9      | 539                   | 817   | 930   | 1539  | 1683   |
| M3!               | Salinity values 10 – 12    | x                     | x     | x     | x     | 961    |
| M4!               | Temperature values 1 – 9   | 24                    | 72    | 174   | 306   | 351    |
| M5!               | Temperature values 10 – 12 | x                     | x     |       | x     | 117    |

## Supply

### Voltage

|          |               |
|----------|---------------|
| Nominal: | 12 V (DC)     |
| Minimum: | 2.7 V (DC) ** |
| Maximum: | 15 V (DC)     |

#### Notes:

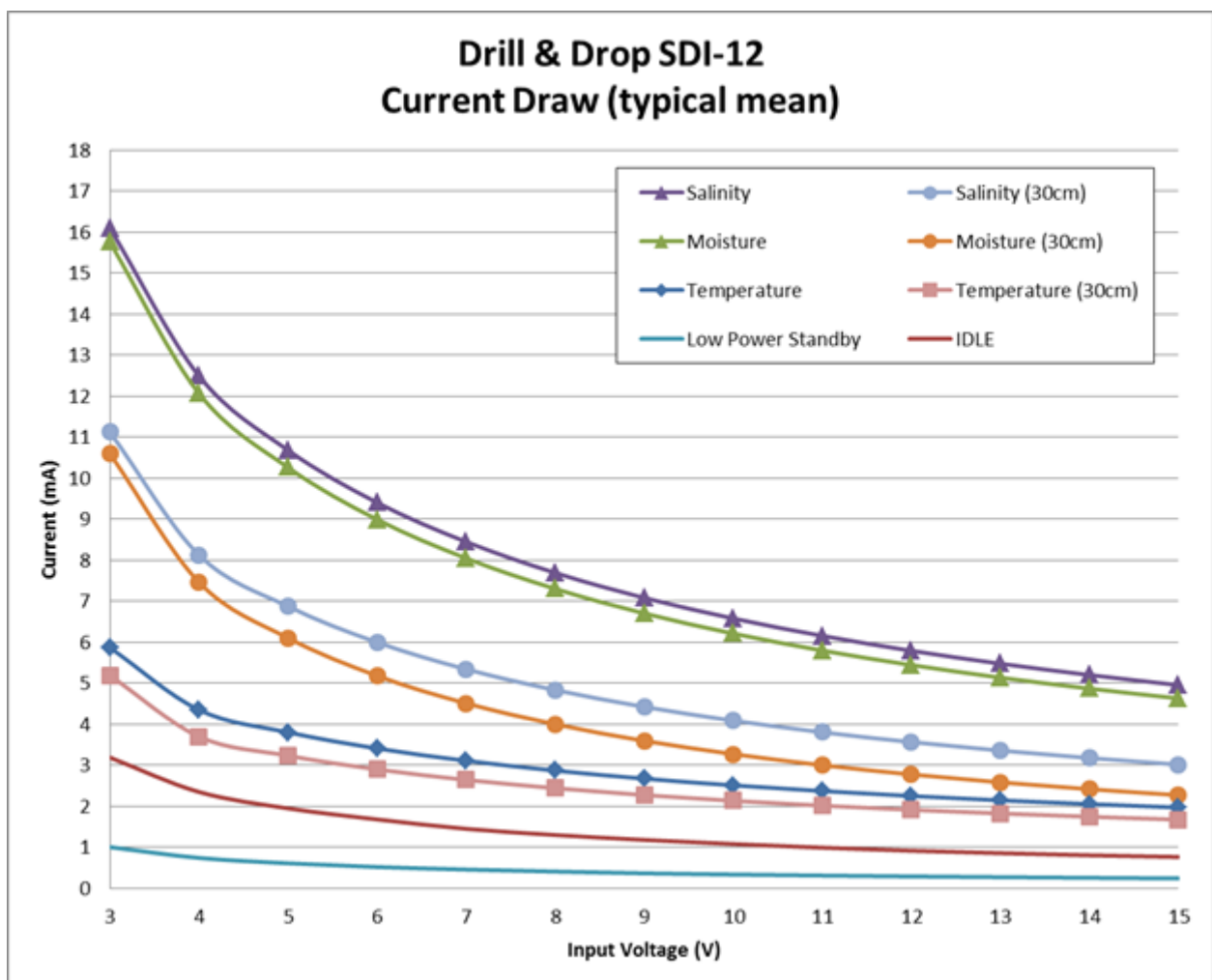
When operating below 5 V the probe will still drive the SDI-12 data line at the 5 V specification, thus the attached logger will also need to be 5 V tolerant.

Permanent damage may result if the probe is operated above 15 V for extended periods of time. Above 15 V the probe will draw higher current (up to 100 mA).

\*\* Minimum supply is 5 V (DC) for Single Point Sensor

### Current consumption

The graph below shows the typical current consumption for each sensor (for non- Single Point Sensor probes). More sensors result in the same current drawn for a longer time. 30cm (3 sensors) probes draw less current than longer probes.



*Single Point Sensor SDI-12*

Single Point Sensor SDI-12 probes draw a fixed current, independent of the input voltage (+Vin) as follows:

|              |        |
|--------------|--------|
| Salinity:    | 6.9 mA |
| Moisture:    | 6.1 mA |
| Temperature: | 3.2 mA |
| Idle:        | 2.0 mA |
| Low Power:   | 0.6 mA |

## Series II Interface Box D&D Probe Technical Specifications

All probe sensors are encapsulated within the probe rod. The interface box (Series II) is also encapsulated and its cable to the probe rod cannot be disconnected.

### Interface Protocols

|       |  |
|-------|--|
| RS232 | Solo<br>Plus, Compact<br>Modbus  |
| RS485 | MULTI<br>Modbus  |
| TTL   | PConfig, Firmware Wizard<br>1200, 2400, 9600 (default), 19200 and 38400 baud |

### Sensors

#### Moisture

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

#### TriSCAN

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

#### Temperature

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

#### Time to sample

|             |   |
|-------------|---|
| 12 sensors: | 1.8 seconds; moisture and temperature<br>2.2 seconds; moisture, TriSCAN and temperature |
| 6 sensors:  | 1.1 seconds; moisture and temperature<br>1.3 seconds; moisture, TriSCAN and temperature |

## Supply

---

### Voltage

|          |           |
|----------|-----------|
| Nominal: | 12 V (DC) |
| Minimum: | 5 V (DC)  |
| Maximum: | 15 V (DC) |

### Current consumption

|                     |   |
|---------------------|---|
| Standby:            | 400 $\mu$ A at 12 V<br>800 $\mu$ A at 6 V |
| Active:             | 9 mA at 12 V<br>16 mA at 6 V              |
| Sampling (average): | 25 mA at 12 V<br>45 mA at 6 V             |

Current is measured at the interface with production version 2.4 manufactured in 2013.

## Additional Information

### Wiring the Series II Interface box Cable

#### Warning!

Drill & Drop probes are preconfigured, based on the product ordered, with the appropriate firmware and cable plug for Sentek Plus, Sentek SOLO, Sentek MULTI and Sentek Compact.



For probes that need to be wired, there are three cable configurations. The "Type" label on the Drill & Drop Interface box identifies which type of probe is relevant.

#### Caution:

Damage to the Drill & Drop cable may result in moisture entering the cable, resulting in corrosion and device failure.

### Sentek MULTI and Modbus RS485 probes

The Sentek MULTI DTU has a built-in connector which uses a four pin "Buccaneer" plug. If required, the probe end connector can be ordered as Sentek Part number:

04086 Sentek MULTI, Probe Cable Connector



For detailed wiring steps, see section Sentek MULTI Probe Cable Connector in the Sentek MULTI Hardware Manual.

A Modbus RS485 probe requires connection to a third-party logger, so no cable connector can be specified.

| 485 Cable           | +Vin | 0V    | A    | B     | N/C    |
|---------------------|------|-------|------|-------|--------|
| 5-wire cable        | Red  | Green | Blue | White | Yellow |
| MULTI Connector Pin | 1    | 2     | 3    | 4     |        |

## Sentek PLUS, Sentek Compact and Modbus RS232 probes

The Sentek PLUS DTU has a connector which uses a seven pin "Buccaneer" plug. If required, this connector can be ordered as Sentek Part number:

61249 Watertight connector, Sentek PLUS, Probe end



For detailed wiring steps, see section C. Install EnviroSCAN Flat Cap probe (common to all probe types) in the Sentek Plus Hardware Manual.

A Modbus RS232 probe requires connection to a third-party logger, so no cable connector can be specified.

| 232 Cable             | +Vin | Switch In                        | Switch Out | 0V    | TX   | RX     | DTR   | CTS    | N/C    |
|-----------------------|------|----------------------------------|------------|-------|------|--------|-------|--------|--------|
| 9 wire cable          | Red  | Orange                           | Brown      | Black | Blue | Purple | Green | Yellow | Grey   |
| Plus 7-pin Connector  | 1    | wired to Red pin 1               | 2          | 3     | 4    | 5      | 6     | Centre | No pin |
| Plus 14-pin Connector | 1    | not connected<br>See ** Warning! | 3          | 2     | 7    | 8      | 6     | 5      |        |

If the Sentek Plus DTU does not have a cable with Buccaneer connector, the Drill & Drop probe cable can be wired directly into connector X2 on the PLUS solar charger board. See section Sentek Plus DTU in the Sentek Plus Hardware Manual.

For Plus 14-pin connector wire colours and codes see section *DTU and PConfig Connector cable*.

### \*\* Warning!

The 14-pin connector cable orange wire (pin 4) **must not** be connected on a Plus/COMPACT DTU. This is to prevent damage to the PConfig programming cable electronics. It is not connected within a 14-pin to 7-pin conversion cable.

If you manually wire a 14-pin connector with bare wire tail into a 7-pin Buccaneer DTU connector the Orange wire **must not** be connected (to the red wire).