Sentek™ SOLO

Hardware Manual

Version 1.4

SENTEK SOLO – STATEMENTS OF COMPLIANCE

FCC NOTE OF COMPLIANCE AND STATEMENT OF LIABILITY

Electro-Magnetic Compliance

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

The Sentek *SOLO* system complies with the following specifications;

- FCC Part 15 Subpart B
  Radio Frequency Devices – Unintentional Radiators
- CISPR 11:2009
  Industrial Scientific and Medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics – Limits and methods of measurement
- 61000.6.1:2005
  Generic standards—Immunity for residential, commercial and light industrial environments

MARKING

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

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SENTEK SOLO INTRODUCTION

BACKGROUND

Sentek SOLO is a cost effective, continuous soil moisture and salinity monitoring solution. The system consists of a battery powered, logging probe connected to a Head Unit, which allows for in-field download via a laptop or SoloPORTER. The data captured is displayed in Sentek's IrriMAX software, allowing for user friendly measurement and management of data.

Sentek SOLO can use the EnviroSCAN or EasyAG probe and can utilize Sentek soil moisture or TriSCAN (salinity) sensors.

Sentek SOLO provides an economical way for Diviner 2000 users to upgrade into continuous soil moisture monitoring. Sentek SOLO utilizes the same interface as the Sentek PLUS, allowing for simple upgrade to wireless, web compatible communications.

Sentek SOLO combines the proven sensor technology of the world's most used soil water monitoring solution, EnviroSCAN.
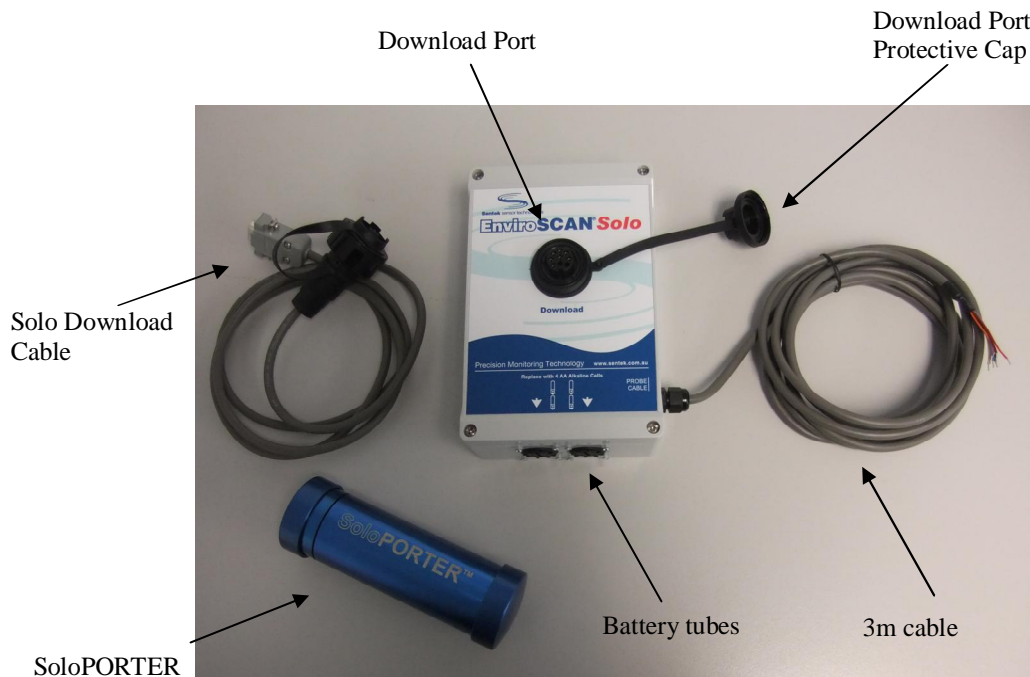

Figure 1: Sentek SOLO

REFERENCED DOCUMENTS

- Sentek SoloPORTER Hardware Manual
- Access Tube Installation Guide
- EasyAG Installation Guide
- Probe Configuration Utility User Guide (and online help) Version 1.7.2 or later (PConfig)
- IrriMAX User Guide (and online help)
- IrriMAX Data Exchange User Guide (and online help)
- EnviroSCAN probe assembly V2.1.ppt (On Distributor kit CD)

FEATURES

Sentek SOLO Probe

- Reads sensors and stores readings
- Configured using Sentek's Probe Configuration Utility Software
- Utilises Sentek moisture and TriSCAN sensors
- Simple upgrade to Sentek PLUS
- Upgradable to Sentek MULTI and third party telemetry options
- Provides continuous soil moisture data and salinity data
- Probe can store over 2000 samples (21 days @ 15 minute sampling intervals)
- Available as both EasyAG and EnviroSCAN probes
- Downloading available from the probe via the SoloPORTER or Solo Download Cable

Sentek SOLO Head Unit

- Power supply and download access for probe
- No in-field data logger or solar panel required. Logged soil moisture and salinity data is stored within the probe interface
- Single probe per Sentek SOLO Head Unit
- Powered by 4 replaceable "off the shelf" alkaline or lithium AA batteries
- Robust download port for in-field downloading
- Inconspicuous, lightweight design
- Flexible Head Unit placement
- Easy to service with simple components
- Easy to move between sites
- Supplied with 3m of cable
- Supplied with 2 mounting brackets

Download Options

SoloPORTER

- Data uploaded from Sentek SOLO probe to SoloPORTER via Head Unit download port
- Download data from SoloPORTER USB to computer for display in Sentek's IrriMAX software
- USB flash drive size determines data storage capacity
- Durable and light-weight design
- Download and battery power indicator lights
- Powered by removable "off the shelf" 9V alkaline or lithium battery

Solo Download Cable

- Data uploaded from Sentek SOLO probe to laptop via the Solo Head unit and Solo Download Cable
- Download cable connects to computer through serial port

HARDWARE REQUIREMENT LIST FOR SENTEK SOLO

- Sentek SOLO Head Unit
- EnviroSCAN Probe including sensors and EnviroSCAN RS232 interface or
- EasyAG probe with RS232 Interface
- XPI-Solo Firmware version 1.2.2 or higher in the RS232 Interface
- 4x AA alkaline or lithium batteries
- Solo Download Cable or Probe Programming Cable (for PConfig)
- Probe Configuration Utility (PConfig, version 1.7.2 or higher)
- SoloPORTER (optional)

SYSTEM SETUP

HARDWARE SETUP

Sentek SOLO Probes

1. Assemble probe as per EnviroSCAN probe assembly training document (see Referenced Documents)

2. Make certain that JP201 on the interface is not connected (see *Solo Head Unit & Probe* Troubleshooting Guide for more information).

3. Place ferrite bead on grey data cable of Solo Head Unit

4. Insert the grey data cable through the cable gland on top cap into the access tube, and refit ferrite bead as close as possible to the probe

5. Connect the grey data cable to the green Phoenix connector at the top of the probe interface in order of colours shown in Figure 2 and Figure 3 below.

Probe Cable

$+V_{IN}$	Red
$+V_{IN}$ (T)	Orange
$+V_{OUT}$ (T)	Brown
Ground	Black
TX	Blue
RX	Purple
RTS	Green
CTS	Yellow
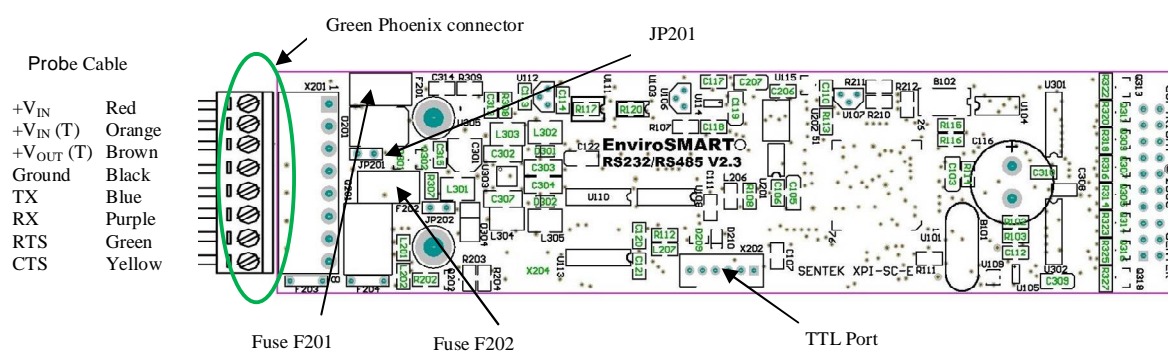
Figure 2: EnviroSCAN Series II RS232 probe interface wiring
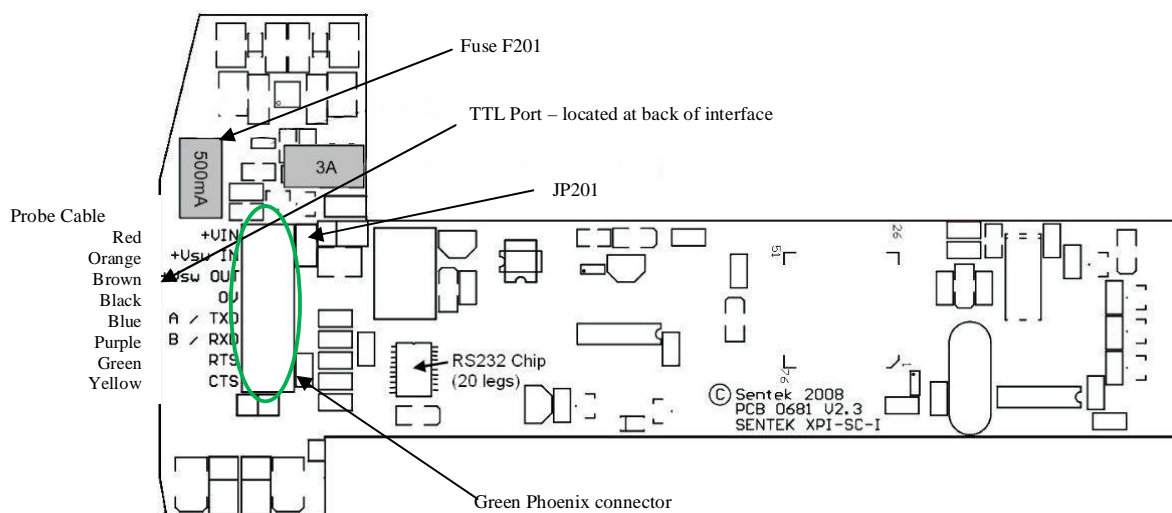
Figure 3: EasyAG Series II RS232 probe interface wiring

Sentek SOLO Head Unit

1. Remove the battery caps that sit in front of the battery tubes at the base of the Head Unit as indicated below, a small coin may be useful to help unscrew the battery caps:

2. Insert the AA alkaline or lithium batteries into the battery tubes making certain that the batteries are inserted in the correct orientation as illustrated on the face of the Head Unit.

> Note: Beware of batteries that do not have the labels 'Alkaline' or 'Lithium' as they are often Zinc-Carbon or Zinc-Chloride. Although these could be marked as 'heavy duty' or 'super heavy duty' they are vastly inferior to Alkaline and Lithium batteries

3. Place the battery caps back onto the battery tubes (as previously, a small coin may be useful for this step):

4. The Sentek SOLO Head Unit comes with 2 x mounting brackets, allowing for either a horizontal or vertical orientation. Attach the mounting brackets in the desired position at the back of the Head Unit with supplied screws.
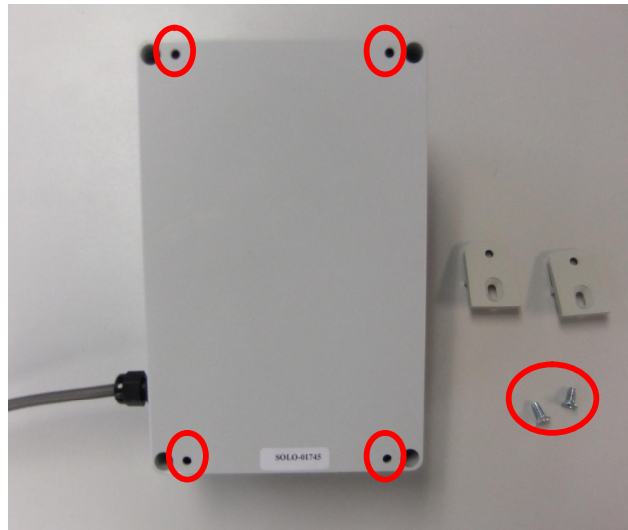
WARNING:
Do not drill new holes in the Solo Head Unit as this may compromise the moisture exclusion integrity.

PROBE CONFIGURATION

Sentek SOLO probes can be configured either through the Head Unit using a Solo Download Cable or through the TTL port on the probe interface using a PConfig cable. Please refer to the PConfig User Guide or Help file for the complete usage instructions on how to configure Sentek probes.

Probe Configuration Utility (PConfig) Software

Open Probe Configuration Utility software and check that the probe interface has the latest firmware version. This can be found in the bottom right hand section of Probe Configuration Utility. The latest version is available on Sentek's website.
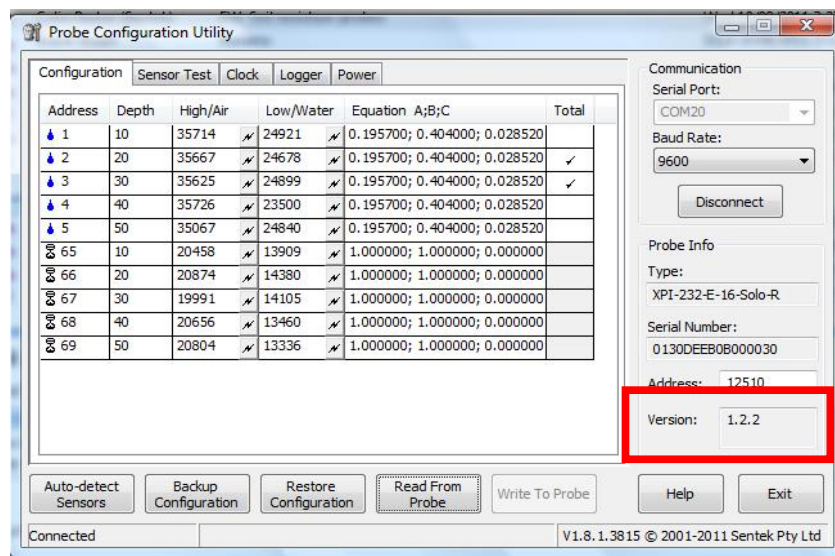
Figure 4: Checking interface firmware in Probe Configuration Utility

Configuration tab

1. Press the **Auto-detect Sensors** button to force the probe interface to read what sensors are attached to the probe

2. Within the Configuration tab, set the depth of each sensor by clicking inside each cell within the Depth column and change the number by either clicking the up and down arrows or by typing the depth in. Sensors with addresses from 65 – 80 (Salinity) will automatically update depths once all other configuration information has been entered and written.

3. Normalise probe (air and water counts)

   a) To obtain the High (Air) counts for each sensor; place the probe **inside its access tube**. Then ensure that there are no obstacles (i.e. hands, cables, soil, tables etc.) within the sensor's sphere of influence (20cm) and click on the header row of the High/ Air column so that the interface takes a reading from each sensor.

   > **Note:** Alternatively, the Air counts can be taken one sensor at a time by clicking on the lightning bolt next to each sensor

   b) To obtain the Low (Water) counts, fill your Normalisation Container with water, slide the probe into the access tube until the first sensor is in the middle of the container. In the Low/Water column click on the lightning bolt in the corresponding row of the sensor being read. Repeat for each sensor, and remember to take a water reading for both moisture and VIC when normalizing TriSCAN sensors.

> **Important:** VIC water counts must be taken in reverse osmosis (RO) water (EC less than 300µS/cm). Always normalise sensors under the same conditions to ensure maximum repeatability.

4. If required, enter custom calibration coefficients for each sensor. Each coefficient should be separated by a semicolon (i.e. A;B;C). See the Sentek Calibration Manual for more information.

5. Save these settings to the probe by clicking **Write to Probe**.
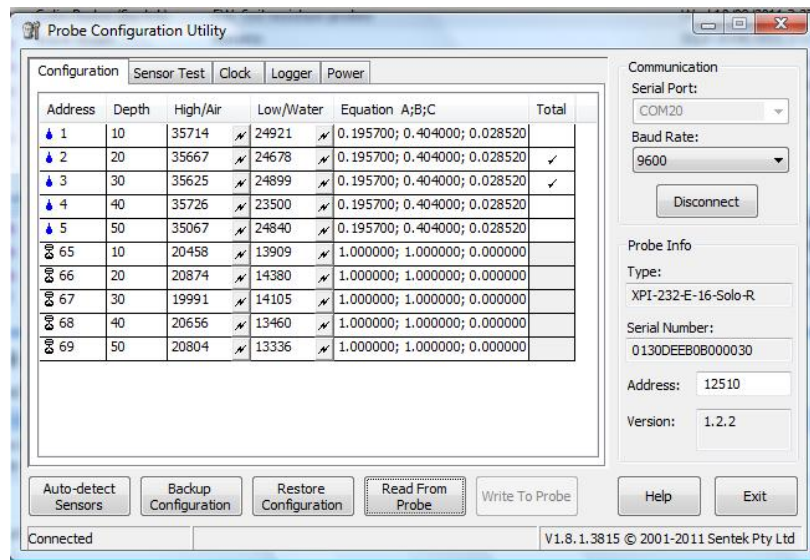
Figure 5: Configuration tab

Clock tab

1. Click on the **Clock** tab to display the clock settings. Decide how often the probe should take a reading and set the desired sampling interval accordingly.

> **WARNING:**
> Probes can only store about 2000 samples, after which the oldest samples are discarded. You must download before this capacity is reached, otherwise new samples will overwrite the oldest samples. The number of days before overwriting is dependent on the sample interval. A scenario of 10 minute sampling gives approximately 14 days before a download is required.

2. Set the probe clock to the desired time (usually probe local time) by either typing it in or synchronizing it with your computer clock.

3. Write to Probe
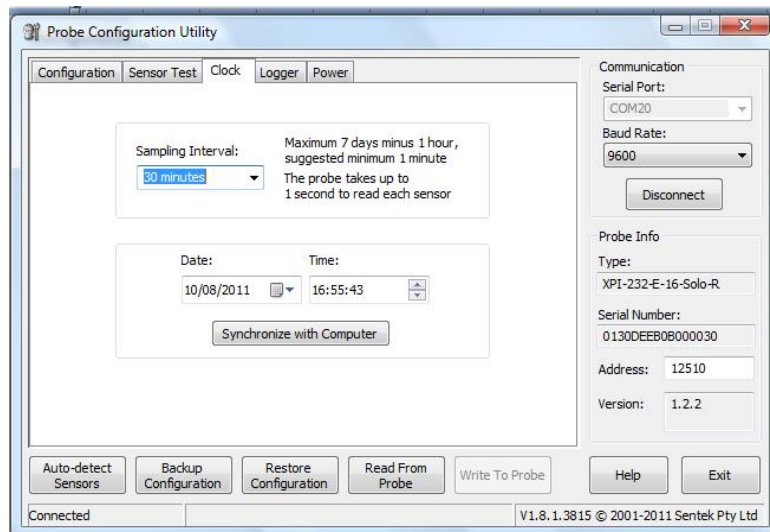
Figure 6: Clock tab

Logger tab

1. Select Logger tab and type in a Logger ID specific to the probe so that the data can be identified later. 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 underscores and cannot contain any spaces.

2. Set your desired **Sample Origin**. This determines when the first reading will be taken by the interface. All subsequent readings will use the Sample Origin as a starting reference. I.e. if the Sample Interval is 1 hour, and the Sample Origin is midnight, but the probe is only switched on at 7:05am, the first reading will occur at 8:00am, then 9am, 10am etc.

3. **Last Response**: This is the result of the last attempt to upload to a SoloPORTER, see SoloPORTER Hardware Manual for a description of the response codes.

4. Press the **Delete Readings** button to delete any unwanted data that may have been recorded

5. **Write to Probe**
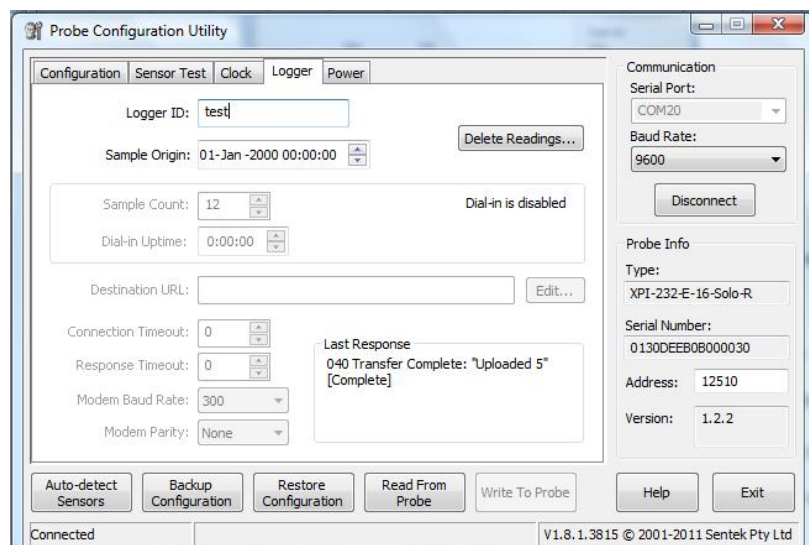
Figure 7: Logger tab

Power tab

1. Select **Power** tab to show the battery voltage supplied to the probe. The probe operating thresholds should only be changed after advice from Sentek. The probe supply voltage should be ≈ 6.1V with new batteries.
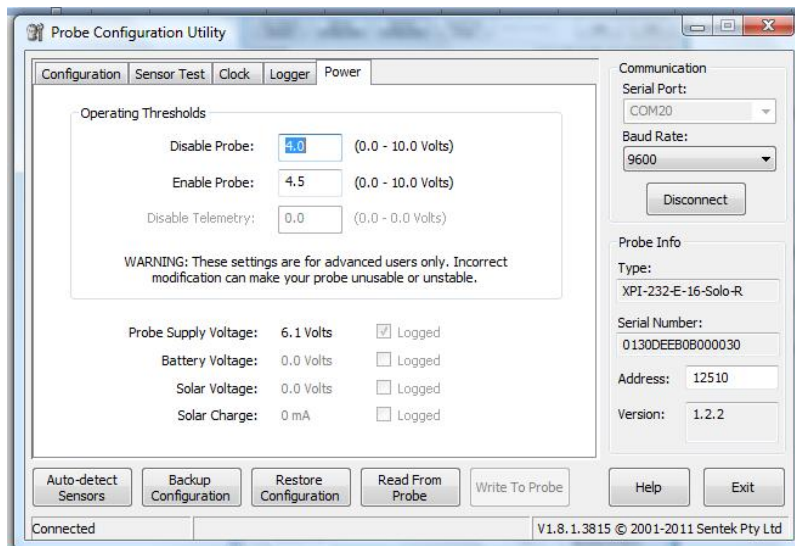
Figure 8: Power tab

WARNING:
The *Disable Probe* voltage value should always be 4 volts or higher

Sensor Test tab

1. Within the Sensor Test tab check sensors are working and reporting values by selecting "**Query All Sensors**". When the probe is correctly configured and installed there should be no INVALID readings for "Calibrated Value" of individual sensors (ignore the "Total" row).

2. To stop sensor test click "**Stop Sensor Querying**"

3. Make sure all changes have been written to probe

4. Back up configuration by clicking on **Backup Configuration**, and saving to a desired location.

FIELD INSTALLATION

1. Install access tubes and mounting poles per the Sentek installation manuals (EnviroSCAN or EasyAG).

2. Secure Solo Head Unit to mounting pole or post using mounting brackets

3. Place ferrite bead on grey data cable

4. Insert the grey data cable through the cable gland on top cap into the access tube, and refit ferrite bead as close as possible to the probe

5. Install the probe with the sensors configured as required. (See Probe Configuration Utility manual for configuration information)

6. Connect the Solo Head Unit cable to the green Phoenix connector at the top of the probe interface in order of colours shown in Figure 2 and Figure 3.

7. Connect to probe via Solo Download Cable or PConfig cable and open PConfig on your computer.

   a) Within the **Clock** tab check that the date and time are correct.

b) Within the **Logger** tab press the "**Delete Readings"** button to delete any unwanted data that may have been recorded before the probe was installed.

c) Within the **Sensor Test** tab check sensors are working and reporting values by selecting "**Query All Sensors**". When the probe is correctly configured and installed there should be no INVALID readings for "Calibrated Value" of individual sensors (ignore the "Total" row).

d) Write to Probe (if required).

DOWNLOADING READINGS FROM PROBE

The data from the Sentek SOLO probe is downloaded in-field using either a Solo Download Cable to a laptop, or the SoloPORTER.

Download Using Solo Download Cable

1. Unscrew the protective cap that sits atop the Sentek SOLO Head Unit

2. On the Solo Download Cable hold the section circled in red still and rotate the section circled in green to release the protective cap from the Solo Download Cable

3. Plug in the Solo Download Cable by aligning the tab on the cable port with the notch on the Head Unit as illustrated below. The pins on the serial connection should slide in firmly but smoothly, then twist the collar clockwise (the collar is circled in green in the previous step) to secure the connection

4. To download make certain the other end of the field download cable is securely attached to you computer COM port. (Computer without built in com ports will need a USB to serial adaptor)

5. Open Data Exchange.

a) Select **Sentek Plus/Multi/Solo (Cable)**

b) Select the communications port to which the download cable is plugged

c) Keep the Baud rate at 9600 (This is the default baud rate of the RS232 probe)

d) Type the Logger ID or you can leave blank and Data Exchange will find the probe ID. This is the same Logger ID that was set on the **Logger** tab of PConfig when configuring the probe. After the first download for each Logger, the Logger ID should appear in the pull-down menu for future downloads.

e) Select IrriMAX Database (sdb) as the destination

f) If downloading for the first time browse to the location you want the database saved and type in a database name. If you are downloading into an existing database Browse to the location of the database on your computer and select the database.

g) Click **Start** to commence the download.

h) Once the download is finished, select "Quit". Disconnect cable and replace protective caps on cable and Solo Head Unit.
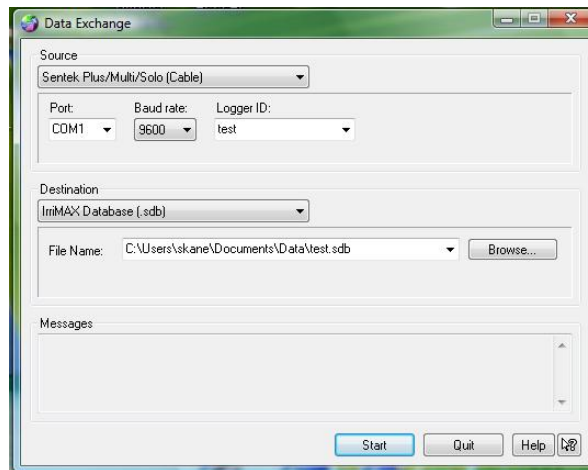
Download Using SoloPORTER

1. Make sure the 9V battery and USB flash drive are installed in the SoloPORTER

2. Remove the battery cap from the SoloPORTER and the protective cap from the Solo Head Unit. Plug the SoloPORTER into the Head Unit.

3. The red light will come on indicating that the SoloPORTER should not be removed. The green light will blink until the SoloPORTER finishes downloading. The green light becomes solid to indicate a successful download.

4. When the SoloPORTER is removed, the status lights will repeat the previous status codes.

> NOTE: If the red light blinks please refer to SoloPORTER Manual or Quick Reference Guide for error light descriptions

5. Remove USB drive from SoloPORTER and insert into your computer

6. A wizard will automatically be launched, select "Download from SoloPORTER" to launch Data Exchange.

> Note: If wizard is not automatically launched, open Data Exchange manually

7. Select the source as 'Sentek Plus/Multi/Solo (Folder)'

8. Select logger ID by clicking 'get list'

9. Select destination as 'IrriMAX Database (sdb)'

10. If downloading for the first time browse to the location you want the database saved and type in a database name. If you are downloading into an already created database Browse to the location of the database on your computer.

11. Click "Start"

> **Note:**
> See Data Exchange online help for more information on downloading.

MAINTENANCE

Sentek SOLO distributors can provide a regular maintenance program which consists of regular visits by an authorized installer to test and ensure correct operation of the system. A regular maintenance program such as this will ensure that the Sentek SOLO system functions properly and continues to give worry free operations.

Probe

The Sentek SOLO probe electronics should be kept free of moisture, dust and insects. If any of these things are found to have entered the access tube they should be removed and the entry point resealed immediately.

The probe top cap should be checked regularly for cracks or breakages. Machinery should be kept well away from the probes. This will avoid damage to the probe rods as well as preventing compacting of the soil around the probe, thus giving a false indication of the soil moisture content.

EasyAG probes should have the top cap gasket replaced each time the cap is removed.

Cable

Regular inspection of the cabling for damage caused by insects, animals or machinery should be carried out. If necessary the cable can be elevated and/or covered to protect it from potential damaging elements.

A break in the outer sheath of the cable can be an entry point for moisture into the probes access tube.

Corrosion on the wires within the cable can cause a drop in voltage between the Solo Head Unit and the probe. Use a volt meter to test the voltage at each end of the cable to be sure this is not an issue.

Head Unit

The Solo Head Unit should be elevated off the ground, out of the canopy, and out of the way of machinery to prevent any breakage, moisture or insect intrusion. For maximum prevention of moisture intrusion, mount the Head Unit on a slight angle so water can run off and place a bead of silicon along the join of the Head Unit. Never submerge the Head Unit and avoid opening it.

Ensure that protective cap is always screwed on straight and tight when not downloading to prevent damage to the download port.

Batteries

Solo Head Unit batteries should be monitored in the IrriMAX software to give an indication of when the batteries need to be replaced.

The graph in Figure 9 shows the typical curve of the voltage graph from a Sentek SOLO system. It should be noted that the actual life of the system may be less than shown. Factors such as sample frequency, ambient temperature, battery age, manufacturer, quality and other unpredictable factors could have an adverse effect on the life of the battery.

Corrosion caused by moisture intrusion on the probe electronics, cable wires or inside of the Solo Head Unit can also have an adverse effect on battery life. Keep components corrosion free by performing regular maintenance as described in this manual.
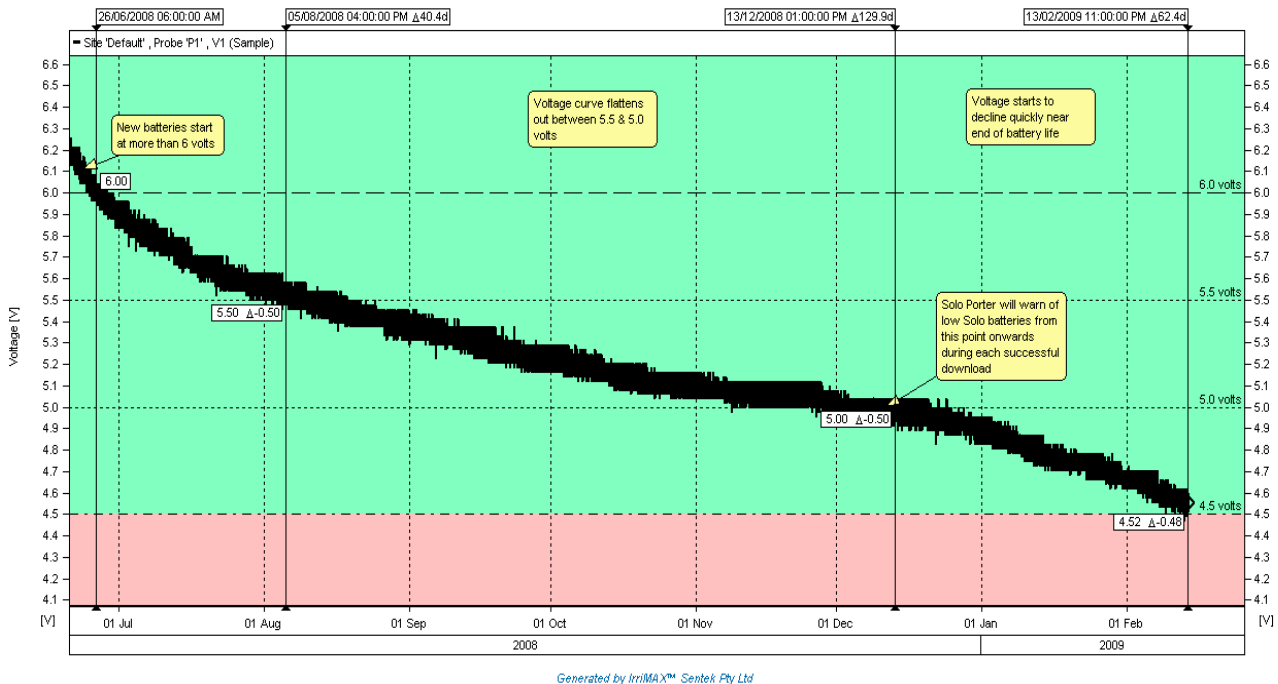
Figure 9: Solo Head Unit battery voltage

WARNING:
The probe interface clock may lose time if there is an interruption in the power supply for more than seven days. An interruption to the power supply could be caused by flat batteries in the Solo Head Unit or damage to the cable.
In the case of a prolonged power interruption, after power is restored the interface clock will need to be checked and possibly reset through the TTL or Download Port using the PConfig utility.

Estimated Battery Life Example

- Probe has 5 TriSCAN sensors
- Data downloaded daily
- Probe taking a reading every 15 minutes
- Batteries are Duracell Alkaline AA

The batteries should last more than 6 months

WARNING:
The above statement is provided purely as an estimate, based on a 'best case' operating scenario with standard Sentek parts. It should be noted that the actual life of the system may be less than 80% of the estimate provided above. Factors such as ambient temperature, battery age, manufacturer and other unpredictable factors could have an adverse effect on the life of the battery.

APPENDIX A – ENVIROSCAN SERIES II RS232 TECHNICAL SPECIFICATIONS

PCB Revision:	REV 2.3
Identification Label:	XPI-SC-E RS232/485
Interface connector type:	Brand: Phoenix Contact
	MC 1,5/8-ST-3,5 (Plug)
	MC 1,5/8-G-3,5 (Socket)

RS232 Interface pin configuration:

1. +Vin
2. +Vin(T) Telemetry (not supported on Solo)
3. +Vout(T) Telemetry (not supported on Solo)
4. Ground
5. TX – RS232 Data
6. RX – RS232 Data
7. Request to send (RTS acts as DTR in the Plus systems)
8. Clear to Send (CTS)

Jumper	JP201 Telemetry (not supported on Solo)
Fuse specifications:	F201 Littelfuse 0154-500 (500mA fast blow)
	F202 Littelfuse 0154-003 (3A fast blow, Unused Telemetry on Solo)
Voltage Supply (RS232 +Vin):	5 – 15 V DC (Solo nominal is 6V)
TTL Interface connector type:	Brand: JST
	B 6B-PH-K (Socket)
	PHR- 6 (Plug), SPH-002T-P0.5S (Crimp connectors)

TTL Interface pin configuration:

1. +Vcc
2. Transmit data (Tx)
3. Receive data (Rx)
4. NC
5. NC
6. Ground

Voltage Supply (TTL +Vcc):	5 Volts, supplied by the probe interface
RS232 baud rate:	1200, 2400, 9600 (default), 19200 and 38400 bits/second
	SoloPORTER only supports 9600 baud
TTL Interface baud rate:	1200, 2400, 9600 (default), 19200 and 38400 bits/second
Total current consumption:	400µA standby @ 12V DC
	105mA sampling (Moisture) @ 12V DC
	130mA Sampling (TriSCAN) @ 12V DC
Time to sample 1 sensor:	45 milliseconds maximum (Moisture only)
	90 milliseconds maximum (TriSCAN)
Maximum sensors supported:	16 Moisture Sensors or
	16 TriSCAN Sensors

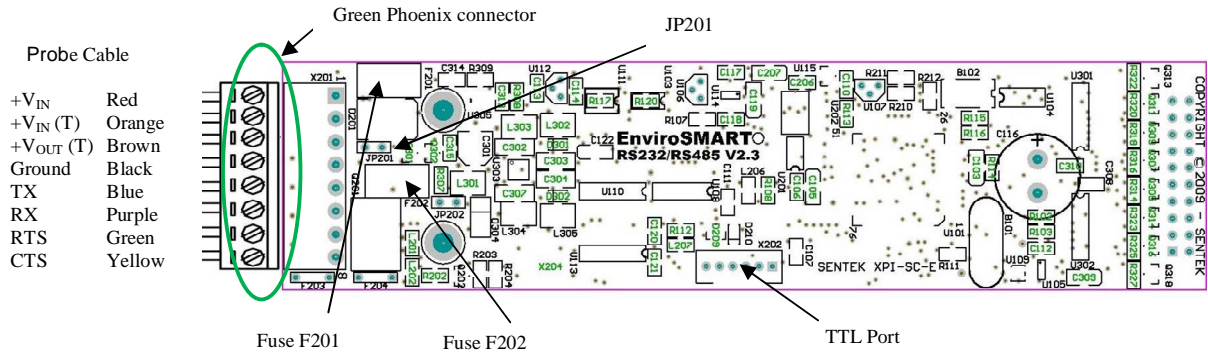**Figure 10: EnviroSCAN series II RS232 probe interface board layout**

APPENDIX B – EASYAG SERIES II RS232 TECHNICAL SPECIFICATIONS

PCB Revision:	PCB 0681 REV 2.3
Identification Label:	XPI-SC-I
Interface connector type:	Brand: Phoenix Contact
	MPT0.5/8-2.54

Interface pin configuration:

1.	+Vin
2.	+Vin(T) (Telemetry, not supported on Solo)
3.	+Vout(T) (Telemetry, not supported on Solo)
4.	Ground
5.	TX – RS232 Data
6.	RX– RS232 Data
7.	Request to send (RTS acts as DTR in the Plus systems)
8.	Clear to Send (CTS)

Jumper	JP201 Telemetry (not supported on Solo)
Fuse specifications:	F201 Littelfuse 0154-500 (500mA fast blow)
	F202 Littelfuse 0154-003 (3A fast blow, Unused Telemetry on Solo)
Voltage Supply (RS232 +Vin):	5 – 15 Volts (Solo nominal is 6V)
TTL Interface connector type:	Brand: JST
	B 6B-PH-K (Socket)
	PHR- 6 (Plug), SPH-002T-P0.5S (Crimp connectors)

TTL Interface pin configuration:

1.	+Vcc
2.	Transmit data (Tx)
3.	Receive data (Rx)
4.	NC
5.	NC
6.	Ground

|	
Voltage Supply (TTL +Vcc):	5 Volts, supplied by the **EasyAG** probe interface
RS232 baud rate:	1200, 2400, 9600 (default), 19200 and 38400 bits/second
	SoloPORTER only supports 9600 baud
TTL Interface baud rate:	1200, 2400, 9600 (default), 19200 and 38400 bits/second
Total current consumption:	400µA standby @ 12V DC
	102mA sampling (Moisture) @ 12V DC
	126mA Sampling (TriSCAN) @ 12V DC
Time to sample 1 sensor:	45 milliseconds maximum (Moisture only)
	90 milliseconds maximum (TriSCAN)
Maximum sensors supported:	8 Moisture Sensors
	8 TriSCAN Sensors
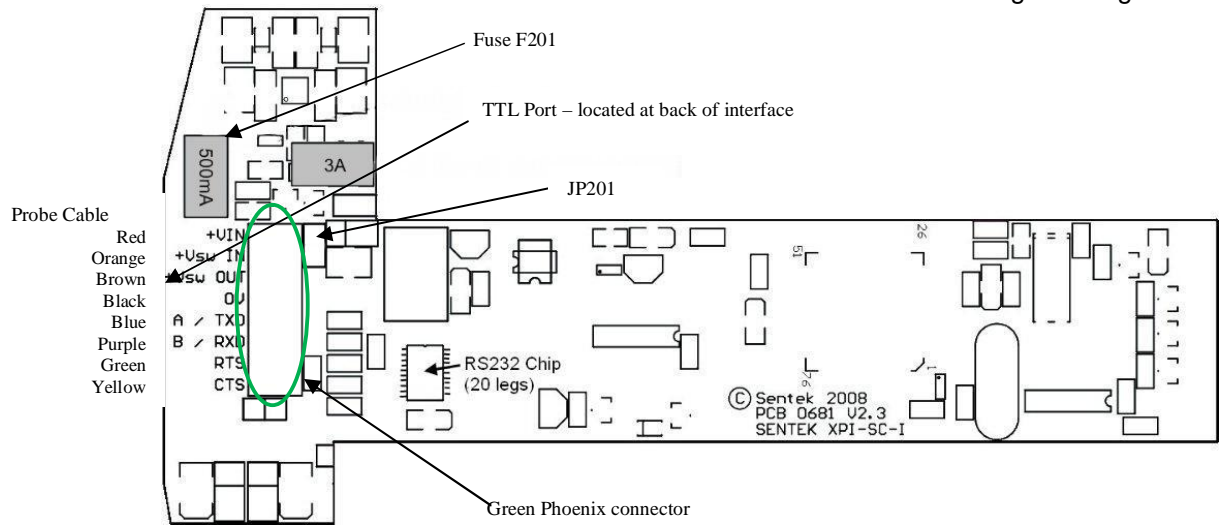
Figure 11: EasyAG series II RS232 probe interface board layout

APPENDIX C - SENTEK SOLO QUICK REFERENCE GUIDE

This appendix is designed to be a short guide for installers of Sentek SOLO. It can be printed and carried into the field and act as a reminder for the basic steps needed to install a complete Sentek SOLO system. It does not replace the manual, it merely supplements it.

PRODUCT SET-UP CHECKLIST

Preparation

1. Assemble Probe as per probe manual and training aids (see Referenced Documents)

2. Insert 4 x AA Alkaline or Lithium batteries into the Solo Head Unit

3. Using PConfig:

   - Check the interface has the latest version of firmware
   - Configuration tab: Auto-detect sensors, set depths & normalise
   - Clock tab: set sampling interval and time
   - Logger tab: enter LoggerID and sample origin (if required)
   - Power tab: Check probe supply voltage (should be 6.1V with new batteries)
   - Sensor Test tab: Check system
   - Back up configuration and Write to probe

Field Installation

1. Install probe as per installation manual (see Referenced Documents)

2. Secure Solo Head Unit to pole or post using mounting brackets

3. Connect probe to the Solo Head Unit

4. Within PConfig, check clock is correct and soil moisture values are as expected

Downloading

1. Retrieve readings from probe with step a) or b)

   a) Downloading using the Solo Download Cable,

      i. Connect laptop to download port with Solo Download Cable

      ii. Open Data Exchange

      iii. Make sure baud rate is 9600

      iv. Type in logger ID or leave blank

      v. Select IrriMAX Database (sdb) as the destination

   b) Downloading using SoloPORTER

      i. Make sure battery and thumb drive are installed in the SoloPORTER

      ii. Insert the SoloPORTER into Solo Head Unit; the red light will come on, Do Not Remove. The green light will blink until the download is complete. Green light solid indicates successful download.

> NOTE: If the red light blinks please refer to SoloPORTER Manual for error light descriptions

      iii. Remove USB drive from SoloPORTER and insert in to computer

      iv. Select "Download from SoloPORTER" from the wizard to launch Data Exchange

      v. Select logger ID by clicking 'get list'

      vi. Select destination as 'IrriMAX Database (sdb)'

      vii. Browse to folder where data is to be downloaded and select database

      viii. Click "Start"

SOLO HEAD UNIT & PROBE TROUBLESHOOTING GUIDE

Symptom/Error Message	Possible Cause of Failure	Possible Solution
New batteries only showing low voltage in PConfig	Poor quality batteries	Replace with high quality alkaline or lithium batteries
	Batteries not connecting properly	Check battery covers are connected properly
		Check for corrosion inside battery holder
		Batteries not inserted correctly
	Interface fault	Replace interface
Cannot connect to probe with Probe Configuration Utility through TTL port "Timeout occurred while trying to connect to the probe"	Lack of power	Old batteries
		Batteries not inserted correctly
		Power wires not connected correctly
	Cable not connected	Make sure cable is firmly connected to computer COM or USB port and to TTL port on interface. Check for any corrosion.
	Interface wiring	Make sure wiring is correct to interface
	Blown fuse	Make sure power connection is correct, replace fuse
	Cable connection with computer	Check cable is connected from TTL port to computer COM port. Try other Serial Port COM numbers, in the PConfig drop down list. Make sure USB to COM port drivers are installed.
	Faulty PConfig USB cable	Replace cable
Hot (high temperature) Batteries	Batteries in Head Unit are in the incorrect orientation and JP201 is installed	Remove JP201 from interface to protect against incorrectly installed batteries (see *Figure 2 or Figure 3*). Remove batteries & insert in correct orientation.
Batteries have gone flat faster than expected	Poor quality batteries or Carbon-zinc	Use new alkaline or lithium batteries
	Very short sampling interval	Increase sampling interval e.g. above 10 minutes
	Corrosion on interface or inside Head Unit	Check for corrosion, and replace corroded parts

SOLOPORTER TROUBLESHOOTING GUIDE

Symptom/Error Message	Possible Cause of Failure	Possible Solution
No last response code given	Communication problem between SoloPORTER and probe	Check probe cabling, interface and all connections
No status lights when SoloPORTER is first plugged in	Both SoloPORTER and Solo Head Unit batteries are too low	Replace SoloPORTER and Solo Head Unit batteries
Red light blinks whilst green light is solid	Low Solo Head Unit batteries	Replace Solo Head Unit batteries
Red light blinks after green light goes off	Low SoloPORTER battery	Replace SoloPORTER battery
Solid red for 5 seconds, followed by solid green and flashing red for 8 seconds	No USB flash drive in SoloPORTER	Insert USB flash drive and confirm is fully inserted into socket
	USB flash drive is write protected	Unprotect the flash drive or replace with unprotected flash drive
	Wires disconnected from probe	Make sure wires are configured correctly and not loose
	Wires connected to wrong position	Make sure wires are configured correctly and not loose
	Probe not configured correctly	Check probe configuration
	A battery cap taken off (no Head Unit power)	Either a battery cap taken off or not sealing correctly
	Incorrect firmware on probe or SoloPORTER	Probe requires firmware version 1.2.2 (or later) and SoloPORTER requires "VDAP0364.FTD" file (or later) in the SoloDATA directory

RECOMMENDED MAINTENANCE SCHEDULES

Weekly

- Make sure to graph battery voltage of Solo Head Unit in IrriMAX to alert user to change Head Unit batteries when voltage approaches 5V
- Inspect moisture and salinity graphs for unstable graph lines (possible sign of moisture in access tube)

Each time access tube is opened

- Check probe for moisture or corrosion
- Replace gaskets (EasyAG probe)
- Replace silica gel bag

6 monthly

- Replace silica gel bag
- Check probe for moisture or corrosion

12 months

- Check Head Unit for any corrosion on batteries or water infiltration
- Check Download port pins for signs of corrosion/moisture
- Check cable for damage to outer sheath and wires
- Replace silica gel bag
- Check probe for moisture or corrosion