Sentek

SoloPORTER
System Manual

Version 2.0

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SOLOPORTER - 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

Sentek SoloPORTER

The equipment complies with the following specifications (0690COC.pdf):

AS/NZS CISPR 22:2006
Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement

CISPR 22:2006
Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement

EN55022:2006 inc C1:2006
Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement

EN55024:1998 inc A1:2002 & A2:2003
Information technology equipment – Immunity characteristics – Limits and methods of measurement

CISPR 24:1997 inc A1:2001 & A2:2002
Information technology equipment – Immunity characteristics – Limits and methods of measurement

FCC Part 15 Class B.
Electromagnetic compatibility – Requirements for information Technology equipment

IEC 61326:2002 inc C1:2002
Electrical equipment for measurement, control and laboratory use – EMC requirements

BS EN 61326:1998 inc A1:1998, 2002 & 2004
Electrical equipment for measurement, control and laboratory use – EMC requirements

Sentek EnviroSCAN Solo

The equipment complies with the following specifications (C-Tick EnviroSCAN Solo.pdf):

EN 61326:1997 inc A1:1998, A2:2002, A3: 2003

Electrical equipment for measurement, control and laboratory use – EMC requirements

Sentek Drill & Drop

The equipment complies with the following specifications (Drill and Drop ACA_D.O.C.pdf):

CISPR 11:2010 Ed 5.1
Industrial Scientific and Medical (ISM) radio-frequency equipment - Electomagnetic disturbance characteristics - Limit and methods of measurement

IEC 61326-1: 2012 Ed 2
Electrical equipment for measurement, control and laboratory use – EMC requirements. Part1: General requirements.

FCC Part 15 Subpart B
Radio Frequency Devices - Unintentional Radiators

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.

TABLE OF CONTENTS

INTRODUCTION

The SoloPORTER with a Solo Head Unit provides a simple way to retrieve probe data from Sentek SOLO logging probes in the field without the need for a laptop computer (though this is an option).

Readily available USB flash drives are used as a storage mechanism, providing the SoloPORTER with a virtually unlimited capacity for downloading data.

FEATURES

- Uses standard 9V alkaline battery
- Uses 6V power from the Solo Head Unit if SoloPORTER battery is too low
- Stores data on interchangeable USB flash drives (65mm long)
- USB flash drive memory size determines data storage capacity
- Durable design
- Download and battery power indicator lights.

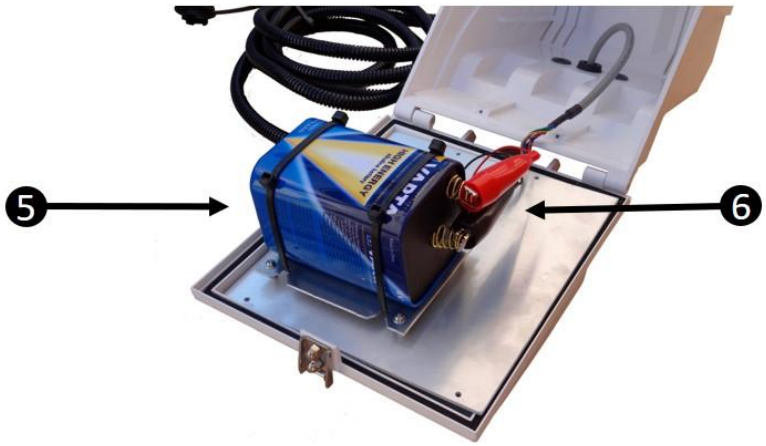
SUPPLIED ACCESSORIES

- SoloPORTER unit
- USB flash drive (65mm long)
- 9 Volt battery

THE SOLOPORTER COMPONENTS

1) Top cap (connector to head unit)
2) Download LED (red)
3) Done LED (green)
4) Bottom cap (expose USB flash drive)
5) Top connector
6) O-ring
7) Battery connector
8) USB connector (USB Flash drive 65mm long)
9) Foam ring
10) O-ring

THE SOLO HEAD UNIT COMPONENTS



1) Front panel
2) SoloPORTER connector
3) Mounting bracket
4) 3 meter probe cable (to connect a Sentek Solo probe)
5) 6V lantern battery (for replacement see *Recommended Maintenance Schedules* section)
6) Battery clips

Note:
Please refer to Sentek SOLO Hardware Manual Version 1.4 for the earlier version of the Solo Head Unit (with alkaline or lithium AA batteries)

THE SENTEK SOLO ENVIROSCAN PROBE

An EnviroSCAN probe for Sentek SOLO consists of:

- EnviroSCAN RS232 Interface loaded with Sentek SOLO Firmware

- Which is attached to an EnviroSCAN probe sensor assembly rod
- Then installed inside an EnviroSCAN access tube (Screw Cap or Flat Cap)
- The interface is pre-wired to a 5m cable with connector to plug into the Solo head unit probe cable (not the front panel connector)

THE SENTEK SOLO DRILL & DROP PROBE

The Drill & Drop probe is an encapsulated tapered probe. It comes in four sensor configurations of 3, 6, 9 or 12 sensors.

The probe consists of two components and associated cables:

INTERFACE BOX

The Interface box contains a Sentek interface device preconfigured with Solo firmware and normalised to match the probe rod configuration.

There are five communication options for the encapsulated interface box: Sentek PLUS, Sentek MULTI, Third party SDI-12 loggers, Sentek SOLO, and MODBUS. This manual describes the Sentek Solo interface. The other interfaces are described in their appropriate manuals.

Product	Interface	Modem	Firmware Version
Sentek SOLO	RS232	SOLO does not have a Web upload capability	Solo 1.3.2 or later

The Interface box has two non-removable cables (with non-removable cable glands).

The probe type (SOLO) and interface serial number are shown on the interface box label.

It also has weather proof connector for the Drill & Drop Probe Programming Cable (PConfig).

A Sentek Solo Drill & Drop probe is supplied with either:

- Interface box cable with a connector to plug into the probe cable connector in the SOLO Head unit.
- With a cable that has a bare end. This end must be joined to the existing SOLO Head Unit cable. This is done using quick connector (PN: 61248) on both Drill & Drop Interface box and SOLO Head Unit cables.

Water tight connector Kit, Sentek SOLO or PLUS

Instructions on how to wire these connectors can be found in the Sentek PLUS hardware manual. Wiring order for the SOLO is identical to PLUS.

Note:
Sentek recommends keeping total cable distance between the probe interface and Sentek SOLO Head unit to 10m or less.

PROBE ROD

The sensors and cable are encapsulated inside the probe rod:

- 3, 6, 9 or 12 moisture sensors, or
  3, 6, 9 or 12 moisture and salinity sensors
- Every sensor has an associated temperature sensor
- Sensors are spaced at 10cm intervals
- Probe length 3 sensors 30 cm (12 inches), 6 sensors 60 cm (24 inches), 9 sensors 90cm (36 inches) or 12 sensors 120 cm (48 inches)
- The probe interface is preconfigured to start sensors at depth 5cm

CABLES

- Drill & Drop Probe Programming Cable (for Probe Configuration Utility), USB to Interface box connector (optional)
- Non-removable 5m cable pre-wired into the Solo Head Unit, with other end pre-wired to the interface box and then pre-wire into the probe rod
- Custom cable lengths may be available with a special order.

SENTEK PROBE CONFIGURATION UTILITY

Warning!
Probes are supplied pre-normalised. Modifying information stored in the Drill & Drop probe interface may result in incorrect volumetric water content (mm/10cm) readings being reported.

The Probe Configuration Utility (PConfig) is provided to configure probe interfaces with depth location, normalization 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 required.

For further information see the Probe Configuration Utility manual or help

SYSTEM SETUP

REQUIREMENTS FOR BASIC SYSTEM

For a typical system with one probe, the following items will be needed;

- One SoloPORTER with battery and USB flash drive (shared between Solo head units)
- Sentek Solo head unit with 6V battery (Sentek part number: 05080)
- Mounting pole for Solo head unit
- EnviroSCAN probe with RS-232 Solo firmware, or
  Drill & Drop probe with RS-232 Solo firmware
- Computer with Sentek IrriMAX desktop software, and USB connector for downloading from the Solo USB flash drive

Multiple probes each have their own Solo head unit but the SoloPORTER is shared.

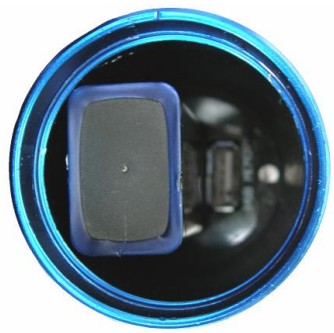
HARDWARE SETUP

9V Battery

1. Remove the end cap on the SoloPORTER that is labelled USB / BATTERY

2. Make certain that the 9V battery is appropriately aligned for the connectors to mate:

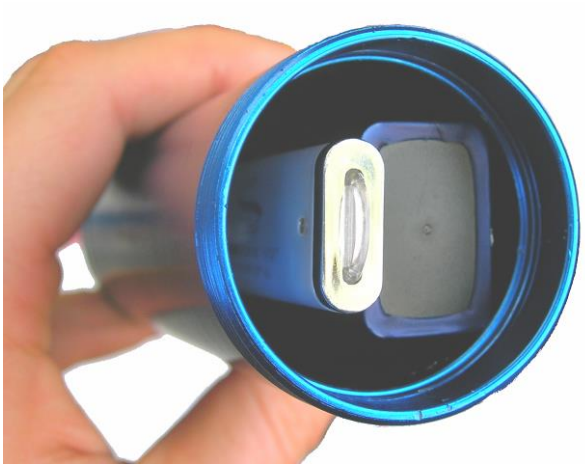
3. Insert the battery into the SoloPORTER until it clicks into place



USB Flash Drive

1. Make certain that the USB connector on the USB flash drive aligns appropriately with the connector in the SoloPORTER. The thicker side of the connector should face the battery, as illustrated below.

2. Gently press the USB flash drive into the socket so that it sits firmly in the receptacle:



Note: A small cable-tie or piece of string, tied to the USB Flash drive handle will help with removal.

3. Firmly screw the safety cap back into place to protect the SoloPORTER internals:

Removing USB Flash Drive & Replacing Battery

To remove the USB flash drive, grasp the end and pull straight out. Avoid moving the USB flash drive from side to side, as this may damage the socket.

To replace the 9V battery, first remove the USB flash drive. Hold the SoloPORTER in one hand and tap the open end firmly against the palm of your other hand. The battery should pop out. Insert a new battery as per the above instructions.

DOWNLOAD USING THE SOLOPORTER

DOWNLOADING (IN THE FIELD)

1. Remove the end cap from the SoloPORTER and open the protective cover on the Solo Head Unit. Plug the SoloPORTER into the head unit as shown:

2. The red light will come on indicating that the SoloPORTER should not be removed. The green light will blink until the SoloPORTER finishes downloading.

Note: If the red light blinks, refer to the section on the SoloPORTER status lights.

Note: It may take up to 90 seconds to fully detect the USB flash drive and during that time the lights will show Solid-Red only. The larger the storage capacity on the USB flash drive the longer the solid red will show at the beginning of downloading.

3. Once the download is successfully finished, the red light will turn off and the green light will turn solid for 10 seconds to indicate the SoloPORTER can be safely removed. After this, the red light will indicate any low battery warnings, then both lights will turn off to conserve power.

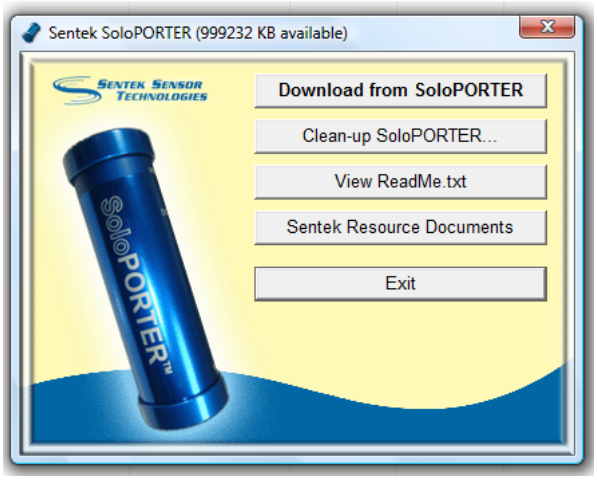
4. When the SoloPORTER is removed, the status lights will repeat the previous status codes – e.g. a successful download with no battery warnings will give a solid green light for 10 seconds.

TRANSFERRING PROBE DATA TO IRRIMAX (IN THE OFFICE)

Sentek branded USB flash drives

1. Remove the USB flash drive from the SoloPORTER and insert it into your PC.

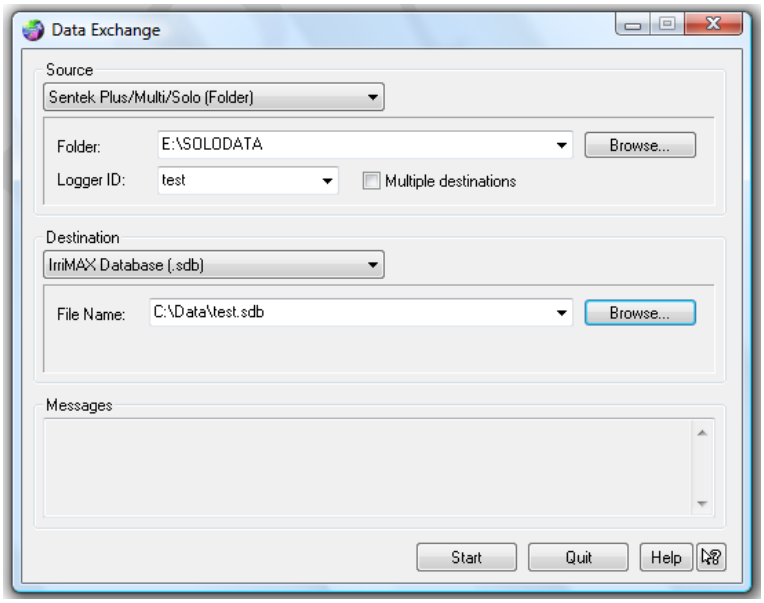
2. The SoloPORTER menu will launch if you are using a version of Windows capable of Autoplay from USB flash drive. Otherwise, you will need to navigate to the root folder of your USB drive and launch Menu.exe. The SoloPORTER menu will tell you the amount of space remaining on the USB flash drive in the title bar, and present a number of options.



3. Select "Download from SoloPORTER". Data Exchange will launch with the correct Source already selected.

4. To import data from one probe:

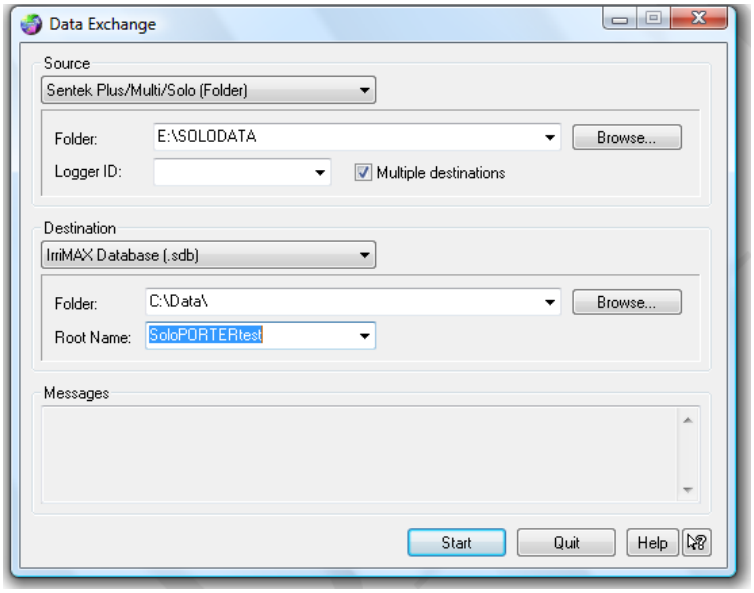
   a) Type in the Logger ID or click the drop down control ▼ and select "Get list…" from the drop down menu, then select logger.
   b) Ensure Multiple Destinations is unticked
   c) In the Destination section, browse to the location you want your database saved to (if first time downloading), Otherwise browse to the database you wish to download to.



5. To import data from multiple probes that have been downloaded to the SoloPORTER,

   a) Leave the Logger ID field blank (you may delete any text in this field)
   b) Ensure that Multiple Destinations is ticked.
   c) Select Destination as IrriMAX Database (sdb)
   d) Select a destination Folder and, if desired, a Root Name. Data Exchange will import probe data in the form <Destination Folder>\<Root Name><Logger ID>.sdb. If Root Name is left blank, each database will only be named after its Logger ID – so, in the example below, if the SoloPORTER had downloaded data from two Solo probes with LoggerID's:

"probe1" and "probe2", Data Exchange would create the files C:\Data\SoloPORTERtestprobe1.sdb and C:\Data\SoloPORTERtes\probe2.sdb. If you are downloading to existing databases, ensure that the destination Folder and Root Name (if any) are the same as the existing databases.



Note: Do not put the database file name in the Root Name field

6. Click "Start", and Data Exchange will import the probe data you have chosen, creating or updating databases as necessary. The destination folder must exist – it will not be automatically created.

Other USB flash drives

If you are not using the Sentek branded USB flash drive, or do not wish to use the SoloPORTER menu,

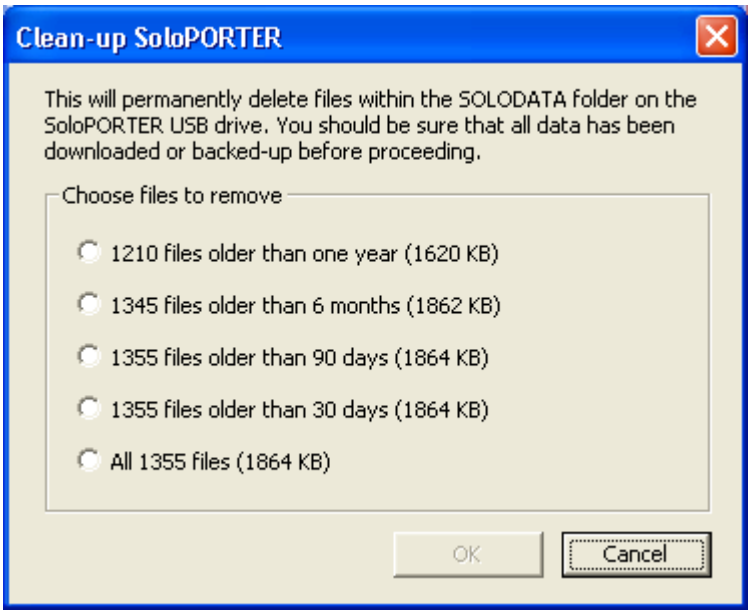
1. Open Data Exchange (note: this can be found as part of the Sentek applications included with IrriMAX).
2. Select **EnviroSCAN Plus/Solo (Folder)** as the source,
3. Browse to your USB flash drive letter and then the folder **SOLODATA** as the folder, and then proceed as from step 4 or 5 from above.

For further options and advanced usage, please see the IrriMAX User Guide.

CLEAN-UP/DELETE SOLOPORTER FILES ON USB FLASH DRIVE

Click the Clean-up SoloPORTER button on the SoloPORTER USB flash drive menu. You are then given options to remove all aged files in the **SOLODATA** folder. Selecting one of the options and clicking OK removes those files. Click Cancel and the files remain.

Warning:
Even non-SoloPORTER files will be removed. Ensure you have downloaded this data into Sentek databases or backed up the folders before clicking OK.



DOWNLOADING IN THE FIELD USING A LAPTOP COMPUTER

Instead of inserting the SoloPORTER into each Solo head unit a laptop with a special USB to Solo head unit cable can be connected to each head unit in turn and downloaded using IrriMAX Data Exchange.

To download:

1. Connect Solo Download Cable between the Solo Head Unit and computer.
2. Open Data Exchange and Select Sentek Plus/Multi/Solo (Cable).
3. Select the communications port to which the download cable is plugged.

   Keep the Baud rate at 9600 (this is the default baud rate of the RS232 probe).
4. 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.
5. Select IrriMAX Database (sdb) as the destination

   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.
6. Click **Start** to commence the download.
7. Once the download is finished, select "Quit". Disconnect cable and replace protective cap on cable and close cover on the Solo Head Unit.

SOLOPORTER STATUS LIGHTS

The SoloPORTER status lights have three states, referred to as *Blink*, *Flash* and *Solid*.

Table 1 SoloPORTER status lights

State	Light Activity
Blink	Short On once per second (1 Hz)
Flash	Regular On-Off twice per second (2 Hz)
Solid	Continuous On

Normally, all conditions except downloading will be shown for 10 seconds and the status lights will turn off to conserve power. The exception to this is if the SoloPORTER battery is too low for use. In this case the red light will *blink* for 5 seconds when first plugged in to the Solo Head Unit, the download will proceed powered by the Solo Head Unit batteries if they have enough charge.

- Green light will blink during downloading,
- Green light solid to indicate that it is safe to remove the SoloPORTER from the Solo Head Unit.
- Red light will remain solid during downloading to indicate that the SoloPORTER should not be removed,
- The red light will flash while green is solid if downloading fails for any reason.
- The red light will blink whilst the green light is solid to indicate low Solo Head Unit batteries.
- The red light will blink after the green light is off to indicate low SoloPORTER batteries.
- When the SoloPORTER is unplugged from the Solo Head Unit, the previous light indicators will be repeated.

TROUBLESHOOTING

First principles

- Check that both SoloPORTER battery and USB flash drive are correctly seated in SoloPORTER.
- Check that SoloPORTER is correctly plugged into Solo Head Unit.
- Using the Solo Download Cable, check that you can communicate to the probe through the head unit

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 with PConfig
	Solo Head Unit battery not connected	Check if either battery has been removed or is not connected correctly
	Incorrect firmware on probe or SoloPORTER	Probe requires v1.2.2 (or later) and SoloPORTER requires "VDAP0364.FTD" file (or later) in the SoloDATA directory

APPENDIX A – ESTIMATED USB STORAGE CAPACITIES

Data calculated on 15 minute sampling interval (96 readings/day) and 1 download per day for each probe.

- 128MB USB flash drive will store **61 years** of data downloaded from **1 probe**.
- 128MB USB flash drive will store **6 years** of data downloaded from **10 probes**.
- 128MB USB flash drive will store **3 years** of data downloaded from **20 probes**.

The **Clean-up SoloPORTER…** option on the SoloPORTER Menu application will free up space on the SoloPORTER USB flash drive by deleting old data.

Note that each Sentek SOLO probe can store approximately 2000 readings. At 96 x 15 minute readings/day, this equates to approximately 21 days before it begins to overwrite the earliest readings. This is therefore the maximum time between SoloPORTER downloads from a Solo Head Unit before data is lost.

APPENDIX B – LAST RESPONSE CODES

The SoloPORTER will generate a response code after it completes an operation. These codes can be viewed in the Probe Configuration Utility "Last Response" field and in the file SOLO.LOG that is stored on the SoloPORTER USB flash drive in the SOLODATA folder.

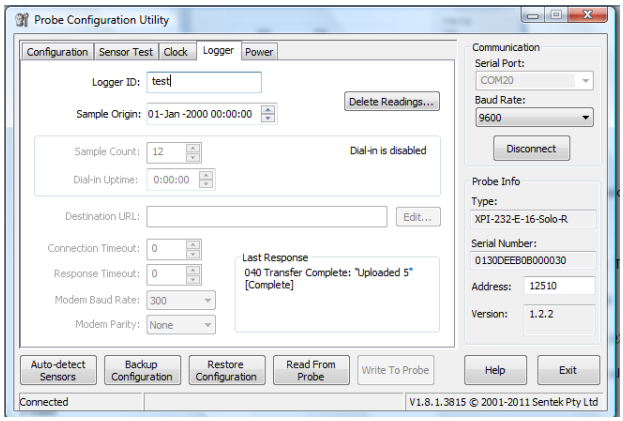


Figure 1 Logger tab in Probe Configuration Utility

Table 2 Last Response Codes

Code	Meaning
000 Idle	Occurs only after probe reprogrammed
001 Transferring	Will only occur if interface power removed during upload
002 Setup	Occurs while the probe is detecting the USB flash drive
003 Firmware Updated	Occurs after the SoloPORTER USB firmware is updated
004 Transferring	Occurs during transfer from Probe to USB flash drive
040 Transfer Complete	Occurs when SoloPORTER completes. Green-solid
041 Success (No new data)	Occurs when files already exist on USB memory e.g. if SoloPORTER plugged back in before probe has new readings
050 Filesys in use	Contact distributor or Sentek
052 Error CD	May occur if USB memory is write-protected. Could not change directory to SOLODATA. Only in last response, never in SOLO.LOG
053 No free space	Occurs if less than 3 clusters available, but SOLO.LOG can be written
054 Could not write file	Contact distributor or Sentek
055 Internal error	Contact distributor or Sentek
056 Timeout	Occurs if SoloPORTER unplugged while upload in progress Red-solid, Green-blink "156 Timeout [Start]" will occur if the USB flash disk is not present in the SoloPORTER
057 Invalid response	Only occurs when invalid VN1CL commands are sent via HyperTerm
058 Probe not configured	AutoDetect with no sensors connected or all sensors zero depth.
059 Clock not set	Occurs when super-cap flat battery then reprogram. No files uploaded - data can be recovered through Data Exchange "EnviroSCAN Plus/Solo (Cable)"

100 to 159 (see above)	Values above 100 are only present as "Last Response" in Probe Configuration Utility, when the probe could not write the result to SOLO.LOG on the USB flash drive. This message is written to SOLO.LOG during the next time the SoloPORTER is inserted.

SOLO.LOG

The SOLO.LOG file is in the SOLODATA folder of the USB flash drive. A new entry is added each time the SoloPORTER is plugged into the Head Unit.

Each line in the SOLO.LOG file contains:

- Probe date and time when the event occurred
- Logger ID (as shown in PConfig)
- Folder on the USB flash drive where the data is stored
- Number of files upload, in brackets
- The Last Response code and description

Examples from SOLO.LOG:

```
2007-09-28 13:59:18 DD63EB0B0000 IZ47GH95TQA (001): 040 Transfer Complete: "Uploaded "
[Complete]
2007-09-28 14:00:18 DD63EB0B0000 IZ47GH95TQA (000): 041 Success (No new data) [Complete]
2007-09-28 14:01:00 DD63EB0B0000 IZ47GH95TQA (000): 058 Probe not configured [StartScanFiles]
2007-09-28 14:06:53 DD63EB0B0000 IZ47GH95TQA (000): 041 Success (No new data) [Complete]
2008-08-04 15:27:09 D576EB0B0000 IZ3B8H95TQA (000): 003 Firmware Updated: "VDAP0364.FTD"
[UpdateFW]
```

RECOMMENDED MAINTENANCE SCHEDULES

6 months (or each time EnviroSCAN access tube is opened)

- Check probe and access tube for moisture
- Replace silica gels bag

12 months

- Check for dust and/or water ingression into SOLO Head Unit
- Check quick connector pins for signs of corrosion/moisture
- Check cable for damage to outer sheath and wires
- Ensure all cables are neat

3 Years

- Replace 6V Lantern battery
  (see battery photo in *The Solo Head Unit Components* section)
  - Unclip the battery connectors
  - Slide the old battery from under the cable ties (do not cut the cable ties)
  -Slide the new battery under the cable ties
  - Re-clip the battery connectors, carefully ensuring the red connector is clipped to battery positive (corner) and black connector to the battery negative (center).

Note: Battery life may be less than 3 years if sampling rate is changed from default, or cable faults occur.