Probe Configuration Utility User Guide

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Probe Configuration Utility Version 1.9.3

PConfig Rev14 (2014-12-22)

Contents

Probe Configuration Utility Overview

This is the documentation for the Probe Configuration Utility (short name PConfig). This utility is a dialog based Windows® application, which allows you to configure and test a range of Sentek probes.

The PConfig program communicates with the probe via a special communications cable connected to the TTL port (PConfig configuration port) on the probe. Once the probe is configured, it can communicate with a logger via the output port on the probe. The available types of output ports are:

- SDI-12 protocol
- Modbus protocol
- SMCP Protocol (Sentek proprietary)
- Voltage (0 to 5V)
- Current (4 to 20mA)
- Sentek Plus/MULTI Internet upload
- Sentek Plus/Solo/MULTI Front Panel download

See the Probe Interface manuals for further information on probe features.

Warning:

The probe firmware does not support concurrent communication through the TTL port and the output port. Invalid data may, as a result, be delivered to the output port.

The probe must be disconnected from a multi-drop situation during configuring.

Organization of this document

This document is divided into Table of Contents, Index and three sections:

- Windows in PConfig
  This describes the Windows and controls in PConfig
- Usage Guide
  How to use PConfig to configure a probe.
- Error Messages
  Errors that may occur and possible ways to resolve the error.

References

The following Sentek manuals describe the characteristics and installation of the various probe types:

- EnviroSMART and EasyAG SDI-12 Probe Interface Manual
- EnviroSMART and EasyAG RS232/RS485 Modbus Probe Interface Manual
- EnviroSMART and EasyAG Voltage Probe Interface Manual
- EnviroSMART Current Probe Interface Manual
- Sentek Plus Hardware Manual
- Sentek Solo Hardware Manual
- SoloPORTER Hardware Manual
- TriSCAN Agronomic User Manual
- Calibration of Sentek Pty Ltd Soil Moisture Sensors
- IrriMAX User Guide

Help

You can access help (this document) via three methods:

- Online help (Help buttons and the key-F1)

- The manual in Adobe Acrobat Reader format, which may be printed (PConfig.pdf)
- The Start menu item Probe Configuration Utility > Help

A glossary of agronomic terms is available in the IrriMAX User Guide.

Windows in PConfig

The main window contains common controls and up to six tabbed pages, with some only visible for specific probe types. All are displayed on the same main window.

- *Main Window Controls*
- *Configuration Page*
- *Sensor Test Page*
- *Clock Page*
- *Analog Outputs Page*
- *Modbus Page*
- *Logger Page*
- *Inputs Page*
- *Network Page*
- *Modem Page*
- *Power Page*

Main Window Controls

This window contains the tabbed pages, the serial port communication controls group, the probe information group, the buttons common to all areas and the status line. Tabbed pages applicable to a specific probe type appear after the probe is connected.

The window can be resized vertically by dragging the top or bottom edge.
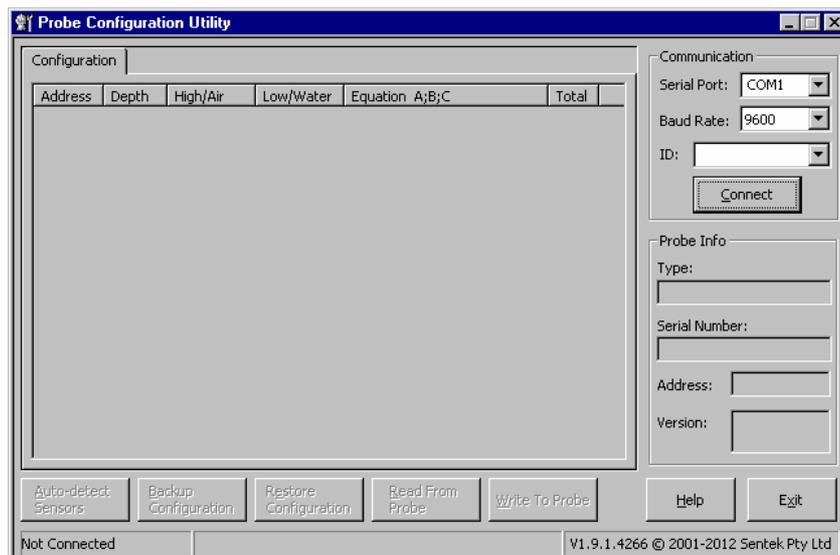
Communication Group
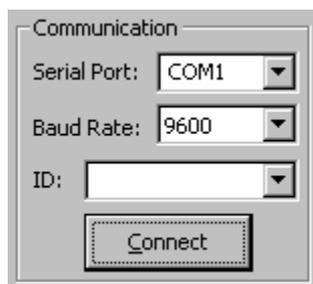
The upper right part of the window displays these controls for connecting to the probe:

Serial Port   Displays a drop down list of available serial ports. Type or select the one which the probe is connected to.

This field cannot be changed if command line parameter /PORT: or /PH: is present.

When /PH is present on the command line the Port name is shown as "Inherited".

Baud Rate   Displays a drop down list of available baud rates to use when connecting to the probe. Selecting 'Auto' will allow auto detection of the baud rate during the connection process.

Note: Selecting a different baud rate while connected changes the probe's baud rate.

This field cannot be changed if command line parameter /BAUD: or /PH: is present.

When /PH is present on the command line the Baud rate value is shown as "Inherited"

ID   Allows entry of a Logger ID to resolve ambiguity when there are multiple logging-capable probes connected to the same port. The drop-down list allows selection of previous IDs to which communication was successfully established, in order of most recent to least recent.

Leave this field blank if there is only one probe connected to the port. Non-logging probe types do not support connection using ID.

Connect/Disconnect   Clicking this button when not connected will attempt to establish a communication with the probe at the specified Serial Port and Baud Rate. Once connected this button will change to "Disconnect" and allows disconnection when clicked.

See also *Connecting and Disconnecting*

Probe Information Group
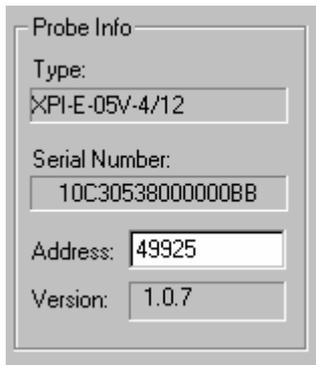
Below the communication section is the probe information, which displays:

Type   The type of probe connected to.

Serial Number   Serial number of the probe

Address   The address of the probe in the range 1-65534 for most types of probes. Probes supporting specific protocols such as SDI-12, Modbus, etc. accept only addresses acceptable to those protocols in protocol specific formats (i.e. ASCII '0'-'9', 'a'-'z', 'A'-'Z' for SDI-12 probes, 1 to 247 for Modbus probes).

The probe address can be changed when the probe is connected. Type the new address and click 'Write To Probe'. The probe address is important in multi-drop (i.e. RS485) situations when clash in the communication would occur if two probes had the same address. Probes with specific protocols use this address on the output port as well.

Note: The depth settings and analog output settings if they exist, must also be valid before the 'Write To Probe' action can be performed. See *Changing the Probe Address*

Version   The version number of the firmware in the probe.

Control buttons

The five buttons along the bottom are for:

Auto-detect Sensors	This is the starting point for a new probe or after altering the physical configuration of the probe (add, remove or shift sensors). After the sensors are detected the configuration information will be displayed in the list.
Backup Configuration	Allows saving of the displayed sensor configuration and other probe settings to a configuration (*.cfg) file. This file is a text based file that contains all the information as it is displayed. See *Backing up and restoring the Configuration*.
Restore Configuration	Allows loading of a previously backed up configuration (*.cfg) file. The configuration information and other probe settings, which are read from the file, will be displayed. **Note:** The loaded configuration is only loaded to the Probe Configuration Utility for review. Only upon clicking the "Write To Probe" button is it written to the probe. An asterisk will appear on the title tab until the information is written to the probe. See Backing up and Restoring the Configuration.
Read From Probe	Reads in the sensor configuration (and other settings) from the probe and displays the information in the lists. See also *Getting the Configuration from the Probe.*
Write To Probe	Sends all the new probe settings from the Probe Configuration Utility to the probe. The entire probe setting information in the probe will be overwritten with the currently displayed configuration. This button becomes enabled when any part of the configuration is modified. Note: Depending on the probe type connected to the Probe Configuration Utility, various tabbed pages may be displayed in the application that are applicable only to the connected probe types. This button writes the settings from all pages to the probe (not just the currently visible one) upon user's confirmation on page-by-page basis. See also *Writing the Configuration to the Probe.*

Status Information Line

The status bar on the bottom line of the window is for displaying:

Connection Status	The first pane displays connection status which can be "Not Connected" or "Connected" and when connecting it will display the baud rate at which it is attempting to connect. When connected using the SDI-12 protocol it displays "Connected (SDI-12)"
General Status	The second pane displays general information about the actions being performed e.g. Probe Busy (while writing to probe or querying sensors); Reading sensor configuration (during read from probe).
Version	Probe Configuration Utility version number

Configuration Page

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

Configuration *	Sensor Test	Modbus			
Address	Depth	High/Air	Low/Water	Equation A;B;C	Total
1	10	35714	24921	0.195700; 0.404000; 0.028520	✓
2	20	35665	24689	0.195700; 0.404000; 0.028520	✓
3	30	33326	23140	0.195700; 0.404000; 0.028520	✗
4	40	35700	24877	0.195700; 0.404000; 0.028520	
5	50	34202	23101	0.195700; 0.404000; 0.028520	
65	0	20122	13909	1.000000; 1.000000; 1.200000	
66	0	20086	13991	1.000000; 1.000000; 1.200000	
67	0	19960	13710	1.000000; 1.000000; 1.200000	
68	0	19991	14001	1.000000; 1.000000; 1.200000	
69	0	19101	13122	1.000000; 1.000000; 1.200000	
129	0			0.010000; 1.000000; 0.000000	

The color red represents an item that has been modified, and an asterisk appears on the title tab to indicate some change has occurred on that page, which has not been written to the probe (this will remain until 'Write To Probe' is performed).

The list displays the configuration information for each sensor in the following columns:

Address

Displays the sensor address for each sensor. See *Sensor Icons Description*. .

Note 1: Moisture sensor addresses start at 1. The sensor address is controlled by the address jumper plug on the physical probe sensor assembly. Non-existent sensors will not be assigned a sensor address e.g. On an EasyAG-50 probe sensor addresses are detected as 1, 2, 3, 5 (no sensor 4).

Note 2: Salinity sensor addresses start at 65 in firmware that supports salinity. If salinity sensor addresses start at 129 the firmware loaded in the probe does not support salinity and salinity sensors readings will be indeterminate.

Note 3: Temperature sensor addresses start at 129 in firmware that supports salinity sensors (earlier firmware versions have a temperature sensor at address 66). At present only one temperature sensor exists and it only samples the temperature on the interface circuit board. This sensor is only accessible using this PConfig program and cannot be accessed through the output port.

Note 4: Salinity sensors (if present) always correspond to a moisture sensor address i.e. salinity sensor 65 is associated with moisture sensor 1, 80 with 16 etc.

Note 5: The sensors are sorted by type (moisture, salinity, temperature) then depth, then sensor address. This sort order cannot be changed.

Depth   Depth of each sensor. When a new sensor is detected a depth of value '0' (zero) is assigned to it. This indicates that the sensor has not been configured yet. Clicking a depth when the row is selected allows changing the depth. Pressing Enter or clicking outside the cell confirms the changes. Pressing Escape discards any changes. The depth figure should reflect the actual (physical) depth of each sensor, by default in cm.

                                Note 6: The depth number is not associated with any units and is just a stored value for informative purposes. Therefore the value may mean "inch", "cm", etc. See *Changing the Depth of Sensors*. Sentek sensors are physically positioned at 10cm intervals, so it is recommended that you set the sensor depths to multiples of 10, with a minimum of 5 or 10.

                                Note 7: You cannot directly set the depth of salinity sensors. The depth is taken from the corresponding moisture sensor depth. The depth of a salinity sensor remains zero until:
1) The depth of corresponding moisture sensor is set, and
2) The salinity sensor is normalized (air and water counts set), and
3) Write To Probe has been done

High/Air   Displays the high counts of the sensor. This field contains buttons for taking new air counts from moisture and salinity sensors. Clicking on these buttons will start a direct sensor reading for that sensor. See *Normalizing the Sensor Air and Water Counts*.

Low/Water   Displays the low counts of the sensors. This field contains buttons for taking new water counts from moisture and salinity sensors. Clicking on these buttons will start a direct sensor reading for that sensor. See *Normalizing the Sensor Air and Water Counts*.

Equation A;B;C   Displays the calibration equation coefficients for the sensors. The A, B and C components of the equation must be separated by semicolons. Clicking on the calibration equation when the row is selected will enable editing of these coefficients. Pressing Enter or clicking outside the cell confirms the changes. Pressing Escape discards any changes. See *Changing the Calibration Coefficients*.

Total   Sentek Smart Probes support a feature, by which the probe can provide a sum of values of the selected sensors. This is useful when an overall amount of water in the soil profile is to be found. A tick specifies that the sensor is used in the "Total Moisture Calculations". Double click in this column to change which sensors are used. A red cross or a blank cell specifies that the sensor is not used in the "Total Moisture Calculations".

                                Note: Early probe versions do not allow de-selection of all sensors from the 'Total' reading. See *Changing the Total Selections*.

           New settings will not be applied until the Write To Probe button is used.

           See also *Getting the Configuration from the Probe*.

Sensor Test Page

The Sensor Test page is for displaying and testing the configuration that is currently stored in the probe.

Address	Depth	Raw Count	Calibrated Value	Total
1	10	25695	43.646385	✔
2	20	27868	21.969677	✔
3	30	29730	3.496781	✔
4	40	27551	25.522314	
5	50	34163	0.000000	
65	10	12915	1.431700	
66	20	15363	1.264529	
67	30	17731	1.203606	
68	40	15033	1.274779	
69	50	23665	11.394178	
129	0	2931	29.309999	
Total Moisture			69.112839	

Query Selected Sensors

Query All Sensors

Stop Sensor Querying

Note: No editing or changes to the 'Total' column can be performed on this page. The configuration must have been read from the probe using Read From Probe for this information to be displayed.

Note: Use "Auto-Detect" with caution. Using "Auto-Detect" with faulty sensor my cause that sensor's configuration (if set up previously) to be lost. It is recommended to backup the old configuration before doing an Auto-Detect. See *Backing up and restoring the Configuration*.

The list displays the probe's present configuration in the following columns:

Address	Displays the sensor address for each sensor. See *Sensor Icons Description*.
Depth	Depth of each sensor. This is value is provided by the user at the time of configuration.
	Note: Sensors with a depth of zero will not be reported on the probe output port, although the Configuration Test will display valid raw and calibrated values.
Current Raw Count	Displays the raw count for each sensor. This is updated continuously when the Query All Sensors button is pressed. .
Calibrated Value	Displays the calibrated value for each sensor as calculated by the probe, using the calibration coefficients. This is updated continuously when the 'Query All Sensors' button is pressed.
	The calibrated moisture units (mm/10cm), represents the amount of water in a sample of soil 10cm deep, centered at each sensor's depth.
	The calibrated salinity reading unit is Volumetric Ion Content (VIC). See the TriSCAN Agronomic User Manual for more information.
	Note 1: Calibrated values will be reported as INVALID VALUE when the raw count is out of range or the calibrated moisture value is not in the range 0.0 to 101.0.
	Note 2: 'Query Selected Sensors' will report INVALID VALUE on a salinity sensor, unless the corresponding moisture sensor is also selected.
Total	When a tick appears in this column it specifies that the sensor is used in the "Total Moisture Calculations". . Total output is only available on probes with an analog output port.

The bottom row of the list displays the Total Moisture, which is the total moisture value calculated by the probe for all of the moisture sensors that are selected to "Total". This is updated continuously when the 'Query All Sensors' button is pressed.

Note: If not ALL the sensors that are assigned to "Total" are selected when 'Query Selected Sensors' button is used, the Total Moisture value will show "NO CALC".

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

Clock Page

This page is present when PConfig is connected to probes that support sampling intervals or a real-time clock.

The Clock page is for displaying and changing the probe's sampling interval and clock time. If either of these features is not supported by the probe then the controls related to that feature will be disabled when connected. The color red is used to indicate items that have been modified, and an asterisk appears on the title tab to indicate some change has occurred which has not been written to the probe (this will remain until 'Write To Probe is used).

Sampling Interval   If the sampling interval is supported by the probe, then the probe will be scheduled to take readings at these regular intervals. To change this use the drop down list to select a new sampling interval or type the desired value. Values can be specified as minutes hours or days and the numbers can be whole or decimal. The new settings will not take effect until the "Write To Probe" button is pressed. The probe takes about 1.2 seconds to read each sensor, so the minimum time should be greater than (number of sensors $\times$ 1.2) seconds. A suggested minimum time is 1 minute.

Note 1: The maximum sample time is 7 days minus 1-hour (167 hours).

Note 2: On Sentek Plus/MULTI probes you should not set this to value less than two minutes because a sample reading will be lost if data is being uploaded to the Internet when the next sample is schedule to be taken. This will result in gaps in graph lines.

Note 3: EnviroSMART Series II and EasyAG Series II probes take about 50 milliseconds to read a moisture sensor and about 100 milliseconds to read a TriSCAN sensor.

Date/Time   If the clock time is supported then this can be set using the date and time controls. Select the desired date and time, or click "Synchronize with Computer" to use the current time from the computer's clock. The new settings will not take effect until the "Write To Probe" button is pressed. See *Changing the Clock Time*.

Analog Outputs Page

The page is only present when PConfig is connected to a probe that has analog outputs (Current or Voltage).

Out #	Sensor	Lower Limit Value	Lower Limit Volts	Upper Limit Value	Upper Limit Volts	Error Volts	Detail
		Lower Limit		Upper Limit		Error	
Out #	Sensor	Value	Volts	Value	Volts	Volts	Detail
1	💧 1	0.00	0.25	70.00	5.00	0.10	⌐
2	💧 2	0.00	0.25	70.00	5.00	0.10	⌐
3	💧 3	0.00	0.25	70.00	5.00	0.10	⌐
4	✓ 0	0.00	0.25	280.00	5.00	0.10	⌐

The Analog Outputs page is automatically displayed when a probe with analog outputs is connected (type XPI-5V, XPI-20C etc). These analog outputs typically produce an output of 0 to 5Vdc or 1-20mAdc (depending on the type of probe), which represent the calibrated value of a sensor.

These outputs can be used for connection to appropriate types of logging probes, PLC's or irrigation controllers, for example. The outputs are updated at the probe's sampling interval. See *Changing the Sampling Interval.*
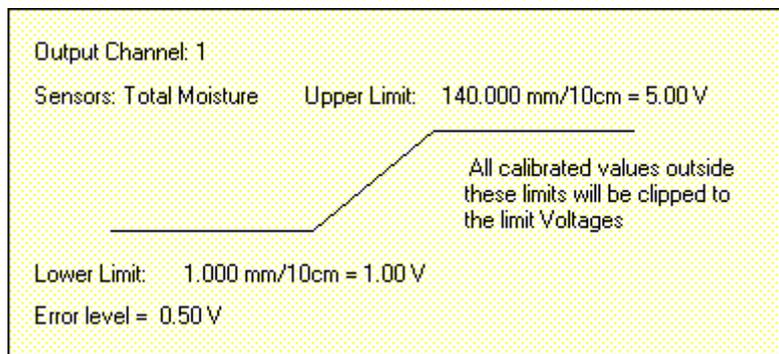
This Analog Outputs page is used to adjust the span of the probe's analog outputs, with respect to the sensor's calibrated value. Any calibrated values (i.e. moisture) between the two specified limits are represented linearly by the values on the analog outputs (voltage, current, etc. respectively) between the two specified analog output limits. Any valid calibrated value, which is outside the two limits, will have its output restricted (clipped) to the specified limit value. If the calibrated value is not valid (shown as an "INVALID VALUE" on the Sensor Test page), the specified Error value will be output.

The values for each output can be edited by selecting the output (click on it) and then clicking on the value to be edited. The color red represents an item that has been modified, and an asterisk appears on the title tab to indicate some change has occurred on that page, which has not been written to the probe (this will remain until 'Write To Probe' is performed).

The following columns are displayed:

Output	The probe's analog output number
Sensor	The address of the sensor that the output represents. Note: The sensor address 0 (zero) represents the Total moisture calculation (i.e. the sum of the sensors with a tick in the "Total" column on the Configuration page). More than one output may be set to a single sensor. See *Sensor Icons Description.* If the sensor selected is zero (Total) and no sensor is assigned to the Total reading, then clicking on this line will highlight the line using "disabled" color (grey by default) instead of the (default) blue color.
	Sensor address 255 can be used to disable the corresponding analog output. This will cause the output voltage or current to be zero (this not the same as error level analog output).
	Note: If the sensor address is 0 and no sensors are configured to Total (no ticks on Configuration page), the line will be displayed with a red background.
Lower Limit Value	The calibrated sensor value at which to clip the lower limit of the output (i.e. voltage, current etc). Valid calibrated values below this value result in output at lower limit voltage.

Lower Limit Voltage (Current)	The value of voltage (current) to be produced for the lower limit of calibrated value.
Upper Limit Value	The calibrated sensor value at which to clip the upper limit of the output (i.e. voltage, current, etc.). Valid calibrated values above this value result in output at upper limit voltage.

Note: If the output is assigned to the 'Total' value, the upper limit value must reflect the sum of values for all the sensors included in the 'Total'. |
| Upper limit Voltage (Current) | The value of voltage (current) to produced for the upper limit calibrated value. |
| Error Voltage (Current) | The voltage (current) to produce if an invalid value is sensed by the sensor. This error voltage (current) MUST be either lower then the lower voltage limit, or higher then the upper voltage limit (i.e. outside the two voltages).

Note: It is recommended to assign the error voltage non-zero, so that the probe reading this voltage (current) can tell the difference between the probe showing an error voltage and possible loss of power or sensor failure. |
| Detail | A button to show the settings in the form of a small graph. |

Output Channel: 1

Sensors: Total Moisture   Upper Limit: 140.000 mm/10cm = 5.00 V

All calibrated values outside these limits will be clipped to the limit Voltages

Lower Limit: 1.000 mm/10cm = 1.00 V

Error level = 0.50 V

Any value above (or below) the limit value will be output at the limit voltage (current).

New settings will not be applied until the Write To Probe is performed.

To test the settings, the Sensor Test page can be used to 'Query All Sensors'. The analog outputs of the probe are updated after all sensors have been read (every cycle). A multi-meter can be used to inspect the output port value, which will update every query cycle, instead of remaining constant until the next sample interval. This allows testing of the analog output settings without having to wait for automatic output update at the set sampling interval and use rather continuous cycling through all the sensors.

See also *Changing the Analog Output settings* .

Modbus Page

The page is only present when PConfig is connected to a probe that has Modbus output.

The Modbus page appears if PConfig is connected to a Modbus probe. It enables the setting of the probe's dedicated Modbus communications port's communications parameters.

Any item which has been changed from the probe's configuration has an asterisk after its title which is highlighted in red, and an asterisk also appears on the page's title tab.

The following settings can be changed, and apply to the Modbus port only (not PConfig communications):

Mode	ASCII (7bit character based) or RTU (8 bit binary based) communications.
Baudrate	The communications speed of the Modbus port. 300 to 38400 b/s.
Parity	None (No Parity, 2 stop bits), Odd parity (1 stop bit), Even parity (1 stop bit).
Turn around Time	For RS485 probes this is the minimum time, in milliseconds, before the probe will start sending the response (maximum 1000 ms, minimum 0 ms). The actual minimum is dependent on the time required for the probe to process the request. **Note:** This field is disabled if the probe firmware version does not support turn around time.
Sample Delay	This is the amount of time, beginning from when the probe was last accessed, after which the next sample will be automatically taken. A value of zero disables this feature. **Note:** This field is disabled if the probe firmware version does not support it.

New settings will not be applied until the Write To Probe button is used.

A Modbus probe's address is limited to between 1 and 247 inclusive. See *Changing the Probe Address*.

Logger Page

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

Warning:
Automatic scheduled samples and uploads do not occur while PConfig is connected to the probe. If a scheduled sample interval occurs while PConfig is connected the sample will not be taken and an invalid reading (gap in the graph) will be recorded. Sampling will not reoccur until at least 60 seconds after PConfig is disconnected.

If the probe is not located in the ground, it is recommended to remove power from the probe after disconnecting, to avoid sampling the sensors when they are not in the ground.

If the probe is a **Solo** then the fields that relate to Internet uploading are disabled:

Logger ID	This name is used to supply the IrriMAX database Logger ID. The default is the probe's serial number. The logger ID can be up to 16 alpha-numeric characters and underscore. It cannot be blank.
Sample Origin	The Sample Origin synchronizes the sample time, so each sample is taken with this time as the reference time and first start time.
	It also aligns the upload (or Dial-in Enable) events relative to this reference time. For example, if samples are taken every hour, and the Sample Count is 6, then the first upload (or Dial-in Enable) will occur 6 hours after the Sample Origin and every subsequent 6 hours thereafter.
	Note: If there are devices clustered in close proximity or if there are limits on the number of parallel uploads your Plus/MULTI Server can handle, it may be necessary to schedule the Sample Origin of each device to different reference times e.g. 10 minutes apart.

Sample Count

This is the number of samples (see *Clock Page* for setting the Sample Interval) taken before either an upload is initiated or Dial-in is enabled

A value of zero disables the upload process (or the enabling of Dial-in). The default is 5, maximum 999.

Uploading (or enabling of Dial-in) takes place immediately after the sample has been taken.

e.g. To upload (or enable Dial-in) once a day when logging interval is 15 minutes:

Sample count = upload interval (hours)/sampling interval (hours) = 24/0.25 = 96.

Warning:

When the probe's memory is full, new samples overwrite the oldest previous samples. The number of days before a given sample is overwritten is dependent on the Sample Interval.

Number of Days $= 1.415 \times$ (Sample Interval in minutes)

A worst case scenario of 10 minute sampling gives about 14 days before data is lost. Data retrieval by upload, Dial-in or direct connection must be done more frequently than this.

Dial-in Uptime

This is the amount of time that Dial-in remains enabled. Use this value in conjunction with Sample Count and Sample Interval to ensure that Dial-in is enabled according to a schedule. During this time it is possible to Dial-in to the telemetry connected to the probe.

This field will be disabled if unsupported by the probe's firmware.

Destination URL	This Uniform Resource Locator (URL) describes the Internet address for FTP upload to the Plus/MULTI Server. The Plus/MULTI Server administrator will supply this information.

You can enter the complete URL in the Destination URL field, or you can click the **Edit…** button to display the following dialog which allows you to compose the URL from separate components. (Do not use the "%" character encoding described below when entering the URL using this method.)
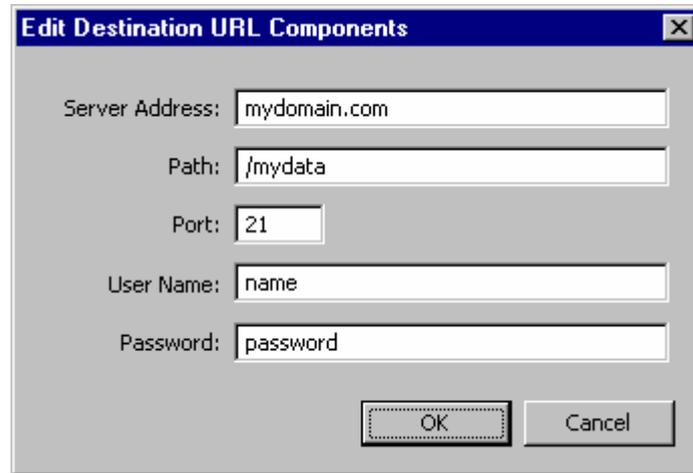
Firmware version 1.2.x supports port 21 only.

If you compose the entire URL manually, the required format is

ftp://<user name>:<password>@<host/Internet address>:<port>/<url-path>

The maximum length is 140 characters. The letters "a" to "z", "A" to "Z", digits "0" to "9", and the characters plus ("+"), period ("."), and hyphen ("-") are allowed. Other special characters must be represented by a character triplet consisting of the character "%" followed by the two hexadecimal digits (from "0123456789ABCDEF") which form the hexadecimal value of the character.

If you enter spaces or other special characters, PConfig converts them to character triplets when you write to the probe.

If the URL is blank the upload process is disabled.

Note 1: If any @ appears in the <user name> it will be converted to %40 before being written to the probe.

Note 2: If the URL is only "ftp://" the probe will use the username, password and URL configured in the modem. This method is not recommended.

Connection Timeout (Plus)	This is the maximum time in seconds before the probe abandons communication with the Internet modem. It should not be necessary to change the default of 30 seconds, maximum 600 seconds.
	This time includes all modem initialization commands up to the time that an IP address is returned from the Internet.
Response Timeout (Plus)	This is the maximum time in seconds before the probe abandons waiting for a reply that the data files has been transferred to the Plus/MULTI Server. It should not be necessary to change the default of 30 seconds, maximum 600 seconds. Satellite connections may require a larger value.
Probe Modem Settings - Baud Rate and Parity (Plus)	The baud rate and parity which the probe uses must match the baud rate and parity configured in the modem. Modems supplied by Sentek are preconfigured to the default of 9600 baud, parity none.
	The steps required to change these values are described in *Setting up the Internet Parameters.*

Last Response	This is either the result of the last attempt to upload to the Internet, or the status of the last download by dial-in or front panel.
	When you find the probe is unsuccessful in uploading, you can use PConfig to connect to the probe. The Last Response indicates the failure point in the communication process.
	See the *Error Messages* section for responses which can occur.
Delete Readings button	Readings in the probe's memory are discarded.

Inputs Page

This page is only present when PConfig is connected to a MULTI probe.

The MULTI probe supports two temperature sensors and two pulse sensors. It can also optionally log various power values (see Power Page)

Temperature Sensor 1	Place a tick in the Logged checkbox to turn on logging for this sensor.
	Enter the sensor's depth in the Depth control Use a depth of zero if the sensor is not buried.
	The sensor's current value is displayed on the right. "Error" is displayed if there is a problem with the sensor connection. "Unavail" is displayed if the probe interface is unable to obtain a reading from the DTU
Temperature Sensor 2	As above.
Pulse Sensor 1	Place a tick in the Logged checkbox to turn on logging for this sensor.
	Choose a sensor type using the Type drop-down control. Available types are Rainfall, Irrigation and Flow.
	Enter the quantity represented by one pulse. In the case of Rainfall and Irrigation sensors, this quantity must be entered in millimeters. For Flow sensors, the quantity must be entered in liters.
	The sensor's current pulse count and status is shown on the right. "Unavail" is displayed for the count if the probe interface is unable to obtain a reading from the DTU. A status of "Stuck" is displayed if the contacts are stuck in the closed positon. A status of "Error" implies a hardware fault on the DTU board. Otherwise status is blank.

Pulse Sensor 2   As above.

Network Page

This page is only present when PConfig is connected to a Plus probe with firmware that supports TCP/IP and FTP protocols. Originally Sentek Plus firmware required modems that supported TCP/IP and FTP protocols. The latest firmware now allows the use of generic modems.

These command strings are used to control a modem connected to the Plus probe.

The values shown in this Network tab example were used to setup a "Wavecom" modem. Your modem may require different values. Please see the Probe's hardware manual for the modem configuration procedure.

The Initialization, Connect and Disconnect strings are required to set up the modem so the probe can set up a connection to the Internet.

Username	(Not used in Dial-in mode) A unique set of up to 80 characters identifying a user of a network, which allows access when coupled with a password.
	Note: This username and password is not related to the FTP username and password in the Logger page's Destination URL field.
Password	(Not used in Dial-in mode) The password associated with the Username (up to 40 characters)
Dial-in Enable	In Dial-in mode, after every Sample Count interval has been reached the telemetry power is turned on and this string (up to 80 characters) is sent to the modem. The telemetry remains powered for the time specified in Dial-in Uptime, then the Dial-in Disable string is sent (see Logger page for more information).
	In normal (not Dial-in) mode, this string (up to 80 characters) is sent upon completion of an upload.
	This command will allow the modem to auto-answer incoming messages, for the uptime period, after the sample count scheduled time.
	If the Dial-in Uptime is zero the dial-in feature is inactive.

Dial-in Disable	In Dial-in mode, after a Dial-in Enable is sent, and when the Dial-in Uptime has been reached, this string (up to 80 characters) is sent, then the power is removed from the telemetry.
	This command will prevent the modem auto-answering incoming messages at times other than the sample count scheduled time.
	In normal (not Dial-in) mode, this string (up to 80 characters) is sent before starting an upload. The Dial-in Enable is sent at the completion of the upload. The telemetry remains powered for the time specified in Dial-in Uptime, then the Dial-in Disable string is sent
	If the Dial-in Uptime is zero the dial-in feature is inactive.
Initialization	This string (up to 80 characters) configures the modem for communication, after it has been powered on.
Connect	(Not used in Dial-in mode) This string (up to 80 characters) supplied by your Network provider, is the command needed to connect to the network. It generally initiates the dialing of a specific telephone number.
Disconnect	(Not used in Dial-in mode) This string, up to 80 characters, is sent to the modem after the probe has sent the data to the network and it will disconnect the modem from the network.
Response(s)	After being sent a command the modem replies with a response. If the specified response string is not received within the Connection Timeout (see Logger Page) the probe abandons communication until the next scheduled time. This includes responses that do not match the response string. The Dial-in Enable and Disable timeout is not dependant on the Connection Timeout value.
	A reply is considered matching when the start of the reply exactly matches the response string (up to 40 characters).

Modem Page

The page is only present when PConfig is connected to a probe with uploading capability.
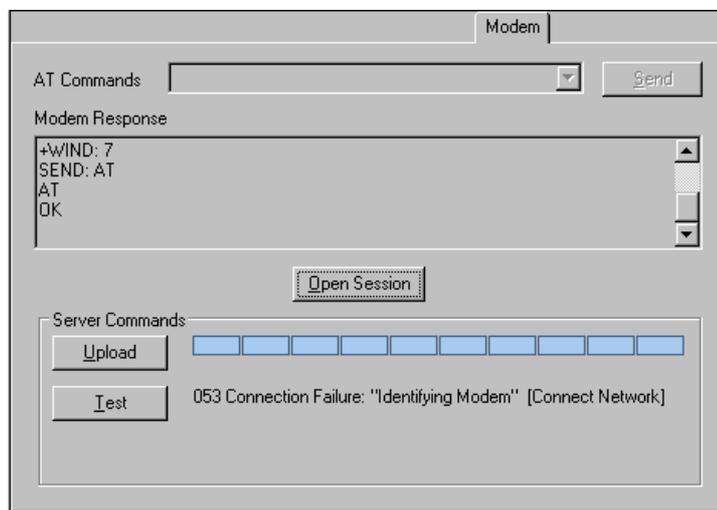
This page requires that the modem be connected to the probe and that the probe and modem have the same baud rate and parity settings. It can be used to setup the modem configuration parameters that cannot be set on the *Logger* page.

Warning:
The probe firmware communicates with the modem using 9600 baud, no parity (Parity None). If clicking the **Test** button does not result in a final state of "040 Success", it may be that the modem is not set for no-parity. This can be checked by clicking **Open Session**, typing AT and clicking **Send**. The modem response field will show a response of "OK" when the probe can successfully communicate with the modem. If the "OK" does not appear the modem may still be set to the wrong parity. See the *Sentek Plus Hardware Manual* for further details.

AT Commands	This field must contain command(s) that the modem understands.
	Sending a simple "AT" should get a response of "OK", indicating the probe can successfully communicate with the modem.
	Pressing Enter/Carriage Return will send the command to the modem.
	The drop-down list contains previously sent commands, in order from most recent to least recent.
Modem Response	After **Send** is clicked, this is the response received from the modem.
	Note: the probe has a receive buffer size of 1000 characters so it is possible that any response from a modem which would generate more than 1000 characters of data may result in data loss. This should not impact normal operations.
Send button	Sends the text in the AT Commands field to the modem.
	Pressing Enter/Carriage Return in the AT Command field will also send the command to the modem.
Open Session button	This turns the modem on and allows the sending of AT commands to the modem.
Upload button	Readings in the probe's memory are uploaded via the Internet to the Plus/MULTI Server.
	This button is disabled on Solo probes.
Progress bar	This bar oscillates to show that the operation is in progress.
Test button	This button initiates a connection to the Internet, but does not upload any readings.
	The probe and modem should not be deployed in the field until a successful test has been done.
	It also stores a dummy file on the Plus/MULTI Server. The filename is of the format:
	<logger ID>-yymmdd-hhmmss.txt. The file contains text describing the logger.
	This button is disabled on Solo probes.
Server response text	This text displays the interim or final state of the Upload or Test transfer. See the Last Response in the *Error Messages* section for the possible conditions.

Power Page

The page is only present when PConfig is connected to a probe which supports the changing of the operating voltage ranges e.g. XPI-Web 1.1.3 and later.

This page is also used to enable or disable the logging of system sensors when connected to a MULTI probe.

EnviroSMART Series II and EasyAG Series II probes can operate over a range of voltages from 4 volts to 15 volts. This means they can be powered from different types of power source e.g. batteries. Sentek has done analysis on some typical power sources and has developed suggested values for these thresholds.

Advanced users must evaluate power source specifications to establish the thresholds, taking into account things like:

- Ambient temperature
- Current draw of the probe and time required to sample its sensors
- Cabling and power source resistances
- Current draw of the telemetry device (e.g. modem) and the time that the device is turned on
- Discharge characteristics of the battery

Disable Probe (voltage)

Once the probe current voltage falls below the Disable Probe voltage the probe will stop taking readings and communicating. It will periodically check if the current voltage has risen above the Enable probe voltage.

Specific probes may have limitations on minimum and maximum values for this threshold. This range is shown to the right of the Enable voltage value.

Enable Probe (voltage)

Once the probe current voltage falls below the Disable Probe voltage the probe will not restore activities until the current voltage is rises to above the Enable Probe threshold. The Enable Probe threshold must be greater than the Disable Probe threshold to prevent a oscillating condition if the current voltage equals the threshold voltage.

Sentek recommends at least 0.5 volts difference between disable probe and enable probe voltages.

Specific probes may have limitations on minimum and maximum values for this threshold. This range is shown to the right of the Enable voltage value.

Disable Telemetry (voltage)	Once the probe current voltage falls below the Disable Telemetry voltage the probe will not attempt to operate the telemetry device e.g. modem. Telemetry devices connected to the probe may have different voltage range characteristics to those of the probe. Typically the probe would continue to sample the sensors but the current voltage value may be insufficient to drive the modem. Reading would be accumulated in the probe until the current voltage rises above the Disable Telemetry voltage threshold voltage.
Probe Supply Voltage	During operation, this is the voltage as measured by the probe. This measurement is compared to the threshold voltages.
	While connected, and this page is displayed, PConfig periodically queries the probe and displays this current input voltage.
	Note: The measured voltage may be slightly less than the voltage at the supply due to internal resistance in the probe and supply voltage wire.
	Note: Plus, Solo and MULTI probes always log this value. The Logged checkbox displays whether the value is logged, but cannot be changed. Also note that the value is only logged if selected in conjunction with a physical sensor.
Battery Voltage	This shows the battery voltage as measured by a MULTI probe.
	Use the Logged checkbox to select the value for logging. Note that battery voltage is only logged if selected in conjunction with a physical sensor.
Solar Voltage	This shows the solar voltage as measured by a MULTI probe.
	Use the Logged checkbox to select the value for logging. Note that solar voltage is only logged if selected in conjunction with a physical sensor.
Solar Charge	This shows the solar charge as measured by a MULTI probe.
	Use the Logged checkbox to select the value for logging. Note that solar charge is only logged if selected in conjunction with a physical sensor.

Usage Guide

This section describes the steps required to configure the different functions of the probe.

- *Connecting and Disconnecting*
- *Command Line Parameters*
- *Getting the Configuration from the Probe*
- *Changing the Baud Rate*
- *Changing the Depth of Sensors*
- *Normalizing the Sensor Air and Water Counts*
- *Changing the Calibration Coefficients*
- *Changing the Total Selections*
- *Changing the Probe Address*
- *Changing the Sampling Interval*
- *Changing the Clock Time*
- *Changing the Analog Output settings*
- *Setting up the Internet Parameters*
- *Writing the Configuration to the Probe*
- *Confirm dialog box*
- *Testing the Configuration*
- *Backing up and restoring the Configuration*
- *Sensor Icons Description*

Connecting and Disconnecting
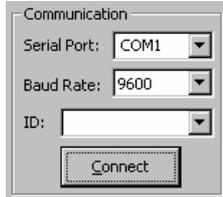
These controls are provided in the upper right part of the *Main Window Controls* for connecting to and disconnecting from the probe.

Ø   To connect to the probe:

Select which serial port the probe is connected to from the Serial Port drop down list. Also select the baud rate to use from the Baud Rate drop down list. You can select "Auto" for the baud rate which will try all possible baud rates in the following order: 1200 (SDI-12 protocol), 9600, 38400, 19200, 2400 and finally 1200 (SMCP2 protocol.)

To connect to an SDI-12 probe, choose Auto (recommended) or 1200 for the baud rate.

If there is more than one logging-capable probe connected to the port, then enter the Logger ID of the probe you wish to connect to.

Now click the Connect button to connect to the probe. If connection is successful then the status bar will now display "Connected" and the Connect button will have changed to Disconnect. If "Auto" was specified as the baud rate then the correct baud rate will now be displayed in the Baud Rate drop down list.

On successful connection, the probe's information (name, serial number, address and firmware version number) will be displayed, and the probe will be queried for its configuration settings.

Ø   To disconnect from the probe:

To disconnect from the probe once connected simply press the Disconnect button.

See also *Changing the Baud Rate* and *Error Messages*.

Command Line Parameters

Command line parameters can be used to automate the connection to PConfig, but once connected it operates interactively until PConfig exits. Typical uses of these parameters include:

- Remote connection through the IrriMAX **Remote Connection Manager** (RCM) in Sentek Plus/Solo/MULTI systems
- Batch file to preset connection parameters
- Windows shortcuts to preset connection parameters

The parameters are not case sensitive except for RCM parameters prefixed with "%".

Command	Functionality
/RETRIES:NumberOfRetries	Defines the number of attempts before PConfig abandons slow communication (by default PConfig will retry once). If the parameter is set to zero no retry is attempted. Valid range is from 0 to 9. e.g. /RETRIES:5
/PREAMBLE:p1,p2	Sets the minimum number of milliseconds for which message preamble characters are repeatedly sent, on initial connection and before each probe command. (If this switch is not used, all preambles will be repeated for at least 18 milliseconds.) **p1** is the minimum number of milliseconds to repeat the initial connection preamble. Note that using a value less than 18 milliseconds may result in a timeout error when connecting to the probe. **p2** (optional) is the minimum number of milliseconds to repeat all subsequent preambles. If not supplied, then the value given for p1 is used. Valid values are 0 to 500 milliseconds. A value of 0 will result in a single preamble being sent. e.g. /PREAMBLE:30,0 will repeat the connection preamble for 30 milliseconds, then use single preambles thereafter. /PREAMBLE:18,18 (or just /PREAMBLE:18) replicates the default condition.
/PORT:PortName	The Serial Port on your computer which will be used to communicate with the probe. When this parameter is present you cannot change the Serial Port name interactively. Valid values are shown in the Serial Port list when you connect interactively e.g. /PORT:COM1 Note: RCM "%P" only supplies the numeric part, so the command line must be /PORT:COM%P.
/BAUD:BaudRate	The Baud Rate for the serial port on your computer which will be used to communicate with the probe. When this parameter is present you cannot change the Baud Rate value interactively. Valid values are shown in the Baud Rate list when you connect interactively e.g. /BAUD:9600
/ID:LoggerID	The Logger ID of a logging-capable probe, to resolve ambiguity when more than one probe is connected to the same port. When this parameter is present you cannot change the Logger ID interactively.
/PH:PortHandle	IrriMAX Remote Connection Manager (RCM) can supply a port handle which passes the RCM connection to the PConfig program. When /PH is present the /PORT and .BAUD parameters are ignored. When this parameter is present the Serial Port and Baud Rate fields show "Inherited" and cannot be changed.

e.g. /PH:%H

/CONNECT   This is the equivalent of clicking the Connect button as soon as PConfig starts.

Upon termination, PConfig supplies a return value which can be checked by RCM, or ERRORLEVEL in batch mode, as success or failure:

Return Value	Meaning
0	Success (user clicked the Exit button)
-1	Invalid command line parameter
-2	PConfig already running

Remote Connection Manager (RCM) usage

RCM can be configured to allow remote dialup connection to the modem attached to an Sentek Plus/Solo/MULTI probe. See the RCM manual for further details.

Warning:
The Baud rate of the probe's output port must match the baud rate of the probe's modem. This rate may be different to the rate setup in RCM device parameters. Sentek recommends setting both modems, the computer's COM port and the probe's output port to 9600. Changing the Baud rate when connecting using the probe's TTL programming port does not change the baud rate of the output port. It recommended to use the /PH command rather than the /PORT and /BAUD commands.

Create a new core program with command line:

```
C:\PROGRAM FILES\SENTEK\PROBE CONFIGURATION UTILITY\PCONFIG.EXE
 /PORT:COM%P /CONNECT /BAUD:%R
```

OR (recommended method)

```
C:\PROGRAM FILES\SENTEK\PROBE CONFIGURATION UTILITY\PCONFIG.EXE
 /CONNECT /PH:%H
```

Set the Return value for Success to 0 and for Failure to -1,-2.

Getting the Configuration from the Probe

The current configuration in the probe is displayed when you connect to it. With a new probe no configuration is present and you must Auto-Detect the connected sensors. Auto-Detect is also needed if you add or remove sensors.

**Note**: Sensors are displayed in depth order (for each type of sensor), not in sensor number order.

Ø   To get the configuration information from the probe:

Click the Read From Probe button. This will read in the sensor configuration information stored in the probe and display it in the list on both the *Configuration Page* and *Sensor Test Page*. If the probe in use is an analog output type, the analog output configuration will also be read and displayed on the *Analog Outputs Page*. The *Modbus Page* will also be refreshed, if applicable.

If the sensors physical configuration has been altered, click the Auto-detect Sensors button. This will re-detect the sensors which is usually a necessary starting point after significant changes to the physical configuration of the probe (add, remove or shift sensors). After the sensors are detected the configuration information will be displayed in the list.

See also *Writing the Configuration to the Probe*, *Backing up and restoring the Configuration* and *Confirm dialog box*.

Changing the Baud Rate
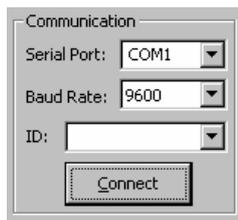
Ø **To change the baud rate:**

When connected to the probe select the new baud rate from the Baud Rate drop down list. You will then be asked if you would like to change to the new baud rate. Click Yes to then change to the new baud rate.

See also *Connecting and Disconnecting.*

Changing the Depth of Sensors

Ø **To change the depth of the sensors:**

From the *Configuration Page* click on the sensor depth when it is selected and it will go into edit mode as shown above. Type the new depth or use the up/down arrows to increase or decrease the depth value 10 units at a time. The minimum allowable depth is 5. To accept the new depth, click outside the cell or press Enter. The new depth will not be set in the probe's configuration until you use the Write To Probe button. If you want to discard the changes, press Escape and the depth will change back to the old value.

Note: The depth number is not associated with any units and is just a stored value for informative purposes. Therefore the value may mean "inch", "cm", etc. Sentek sensors are physically positioned at 10cm intervals, so it is recommended that you set the sensor depths to multiples of 10, with a minimum of 5 or 10.

See the depth description on the *Configuration Page* for special considerations with salinity sensors.

See also *Writing the Configuration to the Probe*.

Normalizing the Sensor Air and Water Counts

On the *Configuration Page*, there are buttons in the high and low columns which initiate a direct read of an individual sensor. If you want to discard the new reading you must press the button again or disconnect the probe and discard any changes.

Note: Earlier versions of this utility continuously sampled the sensor while the button was down. It has been established that a single sample is sufficient.

The expected air and water counts are dependent on the sensor type and sampling mode. See the relevant Product Specifications (see References in *Probe Configuration Utility Overview*) for the expected range of normalization values for your device. Values outside the expected range may indicate errors in the normalization steps or problems with the hardware.

Ø   To normalize the air counts:

With the probe inside an access tube and held in the air, click on the buttons in the "High/Air" column one at a time to start direct sensor reading.

To read the air counts for all the sensors at once, click the "High/Air" column heading.

Ø   To normalize the water counts:

Insert the probe into the tube in the water-filled normalization container so that the sensor that you wish to take the water counts from is in the center of the tube running through. Click the button in the "Low / Water" column that refers to that sensor to start direct sensor reading mode. Repeat this process for each sensor on the probe.

To read the water counts for all the sensors at once, click the "Low/Water" column heading. Note that it is unlikely that your water-filled normalization container will be big enough to make use of this feature.

The air and water counts will not be set in the probe's configuration until you use the Write To Probe button.

It is recommended to backup the probe configuration after normalization. The backup file can be useful in documenting the sensor configuration.

n	High / Air		Low / Water		
	35714		30000		0
	35665		24689		0
	33326		23140		0
	35700		24877		0

It is also possible to manually enter a normalization value by clicking on the current normalization value so the normalization button changes to up-down arrows. You can then either type a new value or make changes to the existing value by click the up-arrow or down-arrow.

See also *Writing the Configuration to the Probe* and *Backing up and restoring the Configuration*.

Changing the Calibration Coefficients

ater	Equation A;B;C	Total
	0.195700; 0.404000; 0.028520	✓
	0.195700; 0.404000; 0.028520	✓
	0.195700; 0.404000; 0.028520	✓
	0.195700; 0.404000; 0.028520	

On *Configuration Page* the "Eq. A;B;C" column displays the coefficients for each sensor.

The default calibration equation coefficients provided for different sensor types are:

Sensory Type	A	B	C
Moisture sensors	0.1957	0.404	0.02852

Sensory Type	A	B	C
TriSCAN sensors	1.0	1.0	0.0

Ø   To change the calibration coefficients of the sensors:

Click on the sensor coefficients cell when it is selected and it will go into edit mode as shown above. Type the new coefficients separated by semicolons. To accept the new coefficients click outside the cell or press Enter. If you want to discard the changes while in edit mode then press Escape. The new coefficients will not be set in the probe's configuration until you use the Write To Probe button.

See also *Writing the Configuration to the Probe*.

Changing the Total Selections

On *Configuration Page*, the "Total" column displays which sensors are used for the total moisture calculations. This is used by an analog output probe to (if an output is assigned to the "Total" reading) produce an output relative to the sum of the sensor readings which are included in the "Total".

Ø   To change which sensors are used for the total moisture calculations:

Double click in the "Total" column to add or remove sensors from the total moisture calculations. The new configuration will not be set in the probe's configuration until you use the Write To Probe button.

See also *Writing the Configuration to the Probe*.

Changing the Probe Address

Warning:
The probe address is important in multi-drop situations (e.g. SDI-12 and Modbus RS485) where a clash in communication would occur if two probes have the same address.

Ø   To change the probe address:

Once the probe is connected, type the new address.

The address of the probe should be in the range 1-65534 for most types of probes. Probes supporting specific protocols such as SDI-12, Modbus, etc. accept only addresses acceptable by those protocols in a protocol specific formats (I.e. ASCII '0'-'9', 'a'-'z', 'A'-'Z' for SDI-12 probes, 1 to 247 for Modbus probes).

This can be edited once connected, and when 'Write To Probe' is performed, the probe's address will be set to the new one. Probes with specific protocols use this address on that protocol side (port) as well.

Note: that the depth settings and analog output settings if they exist, must also be valid before the 'Write To Probe' action can be performed.

See also *Writing the Configuration to the Probe.*

Changing the Sampling Interval

Ø   To change the sampling interval:

From the *Clock Page,* click the sampling interval down arrow to allow selection of a new sampling interval from the drop down list or type in the desired sampling interval. Values can be specified as minutes, hours or days and the numbers can be whole or decimal, up to a maximum of 7 days. The new setting will not take effect until the "Write To Probe" button is pressed, which will send the new setting to the probe.

The sampling interval is used by the probe to decide when to update the probe's analog outputs (if the probe is an analog output version) or the internal logger (if the probe is a logging version). At the end of each sample interval, all sensors which are assigned to an analog output, or to the "Total" reading, are queried for their value.

As the probe is updating its sensors after this time interval, it will be sluggish in responding to the communications port, so this sampling interval should not be shorter than the time needed to sample all sensors. The probe takes 1.2 seconds to update each sensor. EnviroSMART Series II and EasyAG Series II take 50 milliseconds per sensor. A minimum sampling interval of 2 minutes is recommended.

Note: The maximum sampling interval is 7-days minus 1-hour (167 hours). On Internet enabled probes a sampling interval less than 2 minutes will lose data if the Internet upload takes more than 2 minutes.

See also *Changing the Clock Time*

Changing the Clock Time

Ø   To change the clock time:

From the *Clock Page* select the desired date and time or click "Synchronize with Computer" to use the current time from the computer's clock.

New settings will not take effect until the "Write To Probe" button is pressed.

See also *Changing the Sampling Interval*.

Changing the Analog Output settings

Output	Sensor	Lower Limit		Upper Limit		Error	Detail
		Value	Volts [V]	Value	Volts [V]	Volts [V]	
1	✓ 0	1.00	1.00	140.00	5.00	0.50	⟋
2	1	1.00	1.00	35.00	5.00	0.50	⟋
3	3	1.00	1.00	35.00	5.00	0.50	⟋
4	66	1.00	1.00	35.00	5.00	0.50	⟋

The analog output settings can only be changed on a probe which has analog outputs (XPI-5V, XPI-20C etc) using the *Analog Outputs Page.*

Note: If the sensor address is 0 and no sensors are configured with "Total" (no ticks on the Configuration page), the line will be displayed with a red background.

Ø   **To change the sensor address:**

Select the Analog Outputs tab

Select the output to change by clicking on the output number

Click on the sensor address, this will enable the edit window

Change the number and press enter (the address must exist on the probe on the *Configuration Page*). See *Sensor Icons Description.*

Continue to make any other changes you require

Ø   **To change the sensor value and voltage (current) settings:**

Select the Analog Outputs tab

Select the output to change by clicking on the output number

Click on the value, this will enable the edit window

Click on the corresponding voltage (current) value and set this as required

Continue to make any other changes

Ø   **To change the error voltage (current) setting:**

Select the Analog Outputs tab

Select the output to change by clicking on the output number

Click on the error voltage value, this will enable the edit window

Change the value and press enter (and continue to make any other changes)

Ø   **At the conclusion of making changes:**

Click Write To Probe to modify the probe's settings. See *Writing the Configuration to the Probe*.

Voltages (current) and values:

For each output, the upper voltage MUST be higher than the lower voltage, and the upper value MUST be higher than the lower value. The error voltage must be outside the upper and lower voltages.

The error voltage is used to indicate a sensor reading error (e.g. out of range / invalid calibration coefficients etc, or a reading of "INVALID VALUE" on the *Sensor Test Page*). It is recommended that the error voltage be set non-zero, because zero voltage can be used to indicate disconnection of the wiring between the probe and the controller.

Assigning the "Total" reading to an output:

Selecting a sensor address of zero will assign that output to the "Total" reading. To set the sensors included in the "Total" reading. See *Changing the Total Selections*

Disabling an output:

Selecting a sensor address of 255 will assign that output to zero volts, regardless of the lower limit and error voltages.

Backing up and restoring the analog output settings

The analog output settings are backed up or restored to/from a disk file using the 'Backup Configuration' and 'Restore Configuration' buttons (together with the sensor configuration settings).

See also *Backing up and restoring the Configuration* and *Getting the Configuration from the Probe*.

Setting up the Internet Parameters

A probe cannot communicate with the Internet until the parameters are setup and the connection has been tested.

Ø   To setup the Plus/MULTI Server:

See the *Sentek Plus Hardware Manual*.

Ø   To configure the probe:

1. Connect the Sentek Plus probe and if necessary **Auto-detect Sensors**, then on the *Configuration* page set probe depths and normalize the sensors.

2. Select the *Clock* page, set your desired **Sampling Interval** (e.g. 10 minute or 1 hour) then click **Synchronize with Computer**, and click **Write to Probe**.
    Note: if the clock is not correct, your graphs will not show the correct date and time.

3. Select the *Logger* page and type the **Destination URL** as supplied by the Plus/MULTI Server administrator. Either click the **Edit…** button or type a full URL of the form:
    ftp:\\<user name>:<password>@<Plus/MULTI Server address>:<port no>/<path>
    Note: An @ in the <user name> will be converted to %40.

4. Set your desired **Sample Count**. This may be related to how often you wish to view real-time data. e.g. if you review data twice a day and the **Sample Interval** is 1 hour you can set the **Sample Count** to 12 for upload once every 12 hours, then Click **Write To Probe.**

5. Select the *Modem* page and click **Test**. Within about 60 seconds the Server Response status should indicate *040 Success*.

6. If success did not occur in the previous step you should click **Open Session**, type AT in the **AT Command** field and click **Send**. The response OK should appear in the Response text field. If no response appears you must configure the modem, as described below.

Ø   To configure the modem:

1.   If the probe does not successfully connect to the modem it may be necessary to change the modem setting to 9600 baud, parity none (Sentek default).

2.   Follow the instructions in the *Sentek Plus Hardware Manual* or perform the following steps.

Ø   To configure the modem baud rate and parity:

If you wish to change the modem baud rate and parity values you can use the **Server Test** page, **Open Connection** option to send **AT commands** to the modem to change the defaults.

1.   On the *Logger* page change the **Baud Rate** and **Parity** to the known configuration in the modem and click **Write To Probe**.

2.   Select the *Modem* page and click **Open Connection**.

3.   In the **AT Commands** field, type the valid modem commands to permanently change the modem settings then click Send. For example, you can use. `AT+IPR=9600;+ICF=3,4;&W` to set 9600 baud, 8 bit, no parity in a WaveCOM modem (was odd parity in firmware version 1.x). If an OK response is not received, you probably selected the wrong parameters in step 1.

4.   Click **Close Session** and return to the *Logger* page, change the **Baud Rate** and **Parity** to match the modem new settings and click **Write To Probe**.

5.   Return to the *Modem* page, click **Open Session**, type AT in the **AT Command** field and click **Send**. If you do not receive an OK response repeat from step 1.

Ø   To Verify that data is appearing on the Plus/MULTI Server

1.   Ensure that PConfig is unplugged from the probe.

2.   Wait until the probe has completed at least two uploads, plus an extra minute (an upload will occur after a period of time equal to the sample interval multiplied by the sample count.)
      Note: you may want to set the *Clock* page **Sample Interval** to 2 minutes and *Logger* page **Sample Count** to 1, so you only need to wait five minutes. Don't forget to reset them to the desired values after this test.

3.   Start **Data Exchange** and select **Source** of Sentek Plus/MULTI. You may need to setup the Plus/MULTI Server details to match the information you configured in the probe. See the Data Exchange Sentek Plus/MULTI module documentation for further information.

4.   Select Server files and ensure there are files that match the logger ID and date and time of the probe you just configured. There should be at least two files.
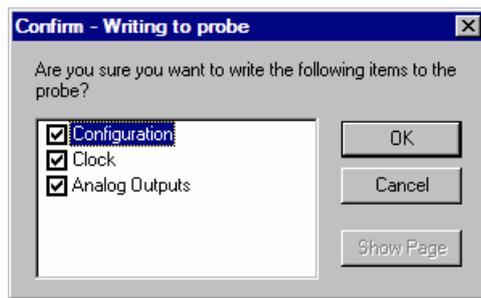
Writing the Configuration to the Probe

Writing the configuration to the probe will send the currently displayed sensor configuration (and other applicable settings) to the probe. Also the probe's address will be set to the one displayed in the Probe Info section. Existing configuration information in the probe will be overwritten.

Ø   To write the configuration to the probe:

Click the 'Write To Probe' button. You will be prompted to make sure you want to write all the changed pages to the probe. Click Yes and the configuration information for that page will be written. Settings will be verified when you click the 'Write To Probe' button.

See also *Getting the Configuration from the Probe*, *Backing up and restoring the Configuration* and *Confirm dialog box*.

Confirm dialog box

The confirm dialog box enables you to confirm items that you are writing to the probe, or changed settings you want to overwrite with settings from the probe or configuration file. It also lists items that will be lost if you disconnect while unwritten changed settings exist.

The controls are:

Item List   A list of the items that are about to be written, overwritten or lost. You can 'uncheck' any item which you don't want to include in the process (except when exiting or disconnecting), by clicking on the relevant check box. Then click "OK" to continue, or click "Cancel" to cancel the process.

OK   Click this button to continue with the process.

Cancel   Click this button to cancel the process.

Show Page   This button is enabled when the highlighted item in the Item list is a page which is not visible on the application's main screen. You can reposition the Confirm dialog box on the screen, highlight the page name in the Item list and click on "Show Page" make that page visible.

Testing the Configuration

For the configuration information to be displayed on *Sensor Test Page* the configuration must have been read from the probe using either Auto-detect Sensors or Read From Probe.

Ø   To test the present probe configuration:

From *Sensor Test Page* click the **Query All Sensors** button to start the query mode. The "Current Raw Count." and "Calibrated Value" columns will be updated after all sensors have been sampled. To stop query mode click **the Stop Sensor Querying** button.

For a faster result, one or more sensors can be updated by clicking on each line (and holding the Ctrl key down to select more than one sensor), then clicking '**Query Selected Sensors**". To stop query mode click the **Stop Sensor Querying** button.

It takes the probe up to 1.2 seconds to query each sensor (In addition, the probe may be busy polling sensors for analog outputs or logger assignments if and when required by the sampling interval setting).

See also *Getting the Configuration from the Probe*.

Ø   To test the Internet connection:

If the probe supports Internet upload, you can use the **Test** button on the *Modem Page*.

1.   Click the **Test** button on the *Modem* page.

2.   Wait for the server test status to change through the sequence of states 001, 002 through to a final state in the 040 or 050 ranges. This may take up to one minute.

3.   Examine the final state. It should be "040 Success". If the result is in the "050" range the test has failed. See Last Response in *Error Messages* section for further information.

4.   You can verify that the data has been uploaded to the correct Plus/MULTI Server address by using **Data Exchange**, setting Source type to "Sentek Plus/MULTI", selecting the appropriate server

name and clicking the **Server Files** button. The Test filename is of the form <loggerID>-yymmdd-hhmmss.txt.

If this file does not appear and the Last Response was "040 success" the Test was uploaded to a different Internet address, so check that the Internet address in the probe matches the Internet address in **Data Exchange**.

Backing up and restoring the Configuration

Ø   To backup the configuration to a file:

Click the Backup Configuration button. Specify the file you would like to save it in and click OK. The sensor configuration (and other applicable settings) should now be stored in the specified file.

Note: The values on the screen are saved to the file, even if displayed in red.

Ø   To restore the configuration from a file:

Click the Restore Configuration button. Select the configuration file you would like to restore and click OK. The sensor configuration information in the file should now be displayed on the relevant pages.

The new configuration will not be sent to the probe until the 'Write To Probe' button is clicked, when the restored settings will also be verified.

See also *Getting the Configuration from the Probe* and *Confirm dialog box*.

Sensor Icons Description

These icons appear next to the sensor number on the *Configuration* and *Sensor Test* pages.

The sensor is a Moisture type sensor

The sensor is a Salinity type sensor

The sensor is a Temperature type sensor

The sensor is a Humidity type sensor

The sensor is a Pressure type sensor

The sensor type is unknown or disabled. This can occur if an analog output is linked to a sensor that does not exist after Auto-Detect Sensors has been done. It also appears if sensor address 255 is selected on the analog output page.
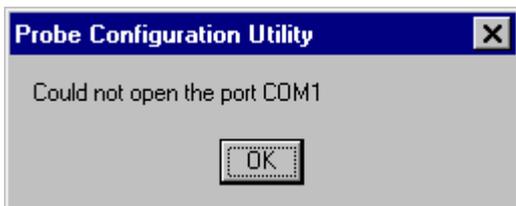
The sensor is included in the 'Total' value (Probe Configuration and Configuration Test pages). The Analog Output is assigned to the 'Total' moisture value (Analog Output Page only).

Error Messages

Some common error messages that can be displayed are (in alphabetical order):

Message	Meaning
A lower calibrated value is greater than or equal to the corresponding upper calibrated value.	The upper calibrated values must always be higher than the lower calibrated value. Re-edit the values on the Analog Output page to achieve this. See *Changing the Analog Output settings*.
A lower <voltage or current> is higher than it's corresponding upper <voltage or current>	The upper analog output voltage (current) settings must always be higher than the lower settings. Re-edit these values and click 'Write To Probe' again. See *Changing the Analog Output settings*.
A <voltage or current> is outside the range of the probe…	The voltage or current specified is greater than the probe's maximum voltage or current, or less than it's minimum. Edit these values and click 'Write To Probe' again. See *Changing the Analog Output settings*.
A water normalization value is greater than or equal to the corresponding air normalization value.	The normalization procedure was not followed correctly for each moisture sensor, see *Normalizing the Sensor Air and Water Counts*
An unsupported command was sent to the probe while…	The command sent to the probe was not supported in this version, or firmware version. This may occur if you are using an out of date PConfig or probe firmware. Please upgrade to the latest version (available from the Downloads section on the Sentek web site). Contact Sentek support if the problem persists.
A Modbus address must be in the range 1 to 247 inclusive	A Modbus probe is connected, and as the Modbus address is shared with the PConfig (TTL) address, it must be from 1 to 247 inclusive. See *Changing the Probe Address*.
A probe with a different serial number has been detected. Do you wish to reconnect to the previously connected probe?	You have unplugged one probe and connected to another without disconnecting first. If this was done by mistake, please re-connect to the original probe now and click yes. If you select not to connect to the previous probe, the program will disconnect, and reconnect to the new one.
An SDI-12 probe address must be in the range '0'-'9', 'a'-'z', or 'A'-'Z'	An SDI-12 type probe must have an address of a single character in the specified range, see *Changing the Probe Address*.
Cannot change baud rate from MULTI front panel.	The probe rejected the command to change the baud rate and you are connected to a MULTI probe. The most likely reason is that you are connected via the front panel. The baud rate cannot be changed from the front panel.
Corrupt data was received while…	The communications data between the probe and the computer was corrupted. Check the cable connections.
Could not open the port **Probe Configuration Utility** Could not open the port COM1 [OK]	This means that the specified communications port couldn't be opened because it may be in use by another application or the specified port may not exist. If communications on the selected port has previously been established since the last startup of this computer, but is no longer possible and this "Could not open port…" message appears: Note: If for some reason this program has been terminated using a task manager or Ctrl-Alt-Delete or an Unrecoverable system error, the support program IPI1Drv.exe may still be running, and will still hold the communication port. You can either re-boot the computer, or close this program and use Ctrl+Alt+Delete and 'Task Manager', to select the IPI1Drv.exe program, and terminate it.

Message	Meaning
Error code <n>	PConfig communication with the probe failed. Check whether another program is using the COM port. If not, reinstall PConfig. If this fails please contact Sentek technical support.
Failed to understand a line in the name mapping file: PConfig.nme	This file is required by PConfig, but has been corrupted. Please reinstall PConfig.
Last Response (field on Logger page)	This field displays the status at the end of the most recent upload or attempt to upload.
	Codes in the range 000 to 030 indicate that upload is still in progress.
	Codes in the range 040 to 049 indicate upload was successful.
	Codes in the range 050 to 059 indicate failure. Some of the codes have additional text indicating reason for the status. If failure persists contact Sentek support.
These responses are for Plus probes.	000 No Error - Only occurs after first ever power on
See below for Solo.	001 Initializing Interface
	002 Initializing FTP
	003 Transferring
	004 Uploading to Server
	040 Success
	041 Success (No Data)
	042 User Cancel - You clicked the Cancel button on the Server Test page
	050 Unsupported
	051 Clock Not Set - Upload is not possible until the clock is set on the Setting page.
	053 Connection Failure - Modem not responding to commands. Check modem is receiving power.
	054 Server Error - Modem could not connect to the Plus/MULTI Server. Check the Destination URL. See the Sentek Plus Hardware Manual for more information about error codes.
	055 Internal Error (Please backup the probe configuration and make a note of what you were doing when the problem occurred. Then send both to Sentek Technical Support for analysis.)
	056 Front panel active
	057 Supply voltage too low
	058 Invalid URL

Message	Meaning
These responses are for Solo probes.	000 Idle - Occurs after probe reprogrammed
See above for Plus.	001 Transferring - Interface power was removed during upload.
	040 Transfer Complete - SoloPORTER completed green-steady.
	041 Success (No Data) - All files already exist on USB memory
	050 Filesys in use
	052 Error CD - USB memory was write-protected.
	053 No Free Space - Less than 3 clusters were available on USB memory
	054 Could Not Write File
	055 Internal Error (Please backup the probe configuration and make a note of what you were doing when the problem occurred. Then send both to Sentek Technical Support for analysis.)
	056 Timeout - SoloPORTER was unplugged while upload in progress
	057 Invalid Response
	058 Probe Not Configured - AutoDetect with no sensors connected or all sensors zero depth.
	059 Clock Not Set - Probe was reprogrammed when its battery (super-cap) was flat.
No sensors are selected	No sensors are selected, and the 'Query Selected Sensors' button was clicked. See *Testing the Configuration*.
One of the sensor addresses assigned to an analog output is not configured in the probe.	You must only select sensor addresses which are listed on the *Configuration Page*, or an address of zero for the total moisture reading. See *Changing the Analog Output settings*. Edit these values and click 'Write To Probe' again.
	This can occur if you restore configuration from the wrong backup file.
Probe enable must be less than <voltage> for this probe	Probes are designed to operate in the range 4 volts to less than 15 volts.
Telemetry disable must be less than <voltage> for this probe	Probes are designed to operate in the range 4 volt to less than 15 volts and cannot supply a telemetry voltage outside this range.
The analog output type in the file you are using differs from the probe's output type. Do you want to use the file's output settings anyway?	The file you loaded the configuration details from was from a different type of probe (current versus voltage for example). You may choose yes to use the settings, but should check that the voltage or current settings are valid and within the limits of this probe.
The communications driver is not registered in the registry	The Windows Registry entry for PConfig is not correct. Please reinstall PConfig.
The 'error' <voltage or current> setting must be below the lower <…>, or above the upper <…> settings	The error voltage (current) is used to indicate that the calibrated reading that the output is representing is invalid. The voltage or current must be outside the normal range of the lower and upper voltages (currents). See *Changing the Analog Output settings*.
The moisture sensor depths are not unique. Please assign a unique depth to each moisture sensor.	Moisture sensors must have unique depths before the configuration can be written to the probe. The sensors normally have depths assigned to them in the range 10, 20, 30 etc. See *Changing the Depth of Sensors*.
The probe address must be between 1 and 65534	The probe address must be between 1 and 65534 inclusive, see *Changing the Probe Address*.

Message	Meaning
The probe requires that you connect using a blank ID.	This message appears when you supply a Logger ID for connection and the probe rejects the command. The probe is most likely a non-logging probe that does not support connecting using a Logger ID.
The probe rejected a command while…	The probe rejected the command specified. This may occur if you are using an out of date PConfig or probe firmware. Please upgrade to the latest version (available from the Downloads section on the Sentek web site). "The probe rejected a command while getting raw readings" has been known to be caused by low battery voltage (<4V) causing the probe to reset. Contact Sentek support if the problem persists.
The upper calibrated value must be greater then the lower calibrated value	The upper calibrated values must always be higher than the lower calibrated values. Edit the values on the Analog Output page to achieve this. See *Changing the Analog Output settings*.
The upper voltage must be greater than the lower voltage	The upper analog output voltage (current) settings must always be higher than the lower settings. Edit these values and click 'Write To Probe' again. See *Changing the Analog Output settings*.
This sensor address does not exist in the probe. It should be either zero, or a valid sensor address.	The sensor address you chose is not listed on the *Configuration Page*. Change the sensor address to an existing one, or to zero for total moisture.
Timeout occurred while... Do you want to retry? **Probe Configuration Utility** ✕ Timeout occured while getting the probe type Do you want to retry? [Retry] [Cancel]	There was no response from the probe during the specified operation. Check all the connections and click 'Retry' to try again. When no specific task is being performed, the program will periodically communicate with the probe to make sure it is still connected.
Unable to open name mapping file: PConfig.nme	This file is required by PConfig. Please reinstall PConfig.
Unable to set the 'Total' settings in the probe	Older probes had to have at least 1 sensor set in the "Total" list. Select one sensor for the "Total".
Unable to set the Probe address	The probe was unable to set the new address.

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