

19 Measurement Control

19.1 Measurement Mode

The drop down box provides a menu of the possible temporal logging intervals with which to operate the instrument.

19.1.1 Manual:

This mode allows the user complete control over the initiation of a measurement. A measurement can only be initiated by clicking on the Start Measurement icon. It is typically used to perform:

- (1) An instrument verification check prior to field deployment
- (2) A calibration of a stem Psychrometer chamber
- (3) Destructive sampling of leaf tissue for leaf water potentials
- (4) Destructive sampling of leaf tissue or sap for osmotic potentials
- (5) Soil water potential measurements of excavated soil samples.

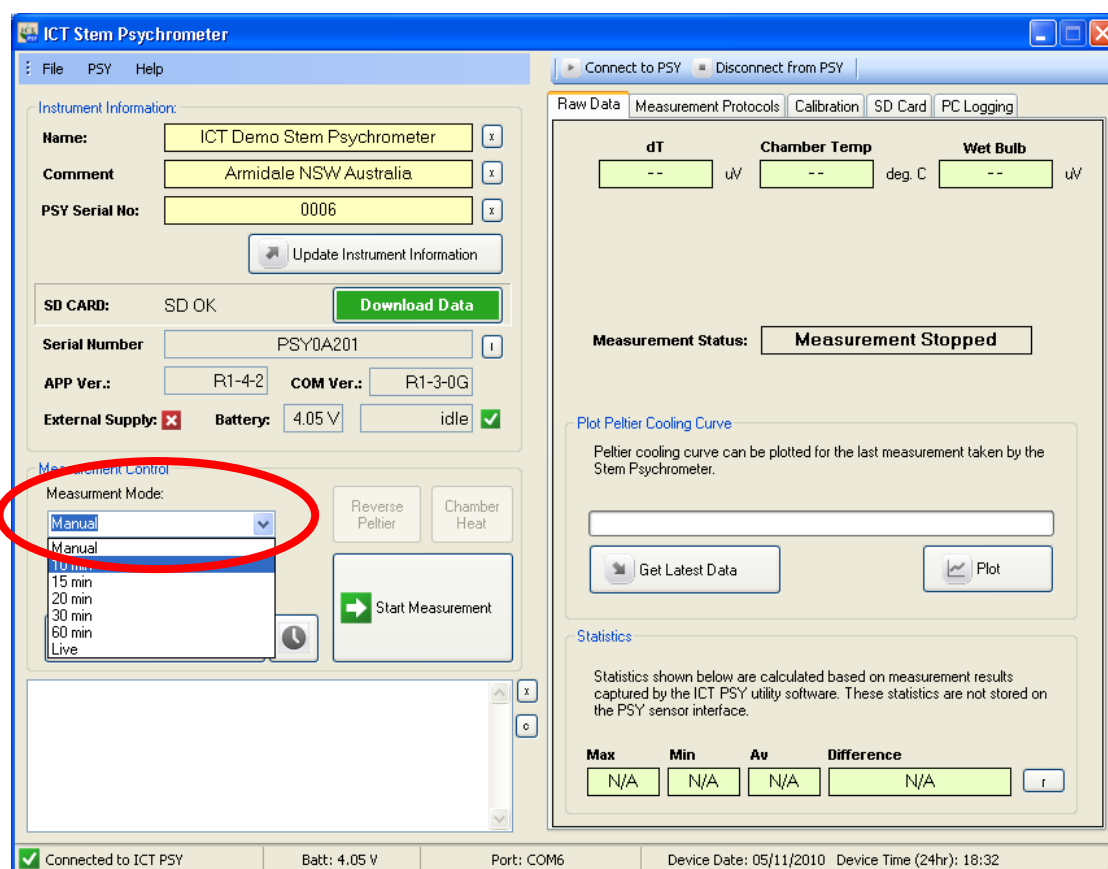


Figure 73: Measurement Control Mode set to "Manual"

NOTE 53: All readings initiated in the manual mode are saved to the MicroSD card and saved direct to the PC (if PC Logging is activated). It is also possible to manually apply reverse Peltier currents to warm the thermocouple or invoke a chamber heating protocol by pressing the respective icons. These protocols are described in detail in the [Reverse Peltier \(warming\)](#) and [Chamber Heating](#) sections.

19.1.2 10 Min:

This is the minimum temporal resolution logging interval allowed in an automated data collection mode. Data collected more frequently than this has a high probability of disrupting the thermodynamics of the chamber by preventing the return to thermal equilibrium between readings and increasing microscopic beads of water on the thermocouples that will artificially appear to increase the readings (make the measurements less negative) therefore, introducing serious errors. This can be empirically demonstrated in the “Manual” mode by making successive measurements without any time interval between each measurement.

NOTE 54: It is recommended not to use 10 min temporal resolution logging interval unless you have done a precursor study of the plant, at the specific site, under the prevailing environmental conditions to verify that 10 minute temporal resolution is indeed sufficient time to allow re-equilibration between measurements.

19.1.3 15 Min:

Optional temporal resolution logging interval often chosen for environmental research.

19.1.4 20 Min:

Optional temporal resolution logging interval.

19.1.5 30 Min:

This is a Good temporal resolution as it affords the plant sufficient time to re-equilibrate thoroughly yet still frequent enough to see rapid changes in plant water potential.

19.1.6 60 Min:

Optional temporal resolution logging interval.

19.2 Live Mode:

Live mode is used as a diagnostic tool to ensure integrity of chamber thermocouples through stability of Thermocouple-C and dT values. Live mode in conjunction with Chamber Heating Protocol or Peltier Warming Protocol can also be used to test and verify a selected protocol before field deployment. ([See Appendix A for a PSY1 Test Procedure](#))

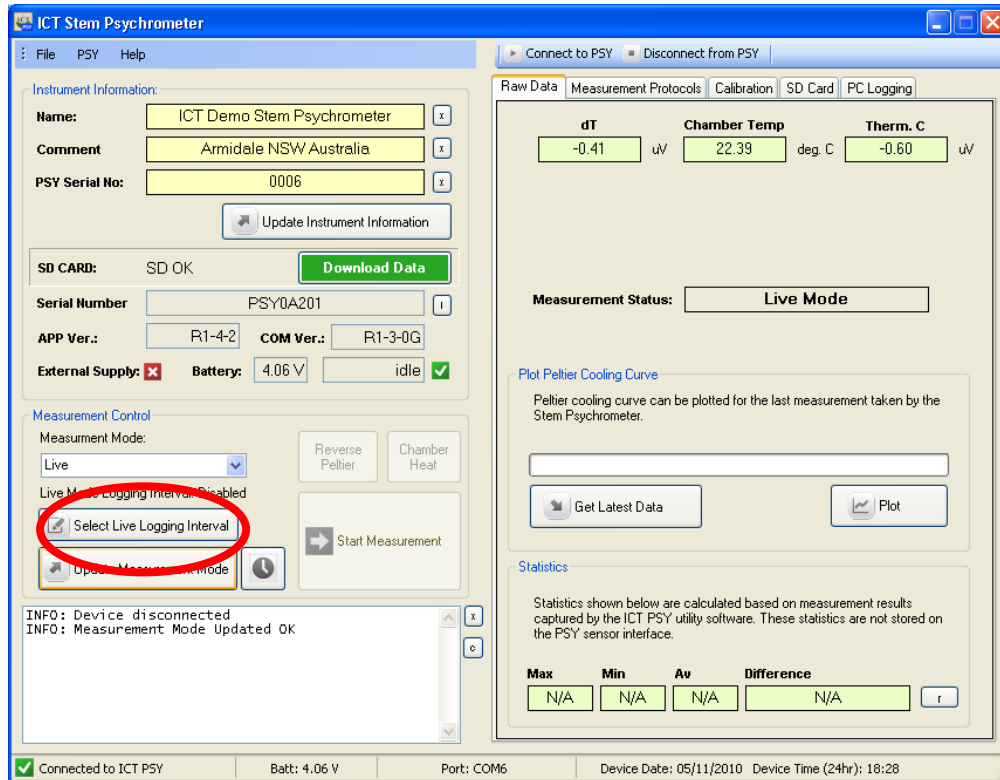
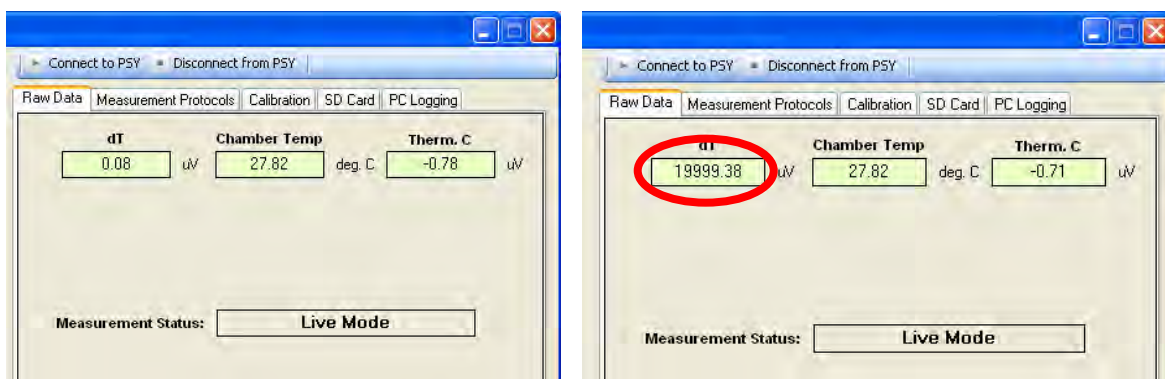


Figure 74: PSY1 Software set to Live Mode displaying real time values measured from the Thermocouples in the psychrometer.



(a)

(b)

Figure 75 (a) shows an expected output from Thermocouple-C when the Thermocouple is intact and in working order. (b) Shows the open circuit response of a broken Thermocouple-S. This chamber requires repair by ICT International.

NOTE 55: Please contact ICT International support via our web site: www.ictinternational.com and submit a ticket for a Return Merchandise Authorisation Number (RMA #) and immediately return the chamber for repair together with a completed RMA Form. Instruments returned without an RMA form WILL NOT BE REPAIRED. Where the repair is urgent it may be possible to organise the dispatch of an exchange chamber to minimise the down time.

19.2.1 Live Logging Interval

The live data can be saved to a custom file extension*.live on the MicroSD card. This can be a file name of your choosing and saved to your preferred folder location on the computer. Data can be logged at intervals between 1-60 seconds. Once the required logging interval is chosen, use the up and down scroll arrows or type the value directly into the field, and click on the **“Done”** icon to commence logging.

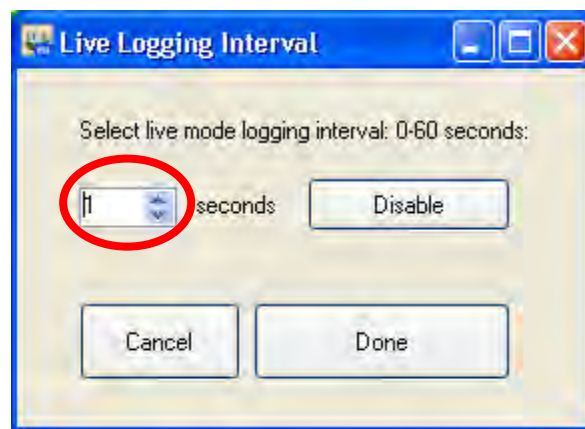


Figure 76: Live Logging Interval Window for and setting Live Logging mode intervals or deactivating Live Logging Mode.

To stop logging in live mode, click on the **“Select Live Logging Interval”** icon to bring up the **“Live Logging Interval”** window.

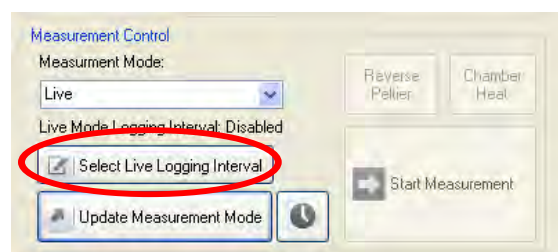


Figure 77: Measurement Control – Select Live Logging Interval.

Then, click the **“Disable”** icon to reset to zero seconds and click **“Done”**. Alternatively, use the scroll arrows to adjust the seconds to zero. Logging is now stopped but the instrument remains in live mode and the live display is still active.

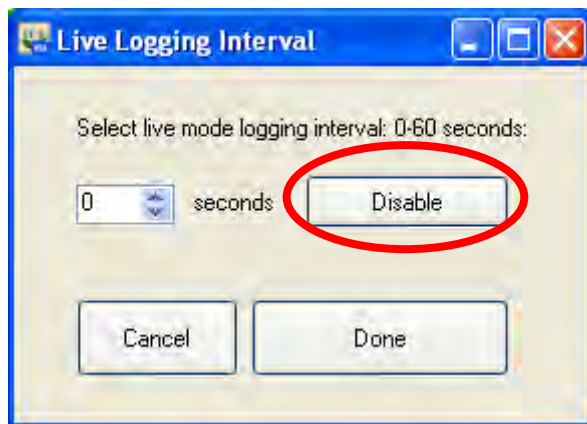


Figure 78: Live Logging Interval Window to deactivate Live Logging Mode.

NOTE 56: The instrument uses more power when set to “Live” mode. It is recommended that when using “Live Mode” for extended periods you should connect an external power source to charge the internal battery.

WARNING 16 - Never disconnect the instrument while in “Live” mode. As the instrument will continue to use power and drain the internal battery unnecessarily. It may also cause the internal battery to become completely discharged. When external power is connected and the battery is recharged above the hibernation mode the “Live” mode will automatically begin to drain power making it impossible to fully recharge the internal battery.

19.2.2 Live Data file

Below is an example of a Live Data, data file. The *.lve file extension is used for differentiation purposes only. The Actual file format is a Comma Separated Values (*.CSV) file that will automatically open in Excel or [Sap Flow Tool \(SFT1\)](#) Analysis software. The data file follows the same format as a psychrometer data file. It includes a Header line that records all of the instruments settings, Columns headings row, separate Date and Time Columns and the measured outputs from the psychrometer chamber.

Serial Number:	PSY0A201								
APP Serial #:	3000008								
Head Serial #:	6								
APP Ver:	R1-4-2								
COM Ver:	R1-3-0G								
Instrument Name:	ICT Demo Stem Psychrometer								
Comment:	Armidale NSW Australia								
Date	Time	Chamber Temperature (°C)	dT (μV)	Thermocouple C (μV)	Cold Junction (°C)	CJ-CD (μV)	Correction Factor	Internal Battery Voltage (V)	External Power Supply Present
5/11/2010	19:05:40	22.37	-0.17	-0.56	23.92	22.37	8.29	4.03	not present
5/11/2010	19:05:41	22.37	-0.17	-0.58	23.92	22.37	8.29	4.03	not present
5/11/2010	19:05:42	22.36	-0.16	-0.58	23.92	22.36	8.29	4.03	not present
5/11/2010	19:05:43	22.37	-0.13	-0.56	23.92	22.37	8.29	4.03	not present
5/11/2010	19:05:45	22.37	-0.14	-0.59	23.92	22.37	8.29	4.03	not present
5/11/2010	19:05:46	22.37	-0.16	-0.63	23.92	22.37	8.29	4.03	not present
5/11/2010	19:05:46	22.36	-0.16	-0.64	23.92	22.36	8.29	4.03	not present
5/11/2010	19:05:47	22.36	-0.15	-0.65	23.92	22.36	8.29	4.03	not present
5/11/2010	19:05:48	22.36	-0.15	-0.65	23.92	22.36	8.29	4.03	not present
5/11/2010	19:05:49	22.36	-0.11	-0.61	23.92	22.36	8.29	4.03	not present
5/11/2010	19:05:50	22.37	-0.11	-0.61	23.92	22.37	8.29	4.03	not present

Table 1: Example of a Live Data, Data File.

19.3 Delayed Start

The delayed start function allows the user to configure the instrument in advance of use. In many situations it may be preferable to set all instruments to the same predetermined start time prior to deployment in the field. This can be done via the GUI software in the office prior to deployment in the field. Once in the field and the instruments have been installed and power is either manually turned on using the power switch ([see turn on the instrument](#)) or by connecting external power ([see connecting a power supply to the instrument](#)) which causes the instrument to automatically turn on and commence logging at the predetermined time and logging interval.

To operate effectively this function requires that the instrument's internal clock has been either synchronised with your computer or manually set to the correct local time of the region in which you are deploying the instruments. Failure to do so will result in erroneous data that will require manual post processing to correct the date & time stamp of the collected data.

NOTE 57: The instrument can only be set to start logging 23:59 minutes after setting the delay as it works on a 24 hour clock only, without a date variable. Therefore, a longer lead time is possible if after configuring the instrument you turn the power off.

To activate the Delayed Start function click on the Clock icon to the right of the Update Measurement Mode icon in the Measurement Control field.

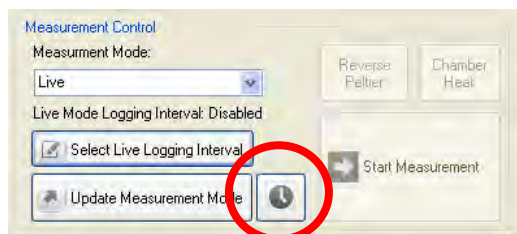


Figure 79: Delayed Start Icon.

The Measurement Scheduler Window will appear. Begin by deselecting the “**Disable Delayed Start**” check box to enable the delayed start function.

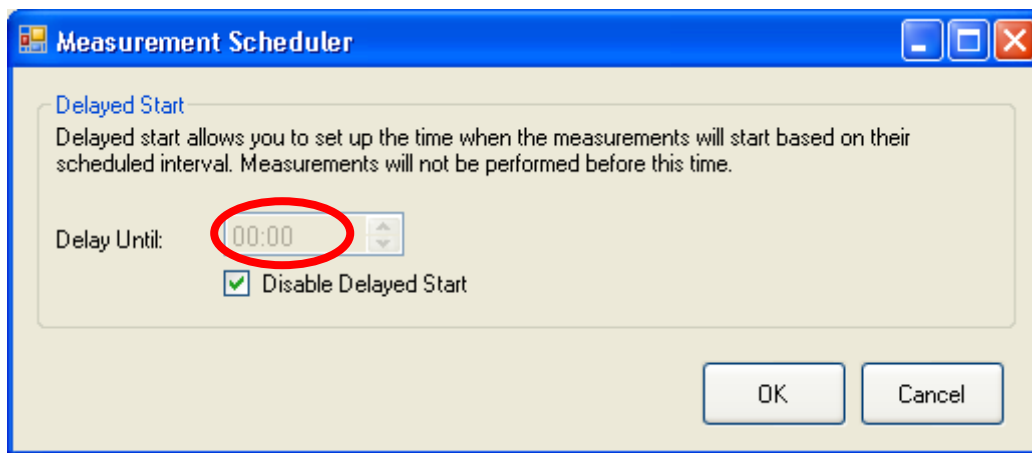


Figure 80: Measurement Scheduler Window – Enable Delayed Start.

Next adjust the time that you require the instrument to commence measurements. This can be done by typing the precise time in hours and minutes in the respective time entry fields or utilising the scroll arrows to increase or decrease the time. To use the scroll arrows click in the hour entry field and click the scroll arrows up or down. Once, the required hour is set, click in the minutes entry field and again use the scroll arrows to adjust the minutes up or down as required. Once both the hours and minutes are set click ok.

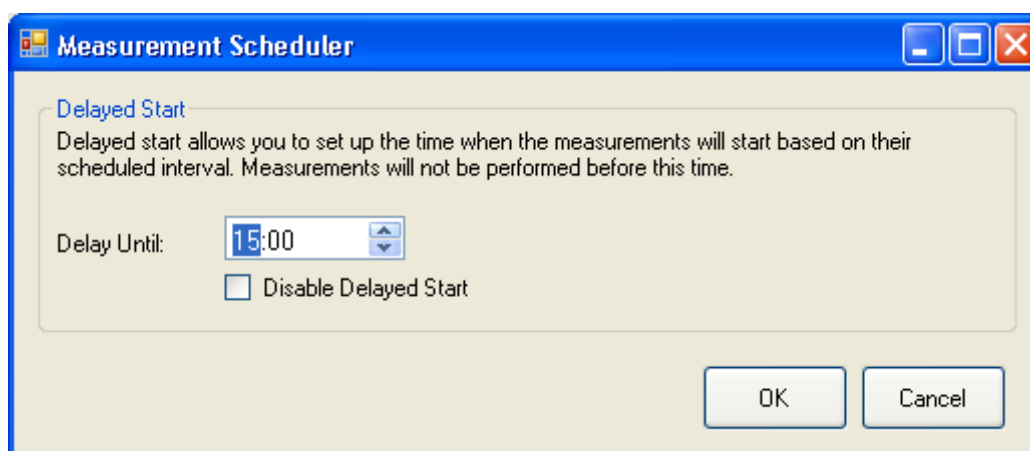


Figure 81: Measurement Scheduler Window – Set start time.

When complete, the Measurement Scheduler window will close returning you to the main GUI window. In the [Dialogue Box](#) a message confirming the change will be displayed:
INFO: Measurement Mode Updated OK.

19.4 Dialogue Box

The dialogue box is located in the bottom left hand corner of the PSY1 GUI software.

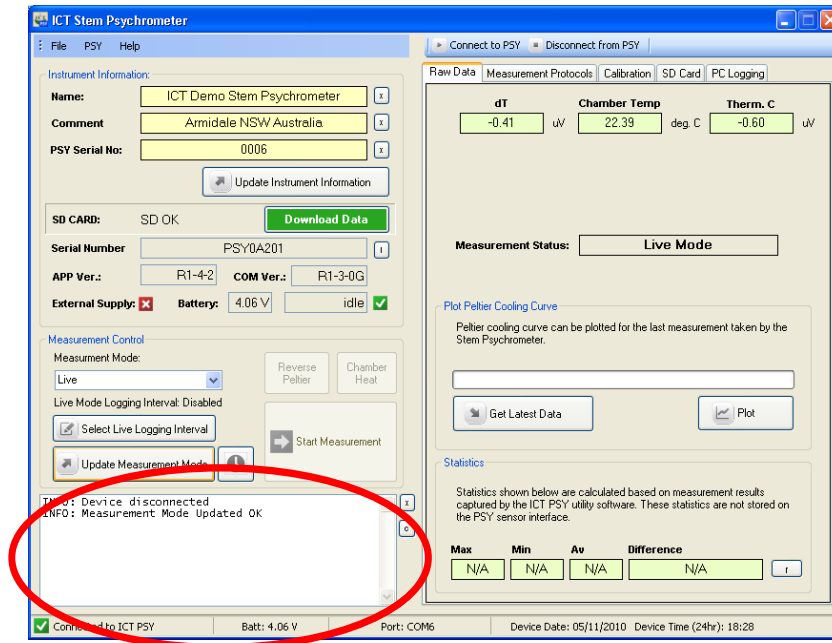


Figure 82: Dialogue Box location and Function.

It is a field for dynamic user feedback from the instrument in response to actions performed by the user. When an action is performed by the user a response is immediately displayed either confirming the action is ok or warning that the action has failed and why.

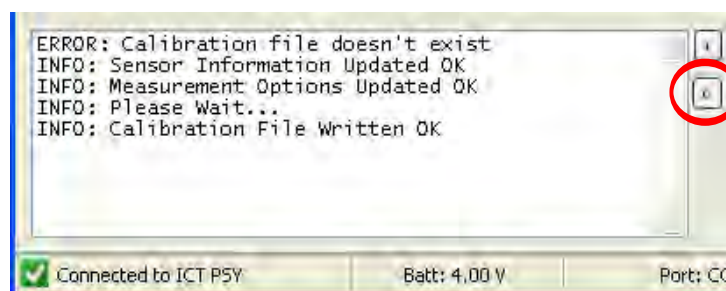


Figure 83: Dialogue Box – Example of user feedback messages & Copy Text function icon.

19.4.1 C:

Clicking on this icon copies all of the information contained within the dialogue box and can be pasted into a word processing application such as Microsoft Word or Notepad. This can be a useful tool in diagnosing possible problems as exact feedback from the instrument can be emailed to ICT engineers for troubleshooting.

ERROR: Calibration file doesn't exist

INFO: Sensor Information Updated OK

INFO: Measurement Options Updated OK

INFO: Please Wait...

INFO: Calibration File Written OK

19.4.2 X:

Clicking on this icon clears the field of any previous information

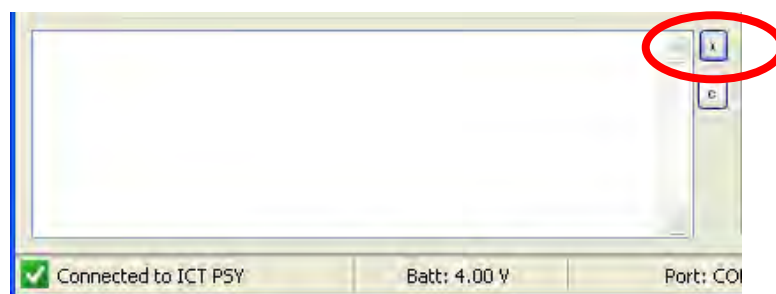


Figure 84: Dialogue Box Clear icon.

19.5 Status Bar:

The status bar is located along the bottom of the PSY1 GUI and provides basic information about the operational status of the instrument.

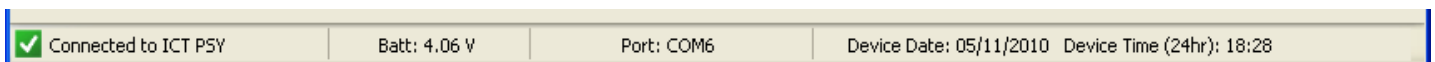


Figure 85: PSY1 Software Status bar.

19.5.1 Connection status:

- Disconnected
- Connecting
- Connected to ICT PSY

19.5.2 Batt:

Displays the internal battery voltage of the instrument both prior to connection and once connected. Prior to connection it provides a very useful diagnostic tool should the PSY1 fail to connect due to a low internal battery voltage.

19.5.3 Port:

Displays the active COM port being used by the instrument associated with the open Software window, multiple instruments can be connected to a PC simultaneously on different COM ports by opening multiple software windows.

19.5.4 Device Date:

The current date of the instrument is displayed. This can be set manually by the user or synchronized with the PC Date & Time. (See section “PSY Menu”)

19.5.5 Device Time:

The current time of the instrument is displayed. This can be set manually by the user or synchronized with the PC Date & Time. (See section “PSY Menu”)

19.5.6 Help Menu:

19.5.6.1 About

The About Splash Screen displays the Software's:

- Product name
- Product Version
- Release date
- And The ICT Web site link: www.ictinternational.com



Figure 86: PSY1 “About” Splash Screen.

19.5.7 Check for Updates

The updates function can be automated, however, a manual update search option is available via the Help menu. The software will check the ICT web site: <http://ictinternational.com/support/software/> and search for any new software or firmware updates that may be available.

19.5.8 Support

The support option is split into two key functions: (1) Create Support Log and (2) Start Debug File. These functions are designed to automatically collect configuration information for use by ICT engineers in troubleshooting problems.

19.5.8.1 Create Support Log

The support log automatically generates a file summarising the configuration settings of the PSY1 that can either be directly emailed to ICT or sent as a text file attachment. An example of a Support Log is shown in Appendix C – Support Log.

19.5.8.2 Start Debug File

The Debug file interrogates the computer you are using, documenting the Operating System, CPU speed, RAM, connected Hardware, USB Com ports and drivers. It then records the communication sequence between the computer and ICT Devices connected to any USB Com port. This file is created when you “Start” a debug file and finishes when you “Stop” the Debug File or close the software. The file is saved as a .txt file that can be emailed to ICT engineers for analysis and trouble shooting.



Figure 87: Help Menu – Support Options - Create Support Log & Start Debug File.