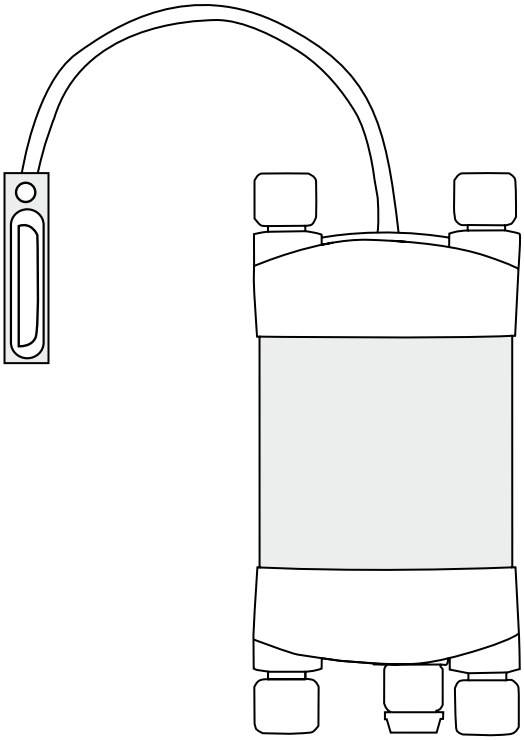
STM
Soil Tension Meter



ICT International
Solutions for soil, plant & environmental monitoring

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1. Introduction

The STM Soil Tension Meter is a complete system for collecting and storing data from up to five Pressure Transducers in the field or laboratory. The STM is equipped with an internal battery which provides power to the Data Logger as well as the transducer attached to the Infiltrometer. A fully charged battery should have the capacity to provide several hours of data collection in the field before recharging is required.

There are three parts to the STM system:

1. The instrument (also known as the data logger).
2. Break-out box for connection between the sensors and the instrument.
3. Sensor

The system is plug-and-play in that it is ready to go from the box. You will need to plug a sensor into a vacant channel, assign a logging interval, and connect external power supply to the instrument.

The output from the MP406 or MP306 sensors is either millivolt (mV) or volumetric water content (% VWC). The mV data are the raw data from the sensors. The % VWC data are derived from a calibration curve performed by scientists at ICT International.

The STM can be programmed to accept your own calibrated data. It can also be programmed so that your MP406 or MP306 sensor can measure soil water potential.

This manual outlines how to start your STM and connect power supply. It also shows how to download data and configure your instrument. Calibration techniques, and how to program your STM so sensors can measure soil water potential, are outlined.

2. System Requirements

2.1 CPU Processor

The ICT Instrument software does not require large processing power.
For example it is compatible with NetBooks.
Minimum Recommended Processor Capacity:
Intel Atom Processors with a CPU N270 @ 1.66 GHz and 1GB RAM or higher.

2.2 Software

The ICT Instrument software is compatible with the following Windows Operating Systems:

a. Windows XP
b. Windows Vista
c. Windows7
d. Windows Virtual OS run from a Mac computer

2.3 Screen Resolution

The ICT Instrument software is written to a fixed screen resolution of 857 x 660 dpi (it does not Auto Resize) and works best on current model laptops that have a screen size of 11.6” or larger and a default screen resolution of 1366 x 768 (the vertical height of 768 being most important otherwise you can't see the bottom of the software).

3. Charging the STM Internal Battery

The STM is a self contained instrument that incorporates a lithium polymer battery. Before using the instrument, this battery MUST be charged.
To choose from a range of charging options see
Connecting a Power Supply to the Instrument (pages 6 to 11).

The STM has an internal battery which can supply up to 6 hours of continuous use. The STM can be used in the field without an external power supply for at least 6 hours. It is recommended to charge the battery overnight with the CH7 power supply for use in the field the next day.

An external power supply can be connected to the STM in the field.
See Connecting a Power Supply to the Instrument (Field Operation) (pages 10 & 11) for more details.

The unique power-bus plug design was developed by ICT International to simplify the electrical wiring process. It minimises the need for custom tools in the field requiring only that the outer cable sheath be stripped back to expose the copper wire.

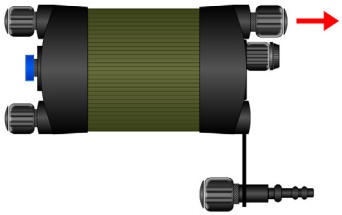
As shown in Connecting a Power Supply to the Instrument (page 6) no other tools are required with all necessary components and fixings fully incorporated into the instrument design. Retaining straps ensure the power-bus plugs do not separate from the instrument when removed from the power-bus during wiring preparation and connection of external power.

3.1 Connecting a Power Supply to the Instrument

3.1.1 Individual Power Supply Connections

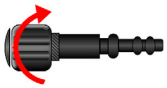
Important: Do not connect external power until the final step

1



Remove both ICT Bus plugs from either end of the sensor.

2



Unscrew the end of the plug 1 to 2 turns.

3

Remove the Bus plug sealing cap.

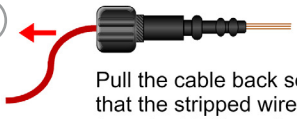
4

Insert either polarity of the external power source cable.

5

Strip a maximum of 15mm from the end of the cable.

6



Pull the cable back so only that the stripped wires protrude from the ICT bus plug.

7

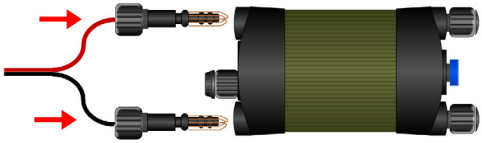
Bend the stripped wires back over the end of the ICT bus plug.

8

Important : Seal the cable against water ingress by tightening the end of the plug.

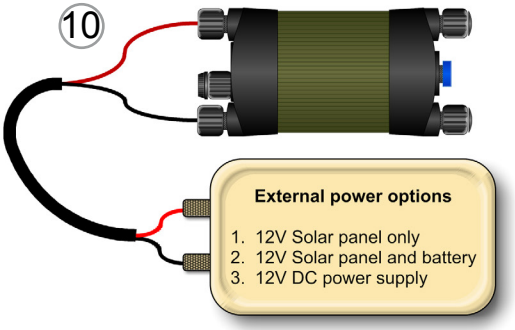
9

Repeat for second bus plug



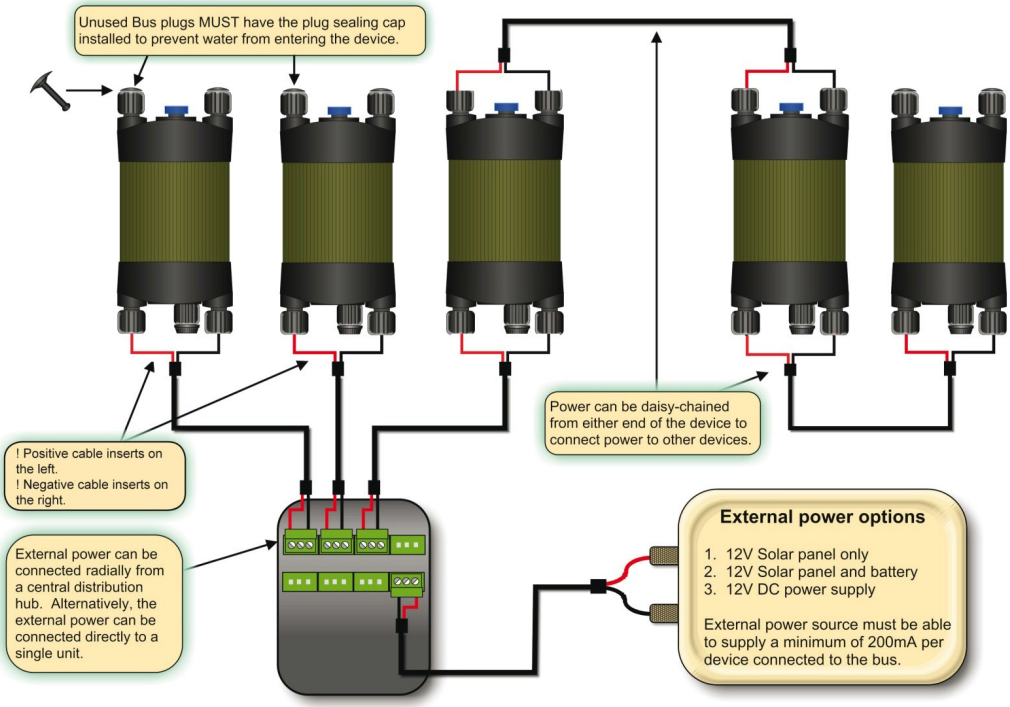
Insert the ICT bus plugs into the endcap of the sensor. The plugs can be inserted in either polarity and will click when seated into position.

10



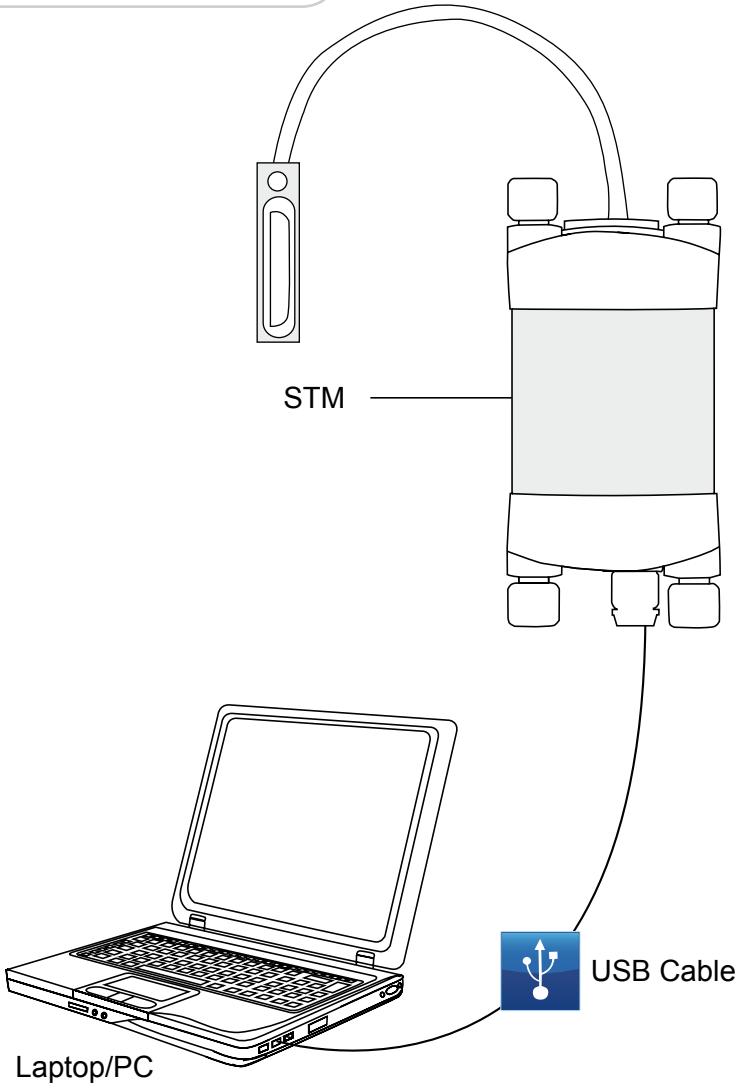
Connect the power cable to the external power source.

3.1.2 Shared Power Supply for Multiple Instruments



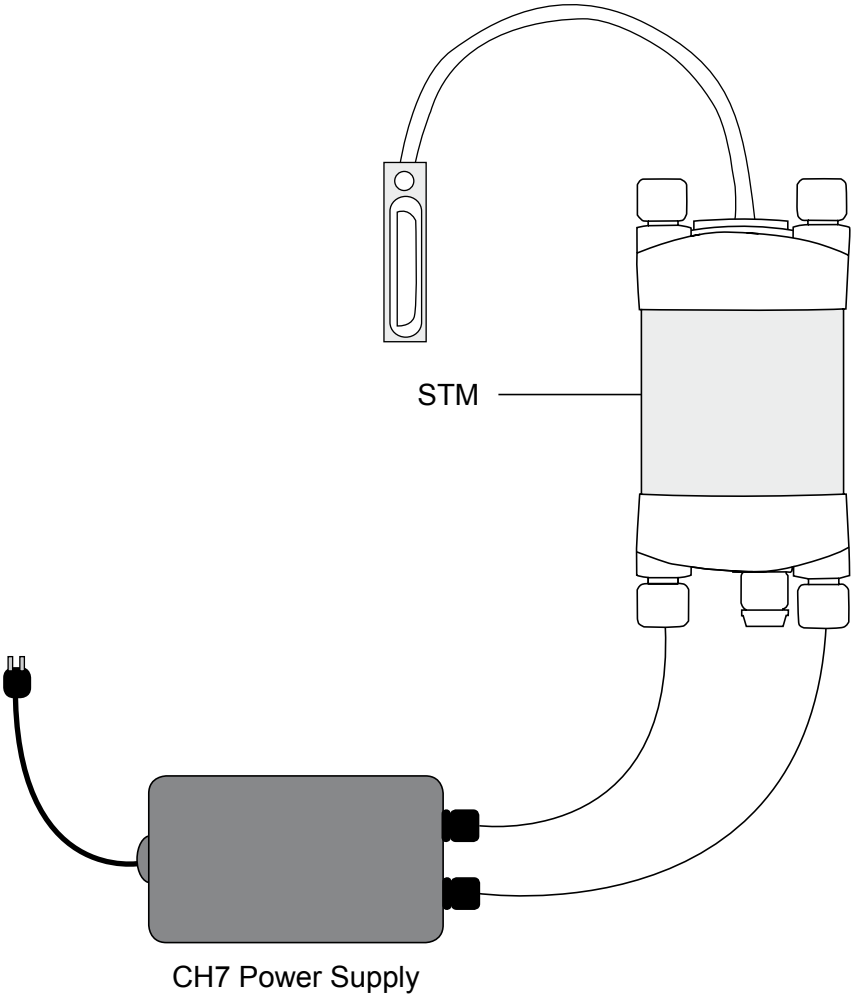
3.1.3 Connecting Power via USB cable to a laptop/PC

Note: The STM Soil Tension Meter is non-polarized



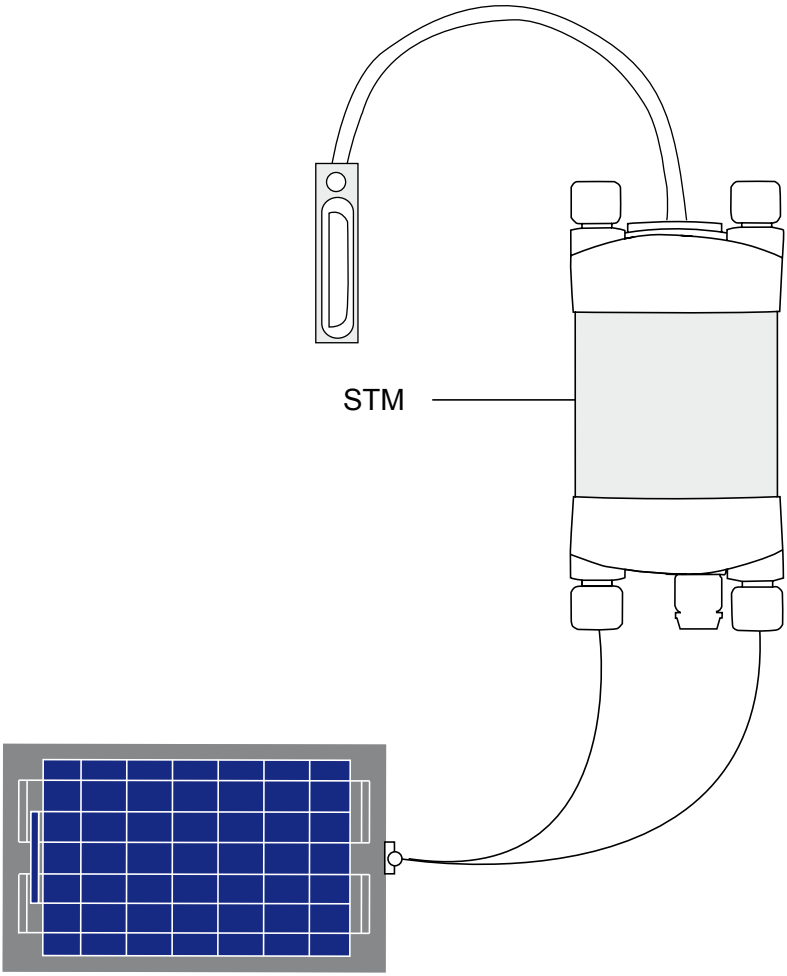
3.1.4 Connecting Power Directly via CH7 Power Supply

Note: The STM Soil Tension Meter is non-polarized



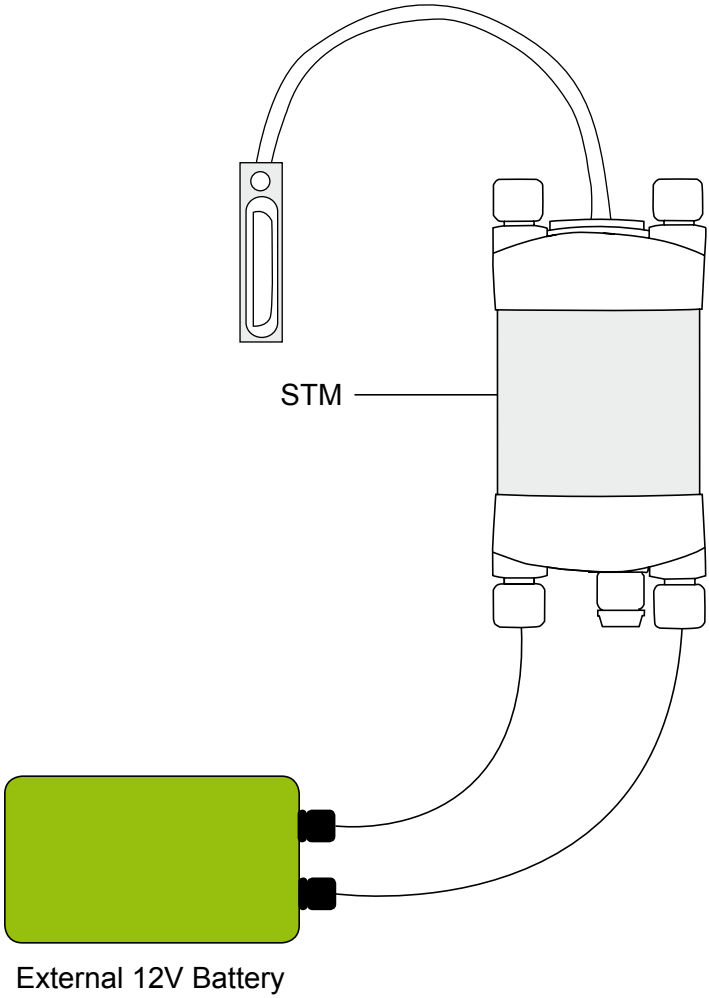
3.1.5 Connecting Power Directly via Solar Panel (Field Operation)

Note: The STM Soil Tension Meter is non-polarized



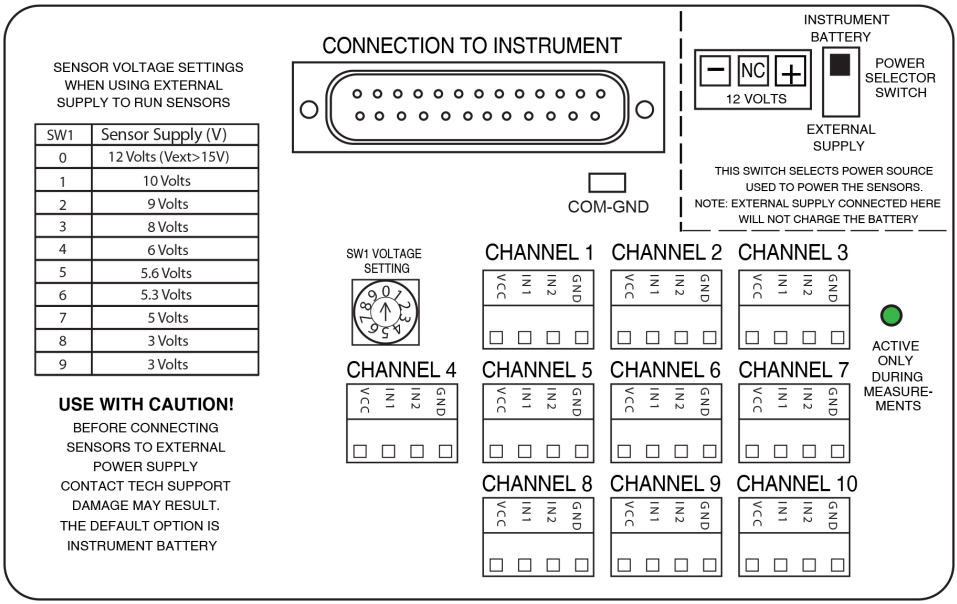
3.1.6 Connecting Power via External 12V Battery (Field Operation)

Note: The STM Soil Tension Meter is non-polarized



4. Connecting Sensor to the STM

The sensor is connected to the logger by inserting the green connector into the appropriate channel in the break–out box supplied with the system.

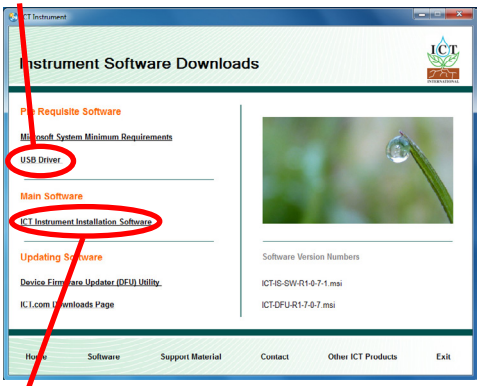


5. Install the STM Software & USB Driver

Insert the supplied CD into the computer. The CD will auto-run to present a menu. Choose software (a) then choose ICT Instrument Installation Software (b).
The software installation will begin follow the screen prompts until the finished installation screen appears. To install the USB driver choose USB Driver (c) and wait for the installation to complete.

(c)

(a)

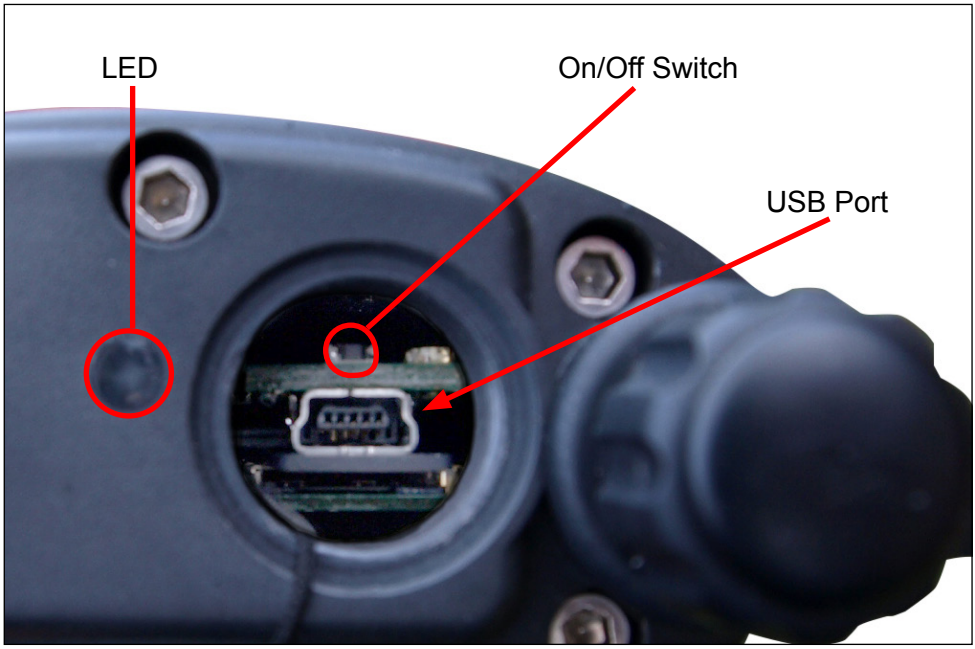


(b)

The STM software can also be downloaded from the ICT International Software Downloads Page.

6. Turn the Instrument On

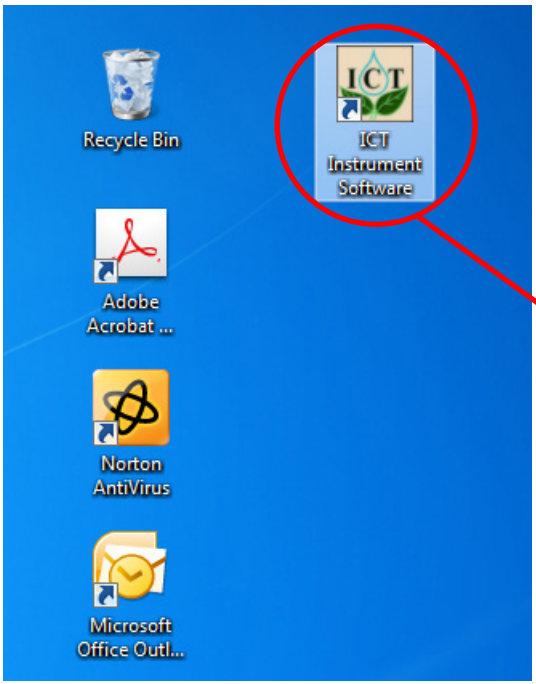
To charge and turn on your STM Soil Tension Meter connect the Instrument to a computer via a USB cable. Alternatively the STM can either be turned on manually by pressing the power button or automatically by connecting an external power supply.



7. Connect to the Instrument

7.1 Connect Via USB

Connect the USB cable to the instrument. The STM will automatically be detected by the computer as with any USB device. Double click the ICT Instrument icon on the Desktop to open the software and click the icon ***"Connect to Instrument"***, then click ***"Find Devices"*** to search for the instrument and select the named instrument from the Available Devices within the Device Selection Window.

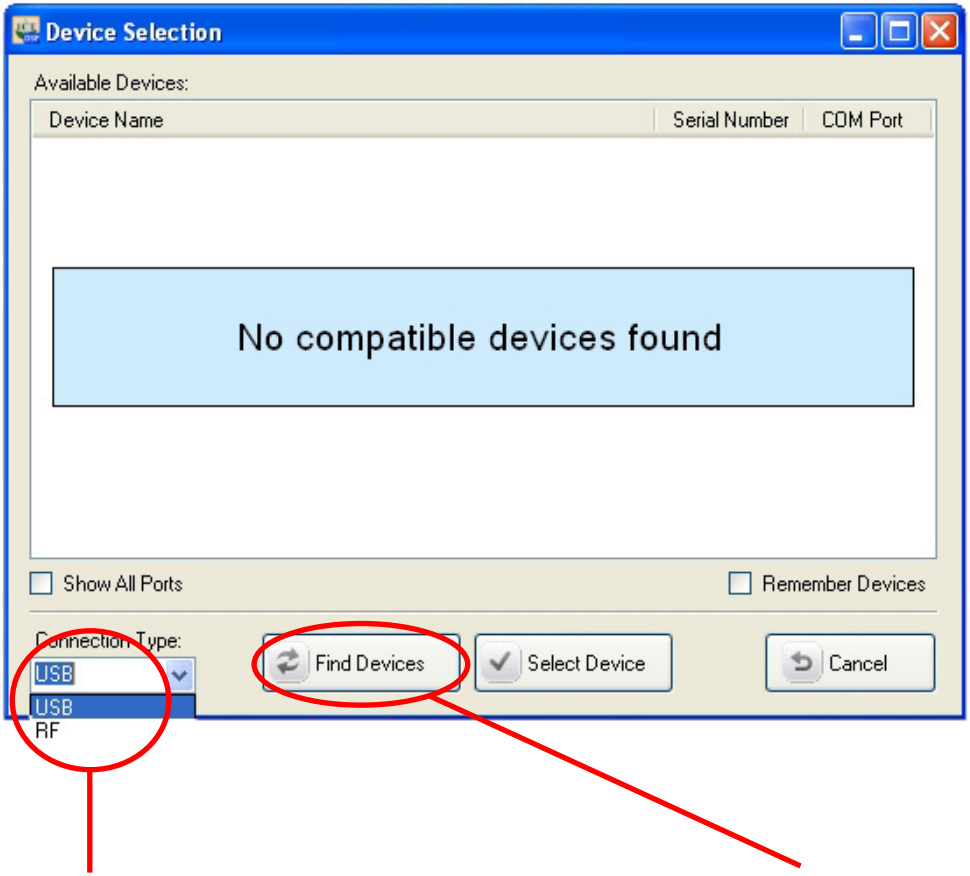


Double click the icon
"ICT Instrument Software"

7.1.1 Software Procedure Step 1:

Click the icon ***"Connect to Instrument"***

7.1.2 Software Procedure Step 2:

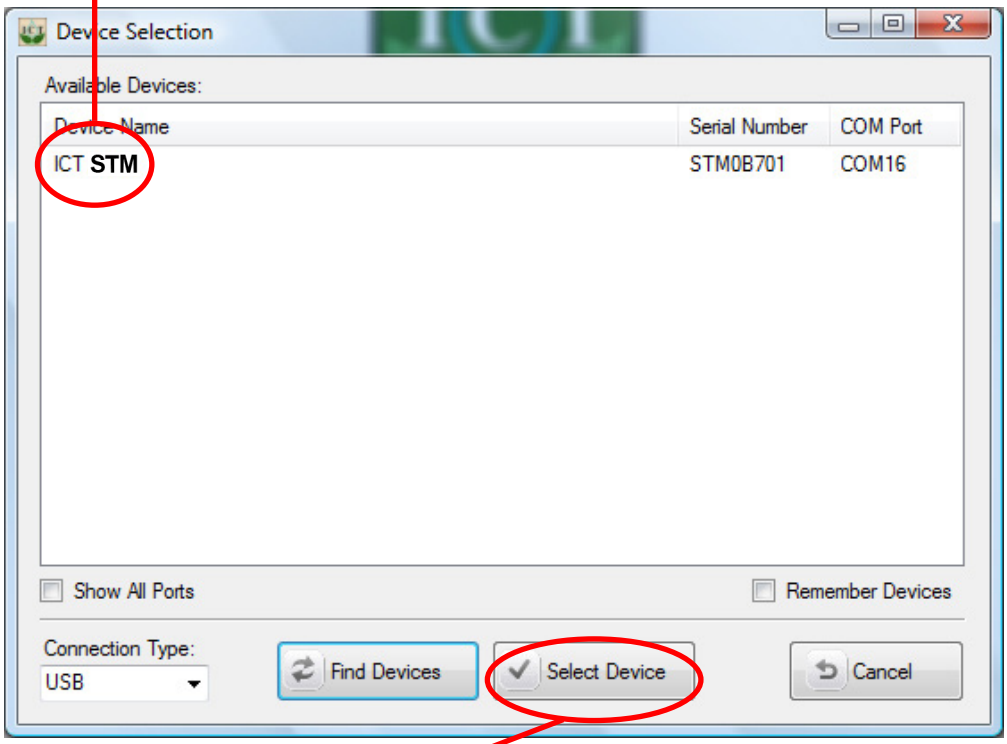


You must first choose the connection type ***"USB"*** then Click ***"Find Devices"*** to search for the instrument.

7.1.3 Software Procedure Step 3:

Note: The software will display a message to ***"Please Wait"*** after which the following screen will be displayed.

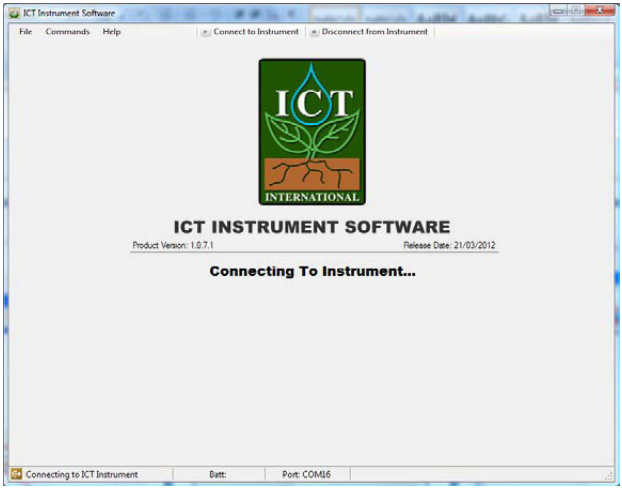
You must click on device and highlight.



After you highlight the device then click ***"Select Device"***.

7.1.4 Software Procedure Step 4:

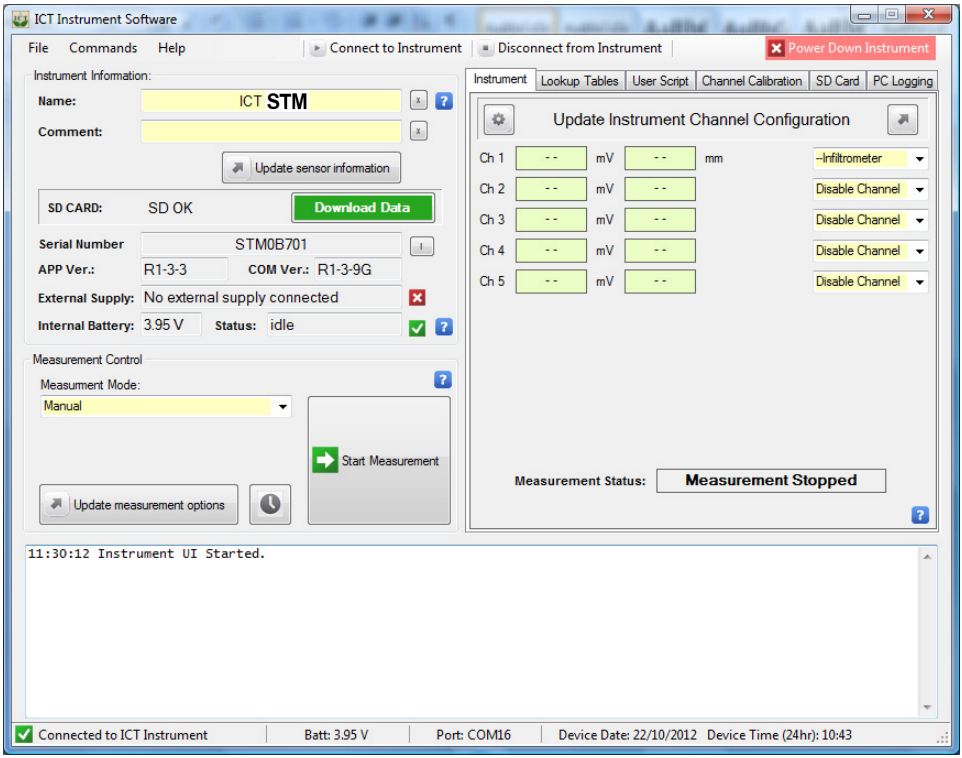
Note: The following screens will be displayed.



7.1.5 Software Procedure Step 5:

When the software has finished loading the instrument parameters the following screen will be displayed.

From here the measurement parameters can be set and the measurement sequence started.



8. Set the Measurement Parameters

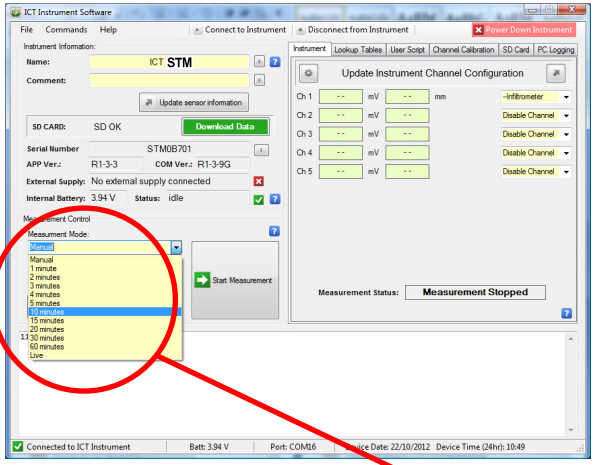
8.1 Software Procedure Step 1:

Position the cursor on the measurement mode drop down box and left click. A list of timing intervals will be displayed. Move the cursor over the timing interval you want between measurements and left click.

In Manual mode the STM will only take a single reading each time the ***"Start Measurement"*** box is clicked. This is the default setting when the logger is to be powered down or set to standby mode.

8.1.2 Selecting Logging Periods from 1 Minute to 60 Minutes

If any parameter from 1 minute to 60 minutes is selected the STM will record a reading at the respective time interval selected. In ***"Live Mode"*** the logger will continually take and record readings while ever Live Mode is selected. For measurement intervals of less than 60 seconds, see Selecting Logging Periods of 60 Seconds or Less (page 23) for more details.



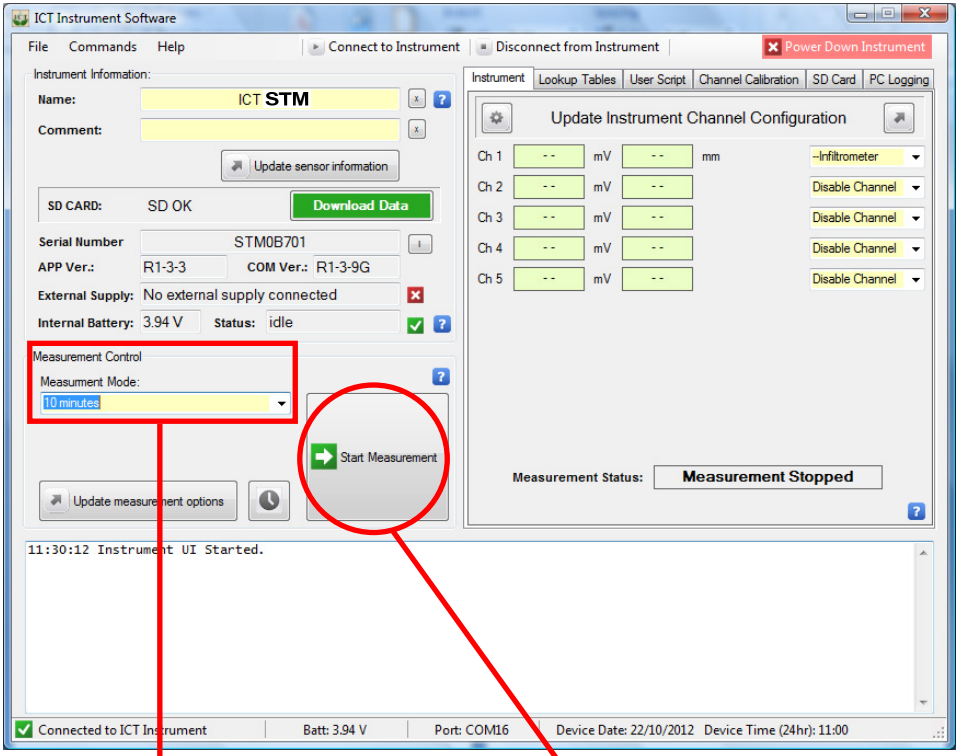
"Measurement Mode" drop down box

8.1.3 Software Procedure Step 2:

Left click on the ***"Update Measurement Options"*** box. Then click on the ***"Start Measurement"*** box to begin logging .

Data will be recorded on the internal SD card.

To stop logging set the Measurement Mode to ***"Manual"***.

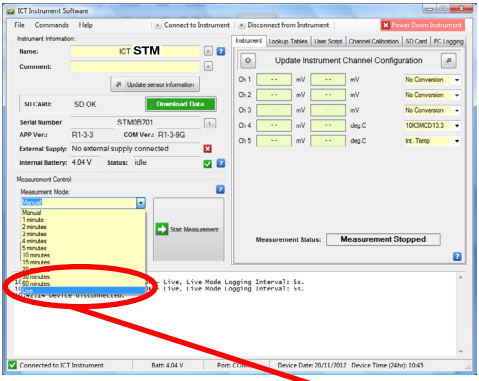


Click ***"Start Measurement"*** box to begin logging

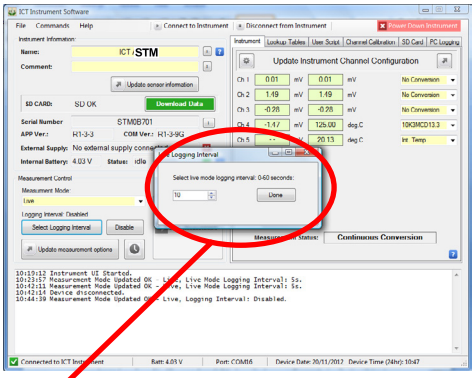
To stop logging set the Measurement Mode to ***"Manual"***

8.1.4 Selecting Logging Periods of 60 Seconds or Less

The Measurement Mode drop box will allow you to select logging intervals of between 1 minute and 60 minutes or continuous conversion in Live Mode. Logging intervals of less than one minute can be set using the following procedure.



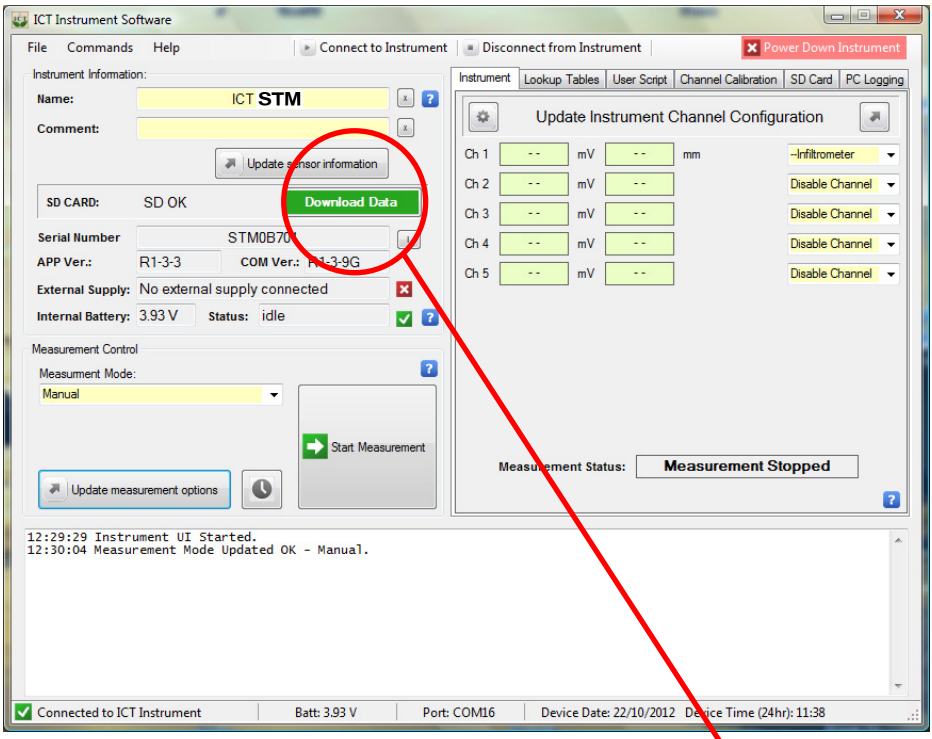
From the Measurement Mode drop down box select ***"Live Mode"*** then update measurement options.



A new menu button will appear ***"Select Logging Interval"***. Click on this button and the ***"Live Logging Interval"*** window will appear. Use the up/down arrows in the window to select the required logging interval anywhere from 0 to 60 seconds and click done. The logger will now start collecting data at the set interval.

9. Download Data

Data can be downloaded in a number of ways. The simplest is to click the green ***"Download Data"*** icon on the main window under the Instrument Information section. (circle)



"Download Data" button

Windows will prompt you for a file name and location to store the data
The file will be stored as a .csv file and the data can be viewed in an exce spreadsheet.

When the download is complete you will be prompted to delete or rename the file on the SD card in the STM.

Note: It is not necessary to delete the data file from the SD card. Instead, it can be renamed and forms an off-site backup should your computer hard drive fail.