

Data collection - getting started

PYRANOMETER and BAROMETER

Quick Reference

PURPOSE

This **Quick Reference** is intended to assist with the use of the SolData 80spc pyranometer (for measuring solar irradiance) and the Vernier BAR-DIN electronic barometer (for measuring atmospheric pressure).

EQUIPMENT

In addition to the two detectors, we recommend the use of the Pasco *Science Workshop* interface. The Pasco 500 interface allows the detectors to be connected to a computer for data collection. If you use the Pasco *Science Workshop* (or *Data Studio*) software, even an older model PC can be used to collect and display data.



Connect the pyranometer to Science Workshop input A and the barometer to input B as shown. The serial cable is connected to the PC with the Science Workshop software installed. Connect power to the unit.

SETUP

To make measurements connect the instruments to the data collection unit as shown in the figure. If a *Science Workshop* (SWS) unit is connected to a serial port and the power is on, then the SWS software will find the correct serial port on start-up.

DATA COLLECTION PROGRAM

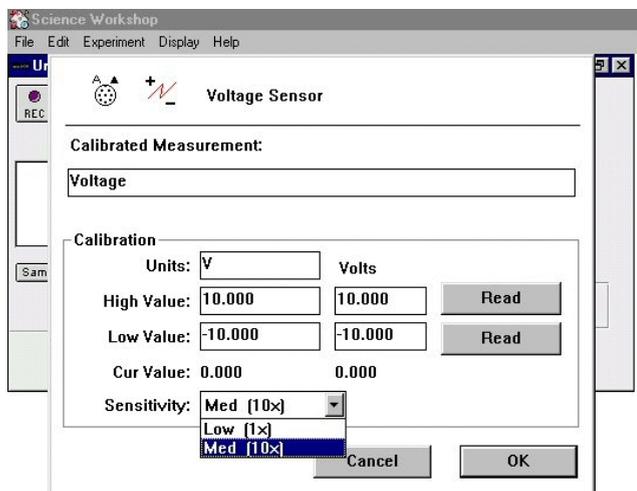
When the SWS software has found the SWS logger, then you are ready to collect data.

<p><i>Pasco Science Workshop 500</i> Can be connected to a PC using a serial interface cable.</p>	
<p><i>Vernier electronic barometer</i> The output is proportional to the atmospheric pressure.</p>	
<p><i>SolData 80spc pyranometer</i> The output signal is proportional to the global solar irradiance.</p>	



Place the mouse cursor on top of the jack at the lower right side of the control panel. Hold the left mouse button down and move the jack over to “input A”. Release the mouse button. Choose “Voltmeter” from the list which appears. Repeat this procedure again, moving the jack to “input B”. Select “Barometer (Hg)” from the list. When the two sensors have been selected, the control panel should appear as shown in the figure above.

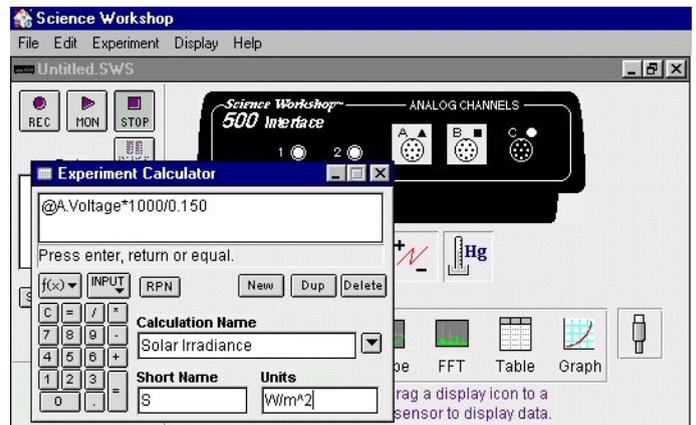
Now right click on the “Voltmeter” (lightning +/-) symbol. Choose:
Sensitivity: Med (10x)



and confirm your selection by clicking “OK”. This selection means that input A will be 10 times more sensitive (range -1 to +1 volt). A good choice since the pyranometer yields a maximum of about 0.16 volts in full sunshine.

Now choose the “Calculator” symbol - the button at the right under the “Sampling options” bar. Click on the “Input” button then choose “Analog A” - “Voltage”. The symbol **@A.Voltage** appears in the calculator window. Multiply by 1000 and divide by your calibration factor in volts per W/m^2 , e.g. 0.150 as in this example. The calculation will provide a value for the solar irradiance directly in watts per square meter.

You can also enter a name, symbol

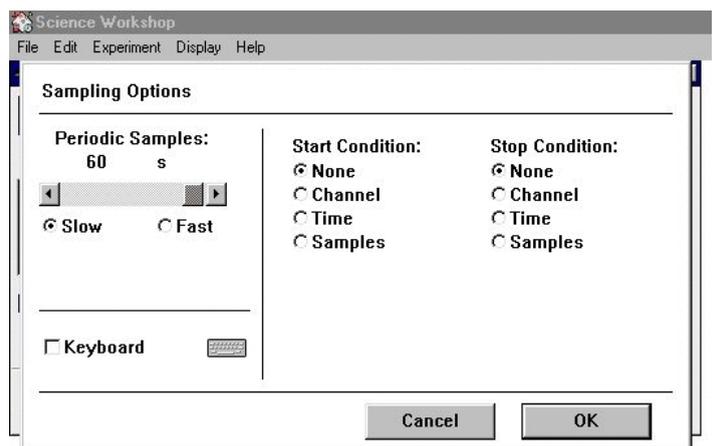


and units for this physical quantity. Confirm your entries by clicking the “=” button then close the calculator window.

We also want to choose a reasonable sampling rate. Too slow a rate yields too little information, and too fast a rate overloads memory and gives us too much data to handle. A one minute sample rate is a good choice here.

Click on the bar marked “Sampling Options”:

Choose “Slow” and adjust to 60 seconds. Close this window with “OK”.

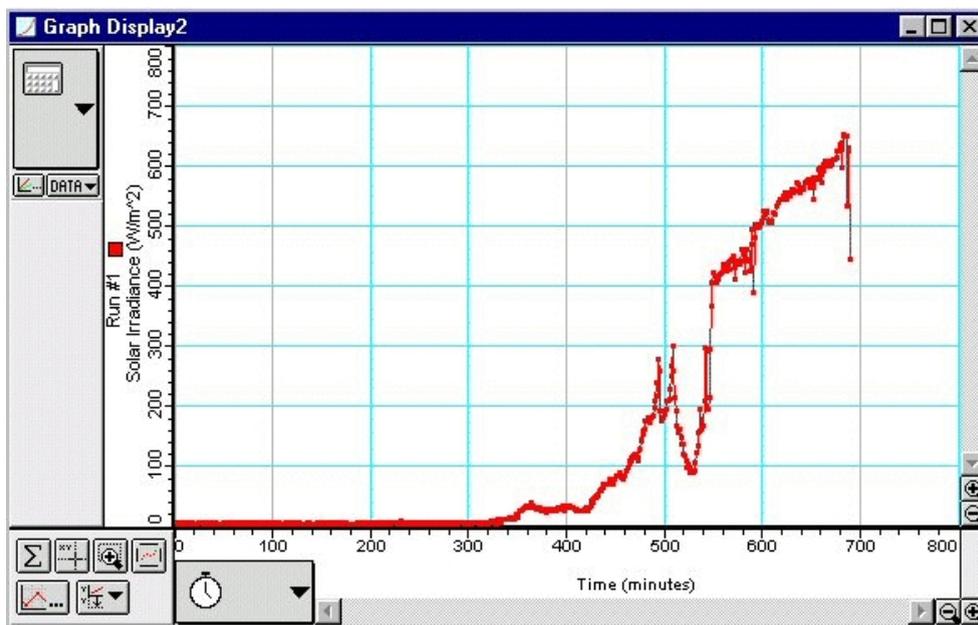


We are now ready to collect some data.

Science Workshop allows the user to output data to a table, digital or analog display or to a graph. In this example we will select a *graph window* for the output from our observations.

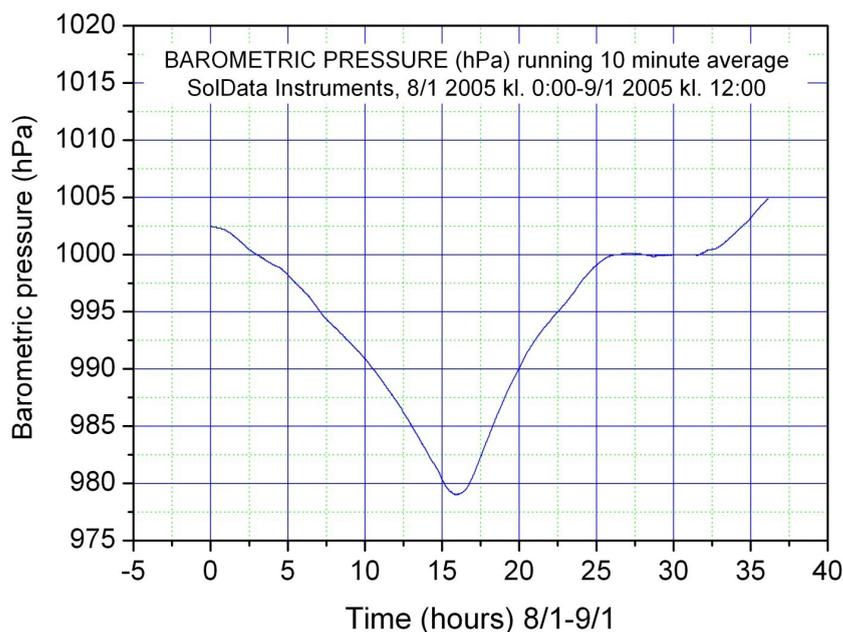
SAMPLE RESULTS

The data shown in the following figure were collected using *Science Workshop* with the setup described above. The graph window was set up to show the solar irradiance. With experience a wide range of useful displays can be achieved using *Science Workshop*.



This graph displays solar irradiance data collected with a SolData pyranometer for a 12 hour period. The area under the graph can be computed by the Science Workshop software. It corresponds to the total energy per square meter striking the instrument.

You may prefer to use *Data Studio* software, which is also available from Pasco Scientific. It can be set up to produce graphical records of the atmospheric pressure and solar irradiance in a similar fashion. Of course other data logging programs and systems are available on the market, and the sensors can be used with most of these systems. See the *Technical data* on page 4 for connections.



Here is an example of barometric pressure data collected using the Vernier sensor during the passage of a deep low pressure system which caused hurricane force winds in Denmark in January 2005.

TECHNICAL DATA

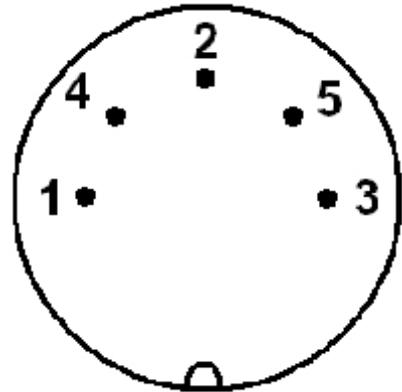
Here is some useful practical information about the sensors:

The pyranometer sensor has just two leads, as it generates its own signal voltage. To connect to *Science Workshop* with a 5-pole (or 8-pole) DIN jack, use:

pin 1: signal voltage (blue lead)
pin 5: signal ground (black lead)

The barometer sensor has three leads, as it must be “biased”, i.e. provided with a voltage for the sensor to operate. It is supplied with a DIN jack, and the pin connections are as follows:

pin 1: signal voltage
pin 4: supply voltage (provided by the SWS unit)
pin 5: signal ground



5 pole DIN jack (male) seen from the REAR. (The 8-pole version has 3 extra pins which are not used for these sensors.)

The DIN jack supplied is ready to use with *Science Workshop*. You will only need to get your soldering iron out if you decide to use a system with a different type of connector.

Additional 5-pole male DIN jacks and other types of connectors are available from most electronics supplies stores, for example *Radio Shack*.

For further information or assistance contact:

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