

# XPLORER GLX

This guide covers the major features of this product - it does not cover all of the available functions. This guide is not intended to replace the original equipment manual. Please refer to the manual for more detailed operating instructions and safety information.

## EQUIPMENT DESCRIPTION

The Xplorer GLX is a portable data logging device, with a graphical user interface making it ideal for use by students. Data can be later exported and analyzed on a computer. It is capable of accepting and using a variety of different sensors, including:

- Up to four sensors using the ports on the top of the device [1]



**Figure 1: Four Sensor Ports on top of GLX**

- Up to two additional temperature sensors, using the ports on the left hand side of the screen [2]
- A voltage sensor using the port on the left hand side of the screen [2]



**Figure 2: Two Temperature Ports and Voltage Port on side of GLX**

- A built-in microphone is available for use as a sound sensor

This guide is designed to cover the majority of functions that you will probably use on a regular basis. It is not comprehensive, and you may need to refer to the original user manual for more detailed instructions or for more specific applications.

## OPERATION

### POWER

The Xplorer GLX has a rechargeable battery allowing it to be used portably. The GLX can be turned on by pressing and holding the  button in the bottom right corner of the device. The GLX can be turned off again by holding the  button.

In order to charge the battery, the AC adaptor must be plugged into the power port on the right hand side of the GLX [3]. When plugged in, the GLX will automatically turn on and cannot be shut down.

In order to preserve the battery, it is recommended that the GLX be plugged in whenever possible.



Figure 3: Power Port on side of GLX

### NAVIGATION

To navigate around the menus on the GLX, simply use the  to move, and the  to select.

## COMPUTER CONNECTION

The Xplorer GLX can be connected to a computer using the USB port on the side of the GLX [3] near the power port. The software interfaces with the Pasco DataStudio, which can be used in place of most of the functions described in this manual. While we have included a Quick Start Guide for DataStudio, it may not be licensed at your school, in which case you can choose to export data as a text file to manipulate it in Microsoft Excel, which is described at the end of this guide in the section **EXPORTING DATA**

## HOME SCREEN

The **Home** screen [4] can be reached at any time by pressing the  button located underneath the directional arrows.

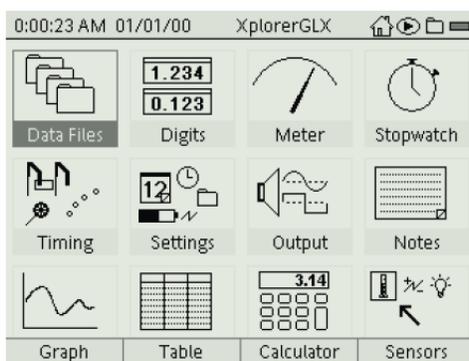


Figure 4: Home Screen

This screen allows you to configure options, and select which mode to view data.



## SETTINGS

The Settings menu allows you to set a number of different settings including:

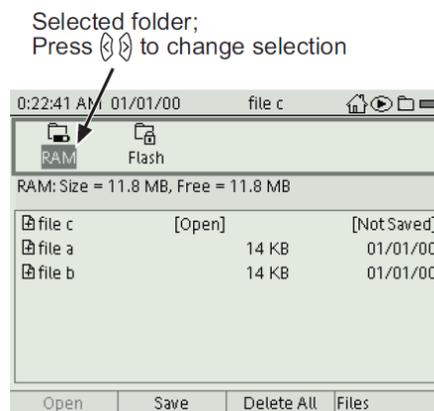
- Date and Time
- Date and Time Format
- Device Name
- Auto Power Off Settings
- Backlight and Contrast Settings

**Contrast** can be adjusted at any point by holding down the  button and using the  arrows.



## Data Files

Before collecting any new data you should create a new file. After entering the **Data Files** mode, you'll be presented with the following screen [5].

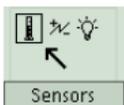


**Figure 5: Data Files Mode**

To create a new file, simply press  and select **New File**. A new file will be created with the name Untitled, and will be highlighted. To change the name of the file, press the , and use the  button and the **Number Pad** to enter a new file name (just like texting). Press the  again to confirm the name.

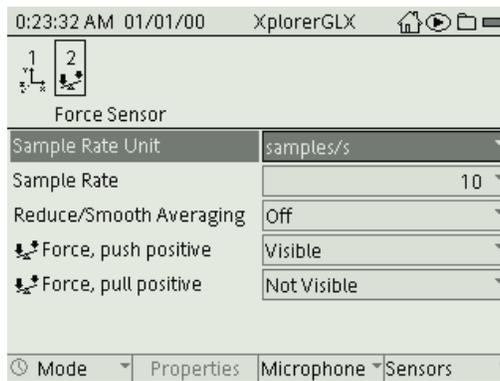
This menu can also be used to:

- Open files
- Save files
- Delete files
- Save As
- Rename files



## SENSORS

Entering **Sensor** mode [6] will allow you to configure the sensors.

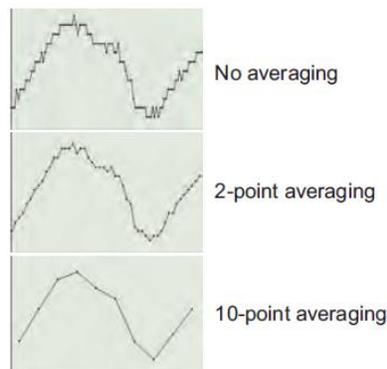


**Figure 6: Sensor Mode**

Each sensor connected will be listed along the top of the screen, with a small icon identifying the type of sensor and a number above it indicating the sensor number. You can see that there are two sensors connected in Figure 6. You can switch between which sensor you are configuring by using the arrows.

For each sensor you can configure (using the arrows, and the ):

- **Sample Rate Unit:** Combined with the Sample Rate below, this allows you to configure how often the GLX reads the value from the sensor. You can choose to read the sensor a certain number of times per second (samples/s), or every certain number of seconds, minutes or hours.
- **Sample Rate:** Here you can choose the value to associate with the Sample Rate Unit. For example, selecting 5 here, and samples/s in Sample Rate Unit would have the GLX read the sensor value 5 times a second. Changing Sample Rate Unit to seconds would result in the GLX reading the sensor value every 5 seconds.
- **Reduce / Smooth Averaging:** This allows you to smooth out the data points by averaging a certain number of points. A larger value will give you a smoother curve, but you'll miss quick changes in the data values. The impact of averaging is shown in Figure [7].

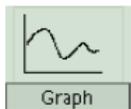


**Figure 7: Averaging**

- **Visible / Not Visible:** You can choose to make a sensor invisible without disconnecting it.

It is highly recommended that you select the same Sample Rate Unit and Sample Rate for all connected sensors.

Remember that a faster Sample Rate will reduce the length of time that the GLX can collect data for before filling its memory. Recording lighting levels in a room every second may not be necessary – once a minute may be more than adequate.

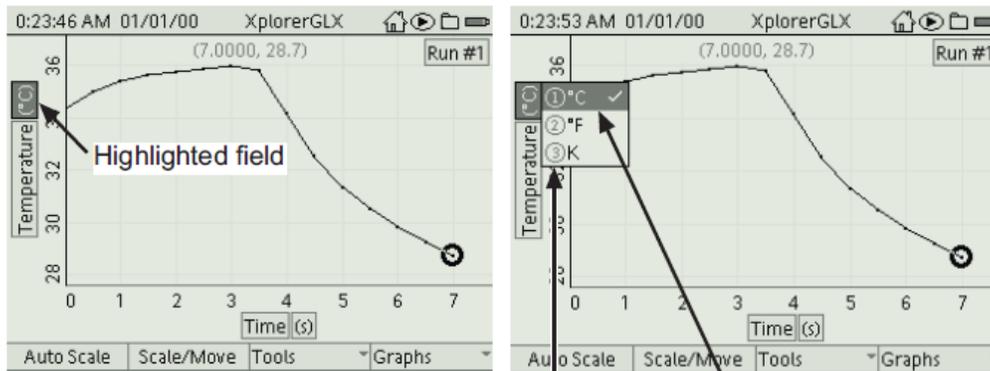


**GRAPH**

Entering the graph mode [8] will allow you to begin and view data collection.

Initially, the graph will be displayed with one sensor on the vertical (Y) axis, and time on the horizontal (X) axis.

Pressing the will allow the user to change the way the data is plotted. Using the keys, you can select the title on any axis and press the again to change which sensor is plotted on that axis (depending on whether or not sensors are connected). By selecting the units, you can choose the units in which the data is plotted (for example temperature could be in °C, °F or K). You can also select which **Run** to plot if more than one run has been conducted.



**Figure 8: Graph Mode indicating how to change fields**

Pressing the button will commence data acquisition, and the icon in the top right of the screen [9] will change from a icon to a icon indicating that data collection is in process.



**Figure 10: Top bar showing that data acquisition is not currently active (third icon from right)**

Pressing  again will cease data acquisition. Every time you start the data acquisition again, the data collected will be stored in a new **Run**. The **Run** number can be seen in the top right hand corner of the screen.

You have a number of options along the bottom of the screen, which can be selected using the , ,  and  buttons

- **Auto Scale:** The scale of the graph will be automatically adjusted to show an appropriate vertical range that fits all of the data collected. The scale will automatically adjust as the data is collected.
- **Scale / Move:** Pressing this button will alternate you between **Scale** and **Move** mode. In **Scale** mode, you can scale the vertical axis with the  arrows and the horizontal axis with the  arrows. In **Move** mode, you can move the scales using the same procedure. After about 10 seconds of no activity, the GLX will exit both modes.
- **Tools:** The tools menu will allow you to select a number of data analysis tools. These include tools that will allow you to determine the slope of the graph at any particular point, as well as add a straight line of best fit to a set of data points. These are more advanced functions, and reference should be made to the user manual for details.
- **Graphs**
  - **Two Measurements:** Selecting this mode allows you to view the data from two sensors simultaneously on the same graph. You can choose which sensors to plot using method described previously.
  - **Two Runs:** Selecting this mode will allow you to view the data from one run against the data from a second run. You can choose which runs to plot using method described previously.
  - **Two Graphs:** Selecting this mode allows you to view the data from two sensors simultaneously on different graphs. You can choose which sensors to plot using method described previously.



## TABLE

The functionality of the **Table** mode [10] is very similar to the **Graph** mode, but instead allows you to see the data in table format.

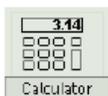
Run #1	Temperature (°C)
1	26.9
2	26.6
3	26.5
Min	26.3
Max	27.2
Avg	26.8
σ	0.3
#	11.0

**Figure 10: Table Mode showing temperature data in one column, and a blank second column, and statistics at the bottom**

Once again you can choose which information to show in each column by pressing the , and then using the  to highlight the variable you would like to change. Pressing the  again will give you a variety of options to choose from.

You have a number of options along the bottom of the screen, which can be selected using the , ,  and  buttons.

- **Statistics [10] – F1:** This menu allows you to see a variety of basic statistics for each column on display including Maximum, Minimum, Average, Standard Deviation and Count (number of data points).
- **Tables – F4:** This menu allows you to choose the number of columns to display. Once you have selected new columns, you can then choose what information is displayed in them using the process described above. You can also choose to show time in either seconds since the start of data collection (i.e. 0s, 60s, 120s), or in absolute time (i.e. 25/12/2010 13:00:00, 25/12/2010 13:01:00, 25/12/2010 13:02:00).



## CALCULATOR

The calculator can be used to calculate and record a value that isn't directly measured by the sensor. For example, the calculator can be programmed to allow the Xplorer GLX to plot the temperature difference between two temperature probes instead of the temperature of each probe individually.

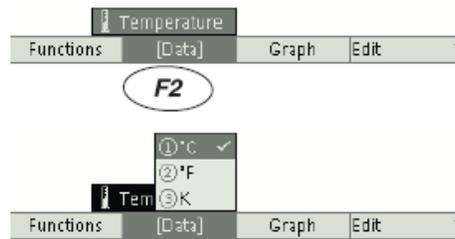


To perform a sensor based calculation, connect the necessary sensors, and push the button to collect some data. Open the calculator mode, and enter your formula, such as:

$$\text{TempDiff} = [\text{Temperature 1 } (^{\circ}\text{C})] - [\text{Temperature 2 } (^{\circ}\text{C})]$$

Where [Temperature 1 ( $^{\circ}\text{C}$ )] and [Temperature 2 ( $^{\circ}\text{C}$ )] represent two temperature sensors connected to the Xplorer GLX. Instead of typing [Temperature 1 ( $^{\circ}\text{C}$ )] and [Temperature 2 ( $^{\circ}\text{C}$ )], you can select each one by pressing

**F2** to enter the data menu [11].



Open the [Data] menu; select Temperature and  $^{\circ}\text{C}$

**Figure 11: Selecting Sensors in Calculator Mode**

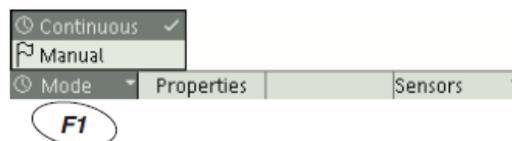
When collecting data using the Xplorer GLX, the GLX will automatically calculate and store the equations entered in Calculator Mode. They will also be available to be plotted in **Graph** mode, and viewed in **Table** mode.

## MANUAL / CONTINUOUS

By default, the GLX collects data in continuous mode. This means that it takes a reading from the sensor in intervals according to the **Sample Rate** specified in the **Sensor** menu.

Alternatively, the GLX can be set to collect data in manual mode, where the user pushes a button each time they want to collect a sample. This can be useful where you want to read a value in a variety of different locations (say temperature in different rooms around the school), and continuously reading the value is not important.

To achieve this, enter the **Sensor** menu from the **Home** screen and press **F1**, and then select Manual from the menu [12].



**Figure 12: Menu showing continuous and manual data collection options**

Now when you press the  button to start data collection, the icon in the top right corner of the screen will change from  to a flashing  icon. To collect a data point, you simply press  each time you want to record a reading. Pressing again will exit  you from data recording mode just as it did when you were in continuous mode.

## EXPORTING DATA

It is possible to export data collected to be later analyzed and manipulated on a computer. This data can be collected in any mode (Graph, Table, Display); however, you have to later view the data in **Table** mode in order to be able to access the export function.

In the **Table** mode, you can export any data file onto a USB stick as a text file; you can then open this text file for manipulation in programs like Microsoft Excel. To do this, open a file [5] from the **Data Files** mode and then go to the **Tables** mode. Press the  button and choose '**Export All Data...**'; this will save your data onto your USB stick as a text file [13]. You can then save this as text file onto your computer.

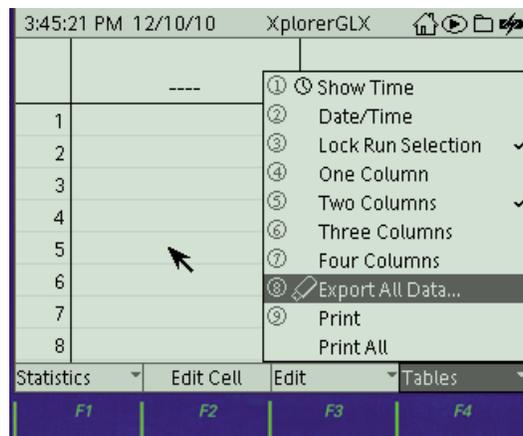


Figure 13: Table mode showing the option to export data to a USB stick.

## LIGHT LEVEL SENSOR BUG

This feature will currently work with all sensors described in this Quick Start Guide except for the Light Level Sensor, due to a bug in the Pasco firmware. If you need to export light level data, configure the sensor and save a new file as normal. **You then must collect your data in the Table format;** after collection, you can then export

data to a USB stick as explained above. If you collect data in the **Graph** format and then move to export data from the **Table**, your data will not show up.

## IMPORT DATA INTO MICROSOFT EXCEL

In Microsoft Excel, go to **Data** and select **From Text** [14]. You will now be able to select your text file from your computer. This will bring you to the text import wizard [15]; the data in your GLX text file will be separated by tabs. To recognize your data into separate columns in Excel, choose **Delimited** [15]. In the next step [16], choose your delimiter as tabs. In the last step [17], you can choose to select the data as either general or as text. You can then save this into an existing worksheet or start a new one.

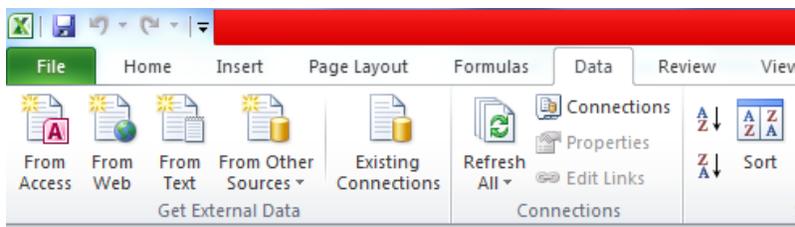


Figure 14: Importing your text file into Microsoft Excel.

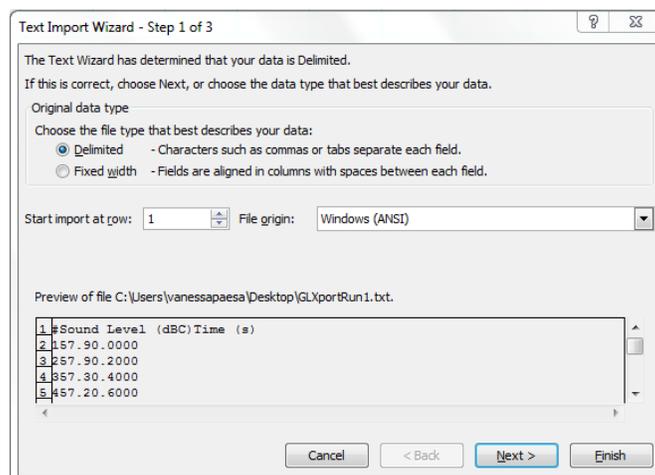


Figure 15: In the Text Import Wizard, choose to import the data as delimited.

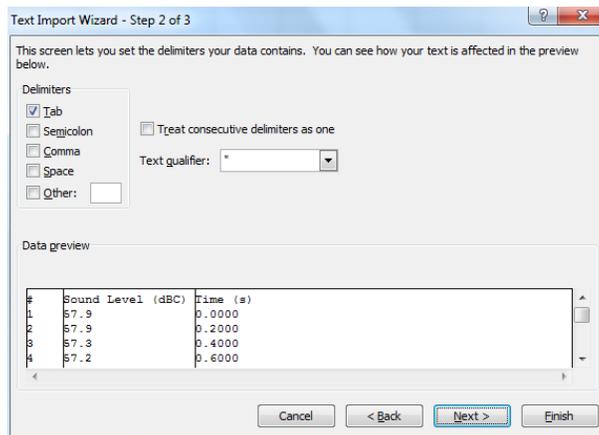


Figure 16: In the Text Import Wizard, choose to delimit your text file with tabs.

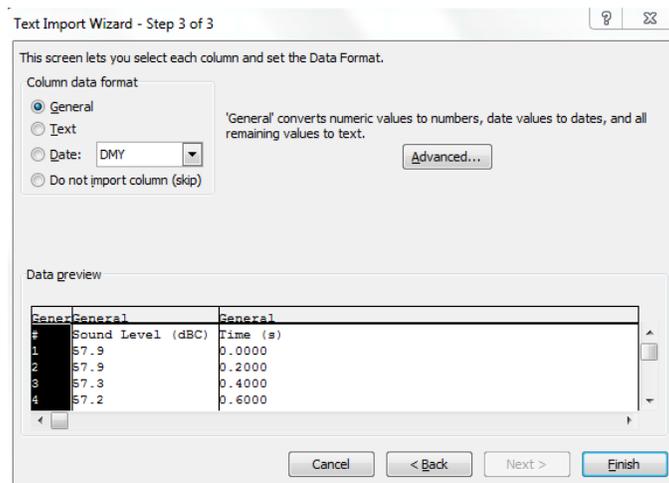


Figure 17: Choose either general or text and finish.