xllogger – Quick start user guide

Install xllogger first using the separate installation instructions

How to use these instructions

To learn to use xllogger quickly, it is suggested that you first follow instructions A on starting xllogger running, and then follow instructions B on Autologging.

As the other functions behave in a similar way to Autologging, you should then find it straightforward to try out Monitor, Continuous logging, Snapshot and Timing as described in section C. Further features are described in sections E, F and G.

If you wish to record data for a long time, make sure that you switch the screen saver and sleep modes off on your computer, otherwise these functions will switch the USB sensors off and cause them to stop recording data.

A   Start xllogger running (once it has been installed)

Note that xllogger is an Excel Add-In. This means that, once installed, it is always available to use whenever Excel is running.

1. **Start Excel**
2. **If you are using more than one sensor, plug in a USB hub now, otherwise skip to step 3.**
   a. Windows may now want to install a driver for the hub – wait until this procedure has been completed
   b. **HINTS** Use a hub with tightly fitting USB sockets to avoid short circuits. Many sensors draw a substantial current and need an independent power supply in order for the computer to recognise them.
3. **Plug in the sensors one by one**
   a. Plug in each of the sensors that you intend to use in turn. Sometimes you may have to wait while Windows installs the driver for the sensor. Windows will go through the standard USB device installation sequence, asking you to respond to a few prompts (the exact number varies). If asked, 'If your hardware came with an installation CD or floppy disk, insert it now.', choose **'Install the software automatically (Recommended)**.'.
4. **Start xllogger running**
   a. **In Excel 2007 or 2010**
      i. Click the **Add-Ins** tab on the ribbon at the top.
      ii. Select the **xllogger menu** at the left hand side of the ribbon.
      iii. Choose **Start xllogger**. The three xllogger toolbars appear in the ribbon .
      WHERE HAS XLLOGGER GONE? If the xllogger toolbars disappear from view, just click the Add-Ins tab in the ribbon and then the xllogger menu – it is easy to forget this and wonder where xllogger has gone to!
   b. **In previous versions of Excel**
      i. Select the **xllogger menu**.
      ii. Choose **Start xllogger**. The main xllogger toolbar appears at the top of the screen and the other two on the left and right of it.
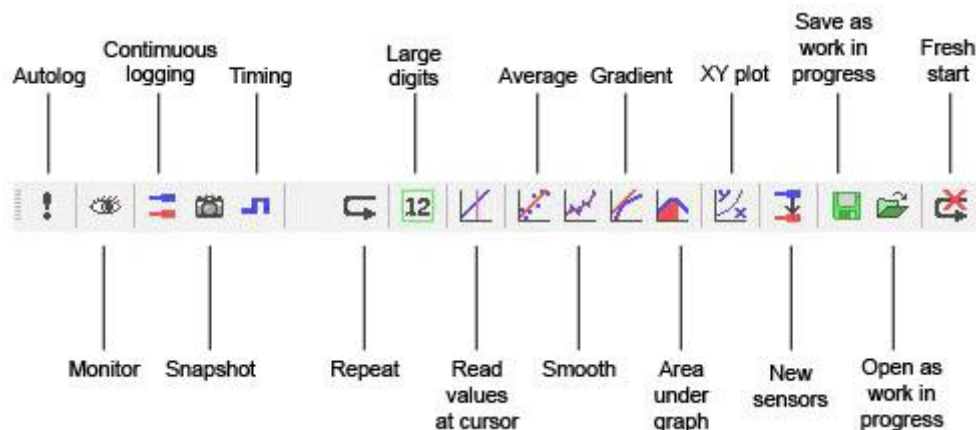
xllogger Main Toolbar

B   Use Autolog to collect some data

This will work with any sensor except a light gate.

1. **Choose Autolog**

    Click the **Autolog** button on the left of the **Main xllogger Toolbar** (see diagram). A floating toolbar will appear with Start, Stop and Pause buttons. You can move this to a different position if you wish.

Start, Stop and Pause buttons

2. **Start**

    Click the **green triangular Start button**. Headings for a table of data will appear on the spreadsheet, **starting from the currently selected cell**. A blank graph will also be drawn ready to plot your data.

3. **Measuring**

    Measurements will be made every 0.5 seconds. The data will be tabulated and plotted on the graph.

4. **Stop**

    When you want to stop collecting measurements, click the **square red Stop button**. You can also pause collection of data using the two black bars of the **Pause button**.

5. **Repeat**

    To repeat the measurements, click the **Repeat** button.

6. **Fresh start**

    To clear existing measurements and start again, click the **Fresh start** button.

7. **New sensors**

    If you add, remove or change the sensors, click the **New sensors** button (or go to the **xllogger menu** and choose **New sensors**). Should a sensor ever fail to get recognised, unplug it, plug it in again, and then click **New sensors** again. If it is still not recognised try using an independently powered USB hub.

    IMPORTANT To help Windows correctly identify all the USB sensors if there are two or more, it is **strongly recommended** that you plug the **hub in first**, **then each of the sensors** in turn into the hub.

C   Other ways of collecting data

In addition to Autolog there are four other ways of collecting data: Monitor, Continuous logging, Snapshot and Timing.

All of these function in a similar way to Autolog. For example:

*After choosing the appropriate settings, each function **waits to start** until you click the triangular green **Start button**. This is so that you have time to check your apparatus and get ready before starting. (Snapshot is an exception to this as it waits for you to press the space bar.)*

***Fresh Start** clears existing measurements and settings and starts again afresh.*

When a button background changes to bright yellow, it indicates that the relevant feature has been selected.

These are the other four functions:

❖ **Monitor**

This shows a continuously updated large digit display of the sensor readings.

❖ **Continuous logging**

This is similar to Autolog, but allows you to choose the time interval between readings and the total time for which measurements are to be made. It also allows you to give names to the quantities measured by the sensors and titles for the graph.

If you choose a time interval shorter than 0.2 seconds, the data will be stored in memory and then tabulated and graphed when the experiment is complete. This allows you to record at a faster rate so that changes that occur rapidly can be measured. The minimum time interval that Excel and the USB sensors can cope with is typically about 0.025 seconds. (In other words the maximum sampling rate is 40 sets of readings per second.)

*If you are using two or more sensors and want to graph one set of readings against another **as well as** all the readings against time, click the **x-y plot button** in the Main toolbar **JUST BEFORE** you click the **green Start button.** . (Should you wish to change which quantity is plotted against which, you can do this when you have finished recording data by clicking the **X-Y plot button** in the Main toolbar.)*

❖ **Snapshot**

In this case readings are only taken when you press the space bar ('snapshots'). Snapshot also gives you the option of labelling each set of measurements. If the labels you give are numerical values you can use the X-Y plot function to plot the measured variable against the label variable (e.g. current against voltage).

For biological fieldwork you may want to take readings at different places and at different times. In this case you can opt to take more readings later on. When you are ready to take the next set of readings, you just need to click the green Start button on the Main Toolbar.

*If you are using two or more sensors and want to plot one set of readings against another (instead of plotting a chart showing all the readings in order) select the **Show x-y plot** checkbox when you choose the Snapshot settings. (Should you wish to change which quantity is plotted against which, you can do this at any time by clicking the **X-Y plot button** in the Main toolbar.)*

❖ **Timing**

This is for measurements of time, velocity or acceleration using light gates.

See the instructions below for how to connect the light gates to your computer.

*Different alternative experiments are shown by small diagrams and you can choose the one that you want to carry out. **IMPORTANT** Don't forget to click the green **Start** button in the Start Stop Toolbar before your experiment starts interrupting the light gates!*

When you repeat timing measurements the new data appears alongside existing data and you can average your measurements.

D Analysis Tools in the Main Toolbar

The Analysis Toolbar provides a variety of useful tools:

❖ **Large digits**

Shows current set of data as large digits.

❖ **Read values at cursor**

Moves a cursor along the data enabling precise values to be read off. Can also show gradients and ranges (including average gradient and range intervals).

❖ **Average**

Averages repeated measurements.

❖ **Smooth**

Smooths either the last set of measurements or the average of repeated measurements.

❖ **Gradient**

Plots a separate graph showing the gradient of either the last set of measurements, the average of repeated measurements, or smoothed data. Useful for velocity when using the distance sensor.

Clicking the gradient button again graphs the gradient of the gradient. Useful for acceleration when using the distance sensor.

❖ **Area**

Plots a separate graph showing the area under either the last set of measurements, the average of repeated measurements, or smoothed data. (Useful for magnetic flux if plotting induced e.m.f. for example.)

❖ **X-Y plot**

*When more than one sensor is being used, enables one variable to be plotted against another. For further details see the information above on **Continuous logging** and **Snapshot**.*
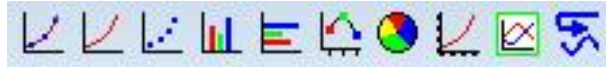
❖ **Save as work in progress**

Allows experiments to be saved in a form that allows new data to be added later on, either by you or by someone else using a different computer.

❖ **Open as work in progress**

Opens an experiment saved as a work in progress so that fresh data can be added.

E   Graph formatting toolbar

xllogger Graph Formatting Toolbar

- ❖   **Graph type** *The first seven buttons enable you to choose between different types of graph and bar chart. (Note: the sixth button 'Bar chart shown by lines' is what Excel confusingly calls a 'line chart'.)*
- ❖   **Graph scales** *Enables you to set the vertical scale on graphs. Also allows you to choose a range of time values to show on your graphs.*
- ❖   **Graph in own window** Expands the graph to fill the screen. Click the button again to return to the previous size.

    Excel 2007 or 2010 may need you to click the Add-Ins tab on the ribbon first, then the xllogger menu.
- ❖   **Replay graphs** *Replays the data on the graph at a rate that you select.*

E   Graph plots toolbar

xllogger Graph Plots Toolbar

The Graph plots toolbar enables you to switch on and off the following individual plots, so making it easy to concentrate on one feature at a time when there are several plots all on the one set of axes:

- ❖   **All the plots for any individual sensor**
- ❖   **The last set of measurements**
- ❖   **Previous sets of measurements**
- ❖   **Average plots**
- ❖   **Smoothed plots**

F   How to connect light gates

PLEASE READ THIS VERY CAREFULLY AS IT IS EASY TO CONNECT THE LIGHT GATES IN THE WRONG WAY

A single light gate is connected directly to the computer via USB cable.

Two light gates are attached by 'daisy chaining' them. Connect the first light gate (the 'master') to the interface as above. Then connect the **IN** socket of this ('master') light gate to the **OUT** socket of the other ('slave') light gate using the cable provided.

Width of interrupt card Use a card to interrupt the beam that is at least 4 cm wide. Smaller widths will work, but there will be larger percentage errors due to the finite width of the infrared beam. (Ideally the card should be of a dark colour, although this is not critical.)

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