

EL-USB-4

Product Overview

EL-USB-4 is a data logger that measures and stores up to 32,510 current loop readings over a 4-20mA measurement range.

The user can easily set up the logging rate and start time, and download the stored data by plugging the data logger into a PC's USB port and running the purpose designed software under Windows 2000, XP (Home and Professional Editions), Vista and 7. The data can then be graphed, printed and exported to other applications such as spreadsheets and reports.

The data logger is supplied complete with a long-life lithium battery, which can typically allow logging for a year. Status indication is via flashing red and green LEDs.

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Quick Start Guide

Remove the translucent cap from the EL-USB-4.

[Install the battery](#) in the EL-USB-4.

Insert the EL-USB-4 into a free USB port on your computer. The computer will automatically detect the presence of the EL-USB-4 and start the hardware installation process. Refer to the Installation Guide.

Double-click the EasyLog USB icon on your desktop to launch the control software. You will be presented with three options on the Main Screen.

Click on the green button to set up and start the EL-USB-4 Data Logger and follow the setup procedure:-

[USB Data Logger Name and Sample Rate:](#)

- enter the Logger Name,
- select the Sample Rate,
- select the Calibration Type,
- then click Next.

Note: If you are using this Data Logger for the first time, then it may contain some sample data, in which case you will receive a warning message. Click OK to continue.

If you selected [Custom Calibration](#), then the next window allows you to:

- select or type in the appropriate measurement unit,
- enter the data for 2 calibration points,
- then click Next.

[Setting alarm levels for the USB Data Logger:](#)

- select the Alarms for voltage, if required,
- select Disable LEDs to conserve battery power, if required,
- enter the Alarm Trigger Levels for any selected alarms,
- select Hold for any selected alarms,
- then click Next.

[Setting the start time and date:](#)

- either click Finish if you want to start logging immediately or
- select the Start Time and Start Date for logging to commence, then click Finish.

The [summary screen](#) will appear.

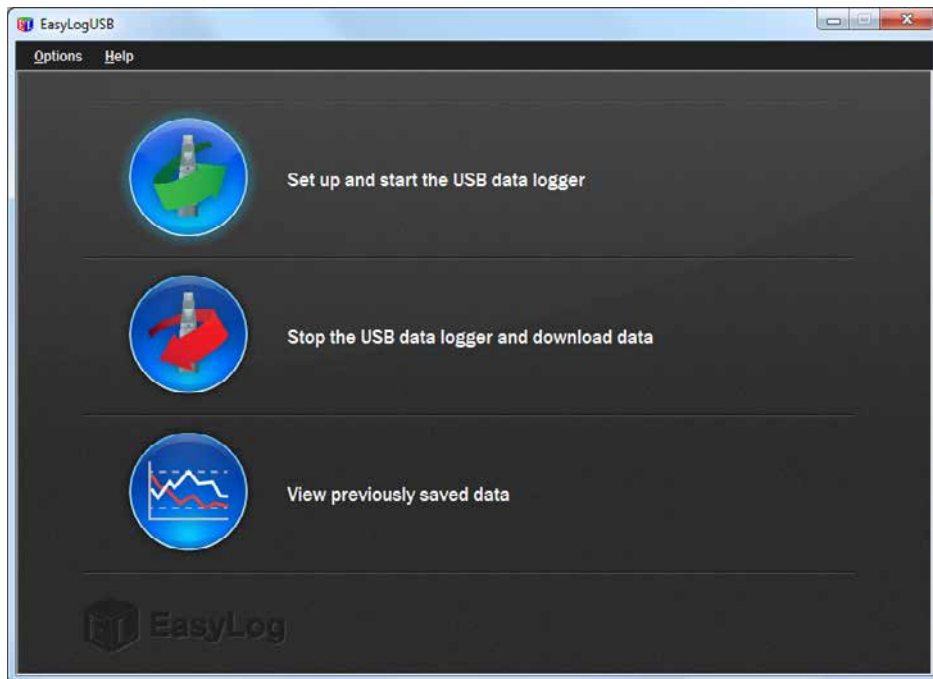
Connect the EL-USB-4 to your application:

- remove the EL-USB-4 from the computer and fit the plastic cap,
- connect the wires (supplied with the EL-USB-4) to the screw terminals (Red to + and Black to -),
- connect the crocodile clips to the voltage to be measured and logged.

Notes: When the EL-USB-4 is connected to the USB port, the battery inside the Data Logger is discharged at a higher rate than normal. To conserve battery life, do not leave the EL-USB-4 connected to the USB port for a prolonged period of time.

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The Software Interface



[Click on the green button to set up and start the data logger.](#)

If the data logger is logging when you click on the green button, or if the data logger is set up for a delayed start, then you will be prompted to stop the logging process.

- If you select No, then the data logger will continue logging.
- If you select Yes, then the data logger will stop taking readings. Any stored data will be permanently erased when Setup is Finished. To enable you to save this data before it is lost, click cancel in the Setup window and then click on the red button to download any stored data.



[Click on the red button to stop the EL-USB-4 data logger and download any stored data.](#)

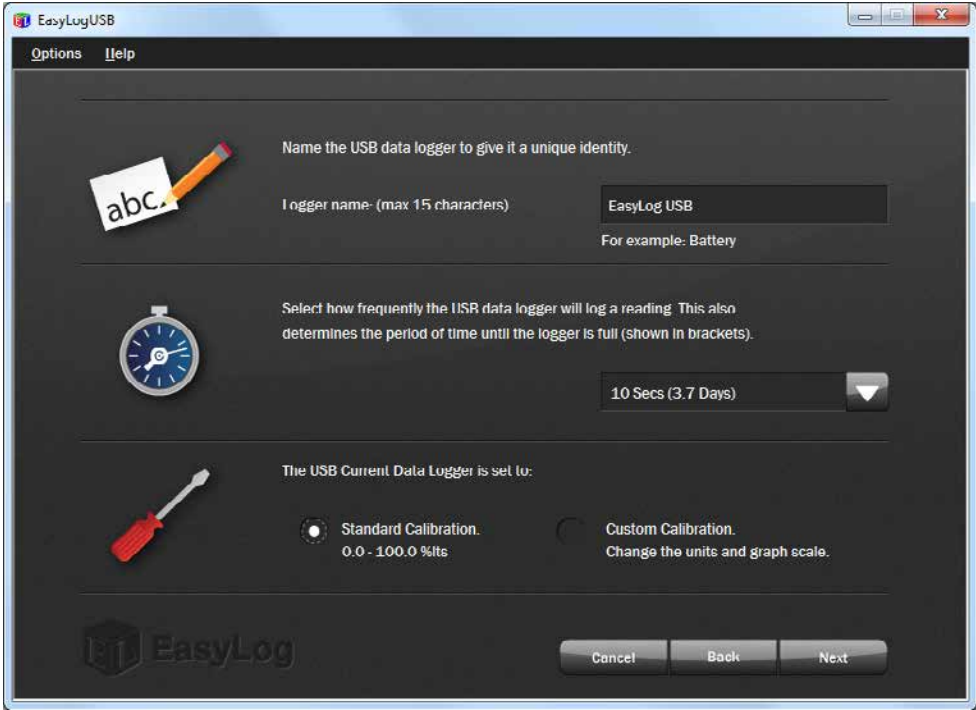
To avoid inadvertently interrupting a logging exercise, you will be asked to confirm that you would like to halt the logging process.



[Click on the blue button to graph previously saved data.](#)

This opens the File Open dialog box which prompts you to select the data file you wish to graph.

USB Data Logger Name, Sample Rate and Calibration



In order to distinguish between several EL-USB-4 data loggers, give each EL-USB-4 a unique name, up to 15 characters long. The name can contain letters (upper and lower case), numbers, and all special characters except any of the following: " % & * , . / : < > ? \ () |

Select the sample rate for the EL-USB-4. The sample rate shows the time interval between stored readings.

Selecting a short sample rate results in the EL-USB-4 memory becoming full faster than when a longer sample rate is selected.

Available sample rates and memory capacities are as follows:-

Sample Rate	Memory Capacity
1 second	9 hours
10 seconds	3 days
1 minute	22 days
5 minutes	3 months
30 minutes	1.8 years
1 hour	> 2 years*
6 hours	> 2 years*
12 hours	> 2 years*

* Although you can log at this sample rate, the battery will in all likelihood run out before you have filled the EL-USB-4's memory.

Always ensure that the remaining charge in the battery is sufficient to last the complete duration of your logging exercise.



Select the calibration for your data logger. The data logger will always measure current in the 0 to 20mA d.c. range.

If you select Standard Calibration, then the 0 to 20mA d.c. measurement range will be translated into a 0 to 100% graph scale, where 4mA = 0% and 20mA = 100%.

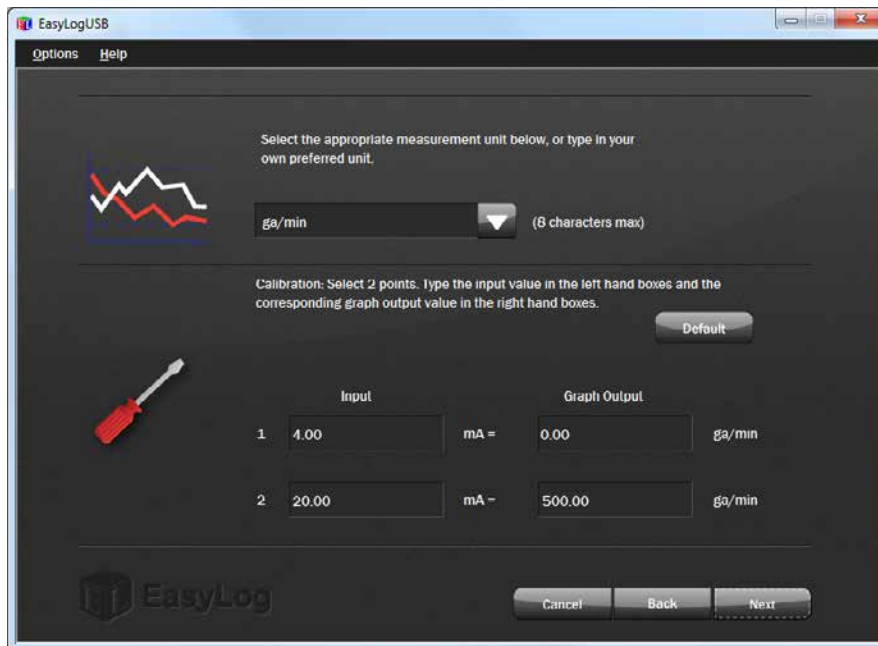
If you select Custom Calibration, then the 0 to 20mA d.c. measurement range will be translated into a graph scale of your own choice, with the unit name up to 8 characters long (e.g. m/s, gal/min, mA, etc.). For example : in a flow measurement application, 4mA = 0 gallons/minute and 20mA = 500 gallons/minute.

If in doubt, we recommend that you install a fresh battery before logging critical data.

Note: Changing the battery while logging is in progress will halt the logging operation.

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Custom Calibration



Select the calibration for your data logger. The data logger will always measure current in the 4 to 20 mA range. If you selected Custom Calibration, then the 4 to 20mA measurement range of the EL-USB-4 will be translated into a graph scale of your own choice, with a unit name of up to 8 characters long (e.g. m/s, gal/min, mA, etc.).

To calibrate the graph scale, you need to match two known input voltages with two corresponding graph output values in the unit that you specified.

For example: You wish to measure flow between 0 and 500 gallons/minute, using a flow transmitter that produces a loop current of 3.2 mA per 100 gal/min.

Step 1: Enter the appropriate measurement unit : gal/min

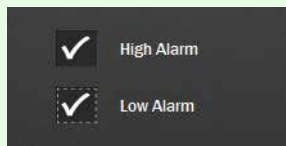
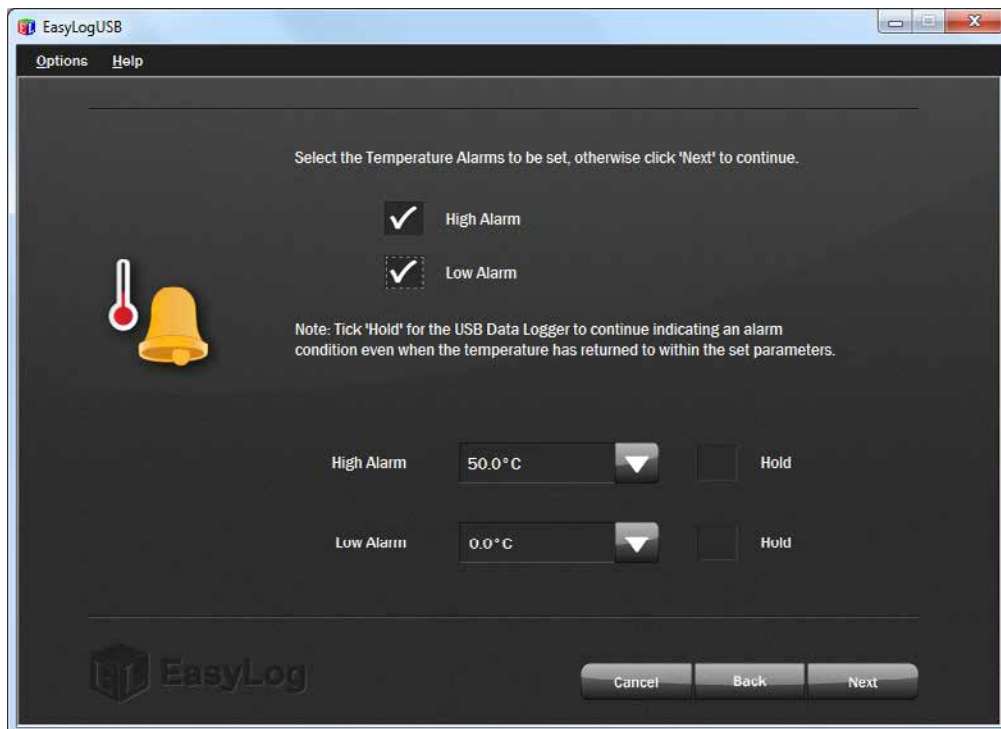
Step 2: Choose a measurement point at the lower end of the scale : 4 mA = 0 gal/min

Step 3: Choose a measurement point at the higher end of the scale : 20 mA = 500 gal/min

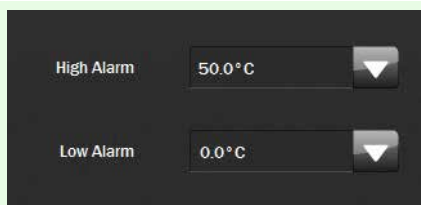
Step 4: Enter these values into the relevant boxes, as shown, then click Next >.

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Setting Alarm Levels



You have the option to set no, one or both alarms. The LEDs on the EL-USB-4 will flash in one of the ways listed below.



For each alarm that you have set, you must enter the alarm trigger level (the level at which the alarm is activated).

Note: The High Alarm cannot be set lower than the Low Alarm.

You also have the option to set Hold for each alarm. By selecting this option, the LED status will continue to show the alarm level even if the value being measured is no longer in an alarm condition. This ensures that you always know whether the Alarm trigger level has been breached, without the need to download the data from the logger.

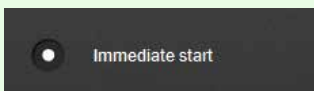
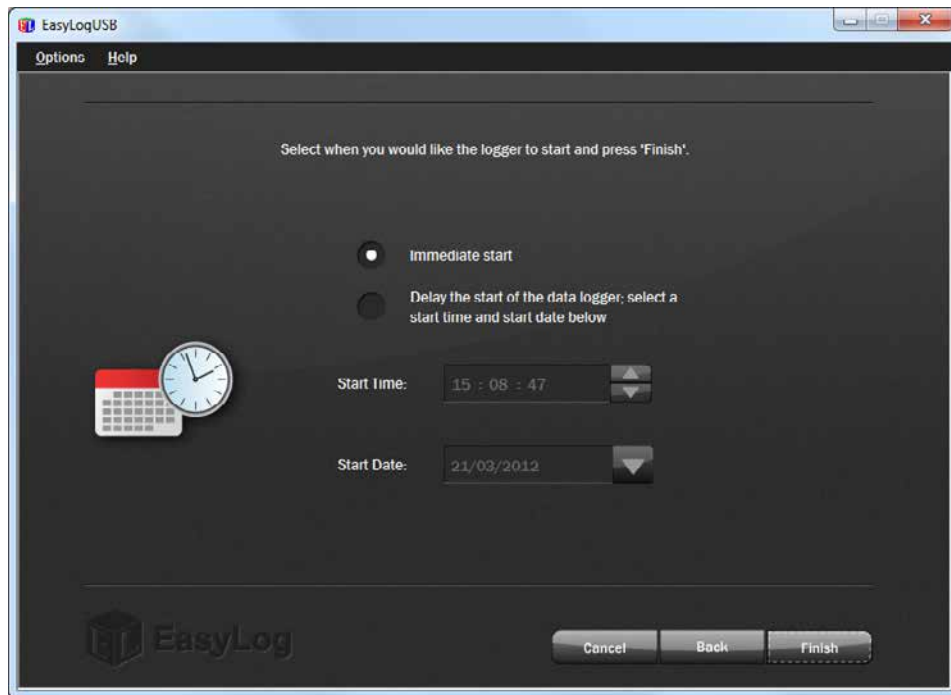
The Hold function can be turned off via the control software. The red LED will then no longer continue to flash after the logged voltage has returned to normal. Instead, the green LED will then flash.

Note: If both alarms have been set to Hold, then Hold will only apply to the alarm trigger level that was breached first.

The colour and flashing rate of the LED only relates to the stored measurements. It does not relate to any voltage fluctuations which may occur between stored measurements, or after the last stored measurement.

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Setting Start Time and Date



To start logging immediately, click the Finish button.



To start logging at a later time and date, select the Start Time (hh:mm:ss format) and Start Date (dd/mm/yyyy format) at which you want to start logging, then click finish.

To change the Start Time :-

- Highlight that part of the start time (hh, mm or ss) that you want to modify. That part will turn blue.
- Use the up and down arrows to increase or decrease the selection.

To change the Start Date :-

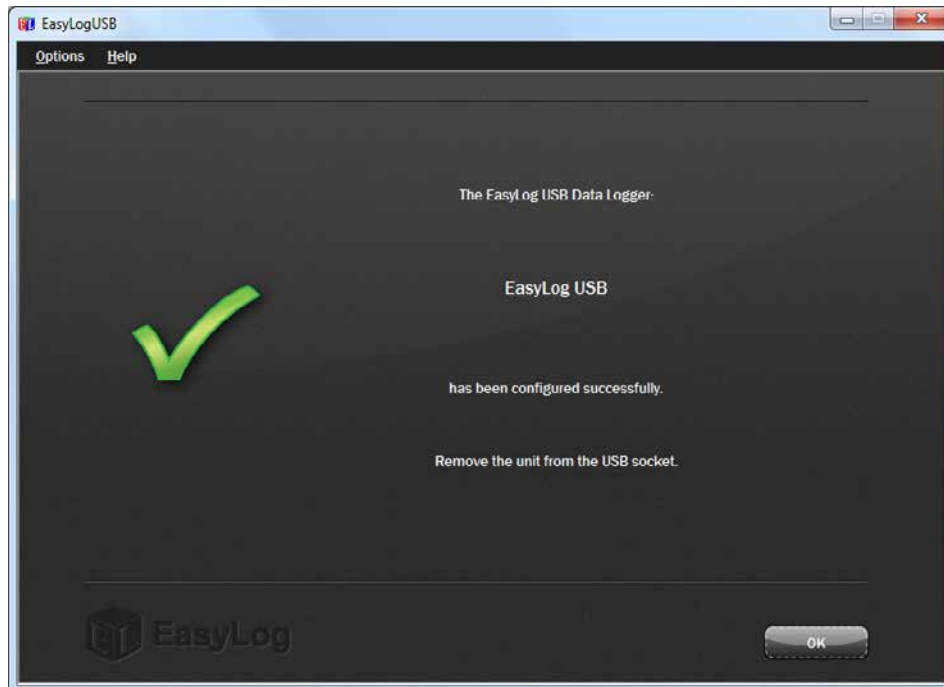
- Click on the down arrow next to the date. This opens up a calendar which allows you to select a date in the future.
- The current date is circled red, while any day you select is highlighted in blue.
- Use the left and right arrows at the top of the calendar to navigate through the months.

Once you have selected the Start Time and Date click the Finish button.

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Setup Summary

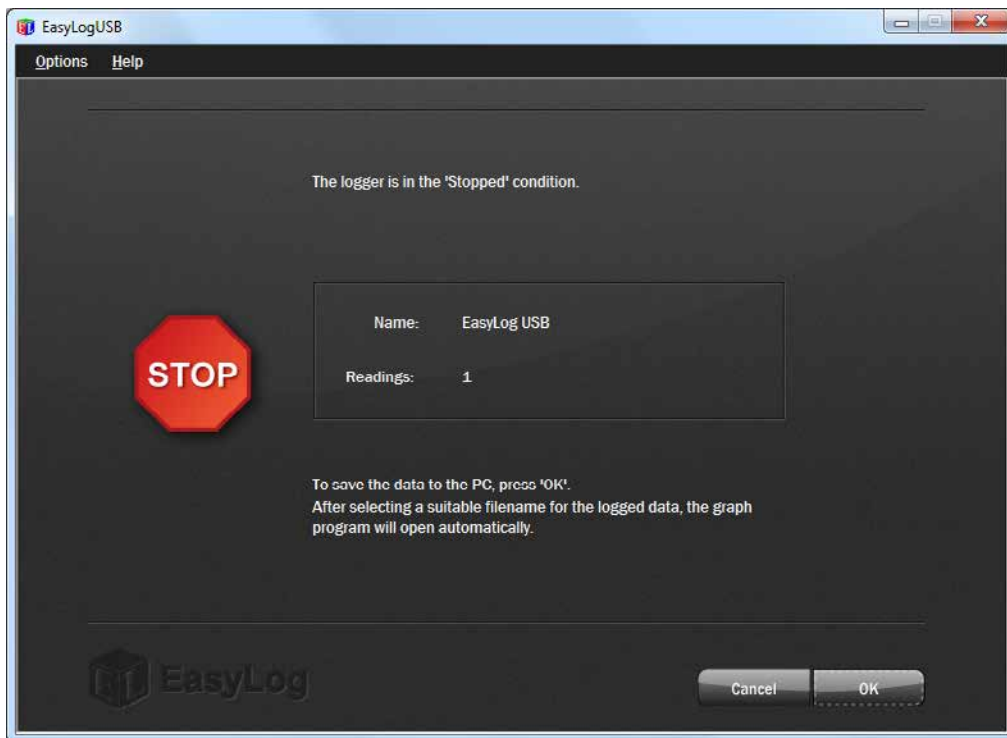
After the computer has configured the Data Logger with your chosen parameters, the following confirmation screen is displayed.



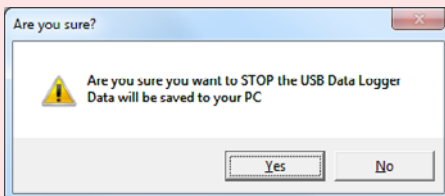
Remove the Data Logger from the computer and connect to the 4-20mA source you wish to measure via the screw-terminals in the data logger's cap.

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Stop Logging and Download Data

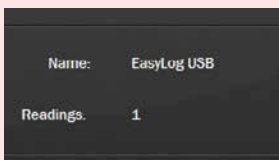


Click on the red button to stop the data logger and download any stored data.

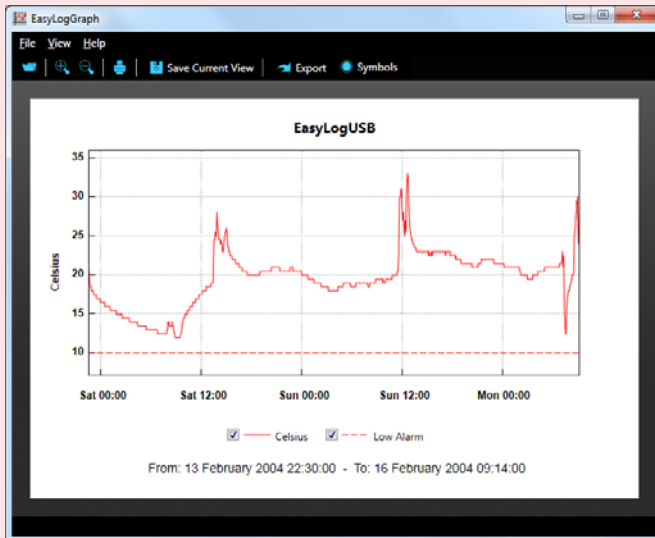


To avoid inadvertently interrupting a logging exercise, you will be asked to confirm that you would like to halt the logging process.

Click Yes to stop the logging exercise.



A window pops up to show that the Data Logger is in the Stopped condition, it also displays the Data Logger's Name and the number of Readings stored inside its memory.



To save the data to the PC and graph it, click OK. After selecting a suitable filename for the logged data*, the graph program will open automatically and display the readings as a graph.

The data that has just been downloaded will remain in the logger's memory until it has been set up again.

* If you do not choose a file name, then the EL-WIN-USB software will attempt to save the data to a file with the same name as the logger name.

Note: Before downloading critical data from the data logger, ensure that there are no other programs running on the PC.

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Graphing

There are two ways to open the graphing program:-

- Clicking the red button on the main program screen stops the logging process, prompts you for a file name to save to and then opens up the graphing program to show the logged data as a graph.
- Clicking the blue button on the main program screen, which prompts you for a file name to open and then opens up the graphing program to show the previously saved data as a graph.



The graph shows the following information:-

1. The vertical axis with scale and unit
2. The horizontal axis including time related information
3. The data logger name.
4. The low alarm trigger level, shown as a red horizontal dashed line.
5. The high alarm trigger level, shown as a red horizontal dashed line.
6. Plotted data logger readings, shown as a red line.
7. Marker line, shown as a blue vertical line that follows the mouse pointer.
8. Marker line data, showing the data relevant to the current marker line position, or the logging period, if no marker line is shown.

Traces:-

Up to 3 traces can be displayed with data from an EL-USB-4 (4-20mA or your selected unit, low alarm, high alarm). Individual traces can be turned off by clicking on View - Show traces and clicking on the listed trace name that you wish to switch off. It is also possible to toggle traces on and off using the tick box at the bottom of the graph. Similarly, the trace can later be switched back on again by clicking on the same menu option.

Grid lines:-

When graphing data, the image will by default automatically include horizontal (y-axis) and vertical (x-axis) grid lines to facilitate interpretation of the data. These lines can be turned off by clicking on View - Grid Lines and clicking on the horizontal or vertical grid line that you wish to switch off. Similarly, the grid lines can later be switched back on again by clicking on the same menu option.

Notes:

- The horizontal grid line will be aligned to specific values on the vertical axis.
- When plotting another graph, the graphing software will remember your grid line preferences. When exiting the graphing software, your grid line preferences are lost

The toolbar shows the following buttons:-



Open - Clicking this button opens the Open dialogue box, prompts you to select the data file that you want to graph, and then displays the data as a graph.

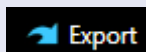


Zoom in - Click this button. Then select the zoom area by holding the left mouse button down and dragging a box over that part of the graph that you wish to inspect more closely.

You can zoom in several times before the maximum zoom level is reached and no further zooming in is achieved.



Zoom out - Every time you click this button, the zoom level is decreased to the previous zoom level until, eventually, the minimum zoom level is reached and no further zooming out is achieved.



Export – Automatically exports, formats and graphs the data into Microsoft Excel.



Print - Click this button to open the Print dialogue box.
Note: Selecting Landscape orientation for your printer allows you to print larger graphs, showing more detail.

Importing the Measurements into Other Applications

The graphing software includes an automatic export button for Microsoft Excel. Other spreadsheet programs are currently unsupported. Users of these other programs have to perform a manual import of the data. Data is stored in the .txt file in a 'comma separated variable' format, sometimes called 'comma delimited format'.

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Copying the Graph into Other Applications

1) Capturing the Image

Open the EasyLog data file that you wish to graph and copy into your report. There are two ways of doing this: -

- If you want to plot data that is still in your data logger, then connect your data logger to the PC and click the red button on the main EasyLog USB program screen to stop the logging process. This prompts you for a file name to save to and then opens up the graphing program to show you the saved data as a graph.

- If you want to plot data that has already been saved, then click the blue button on the main program screen. This prompts you for a file name to open and then runs the graphing program to show the previously saved data as a graph.

You now need to prepare the graph prior to capturing it: -

- Maximise the image on your screen.

- If the mouse pointer is located over the graph, then this will result in a vertical pink marker line on the graph and the legend below the graph will show the values for the date, time, temperature and humidity that coincide with that pink marker line. If this pink marker line is not required, then move the mouse pointer away from the graph. The legend below the graph will then show the start and end dates and times of the graph.

Now press ALT+PRINT SCREEN on the keyboard. This will copy an image of the screen to the clipboard.

You are now ready to paste this image from the clipboard into your target application. The examples below show you how to paste and manipulate the captured image in Word 2000 and Paint, the latter enabling the image to be saved as a BMP and used in any other application.

2)

- Using the Captured Image in Word 2000

Position the cursor (mouse pointer) at desired location in your document and left-click once.

Paste the captured image from the clipboard into your document by selecting Edit / Paste or pressing Ctrl+V on the keyboard.

Save your document.

Left-click on the image to select it and then drag its corners in or out to reduce or increase the size of the image.

To remove borders from the image, double-click on the image. This opens up the Format Picture dialog box. Click on the Picture tab. Here, you can crop left, right, top and bottom parts of the image that are not required. Typically, this could be (5mm) left, (5mm) right, (20mm) top, (10mm) bottom. These values depend on the measurement unit used and the screen resolution at which the image was captured.

Centre justify the image, if required, and add a suitable caption, if required.

- Using the Captured Image in Paint

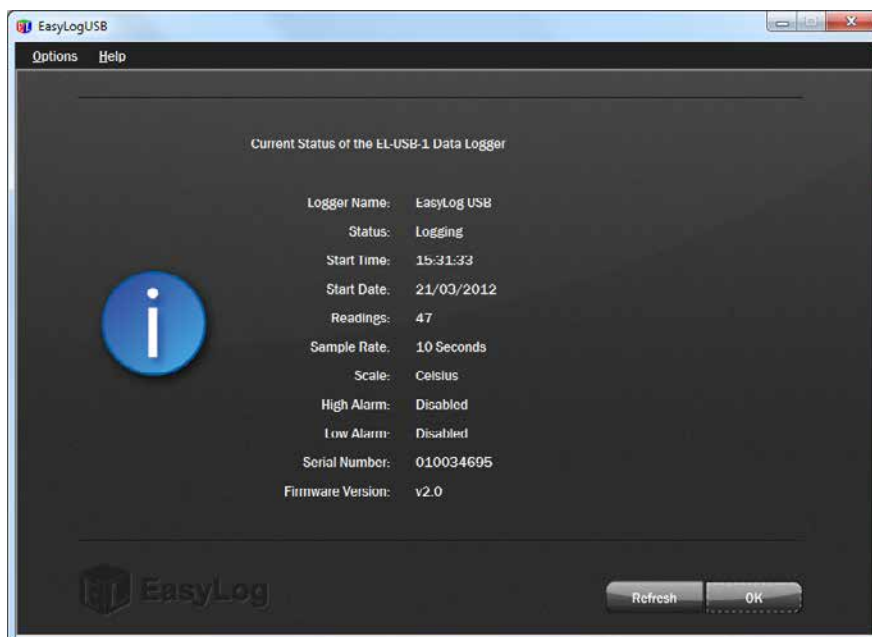
Click 'File > New' to create a new picture.

Select Edit / Paste (or press Ctrl+V on the keyboard).

Use the select tool to select the area of the graph you wish to use. Select Edit / Copy, then File / New (do not save the file when prompted). A new blank picture will open. Now select Edit / Paste, the screen should now show the selected part of your graph. Finally click File / Save to save the picture as a .BMP file which can be used in a variety of applications.

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View the Data Logger Status



Click on 'Options', then 'Current Status...' to display the current status of the Data Logger.

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Installing/Replacing the Battery

We recommend that a suitable, new battery is used if any low battery state is detected.

When the [LEDs indicate](#) that the battery inside the data logger is nearly empty, the battery should be replaced immediately. If a battery is completely discharged, all previously logged readings are stored securely inside the data logger, but no new readings are being taken.

When communicating with the data logger, the PC will detect if the battery is in need of replacing.

1. The first state is a 'BATTERY LOW' warning.



The data logger will still work in this state but the battery has a very limited life.

2. The final state is a 'BATTERY CRITICAL' warning.



The data logger has stored any readings taken and safely shut itself down. No more readings will be logged and the battery **MUST** be replaced.

- Do not open, puncture, or mutilate the batteries
- Do not heat batteries or attempt to recharge them
- Do not use a fire to dispose of batteries
- Keep batteries out of reach of children
- Always remove old, weak, or worn-out batteries promptly and recycle or dispose of them in accordance with local regulations
- Remove the batteries if your device is to be stored for longer than a month without being used

To replace the battery, proceed as follows:



Use a small flat blade screwdriver to gently push down the tab, by moving the screwdriver in the direction of the arrow. Take care not to push the tab down too far, as this may damage the tab.



While the tab is pushed down, gently pull apart the two parts of the data logger enclosure.



Remove the old battery and dispose of it in accordance with local regulations. Observe warnings on the battery casing.

Fit a new 1/2AA battery of the same type, making sure it is fitted the correct way round and noting the polarity symbols moulded into the battery bay.

Only use 3.6V 1/2AA lithium batteries. Before replacing the battery, remove the data logger from the PC. We recommend the following part:-

MANUFACTURER	BATTERY PART NUMBER
Tekcell	SB-AA02P



Slide the two parts of the data logger enclosure back together again, until a click is heard. This confirms that the two parts are snapped together correctly.

After the battery has been replaced, connect the data logger to your PC to download any data that may be stored from a previous exercise.

The data logger is now ready to be set up to start a new logging exercise.

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LED Status Indication

EL-USB-4 features two LEDs that indicate the logging, battery and alarm status:

-The first LED flashes red (R) to indicate that the EL-USB-4 is in an alarm condition. It will flash when the logged temperature has exceeded a Low or High alarm level.

-The second LED flashes green (G) to indicate that the EL-USB-4 is not in an alarm condition.

- 'Hold' forces the logger to continue flashing the red LED after an alarm, even when the input has returned to normal. This feature ensures that the user is notified that an alarm level has been exceeded, without the need to download the data from the logger.

Additional LED modes are explained below:

R G



Green LED flashes once every 30 seconds

-The data logger is not currently logging, but is primed to start at a later date and time.



Green LED flashes once every 10 seconds

-The most recently logged temperature is between the Low alarm and high alarm levels.



Red LED flashes once every 10 seconds

-The most recently logged temperature is equal to or lower than the low alarm level.

NB: If latching is enabled, then the alarm condition may have been triggered by a previous event.



Red LED flashes twice every 10 seconds

-The most recently logged temperature is equal to or higher than the high alarm level.

NB: If latching is enabled, then the alarm condition may have been triggered by a previous event.



Green LED flashes once every 20 seconds

-The battery is low and the most recently logged temperature is between the Low alarm and high alarm levels.



Red LED flashes once every 20 seconds

-The battery is low and the most recently logged temperature is equal to or lower than the low alarm level.

NB: If latching is enabled, then the alarm condition may have been triggered by a previous event.



Red LED flashes twice every 20 seconds

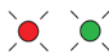
-The battery is low and the most recently logged temperature is equal to or higher than the high alarm level.

NB: If latching is enabled, then the alarm condition may have been triggered by a previous event



Green LED flashes twice every 20 seconds

-The logger is full and the most recently logged temperature is between the Low alarm and high alarm levels.



Red and Green LEDs flash alternately every 20 seconds

-The logger is full and a stored value is equal to or exceeds the low or high alarm level.

NB: This state is only possible if latching is enabled.



No LEDs flash

- The logger is not being used.

or

- The logger was logging, but has now shut down due to a flat battery (voltage has dropped below 2.8V). Plug the data logger into the PC and run the software to find out which condition applies.

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