



LeWL

Installation & User Guide

LeWL
Aug 2012

Revision Sheet

Release No.	Date	Revision Description
Rev. 2	21-04-09	Manual for LeWL version 5
Rev. 5	23-06-09	Adaptation for LeWL version 5 menu
Rev. 6	18-11-09	Lewl_setup application
Rev. 7	10-04-09	New contact details
Rev. 8	07-07-11	Menu setup changes
Rev. 9	07-09-12	Layout changes, setup and sensor review

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TABLE OF CONTENTS

1	GENERAL INFORMATION.....	6
1.1	Safety.....	6
1.2	Disclaimer	6
2	INTRODUCTION	8
2.1	System Overview	8
2.2	Acronyms and Abbreviations.....	9
3	INSTALLATION AND SETUP	11
3.1	Hardware Installation	11
3.1.1	Mounting the LeWL	11
3.1.2	Sensor Connection.....	12
3.1.3	Powering the LeWL.....	12
3.2	Operating Modes.....	13
3.3	Logger Setup	14
3.3.1	LeWL Setup via the SD card	14
3.3.1.1	Date and time setup	15
3.3.1.2	Recording interval setup	16
3.3.1.3	Anemometer type setup.....	16
3.3.1.4	Custom North point setup	16
3.3.1.5	Applying the settings to the LeWL.....	17
3.3.2	LeWL Setup Menu via Serial Port.....	18
3.3.2.1	Recording Interval setup.....	19
3.3.2.2	Anemometer type setup.....	19
3.3.2.3	Date and time setup	20
3.3.2.4	Custom North point setup.....	20
4	DATA EXTRACTION.....	21
4.1	Data on the SD Card	21
4.2	Data on the Serial port	22
5	SPECIFICATIONS	23
5.1	Physical Dimensions	23
5.2	Technical Specification.....	23
6	TROUBLESHOOTING	24
7	WARRANTY	26

GENERAL INFORMATION

1 GENERAL INFORMATION

1.1 Safety

Contact with AC electrical mains can cause a severe electric shock and could be lethal

- Never remove the cover from LeWL if you are not sure what you are doing.
- Follow the set-up instructions in this manual with care to ensure all electrical connections are made properly.
- Do not connect any equipment to the battery supply until you have properly connected all the other leads.
- Never push anything into holes, slots or other openings in the LeWL unless specifically detailed in this document.
- All Logic Energy products have been designed with ease of use in mind.

Caution:

- Do not use or store the LeWL device without its cover lid and/or open gland in hot, cold, damp or dusty places as this could affect the unit's performance and may prove to be a fire hazard. Always ensure the lid is securely fastened and the gland is sealed and pointing downwards for reliable operation.
- Do not put anything on the LeWL device that could cause water damage (e.g. drinks, plants, etc).
- Do not place the LeWL on top of a unit which emits heat.
- The cover of the LeWL should never be removed while the unit is in operation, unless indicated by this manual. If for any reason the cover has been removed it should be replaced before operation begins
- A service of the unit should be carried out only by an authorised Logic Energy service centre or Logic Energy authorised engineer.

1.2 Disclaimer

Under no circumstances will Logic Energy be liable for any direct, indirect, consequential or incidental damage, including loss of profits, business interruption and loss of data arising out of the use or the inability to use the software or hardware however caused, save to the extent that such liability is not capable of exclusion at law. These limitations of liability apply even if Logic Energy or a third party reseller have been advised of the possibility of such damage occurring.

INTRODUCTION

2 INTRODUCTION

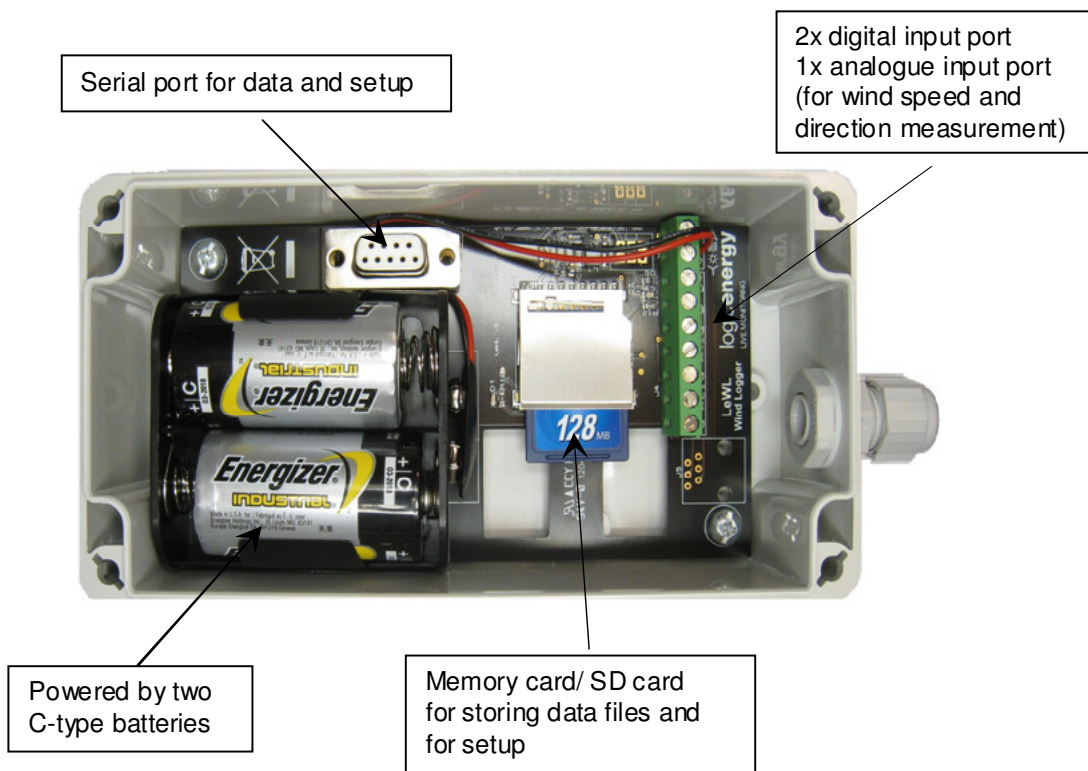
2.1 System Overview

LeWL is an automatic stand alone data logger that provides flexible and powerful data logging capabilities, specifically designed for the Energy Industry. LeWL is able to monitor 2 digital inputs, 1 analogue input and a built-in temperature sensor. LeWL works together with various anemometers and wind vanes in order to log real time wind speed and wind direction data onto a flash memory card.

Each data record has a date/time stamp when stored on the memory card. Data is stored as CSV (comma-separated values) files that are archived either by month or day depending on the pre-set logging interval.

All data including settings are stored onto a SD or MMC card (up to 2GByte capacity). This simplifies the collection of data by just removing the memory card from the LeWL wind logger and inserting it onto a PC card reader. All stored files can be accessed with a standard text editor or any spreadsheet program like MS Excel or OpenOffice.

The LeWL wind logger is powered by two C-type batteries which provide a year's battery life under normal circumstances, when logging on 1 minute intervals or higher.



2.2 Acronyms and Abbreviations

CSV: A data format originally known as comma-separated values (CSV).

FAT16: Older version of the FAT file system used on smaller memory cards.

FAT32: File Allocation Table, 32 bits; a modified form of the FAT16 file system.

Hertz: Frequency in cycles per second, 1 hertz equals 1 cycle per second.

IP65: Ingress Protection rating. 6 = totally sealed against dust; 5 = Protected against low pressure water jets from any direction.

RTC: Real Time Clock.

RS232: Standardised connection system for connecting a device to the serial port of a computer or terminal.

SD: Secure Digital memory card, available in sizes up to 2GB

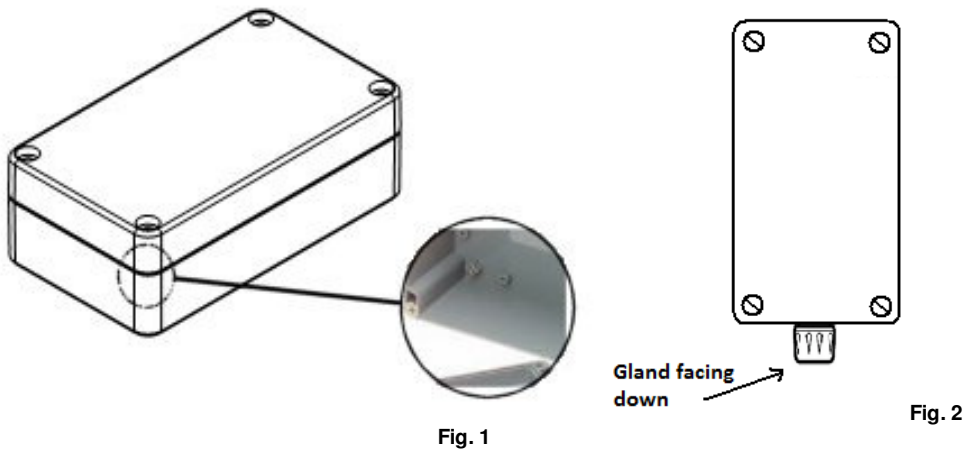
INSTALLATION AND SETUP

3 INSTALLATION AND SETUP

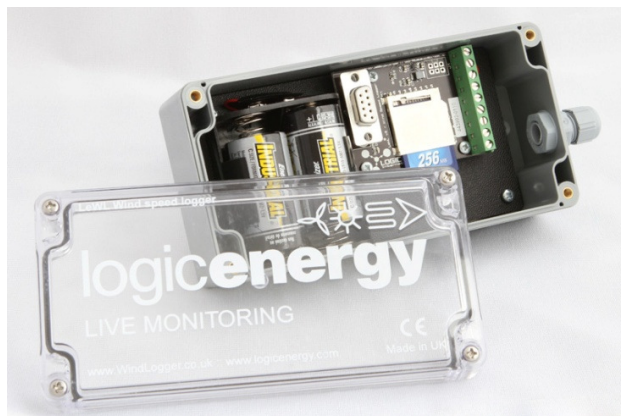
3.1 Hardware Installation

3.1.1 Mounting the LeWL

LeWL can be wall or pole mounted using the four holes provided inside each corner of the box. These are underneath the lid (Fig.1), as shown below:



Always make sure the logger is mounted with its gland facing down and the lid is securely fitted to avoid any possible water leaks (Fig.2)



3.1.2 Sensor Connection

LeWL has 2 digital inputs for anemometers and 1 analogue input for the wind direction sensor. For a list of compatible wind sensors, please visit <http://shop.logicenergy.com/>. The connectors are labelled and numbered on the circuit board. See Fig. 3 for connector layout:

From left to right:

- G:** Common ground
- A2:** Input sensor 2
- G:** Common ground
- A1:** Input sensor 1 (lowest power consume)
- G:** Common ground
- D:** Input wind direction sensor
- D+:** Wind direction sensor power
- V+:** Lower DC positive power (red)
- G:** Common ground (black)

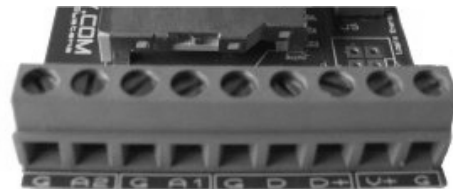
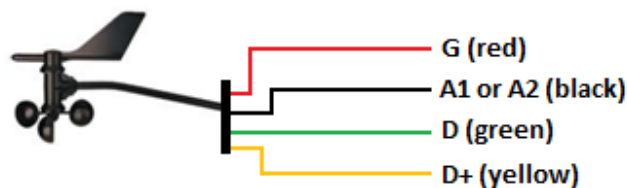


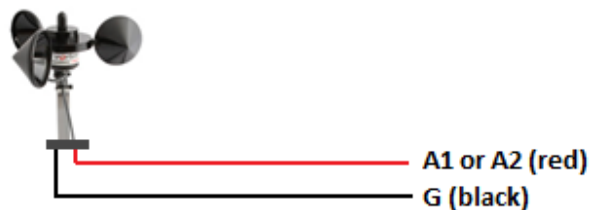
Fig.3

The anemometers are connected to the LeWL by using one of the common grounds “G” and one “A” input. A1 is the default input port when using just one anemometer.

Pro Anemometer



Vortex Anemometer



The LeWL must be configured to match the installed sensors. Refer to section 3.3

3.1.3 Powering the LeWL

LeWL uses two C type alkaline batteries. Always use premium or industrial alkaline batteries as these provide the best battery life.

Replace batteries at least every 3 months for best performance

3.2 Operating Modes

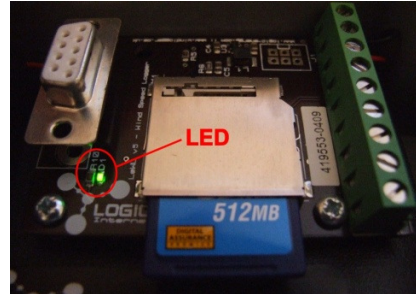


Fig.5

The LeWL has a green LED to indicate its three operation modes.

LED OFF: Normal Logging Mode

This is the normal operation mode. The LED is normally off, and flashes briefly every time LeWL writes to the memory card. If the logging interval is set to 1 minute, then it flashes once every 1 minute. If set to 10 minutes, then the LED flashes once every 10 minutes.

QUICK FLASHING: SD Card Not Inserted

Quick flashing LED indicates that the memory card has been removed and the logger is waiting for the card to be re-inserted or for setup via the serial port.

The quick flashing can also indicate that there is a problem with the memory card. For example the memory card is not properly inserted, the card is incompatible, or the power consumption of the card is too high to guarantee a normal working operation of the logger.

LED ON SOLID: Serial Setup Mode

LeWL is in serial setup mode, when LED is continuously ON. A computer with a serial port is required to setup the logger using this mode. See section 3.3.2 for details.

3.3 Logger Setup

In order to setup the logging interval, sensor factor, date and time, LeWL can be configured via a setup program on the SD card, or via a serial port menu system.

Before being used, LeWL must be configured with the correct date, time, logging interval and sensor factor.

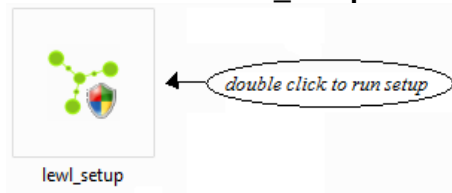
All the configured values (except date/time) are stored in “*non volatile*” memory. LeWL will therefore continue its operation using the previous configuration unless re-configured.

Date/Time will reset if the logger is powered OFF. So make sure to set date and time after replacing batteries.

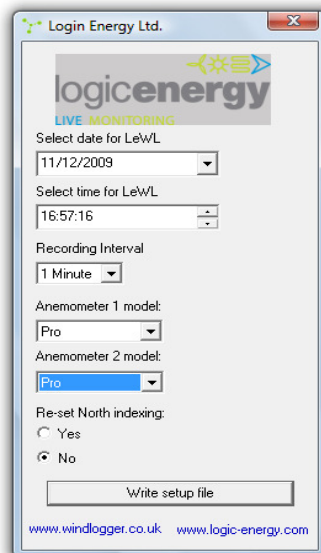
3.3.1 LeWL Setup via the SD card

The LeWL wind logger can be easily configured by using the setup program called **lewl_setup** on the SD card. This stores the logger configuration in a file called “setup.txt” file on the SD card. The setup file can be also edited manually if necessary.

Browse to the SD card and double-click on the **lewl_setup** icon to launch the setup program:



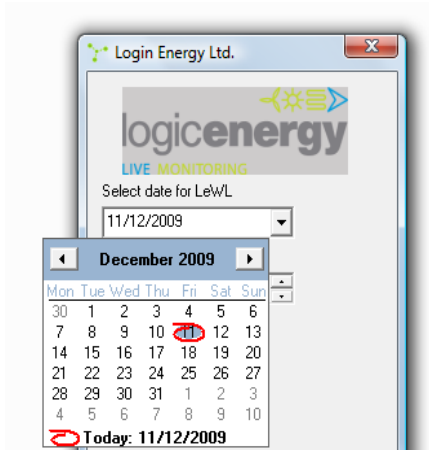
The setup window appears as shown below:



3.3.1.1 Date and time setup

Default Date value: When the setup application file is executed, it automatically takes the date from the computer's clock.

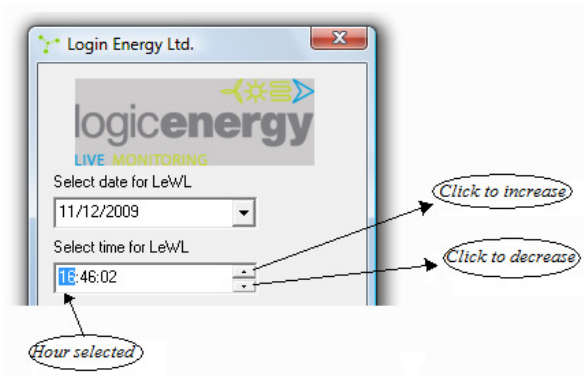
Changing Date: The Logging date can be changed by selecting the date from the calendar that appears by clicking the arrow.



Please Note that if batteries are removed, date and time will be reset

Default Time value: When the setup application file is executed, it automatically takes the current time from the computer's clock.

Changing Time: The Logging time can easily be changed by selecting the corresponding time unit (hh:mm:ss) and then it can be increased/decreased by the up/down arrows.



Please ensure that correct time and date values are setup, as these control the date/time in the log files created by the LeWL.

3.3.1.2 Recording interval setup

The LeWL wind logger will continuously sample the sensors and store the collected values onto the SD card every 1 minute or 10 minutes.

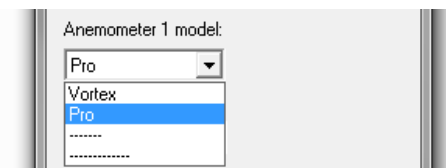
The default value for the recording interval is one minute (1 Minute), and this is the recommended setting for long-term data logging. Alternatively, you can select 10 minutes.

For long-term logging, 1 minute interval is recommended. The 10 second interval should only be used for testing purposes like quick pre-install tests.

3.3.1.3 Anemometer type setup

Set the type of anemometer for **A1** and **A2** inputs to **Vortex** or **Pro** to match the installed anemometer(s).

If a custom value needs to be entered, please use the serial port interface and setup menu.



Pro	Davis Pro Anemometer
Vortex	Vortex Anemometer
-----	Not used
-----	Not used

3.3.1.4 Custom North point setup

The wind vane should normally be mounted with its index marker facing **North**. In this case, the LeWL does not need any wind direction calibration.

For installations where it is not possible to mount the vane facing north, the “Reset North Indexing” option must be used to calibrate the North direction.

To set the North calibration, select **Yes** and write the setup file as normal. Before inserting the SD card into the LeWL and/or powering up the LeWL, manually point the vane to North and hold it there. Then insert the card and power up the LeWL and it will apply the north calibration.

NOTE: After North calibration is done, make sure this option is set to “No” in order to avoid re-calibration when the wind vane is in operation. The LeWL will automatically change this part of the setup file but is good practice to check it.

You can also use the Serial Port to perform the North calibration.

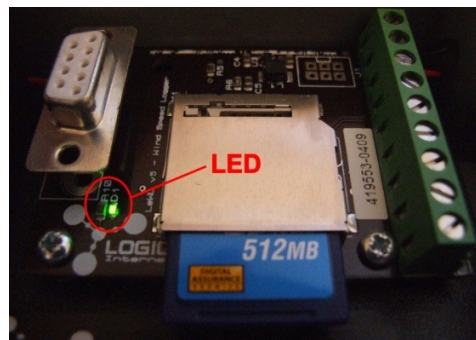
3.3.1.5 Applying the settings to the LeWL

After selecting and setting up all the parameters for the LeWL, the final step is to write the setup file to the SD card. Just click the “**Write setup file**” button, and the parameters will be written to the setup.txt file on the SD card.

You can verify the selected parameters for the LeWL by viewing the setup.txt file on the SD card after clicking the Write Setup file button.

After the new setup file is ready, insert the SD card into the LeWL’s card slot. The LeWL will detect these new settings. After new settings have been changed, you should see the green LED on the LeWL blink:

- One long flash then three shorter flashes before going into normal operation indicates new settings have been stored successfully.
- Any other sequence indicates that the parameters have been rejected. Please check the setup.txt file or LOG.txt file.



As a secondary check to ensure the new parameters have been successfully setup, after the LeWL finishes writing to the SD card (indicated by the green LED), remove the SD card and open the **LOG.TXT** file. You will find a log of all the changes done over time, with your most recent change as the last one on the log.

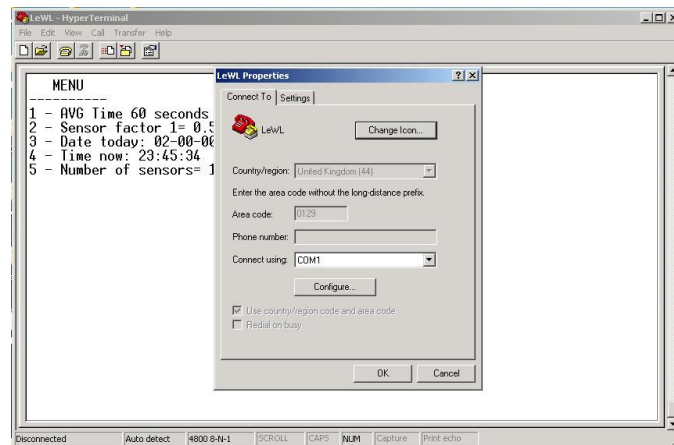
Date and Time setup: Please ensure that this is displaying the correct time and date values, as these are used in the log files created by the LeWL. If the batteries are removed, make sure the date and time are set again after replacing the batteries.

3.3.2 LeWL Setup Menu via Serial Port

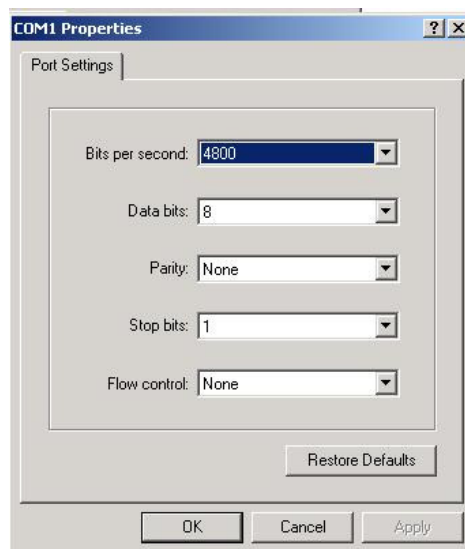
LeWL has a built-in menu system to allow for different configuration options.

Connect a serial cable to the LeWL with the following settings on HyperTerminal (Windows XP OS -> Start -> Run -> hypertrm -> Ok) or similar terminal program:

- The COM port you are using
- 4800 bits per second
- Data bits 8
- Parity None
- Stop bits 1
- Flow control None



Click on configure:



And click ok.

To enter the setup menu when the LeWL is not logging (no SD card or batteries), simply insert batteries and the menu will appear on the terminal. The LED will stay ON continuously.

If the LeWL is powered and logging, remove the SD card from the LeWL unit and the LED will start flashing. Press capital "M" on your computer's keyboard. You should see a menu like this:

```
MENU - 5.3.3sd
-----
1 - AVG Time 60 seconds
2 - Anemometer setup
3 - Date today: 12-09-08
4 - Time now: 13:49:25
6 - Wind direction calibration
Select option and press Enter

(Insert card and press Enter to start logging)
```

3.3.2.1 Recording Interval setup

Type "1" and press Enter to change the averaging periods to write to the memory card:

```
1 - 10 secs (This setting is for testing purposes only)
2 - 1 min
3 - 10 min
4 - Back
(60 seconds) ?
```

Select your preferred timing option (1, 2, 3,4) and press Enter (by default it is set to 1 minute average)

3.3.2.2 Anemometer type setup

Press 2 and press Enter to access the variables assigned to each sensor. Select from the list the anemometer you are using:

```
ANEMOMETER A1 = LE-Pro
Select type:
-----
Anemometer LE-Vortex > 1
Anemometer LE-Pro > 2
Anemometer custom > 5
Exit > 6
?
```

If using a custom anemometer, type "5" and press Enter, then enter the conversion factor from Hertz to meters per second (or any other preferred unit of measure):

```
Anemometer 1 = 1.006
Enter value
```

Enter the required value and press Enter.

The same menu will then appear for Anemometer 2 (A2).

3.3.2.3 Date and time setup

Press “3” and Enter to access the date menu:

```
Date (dd/mm/yy)
```

Enter the date in the format shown, and press Enter.

Press “4” and Enter to adjust the time:

```
Enter time in 24h, hh:mm:ss
```

Enter time in the format shown, and press Enter.

Please Note that if batteries are removed, date and time will be reset

3.3.2.4 Custom North point setup

The wind vane should normally be mounted with its index marker facing North. In this case, the LeWL does not need any wind direction calibration.

For installations where it is not possible to mount the vane facing north, the LeWL’s wind direction calibration must be used. To do the wind vane calibration, follow the steps below:

Ensure the wind vane is mounted in its final installation position, then manually point it to North. Press “6” and Enter on the terminal to enter wind vane calibration mode:

```
Wind direction offset = nnn  
Point Wind Vane to North and press Enter when ready
```

`nnn` is an offset number that will have a different value depending on where the wind vane is pointing. After pressing Enter, a new value will be displayed:

```
The new offset value is: nnn  
Store value (Y/N)
```

If it was intended to change the offset value, press Yes (Y/y), otherwise No (N/n) to use the old value. After calibration of the wind direction, the new value will be used only if you select Yes.

```
Yes  
New value nnn stored
```

```
No  
Old value nnn used
```

Once the above configuration steps have been completed, put the SD card in its slot and press Enter. Leave the serial cable connected and check the readings (see Section 4.2). If the readings are satisfactory, disconnect the serial cable with care. The logger is now actively logging data.

4 DATA EXTRACTION

The LeWL stores data in files on the SD card in CSV (comma-separated values) format. The data is also output on the serial port as it is logged to SD card.

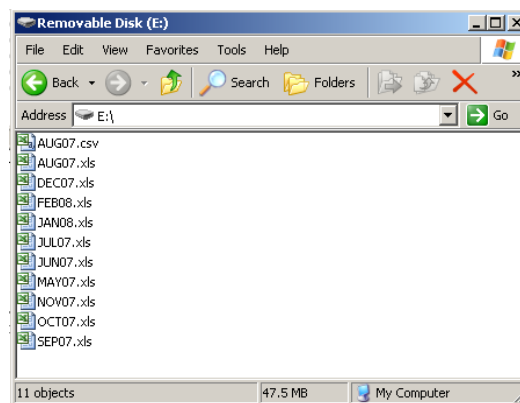
4.1 Data on the SD Card

Before removing the memory card ensure that LeWL is not writing to, or has completed writing to the card. To avoid data corruption, the card should be removed quickly when the LED is off.

Retrieve data on a monthly basis, and keep backups of the data files.

To resume normal operation after removing the memory card, just replace the memory card in its slot. Replace the SD card as soon as possible, because LeWL will not be able to record data without the card.

To read the data from the memory card, use any computer SD card reader compatible adapter. After inserting the memory card into the adapter, a new drive should appear on your computer with all the files that have been logged. For 1 minute or 10 minute logging intervals, files are archived by month:



For example the file AUG07.CSV will contain all the relevant data from August 2007. The first line/row contains the name of the data value for that column.

© Logic Energy Ltd. LeWL v5.2.3sd									
Date	Time	Direction	Temp. °C	Wind1 avg	Wind1 max	Wind1 std	Wind2 avg	Wind2 max	Wind2 std
01/08/2007	09:00:28	225	1.25	3.64	4.23	0.18	0	0	0
01/08/2007	09:01:28	225	1.22	3.21	4.51	0.12	0	0	0

Direction: Wind direction (heading) in degrees (0° to 360°)

Temp °C: Temperature in degrees Celsius

Wind1 avg: Average wind speed in meters/second (m/s) for A1 input

Wind1 max: Maximum wind speed recorded for A1 in m/s

Wind1 std: Standard Deviation of wind speed for A1

Wind2 avg: Average wind speed in m/s for A2 input

Wind2 max: Maximum wind speed recorded for A2 in m/s

Wind2 std: Standard Deviation of wind speed for A2

For 10-second logging interval, data is stored in daily files. For example, 01-08-07.CSV contains data for 1st August 2007.

The LOG.TXT file contains details of the configuration done on the LeWL logger: date, time of the day a new configuration was done, recording interval, number of anemometers, the conversion factors of the anemometers and wind direction offset.

```
16-10-08, 17:16:51, Avg_time=60, Sensor1=1.05999994, Sensor2=1.05999994, WD offset=-1
```

4.2 Data on the Serial port

If you have the LeWL serial port connected to the PC, the terminal screen should display a line of data each time it logs to the SD card (10 seconds, 1 minute or 10 minute intervals), as shown below:

Card found: 120818 KB

```
16-06-08, 19:38:36, 90, 21.7, 0.7, 1.3, 0.3, 2.7, 3.3, 1.3
```

This data can be interpreted as follows:

16-06-08 -> Date in dd-mm-yy format

19:38:36 -> Time in 24h format

90 -> Wind direction in degrees, 90° = East. Value increasing clockwise, divided into 16 bins

21.7 -> Temperature in °C (Celsius)

0.7 -> Average wind speed (m/s) for A1 during measurement period

1.3 -> Maximum wind speed (m/s) for A1 during measurement period

0.3 -> Standard deviation for A1 during measurement period

2.7 -> Average wind speed (m/s) for A2 during measurement period

3.3 -> Maximum wind speed (m/s) for A2 during measurement period

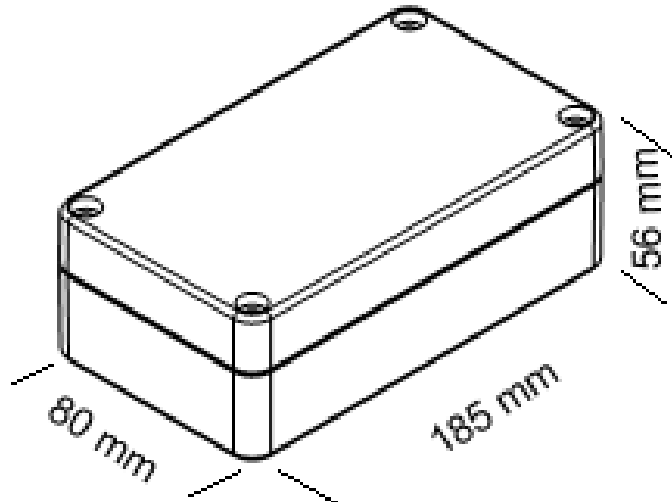
1.3 -> Standard deviation for A2 during measurement period

It is very important to check that the data is being collected properly and the LeWL wind logger is setup properly before leaving the unit on site. To do this connect a computer's serial port to the LeWL as indicated in Section 3.3.2 and wait for at least the first stream of data on the serial port. Check the number of anemometer logged and the date and time is correct.

A rapid flashing LED at any time means there is a PROBLEM. If you leave the serial cable connected you can confirm that the LeWL is working by seeing a line of the data written every log interval, or an error message indicating the problem.

5 SPECIFICATIONS

5.1 Physical Dimensions



Mounting hole centres 148x50mm

5.2 Technical Specification

Memory	SD/MMC flash card (FAT16/32), 2GB max.
Power	2 x Alkaline batteries 1.5v C size
Operating Temperature	-15°C to +50°C
Maximum frequency input	200Hz max (internal pull-up to suit reed switch / dry contact)
Sensor Input	1 Analogue and 2 Digital input Channels
Communications	RS232 @ 4800baud
Logging Interval	1 minute or 10 minutes
Output data format	CSV ASCII format data file
Readings	Average wind speed for anemometer 1 and 2 (m/s) Maximum wind speed for anemometer 1 and 2 (m/s) Standard deviation for anemometer 1 and 2 (m/s) Wind direction (degrees, 16 bins) Temperature (degrees Celsius, for internal logger reference)
Housing	Sealed plastic case (IP65)
Dimensions	160x80x55mm excluding cable gland
Weight	approx 450 gm (including batteries)

6 TROUBLESHOOTING

Problem: Data is not written to the memory card

Solution: This is likely to be due to a corrupted memory card or excessive memory card power consumption. Some memory cards use much more power than others. To guarantee a long battery life, LeWL limits the current being supplied to the memory card. We recommend using the memory cards supplied by Logic Energy Ltd. The LeWL is compatible with SD cards up to 2GB.

Problem: The time and date has reset to 00

Solution: LeWL uses its battery to keep its internal clock working. If at any time the batteries are removed, LeWL will reset its time and date to 00. To resolve this issue follow the instructions in section 3.3.1.1 or 3.3.2.3 to set the time and date.

Problem: LeWL's green LED is flashing continuously.

Solution: Make sure the memory card is properly inserted, and the card is working correctly. The LeWL is compatible with standard SD cards up to 2GB.

Problem: Wind direction is stuck at zero

Solution: Ensure that the wind vane wiring is correct, and that there are no short circuits or open circuits at the terminals. Check that the cable is not damaged.

7 WARRANTY

All products manufactured by Logic Energy Ltd., are guaranteed against defective materials for a period of one year from the date of delivery to the original purchaser.

THE WARRANTY WILL NOT APPLY TO THE PRODUCT IF IT HAS BEEN DAMAGED BY MISUSE, ALTERATION, ACCIDENT, IMPROPER HANDLING OR OPERATION, OR IF UNAUTHORISED REPAIRS ARE ATTEMPTED OR MADE. SOME EXAMPLES OF DAMAGES NOT COVERED BY WARRANTY INCLUDE, BUT ARE NOT LIMITED TO, BATTERY LEAKAGE, BENDING, OR VISIBLE CRACKING OF THE PCB, WHICH ARE PRESUMED TO BE DAMAGES RESULTING FROM MISUSE OR ABUSE.

THIS WARRANTY DOES NOT COVER THE ACCURACY OF THE SENSORS CONNECTED TO THE LeWL WIND LOGGER OR THE ACCURACY OF THE DATA COLLECTED BY THE LeWL WIND LOGGER.