logicenergy
LIVE MONITORING

Installation & User Guide

LeWL
Apr, 2010

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

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INSTALLATION MANUAL

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1.0   GENERAL INFORMATION

1.0 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.
- 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.

2.0   INTRODUCTION

2.0   INTRODUCTION

2.1   System Operations

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 different anemometers and wind vanes to log in real time wind speed and direction onto a flash memory card.

Each data record has a date and/or time stamp when stored on the memory card. Files (.CSV) are archived either by month or day depending on the pre-set logging speed.

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 years battery life under normal circumstances and 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, based on 16-bit integers.

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

RTC: Real Time Clock.

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

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

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

3.0   INSTALLATION

3.0   INSTALLATION

3.1   Hardware Installation

LeWL can be wall mounted using the four holes provided on each corner of the box. These are underneath the transparent lid:
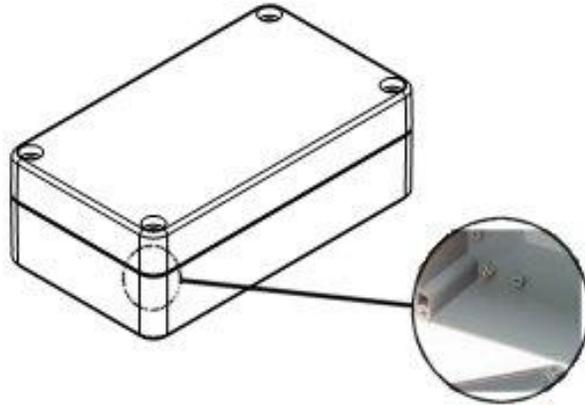

Fig. 1

> ## - Always make sure the logger is mounted with its gland facing down to avoid any possible water leaks -

The connectors are labelled and numbered on the circuit board. See Fig. 2 for connector's layout:
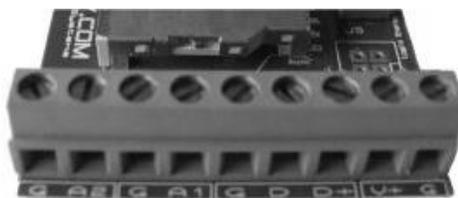

Fig.2

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)

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3.1.1 Sensors

LeWL has 2 digital inputs for anemometers and 1 analogue input for the wind direction sensor. For a set of compatible wind sensors, please visit www.windlogger.co.uk

3.1.1.1 Anemometers and wind vanes

The anemometers are connected to the LeWL by using one of the common grounds and an "A" input. A1 input is the default when using just one
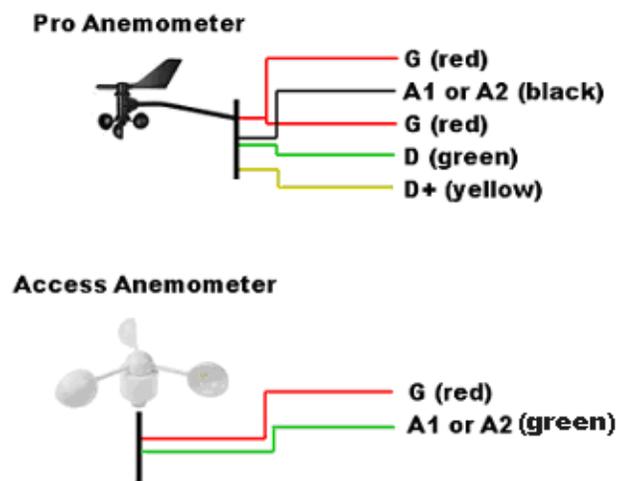.

Pro Anemometer
- G (red)
- A1 or A2 (black)
- G (red)
- D (green)
- D+ (yellow)

Access Anemometer
- G (red)
- A1 or A2 (green)

Fig. 3

For setting up the wind direction vane, please make sure to read section **3.2.1.5**

3.1.2 Power

LeWL uses two C type alkaline batteries. Use always premium alkaline batteries as these provide the best battery life.

Fig.4

3.1.3 Operation

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

Fig.5

OFF: This is the normal operation mode. It flashes approx 0.5 seconds every time it writes to the memory card. If the writing interval is set to 10 seconds, then it will flash once every 10 seconds. If set to 1 minute, then once every minute and so on.

QUICK FLASHING: Indicates a problem with the memory card, usually the memory card is not properly inserted or the power consume of the card is too high to guarantee a normal working operation of the logger.

- Please DO NOT leave the logger in this status for long periods of time as it will dramatically reduce its battery life. -

Also indicates when ready to access the setup menu, this occurs if removing the SD card.

FIX ON: Logger in setup mode. A computer with a serial port is necessary to use the setup menu. See section **3.2.1** for details.

3.2 Extracting data from the memory 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.

Fig.6 (Switch1 is marked with a "1")

To resume normal operation after removing the memory card, just replace the memory card on its slot.

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 being logged. When data is logged every 10 seconds, files are archived by date:
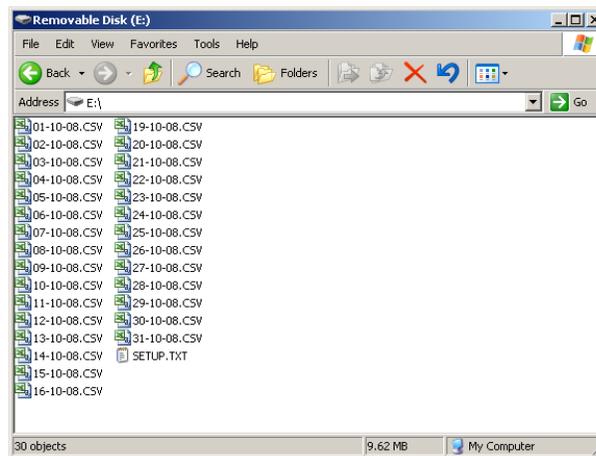

Fig.7 (data stored by days)

For example the file 01-10-08.CSV will contain all the relevant data from this day. Each row top row contains the name of each data collected.

© Logic Energy Ltd. LeWL v5.1.1sd									
Date	Time	Direction	Temp.ºC	Wind1	Wind1 max	Dev1	Wind2	Wind2 max	Dev2
01/12/2009	00:00:28	225	1.25	3.64	4.23	0.18	0	0	0

Fig. 8 (Spreadsheet compatible data)

Direction: Wind direction in º (0º to 360º)
Temp ºC: Temperature in ºC
Wind1: Average wind speed in m/s for A1 input
Wind1 max: Maximum wind speed recorded for A1 in m/s
Dev1: Standard Deviation for A1
Wind2: Average wind speed in m/s for A1 input
Wind2 max: Maximum wind speed recorded for A1 in m/s
Dev2: Standard Deviation for A1

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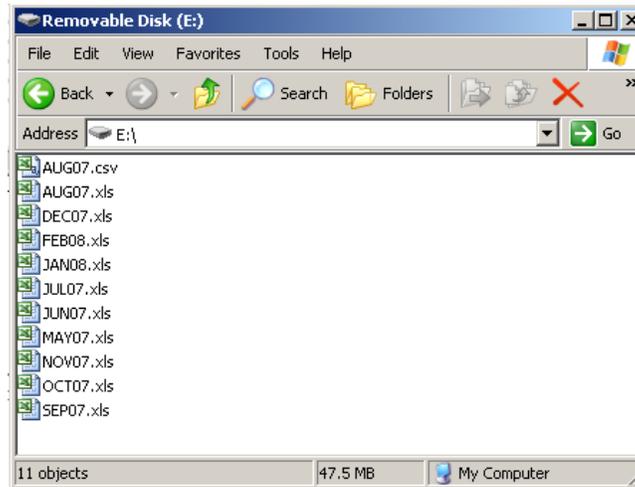By minute or 10 minutes, files are archived by months.

Fig. 9 (data stored by months)

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=10, Sensor1=1.05999994, Sensor2=1.05999994, , WD offset=-1
```

3.2.1 LeWL Setup menu via Serial port

LeWL has a built-in menu system to allow for different configuration options. All the configured values except date and time are stored on "*non volatile*" memory, therefore it is not necessary to configure the LeWL wind logger every time it needs to be used. Old parameters will continue to be used unless re-configured again.

To enter the menu mode connect a serial cable to the LeWL with the following settings on **HyperTerminal** (Windows XP OS -> Start -> Run -> hypertrm -> Ok) or similar terminal program:

1. The COM port you are using
2. 4800 bits per second
3. Data bits 8
4. Parity None
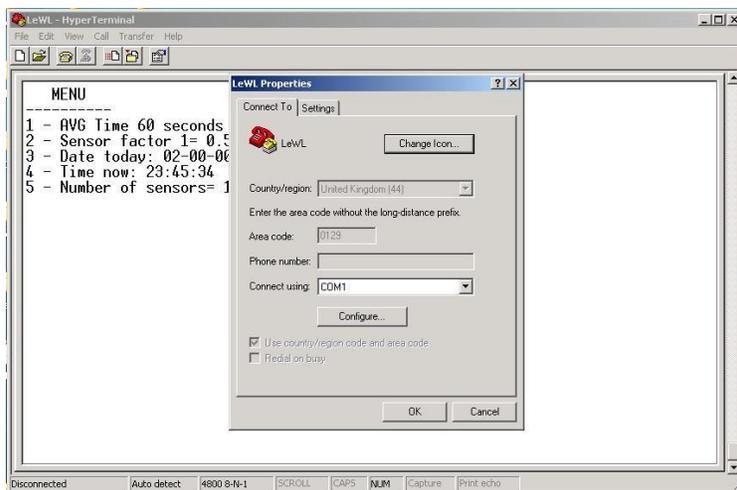5. Stop bits 1
6. Flow control None

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Fig.7
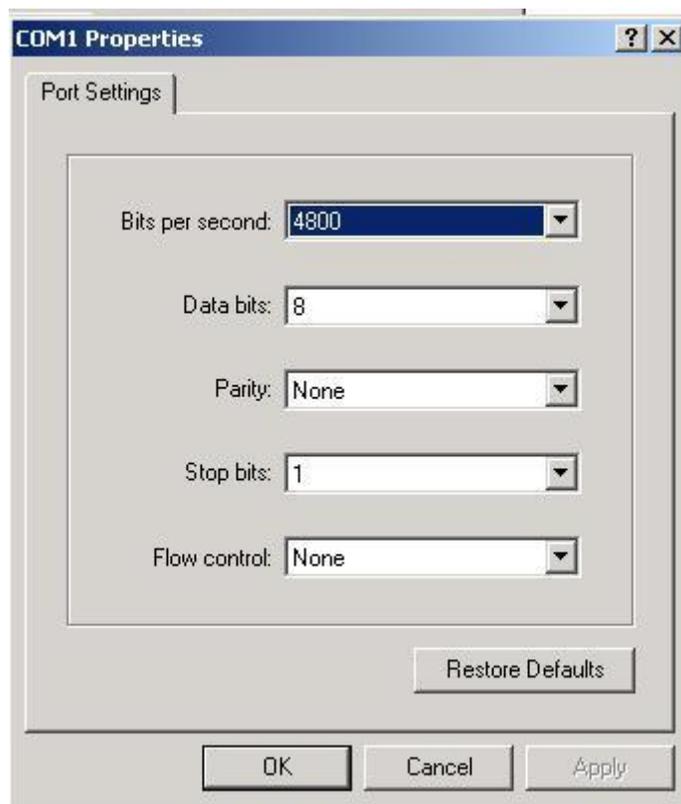
Click on configure:

Fig.8

And click ok.

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

```
MENU - 5.1.2sd
------------
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

(Switch off menu switch and press Enter to start logging)
```

3.2.1.1 Select data logging interval

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

```
1 - 10 secs
2 - 1 min
3 - 10 min
4 - Back
(60) ?
```

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

3.2.1.2 Change anemometer factor

Press 2 and press Enter to access the variables assigned to each sensor. NRG and Second Wind sensors need the analogue to digital interface board. Select from the list the anemometer you are using:

```
ANEMOMETER A1 = LE-Basic
Select type:
------------
Anemometer LE-Access      > 1
Anemometer LE-Pro         > 2
Anemometer NRG40C         > 3
Anemometer SW  C3         > 4
Anemometer custom         > 5
Exit                      > 6
?
```

If using a custom anemometer, select 5 and press Enter the conversion factor from Hertz to meters per second or any other preferred unit of measure:

```
Sensor 1 Hz/= (0.5) ?
```

Enter value and press Enter. The same menu will appear for Anemometer 2 (A2).

3.2.1.3 Adjust the time and date

Press 3 to access the date menu:

> MENU - 5.1.2sd
> -----------
> 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
>
> Enter date dd/mm/yy

Enter date and press Enter.
Press 4 to adjust the time:

> MENU - 5.1.2sd
> -----------
> 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
>
> Enter time in 24h, hh:mm:ss

Enter time and press Enter.
- Please Note - if batteries are removed, date and time will be reset -

3.2.1.4 Select number of anemometers

The LeWL version 5 always logs both anemometer channels. If only one anemometer is required, connect only one anemometer and leave the other one unused.

3.2.1.5 Indexing wind direction

This option facilitates the orientation of the wind vane towards North. This is useful to install the wind vane without necessarily having the internal potentiometer of the wind vane set to zero, and the wind vane indicator towards North. To do the wind vane calibration, follow the steps below:

```
MENU - 5.1.2sd
-----------
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
```

Ensure the wind vane is installed in place and pointing North. Press 6 and Enter to enter wind vane calibration mode:

Wind direction offset = nnn (number)
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 (number)
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, Only when selecting yes, the new value will be used:

Yes
New value nnn stored

No
Old value nnn used

Once the above steps have been completed, put the SD card in its slot and press Enter. Leave the serial cable connected and read Section **3.2.2**, if the readings are of your satisfaction, disconnect the serial cable with care.

3.2.2 LeWL Setup via the SD card

The LeWL wind logger can be also setup via the SD card. We recommend using the serial port for setup, however when this is not possible, the setup can be done by editing the "setup.txt" file on the SD card supplied. Editing the setup file can be done manually or using the program "lewl_setup" included in the SD memory card.

Double click on the icon:

Fig. 9

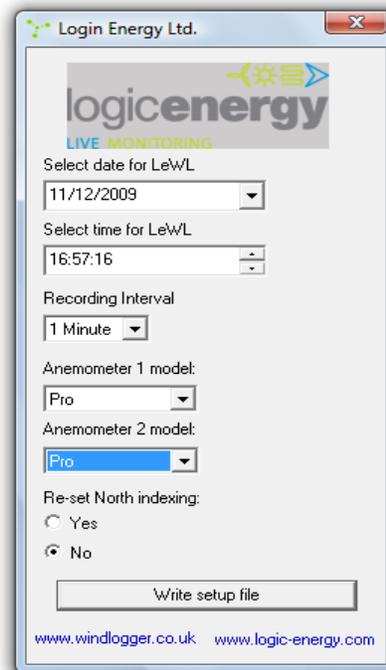A setup window appears as shown below (Fig.10):

Fig.10

© Logic Energy Ltd.

3.2.2.1 Setting up the date for the LeWL

Default value: When the setup application file is executed, it automatically selects the date from the system (computer).

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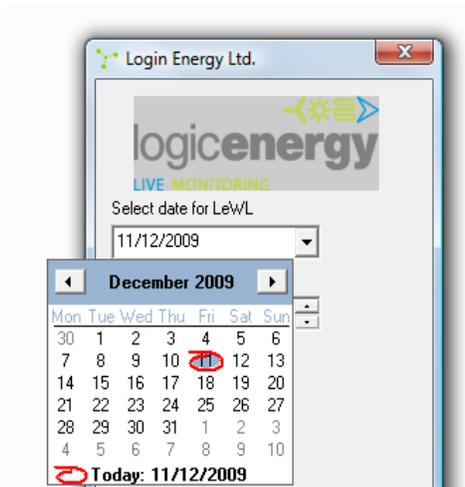

Fig.11

3.2.2.2 Setting up the time for the LeWL

Default value: When the setup application file is executed, it automatically selects the current time from the system (computer).

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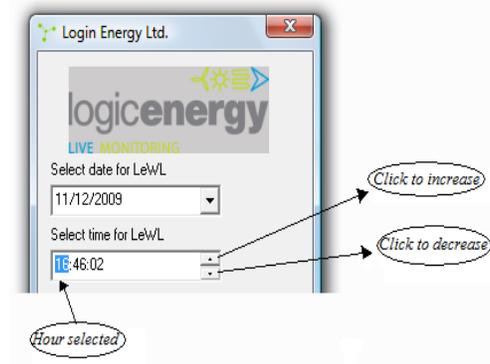

Fig.12

3.2.2.3 Setting up recording intervals for the LeWL

The LeWL wind logger will continuously sample the sensors input and store the collected values onto the SD card every 10 seconds, 1 minute or 10 minutes. This parameter can be selected:

- The default value for the recording interval is one minute (1 Minute) - **Recommended**
- The value for recording interval can be changed by selecting one of the three values: 10 seconds, 1 minute or 10 minutes.

3.2.2.4 Selecting the type of anemometer for the LeWL

To setup the type of anemometer for **A1** and **A2** input, setup the "anemometer" option to **Access, Pro, NRG #40C or Second Wind C3 anemometers**.
If a custom value needs to be entered, please use the serial port interface and setup menu.

Fig.13

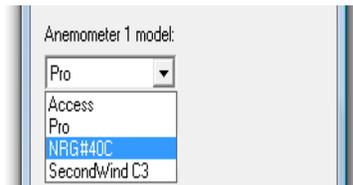|	
Pro	for pro Anemometer
Access	for access Anemometer
NRG#40C	for NRG # 40C Anemometer
SecondWind C3	for Second wind C3 Anemometer

3.2.2.5 Indexing a custom North point on the LeWL

This option is used to align the wind vane mounting arm with the wind vane sensor or when prevalent wind direction is South. This option allows to add an offset to 0º/360º (North) so the North index of the wind vane is set to a different point than 0º/360º.

When setting up the "Re-set North calibration" to yes, please ensure the wind vane is fixed pointing North when the new LeWL wind logger is switched on for the first time to take on the new parameters from the **setup.txt** file.

NOTE: **After North calibration is done, make sure this value is set to no in order to avoid re-calibration when the wind vane is in operation. The LeWL will auto edit this part of the file but is good practice to revise it.**

You can also use the Serial Port to do this too.

3.2.2.6 Auto generating the setup file for the LeWL

After selecting and setting up all the attributes for the wind logger, the final step is to write the setup file for Lewl. Just by clicking the " **Write setup file** " button, all the selected attributes for wind logger will be written into the setup.txt file on the SD card.

> You can verify the selected attributes for the wind logger by viewing the setup.txt file that is created there after clicking the Write Setup file button.

After the new setup file is ready, insert the SD card on the LeWL wind logger. 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 setup successfully.
- Any other sequence, parameters have been rejected, please revise setup.txt file or LOG.txt file

Fig.14

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 very useful for the files created by the LeWL. If the batteries are removed, make sure the date and time are set.

3.2.3 Receive data on the serial port

Once the steps above have been completed, press Enter. If you still have the serial port connected to the PC, your screen should display similar to 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 -> Everytime the LeWL writes to the memory card, it outputs a line to the serial port, this will happen every 10s, 1min or 10min.

16-06-08 -> Date in dd-mm-yy format
19:38:36 -> Time in 24h format
90 -> Wind direction in degrees, 90⁰ = East. Value increasing clockwise into 16 bins
21.7 -> Temperature in ⁰C (Celsius)
0.7 -> Average wind speed m/s for A1
1.3 -> Maximum wind speed in m/s during logging period for A1
0.3 -> Standard deviation during logging period for A1
2.7 -> Average wind speed m/s for A2
3.3 -> Maximum wind speed in m/s during logging period for A2
1.3 -> Standard deviation during logging period for A2

> **It is very important to check 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 3.2.1 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 quick flashing LED at any time means there is a PROBLEM. If you leave the serial cable connected you can confirm that it is working by seeing a line of the data written every time it does so or the error message.
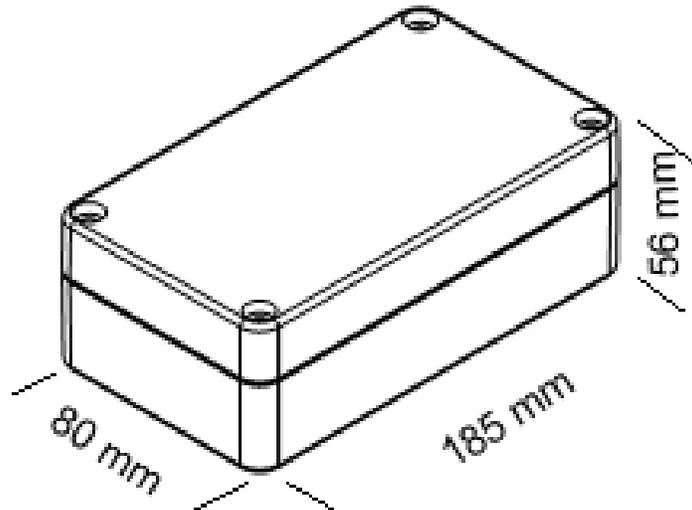
3.3   Physical Dimensions

Fig. 15

3.4   Product Technical Specification

Memory:	SD/MMC flash card (FAT16/32)
Power:	2 x Alkaline batteries 1.5v C size
Operating Temperature:	-15ºC to +50ºC
Maximum frequency input:	1.5kHz, 200Hz maximum recommended
Sensor Input:	1 Analogue and 2 Digital input Channel.
Communications:	RS232 @ 4800
Logging Interval:	10 second, 1 or 10 minutes, user-specified interval.
Output:	CSV ASCII format data file.
	By default data stored in meters per seconds [m/s]
Readings:	Average wind speed anemometer 1 and 2
	Maximum wind speed anemometer 1 and 2
	Standard deviation anemometer 1 and 2
	Wind direction
	Temperature (for internal logger reference)
Housing:	Sealed plastic case. (IP65)
Dimensions:	160x80x55mm.
Weight:	450 gm (including batteries).

4.0   TROUBLESHOOTING

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Problem: Data has not written to the memory card
Solution: This is likely to be due to a corrupted memory card or excessive power being needed to power up the memory card. 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.

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 on section 3.2.1 to setup the time and date.

Problem: LeWL's green LED is flashing continuously.
Solution: Make sure the memory card is properly inserted and Switch1 set to OFF.

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5.0   WARRANTY

© Logic Energy Ltd.

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.