User Manual

PCE-WL 1 Air Velocity Meter

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v1.0

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Contents

1   Safety notes

Please read this manual carefully and completely before you use the device for the first time. The device may only be used by qualified personnel and repaired by PCE Instruments personnel. Damage or injuries caused by non-observance of the manual are excluded from our liability and not covered by our warranty.

- The device must only be used as described in this instruction manual. If used otherwise, this can cause dangerous situations for the user and damage to the meter.
- The instrument may only be used if the environmental conditions (temperature, relative humidity, …) are within the ranges stated in the technical specifications. Do not expose the device to extreme temperatures, direct sunlight, extreme humidity or moisture.
- Do not expose the device to shocks or strong vibrations.
- The case should only be opened by qualified PCE Instruments personnel.
- Never use the instrument when your hands are wet.
- You must not make any technical changes to the device.
- The appliance should only be cleaned with a damp cloth. Use only pH-neutral cleaner, no abrasives or solvents.
- The device must only be used with accessories from PCE Instruments or equivalent.
- Before each use, inspect the case for visible damage. If any damage is visible, do not use the device.
- Do not use the instrument in explosive atmospheres.
- The measurement range as stated in the specifications must not be exceeded under any circumstances.
- Non-observance of the safety notes can cause damage to the device and injuries to the user.

We do not assume liability for printing errors or any other mistakes in this manual.

We expressly point to our general guarantee terms which can be found in our general terms of business.

If you have any questions please contact PCE Instruments. The contact details can be found at the end of this manual.

2 Specifications

2.1 Technical Specifications

Logger	
Inputs	2 x digital inputs 1 x analogue input 1 x NTC input for external temperature sensors
Interface	RS-232
Sampling interval	1 min or 10 min
Memory	microSD card (FAT32), max. 2 GB
Data format	CSV file, ASCII format
Recorded parameters	Average values, min/max values and standard deviation (with date and time stamp)
Power supply	2 x 1.5 V C-type batteries
Battery life	Up to 1 year (with 1 min sampling interval); up to 3 years (with 10 min sampling interval)
Housing	Robust plastic housing
Protection class	IP65
Dimensions	160 x 80 x 55 mm
Weight	450 g
Wind sensor	
Output	0 … 100 Hz at 40 m/s
Measuring range	0.8 … 40 m/s
Accuracy	±0.5 m/s or ±5 % of measured value
Max. load	Max. 60 m/s (short-term)
Contact classification	10 VA, max. 42 V DC, max. 0.4 A
Mounting	With support bracket
Heating	Max. 24 V AC/DC, max. 1 A
Environmental temperature	-25 … +60 °C (ice-free)
Cable	3 m; LiYY 4 x 0.5 mm²
Protection class	IP54
Dimensions	Ø134 x 160 mm
Weight	Approx. 300 g

2.2 Delivery content

1 x wind speed meter PCE-WL 1 with wind sensor
1 x microSD card (512 MB)
1 x mounting bracket
2 x 1.5 V type C batteries
1 x instruction manual

3 System description

3.1 Logger
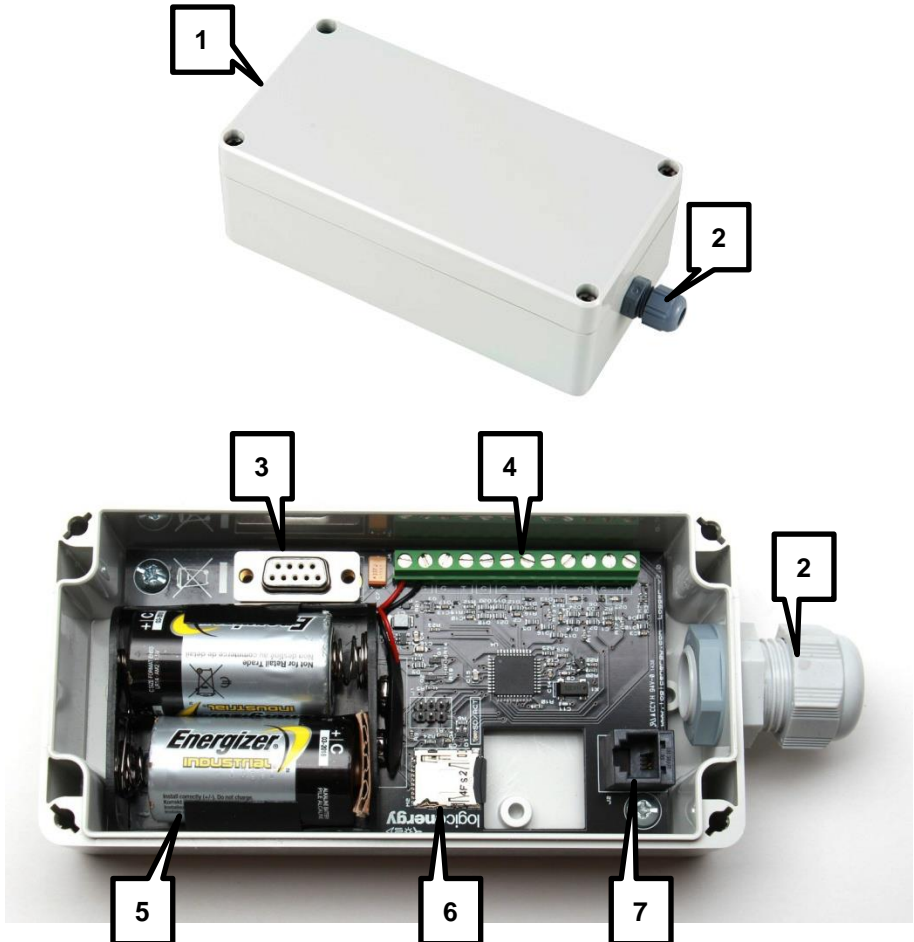
1. Cover plate
2. Cable connection
3. RS-232 interface
4. Sensor connection (2 x anemometer, 1 x wind direction sensor, 1 x NTC temperature sensor)
5. Batteries (2 x 1.5 V type C)
6. microSD slot
7. Connector for Pro-D anemometers

3.2   Sensor
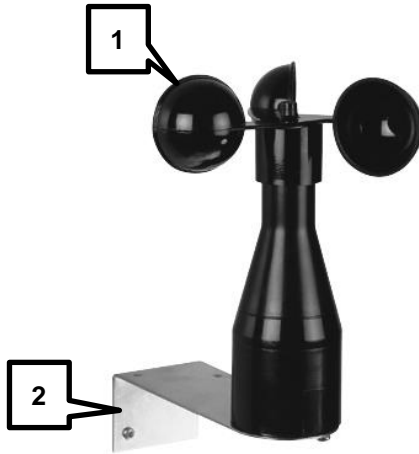
1.   Vane anemometer
2.   Mounting bracket

4 Getting started

4.1 Power supply

The power supply is powered by 2 x 1.5 V C-type batteries. In order to replace them, follow these steps:

1. Remove the 4 screws which hold the cover plate in place.
2. Remove the cover plate.
3. Take out the old batteries and replace them with new ones.
4. Close the cover plate and fasten the screws.

4.2 Connecting the sensor

To connect the sensor, remove the 4 screws which hold the cover plate in place and then remove the cover plate.

On the circuit board, you can find the connectors which are labelled as follows:

From left to right:

V+	Battery positive power (red)
G	Battery negative power (black)
G	Common ground (for NTC)
T	NTC temperature sensor
G	Common ground (spare)
G	Common ground (wind vane)
D	Wind vane signal
D+	Wind vane power supply
G	Common ground (anemometer 2)
A2	Anemometer 2 signal
G	Common ground (anemometer 1)
A1	Anemometer 1 signal

The sensor has 4 cables which are coloured and numbered:

1. White: anemometer signal
2. Brown: common ground
3. Green: heating (+)
4. Yellow: heating (-)

Connect the white cable (1) to the connector for anemometer 1 (A1) and connect the brown cable (2) to the common ground of anemometer 1 (G).

To use the heating of the sensor, you need an external mains adaptor (24 V / 1 A / 24 W). Connect the green (3) and yellow (4) cables to the power supply.

4.3   Mounting

Logger

The logging unit has 4 mounting holes. To reach them, you have to remove the cover plate.
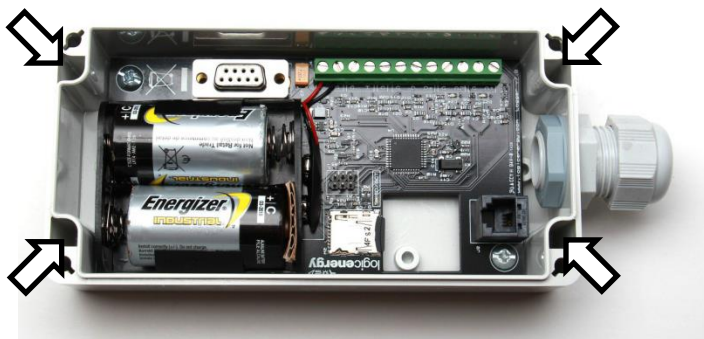
ATTENTION: When mounting the logger to a wall, make sure that the cable connection is pointing downwards. This prevents moisture from getting inside the logger.

Sensor

To mount the sensor, use the supplied mounting bracket. The sensor has 2 screws at the bottom while the mounting bracket has 2 matching holes.
To attach the sensor to the mounting bracket, put the screws of the sensor through the hole of the mounting bracket and then rotate the sensor in a clockwise or anti-clockwise direction (depending on how you attach the sensor to the bracket). To lock the sensor into position, tighten the screws afterwards.

You can attach the sensor to the mounting bracket in two different ways:

4.4   SD card

To remove the microSD card, carefully push it into the SD card slot until the locking mechanism releases the card (clicking noise). The card comes out of the slot and can be removed.

To insert the card, gently push it into the slot until it snaps into place (clicking noise).

5   Operation

The operation status is indicated by an LED inside the logger.

LED off (short flashes every 5 seconds)
The logger is in regular storage mode. The LED flashes every 5 seconds. In addition, it also flashes according to the set sampling interval (every minute or every 10 minutes). This means that data is recorded.

LED flashes rapidly
This means that the microSD card does not work or has not been inserted properly. It can also mean that the logger is connected to a PC via the RS-232 interface and is waiting for configuration.
Make sure that the microSD card is inserted properly and compatible with the logger.
Also check the power consumption of the card and the amount of data. Low battery voltage can also cause this problem because the logger does not record data when the batteries are low.
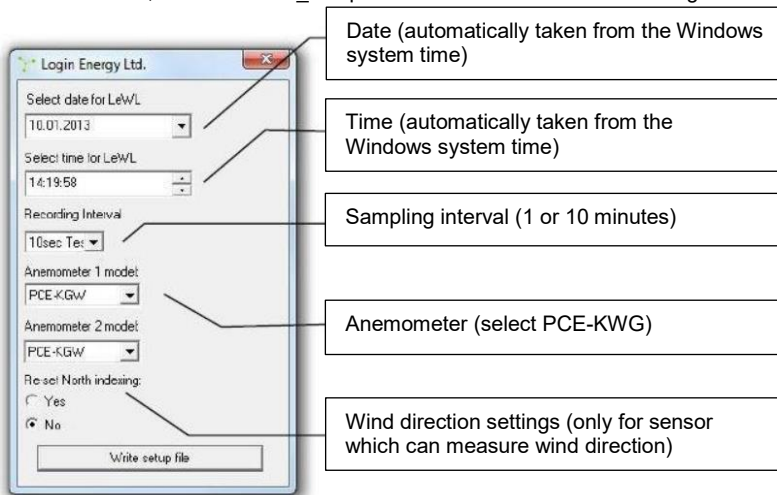
LED on
The logger is connected to a PC via the RS-232 interface and the configuration is running. To set up the logger via the RS-232 interface, you need to remove the microSD card.

5.1   Configuration

5.1.1   Configuration via SD card

Remove the SD card from the logger and use a card reader to connect it to your PC.
On the SD card, there is a "lewl_setup.exe" file. Run the file. The following window appears:

Date (automatically taken from the Windows system time)	
Time (automatically taken from the Windows system time)	
Sampling interval (1 or 10 minutes)	
Anemometer (select PCE-KWG)	
Wind direction settings (only for sensor which can measure wind direction)	

Once you have adjusted all settings to your needs, click on "Write setup file" to confirm the settings. Insert the microSD card into the card slot of the logger. The settings are adopted automatically and the logger is in recording mode.

5.1.2   Configuration via terminal program

The PCE-WL1 data logger has an integrated menu which can be accessed via the RS-232 interface. To configure the logger, you need a terminal program to be installed on your PC. All parameters (except date and time) are saved to the device permanently and so not have to be set every time. Make sure to set up time and date every time when using this configuration method.

Note: If your operating system does not come with a terminal program (Windows 7 or higher), you can download a freeware program from the internet. We recommend using "HTerm".

Access the internal menu

Run the terminal program and adjust the interface settings as follows:

The COM port number that you are using
Data rate = 4800 baud
Data bits = 8
Parity = None
Stop bits = 1
Flow control = None

Make sure that the SD card is not inserted and that the logger is supplied with power. Connect the logger to your PC via the RS-232 interface.

Press the "M" key on your keyboard. The following menu appears in the terminal program:

MENU
----
1 - Set Log Interval (60 seconds)
2 - Anemometer Setup (A1=LE-Pro, A2=LE-Pro)
3 - Set Date (now 10-11-14)
4 - Set Time (now 16:47:19)
6 - Wind direction calibration
Select option and press Enter
(Insert card and press Enter to start logging)

Sampling interval setup

Press "1" and the Enter key afterwards to access the sampling interval sub-menu.

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

Choose the desired sampling interval by pressing a key. (By default, the sampling interval is set to 1 minute)

Anemometer settings

Press "2" and the Enter key afterwards to access the anemometer settings sub-menu.

ANEMOMETER A1 = LE-Pro
Select type:
----
1 - Anemometer 1 LE-Vortex
2 - Anemometer 1 LE-Pro
3 - Anemometer 1 PCE-KWG1
4 - Anemometer 1 Raw Hz
5 - Anemometer 1 Custom
6 - Exit
?

Press "3" to select PCE-KWG1.

Date setup

Press "3" and the Enter key afterwards to access the date setup sub-menu.

Date (dd/mm/yy)

Type in the date and press Enter to confirm.

Time setup

Press "4" and the Enter key afterwards to access the time setup sub-menu.

Enter time in 24h, hh:mm:ss

Type in the time and press Enter to confirm.

Note: You have to set date and time every time you remove or replace the batteries.

Wind direction calibration

ATTENTION: This setting is only relevant when you use a sensor which is able to measure the wind direction. If you only use the supplied sensor you can skip this setting.

Press "6" and the Enter key afterwards to access the wind direction calibration sub-menu.

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

Make sure that the sensor is mounted in its final installation position, then manually point it to North.

"nnn" is the current offset in degrees.

Press Enter to start the calibration. The new offset value is shown in the terminal program:

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

Press "y" to store the new value or press "n" to restore and use the old value.

Activate logging mode

After finishing the configuration, insert the SD card into the card slot of the logger and press the Enter key. Leave the RS-232 cable plugged in and check the readings (see chapter 5.2.2). If the readings are ok, carefully unplug the RS-232 cable. The logger is now in logging mode.

ATTENTION: Do not leave the RS-232 cable plugged in for a longer period of time because it causes higher power consumption.

5.2   Read out the data

The data is stored on the SD card in Excel-compatible format. The logger creates a file for each month which contains all readings of this time span.

Note: We recommend that you retrieve the data every month and keep backups of the data.

There are two ways of reading out the data.

5.2.1   Read out the data via SD card

Make sure that the logger is not storing any data at the moment (LED off) and then quickly remove the microSD card.
Use a card reader to connect the SD card to your PC. On the SD card, you can find the monthly files which contain the readings:
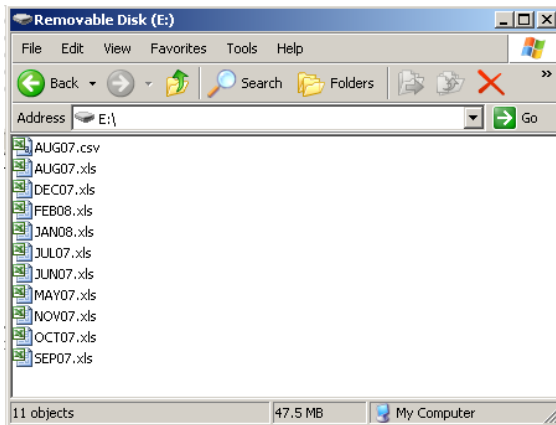
You can open the files with Excel. They contain the following parameters of each measurement:

Date:	Date of this data, DD-MM-YY format
Time:	Time at which this data was recorded, 24h HH:MM:SS format
Direction:	Wind direction (heading) in degrees (0º to 360º)
Temp C:	Temperature in degrees Celsius (if NTC temperature sensor connected)
Wind1avg:	Average wind speed in this interval for A1 input, meters/second (m/s)
Wind1max:	Maximum wind speed recorded in this interval for A1 in m/s
Wind1std:	Standard deviation of wind speed in this interval for A1 in m/s
Wind2avg:	Average wind speed in this interval for A2 input, meters/second (m/s)
Wind2max:	Maximum wind speed recorded in this interval for A2 in m/s
Wind2std:	Standard deviation of wind speed in this interval for A2 in m/s
Batt V:	Battery voltage

Note: If you set the sampling interval to 10 seconds, the logger creates files for each day. However, to open these files in Excel, you need to use the Excel text import wizard.

The "log.txt" file contains all parameters of the configuration.

5.2.2   Read out the data via RS-232 interface

You can read out the data by using the RS-232 interface and a terminal program, too.
Depending on the sampling interval, data is transmitted to your PC. In the terminal program, the data packets look as follows:

10-08-14,16:48:25,180,21.7,7.01,9.56,0.84,6.68,9.03,0.79,2.26

Interpretation:

10-08-14	Date in dd-mm-yy format
16:48:25	Time in 24h format
180	Wind direction in degrees, 180º = south. Value increasing clockwise in 16 steps
21.7	Temperature in degrees Celsius
7.01	Average wind speed (m/s) for A1 during measurement period
9.56	Maximum wind speed (m/s) for A1 during measurement period
0.84	Standard deviation for A1 during measurement period
6.68	Average wind speed (m/s) for A2 during measurement period
9.03	Maximum wind speed (m/s) for A2 during measurement period
0.79	Standard deviation for A2 during measurement period
2.26	Battery voltage. Note that 2.26 volts is very low and batteries should be replaced.

If the LED flashes rapidly, a problem has occurred. If logger and PC are still connected, you can check if the logger is still working by using the terminal program. If data is still transferred, the logger works fine, otherwise an error message appears.

ATTENTION: Always check if data is transferred and the readings are fine before using the logger on site.
Check the data by connecting the SD card to a PC or by using the RS-232 interface and a terminal program.

ATTENTION: Do not leave the RS-232 cable plugged in for a longer period of time because this causes higher power consumption.

6   Troubleshooting

Problem: Data is not written to the memory card.
Solution: This is likely to be due to a corrupted memory card, excessive memory card power consumption or flat batteries. Some memory cards use much more power than others. To guarantee a long battery life, the logger limits the current being supplied to the memory card. We recommend using the memory cards supplied. The logger is compatible with microSD cards up to 2 GB.

Problem: The time and date has reset to zero.
Solution: The logger uses the batteries to keep its internal clock working. If at any time the batteries are removed, the logger will reset its time and date to 00. Follow the instructions in chapter 5.1 to set the time and date.

Problem: The green LED is flashing continuously.
Solution: Make sure the memory card is inserted properly and the card is working correctly. The logger is compatible with standard microSD cards up to 2 GB.

Problem: Wind direction is stuck at zero.
Solution: Check if your sensor is able to measure the wind direction. If so, ensure that the wind vane wiring is correct and that there are no short circuits or open circuits at the terminals. Check if the cable is damaged.

Problem: Wind speed is zero or incorrect.
Solution: Ensure that the anemometer wiring is correct and that there are no short circuits or open circuits at the terminals. Check if the cable is damaged. Also check if the anemometer type is set correctly, as this affects the speed calculations.

Problem: The batteries go flat quite quickly.
Solution: Ensure that the batteries are good-quality alkaline type. These will ensure longer life, especially at low temperatures. Ensure that the microSD memory card is inserted properly and does not have large amounts of data stored on it. Do not use the 10-second logging interval for normal long-term logging, as this uses more power. Make sure there are no short circuits in the sensor connections and that the sensors are working correctly.

7   Warranty

You can read our warranty terms in our General Business Terms which you can find here: https://www.pce-instruments.com/english/terms.

8   Disposal

For the disposal of batteries in the EU, the 2006/66/EC directive of the European Parliament applies. Due to the contained pollutants, batteries must not be disposed of as household waste. They must be given to collection points designed for that purpose.

In order to comply with the EU directive 2012/19/EU we take our devices back. We either re-use them or give them to a recycling company which disposes of the devices in line with law.

For countries outside the EU, batteries and devices should be disposed of in accordance with your local waste regulations.

If you have any questions, please contact PCE Instruments.

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