RainWise® Inc.
Professional Weather Instruments

PortLog™

User's Guide

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The PortLog is a compact rugged industrial grade data logging weather station which measures Temperature, Wind Speed, Wind Direction, Barometric Pressure, Relative Humidity, Dew Point, Solar Radiation and Rainfall. The unit is fully assembled and can be quickly deployed. The large 3-Watt solar panel and 5AH sealed lead acid battery ensure reliable operation in the harshest conditions.

The PortLog communicates directly to a PC via an RS232 serial port. During the data logging time interval, the wind speed and wind direction are averaged. The maximum wind speed is also captured and the solar energy calculated. All data is saved to non-volatile RAM. Selectable units are English and Metric with wind speed also recorded in Knots and Meters per Second. Solar Radiation is in SI units only.

Deployed PortLog with tripod and travel case

2) Getting Started

Every PortLog comes with the standard package listed below. Additional options are also available to the standard package.

The itemized lists should be consulted after opening the PortLog to verify if any equipment is missing or damaged. If equipment is missing or damaged, contact RainWise Inc. at (207) 288-5169 immediately.

Standard:

- PortLog Data Logger Assembly
- Solar Assembly
- Serial Cable
- WLcom Software Disk
- Battery Charger
- Instruction Manual
- Tripod Mount Mast

Optional: (Tripod Kit & Compass)

- Tripod Assembly
- Three Tripod Mounting Feet
- Tripod Anchor Kit
  - Hammer
  - 3 Nails
- Compass

Optional:

- Travel Case

Standard unit in travel case

- "SP/SR: solar panel/solar radiation sensor

- "Mtf": tripod mounting feet (included with tripod purchase)

Tripod in travel case

The PortLog is stored under the tripod and foam. The other accessories are located in the well. The top is cushioned to support the items when the cover is closed.

3)   Physical Setup

The physical setup is important for functionality of your PortLog.

3.1)   Quick Guide

1. Select suitable location to set up

2. Unpack the tripod (if purchased)

3. Attach tripod mounting feet

4. Layout the tripod, do not extend the tripods legs

5. Level the tripod

6. Attach mounting pole into tripod

7. Attach PortLog to mounting pole

8. Attach Solar Panel and Solar Radiation Assembly to the PortLog

9. Connect the Solar Panel and Solar Radiation Cable to the PortLog

10. Set the angle of the solar panel

11. Fully extend the tripods legs

12. Face the solar panel in the correct compass bearing for your location (refer to   Section 3.25)

13. Secure the tripod to the ground

14. Level tripod

15. Turn PortLog ON

3.2)   Detailed Setup

A few different aspects are important to consider when setting up the PortLog.

3.21) Site Selection

Select an open site for the PortLog. The site should be located where temperature and humidity won't be affected by heat and water sources. Nearby obstructions can affect the wind, rainfall and solar radiation sensors. The World Meteorological Organization (WMO) defines open terrain as an area where the distance between the anemometer and any obstruction is at least ten times the height of the obstruction. RainWise recommends this guideline to be used as minimum for selecting a site.

3.22) Tripod Setup

1. Remove the tripod from its travel case

2. Install the tripod mounting feet. To mount the feet, pull the pin and slide the mounting foot over the tripod leg. Put pin back through hole of mounting foot.

3. Unfold the tripod legs to the extent of the chain. Do not fully extend the tripods legs yet.

The tripod legs will extend to approximately twice the in case length. Be sure to secure the extension lock on the side of each of the tripods legs. The holes in the tripod mounting foot are for securing the tripod mount kit.

3.23) Leveling PortLog

If the PortLog has not been downgraded, the tripod will be used to level it. There is a bubble level attached to the base of the tripod. The tripod base should be leveled so that the bubble on the level is within the circle. Push down and rotate until the support mast engages the base alignment pin. The tripod's mounting mast has a small screw that should be now facing South.

3.24) Solar Panel and Solar Radiation Sensor Assembly Setup

1. Slide the solar panel and solar radiation sensor assembly over the front cover. The assembly slides down over the cover and stops just above the receptacle.

2. Plug the black twist lock connector into the receptacle. Be sure to twist the connector collar until it locks into place. The thumbscrew attaches the solar panel assembly ball chain to the logger housing.

This Figure shows the assembled PortLog on the tripod mount, with the chain fully extended. The insert shows the Solar Panel Solar Radiation Sensor connector and the tie down chain. Remove the thumb screw to install the chain.

With temperature above 20 °C and the logger in sleep mode, the battery will operate the logger for at least 60 days without sun. Also note that battery capacity diminishes with lower temperatures. RainWise recommends the battery be charged overnight before the logger is deployed. For cold temperatures and/or long deployment, correct solar panel adjustment is important.

In the **Northern Hemisphere**, face the solar panel south. For **Southern Hemisphere** deployment, face the solar panel north. There is a software command {"H"} to set the wind direction for southern hemisphere deployment. (Refer to Section 8.3)

3.25) Solar Panel Latitude Adjustment

Solar panel latitude adjustment is to ensure the solar panel is perpendicular to the sun's rays at noon. There are five holes arranged around the panel pivot allowing angles of 15, 30, 45, 60, 75 and 90 as measured from horizontal.

Site Latitude North or South	Panel Angle from Horizontal	Panel Angle from Vertical
0° to 4°	10°	80°
5° to 20°	Latitude +5°	90°- Latitude +5°
21° to 45°	Latitude +10°	90°- Latitude +10°
45° to 65°	Latitude + 15°	90°- Latitude +15°
65° to 75°	80°	10°

Table of rough latitude tilt angle as measured from horizontal and vertical for the winter

Panel Angle from Horizontal	Hole Number
15°	1
30°	2
45°	4
60°	2
75°	3
90°	5

Table of hole numbers and corresponding angles.

Picture of Hole Numbers

Low angle: The solar panel angle for this setting is for high latitudes i.e. latitudes located close to the poles.

High angle: The figure shows the panel set at 15 degrees from horizontal. This angle is for low

4) Software Setup

4.1) Initial Logger Setup

The on/off switch and serial port connector are on the bottom of the PortLog housing. The illustration below shows the bottom view of the sensor assembly. To power up the PortLog, flip the toggle switch to the "ON" position. Without the serial port cable attached, the LED on the bottom center will remain on for less than one minute and blink every two seconds. This is the normal logging mode. When the serial port circular connector is attached, the logger will exit its power saving mode and the LED will be on. **The serial port cable must not be left connected for extended periods.**

Portlog Enclosure Bottom: This figure shows the power switch, RS232 port and Indicating LED. For power on, the toggle switch is set towards the solar panel as shown. In the normal operating mode, the RED LED blinks every two seconds. The Blue cap covers the RS232 port. When the RS232 cable is installed AND connected to a PC the PortLog wakes from the sleep mode. The RED LED will be on. The battery charging cable also attaches to the RS232 receptacle.

1. Flip the toggle switch to the "ON" position. The LED will illuminate.

2. Connect the serial cable to the PortLog. Connect the DB-9 serial connector to a computer.

3. Run the provided WLcom software and connect to the comm. port.

4. The clock and logging interval can be set and the RAM cleared. Refer to Section 8.2 for the relationship between the logging interval and number of logging days.

5. The PortLog should always be deployed with a fully charged battery. Verify that the battery voltage is higher than 6V. The battery voltage can be viewed using the WLcom software (Section 6.0). An excessively low battery could result in data loss.

6. Disconnect the serial cable from the PortLog.

4.2)   Setting the Barometer

The barometer in the PortLog reports absolute pressure. The readings can be adjusted to compensate for elevation if necessary.

1. Using the Wlcom Data Retrieval Software, open the Command Mode Window.

2. Type a " : " followed by a " B" and the current corrected pressure.

   a. For PortLog with measurement units set to metric, the pressure is entered in millibars to the nearest tenth, for example ":B1000.0". The decimal point is included.

   b. For PortLog set to English units enter the current pressure in inches of Mercury, for example ":B30.00".

   c. Setting the pressure to zero in either unit system, removes the offset and the Portlog reports absolute pressure.

5)   Verification of Deployment

The PortLog has an RS-232 serial port for direct connection to a computer. The data may be accessed by use of the WLcom program provided with the unit, or any terminal program can be used.

The PortLog transmits data at 9600 baud, with 8 data bits, 1 stop bit, and no parity. A 6 foot data cable is provided that will connect the PortLog to a standard DB-9 male PC serial port.

1. Connect the serial cable from the serial plug receptacle on the bottom of the PortLog to a serial port on the computer. Within two seconds, the LED will be on.

2. The PortLog is ready to communicate with the PC. The PC must assert the DTR RS232 signal in order for the PortLog to awaken.

The same receptacle is used for battery charging with the supplied cable and charger.

6) WLcom Data Retrieval Software Overview

WLcom is a Windows compatible software program that automates the process of transferring data from the remote unit to a computer. This software will link to the remote unit via a direct cable, telephone modem, or radio modem, depending on the system configuration.

6.1) Installation

The WLcom program is provided on a CD.

1. To install the software on a PC run "setup.exe" on the disk. This is done by selecting "Run.." from the "Start" button.

2. Enter the following string "A:\setup.exe" assuming the drive is designated as the "A" drive. Follow the on screen instructions to complete the installation.

By default the program will be installed in the following folder "Programs/Rainwise/Wlcom".

6.2) Starting the Program

1. Connect the serial cable to a free port on the PC and start the WLcom program.

2. Click the "Auto Detect" button and the system will scan all the ports until it finds the weather station.

3. Once the station is found the real-time data will be displayed.

6.3) Editing the Item Descriptions

1. To edit item descriptions select "Edit Descriptions" from the "Edit Menu". All the items can be edited.

2. If the weather station has a wind sensor then the wind rose can be enabled by selecting enable and entering the item numbers for wind speed and direction.

6.4) Command Mode Window

The command mode window is an ASCII Terminal. Commands can be sent to the device by typing the appropriate commands– refer to **SERIAL COMMAND FORMAT**. The window shows both sent and received data.

To see the current data type ':' followed by 'D' the unit will respond with a string giving current conditions.

Setting the logging interval must be done in the Command Mode Window.

7) Using Weather Station Data Files with other PC Software

The data collected by RainWise loggers can be imported into most spreadsheet, graphing, and data base programs for analysis and formatted output. The RainWise data is saved as a comma delimited ASCII file (.csv). This basic format is acceptable by the import function of many programs.

Comma Delimited Files (*.csv) are directly supported by Microsoft Excel.

7.1) Opening a data file in Excel

1. Start Excel and select File Open from the main menu.

2. Select "Text Files (*.prn;*.txt;*csv)" in the types of files drop down list in the Open dialog window.

3. Select the data file and click open. Comma Delimited files do not support formatting or graphs, so it is advised that you save changes in Excel format (*.xls);

Note: All programs mentioned are copyright by or are registered trademarks of their respective developers.

8)   Data Format Sheet

This data sheet describes the order and format of data that will be supplied from your system. The data is saved in ASCII text format. The time and date items are in quotation marks, items are separated by commas, and each data record ends with a carriage-return and line-feed character. This format can be directly imported by most spreadsheet and data base programs.

Order of Data Items:

- Date (Month/Day/Year, in quotation marks)

- Time (Hour:Minute in quotation marks)

- Temperature (degrees F, degrees C)

- Humidity (percent)

- Barometer (inches of Hg., mb (hPa))

- Wind Direction (Compass Degrees)

- Wind Speed (miles per hour, kilometers per hour, Knots, meters per sec.)

- Wind Speed Maximum (miles per hour, kilometers per hour, Knots, meters per sec.)

- Solar Radiation (Watts/m^2)

- Solar Energy (J/m^2)

- Rainfall (inches, millimeters)

- Battery Status (1=ok, 0= supply volts less than 4.75)

- Units (0=English & mph, 1=English & knts, 2=metric & mps, 3=metric & kph, 4=metric & knts)

- Checksum (An exclamation point(!) followed by three digits, 000 to 255)

Header and sample for RAM data:

DATE,TIME,T_AIR,HUM,DEW,BARO,WDIR,WSPD,WS_MAX,SRAD,SR_SUM,RAINF,BATT,UNITS,

CKSUM <cr><lf>

"04/05/94","16:17",078,029,043,29.92,270,010,015,0760,1.066E04,1.50,1,0.!xxx <cr><lf>

8.1) Data

The temperature, barometer, humidity and solar radiation data are sampled at the data save interval. The wind direction and speed are sampled every two seconds and averaged over the data save interval. The rainfall and wind speed max data are captured during the data save interval and reset after saving. When the battery voltage is less than 5.05 volts, the logger will NOT save to RAM.

Battery Life: The battery alone with no solar panel connected will operate the PortLog for over 25 days. About 1 hour at 160 milliamperes is required to replace the energy removed for one day of operation. The Solar Panel is configured to charge the battery when the PortLog is not powered up. In addition, a separate Battery charger is provided. **The charger and the serial cable connect at the same connector and may not be used at the same time.** The real time clock uses a capacitor for backup and will operate for 8 days without power.

8.2) RAM Capacity

The PortLog has 5 different options of RAM which will hold the logged records. You can find what size of RAM that was installed on your PortLog by using any communications or terminal emulator software that uses ASCII characters. The communications protocol is described in Section 8.3: "Serial Command Format", a command ".V" will give you the size of RAM.

The table below shows the maximum amount of time the PortLog can log data before its RAM will fill up.

Size of RAM	Maximum number of Records
128k	4672
256k	9344
512k	18688
1M	37376
2M	74752

The maximum recording time depends on the logging interval. The table below shows the logging interval and the number of days until the RAM is full. When the RAM fills, recording stops until the RAM is cleared so that the first data is preserved.

Logging Interval (Mins)	128k Logging Time (Days)	256k Logging Time (Days)	512k Logging Time (Days)	1M Logging Time (Days)	2M Logging Time (Days)
1	4	8	16	32	64
5	17	34	68	136	272
10	33	66	132	264	528
20	66	132	264	528	1056
30	97	194	388	776	1552
60	194	388	776	1552	3104

8.3)   Serial Command Format test

The following list is command structure for communicating with the PortLog. Any communications or terminal emulator software can be used to read data from the PortLog. The host computer communicates with the logger by sending simple ASCII text commands and receiving ASCII text data.

The host computer begins a command by sending a colon character (**:**) to the logger. The unit will respond with a greater-than character (**>**). The host then sends a single command letter from the list below. The logger will respond with a question mark (**?**) if it receives an unknown command letter.

A   Output the altitude setting in feet or meters.

B   Barometer altitude correction: After typing B, send the adjusted pressure in either inches of mercury or millibars followed by a carriage return line feed (<ENTER>). For PortLog with measurement units set to metric, the pressure is entered in millibars to the nearest tenth, for example **":B1000.0"**. The decimal point is included. For PortLog set to English units enter the current pressure to the nearest 100th inches of Mercury, for example **":B30.00"**. Setting the pressure to zero in either unit system, removes the offset and the Portlog reports absolute pressure.

C   Clear data RAM. All stored data is erased. The logger responds with OK.

D   Dump current data. The PortLog responds with the a single line of data as shown in the "Header and Sample for RAM data" plus the battery voltage and a number which indicates the selected units.

H   Selects the current hemisphere. The command returns either a **N** or a **S** to indicate which hemisphere is currently selected. The value will alternate each time the command is issued.

I   Increment the RAM recording interval. The logger selects the next interval and outputs it.

K   Set the data logger's clock. After the K, send the date and time to the logger as YYMMDDhhmm<cr>. For example, **:K0406031534<Enter>** sets the logger's clock for June 3, 2004, at 3:34 PM. The logger will respond "OK" if it receives 10 digits after the K, or "Clock not set." if any other character is received. Use the **:D** command to verify that the time and date were set properly.

L   Output RAM recording interval. The logger responds with the logging interval in minutes.

O   Output stored data. The output begins with a text header, and then is one record of data per line. The output ends with "OK". Each data line has the format shown on the "Data Format Sheet"

Q   Query RAM. The data logger responds with the number of records stored.

U   Outputs the current units.

V   Changes the current unit setting and outputs the current units.

.V   Outputs version information and RAM size

@   Toggle memory wrapping, if wrapping is enabled then the PortLog will begin to overwrite old records once the memory is full. When turned off logging will stop when the memory is full. By default wrapping is not enabled.

!   In the case of a bad record count error during download from the PortLog, you can dump the memory and the software will sort the memory packets that are good. After you enter the command, it will say "Next download will dump memory". You may now close the window and select download to initiate the process.

For Computers equipped with Windows, "HyperTerminal" can be used with this command set from Section 8.3) Serial Command Format

1. To begin select "HyperTerminal" under the accessories menu.

2. Click on "hypertrm.exe".

3. Enter name for the connection.

4. Enter phone number.

5. In the last entry on this screen, select "Direct to Com1, or Com2." A screen for Com1 (or Com2) settings should be set as 9600 bits per sec, 8 data bits , no parity , 1 stop bit, no flow control.

6. Click on "Apply". Commands can be directly entered on the screen.

7. To save data from the PortLog, click on "Transfer" and then on "Capture Text". Type in the same of the file, and the ":" followed by the "O" command after the ">" character is sent.

8. When the data stops appearing access the screen, click on "Transfer" and then "Stop". This forces the buffer to be emptied and sent to the file. The data is now read to be imported into a spread sheet.

9)   Product Support

Product support can be found on Rainwise.com at the bottom of your products web page. Documents are available here along with frequently asked questions. If your support inquiry is not resolved by troubleshooting or our product support, you may wish to contact RainWise.
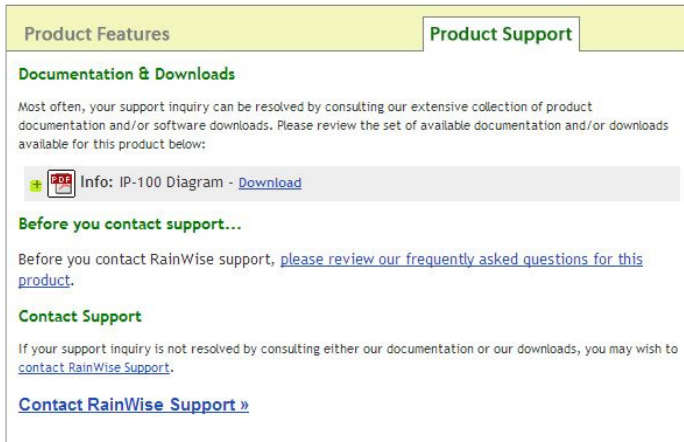
10)   Contact Information

RainWise Inc.

23 Creek Circle, Boothwyn, PA 19061

Phone: (207) 288-5169

Toll Free: (800) 762-5723

Online: http://www.rainwise.com/

Contact Form: http://www.rainwise.com/about/contact

11)   Warranty

RainWise, Inc. warrants RainWise, Inc. manufactured PortLog products against defects in materials and/or workmanship for a period of **2** years from the date of purchase and agrees to repair or replace any defective product without charge. Equipment supplied by RainWise but not manufactured by RainWise is covered by the particular warranty of that manufacturer.

IMPORTANT: This warranty does not cover damages resulting from accident, misuse or abuse, lack of reasonable care, the fixing of any attachment not provided with the product or damage due to a lightning strike. RainWise, Inc. will not reimburse for take-down or installation charges. RainWise, Inc. will not pay for warranty service performed by a non-authorized repair service and will not reimburse the consumer for damage resulting from warranty service performed by a non-authorized repair service. No responsibility is assumed for any special, incidental or consequential damages.

To return a unit under this warranty, call (800)762-5723 within the continental US or (207)288-5169. The service department will document the need for repair/replacement and arrange such. Shipping costs from the customer to RainWise are borne by the customer, RainWise will cover return shipment.   It is the customer's responsibility to see that the unit is properly packed, preferably in the original box, because damage occurring during return shipment is not covered by this warranty.

NOTE: No other warranty, written or oral, is authorized by RainWise, Inc. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. Some states do not allow the exclusion of limitation of incidental or consequential damages, so the above exclusion and limitations may not apply to you.