Instruction Manual

RainLog™ 2.0

10/10/13

Rev.0

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CONVENTIONS USED

WARNING
Warnings tell you about conditions or actions that could result in personal injury or loss of life. A qualifier (e.g. High Leakage Current) may follow the warning title.

CAUTION
Cautions tell you about conditions or actions that could result in damage to the inverter or other equipment. A qualifier (e.g. Inverter Damage) may follow the warning title.

NOTE
Notes tell you about things which are important for you to know but not as serious as cautions or warnings.

The RainLog™ 2.0 is the ideal solution for monitoring rainfall amounts in remote locations. When used in conjunction with a precipitation gauge or rain gauge the system constitutes a complete stand-alone measuring and recording system. It can be left in the field for months or even years of uninterrupted data logging due to its large memory and low power consumption.

The RainLog™ 2.0 is supplied with the RL-Loader™ software. This software is free, user friendly, and intuitive. It allows the user to view the data graphically and export it to any third party software.

PRODUCT COMPONENTS

When unpacking the system the following components should be located.

Product Components:

A.   RainLog 2.0

B.   USB Cable

C.   2 x AAA Batteries

D.   RL-Loader™   CD-ROM

E.   Universal Connector

F.   Quick Start Guide

G.   Desiccant Bag

If the system was ordered with any accessories, they should be located while unpacking the system.

Optional accessories and sensors:

The RainLog™ may be supplied with or without a rain collector. This will depend on the product and package that was purchased.

If any of the components are missing, RainWise Inc. should be contacted.

INSTALLATION

The RainLog™ must be configured and installed correctly to ensure accurate reliable operation. This process involves installing batteries, software and USB drivers. Once configured the RainLog™ must be correctly installed inside the rain collector.

THE BATTERIES

The RainLog™ requires two 1.5V AAA batteries. Common Alkaline batteries maybe used, but, Lithium batteries are recommended. Lithium batteries will power the RainLog™ longer and will allow the device to operate at temperatures down to -40°C and up to 60°.

The batteries should last for 12 months or more but due to differences in battery quality and fluctuations in seasonal weather it is suggested that they be replaced every 6-9 months. If you are downloading on a regular basis, watch the battery voltage on the RainLog™ and replace the batteries when the LED flashes red.

The battery compartment is located on the bottom side of the RainLog™. Slide the cover off to access the battery compartment and follow the pictorial directions on the inside to correctly orientating the batteries. Once the batteries are installed the LED indicator on the side of the enclosure will start to blink green. On first power up the LED will blink rapidly, after this power up sequence the LED will blink green once every 5 seconds.

The battery configuration used by the RainLog™ allows you to replace old batteries in the field without disrupting power.

Please see section "Changing Batteries" for complete instructions on changing batteries.

WARNING
Ensure that the batteries are installed correctly in order to avoid injury or damage to the equipment.

INSTALLING THE PC SOFTWARE & USB DRIVERS

 The RainLog™ must be configured prior to using it for the first time. This is done by connecting it to a PC and using the RL-Loader™ software provided with the unit. A USB cable is provided to connect the RainLog™ to a computer. A CD-ROM is provided with the RainLog. ***Do not connect the USB cable to the computer or the RainLog™ before installing the USB drivers.***

Please follow the directions below in sequence.

1. Insert the CD and allow the auto start program "CD_startup.exe" to load. You should see a window with buttons to install the USB drivers and RL-Loader™ software.

2. Install the USB drivers. Follow the on screen prompts.

3. Install RL-Loader™. Follow the on screen prompts.

4. Connect the USB cable to the RainLog™ and PC. It may take Windows a few seconds to locate and install the virtual comport for the RainLog. Monitor the taskbar at the bottom right of your screen.

This completes the installation of the USB drivers and software. You can view a digital copy of both the 'Quick Start' and 'User Manuals' for the RainLog™ .

CONFIGURING THE RAINLOG

With the RainLog™ connected to the PC with the USB cable, run the RL-Loader™ software.

1. From the 'Settings' menu on the top tool bar, select the appropriate type of collector. The 0.254 mm/tip setting is the metric equivalent of the standard 0.01 in/tip collector. The default setting of 0.01" is typical for most RainWise gauges.

2. Verify that the "RainLog 2.0 (USB)" is selected in the 'Settings\Logger Version' menu.

3. Connect to the RainLog™ by clicking the 'Auto Detect' button ![icon] or select 'Auto Detect' from the 'Logger' menu. RL-Loader™ will begin scanning available ports for the RainLog. If the RainLog™ is not found you may need to use the Manual Connect option. This does require knowing which com port number has been assigned to the RainLog.

4. Once connected, the 'Device Info' window will show the status of the RainLog. Click the 'Set Logger Clock" button ![icon] or select 'Set Clock' from the 'Logger' menu. The RainLog's clock and calendar will be set to match the PC.

5. You may assign the RainLog™ a unique ID. This ID helps manage data from multiple RainLogs. Click the 'Set ID' button ![ID icon] or select 'Set ID' from the 'Logger' menu. Enter a name when prompted. The 'Device Info" window will update.

6. Clear the RainLog's memory by clicking the 'Clear Ram' button ![icon] or select 'Clear Ram' from the 'Logger' menu.

7. Check the battery voltage in the Device Info window. Fresh batteries should give a reading of 1.5V or higher. A low battery warning is generated at 1.2V.

8. Close the RL-Loader™ application and disconnect the RainLog. Verify that the green LED on the logger is flashing at regular intervals.

The logger is now configured and ready to be connected to the rain gauge.

CONNECTING TO A RAIN GAUGE

The RainLog™ can be used with most tipping bucket rain gauges. This manual covers several RainWise gauges. A universal connector is included to connect to older RainWise gauges and other 3rd party gauges.

RAINEW™ RAIN GAUGES (INCLUDING RAINLOGGER™ & RAINLOG™/RAINEW™)

1. Loosen the 4 screws securing the top of the collector to its base. Twist the collector top counter clockwise to free the tabs. Lift the top off and set it aside.

2. Remove the blue cap on the base and carefully pull the connector out of the tube. *Note: If you have a red or white connector you will need to change the connector using the universal connector provided. Refer to the Universal Connector section below.*

3. Connect the RainLog™ to the connector and place the RainLog™ inside the tube.
   Place the desiccant pack in the tube with the RainLog.
   Replace the blue cover.

4. Re-attach the collector top and tighten the four screws.

RGA AND PGH RAIN GAUGES

RainWise RGA and PGH gauges are provided with various custom configurations. Please refer to the RGA/PGH instructions for connection details.

OTHER GAUGES

The RainLog™ input requires a non-voltage contact closure to operate. The contact closure should be approximately 100 ms in length and should not have excessive contact bounce (< 10 ms).

The following counts per tip inputs are supported:

- 0.01" (0.254 mm)

- 0.1 mm

- 0.2 mm

- 0.5 mm

The universal connector supplied with the RainLog™ can be used to connect to existing rain gauge reed switch wires. Refer to the Universal Connector section below.

The RainLog™ must be housed in a waterproof enclosure; it must be kept dry. It is also recommended that a desiccant pack be included in the enclosure as an added precaution.

Water damaged loggers used in 3rd party gauges are not covered by the Rainwise warranty.

UNIVERSAL CONNECTOR

A universal connector is supplied with each RainLog. This connector is very easy to install and doesn't require tools. The connector supports wire gauges between 22 and 24 AWG.

Make sure that the collector wires are equal in length and that the insulation has not been stripped.
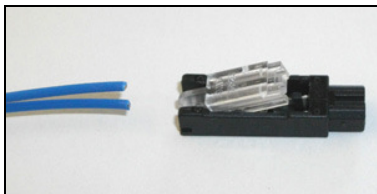
Pry the hinge connector up using a small screwdriver.
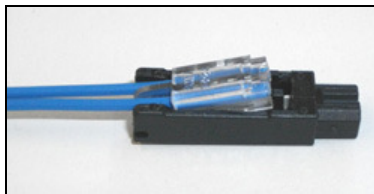
Insert the wires stopping at the end of the clear plastic.

Press the clear hinge down firmly (some force required).

OPERATION

The RainLog™ continually monitors for rainfall events. Rainfall data records are recorded with a one-minute resolution. If rainfall occurs during a given minute the logger will save that minute's rainfall to the flash memory. If no rainfall occurs during a minute nothing is saved. In this way only actual rainfall events are recorded thereby saving on memory space.
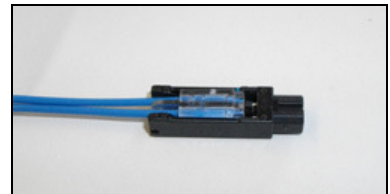
REAL-TIME CLOCK

It is important to note that the clock in the RainLog™ is dependent on the primary batteries. If power is lost due to drained batteries or faulty battery exchange, the clock will reset back to its default time and date of January 1st 2011.

USB

The RainLog™ incorporates a FTDI USB serial bridge interface. The supplied drivers create a virtual com port on the host computer. <u>It is important to note that the driver will create a new com port if the RainLog™ is plugged into a different USB port on the computer.</u> The computer's Device Manager will indicate what comport number has been assigned to the RainLog. This is only available when the logger is attached. You can open the Device Manger from the 'File' menu in RL-Loader™.

When USB is connects the RainLog™ to a PC, the RainLog™ will be powered via the USB and not from the batteries.

COUNTER INPUT

The RainLog 2.0 is designed to operate with a normally open contact closure. The two pin connector provides one input pin that is pulled to the RainLog supply rail through a resistor. The other pin is connected to the RainLog ground. An external switch closure shorts the two pin together. This causes the RainLog to register a count on the falling edge of the closure. The switch must be closed for a minimum of 10 milliseconds. The input does incorporate a denounce filter to eliminate counts caused by switch bounce.

Do not apply voltage to the RainLog counter inputs.

MEMORY

The RainLog™ is equipped with 2 MB of serial flash memory. This memory provides capacity for 298,422 data records. Storing only actual rainfall events maximizes the storage capacity.

Data stored in the flash memory is non-volatile and will be retained even if power is lost.

RL-LOADER™ SOFTWARE

NOTE: Please refer to the online help in RL-Loader™ for the latest software instructions. The instructions that follow may not be current.

OVERVIEW

RL-Loader™ is a Windows based application that was designed to easily extract and manage rainfall data collected by the RainLog™ data logger. Data can be viewed in a text or graphical format.

The basic methods for connecting and extracting data from the RainLog™ are covered in previous sections of this manual. Three primary windows are available in RL-Loader™: 'Device Info,' 'Text' and 'Graph.' The following sections explain each in detail.

THE DEVICE INFO WINDOW:

This window provides information about the status of the RainLog™ . The information displayed is only valid when a RainLog™ 2.0 is connected. The following information is presented:

Name: ID string (user configurable).

Status: Connection status, 'Connected' or 'Not Connected.'

Time: Device time.

Date: Device date.

Version: Device version.

Memory: Device memory size in kilobytes

Capacity: Amount of memory used.

Battery Voltage: Voltage of the batteries installed in the RainLog™

THE TEXT WINDOW:

The text window displays rainfall data in a sequential list. There are two modes, Event and Daily:

Event shows individual rainfall event records. This is the format used by the RainLog™. When data is downloaded from the RainLog™, a final entry is added that contains the current PC time/date with a 0 rainfall count. This is used to set the end of logging for reports and graphing.

Daily shows rainfall by the day and includes days when there was no rainfall. This data is computed from the event records. All graphs are based on the daily data. The first entry is based on the date when the unit was last cleared. This is assumed to be the start of logging. Error messages are appended to records

when there is a calculated date/time sequence error. All or part of the text data can be copied using the Windows Clipboard. Use the menu options under 'Edit' to select and copy data. Once the data is in the clipboard it can be pasted into any Windows application that supports cutting and pasting.

Important: Right click in the text window to get a pop-up menu that will allow you to copy, select and graph selected portions of data.

THE GRAPH WINDOW:

The Graph window provides a graphical representation of the Daily data in the Text window. By default, all of the data in the Daily text window is displayed. The graph can be customized to show different ranges.

To graph a specific range of data, select (highlight) the desired Daily data in the Text window. Right click your mouse and select Graph from the pop-up menu. The graph will update showing only the select data.

The graph can be copied and pasted into other applications. The graph is copied as a Windows Meta File image.

DOWNLOADING DATA

To download your data to your PC and access it through RL-Loader™, please follow these steps:

After removing the RainLog™ from the collector, connect it to a PC using the USB cable provided.

1. Run the RL-Loader™ application. Click the 'Auto Detect' button or select 'AutoDetect' from the 'Logger' menu.

2. Click the 'Download' button or select 'Download' from the 'Logger' menu. The text and graph windows will update once the download is complete.

3. The downloaded information should be saved to disk. Select 'Save As..' from the file menu. Select a meaningful file name and save the file. This file can be opened again at a later time. You also have the option of appending data to this file. This means that you can maintain one file per RainLog™ data logger.

WORKING WITH SAVED DATA

 Data from the RainLog™ can be saved to disk. The saved file can be loaded back into RL-Loader™ at any time for analysis and for creating reports. When saving data to file you can either create a new file or append the data to an existing file. Appending data is useful for keeping track of rainfall from one particular logger for extended periods. If you are working with multiple RainLogs, it is recommended that you save data to files using the same name as the loggers ID. This way it is easy to keep track of what data belongs to what logger. If you are using two RainLogs with one collector, give each RainLog™ a unique ID and save data to a common file. For Example, call the loggers 'City Hall 1' and 'City Hall 2.' Save the data to a common file 'City Hall.'

EXPORTING DATA

Data may be exported directly into Microsoft Excel. Excel must be installed on your computer for this feature to work.

Click the Export button or select Export from the File menu.
Data can be exported in three different ways:

Report by Day:
This will export daily rainfall totals into Excel. The range of data can be specified using the begin and end date selectors.

Report by Minute:
Data will be exported by minute. Minutes with zero rainfall will also be exported. Depending on the selected time span this method can create a very large spreadsheet. Excel is limited to 65535 rows which equates to approximately 45 days of one minute data. Before exporting, you will be prompted to first confirm that you wish to proceed. Second, you will be asked if you wish to remove inactive data. If you elect to use this inactive data removal feature, then all periods of 3 hours or more that had no rainfall will not be exported. The first rainfall record after this inactive period will be flagged with a comment "New rainfall event". The advantage of using this feature is the elimination of large portions of data that contain no rainfall while still maintaining true one minute resolution for each rainfall event.

Report Events:
This method exports one minute rainfall events without any padding. No zero rainfall records will be exported. This makes the output very compact and only contains relevant rainfall data. The downside to this method is that it makes graphing more difficult as the time interval is random.

Exporting Graphs:
Make sure that the graph window is the active window.
Copy the graph using the Copy button or click the right mouse button and select Copy.
The graph is copied as a Windows Meta File. This offers the advantage over the Bitmap format in that the object may be scaled in the destination application.
The graph can now be pasted into any application that supports wmf cutting and pasting (Microsoft Word).

MAINTENANCE AND SERVICE

CHANGING BATTERIES

It is possible to change the batteries without resetting the device and loosing the clock settings. This can be done by carefully replacing the batteries one at a time. Carefully removing one of the old batteries and replacing it with a new one. Do the same for the other battery. As long as there is at least one battery in the unit at all times it will continue to run. If the device does loose power and resets, the red indicator LED will flash quickly for 5 seconds. If this happens you must connect the RainLog™ to your computer and reset the clock. While the clock setting can be lost during power disruption, data stored in memory will not be lost.

Batteries should last in excess of 12 months for both Alkaline and Lithium. Alkaline voltage tends to slowly drop down with use. The voltage report in RL-Loader™ can be used as a reasonable gauge of the batteries health. Lithium batteries tend to hold their voltage throughout their life. The voltage will drop suddenly at the end of their lives. The RL-Loader™ voltage indicator is therefore not a reliable gauge of battery health with Lithium batteries. Due to the differences in battery types, quality, and environmental fluctuations, it is recommended that the batteries be replaced every 6-9 months as a precautionary measure.

FLASH MEMORY CAPACITY

The RainLog™ is equipped with 2MB of flash memory. This will provide many years of storage. It is recommended that the memory be cleared on a regularly after each successful download. Be sure that the data has been successfully downloaded and saved before clearing the memory.

REAL-TIME CLOCK

The RainLog's internal clock maintains time to an accuracy of +/- 1 minute per month. It is recommended that the clock be synced with a PC after each download.

The clock does not implement automatic daylight savings.

RAIN COLLECTOR (RAINEW & RAINLOGGER)

The rain collector must be kept free and clear of debris and dirty in order to maintain accuracy. Perform a visual inspection every time the RainLog™ is removed for download.

Verify that the rain collector is clean and that the drain hole in the center is not blocked.

A cleaning schedule will depend on the environment that the RainLog™ is used in. This could be anywhere from an annual cleaning to every month in extreme conditions.

Clean the rain collector by removing the cotter pin and screen and using warm soapy water to clean the collection area and inlet. The inlet may also be cleaned by using a Q-tip. Replace screen and cotter pin. Make sure that both legs of the cotter pin are bent up next to the plastic collector so that they don't interfere with the dipper.

TROUBLESHOOTING

THE COMPUTER DOESN'T DETECT THE RAINLOG

The RL-Loader™ connects to a PC using a virtual comport (VCP). The VCP driver creates a virtual comport for the RL-Loader™ software to connect to. It is critical that the driver is installed correctly and functioning. The first step is to connect the RainLog™ and check the Device Manger to see if the port has been created and what comport number has been assigned to it.
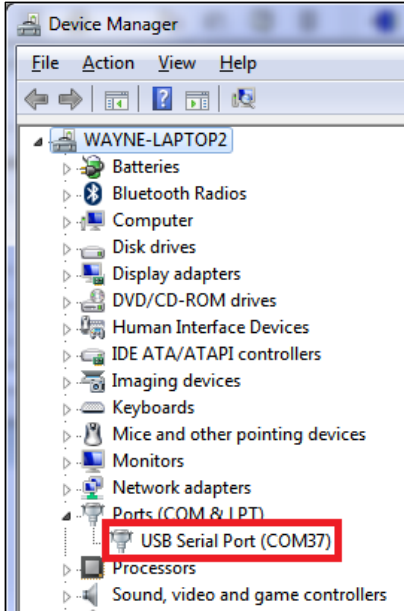
A shortcut to the device manager is provided in the File menu of RL-Loader™. The example on the left shows a RainLog™ connected on com port 37. A new number will be assigned for each USB port on the computer. New port numbers will also be generated if you have more than one RainLog. It is suggested that you use the same USB port each time as this makes it easier to track and RL-Loader™ will automatically try the last port number used.

If Auto Detect fails and the Device Manager indicates that the RainLog™ is present, try using the Manual connect. Use the port number displayed in the Device Manager.

The fact that a serial port is shown in the device manager does not necessarily indicate that RainLog™ is fully functional. The USB interface in RainLog™ can operate without a running processor in the RainLog. The flashing light on the RainLog™ indicates that the RainLog™ processor is operating.

THE RAINLOG™ IS NOT RECORDING RAINFALL

Verify that the rain collector is clean and that the drain hole in the center is not blocked. If you remove the screen, make sure that you bend the cotter pin legs back up when you reinstall it. Leaving the legs down will stop the tipping bucket from tipping.

If the collector is not blocked, verify that the RainLog™ can read the mechanism. Set the RainLog's clock and clear its memory using the RL-Loader™ application. Connect the RainLog™ to the tipping bucket and tip it by hand 5 times. Wait 1 minute and then download the data. A new record should appear with 5 counts. If no records appear, disconnect the RainLog™ from the collector and short the two rainfall input terminals on the RainLog™ with a small screwdriver several times. Wait 1 minute and download again. If you see new records, then there is likely a fault with the collector. A continued absence of records may indicate a RainLog™ failure. Contact Rainwise Support for further assistance.

SPECIFICATIONS

Power Specification:	Two 1.5V AAA Batteries
Battery Life:	> 12 Months Lithium
	>12 Months Alkaline (temperature dependent)
Clock Accuracy:	±1min/month
Communications:	USB 2.0
Maximum Input Frequency:	100 Hz
Minimum Pulse Width:	10 ms
Logging Interval	60 seconds

OPERATING ENVIRONMENT:

Temperature:	-40 ~ 60°C with Lithium Batteries
	-18 ~ 55°C with Alkaline Batteries
Humidity:	0 ~ 100% Non-Condensing

WARRANTY

RainWise, Inc. warrants this product against defects in materials and workmanship for a period of two (2) years from the date of purchase, and agrees to repair or replace any defective product without charge.

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

NOTE: This warranty gives you specific legal rights, and you may have other rights, which vary from state to state. Some states do not allow the exclusion of 'incidental or consequential damages' and so the above exclusions and limitations may not apply to you.

To return a unit under warranty contact RainWise or authorized Reseller for Return Authorization. To contact RainWise call 1-800-762-5723 within the continental US or internationally at (207) 288-5169.

IMPORTANT: Make sure equipment is properly packed - preferably in the original box. Damage incurred in shipping is not covered by this warranty.

CONTACT INFORMATION

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