

260-2103

User Manual

260-2103 Rain Logger with Display



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Receiving and Unpacking

Carefully unpack all components and compare to the packing list. Notify NovaLynx Corporation immediately concerning any discrepancy. Inspect equipment to detect any damage that may have occurred during shipment. In the event of damage, any claim for loss must be filed immediately with the carrier by the consignee. Damages to equipment sent via Parcel Post or UPS require the consignee to contact NovaLynx Corporation for instructions.

Returns

If equipment is to be returned to the factory for any reason, call NovaLynx between 8:00 a.m. and 4:00 p.m. Pacific Time to request a Return Authorization Number (RA#). Include with the returned equipment a description of the problem and the name, address, and daytime phone number of the sender. Carefully pack the equipment to prevent damage or additional damage during the return shipment. Call NovaLynx for packing instructions in the case of delicate or sensitive items. If packing facilities are not available take the equipment to the nearest Post Office, UPS, or other freight service and obtain assistance with the packaging. Please write the RA# on the outside of the box.

Warranty

NovaLynx Corporation warrants that its products are free from defects in material and workmanship under normal use and service for a period of one year from the date of shipment from the factory. NovaLynx Corporation's obligations under this warranty are limited to, at NovaLynx's option: (i) replacing; or (ii) repairing; any product determined to be defective. In no case shall NovaLynx Corporation's liability exceed product's original purchase price. This warranty does not apply to any equipment that has been repaired or altered, except by NovaLynx Corporation, or that has been subjected to misuse, negligence, or accident. It is expressly agreed that this warranty will be in lieu of all warranties of fitness and in lieu of the warranty of merchantability.

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1 FORWARD

Thank you for purchasing NovaLynx products. NovaLynx has been designing and manufacturing weather instruments since 1988. NovaLynx represents several well-known brands of quality manufacturers, including Gill Instruments, RM Young, Kipp & Zonen, and Vaisala. It is our hope that our products will meet all your monitoring requirements.

2 INTRODUCTION

The 260-2103 Rain Logger is a single-input event counter that is programmed to record rainfall measured by a tipping bucket rain gauge. Each tip is counted and time-stamped to provide a detailed rainfall history. Filters can be applied to totalize rainfall on an hourly, daily or weekly basis.


The 260-2103 is pre-configured to read rainfall in inches unless calibration in millimeters is requested at the time of order. Up to 84,650 events can be counted, equivalent to 846 inches of rainfall when connected to a tipping bucket rain gauge that is calibrated to 0.01" per tip. The logger can also be used with a digital output atmometer, which measures evapotranspiration. Another application is monitoring status, such as a switch that indicates when a door is opened.

NovaLynx offers an accessory kit (195-BHW-KIT) which includes HOBOWare® software on a CD and USB communications cable for connecting the logger to your computer. Users who already have a cable can obtain the software as a free download. The software is used to configure, launch, and read data from the logger. Saved files can be opened and graphed easily in HOBOWare®, or exported for use in a spreadsheet.

The logger is housed in a compact, waterproof case which may be mounted below the rain gauge, or inside the gauge (by request at the time of order). Another option is to extend the rain gauge cable and mount the logger indoors where the real-time display on the logger can be viewed conveniently.

The logger is powered by a replaceable battery that will last about 1 year. Data is stored in non-volatile memory, so that even if the battery fails the stored data can be recovered once the battery is replaced.

3 SPECIFICATIONS

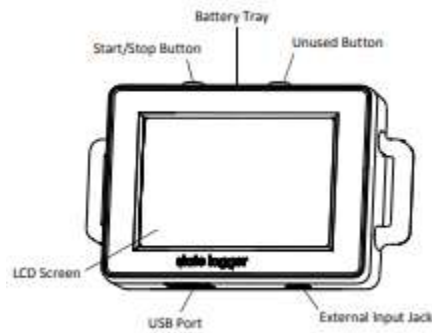
External input	
External dry contact input (6' input cable)	Electronic solid state switch or logic driven voltage output
Range	0-3 Vdc (USB powered), 0-2.5 Vdc (battery powered)
Maximum pulse frequency	50 Hz
Maximum state, event, runtime frequency	1 Hz
Pulse, event lockout time	0-1 second in 100 mS steps
Solid state switch closure	Input Low: < 10 K Ω ; Input High: > 500 K Ω
Internal weak pull-up	100 K Ω
Input impedance	Solid state switch closure: 100 K Ω pull up
Logger	
Resolution	Pulse: 1 pulse, Runtime: 1 second, State and Event: 1 State or Event
Logging rate	1 second to 18 hours, 12 minutes, 15 seconds
Time accuracy	± 1 minute per month at 25°C (77°F)
Battery type	CR-2032 Lithium, 3V
Battery life	1 year, typical with logging intervals greater than 1 minute and normally open contacts
Memory	128 KB (84,650 measurements, maximum)
Download type	USB 2.0 interface, USB mini-B connector
Download time	10 seconds for 128 KB
Temperature range: Logging	-20° to 70°C (-4° to 158°F); 0 to 95% RH (non-condensing)
Temperature range: Launch/readout	0° to 50°C (32° to 122°F) per USB specification
LCD	LCD is visible from: 0° to 50°C (32° to 122°F); the LCD may react slowly or go blank in temperatures outside this range
Size	3.66 x 5.94 x 1.52 cm (1.44 x 2.34 x 0.6 in.)
Weight	23 g (0.81 oz)
Environmental rating	IP50 (logger only)
	The CE Marking identifies this product as complying with all relevant directives in the European Union (EU)
Overall	
Size	2.7" x 4.3" x 1.3" (6.9 x 11.9 x 3.3 cm)
Weight	3.7 ounce (105 g)
Environmental	Waterproof enclosure

4 ORDER INFORMATION

260-2103	Rain Logger with Display
195-BHW-KIT	HOBOWare® software CD and 6' USB Mini-B cable (specify Windows or macOS)
260-2103RGI-2	Installation of Rain Logger in 260-2500 series rain gauge (non-heated)*
260-2103RGI-3	Installation of Rain Logger in 260-2501 rain gauge*

* Only available with purchase of both rain gauge and logger.

5 LOGGER COMPONENTS



Start/Stop Button: Not used in this application.

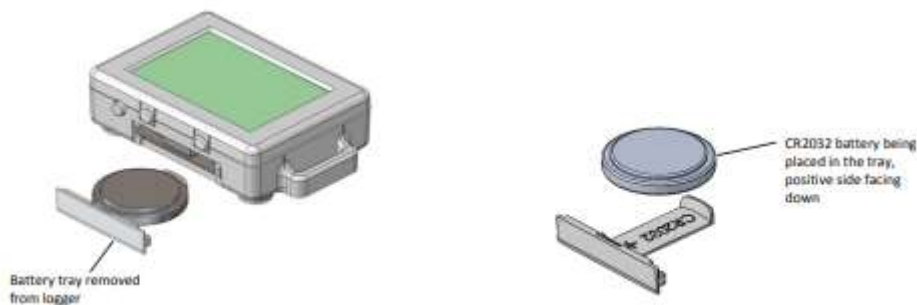
Battery Tray: Remove the battery tray on the top of the logger to access the logger battery (see Battery Replacement).

External Input Jack: Use this jack to attach the 2.5 mm input cable to an external sensing device.

USB Port: Use this port to connect the logger to the computer or the HOBO U-Shuttle via USB cable.

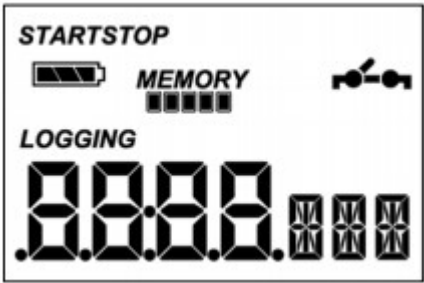
LCD Screen: This logger is equipped with an LCD screen that displays details about the current status.

6 BATTERY REPLACEMENT



1. Open the outer enclosure by lifting the latch on the side. Slide the foam carrier upwards and lift the logger out to access the battery tray on the logger.
2. Remove the old battery from the tray.
3. Place the new battery in the tray with the positive side facing down.
4. With the LCD screen still facing up, slide the tray back into the logger. The LCD should display "HOBO" briefly after correctly installing the battery.
5. Replace the logger in the foam carrier and slide the carrier into the outer enclosure.

7 DISPLAY FEATURES



NOTE:

- The display on a new logger will be blank until it is connected to a computer or a pulse is input by touching together the bare wires on the input cable. The display will turn off after uploading data if a pulse is not received within two hours.
- If the pulse count exceeds 9,999 or -999, a second decimal point will be illuminated on the LCD to indicate the count has surpassed the 4-digit display.

LCD Symbol	Description
START	Connect the logger to a computer to synchronize the time and start logging.
	The battery indicator shows the approximate battery power remaining.
MEMORY	If the logger has been configured to stop logging when memory fills, the memory bar indicates the approximate space remaining in the logger to record data. In this example, the logger memory is almost full.
MEMORY	If the logger has been configured to never stop logging (wrapping enabled), then a single block will blink starting at the left and moving right over time. Each block represents a segment of memory where the data is being recorded. In this example, the middle block is blinking.
	The switch is open or off.
	The switch is closed or on.
	The 260-2103 logger is configured to record event data.
LOGGING	The logger is currently logging.
Stop	The logger has been stopped.

8 OPERATION

The 260-2103 Rain Logger is pre-programmed for immediate use once it has been connected to your rain gauge. However, you may wish to install HOBOWare® on your computer and become familiar with the operation of your logger prior to installation. The default settings can be changed if needed and filters applied (to accumulate hourly data, for instance).

8.1 SOFTWARE INSTALLATION

HOBOWare® software is available to run on Windows or macOS machines. Please review the system requirements and choose the correct version for your computer. The software is on your CD (if you purchased 195-BHW-KIT), or available for download at:

<https://www.onsetcomp.com/hoboware-free-download/>

System Requirements:

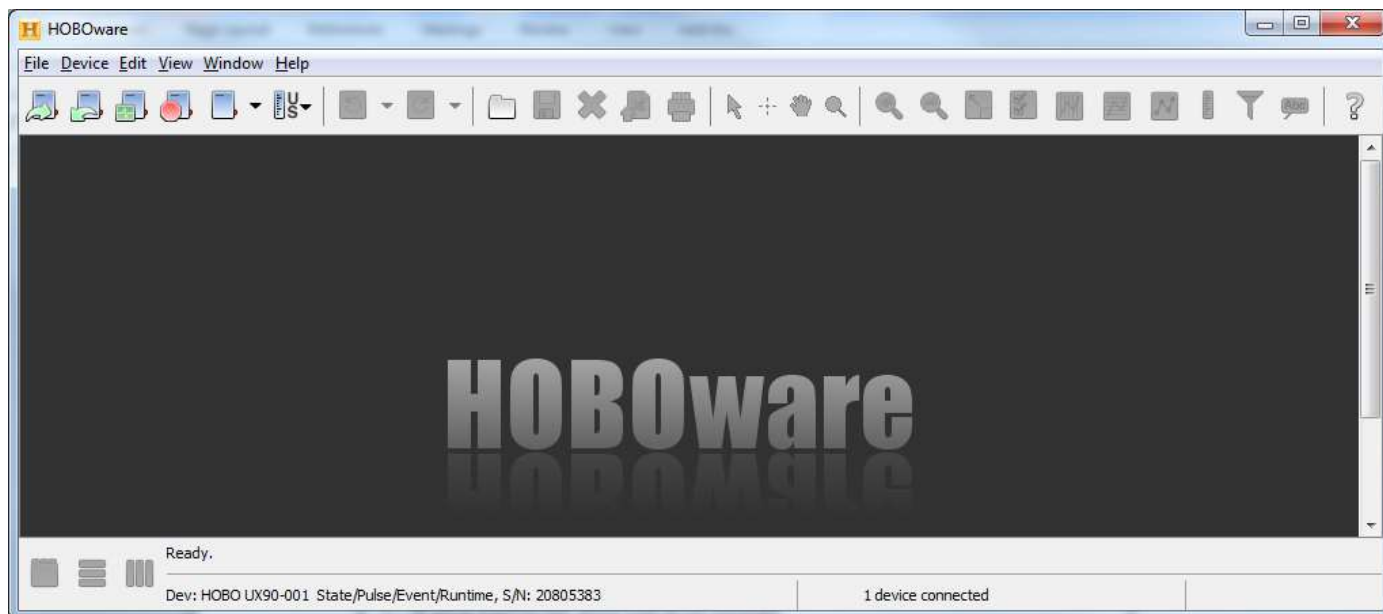
HOBOWare® 3.7.21 has some basic common System Requirements that are presented in the list below. If using HOBOWare® as the data collection server for a network of Indoor Wireless HOBOWare data nodes you may want to consider the configuration guidelines provided in the table. There are more detailed configuration recommendations available on the Onset Web site at <http://www.onsetcomp.com/tech-note/hoboware-performance>

- * PC: Windows 8 and 8.1 (Core, Pro), Windows 7 (Pro, Ultimate and Home Premium), Windows 10 (Home, Pro).
- * Mac: macOS Versions 10.12, 10.13, 10.14, and 10.15
While HOBOWare® may run using a previous version of OS X, those earlier versions of OS X are specifically no longer supported.
- * One of the following Internet browsers: The most recent version of Safari, Microsoft Internet Explorer, Microsoft Edge, Firefox or Google Chrome.
- * Minimum screen resolution of 1024x768. Recommended screen resolution of 1280x800 or greater particularly for non-English users.
- * 256+ colors
- * Processor Speed, Memory and Disk Space:

	High End	Mid Range	Low End	Lowest End
CPU	2.9 GHz dual core	2.0 GHz dual core	1.8 GHz single core	1.8 GHz single core
RAM	3 GB	2 GB	1.5 GB	1 GB
Disk Space (est.)	100 GB+	50 GB+	20 GB+	300 MB

8.2 COMPUTER CONNECTION

Install HOBOWare® on your computer prior to connecting the 260-2103 Rain Logger. Open the outer enclosure by lifting the latch on the side. It is not necessary to remove the logger from the enclosure. Plug the Mini-B end of your USB cable into the logger, and plug the other end into your computer. At the first usage it may take some time for the USB driver to install. Wait until the information bar (lower left) shows the logger is Ready. If the device does not appear after a minute or so, disconnect the logger, restart HOBOWare®, and reconnect the logger.



8.3 DEFAULT SETTINGS

Select Device / Launch to view the configuration of the logger. The following settings may be customized to your application.

NovaLynx Default Settings

Name	Rainfall
Sensor input / Type	External / Event
Label	Rain
Increment	0.01
Unit	Inches
LCD Unit	IN
Start Logging	Now
Stop Logging	When memory fills
Filters	None applied

NOTE: Special calibration is available (for metric rain gauges, for instance) if the request is made at the time of order. Following are typical settings for English and metric rain gauges.

Increment	Unit	LCD Unit	Note
0.01	inches	IN	Default setting
0.2, 0.25, 0.5 or 1	millimeter	MM	Metric rain gauge

Typical Setup for Rain Gauge Monitoring (0.01 in/tip)

Launch Logger

HOB0 UX90-001 State/Pulse/Event/Runtime

Name: Rainfall
 Serial Number: 20805383
 Deployment Number: 8
 Battery Level: 63 %

Sensors

Configure Sensors to Log:

	Measurement:	Label:	% or Time:
1) Internal: Runtime	State	<Enter label here>	open/closed
2) External: Event	Rainfall	Rain	0.01 INCHES

LCD: For Event sensor, show units IN

Deployment

Logging Interval: 1 minute
 Logging Duration: Event Dependent
 Start Logging: Now 09:01:03 AM
 Stop Logging: ☒ When memory fills ☐ Never (wrap when full)
☐ Push Button
☐ After 1 day
 Options: ☐ Turn LCD off

Help Cancel Start

After verifying that the logger is configured to match your rain gauge, you can either start the logger or set up filters to organize the data into convenient groups. Filters cannot be applied to data that has already been collected. New filters will be applied when the device is launched and collects new data.

Note: Pulse lockout has been set to 500 mS for rain gauge use. This setting is adjustable using the **Advanced** button.

8.4 FILTERS

There are two types of filters for use with pulse input sensors: 1) cumulative sum or 2) counter. The cumulative sum filter adds the value of each tip and reports the total at the end of a period of time such as hourly, daily, weekly or monthly. Cumulative sum filters save the effort of manually adding these totals from the raw data.

The counter filter simply reports the total counts (number of times the rain bucket tips) for a given interval. The data would need to be multiplied by the calibration factor of the rain gauge to convert to inches or millimeters of rain, so this is a less useful filter for rainfall monitoring.

At the end of each interval (hour, day, week, etc.) the cumulative sum or count is logged and the sum starts over at zero.

To set up filters, click the **Filters** button on the "Launch Logger" window. A new "Filter Series" window opens.

For each filter you wish to add, enter the parameters in the upper section of the window and then click the **Create New Series** button to save the filter into the lower section. Entries can be edited or deleted if needed. Be sure to enter a descriptive series name otherwise it will be difficult to interpret the data in the tables and charts that will be produced later.

Typical Filters for Rain Gauge Monitoring

The screenshot shows a window titled "Filter Series" with a close button (X) in the top right corner. The window is divided into two main sections. The top section is for configuring a new filter series. It includes a dropdown menu labeled "Select channel to filter:" with "2) Rainfall : Rain" selected. Below this, there are three dropdown menus: "Show the" with "Rainfall Cumulative Sum" selected, "in each" with "1" selected, and "interval" with "Month" selected. To the right of these is a "Start day" dropdown with "First data point" selected. Below these dropdowns is a text field labeled "Resultant Series Name:" containing the text "Cum. Sum: Rainfall - Monthly". To the right of this text field is a button labeled "Create New Series". The bottom section is titled "Filter Series" and contains a list box with four entries: "Cum. Sum: Rainfall - Hourly", "Cum. Sum: Rainfall - Daily", "Cum. Sum: Rainfall - Weekly", and "Cum. Sum: Rainfall - Monthly". To the right of the list box are two buttons: "Edit" and "Delete". At the bottom left of the window is a "Help" button, and at the bottom right is a "Done" button.

Click **Done** to close the "Filter Series" window.

8.5 LAUNCH

At the "Launch Logger" window, click **Start** to close that window and prepare the logger to operate.

Note that if the logger is not installed immediately, the display will go blank after a period of two hours. The display will turn on automatically when the first pulse is received on the external input.

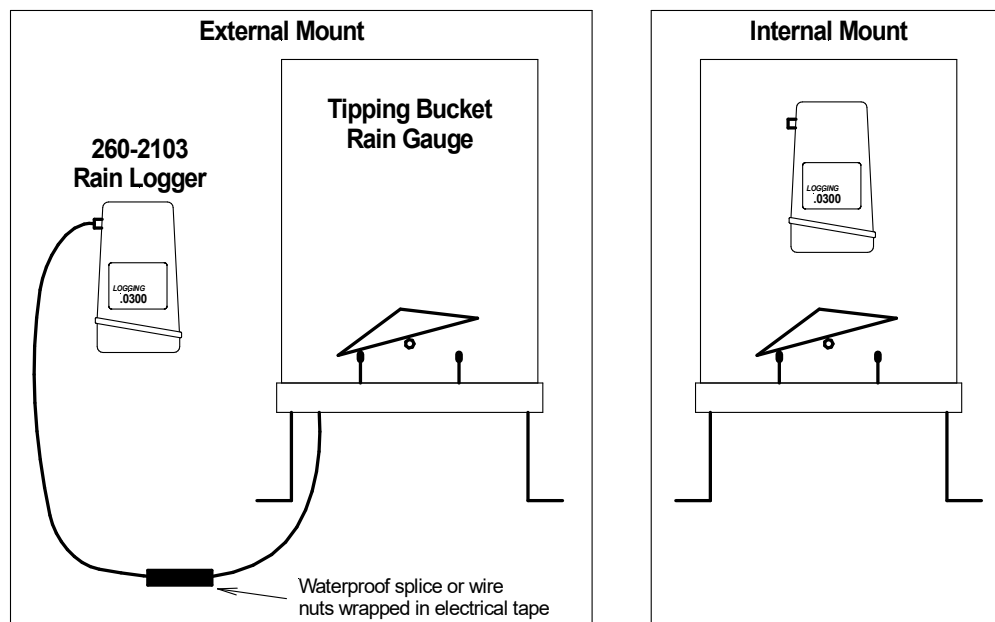
9 INSTALLATION

When ordered by itself, the 260-2103 Rain Logger is supplied with two feet of cable for connection to a tipping bucket rain gauge. Two wire nuts are included to make the attachment simple. Connect the black wire from the logger to the black wire on the rain gauge cable using one wire nut, and connect the white wire to the rain gauge's signal wire. Use electrician's tape (not supplied) to waterproof the connections. Note that most rain gauges have a simple dry contact switch so that polarity is not an issue.

When a rain gauge is ordered with the logger, the cable that comes with the rain gauge is normally terminated with a stereo plug. To connect the cable, slide the logger out of the enclosure, then pass the stereo plug through the cord grip and plug it into the receptacle on the logger.

The logger is shipped in the STOPPED mode. It must be connected to your computer and LAUNCHED using HOBOWare software. Once this is done, test the connection by tipping the bucket in the rain gauge while observing the LCD display on the logger. The display value should increase with every tip of the rain bucket.

Make a note of the count at the end of your test, in case you want to deduct it from your total after you collect the data from the logger. Or, to zero the counter, read out and re-launch the logger using a computer.



The waterproof enclosure of the Rain Logger can be mounted inside the cover of non-heated tipping bucket rain gauges so long as it does not interfere with the movement of the tipping bucket or disturb the flow of water.

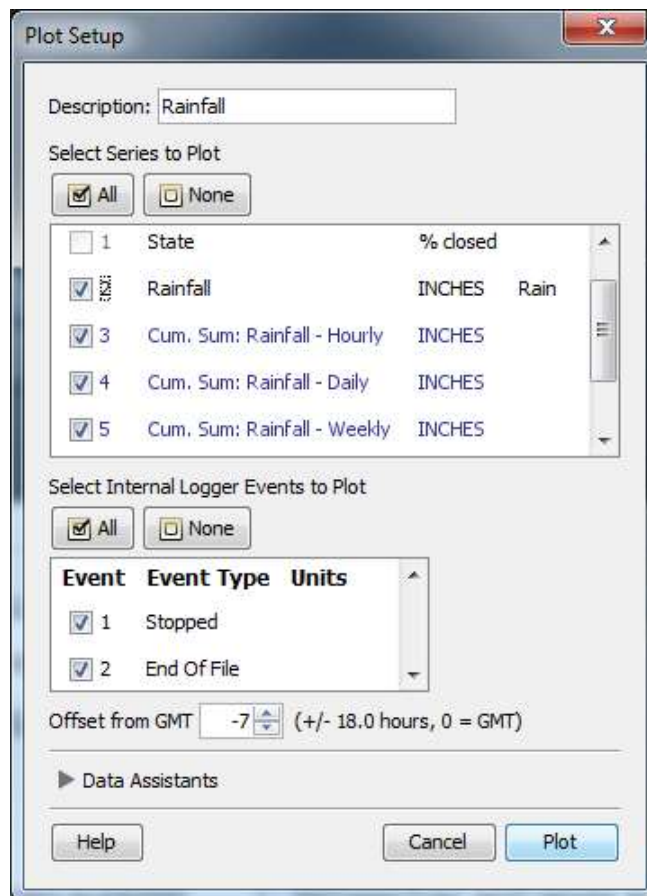
Add part number 260-2103RGI-2 (series 260-2500 gauges) or 260-2103RGI-3 (series 260-2501 gauges) to your order if you want the logger pre-installed inside your rain gauge. In this configuration, all wiring is internal to the rain gauge.

10 DATA READOUT

Refer to **Section 8 Operation** for instructions on installing HOBOWare® software.

Connect a Mini-B USB cable from the logger to your computer.

1. Confirm the logger is connected.
2. Select Device / Stop to make the logger stop logging.
3. Select Device / Readout
4. You will be prompted to enter a file name (or use the default file name) for the data.
5. At the "Plot Setup" dialog box, check the boxes for the data and filters you want to upload. In the example below, Item 2: Rainfall is the on-going record of all the tips of the rain bucket. Items 3 through 5 are the filters added to totalize the rainfall in increments of hours, days, and weeks.
6. Select which internal events you want to see in your data.
7. Set the **Offset from GMT** for your time zone.
8. Click **Plot** to download and view the data.
9. **IMPORTANT:** be sure to re-start your logger (Device / Launch) when you are done viewing your data.



11 DATA DISPLAY

Information from the logger is displayed in tabular and graphic form. The window for the graph can be resized by dragging the top bar of the graph window up or down.

Select the View menu to customize the display:

Details Pane

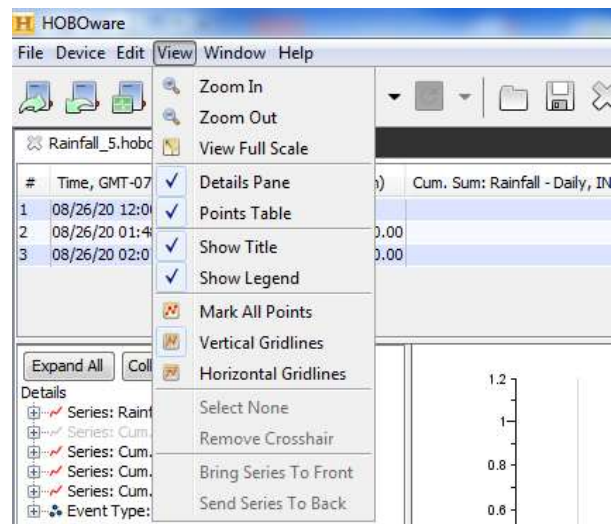
Displays the elements that are on the graph. Right-click on an element to either hide or delete it from the graph.

Points Table

Display or hide the tabular points table. When hidden, the graph fills the window for easier viewing.

Gridlines

Select Vertical or Horizontal gridlines, or none.



Use the File / Open dropdown to open additional previously logged files. A new tab will appear below the top banner. Switch between files by clicking on the tabs.

Export data to a .csv file which can be opened in a spreadsheet. Click the **Export Data** icon in the banner, then select the elements from the current file that you want to export.

There are many ways to present the data. Click the **?** icon to link to an on-line HOBOWare® guide.

