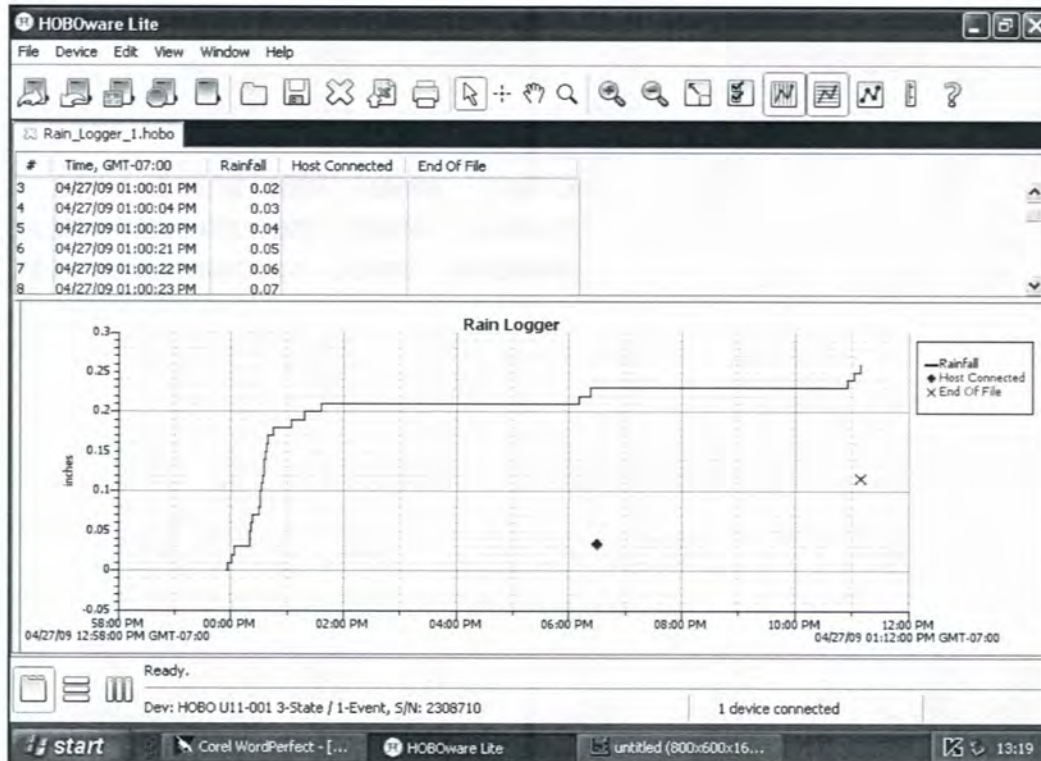


# NOVALYNX CORPORATION

## MODEL 260-2102 RAIN LOGGER

### INSTRUCTION MANUAL



REVISION DATE: 07/2010

## 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.

## Address

**NovaLynx Corporation**  
**4055 Grass Valley Highway, Suite 102**  
**Auburn, CA 95602**  
**Phone: (530) 823-7185**  
**Fax: (530) 823-8997**  
**E-mail: [nova@novalynx.com](mailto:nova@novalynx.com)**

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# NOVALYNX CORPORATION

## MODEL 260-2102 RAIN LOGGER

### INTRODUCTION

The Model 260-2102 Rain Logger is an event data logger that connects to standard tipping bucket rain gauges to provide detailed rainfall history. The data can be useful in a wide range of fields such as agriculture, forestry, hydrology, and climatology. This compact unit comes in a waterproof case and records the date and time of each bucket tip, along with the accumulated totals. The data is stored in nonvolatile EEPROM memory that retains collected data even if the battery fails. Direct USB connectivity provides fast data readout.

The 2102 runs for up to 1 year on a user-replaceable battery.

The Logger itself is Not Waterproof, It is placed inside a Waterproof Clear Case and the Input Cable is fed thru a waterproof strain relief.



**USB Cable Connection**

### **RAIN LOGGER in Waterproof Enclosure**

The 43,000 tip/event capacity can record up to 430" of rainfall between readouts at 0.01" per tip. A red light blinks every two seconds when the unit is logging.

For start up and readout, the 260-2102 connects easily to your PC using the 195-704BHW-LITE Starter Kit.

The starter kit includes software CD, a USB interface cable, and a manual.

The cable connects to an available USB port on your PC.

#### **Analysis functions for Event logger data:**

- Number of events
- Cumulative event totals
- Print preview

#### **Other Features**

- Offload logged data or check status while logging
- Print graphs
- Print preview

## Specifications

Event type: Relay contact opening (rain gauge tip)  
Event resolution: 0.5 seconds  
Minimum event duration: 20 microseconds  
Operating temperature: -20° to +70°C (-4° to +158°F)  
Timekeeping accuracy: ±1 minute per week at 20°C  
Capacity: 43,000 events  
Battery: CR-2032 lithium  
Waterproof Logger Case Size: 2.7" x 4.3" x 1.3"  
Translucent waterproof, durable ABS plastic

## Software for Windows® System Requirements

Microsoft Vista Business or Home Premium, Microsoft Windows XP Professional or Home Edition, or Windows 2000 Professional, Vista or Windows 7  
Sun Java Runtime Environment (JRE) version 1.4.2 or 1.5  
256 MB system RAM (512 MB recommended)  
3.5 MB free disk space after installing the Java Runtime Environment  
256 color, 800 x 600 display resolution ~ 1024 x 768 or greater recommended

## INSTALLATION

The Rain Logger is has 3 status channels and one Event Channel ( E )

The Event channel ( E ) is where the Rain Gauge will connect

the 3 status channels are Not Used for Rainfall measurements .

The Rain Logger detects each tip of the rain gauge, the 6 foot cable connected to its 2.5mm jack. The cable assembly is already attached to the logger, and the other end or the wire can be spliced for easy connection to your rain gauge.

### Connection to Tipping Bucket Rain Gauge

The **Black and White** tinned wires from the logger can be connected directly to the output of most tipping bucket rain gauges (polarity of input connection does not matter).

The Logger Cable has a 3<sup>rd</sup> Red wire inside, DO NOT Connect this wire to the Rain Gauge.

Use Only The Black and White wires coming from the logger.

The Rain Gauge Cable is Usually Black and Red .( Two Wire Nuts are included, to make a simple splice )

#### Typical Connection

{ Rain Gauge Cable } [ Splice ] { Logger Cable }

RAIN \*\*\*\*\* Red \*\*\*\*\* ## \*\*\*\*\* White \*\*\*\*\* RAIN  
GAUGE \*\*\*\*\* Black \*\*\*\*\* ## \*\*\*\*\* Black \*\*\*\*\* LOGGER



## 4.0 SOFTWARE

### Installation for 195-704BHW-LITE Software General Information, HOBOWARE Lite

**Quick Start ( Initial Test and Setup ) See the following ScreenShots for Information**  
**Follow this procedure to quickly get you Rain Logger connected and displaying data.**  
**Details on programmable options follow.**

**Launch Screen ..... Make changes as Necessary See Below .....**

Logger Type: HOBO U11-001 3-State / 1-Event  
 Serial Number: 9702359  
 Deployment Number: 2  
 Battery Level: 100 %  
 Description: 9702359

Event & State Channels:

S-2	Line 2	Line 2 Open	Line 2 Closed
S-3	Line 3	Line 3 Open	Line 3 Closed

Name: Event    Increment: 1    Units: units

Channels to Log:  1) Logger's Battery Voltage

Logging Interval: 12 Hr 0 Min 0 Sec

Logging Duration: Event Dependent

Launch Options:  
 Now: 06/29/10 12:44:27 PM GMT-07:00  
 At Interval: 06/30/10 12:00:00 AM GMT-07:00  
 Delayed:  6/29/10 01:00:00 PM GMT-07:00  
 Maximum delay: 194 Days 4 Hr 20 Min 15 Sec  
 Trigger:  Push Logger Button for 3 Seconds

Example ..... 0.01 inches  
 0.25 mm  
 0.20 mm  
 1.00 mm

**Typical Launch Screen for rainfall calibration at 0.01" per tip ->>>>**

**After cables are properly connected, select Launch... under Logger on the menu bar.**

Logger Type: HOBO U11-001 3-State / 1-Event  
 Serial Number: 2308710  
 Deployment Number: 4  
 Battery Level: 100 %  
 Description: Rain Logger

Event & State Channels:

S-2	Line 2	Line 2 Open	Line 2 Closed
S-3	Line 3	Line 3 Open	Line 3 Closed

Name: Rainfall    Increment: 0.01    Units: inches

Channels to Log:  1) Logger's Battery Voltage

Logging Interval: 0 Hr 0 Min 1 Sec

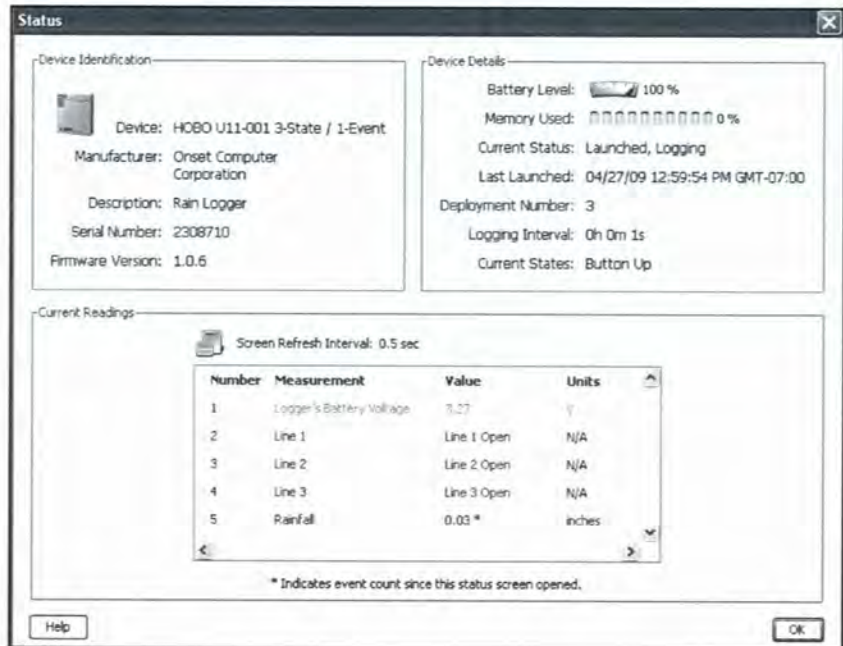
Logging Duration: Event Dependent

Launch Options:  
 Now: 04/27/09 01:07:21 PM GMT-07:00  
 At Interval: 04/27/09 01:07:21 PM GMT-07:00  
 Delayed:  4/27/09 02:00:00 PM GMT-07:00  
 Maximum delay: 194 Days 4 Hr 20 Min 15 Sec  
 Trigger:  Push Logger Button for 3 Seconds

Select **STATUS SCREEN**

Then Manually tip the bucket in the rain gauge 3 to 8 times.

You Will see the ( 5 ) Rainfall Value turn Green and Count each on these Tips



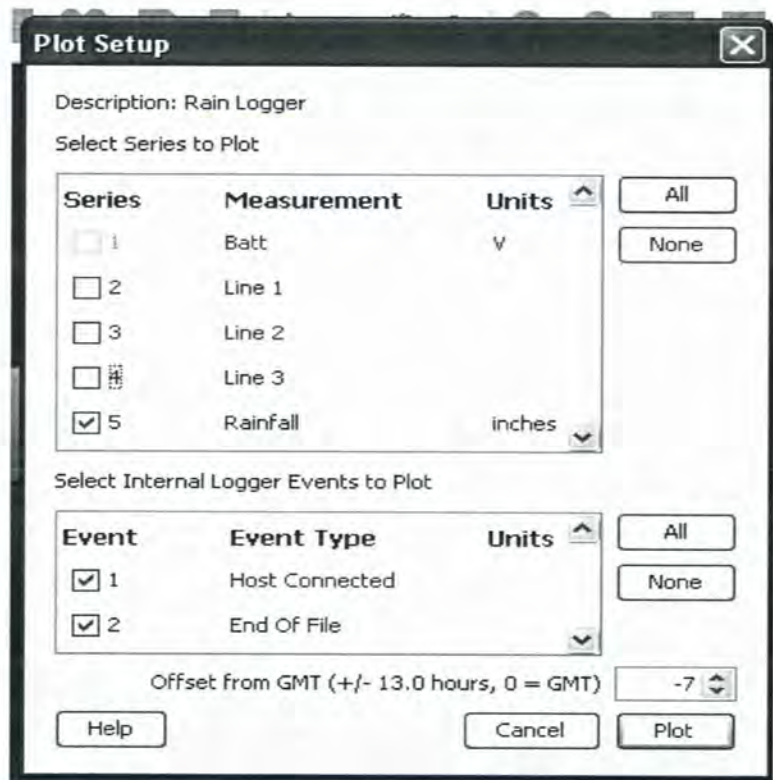
Wait a few seconds and select **Readout** under the Logger menu.

The data recorded by the logger will be offloaded and can be displayed on the screen as a table; You will be prompted to save the file.... after saving

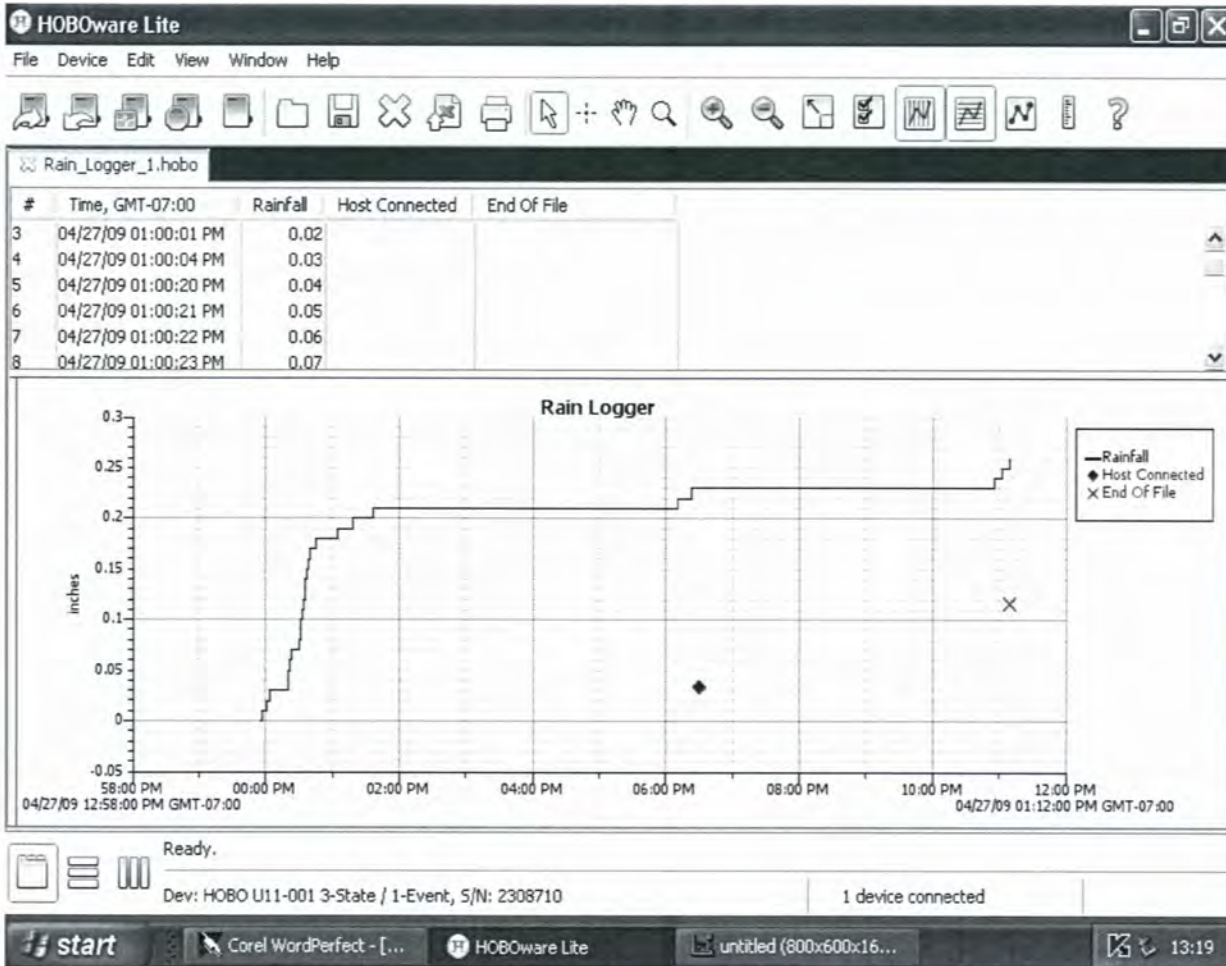
**Uncheck all or the Series except 5,**  
This is the Rainfall Series

Select **5 Rainfall**

and then select Plot information desired.



## Typical Plot from the Rainfall Series with VIEW / Points Table Selected



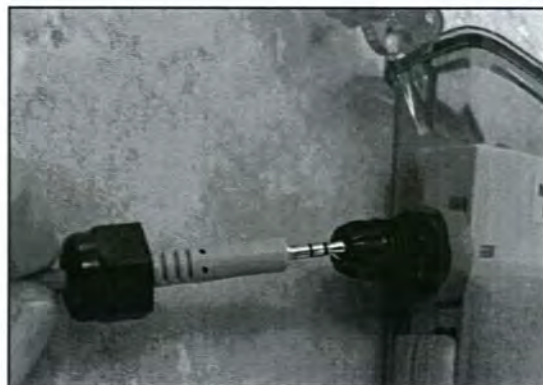
**The Original U11 HOBO manual on the following Pages is Included for General Basic information .**

**Information on How to Remove Data Logger, to allow Changing the CR-2032 Battery inside of the Rain Logger .**

**Step 1 : Loosen Strain Relief Nut**



**Step 2 Pull to Remove Rain Gauge Input Stereo Connector.**



**Step 3 Pull to Remove Rain Logger with Your Fingers or with A pair of Pliers.**



**Step 4 Now you Can Unscrew the back of the logger case to change the Battery ( see battery section in U11 manual )**



**To Re-install the Logger into the Waterproof Case, Reverse the Above Steps .**

**Carefully Align the input Cable connection and insert All the Way in as far as possible .**





**HOBO® U11 3-State/1-Event  
Data Logger  
(Part # U11-001)**

Distributed by:  
**NovaLynx Corporation**  
P.O. Box 240  
Grass Valley, CA 95945-0240

Inside this package:

- HOBO U11 3-State/1-Event Data Logger
- Four input cables
- Mounting kit with magnet, hook and loop tape, tie-wrap mount, tie wrap, and two screws.



Doc # 8806-A, MAN-U11-001  
Onset Computer Corporation

Thank you for purchasing a HOBO data logger. With proper care, it will give you years of accurate and reliable measurements.

The HOBO U11 3-State/1-Event data logger has 64K of memory and can record up to 43,000 state changes or events. The three state channels and one event channel monitor conditional changes when the allocated conductors are connected or disconnected. External contact closer devices are used to “make” and “break” the logger’s conductors and are controlled by external sensing devices. External sensing devices are commonly used in monitoring equipment and machines such as motors, doors and other cycling equipment. The logger uses a direct USB interface for launching and data readout by a computer.

An Onset software starter kit is required for logger operation. Visit [www.onsetcomp.com](http://www.onsetcomp.com) for compatible software.

**Specifications**

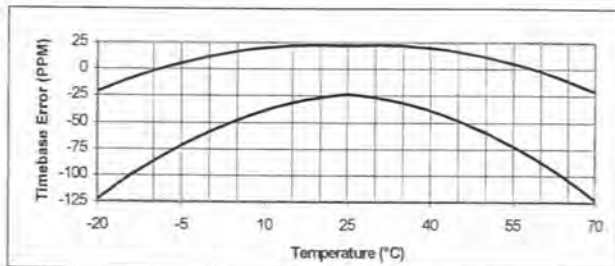
State and Event Channels	External contact input: Passive relay switch or contact closure - minimum duration 1 second (open > 300 KΩ or closed < 10 KΩ)
Max total cable run	32 m (105 ft), if using only state channels, 64 m (210 ft)
Time accuracy	Approximately ± 1 minute per month at 25°C (77°F); see Plot A
Operating temperature	Logging: -20° to 70°C (-4° to 158°F) Launch/readout: 0° to 50°C (32° to 122°F), per USB specification
Humidity range	0 to 95% RH, non-condensing
Battery life	1 year typical use with normally open contacts, two months if all four channels are logging with continuously closed contacts
Memory	64K bytes (up to 43,000 state changes or events); see “Storage capacity” on the next page
Weight	50 g (1.8 oz)
Dimensions	58 x 74 x 22 mm (2.3 x 2.9 x 0.9 inches)
CE	The CE Marking identifies this product as complying with all relevant directives in the European Union (EU).

You can read out the logger while it continues to log, stop it manually with the software, or let it record data until the memory is full.

Refer to the software user’s guide for complete details on launching, reading out, and viewing data from the logger.

**Important notes:**

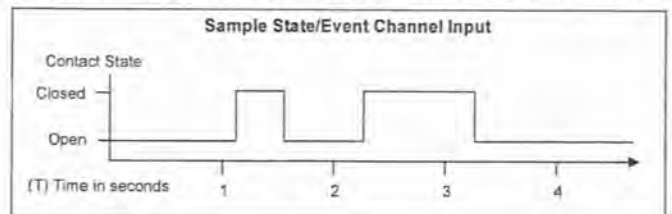
- If you use a portable computer with a rechargeable battery, ensure that the AC power cord is not connected to the computer when you are communicating with the logger. This may produce false events.
- If you configure the logger to start with a button start, be sure to press and hold down the button on the front of the logger for at least three seconds when you want to begin logging data.
- Plug the cables into the side of the logger before logging begins. Plugging cables in or removing them while logging may produce false state changes or events on other channels.
- The state and event channels are always enabled. An unused event channel will record nothing. An unused state channel will record an initial open state only.
- Connecting input cables to the logger while the battery is low can reset the logger and stop it from operating.



Plot A

**State logging**

The logger checks the state value every second. It is unaware of any changes that happen between checks. Accordingly, if the contact activity shown in Plot B below is on a **state** channel, the logger does not see the momentary closure that happens between T1 and T2 because the contacts are open at both times. However, the state changes from T2 to T3, and from T3 to T4, are recorded as a closure that begins at T3 and ends at T4.



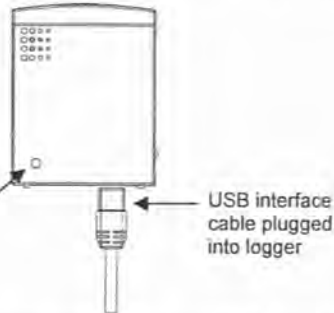
Plot B

## Connecting the logger

The U-Family logger requires an Onset-supplied USB interface cable to connect to the computer. If possible, avoid connecting at temperatures below 0°C (32°F) or above 50°C (122°F).

1. Plug the large end of the USB interface cable into a USB port on the computer.
2. Plug the small end of the USB interface cable into the bottom of the logger, as shown in the following diagram.

**Important:** Press this button for at least **3 seconds** when logger is launched with Button Start, or press for at least **1 second** to record an event while logging



If the logger has never been connected to the computer before, it may take a few seconds for the new hardware to be detected. Use the logger software to launch and read out the logger.

## Event logging

The event channel records the transition from a closed contact to an open contact. The logger checks every second to see if a transition happened during the last second. If a transition occurred, it is recorded as an event at that second. Accordingly, if the contact activity shown in Plot B above is on an **event** channel, an event is recorded at T2 and another event is recorded at T4. Note that the contacts close between T2 and T3 but open between T3 and T4, causing the event to be logged at T4. Closing the contacts does not trigger the event; re-opening them afterward does.

## Logging the battery voltage

In addition to event and state readings, the logger can record battery readings at regular intervals. If you enable the internal battery channel for logging, battery measurements should be made at long intervals (one hour or greater) to minimize memory usage.

## Internal events

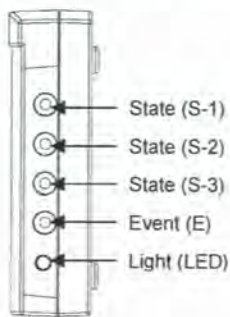
Like other U-Family loggers, this logger stores events that are unrelated to the external state and event inputs. Events are stored when the pushbutton is pressed or released, when the battery drops below approximately 2.7V, when the battery rises above 2.8V, when a host computer is connected, and when the logger is stopped by a command from the host software.

Press and hold down the button on the front of the logger for at least one second to record a pushbutton event. Both a button down and button up event will be recorded. This is useful if you want to manually mark the datafile at a particular point.

**Operation**

A light (LED) on the side of the logger confirms logger operation.

The following table explains when the logger blinks during logger operation:



When:	The light:
The logger is logging	Blinks when logging a sample, and every four seconds between logging samples
The logger is awaiting a start because it was launched in Start At Interval, Delayed Start, or Button Start mode	Blinks once every eight seconds until launch begins
The button on the logger is being pushed for a Button Start launch or manual event	Blinks once every second while pressing the button and then (button start only) flashes rapidly once you release the button. The light then reverts to a blinking pattern based on the logging interval

**Storage Capacity**

The logger's storage capacity depends on the interval between state changes or events. The longer the interval between a state change or event, the more memory is needed to store the data. The following table shows how memory capacity is affected by various intervals between events, assuming the battery channel is disabled.

Average interval between events	Approximate total points
1 sec. – 15 sec.	43,439
16 sec. – 4.25 min.	32,512
4.24 min – 68.25 min	26,009

**Protecting the logger**

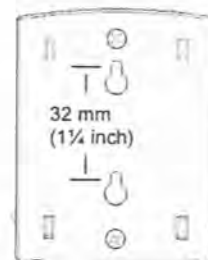
The logger can be permanently damaged by corrosion if it gets wet. Protect it from condensation. If it gets wet, remove the battery immediately and dry the circuit board with a hair dryer before reinstalling the battery. Do not let the board get too hot. You should be able to comfortably hold the board in your hand while drying.

**Note! Static electricity may cause the logger to stop logging.** To avoid electrostatic discharge, transport the logger in an anti-static bag, and ground yourself by touching an unpainted metal surface before handling the logger. For more information about electrostatic discharge, visit our website at <http://www.onsetcomp.com/Support/support.html>.

**Mounting**

There are four ways to mount the logger using the materials in the mounting kit included with the logger:

- Use the hook-and-loop tape to affix the logger to a surface.
- Attach the magnet, then place the logger on a magnetic surface.
- Use the tie wrap and tie wrap mount to tie the logger to an object.
- Fasten the logger to a surface with the two Phillips-head screws. The back of the logger has two inserts for the screws, 32 mm (1¼ inches) apart.



**Battery**

The logger requires one 3-Volt CR-2032 lithium battery. Expected battery life varies based on the temperature and the frequency at which the logger is recording data (the logging interval and the rate of state changes and/or events). A new battery typically lasts one year with logging intervals greater than one minute and normally open contacts. Deployments in extremely cold or hot temperatures, logging intervals faster than one minute, or continuously closed contacts may significantly reduce battery life. **Battery life is about two months when all four channels' contacts are closed continuously.**

To replace the battery:

1. Disconnect the logger from the computer.
2. Unscrew the logger case.
3. Lift the circuit board and carefully push the battery out with a small blunt instrument, or pull it out with your fingernail.
4. Insert a new battery, positive side facing up.
5. Carefully realign the logger case and re-fasten the screws.

**⚠ WARNING:** Do not cut open, incinerate, heat above 85°C (185°F), or recharge the lithium battery. The battery may explode if the logger is exposed to extreme heat or conditions that could damage or destroy the battery case. Do not dispose of the logger or battery in fire. Do not expose the contents of the battery to water. Dispose of the battery according to local regulations for lithium batteries.