

**RG2 & RG2-M
MOUNTING TEMPLATE**

**6.688"
Circle Diameter**

DATA LOGGING RAIN GAUGE MANUAL

Part # RG2 and RG2-M



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Software Requirements

Requires Onset Computer Corporation's BoxCar® (version 3.0 or later) or BoxCar® Pro software and interface cable for operation.

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 The CE mark identifies this product as complying with all relevant directives in the European Union (EU).

Onset reserves the right to change product specifications without prior notice.

HOBOb Warranty

HOBOb data loggers are warranted to be free from defects in material and workmanship for a period of one year from the date of original purchase. The rest of the components comprising the Data Logging Rain Gauge are warranted for three years. During the warranty period Onset will, at its option, either repair or replace products that prove to be defective. This warranty is void if the Onset products have been damaged by customer error or negligence or if there has been an unauthorized modification.

Returning Products to Onset

Direct all warranty claims to place of purchase.

Before returning a failed unit, you must obtain a Return Merchandise Authorization (RMA) number from Onset. You must provide proof that you purchased the Onset product(s) directly from Onset (purchase order number or Onset invoice number). Onset will issue an RMA number that is valid for 30 days. You must ship the product(s), properly packaged to protect against further damage, to Onset (at your expense) with the RMA number marked clearly on the outside of the package. Onset is not responsible for any package that is returned without a valid RMA number or for the loss of the package by any shipping company. Products must be clean and free of any toxins before they are sent back to Onset or they may be returned to you.

Repair Policy

Products that are returned after the warranty period or that are damaged by the customer as specified in the warranty provisions can be returned to Onset with a valid RMA number for evaluation.

Please contact Onset for more information and prices on:

ASAP Repair Policy

Onset will expedite the repair of a returned product.

Data-back™ Service

HOBOb data loggers store data in nonvolatile EEPROM memory. Onset will, if possible, recover your data to a disk.

Tune Up™ Service

Onset will examine and retest any HOBOb data logger.

Service and Support

HOBO® products are easy to use and reliable. In the unlikely event that you have a problem with this instrument, please read the following.

Who do I contact?

Contact the company that you bought the loggers from: Onset or an Onset Authorized Dealer.

Before calling, you can evaluate and often solve your problem if you try the following:

1. Read this manual and the ReadMe file on the software disk. It may only take a few moments to get the answers you need.
Note: Software purchased separately.
2. Write down the events that led to the problem. Have you changed anything in your computer recently? Are you doing anything differently?
3. Visit the Technical Support section of the Onset web site at www.onsetcomp.com.

When contacting Onset, please indicate that you need Technical Support for HOBO® products. Be prepared to:

1. Provide the product number and serial numbers for the HOBO® Event Logger (which are found inside the case), the tipping-bucket collector, and software version in question.
2. Provide details on the hardware and software configuration of your computer including manufacturer, model number, peripherals, and version of operating system.
3. Completely describe the problem or question. The more information you provide the faster and more accurately we will be able to respond.

Onset Technical Support

Onset Computer Corporation
470 MacArthur Blvd., Bourne, MA 02532
Mailing: PO Box 3450, Pocasset, MA 02559-3450
Phone: 1-800-LOGGERS (1-800-564-4377) or 508-759-9500
Fax: 508-759-9100
E-mail: loggerhelp@onsetcomp.com

Rain gauge overview

The Data Logging Rain Gauge consists of two major components, a tipping-bucket type rainfall collector and a HOBO Event data logger. The collector consists of a black-anodized aluminum collector ring with a knife edge and a funnel that diverts the water to a tipping-bucket mechanism. The mechanism is designed such that one tip of the bucket occurs for each 0.01" or 0.2 mm of rainfall. Bucket tips are detected when a magnet attached to the tipping bucket actuates a magnetic switch as the bucket tips, thus effecting a momentary switch closure for each tip of the bucket. The spent water drains out of the bottom of the housing. The switch is connected to a HOBO Event data logger which records the time of each tip. The aluminum housing is coated with a white baked enamel surface to withstand years of exposure to the environment.

Note that the HOBO Event data logger and the tipping-bucket collector each have their own serial number. The HOBO Event serial number is the one included in the data file (.dtf file). You should note your serial numbers here.

HOBO Event Serial Number _____
Tipping-Bucket Collector Serial Number _____

Accessing the logger

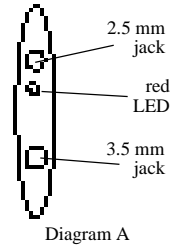
The logger is accessed by removing the collector, screen, and funnel assembly. To remove the assembly simply pull up on the collector while holding down on the rain gauge housing. With this removed the logger can be seen installed in its holder located on the inside of the rain gauge housing. To access the logger lift it out of its holder and unwrap the cable attached to the tipping-bucket mechanism. Note the orientation of the wrapped cable. The cable fits into the holder much better when it is wrapped clockwise around the logger case. Once the cable is unwrapped, flip open the latch on the case and the logger interface cable port is exposed. Assembly is the reverse of disassembly. When assembling, be sure that the logger is firmly seated in its bracket, and that the cable does not interface with the tipping-bucket mechanism.

Connecting the communications cable and launching

A Starter Kit, purchased separately, which includes an interface cable and software, is required to operate your logger. Connect the interface cable into the 3.5 mm jack on the logger and into a working serial port of your computer (Diagram A). Install and start the logger's software. Select **Launch...** under **Logger** on the menu bar and the launch dialog box will appear. For a complete explanation on installing the software and launching your logger, please refer to the software manual or the software's on-line help.

Operation indication

The HOBO Event data logger has a red LED (Diagram A) that blinks every two seconds while it's logging. The LED also blinks four times rapidly as it stores an event.



Lockout after event

The HOBO Event data logger has a feature that causes it to ignore events for a programmable period after an event is recorded. *For the Data Logging Rain Gauge, the lockout is preset to one second and should be left that way to eliminate the possible effects of switch bounce.*

Installation instructions

A clear and unobstructed mounting location is necessary to obtain accurate rainfall readings. This rain gauge has provisions for mounting two ways, surface mounting and mast mounting (See Diagram B on page 4). Surface mounting is recommended where possible. The rain gauge housing **MUST** be mounted in a LEVEL position, clear of overhead structures, and in a location free from vibration. If mast mounted, make sure that the mast is properly guyed so that vibration in high winds is kept to a minimum. **For maximum sensitivity** in low moisture environments you can remove the collector screen. This eliminates water retention on the screen which could evaporate before being measured. The tradeoff is that without the screen, debris can get into the funnel and clog the orifice. To remove the screen you need to first remove the spring clip inside the collector.

***NOTICE!** During shipment the tipping assembly has been secured to avoid possible damage to the pivot assembly. Lift off the collector ring assembly (ring, screen, and funnel), and remove the rubber band from inside to release the tipping-bucket mechanism before installation. After the rain gauge is installed, remove the collector ring assembly and verify that the tipping-bucket mechanism is not in the dead-center position. Press either end of the tipping bucket down against the stop to be sure that it is not centered.*

Readout

Reconnect the HOBO Event logger to the interface cable, then start the software, select **Readout** under **Logger** on the menu bar and the data will be displayed. For a complete explanation on reading out your logger please refer to the software manual.

Maintenance

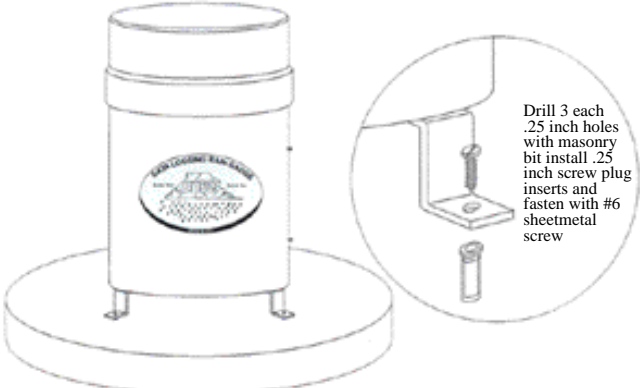
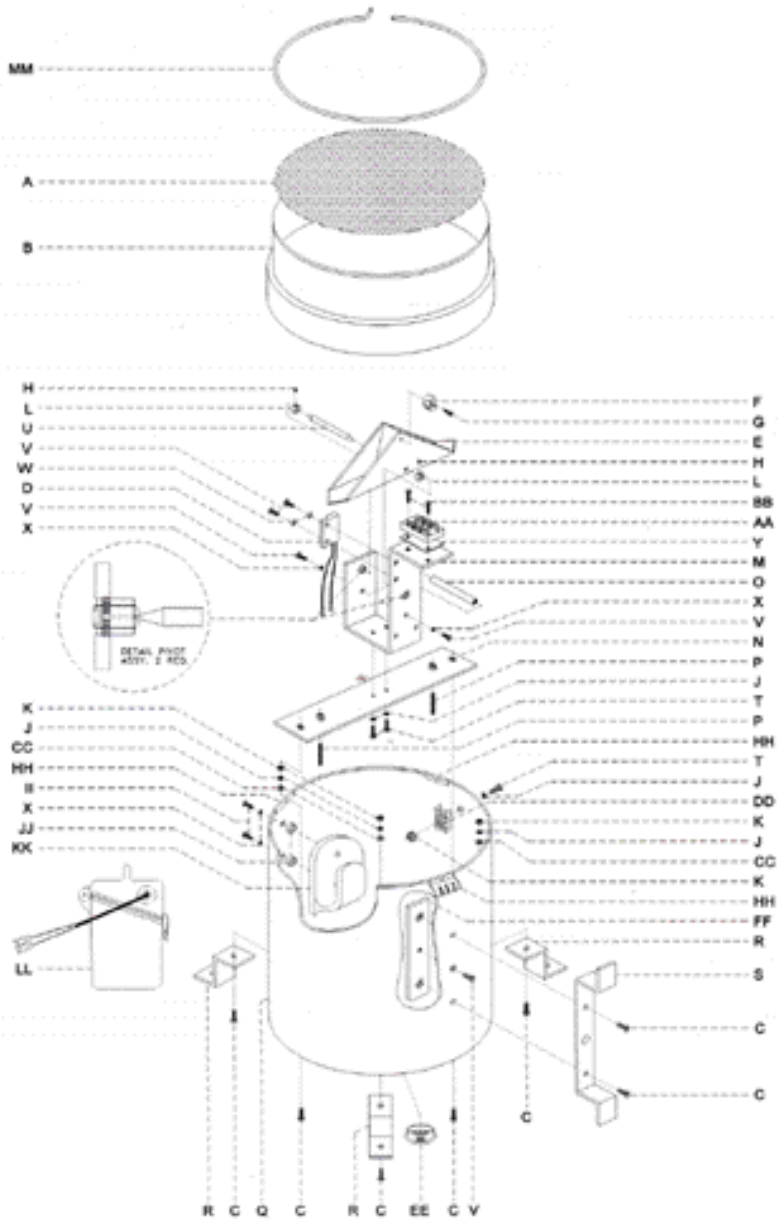
The filter screen, funnel, and tipping-bucket mechanism should be cleaned periodically. An accumulation of dirt, bugs, etc. on the tipping bucket will adversely affect the calibration. The screen may be taken out for cleaning. To clean the screen, remove the spring clip from inside the collector. Remove the screen and clean the screen and funnel. Replace the screen and the spring clip.

Data Logging Rain Gauge

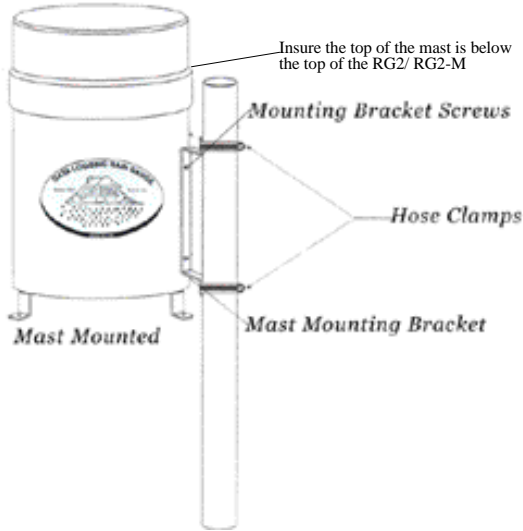
Parts List

FIG.	PART NO.	DESCRIPTION	QTY REQ'D.
A	TE-975B	Screen	1
B	TE-871/872B	Collector, 6"	1
C	63238PP	Screw, 6-32 x 3/8" Pan Head, Phillips	7
D	S1-128	Switch	1
E	B-102	Bucket, Tipping	1
F	M2-101	Magnet	1
G	256716PP	Screw, 2-56 x 7/16" Pan Head, Phillips	1
H	44018A	Screw, 4-40 x 1/8" Allen Set	2
J	6S	Washer, Lock Number 6	6
K	632SPN	Nut, 6-32 Small Pattern	4
L	TE-823	Bushing, Spacer	2
M	TE-779	Holder, Bucket	1
N	TE-961	Plate, Base	1
O	TE-825	Spacer	1
P	6321PP	Screw, Calibrating 6-32 x 1"	2
Q	OS-775	Case, Main	1
R	TE-777B	Foot	3
S	TE-776B	Bracket, Side Mounting	1
T	63214PP	Screw, 6-32 x 1/4" Pan Head, Phillips	3
U	TE-824P	Shaft, Pivoted, S.S.	1
V	44014PP	Screw, 4-40 x 1/4" Pan Head, Phillips	5
W	4F	Washer, Number 4 Flat	2
X	4S	Washer, Number 4 Lock	4
Y	TE-907	Gasket, Terminal Strip	1
AA	TS-101	Terminal Strip	1
BB	44038PP	Screw, 4-40 x 3/8" Pan Head, Phillips	2
CC	6F	Washer, Flat No. 6	3
DD	CTM-0	Cable Tie Mount	1
EE	H-209	Plug, Screen	1
FF	TE-911	Bracket	1
HH	IS-0097	CLIP	3
II	44012PPS	Screw, 4-40 x 1/2" Pan Head, Phillips	2
JJ	OS-669-7	Spacer, 3/8" OD, 1/4" ID x 1/8"	2
KK	20400-SDD	Logger Mounting Clip	1
LL	H07-002-04	HOBO Event Data Recorder	1
MM	W-1281	Screen Retaining Clip	1

Mounting Options



Surface Mounted on Masonry Block



Mast Mounted

Mast Mounting Bracket

Diagram B

Field calibration

The tipping-bucket mechanism is a simple and highly reliable device. Absolutely accurate calibration can be obtained only with laboratory equipment, but an approximate field check can be easily done. The rain gauge must be located in a clear area away from trees, buildings, etc. Accurate readings will not be obtained unless the rain gauge is mounted in a level position. The mechanism must be clean. The rain gauge must be calibrated with a controlled rate of flow of water through the tipping-bucket mechanism. At least 36 seconds should be allowed to fill one side of the tipping bucket. This represents a maximum flow rate of one inch of rain per hour. If the flow rate is increased, a properly calibrated instrument will read low. Decreasing the rate of flow will not materially affect the calibration. The reason for this is obvious if the tipping bucket assembly is observed in operation. With water falling into one side of the tipping bucket there comes a point when the mass of the water starts to tip the bucket. Some time is required for the bucket to tip (a few milliseconds). During the first 50% of this tipping time water continues to flow into the filled bucket; the last 50% of this tipping time water flows into the empty bucket. The amount of water flowing during the first 50% of time is error, the faster the flow rate the greater the error. At flow rates of one inch per hour (20 mm/hr) or less the water actually drips into the buckets rather than flowing. Under this condition the bucket tips between drips, and no error water is added to a full moving bucket.

To check calibration:

1. Obtain a plastic or metal container of at least one quart capacity. Place a very small hole (pinhole) in the bottom of the container.
2. Place the container in the top funnel of the rain gauge with the hole not over the orifice.
3. Follow the instructions for the Rain Gauge model you have:
RG2: Pour exactly 473 ml of water into the container. Each tip of the bucket represents 0.01" of rainfall.
RG2-M: Pour exactly 373 ml of water into the container. Each tip of the bucket represents 0.2 mm of rainfall.
4. If it takes less than one hour for this water to run out then the hole (Step 1) is too large.
5. Field calibration of this sort should result in one hundred tips, plus or minus two.

Adjusting screws are located on the bottom outside of the rain gauge housing. These two socket head set screws require a 5/64" (.078") Allen wrench. Adjust both equally, i.e. if you turn one a half turn then turn the other a half turn. Turning these screws clockwise will increase the number of tips per measured amount of water. Turning the screws counterclockwise will decrease the number of tips per measured amount of water. A 1/4 turn on both screws either clockwise or counterclockwise will increase or decrease the number of tips by approximately one tip.

Changing the battery

Open the case by unsnapping the latch and lifting the lid. Unplug the 2.5 mm sensor cable. Holding on to the HOBO's main case (not the lid) firmly tap the open case into the palm of your hand until the circuit board dislodges. Remove the circuit board, then remove the battery by carefully pushing it out with a small, non-metallic, blunt instrument. Be sure to install the battery with the printed side of the battery away from the HOBO's circuit board (Diagram C). The logger's light will blink three times after the battery has been installed.

Battery

Battery Holder
Diagram C

Keep the inside of the case dry

With the case closed and latched, the HOBO Event data logger is weatherproof. The electronics can be permanently damaged by corrosion from moisture, so protect them from rain and condensation. Should the electronics get wet, remove the battery immediately and dry the board completely with a hair dryer before reinstalling the battery. The moisture-absorbing desiccant pack inside the case should be replaced when the battery is changed.

Specifications

Resolution:

RG2: 0.01"

RG2-M: 0.2 mm

Calibration accuracy: $\pm 1.0\%$ (up to 1"/hr for the RG2 and 20 mm/hr for the RG2-M; field accuracy depends on installation and environmental conditions.)

Time accuracy: ± 100 ppm at 20°C,
full dependence shown in Plot A

Capacity: 8000 tips (note that the 8000 tips require 32K of memory in the HOBO Shuttle to fully offload.)

Battery: CR-2032 (lithium); provides one year of continuous use

Operating temperature range: +32°F to +125°F (0°C to +50°C)

Storage temperature range: -4°F to +158°F (-20°C to +70°C)

Relative humidity range: (when logger case is closed)
0 to 100% RH, weatherproof

Size: 6.5" diameter x 10.0" high (165 x 254 mm)

Weight: 2.2 pounds (1.0 kg)

Receiving orifice diameter: 6.060" (154 mm)

