

# Rain Gauge Smart Sensor (S-RGx-M002) Manual



The rain gauge smart sensor is designed to work with HOBO® stations. The smart sensor has a plug-in modular connector that allows it to be added easily to a HOBO station. All sensor parameters are stored inside the smart sensor, which automatically communicates configuration information to the logger without the need for any programming or extensive user setup.

## Rain Gauge Smart Sensor

Models: S-RGA-M002  
 S-RGB-M002

### Items included:

- Two hose clamps
- Three screws

### Accessories:

- Guy wire kit (M-GWA)
- 1.5 meter mast (M-MPB)
- Mast level (M-MLA)

## Specifications

<b>Measurement Range</b>	0 to 12.7 cm (0 to 5 in.) per hour, maximum 4000 tips per logging interval
<b>Calibration Accuracy</b>	±1.0% at up to 20 mm/hour (1 in./hour)
<b>Resolution</b>	0.01 in. (S-RGA-M002) or 0.2 mm (S-RGB-M002)
<b>Calibration</b>	Requires annual calibration: can be field calibrated or returned to the factory for re-calibration
<b>Operating Temperature Range</b>	0° to 50°C (32° to 122°F), survival -40° to 75°C (-40° to 167°F)
<b>Environmental Rating</b>	Weatherproof
<b>Housing</b>	15.24 cm (6 in.) aluminum collector and base
<b>Mechanism</b>	Tipping bucket; stainless steel shaft with brass bearings
<b>Dimensions</b>	22.8 cm height x 15.4 cm diameter (9 x 6 in.), 15.4 cm (6.06 in.) receiving orifice
<b>Weight</b>	1 Kg (2 lbs)
<b>Bits per Sample</b>	12
<b>Number of Data Channels*</b>	1
<b>Data Format</b>	Number of tips per recorded measurement, reported in inches or millimeters; S-RGA-M002 0.01 in. per tip, S-RGB-M002 0.2 mm per tip
<b>Measurement Averaging</b>	No
<b>Cable Length Available</b>	2 m (6.6 ft)
<b>Length of Smart Sensor Network Cable*</b>	0.5 m (1.6 ft)



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

\* A single HOBO station can accommodate 15 data channels and up to 100 m (328 ft) of smart sensor cable (the digital communications portion of the sensor cables).

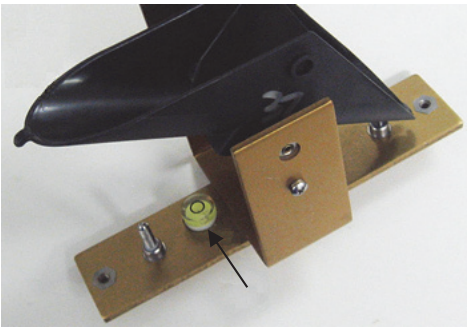
**⚠ WARNING:** The black powder-coated aluminum knife-edged ring is extremely sharp and can cause injury if not handled properly. Do not press edge against any body parts as severe cuts and bleeding may occur.

## Mounting

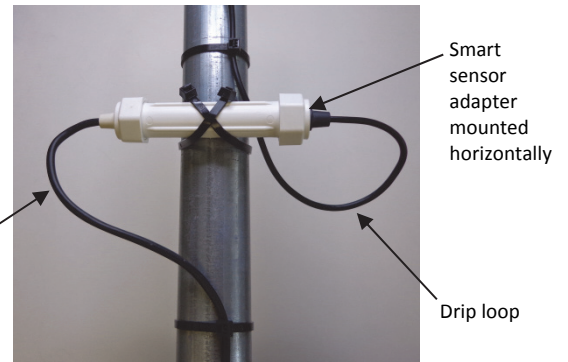
**NOTICE:** During shipment the tipping assembly has been secured to avoid possible damage to the pivot assembly. Unscrew the thumbscrews on the housing. Lift the collector ring assembly (ring, screen, and funnel) off the housing and remove the rubber band from inside to release the tipping-bucket mechanism before installation. When reassembling the ring on the logger housing, align the thumbscrews with the slots (if there are slots in the housing). Screw the thumbscrews in, making sure they go through the slots.

### Mounting Considerations

- For the most accurate rainfall measurements, it is recommended that you mount the Rainfall sensor upslope, about 3 meters (10 feet) away from the tripod, on a 1.5 meter high mounting pole (M-MPB). Alternatively, you can mount the Rainfall sensor on the tripod mast. This section includes steps for both configurations.
- The rain gauge housing **MUST** be mounted in a **LEVEL** position. Use the bubble level underneath the tipping-bucket mechanism shown below. The rain gauge is level when the bubble is within the circle on the level.



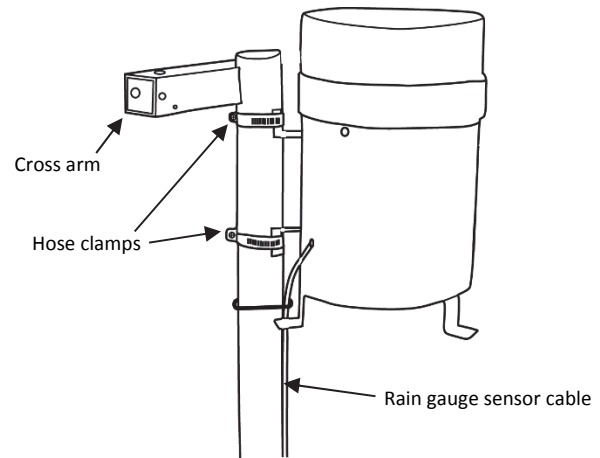
- Tall objects can interfere with accurate rain measurements. It is recommended that you place the rain bucket away from the obstruction by a distance greater than three times the height of the obstruction. If that is not possible, raise the rain bucket as high as possible to avoid shedding.
- Avoid splashing and puddles. Be sure the gauge is high enough above any surface that rain will not splash into the top of the collector.
- Vibration can significantly degrade accuracy of the tipping bucket mechanism. In windy locations make sure that the bucket will be vibration-free. Consider using guy wires to secure a pole or tower-mounted bucket.
- To provide long-term protection from moisture entry, the smart sensor adapter must be mounted horizontally and with the cable wires routed with drip loops so that water drains away from the cable entry point as shown in the example below. When mounted properly, the housing is weatherproof (but not waterproof).



- Refer to the Tripod Setup Guide for more information.

### Mounting the Sensor on a HOBO Station Tripod

Secure the rain gauge sensor near the top of the mast on the side opposite the cross arm, using the two hose clamps provided.



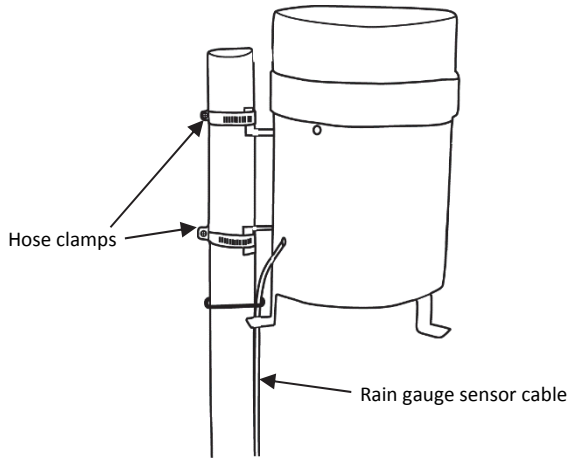
#### Rain Gauge Sensor on the Tripod Mast

- Open each hose clamp and place it around the mast.
- Close the hose clamps until the rain gauge side bracket easily slides into the clamp.
- Hold the rain gauge sensor bracket against the mast with the top of the rain gauge sensor above the top of the mast.
- Slip the upper clamp over the side bracket and tighten the clamp until the rain gauge is secure. **Note:** Be sure the collector is above the top of the mast so you don't get any splashing, wind, shedding, or shadow effects.
- Install the lower clamp and check that the top of the bucket is level. **Note:** For windy locations, it is recommended that you use the guy wire kit (M-GWA) to reduce vibration and ensure data collection accuracy.

### Mounting the Sensor on a Pole

Secure the rain gauge sensor to the separate mounting pole, using the two hose clamps provided (see the instructions on the next page). This separate mounting pole can either be pounded in the ground or mounted in concrete, depending on how firm the ground is.

In either case, be sure the pole is vertical when you install it. The top of the pole should be slightly less than the height desired for the top of the rain gauge sensor (1 meter or 3 feet is typical).



Rain Gauge Sensor on Separate Mounting Pole

### Horizontal Surface Mounting

If mounting the rain gauge on a horizontal surface:

- The rain gauge housing **MUST** be mounted in a **LEVEL** position, clear of overhead structures, and in a location free from vibration. Use the bubble level as shown in *Mounting Considerations*.
- Place the bucket on the mounting surface and mark the holes for the three mounting screws.
- For wood surfaces, drill three 1/16<sup>th</sup> inch holes.
- For concrete, drill three appropriately sized holes with a masonry bit, and install screw plug inserts.
- Use shims as required to level the bucket.
- Fasten the bucket with the screws shipped with the Rain Gauge.

### Connecting the Sensor to a Station

To connect the sensor to a station, stop the station from logging and insert the smart sensor's modular jack into an available smart sensor port on the station. See the station manual for details on operating stations with smart sensors.

### Operation

The rain gauge smart sensor measures rainfall by counting the number of tips per recorded measurement, up to 4000 tips per logging interval (40 inches or 80 cm of rain).

### Maintenance

Clean the filter screen, funnel, and tipping-bucket mechanism with mild soap and water and a cotton swab. An accumulation of dirt, bugs, etc. on the tipping bucket will adversely affect the calibration. Oil the needle bearings with light oil on an annual

basis. In harsh environments, it is recommended that you lubricate the needle bearings more frequently.

### Field Calibration

The tipping-bucket mechanism is a simple and highly reliable device. Absolutely accurate rain gauge smart sensor calibration can be obtained only with laboratory equipment, but an approximate field check can be easily done. The Rain Gauge smart sensor must be calibrated with a controlled rate of flow of water through the tipping-bucket mechanism.

The maximum rainfall rate that the rain gauge smart sensor can accurately measure is one inch of rain per hour (36 seconds between bucket tips). Therefore, the rain gauge smart sensor should be field calibrated using a water flow rate equivalent to, or less than, one inch of rain per hour (more than 36 seconds between bucket tips).

You can follow the instructions or you can use the Texas Electronics Field Calibration Kit to easily calibrate the rain gauge. See <http://texaselectronics.com/products/parts-accessories/field-calibration-kit.html>.

To check calibration:

1. Obtain a plastic or metal container of at least one liter capacity. Make a very small hole (a pinhole) in the bottom of the container.
2. Place the container in the top funnel of the rain gauge Smart Sensor. The pinhole should be positioned so that the water does not drip directly down the funnel orifice.
3. Follow the instructions for the rain gauge model you have.

**S-RGA-M002:** Pour exactly 473 ml of water into the container. Each tip of the bucket represents 0.01 inch of rainfall.

**S-RGB-M002:** Pour exactly 373 ml of water into the container. Each tip of the bucket represents 0.2 mm of rainfall.

- If the test takes less than one hour for this water to run out, the hole (step 1) is too large. Repeat the test with a smaller hole.
- Successful field calibration of this sort should result in one hundred tips plus or minus two.
- Adjusting screws are located on the outside bottom of the rain gauge housing. These two socket head set screws require a 5/64 inch Allen wrench. Turning the screws clockwise increases the number of tips per measured amount of water. Turning the screws counterclockwise decreases the number of tips per measured amount of water. A ¼ turn on both screws either clockwise or counterclockwise increases or decreases the number of tips by approximately one tip. Adjust both screws equally; if you turn one a half turn, then turn the other a half turn.
- Repeat these steps as necessary until the sensor has been successfully calibrated.