

Rain Gauge Smart Sensor (Part # S-RGA-M002, S-RGB-M002)

The Rain Gauge smart sensor is designed to work with HOBO Station loggers. 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.

Inside this Package:

- Rain Gauge Smart Sensor
- Mounting Accessories: 2 hose clamps, 3 screws



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

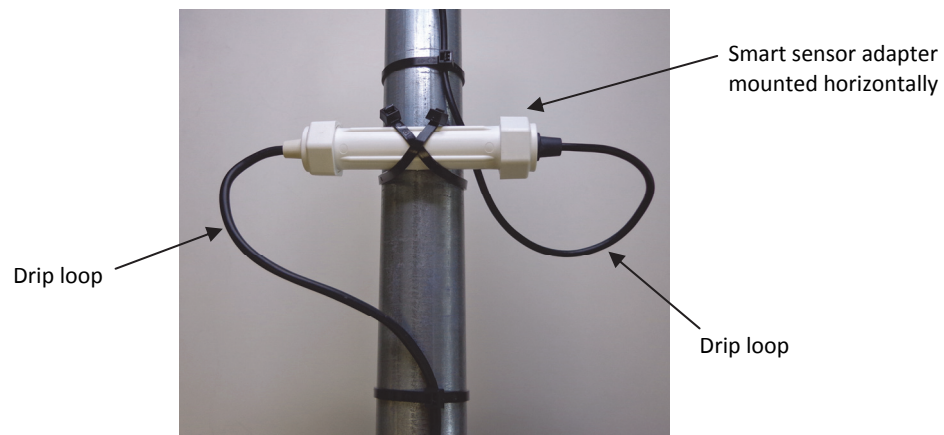
⚠ WARNING: The black-anodized aluminum knife-edged ring is extremely sharp and can cause injury if not handled properly. Do not press edge against any body parts as severe cuts and bleeding may occur.

Mounting

NOTICE: During shipment the tipping assembly has been secured to avoid possible damage to the pivot assembly. 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.

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 (Part # M-MPB). Alternatively, you can mount the Rainfall sensor on the tripod mast. This section includes steps for both configurations.
- 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).



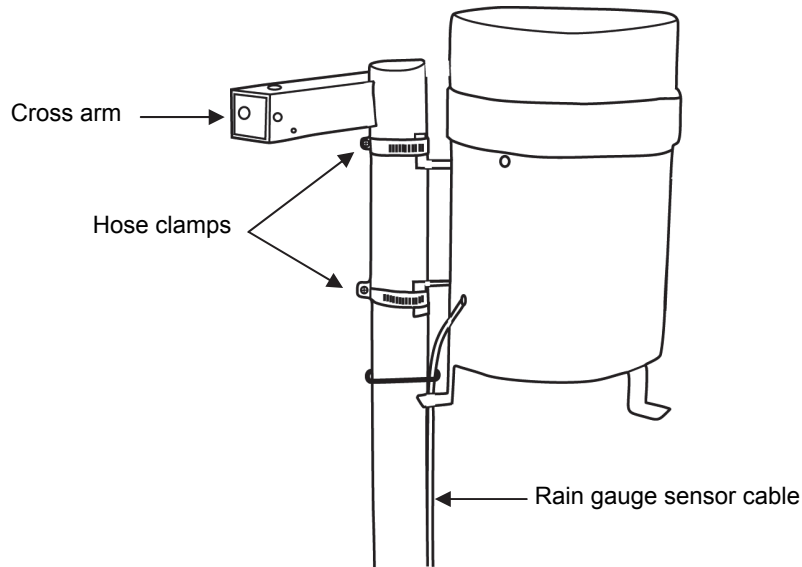
- Refer to the *HOB0 Station Tripod Setup Guide* for more information.

Mounting the Sensor on a HOBO Station Tripod

Accessories:

- Guy Wire Kit (Part # M-GWA)

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

1. Open each hose clamp and place it around the mast.
2. Close the hose clamps until the rain gauge side bracket easily slides into the clamp.
3. Hold the Rain Gauge sensor bracket against the mast with the top of the Rain Gauge sensor above the top of the mast.
4. 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.
5. 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 (Part # M-GWA) to reduce vibration and ensure data collection accuracy.

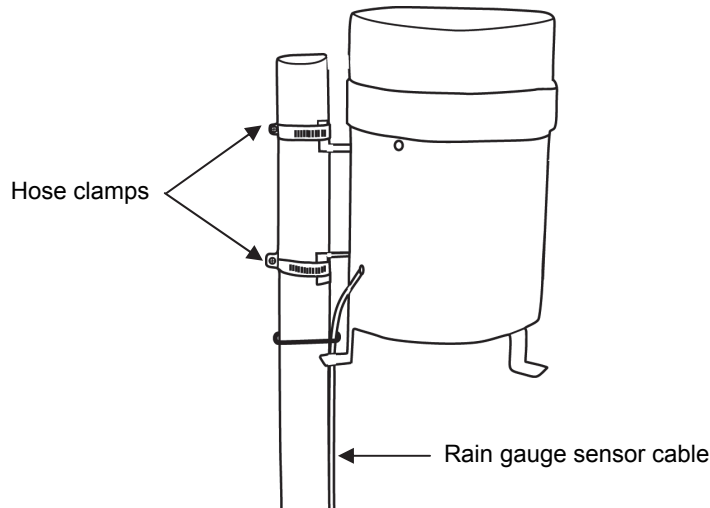
Mounting the Sensor on a Pole

Accessories:

- 1.5 Meter Mast (Part # M-MPB)
- Mast Level (Part # M-MLA)

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
- Place the bucket on the mounting surface and mark the holes for the three mounting screws
- For wood surfaces, drill three 1/16th 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 Logger

To start using the Rain Gauge smart sensor, stop the logger and insert the modular jack into an available port. If a port is not available, use a 1-to-2 adapter (Part # S-ADAPT), which allows you to plug two sensors into one port. The next time you use the HOBO Station, it will automatically detect the new sensor. Note that a HOBO Station supports a maximum of 15 data channels; this sensor uses one data channel. Launch the logger and verify that the sensor is functioning correctly.

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).

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.