Manitoba Métis Federation
Weather Station Instrument Guide

MANITOBA METIS FEDERATION AND
CENTRE FOR EARTH OBSERVATION SCIENCE

Document Control

0.1 Version History

Version	Author(s)	Type	Date Modified	Comments
1.0	Hammet, D., Friesen, K. L.	Draft copy	2021/11/25	Incorrect attribution.
1.1	Friesen, K. L.	Working Copy	2022/02/03	Updated contents.

0.2 Document Location

This manual can be located on our remote repository on Gitlab.

0.3 License

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1 Overview

1.1 Introduction

This manual will detail the sensors, required equipment, and set-up instructions specifically used to set up HOBO weather stations. While this information pertains to HOBOware equipment, some information may be transferable to other manufactured weather stations.

1.2 Required Equipment

Below are checklists for you to read through prior to traveling to location and setting up a meteorological station.

Figure 1.1: Completed weather station assembly.

1.2.1 Sensors

Table 1.1: Sensor Checklist

Check Box	Sensor Type	Model Number	Range	Units
	Wind Monitor	05103	0 to 100m/s	Meters per second
	Rain Gauge	S-RGx-M002	0-12.7cm	Centimeter
	PAR Smart Sensor	S-LIA-M003	400-700nm	PAR:mol/m2/sec Wavelength: Nanometer
	Barometric Pressure SmartSensor	S-BPA-CM10	660-1070 mbar	Millibar
	Temperature and RH SmartSensor	S-THB-M00x	-40ºC to 75ºC	Degrees Celcius
	External battery	NA	8-12	Volts

1.2.2 Tripod

Table 1.3: Tripod Checklist

Check Box	Equipment Name	Number needed
	Guy wire kit	1
	Grounding kit	1
	Anchor Plates	3
	Leg U-bolt assembly	3
	Inner support legs	3
	Upper Mast tri-clamps	2
	Lower and upper mast poles	2
	Mast level	1
	Anemometer mounting pole, bracket and clamps	1
	PAR Sensor mounting bracket	1
	Temp/RH Solar radiation shield	1
	Rain gauge mounting pole	1

1.2.3 Assembly Equipment

Table 1.5: Additional Equipment Checklist

Check Box	Equipment Name
	1/2 inch Wrench
	Wire Cutters
	Crescent Wrench
	Zip Ties
	Sledge Hammer
	Step Ladder

2 Details

2.1 Sensors

2.1.1 Wind Monitor

This sensor measures **horizontal windspeed** and **direction**. Proper placement of the sensor is extremely important in order to make meaningful observations. Trees, buildings or other structures can greatly influence wind speed. The wind monitor is located external to the logger box and should be attached at the top of the tripod with the anemometer mounting pole and clamps. Careful consideration should me made to face the direction of the orientation ring due **south** in order to get accurate wind direction data (Arrow 2).

Figure 2.1: Wind sensor attachement.

2.1.2 Rain Gauge

This sensor measures rainfall by counting the number of tips over the recording interval. Each tip represents **0.01 inches of rain**, and can count up to 4000 tips per logging interval. The tipping bucket rain gauge is located externally to the logger box and should be mounted on the mounting pole **0.4-0.6 meters** above the ground and **>3 meters** away from the tower and any other surfaces which may influence rainfall. Hose clamps can be used to mount the sensor to the mounting pole. Shims can be used as required to level the bucket.

Figure 2.2: Rain gauge placement relative to Met tower.

2.1.3 PAR SmartSensor

This sensor measures **photosynthetically active radiation** from the wavelengths of 400-700nm. This sensor is located externally to the logger box and should be the **highest** mounted sensor on the tower besides the wind monitor to avoid any potential shading. The mounting bracket for the sensor should also be facing **south** to receive the maximum amount of light during the day.

Figure 2.3: PAR sensor and mounting bracket.

2.1.4 Barometric Pressure SmartSensor

This sensor measures **air pressure** of the enclosure. In this specific set up the sensor came mounted to the inside of the logger housing box with a loop tape, though this may not always be the case.

2.1.5 Temperature and RH SmartSensor

This combination of sensors measures air temperature and relative humidity. These sensors should always be used in combination with a solar radiation shield with the sensor mounted inside. Direct sunlight can result in a significant source of error in the temperature and RH reading and reduce sensor accuracy over time. The smart sensor adapter should also be mounted horizontally so that water drains away from the sensor.

Figure 2.4: Solar radiation Shield with Smart Sensor adapter.

2.1.6 External Battery

The external battery is a 12 volt (V) car battery. It is the main power source for the Weather Station. The battery is connected to the logger housing box with the battery connection cables and is charged by the solar panel. The operational range for the battery is 8 - 12 V. At 25% capacity, roughly 3 V, the low battery LED indicator will flash in the logger box. This may indicate a need to replace the battery or more simply the solar panel needs attention.

Figure 2.5: External 12V battery inside battery housing box.

3 Setup

3.1 Software Set-up

Before starting check that you have the HOBOware Sensor software installed on your computer. You can check this by typing in *HOBOware* in the search menu beside the windows start button.

It is best that you download the software onto a USB memory drive. You can download the software from the Geoconnections repository or in the MMF repository on GitLab. If you have any issues with the software or connecting the sensors, refer to the **??** for steps to solve your issues.

3.2 Sensor Set-up

1. The sensors can connect to the logger box in two ways;

   - **RJ-12 Modular Jack SmartSensor:** This connection is specifically for any SmartSensors. This can be connected by plugging the RJ-12 into any of the ports connected to the logger.

     OR

   - **Manual connection:** This connection is for the sensors with (+) and (-) wires. Each sensor will have a labeled port. Plug the (+) and (-) splitters into their respective ports (this will require a small Phillips screwdriver). Make sure the battery is not connected when removing the connections manually.

Figure 3.1: Completed SmartSensor Set-up.

2. Check that all connections are secure.
3. Connect the positive (+) and negative (-) ends of the battery cable splitters into their matching ports.
4. Connect the battery to the battery cable.
5. Inside the battery housing box connect the negative (-) and then the positive (+) with the bolt. Turn to finger tightness.
6. You can now safely close the breakers.
7. Start the **Logger breaker**, close them in order finishing with the Solar Panel breaker.
8. Check that your logger box looks like in Figure 3.2.

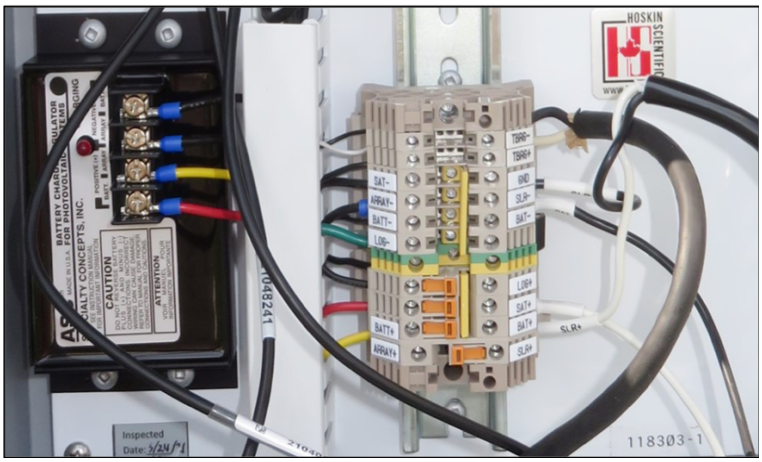

Figure 3.2: Completed Manual Connection Set-up.

9. You can now connect to the computer.

10. Using the USB cable, connect the logger to a computer running the HOBOware software.

11. Select the **Launch** option in the HOBOware user interface.

3.3 Logger Setup

1. Select the **Device** drop down option and click **Launch**.
2. Ensure that the HOBO Energy Logger is selected and the press **OK**.
3. Look that each of the sensors connected are listed and checked off to log.
4. Select a logging interval of 15 minutes, with a sampling interval of 5 seconds.
5. Then select the **Start Logging at Interval** option, and press **Launch**.
6. The Delayed Start feature will begin logging data on the next 15-minute increment.

3.4 Tripod Set-up

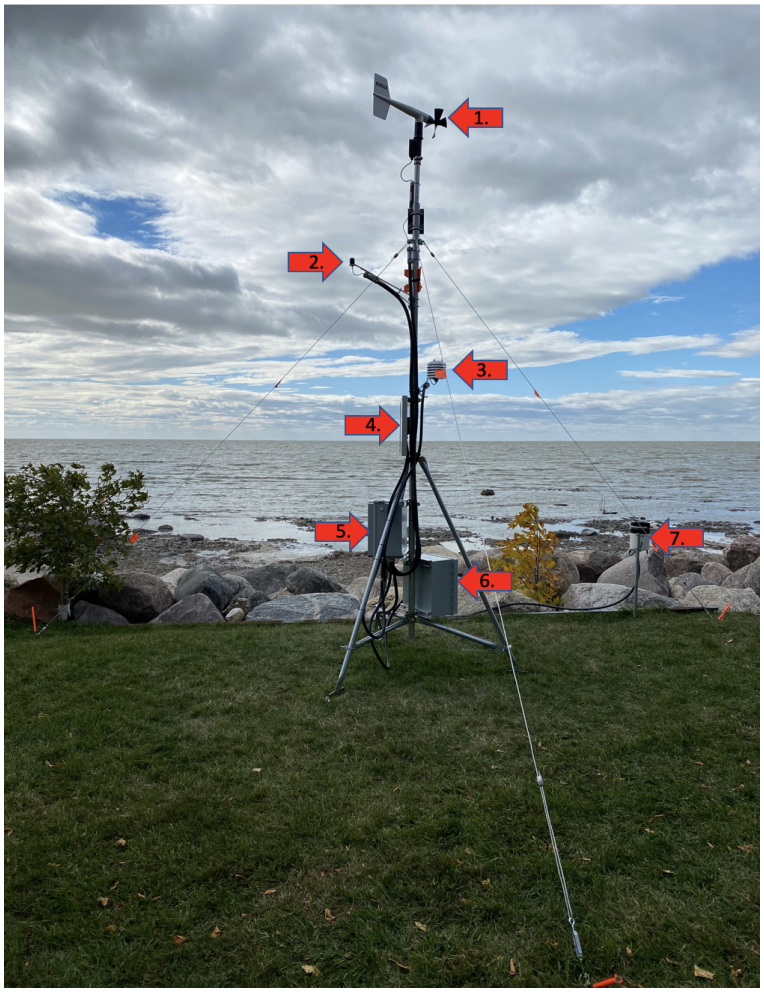

Figure 3.3: Completed Tripod with Sensors attached. (1) Anemometer (2) PAR SmartSensor (3) Temp/RH SmartSensor (4) Solar Panel (5) Logger Housing Box (6) Battery Housing Box (7) Rain Gauge

1. Attach anchor plates to the three tripod legs with the large holes facing outside.
2. Attach three leg u-bolts to each leg about 8 inches from the bottom.
3. Open tripod and place it up right, attaching the leg brace assembly to the u-bolts.
4. Place the main mast through the upper and lower mast tri-clamps.
5. Secure the mast in place after using the mast level to check it is levelled correctly.
6. Insert the top mast into the groves of the bottom mast.
7. The HOBOware energy logger housing box should be mounted at the highest point of the bottom mast.

4 Maintenance

Regular maintenance of the logger and associated sensors should be done to ensure the accuracy of data, and longevity of the equipment.

4.1 Inspecting the logger housing and cables

1. Visually verify that the logger housing box has not been damaged and is clean.
2. Cables should also be inspected at this time to ensure they are free from damage and are properly secured.

4.2 Cleaning the Logger

1. If upon visual inspection the logger is dusty, or grimy the logger and sensors should be wiped down with a wet cloth. This must be done to ensure dirt or dust from interfering with the sensors.
2. It is not advised to use any cleaners or isopropyl alcohol to clean any sensors or housing boxes.

4.3 Final Checks

Prior to leaving the set up site, complete the following steps to ensure everything is working correctly:

1. Ensure that all wires have been properly connected to the logger box.
2. Ensure the **Logging** LED light is flashing.
3. Check to see that the lights on the Iridium chip are flasking.
4. Walk around the site to make sure all garbage from the tower set up has been removed.
5. If able, take pictures of the met station from each cardinal direction, this helps to account for any objects near the Weather Station that may cause a disruption in data collection (Trees, buildings, etc.).
6. **Verify** data is streaming to the datasite. You can check this through the DataGarrison site with the username and password that was provided by Hoskins. It may take roughly 30 minutes to an hour for the data to start streaming.

   Link to account login: https://datagarrison.com/*l*

A Trouble Shooting Guide

Problem	Solution	Contact for Assistance
No status indicators are blinking	This may be due to a number of issues: - Ensure batteries are not dead. Each battery should have at least 1 volt per cell. - The memory may be full. Relaunch the logger. - The logger may not have been launched correctly or at all.	Claire.Herbert@umanitoba.ca Devin.Hammett@umanitoba.ca
Individual modules or sensors are not found by the HOBOware Launcher software	If a SmartSensor is removed and then immediately reconnected it may bot be detected. This can be fixed with the **Refresh** button in the HOBOware Launch software. You may want to check for loose connection between sensor and logger.	Devin.Hammett@umanitoba.ca
Batteries die prematurely	This can be cause by an excess of moisture or condensation in the logger enclosure. It is important to keep up general maintenance by checking the logger box regularly. Check for damaged wiring and malfunctioning sensors. This can result in short circuits that can rapidly drain batteries.	Claire.Herbert@umanitoba.ca Devin.Hammett@umanitoba.ca
Logger is not found	Check and replace the batteries and reconnect the logger. Check cable connections, computer COM port, and USB settings.	Claire.Herbert@umanitoba.ca Devin.Hammett@umanitoba.ca