Weather Station Lora Version

Operation Manual

Model: WXM-WS1001C

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1. Introduction

Thank you for purchasing this WL69 7-in-1 weather station. This device measures Rain, wind speed, wind direction, temperature, humidity, UV Index and solar radiation. The Sensor is solar powered and sends data to the receiver via a low-power radio. The Lora version allows a long distance transmission up to 600M/2000FT.
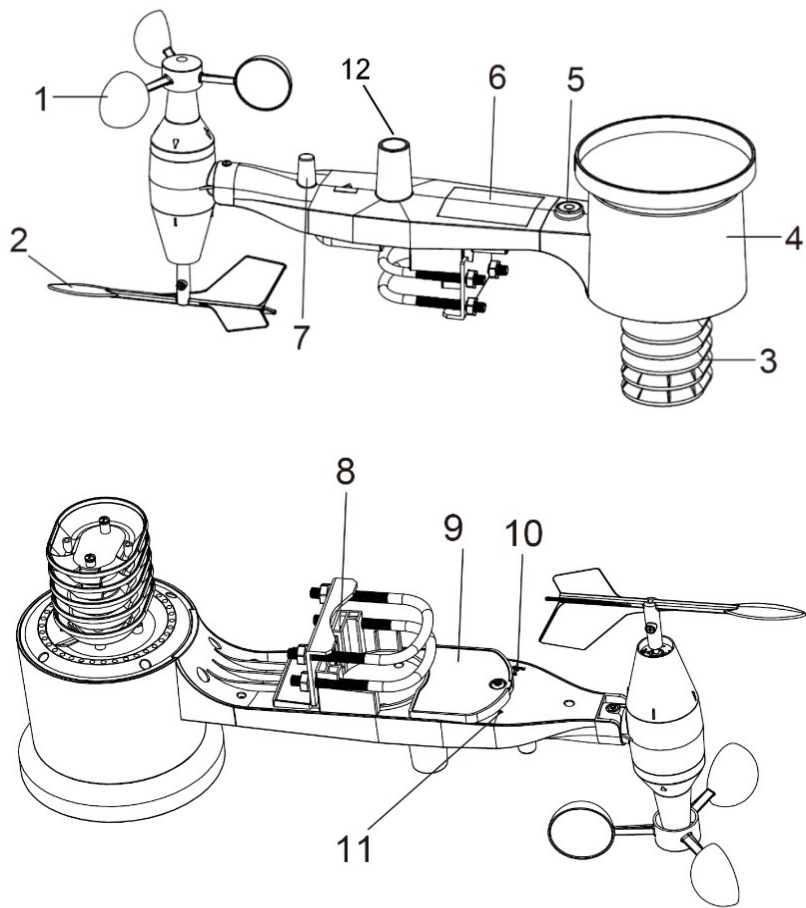
2. Unpacking

Open your weather station box and inspect that the contents are intact (nothing broken) and complete (nothing missing). Inside you should find the following:

QTY	Item Description
1	Sensor Array with built-in: Thermo-hygrometer / Rain Gauge / Wind Speed Sensor/ Wind Direction Sensor, Light and UV sensor, Solar panel
1	Wind speed cups (to be attached to outdoor sensor body)
1	Wind vane (to be attached to outdoor sensor body)
2	U-Bolts for mounting on a pole
4	Threaded nuts for U-Bolts (M6 size)
1	Metal mounting plate to be used with U-Bolts
1	Wrench for M6 bolts
1	User manual

Note: Batteries for the sensor array package are not included. You will need 2 AA size batteries, alkaline or Lithium batteries (Lithium recommended for colder climates). The batteries were primarily for startup and backup purpose. After setup and during normal operation, the unit is getting its power from solar cell

3. Overview

3.1 Outdoor 7-in-1 Sensor Array

1. Wind speed cups	7. Antenna
2. Wind vane	8. U-Bolts
3. Thermo- and hygro-meter sensors	9. Battery compartment door
4. Rain collector	10. Reset button
5. Bubble level	11. LED (red) to indicate data transmission
6. Solar panel	12.Light sensor and UV sensor

4. Setup Guide

4.1 Install U-bolts and Metal Plate

Installation of the U-bolts, which are used to mount the sensor package on a pole, requires installation of an included metal plate to receive the U-bolt ends. The metal plate, visible in Figure 1 on the right side, has four holes through which the ends of the two U-Bolts will fit. The plate itself is inserted in a groove on the bottom of the unit (opposite side of solar panel). Note that one side of the plate has a straight edge (which goes into the groove), the other side is bent at a 90-degree angle and has a curved profile (which will end up "hugging" the mounting pole). Once the metal plate is inserted, remove nuts from the U-Bolts and insert both U-bolts through the respective holes of the metal plate, as shown in Figure 1.
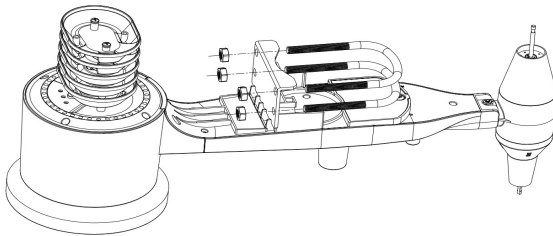

Figure 1: U-bolt Installation

Loosely screw the nuts on the ends of the U-bolts. You will tighten these later during final mounting. Final assembly is shown in Figure 2.
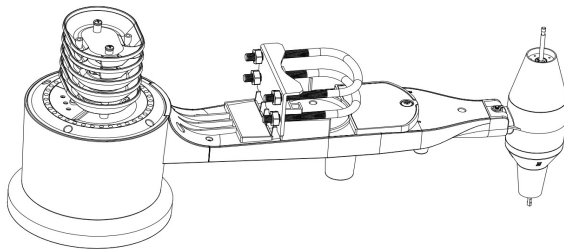

Figure 2: U-bolts and Nuts Installed

The plate and U-Bolts are not yet needed at this stage but doing this now may help avoid damaging wind vane and wind speed cups later on. Handling of the sensor package with wind vane and speed cups installed is more difficult and more likely to lead to damage.

4.2 Install Wind Vane

Push the wind vane onto the shaft on the bottom side of the sensor package until it goes no further, as shown on the left side in Figure 3. Next, tighten the set screw with a Philips screwdriver (size PH2), as shown on the right side, until the wind vane cannot be removed from the axle. Make sure the wind vane can rotate freely. The wind vane's movement has a small amount of friction, which is helpful in providing steady wind direction measurements.
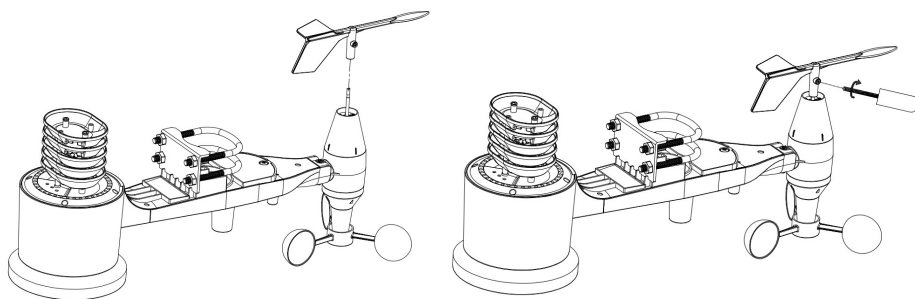
Figure 3: Wind Vane Installation

4.3 Install Wind Speed Cups

Push the wind speed cup assembly onto the shaft on the opposite side of the wind vane, as shown in Figure 4 on the left side. Tighten the set screw with a Philips screwdriver (size PH2), as shown on the right side. Make sure the cup assembly can rotate freely. There should be no noticeable friction when it is turning.
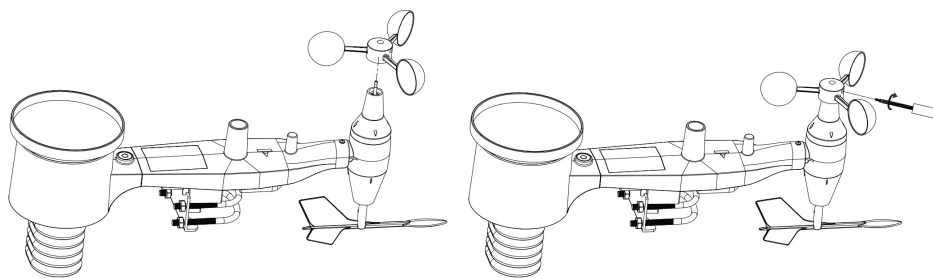

Figure 4: Wind Speed Cup Installation

4.4 Install Batteries

Open the battery compartment with a screwdriver and insert 2 AA batteries in the battery compartment. The LED indicator on the back of the sensor package (item 9) will turn on for 4 seconds and then flash once every 9 minutes indicating sensor data transmission. If you did not pay attention, you may have missed the initial indication. You can always remove the batteries and start over, but if you see the flash once every 9 minutes, everything should be OK.
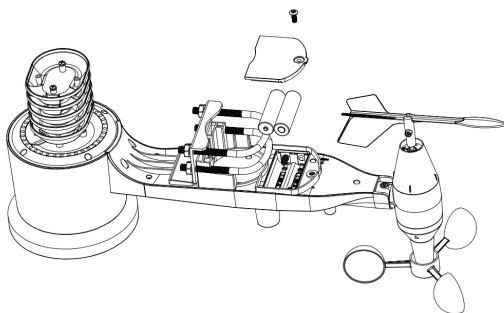

Figure 5: Battery Installation

Note: If no LED lights up or is lighted permanently, make sure the battery is inserted the correct way and properly reset the device. Do not install the batteries backwards. You can permanently damage the outdoor sensor.

Note: We recommend lithium batteries for cold weather climates, but alkaline batteries are sufficient for most climates. We do not recommend rechargeable batteries. They have lower voltages, do not operate well at wide temperature ranges, and do not last as long, resulting in poor reception.

4.5 Reset Button and Transmitter LED

In the event the sensor array is not transmitting, reset the sensor array.

Using a bent-open paperclip, press and hold the RESET BUTTON (see Figure 9) to affect a reset: the LED turns on while the RESET button is depressed, and you can now let go. The LED should then resume as normal, flashing approximately once every 9 minutes.
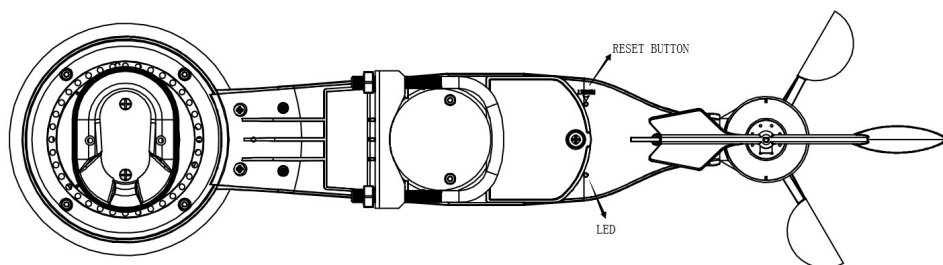

Figure 9: Reset Button and Transmitter LED

4.4 Mounting

You can attach a pipe to a permanent structure and then attach the sensor package to it (see Figure 10). The U-Bolts will accommodate a pipe diameter of 1-2 inches (pipe not included).
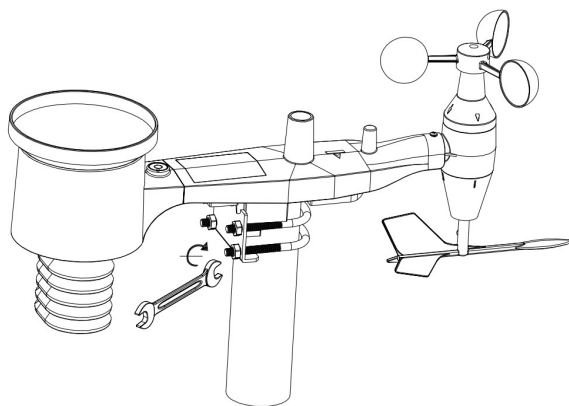

Figure 10: Sensor Package Mounting

Make sure the mounting pipe is vertical, or very close to it. Use a level if needed.

Finally, place the sensor package on top of the prepared mounting pipe. The U-Bolts should be loose enough to allow this but loosen the nuts as necessary. Once placed, hand tightens all four nuts, taking care to do so evenly. Do not use a wrench yet!

Now you will need to align the whole package in the proper direction by rotating it on top of the mounting pipe as needed. Locate the arrow labeled "WEST" that you will find on top of the sensor package next to the light sensor, on the opposite side of the solar panel. You must rotate the whole sensor package until this arrow points due west. To achieve proper alignment, it is helpful to use a compass (many cell phones have a compass application). Once rotated in the correct orientation, lightly tighten the bolts a little more (use a wrench) to prevent further rotation.

Note: The orientation to WEST is necessary for two reasons. The most important one is to position the solar panel and light sensor in the most advantageous position for recording solar radiation and charging internal capacitors. Secondly it causes a 0 reading for wind direction to correspond to due NORTH, as is customary.

Now look at the bubble level. The bubble should be fully inside the red circle. If it is not, wind direction, speed, and rain readings may not operate correctly or accurately. Adjust the mounting pipe as necessary. If the bubble is close, but not quite inside the circle, and you cannot adjust the mounting pipe, you may have to experiment with small wooden or heavy cardboard shims between the sensor package and the top of the mounting pole to achieve the desired result (this will require loosening the bolts and some experimentation).

Make sure you check, and correct if necessary, the westerly orientation as the final installation step. Now tighten the bolts with a wrench. Do not over tighten, but make sure strong wind and/or rain cannot move the sensor package.

Note: If you completed the assembly indoors and then mounted the sensor package outdoors, you may want to check and make adjustments on the receiver unit. The transportation from indoor to outdoor and handling of the sensor is likely to have "tripped" the rainfall sensing bucket and consequently the receiver unit may have registered rainfall that did not really exist. You can use pc software to clear this from history by doing a Factory Reset. Doing so is also important to avoid false registration of these readings with weather services.

5. Maintenance

Clean Rain Gauge:

Check the rain gauge every 3 months. Rotate the funnel counterclockwise and lift it up. Clean the funnel and bucket with a damp cloth to remove any dirt, debris, or insects. If there's a bug infestation, spray the array lightly with insecticide.

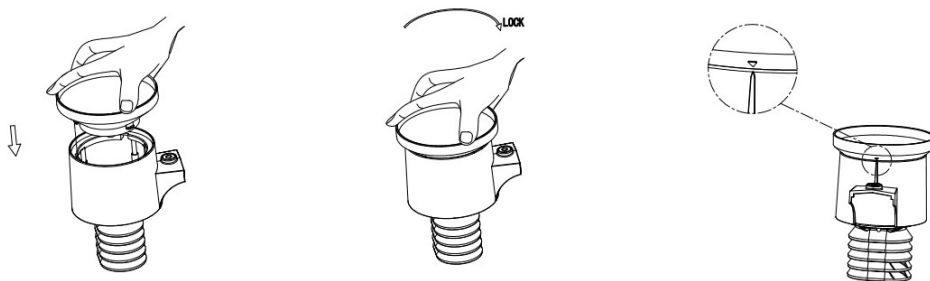Figure 11: Rain Gauge Installation and Maintenance

Clean Solar Radiation Sensor and Solar Panel:

The solar radiation sensor and solar panel of the outdoor sensor array need to be cleaned with a non-abrasive slightly damp cloth every 3 months.

Replacing Batteries Regularly:

Batteries of the outdoor sensor array need to be replaced every 1-2 years for environmental reasons. In serious environments, check the batteries every 3 months and apply a corrosion preventive compound (not included) on the battery terminals for protection.

To Prevent Snow build up:

In snowy climates, use anti-icing silicon spray on the top of the weather station to prevent snow build up.

6. Troubleshooting Guide

Problem	Solution
Outdoor data not transmitted.	The outdoor sensor array may have initiated properly and the data is registered by the console as invalid, and the console must be reset. Press the reset button as described in **Initial Receiver Unit Set Up**

Take out the batteries and wait one minute, while covering the solar panel to drain the voltage.

Put batteries back in and re-sync the console with the sensor array about 10 feet away.

The LED next to the battery compartment will flash every 9 minutes.

If the LED is not flashing every 9 minutes …

Replace the batteries in the outside sensor array.

If the batteries were recently replaced, check the polarity. If the sensor is flashing every 9 minutes, proceed to the next step.

There may be a temporary loss of communication due to reception loss related to interference or other location factors,

or the batteries may have been changed in the sensor array and the console has not been reset. The solution may be as simple as powering down and up the console (remove battery, wait 10 seconds, and reinsert battery). |
| Temperature sensor reads too high during the daytime. | Make certain that the sensor array is not too close to heat generating sources or strictures, such as buildings, pavement, walls or air conditioning units. |

Rain gauge reports rain when it is not raining	An unstable mounting solution (sway in the mounting pole) may result in the tipping bucket incorrectly measuring rainfall. Make sure you have a stable, level mounting solution.

7. Specifications

Outdoor data:

Frequency: 923MHz

RF working distance in open field: 600m (2000 feet)

Temperature range: -40˚C--60˚C   Resolution: 0.1˚C

Measuring range rel. humidity: 1%～99%

Wind speed: 0-160km/h (0~100mph) (show --- if outside range)

Light: 0-200k Lux

UV index: 0-15(0-2000 w/m2)

Sensor update interval: 10 times in 10 seconds if no response is received

                              3 minutes if a response is received

Waterproof level: IPX44

Power consumption:

Outdoor sensor: 2xAA Alkaline batteries (not included)

Battery life: Minimum 12 months for indoor & outdoor sensor

Please help in the preservation of the environment and return used batteries to an authorized depot.

FCC Caution:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum distance between 20cm the radiator your body: Use only the supplied antenna.