

ecowitt[®]



7-IN-1 WIRELESS SOLAR POWERED WEATHER SENSOR

Model: WS69



<https://s.ecowitt.com/P32JPU>

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1.Introduction

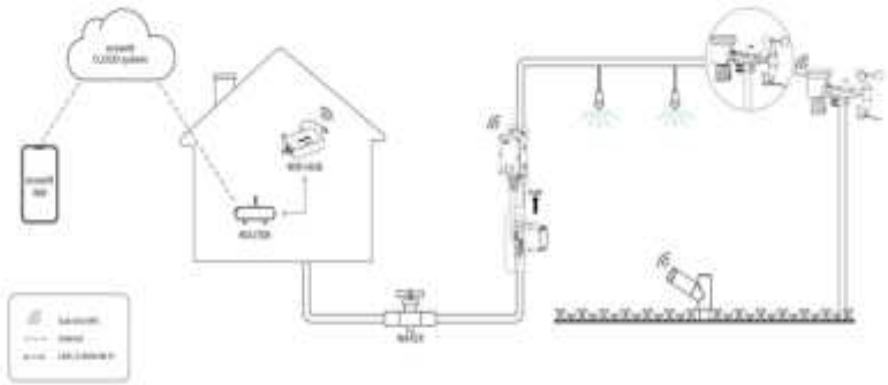


Figure 1 ECOWITT Ecosystem

Thank you for purchasing this 7-in-1 Wireless Solar Powered Weather Sensor (built-in: Thermo-hygrometer / Rain Gauge / Wind Speed Sensor/ Wind Direction Sensor, Light and UV sensor, Solar panel Sensor)! This unit measures outdoor temperature and humidity, wind direction, rainfall, wind speed, wind gust, UV & light, Solar light intensity and UV index data.

Please note that this sensor cannot be used alone. The data can be transmitted via the Ecowitt Wi-Fi Gateway or displayed on a receiver console (sold separately). Once the Wi-Fi configuration is complete, the data can be viewed on the Ecowitt app/ WS View Plus or on the receiver console.

To ensure optimal product performance, please read this manual carefully and keep it for future reference.

General Terms Used in the Manual:

Gateway:

Also known as a hub, it is a display-less console

Receiver:

Refers to the console.

RF: Radio frequency.

It refers to the ISM and SRD SubG (Industrial, Scientific and Medical and Short-Range Devices frequency bands below 1 GHz) for communicating between the console and its sensors.

This frequency is not the same as the 4G modem (LTE) or Wi-Fi working frequencies (2.4 GHz, 5 GHz.) ISM/SRD bands are kept separate from 4G frequencies by national regulations to avoid interference. Typical ISM/SRD frequencies are 915MHz(Americas), 868MHz(Europe), 433MHz(worldwide), 920MHz (Japan, Korea)

2. Warnings and Cautions

- Any metal object may attract a lightning strike, including your weather station mounting pole. Never install the weather station in a storm.
- If you are mounting the weather station to a house or structure, consult a licensed electrician for proper grounding. A direct lightning strike to a metal pole can damage or destroy your home.
- Installing your weather station in a high location may result in injury or death. Perform as much of the initial check out and operation on the ground and inside a building or home. Only install the weather station on a clear, dry day.

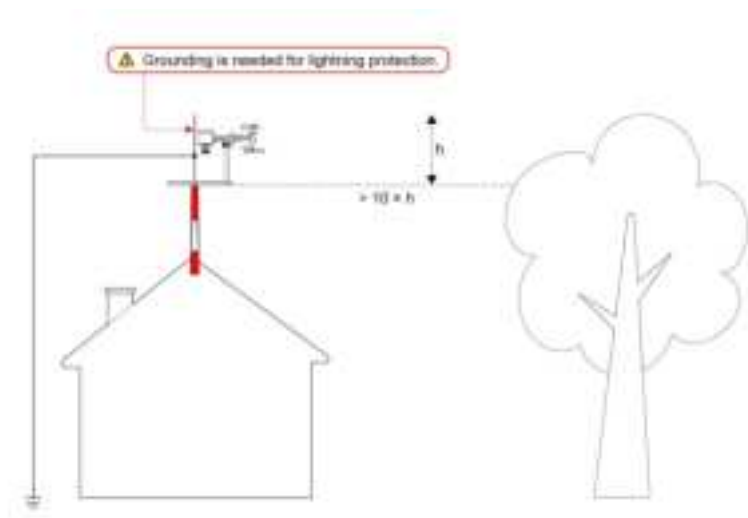


Figure 2 Grounding protection

Note:

Sensor damage, due to lack of grounding-protection against lightning ESD discharge, is not covered by warranty .

3. Instructions for Use

3.1 Part List

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	Outdoor Sensor Body 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 (this manual)

Table 1: Package content

If components are missing from the package, or broken, please contact customer service to resolve the issue.

Note: Batteries for the outdoor sensor package are **not included**.

3.2 Views and Sizes

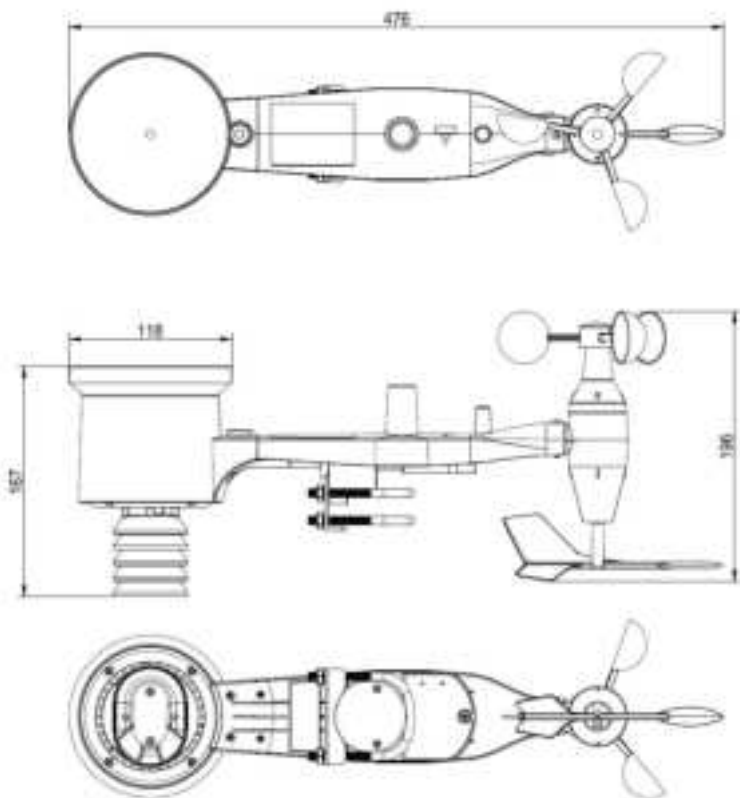


Figure 3

3.3 Overview

After full assembly, the WS69 will appear as follows.

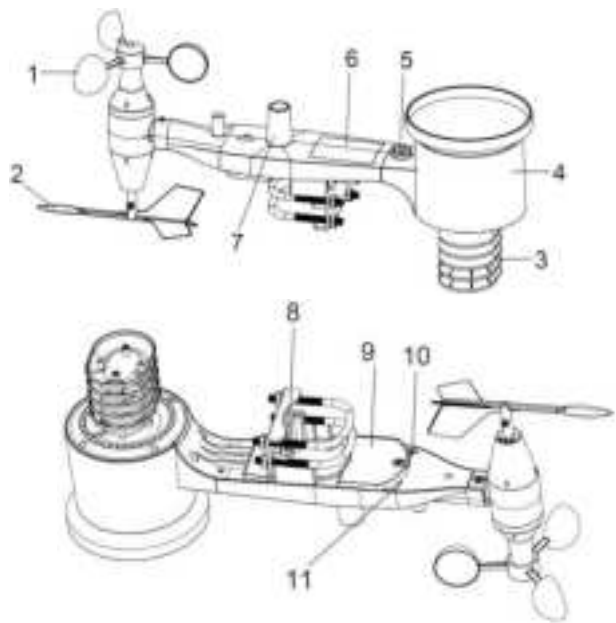


Figure 4 Sensor assembly components

1 Wind speed cups	7 Light sensor and UV sensor
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	

Table 2: Sensor assembly detailed items

3.4 Optional accessories(sold separately)

The Detachable Metal Bird Spikes Set for Rain Gauge is designed to discourage birds from landing on the sensor.

4. Configuration and Mount

4.1 Pre Installation Checkout

4.1.1 Assemble all components

To complete assembly you will need a Philips screwdriver (size PH0) and a wrench (size M6; included).

Note:

We suggest you assemble all components of the weather station, including console in one location so you can easily test functionality. After testing, place the outdoor sensor package in the desired location. Note, however, that movement during assembly, and movement after assembly can cause the rain sensor to “falsely” register rain. It is therefore best if you do not connect the console to any Internet services until you have reset these false readings using the console. The errant values may be hard to remove from Internet services if you do not reset first.

Attention:

Follow suggested order for battery installation (outdoor sensor first, console second)

4.1.2 Site Survey

Perform a site survey before installing the weather station. Consider the following:

You must clean the rain gauge every few months and change the batteries every 2-3 years. Provide easy access to the weather station.

Avoid radiant heat transfer from buildings and structures. In general, install the sensor array at least 5' or 1.52m from any building, structure, ground, or roof top.

Avoid wind and rain obstructions. The rule of thumb is to install the sensor array at least four times the distance of the height of the tallest obstruction. For example, if the building is 20' or 6.10m tall and the mounting pole is 6' or 1.83m tall, install the sensor array $4 \times (20 - 6)' = 56'$ or $4 \times (6.1 - 1.83) = 17.08\text{m}$ away.

Mount the sensor array in direct sunlight for accurate temperature readings.

Installing the weather station over sprinkler systems or other unnatural vegetation may affect temperature and humidity readings. We suggest mounting the sensor array over natural vegetation.

Wireless Range. Radio communication between receiver and transmitter in an open field can reach a distance of up to 330 feet or 100 meter, providing there are no interfering obstacles such as buildings, trees, vehicles and high voltage lines. Wireless signals will not penetrate metal buildings. Under most conditions, the maximum wireless range is 100' or 30m.

Radio Interference. Computers, radios, televisions and other sources can interfere with radio communications between the sensor array and console. Please take this into consideration when choosing console or mounting locations. Make sure your display console is at least five feet or 1.52 meter away from any electronic device to avoid interference.

4.2 Assemble the WS69

4.2.1 Install U-bolts and metal plate

Installation of the U-bolts, which are in turn 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 5 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 5.

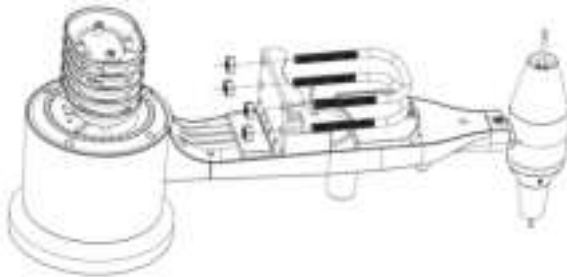


Figure 5 U-Bolt installation

Loosely screw on the nuts on the ends of the U-bolts. You will tighten these later during final mounting. Final assembly is shown in Figure 6 .

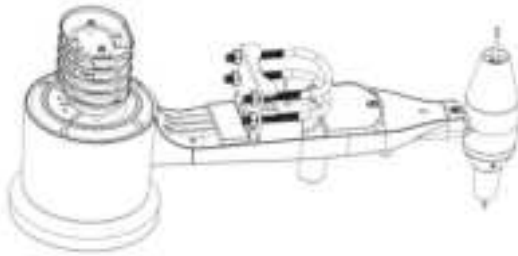


Figure 6 U-Bolts and nuts installed

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 to install these bolts is more difficult and more likely to lead to damage.

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 7. Next, tighten the set screw, with a Philips screwdriver (size PH0), 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.

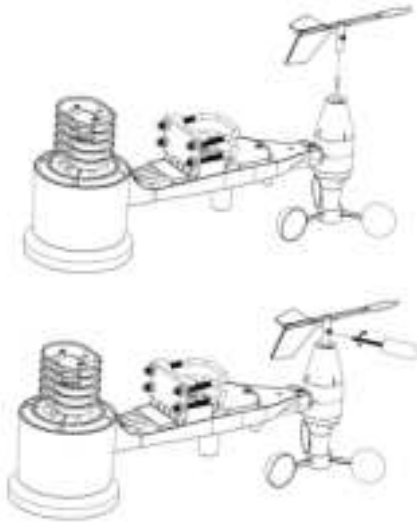


Figure 7 Wind vane installation diagram

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 8. on the left side. Tighten the set screw, with a Philips screwdriver (size PH0), 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 8 Wind speed cup installation diagram

4.3 Pairing with a gateway/console

4.3.1 Compatible Gateways/Consoles for WS69

You need to pair this device with the Ecowitt Wi-Fi Gateway or display consoles in order to view data on your Ecowitt app and receive email alerts on our weather server. Compatible models are listed in the table below.














Console Model Name	Picture	Whether the data could Upload to Internet	Whether the data Could Display on the Gateway/Console
GW1100		√	×
GW1200		√	×
GW2000		√	×
GW3000		√	×
HP2550		√	√
HP2560		√	√
HP3500		√	√
WN1820/WN1821		√	×
WN1900/WN1910		√	×
WN1920/WN1980		√	×
WS3800		√	√
WS3900/WS3910		√	√
WS6210		√	×

Table 3

- The WN1900/WN1910/WN1920/WN1980 can't display the light intensity and UV data(Uploading not affected).
- The WN1820/WN1821 only displays the outdoor temperature and humidity data(Uploading not affected).

4.3.2 Configure with Gateway/Console

For details in this part, please refer to the manual of the gateway/console.

If Wi-Fi gateway has been in operation, and you have never had a weather sensor setup before, the sensor and Wi-Fi gateway will pick its data automatically.

4.4 Power up the WS69

Battery Usage Warnings	
Correct Installation	Insert the battery with the correct polarity. The system requires initial power from the backup battery before the solar panel takes over. If the LED does not light up or stays on permanently, check battery orientation and reinsert if needed. Incorrect installation may cause permanent damage.
Cold Weather Considerations	In winter or high-altitude areas with limited sunlight, the system depends more on the backup battery. Lithium batteries are recommended for better performance in cold conditions.
Battery Type Recommendations	Do not use rechargeable NiMH or NiCd batteries, as they are unsuitable. Lithium batteries are ideal for cold climates, while alkaline batteries work for most environments. Rechargeable batteries should never be used due to their lower voltage.

Table 4

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 four seconds and then flash once every 16 seconds 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 16 seconds, everything should be OK.

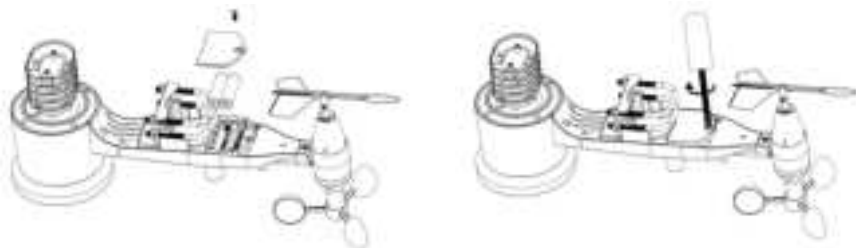


Figure 9 Battery installation diagram

4.5 View Online Data on Ecowitt APP

When the Wi-Fi configuration is done, you can view the live data of your weather sensor on the Ecowitt app.

4.6 Notes Before you mount

4.6.1 keep the assembled outdoor sensor nearby

Before proceeding with the outdoor mounting detailed in this section, keep the assembled outdoor sensor package nearby (although preferably not closer than 5 ft. or 1.53m from the console). This will make any troubleshooting and adjustments easier and avoids any distance or interference related issues from the setup.

After setup is complete and everything is working, return here for outdoor mounting. If issues show up after outdoor mounting they are almost certainly related to distance, obstacles etc.

4.6.2 Power off the Gateway/Console

- Moving the sensor from indoors to outdoors may accidentally trigger the rainfall sensing bucket, causing the console to register false rainfall data. To prevent this, you can temporarily turn off the gateway after pairing.
- Additionally, use the console functions to clear any incorrect rainfall records if necessary.
- This step is important to ensure that false readings are not reported to weather services.

4.7 Final Mount

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).

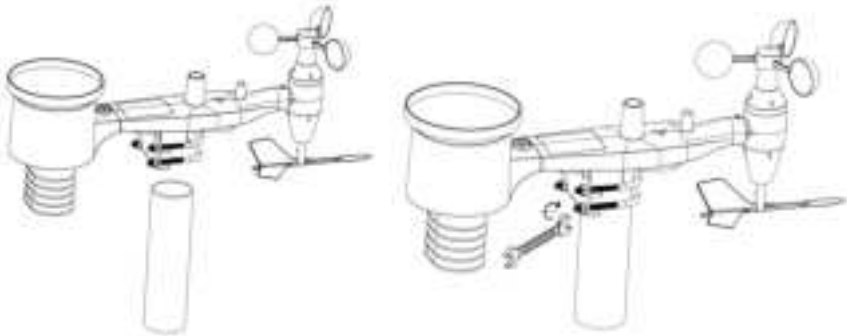


Figure 10 Sensor package mounting diagram

4.7.1 Vertical confirmation

1. Ensure the Mounting Pipe is Vertical

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

2. Place the Sensor Package on the Mounting Pipe

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-tighten all four nuts, taking care to do so evenly. **Do not use a wrench yet!**

3. Align the Sensor Package

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” on top of the sensor package, right next to the light sensor, on the opposite side of the solar panel. Rotate the entire 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 aligned correctly, lightly tighten the bolts a little more (use a wrench) to prevent further rotation.

4. Check the Bubble Level

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 need 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).

5. Final Step

Make sure you check, and correct if necessary, the westerly orientation as the final installation step. Then, tighten the bolts with a wrench. Do not

overtighten, but ensure that strong wind and/or rain cannot move the sensor package.

4.7.2 Orientation to WEST & Note for Northern and Southern Hemispheres

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 zero reading for wind direction to correspond to due NORTH, as is customary. This orientation is correct for installations in the northern hemisphere. If you are installing in the southern hemisphere, the correct orientation to achieve the same optimal positioning is to have the “WEST” arrow actually point due EAST! This has the side effect, however, of lining up the 0 reading of the wind direction with SOUTH. This needs to be corrected using a 180-degree offset in the calibration settings.

4.7.3 Outdoor Mounting

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 right 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.

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, and 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 tested the full assembly indoors and then came back here for instructions and mounted to sensor package outdoor you may want to make some further adjustments on the console. The transportation from indoor to outdoor and handling of the sensor is likely to have “tripped” the rainfall sensing bucket one or more times and consequently the console may have registered rainfall that did not really exist. You can use console functions to clear this from history. Doing so is also important to avoid false registration of these readings with weather services.

4.8 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 11) 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 16 seconds.

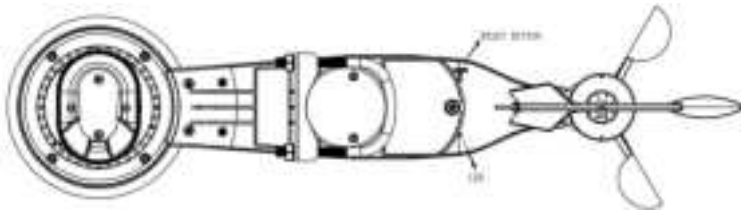


Figure 11 Reset button and Transmitter LED location

4.9 Replace the old weather sensor

If you want to use a new WS69 sensor to replace a old weather sensor (already configured on certain channel), please try the following:

- 1.Open the Sensor ID page on the Ecowitt app, and find your old sensor ID.
- 2.Power off the old sensor and power on the new sensor.
- 3.Click Re-register on the Sensor ID page.

Then the new sensor will be learned, and the old sensor will be erased.

4.10 Best Practices for Wireless Communication

Wireless (RF) communication is susceptible to interference, distance, walls and metal barriers. We recommend the following best practices for trouble free wireless communication between both sensor packages and the console:

Electro-Magnetic Interference (EMI). Keep the console several feet away from computer monitors and TVs.

Radio Frequency Interference (RFI). If you have other devices operating on the same frequency band as your indoor and/or outdoor sensors and experience intermittent communication between sensor package and console, try turning off these other devices for troubleshooting purposes. You may need to relocate the transmitters or receivers to avoid the interference and establish reliable communication. The frequencies used by the sensors are

one of (depending on your location): 433, 868, or 915 MHz (915 MHz for United States).

Line of Sight Rating. This device is rated at 300 feet or 100 meter line of sight (under ideal circumstances; no interference, barriers or walls), but in most real-world scenarios, including a wall or two, you will be able to go about 100 feet or 30 meter.

Metal Barriers. Radio frequency will not pass through metal barriers such as aluminum siding or metal wall framing. If you have such metal barriers and experience communication problems, you must change the placement of sensor package and or console.

The following table shows different transmission media and expected signal strength reductions. Each “wall” or obstruction decreases the transmission range by the factor shown below.

Medium	RF Signal Strength Reduction
Glass (untreated)	5-15%
Plastics	10-15%
Wood	10-40%
Brick	10-40%
Concrete	40-80%
Metal	90-100%

Table 5: RF Signal Strength reduction

5. Features

- Measures outdoor temperature and humidity wind direction, rainfall, wind speed, wind gust, UV & light, Solar light intensity and UV index data.
- No display, need to work with the WIFI gateway to complete the WIFI configuration on our WS View Plus/ Ecowitt App.
- After the WIFI configuration, the live weather data can be viewed directly on the WS View Plus/ Ecowitt App.
- Supports uploads to WU/Weather Cloud/WOW. The history graph of your WU station ID can be viewed on the WU Dashboard on the WS View Plus/ Ecowitt App.
- Works with Ecowitt Weather Station display console(sold separately). The outdoor sensor and display console should be at the same frequency.

6. Specifications

Note: Out of range values will be displayed “---”:

Outdoor 7-in-1 sensor	Specification
Transmission distance in open field	100 m (328 ft.)
RF Frequency	433/868/915 MHz depending on location
Dimensions	475×118×207(mm)
Weight	634(g)
Material of Plastic Casing	PC+ABS
Temperature range	-40°C – 60°C (-40°F - 140°F)
Temperature accuracy	± 1°C, or ± 1.8°F
Temperature resolution	0.1°C, or 0.2°F
Humidity range	1%RH ~ 99%RH
Humidity accuracy	± 5%RH
Humidity resolution	1%RH
Rain volume display range	0 – 9999 mm
Rain volume accuracy	± 10%
Rain volume resolution	0.3 mm (for volume < 1,000 mm) 1 mm (for volume ≥ 1,000 mm)
Wind speed range	0 – 50 m/s (0 ~ 100 mph)
Wind speed accuracy	± 1 m/s (speed < 10 m/s) ± 10% (speed ≥ 10 m/s)
Wind speed Metering Resolution	0.1m/s
Wind Metering Inertval	2s
Gust wind speed	Maximum wind speed recorded in the past 16 seconds
Wind direction Metering Range	0° to 359°
Wind direction Metering Accuracy	± 15°
Wind direction Metering Resolution	1°

Light Metering Range	0 – 200 kLux
Light Metering Accuracy	± 25%
Light Metering Resolution	0.1Klux
UV Metering Range	0 - 15
UV Metering Accuracy	±2
UV Metering Resolution	1
Sensor reporting interval	16 seconds
Operating Temperature Range	-40°C to 60°C(-40°F to 140°F)
Protection Rating	IP44

Table 6 Outdoor sensor specification

Power	Specification
7-in-1 weather sensor	Solar panel (built-in)(6.5V/60mA)
7-in-1 weather sensor (backup)	2 x AA LR6 Alkaline/Lithium batteries (not included)

Table 7 Power specification

The primary power source for the outdoor sensor is the solar panel. When available solar power (light over recent period) is insufficient, the batteries will be used. In outdoor climates that frequently have sustained temperatures below 0°C (or 32°F) the use of Lithium batteries is strongly suggested as these are performing better than Alkaline batteries under such circumstances.

7. Warranty

We disclaim any responsibility for any technical error or printing error or the consequences thereof.

All trademarks and patents are recognized.

We provide a 2-year limited warranty on this product against manufacturing defects or defects in materials and workmanship.

This limited warranty begins on the original date of purchase, is valid only on products purchased, and only to the original purchaser of this product. To receive warranty service, the purchaser must contact us for problem determination and service procedures.

This limited warranty covers only actual defects within the product itself and does not cover the cost of installation or removal from a fixed installation, normal set-up or adjustments, or claims based on misrepresentation by the seller, or performance variations resulting from installation-related circumstances.

8. FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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

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

IC Caution:

English:

This device contains licence-exempt transmitter(s) /receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

9. Care and Maintenance

9.1 Maintenance Routine

The following steps should be taken for proper maintenance of your station

1. Clean the rain gauge once every 3 months.

Rotate the funnel counter-clockwise and lift to expose the rain gauge mechanism, and clean with a damp cloth. Remove any dirt, debris and insects. If bug infestation is an issue, spray the array lightly with insecticide.



Figure 12 Rain gauge installation and maintenance

2. Clean the solar radiation sensor and solar panel every 3 months with a non-abrasive slightly damp cloth.
3. Replace batteries every 1-2 years.

If left in too long, the batteries may leak due to environmental challenges. In harsh environments, inspect the batteries every 3 months (while cleaning the solar panel).

4. When replacing the batteries, apply a corrosion preventing compound on the battery terminals, available at Amazon and most hardware stores.
5. In snowy environments, spray the top of the weather station with anti-icing silicon spray to prevent snow build up.

9.2 Battery usage

When batteries of different brand or type are used together, or new and old batteries are used together, some batteries may be over-discharged due to a difference of voltage or capacity. This can result in venting, leakage, and rupture and may cause personal injury.

- Do not mix Alkaline, Lithium, standard, or rechargeable batteries.
- Always purchase the correct size and grade of battery most suitable for the intended use.
- Always replace the whole set of batteries at one time, taking care not to mix old and new ones, or batteries of different types.
- Clean the battery contacts and also those of the device prior to battery installation.
- Ensure the batteries are installed correctly with regard to polarity (+ and -).
- Remove batteries from product during periods of non-use. Battery leakage can cause corrosion and damage to this product.
- Remove used batteries promptly.
- For recycling and disposal of batteries, and to protect the environment, please check the internet or your local phone directory for local recycling centers and/or follow local government regulations

10. Contact Us

10.1 After-sales Service

Order Issues:

If you encounter any missing or incorrect shipments of Ecowitt products purchased, please reach out to the respective platform's customer service from the store where you bought the product for assistance.

Usage Inquiries:

Our product is continuously changing and improving, particularly online services and associated applications. To download the latest manual, and additional help, and for any issues related to product usage feel free to contact our customer support team at support@ecowitt.com. We are committed to providing assistance and resolving any concerns you may have.

10.2 Stay in Touch

Ask questions, watch setup videos, and provide feedback on our social media outlets. Follow Ecowitt on Discord, YouTube, Facebook and Twitter.



Patented: US12,181,491B2

This product (WS85, WS80, WS69) is protected by
US Patent No. 12,181,491B2.