ecowitt®

Solar powered ultrasonic anemometer with Light and UV, air temperature/humidity sensor integrated

Model: WS80

https://s.ecowitt.com/C7W33P

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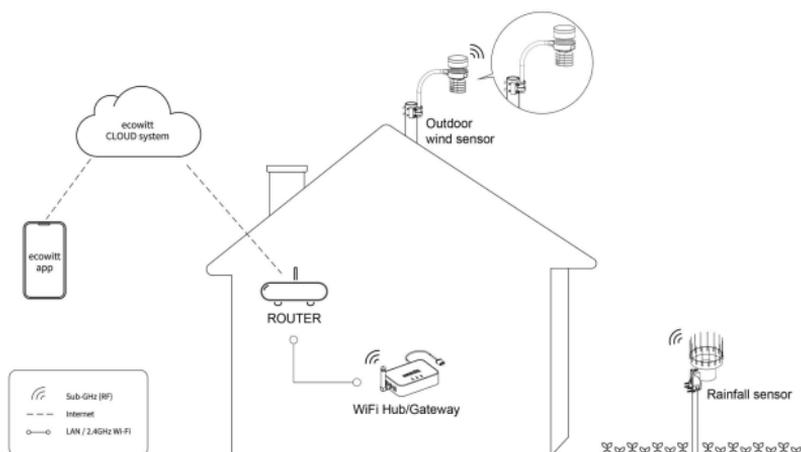
Figure 1 ECOWITT Ecosystem

Thank you for purchasing this WS80 6-in-1 Wireless Solar Powered Weather Sensor (built-in: Thermo-hygrometer / Wind Speed Sensor/ Wind Direction Sensor, Light and UV sensor, Solar panel)! This device measures wind speed, wind direction, temperature, humidity, UV Index and solar radiation. 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 Sub-G (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. Pairing with a data receiver

You need to pair this sensor with the Ecowitt Wi-Fi Gateway or 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.

Gateways		
GW1XXX	GW2000	GW3000
WS6210	WS6006	

Table 1

Consoles			
HP25XX	HP3500	WS38XX	WS39XX
WN182X	For WN1900/1910 WN1900 /WN1910	WN1920 /WN1980	WN1700

Table 2

- 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).

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	WS80 weather sensor
1	U-Bolts set for mounting on a pole (2pcs/set)
1	Threaded nuts for U-Bolts set (M6 size) (4pcs/set)
1	Mounting arm for ultrasonic anemometer
1	Mounting bracelet for ultrasonic anemometer
1	User manual (this manual)

Table 3 Package content

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

Note: Batteries are **not included**.

Note: There is a built-in heat plate in the WS80 sensor body. If you live in an area where the temperature often drops below 0°C (or 32°F) and the weather is frequently snowy or rainy, it is recommended to supply external 12V/1A power**(not included)** to activate the heating function. This helps melt accumulated snow or ice, which can significantly affect wind measurement accuracy.

The heat plate is controlled by a built-in thermostat: it will automatically turn on when the internal temperature of the battery compartment is ≤ 3°C (37.4°F) and automatically turn off when it reaches ≥ 29°C (84.2°F).
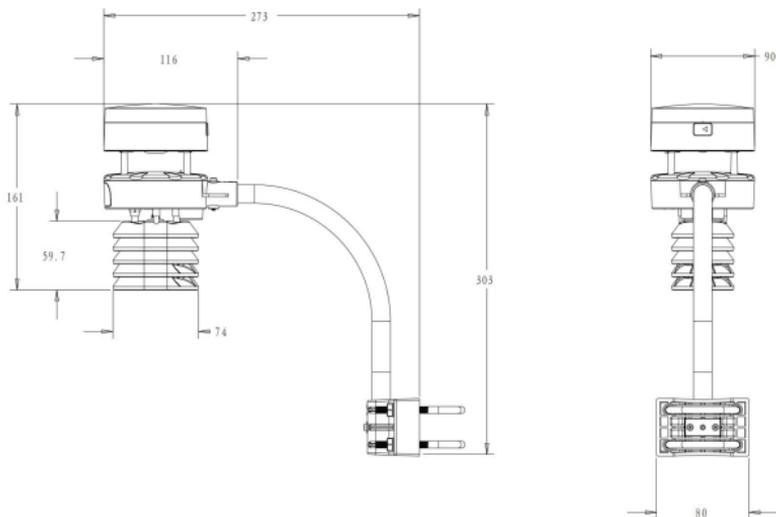
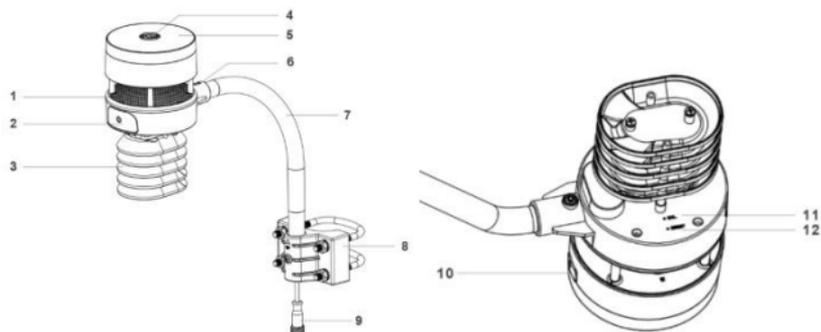## 3.2 Views and Sizes

Figure 2

3.3 Overview

Figure 3 Sensor package assembly components

1. Surface tension conditioner layer (patent pending)	7. Mounting arm
2. Battery compartment	8. Mounting bracelet and U-bolt set
3. Temperature & humidity sensor	9. Power cord for built-in heater
4. Light & UV sensor, LED indicator	10. USB port (factory use only)
5. Solar Panel	11.Calibration button (factory use only)
6. NORTH alignment indicator	12. Reset button

Table 4 Sensor package assembly component list

3.4 Optional accessories(sold separately)

● **Extension Battery Pack:**

If you want to install it at a high location without using power extension cords, choose an Extension Battery Pack.

● **Extension Cord and DC 12V/1A Power Adapter / 3M extension cord**

There is a built-in heating element in the sensor housing. If the lowest temperature in your area falls below 0°C (32°F), and the weather is mostly snowy or rainy, you may need to activate the heater. To do so,

supply power to the heating element using either a DC 12V/1A power adapter or a 3M extension cord.

Please select and connect the appropriate accessory based on the required port.

4. Power up

4.1 Battery Usage Warning

Battery Usage Warning	
Correct Battery Installation	Ensure the battery is inserted with the correct polarity. The system requires initial power from this backup battery to start up before the solar panel charges the accumulator and supplies system power.
Cold Weather Considerations	In high-altitude areas during winter, sunlight exposure is limited, and the system relies more on the backup battery. We recommend using lithium batteries for better performance in cold climates.
Avoid Alkaline	If the internal heater is activated

Batteries for Heated Operation	during cold and wet conditions, heat will build up inside the device. Alkaline batteries are highly prone to leakage when exposed to high temperatures and should be avoided in such scenarios.
Battery Type Recommendations	Alkaline batteries can be used but should be avoided if the heater is activated. Rechargeable NiMH or NiCd batteries should not be used as they are not suitable for this system.

Table 5

4.2 Install Battery

Use a screwdriver to open the battery compartment and insert 2 AA batteries. Press the "Reset" button — the LED will turn on for 3 seconds, then blink every 4.8 seconds to indicate normal data transmission. If you miss the initial light, you can press "Reset" again.

If the solar panel has already charged the internal capacitor, inserting batteries may not start the system. In this case, press "Reset" to activate it.
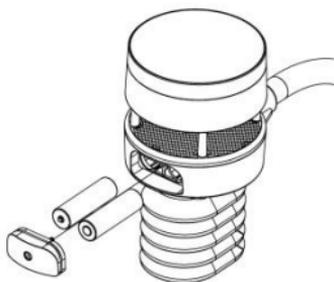
Figure 4 Battery installation diagram

Note: The primary power source for the sensor is the solar panel. When available solar power (light over recent period) is insufficient, the batteries will be used.

5. View Live and Online Data

Important Notice:
Due to the higher update frequency of the transmitter, while the gateway uploads only the latest data once per minute, the MAX and MIN values shown on the app dashboard may differ from those displayed on the local console. The local console calculates MAX and MIN values based on all received readings, whereas the gateway only reports the latest value within each upload interval, which may result in differences in the recorded MAX and MIN data.

The console will automatically receive signals from a powered-on sensor array and lock onto the first detected data source of the same data type. If your dashboard has received some data when your sensor array is powered off, it indicates nearby devices emitting similar signals. Register the labeled sensor ID via the console or set up the ID in the APP/Web UI after the WiFi connection.

For gateway users, complete the WiFi setup first, then read the data via the APP/Web UI dashboard. If your dashboard has received some data when your sensor array is powered off, please manually register the sensor ID to lock your sensor ID before powering on your sensor.

For detailed operation, please refer to the data receiver manual.

5.1 Replace the old weather sensor

If you want to use a new WS80 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.

6. Mounting

6.1 Before you mount

Before installing your outdoor sensor in the permanent location, we recommend operating the device for one week in a temporary location with easy access. This will allow you to check out all of the functions, ensure proper operation and familiarize you with the device performance.

6.2 Site Survey

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

You 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 x (20 – 6)' = 56' or 4 x (6.1-1.83)=17.08m 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.

6.3 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.
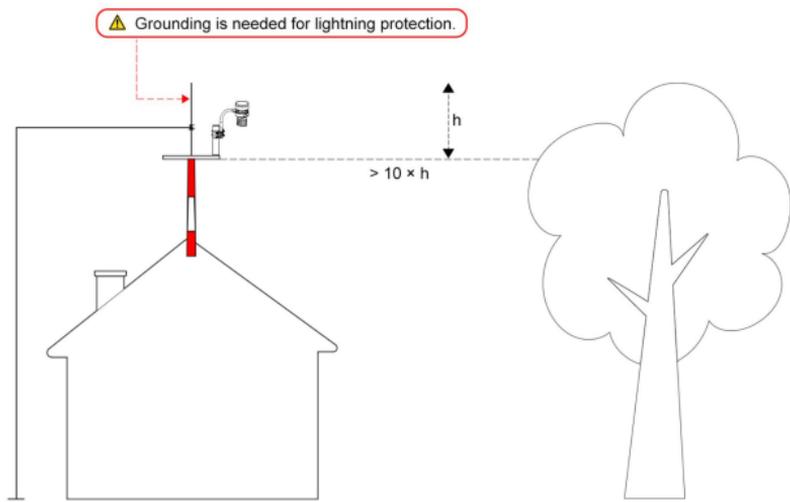
Figure 5 Grounding protection

Note:

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

6.4 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 6 RF Signal Strength reduction

6.5 Mounting on a pole

- You can attach a pole(not included) to a permanent structure and then attach the sensor package to it.
- The U-Bolts will accommodate a pole diameter of 1.25-2 inches (pole not included).

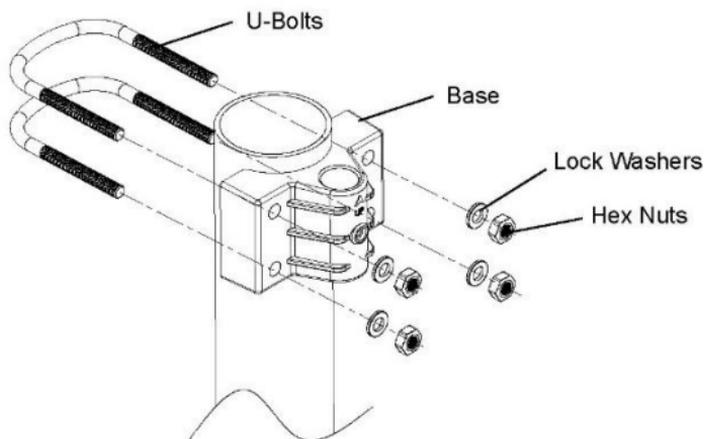1. Install the base on a pole (1.25inch~2inch).

Figure 6 Sensor package mounting diagram 6-1

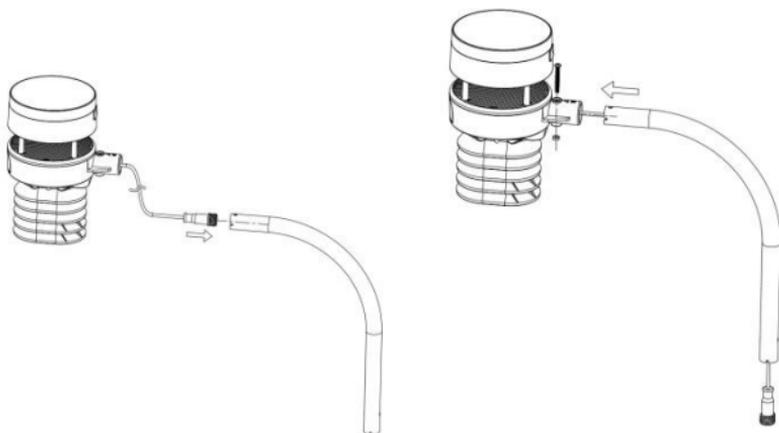2. Pass the connector cord through the arm tube:

Figure 7 Sensor package mounting diagram 6-2

3. Attaching the arm tube to the WS80 sensor.

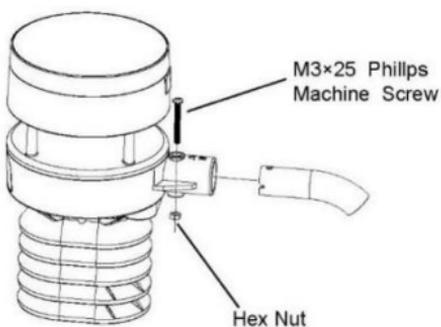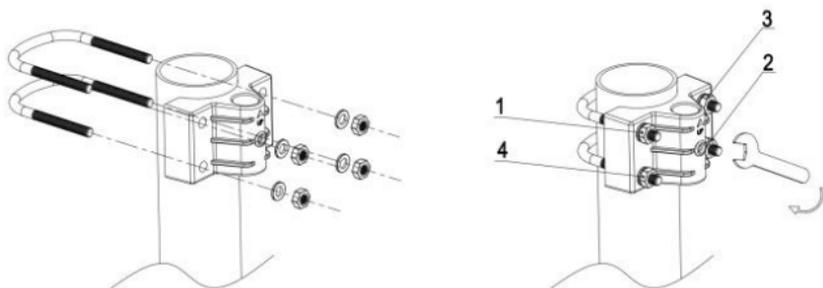M3×25 Phillps Machine Screw

Hex Nut

Figure 8 Sensor package mounting diagram 6-3

4. Install the base with U-bolts and threaded nuts to a pole (not included):

Install each M6 nut in the order 1,2,3 then 4.
Do not tighten with an impact driver.
Hand tighten, then a half turn/180°
No more. If your mounting pole
is a soft material (wood, pvc, etc.)
you may need to retighten the
M6 nuts when you perform your
maintenance every 3 months.

Figure 9 Sensor package mounting diagram 6-4
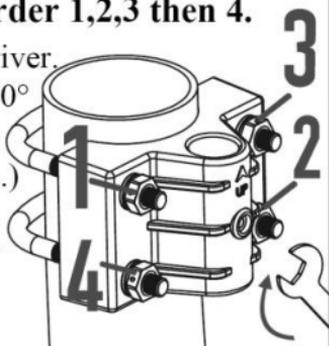
5. Insert the arm tube into the base. Be sure to line up the small hole in the arm with the holes in the base. Insert the machine screw through the holes in the base and arm. (if you don't need to power up the heater, you should keep the power cord terminal inside the mounting arm and this can make the installation looks neat and tidy. You may take it out when needed.)
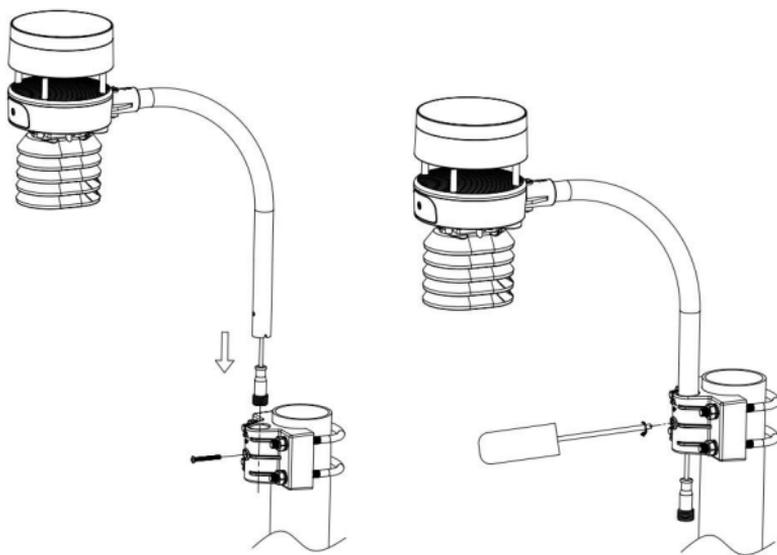
Figure 10 Sensor package mounting diagram 6-5

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

6. Accessory: 3M extension cord (sold separately)

During wintertime, to prevent ice from forming on the reflective surface, you may optionally use either a 3M extension cord or an extension cord with a DC 12V/1A power adapter. Please choose and connect the appropriate accessory according to the required port.

Accessory Part only, not included!
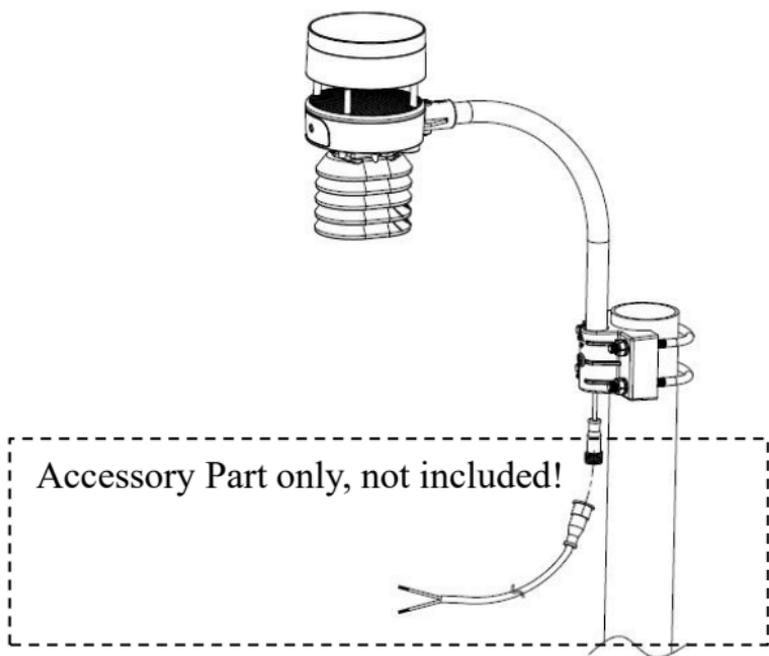
Figure 11 Sensor package mounting diagram 6-6

7. Accessory: Extension Cord and DC 12V/1A Power Adapter (not included)

Please choose and connect the appropriate accessory according to the required port. Connect the extension cord, then plug it into the AC adapter.

Accessory Part only, not included!

Figure 12 Sensor package mounting diagram 6-7

Finally, place the sensor 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!

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 "NORTH" that you will find on top of the connector tube of the sensor pack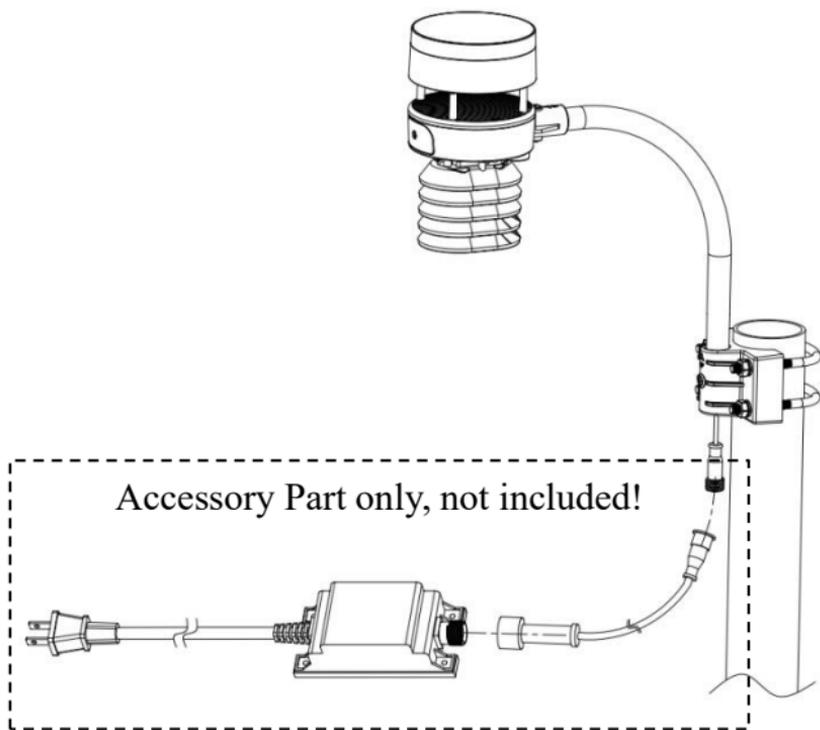age. You must rotate the whole sensor package until this arrow points due north. To achieve proper alignment, it is helpful to use a compass (many cell phones have a compass application). Once rotated in the correct orientation, lightly tighten the bolts a little more (use a wrench) to prevent further rotation.

Note: In **Southern hemisphere**, it is **not necessary** to change the orientation to SOUTH as its solar panel is a rounded type and it is orientation free for its charging capability.

Make sure the mounting tube for the sensor package is installed vertically (use a level at 90-degree offsets around the tube). Adjust the mounting pipe as necessary. Next also make sure the mounting of the anemometer body on the pipe is level. If it is not, wind direction and speed readings may not operate correctly or accurately. Adjust the mounting assembly as necessary.

Make sure you check, and correct if necessary, the north orientation again, 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.

7. Specifications

Model	WS80
Name	Solar powered ultrasonic anemometer with Light and UV, air temperature/humidity sensor integrated(optional heater for climate with snow/ice conditions available)
Dimensions	116×90×161(mm)
Dimensions With Bracket	273×90×303(mm)
Weight	617(g)
Material of Plastic Casing	PC+ABS
Temperature Metering Range	-40°C to 60°C(-40°F to 140°F)
Temperature Metering Accuracy	±1°C (± 1.8°F)
Temperature Metering Resolution	0.1°C (0.2°F)

Humidity Metering Range	1%RH to 99%RH
Humidity Metering Accuracy	±5%RH
Humidity Metering Resolution	1%RH
Wind speed Metering range	0m/s to 40 m/s (0mph to 89mph)
Wind speed Metering accuracy	<10m/s, ±0.5m/s; ≥10m/s, ±5%
Wind speed Metering resolution	0.1m/s
Wind Metering Interval	**2s**
Gust wind speed	**Maximum wind speed recorded in the past 28 seconds**
Wind direction Metering range	0° to 359°
Wind direction Metering accuracy	±15°
Wind direction Metering resolution	1°
Light Metering range	0Klux to 200Klux
Light Metering accuracy	±25%

Light Metering resolution	0.1Klux
UV Metering range	1 to 15
UV Metering accuracy	±2
UV Metering resolution	1
Data reporting Interval	**About 5 seconds**
RF Connection Frequency	920/915/868/433MHz (depending on local regulations)
RF Wireless Range (in open areas)	Over 100 meters (330 ft.)
Operating Temperature Range	-40°C to 60°C(-40°F to 140°F)
Protection Rating	IPX5
Built-in Solar panel	7.5V±5% / 30mA±10%
Power Supply	2*AA batteries(not included) or DC12V/1A Power adapter (not included)
Battery Life	1 year
Super capacitor Capacity	20mAh

Table 6

Note:

The primary power source for the sensor is the solar panel. When available solar power (light over recent period) is insufficient, the batteries will be used.

Note:

- The wind speed is detected at 2-second intervals.
- The wind speed reading will be a real-time value (The latest sampling data will be reporting to the receiver).
- **The wind gust reading will be the max wind speed in the past 28s.**
- When the wind speed is lower than 5m/s, the dispersion of wind direction will increase.

8. Calibration and Maintenance

8.1 How to calibrate WS80

Ensure WS80 has been paired with the gateway/console. Make sure your mobile device and the gateway/console are connected to the same Wi-Fi network.

8.1.1 A certain parameter Calibration

If you have data from a relatively accurate weather station. You can use the data to do the calibration.
Use Indoor temperature as an illustration in the Figure 13.

1. Open the Ecowitt app. Click "…" on top right corner and choose "Calibration".
2. Calculate the offset of data from accurate weather station and ecowitt sensor.
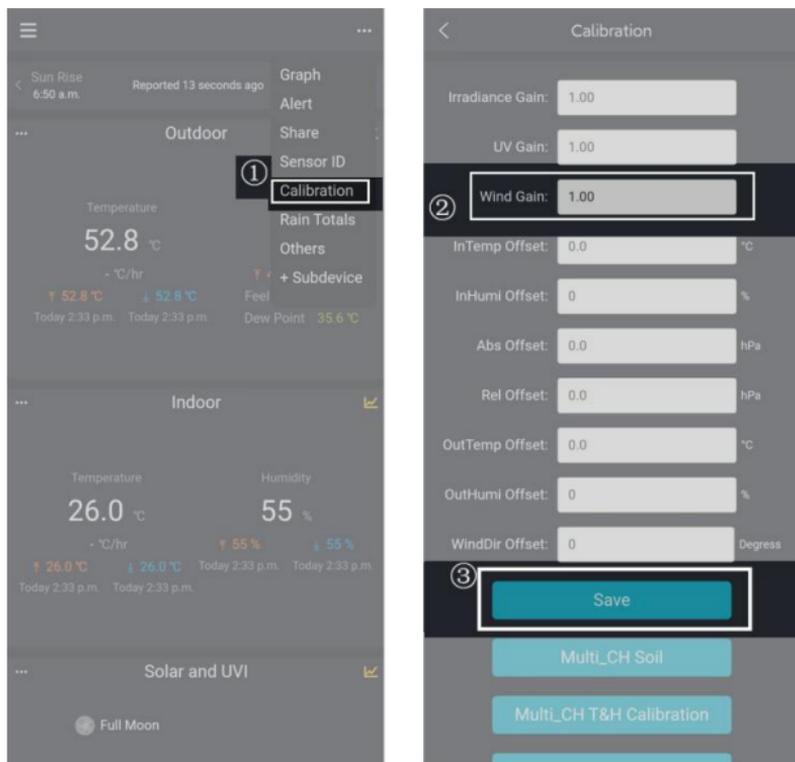3. Fill in the offset got from step3, click Save.

Figure 13

8.2 Wind Speed 0 Calibration

Wind speed needs to be re-zeroed after the firmware upgrade (establish the zero baseline)

Use a fan to test if the wind speed responds at all angles！

1. Perform calibration in a windless room. Cover the top and wind speed sensor area of the WS80 with a soft

cloth.

- Hold the CAL button for 3 seconds until the LED lights up for 5 seconds and starts flashing.
- Wait until the LED turns off, indicating that the wind speed calibration is complete and reset to zero.
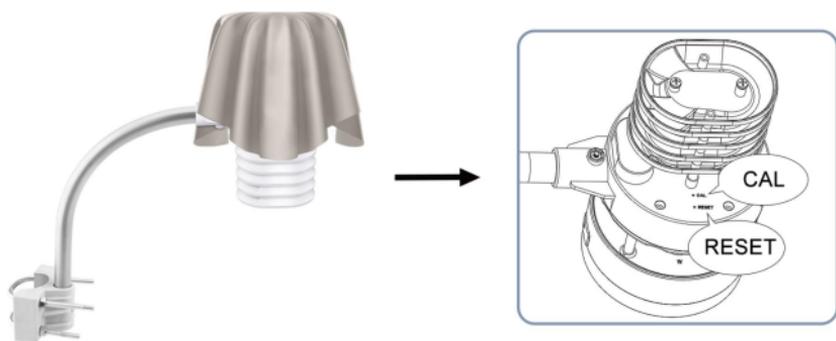

Figure 14

2. To stop the LED from flashing, press the **CAL** button three times.

- To restart the LED light function, press the CAL button three times again.

8.3 Managing LED Flashing

For some, the LED flashing is disturbing.

- To stop the LED from flashing, press and release the CAL button three times shortly.
- To restart the LED light function, press the CAL button three times again.

9. Troubleshooting

9.1 Reset Button and Transmitter LED

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

Using a bent-open paperclip, press and hold the RESET BUTTON 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 4.8 seconds.

9.2 T&H data malfunctioning

If the temperature and humidity data of the WS80 is malfunctioning, it may be due to a faulty sensor module. You can resolve this by replacing the T&H module:

- First of all. Take a photo of your WS80 and briefly describe the issue.
- Send the photo and description to our support team to confirm the required sensor module model.
- Steps to Replace the T&H Module on WS80:

    1. Open the insulation cover on the top.

    2. Remove the temperature and humidity module that needs to be replaced

    3. Replace it with a new temperature, humidity and pressure module. Make sure that the module is securely fastened in place.

    4. Install the protection filter for the temperature, humidity and pressure module, and close the insulation cover.

10. 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.

11. 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.

12. Battery Care and Maintenance

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

13. Contact Us

13.1 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.

13.2 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, WS90) is protected by US Patent No. 12,181,491B2.