PRO TECH

WS7IN1S WIFI WEATHER STATION

with 7-In-1 Solar Powered Outdoor Sensor Array

Operation Manual

Model: WS7IN1S

1. Introduction

Thank you for purchasing this WS7IN1S Wi-Fi Weather Station. Your sensor data will be available on your local Wi-Fi network and the Internet.

This manual will guide you, step-by-step, through setting up your weather station and gateway, and understanding the operation of your weather station. Use this manual to become familiar with your professional weather station and save it for future reference.

2. Getting Started

2.1 Parts List

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 (M5 size)
1	Metal mounting plate to be used with U-Bolts
1	Wrench for M5 bolts
1	User manual (this manual)

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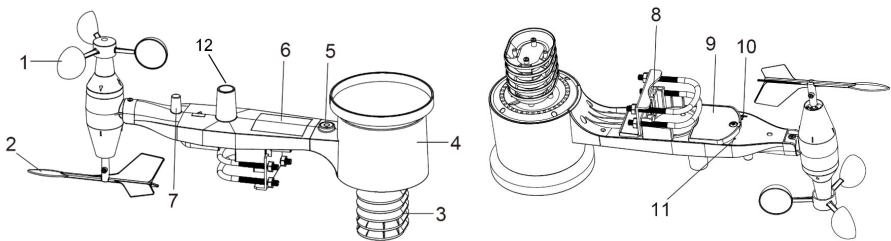
1. Wind Speed cups	7. Antenna
2. Wind Vane	8. U-Bolts
3. Thermo- and hygro-meter sensors	9. Battery compartment door
4. Rain collector	10. Reset button
5. Bubble level	11. LED (red) to indicate data transmission
6. Solar panel	12.Light sensor and UV sensor

3.1 Features

Outdoor Sensor
- Outdoor temperature and humidity
- Wind speed, gust speed, and wind direction
- Rainfall rate and totals for day, week, month, and year
- Solar light intensity and UV index

4. Setup Guide

4.1 Sensor Package Assembly

4.1.1 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 3 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 3.
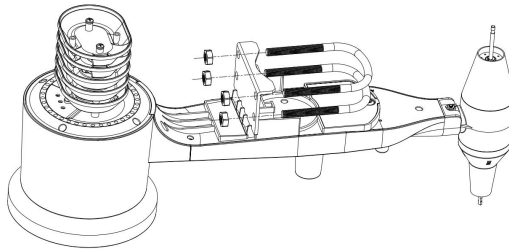

Figure 3: U-Bolt installation

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 4.
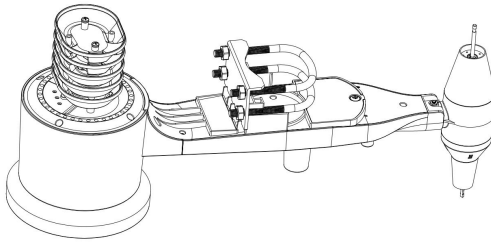
Figure 4: U-Bolts and nuts installed

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.

4.1.2 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 5. 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.
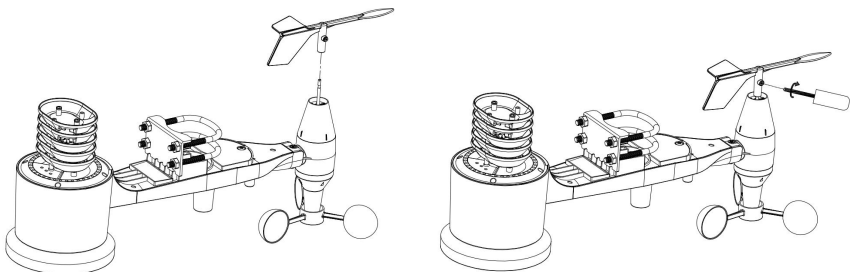

Figure 5: Wind vane installation diagram

4.1.3 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 6 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.
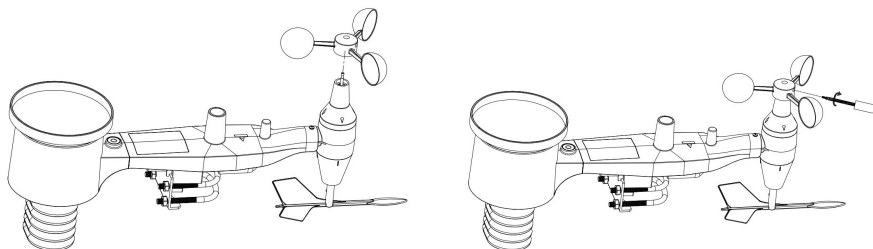

Figure 6: Wind speed cup installation diagram

4.1.4 Install Batteries in sensor package

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.
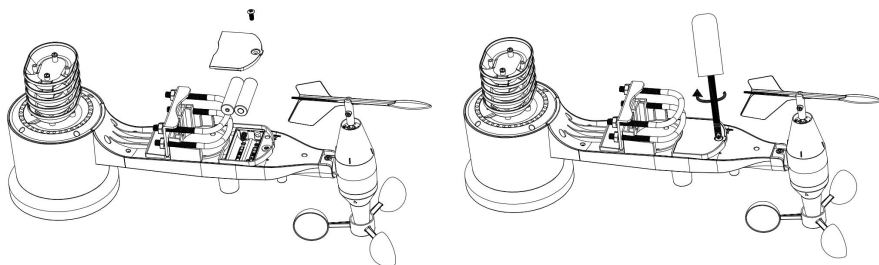

Figure 7: Battery installation diagram

Note: If LED does not light up or is on permanently, make sure the battery is inserted the correct way and inserted fully, starting over if necessary. Do not install the batteries backwards as it may permanently damage the outdoor sensor.

Note: We recommend Lithium batteries for cold weather climates, but alkaline batteries are sufficient for most climates. Rechargeable batteries have lower voltages and should never be used.

4.1.5 Mount assembled outdoor sensor package

4.1.5.1 Before you mount

Before proceeding with the outdoor mounting detailed in this section, you may want to skip to setup instructions in section 4.3 and onwards first, while you keep the assembled outdoor sensor package nearby (although preferably not closer than 5 ft. from the gateway). 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.

4.1.5.2 Mounting

Your package includes two U-Bolts, 4 nuts, and a metal mounting plate for the U-Bolts. You can attach a pipe(not included) to a permanent structure in the desired location. The U-Bolts will accommodate a pipe diameter of 1-2 inches.
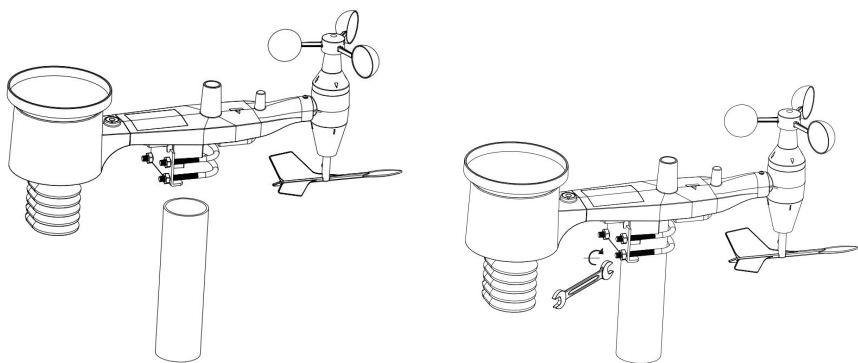
Figure 8: Sensor package mounting diagram

The mounting plate will slide into a slot on the bottom of the sensor package and then you can provisionally insert the U-Bolts from the other side through the holes provided holes. Next place a nut on each of the four ends of the U-Bolts and tighten by hand several turns so they will not fall off.

Next prepare the mounting pipe in the desired location and make sure it 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 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.

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.

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.

4.1.6 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 16 seconds.
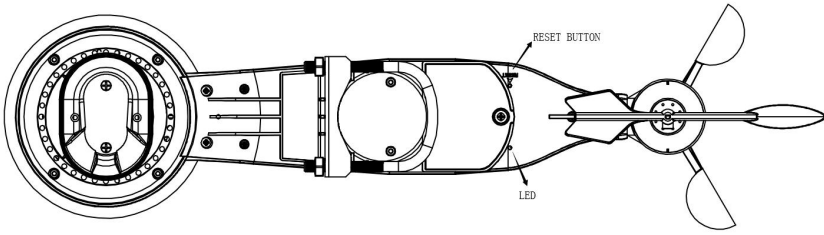
RESET BUTTON

LED

Figure 9: Reset button and Transmitter LED location

4.2 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 gateway:

- **Indoor sensor placement:** The sensor will have the longest reach for its signal when mounted or hung vertically. Avoid laying it down on a flat surface.

- **Electro-Magnetic Interference (EMI)**. Keep the gateway 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 gateway, 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 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.

- **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 gateway.

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 3: RF Signal Strength reduction

5. Wi-Fi Configure with gateway

This WS7IN1S sensor doesn't has a display function and you need to use our WS View App to view the data on your mobile application after pairing this device with our GW1000 Wi-Fi Gateway(sold separately).

5.1 Pair with Gateway
The gateway can function as an independent Wi-Fi access point during Wi-Fi configuration. This will be used to allow your mobile application to connect to it directly during configuration (temporarily), passing configuration information about your normal Wi-Fi network to the Gateway so that it can later connect to your preferred Wi-Fi network.

5.2 Wi-Fi Connection for the Gateway
For this part, please refer to the manual of the GW1000 Wi-Fi gateway.
Any question, please contact the customer service.

6. View Online Data on WS View

When the Wi-Fi configuration is done, you can view the live data of your WS7IN1S sensor on the WS View application.

Note: It requires your phone and the gateway using the same network to view your sensor data on the WS View app.

To remote monitor the sensor data, please upload the data to our free Ecowitt Weather Server: https://www.ecowitt.net.

Detailed operation instructions can be found on the GW1000 manual.

Any question, please feel free to contact our customer service at support@ecowitt.com

7. Specifications

Note: Out of range values will be displayed using "---":

Outdoor sensor	Specification
Transmission distance in open field	100 m (330 ft.)
RF Frequency	433/868/915 MHz depending on location
Temperature range	-40°C – 60°C (-40°F - 140°F)
Temperature accuracy	± 1°C, or ± 2°F
Temperature resolution	0.1°C, or 0.1°F
Humidity range	10% ~ 99%
Humidity accuracy	± 5%
Humidity resolution	1%
Rain volume display range	0 – 9999 mm, or 0 – 199.99 in
Rain volume accuracy	± 10%
Rain volume resolution	0.3 mm (for volume < 1,000 mm) 1 mm (for volume ≥ 1,000 mm), or 0.01 in (for volume < 100 in) 1 mm (for volume ≥ 100 in)
Wind speed range	0 – 50 m/s (0 ~ 100 mph)
Wind speed accuracy	± 1 m/s (speed < 5 m/s) ± 10% (speed ≥ 5 m/s), or ± 0.1 mph (speed < 11 mph) ± 10% (speed ≥ 11 mph)
UV-Index range	0 - 15
Light range	0 – 120 kLux
Light accuracy	± 15%
Sensor reporting interval	16 seconds

Power	Specification
Outdoor sensor	Solar panel (built-in)
Outdoor sensor (backup)	2 x AA 1.5V LR6 Alkaline (not included), or 2 x AA 1.5V Lithium battery (not included)

Table 8: 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.

8. Warranty Information

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

All trademarks and patents are recognized.

We provide a 1-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.