

Ambient Weather WS-1551-IP OBSERVER Solar Powered Wireless IP Weather Station User Manual



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1. Introduction


Thank you for your purchase of the Ambient Weather WS-1551-IP Smart Wireless Weather Station with Remote Monitoring. The following user guide provides step by step instructions for installation, operation, and troubleshooting. To download the latest manual, firmware upgrades.


<https://ambientweather.com/faqs/question/tags/tag/WS-1550-IP/>

The product is continuously changing and improving, particularly online services and associated applications. Make sure you download the latest manual. Please visit:

<https://ambientweather.com/amws1500.html>

2. Warnings and Cautions

 **Warning:** Any metal object may attract a lightning strike, including your weather station mounting pole. Never install the weather station in a storm.

 **Warning:** 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.

3. Quick Start Guide

Although the manual is comprehensive, much of the information contained may be intuitive. In addition, the manual does not flow properly because the sections are organized by components.

The following Quick Start Guide provides only the necessary steps to install, operate the weather station, and upload to the internet, along with references to the pertinent sections.

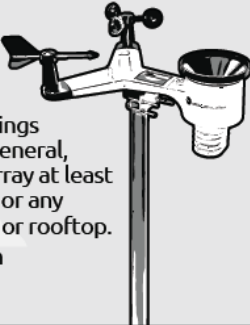

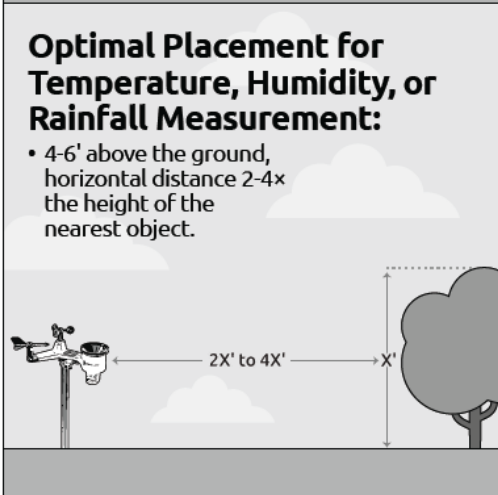
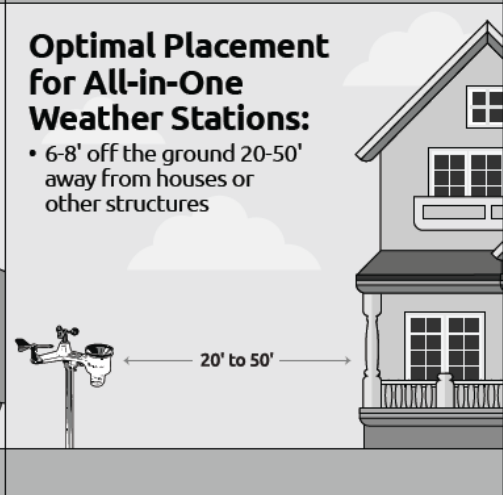
Required		
Step	Description	Section
1	Assemble and power up the outdoor array	5.3-5.3.5
3	Power up the indoor thermometer-hygrometer-barometer	5.3.5
4	Power up the OBSERVERIP2.0	6.2
6	Calibrate the relative pressure to sea-level conditions (local airport) on the OBSERVERIP2.0	6.8
7	Register and upload to Weather Services	5.10
8	Mount the sensor array	5.11

4. Pre-Installation Checkout and Site Survey

4.1 Pre-Installation Checkout

Before installing your weather station in the permanent location, we recommend operating the weather station 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 weather station and calibration procedures. This will also allow you to test the wireless range of the weather station.

4.2 Site Survey

<p>General Guidelines:</p> <ul style="list-style-type: none"> • Install in an easily accessible location • Clean the rain gauge every few months • Change batteries every 2-3 years • Avoid radiant heat transfer from buildings and structures. In general, install the sensor array at least 5' from the ground or any building, structure, or rooftop. • Avoid wind and rain obstructions. 	<p>Optimal Placement for Wind Speed Measurement:</p> <ul style="list-style-type: none"> • On roof, 8-10' above roofline 
<p>Optimal Placement for Temperature, Humidity, or Rainfall Measurement:</p> <ul style="list-style-type: none"> • 4-6' above the ground, horizontal distance 2-4x the height of the nearest object. 	<p>Optimal Placement for All-in-One Weather Stations:</p> <ul style="list-style-type: none"> • 6-8' off the ground 20-50' away from houses or other structures 

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

1. You must clean the rain gauge every few months and change the batteries every 2-3 years. Provide easy access to the weather station.
2. Avoid radiant heat transfer from buildings and structures. In general, install the sensor array at least 5' from any building, structure, ground, or roof top.
3. 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' tall, and the mounting pole is 6' tall, install $4 \times (20 - 6)' = 56'$ away.
4. **Wireless Range.** The radio communication between receiver and transmitter in an open field can reach a distance of up to 330 feet, providing there are no interfering obstacles such as buildings, trees, vehicles, high voltage lines. Wireless signals will not penetrate metal buildings. Under most conditions, the maximum wireless range is 100'.
5. Radio interference such as PCs, radios or TV sets can, in the worst case, entirely cut off radio communication. Please take this into consideration when choosing ObserverIP2.0 receiver or mounting locations. Make sure your ObserverIP2.0 receiver is at least five feet away from any electronic device to avoid interference.
6. Visit Ambient Weather Mounting Solutions for assistance and ideas for mounting your weather station:

<http://www.ambientweather.com/amwemoso.html>

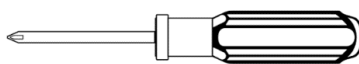
5. Getting Started

The WS-1551-IP weather station consists of a ObserverIP2.0 receiver, and an all-in-one sensor array.

5.1 Parts List

QTY	Item
1	ObserverIP2.0 Module
1	Sensor Array
1	Wind Vane
1	Wind Cups
1	5V DC Adaptor
2	Pole mounting U-bolts
2	Pole mounting U-bolt nuts
1	Ethernet Cable
1	ObserverIP2.0 Module Reset Tool
1	User manual

5.2 Included tools

Quantity	Picture	Item
1		Precision Screwdriver #1 (for small Phillips screws on wind vane and wind cups)

5.2 Recommend Tools

- Adjustable wrench (for mounting pole)

- Compass or GPS (for wind direction calibration)

5.3 Sensor Array Set Up

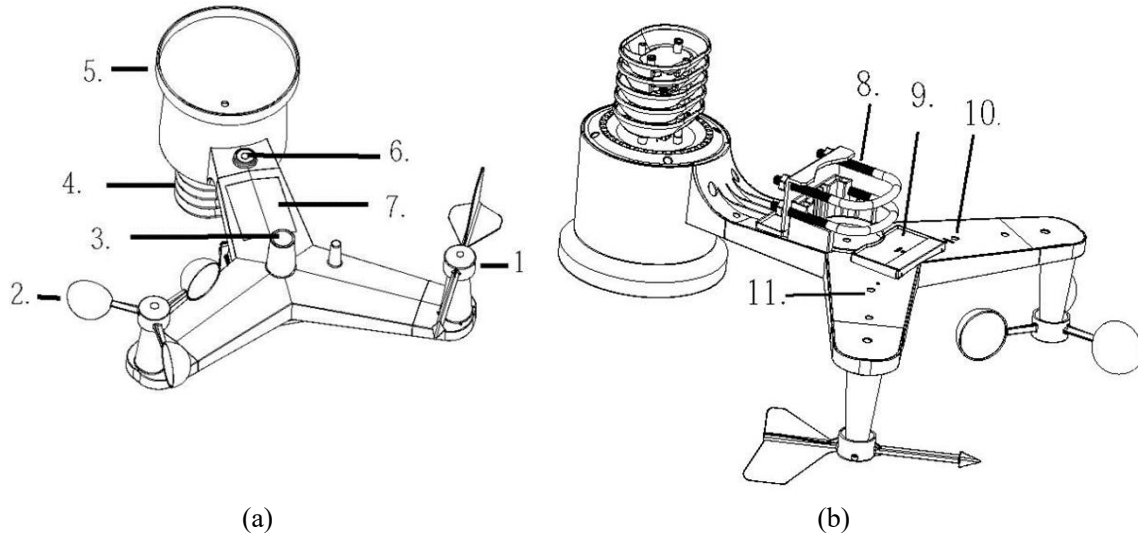




Figure 1

No	Description	No	Description
1	Wind Vane (measures wind direction)	7	Solar panel
2	Wind Speed Sensor (measures wind speed)	8	U-Bolt
3	UV sensor/ Light sensor	9	Battery compartment
4	Thermometer-hygrometer sensor (measures temperature and humidity)	10	Reset button
5	Rain collector	11	LED transmitter Indicator
6	Bubble level		

5.3.1 Install Wind Vane

Reference Figure 2. (a) Locate and align the flat key on the wind vane shaft to the flat key on the wind vane and push the vane on to the shaft. (b) tighten the set screw with a precision screwdriver and make sure the wind vane spins freely.

 **Note:** You may need to back out the set screw first before sliding the vane onto the shaft.

 **Note:** The wind vane shaft does not spin as freely as the wind cups. This is by design. The dampening prevents the wind vane from spinning with the slightest breeze, which will result in variable wind all the time. The added resistance allows the wind vane to change direction with 2 – 3 mph, providing a much better wind direction tracking.

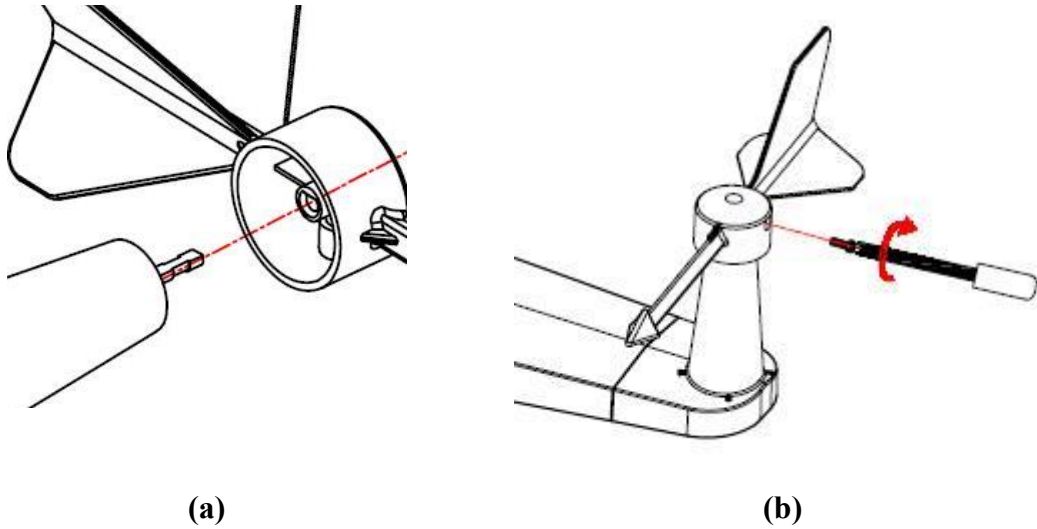



Figure 2

5.3.2 Install Wind Cups

Reference Figure 3. (a) push the wind cups on to the shaft. (b) tighten the set screw with a precision screwdriver and make sure the wind cups spin freely.

 **Note:** You may need to back out the set screw first before sliding the cups onto the shaft.

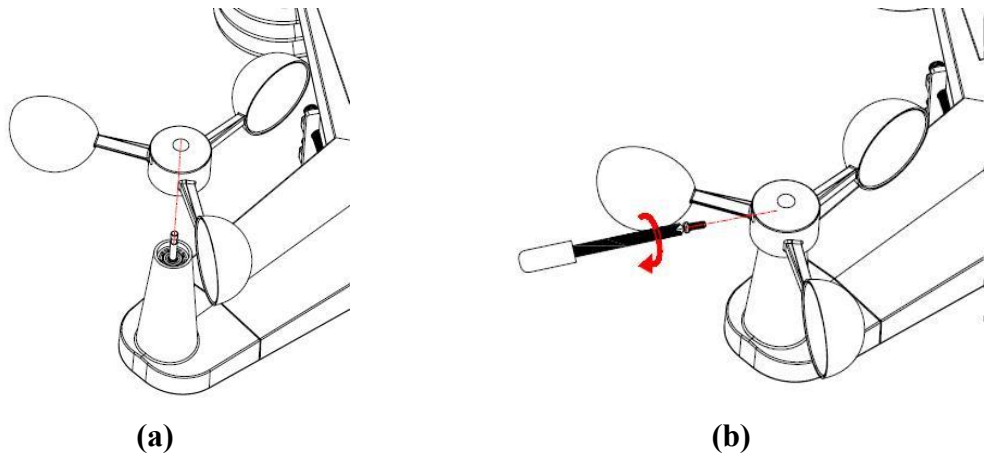


Figure 3

5.3.3 Install the Rain Gauge Funnel

Reference Figure 4. Install the rain gauge funnel. Rotate clockwise to attach the funnel to the sensor array.

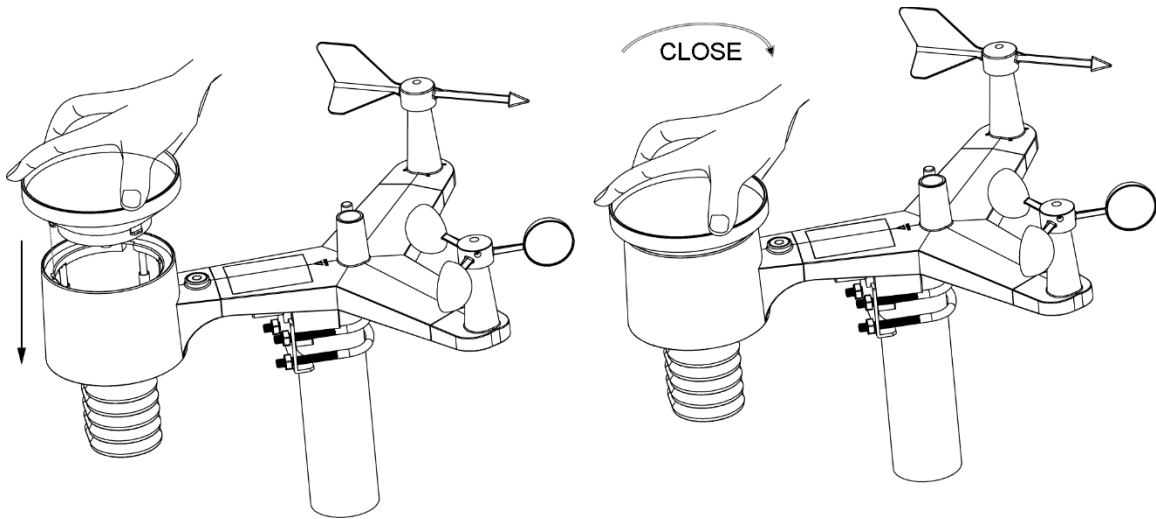
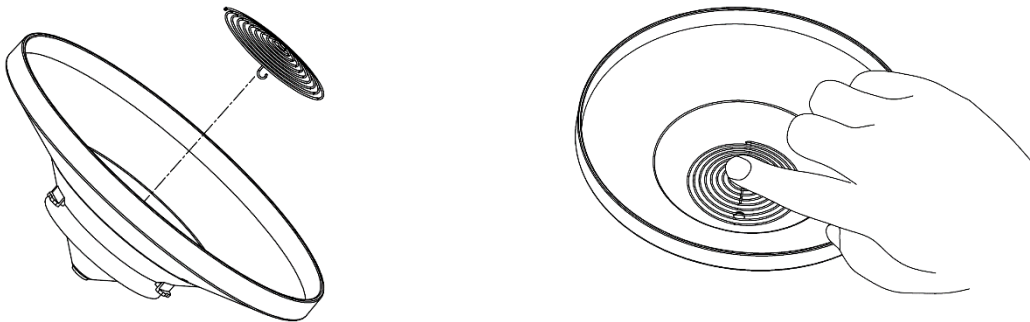


Figure 4

5.3.4 Install the Funnel Coil Filter

To install the funnel coil filter, press the coil until the hook is inside the hole at the bottom of the funnel, and locked in place. The spring tension will keep the filter sit tight on the funnel.



5.3.5 Install Batteries

Reference Figure 5. Insert 2 x AA non-rechargeable batteries (not included) into the battery compartment. The LED indicator on the back of the transmitter will turn on for four seconds, and then flash once every 16 seconds (the sensor transmission update period).

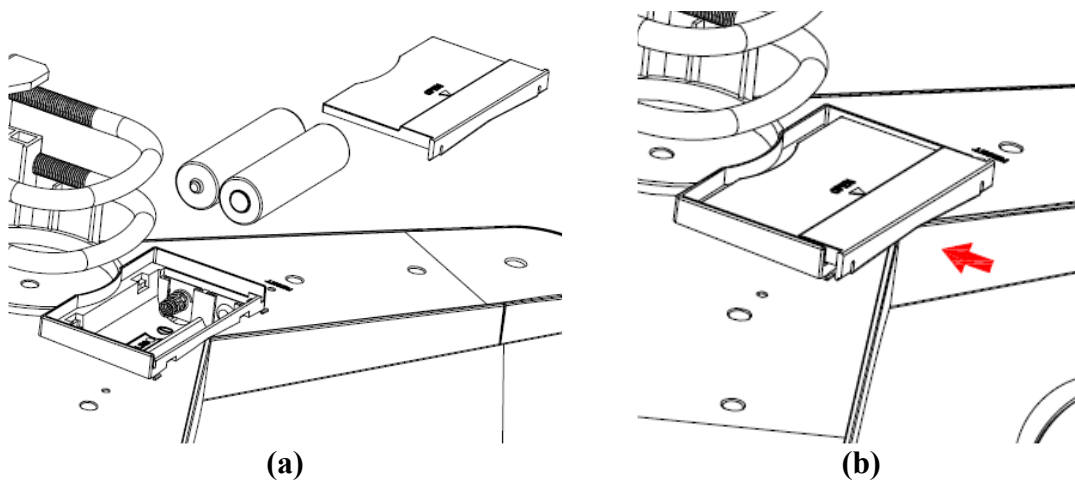





Figure 5


 **Note:** If the LED does not light up, or stays on permanently, make sure the battery polarity is correct, or the batteries are fresh. Do not install the batteries backwards. You can permanently damage the thermo-hygrometer.


 **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 poorer reception.

5.3.6 Indoor Thermo-Hygrometer-Barometer Transmitter (Optional WH32B)

The optional indoor thermometer, hygrometer and barometer measures and displays the indoor temperature, humidity and pressure and transmits this data to the ObserverIP2.0 receiver.

 **Note:** Do not install the thermo-hygrometer-barometer transmitter outside. This will cause errors in the barometric pressure due to large variations in temperature (barometric pressure is temperature compensated for accuracy). Note that pressure readings made inside your home, business, or facility will correspond closely to the actual barometric pressure outside.

 **Note:** The thermo-hygrometer-transmitter transmits directly to the ObserverIP2.0 receiver. For best results, place between 5 to 20 feet from the ObserverIP2.0 receiver.

 **Note:** To avoid permanent damage, please take note of the battery polarity before inserting the batteries.

Remove the battery door on the back of the sensor, as shown in Figure .

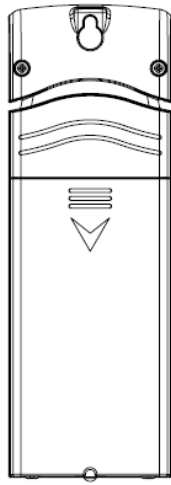


Figure 7

1. Insert two AA batteries.
2. After inserting the batteries, the remote sensor will display temperature, humidity, and barometric pressure on the display, as shown in Figure .

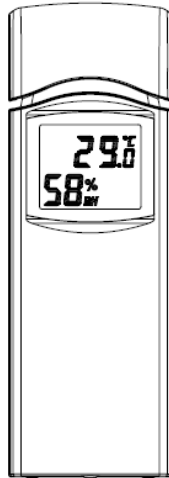


Figure 8

3. This sensor is also capable of displaying in Celsius or Fahrenheit by using the switch under the battery door. As shown in Figure 8a.

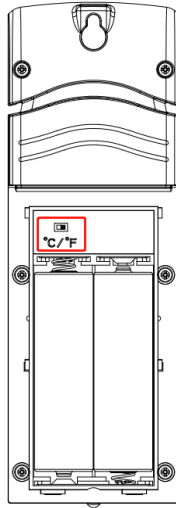




Figure 8a

5.4 Accessories


Description	Part Number	Image
Ultrasonic Anemometer, Outdoor Thermometer / Hygrometer, Solar Radiation and UV	WS-5000-ARRAY	
Rain Collector	WS-5000-RAIN	
Indoor Air Quality Monitor	AQIN	
Outdoor PM25 Particulate Monitor	PM25	
Indoor PM25 Particulate Monitor	PM25IN	
Wireless Temperature and Humidity Sensor	WH31E	
Leak Detector	WH31LA	
Waterproof Probe Temperature Sensor	WH31P	


Description	Part Number	Image
Soil moisture sensor	WH31SM	
Floating Pool Thermometer	WH31PF*	

(*) The WH31E, WH31P and WH31PF share the same 8-channels.

(*) The PM25IN and AQIN share the same channel.

5.4.1 Indoor / Outdoor 8-Channel Thermo-Hygrometer Transmitter (Optional WH31E)

 **Note:** These 8-channel sensors only appear on AmbientWeather.net. They are not supported on Weather Underground. Unlike other sensors, they cannot be calibrated or adjusted from the ObserverIP2.0 modules User Interface.

 **Note:** Do not use rechargeable batteries. We recommend fresh alkaline batteries for outdoor temperature ranges between -4 °F and 140 °F and fresh lithium batteries for outdoor temperature ranges between -40 °F and 140 °F.

1. Remove the battery door on the back of the transmitter(s) by sliding down the battery door, as shown in Figure .

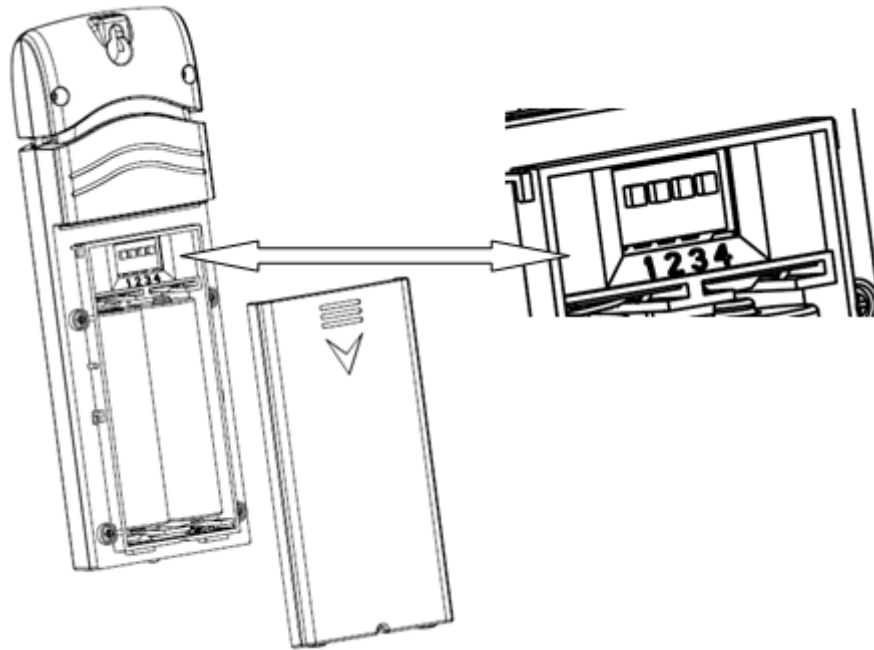


Figure 10

2. **BEFORE** inserting the batteries, locate the dip switches on the inside cover of the lid of the transmitter.
3. **Channel Number:** The ObserverIP2.0 supports up to eight transmitters. To set each channel number (the default is Channel 1), change Dip Switches 1, 2 and 3, as referenced in Figure .
4. **Temperature Units of Measure:** To change the transmitter display units of measure ($^{\circ}\text{F}$ vs. $^{\circ}\text{C}$), change Dip Switch 4, as referenced in Figure .

Switch in down position. Switch in up position.

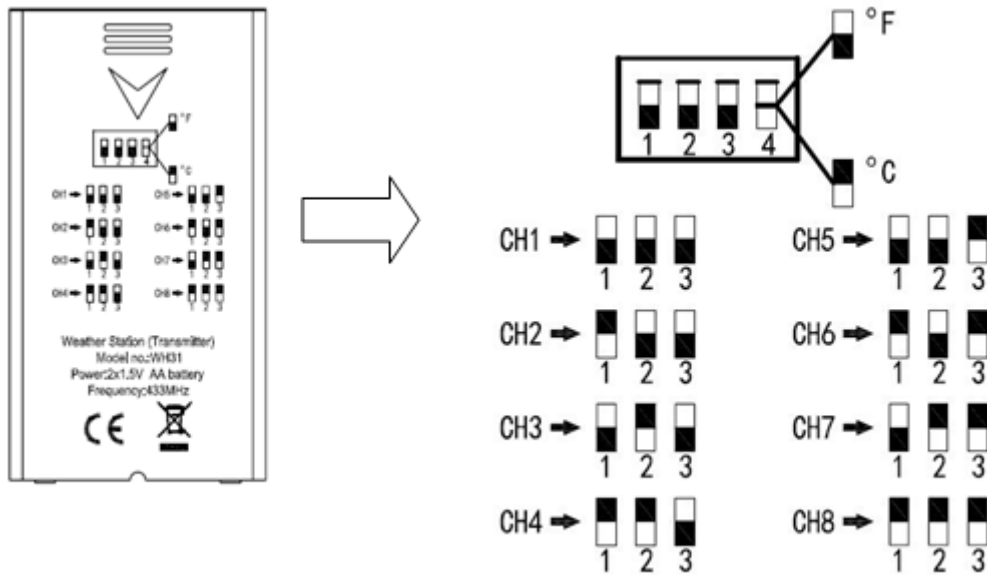


Figure 11

5. Insert two AA batteries.
6. Verify the correct channel number (CH) and temperature units of measure ($^{\circ}\text{F}$ vs. $^{\circ}\text{C}$) are on the display, as shown in Figure .

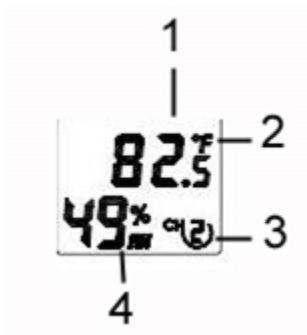


Figure 12


- (1) temperature
 - (2) temperature units ($^{\circ}\text{F}$ vs. $^{\circ}\text{C}$)
 - (3) channel number
 - (4) relative humidity
7. Close the battery door.
 8. Repeat for the additional remote transmitters, verifying each remote is on a different channel.

5.4.2 PM2.5 Air Quality Sensor

The ObserverIP2.0 module supports one PM2.5 Air Quality indoor and one Outdoor sensor. For more information, please visit:

<https://ambientweather.com/faqs/question/tags/tag/PM25/>

5.4.3 Mounting the WH32B and WH31E Sensors

 **Note:** If you mount the sensor outside, it is recommended you mount the remote sensor on an outside north facing wall, in a shaded area, at a height at or above the receiver. Direct sunlight and radiant heat sources will result in inaccurate temperature readings. Although the sensor is weatherproof, it is best to mount in a well-protected area, such as an eave.

Use a small nail or screw (included) to mount to a vertical surface, as shown in Figure 6.



Figure 6

The sensor can also be hung from a nylon zip tie (included) or string (not included).

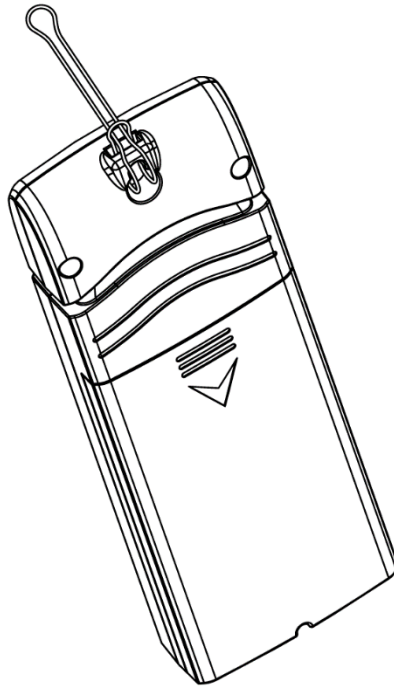


Figure 7

5.4.4 Best Practices for Wireless Communication

Wireless communication is susceptible to interference, distance, walls, and metal barriers. We recommend the following best practices for trouble free wireless communication.

1. **Electro-Magnetic Interference (EMI).** Keep the console several feet away from computer monitors and TVs.
2. **Radio Frequency Interference (RFI).** If you have other 915 MHz devices and communication is intermittent, try turning off these other devices for troubleshooting purposes. You may need to relocate the transmitters or receivers to avoid intermittent communication.
3. **Line of Sight Rating.** This device is rated at 300 feet line of sight (no interference, barriers or walls) but typically you will get 100 feet maximum under most real-world installations, which include passing through barriers or walls.
4. **Metal Barriers.** Radio frequency will not pass-through metal barriers such as aluminum siding. If you have metal siding, align the remote and console through a window to get a clear line of sight.

The following is a table of reception loss vs. the transmission medium. 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%

5.4.5 Adding Additional Sensors

The OBSERVERIP2.0 module supports up to 8 additional thermos-hygrometer sensors (Model WH31E, WH31P, WH31PF). Place the sensors in and around your home and monitor on AmbientWeather.net.

The data is automatically passed from the OBSERVERIP2.0 module to AmbientWeather.net based on the channel number.

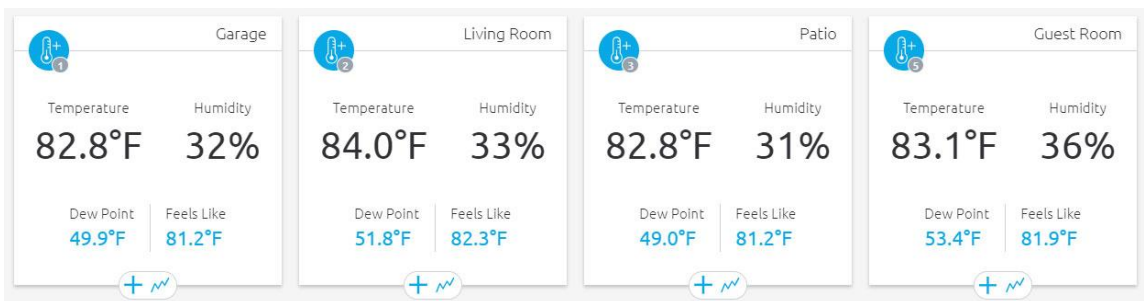
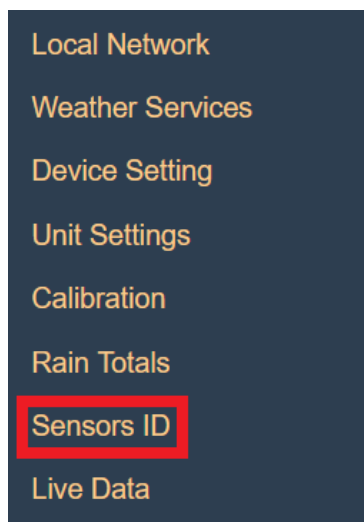


Figure 15

Registering additional sensors.

Login to the OBSERVERIP2.0 web GUI and access Sensors ID tab.



On the Sensors ID screen, you can register or re-register an additional sensor by clicking the Re-register button.



6. Programming the ObserverIP2.0 Receiver

6.1 Hardware Requirements

1. Broadband router
2. An “always-on” connection to the Internet. A high-speed DSL or cable internet connection that maintains constant connection to the internet.

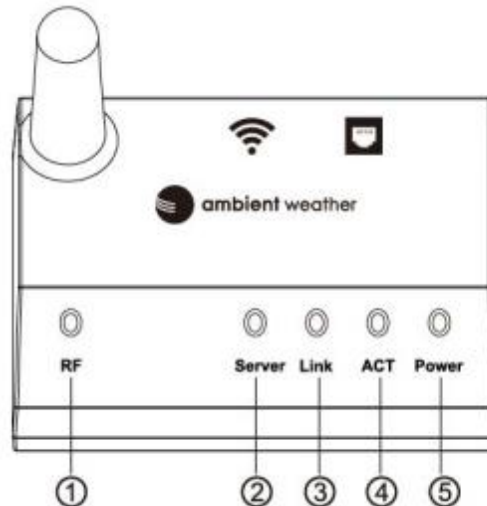
6.2 ObserverIP2.0 Physical Connections

Connect the ObserverIP2.0 receiver power jack to AC power with the power adapter (included), as shown in

Ref.	Description
6	LAN connection (connect to router)
7	Reset button (use IP Module reset tool or open-ended paper clip)
8	AC Power connection

Figure 9, reference 8.

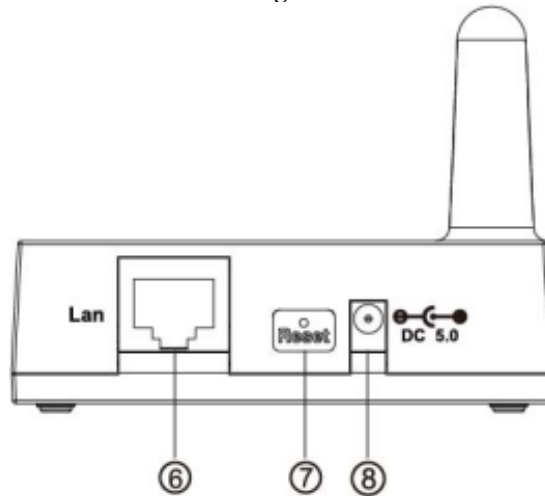
Place the sensor array and indoor thermo-hygrometer transmitter about 5 to 10 feet from the ObserverIP2.0 receiver and wait several minutes for the remote sensors to synchronize with the receiver. Once synchronized, the RF blue LED (Figure 8, reference 1) will be illuminated.



Ref.	LED	Description
1	RF	On when radio frequency receiver is operating properly

Ref.	LED	Description
2	Server	On when connected to AmbientWeather.net internet hosting service
3	Link	Connect to the internet (or router)
4	ACT	Flashes when there is internet activity
5	Power	AC Power connected

Figure 8



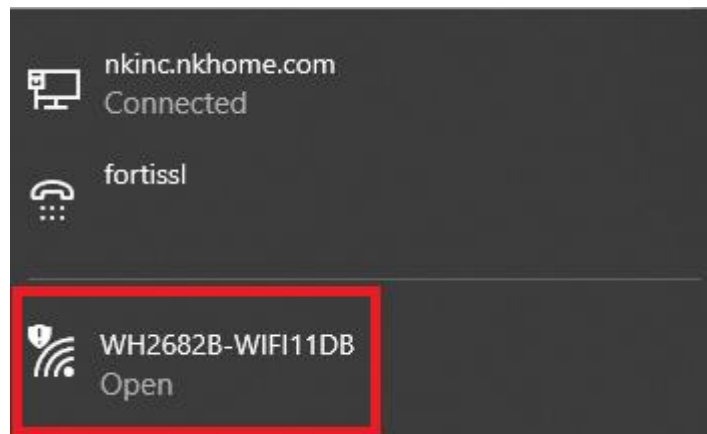
Ref.	Description
6	LAN connection (connect to router)
7	Reset button (use IP Module reset tool or open-ended paper clip)
8	AC Power connection

Figure 9

6.3 Finding the OBSERVERIP2.0 from your device (computer, smart phone, or tablet with a browser) when connected to your network via Wi-Fi Computer

6.3.1 PC Users

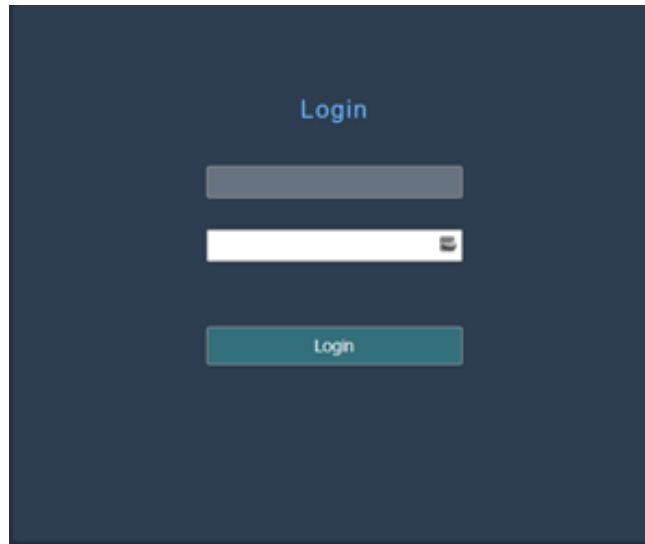
To find the OBSERVERIP2.0 receiver, connect to power and look for the following WIFI network.



Connect to the network and then open a browser **Note: you may be told network has no internet.**

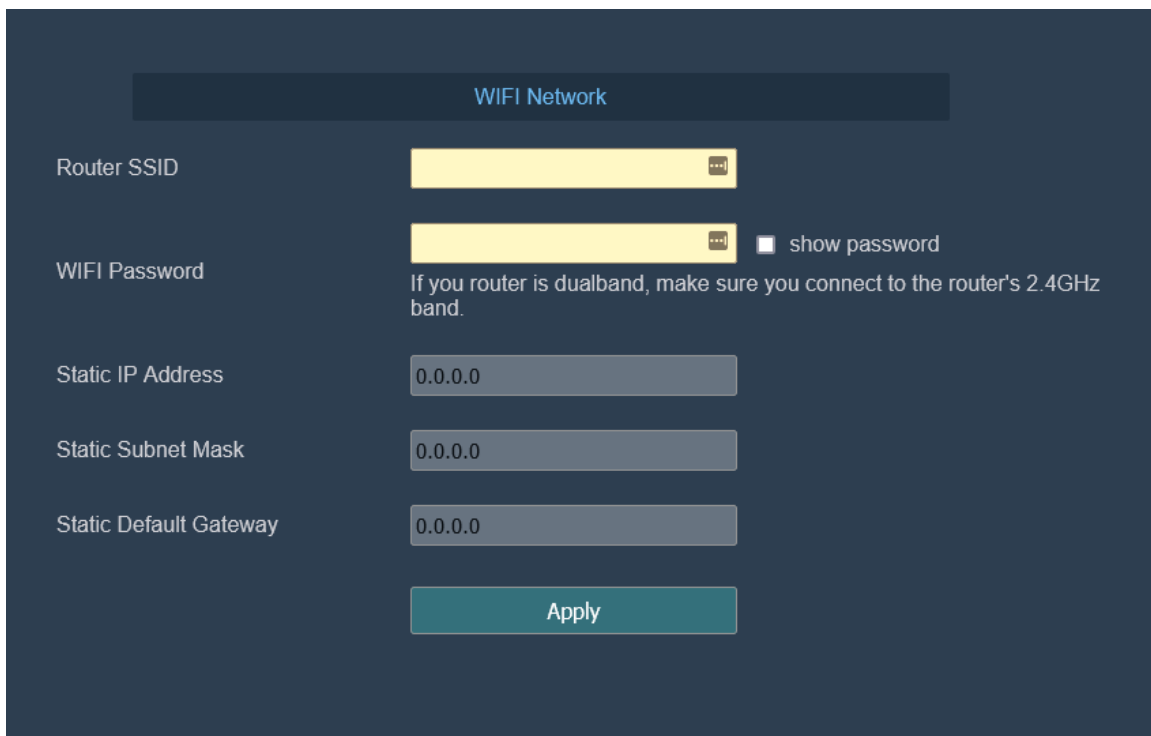
Navigate to the following IP address 192.168.4.1 you will be presented with the following screen.

(Note: default password is blank)



A dark blue login screen with the word "Login" in light blue at the top center. Below it are two input fields: a grey one for the username and a white one for the password with a small eye icon on the right. At the bottom is a teal "Login" button.

Once logged in you will want to navigate to the local network screen to connect to WIFI.



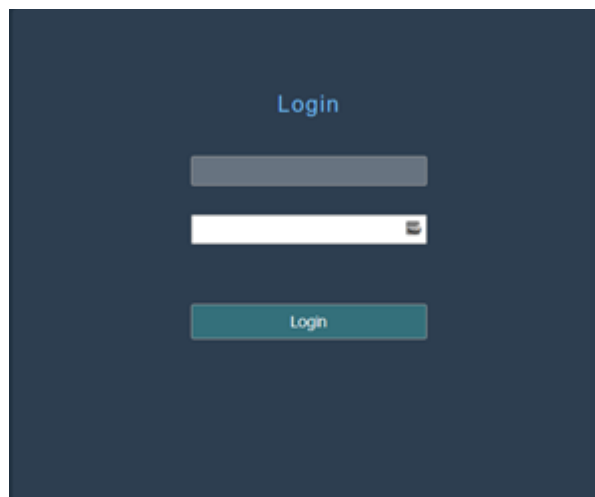
A dark blue "WIFI Network" configuration screen. It features several input fields: "Router SSID" (yellow), "WIFI Password" (yellow) with a "show password" checkbox, and three "Static" fields for IP Address, Subnet Mask, and Default Gateway (all grey and set to 0.0.0.0). A teal "Apply" button is at the bottom. A note below the password field reads: "If you router is dualband, make sure you connect to the router's 2.4GHz band."

6.3.2 Mac Users

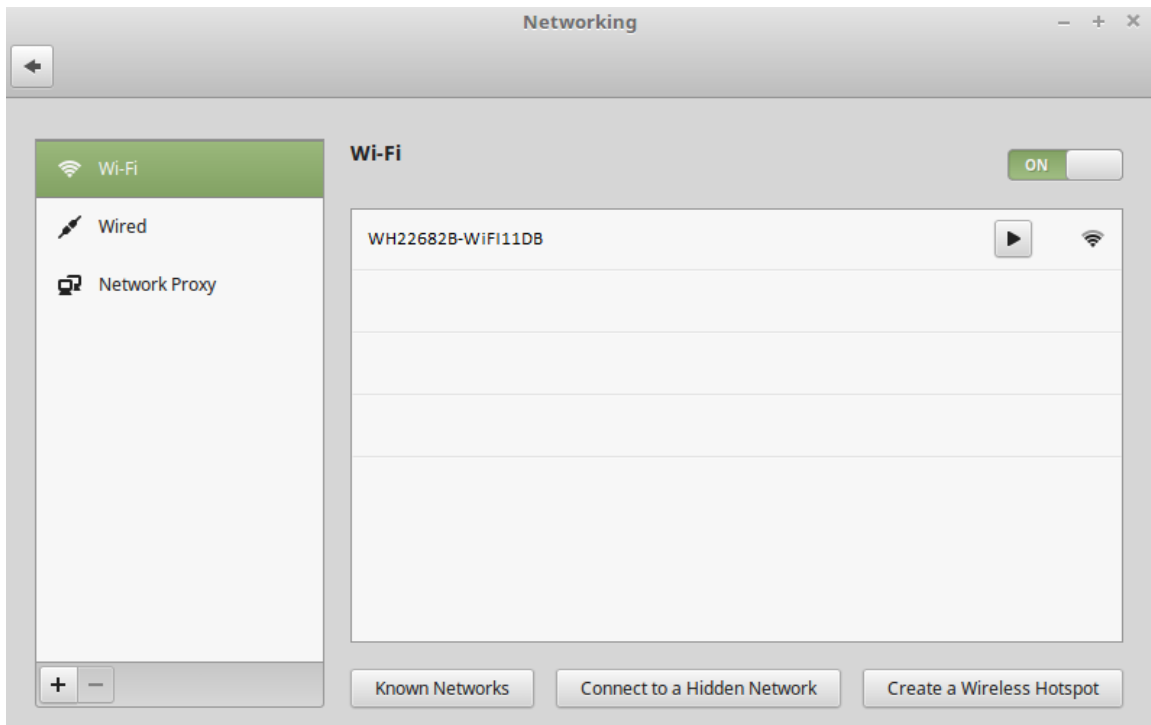
To find the OBSERVERIP2.0 receiver, connect to power and look for the following WIFI network.



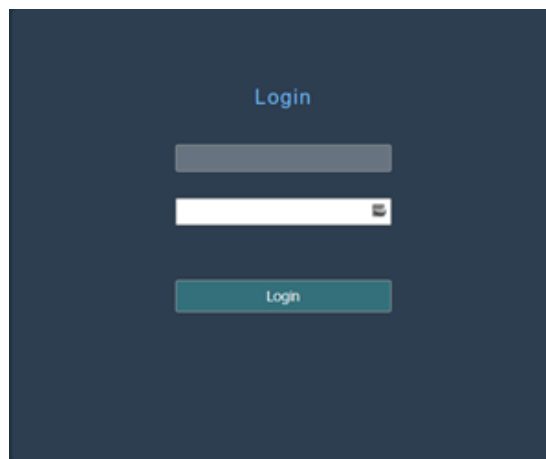
Connect to the network and then open a browser **Note: you may be told network has no internet.** Navigate to the following IP address 192.168.4.1 you will be presented with the following screen. **(Note: default password is blank)**



6.4.3 Linux Users



Connect to the network and then open a browser **Note: you may be told network has no internet.** Navigate to the following IP address 192.168.4.1 you will be presented with the following screen. **(Note: default password is blank)**



6.4 Local Network Settings

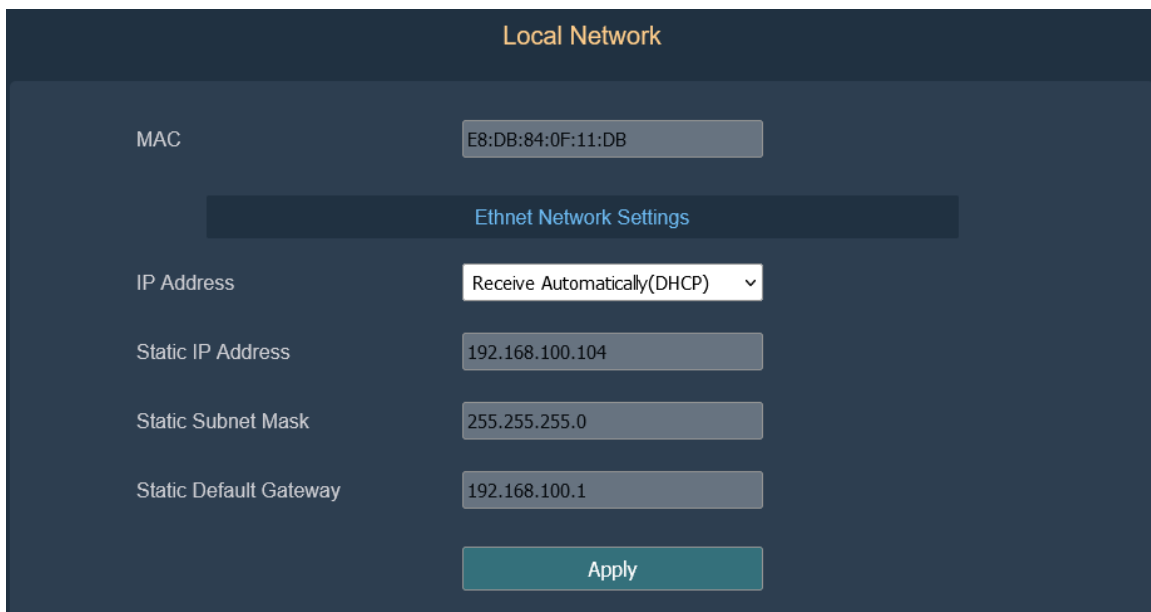
From your web browser, access the OBSERVERIP2.0 from the IP address in the previous section.

Select the **Local Network** tab to program the local network settings. Reference Figure :

1. **IP Address.** The default setting is receiving automatically (DCHP), **which is recommended.** The network will assign an IP address. To statically assign an IP address, select **Static** from the pull-down menu. This will prevent the IP address from changing each time you power up the OBSERVERIP2.0 receiver.
2. **Static IP Address.** If Static is selected as the IP address, enter the IP address you wish to access the OBSERVERIP2.0 module.
3. **Static Subnet Mask.** Default is 255.255.255.0. This should not be changed unless you are familiar with networking and subnet masking.
4. **Static Default Gateway.** This is typically the IP address of your router.

If you made any Static IP Address changes (not recommended), to confirm these changes, select **Apply**.

Note: If you incorrectly set the static IP settings and can no longer access the OBSERVERIP2.0, press the reset button on the back of the module.



Local Network

MAC E8:DB:84:0F:11:DB

Ethernet Network Settings

IP Address Receive Automatically(DHCP) ▾

Static IP Address 192.168.100.104

Static Subnet Mask 255.255.255.0

Static Default Gateway 192.168.100.1

Apply

Figure 18

6.4.1 Time Zone Setting

Under the device settings area you can adjust you time zone or select the Auto Time zone option.

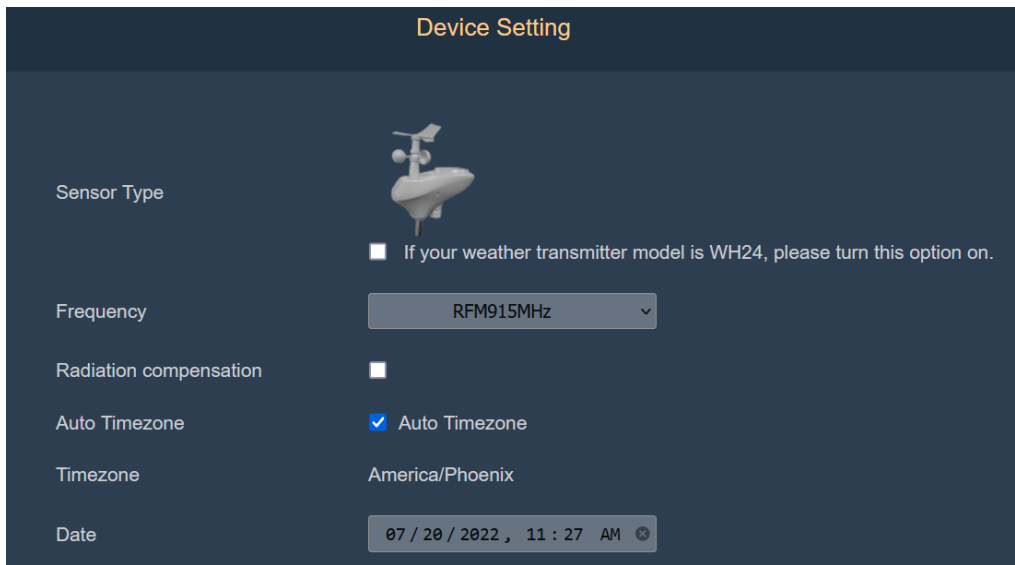


Figure 19

6.4.2 Units of Measure

Under unit settings you may choose which unit of measure you would like to utilize

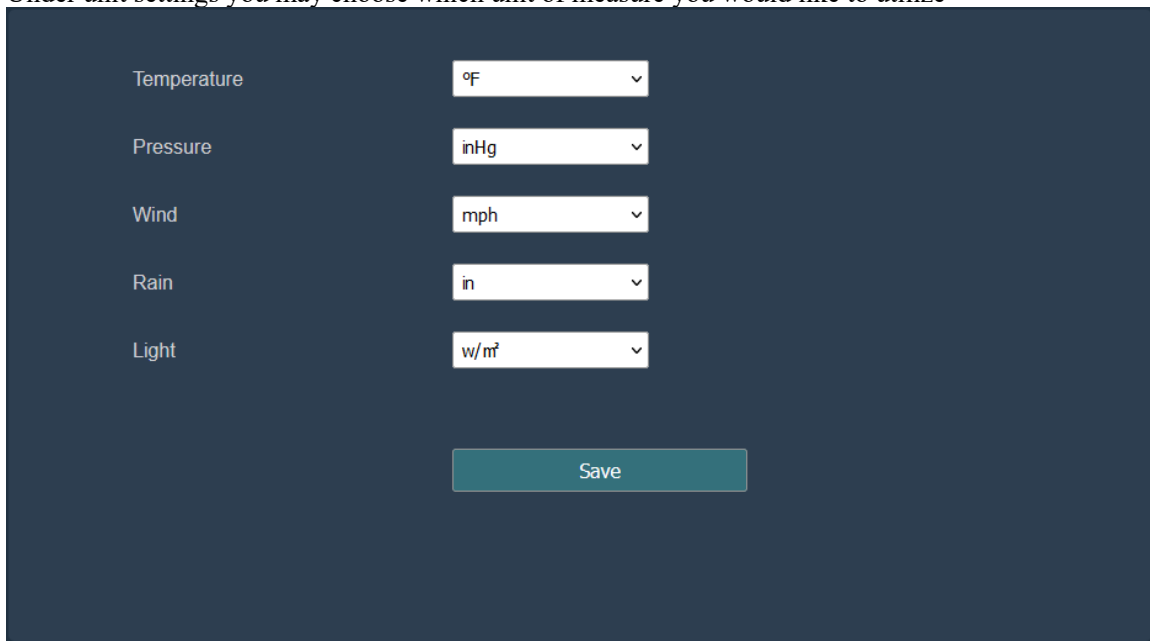


Figure 10

6.5 Live Data

Select the **Live Data** tab to view your live data from the weather station.

Local Network

Weather Services

Device Setting

Unit Settings

Calibration

Rain Totals

Sensors D

Live Data

Version: WH2632B_V2.0.3

Live Data

Outdoor Temperature 71.8 °F	Outdoor Humidity 45%	Feel Like 71.8 °F
Dew point 49.3 °F	Wind chill 71.8 °F	Wind Speed 0.00 mph
Gust Speed 0.00 mph	Day Wind Max 0.00 mph	Solar Radiation 0.00 w/mf
UV-index 0	Wind Direction 0°	

Indoor Temperature 78.6 °F	Indoor Humidity 36%	Absolute Pressure 28.71 inHg	Relative Pressure 30.04 inHg
-------------------------------	------------------------	---------------------------------	---------------------------------

Rain

Rain Event	0.00 in
Rain Rate	0.00 in/hr
Rain Day	0.00 in
Rain Week	0.00 in
Rain Month	0.00 in
Rain Year	0.00 in

Temperature 74.1 °F	Humidity 42%	PM2.5 4.2	Real-time AQI 18 Good	24H AQI 18 Good	
PM10 4.7	Real-time AQI 4 Good	24H AQI 4 Good	CO2 491	24H CO2 502	

IN PM2.5 9.9	Real-time AQI 15 Good	24H AQI 16 Good	
-----------------	-----------------------------	-----------------------	--

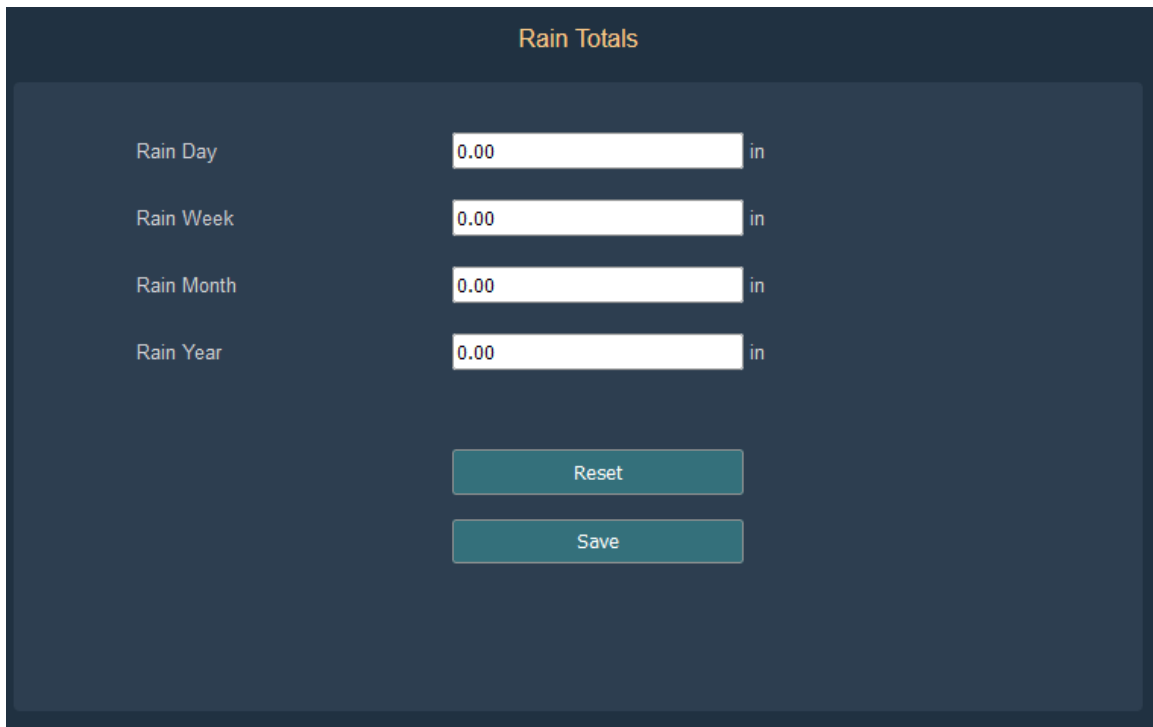
CH2 Leak: Normal

CH1 Temperature: 77.4 °F Humidity: 41%	CH3 Temperature: 78.3 °F Humidity: 40%
CH4 Temperature: 46.2 °F Humidity: 13%	CH5 Temperature: 77.5 °F Humidity: 41%
CH6 Temperature: 77.4 °F Humidity: 41%	CH7 Temperature: 77.4 °F Humidity: 41%
CH8 Temperature: 77.2 °F Humidity: None	

6.5.1 Reset and Change Rain Totals

During the installation of your weather station, you may report false rain due to vibration of the tipping mechanism. To reset the rain to 0.00, select the **Reset** button as shown in **Error! Reference source not found.**, or enter the Daily, Weekly, Yearly, Monthly and Yearly rain totals in the appropriate fields, and select **Save**.

During rain gauge cleaning, the tipping mechanism may record false rain. Before rain gauge cleaning, record the rain totals before and after the cleaning procedure, then correct the daily, weekly, monthly, and yearly totals.



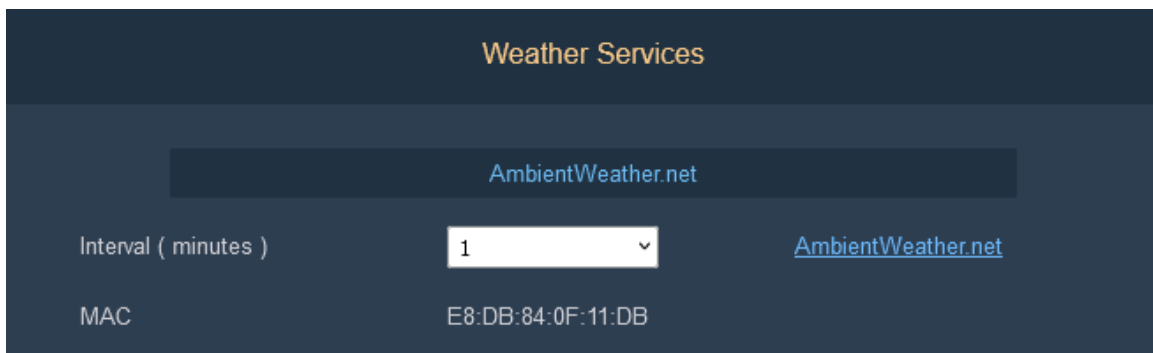
Rain Totals

Rain Day	<input type="text" value="0.00"/>	in
Rain Week	<input type="text" value="0.00"/>	in
Rain Month	<input type="text" value="0.00"/>	in
Rain Year	<input type="text" value="0.00"/>	in

Figure 11

6.6 Weather Services

Select the **Weather Services** tab to program the Ambient Weather Network settings Reference Figure 12:



Weather Services

Interval (minutes)	<input type="text" value="1"/>	AmbientWeather.net
MAC	E8:DB:84:0F:11:DB	

Figure 12

6.6.1 AmbientWeather.net

Reference Figure 12. Enter and update schedule and select **Apply**. Make a note of the MAC address. It will be required when you sign up at AmbientWeather.net.

6.6.1.1 Creating an AmbientWeather.net Account

Visit: www.AmbientWeather.net to create an account and select Add Device, as shown in Figure .

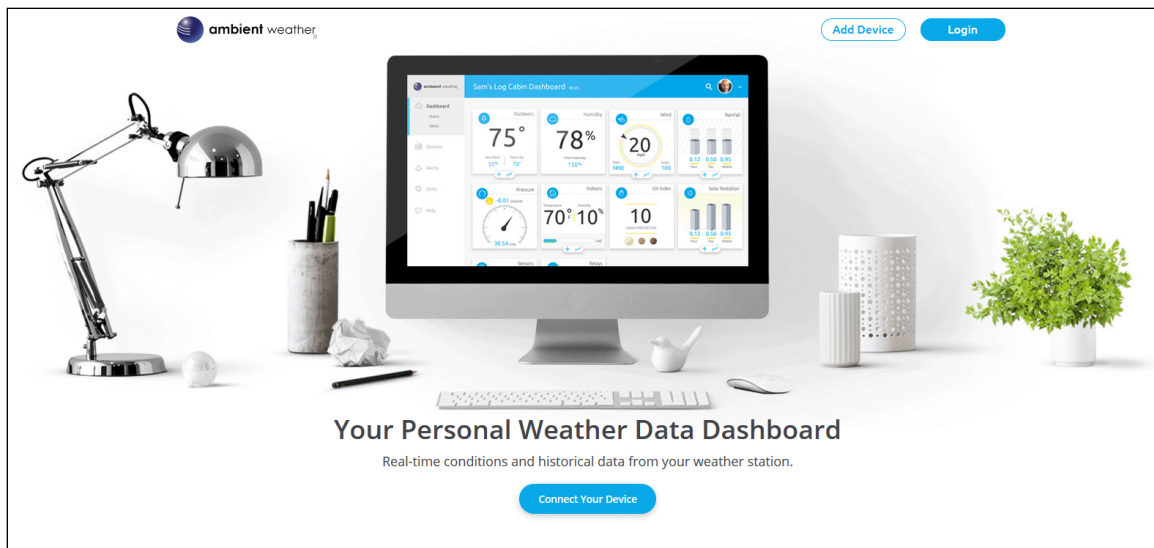


Figure 23

Next, enter the MAC address found on your IP Module Weather Network Panel (Figure 12), as shown in Figure . Note that this is an example only and your MAC address will be different.

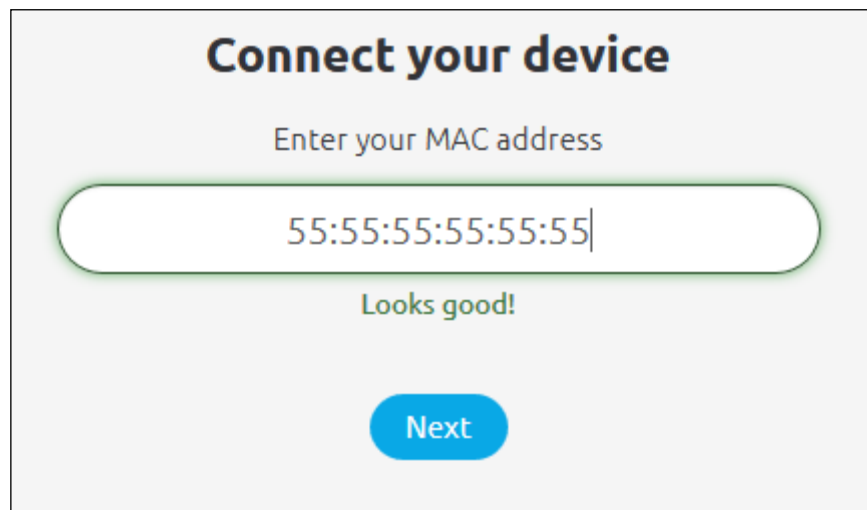


Figure 24

Register an account on AmbientWeather.net (email address and password).

Once registered, select the dashboard to view your data, as shown in Figure .

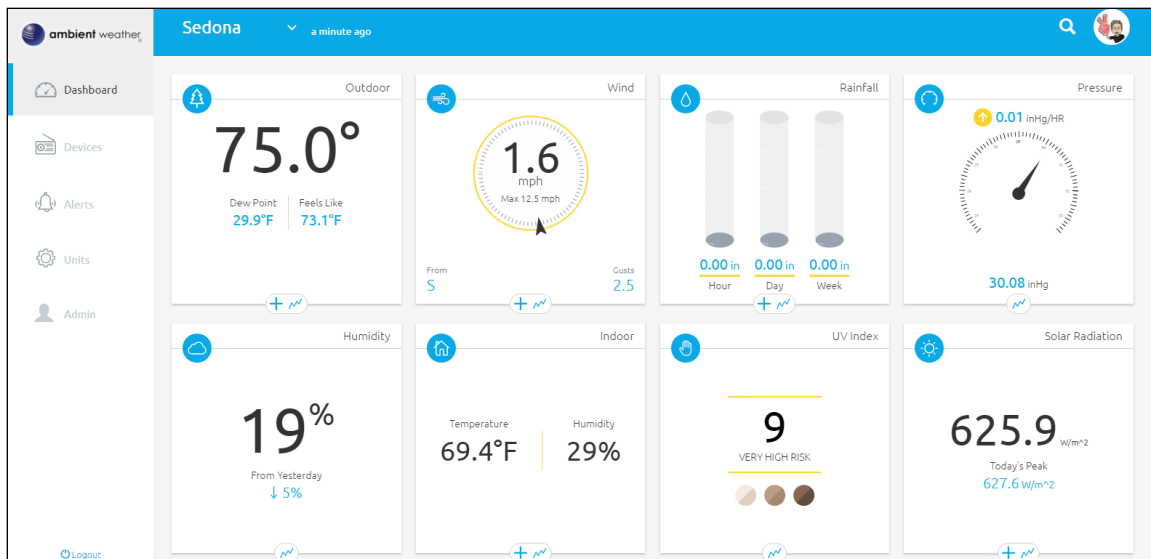


Figure 25

AmbientWeather.net is a responsive design and mobile friendly, so there is no need for a mobile app. Simply open your mobile devices web browser, browse to AmbientWeather.net, and bookmark your dashboard. If you save the bookmark to your desktop, it will automatically save the Ambient Weather icon, as shown in Figure .

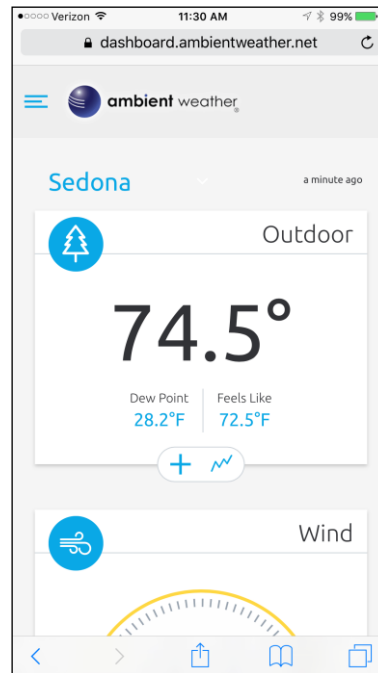


Figure 26

6.6.1.2 IFTTT

The AmbientWeather.net service connects to IFTTT, the platform that allows devices and services to work together seamlessly.

Here are a few things you can do with IFTTT:

- Turn off your Rachio sprinklers when it rains, there is too much wind, or below freezing.

- Close your Hunter blinds when the sun is too intense.
- Close your garage door when it is too windy.
- Blink your hue lights when it starts raining.
- Connect to other web services, such as Gmail, Facebook, Instagram, or Pinterest.

For more information on IFTTT and how it can work for you, visit:

https://ifttt.com/ambient_weather

6.6.1.3 Compatible with Alexa

The Ambient Weather skill provides Ambient Weather personal weather station owners with the ability to get real-time, and past weather information generated by the devices they have set up at AmbientWeather.net.

Enable the skill and get started: say "Alexa, ask Ambient Weather for a weather report.". This will provide you with your outdoor weather report, but you can ask for your indoor weather report as well by saying, "Alexa, ask Ambient Weather about the indoor conditions." You can also ask for a report about a specific day, month or year! Just say "Alexa, ask Ambient Weather about the weather yesterday." or "Alexa, ask Ambient Weather about the weather in May".

For more information and to enable this skill, visit:

<https://www.amazon.com/dp/B074PGCM1D/>

6.6.1.4 Works with Google Assistant

The Ambient Weather Google Assistant app provides Ambient Weather personal weather station owners with the ability to get real-time, and past weather information generated by the devices they have set up at AmbientWeather.net

Link your account to get started: say 'hey google, Ambient Weather... weather report.' This will provide you with your outdoor weather report. You can ask for your indoor weather report as well by saying, 'indoor conditions'.

You can also link the Ambient Weather app by downloading the Google Assistant.

Here are some sample commands:

- Weather Report
- Outdoor conditions
- Indoor conditions
- Yesterday's weather
- Conditions for October 15, 2017
- Conditions for September 2017
- Conditions for 2016

For more information and to enable this app, visit:

<https://assistant.google.com/services/a/id/668e6f3369f27209/>

6.7 Calibration

Select the Calibration tab to view your calibration data from the weather station. Select the **Apply** button

to confirm changes.

Calibration of most parameters is not required, except for Relative Pressure, which must be calibrated to sea-level to account for altitude effects. For more information on sea-level pressure calibration, please reference note (3) below.

6.7.1 Relative Barometric Pressure Calibration Example

If you have the optional WH32B Indoor Baro-Thermo-Hygrometer, the following is an example of how to calculate the relative pressure offset {(4) below} to put into the Rel Offset section of the OBSERVERIP2.0 web GUI Calibration Screen. Your results will vary.

Steps:

1. The local “official” relative pressure found on the Ambient Weather Network (QR code two pages below) in your area is 30.12 inHg.
2. From the Live Data panel, your absolute pressure (measured, and not corrected to sea-level) reads 28.90 inHg.
3. Reference Figure 27. Enter the following offset in the Calibration panel for Relative Pressure Offset:

$$\text{Relative Pressure Offset} = 30.12 - 28.90 = \mathbf{1.22}$$



Calibration	
SolarRad Gain	1.00
UV Gain	1.00
Wind Gain	1.00
Rain Gain	1.00
InTemp Offset	0.0 °F
InHumi Offset	0 %
Abs Offset	0.00 inHg
Rel Offset	1.33 inHg
OutTemp Offset	0.0 °F
OutHumi Offset	0 %
WindDir Offset	0 Degress

Figure 27

Parameter	Type of Calibration	Default	Typical Calibration Source
Temperature	Offset	Current Value	Red Spirit or Mercury Thermometer (1)
Humidity	Offset	Current Value	Sling Psychrometer (2)
ABS Barometer	Offset	Current Value	Calibrated laboratory grade barometer
REL Barometer	Offset	Current Value	Local airport / AWN (3)
Wind Direction	Offset	Current Value	GPS, Compass (4)

Solar Radiation	Gain	1.00	Calibrated laboratory grade solar radiation sensor
1 w/m ²	Gain	126.7 lux	Solar radiation conversion from lux to w/m ² for wavelength correction (5)
Wind	Gain	1.00	Calibrated laboratory grade wind meter (6)
Rain	Gain	1.00	Sight glass rain gauge with an aperture of at least 4" (7)
Daily Rain	Offset	Current Value	Apply an offset if the weather station was not operating for the entire day.
Weekly Rain	Offset	Current Value	Apply an offset if the weather station was not operating for the entire week.
Monthly Rain	Offset	Current Value	Apply an offset if the weather station was not operating for the entire month.
Yearly Rain	Offset	Current Value	Apply an offset if the weather station was not operating for the entire year.

- (1) Temperature errors can occur when a sensor is placed too close to a heat source (such as a building structure, the ground or trees).

To calibrate temperature, we recommend a mercury or red spirit (fluid) thermometer. Bi-metal (dial) and digital thermometers (from other weather stations) are not a good source and have their own margin of error. Using a local weather station in your area is also a poor source due to changes in location, timing (airport weather stations are only updated once per hour) and possible calibration errors (many official weather stations are not properly installed and calibrated).

Place the sensor in a shaded, controlled environment next to the fluid thermometer, and allow the sensor to stabilize for 48 hours. Compare this temperature to the fluid thermometer and adjust the ObserverIP2.0 receiver to match the fluid thermometer.

- (2) Humidity is a difficult parameter to measure electronically and drifts over time due to contamination. In addition, location has an adverse effect on humidity readings (installation over dirt vs. lawn for example).

Official stations recalibrate or replace humidity sensors on a yearly basis. Due to manufacturing tolerances, the humidity is accurate to $\pm 5\%$. To improve this accuracy, the indoor and outdoor humidity can be calibrated using an accurate source, such as a sling psychrometer.

- (3) The ObserverIP2.0 receiver displays two different pressures: absolute (measured) and relative (corrected to sea-level).

To compare pressure conditions from one location to another, meteorologists correct pressure to sea-level conditions. Because the air pressure decreases as you rise in altitude, the sea-level corrected pressure (the pressure your location would be at if located at sea-level) is generally higher than your measured pressure.

Thus, your absolute pressure may read 28.62 inHg (969 mb) at an altitude of 1000 feet (305 m), but the relative pressure is 30.00 inHg (1016 mb).

The standard sea-level pressure is 29.92 in Hg (1013 mb). This is the average sea-level pressure around the world. Relative pressure measurements greater than 29.92 inHg (1013 mb) are considered high pressure and relative pressure measurements less than 29.92 inHg are considered low pressure.

- (4) To determine the relative pressure for your location, locate your local “official” barometric pressure reading on www.AmbientWeather.net/baro or scan QR code below. To access the pressure relative pressure calibration screen of your console, see Section 6.7.1 / Figure 27 to enter the value.



Note: Calibration setting is saved until the OBSERVERIP2.0 is factory reset. If the OBSERVERIP2.0 location/elevation changes it will need to be recalibrated.

- (5) Only use this if you improperly installed the weather station sensor array and did not point the direction reference to true north.
- (6) The default conversion factor based on the wavelength for bright sunlight is $126.7 \text{ lux} / \text{w/m}^2$. This variable can be adjusted by photovoltaic experts based on the light wavelength of interest, but for most weather station owners, is accurate for typical applications, such as calculating evapotranspiration and solar panel efficiency.
- (7) Wind speed is the most sensitive to installation constraints. The rule of thumb for properly

installing a wind speed sensor is 4 x the distance of the tallest obstruction. For example, if your house is 20' tall and you mount the sensor on a 5' pole:

$$\text{Distance} = 4 \times (20 - 5)' = 60'.$$

Many installations are not perfect and installing the weather station on a roof can be difficult. Thus, you can calibrate for this error with a wind speed multiplier.


In addition to the installation challenges, wind cup bearings (moving parts) wear over time.

Without a calibrated source, wind speed can be difficult to measure. We recommend using a calibrated wind meter (available from Ambient Weather) and a constant speed, high speed fan.

- (8) The rain collector is calibrated at the factory based on the funnel diameter. The bucket tips every 0.01" of rain (referred to as resolution). The accumulated rainfall can be compared to a sight glass rain gauge with an aperture of at least 4". The following is a link to an accurate sight glass rain gauge:

<http://www.ambientweather.com/stpraga.html>

Make sure you periodically clean the rain gauge funnel.

 **Note:** The purpose of calibration is to fine tune or correct for any sensor error associated with the devices margin of error. Errors can occur due to electronic variation (example, the temperature sensor is a resistive thermal device or RTD, the humidity sensor is a capacitance device), mechanical variation, or degradation (wearing of moving parts, contamination of sensors).

Calibration is only useful if you have a known calibrated source, you can compare it against, and is optional. This section discusses practices, procedures, and sources for sensor calibration to reduce manufacturing and degradation errors. Do not compare your readings obtained from sources such as the internet, radio, television, or newspapers. The purpose of your weather station is to measure conditions of your surroundings, which vary significantly from location to location.

6.8 Sensor Array Mounting

Reference Figure . The mounting assembly includes two U-Bolts and a bracket that tightens around a 1 to 2" diameter pole (not included) using the four U-Bolt nuts.

- Insert the U-Bolts into the sensor array mounting bracket and hand tighten the nuts.
- Tighten the nuts to fit the size of your mounting pole (between 1" and 2" diameter)
- Insert the sensor array and U-Bolt assembly onto the mounting pole.
- Tighten the U-Bolts around the pole with an adjustable wrench. Make sure the sensor array is level.

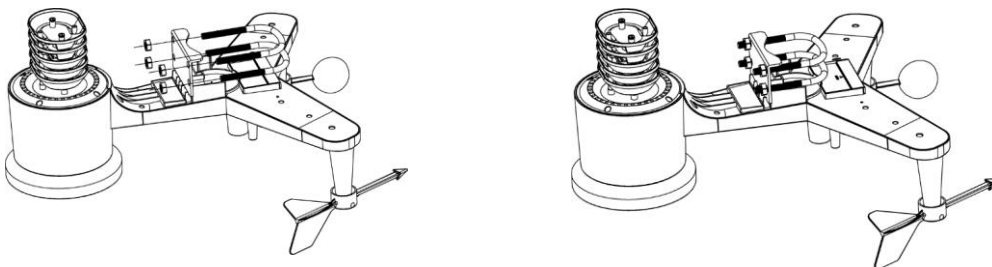
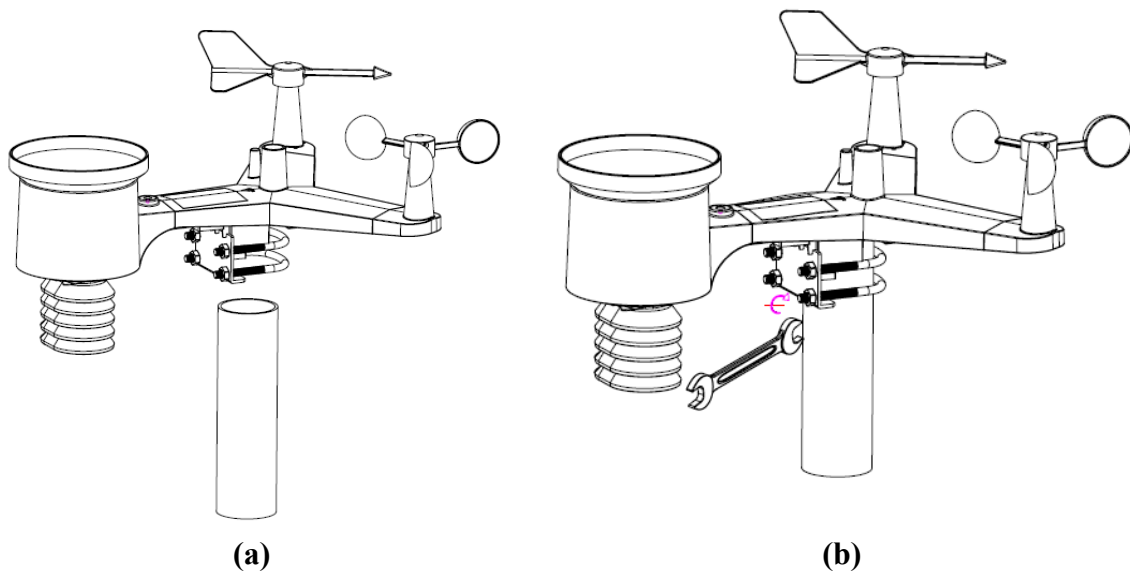





Figure 29

Use the bubble level next to the rain sensor to make sure the sensor array is completely level. If the sensor array is not level, the rain gauge, UV, and solar radiation sensors will not measure properly.



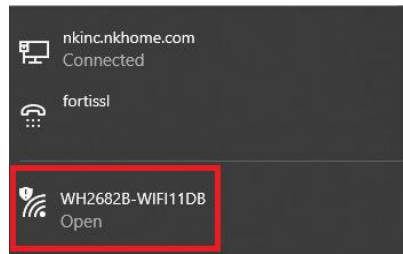
 **Note:** If you cannot read the bubble level due to mounting constraints, place straddle a line or ruler level across the top of the rain gauge for easier viewing.

6.8.1 Aligning the Wind Direction

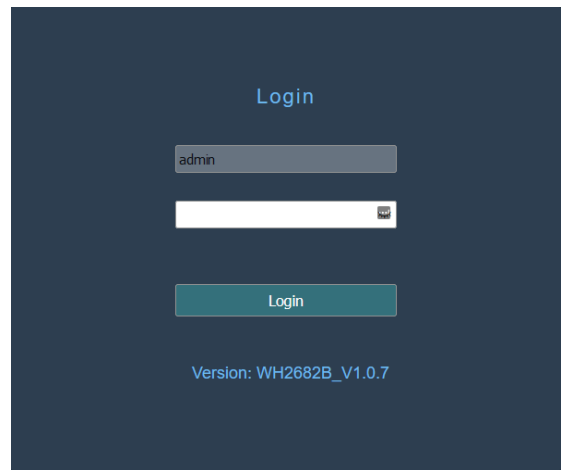
Locate the four-wind vane compass rose indicators of N, E, S, W (representing North, East, South and West) at the base of the wind vane. Align the compass rose direction upon final installation with a compass or GPS.

7. Updating Firmware

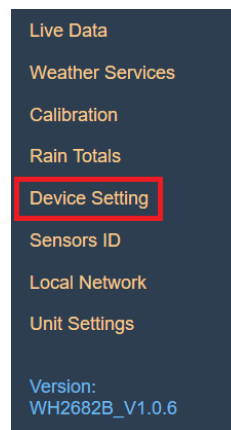
7.1 PC Users



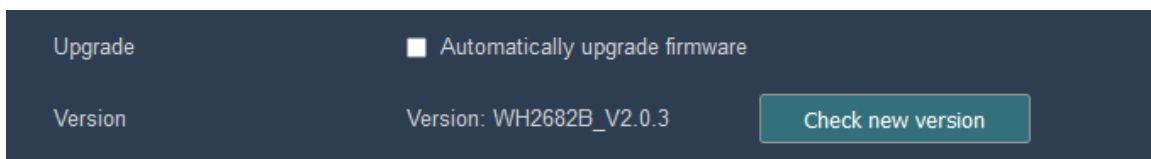
Open internet connections on your PC and look for the following WIFI network. Connect to the network and then open a browser **Note: you may be told network has no internet.**



Navigate to the following IP address 192.168.4.1 you will be presented with the following screen. **(Note: default password is blank)**



Once logged in you will want to navigate to Device Setting page



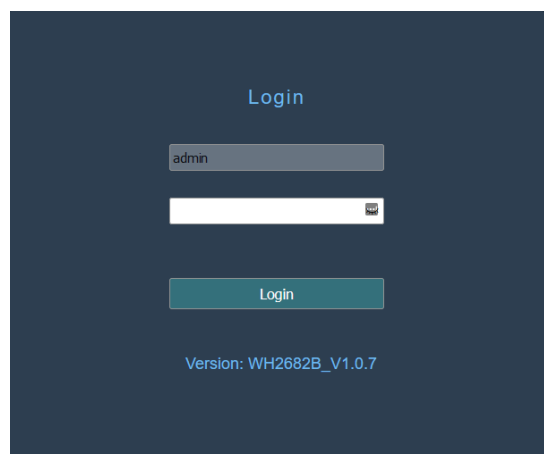
You may choose to automatically upgrade firmware by clicking the checkbox and click save. You may also check for a new version manually.

7.2 Mac Users

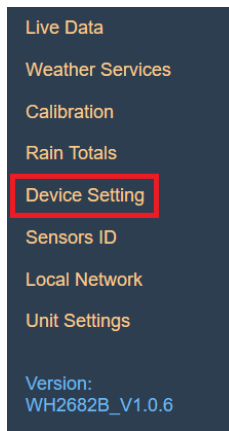
To find the OBSERVERIP2.0 receiver, Open internet connections on your Mac and look for the following WIFI network.



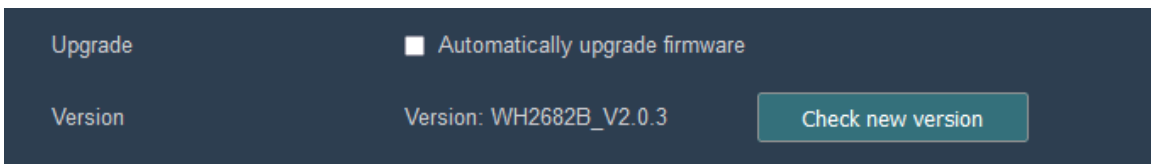
Connect to the network and then open a browser **Note: you may be told network has no internet.**



Navigate to the following IP address 192.168.4.1 you will be presented with the following screen. **(Note: default password is blank)**

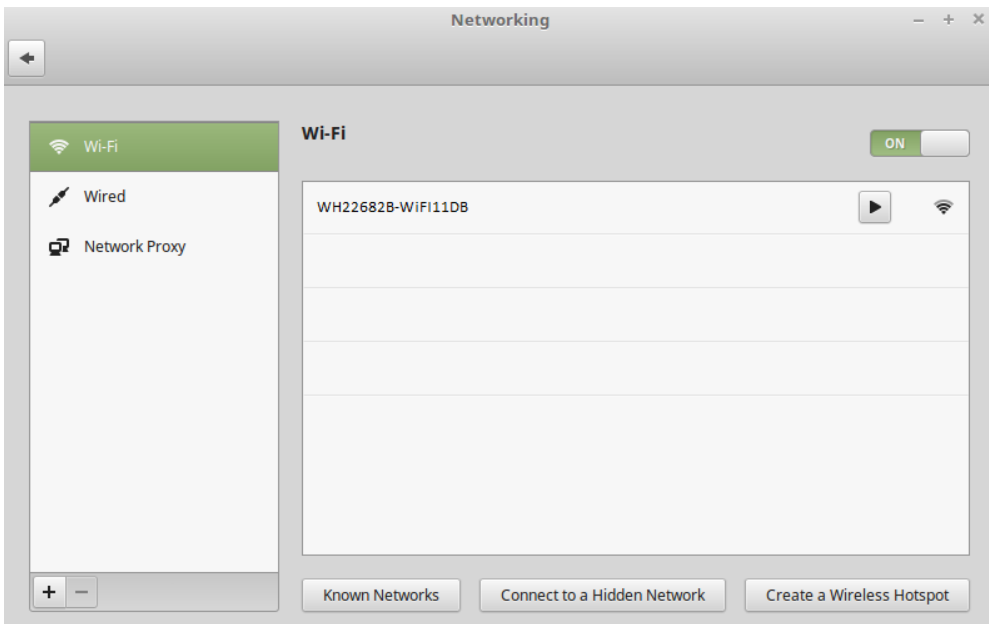


Once logged in you will want to navigate to Device Setting page

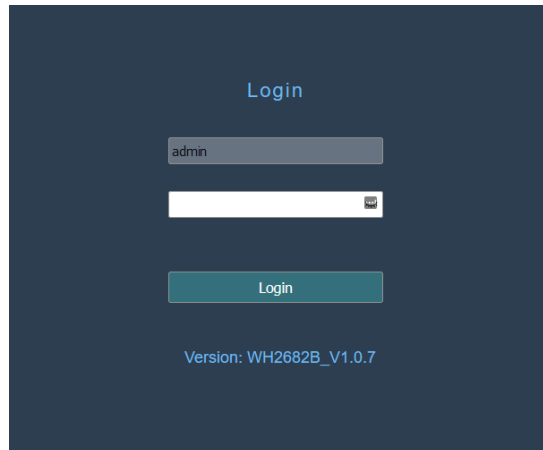


You may choose to automatically upgrade firmware by clicking the checkbox and click save. You may also check for a new version manually.

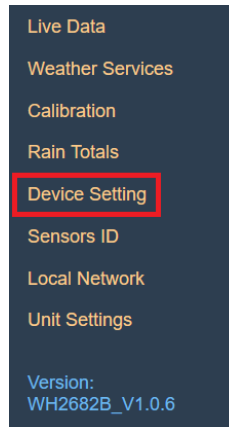
7.3 Linux Users



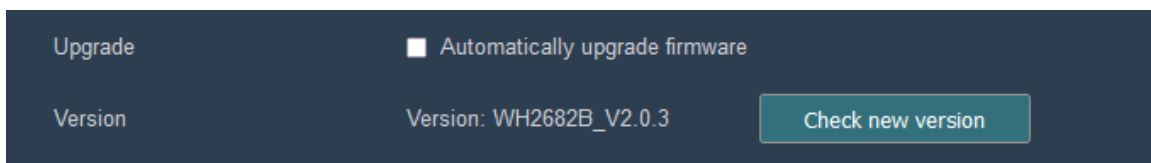
Open internet connections on your PC and look for the above WIFI network. Connect to the network and then open a browser **Note: you may be told network has no internet.**



Navigate to the following IP address 192.168.4.1 you will be presented with the following screen.
(Note: default password is blank)



Once logged in you will want to navigate to Device Setting page



You may choose to automatically upgrade firmware by clicking the checkbox and click save.
You may also check for a new version manually.

8. Access Point Deactivation

The ObserverIP2.0 does broadcast a Wi-Fi network to connect the device to Wi-Fi we have included an option to turn this off once it has connected to Wi-Fi

Device AP Auto OFF

- When the device is successfully connected to the router, the AP (WH2682B-WIFI5A6B) will be automatically shut down 5 minutes later

Save

9. Glossary of Terms

Term	Definition
Absolute Barometric Pressure	<p>Absolute pressure is the measured atmospheric pressure and is a function of altitude, and to a lesser extent, changes in weather conditions.</p> <p>Absolute pressure is not corrected to sea-level conditions. <i>Refer to Relative Barometric Pressure.</i></p>
Accuracy	Accuracy is defined as the ability of a measurement to match the actual value of the quantity being measured.
Barometer	A barometer is an instrument used to measure atmospheric pressure.
Calibration	Calibration is a comparison between measurements – one of known magnitude or correctness of one device (standard) and another measurement made in as similar a way as possible with a second device (instrument).
Dew Point	<p>The dew point is the temperature at which a given parcel of humid air must be cooled, at constant barometric pressure, for water vapor to condense into water. The condensed water is called dew. The dew point is a saturation temperature.</p> <p>The dew point is associated with relative humidity. A high relative humidity indicates that the dew point is closer to the current air temperature. Relative humidity of 100% indicates the dew point is equal to the current temperature and the air is maximally saturated with water. When the dew point remains constant and temperature increases, relative humidity will decrease.</p>
HectoPascals (hPa)	Pressure units in SI (international system) units of measurement. Same as millibars (1 hPa = 1 mbar)
Hygrometer	A hygrometer is a device that measures relative humidity. Relative humidity is a term used to describe the amount or percentage of water vapor that exists in air.
Inches of Mercury (inHg)	Pressure in Imperial units of measure. 1 inch of mercury = 33.86 millibars
Rain Gauge	<p>A rain gauge is a device that measures liquid precipitation (rain), as opposed to solid precipitation (snow gauge) over a set period of time.</p> <p>All digital rain gauges are self-emptying or self-dumping (also referred to as tipping rain gauge). The precision of the rain gauge is based on the volume of rain per emptying cycle.</p>
Range	Range is defined as the amount or extent a value can be measured.
Relative Barometric Pressure	Measured barometric pressure relative to your location or ambient conditions.
Resolution	Resolution is defined as the number of significant digits (decimal

Term	Definition
	places) to which a value is being reliably measured.
Solar Radiation	<p>A solar radiation sensor measures solar energy from the sun.</p> <p>Solar radiation is radiant energy emitted by the sun from a nuclear fusion reaction that creates electromagnetic energy. The spectrum of solar radiation is close to that of a black body with a temperature of about 5800 K. About half of the radiation is in the visible short-wave part of the electromagnetic spectrum. The other half is mostly in the near-infrared part, with some in the ultraviolet part of the spectrum.</p>
Thermometer	A thermometer is a device that measures temperature. Most digital thermometers are resistive thermal devices (RTD). RTDs predict change in temperature as a function of electrical resistance.
Wind Vane	A wind vane is a device that measures the direction of the wind. The wind vane is usually combined with the anemometer. Wind direction is the direction from which the wind is blowing.

10. Specifications

10.1 Wireless Specifications

- Line of sight wireless transmission (in open air): 330 feet, 100 feet under most conditions
- Update Rate: Outdoor Sensor: 16 seconds, Indoor Sensor: 64 seconds
- Frequency: 915 MHz

10.2 Measurement Specifications

The following table provides the specifications for the measured parameters.

Measurement	Range	Accuracy	Resolution
Indoor Temperature	14 to 140 °F	± 2 °F	0.1 °F
Outdoor Temperature	-40 to 149 °F (lithium batteries) -23 to 140 °F (alkaline batteries)	± 2 °F	0.1 °F
Indoor Humidity	10 to 99%	± 5%	1 %
Outdoor Humidity	10 to 99%	± 5%	1 %
Barometric Pressure	8.85 to 32.50 inHg	± 0.08 inHg (within range of 27.13 to 32.50 inHg)	0.01 inHg
Light	0 to 200,000 Lux	± 15%	1 Lux
Rain	0 to 394 in.	± 5%	0.01 in
Wind Direction	0 - 360 °	± 10°	1°
Wind Speed	0 to 100 mph (operational)	± 2.2 mph or 10% (whichever is greater)	1.4 mph

10.3 Power Consumption

- ObserverIP2.0 Receiver : 5V DC Adaptor (included)
- Optional WH31E and WH32B Sensors : 2 x AA batteries (not included)
- Outdoor sensor array: 3 x AA batteries (not included; we suggest Energizer Lithium)

11. Maintenance

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.

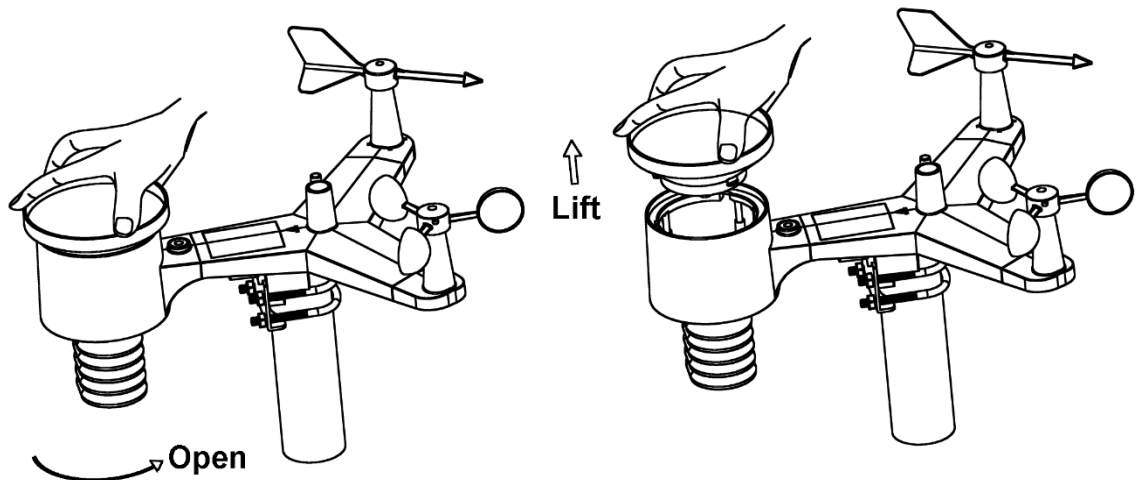


Figure 13

2. Clean the solar radiation sensor and solar panel every 3 months with 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 (when cleaning the solar panel).
4. When replacing the batteries, apply a corrosion preventive 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.

12. Troubleshooting Guide

If your question is not answered here, you can contact us as follows:

1. Email Support: support@ambientweather.com
2. Technical Support: 480-346-3380 (M-F 8am to 3pm Arizona Time)

Problem	Solution
Outdoor sensor array does not communicate to the display console.	<p>The 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 Figure 1.</p> <p>With an open ended paperclip, press the reset button for 3 seconds to completely discharge the voltage.</p> <p>Take out the batteries and wait one minute, while covering the solar panel to drain the voltage.</p>

Problem	Solution
	<p>Put batteries back in.</p> <p>The LED next to the battery compartment will flash every 16 seconds. If the LED is not flashing every 16 seconds...</p> <p>Replace the batteries in the outside sensor array.</p> <p>If the batteries were recently replaced, check the polarity. If the sensor is flashing every 16 seconds, proceed to the next step.</p> <p>There may be a temporary loss of communication due to reception loss related to interference or other location factors,</p> <p>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 AC power and batteries, wait 10 seconds, and reinsert AC power and batteries).</p>
Temperature sensor reads too high in the day time.	<p>Make certain that the sensor array is not too close to heat generating sources or structures, such as buildings, pavement, walls or air conditioning units.</p> <p>Use the calibration feature to offset installation issues related to radiant heat sources.</p>
Relative pressure does not agree with official reporting station	<p>You may be viewing the absolute pressure, not the relative pressure.</p> <p>Select the relative pressure. Make sure you properly calibrate the sensor to an official local weather station. Reference Section 6.7.1 for details.</p>
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 incrementing rainfall. Make sure you have a stable, level mounting solution.
Wind Vane does not spin as freely as the wind cups.	This is by design. The dampening prevents the wind vane from spinning with the slightest breeze, which will result in variable wind all of the time. The added resistance allows the wind vane to change direction with 2 – 3 mph, providing a much better wind direction tracking.
Time off by increments of an hour, or date is off by one day.	The time zone is entered incorrectly. Reference Section 6.4.1.

13. Accessories

The following software and hardware accessories are available for this weather station at www.AmbientWeather.com.

Accessory	Description
Ambient Weather Mounting Solutions	Ambient Weather provides the most comprehensive mounting solutions for weather stations, including tripods, pole extensions, pole mounting kits, guy wires, ground stakes and more.

14. Liability Disclaimer

Please help in the preservation of the environment and return used batteries to an authorized depot. The electrical and electronic wastes contain hazardous substances. Disposal of electronic waste in wild country and/or in unauthorized grounds strongly damages the environment.

Reading the “User manual” is highly recommended. The manufacturer and supplier cannot accept any responsibility for any incorrect readings and any consequences that occur should an inaccurate reading take place.

This product is designed for use in the home only as indication of weather conditions. This product is not to be used for medical purposes or for public safety information.

The specifications of this product may change without prior notice.

This product is not a toy. Keep out of the reach of children.

No part of this manual may be reproduced without written authorization of the manufacturer.

Ambient, LLC WILL NOT ASSUME LIABILITY FOR INCIDENTAL, CONSEQUENTIAL, PUNITIVE, OR OTHER SIMILAR DAMAGES ASSOCIATED WITH THE OPERATION OR MALFUNCTION OF THIS PRODUCT.

15. FCC Statement

Statement according to FCC part 15.19:

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.
2. This device must accept any interference received, including interference that may cause undesired operation.

Statement according to FCC part 15.21:

Modifications not expressly approved by this company could void the user's authority to operate the equipment.

Statement according to FCC part 15.105:

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.

16. Warranty Information

Ambient, LLC provides a 1-year limited warranty on this product against manufacturing 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 Ambient, LLC for problem determination and service procedures.

Warranty service can only be performed by a Ambient, LLC. The original dated bill of sale must be presented upon request as proof of purchase to Ambient, LLC.

Your Ambient, LLC warranty covers all defects in material and workmanship with the following specified exceptions: (1) damage caused by accident, unreasonable use or neglect (lack of reasonable and necessary maintenance); (3) damage resulting from failure to follow instructions contained in your owner's manual; (4) damage resulting from the performance of repairs or alterations by someone other than an authorized Ambient, LLC authorized service center; (5) units used for other than personal use (6) applications and uses that this product was not intended (7) the products inability to receive a signal due to any source of interference or metal obstructions and (8) extreme acts of nature, such as lightning strikes or floods.

This 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, claims based on misrepresentation by the seller or performance variations resulting from installation-related circumstances.

17 California Prop 65

WARNING: Use of the Ambient Weather Products can expose you to chemicals, including lead and lead compounds, which are known to the State of California to cause cancer and bisphenol A (BPA), and phthalates DINP and/or DEHP, which are known to the State of California to cause birth defects or other reproductive harm.

Can I Trust that Ambient Weather Products are Safe Despite this Warning?

In 1986, California voters approved the Safe Drinking Water and Toxic Enforcement Act known as Proposition 65 or Prop 65. The purpose of Proposition 65 is to ensure that people are informed about exposure to chemicals known by the State of California to cause cancer, birth defects and/or other reproductive harm. A company with ten or more employees that operates within the State of California (or sells products in California) must comply with the requirements of Proposition 65. To comply, businesses are: (1) prohibited from knowingly discharging listed chemicals into sources of drinking water; and (2) required to provide a "clear and reasonable" warning before knowingly and intentionally exposing anyone to a listed chemical. Proposition 65 mandates that the Governor of California maintain and publish a list of chemicals that are known to cause cancer, birth defects and/or other reproductive harm. The [Prop 65 list](#), which must be updated annually, includes over 1,000 chemicals, including many that are commonly used in the electronics industry.

Although our manufacturing process is "lead-free" and RoHS compliant, it remains possible that trace amounts of lead could be found in components or subassemblies of Ambient Weather Products. Bisphenol A (BPSA) could conceivably be present in minute amounts in our plastic housings, lenses, labels or adhesives, and DEHP & DINP (phthalates) could possibly be found in PVC wire coatings of our cables, housings, and power cords. Unlike RoHS, Prop 65 does not establish a specific threshold for reporting on the substances of concern and instead sets forth a much less definitive standard

requiring that the business demonstrate with certainty that there is "no significant risk" resulting from exposure. With respect to carcinogens, the "no significant risk" level is defined as the level which is calculated to result in not more than one excess case of cancer in 100,000 individuals exposed over a 70-year lifetime. In other words, if you are exposed to the chemical in question at this level every day for 70 years, theoretically, it will increase your chances of getting cancer by no more than 1 case in 100,000 individuals so exposed. With respect to reproductive toxicants, the "no significant risk" level is defined as the level of exposure which, even if multiplied by 1,000, will not produce birth defects or other reproductive harm. In other words, the level of exposure is below the "no observable effect level," divided by 1,000. (The "no observable effect level" is the highest dose level which has not been associated with observable reproductive harm in humans or test animals.) Proposition 65 does not clarify whether exposure is to be measured only in normal operation, or in the event of misuse such as intentionally damaging, incinerating or consuming an Ambient Weather Product or component and Ambient Weather has not attempted to evaluate the level of exposure.

A Proposition 65 warning means one of two things: (1) the business has evaluated the exposure and has concluded that it exceeds the "no significant risk level"; or (2) the business has chosen to provide a warning simply based on its knowledge about the presence of a listed chemical without attempting to evaluate the exposure. The California government has itself clarified that "The fact that a product bears a Proposition 65 warning does not mean by itself that the product is unsafe." The government has also explained, "You could think of Proposition 65 more as a 'right to know' law than a pure product safety law."

While using Ambient Weather Products as intended, we believe any potential exposure would be negligible or well within the "no significant risk" range. However, to ensure compliance with California law and our customers' right to know, we have elected to place the Proposition 65 warning signs on Ambient Weather Products.

For further information about California's Proposition 65, please visit <https://oehha.ca.gov/prop65/background/p65plain.html>

