TFT COLOR DISPLAY WIFI WEATHER STATION
Operation Manual

Model: HP3501

Thank you for purchasing this TFT Color Display Weather Station! This device provides accurate weather readings and is Wi-Fi capable to stream data from the weather station to Internet based weather services.

This manual will guide you, step-by-step, through setting up your weather station and console, 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.

* Please scan the QR code to read English manual and keep it for future reference

* Bitte scannen Sie den QR-Code zudeutsche Anleitung lesen und aufbewahren füZukunftsbezug

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Instruction manuals

https://www.ecowitt.com/support/download/33

Help

Our product is continuously changing and improving, particularly online services and associated applications. To download the latest manual and additional help, please contact our technical support team:

support@ecowitt.com
support.eu@ecowitt.net (EU/UK)

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1 Table of Contents

2 Unpacking

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

QT	Item Description
1	Display Console
1	Wireless Anemometer with built-in: Wind Speed Sensor/ Wind Direction Sensor, Light and UV sensor, Solar panel
1	Wind speed cups (to be attached to anemometer sensor body)
1	Wind vane (to be attached to anemometer sensor body)
1	USB Cable (for console to PC connectivity)
1	Indoor sensor unit(temperature, humidity and pressure)
1	Outdoor temperature and humidity sensor unit
1	Rain gauge sensor unit
2 Set	U-Bolts for mounting on a pole(2pcs/set)
2 Set	Threaded nuts for U-Bolts (M5 size)(4pcs/set)
2 Set	Metal mounting plate to be used with U-Bolts(1pcs/set)
1	Wrench for M5 bolts
1	Stainless steel filter for rain gauge collector
1	AC adapter
1	User manual (this manual)

Table 1: Package content

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

Note: The console can store historical data on a memory card. This memory card is **not included**. If you want to use one you will need a microSD memory card. There is no required size for this card. A 1GB card will store more than 10 years' worth of data, so you do not need a very large capacity card. There is also no requirement on the speed class of this card as data writing happens infrequently and is not speed critical.

Note: Batteries for the wireless anemometer and the rain gauge sensor are all **not included**. You will need 1 AA size battery, alkaline or Lithium battery (Lithium recommended for the rain) for each unit.

Note: The console operates using an AC adapter. The included adapter is a switching-type adapter and can generate a small amount of electrical interference with the RF reception in the console, when placed too close to the console. Please keep the console display at least 2 ft. or 0.5 m away from the power adapter to ensure best RF reception from the outdoor sensor package.

Note: There are two sets of U-bolts in the box, one is for the wireless anemometer sensor and the other one is for the rain gauge sensor.

Note: The rain gauge can also be mounted to a surface using two screws, so the stainless-steel tube is not always necessary!

3 Overview

3.1 Display console

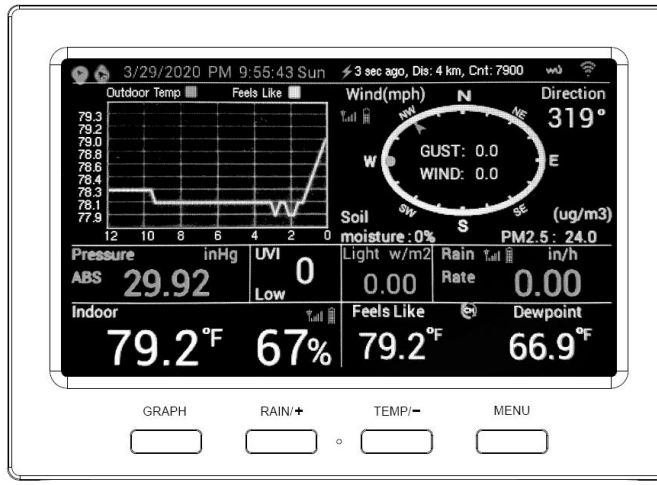


Figure 1: Display console screen

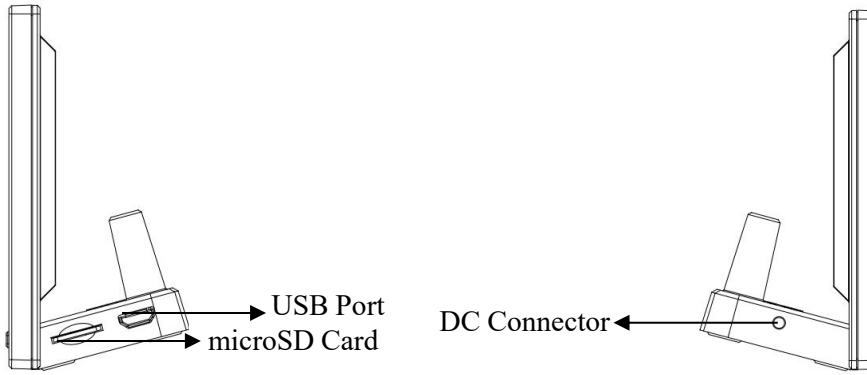


Figure 2: Display console side views

3.2 Indoor sensor:

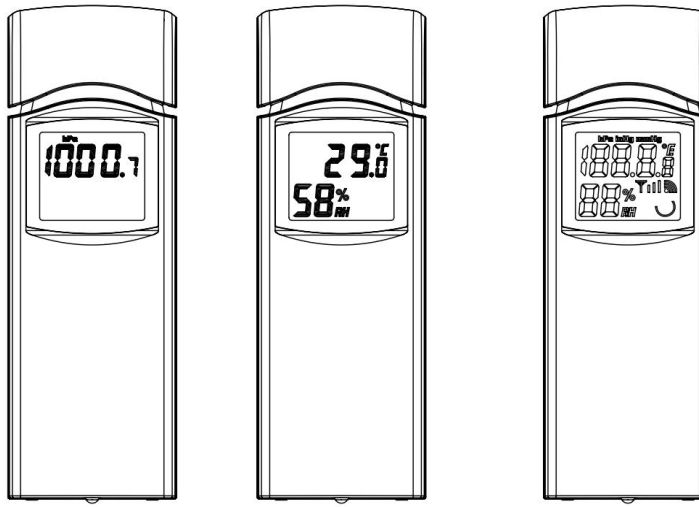
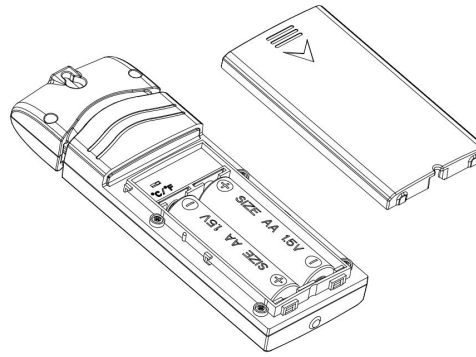


Figure 3: Indoor sensor 3 display variations

The indoor sensor will display indoor temperature, humidity and barometric pressure alternately. The sensor temperature unit for imperial or metric units is user selectable with a dip switch inside the battery compartment.



3.3 Outdoor temperature and humidity sensor:

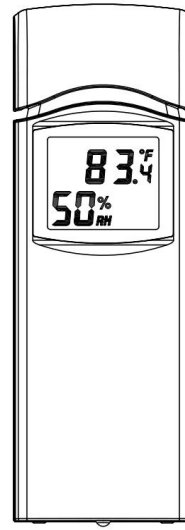


Figure 4: Outdoor temperature and humidity sensor display

3.4 Features

- TFT full color display
- Time and date
- Indoor/Outdoor temperature and humidity
- Wind speed, gust speed, and wind direction (red arrow icon for the current wind direction and blue dot icon for the previous wind direction on the compass)
- Absolute and Relative barometric pressure
- Rainfall rate and totals for day, week, month, and year
- Calculated wind chill, dew point and heat index display
- Solar light intensity and UV index
- Selectable display units for each sensor: C or F (temperature); mph, km/h, m/s, knots or Beaufort (wind speed); inHg, hPa or mmHg (pressure); in or mm (rainfall); lux, fc or w/m^2 (solar lighting)

- Barometric history graph (12, 24, 48, or 72 hr.)
- Maximum and minimum values for sensor with time stamp
- High/low alarm options for sensors
- Historical data preserved during power outage on optional SD card
- PC software (requires USB connection)
- Additional/optional sensors supported:
  - One WH57 lightning sensor
  - Up to 8 WN31 multi-channel temperature and humidity sensors
  - Up to 8 WH51 soil moisture sensors
  - Up to 4 WH41 PM2.5 air quality sensors
  - Up to 4 WH55 Water leak sensors (pending)
- Pushes sensor data to cloud weather services:
  - https://www.ecowitt.net
  - https://www.wunderground.com
  - https://www.weathercloud.com/
  - https://www.wow.com
  - Custom own server data hosting possible when server data exchange is compatible with either Wunderground or Ecowitt protocol.
- Mobile application (WS View Plus)
  - Configure the console to Wi-Fi network
  - View WU Dashboard (data obtained from the Weather Underground server).
- Data storage service on Ecowitt server: https://ecowitt.net
  - Stores data for past year days at 5-minute intervals
  - Stores data for past 2 years at 30-minute intervals

Note: The optional sensors can be purchased separately. If more info needed, please visit our website: http://www.ecowitt.com. Make sure to select the model of the units with the same RF frequency as your gateway (the frequency is different for various countries because of regulations).

4 Set up Guide

To complete assembly you will need a Philips screwdriver (size PH0) and a wrench (size M5; included in package).

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

Attention:

- Follow suggested order for battery installation (outdoor sensor first, console second)
- Ensure batteries are installed with correct polarity (+/-)
- Do not mix old and new batteries
- Do not use rechargeable batteries
- If outdoor temperature may go below 32F or 0C for prolonged periods, Lithium based batteries are suggested over alkaline type batteries for the outdoor sensor array

4.1 Site Survey

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

Anemometer

- Ideally mounted at 32.8 feet (10 meters) above ground level.
- Try to make the anemometer the highest object around. 7 feet(2.76 meters) or more above the surrounding obstructions is best.

Rain Gauge

- Ideally mounted at a height of 4 to 6 feet above the ground.
- Ideally located at a horizontal distance of 4 times the height of the nearest obstruction.
- Ensure the gauge is mounted level to the ground, away from any horizontal surface that can introduce rain-splashing or surrounding snow buildup.

Reference:
https://www.weather.gov/media/epz/mesonet/CWOP-Siting.pdf

4.2 Wireless Anemometer Sensor Assembly

See Figure 5 to locate and understand all the parts of the wireless anemometer with UV & light sensors package once fully assembled.

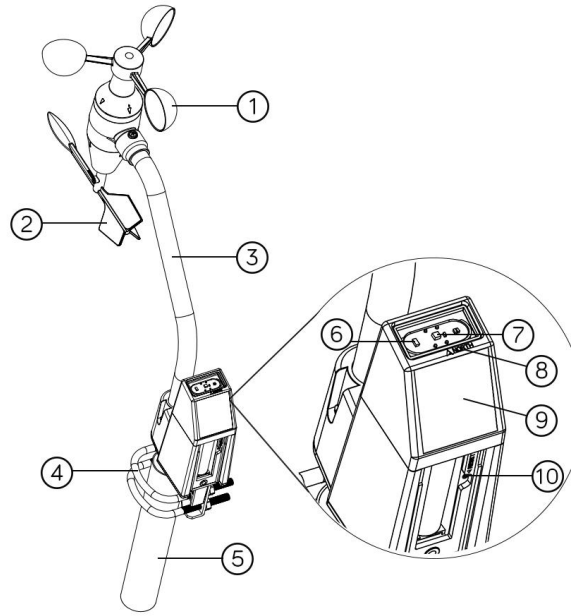


Figure 5: Sensor assembly components

1 Wind speed cups	6 LED (red) to indicate data transmission
2 Wind vane	7 Light sensor and UV sensor
3 Connection tube	8 NORTH arrow
4 U-Bolts	9 Solar panel
5 Mounting Pole (not included)	10 Reset button

Table 2: Sensor assembly detailed items

4.2.1 Install U-bolts and metal plate

Installation of the U-bolts, which are in turn used to mount the sensor package on a pole, requires installation of an included metal plate to receive the U-bolt ends. The metal plate, visible in Figure 6, has four holes through which the ends of the two U-Bolts will fit. The plate itself is inserted in a groove on the right bottom of the unit. 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 6.

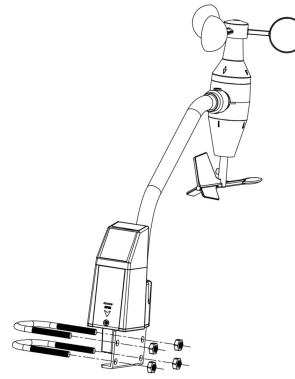


Figure 6: U-Bolt installation

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 7.

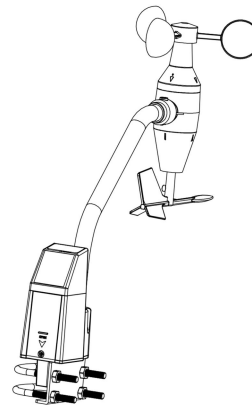


Figure 7: U-Bolts and nuts installed

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.

4.2.2 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 8. 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.

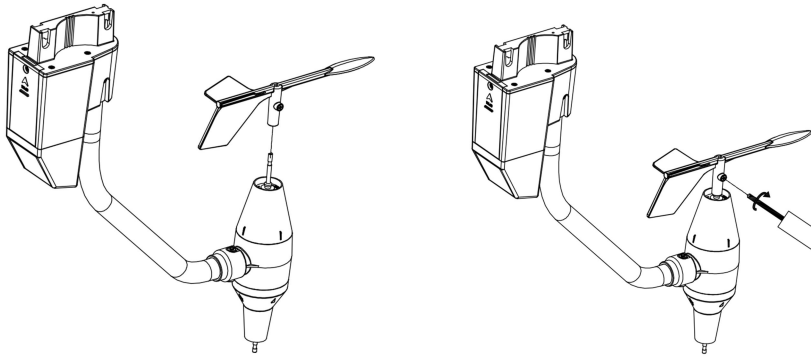


Figure 8: Wind vane installation diagram

4.2.3 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 9 on the top 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.

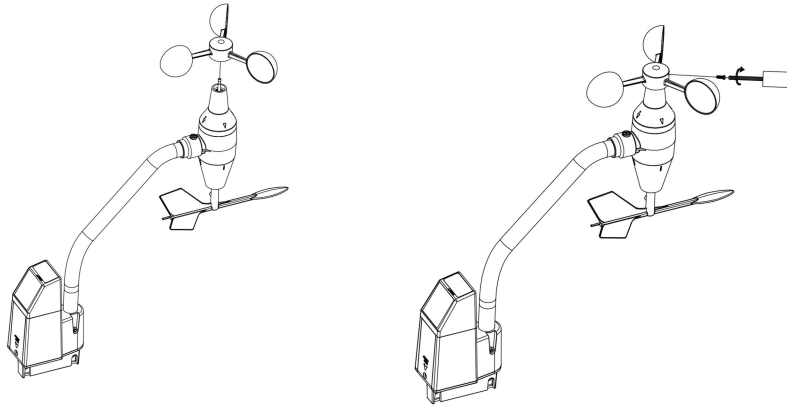


Figure 9: Wind speed cup installation diagram

4.2.4 Install Batteries in sensor package

Open the battery compartment with a screwdriver and insert 1 AA battery in the battery compartment. The LED indicator on the back of the sensor package (item 6) will turn on for 3 seconds and then flash once every 16.5 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 16.5 seconds, everything should be OK.

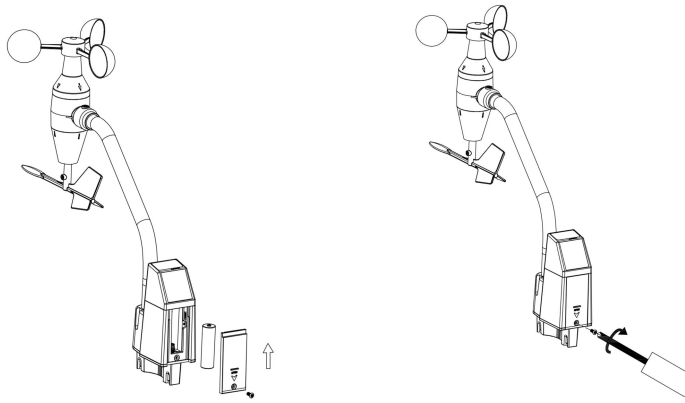


Figure 10: Battery installation diagram

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 battery 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.

4.2.5 Mount assembled wireless anemometer sensor

4.2.5.1 Before you mount

Before proceeding with the outdoor mounting detailed in this section, you may want to skip to setup instructions in section 5-7 and onwards first, while

you keep the anemometer sensor nearby (although preferably not closer than 5 ft. or 1.53m from the display console). This will make any troubleshooting and adjustments easier and avoids any distance or interference related issues from the setup.

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

4.2.5.2 Mounting

You can attach a pole to a permanent structure and then attach the sensor package to it (see Figure 11).

The U-Bolts will accommodate a pole diameter of 1-2 inches (pole not included).

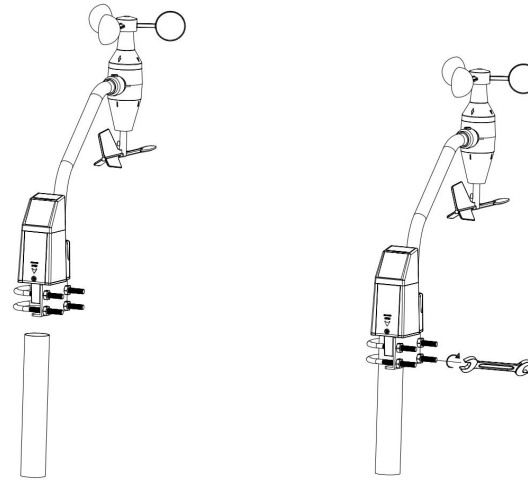


Figure 11: Sensor package mounting diagram

Make sure the mounting pole 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 "NORTH" that you will find on top of the transparent cover on the sensor package (Item 8). 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: The orientation to NORTH 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.

Make sure the sensor package is installed vertically. If it is not, wind direction and speed readings may not operate correctly or accurately. Adjust the mounting pipe as necessary.

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

4.2.6 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** (item 10) 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 16.5 seconds.

4.3 Rain Gauge Sensor Set Up

See Figure 12 to locate and understand all the parts of the rain gauge sensor once fully assembled.

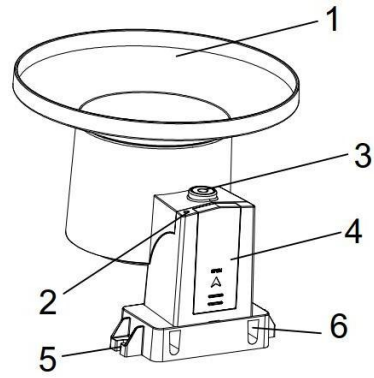


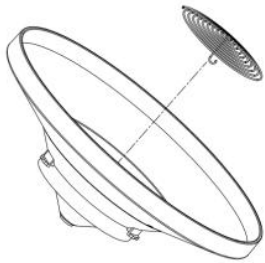
Figure 12: Sensor assembly components

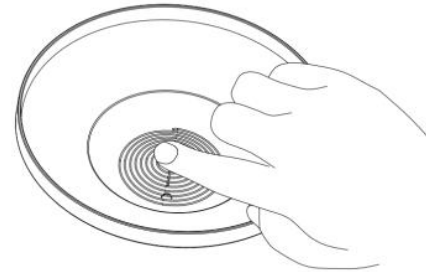
1 Rain collector top	4 Battery door
2 LED Indicator	5 Screw hole
3 Bubble level	6 U-bolt install hole

Table 3: Sensor assembly detailed items

4.3.1 Install rain gauge filter

There's a stainless steel filter included in the package. It's aimed to stop leaves or bird's dropping to avoid the obstruction of the cone hole. The installation is as simple as the below figures show:





Hook the filter hook on the edge of the rain collector to install the filter(as the figure below shows on the left).
Take out the filter hook from the edge to uninstall the filter(as the figure below shows on the right).

Hook the filter hook on the edge to install

Take out the filter hook from the edge to uninstall

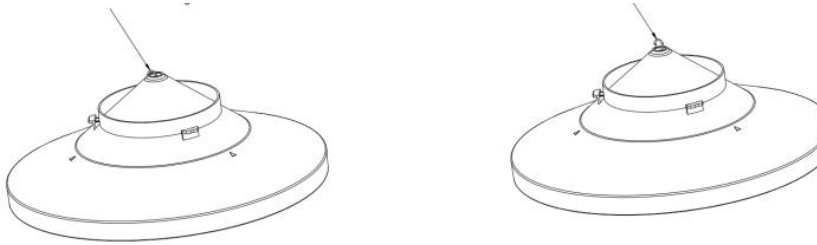


Figure13: Rain gauge filter in/un-installation diagram

4.3.2 Install Rain Collector Top

Align the rain collector top with the rain bucket, pay attention to the lock groove position as shown on the left side in Figure 14. Next, lock the top clockwise to the lock groove position, as shown on the right side, until the top cannot be removed from the bucket.

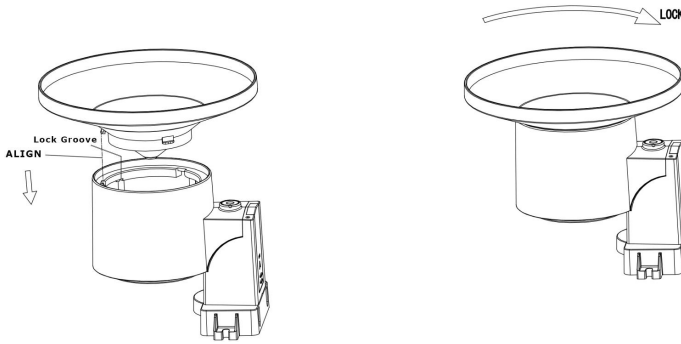


Figure 14: Rain collector top installation diagram

4.3.3 Install Batteries in rain gauge sensor

Remove the battery door on the back of the sensor by sliding it in the direction of the arrow. Insert one AA battery as described and put compartment door back and slide it in the opposite direction to lock.

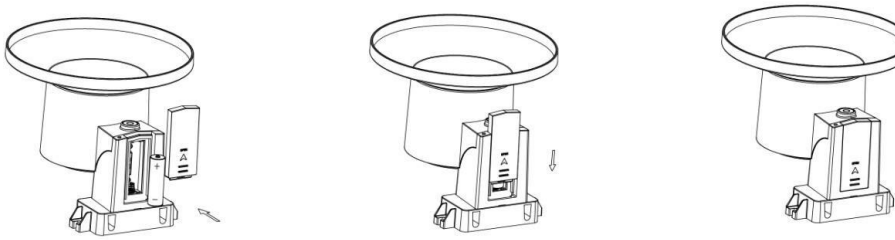


Figure 15: Rain gauge sensor battery installation diagram

The LED indicator on the top of the battery door (item 2) will turn on for 4 seconds and then flash once every 49 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 49 seconds, everything should be OK.

Note: If no LED light up or is lighted permanently, make sure the battery is inserted the correct way or a proper reset is happened. Do not install the batteries backwards. You can permanently damage the outdoor sensor.

Lithium batteries are recommended for the best performance. Rechargeable battery should not be used as it has lower voltage, resulting in poorer reception. The solar panel charges power on a super capacitor, and battery is mainly for backup power purpose only.

4.3.4 Mounting

Before you mount

Before proceeding with the outdoor mounting detailed in this section, you may want to skip to setup instructions in section 5-7 and onwards first, while you keep the assembled **rain gauge sensor** nearby (although preferably not closer than 5 ft. from the **display console**). This will make any

troubleshooting and adjustments easier and avoids any distance or interference related issues from the setup.

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

Mount with U-bolts

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.

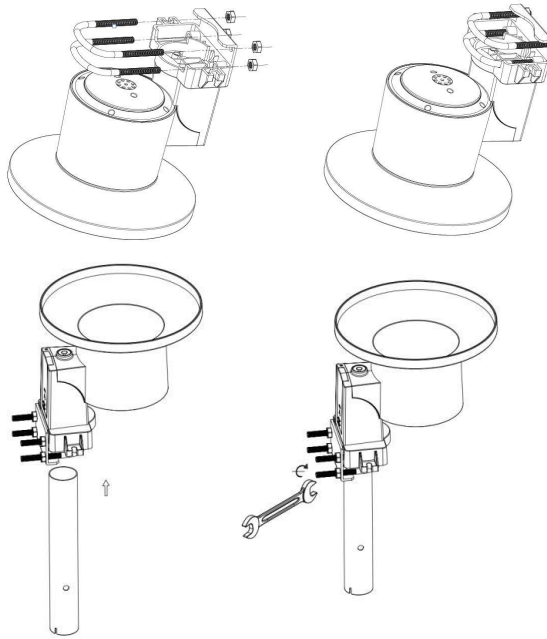


Figure 16: Rain gauge sensor mounting with u-bolts installation diagram

Note: Use the bubble level beside the rain sensor as a guide to verify that the sensor is leveled.

Mount with screws

The mounting assembly also includes two screws for installation on a flat place.

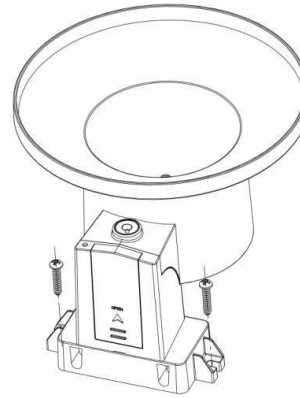


Figure 17: Rain gauge sensor mounting with screws installation diagram

Note: Use the bubble level beside the rain sensor as a guide to verify that the sensor is levelled.

4.4 Indoor Sensor Set Up

Note: To avoid permanent damage, please take note of the battery polarity before inserting the batteries. Looking at Figure 18 from left to right the left-most (or bottom) battery is to be installed with its + terminal pointing down, and the other battery with its + terminal pointing up.

Remove the battery door on the back of the sensor by sliding it in the direction of the arrow. Insert two AA batteries as described and put compartment door back and slide it in the opposite direction to lock.

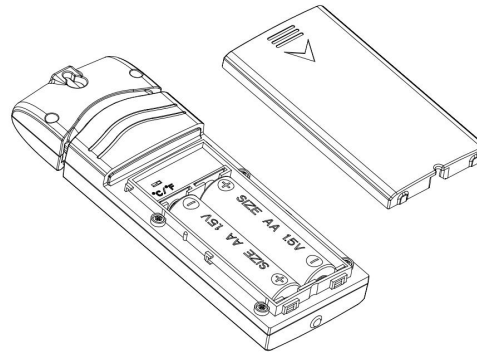


Figure 18: Indoor sensor battery installation

4.4.1 Sensor Placement

The best mounting location for the indoor sensor is in a location that never receives direct sunlight, not even through windows. Also, do not install in a location where a nearby radiant heat source (radiator, heaters, etc.) will affect it. Direct sunlight and radiant heat sources will result in inaccurate temperature readings.

The sensor is meant to provide indoor conditions for display on the console, but if you would rather have a second source for outdoor conditions instead, you can mount this unit outside. The unit is not weatherproof, you should mount the unit under cover (eve , awning , inside a solar radiation shielding housing or similar).

To mount or hang the unit on a wall or wood beam:

- Use a screw or nail to affix the remote sensor to the wall, as shown on the left side of Figure 19, or
- Hang the remote sensor using a string, as shown in right side of Figure 19

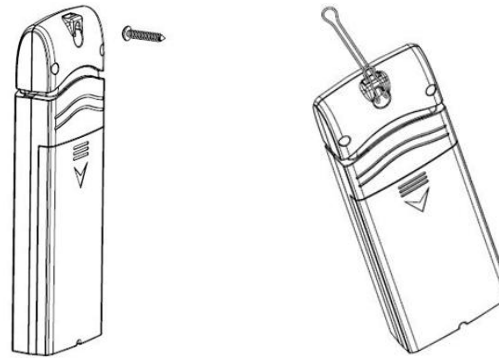


Figure 19: Indoor sensor mounting

Note: Make sure the sensor is mounted vertically and not lying down on a flat surface. This will insure optimum reception. Wireless signals are impacted by distance, interference (other weather stations, wireless phones, wireless routers, TVs and computer monitors), and transmission barriers, such as walls. In general, wireless signals will not penetrate solid metal and earth (down a hill, for example).

4.5 Outdoor Temperature and Humidity Sensor Operation

The operation for the outdoor temperature and humidity sensor is similar with the indoor sensor.

4.6 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:

- **Indoor/outdoor 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 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 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 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 4: RF Signal Strength reduction

4.7 Console Display

See Figure 20 to help you identify elements of the console's display screen.

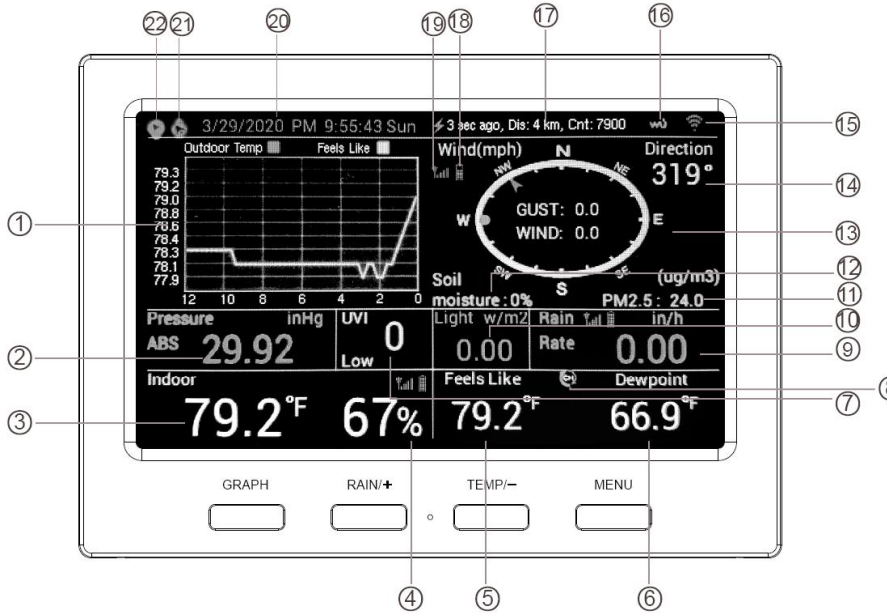


Figure 20: Display Console Screen Layout

1 Historical Data Graph	12 Soil Moisture (optional)
2 Barometric Pressure	13 Wind speed/Gust speed
3 Indoor Temperature	14 Wind Direction
4 Indoor Humidity	15 Wi-Fi Signal icon
5 Outdoor Temperature / Multichannel Temperature (optional)	16 WU Icon
6 Outdoor Humidity / Multichannel Humidity (optional)	17 Last lightning strikes detected time/distance; daily count(optional)
7 UV index	18 Sensor battery power status icon
8 Multichannel temp and humidity cyclemode icon	19 Sensor signal icon
9 Rainfall	20 Time and Date
10 Solor Radiation	21 High Alarm icon
11 PM2.5 concentration (optional)	22 Low Alarm icon

Table 5: Display console detailed items

4.7.1 Initial Display Console Set Up

Immediately after power up (inserting power adapter), the unit will turn on the display, and the unit will start to look for reception of the indoor and outdoor sensor data. This may take up to 3 minutes. Once the signal has been found and registered, the unit will display current sensor values and start Wi-Fi connect mode.

In Wi-Fi connect mode, the Wi-Fi signal icon will blink on and off and the unit will attempt to connect to a previously configured Wi-Fi network. If the network is not found, or none has been configured yet, it will stay in Wi-Fi connect mode.

4.7.2 Key functions

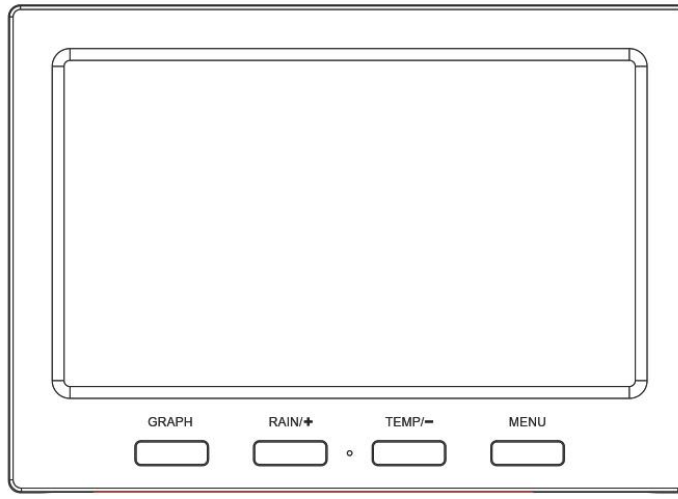


Figure 21: Buttons around the display

There is a set of four keys on the bottom of the display console. The following tables briefly explains the function of these keys.

Button	Function(s)
GRAPH	Cycle between display of historical graphs of various weather quantities (press repeatedly); also functions as a “next” button in setup mode; hold the button for 5s will full display the graph (also works for the optional sensor(s) display)
RAIN/+	Switch between display of various rain related quantities (press repeatedly); also functions as a “+” or “increase” button while in setup mode, and as a “select” button for various setup options; hold the button for 5s will enter calibration mode while in display mode for optional sensor(s)
TEMP/-	Switch between display of outdoor temperature and humidity, or display of “feels like” temperature and dew point temperature or display of multichannel temperature and humidity when optional WN31 sensor(s) added; also functions as a “-” or “decrease” button while in setup mode; hold the button for 5s will full display the optional sensor(s) data when added
MENU	Enter setup mode, or return from setup mode to display mode or skip to full display another type of optional sensor(s)

Table 6: Console buttons

5 Operating the console

The display console has seven modes. At normal mode, the display shows you various weather data. Use the **MENU** key to enter the various setup modes. Press the **MENU** key repeatedly to reach the various setup pages and, eventually, return back to normal mode. You may hold down the **MENU** key at any time to force a return to normal mode, or if you do not press any key for 30 seconds, the console will also return to normal mode.

The following sections will discuss each of the modes and the items and options available in each. When not in "normal" mode the console buttons are used for various functions. The current function of each button is depicted graphically with a symbol directly above the hardware button. Typical functions are "NEXT" indicated with a right arrow, "PREVIOUS" indicated with a left arrow, and "+" and "-".

5.1 Normal mode

Normal mode is the most often used mode. It is used to display most current sensor information for quick inspection. Information is displayed in several rectangular shaped areas. Some of these areas can be configured to display different content:

5.1.1 Outdoor or "Feels Like"

In the normal mode press the **TEMP/-** button to alternate the display between:

- Outdoor temperature and outdoor humidity, or
- "Feels Like" temperature (depending on the weather this will either indicate wind-chill temperature, or heat-index), and dew point temperature.

Wind chill and heat index are perceptual values (that's why they are described as "Feels Like") that indicate the air temperature as experienced by humans, as opposed to the measured ambient air temperature. The passing flow of lower temperature air makes it feel "colder" and this is

reflected in the wind chill temperature. Conversely, if it feels warmer than the measured air temperature due to the effects of humidity, we use a heat-index temperature to indicate how warm it feels.

The "dew point" is not a perceptual value, but it is calculated from the sensor values (temperature and humidity). The dew point is the temperature to which air has to be cooled to become saturated, and beyond which airborne water vapor would become liquid (dew).

5.1.2 Rain data

The normal mode has a segment for displaying rainfall related data. Press the **RAIN/+** button to alternate the display between:

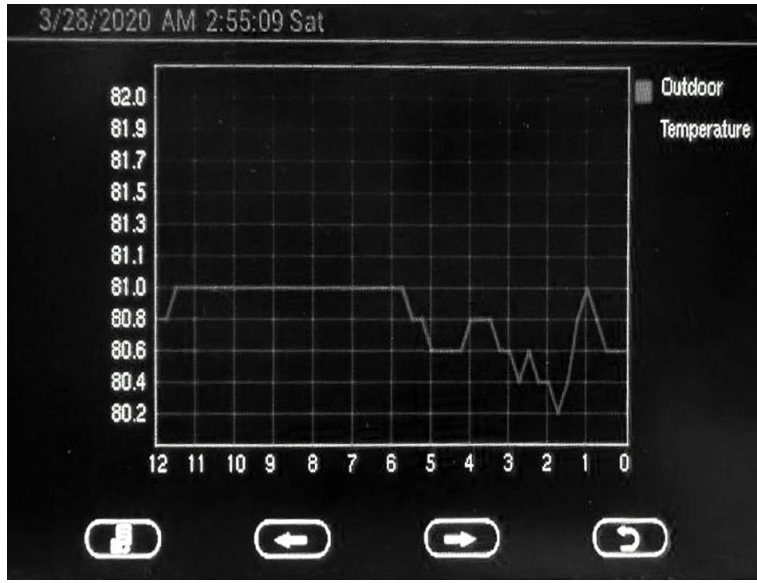
- Rain rate: amount of rainfall accumulated in the past 60 minutes
- Rain day: amount of rainfall accumulated since midnight
- Rain week: amount of rainfall accumulated since the start of the week. The week starts when Sunday begins and ends exactly 7 days later
- Rain month: amount of rainfall accumulated since the start of the current month
- Rain year: amount of rainfall accumulated since the start of the year

5.1.3 Graphed data

The normal mode has an area that displays a graph of historical data. The graph will span a period of 12, 24, 48 or 72 hr. This is controlled from a setup menu (see section 5.2.6). Press the **GRAPH** button to alternate the displayed graph between:

- Indoor and outdoor temperature
- "Feels Like" temperature and dew point temperature
- Indoor and outdoor humidity
- Absolute (ABS) and Relative (REL) barometric pressure
- Wind speed and gust speed
- UV-index
- Solar Radiation (Light)
- Rain rate

Note: In normal display, hold the Graph button for 5 seconds can full display the graph:



5.2 Setting Mode

Settings mode can be activated from "normal mode" by pressing the **MENU** once. Doing so will show a screen titled "Setup" that offers 10 individual buttons for changing configuration of specific settings.

Use the **GRAPH** or **TEMP** button to move to the next, or previous, setting (indicated by a right arrow above the button). The selected setting will be highlighted in yellow. Press the **RAIN** button to change the settings for the selected item. For some items you will now be able to change its value, for others (when labeled "Setup" you will enter a sub-menu that again allows you to select a specific item first. Use the **RAIN/+** and **TEMP/-** buttons to change the value selected in small changes or hold these buttons for two seconds or more to make rapidly repeating large changes. In the following buttons will sometimes be referred to as just "**next**", "**previous**", "+" or "**-**" if that is their function.

Press MENU again to return to the previous menu or normal mode.

5.2.1 Backlight

In backlight setting mode you use the GRAPH/next button to move between the items you can change:

- Enable or disable time-based backlight control. When disabled the backlight stays on permanently, otherwise the backlight will be switched on and off at designated times. Backlight off means the display is off!
- Turn on backlight: Use **next** button to move between controlling hours or minutes and use "+" and "**-**" buttons to changes the values.
- Turn off backlight: Use **next** button to move between controlling hours or minutes and use "+" and "**-**" buttons to changes the values.
- Current brightness: Use "+" and "**-**" buttons to change brightness level, indicated by the size of the yellow bar.

Use a single press of **MENU** to go back to the Setup menu, or a long press to go back to normal mode.

5.2.2 Data Units

In the data unit sub-menu, you can change settings for the following:

- Temperature: Select between F and C by repeatedly pressing the "+" button
- Barometer units: Select between hPa, inHg, and mmHg by repeatedly pressing the "+" button
- Wind speed: Select between mph, knots, m/s, km/h and bft by repeatedly pressing the "+" button
- Solar radiation: Select between w/m2, klux and fc by repeatedly pressing the "+" button
- Rainfall: Select between in and mm by repeatedly pressing the "+" button

Use a single press of **MENU** to go back to the Setup menu, or a long press to go back to normal mode.

5.2.3 Coefficients

In the coefficients sub-menu, you can change settings for the gain value of some sensor values. Gain means that the sensor value is multiplied by a "gain" or "factor." When "gain" is larger than 1 value are increased proportionally, when it is less than 1 they are decreased proportionally.

Generally, you should not have to change these gain values, but if you know for sure that your sensor readings are systematically incorrect by a proportional amount (not an offset), you can edit the following:

- Rain: Register rain in greater amounts (> 1) or lesser amounts (< 1).
- Wind: Register wind at greater speeds (> 1) or lesser speeds (< 1).
- Solar radiation: Register light in greater amounts (> 1) or lesser amounts (< 1).
- UV: Register UV radiation in greater amounts (> 1) or lesser amounts (< 1). This gain is initially set to 1 and cannot be changed.
- Lux conversion factor: This is not a gain for a sensor, but rather a conversion factor. Conversion from w/m^2 to lux and vice versa needs to take into account the wavelength of the light. The standard conversion factor is 126.7 lux per w/m^2. This value cannot be changed.

Use a single press of **MENU** to go back to the Setup menu, or a long press to go back to normal mode.

5.2.4 Barometer

The "Barometer" setting can be used to control whether in normal mode the barometer displays absolute pressure (ABS), which is pressure as measured at the sensor, or relative pressure (REL) which represents the measured pressure corrected to sea level elevation. Use the "+" button to switch between the two.

5.2.5 Rainfall

The “Rainfall” setting can be used to control which rainfall value is displayed. Use the “+” button repeatedly to select from “Rate,” “Daily,”, “Weekly,” “Monthly,” or “Yearly.”

5.2.6 Graph Time

The “Graph Time” setting controls how far back the historical data graph looks to present data. Press the “+” button repeatedly to select from “12,”, “24,”, “48,” or “72” hours.

5.2.7 Time Format

The “Time Format” setting controls how time is displayed. Press the “+” button repeatedly to select between “AM h:mm:ss”, “h:mm:ss AM”, and “h:mm:ss”. The first two will use a 12-hr clock system and display AM or PM as appropriate either before the time, or after the time. The last format uses a 24-hr clock system.

5.2.8 Date Format

The “Date Format” setting controls how dates are displayed. Press the “+” button repeatedly to select between “DD-MM-YYYY”, “YYYY-MM-DD”, and “MM-DD-YYYY”.

5.2.9 Date and Time

The “Date and Time” setting can be used to manually set the time, and it can be used to set the console’s time zone and whether or not daylight savings time should be handled automatically. If you are using the units with Wi-Fi connected, the time setting itself will be handled for you automatically, but you will have to set the correct time zone and daylight savings time handling.

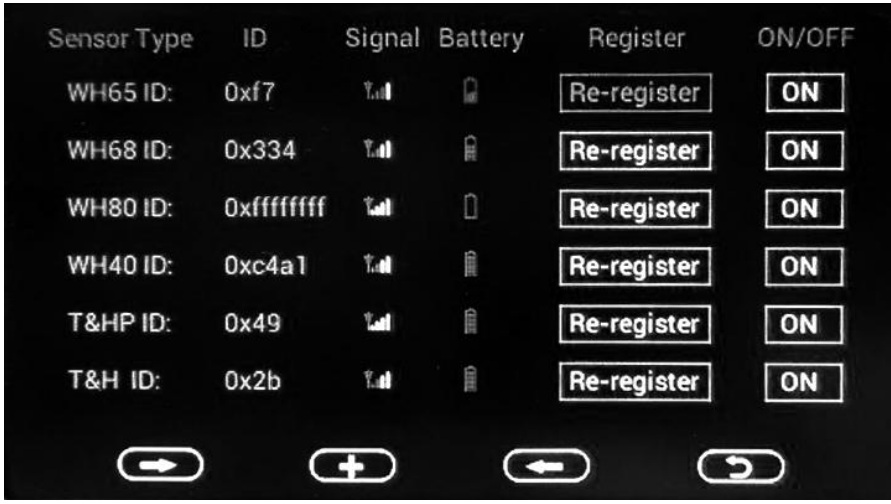
Use the “**next**” and “**previous**” buttons to move to the desired input box and then use the “+” and “**-**” keys to change the value.

The automatic daylight savings time adjustments are enabled when the box is solid red.

5.2.10 Sensor Type

On this page you can set the following:

- View sensor ID, signal strength and battery power condition. 1-4 bars means 1-4 successful successive signal receptions without missed ones.
- Register the sensor when offline.
- Enable or disable the sensor.



Here's the signal icon and battery icon instruction:

ICON	Color	Item Description
Signal	White	No sensor data received
Signal	Green	Display signal strength
Battery	Blank	No sensor data received sensor body)
Battery	Green	Display battery power condition
Battery	Red	Display low battery alert

Note: When it displays "0xffffffff" on the ID place, it means that no sensor data received. Only enable sensors you have, and with those you don't have, you can set it to "OFF" and console will not take any data preventing some wrongly received value to be displayed.

5.3 Calibration Mode

Calibration mode can be activated from "normal mode" by pressing the **MENU** twice. Doing so will show a screen titled "Calibration" that offers 11 individual buttons for changing calibration values for specific sensors.

Use the **GRAPH** or **TEMP** button to move to the next, or previous, setting (indicated by a right arrow above the button). The selected setting will be highlighted in yellow. Press the **RAIN** button to change the settings for the selected item. You will be shown a page with just that one value on it, highlighted in yellow. You are now able to change the value for the highlighted item. Use the **RAIN/+** and **TEMP/-** buttons to change the value in small amounts or hold these buttons for two seconds or more to make rapidly repeating large changes. In the following buttons will sometimes be referred to as just "**next**", "**previous**", "+" or "**-**" if that is their function.

In all cases you will change the value that would be displayed to a new value. So, if you have determined (through a reference instrument for example) that temperature is indicating 0.2F too high, you will select it and the page will display the temperature that is too high. You now press the "**-**" key twice to reduce it by 0.2 and press the **MENU** key to return to the previous menu. The following can be adjusted in this manner:

- Indoor temperature
- Indoor humidity
- Outdoor temperature
- Outdoor humidity
- Wind direction (compensate for inaccurate positioning during mounting)
- Daily Rain total
- Weekly Rain total
- Monthly Rain total
- Yearly Rain total
- Absolute (ABS) barometric pressure (measured at the console)
- Relative (REL) barometric pressure (calculated from ABS to correspond to sea level)

The rain values are not corrections, but rather reflect totals accumulated so far. They can be adjusted up or down as desired.

5.3.1 Calibration of barometric pressure settings.

Calibration of barometric pressure requires some additional understanding, which we will provide here. Also provided is a step by step procedure for calibrating correctly.

Absolute barometric pressure, can be calibrated at manufacturing time by comparing with a precise instrument that measures pressure at the same location. In practice, sometimes small adjustments of a few hPa may be needed. The relative pressure represents what the air pressure would indicate if your station was at sea level and depends on the altitude of your console and cannot be known in advance. This is why it needs an adjustment.

There are different manners in which to handle this adjustment. We will outline a reliable procedure below, which requires adjusting both pressures. The method assumes that you have an official airport sufficiently nearby to act as a reliable reference. Usually distances of up to 25 miles work reliably, but this is not always true and depends on geography. We start by assuming that your station's absolute pressure reading is correct and needs no offset correction.

The procedure below assumes you are starting from the console's factory setting. With those settings, ABS and REL should, at this time, be displaying the same value. We also assume, for the moment, that ABS pressure is 100% correct.

1. For this procedure we will get the most precise results if our display for pressure is in hPa units. Even if you do not want to use those units eventually, set the console to use them for now.
2. Determine the altitude, or elevation above sea level, of your station's console. This measurement is necessary to account for the difference in air pressure caused by the elevation of your console. Elevation above sea level reduces the absolute pressure measured by your sensor. Determine this altitude using a GPS, or look it up using a tool such as

this web site: https://www.freemaptools.com/elevation-finder.htm. You can input your location's GPS coordinates, or manipulate the map to your location. Click on "Estimate Elevation" and observe the result. For an example we will use a console location at 42 ft. above sea level.

3. This tool will provide the ground level elevation at your location, so you will need to add the right amount for how high above ground level your console is. If you are on a ground floor and have the console on a desk, you'll have to add something like 3-4 ft. If you are using a GPS system that tells you elevation, make sure it is right next to the console and you'll be able to read the correct elevation right from the GPS results without further adjustment.
4. With the correct altitude/elevation in hand you will need to determine the correct offset. To be added to the absolute pressure reading in order to compute relative pressure (sea level equivalent). Correction tables can be found on-line in many places. One example is the table found at the web site at https://novalynx.com/manuals/bp-elevation-correction-tables.pdf.
5. Locate your elevation in the first column and read the correction in the third column. This table, however is rather coarse, making it hard to be precise. An alternative is an on-line calculator such as the one found here:
6. http://www.csgnetwork.com/barcorrecthcalc.html
7. For our example of 42 ft. above sea level we input 42 ft. of elevation and a standard pressure of 1013.25 hPa/mb and press calculate. We find an "absolute barometer value" that should be -1.5626061222588443 hPa lower than at sea level. The inverse (because relative pressure is higher than absolute pressure) of this number will be our "REL PRESS OFFSET" value. Use the settings procedure to increase REL by +1.6 (nearest rounded value we can input).
8. Now we need a reliable reference for pressure at sea level. Locate the official identifier for the nearest airport. Refer to "World Airport Codes" at https://www.world-airport-codes.com or a similar reference. Enter your location or nearby airport name, and press "Search." Select

the correct airport from your search results and click on it. For example, search for "Mountain View" and click on "Moffet Field."

9. From the resulting page find the ICAO code, if listed. Otherwise use the IATA code. For the example above, you would find IATA code "NUQ."
10. Now go to a web site like AVIATION WEATHER CENTER (for US locations) at https://www.aviationweather.gov/metar?gis=off and enter the code you found in step 2, and click "Decoded" (to make the next step easier) before requesting the METAR information. For the example we would enter "KNUQ" and find a result output like: "30.09 inches Hg (1019.0 mb) [Sea level pressure: 1019.1 mb]"
11. Go to the calibration settings page and observe the "REL Barometer value (this is the value we just adjusted in step 4 above). Compare the REL value with the value from the airport. IN our example, the REL display was 1022.9 where we expected 1019.1. This then tells us that our displayed REL pressure is 1022.9 – 1019.1 = 3.8 hPa different from the reference source.
12. Since we assumed the absolute pressure measured was correct, and we presumably calculated the elevation related offset correctly, we must conclude that the absolute pressure was not correct after all. It appears to be 3.8 too high, so we'll now enter a correction of -3.8 in the settings for "ABS Barometer" until it reads a value 3.8 hPa lower than before. This kind of correction is entirely normal as during manufacturing small shifts in the pressure sensor readings can be introduced.
13. For a more precise procedure, locate a very precise barometer that you can place right next to the console, you would adjust "ABS Barometer" until the ABS pressure reads identical. You would then still adjust "REL barometer" until it displays the value from the reference airport. This procedure would also produce the correct relative pressure, but due to a precise calibration of the absolute pressure, it too is correct.

The first procedure above generally works quite well, but for stations at fairly high altitudes (e.g. 5,000 ft. or higher) it may be more incorrect than at

lower altitudes. In such cases comparisons with other known correct, and nearby at similar altitude, stations may help.

Now that calibration is complete, feel free to change the pressure units to whatever you like.

Note: Airport METAR data is often only updated every 10, 15 or even 30 minutes. If you use the information in the procedure above, you may be looking at pressure data that is out of date by as much as the update interval. To get best results observe several times and figure out the update interval and then use two values for the procedure: one taken immediately after an update, another taken about halfway through the interval.

Note: It is also a good idea to observe some more after the calibration procedure is complete to make sure the numbers are correct.

5.4 Alarm Mode

In ALARM mode you can activate alarms that will alert you to the presence of alarmingly high or low sensor values. From normal mode, you can enter alarm mode by pressing the **MENU** key three times to get to the "Indoor" alarms page, or four times to get to the "Outdoor" alarms page.

When an alarm condition is met, the alarm will sound a loud beep, and the alarm icon () will flash on the top of the display. Press any button to silence the alarm beep. The flashing alarm icon will stay until the alarm condition itself is no longer satisfied (e.g. temperature drops below alarm value, etc.)

You will see sensor values for which you can set alarm conditions. Each sensor displays an editable high and low value, each followed by a "bell/alarm" icon. Values, and the bell icon, can be changed using "+" and "-" keys. The alarm is enabled when the bell icon is yellow (for high alarm) or blue (for low alarm) and disabled when it is gray. Use the **MENU** button to go to the next menu or long press it to return to normal mode.

Alarms can be set for:

- Indoor temperature
- Indoor Humidity
- Indoor absolute (ABS) barometer
- Indoor relative (REL) barometer
- Outdoor temperature
- Outdoor humidity
- Outdoor “Feels Like” temperature
- Outdoor dew point temperature
- Wind speed (high value alarm only)
- Wind gust (high value alarm only)

5.5 Temperature Max/Min Mode

The “Temperature Max/Min” mode can be entered by pressing the **MENU** button repeatedly from normal mode. The page displays maximum and minimum values encountered, and the time and date of such, for the following sensor values:

- Indoor temperature
- Indoor humidity
- Outdoor temperature
- Outdoor humidity
- Dew point temperature
- “Feels Like” temperature

The values are for observation only and cannot be changed.

5.6 Other Max/Min Mode

The “Other Max/Min” page can be entered from the “Temperature Max/Min” page by pressing the **MENU** button once (long press to return to the normal mode).

The page displays maximum and minimum values encountered, and the time and date of such, for the following sensor values:

- ABS Barometer
- REL Barometer
- Wind speed
- Gust wind speed
- Solar Radiation
- UVI (UV-Index)

5.7 Rainfall

The "Rainfall" summary page can be entered from the normal mode by repeatedly pressing the **MENU** key. The page displays (left column) the current rain rate, and accumulated values for rainfall for the day, week, month and year. On the right hand side, you will find the largest value ever seen (since device installation or reset) for each of these values, along with date and time that maximum value was observed.

5.8 Factory Mode

The "Factory" mode page can be entered from the normal mode by repeatedly pressing the **MENU** key.

Use the **GRAPH** or **TEMP** button to move to the next, or previous, option (indicated by a right arrow above the button). The selected option will be highlighted in yellow. Press the **RAIN** button to change or activate the selected option. In all cases you will next be asked if you want to proceed with the chosen action, answering "Yes" or "No" by using the "**next**," and "**previous**" buttons to highlight (in yellow) the desired answer and press "+" to select that answer.

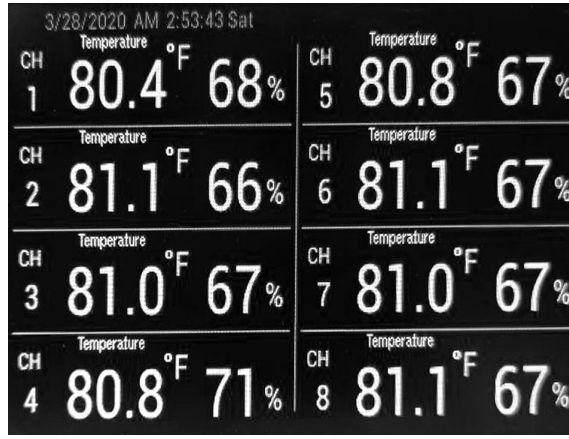
The following options are available:

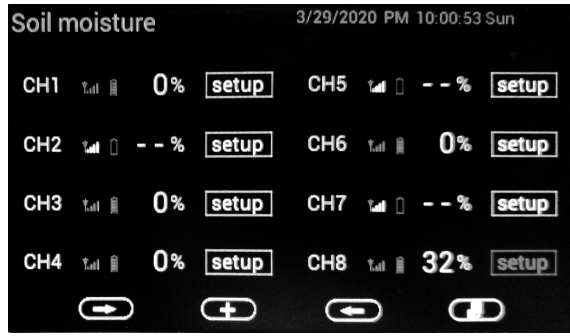
- Factory Reset: Any and all customization to settings, calibration and historical data will be erased and reset to factory default values.
- Clear Max/Min: Removes all recorded maximum and minimum values (for temperature in "section 5.5" and "other" in "section 5.6")

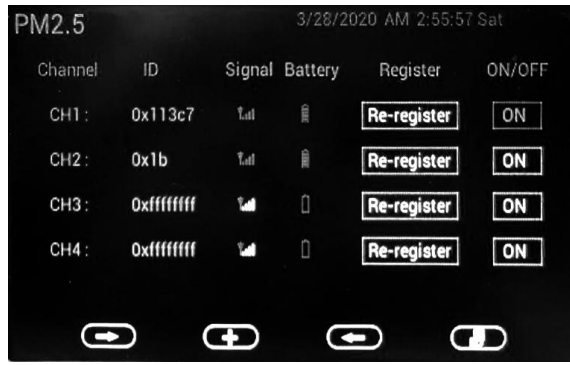
- Re-register Indoor: Forces the console to forget which indoor sensor it is receiving and then start “looking” for available sensors and “registering” the first one found.
- Re-register Outdoor: Forces the console to forget which outdoor sensor it is receiving and then start “looking” for available sensors and “registering” the first one found. Both options should rarely be needed, unless you have had to replace indoor or outdoor sensor(s) or in case of troubleshooting
- About: Displays various technical information that may be useful to troubleshooting or for communication of issues with customer service. Press **MENU** to return to the “Factory” mode page.
- English: Displays the console’s language. Currently cannot be changed, but future versions may allow choice of other languages.
- Reconnect Wi-Fi: Disconnects the console from the Wi-Fi network and then lets it reconnect using the already configured network name and password. This should rarely be necessary but might be useful after you have moved the console or Wi-Fi access point and want to check the console is able to re-connect.
- Wi-Fi Reset: Reset Wi-Fi to factory setting. This causes the already configured network name and password to be erased. The console will enter the Wi-Fi search mode and you will have to use your mobile application to (re)configure a Wi-Fi connection as described in section TBD.

5.9 Display Mode for optional sensor(s)

In normal mode, hold the **TEMP/-** button for 5 seconds will enter the optional sensor(s) display mode. Press the **MENU** button can skip to full display another type of optional sensor(s):







Note:

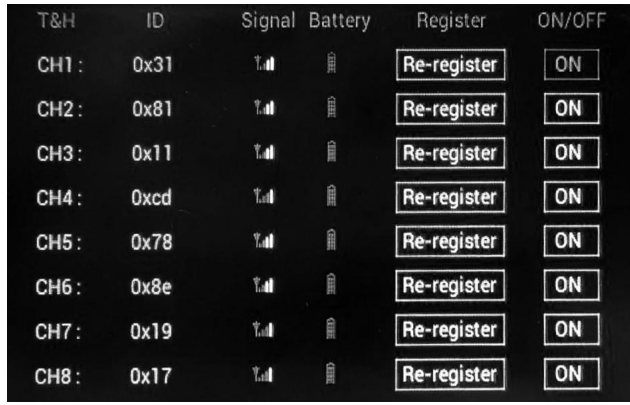
1.In optional sensor(s) display mode, hold the RAIN/+ button for 5s will enter corresponding calibration mode.

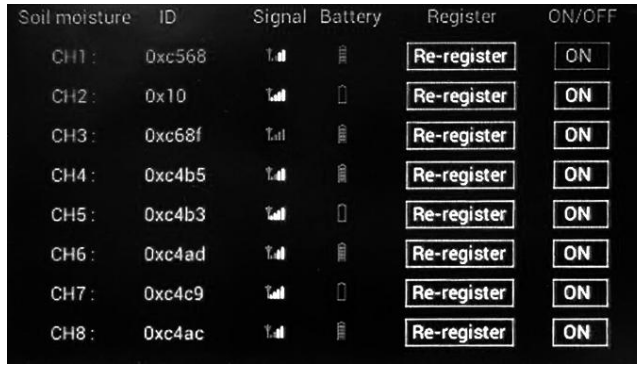
2.In soil moisture sensor display mode, select the setup button will enter th e calibration mode.

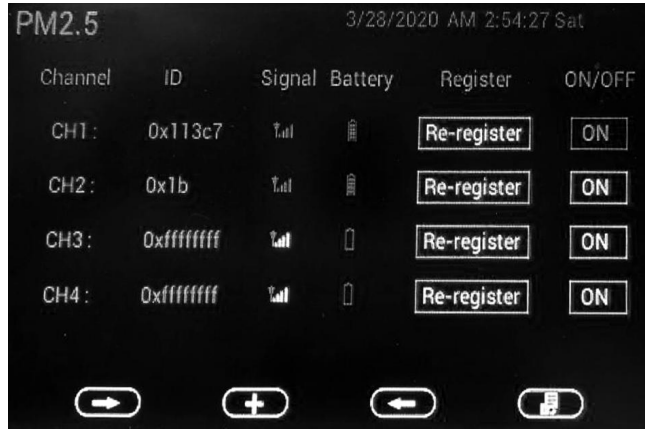
3.For the calibration setting of each kind of sensor, please refer to the corresponding sensor manual on our website.

5.9.1 Sensor management mode for optional sensors(s)

In each optional sensor(s) display mode, hold the **TEMP/-** button for 5 seconds will enter sensor management mode:





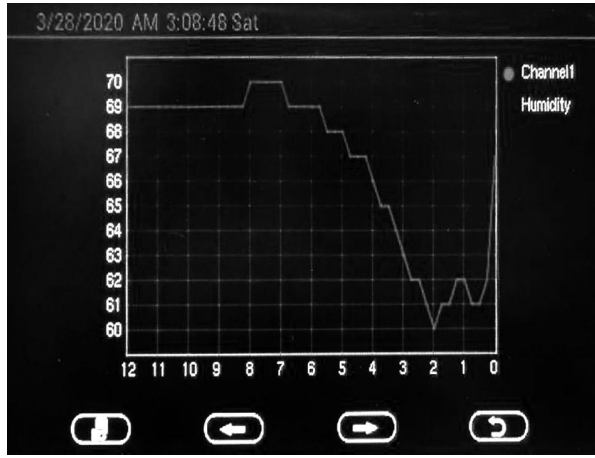


On this mode you can set the following:

- View sensor ID, signal strength and battery power condition. 1-4 bars means 1-4 successful successive signal receptions without missed ones.
- Register the sensor when offline.
- Enable or disable the sensor.

5.9.2 Graph mode for optional sensors(s)

In each optional sensor(s) display mode, hold the **GRAPH** button for 5 seconds will enter graph mode:



6 Other Console Functions

6.1 Historical data storage

The console can record historical weather data when an appropriate microSD card is inserted in the slot available for this purpose. This is an optional feature so there will be no problem if you do not install a card.

If you wish to install a card you should use a microSD card. Capacity of this card is not critical, nor is its “speed class.” Historical data will be written less often than once a minute, and this is why speed is not critical. While there is no minimum card size, you can take some guidance from the fact that a 1 GB card can store in excess of 10 years’ worth of recorded data.

The card should be formatted in MS-DOS FAT format before inserting it in the slot; Most cards come pre-formatted this way.

Insert the card and press with your finger until you feel a slight “click.” A correctly installed card will be almost flush with the console housing, protruding by one or two finger nail thicknesses.

6.2 Beaufort Wind Force Scale

If you have selected the use of Beaufort wind speed units, you can use the table below for reference. The Beaufort scale is based on qualitative wind conditions and how they would affect a ship’s (frigate) sails (so yes, it is an “old” standard). It is therefore less precise than the other scales but is still in use in various locales.

Wind speed	Beaufort number	Description
0 - 1 mph, or 0 - 1.6 km/h	0	Calm
1 - 3 mph, or 1.6 - 4.8 km/h	1	Light air
3 - 7 mph, or 4.8 - 11.3 km/h	2	Light breeze
7 - 12 mph, or 11.3 -1 9.3 km/h	3	Gentile breeze
12 - 18 mph, or 19.3 - 29.0 km/h	4	Moderate breeze
18 - 24 mph, or 29.0 - 38.6 km/h	5	Fresh breeze
24 - 31 mph, or 38.6 - 49.9 km/h	6	String breeze
31 - 38 mph, or 49.9 - 61.2 km/h	7	Near gale
38 - 46 mph, or 61.2 - 74.1 km/h	8	Gale
46 - 54 mph, or 74.1 - 86.9 km/h	9	Strong gale
55 - 63 mph, or 88.5 - 101.4 km/h	10	Storm
64 - 73 mph, or 103 - 117.5 km/h	11	Violent storm
74 mph and above, or 119.1 km/h and above	12	Hurricane

Table 7: Beaufort wind force scale

7 Publishing to Internet Weather Services

Your console is capable of sending your sensor data to select internet-based weather services. The supported services are shown in the table below:

Service	Website	Description
Ecowitt Weather	https://www.ecowitt.net	Ecowitt is a new weather server that can host a bunch of sensors that other services don't support.
Weather Underground	https://www.wunderground.com	Weather Underground is a free weather hosting service that allows you to send and view your weather station data real-time, view graphs and gauges, import text data for more detailed analysis and use iPhone, iPad and Android applications available at Wunderground.com. Weather Underground is a subsidiary of The Weather Channel and IBM.
WOW	http://wow.metoffice.gov.uk/	WOW is a UK based weather observation website.
Weather Cloud	https://weathercloud.net	Weathercloud is a real-time weather social network formed by observers from around the world.
Customized Website		Supports uploading to your customized website, if the website has the same protocol with Wunderground or Ecowitt

Table 8: Supported weather services

7.1 Wi-Fi Connection for the Weather Station Console

To send weather data to these services you must connect your console to the internet via Wi-Fi. The console can only operate using Wi-Fi when the external power adapter is connected and plugged in!

Note: If you are testing the setup with the outdoor sensor package nearby and indoor, you may want to consider connecting to Wi-Fi, but not yet configuring any of the weather services. The reason is that while indoor the temperatures and humidity recorded by the outdoor sensor, and as reported to the weather service(s) will reflect indoor conditions, and not outdoor conditions. Therefore, they will be incorrect. Furthermore, the rainfall bucket may be tripped during handling, causing rain to register while it may not actually have been raining. One way to prevent this is to follow all instructions, except to use an incorrect password, on purpose! Then, after final outdoor installation, come back and change the password after clearing console history. That will start uploading to the services with a clean slate.

7.1.1 Configure Device – Connect your console with WIFI

The console 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 console so that it can later connect to your preferred Wi-Fi network.

Please follow the following procedure:

1. Download the mobile application **WS View Plus** or **Ecowitt** from the iOS App Store or Google Play store, as appropriate for your device.
2. Power your console with the included AC adapter and ensure it is in Wi-Fi configuration mode (Wi-Fi icon and M-B flashing). If it is not, follow the procedure to put it in that mode (Press the MENU button

to switch to the Factory mode – Select Connection Wi-Fi and confirm)

3. Start the application and make sure the location permission function is granted (on) when you are running the app for the first time. In case you disabled the location access function for this application, please go to your mobile device settings page and configure it as "on". The application needs your location to configure weather services.
4. Press "Configure New Device". This may be automatic on the very first use of the application.
5. Tap on the appropriate device type and select "Next". Follow the prompts.

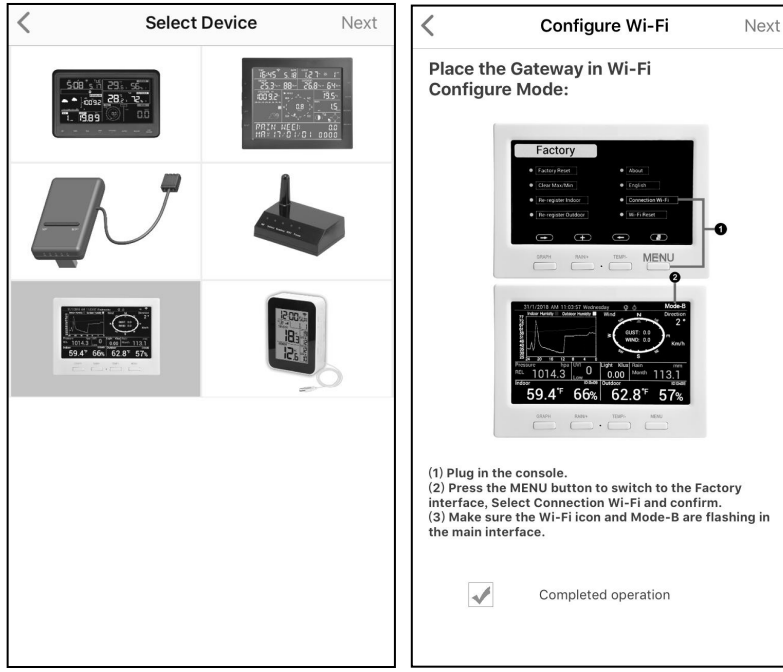


Figure 22

6. Confirm Wi-Fi configuration mode is active, as prompted. Correct if necessary (see above). Press "Next".

7. Enter your preferred Wi-Fi SSID (network name) and security password. Press “Next”. This will be communicated to the console in a later step.
8. Now switch your mobile device to the ad-hoc Wi-Fi network created by your console. It will be named something like “EasyWeather-WIFI” followed by some numbers. Wait until connected. You may see a message such as “Unsecured Network” and “No Internet connection”: this is normal and can be ignored. Please disable your mobile phone cellular network feature during the setup as some phones will switch to mobile data service automatically when the current WiFi connection has no Internet connection.
9. Return to the mobile application. The connection should be recognized, and you should see a few messages about connecting to the console and configuring it. The Wi-Fi icon on the console should now no longer be flashing and display steady.
10. Your mobile device should have been returned to your normal Wi-Fi network setting and the page will automatically jump to Upload page.

If not successfully, please contact the customer service resolve the issue.

7.2 Adding weather services

You may have configured weather services during the initial configuration, or you may do so later. To do so, open the mobile application and select your device from the device list. This will bring you to the “Upload” screen for the device.

Navigate to the weather service you wish to configure by pressing “Next” and enter the appropriate data.

Figure 23

7.2.1 Ecowitt Weather

It's recommended to use the Ecowitt Weather server to monitor and record your sensors' data. Configure as follows:

- On the ecowitt.net uploading page, enable the ON button (displayed blue) and set the uploading interval time.
- Copy the MAC address (will be used to add the device on the server later)

- Press Save on the page.
- Press “Register at ecowitt.net” and finish the registration on the page.
    - Press the upper left menu button and select Devices.
    - Press Add Device and input all the information needed.
    - Press Save.
    - Press Dashboard on the menu. Your sensor data would be available on the dashboard within several minutes.

Note: When select device address on map, please wait until the map displays before selecting your address.

You may add a shortcut to the ecowitt.net website on the home page of your phone so that you can visit it just like an app. The ecowitt APP is working only for ecowitt.net cloud data display.

7.2.2 Viewing data on ecowitt.net

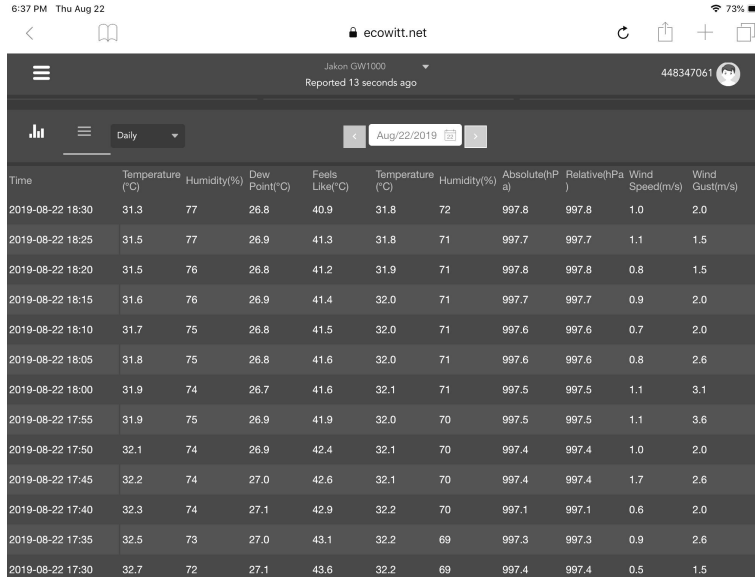
You can observe your sensor’s data by using the ecowitt.net web site. You will use a URL like this one, where your station ID replaces the text “STATIONID”.
https://www.ecowitt.net/home/index?id=STATIONID

Note: If you want to share your station data with other users, you’ll need to set your data to be public. Other users need to log in the ecowitt.net first to view your data.
It will show a page such as this, where you can look at today’s data and historical data as well.

Dashboard

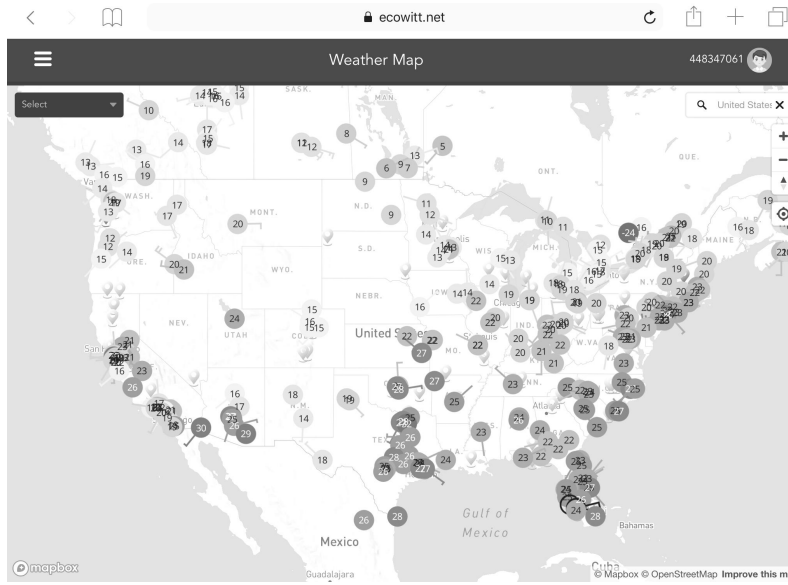
Graph display

List display

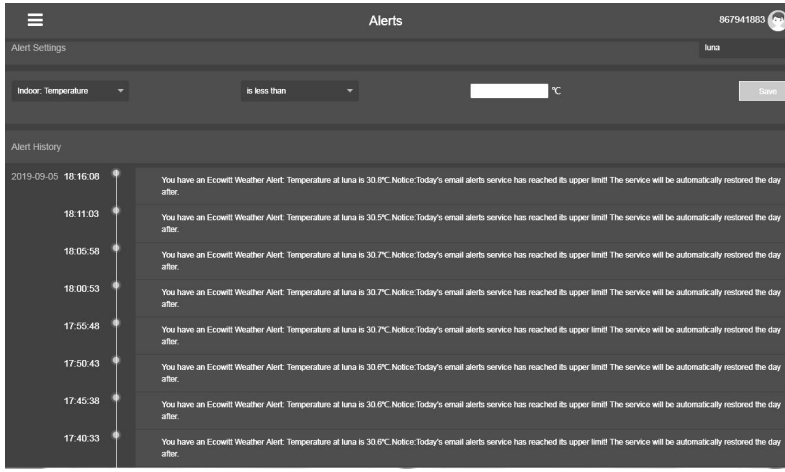


Time	Temperature (°C)	Humidity(%)	Dew Point(°C)	Feels Like(°C)	Temperature (°C)	Humidity(%)	Absolute(hPa)	Relative(hPa)	Wind Speed(m/s)	Wind Gust(m/s)	Wi Dir
2019-08-22 18:30	31.3	77	26.8	40.9	31.8	72	997.8	997.8	1.0	2.0	4
2019-08-22 18:25	31.5	77	26.9	41.3	31.8	71	997.7	997.7	1.1	1.5	2
2019-08-22 18:20	31.5	76	26.8	41.2	31.9	71	997.8	997.8	0.8	1.5	3
2019-08-22 18:15	31.6	76	26.9	41.4	32.0	71	997.7	997.7	0.9	2.0	2
2019-08-22 18:10	31.7	75	26.8	41.5	32.0	71	997.6	997.6	0.7	2.0	3
2019-08-22 18:05	31.8	75	26.8	41.6	32.0	71	997.6	997.6	0.8	2.6	2
2019-08-22 18:00	31.9	74	26.7	41.6	32.1	71	997.5	997.5	1.1	3.1	8
2019-08-22 17:55	31.9	75	26.9	41.9	32.0	70	997.5	997.5	1.1	3.6	7
2019-08-22 17:50	32.1	74	26.9	42.4	32.1	70	997.4	997.4	1.0	2.0	5
2019-08-22 17:45	32.2	74	27.0	42.6	32.1	70	997.4	997.4	1.7	2.6	1
2019-08-22 17:40	32.3	74	27.1	42.9	32.2	70	997.1	997.1	0.6	2.0	2
2019-08-22 17:35	32.5	73	27.0	43.1	32.2	69	997.3	997.3	0.9	2.6	6
2019-08-22 17:30	32.7	72	27.1	43.6	32.2	69	997.4	997.4	0.5	1.5	5

Weather Map



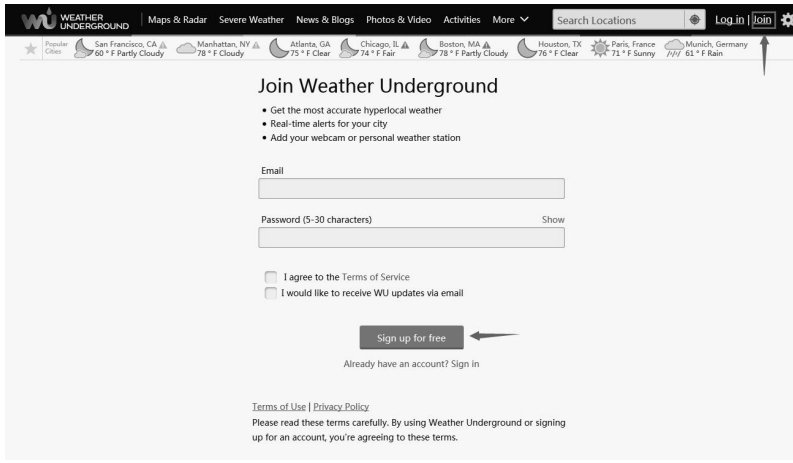
Email Alerts



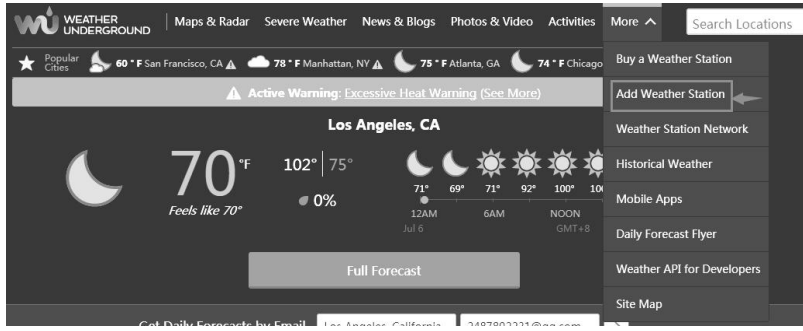
7.3 Weather Underground

If you are planning to use wunderground.com you must have an account and register a (new) personal weather station. You may do so on the Wunderground uploading page in the **WS View Plus** application:

- Press Register at Wunderground.com and finish the registration on the page：
    1. Visit Wunderground.com and click **Join** as the right top arrow indicates and select the **Sign up for free** option.



2. Click **More** and select **Add Weather Station** to register your station



Click **verify location** and fill out the form.

Note： You may choose “other” when selecting device hardware.

After submitting the form, you will see the following:

- Take note of the PWS identifier (ID) and the password that will be generated for you.
- Back to the app and input the Station ID and Key.
- Press Save.
- Back to the Menu page and select WU Dashboard(for Android version) or select your station on the Stations(for iOS version) . You'll see the current WU data, including graphs on the screen within hours.

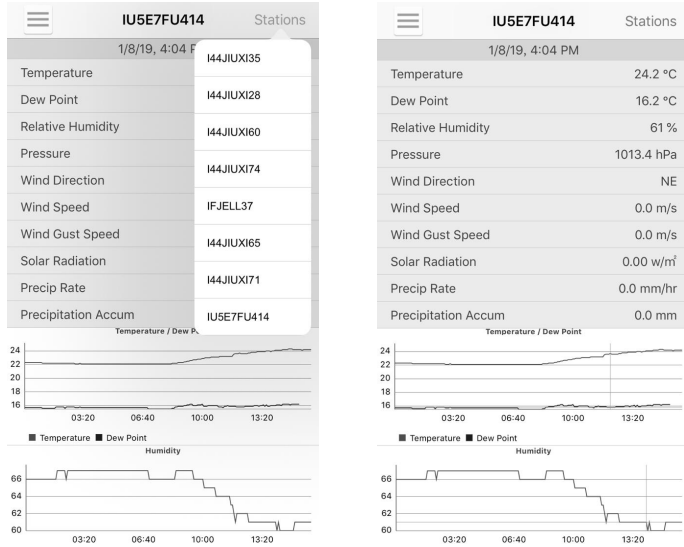


Figure 24

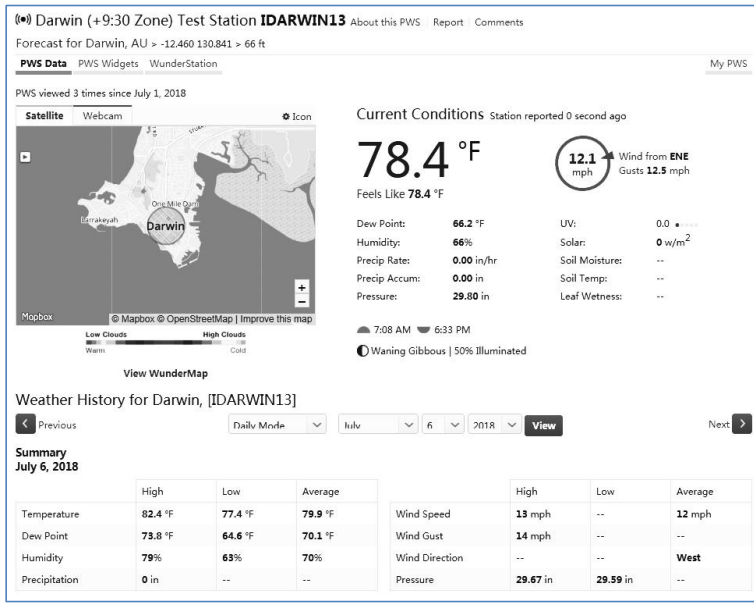
Note: **WU Dashboard** shows the data obtained from WU server. This requires that your mobile device can reach the Internet and therefore this is possible even when you are not on your home Wi-Fi network, such as when using cellular data.

7.4 Viewing data on wunderground.com

You can also observe your weather station's data by using the wunderground.com web site. You will use a URL like this one, where your station ID replaces the text "STATIONID".

http://www.wunderground.com/personal-weather-station/dashboard?ID=STATIONID

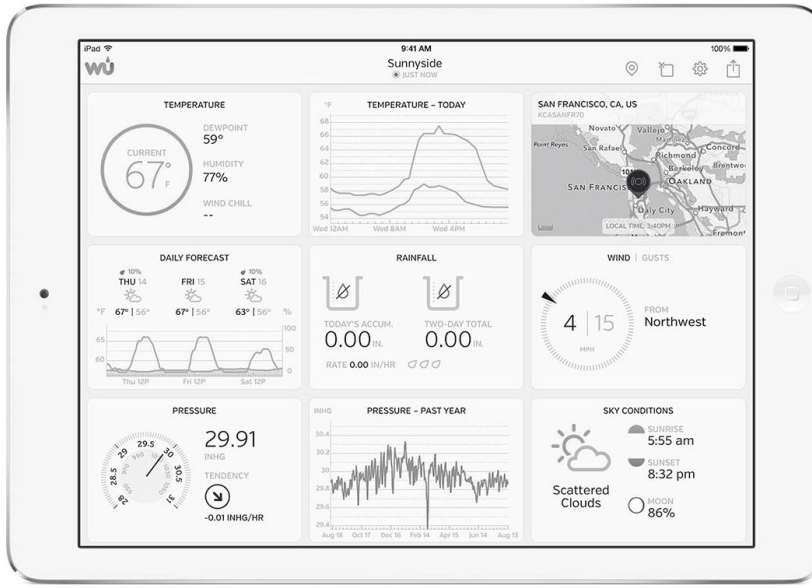
It will show a page such as this, where you can look at today's data and historical data as well.



There are also some very useful mobile apps. The URLs provided here go to the Web version of the application pages. You can also find them directly from the iOS or Google Play stores:

WunderStation: iPad application for viewing your station's data and graphs**:**

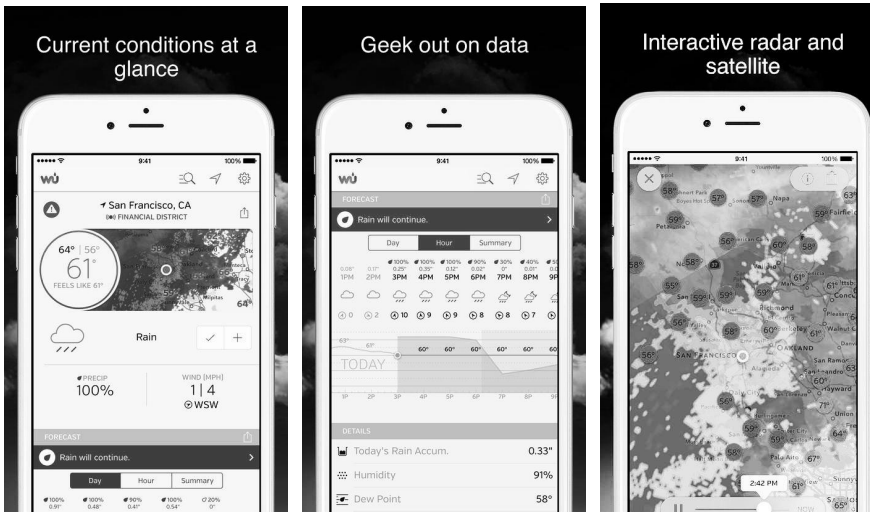
https://itunes.apple.com/us/app/wunderstation-weather-from-your-neighborhood/id906099986



Weather Underground: Forecast: iOS and Android application for forecasts

https://itunes.apple.com/us/app/weather-underground-forecast/id486154808

https://play.google.com/store/apps/details?id=com.wunderground.android.weather&hl=en



PWS Weather Station Monitor: View weather conditions in your neighborhood, or even right in your own backyard. Connects to wunderground.com:

https://itunes.apple.com/us/app/pws-weather-station-monitor/id713705929

7.5 Device list

When on WU Dashboard screen, you can press the “Menu” button (upper right) and select Device List to view all your devices.
You can press your device to view or modify the settings.

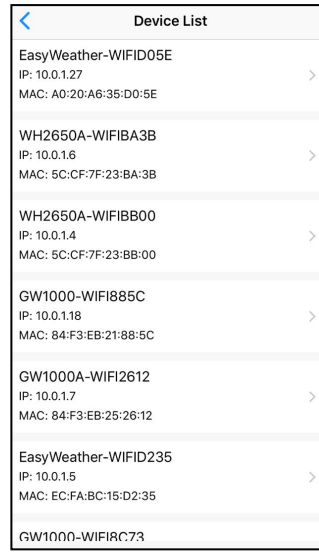


Figure 25

Note: This function requires that your phone and the console is using the same network. When you tap the device, if there is a new firmware upgrade is available, it will pop up a message and asking for WiFi module firmware upgrade. Please check back for WiFi module firmware upgrade for feature or reliability enhancement.

7.6 Manage Wunderground

You can add or delete WU Station ID by selecting “Manage Wunderground”on the submenu:

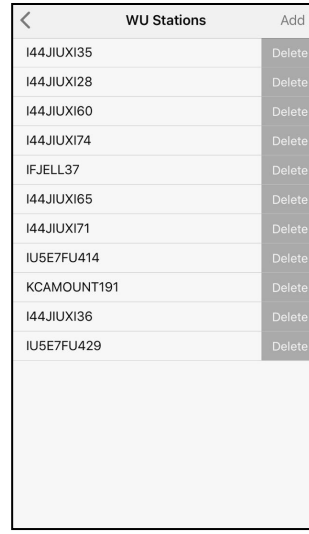


Figure 26

7.7 Unit Settings

You can set your desired display units by selecting “Unit Settings” on the submenu:

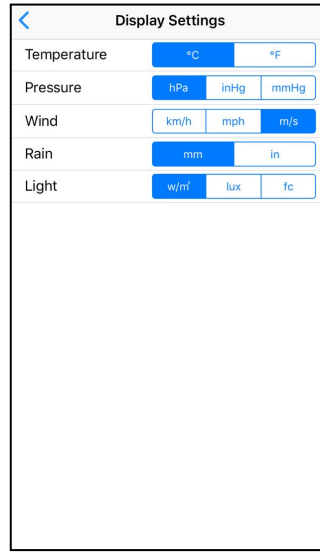


Figure 27

8 PC Software Operation

Software to monitor your weather station or set values is available for your computer or laptop. The following operating systems are supported: Windows version XP, Vista, 7, 8 or 10. You may download the software from http://www.ecowitt.com/manual/ or http://download.ecowitt.net/down/softwave?n=EasyWeather2

8.1 Installation and configuration

After downloading, install the software by decompressing the archive named "**EasyWeather2 Setup**." You will then have a file called "**EasyWeather2 setup**" located inside a folder with that same name. Double click it to start installation.

8.1.1 Connect the display console to the PC

The console must be connected to the PC using the USB cable. After connecting the USB cable to the console port and then the PC, launch the EaseWeather2 program from your "Start" menu.

If your console is correctly connected the program will start communicating with it and display a screen like shown below.

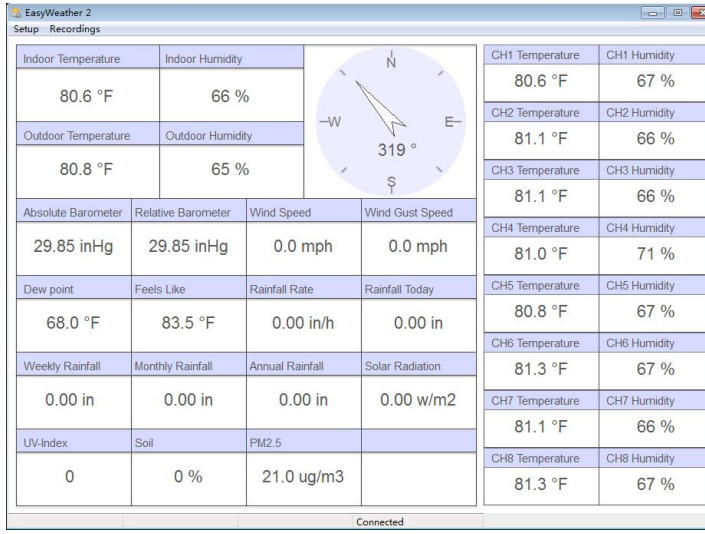


Figure 28: EasyWeather2 main screen

8.2 Setup Functions

Setup functions are reached via the "Setup" menu. Each of the different setup categories will be discussed in the next sections.

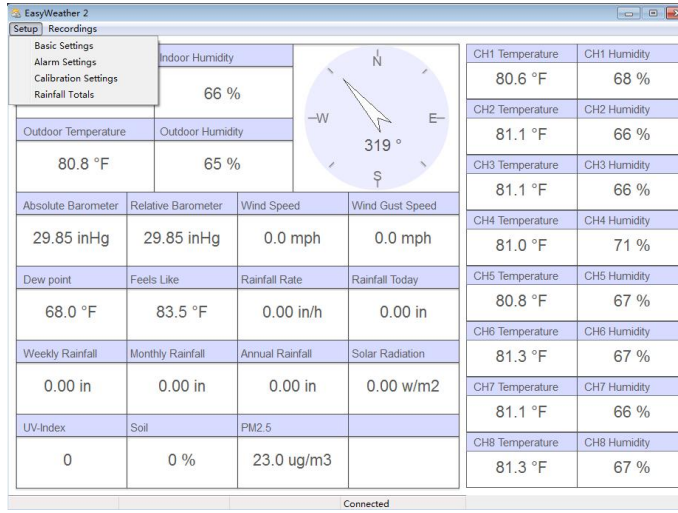


Figure 29: Setup menu

8.2.1 Basic Settings

Basic settings can be used to change display units, time zone and daylight savings time handling, and data logger interval.

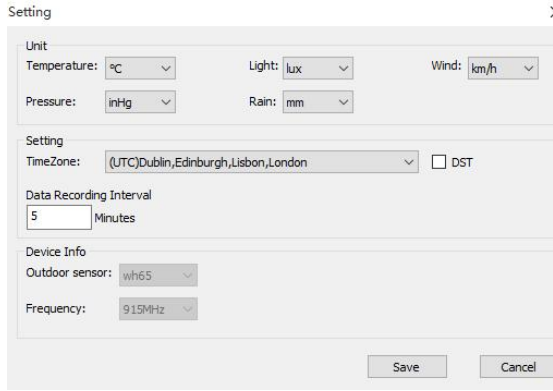


Figure 30: Basic Settings screen

Changing settings on this screen will cause the corresponding change to be made on the console as well. Thus, this screen controls both the display format on the PC screen as well as the console.

The data logger interval determines how often current sensor values are written to the SD card inserted in the console (if you indeed have inserted a card there). This setting can only be changed through the PC software. Recordings are made as lines in CSV (Comma Separated Values) files stored on the SD card. The console will switch to new files every so often so that files do not grow beyond a reasonable size.

8.2.2 Alarm Settings

Alarm Settings can be used to change thresholds for alarm activation, or to enable or disable individual alarms. These values are stored inside the console and can be changed here, or on the console (Section 5.4).

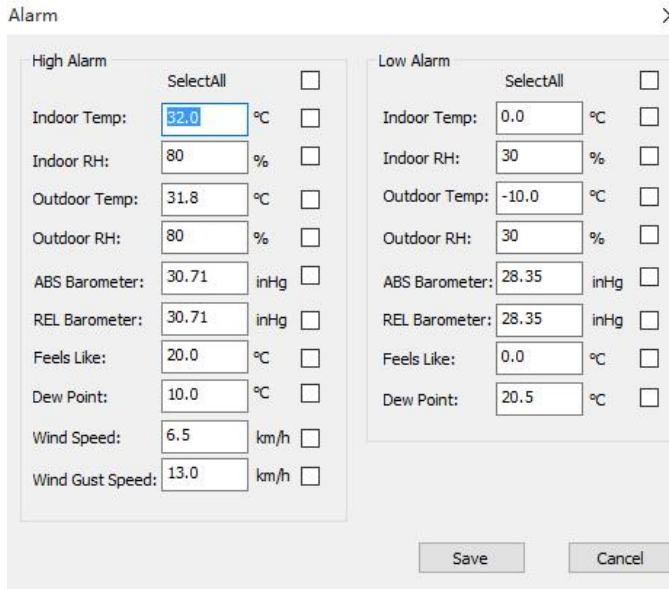


Figure 31: Alarm Settings screen

Any changes you make here will be reflected inside the console. Change the value(s) in the respective input fields and use the checkbox(es) to enable or disable specific alarms.

8.2.3 Calibration Settings

Calibration Settings allow you to change calibration settings for the sensors. These are the same settings that you can also change in the console itself (see section 5.2.3).

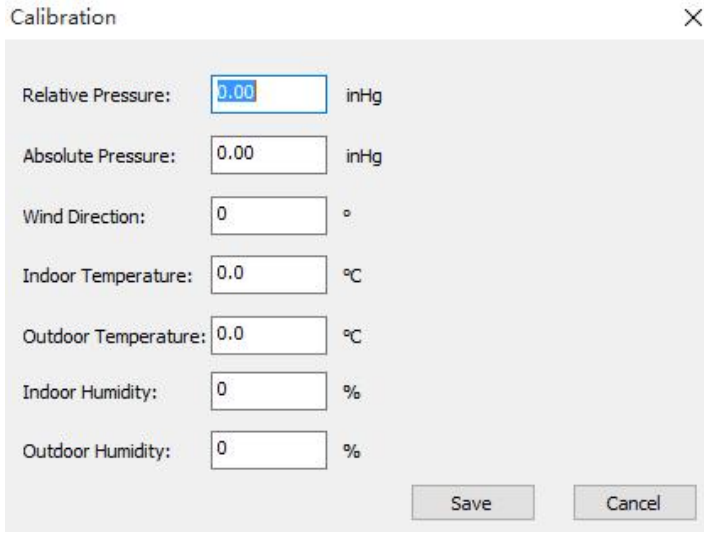


Figure 32: Calibration Settings screen

Any changes you make here will be reflected in the console. Note that when using the console, you will generally change the value displayed using "+", or "-" buttons, but here you will instead edit the amount of change that you "dialed in" on the console. For example, if you changed a displayed temperature by pressing the "+" button three times, you effectively caused 0.3 to be added (3 times 0.1). So here, you will see a value of 0.3.

The Absolute Pressure offset will be added to the value of the pressure sensor in the console to determine the absolute pressure (ABS) that will be displayed. The Relative Pressure offset will be added to the displayed absolute pressure (ABS) to determine the displayed relative pressure (REL). This offset typically corresponds to the elevation above sea level for your weather station's indoor sensor.

8.2.4 Rain Totals

The currently accumulated rain totals for different periods can be seen, and changed, on this screen.

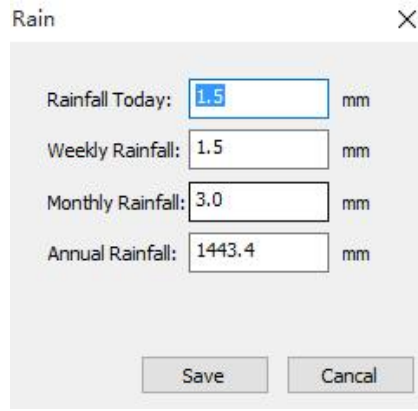


Figure 33: Rain Totals screen

Any changes you make here will be immediately reflected in the console.

8.3 Record and recording functions

You can access maximum and minimum temperatures as recorded in the console, or data in accumulated historical records (stored on the SD card, if you have one inserted) through the “Record” menu.

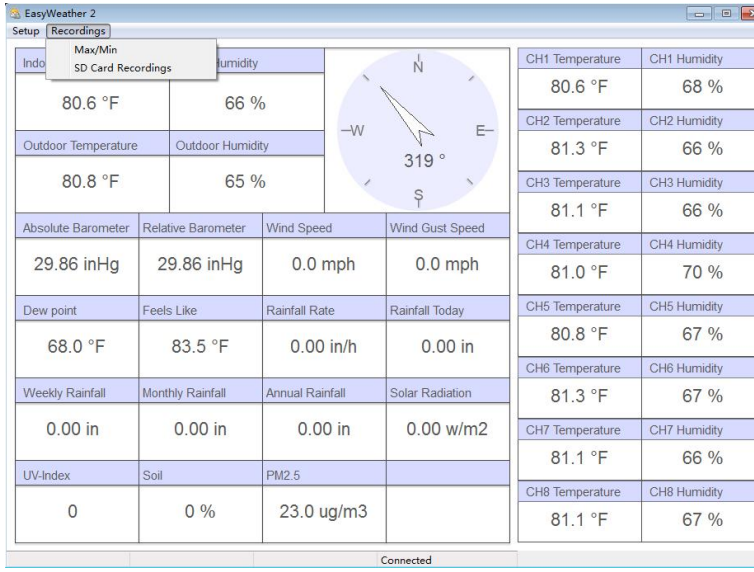


Figure 34: Record menu

8.3.1 Max/Min

The Max/Min menu will bring up a screen that displays maximum and minimum recorded values for the various sensors. These extremes are across the entire usage lifetime of the weather station, or since the last reset, whichever is shorter.

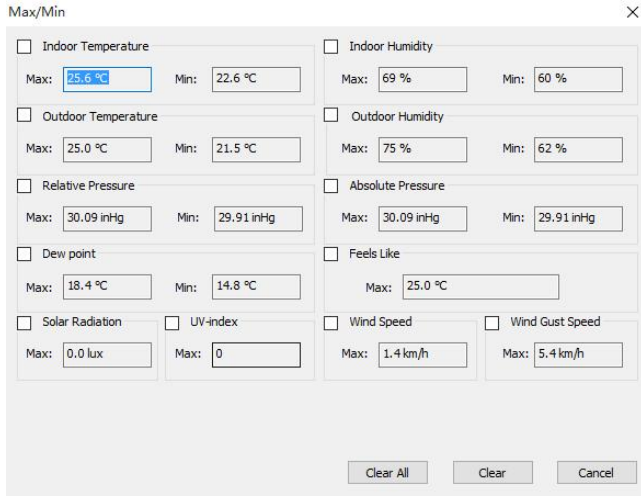
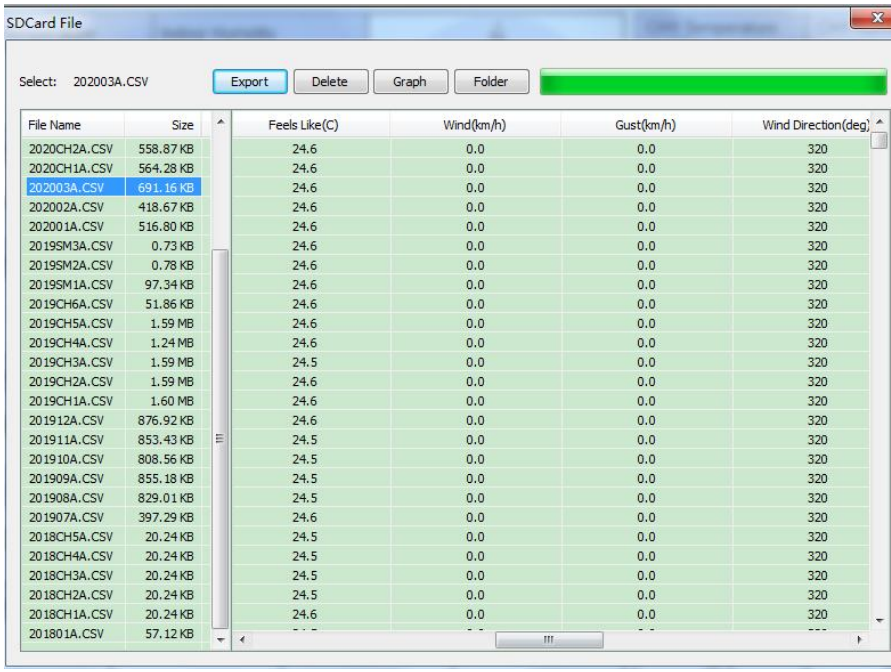


Figure 35: Max/Min screen

The screen also offers a “Clear” button. When pressed, all maximum and minimum values will be “forgotten” and new maxima and minima will only be collected from sensor data collected from this point forward.

8.3.2 SDCard File



File Name	Size	Feels Like(C)	Wind(km/h)	Gust(km/h)	Wind Direction(deg)
2020CH2A.CSV	558.87 KB	24.6	0.0	0.0	320
2020CH1A.CSV	564.28 KB	24.6	0.0	0.0	320
202003A.CSV	691.16 KB	24.6	0.0	0.0	320
202002A.CSV	418.67 KB	24.6	0.0	0.0	320
202001A.CSV	516.80 KB	24.6	0.0	0.0	320
2019SM3A.CSV	0.73 KB	24.6	0.0	0.0	320
2019SM2A.CSV	0.78 KB	24.6	0.0	0.0	320
2019SM1A.CSV	97.34 KB	24.6	0.0	0.0	320
2019CH6A.CSV	51.86 KB	24.6	0.0	0.0	320
2019CH5A.CSV	1.59 MB	24.6	0.0	0.0	320
2019CH4A.CSV	1.24 MB	24.6	0.0	0.0	320
2019CH3A.CSV	1.59 MB	24.5	0.0	0.0	320
2019CH2A.CSV	1.59 MB	24.6	0.0	0.0	320
2019CH1A.CSV	1.60 MB	24.6	0.0	0.0	320
201912A.CSV	876.92 KB	24.6	0.0	0.0	320
201911A.CSV	853.43 KB	24.5	0.0	0.0	320
201910A.CSV	808.56 KB	24.5	0.0	0.0	320
201909A.CSV	855.18 KB	24.5	0.0	0.0	320
201908A.CSV	829.01 KB	24.5	0.0	0.0	320
201907A.CSV	397.29 KB	24.6	0.0	0.0	320
2018CH5A.CSV	20.24 KB	24.5	0.0	0.0	320
2018CH4A.CSV	20.24 KB	24.5	0.0	0.0	320
2018CH3A.CSV	20.24 KB	24.5	0.0	0.0	320
2018CH2A.CSV	20.24 KB	24.5	0.0	0.0	320
2018CH1A.CSV	20.24 KB	24.6	0.0	0.0	320
201801A.CSV	57.12 KB				

Figure 36: SDCard File screen

If you have an SD card installed, you may also access the data on the SD card directly.

On the data screen you will see, in the left column, a list of files that contain recorded data. Select the file you are interested in by clicking on it and then pressing the “Export” button. If you wish to delete the file, press the “Delete” button instead. Before really deleting the file, you will be asked to confirm.

Selecting a file will show the data from the file in tabular format to the right of the file name column. You can see a time stamp for each row, followed by individual sensor values.

8.3.2.1 Graph

You can look at the data on the SDCard file(s) in the form of a graph.

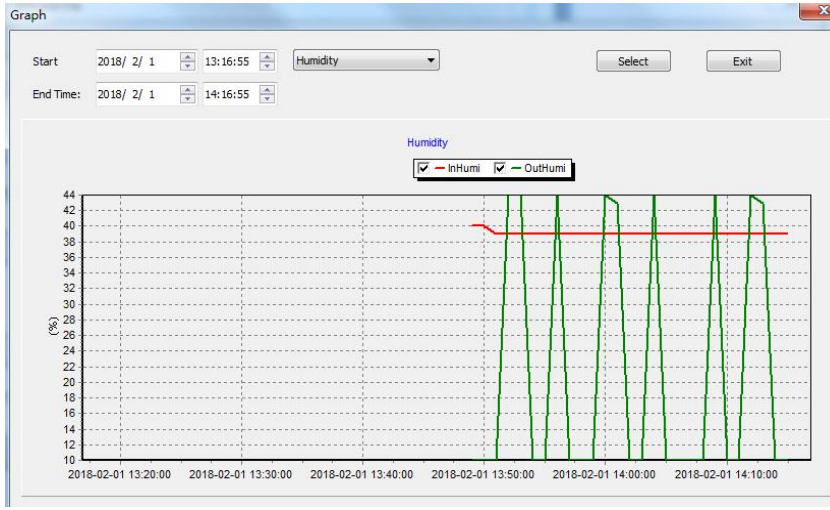


Figure 37: Graph screen

After displaying data from a particular file, you can press the “Graph” button to see the data in graphical format. The Graph screen will come up, but a graph will not yet be drawn. You first must select that time range in “Start” and “End Time” and then press “Select”. You can also use the pop-up menu to the right of start and end-time to determine what kind of data will be graphed.

9 Maintenance

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

Clean Rain Gauge

Check the rain gauge every 3 months. Rotate the funnel counter-clockwise and lift it up. Clean the funnel and bucket with a damp cloth to remove any dirt, debris and insects. Spray the array lightly with insecticide, if there's a bug infestation.

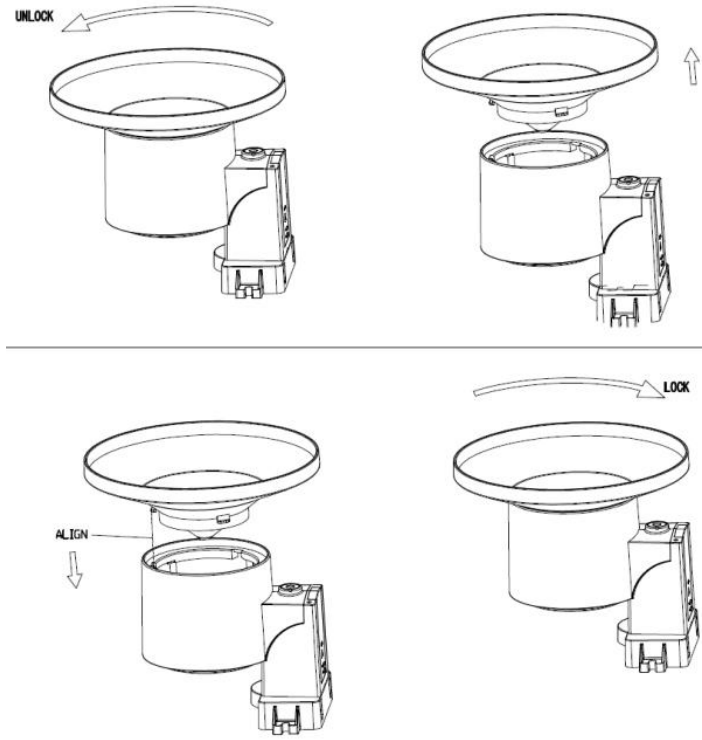


Figure 38: Rain gauge maintenance

Clean Solar Radiation Sensor and Solar Panel

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

Replacing Batteries Regularly

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

To Prevent Snow build up

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

10 Troubleshooting Guide

Look through the following table and locate an issue or problem you are experiencing in the left column and read possible solutions in the right column.

Problem	Solution
Outdoor sensor not reporting to console Dashes (--) on the display console	Check that the outdoor transmission LED is flashing normally. See **Sensor reporting interval** on Section 15. If the batteries were recently (re)placed, check correct polarity was used and/or reseat the batteries. If the batteries are old, replace them. If the LED is now flashing normally, proceed to the next step. If it is not flashing and you have repeated battery checks and placement, you may have a defective unit. Make sure you have fresh batteries in the display console. If the batteries may have been changed in the remote and/or the console, and the console has not been reset, the solution may be as simple as **powering cycling** the console: remove both batteries and external adapter for about 10 seconds and reconnect. If you still have problems, bring the outdoor sensor to a location about 10 ft. away from the console for testing. Power cycle the console as described above. Do not touch any buttons for several minutes to allow the console to "discover" the outdoor sensor. If the outdoor temperature and humidity are still showing dashes (--) after several minutes, go to the Sensor Type setup and re-register the sensors. If the sensor properly syncs up, proceed to the next step "Intermittent problems with outdoor sensor reception on console."

Problem	Solution
Intermittent problems with outdoor sensor reception on console	There may be a temporary loss of communication due to signal quality issues caused by electrical interference or other location related factors (obstacles along line of sight). To troubleshoot, install a fresh set of batteries in the remote sensor and console. For cold weather environments, install lithium batteries. If problems remain with fresh batteries, ensure power adapter is not too close to the console, and the console is not close to other electrical noise generating devices such as TVs, monitors, computers and transmitting devices. If you still have intermittent problems move sensor and console closer together, but not closer than 5 ft. Also check that there are no metal barriers like aluminum siding, or metal wall framing, along the line of sight between sensor and console. Relocate sensor and console as necessary to avoid obstacles. Depending on natural barriers you may also have to move the outdoor sensor higher and/or closer.
Indoor temperature sensor reads too high in the day time, and/or night time	Make sure the thermo-hygrometer is mounted in an indoor area where it will not be exposed to direct sunlight, or radiative heating, or convective heating.
Indoor and Outdoor Temperature do not agree during indoor testing	During installation testing it is useful to test with both console and outdoor unit in the same room. Allow up to one hour for the sensors to stabilize and adjust to room temperature. The indoor and outdoor temperature sensors should agree within 4 °F (the sensor accuracy is ± 2 °F). If these values still disagree, use calibration offsets for one or both sensors (see section 5.3.1) to adjust to a known good reference temperature.

Problem	Solution
Indoor and Outdoor Humidity do not agree during indoor testing	The procedure here is that same as for outdoor/indoor temperature. The sensors should agree within 10 % (the sensor accuracy is ± 5 %) If these values still disagree, use calibration offsets for one or both sensors (see section 5.3) to adjust to a known good reference humidity.
Relative pressure does not agree with official reporting station	Relative pressure refers to sea-level equivalent temperature and should generally agree closely with the official station. If there is a disagreement, make sure you are not looking at absolute pressure, in particular if your station is not near sea level. Also check at different times due to occasional delays in updates to the official station. Redo the pressure calibration procedure described in section 5.3.1. The barometer is only accurate to ± 0.09 inHg (3 hPa) within the following relative pressure range: 20.67 to 32.50 inHg (700 – 1,100 hPa), which corresponds to an altitude of 9,000 ft. (2,750 m) down to 2,500 ft. (750 m) below sea level. At higher altitudes, you should expect a possible lesser accuracy and non-linearity effects in the error (the calibration offset only allows for a partially linear correction).
Time is incorrect	Make sure your time zone and daylight savings time setting is correct (even when connected to the Internet via Wi-Fi this is needed). If not connected to the Internet via Wi-Fi, you may also have to manually set the correct time.
Display console brightness is weak	Adjust brightness using setup functions, or place console in a darker location.

Problem	Solution
Data not reporting to Wunderground.com	Confirm your station ID is correct. The station ID is all caps, and the most common issue is substituting a capital letter O for a 0 (zero) or vice versa. Please note the digit 0 can only occur in the last part of the station ID (which is a station number in a city). Example, KAZPHOEN11, not KAZPH0EN11 If there's a number "1" on the station key, try to input thelower case of letter "L" to replace it on the app. Confirm that your password (also called: key) is correct. It is the password wunderground.com generated for your station ID. You can also verify it by logging in to wunderground.com and looking it up under “My PWS.” Make sure the date, time and time zone is correct on the console. If it is not incorrect, you may be reporting data for a point in the past or future and you may not see it where you expect it. Check your router firewall settings. The console sends data via port 80. If you can access other web sites using “http” (not to be confused with “https”) this setting will be OK.
No Wi-Fi connection	Check for Wi-Fi symbol on the display. If wireless connectivity is operational, the Wi-Fi icon  will be displayed in the time segment on the console. If the symbol is not displayed, but you do remember configuring it successfully before, check that the console external power adapter is plugged in and functional. Wi-Fi use demand more energy than batteries alone can provide. If you have never been able to configure Wi-Fi to a

Problem	Solution
	working state, make sure your Wi-Fi supports 2.4 GHz signals (801 type B or G, or N). The console does **not support** Wi-Fi that uses the 5 GHz spectrum. Make sure you configured the correct SSID and password. Repeat the procedure if necessary to verify. The console does not support so-called “captive Wi-Fi” networks. These are typically “guest” type networks where users have to agree to terms and conditions before being connected.

11 Glossary of Common Terms

TERM	DESCRIPTION
ABSOLUTE AIR PRESSURE ABSOLUTE BAROMETRIC PRESSURE	Absolute air pressure is the air pressure registered on a barometer without regard to altitude.
BAROMETER	A barometer is a device that measures the pressure of the air pushing on it—this measurement is called the barometric pressure. We don't actually feel the barometric pressure because the air pressure is pushing equally in every direction.
BEAUFORT (Bft)	An indicator of wind force strength (not speed) as it would act on a ship's sails. Still commonly in used in some locales to indicate wind force.
DEW POINT	The temperature to which air must be cooled to become saturated with water vapor. When further cooled, the airborne water vapor will condense to form liquid water (dew), or frost if below freezing.
HEAT INDEX	The heat index (HI) or humiture is an index that combines air temperature and relative humidity, in shaded areas, as an attempt to determine the human-perceived equivalent temperature, as how hot it would feel if the humidity were some other value in the shade.
HECTOPASCALS (hPa)	This is an international standard (SI system) for measuring air pressure. It used to be referred to as milli-bar (mb) and sometimes still is. They are equivalent.

TERM	DESCRIPTION
HYGROMETER	An instrument that measure relative humidity of the air. This is expressed as a percentage between 0% and 100%.
INCHES OF MERCURY (inHg)	This is the common unit of measurement for air pressure in the United States. It refers to the length of a standard column of mercury (a liquid metal) that can be pushed up by the ambient air pressure. Standard pressure is approximately 29.92 inHg
KNOTS (kn)	One knot is equivalent to one nautical mile and is sometimes used to indicate wind speed.
LCD	An acronym for "Liquid Crystal Display." This is a common type of display screen used in televisions, computers, watches, and digital clocks.
LUX (lx)	The unit of illuminance (a measure of the intensity of illumination on a surface) as used in the SI system.
MILLIBAR (mb)	See HECTOPASCALS.
MM OF MERCURY (mmHg)	This is similar to inches of mercury, except expressed in millimeters. Standard pressure is approximately 760 mmHg.
NIST	National Institute of Standards and Technology. A United States institute that keeps very accurate time using atomic clocks and provides and internet-based service to accurately set device clocks.
RELATIVE AIR PRESSURE RELATIVE BAROMETRIC PRESSURE	Relative air pressure is the absolute air pressure compensated for the altitude of the barometer. The result is what the air pressure would be at sea level.

TERM	DESCRIPTION
TFT	Thin-Film-Transistor, a type of LCD screen.
ULTRA VIOLET INDEX	The ultraviolet index or UV-Index (UVI) is an international standard measurement of the strength of sunburn-producing ultraviolet (UV) radiation at a particular place and time. The purpose of the UV Index is to help people effectively protect themselves from UV radiation. The UV Index is a linear scale, with higher values representing a greater risk of sunburn (which is correlated with other health risks) due to UV exposure. An index of 0 corresponds to zero UV radiation, as is essentially the case at night. An index of 10 corresponds roughly to midday summer sunlight with a clear sky when the UV Index was originally designed, but values above 10 are sometimes possible. Levels above 8 are considered "very high" and above 11 are considered "extreme."
WIND CHILL	Wind chill (popularly wind chill factor) is the lowering of body temperature due to the passing-flow of lower-temperature air. In other words, the air "feels" colder than it is because of the chilling effect of the wind on the skin.

Table 9: Glossary of terms

12 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 United States: 915 MHz
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 – 6000 mm
Rain volume accuracy	± 5%
Rain volume resolution	0.1mm/0.01inch
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	Anemometer: 16.5s; rain gauge sensor: 49s; thermo-hygrometer sensor: 64s

Table 10: Outdoor sensor specification

Indoor sensor	Specification
Temperature range	-10°C – 60°C (14°F - 140°F)
Temperature resolution	0.1°C, or 0.1°F
Humidity range	10% ~ 99%
Humidity resolution	1%
Barometric pressure range	300 – 1,100 hPa (8.85 – 32.5 inHg)
Barometric pressure accuracy	± 3 hPa in 700 – 1,100 hPa range
Barometric pressure resolution	0.1 hPa (0.01 inHg)
Sensor reporting interval	60s
Alarm Duration	120s

Table 11: Indoor sensor specification

Power	Specification
Base station/console	5V DC Adapter (included)
Indoor sensor	2 x AA 1.5 Alkaline batteries (not included)
Outdoor thermo-hygrometer sensor	2 x AA 1.5 Alkaline batteries (not included)
Rain gauge sensor	1 x AA 1.5V Lithium battery (not included)
Anemometer sensor	Solar panel (built-in)
Anemometer sensor (backup)	1 x AA 1.5V LR6 Alkaline (not included), or 1 x AA 1.5V Lithium battery (not included)

Table 12: Power specification

The primary power source for the anemometer sensor is the solar panel. When available solar power (light over recent period) is insufficient, the battery 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.

13 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.