IP Observer Internet Weather Station

Operation Manual

1. Introduction

Thank you for your purchase of the IP OBSERVER Internet Weather Station. The following user guide provides step by step instructions for installation, operation and troubleshooting.

2.Quick Start Guide

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

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

Required		
Step	Description	Section
1	Assemble and power up the sensor array	4.3.1 - 4.3.3
2	Power up the indoor thermometer-hygrometer-barometer	4.4
3	Power up the receiver, connect to your router and synchronize with sensor array and thermo-hygrometer-barometer.	4.6
6	Mount the sensor array	4.3.2
5	Calibrate the relative pressure to sea-level conditions (local airport) on console	4.6.9
7	Reset the rain to zero on console	4.6.8.1
9	Register and upload to Weather Server	4.6.6

3.Pre-Installation Checkout and Site Survey

3.1 Pre Installation Checkout

Before installing your weather station in the permanent location, we recommend operating the weather station for one week in a temporary location with easy access. This will allow you to check out all of the functions, insure proper operation, and familiarize you with the weather station and calibration procedures. This will also allow you to test the wireless range of the weather station.
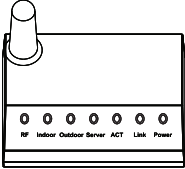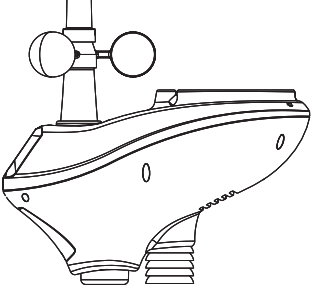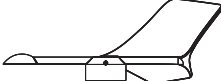
3.2 Site Survey

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

1. You must clean the rain gauge every few months and change the batteries every 2-3 years. Provide easy access to the weather station.
2. Avoid radiant heat transfer from buildings and structures. In general, install the sensor array at least 5' from any building, structure, ground, or roof top.
3. Avoid wind and rain obstructions. The rule of thumb is to install the sensor array at least four times the distance of the height of the tallest obstruction.
4. Wireless Range. The radio communication between receiver and transmitter in an open field can reach a distance of up to 100 meter, providing there are no interfering obstacles such as buildings, trees, vehicles, high voltage lines. Wireless signals will not penetrate metal buildings.
5. Radio interference such as PCs, radios or TV sets can, in the worst case, entirely cut off radio communication. Please take this into consideration when choosing receiver or mounting locations. Make sure your receiver is at least five feet away from any electronic device to avoid interference.

4. Getting Started

The the IP OBSERVER Internet Weather Station consists of a receiver, an all in one sensor array, and wireless thermo-hygrometer-barometer transmitter.

4.1 Parts List

QTY	Item	Image
1	Receiver	
1	Thermo-hygrometer-barometer transmitter	
1	Sensor Array	
1	Wind Vane	
1	5V DC Adaptor	
1	Ethernet Cable	
1	Allen wrench	
1	Pole	
1	U-bolt	
1	User manual	

4.2 Recommend Tools

- Precision screwdriver (for small Phillips screw on battery cover door)
- Adjustable wrench (for mounting pole)
- Compass or GPS (for wind direction calibration)

4.3 Sensor Array Set Up
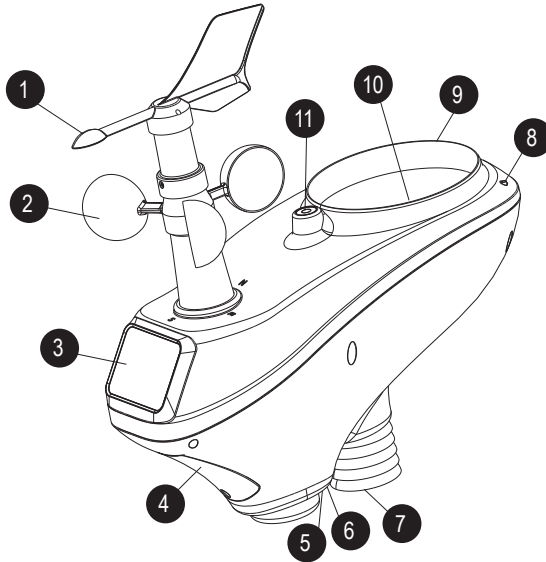
Figure 1

No	Description	No	Description
1	Wind Vane (measures wind direction)	6	Reset button
2	Wind Speed Sensor (measures wind speed)	7	Thermo-hygrometer Sensor (measures temperature and humidity)
3	Solar collector	8	UV sensor
4	Battery compartment	9	Solar Radiation Sensor
5	LED transmission indicator (turns on for 10 seconds on power up, flashes once per 16 seconds)	10	Rain Collector (self emptying)
		11	Bubble Level

4.3.1 Install Wind Vane

Reference Figure 2. (a) Locate and align the flat key on the wind vane shaft to the flat key on the wind vane and push the vane on to the shaft. (b) tighten the set screw with the hex wrench (included).

(a)   (b)

Figure 2

4.3.2 Install Mounting Pole

Reference Figure 3. Remove the mounting pole collar by rotating counter clockwise.
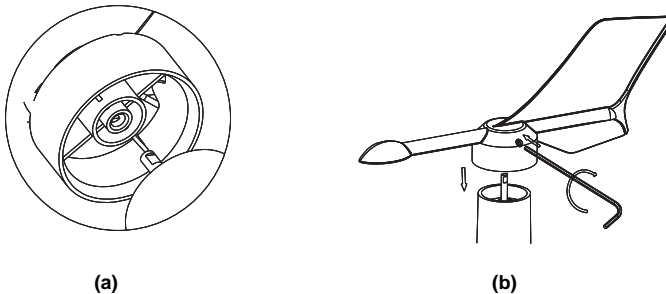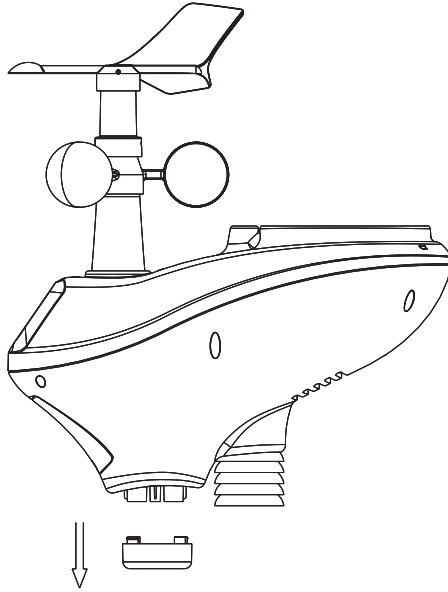
Figure 3

Reference Figure 4.   Locate and align the groove on the sensor array and mounting pole.

Groove
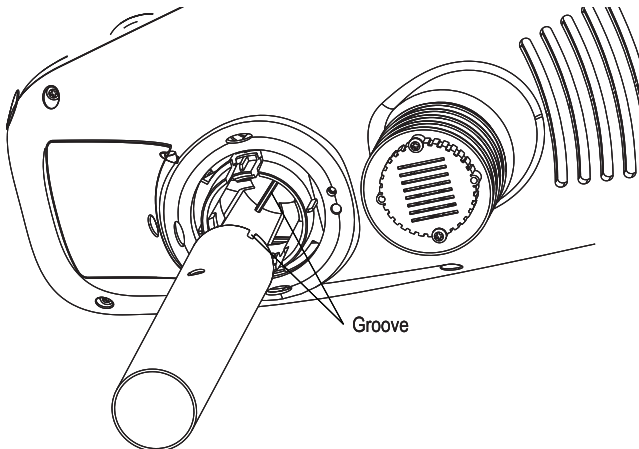
Figure 4

Reference Figure 5. Turn the mounting pole collar to lock the pole into place by rotating clockwise.
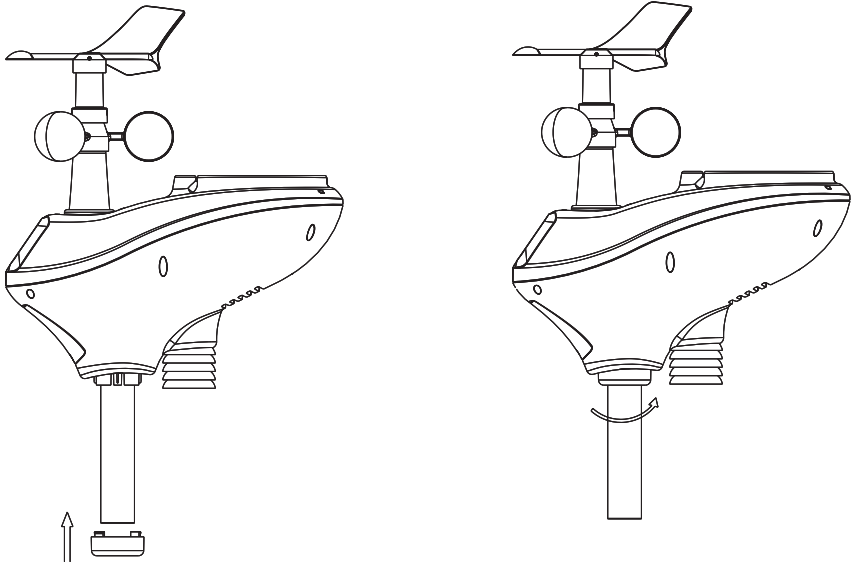
Figure 5

4.3.3 Install Batteries

Reference Figure 6. Locate the battery door on the bottom of the sensor array. Turn the set screw counter clockwise to open the battery compartment. Insert 3xAA batteries (not included).The LED indicator on the bottom of the sensor array will turn on for ten seconds and normally flash once per 16 seconds (the transmission update period).

Close the battery door and tighten the set screw.
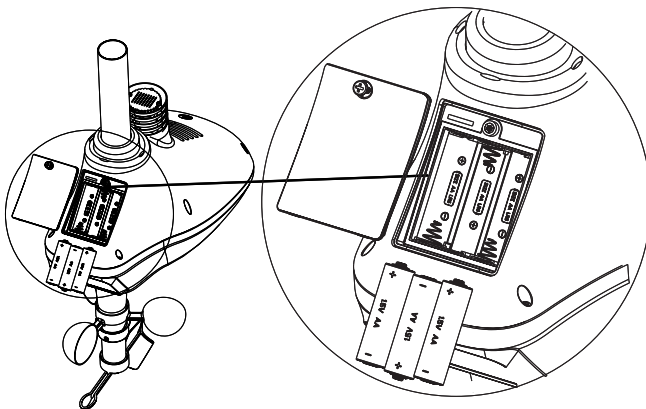
Figure 6

Note:Please use good quality alkaline batteries. The batteries are intended for back-up power only. The solar cell current charges the supercapacitor.

4.3.4 Mount Weather Station

Fasten the mounting pole to your mounting pole with the U-bolt, mounting pole brackets and nuts, as shown in Figure 7.   Tighten the mounting pole to your mounting pole with the U-Bolt assembly. Make sure your mounting pole is as far away from the temperature sensor as possible, as shown in Figure 7.
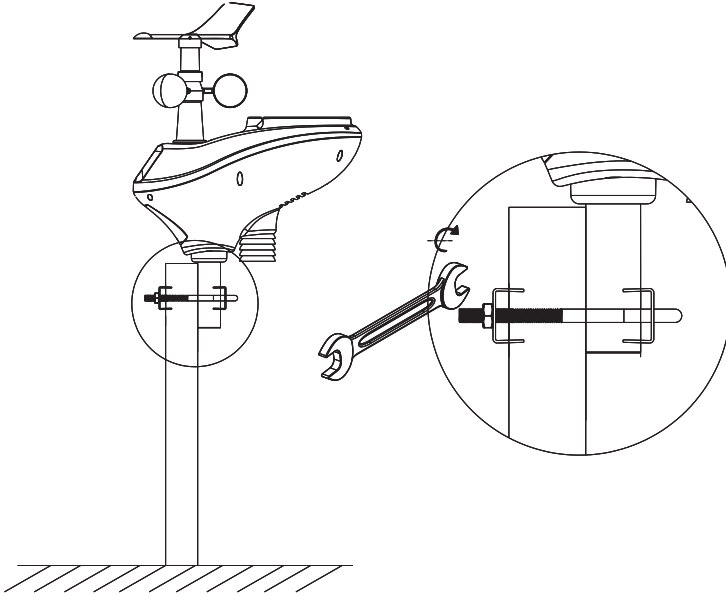
Figure 7

Reference Figure . Locate the four wind vane compass rose indicators of N, E, S, W (representing North, East, South and West). Align the compass rose direction upon final installation with a compass or GPS.
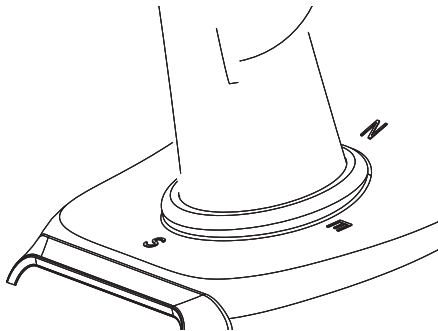
Figure 8

Reference Figure 9. Make sure the sensor array is completely level upon final installation. Failure to do so will result in inaccurate rain gauge readings.
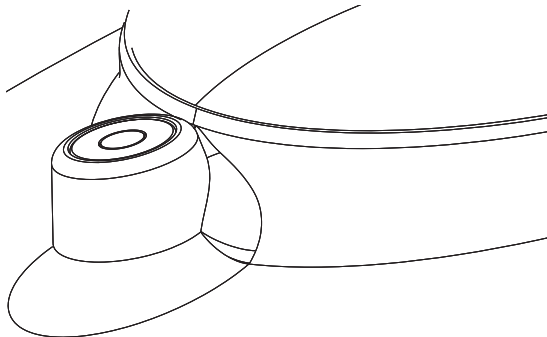
Figure 9

4.3.5 Reset Button and Transmitter LED

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

With an open ended paperclip, press and hold the **RESET BUTTON** for three seconds to completely discharge the voltage.

Take out the batteries and wait one minute, while covering the solar panel to drain the voltage.

Put batteries back in and resynchronize with the receiver by powering down and up the receiver with the sensor array about 3meter away.

LED ⟵ ⟶ **RESET BUTTON**
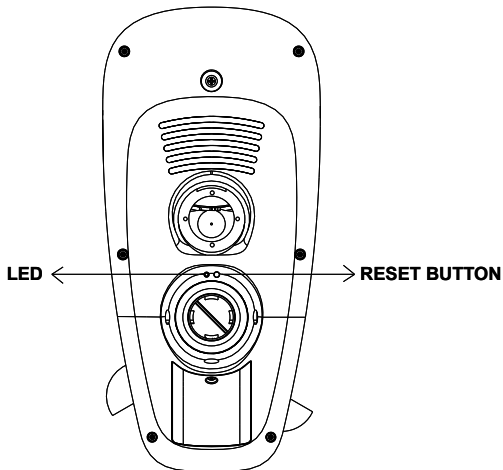
Figure 10

4.4 Indoor Thermo-Hygrometer-Barometer Transmitter

The indoor thermometer, hygrometer and barometer measures and displays the indoor temperature, humidity and pressure and transmits this data to the receiver.
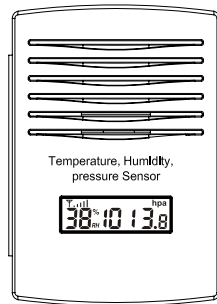
Figure 11

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

Note: The thermo-hygrometer-transmitter transmits directly to the receiver. For best results, place between 2 to 8 meter from the receiver.

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

Remove the battery door on the back of the sensor with a Philips screwdriver (there is only one screw, at the bottom of the unit). Insert two AAA batteries, as shown in Figure 12.

Replace the battery door and set screw. Note that the temperature, humidity and barometric pressure will be displayed on the LCD display. Looking at the back of the unit from left to right, the polarity is (-) (+) for the top battery and (+) (-) for the bottom battery.

Figure 12

4.5 Best Practices for Wireless Communication

Note: To insure proper communication, mount the remote sensor(s) upright on a vertical surface, such as a wall. **Do not lay the sensor flat.**

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

1. **Electro-Magnetic Interference (EMI)**. Keep the receiver one meter away from computer monitors and TVs.
2. **Radio Frequency Interference (RFI).** If you have other 433 MHz devices and communication is intermittent, try turning off these other devices for troubleshooting purposes. You may need to relocate the transmitters or receivers to avoid intermittent communication.
3. **Line of Sight Rating.** This device is rated at 100meter line of sight (no interference, barriers or walls) but typically you will get 30meter maximum under most real-world installations, which include passing through barriers or walls.
4. **Metal Barriers.** Radio frequency will not pass through metal barriers such as aluminum siding. If you have metal siding, align the remote and receiver through a window to get a clear line of sight.

The following is a table of reception loss vs. the transmission medium. Each "wall" or obstruction decreases the transmission range by the factor shown below.

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

4.6 Receiver

4.6.1 Hardware Requirements

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

4.6.2 Software Requirements

An IP scan tool (included) is required to locate the device on the network.

4.6.3 Connections

Connect the receiver power jack to AC power with the power adapter (included), as shown in Figure 14, reference 10.

Connect the receiver to your router using the Ethernet cable (included), as shown in Figure 14, reference 8.

Place the sensor array and indoor thermo-hygrometer transmitter about 1 to 3meter from the receiver and wait several minutes for the remote sensors to synchronize with the receiver. Once synchronized, the Indoor blue LED (Figure 13, reference 2) and Outdoor blue LED (Figure 13, reference 3) will be illuminated.
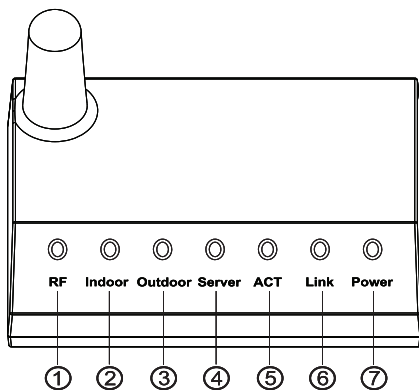
Figure 13

Ref.	LED	Description
1	RF	On when radio frequency receiver is operating properly
2	Indoor	On when indoor sensor received
3	Outdoor	On when outdoor sensor array received
4	Server	On when connected to Wunderground.com® internet hosting service
5	ACT	Flashes when there is internet activity
6	Link	Connected to the Internet (or router)
7	Power	AC Power connected
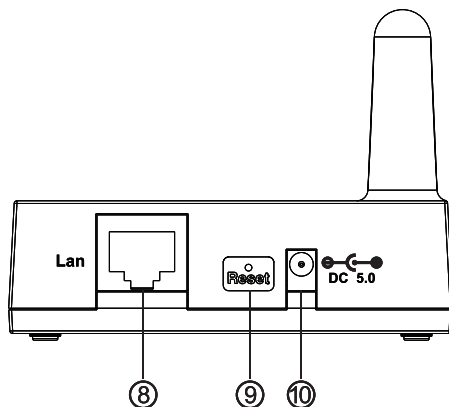
Ref.	Description
8	LAN connection (connect to router)
9	Reset button
10	AC Power connection

Figure 14

4.6.4 Finding the ObserverIP from your computer

4.6.4.1 Windows PC Users

To find the ObserverIP receiver, launch the IP Tools software. The HostIP (your computers IP address) will be displayed.   Press the **OK** button to continue.

Figure 15

Select the **Search** button to find the device on your local area network.

Figure 16

Select the device on your network and select the **Open** button to view within your browser. Alternately, you can type the IP address in your web browser address bar (example, Figure 17):

Figure 17

Figure 18

You are now communicating directly to the device and can proceed to Section 4.6.5.

If you cannot access the device, press the reset pinhole on the back of the receiver (reference Figure 13) and wait for the lights to stabilize, and repeat by selecting the **Search** button again.

4.6.4.2 Mac PC Users

Launch the IP tool. The HostIP (your computers IP address) will be displayed.
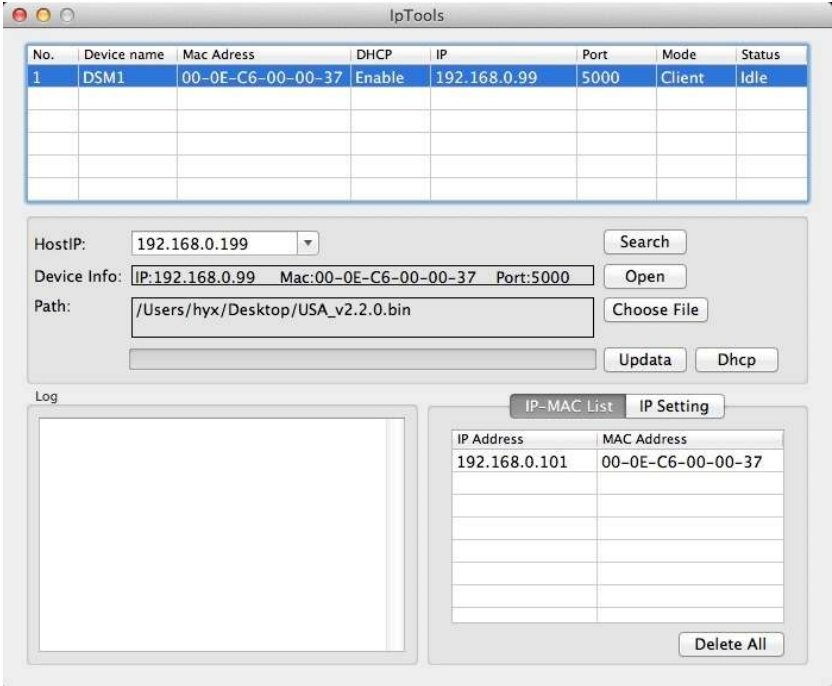
Figure 19

Click the **Search** button (Figure 20) to find the device on your local area network (Figure 21).
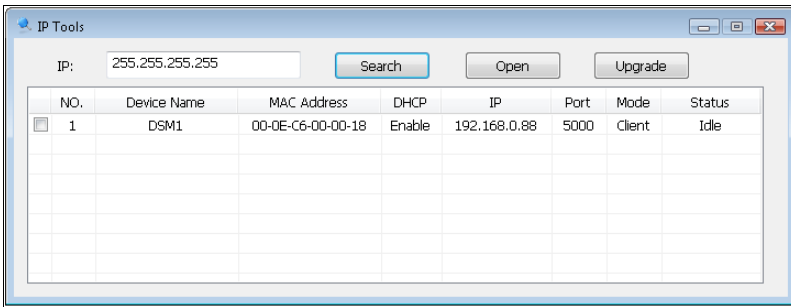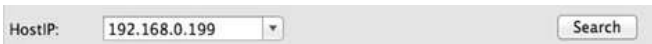

Figure 20
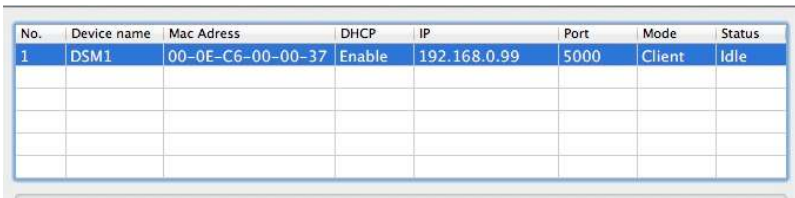
Figure 21

Select the device on your network and click the **Open** button(Figure 22) to view within your browser. Alternately, you can type the IP address in your web browser address bar.(example, Figure 23)
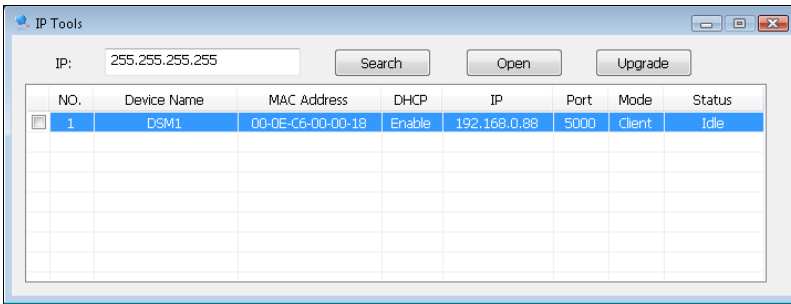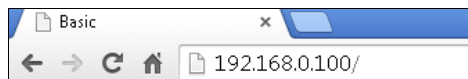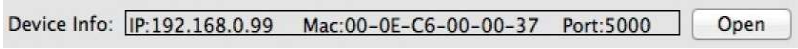

Figure 22
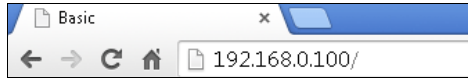
Figure 23

4.6.4.3 Linux Users

If you use Linux operating system, download any commercially available IP scan tool, such as AngryIP Scanner and find the MAC address of the device. The MAC address is a unique identifier for internet enabled devices.

The MAC address will be printed on the bottom of the ObseverIP receiver. An example MAC address is 00:0E:C6:00:00:19.

Figure 24 shows typical scan results. Locate the IP address of the device by cross referencing the Mac address. In the example below, the IP address is 192.168.0.105.
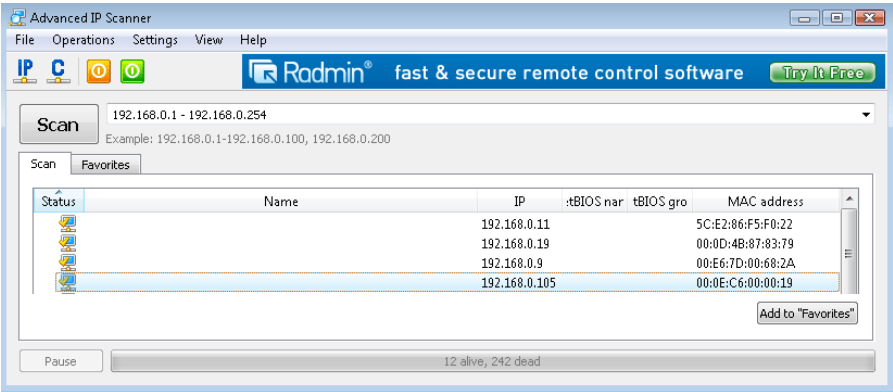
Figure 24

Type the IP address you located from the IP Scan Tool into your web browser (example, Figure 25):
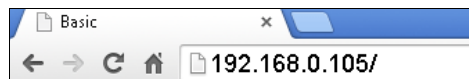
Figure 25

You are now communicating directly to the device and can proceed to Section 0.

4.6.5 Local Device Network Settings

From your web browser, access the device from the IP address obtained in the previous section.

Select the **Local Network** tab to program the local network settings.   Reference Figure 26:

1. **IP Address.** The default setting is receive automatically (DCHP), which is recommended. The network will assign an IP address. To statically assign an IP address, select **Static** from the pull down menu. This will prevent the IP address from changing each time you power up the receiver.
2. **Static IP Address.** If Static is selected as the IP address, enter the IP address you wish to access the device.
3. **Static Subnet Mask.** Default is 255.255.255.0. This should not be changed unless you are familiar with networking and subnet masking.
4. **Static Default Gateway.** This is typically the IP address of your router.
5. **Static DNS Server.** This is your DNS Server setting based on your router connection.
6. **Server Listening Port.** Default is 5000. Enter an integer between 1024 – 65535.

To confirm the changes, select **Apply** and **Reboot**.

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

Figure 26

4.6.6 Weather Network Settings

Select the **Weather Network** tab to program the Weather Network settings.   Reference Figure 27:
1. **Remote Server.** The default setting is rtupdate.wunderground.com, which is recommended. If you want to upload the weather data to your own website, select **Customized** from the pull down menu
2. **Server IP/Hostname.** If **Customized i**s selected as remote server, enter the host name or IP address.
3. **Server Port.** Default is 80. Enter an integer between 1024~65535
4. **Server type.** Default is PSP. (JSP, PHP, ASP)
5. **Station ID.**
6. **Password.**

To confirm the changes, select **Apply**.
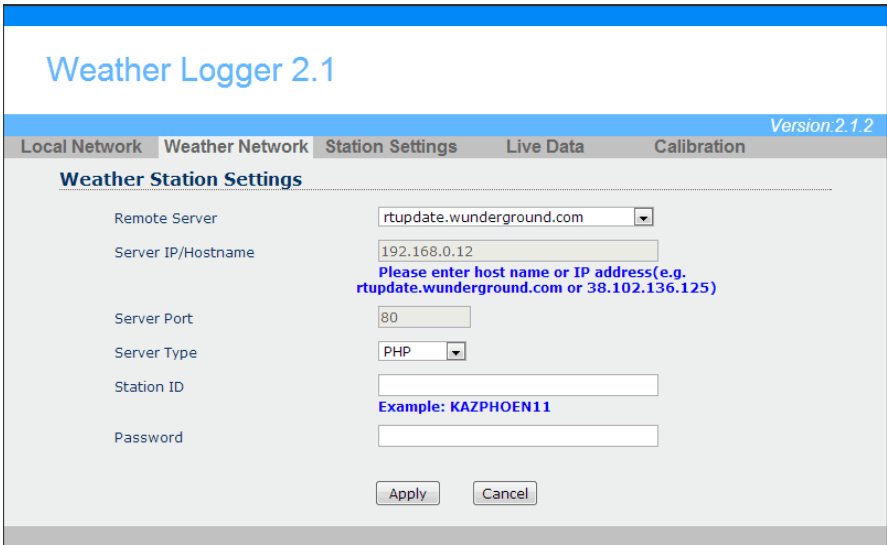
Figure 27

If you select default remote server as rtupdate.wunderground.com, please follow the below procedure to got the Weather ID and Pass word.

1. Join the Wunderground.com® Community.　Visit:

   https://www.wunderground.com/members/signup.asp

   and sign up with Wunderground.com.
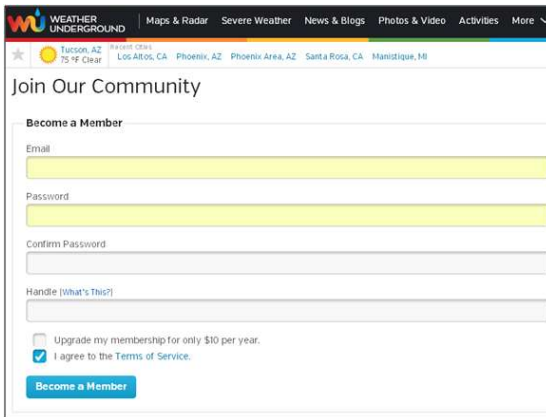
2. **Join the Personal Weather Station (PWS) network**. Visit:

   http://www.wunderground.com/personal-weather-station/signup

   or select **More | Register Your PWS** from the menu at the top of the WeatherUndeground.com website:

Enter the Station ID obtained and password you sign up with Wunderground.com.

📝 **Note:** **If Wunderground.com® is not updating**, make sure the Station ID and Password are correct. The Station ID is all capital letters, and the password is case sensitive. The most common issue is substituting an O for 0 in the Station ID. Example, You live in Phoenix, AZ and you are station number 11:

Station ID:

KAZPHOEN11, not KAZPH0EN11
K = USA station designation
AZ = Arizona
PHOEN = Phoenix
11= station 11 in Phoenix, AZ

4.6.7 Station Settings

Select **Apply** to confirm any of the changes in this section.

4.6.7.1 Wireless Transmitter Settings

1. **Indoor Sensor Type:** Enter WH25 for the indoor thermometer-hygrometer-barometer (default).
2. **Outdoor Sensor1 Type:** Enter WH24 for the outdoor sensor array (default).
3. **Outdoor Sensor2 Type:** Enter none. At the present time, additional sensors are not available.

4.6.7.2 Time Zone Setting

Enter your local time zone and daylight Savings Time.

4.6.7.3 Daylight Savings Time

There are three options to select from:

1. Off-If it is not Daylight Saving Time for your location.
2. On-If it is Daylight Saving Time for your location(you will need to switch this off when your location returns to Standard Time)
3. Auto-Your station will automatically turn Daylight Saving Time on and off based on German (868 MHz and 433 MHz version) or US (915 MHz version) Daylight Saving Time.

4.6.7.4 Units of Measure

Enter your preferred units of measure for each parameter.
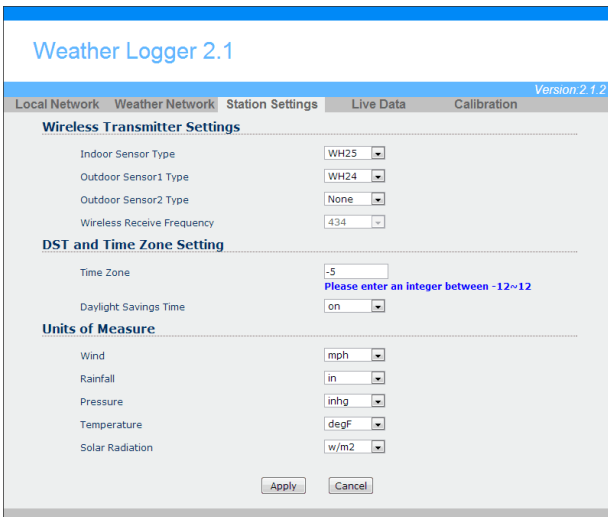
Figure 28

4.6.8 Live Data

Select the **Live Data** tab to view your live data from the weather station. To freeze the live data updates, select the **Stop Refresh** button.

4.6.8.1 Reset Rain

During the installation of your weather station, you may report false rain due to vibration of the tipping mechanism. To reset the rain to 0.00, select the **Rain Reset** button as shown in Figure 29.

Figure 29

4.6.9 Calibration

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

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

4.6.9.1 Relative Barometric Pressure Calibration Example

The following is an example of calibrating the relative pressure. Your results will vary.

1. The local relative pressure from TV, the newspaper or the internet for the official station in your area is 30.12 inHg.
2. From the Live Data panel, your absolute pressure (measured, and not corrected to sea-level) reads 30.47 inHg.
3. Reference Figure30. Enter the following offset in the Calibration panel for Relative Pressure Offset:

Relative Pressure Offset = 30.12 – 30.47 **= -** 0.35

Figure 30

Parameter	Type of Calibration	Default	Typical Calibration Source
Temperature	Offset	Current Value	Red Spirit or Mercury Thermometer (1)
Humidity	Offset	Current Value	Sling Psychrometer (2)
ABS Barometer	Offset	Current Value	Calibrated laboratory grade barometer
REL Barometer	Offset	Current Value	Local airport (3)
Wind Direction	Offset	Current Value	GPS, Compass (4)
Solar Radiation	Gain	1.00	Calibrated laboratory grade solar radiation sensor
1 w/m^2	Gain	126.7 lux	Solar radiation conversion from lux to w/m^2 for wavelength correction (5)
Wind	Gain	1.00	Calibrated laboratory grade wind meter (6)
Rain	Gain	1.00	Sight glass rain gauge with an aperture of at least 4" (7)
Daily Rain	Offset	Current Value	Apply an offset if the weather station was not operating for the entire day.
Weekly Rain	Offset	Current Value	Apply an offset if the weather station was not operating for the entire week.
Monthly Rain	Offset	Current Value	Apply an offset if the weather station was not operating for the entire month.
Yearly Rain	Offset	Current Value	Apply an offset if the weather station was not operating for the entire year.

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

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

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

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

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

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

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

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

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

To determine the relative pressure for your location, locate an official reporting station near you (the internet is the best source for real time barometer conditions, such as Weather.com or Wunderground.com®), and set your weather station to match the official reporting station.

(4) Only use this if you improperly installed the weather station sensor array, and did not point the direction reference to true north.

(5) The default conversion factor based on the wavelength for bright sunlight is 126.7 lux / w/m^2. This variable can be adjusted by photovoltaic experts based on the light wavelength of interest, but for most weather station owners, is accurate for typical applications, such as calculating evapotransporation and solar panel efficiency.

(6) Wind speed is the most sensitive to installation constraints. The rule of thumb for properly installing a wind speed sensor is 4 x the distance of the tallest obstruction. For example, if your house is 6m tall and you mount the sensor on a 1.5m pole:

Distance = 4 x (6 – 1.5)m = 18m.

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

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

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

(7) The rain collector is calibrated at the factory based on the funnel diameter. The bucket tips every 0.03 of rain (referred to as resolution). The accumulated rainfall can be compared to a sight glass rain gauge with an aperture of at least 10mm..
Make sure you periodically clean the rain gauge funnel.

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

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

5. Updating Firmware

You must own a PC to update the firmware. Sorry, Linux products are currently not supported.

5.1 Updating on Windows products:

1. You can contact your reseller to obtain the update firmware.

2. **Important Note: Close all of other applications while running the firmware update. This will insure the upgrade process will not be interrupted.**

3. Launch the IP Tools application as referenced in Section 4.6.4.1, and locate the device on your network. Reference Figure . Select the Upgrade button to begin the firmware upgrade. As shown in this figure, the IP address of the device is 192.168.0.7. Make a note of your IP address (your results will vary).
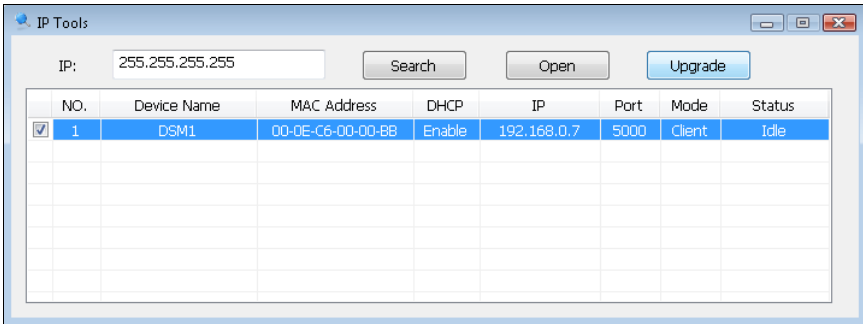
Figure 31

4. Reference Figure 32. Select the **Select File** button, and browse to the location of the file

Figure 32

5. Select the Upgrade **Firmware button**. Reference Figure 33. The dialog box will display **Received a Read Request** from the device. A green progress bar will provide you with the upgrade status.

   DO NOT OPERATE THE MOUSE OR KEYBOARD WHEN UPGRADING to prevent interruption of the upgrade.
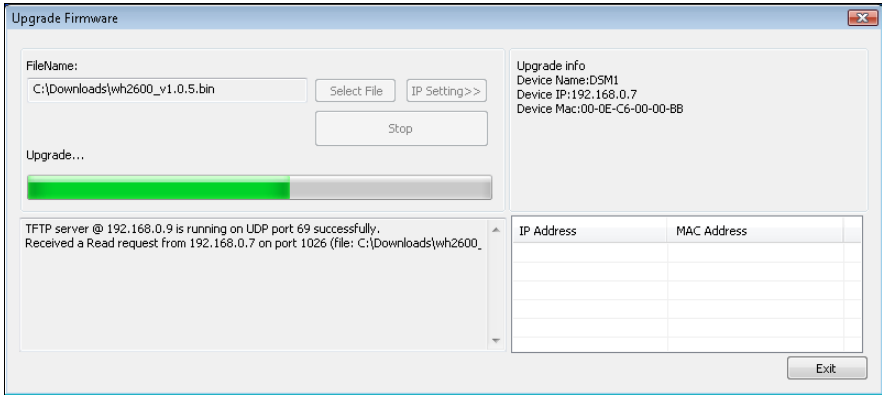
Figure 33

6. Once the firmware upgrade is complete, the dialog box will display **Read session is completed successfully**, as shown in Figure 34.
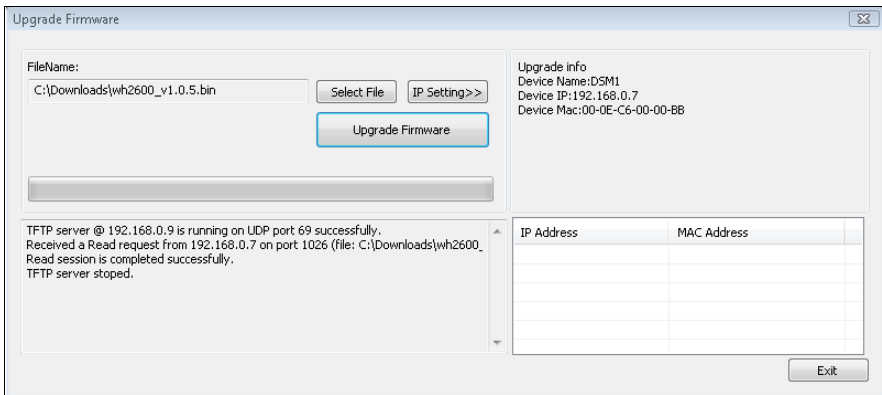
Figure 34

7. Wait about one minute for the device to reboot. You can now **Exit** the upgrade window, and access the module again, as referenced in Section 4.6.4.

You may be required to enter some settings, so check all of the panels for completeness.

5.2 Updating on Apple products:

1. Obtain the update firmware from your reseller.
2. **Important Note: Close all of other applications while running the firmware update. This will insure the upgrade process will not be interrupted.**

3. Launch the IP Tools application as referenced in Section 4.6.4.2, and locate the device on your network. Reference Figure 35. As shown in this figure, the IP address of the device is 192.168.0.99. Make a note of your IP address (your results will vary).
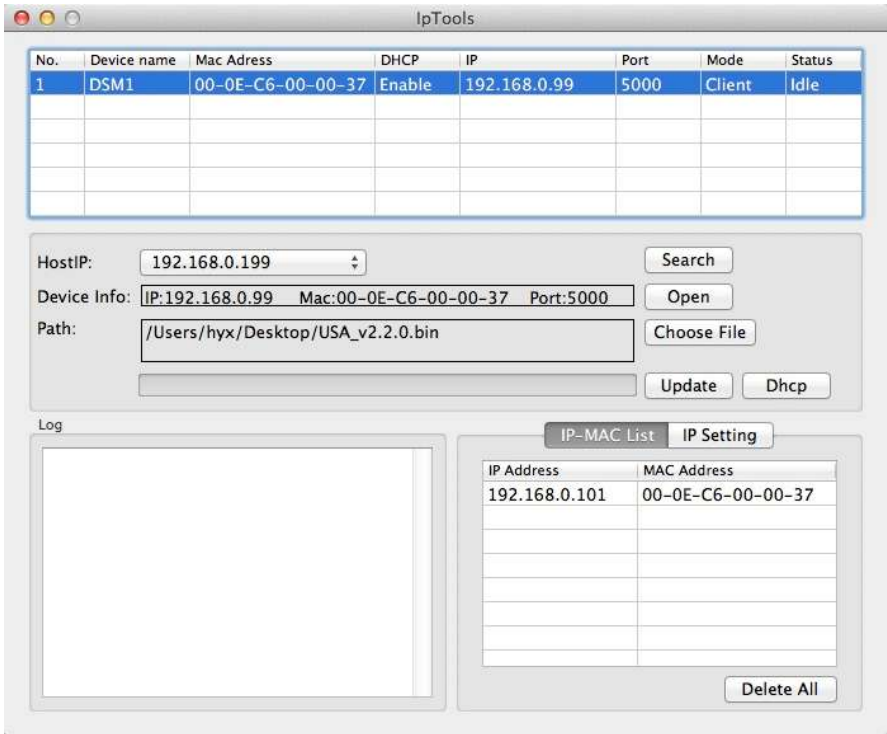
Figure 35

4. Click the **Choose File** button, and browse to the location of the file
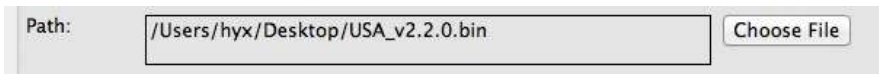
Figure 36
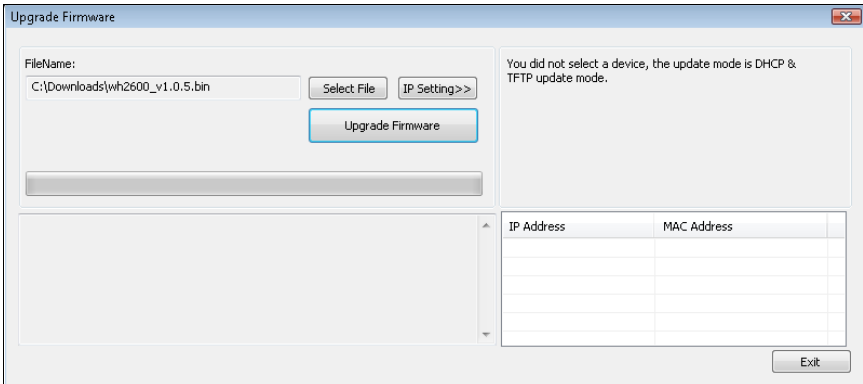
5. Select the Update **button**. Reference Figure 37.   A blue progress bar will provide you with the upgrade status.
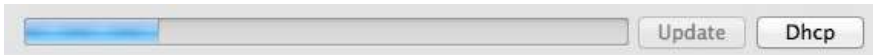
Figure 37

And there would be indication information listed in the log box
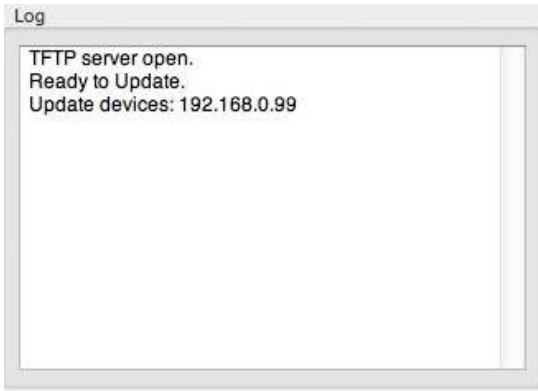
Figure 38

Once the firmware upgrade is complete, the log box will display 'Update Success'.

6. Wait about one minute for the device to reboot.
7. If some error occurs during the firmware upgrade or Reset operation, the IP of the device won't be found in local network. At this moment, please press DHCP button to re-upgrade. A random IP address would be distributed to the device displayed in the below box.

Figure 39

DO NOT OPERATE THE MOUSE OR KEYBOARD WHEN UPGRADING to prevent interruption of the upgrade.

6. Glossary of Terms

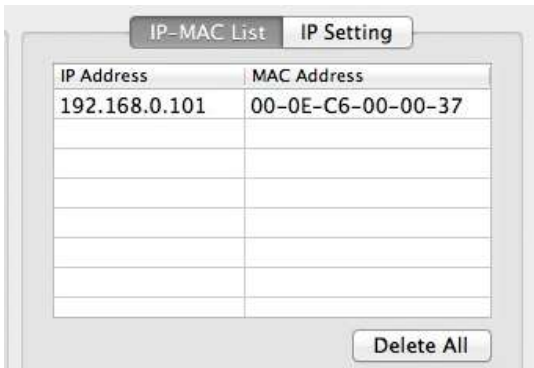| Term	Definition
Absolute Barometric Pressure	Absolute pressure is the measured atmospheric pressure and is a function of altitude, and to a lesser extent, changes in weather conditions. Absolute pressure is not corrected to sea-level conditions. *Refer to Relative Barometric Pressure.*
Accuracy	Accuracy is defined as the ability of a measurement to match the actual value of the quantity being measured.
Barometer	A barometer is an instrument used to measure atmospheric pressure.
Calibration	Calibration is a comparison between measurements – one of known magnitude or correctness of one device (standard) and another measurement made in as similar a way as possible with a second device (instrument).
Dew Point	The dew point is the temperature at which a given parcel of humid air must be cooled, at constant barometric pressure, for water vapor to condense into water. The condensed water is called dew. The dew point is a saturation temperature. The dew point is associated with relative humidity. A high relative humidity indicates that the dew point is closer to the current air temperature. Relative humidity of 100% indicates the dew point is equal to the current temperature and the air is maximally saturated with water. When the dew point remains constant and temperature increases, relative humidity will decrease.
HectoPascals (hPa)	Pressure units in SI (international system) units of measurement. Same as millibars (1 hPa = 1 mbar)
Hygrometer	A hygrometer is a device that measures relative humidity. Relative humidity is a term used to describe the amount or percentage of water vapor that exists in air.
Inches of Mercury (inHg)	Pressure in Imperial units of measure. 1 inch of mercury = 33.86 millibars
Rain Gauge	A rain gauge is a device that measures liquid precipitation (rain), as opposed to solid precipitation (snow gauge) over a set period of time. All digital rain gauges are self emptying or self dumping (also referred to as tipping rain gauge). The precision of the rain gauge is based on the volume of rain per emptying cycle.
Range	Range is defined as the amount or extent a value can be measured.
Relative Barometric Pressure	Measured barometric pressure relative to your location or ambient conditions.
Resolution	Resolution is defined as the number of significant digits (decimal places) to which a value is being reliably measured.
Solar Radiation	A solar radiation sensor measures solar energy from the sun. Solar radiation is radiant energy emitted by the sun from a nuclear fusion reaction that creates electromagnetic energy. The spectrum of solar radiation is close to that of a black body with a temperature of about 5800 K. About half of the radiation is in the visible short-wave part of the electromagnetic spectrum. The other half is mostly in the near-infrared part, with some in the ultraviolet part of the spectrum.
Thermometer	A thermometer is a device that measures temperature. Most digital thermometers are resistive thermal devices (RTD). RTDs predict change in temperature as a function of electrical resistance.
Wind Vane	A wind vane is a device that measures the direction of the wind. The wind vane is usually combined with the anemometer. Wind direction is the direction from which the wind is blowing.

7. Specifications

7.1 Wireless Specifications

- Line of sight wireless transmission (in open air): 100meter
- Update Rate: Outdoor Sensor: 16 seconds, Indoor Sensor: 64 seconds
- Frequency: 433/868/915 MHz

7.2 Measurement Specifications

The following table provides the specifications for the measured parameters.

Measurement	Range	Accuracy	Resolution
Indoor Temperature	0 to 60 °C	± 1 °C	0.1 °C
Outdoor Temperature	-40 to 65 °C sensor -5 to 60 °C battery range (alkaline)	± 1 °C	0.1 °C
Indoor Humidity	1 to 99%	± 5%	1 %
Outdoor Humidity	1 to 99%	± 5%	1 %
Barometric Pressure	300-1100hPa (8.85 to 32.50 inHg)	+/-3hpa under 700-1100hPa	0.1hPa
Light	0 to 400,000 Lux	± 20%	1 Lux
Rain	0 – 9999mm	± 10%	0.03mm
Wind Direction	0 - 360 °	10º	1º
Wind Speed	0-50m/s	± 1m/s or 10% (whichever is greater)	0.1 m/s

7.3 Power Consumption

- ObserverIp Receiver : 5V DC Adaptor (included)
- Indoor Thermo-hygrometer-barometer sensor : 2xAAA batteries (not included)
- Outdoor sensor array: 3xAA alkaline batteries (not included)

8. Maintenance

1. Clean the rain gauge once every 3 months as follows. Reference Figure 40.

   Step 1: Make a note of the current rain totals by referencing the calibration panel (reference Section 0). You will need to re-enter these values after the calibration procedure it complete.

   Step 2: Pour water into the rain collector to moisturize the dirt inside rain bucket.

   Step 3: Use an approximately 3 inch (80 mm) long cotton swab, and push the cotton tip through the rain collector hole until is reaches the self emptying mechanism, and press until the mechanism no longer rotates.

   Step 4: Rotate the cotton swab back and forth, removing dirt from the tipping mechanism and rain collector hole.

   Step 5: Remove the cotton swab and flush with water to remove any remaining dirt.

   Step 6: Re-enter the rain totals recorded in Step 1.
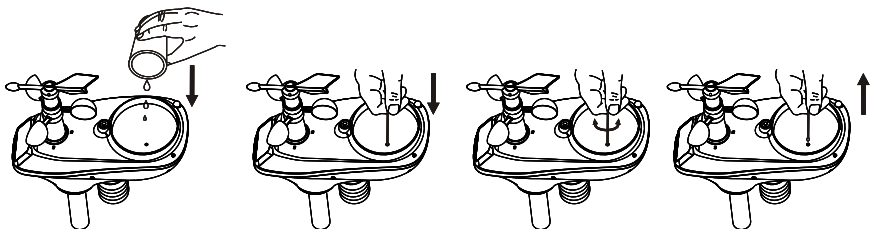
Figure 40

2. Clean the solar radiation sensor every 3 months with water and towel.
3. Replace alkaline batteries every 2 to 3 years.

8.1 Advanced Rain Gauge Cleaning

If the rain gauge stops updating, it is possible for spiders and other insects to nest inside the sensor array housing and interfere with the rain gauge mechanism.

1. Remove the six screws on the bottom of the sensor array, as shown in Figure 41.
2. **CAREFULLY** separate the top housing from the bottom housing. They cannot be completely separated due to wires. **DO NOT STRESS THE WIRES**. Open the sensor housing slightly, like a clam shell.
3. Clean any debris and spider webs, as shown in Figure 42.

Figure 41

Do not stress wires

Clean Debris

Figure 42

9. Troubleshooting Guide

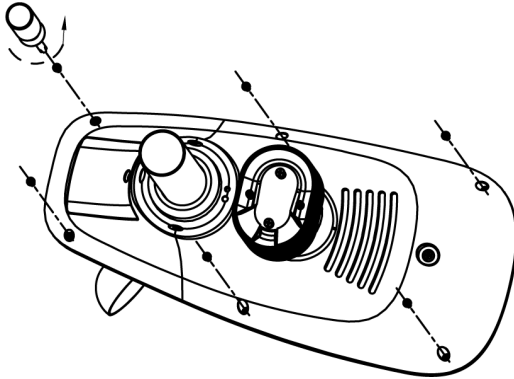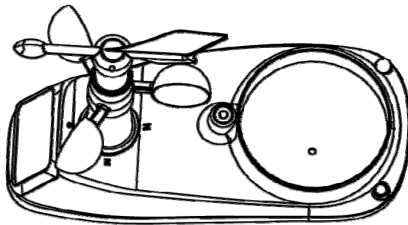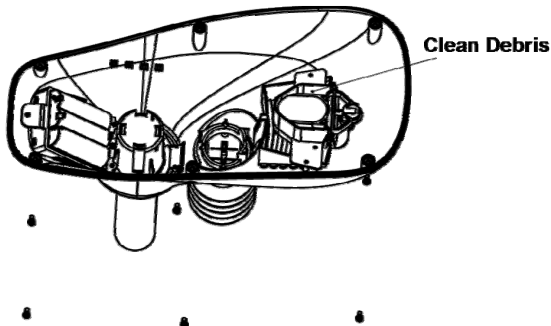| Problem	Solution
Wireless remote (thermo-hygrometer) not reporting in to Receiver.	The maximum line of sight communication range is about 100m. Move the sensor assembly closer to the receiver.
	Install a fresh set of batteries in the remote sensor(s).
	Make sure the remote sensors are not transmitting through solid metal (acts as an RF shield), or earth barrier (down a hill). Radio Frequency (RF) Sensors cannot transmit through metal barriers (example, aluminum siding) or multiple, thick walls.
	Move the receiver around electrical noise generating devices, such as computers, TVs and other wireless transmitters or receivers.
Outdoor sensor array does not communicate to the Receiver.	The sensor array may have initiated properly and the data is registered by the receiver as invalid, and the sensory array must be reset. The reset button is **next to the LED**, near the mounting point on the sensor array, as shown in Figure 10.
	With an open ended paperclip, press the reset button for 3 seconds to completely discharge the voltage.
	Take out the batteries and wait one minute, while covering the solar panel to drain the voltage.
	Put batteries back in and resync with receiver by powering down and up the receiver with the sensor array about 3 meter away.
	Bring the sensor array inside the house (you can disconnect it from the rest of the sensors). The LED next to the battery compartment will flash every 16 seconds. If the LED is not flashing every 16 seconds…
	Replace the batteries in the outside sensor array.
	If the batteries were recently replaced, check the polarity. If the sensor is flashing every 48 seconds, proceed to the next step.
	There may be a temporary loss of communication due to reception loss related to interference or other location factors,
	or the batteries may have been changed in the sensor array and the receiver has not been reset. The solution may be as simple as **powering down and up the device**.
	Replace the batteries in the outside sensor array.
	With the sensor array and **receiver** 3 meter away from each other, remove AC power from the receiver and wait 10 seconds. Re-connect power.
Temperature sensor reads too high in the day time.	Make certain that the sensor array is not too close to heat generating sources or strictures, such as buildings, pavement, walls or air conditioning units.
	Use the calibration feature to offset installation issues related to radiant heat sources. Reference Section 4.6.9.
Relative pressure does not agree with official reporting station	Make sure you properly calibrate the relative pressure to an official local weather station. Reference Section 4.6.9 for details.

Problem	Solution
Wireless remote (thermo-hygrometer) not reporting in to Receiver.	The maximum line of sight communication range is about 100m. Move the sensor assembly closer to the receiver. Install a fresh set of batteries in the remote sensor(s). Make sure the remote sensors are not transmitting through solid metal (acts as an RF shield), or earth barrier (down a hill). Radio Frequency (RF) Sensors cannot transmit through metal barriers (example, aluminum siding) or multiple, thick walls. Move the receiver around electrical noise generating devices, such as computers, TVs and other wireless transmitters or receivers.
Rain gauge reports rain when it is not raining	An unstable mounting solution (sway in the mounting pole) may result in the tipping bucket incorrectly incrementing rainfall. Make sure you have a stable, level mounting solution.
Data not reporting to Wunderground.com®	1. Confirm your password is correct. It is the password you registered on Wunderground.com®. Your Wunderground.com® password cannot begin with a non-alphanumeric character (a limitation of Wundeground.com, not the station). Example, $oewkrf is not a valid password, but oewkrf$ is valid. 2. Confirm your station ID is correct. The station ID is all caps, and the most common issue is substituting an O for a 0 (or visa versa). Example, KAZPHOEN11, not KAZPH0EN11. 3. Make sure your time zone is set properly. If incorrect, you may be reporting old data, not real time data. 4. Check your router firewall settings. The device sends data via Port 80.

10. Liability Disclaimer

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

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

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

The specifications of this product may change without prior notice.

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

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