

# WS029T Professional Integrated Outdoor Transmitter User Manual

## 1. Introduction

Thank you for your purchase of the WS029T Professional Wireless Weather station. The following user guide provides step by step instructions for installation, operation and troubleshooting.

## 2. Warnings

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

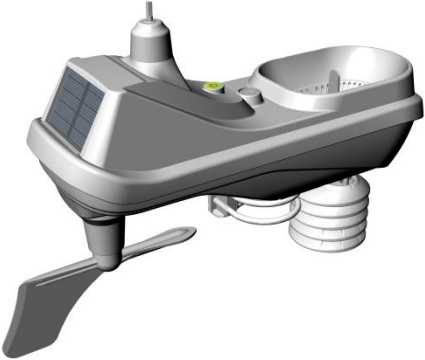
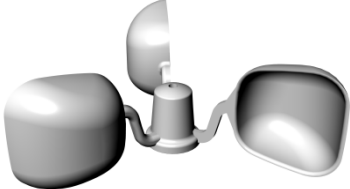
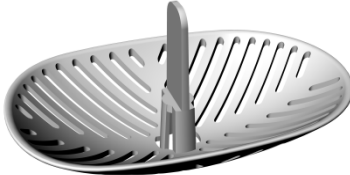
**⚠ Warning:** Installing your weather station in an elevated location may result in injury or death. Safety goes first. Make sure your setup and preparation is secure, and take no risks.

## 3. Getting Started

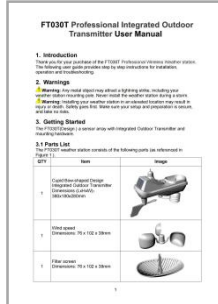
The WS029T(with UV ) a sensor array with Integrated Outdoor Transmitter and mounting hardware.

### 3.1 Parts List

The WS029T weather station consists of the following parts (as referenced in Figure 1 ).

| QTY | Item                                                                                      | Image                                                                                |
|-----|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 1   | (7-in-1) Design<br>Integrated Outdoor Transmitter<br>Dimensions (LxHxW):<br>330x120x270mm |  |
| 1   | Wind speed<br>Dimensions: 146 x 146 x 46mm                                                |  |
| 1   | Filter screen<br>Dimensions: 88 x 59 x 45mm                                               |  |

| QTY | Item                                                             | Image                                                                                |
|-----|------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 4   | Metal thin flat ring washer                                      |   |
| 4   | Pole mounting U-bolt / Hex nuts (M5)/Metal thin flat ring washer |    |
| 2   | U-Bolt (M5)<br>V-Dimensions: 60x 60 x 5mm                        |   |
| 1   | Stainless Steel L-shaped base<br>Dimensions: 75x 40 x 15mm       |  |
| 1   | Single-head wrench (M5)<br>Dimensions: 65x 20 x 2mm              |  |
| 1   | Slot Type Screwdriver (M3)<br>Dimensions: Φ10 x 90mm             |  |

| QTY | Item                                                                         | Image                                                                                |
|-----|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 2   | Wind Speed mounting bolts (Ø3)<br>Dimensions: M2*6mm<br>One is a spare part. |   |
| 1   | Wind Speed Waterproof rubber plug<br>Dimensions: Φ4 x 3mm                    |   |
| 1   | Manual                                                                       |  |

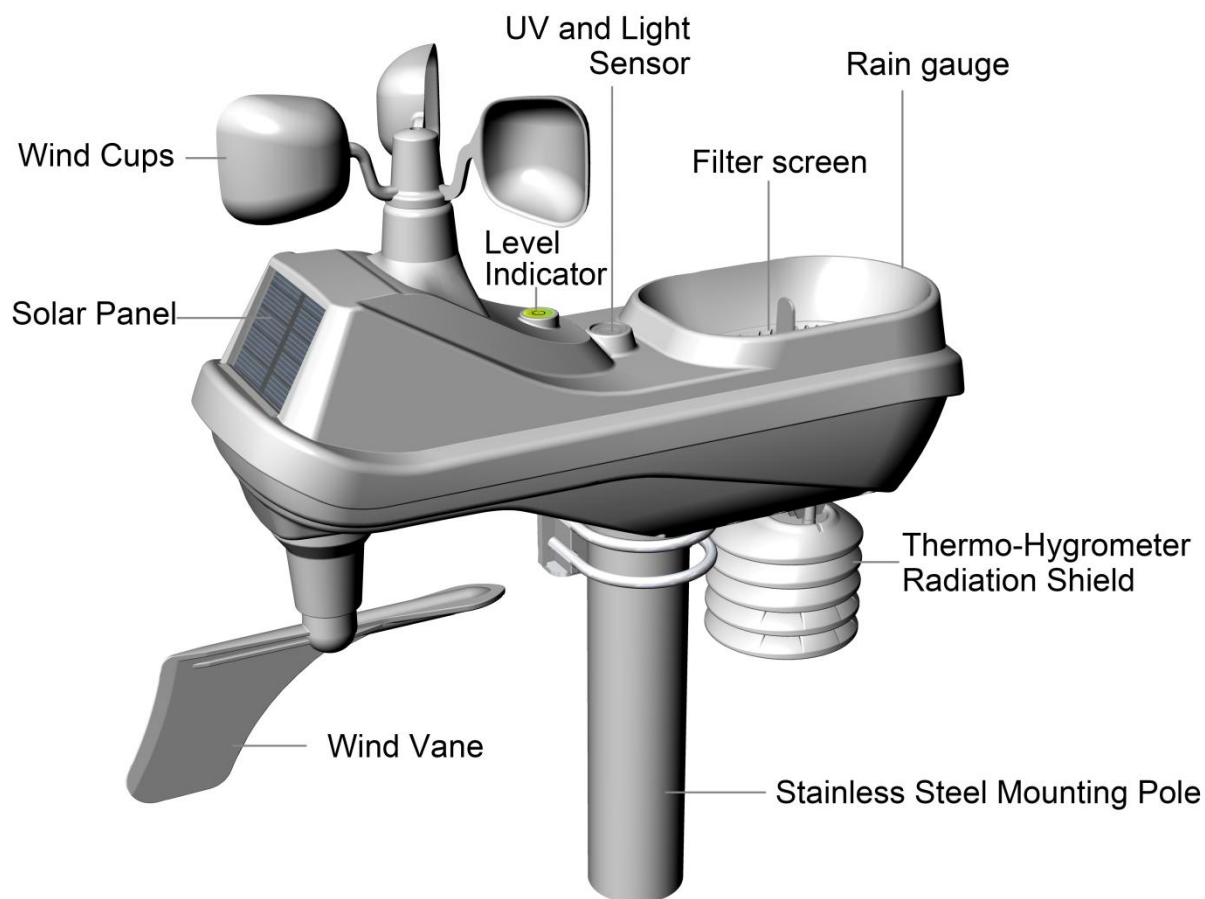
**Figure 1**

### 3.2 Recommended Tools

- Precision screwdriver (for small Phillips screws)
- Compass or GPS (for wind direction calibration)
- Adjustable Wrench

### 3.3 Setup of Sensor

The following illustration shows the full segment for Thermo-Hygrometer, WIND,RAIN and UV INDEX sensor. purposes only ,as shown in Figure 2.

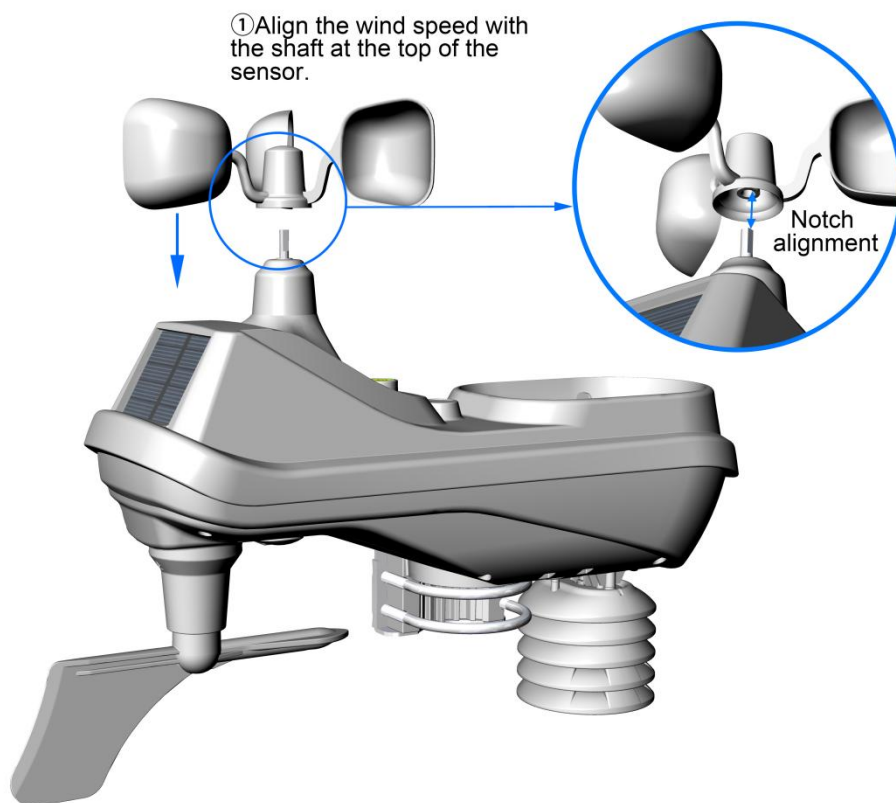


**Figure 2**

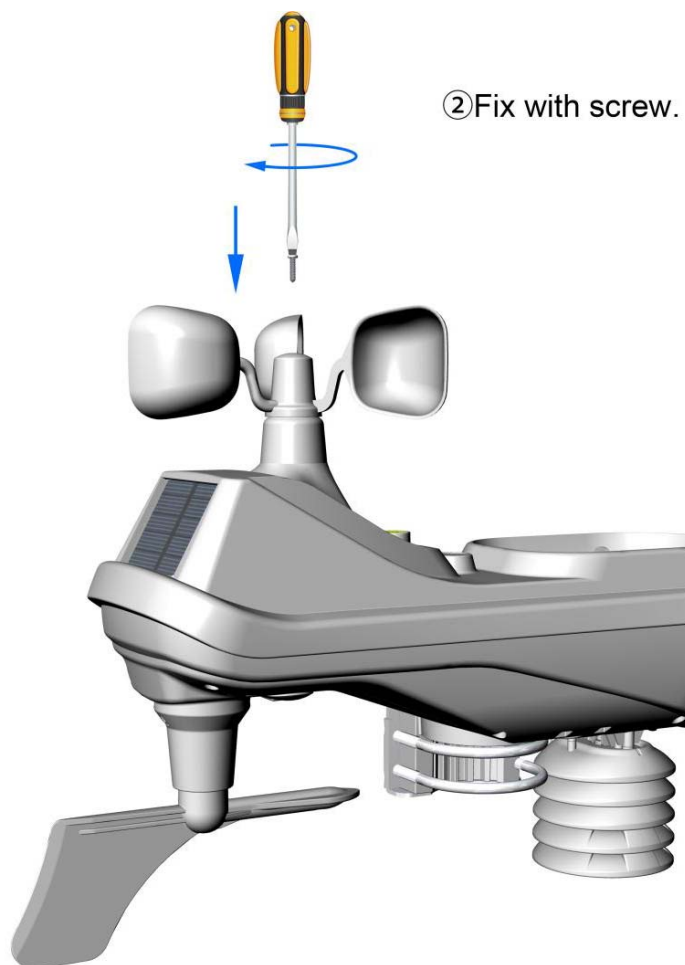
### **3.3.1 Install wind speed**

Push the wind speed into the shaft. as shown in Figure 3.  
Tighten the set screw with as shown in Figure 4.

Insert white waterproof rubber at the top of the wind speed  
Make sure the wind speed can spin freely.



**Figure 3**



**Figure 4**

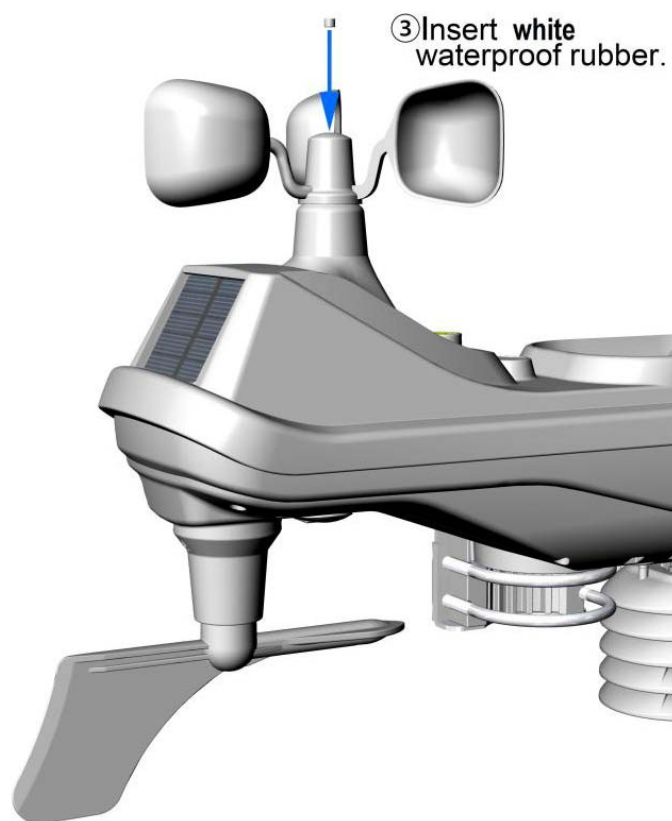


Figure 5

### 3.3.2 Install Rain Gauge Debris Filter

Pre- installed to prevent debris from entering the rain gauge. As show below photo.

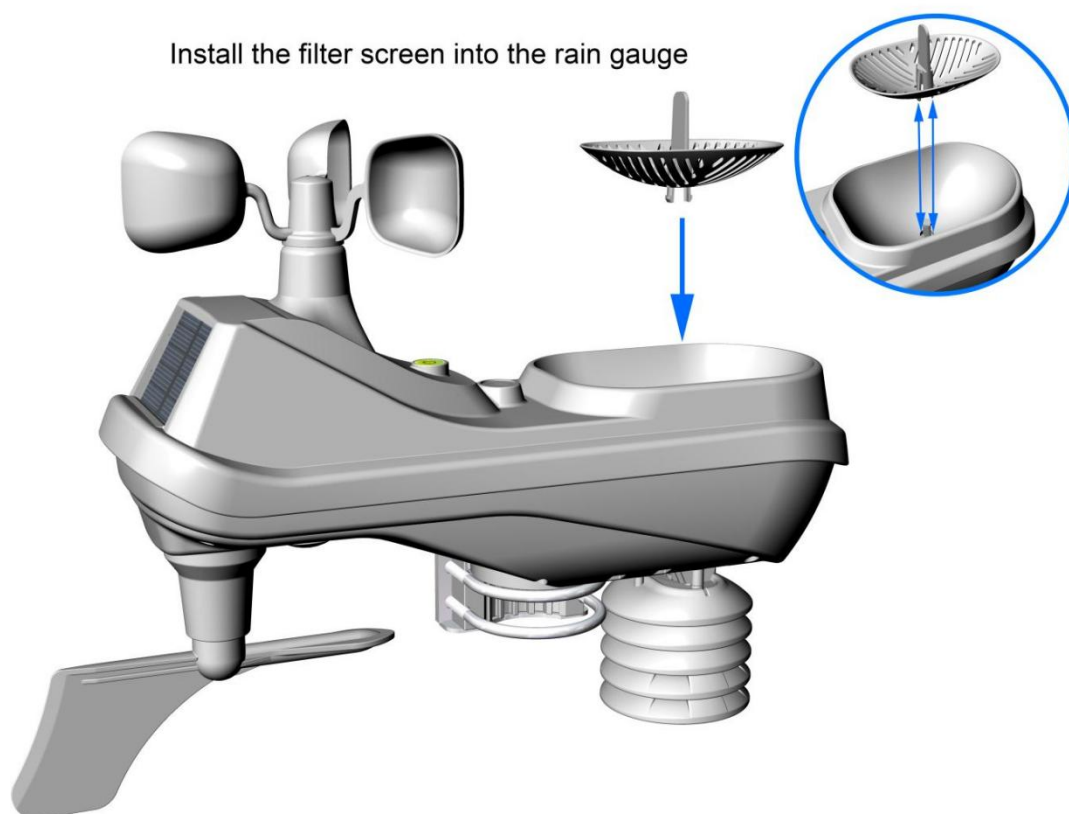
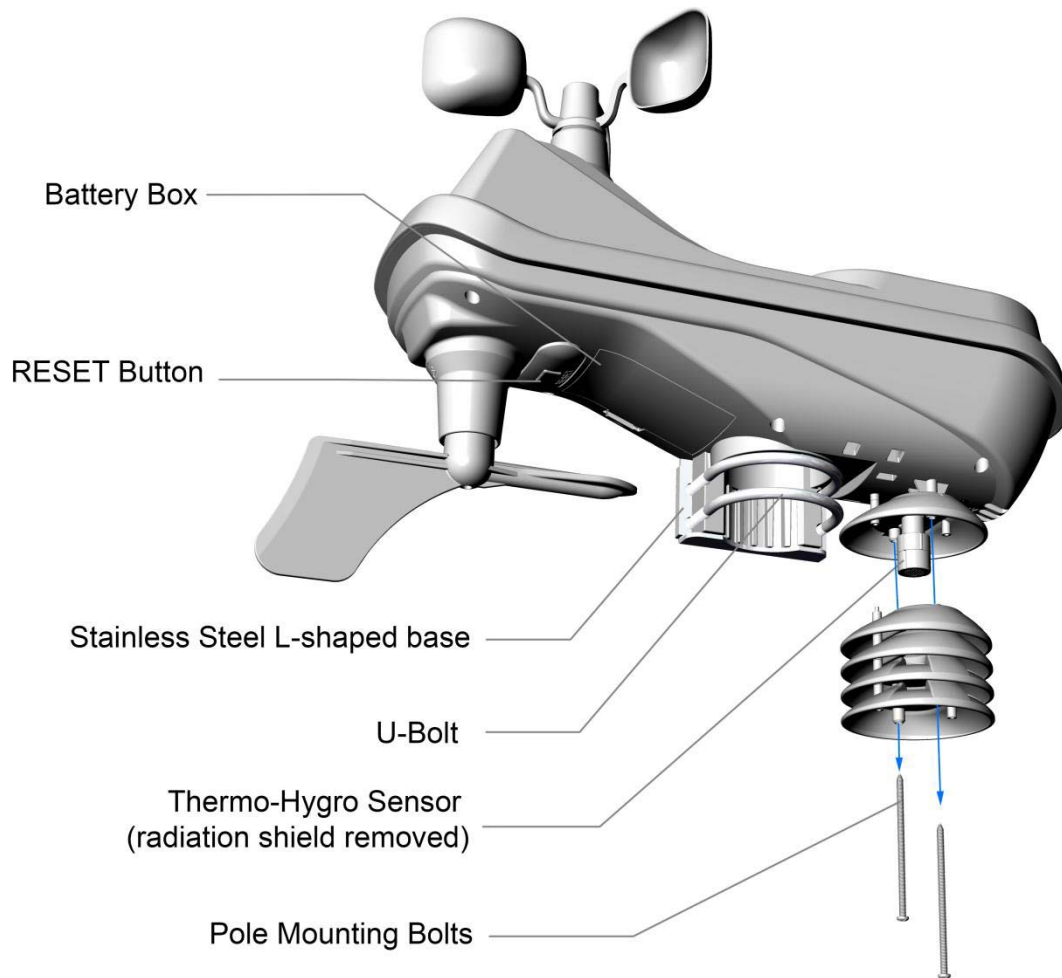


Figure 6

### 3.3.3 Insert batteries into the transmitter.

Locate the battery cover on the transmitter, push and open the battery compartment, as show in Figure 8.



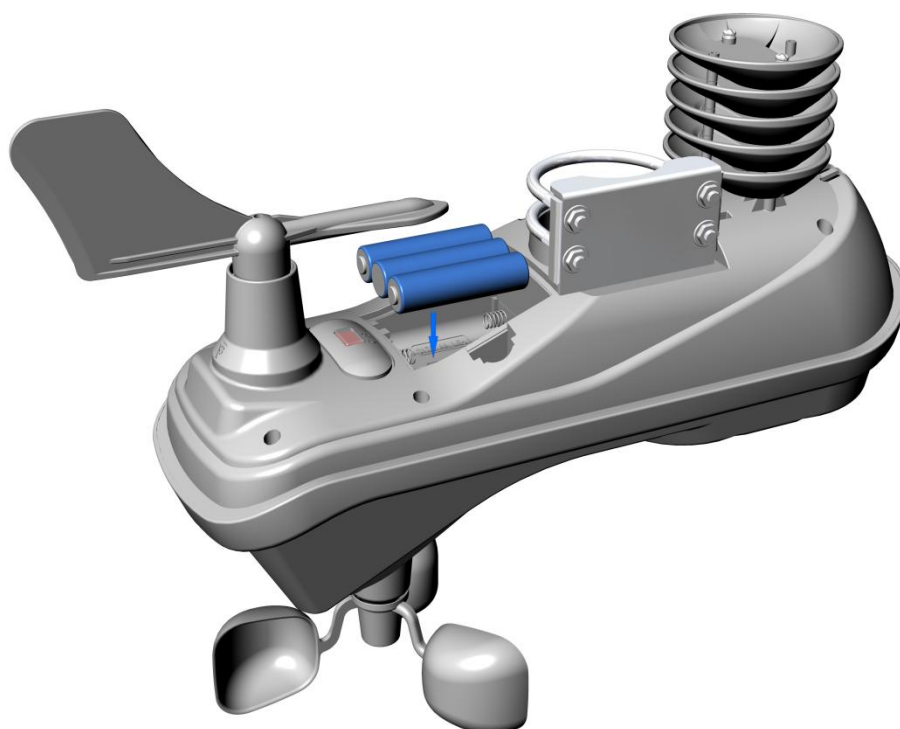
**Figure 8**

Remove the battery cover on the back of the sensor , as shown in Figure 9.



**Figure 9**

Inserting 3xAA batteries in the battery compartment, as show in Figure 10.



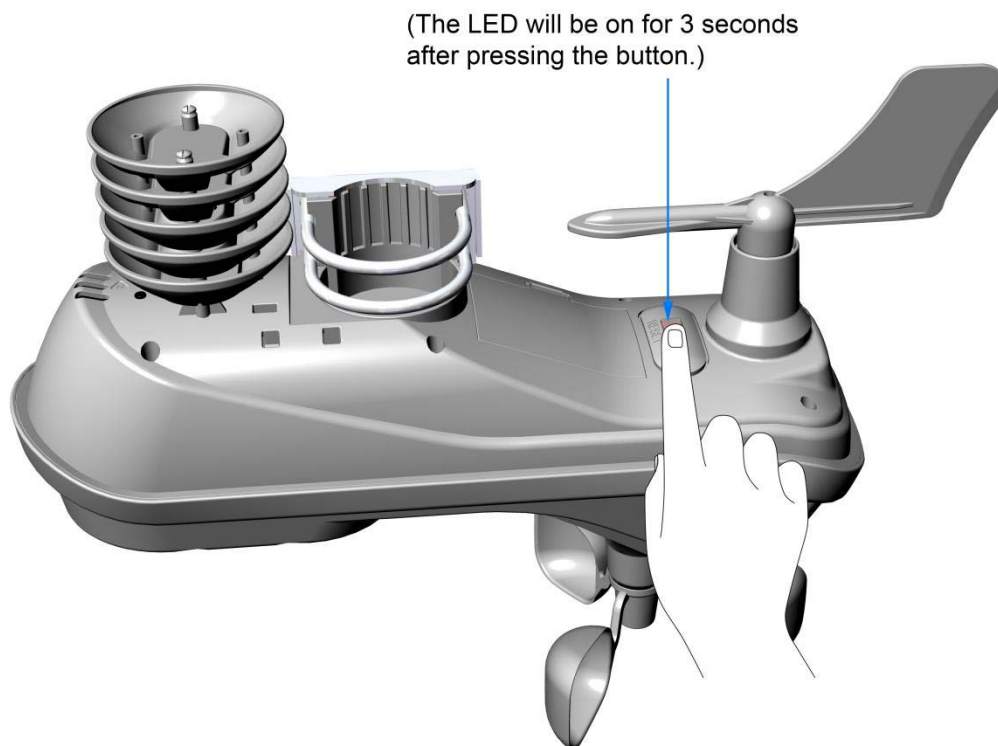
**Figure 10**

Close the battery cover.

 **Note:** Do not install the batteries backwards. You can permanently damage the sensors. The solar panel does not charge the batteries, so rechargeable batteries are not needed or recommended.

 **Note:** We recommend installing Lithium AA batteries for sensors. The sensor LED indicator will light for 3 seconds, and then flash once per 16 seconds thereafter. Each time it flashes, the sensor is transmitting data. Place the battery cover and push it to close the compartment.

 **Note:** If the sensor does not power up after inserting the batteries, press the reset button shown in Figure 11.



**Figure 11**

### 3.3.4 Sensor Operation Verification

The following steps verify proper operation of the sensors prior to installing the sensor array.

1. Verify proper operation of the rain gauge. Tip the sensor array South and North( S and N molded on the body of the outdoor sensor) several times. You should hear a “clicking” sound within the rain gauge. Verify the rain reading on the display console is not reading 0.00. Each “click” represents 0.3mm of rainfall.
2. Verify proper operating of the wind speed. Rotate the wind cups manually or with a constant speed fan. Verify the wind speed is not reading 0.0.
3. Verify proper operation of the indoor and outdoor temperature. Verify the indoor and outdoor temperature match closely with the console and sensor array in the same location (about 3m apart). The sensors should be within 2°C (the accuracy is  $\pm 1^\circ\text{C}$ ). Allow about 30 minutes for both sensors to stabilize.

4. Verify proper operation of the indoor and outdoor humidity. Verify the indoor and outdoor humidity match closely with the console and sensor array in the same location (about 3m apart). The sensors should be within 10% (the accuracy is  $\pm 5\%$ ). Allow about 30 minutes for both sensors to stabilize.

## **4. Weather Station Installation**

**4.1 Pre Installation Check.** 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.

## **4.2 Location Survey**

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

1. You must clean the rain gauge once per year and change the batteries every two years. Provide easy access to the weather station.
2. Avoid radiant heat transfer from buildings and structures. In general, install the sensor array at least 5' from any building, structure, ground, or roof top.
3. Avoid wind and rain obstructions. The rule of thumb is to install the sensor array at least four times the distance of the height of the tallest obstruction. For example, if the building is 6m tall, install  $4 \times 6\text{m} = 24\text{m}$  away. Use common sense. If the weather station is installed next to a tall building, the wind and rain will not be accurate.
4. Wireless Range. The radio communication between receiver and transmitter in an open field can reach a distance of up to 100 m, providing there are no interfering obstacles such as buildings, trees, vehicles, high voltage lines. Wireless signals will not penetrate metal buildings. Most applications will only reach 30m due to building obstructions, walls and interference.
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 console or mounting locations.

## **4.3 Best Practices for Wireless Communication**

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

1. **Electro-Magnetic Interference (EMI).** Keep the console several feet away from computer monitors and TVs.
2. **Radio Frequency Interference (RFI).** If you have other 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 100 m line of sight (no interference, barriers or walls) but typically you will get 30 m maximum under most real-world installations, which include passing through barriers or walls.

**4. Metal Barriers.** Radio frequency will not pass through metal barriers such as aluminum siding. If you have metal siding, align the remote and console through a window to get a clear line of sight.

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

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

## 5. Final Installation of Sensors

### Integrated outdoor transmitter installation.

Professional Wireless Weather Station can be used in both the Northern and Southern Hemispheres.

Prior to installation, you will need to calibrate the wind direction.

### 5.1. Northern Hemispheres (NOR).

The cardinal directions (S) molded on the body of the outdoor sensor are indicators for the Northern Hemisphere only.

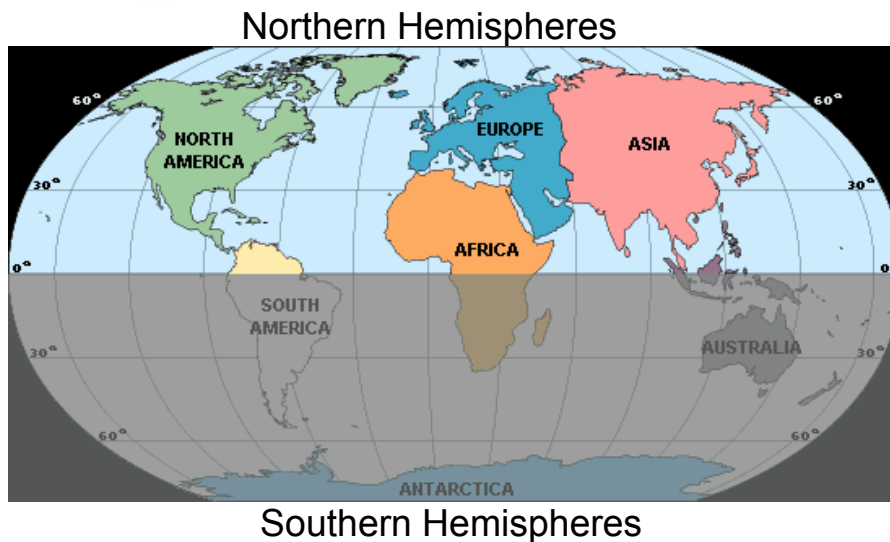
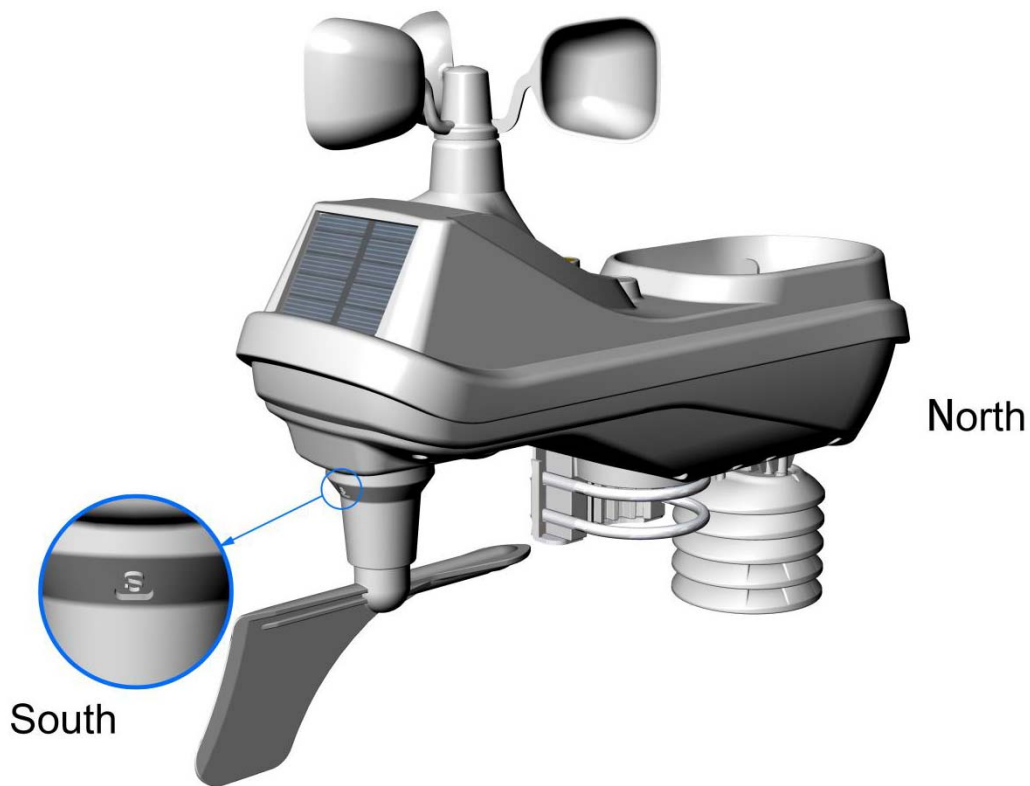
**Step 1:** There is a “S” indicator on the wind vane that indicates South, as shown in Figure 12. Align this “S” marker in the direction of South.



Figure 12

**Step 2:** Console operation is set to Northern Hemispheres ( **NOR** in the time area) in Location division.

 **Note:** There is an alphabet letter of "S" besides the wind direction, representing for the direction of South . Wind direction sensor has to be adjusted so that the directions on the sensor are matching with your real location. Permanent wind direction error will be introduced when the wind direction sensor is not positioned correctly during installation.



**Figure 13**

## **5.2. Southern Hemispheres (SOU).**

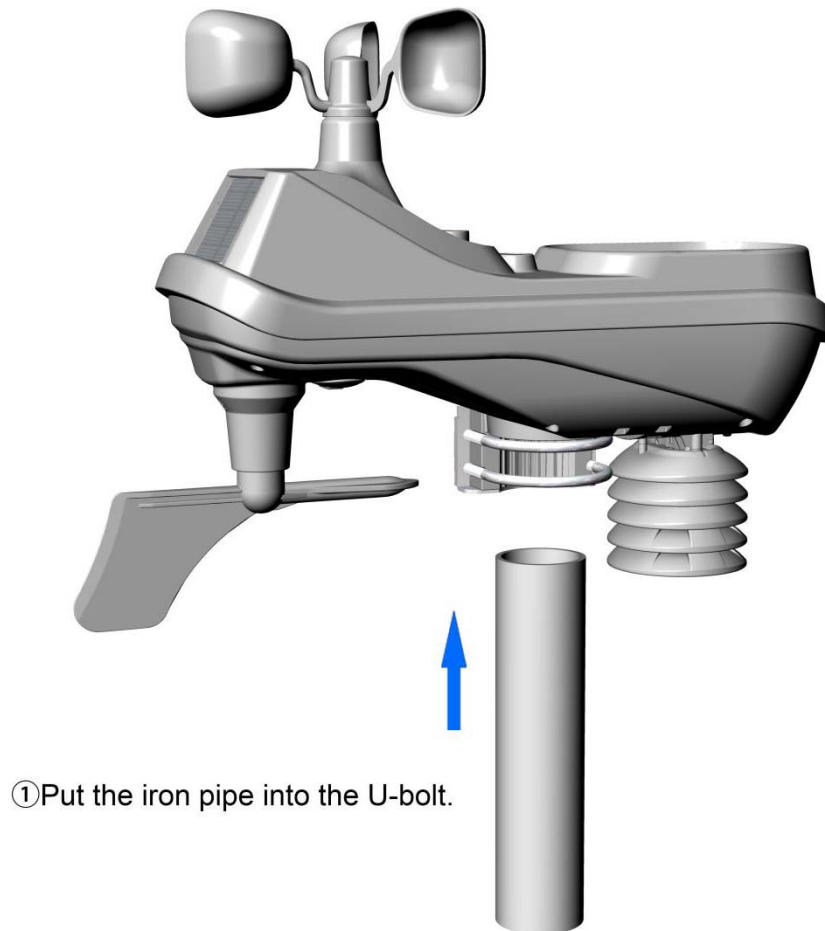
For Southern Hemisphere installations, ignore these(N, S,) and face **the solar panel to the North** (and in a sunny position,This ensures the solar cell receives as much sun as possible and orients wind direction.) when installing the Integrated outdoor transmitter.

**Step 1:** Install the Integrated outdoor transmitter and face the solar panel North.

**Step 2:** Console operation is set to Southern Hemispheres ( **SOU** in the time area) in Location division.

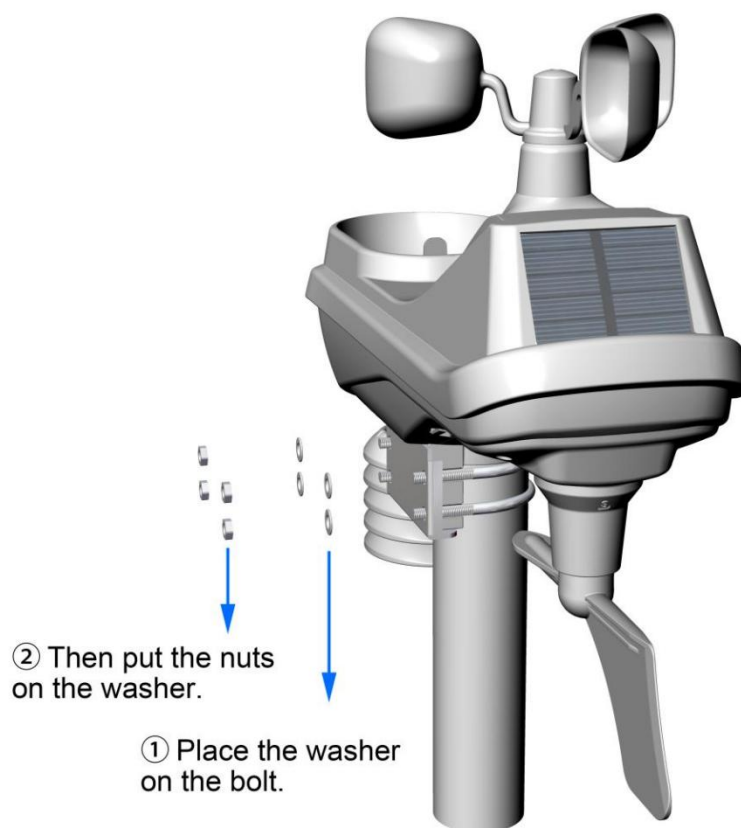
 **Note:** Console has to be location division setting so that the directions on the sensor are matching with your real location. Permanent wind direction error (read approximately 180°) will be introduced when the wind direction sensor is not positioned correctly during installation.

First attach a pipe to a permanent structure and then attach the sensor package to it . The U-Bolts will accommodate a pipe diameter of 30-45mm (pipe not included), as shown in Figure 14.



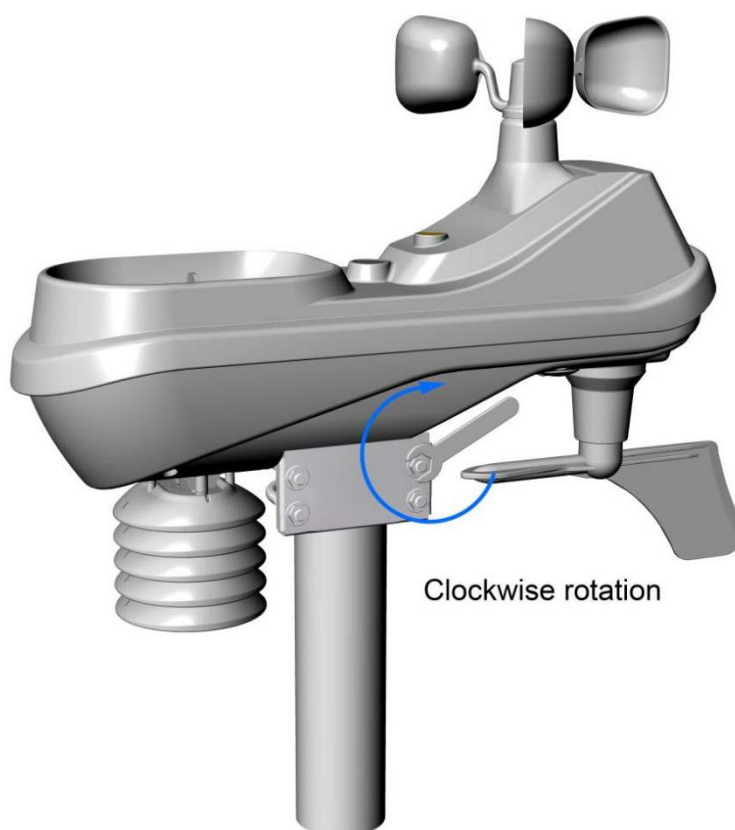
**Figure 14**

The washers are placed over a bolt before the nut is screwed on.



**Figure 15**

Tighten the mounting pole to your existing mounting pole with the two  $\varnothing 5$  U-Bolts and M5 Nuts assembly, wrench tightens all four nuts, taking care to so evenly, as shown in Figure 16.



**Figure 16**

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

## 6. Low Battery Icon

A low battery indicator icon is shown in the display window for Integrated outdoor transmitter. When the low battery icon appears (the battery voltage is lower than 3.6V), replace the batteries in the sensor with fresh batteries. Be sure to never mix old and new batteries, and never mix battery types such as alkaline and lithium together.

## 7. Specifications

### 7.1 Wireless Specifications

- Line of sight wireless transmission (in open air): 100m.
- Frequency: 433 MHz
- Integrated Outdoor transmitter interval: 16 seconds

### 7.2 Measurement Specifications

The following table provides specifications for the measured parameters.

| Measurement         | Range        | Accuracy                                                               | Resolution                       |
|---------------------|--------------|------------------------------------------------------------------------|----------------------------------|
| Outdoor Temperature | -40 to 60 °C | ± 1 °C                                                                 | 0.1 °C                           |
| Outdoor Humidity    | 10 to 99%    | ± 5% (only guaranteed between 20 to 90%)                               | 1 %                              |
| UV Index            | 1 to 15+     | ± 1                                                                    | ± 1                              |
| Sunlight            | 0 to 200klux | ± 15%                                                                  | ± 15%                            |
| Rain                | 0 to 9999mm  | <15mm:±1 mm,<br>15mm to 9999mm:±7%                                     | <1000mm (0.3mm)<br>>1000mm (1mm) |
| Wind Direction      | 0 - 360 °    | ± 10° (16 point compass)                                               | ± 1° (16 point compass)          |
| Wind Speed          | 0 to 50 m/s  | 2 m/s ~10 m/s: ±3m/s,<br>10m/s ~50 m/s: ±10%<br>(whichever is greater) | 0.1 m/s                          |

### 7.3 Power Consumption

- Integrated Outdoor Transmitter: 3xAA alkaline batteries or Lithium batteries (not included)
- Minimum 12 months for Integrated Outdoor Transmitter (use lithium batteries in cold weather climates less than -20 °C), The primary power

source is the solar panel. The batteries provide backup power when there is limited solar energy

## 8. Maintenance

### 8.1 Clean the rain collector

1. Clean the rain gauge of Integrated Outdoor Transmitter once every 3 months.

- Gently remove the Debris Filter from the rain collector.
- Clean and remove any debris or insects.
- Install the debris filter after it has been cleaned and completely dried.

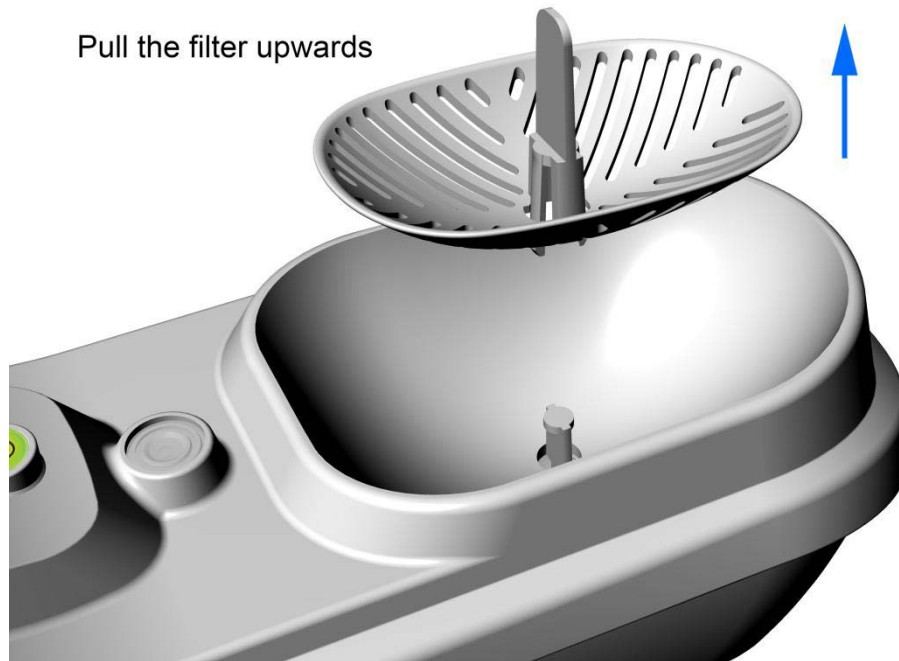


Figure 17

2. Replace the Integrated Outdoor Transmitter batteries once every 1-2 years.

## 9. Troubleshooting Guide.

| Problem | Solution |
|---------|----------|
|---------|----------|

| Problem                                                                                                   | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Wireless remote not reporting in to console.</p> <p>There are dashes (---) on the display console.</p> | <p>If any of the sensor communication is lost, dashes (---) will be displayed on the screen. To reacquire the signal, press and hold the <b>CHANNEL/+</b> button for 3 seconds, choose the lost sensor and the remote search icon  will be constantly displayed. Once the signal is reacquired, the remote search icon  will turn off, and the current values will be displayed.</p> <p>The maximum line of sight communication range is 100 m and 30 m under most conditions. Move the sensor assembly closer to the display console.</p> <p>If the sensor assembly is too close (less than 1.5m), move the sensor assembly away from the display console.</p> <p>Make sure the remote sensor LCD display is working and the transmitter light is flashing once per 60 seconds.</p> <p>Install a fresh set of batteries in the remote thermo-hygrometer. For cold weather environments, install lithium batteries.</p> <p>Make sure the remote sensors are not transmitting through solid metal (acts as an RF shield), or earth barrier (down a hill).</p> <p>Move the display console around electrical noise generating devices, such as computers, TVs and other wireless transmitters or receivers.</p> <p>Move the remote sensor to a higher location. Move the remote sensor to a closer location.</p> |
| Temperature sensor reads too high in the day time.                                                        | Make sure the thermo-hygrometer is mounted in a shaded area. The pre preferred location is a north facing wall because it is in the shade most of the day.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Indoor and Outdoor Temperature do not agree                                                               | <p>Allow up to one hour for the sensors to stabilize due to signal filtering. The indoor and outdoor temperature sensors should agree within 2 °C (the sensor accuracy is <math>\pm 1</math> °C).</p> <p>Use the calibration feature to match the indoor and outdoor temperature to a known source.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Indoor and Outdoor Humidity do not agree                                                                  | <p>Allow up to one hour for the sensors to stabilize due to signal filtering. The indoor and outdoor humidity sensors should agree within 10 % (the sensor accuracy is <math>\pm 5</math> %).</p> <p>Use the calibration feature to match the indoor and outdoor humidity to a known source.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Display console contrast is weak                                                                          | Replace console batteries with a fresh set of batteries.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

# FCC Statement

**Statement according to FCC part 15.19:**

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

**Statement according to FCC part 15.21:**

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

**Statement according to FCC part 15.105:**

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.