
Ambient Weather WS-24 Big Digit 8-Channel Wireless Indoor / Outdoor Thermometer User Manual



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1 Introduction

Thank you for your purchase of the Ambient Weather WS-24 Wireless Indoor/Outdoor 8-Channel Thermometer with Backlit Display. The following user guide provides step by step instructions for installation, operation and troubleshooting. To download the latest manual and additional troubleshooting tips, please visit:

<http://ambientweather.wikispaces.com/ws24>

2 Getting Started

 **Note:** The power up sequence must be performed in the order shown in this section (insert batteries in the remote transmitter(s) first, Display Console second).

The WS-24 weather station consists of a display console (receiver), and a thermometer (remote transmitter).


2.1 Parts List

QTY	Item
1	Display Console Frame Dimensions (LxHxW): 6 x 3.25 x 1 in LCD Dimensions (LxW): 4.5 x 2.5" LCD Segment Height: 1 inch
1	Thermometer transmitter (FT007T) Dimensions (LxHxW): 4.5" x 2.0" x 0.75"
1	User Manual

2.2 Recommend Tools

Hammer and nail for hanging remote thermometer transmitter.

2.3 Thermometer Sensor Set Up

 **Note:** Do not use rechargeable batteries. They tend to have a lower operating voltage, do not have a wide temperature range, and do not last as long as non-rechargeable batteries.

We recommend fresh alkaline batteries for outdoor temperature ranges between -4 °F and 140 °F and fresh lithium batteries for outdoor temperature ranges between -40 °F and 140 °F.

1. Remove the battery door on the back of the sensor by removing the set screw, as shown in Figure 1.

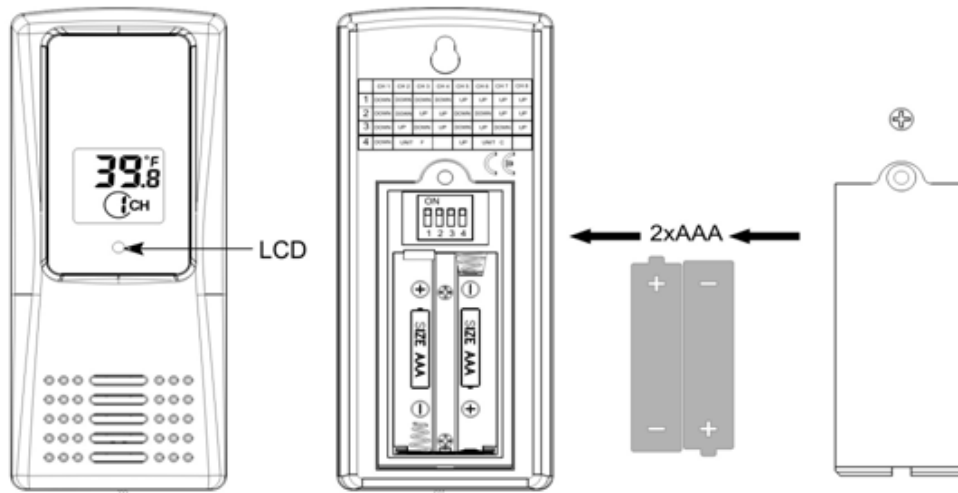


Figure 1

2. **BEFORE** inserting the batteries, locate the dip switches on the inside cover of the lid of the transmitter. Figure 2 displays all four switches in the OFF position (factory default setting).



Figure 2

3. **Channel Number:** The WS-24 supports up to eight transmitters. To set each channel number (the default is Channel 1), change Dip Switches 1, 2 and 3, as referenced in Table 1.
4. **Temperature Units of Measure:** To change the transmitter display units of measure (°F vs. °C), change Dip Switch 4, as referenced in Table 1.

DIP SWITCH				FUNCTION
1	2	3	4	
DOWN	DOWN	DOWN	---	Channel 1
DOWN	DOWN	UP	---	Channel 2
DOWN	UP	DOWN	---	Channel 3
DOWN	UP	UP	---	Channel 4
UP	DOWN	DOWN	---	Channel 5
UP	DOWN	UP	---	Channel 6
UP	UP	DOWN	---	Channel 7
UP	UP	UP	---	Channel 8
---	---	---	DOWN	°F
---	---	---	UP	°C

Table 1

5. Insert two AAA batteries.
6. After inserting the batteries, the remote sensor LED indicator will light for 4 seconds, and then flash once per 60 seconds thereafter. Each time it flashes, the sensor is transmitting data.
7. Verify the correct channel number (CH) and temperature units of measure (°F vs. °C) are on the display, as shown in Figure 3.

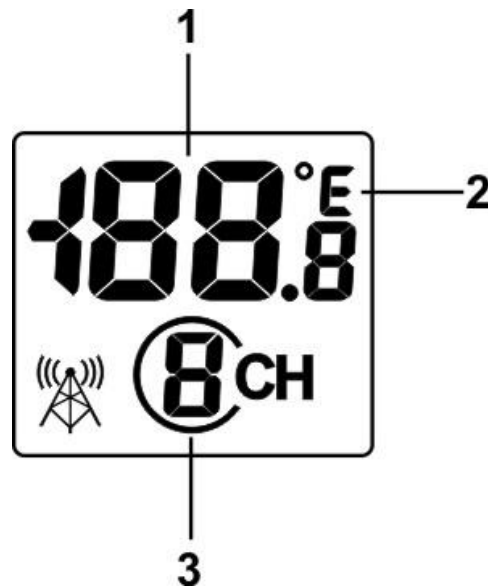


Figure 3

- (1) temperature
- (2) temperature units (°F vs. °C)
- (3) channel number

8. Close the battery door. Make sure the gasket (around the battery compartment) is properly seated in its trace prior to closing the door. Tighten the set screw.

2.4 Display Console Set Up

1. Move the remote thermometer(s) about 5 to 10' away from the display console (if the sensor is too close, it may not be received by the display console). If you have more than one thermometer, make sure they are all powered up and transmitting on different channels.
2. Remove the battery door on the back of the display, as shown in Figure 4. Insert four AAA (alkaline or lithium, avoid rechargeable) batteries in the back of the display console.

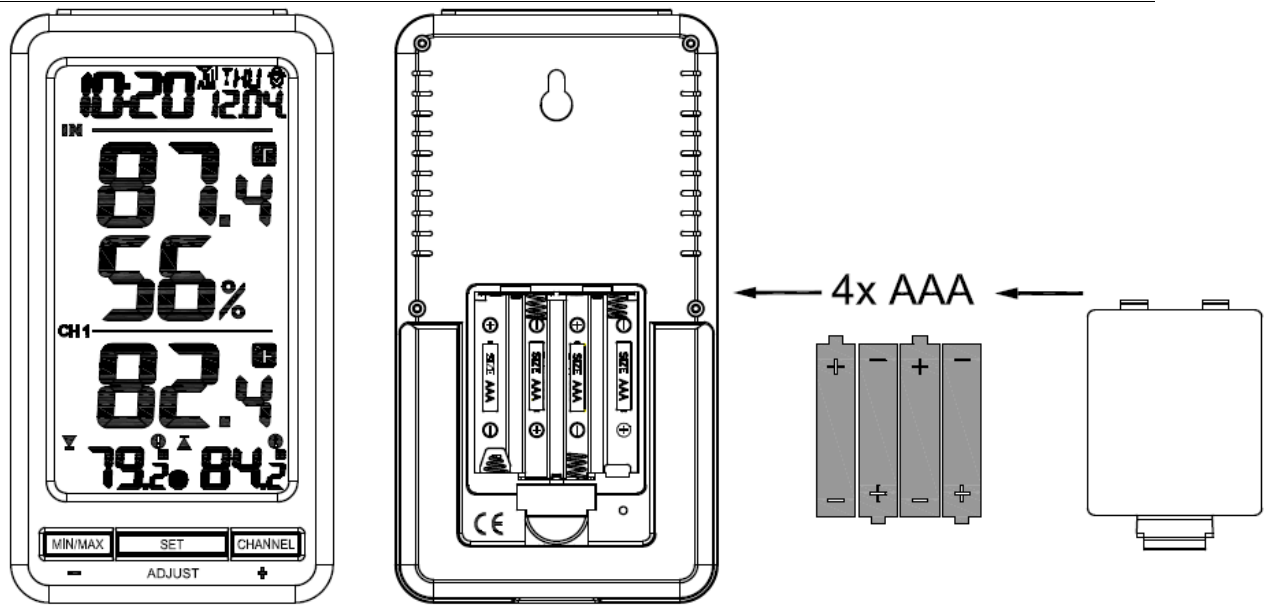



Figure 4


All of the LCD segments will light up for a few seconds to verify all segments are operating properly.

3. Replace the battery door, and fold out the desk stand and place the console in the upright position.

The console will instantly display indoor temperature and humidity. The remote temperature will update on the display within a few minutes on the appropriate channel.


While in the search mode, the remote search icon  will be constantly displayed next to the channel number.

If you have more than once remote sensor (up to eight remotes are supported), the display will automatically toggle between sensors until all sensors have reported in.

Do not touch any buttons until the remote sensor has reported in, or the radio search icon  is no longer on, otherwise the remote sensor search mode will be terminated. When the remote sensor temperature has been received, the console will automatically switch to the normal mode, and all further settings can be performed.

If the remote does not update, please reference the troubleshooting guide in Section 7.

2.4.1 Display Console Layout

 **Note:** The following illustration shows the full segments of the LCD for description purposes only and will not appear like this during normal operation.

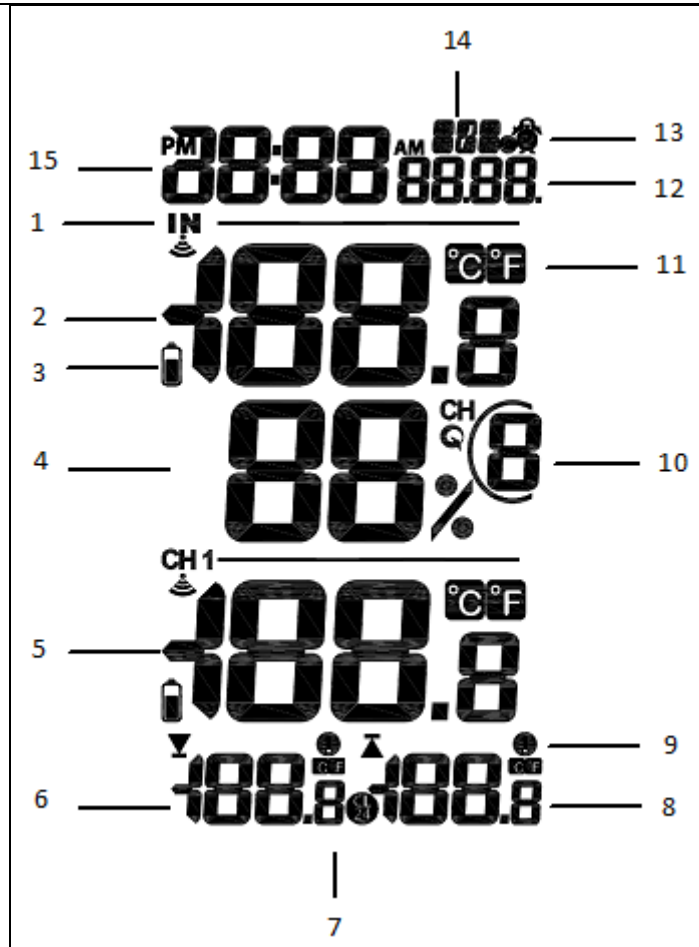


Figure 5

- | | |
|---|--|
| 1. Indoor temperature and humidity display icon | 8. Maximum Temperature |
| 2. Temperature display | 9. HI/LOW alarm icon |
| 3. Console Low Battery indicator | 10. Scroll mode (IN, CH 2-8) |
| 4. Indoor Relative humidity display | 11. Temperature units (°F or °C) |
| 5. Outdoor Temperature (Channel 1) | 12. Date/Year display |
| 6. Minimum Temperature | 13. Time alarm icon |
| 7. Min/Max reset for 24h | 14. Min/Max icon, week or second display |
| | 15. Time display (AM/PM) |

2.4.2 Sensor Operation Verification

Verify the indoor and outdoor temperature match closely with the console and sensor array in the same location (about 5 to 10' apart). The sensors should be within 2°F (the accuracy is $\pm 1^\circ\text{F}$). Allow about 30 minutes for both sensors to stabilize. The temperature can be adjusted or calibrated later to match each other or a known source.

3 Remote Sensor Installation

It is recommended you mount the remote sensor on a north facing wall, in a shaded area. Direct sunlight and radiant heat sources will result in inaccurate temperature readings. Although the sensor is water resistant, it is best to mount in a well-protected area, such as under an eave. Use a screw or nail (not included) to affix the remote sensor to the wall, as shown in Figure 6.

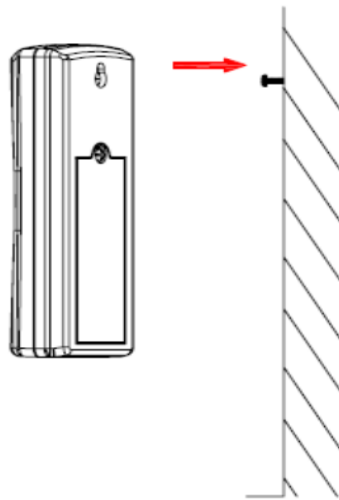





Figure 6

4 Console Operation

 **Note:** The console has four buttons for easy operation: **MIN/MAX/-** button, **SET/ADJUST** button, **CHANNEL/+** button, and **SNOOZE/LIGHT** button (on the top of the display console).

4.1 Set Mode

 **Note:** In the Set mode, press the [+] key or [-] key to change or scroll the value. Hold the [+] key or [-] key for three seconds to increase/decrease rapidly.

 **Note:** To exit the Set mode at any time, press the **SNOOZE/LIGHT** button on the top of the display console.

The Set Mode allows you to set the Time Format and time, date and Year. To enter the set mode, press and hold the **SET** key for 3 seconds.

1. 12 hr/24 hr time format (default: 12). Press the [+] key to switch between 12 and 24 hour format. Press the **SET** key to advance to the next setting.

2. Hour. Press the [+] or [-] key to increase or decrease the hour. Press the **SET** key to advance to the next setting.

3. Minute. Press the [+] or [-] key to increase or decrease the minute. Press the **SET** key to advance to the next setting.

4. Date Format (default: M-D): Press the [+] or [-] key to switch between M-D (month/day) and D-M (day/month). Press the **SET** key to advance to the next setting.

5. Day: Press the [+] key or [-] key to adjust the calendar day. Press the **SET** key to advance to the next setting.

6. Month: Press the [+] key or [-] key to adjust the calendar month. Press the **SET** key to advance to the next setting.

7. Year. Press the [+] key or [-] key to adjust the calendar year. Press the **SET** key to advance to the next setting.

8. Min/Max Clears Daily (default: on): Press the [+] key or [-] key to switch between **Clears On** (the min and max temperature clears every day at midnight) or **Clears Off** (min/max temperature clears manually). Press the **SET** key to advance to the next setting.

9. Temperature Units (default: °F). Press [+] key or [-] key to toggle the temperature units of measure between Fahrenheit to Celsius. Press the **SET** key to exit the set mode.

4.2 Displaying Seconds, Day of Week, and Year

In normal mode, press and hold MIN/MAX key for three seconds to switch the display from Day of Week/Month-Day to Seconds/Year

The year will be displayed for 30 seconds, and then switch back to Month-Day.

4.3 Alarms



Note: High and low temperature alarms can be set for the Channel 1 sensor only.

4.3.1 Viewing the Alarms

Press the **SET** button to view the High (**MAX**) and LOW (**MIN**) alarm along with the alarm time. Press the **SET** button again to return to the normal mode.

4.3.2 Default Alarms

Channel	Default Condition	HI ALARM (temperature) °F	LOW ALARM (temperature) °F
1	OFF	100	60

4.3.3 Setting the Alarms

1. In normal mode, press the **SET** button once, and the alarm time and icon **ALM** will appear.
2. **Alarm Hour:** Press and hold the **SET** button for 3 seconds, and the alarm hour will flash. Press the [+] button to increase the alarm hour and the [-] button to decrease the alarm hour. Press and hold the + or - button to change rapidly.
3. **Alarm Minutes:** Press the **SET** key again (do not hold) and the alarm minutes and flash. Press the [+] button to increase or the alarm minute and the [-] button to decrease the alarm minute. Press and hold the + or - button to change rapidly.

While the alarm hour or minutes is flashing, press and hold the **SET** button for three seconds to toggle the alarm on and off. The alarm icon will appear when active and disappear when inactive.

4. **Low Temperature Alarm:** Press the **SET** key again and the low temperature alarm will flash. Press the [+] button to increase the low temperature alarm and the [-] button to decrease the low temperature alarm. Press and hold the + or - button to change rapidly.

While the low temperature alarm is flashing, press and hold the **SET** button for three seconds to toggle the alarm on and off. The alarm icon will appear when active and disappear when inactive.

5. **High Temperature Alarm:** Press the **SET** key again and the high temperature alarm will flash. Press the **[+]** button to increase the high temperature alarm and the **[-]** button to decrease the high temperature alarm. Press and hold the **+** or **-** button to change rapidly.

While the high temperature alarm is flashing, press and hold the **SET** button for three seconds to toggle the alarm on and off. The alarm icon will appear when active and disappear when inactive.

6. Press the **SET** button to confirm the change. Press the **SET** button again exit the alarm set mode.

4.3.4 Silencing an Alarm

If the high or low temperature alarms are exceeded, the alarm will sound and the alarm icon will flash. To silence the alarm, press any button. The alarm icon will continue to flash until the alarm is no longer active.

4.4 Min/Max Mode


In normal mode, Press the **MIN/MAX** button once to view the MAX values.

Press the **MIN/MAX** button again to view the MIN values.

Press the **MIN/MAX** button again to return to normal mode.







In **MIN/MAX mode**, to reset the Max/Min values, press and hold the **MIN/MAX/-** button for 3 seconds.

4.5 Channel Selection and Scroll Mode


Press the **CHANNEL/+** button to switch the display between IN, Sensors 2 through 8, and scroll mode . In scroll mode, the indoor temperature and humidity and sensors 2-8 will be displayed in five second intervals.

4.6 Sensor Search Mode and Resyncing the Sensors

If any of the sensor communication is lost, dashes (---) will be displayed on the screen. To reacquire the signal:

1. If a specific channel 2-8 is lost, press the **CHANNEL/+** button to display this channel, then Press and hold the **CHANNEL/+** button for 3 seconds, and the remote search icon  will be constantly displayed for up to 10 minutes. Once the signal is reacquired, the remote search icon  will turn off, and the current values will be displayed.
2. If channel 1 is lost, press the **CHANNEL/+** button to display IN temperature and humidity, then Press and hold the **CHANNEL/+** button for 3 seconds, and the remote search icon  will be constantly displayed for up to 10 minutes. Once the signal is reacquired, the remote search icon  will turn off, and the current values will be displayed.
3. If new sensors are added, subtracted, or multiple sensor channels are lost, Press and hold the **CHANNEL/+** button for 5 seconds, and the remote search icon  will be constantly displayed for up to 10 minutes. Once the signal is reacquired, the remote search icon  will turn off, and the current values will be displayed.

4.6.1 Best Practices for Wireless Communication

 **Note:** To insure proper communication, mount the remote sensor 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 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 300 feet line of sight (no interference, barriers or walls) but typically you will get 100 feet maximum under most real-world installations, which include passing through barriers or walls.
4. **Metal Barriers.** Radio frequency will not pass through metal barriers such as aluminum siding. If you have metal siding, align the remote and console through a window to get a clear line of sight.

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

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

4.7 Snooze/Light Button

4.7.1 Backlight Operation

The backlight operation is different when operating on batteries to save power.

4.7.1.1 Backlight Operation, Battery Power

To temporarily turn on the back light for five seconds, press the **SNOOZE/LIGHT** button on the top of the console.

To turn on the backlight for 30 minutes, press and hold the **SNOOZE/LIGHT** button on the top of the console for two seconds.

To turn off the backlight at any time, press and hold the **SNOOZE/LIGHT** button for two seconds.

4.7.1.2 Backlight Operation, AC Power (optional)

The AC power plug is optional.

To temporarily turn on the back light for five seconds, press the **SNOOZE/LIGHT** button on the top of the console.


To turn on the backlight permanently, press and hold the **SNOOZE/LIGHT** button on the top of the console for two seconds.


To turn off the backlight at any time, press and hold the **SNOOZE/LIGHT** button for two seconds.

4.7.2 Snooze Operation

If the alarm is sounding, press the **SNOOZE/LIGHT** button to silence the alarm. The alarm icon will flash while in snooze mode. The alarm will sound again in 5 minutes. The snooze mode will continue indefinitely. Press any key on the front of the display to cancel the snooze mode.

4.8 Adjustment or Calibration

 **Note:** The calibrated value can only be adjusted on the console. The remote sensor(s) always displays the un-calibrated or measured value.

 **Note:** The measured humidity range is between 10 and 99%. Humidity cannot be accurately measured outside of this range. Thus, the humidity cannot be calibrated below 10% or above 99%.

4.8.1 Temperature Calibration

In normal mode, press and hold the **SET** and **CHANNEL/+** keys at the same time for five seconds to enter the temperature calibration mode. The indoor temperature will begin flashing.

Press the **[+]** or **[-]** key to increase or decrease the temperature reading (in increments of 0.1). Press and hold the **[+]** or **[-]** key for three seconds to increase or decrease rapidly.

Press and hold the **ADJUST** key for three seconds to reset to the uncalibrated or measured value.

Press the **SET** key to switch to the next channel (1 through 8).

To exit the calibration mode at any time, press the **SNOOZE/LIGHT** button. The calibration mode will automatically if no button is pressed for 30 seconds.

4.8.2 Setting Calibrated Humidity


In normal mode, press and hold the **SET** and **MIN/MAX** keys at the same time for five seconds to enter the humidity calibration mode. The indoor humidity will begin flashing.


Press the **[+]** or **[-]** key to increase or decrease the humidity reading (in increments of 1%). Press and hold the **[+]** or **[-]** key for three seconds to increase or decrease rapidly.

Press and hold the **ADJUST** key for three seconds to reset to the uncalibrated or measured value.


Press the **SET** key to switch to the next channel (2 through 8).

To exit the calibration mode at any time, press the **SNOOZE/LIGHT** button. The calibration mode will automatically if no button is pressed for 30 seconds.

 **Note:** Humidity is a difficult parameter to measure accurately and drifts over time. The calibration feature allows you to zero out this error. To calibrate humidity, you will need an accurate source, such as a sling psychrometer or Humidipaks One Step Calibration kit.

 **Note:** To calibrate temperature, we recommend a mercury or red spirit (fluid) thermometer. Bi-metal (dial) and other digital thermometers 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).

 **Note:** 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 console to match the fluid thermometer.

4.9 Restoring the Console to Factory Default

To restore the console to factory default:

1. Remove one battery from the display console and wait 10 seconds.
2. Press and hold the MIN/MAX button and insert the battery. Hold the **MIN/MAX** button for 5 seconds after power up.
3. Resync the sensors again per Section 0.

5 Glossary of Terms

Term	Definition
Accuracy	Accuracy is defined as the ability of a measurement to match the actual value of the quantity being measured.
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.
Range	Range is defined as the amount or extent a value can be measured.

6 Specifications

6.1 Wireless Specifications

- Line of sight wireless transmission (in open air): 300 feet, 100 feet under most conditions.
- Frequency: 433 MHz
- Update Rate: 60 seconds

6.2 Measurement Specifications

The following table provides specifications for the measured parameters.

Measurement	Range	Accuracy	Resolution
Indoor Temperature	32 to 140 °F	± 1 °F	0.1 °F
Outdoor Temperature	-40 to 140 °F	± 1 °F	0.1 °F
Indoor Humidity	10 to 99 %	± 5% (only guaranteed between 20 to 90%)	1 %



6.3 Power Consumption

- Base station (display console) : 4 x AAA 1.5V Alkaline or Lithium batteries (not included)
- Remote sensor : 2 x AAA 1.5V Alkaline or Lithium batteries (not included)
- Battery life: Minimum 12 months for base station with one sensor and excellent reception. Intermittent reception and multiple sensors may reduce the battery life.
Minimum 12 months for thermometer sensor (use lithium batteries in cold weather climates less than -4 °F)

7 Troubleshooting Guide

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

1. Email Support: support@ambientweather.com
2. Technical Support: 480-346-3398 (M-F 8am to 3pm Arizona Time)

Problem	Solution
<p>Wireless remote (thermometer) 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 CHANNEL/+ button for 3 seconds, 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 300' and 100' under most conditions. Move the sensor assembly closer to the display console.</p> <p>If the sensor assembly is too close (less than 5'), 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 thermometer. 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>
<p>Temperature sensor reads too high in the day time.</p>	<p>Make sure the thermometer is mounted in a shaded area on the north facing wall. Consider the following radiation shield if this is not possible: http://www.ambientweather.com/amwesrpatean.html</p>
<p>Indoor and Outdoor Temperature do not agree</p>	<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 °F (the sensor accuracy is ± 1 °F).</p> <p>Use the calibration feature to match the indoor and outdoor temperature to a known source.</p>

Problem	Solution
Display console contrast is weak	Replace console batteries with a fresh set of batteries.

8 Accessories

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

Accessory	Description
Ambient Weather F007TH Wireless Thermometer for Ambient Weather Stations	Add additional remote thermometer-hygrometers. Supports up to eight remote sensors.
Ambient Weather F007T Wireless Thermometer for Ambient Weather Stations	Add additional remote thermometers. Supports up to eight remote sensors.
Ambient Weather F007TP 8-Channel Wireless Thermometer with Temperature Probe	Add additional remote temperature sensors with probe. Supports up to eight remote sensors.
Ambient Weather F007PF 8-Channel Wireless Pool and Spa Remote Sensor	Add additional remote floating pool and spa thermometers. Supports up to eight remote sensors.
Ambient Weather WS-24-C 8-Channel Wireless Thermometer, Console Only	Add as many display consoles as you like to your existing system to display the remote sensor in different locations.
Energizer AAA Lithium Battery (2-pack) - Batteries for Long Life and Cold Climates	AAA lithium batteries for cold weather climates.
Ambient Weather SRS100LX Temperature and Humidity Solar Radiation Shield	Solar Radiation Shield improves temperature accuracy for hot weather climates. Remove the rain guard and install over thermometer.

9 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 information.

The specifications of this product may change without prior notice.

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

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

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

10 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.

11 Warranty Information

Ambient, LLC provides a 1-year limited warranty on this product against manufacturing defects in materials and workmanship.

This limited warranty begins on the original date of purchase, is valid only on products purchased and only to the original purchaser of this product. To receive warranty service, the purchaser must contact Ambient, LLC for problem determination and service procedures.

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

Your Ambient, LLC warranty covers all defects in material and workmanship with the following specified exceptions: (1) damage caused by accident, unreasonable use or neglect (lack of reasonable and necessary maintenance); (2) damage resulting from failure to follow instructions contained in your owner's manual; (3) damage resulting from the performance of repairs or alterations by someone other than an authorized Ambient, LLC authorized service center; (4) units used for other than home use (5) applications and uses that this product was not intended (6) the products inability to receive a signal due to any source of interference or metal obstructions and (7) extreme acts of nature, such as

lightning strikes or floods.

This warranty covers only actual defects within the product itself, and does not cover the cost of installation or removal from a fixed installation, normal set-up or adjustments, claims based on misrepresentation by the seller or performance variations resulting from installation-related circumstances.

