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# Ambient Weather AQIN Wireless Indoor Particulate Monitor User Manual



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## 1. Introduction

Thank you for your purchase of the Ambient Weather AQIN wireless Indoor Particulate Monitor. The following user guide provides step by step instructions for installation, operation, and troubleshooting. To download the latest manual, compatible devices, and additional troubleshooting tips, please visit:

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

The following WS-2000 and WS-5000 console firmware versions or greater support AQIN

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detector:

- Firmware revision number: V1.6.9
- Wi-Fi Firmware: V4.1.2

For details on updating the firmware, consult your weather station user manual the awnet application is required to update Wi-Fi firmware.

The AQIN sensor measures PM2.5, PM10 and CO<sub>2</sub>. PM2.5 refers to particles that are 2.5 microns or smaller in diameter, and PM10 refers to particles that are 10 microns or smaller in diameter. This sensor uses laser scattering to radiate suspending particles in the air, then collects scattering light to obtain the curve of scattering light change with time. The microprocessor calculates equivalent particle

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diameter and the number of particles with different diameter per unit volume.

The following table describes the Air Quality Index (AQI) vs. PM<sub>2.5</sub> breakpoints.

<b>AQI Category</b>	<b>Breakpoints (<math>\mu\text{g}/\text{m}^3</math>)</b>
Good	0.0 – 12.0
Moderate	12.1 – 35.4
Unhealthy for Sensitive Groups	35.5 – 55.4
Unhealthy	55.5 – 150.4
Very Unhealthy	150.5 – 250.4
Hazardous	250.5 – 500.4

**Figure 1**

The following table describes the Air Quality Index (AQI) vs. PM1.0 breakpoints.

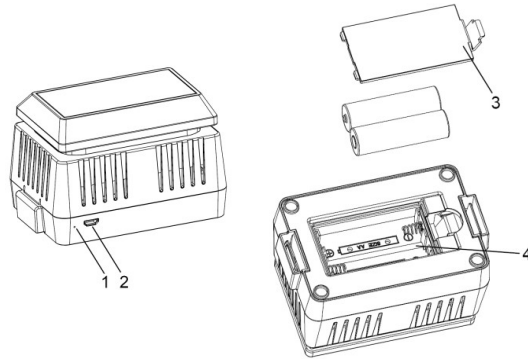
<b>AQI Category</b>	<b>Breakpoints (<math>\mu\text{g}/\text{m}^3</math>)</b>
Good	0 – 54
Moderate	55 – 154
Unhealthy for Sensitive Groups	155 – 254
Unhealthy	255 – 354
Very Unhealthy	355 – 424
Hazardous	425 – 604

**Figure 2**

## 1.1 Parts List

<b>QTY</b>	<b>Item</b>
1	AQIN Sensor
1	AC USB Power Adapter
1	USB Power Cable
1	User manual

## 1.2 Sensor Overview



**Figure 2**



No	Description	No	Description
1	Red LED Indicator (RF transmission)	3	Battery Compartment Cover
2	AC Adapter USB Power Port	4	Battery Compartment

## 2. Sensor Setup

Remove the battery cover on the bottom of the sensor, and insert 2 x AA Alkaline batteries (not included)

Close the battery door.

The sensor can operate on both battery and AC power, but AC power is preferred as the battery

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life is limited to about 14 days. The AC power circuit does not charge the back up batteries.

Connect the AC power adapter.

After inserting the batteries or connecting AC power, the sensor LED indicator will light for four seconds, and then flash once per 10 minutes thereafter. Each time it flashes, the sensor is transmitting data.

The Ambient Weather PM25IN and AQIN utilize the same channel and location on the WS-2000 / WS-5000 console. Users can only use one sensor PM25IN or AQIN at a time. If you already have a PM25IN and are adding a AQIN to your console, please see Section # 4.1 of the manual to sync

your new AQIN sensor.

**Note:** The AQIN sensor has the same form factor as the PM2.5 sensor, but the solar collector is not used and is replaced by a glass cover and will not charge the batteries.

## 2.1 Connecting AQIN to console

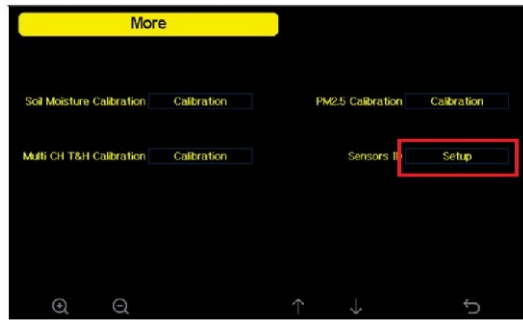
1. Enter Setup mode as shown below.



2. Select 'SETUP' to enter the MORE screen



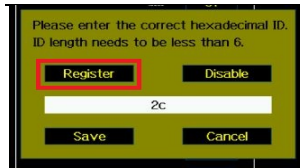
3. Select 'setup' to enter the sensor id screen.



4. Select the Sensor ID next to the sensor you want to re-register. Example Lightning Sensor WH31L

Sensor	Signal	ID	CH	Sensor	Signal	ID	CH	Sensor	Signal	ID
WH65	T <sub>air</sub>	33	OUT	PM2.5	T <sub>air</sub>	59	2	WH31SM	T <sub>air</sub>	c53d
WH32D	T <sub>air</sub>	49	IN	PM2.5			3	WH31SM		
WH32E	T <sub>air</sub>	88	1	T&H	T <sub>air</sub>	ca	4	WH31SM		
WS80BN			2	T&H	T <sub>air</sub>	1d	5	WH31SM		
WH40E			3	T&H	T <sub>air</sub>	9c	6	WH31SM		
WH31L			4	T&H	T <sub>air</sub>	cd	7	WH31SM		
			5	T&H	T <sub>air</sub>	66	8	WH31SM		
			6	T&H	T <sub>air</sub>	8e	1	Leak		
			7	T&H	T <sub>air</sub>	19	2	Leak		
			8	T&H	T <sub>air</sub>	17	3	Leak		
			1	WH31SM	T <sub>air</sub>	c518	4	Leak	T <sub>air</sub>	d4a7

Select “Register” to register the sensor to the console.



## 2.2 Display

The PM2.5, PM10 and CO<sub>2</sub> data automatically scrolls in the middle left position of the screen every 5 seconds, as displayed in Figure 3. The scrolling feature cannot be disabled.



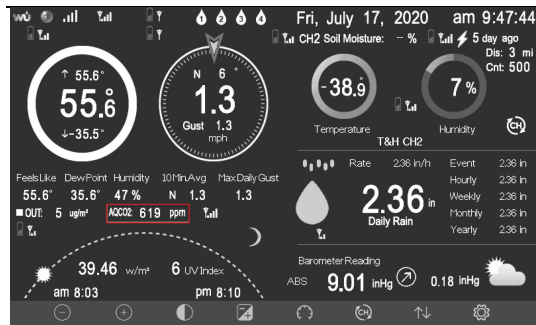


Figure 3

### 3. Sensor Placement

Place the sensor on any horizontal surface. Note that the vents must be clear of any obstructions, and we recommend placement away from other

electronic devices to prevent interference. Do not place on a metal table to prevent RF signal loss.

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

1. **Electro-Magnetic Interference (EMI).** Keep the console several feet away from computer monitors and TVs.

2. **Radio Frequency Interference (RFI).** If you have other 915 MHz devices and communication is intermittent, try turning off these other devices for troubleshooting purposes. You may need to relocate the transmitters or receivers to avoid

intermittent communication.

3. **Line of Sight Rating.** This device is rated at 300 feet line of sight (no interference, barriers or walls) but typically you will get 100 feet maximum under most real-world installations, which include passing through barriers or walls.

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

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

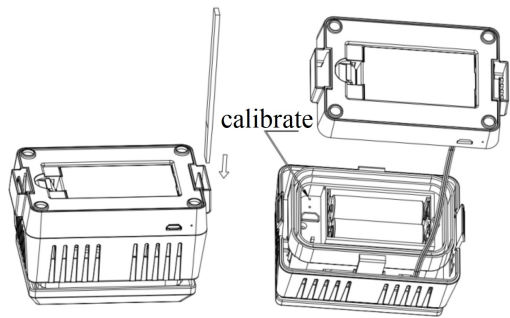
<b>Medium</b>	<b>RF Signal Strength Reduction</b>
Glass (untreated)	5-15%
Plastics	10-15%
Wood	10-40%
Brick	10-40%
Concrete	40-80%
Metal	90-100%

#### **4. Sensor Calibration**

CO2: There is an easy way to find the CO2 sensor is drifted or not: put the sensor in outdoor open air locations, away from any combustion exhausts, wait for 30 minutes, you should see the CO2 reading is 420ppm +/-10. If it is far from this reading, you can wait for some more time, and test it during night to confirm. Once it is

confirmed, you can open the back housing, and use a clipper pin to press the Calibrate button as below figure shows, leave it for 4minutes at least, because the calibration must be completed in a ventilated environment with Co2 fluctuations  $< \pm 15 \text{ppm}$  for 4 minutes, and the calibration will always be in the state if the conditions are not met. If the led flash, it indicates that calibration is not finished.

Note: When the CO2 sensor in calibration state, please do not stand near the sensor, otherwise it will affect the calibration result.



PM2.5/PM10: Cannot be calibrated on the sensor side. You can calibrate the PM2.5/PM10 through the paired WS-2000/WS-5000 console. However, if PM2.5/PM10 data is persistently low, it can be that there is a spider net going inside the sensor. So please clean the sensor from time to

o time to see if there is any sign of spider infiltration.

Note: If the battery level is lower than 4 bars, calibration is prohibited. When the led light on the sensor is steady for 3 seconds, it indicates that calibration is prohibited.

## 5. Specifications

### 5.1 Measurement Specifications

Measurement	Range	Accuracy	Resolution
PM 2.5	0- 999 ug/m3	>100ug/m3, ±15% <100ug/m3, ±15ug/m3	1ug/m3
PM 10	0- 999 ug/m3	>100ug/m3, ±25% <100ug/m3, ±25ug/m3	1ug/m3
CO <sub>2</sub>	0- 40000 ppm	400-10000ppm ± (30ppm ± 3%)	1ppm
Temperature	-40.0-60.0°C (-40°F-140°F)	±1°C or 2° F	0.1°C or 0.1° F



Humidity	0-99%	±5%	1%
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## 5.2 Wireless Specifications

Transmission distance in open field: 300 feet line of sight, 100 feet under most conditions.

Frequency: 915 MHz

Sensor reporting interval: 1 minute

## 5.3 Power Specifications

AQIN sensor: AC power, 2 x AA back up batteries (not included).

Note:

If you have other PM2.5 sensors (Ambient Weather brand or otherwise), the PM2.5 readings/AQI at low levels may vary due to differing sensitivities set by the manufacturer.

Note:

This device is mainly used to detect the particle concentration in air. The accuracy for temperature and humidity reading may vary due to different environment:

When the sensor is placed at unventilated environment, the temperature reading may be 2 degrees higher.

When the sensor is placed at ventilated environment, the temperature and humidity reading may be lower than the actual reading.

#### **5.4 High Moisture Limitations**

High moisture should not be an issue when the sensor is placed indoors, but the following section is included in the event the sensor is placed in a high moisture environment, like a

greenhouse.

With AQIN sensors, fog reflects the light, and can result in a higher reading. This is characteristic to the inherent sensor design.

The condition occurs during rainy or foggy weather, where:

$$\text{Outdoor Temperature} - \text{Dew point Temperature} \leq 2^{\circ} \text{C (3.6 } ^{\circ}\text{F)}$$

Thus, when the air is nearly saturated, the data is invalid.

Do your best to mount the sensor in a well-drained area which is less prone to moisture condensation if possible.

## **6. Liability Disclaimer**

Please help in the preservation of the environment and return used batteries to an authorized depot.

The electrical and electronic wastes contain hazardous substances. Disposal of electronic waste in wild country and/or in unauthorized grounds strongly damages the environment.

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

an inaccurate reading take place.

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

The specifications of this product may change without prior notice.

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

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

Ambient, LLC WILL NOT ASSUME  
LIABILITY FOR INCIDENTAL,

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CONSEQUENTIAL, PUNITIVE, OR OTHER SIMILAR DAMAGES ASSOCIATED WITH THE OPERATION OR MALFUNCTION OF THIS PRODUCT.

## **7. 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:**

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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

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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.

## **8. Warranty Information**

Ambient, LLC provides a 1-year limited

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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

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

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

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circumstances.

## 9. California Prop 65

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

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

In 1986, California voters approved the Safe

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

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The [Prop 65 list](#), which must be updated annually, includes over 1,000 chemicals, including many that are commonly used in the electronics industry.

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

certainty that there is "no significant risk" resulting from exposure. With respect to carcinogens, the "no significant risk" level is defined as the level which is calculated to result in not more than one excess case of cancer in 100,000 individuals exposed over a 70-year lifetime. In other words, if you are exposed to the chemical in question at this level every day for 70 years, theoretically, it will increase your chances of getting cancer by no more than 1 case in 100,000 individuals so exposed. With respect to reproductive toxicants, the "no significant risk" level is defined as the level of exposure which, even if multiplied by 1,000, will not produce birth defects or other reproductive harm. In other words, the level of exposure is below the "no observable effect level," divided by 1,000. (The "no observable effect level" is the highest dose level which has not been associated with

observable reproductive harm in humans or test animals.) Proposition 65 does not clarify whether exposure is to be measured only in normal operation, or in the event of misuse such as intentionally damaging, incinerating or consuming an Ambient Weather Product or component and Ambient Weather has not attempted to evaluate the level of exposure.

A Proposition 65 warning means one of two things: (1) the business has evaluated the exposure and has concluded that it exceeds the "no significant risk level"; or (2) the business has chosen to provide a warning simply based on its knowledge about the presence of a listed chemical without attempting to evaluate the exposure. The California government has itself clarified that "The fact that a product bears a Proposition 65 warning does not mean by itself

that the product is unsafe." The government has also explained, "You could think of Proposition 65 more as a 'right to know' law than a pure product safety law."

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

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



