

Model: WS-1938



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1.Features

1. Built-in CO₂ sensor, temperature, humidity, and air pressure.
2. Displays indoor temperature humidity and trends; support displaying outdoor multi-channel transmitter temperature humidity and the changing trend.
3. Supports receiving and displaying multi-channel sensor transmitters such as the WH31 family.
4. Can be used as a Wi-Fi gateway to support the reception of more sensors' data, which can be viewed via the web.
5. Maximum/minimum data logging
6. Supports Wi-Fi configuration on web page, viewing more sensors' data, setting server, setting calibration parameters, setting Sensor ID.
7. With Wi-Fi function, support for uploading data to a weather station server.

8. Automatic time zone and automatic network time acquisition
9. Tabletop or wall mount.
10. DC power supply supports backlight brightness adjustment.

2. Display Console

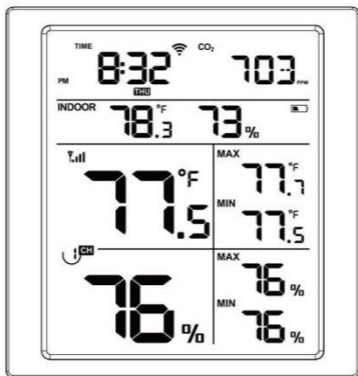


Figure 1

- (1) Unfold the desk stand and place the console 5 to 10 feet away from the outdoor sensor.
- (2) Remove the battery door on the back of the console and insert 2 x AA good quality

Alkaline or Lithium batteries per Figure 14.

- (3) Wait several minutes for the remote sensors to synchronize with the display console.
- (4) The temperature and humidity sensors are placed at the antenna end, away from the station body. This is to prevent influence by the small amount of heat generated by the console. Orient the console antenna straight up for accurate indoor temperature and humidity reading.

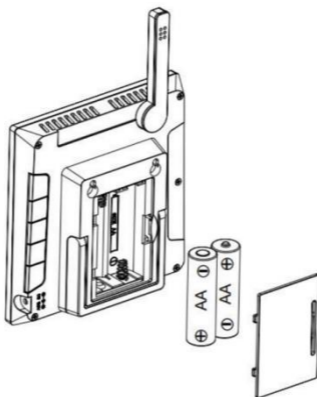


Figure 2

Built-in Sensors:

1. Thermometer & Hygrometer Sensor
2. CO₂ Sensor
3. Barometer

3. Screen Display

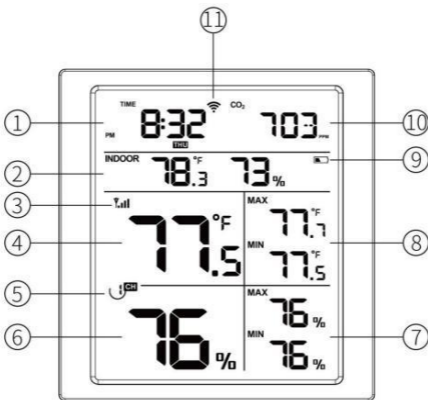


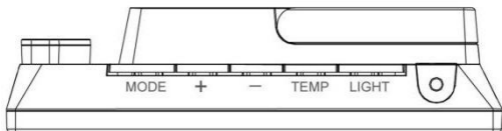
Figure 3

- ① Time
- ② Indoor Temp/Relative Humidity and Shared with Soil Moisture, Leaf Sensor

- ③ Signal Icon
- ④ WH31E Temperature and Humidity Sensor
- ⑤ Channel Number
- ⑥ WH31E MAX&MIN Humidity (Included External Sensor)
- ⑦ WH31E MAX&MIN Temperature (Included External Sensor)
- ⑧ Power Status
- ⑨ CO₂ Level (parts per million)
- ⑩ Wi-Fi Icon

4. Key Function

The console has five keys for easy operation.



【MODE】 :

- (1) Press to switch between Normal Mode, Alarm Clock Hour-Setting Mode, Alarm Clock Minute-Setting Mode, MAC Address Display Mode.
- (2) Press and hold for two seconds to enter the Set Mode.

【+】 :

- (1) While in Normal Mode, press this button to shift the display in CO₂ display Section, the sequency is date, CO₂, CO₂ 24hAVG,

CO₂ 1hMAX, CO₂ 24hMAX and CO₂ MAX.

- (2) While displaying the CO₂ 24hAVG/1hMAX/24hMAX/MAX, long press this button to reset max data.

【-】 :

- (1) While in Normal Mode, press the (-) button to shift the display in indoor temp/humidity section.
- (2) While in single channel of the above operation, long press this button 5 seconds to re-register the corresponding CH sensor.
- (3) While in Auto cycle mode, press the (-) button for 5 seconds to re-register the CH1~8 sensors.

【TEMP】 :

- (1) While in Normal Mode, press the (Temp) button to switch shift the display in outdoor temperature and humidity section.
- (2) While in single WH31 CH mode, press this button for 5 seconds to re-register the corresponding CH sensor.
- (3) While in Auto cycle mode, long press this button for 5 seconds to re-register WH31 CH1~8 sensor.

【Light】 :

When powered by DC adaptor, press this button to adjust the level between High, Middle, Low, and Off.

Combination Button

MODE/Light : long press these 2 buttons at the same time for 5 seconds to restore factory settings and reboot.

+/TEMP : long press these 2 buttons at the

same time over 2 seconds to trigger Soft-AP and the Wi-Fi icon will fast flash; you can use PC or phone to connect its hotspot.

5. Modes

There are 5 modes: Normal Mode, Setting Mode, Alarm Clock Hour-Setting Mode, Alarm Clock Minute-Setting Mode, MAC Address Display Mode

5.1 Normal Mode

While power on, the device enters into the normal mode in default. While in other modes, the device will automatically enter into the normal mode after 30 seconds of no operation. Press the button LIGHT (Not hold) to enter into normal mode.

5.2 Alarm Clock Hour-Setting Mode

1. While in Alarm Clock Hour-Setting Mode, Adjust the hour by pressing the buttons + and -
2. Power on/off the alarm clock by pressing the button TEMP

5.3 Alarm Clock Minute-Setting Mode

1. While in Alarm Clock Minute-Setting Mode, Adjust the minute by pressing the buttons + and -.
2. Power on/off the alarm clock by pressing the button TEMP.

5.4 MAC Address Display Mode

Press the button **MODE** to display the MAC Address. MAC address is also on a sticker on the rear of the console.

5.5 Setting Mode

Press and hold the **MODE** button for two seconds to enter the Setting Mode. To proceed to the next setting, press (do not hold) the **MODE** button.

To exit the SET mode at any time, press the **LIGHT** button.

Error! Reference source not found.





summarizes the set mode sequence and commands.

| Command | Mode | Settings |
|-------------------------------|---|---|
| [MODE] + 2 seconds | Enter Setting Mode, Beep On or Off | Press [+] or [-] to switch OFF and ON. This will prevent the beep from sounding when pressing any button. |
| [MODE] | Clear Max/Min | Press [+] or [-] to switch OFF and ON. When set to ON, the minimum and maximum values reset every day at midnight (00:00). When set to OFF, the minimum and maximum values must be reset manually. |
| [MODE] | 12 hour / 24 Hour | Press [+] or [-] to switch hour format between 12 hour |

| | | |
|--------|------------------------------|--|
| | Format | and 24-hour format. |
| [MODE] | Hour | Press [+] or [-] to adjust hour up or down. |
| [MODE] | Minute | Press [+] or [-] to adjust minute up or down. |
| [MODE] | Year | Press [+] or [-] to adjust year up or down |
| [MODE] | Month | Press [+] or [-] to adjust month up or down |
| [MODE] | Day | Press [+] or [-] to adjust day up or down |
| [MODE] | Temperature Units of Measure | Press [+] or [-] to change temperature units of measure between °F and °C. |
| [MODE] | CO ₂ Calibration | Press [TEMP] to switch OFF and ON. |

6. Display Console

6.1 List of sensors that can be displayed on the screen.

| Item Number | Number of Channels | Description | Image |
|-------------|--------------------|---|---|
| WH 31E | 8 | Multi-Channel Thermometer and Hygrometer Sensor |  |
| WH 31 SM | 8 | Soil Moisture Sensor |  |
| WH 51 LW | 8 | Leaf wetness sensor |  |
| WH 31P | 8 | Waterproof probed thermometer |  |

6.2 CO₂ Concentration

1. The device will automatically display the CO levels in units of Parts Per Million when powered on.
2. While in Normal Mode, press this button to switch between date, CO₂ live data, CO₂ 24h AVG, CO₂ 1h MAX, CO₂ 24h MAX and CO₂ MAX.

6.3 CO₂ Calibration

In Normal Mode, hold the button Mode 2 seconds to enter into the Setting Mode, and press the button Mode until CO₂ calibration mode is presented. Put the console in outdoor air location, or at least with normal fresh outdoor air submerged.

1. Display real-time CO₂ concentration data, updates once every 5 seconds.
2. When "ON" flashes to indicate that CO₂ calibration is currently in progress; when

"OFF" flashes to indicate that CO₂ calibration is not currently in progress. Default value 420 PPM will be displayed.
Only adjust this value if you have other reliable reference reading available.

3. Before calibration is completed, the calibration value can be adjusted by pressing the button.
4. After calibration, "OK" flashes to indicate successful CO₂ calibration; when "NG" flashes to indicate failure of CO₂ calibration.
5. In the CO₂ calibration page, it will not return to the main page automatically.

6.4 Wi-Fi Icon

| Wi-Fi Icon | State |
|------------|--|
| Fast Flash | Soft-AP switched on after power up or key activation |

| | |
|------------|--|
| Solid OFF | Device lost connection with the router |
| Slow Flash | Device successfully connects with the router |
| Solid ON | Data has been uploaded to the server. |

6.5 Host Battery Low Voltage Icon

1. The display will show the low voltage icon if no batteries are presented on console.
2. When the battery voltage of the device is less than or equal to 2.5V, the low voltage icon will be displayed.
3. If the device's battery is higher than 2.5V, the low voltage icon will not be displayed (when recovering from low voltage, it needs to be above 2.6V before the low voltage icon will not be displayed).
4. The battery is purely for backup purpose, and with battery power, the device can work for 24hours.

7. Live Internet Publishing

Your console can send your sensor data to different cloud weather services. The supported services are shown in the table below:

| Hosting Service | Website | Description |
|------------------------|--------------------|---|
| Ambient Weather | Ambientweather.net | Ambient is a weather server that can host many sensors that other services don't support. |
| Customized Server | | Supports uploading to your customized server, if it has the same protocol with Ambient |

7.1 Wi-Fi Configuration

7.1.1 Wi-Fi Configuration via Web Page

1. Turn on Soft-AP

The device will automatically turn on this

mode when powered on. If the product is not configured Wi-Fi, the Wi-Fi icon flashes. You can also press “+ / TEMP” button at the same time for 2s to activate this Wi-Fi access point mode.

2. PC or mobile phone connect to this Wi-Fi network.

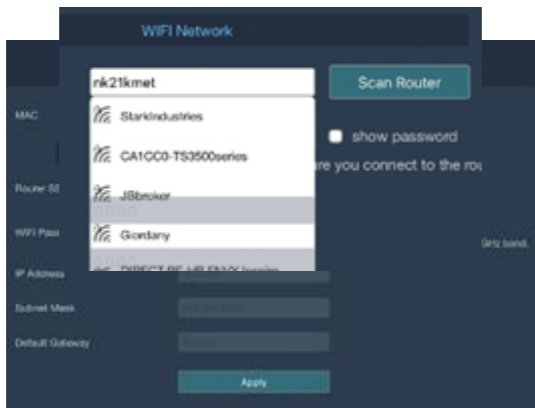


e.g. WS1938-WIFI stands for the product model. To prevent phone switching back to cellular network, please switch off your

phone cellular data service, which can prevent many unknown problems.

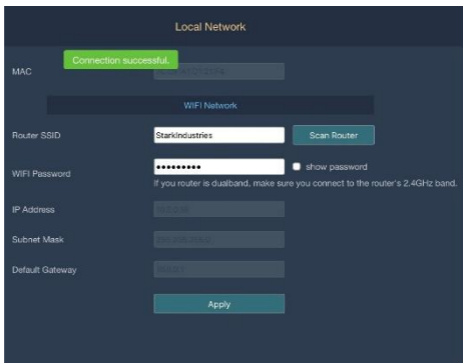
3. Open your browser and visit 192.168.4.1
Enter the login page. **There is no password needed**, click Login.





4. Select the Local Network
5. Select “Scan Router”, then select the router that is to be connected to
6. Enter your router password and click “Apply” to save the inputs

7. When successfully connected with the



The screenshot shows a web interface titled "Local Network". At the top, a green notification box says "Connection successful.". Below this, there are several input fields and a button:

- MAC:** A greyed-out input field.
- WIFI Network:** A greyed-out header for the following section.
- Router SSID:** An input field containing "Starkindustries" and a "Scan Router" button to its right.
- WIFI Password:** An input field with masked characters (dots) and a "show password" toggle switch.
- IP Address:** A greyed-out input field.
- Subnet Mask:** A greyed-out input field.
- Default Gateway:** A greyed-out input field.
- Apply:** A teal button at the bottom center.

Below the "WIFI Password" field, there is a note: "If your router is dualband, make sure you connect to the router's 2.4GHz band."

router, a success message will be prompted

8. Complete the Wi-Fi configuration

You may come back to this embedded webpage anytime with the newly assigned IP address. Sensor management, sensor calibration, live data etc. can all be handled here.

Connect to Ambientweather.net

1. Obtain your console's MAC address
2. Visit Ambientweather.net and if needed, create an account.
3. Click "Devices" tab and then "Connect a new device". On that page, enter your console's MAC address and hit "next"
4. Next, you may name your console, enter its address, and set barometer.

5. You will be informed when your device is set up. From here, you may click the green circled arrow to share various readings or keep some private.

Please see these screenshots for additional guidance.



 Dashboard

 Devices

 Alerts

 Units



Connect your device

Enter your device's MAC address.

[How to Find my MAC address](#)

Looks good!

Next

Now let's get some details:

Give your device a name

Where is your device located?

Or

Find my location

[Select location from map view](#)

8. Backlight

- * When powered by batteries, the backlight will turn off after the product is powered on 15s.
- * When powered by batteries, the backlight will on by pressing any button, and the backlight will turn off automatically after 15s of no button operation.
- * When powered by DC power supply, the backlight will be automatically adjusted to medium.
- * After disconnecting with DC power supply, the brightness will maintain for 15s and then automatically turn off.
- * When powered by DC power supply, short press LIGHT to adjust the backlight : High -> Medium -> Low -> Off.

9. Alarm Clock

9.1 Alarm Clock Function

After the alarm is triggered, the alarm will continue to ring for 2 mins without any button operation, and the alarm will ring more and more rapidly during the 2 mins.

9.2 Snooze Function

- * When you set the alarm and the it is triggered, short press LIGHT to enter snooze mode and the icon will be displayed at the alarm. 10 minutes later the alarm will sound again.
- * Press and hold any button for 2 seconds after entering snooze mode to exit snooze mode.

10. Trend Arrow Function

* Only indoor temperature and humidity, WH31E temperature and humidity have the trend arrow function.

* The algorithm is as follows:

3 hrs comparison which changes on every ½ hour

Eg.: At 3:00 - compare to 12:00 data; at 3:30 - compare to 12:30 etc





| Tendency indicators | Humidity | Temperature |
|---------------------|--------------|------------------|
| ▲ | Rising > 3% | Rising >= 1C/2F |
| ▼ | Falling > 3% | Falling >= 1C/2F |







11. RF Reception Function

* The RF icon will decrease the signal by one frame if data is not received from a

registered sensor; if data is received, the RF icon will increase the signal by one frame.

- * The RF reception function will always be on to receive data from multiple sensors at any time. With Ambient APP, you will get more powerful data service functions.
- * When powered by DC supply, the device supports these sensors as below:

| Sensor Model | Qty max | Picture | Function |
|--------------|---------|---|----------------------------|
| WH31E | 8 |  | Temperature and Humidity |
| WH31P | 8 |  | Waterproof Temp Probe |
| WH51LW | 1 |  | Leaf Wetness Sensor |
| PM25IN | 1 |  | Indoor Particulate Monitor |

| | | | |
|--------|---|--|---|
| WH31PF | 8 |  | Pool Float |
| AQIN | 1 |  | Air Quality Monitor |
| WH31LA | 4 |  | Leak Detector |
| WH31L | 1 |  | Lightning Detector |
| WH31SM | 8 |  | Soil Moisture |
| WH32B | 8 |  | Indoor Thermometer, Barometer, Hygrometer |

12. Storage Function

- * Once powered on, the device will save the changed settings after 3 mins, and the product will restore the previous setting items when re-powered.
- * If you change the setting parameters via its embedded web page, it will save them immediately and the settings will not be lost when powered off.
- * The following settings can be saved:
 1. Turn on/off the alarm clock, set the hour and minute of the alarm clock.
 2. BEEP on/off
 3. RST daily maximum/minimum on/off
 4. 12/24H hour format
 5. Temperature unit setting
- * After the device completes an upgrade it will save the built-in CO₂, WH31 1~8 maximum

and minimum value data, including

1. MAX, 1H MAX, 24H MAX, 24H AVG for CO₂
2. WH31 1~8 MAX/MIN temperature and humidity

* After finishing CO₂ calibration, the CO₂ calibration value will be saved in the NVS, and the next power-up will read the latest CO₂ calibration value after a successful calibration.

13. Cloud Functions

- * Only after Wi-Fi configuration can the upload function be utilized.
- * Weather servers support below servers after

successful Wi-Fi configuration;

A. Ambientweather.net

B. Custom server

- * Automatically get the network time every hour automatically.
- * If you have set up automatic firmware updates on the web page, every time a new firmware is available, the product goes into OTA and the "OTA" character and the update progress are displayed on the screen. After a successful automatic firmware update, "OTA OK" is displayed and the product is automatically rebooted. (The automatic update interval is 24 hours)

14. Specification

CO₂ Range: 0-40000ppm

CO₂ Accuracy: ± (50 ppm + 5% of reading)

CO₂ Resolution: 1ppm

Indoor temperature range: 0°C to 60°C (32°F to 140°F)

Indoor temperature Accuracy: $\pm 0.2^{\circ}\text{C}$

Indoor Temperature Resolution: 0.1°C

Indoor Humidity range: 1%-99%

Indoor Humidity Accuracy: $\pm 1.8\%$

Indoor Humidity Resolution: 1%

Air Pressure Range: 300hpa-1100hpa

Air Pressure Accuracy: $\pm 1.5\text{hpa}$ (absolute pressure); $\pm 2\text{hpa}$ (relative pressure)

Air Pressure Resolution: 0.1hpa

Power consumption

- Base station : 5V DC (USB to 2.5*0.7mm DC 5V power plug connector cable included)
- Base station : 2 x AA batteries (not included)