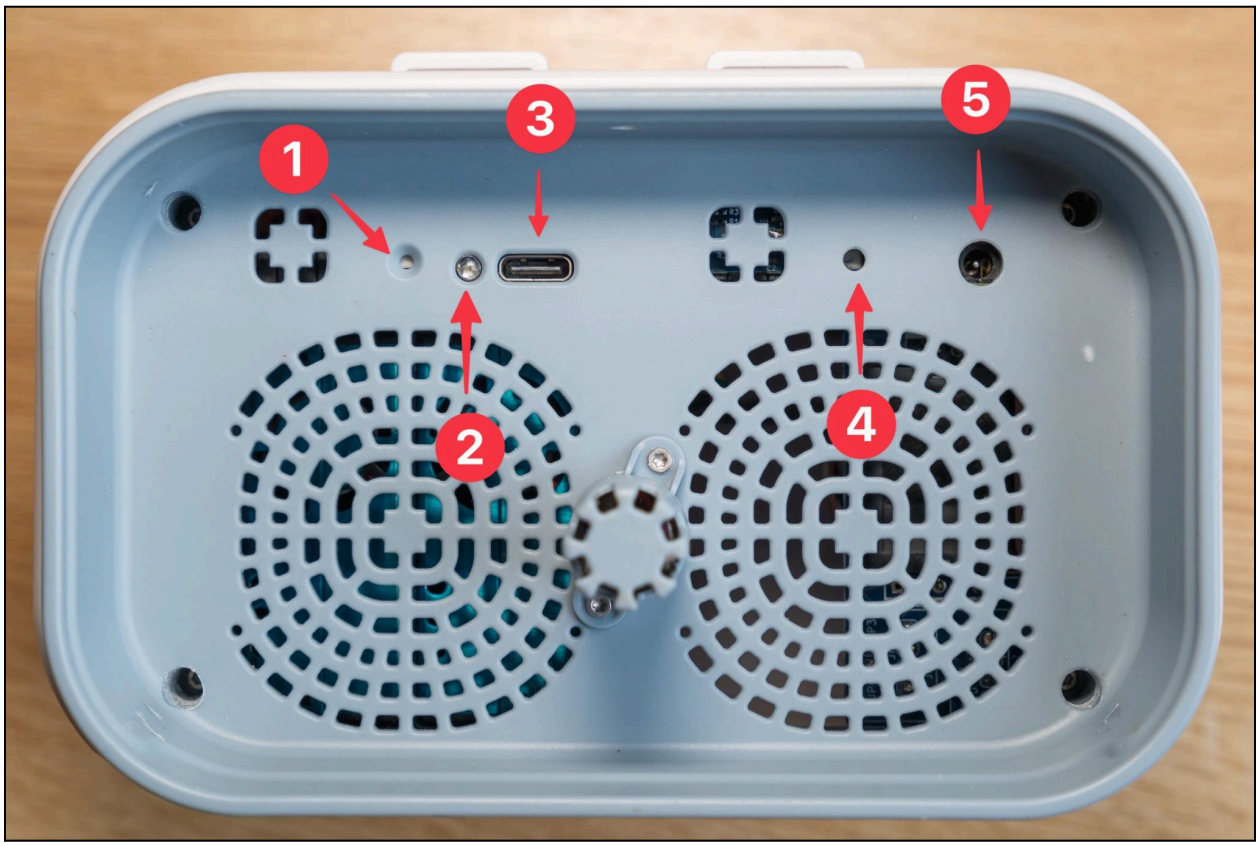
AirGradient Open Air Max Manual

Revised 15.05.2025

Open Air Max Quick Start Guide



1. *Reset Button, 2. Status LED, 3. USB Type-C Port, 4. Power Switch, 5. Solar Power Input*

The AirGradient Open Air Max comes with preinstalled batteries and a preinstalled SIM card (unless otherwise stated), meaning the device is ready to set up and deploy within minutes. We recommend testing the monitor in a temporary installation before deploying it in a permanent installation.

The power switch must be turned on to power on the device. If you do not press the power button (labelled 4 in the image above), the device will not turn on. To press the button, we recommend using a paperclip or a small screwdriver. Once pressed, the button will be in a recessed position, and the blue LED should light up for a few seconds. This means the device is on.

Alongside the power switch being in the ‘on’ position, the device must also be powered via USB (3) or the solar panel input (5). Please note that when powered by USB, the batteries will not charge (but the device can be powered via this method even if the batteries have no charge). Therefore, we recommend only using USB for testing purposes before deploying the monitor. Alternatively, you can test the device with the solar panel plugged into the solar panel input (5). Please keep in mind that, based on the available sunlight, the device may take a while to turn on if relying on solar power.

Once plugged in, the LED should light up solid blue for a few seconds. This means the device is on (both the power switch is in the ‘on’ position, and the device is powered). After powering on, the LED should turn off. However, if it flickers three or four times, this indicates that the monitor has encountered an issue. If the LED blinks three times, a sensor has failed to initialise. If it blinks four times, the device has failed to post.

If the device fails to connect to a cellular network (the LED blinks four times), please check the coverage map to ensure your region is supported. We also recommend checking the reception with your smartphone to ensure there is cellular coverage in the area you intend to deploy the monitor.

If the device does not connect despite there being coverage, you may need to replace the included SIM card with your own. Please refer to later sections of this manual for the process required to change the SIM card.

Mounting The Open Air Max

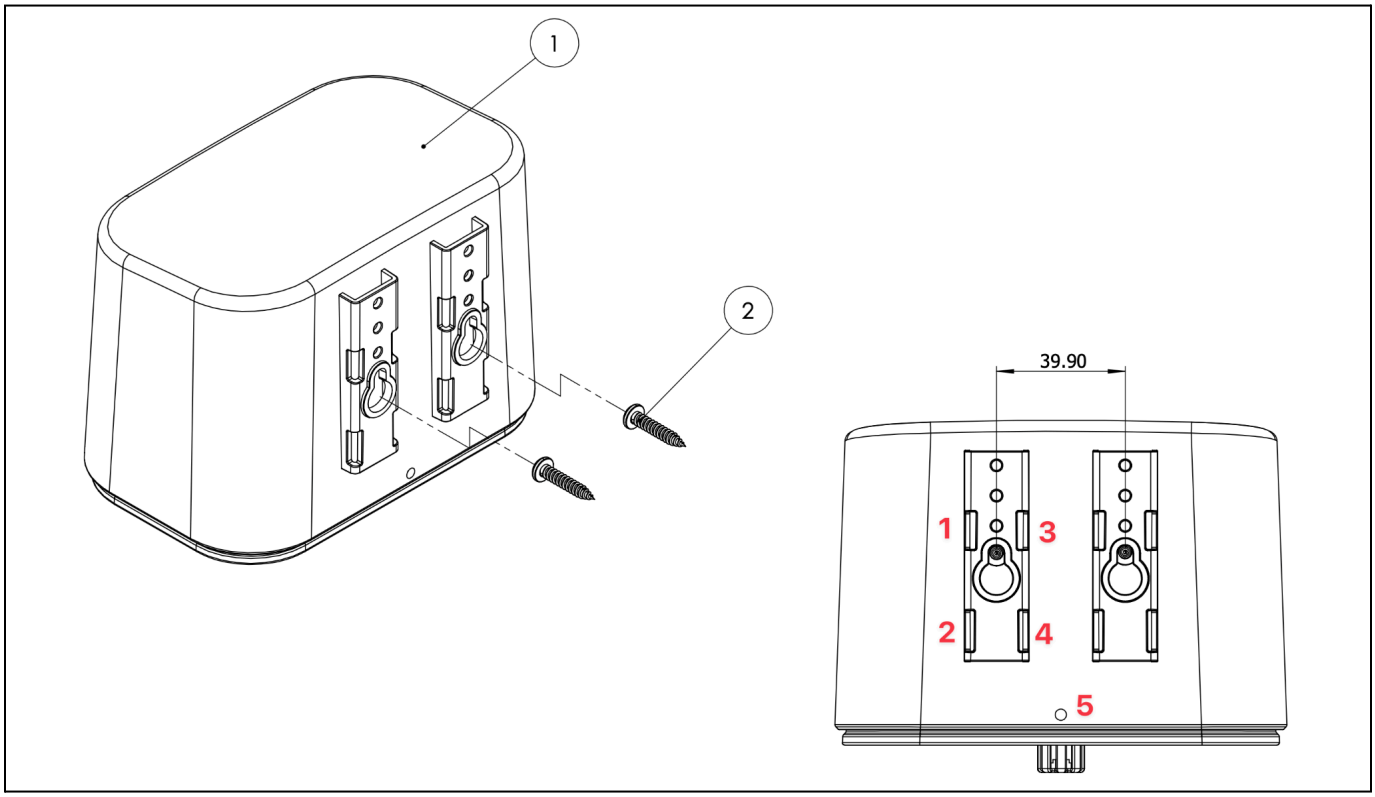
Once you’ve ensured that your Open Air Max can connect with the cellular network, the device is ready to deploy. Before deploying, make sure the solar panel is securely connected to the device via the included mounting hardware.

Next, choose the final mounting location for the monitor unit. Look for a spot with good natural airflow, away from enclosed spaces or direct obstructions to the monitor's sensor vents. Crucially, the location must allow the solar panel to receive direct sunlight for at least a few hours throughout the day, minimising shadows from buildings or trees. Without sunlight, a fully

charged Open Air Max should have around six days of battery life. In direct sunlight, the batteries can fully charge in around 3-4 hours.

Split installation: The included solar panel does not need to be mounted to the Open Air Max. With an extension cable, the solar panel and monitor can be mounted independently, allowing for the solar panel to be placed in the sun and the monitor to be placed in the shade (for more accurate temperature and RH measurements). An individually sold extension cable is required for this.

The monitor itself should be placed on a stable surface, like a sturdy pole or wall, at a height of at least 1.5 metres. Consider future accessibility for maintenance and security against tampering. Avoid placing the monitor immediately next to localised pollution sources like chimneys or vents, unless that specific source is your monitoring target. Remember to obtain any necessary permissions if installing on property you do not own.



Now, you can mount the monitor unit. Use the provided hardware and the brackets on the back of the Open Air Max. This allows for pole mounting (using stainless steel straps or cable ties, fed

through the bracket slots) or wall mounting (using M4 screws). It is essential to mount the monitor in the correct orientation, with the sensor intake vents pointing downwards. This orientation ensures proper sensor function and allows any moisture to drain away. For added security in public locations, utilise the anti-theft screw hole (located at the bottom, marked '5' in the diagram above) on the monitor unit.

Finally, position the solar panel for optimal sun exposure and connect its cable to the monitor's Solar Input Port if you haven't already done so. Angle the panel to face the sun's daily path and ensure surrounding objects do not shade it. The more sunlight the device is exposed to, the better. However, even if placed in a location that receives only a few hours of sunlight every day, the Open Air Max should be able to run continuously.

Once plugged in, the monitor should start reporting, and you can now create a dashboard account to see the data generated by the device.

Adding the Open Air Max to the AirGradient Dashboard

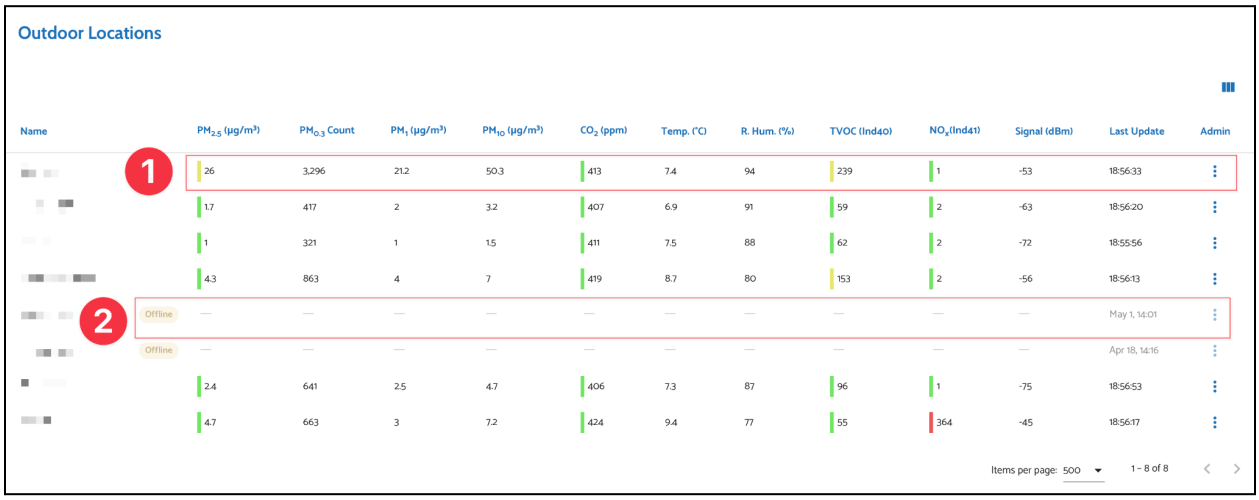
To add your monitor either to a new or preexisting dashboard, please visit this link on a PC or smartphone: https://app.airgradient.com/onboarding/welcome.

If you're already signed in, the link will take you to a page where you can add a new monitor to your dashboard. If you are not logged in, you will be prompted to create an account or log in. If this is your first AirGradient device, please log in and create a new dashboard.

You will be asked which monitor you would like to set up - in this case, select 'Open Air Max' and choose either O-M-PPST (if you have the model without NO2 and O3) or O-M-PPSTON (if you have the model with NO2 and O3). You will be asked for the monitor's serial number (which can be found on the back of the device) and to set a location name. This is the name that will be given to the monitor on the dashboard.

Once you have successfully added the monitor to your dashboard, you should see an entry for it on the main screen. If the entry appears like the '1' row in the image below, the monitor is already reporting data. If the entry appears like the '2' row below, it has not yet reported any

data. If this is the case, please allow at least 15 minutes before further troubleshooting the monitor's connection to the dashboard.



Operating the Open Air Max

The Open Air Max can be powered via USB Type-C or with the included solar panel. Please note that if you choose to power the device by USB Type-C, the rechargeable 18650 batteries inside the device will NOT be charged. Therefore, the device will not continue operating once the USB cable has been removed.

The Solar Panel Input Port must be used to charge the included batteries. It's also important to note that, depending on the level of sunlight the device is exposed to, it might take some time for the device to get enough power to turn on. Therefore, for testing before deployment, we recommend using the USB connection.

By default, the Open Air Max is shipped OFF, meaning it must be switched on before it can be used. To switch the device on, press the button labelled 4 in the diagram below.

Important: The Open Air Max must be turned on before it can be used.

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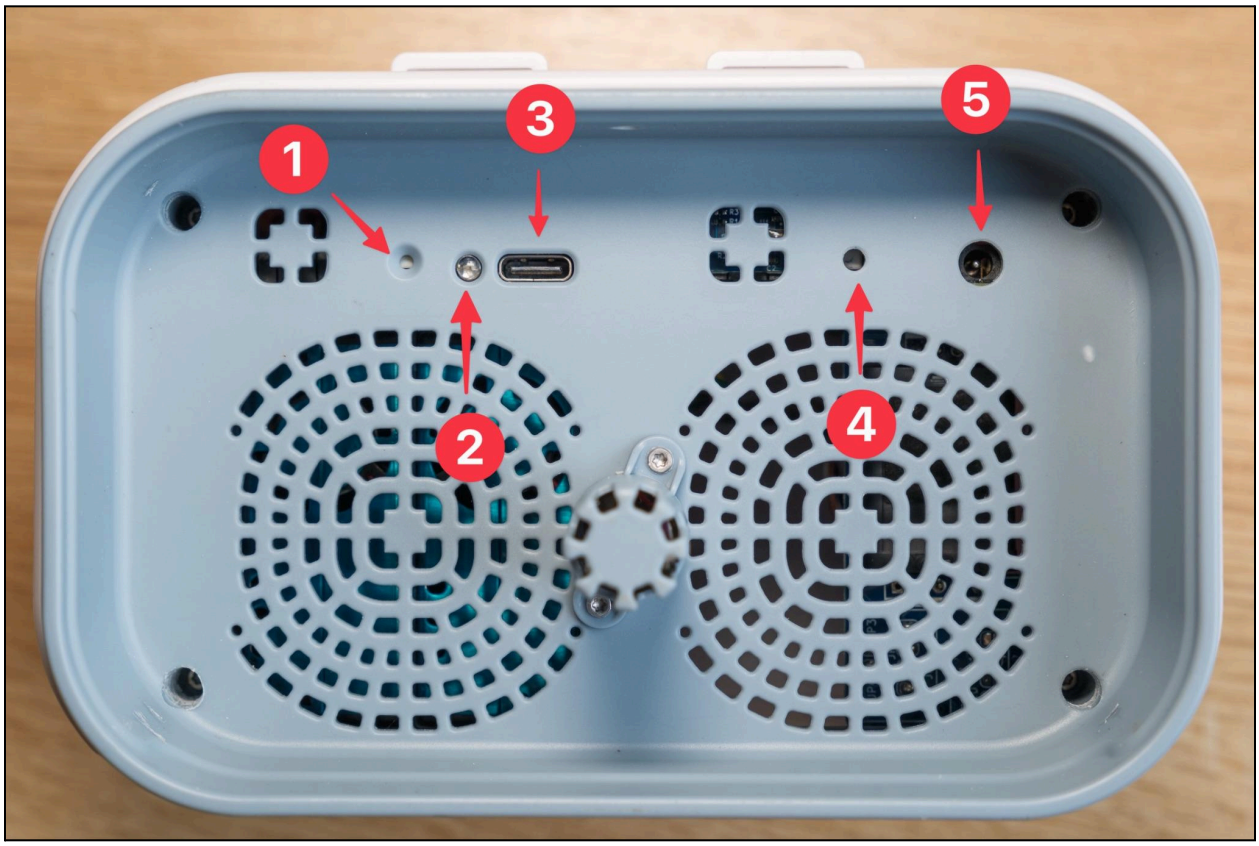
Open Air Max Buttons



Alongside the LED and the two ports on the bottom of the Open Air Max, there are also two buttons. As seen in the diagram above, button 1 is the reset button, and button 4 is the power button. You will need a paperclip, a pin, or something else small and narrow to access these buttons.

The reset button is not currently utilised and should not be used.

The power button turns the device on and off and disconnects the batteries. It should always be pressed when using the device.

Open Air Max LED

Most of the time, the LED on the bottom of the Open Air Max should be off. This is intended behaviour.

Upon first powering the monitor, this LED will light up solid blue for a few seconds. This indicates that the monitor is on. The LED will then turn off after a few seconds, indicating that the monitor is working as intended. If the LED flashes three times, it means that a sensor failed to initialise. If this is the case, we recommend checking which sensor has failed to initialise on the dashboard.

If the LED flashes four times, the monitor has failed to post. This generally indicates that the device is experiencing connectivity issues with the cellular network.

Please note: You may sometimes see a yellow/orange LED blinking inside the device. This is the NDIR CO2 sensor's expected behaviour. It has no relevance to the device's status and only indicates that a CO2 measurement has been taken.

Connectivity and Data

Your monitor comes equipped with a pre-installed SIM card and is designed for automatic connection. When powered on (as described above), the Open Air Max will automatically search for a compatible cellular network and attempt to connect. No user configuration is typically required for this initial connection. The Status LED on the monitor provides visual feedback on the connection process.

Understanding the Included SIM Card

The pre-installed SIM card is a 1nce SIM. This is a specialised IoT SIM card designed for devices like the Open Air Max that transmit small amounts of data. It often offers connectivity across multiple cellular networks within a region to improve coverage reliability.

- **Coverage:** This SIM card provides coverage in over 173 countries. However, it may not work in all regions. To check coverage, please visit this map.

- **Included Data & Validity:** Your monitor comes with an initial data bundle included with the 1once SIM. This data plan should last for around five years from activation.
- **Changing SIM card:** While a SIM is included, you may need to use your own SIM card. This may be because you live in a location that isn't covered by 1nce, or because the data has run out. If this is the case, please refer to the disassembly instructions below.

Using Your Own SIM Card (Optional)

If you prefer not to use the included 1nce SIM, you can replace it with your own. Here are the requirements for the SIM card:

- **Nano SIM size:** The SIM card must be nano-SIM sized to fit into the AirGradient Open Air Max. Therefore, full-sized SIM cards and micro SIM cards are not supported.
- **LTE CAT-1:** The replacement SIM must support LTE CAT-1.
- **Data Requirements:** The Open Air Max is optimised to use minimal data. We recommend using a 500MB SIM card, which will give enough data for 5 years of measurements. For reference, you can learn more about the included SIM card here: https://shop.1nce.com/en?_gl=1*g5hfmr*_gcl_au*OTUyMDU1NjAwLjE3NDAwMjYyNTM

Data Transmission

The Open Air Max collects sensor readings and transmits them periodically to the AirGradient servers.

- **Sending Frequency:** By default, the Open Air Max sends data to the dashboard every nine minutes.
- **Data Batching:** The monitor takes measurements from its sensors three minute, and these are then batched together and sent every nine minutes. This means that 'real time' data may have a delay of up to nine minutes, but you can view data in 3-minute resolution.
- **Failure to Send Data:** If transmission fails, the data is buffered and the device will attempt to transmit the data again.

Accessing Your Data

All data transmitted by your Open Air Max can be easily viewed and analysed through the AirGradient Dashboard. As this is an open-source device, you are also welcome to create integrations and use the device on your own platform.

To set up a dashboard account and add your Open Air Max, please visit the onboarding wizard.

Powering the Open Air Max

The Open Air Max includes a 10-watt solar panel (10w, 18v) and three 18650 batteries (unless otherwise stated). These batteries are pre-installed in the monitor, and the device is ready to be powered on and used. To power on the device, ensure the power button is pressed (recessed) and that the solar panel is plugged into the solar panel port on the bottom of the device. Please keep in mind that you can also use USB Type-C to power the device, but you can not charge the batteries via this method.

The Open Air Max has a battery life of around six days when fully charged. Charging to full takes around 5-6 hours in direct sunlight, and the device can operate with an average of one hour of direct sunlight every day. If you live in an area where this exposure isn't possible, a second solar panel or power via Type-C may be required.

When Is a Second/More Powerful Solar Panel Needed?

In some extreme cases, a second (or more powerful) solar panel may be needed. Here are a few cases in which one may be needed:

- **High Latitudes:** Locations significantly north or south (e.g., > 45-50° latitude) with weak winter sunlight.
- **Low Sunlight Areas:** Regions known for persistent cloud cover, fog, or very frequent rain/snowfall.
- **Partially Shaded Sites:** If the optimal mounting location inevitably involves significant daily shading.

If you choose to use your own solar panel, please ensure it is an 18-volt panel. You can also add a second panel and use a splitter cable to give the device additional power.

Open Air Max Batteries

The Open Air Max is powered by three 18650 batteries. These batteries can be purchased easily online, but we recommend buying from reputable manufacturers, as there are many fake batteries on the market.

We also recommend purchasing three identical batteries if possible. To ensure proper charging, the batteries should all have the same capacity (around 3500mAh is recommended).

Important note: There are two types of 18650 batteries - ‘protected’ and ‘unprotected’/standard. Protected batteries come with integrated protection, but this means they are slightly longer than unprotected batteries. In the Open Air Max, unprotected batteries must be used as protected batteries will not fit into the battery slots.

Battery Life Expectancy

Most 18650 batteries from reputable manufacturers last around 300-500 charge cycles. This means that with one set of batteries, we estimate a minimum of five years before replacements are needed.

Other factors (such as corrosion) can shorten the lifespan of the batteries, but replacements should still only be required very infrequently. Please note that our warranty does not cover replacement batteries.

Solar Panel Life Expectancy

The included solar panel should be able to power the device for at least 10 years. While the performance will degrade over time, the panels are designed to be durable.

If you begin to notice the device dropping offline, it’s possible that the solar panel needs to be cleaned - this is especially important in areas with a lot of dust. Please note that dust covering

the solar panel will reduce performance, so we recommend cleaning it as frequently as needed in the conditions the monitor is placed.

Maintenance

While the AirGradient Open Air Max is designed for durability and minimal upkeep, performing occasional checks and light maintenance can ensure optimal performance, accuracy, and longevity. Choose an installation location that allows safe and relatively easy access for these tasks.

Cleaning

Dust and environmental debris can accumulate over time. Regular cleaning helps maintain accurate readings and efficient solar charging.

- **Enclosure and Sensor Vent:** Periodically inspect the grey sensor intake vent located at the bottom of the monitor. If dust or debris are visible, gently clean them using a soft brush or a can of compressed air to ensure proper airflow to the sensors. Do not use water or cleaning agents directly on or inside the vent, as this could damage internal components.
- **Solar Panel:** If the surface of the solar panel appears dirty, dusty, or covered in residue (like pollen or bird droppings), gently wipe it clean using a soft cloth or tissue. Keeping the panel surface clean is important for maximising solar power generation, especially if you notice power issues.
- **PM Sensor (Only if Necessary):** Cleaning the internal PM sensor is not part of routine maintenance and should only be considered if the dashboard flags abnormal PM readings (e.g., consistently zero, unexpectedly high, or erratic values). As a first step, try blowing compressed air *through* the bottom vent. If issues persist, please contact AirGradient support or consult advanced troubleshooting guides before attempting to open the enclosure.

Sensor Replacements

The AirGradient Open Air Max features a modular design allowing the user to quickly and easily replace and change components. While all of our components are selected to provide the best accuracy and cost-effectiveness, there are some components that may need to be replaced:

- **O3 and NO2 sensors:** If you have the O-M-1PPSTON variant of the Open Air Max, it will also have an NO2 and O3 sensor inside. These electrochemical sensors have a finite lifespan of around two years. We recommend replacing them every two years if possible. If they are not replaced, accuracy will deteriorate.
- **PM Sensor:** The PM sensor usually lasts three to five years before needing to be replaced. If you notice the two modules are providing significantly different results, it's likely that one needs to be replaced. However, we do not recommend replacing the PM sensor unless there is an obvious issue, as these sensors can often continue to perform for many years.

While the other components in your monitor may need to be replaced for other reasons, they all have a much longer lifespan, and there is no replacement schedule for them. Rather, if you begin to notice issues, we recommend replacing the components, but there is no fixed time after which they need to be replaced.

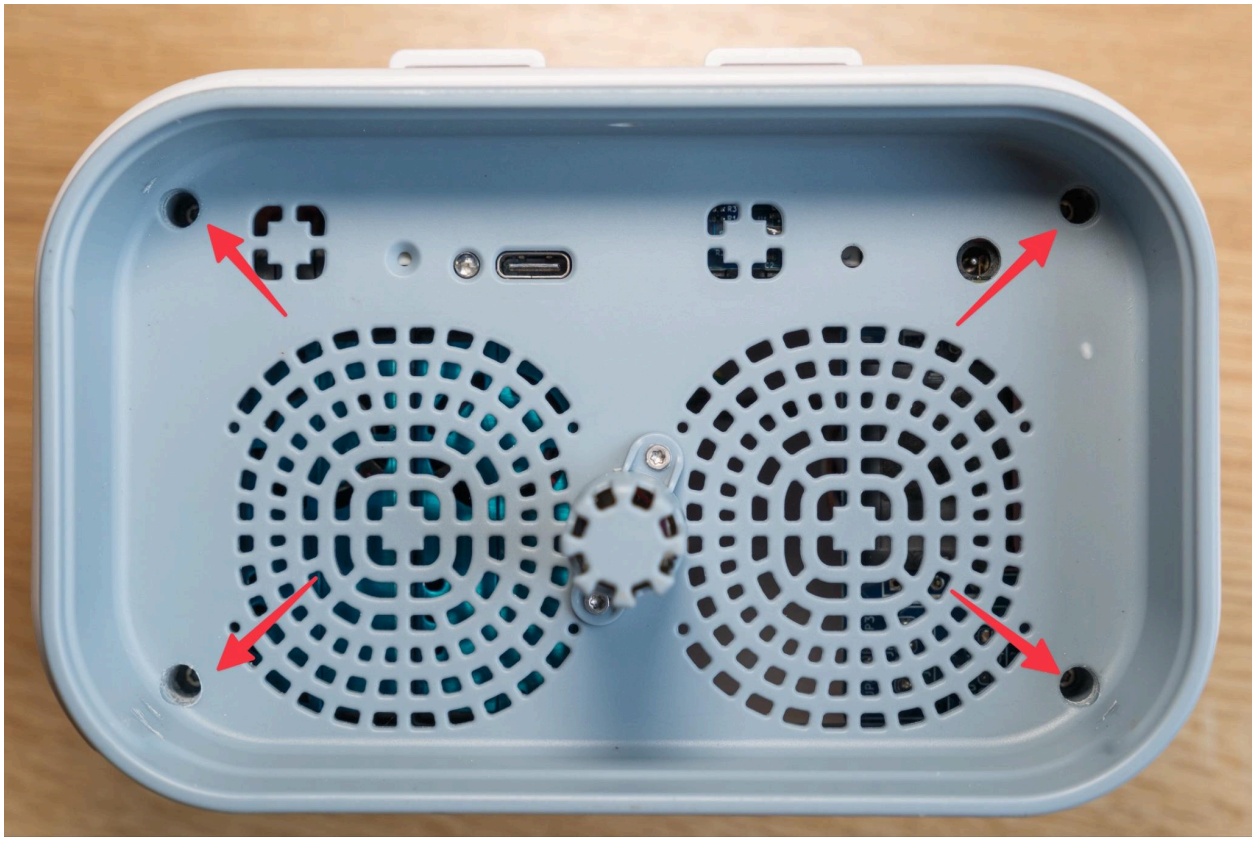
Firmware Updates

Firmware is the internal software running on your Open Air Max. Updates are released periodically to add features, improve performance, and fix bugs.

- Update Process: Firmware updates are typically delivered automatically over the Air (OTA). As long as your monitor is powered on and has a stable cellular connection, it will automatically download and install new firmware versions when they become available. No user action is usually required. In rare cases where OTA updates fail or if the monitor has been offline for an extended period, a manual update might be necessary.

To manually update your firmware, please visit the AirGradient firmware page. To see which firmware version you are currently running, please visit this page.

Opening the Open Air Max



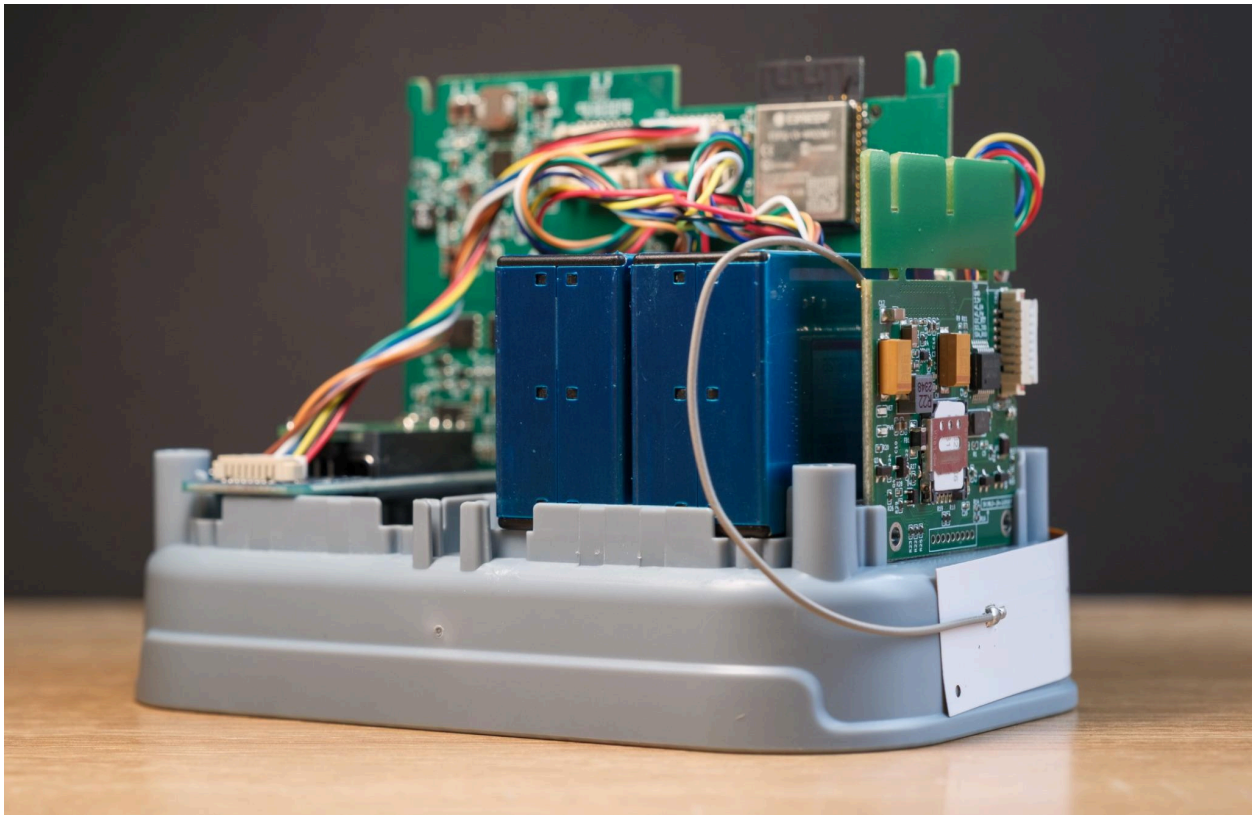
Remove these four screws to access the Open Air Max components.

Sometimes, you may need to open the Open Air Max. While we recommend avoiding this where possible, it may come to the point that a sensor needs to be replaced or perhaps you need to clean the device. In either case, the Open Air Max is very easy and straightforward to open and perform maintenance on.

1. Turn your device off and remove both the USB Type-C cable (if used) and the solar panel cable.
2. Unscrew the four screws on the bottom of the device. To loosen these screws, you will need a Torx T6 screwdriver with a long, narrow head. Make sure to put them in a container so you don’t lose them.

3. With the device upright, slide the white cover up away from the base. Do not pull the base down (away from the white part of the case), as this can apply pressure to the components inside.
4. You should now have quick access to all of the components inside the device.

O-M-PPST



When opened, the O-M-PPST will look like the image above. Please note that this device does not house the additional components of the O-M-PPSTON.

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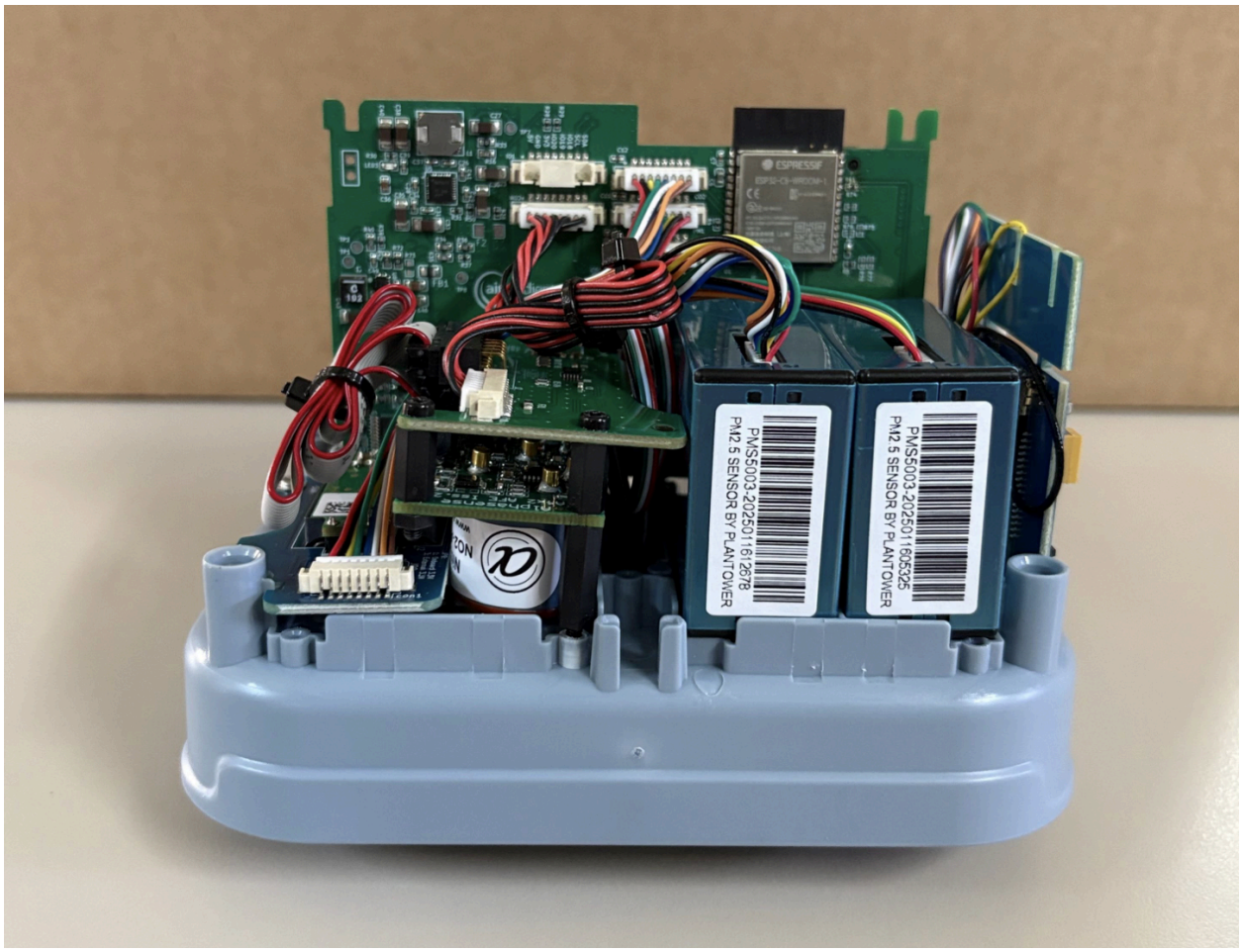
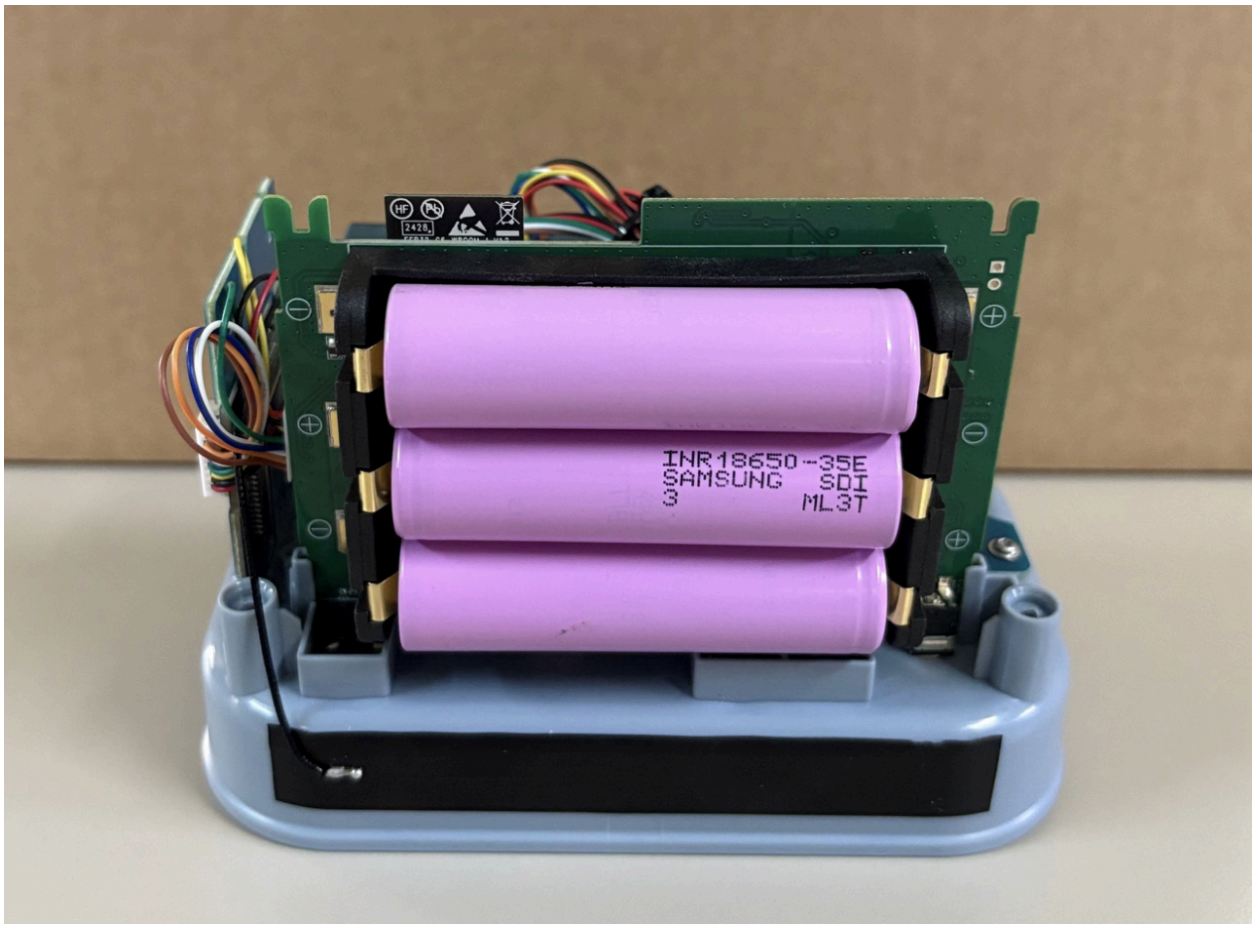
O-M-PPSTON



The O-M-PPSTON will look like the image above when opened.

Any component inside your AirGradient Max can be replaced by unscrewing it (if needed) and then unplugging the ribbon cable connecting that sensor. There is no special procedure for replacing components, and you can simply slot in a new sensor and connect it to the same cable that the previous sensor was attached to. Just ensure that the orientation of the cable is the same as it was initially.

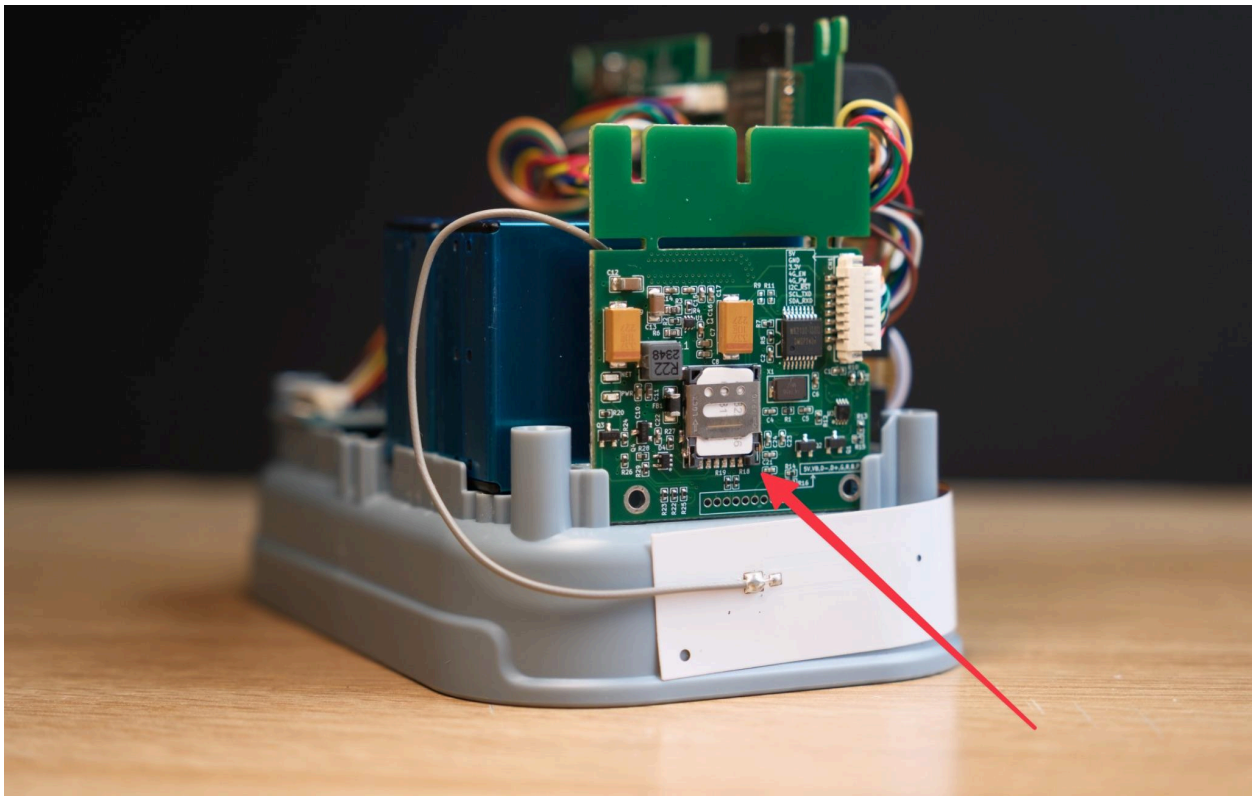
Replacing the Batteries



While the included batteries should not need to be replaced frequently, they can be replaced easily if needed. Simply remove the three included batteries and replace them with three batteries of your choice.

As noted in the ‘Power the Open Air Max’ section of this manual, please ensure the batteries you use are unprotected 18650s. We also recommend that you replace all three batteries at once to ensure they are the same type and capacity.

Replacing the SIM Card



The included 1nce SIM card can be replaced with any Nano SIM of your choosing. To replace the SIM, simply push the installed card out with your finger. Once removed, you can slide in your own SIM card.

Please refer to the section titled ‘Using Your Own SIM Card’ above for information on which SIM cards are supported and the requirements.

Detailed Specifications

Specification	Description
Model	O-M-1PPSTON-CE (AirGradient Open Air Max)

Microcontroller	ESP32-C6-WROOM-1
WiFi	2.4GHz IEEE 802.11 b/g/n-compliant
Cellular	4G connectivity (LTE Cat 1)
Extensions	Broken out on PCB: I2C, 3 GPIO
Peripherals	Status LED, Push Button, Power Button, USB C Connector
External Hardware Watchdog	Texas Instruments TPL5010
Particle Sensor Module	x2 Plantower PMS5003 (laser scattering principle). Accuracy: PM2.5 ±10% @ 100–500 µg/m3, ±10 µg/m3 @ 0–100 µg/m3 (PM1 and PM10 are also measured, but PM2.5 has the highest accuracy).
Temperature and Humidity	Sensirion SHT40. Accuracy: Temperature ±0.2°C @ -40 to +125°C; Humidity ±2% RH @ 0–100% RH
CO2 Sensor Module	SenseAir Sunlight (NDIR). 0 to 5,000 ppm. Accuracy: ±50 ppm ±3%
TVOC/NOX Module	Sensirion SGP41. Accuracy: TVOC < ±15 @ 0 to 500 VOC Index; NOX < ±50 @ 0 to 500 NOX Index.
NO2 Sensor	AlphaSense A43F (Electro-Chemical)
O3 Sensor	AlphaSense A431 (Electro-Chemical)
Enclosure	ASA Plastic, UV Resistant and Weather Proof
Mounting Options	Wall or pole mounting options
Solar Panel	10 watts (28 x 19.5cm)
Battery	ca. 10,000 mAh (3x18650 cells, user replaceable). Might not be included due to shipping regulations.

Certifications	CE, RoHS, REACH, FCC
Operating Conditions	-20 - 40 °C

Additional Support

If you require any additional support with your Open Air Max, please don't hesitate to contact our support team at support@airgradient.com.

Revision History

May 15, 2025: First version of the Open Air Max Manual published.