



Kaiterra Square Air Quality Monitor Deployment Guide

April 2024

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1.

Introduction

Kaiterra enterprise air quality monitors are designed to be intuitive solutions for your continuous air quality monitoring needs.

These monitors can be used in the following cases:

- To gain a better understanding of the air quality in your building
- To ensure optimized air quality and occupant comfort
- To address concerns of occupants and tenants
- To analyze how cleaning chemicals impact air quality
- To troubleshoot pollution hot spots and identify under-utilized areas
- To evaluate the performance of the filtration and HVAC systems

This guide will assist you in determining the best place to install your Kaiterra Square air quality monitors for individual rooms, large open spaces, and entire building projects.

This guide will also cover power considerations, network considerations, and device configuration so you are best prepared to handle your upcoming installation project.

2.

Layout Considerations

You will want to consider installing your air quality monitors in rooms and open spaces that are regularly occupied. The following chart will give you an idea of the types of rooms and spaces you should consider.

Standard Spaces	Recommendation
Lobby/Reception	Recommended
Break Room	Recommended
Conference Room (Any Size)	Recommended
Collaboration Areas (Rooms or Spaces)	Recommended
Workstations	Recommended
Multipurpose Rooms	Recommended
Game / Rec Rooms	Recommended
Kitchens	Recommended
Fitness Centers	Recommended
Restrooms / Shower Rooms	Subject to project needs
Mailroom / Shipping & Receiving	Recommended
Labs	Recommended
Storage Rooms	Not recommended
Locker Rooms	Not recommended

For any of Kaiterra's enterprise air quality monitors, we recommend an area coverage of 3,500ft² (325m²) with the area of each enclosed space calculated individually*.

*Our guidelines follow the standards outlined in RESET and WELL v2 for sensor area coverage

For example:

- One (1) open space of 3,500ft² (325m²) requires one (1) monitor
- Three (3) conference rooms of 225ft² (21m²) require one (1) monitor **in each room**

Spaces over 3,500ft² (325m²) should consider installing multiple monitors throughout the room to achieve optimal coverage. It is also recommended to align the sensor deployment areas with the HVAC thermal zoning plan.

This inclusion of multiple sensors in larger spaces is required for achieving various building certifications, so be sure to check the requirements for your desired certification to meet their standards.

For projects that are not looking to get certified, you have much more flexibility in terms of what your goals are with IAQ monitoring and the budget available for the project. Feel free to contact your account representative at Kaiterra to discuss this further.

The following is a sample floor plan that demonstrates how our air quality monitors should be distributed throughout a typical building floor plan.

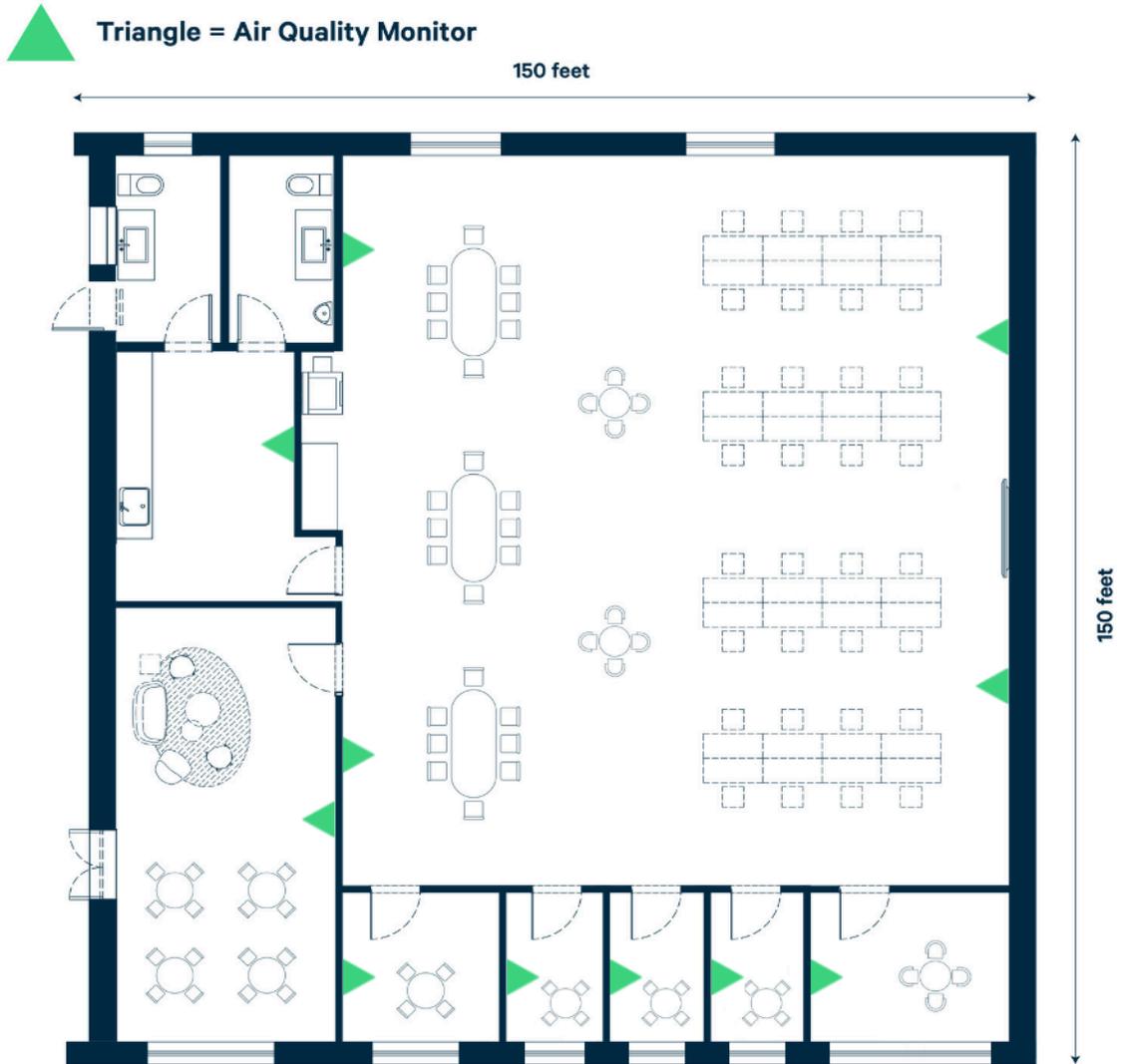


Image 1. Example of a 22,500ft² (2090m²) office space with multiple rooms.

Placement Guidelines

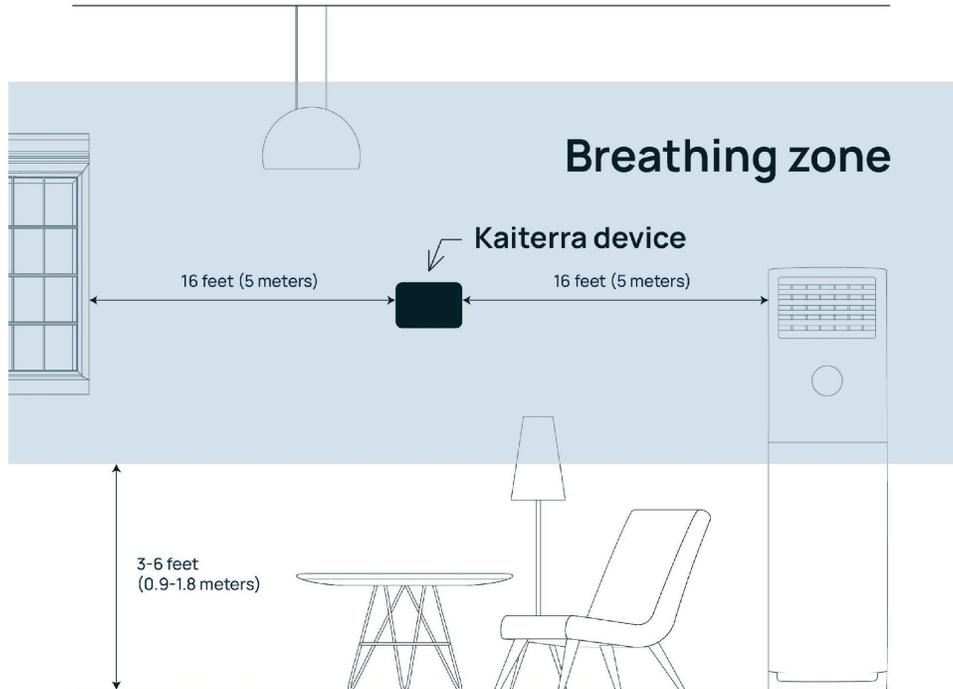


Image 2. A room demonstrating proper air quality monitor placement.

For placement, we recommend the guidelines required for RESET Air certification, which requires RESET Air Accredited Monitors to be installed according to the following requirements:

- A. Wall-mounted and centrally-located within monitored spaces.
- B. Mounted in the breathing zone: between 3-6 feet (0.9-1.8 meters) from the ground (after finished floor to underside of the finished ceiling)*.
- C. Located at least 16 feet (~5 meters) away from operable windows. In areas where this is not possible, monitors must be located no closer to windows than half the width of the space, measured linearly from the windows inwards.
- D. Located at least 16 feet (~5 meters) away from air filters and diffusers. In areas where this is not possible, monitors must be located closer to air returns than air diffusers.
- E. Hard-wired to a permanent power source (recommended but not mandatory).

***Note:** this aligns with ASHRAE 62.1

Other things to consider:

- Air is drawn into the Kaiterra Square from all sides of the device. None of the sides of the device must be covered as any changes in the airflow may affect the readings and accuracy of our devices.
- In order to avoid direct breathing on a device, which would impact your air quality readings, try to avoid installing air quality monitors right next to a workspace, providing at least 3 feet (0.9 meters) of space between the device and any workstations. If the space does not allow this, then make sure the monitor is facing the occupants back.
- Our air quality monitors were designed to be installed in an upright position. Please do not install our products sideways or upside down, as your readings will be impacted.
- Ceiling installations are also not ideal. If you are going to proceed with a ceiling installation, please keep in mind the following:
 - Since your ceilings are likely above the breathing zone, your devices will be measuring the air that is not directly associated with the air that your tenants, colleagues, or customers are breathing in, making your readings less accurate according to the actual air that would impact these individuals.
 - Temperature and Relative Humidity readings will especially be influenced: as hot air rises, the Temperature/Relative Humidity readings can be impacted by numerous degrees/% compared to the breathing zone levels.
- Building certifications, such as WELL, RESET, and LEED, may have their own requirements for things such as installation height and placement. If this installation is pursuing any of these certifications, please check their requirements so that your air quality monitor is properly installed.

Exact room placement may vary based on the type of space, but these spaces can be categorized into two general scenarios:

1. Enclosed Spaces
2. Open Spaces

Enclosed Spaces

Definition: A room enclosed by four walls and a door, which is smaller than 3,500ft².

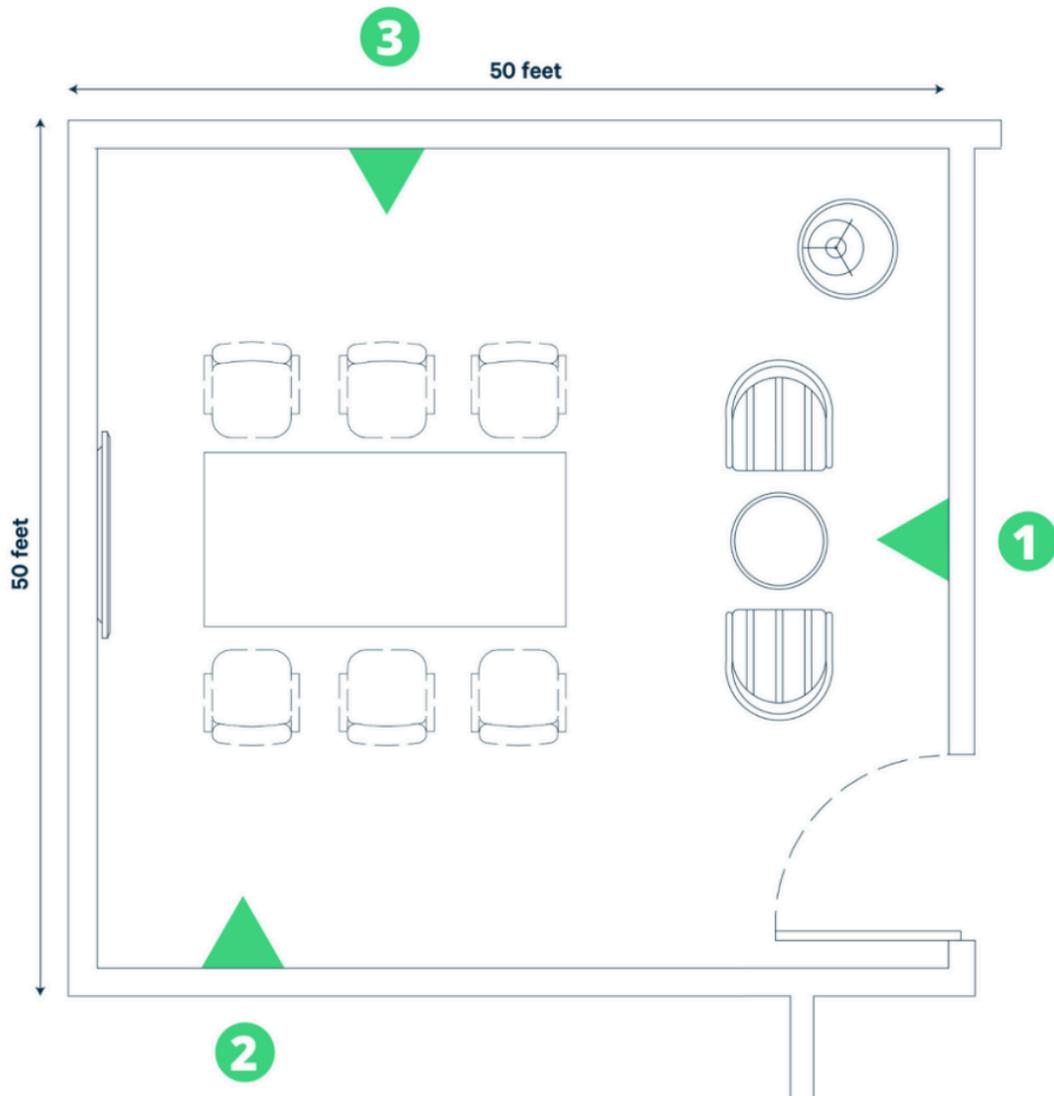


Image 3. A 2,500ft² (232m²) room with three (3) suggested AQM installation locations.

Image 3 is an example of an enclosed space with three (3) suggested installation locations. Assuming that all three locations fall within the breathing zone of 3-6 feet (0.9-1.8 meters), all three of these locations are acceptable. **However:**

- Location one (1) has the device installed on the same wall as a door. While this is not a bad thing in this example, as the door is more than 16 feet (~5 meters) away, smaller rooms might not be able to make this location work as the space between the device and the door could be smaller.
 - Because of this, considering installation locations that are separate from any doors may be easier to ensure ideal conditions – but for this example, location one (1) is acceptable.
- Kaiterra air quality monitors should be as central to the room as possible. Because of this, location two (2) is not ideal. However, since the door on the right is 40 feet (12 meters) away, the installer could shift location two (2) toward the center of the room to become a better option.
- Of the three suggested locations, position three (3) is the most ideal since it is relatively centralized to the room, does not have any features in the way that might impact air quality, such as windows or diffusers nearby, will provide great coverage of the regularly occupied space, and would still be ideal if the room was smaller or narrower.

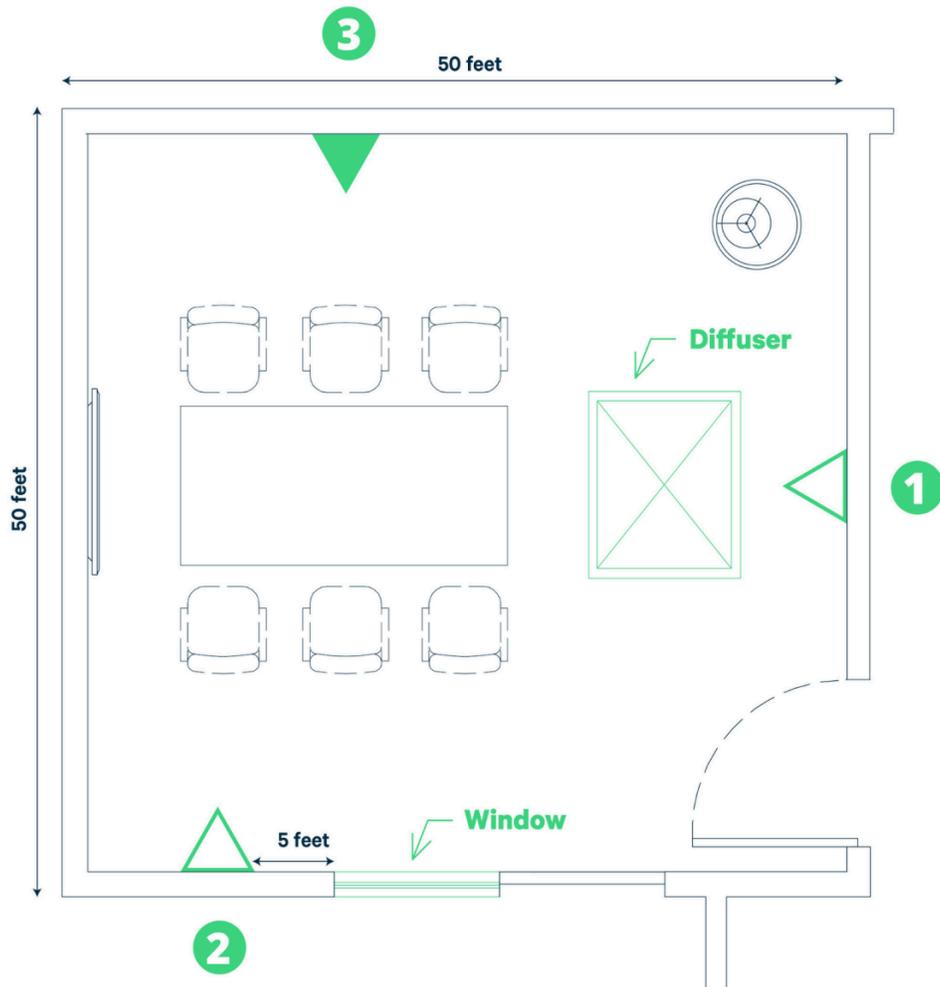


Image 4. A 2,500ft² (232m²) room with three (3) suggested AQM installation locations.

As a comparison, the same example now has a diffuser and a window added to the layout.

Given the RESET placement requirements and Kaiterra's best practices, the only acceptable air quality monitor placement for this scenario is position three (3):

- It is centrally located – especially for the regularly occupied space in the room
- It is at least three (3) feet (0.9 meters) away from occupants and workstations
- It is at least 16 feet (~5 meters) away from any operable windows or diffusers

Open Spaces

Definition: An open space, uninterrupted by walls for more than 3,500ft².

For open spaces, the best way to approach this is to take a look at the entire space as a whole and determine two key things:

1. How big is the space you are trying to collect data from?
2. What is the optimal placement that will provide the best coverage?

One way of achieving this is to look at a floor plan for the space in question, which will provide a holistic view of the walls, general placement of furniture, and areas that people will regularly occupy.

From there, using our recommendation of 3,500ft² (325m²), measure out the larger open areas of the floor plan, prioritizing the areas that will have regular occupants, such as workstations, break areas, and receptions.

Since these spaces are larger than 3,500ft² (325m²), divide the space into sections and try to place a monitor in each section.

Placement should also be aligned with HVAC thermal zones and follow the same, general rules as enclosed spaces, including avoiding installation locations:

- Within 16 feet (~5 meters) of operable windows, doors, air filters, and air diffusers
- Within 3 feet (0.9 meters) of occupants and workstations

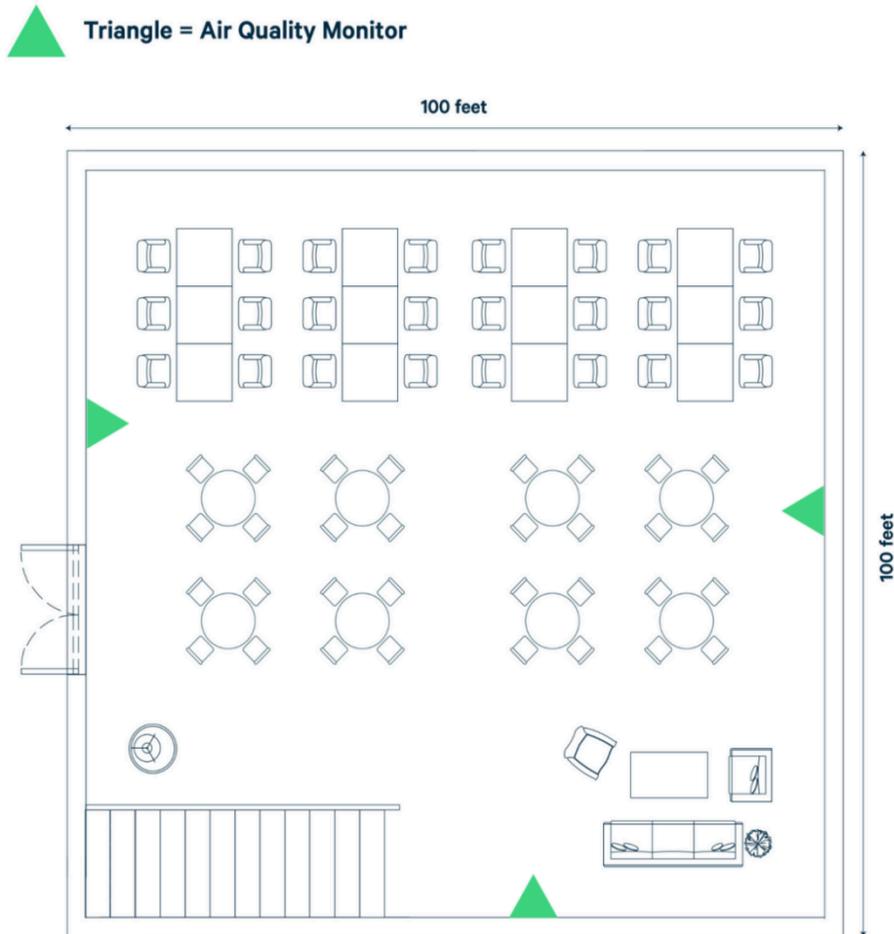


Image 5. A 10,000ft² (929m²) open space with three (3) AQMs installed for optimal air data coverage.

For the example above (Image 5), we have a 10,000ft² (929m²) open space. In order to achieve optimal coverage for this space, you will want three (3) air quality monitors installed – which would meet both WELL and RESET certification requirements.

Since the space has three (3) general sections that will be regularly occupied, the priority areas would be the top-left, top-right, and bottom-right, which, given the 10,000ft² (929m²) of the entire space, can be divided evenly for optimal coverage using the suggested monitor placements.



For non-certification projects with a similar scenario as above, you will still want to prioritize the regularly occupied spaces. However, you could reduce the number of monitors in the space from three (3) to two (2) by removing the bottom monitor as this would still provide great coverage of the regularly occupied areas.

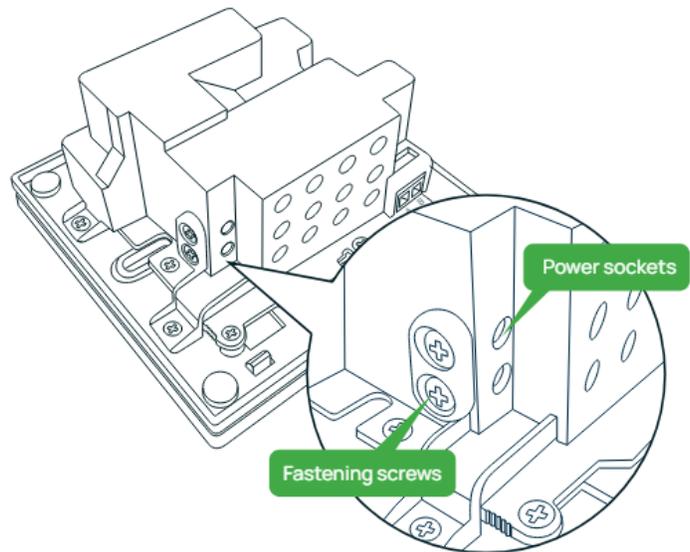
3.

Power Considerations

There are two (2) models for the Kaiterra Square:

One supports Low Voltage DC power
The other supports 220V AC Power

For instructions on how to properly power your Kaiterra Square, please refer to our [Kaiterra Square Installation Guide](#).



4.

Network Connectivity and Data Considerations

Network connectivity and data considerations are essential to consider prior to any installation.

Our Kaiterra Square supports the following:

- Modbus RTU via RS-485 Cables
- Primary MQTT via Wi-Fi
- Secondary MQTT via Wi-Fi
- Open API via Wi-Fi (via the Kaiterra Cloud)

Some network connections may require additional wiring, such as RS-485 for Modbus communication. We do not provide any additional wiring with our devices, so if you wish to use any of the communication protocols above, please make sure you are able to properly connect to them and provide any necessary wiring.

For more information, please refer to the following documentation:

[Kaiterra Square Modbus User Manual](#)

[Secondary MQTT Documentation](#)

[API Documentation](#)

While multiple communications can be connected to simultaneously, we recommend, as a minimum, establishing a Wi-Fi connection to the Internet. This will allow your data to be uploaded to the Kaiterra Cloud and Dashboard for ease of access via Primary MQTT and also enables many other communications and features that require the Internet, such as our Open API and the Kaiterra Dashboard.

If you plan on connecting your device(s) to the Internet, here are all of the servers and ports that the device(s) need to access:

- MQTT server:
 - mqtt.kaiterra.com **port 8884**
 - mqtt.kaiterra.cn **port 8884***
- API server:
 - api.kaiterra.com **port 443**
 - api.kaiterra.cn **port 443***
- Firmware download:
 - Firmware version **> = 2.3.32**
 - ◆ dl.kaiterra.com **port 443**
 - ◆ dl.kaiterra.cn **port 443***
 - Firmware version **older than 2.3.32**
 - ◆ dl.kaiterra.com **port 80**
 - ◆ dl.kaiterra.cn **port 80***
- NTP server:
 - time.kaiterra.com **port 123**
 - time.kaiterra.cn **port 123***

***Note:** Inside Mainland China only

The MQTT server allows data to communicate with our Kaiterra Cloud and Dashboard.

The API server allows communication between the device and our API.

The Firmware download server allows your device to regularly check for firmware updates.



The NTP server makes sure your device maintains an accurate time, preventing data errors.

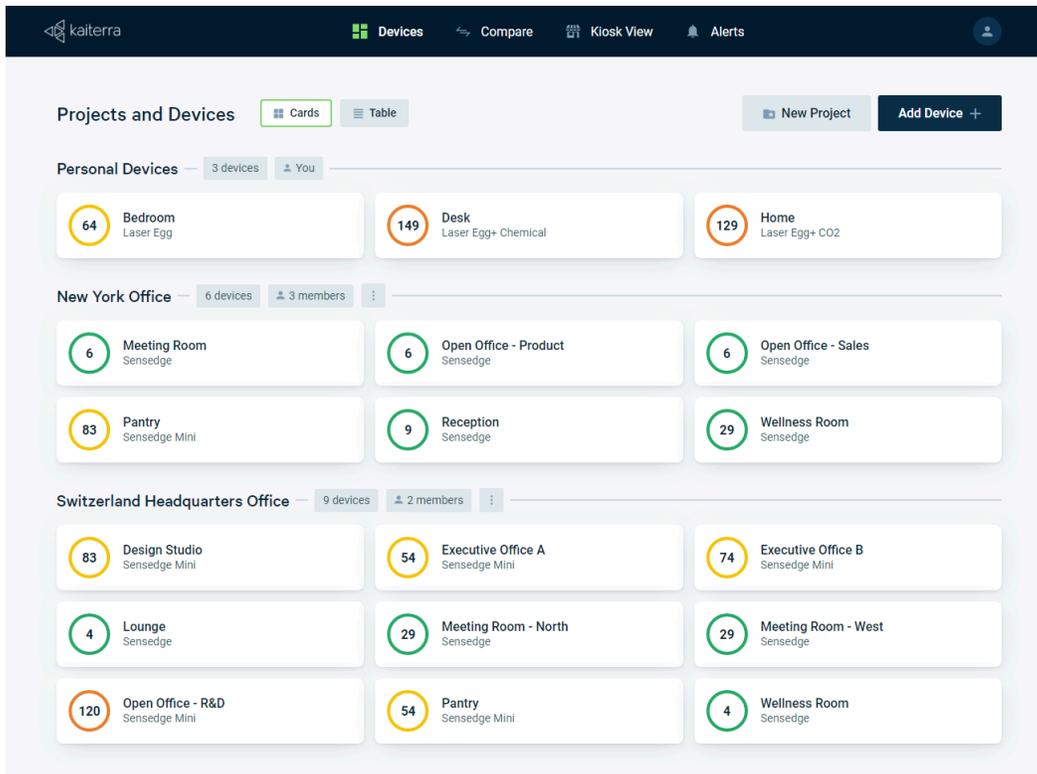
If it is required to whitelist the MAC address of your device for Internet network access, the MAC address for the Kaiterra Square can be found directly on the device, under the front cover.

While Internet Network connectivity is recommended, our Kaiterra Air Quality Monitors can be used in offline settings. For example: Modbus/RTU communication can be established via RS-485.

If offline communication is used, we recommend regularly connecting online to check for firmware updates as they ensure device stability and functionality.

5.

Dashboard Setup

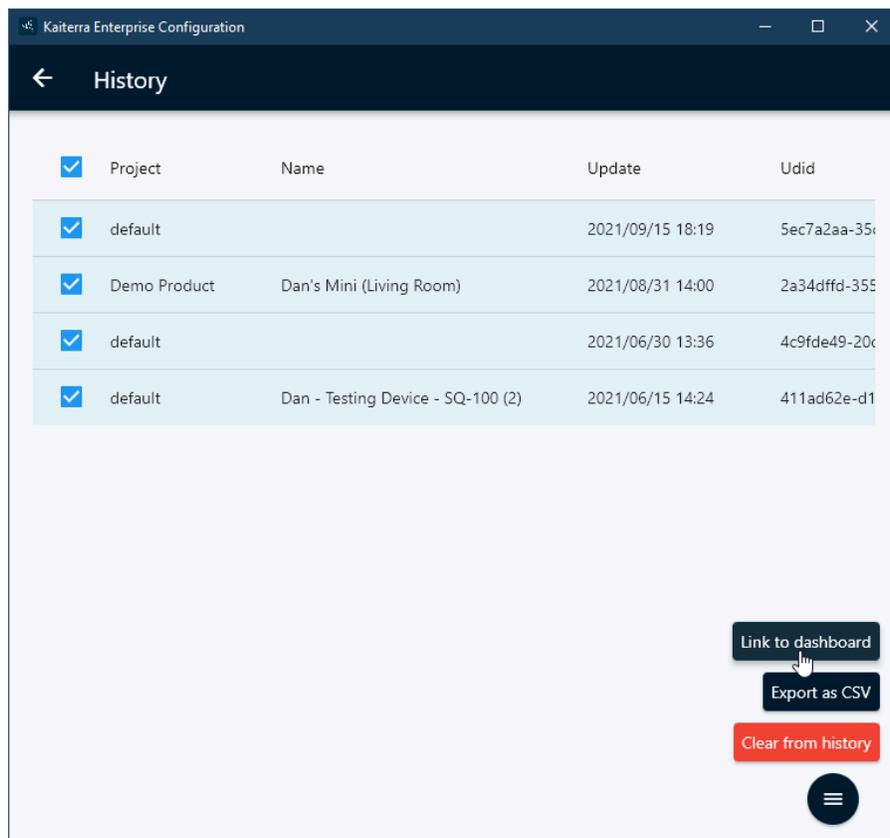


The Kaiterra Web App Dashboard allows you to view the data from your Kaiterra air quality monitors.

Log in to your account at app.kaiterra.com. Then, click “Add Device” and use the Unique Identifier (UDID) of each device to add them to the dashboard.

However, for large scale projects, the process of adding each individual device to the Kaiterra Web App Dashboard can be difficult. When configuring a device with the [Kaiterra Enterprise Configuration Tool](#), it saves every device you configure under the **Options** → **History** tab and provides a way for you to link any of the devices that were configured by that specific computer or smartphone to the Kaiterra Web App Dashboard.

Once you configure each device, which is covered in Section 7 of this deployment guide, navigate to the **Options** → **History** tab to view all of the devices you have configured.



Select which ones you want to add to the dashboard, then click on **Options** → **Link to dashboard** and follow the on-screen instructions.



Once all of the devices are added to the Kaiterra Web App Dashboard, there are plenty of things you can do with it, such as creating alerts to notify you when a pollutant reading has gone too high or you can put your air quality readings on display using our Kiosk View.

For more information on the Kaiterra Web App Dashboard, please refer to our [Kaiterra Web App Dashboard](#) guide.

6.

Device Setup

You will need the following tools to complete your installation:

- Kaiterra Square Air Quality Monitor
- 220V AC or 30V DC Power Cable that supports Direct Wiring
- Cross Screwdriver
- Electrical Tape
- RS-485 Communication Cable (Optional)
- Other protection measures, such as a standard electrical box

For proper wiring procedures, please refer to the [Kaiterra Square Installation Guide](#).

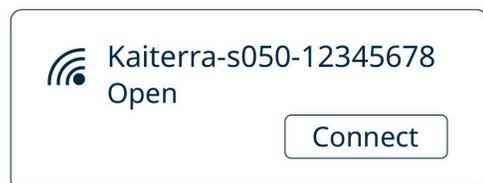
7.

Device Configuration

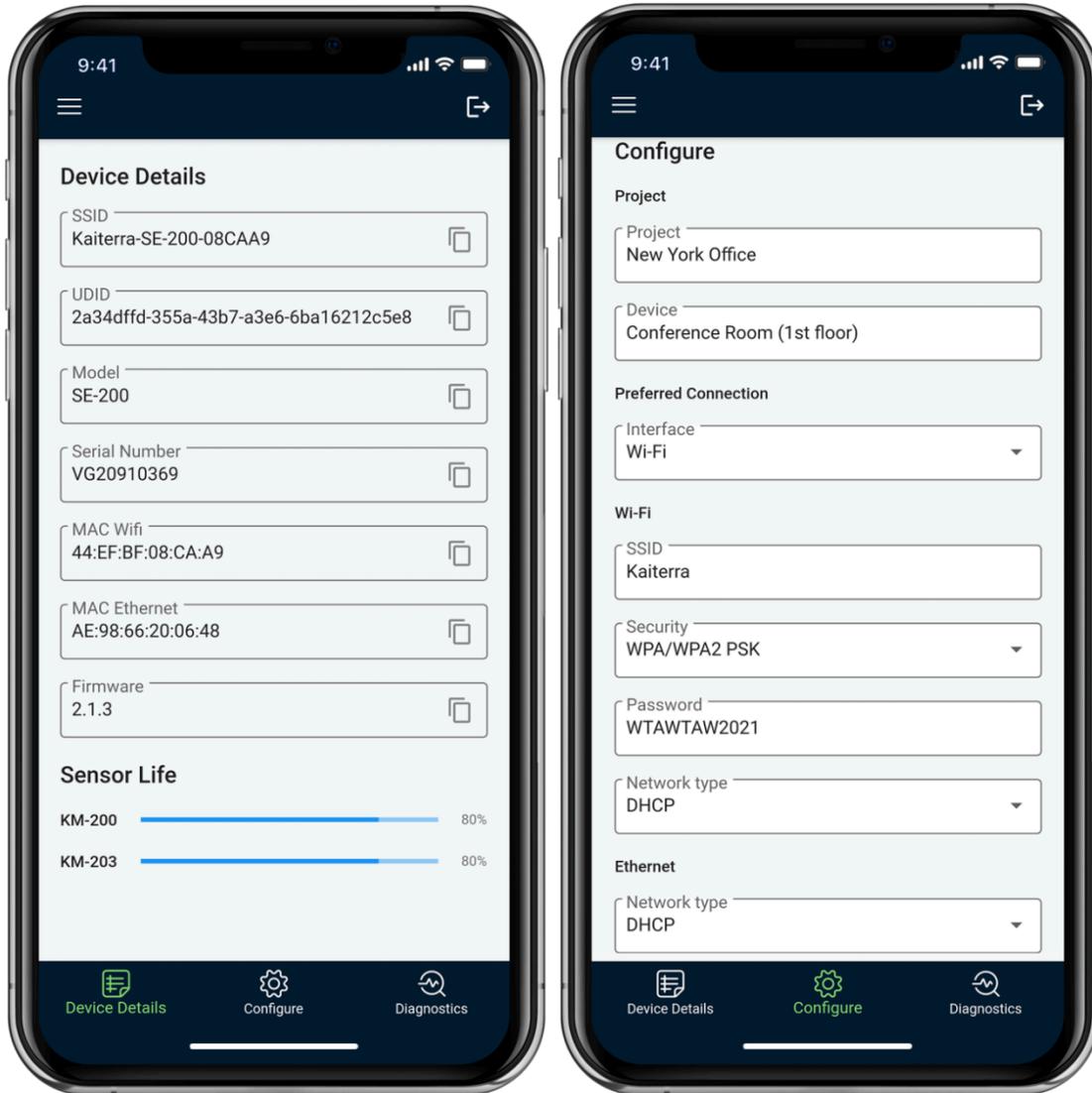
You will need the [Kaiterra Enterprise Configuration Tool](#) to complete the configuration process.

When the Kaiterra Square is powered on, the device will enter Configuration Mode for 15 minutes, which will be indicated by a flashing status light on the device. This configuration mode causes the Kaiterra Square to broadcast a WiFi Access Point signal, allowing you to connect directly to the device.

Open up the Kaiterra Enterprise Configuration Tool and connect to the WiFi signal with “Kaiterra” at the start of its name (SSID).



Once connected, click “Configure” on the Configuration Tool, which will then show your device’s details, including the device’s Unique Identifier (UDID).



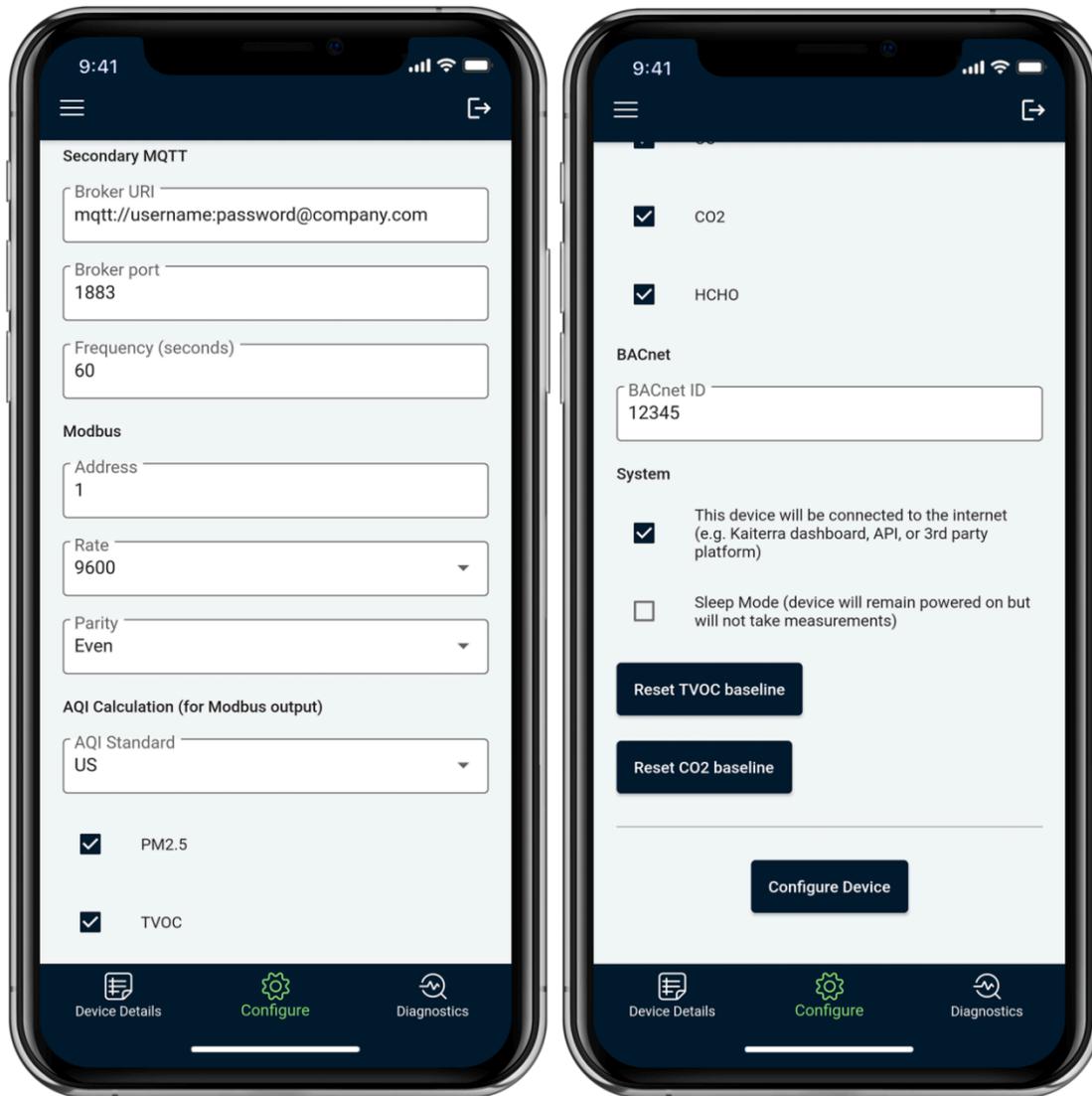
Select the “Configure” tab to configure the device.

For basic configuration, fill in the information for:

- **Project** for easier project identification via the History tab
- **Device (Name)** for easier device identification on the dashboard
- **Wi-Fi** settings

Once complete, scroll to the bottom and click “Configure device”.

The device will then use your configured settings to connect to the network.



For advanced configuration, scroll down and fill in the information for:

- **Secondary MQTT** (Broker URI, Broker Port, and Frequency)
- **Modbus** (Address, Rate, Parity, and AQI Calculation)

Once complete, click “Configure device” at the bottom.

The device will then use your configured settings to connect to the network/BMS.

8.

Resources

General

[Kaiterra Square Installation Guide](#)

[Kaiterra Square Modbus User Manual](#)

[Kaiterra Square Connectivity FAQs and Troubleshooting Guide](#)

Kaiterra Dashboard

[Navigating Your Kaiterra Web App Dashboard \(Video\)](#)

Miscellaneous

[Secondary MQTT Documentation](#)

[API Documentation](#)

[Understanding Your Air Quality Readings](#)