



Kaiterra Sensedge Air Quality Monitor Deployment Guide

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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 Sensedge 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*.

For example:

- One (1) open space of 3,500ft² (325m²) requires one (1) monitor
- Three (3) conference rooms of 225ft² (21m²) requires 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 in order 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.

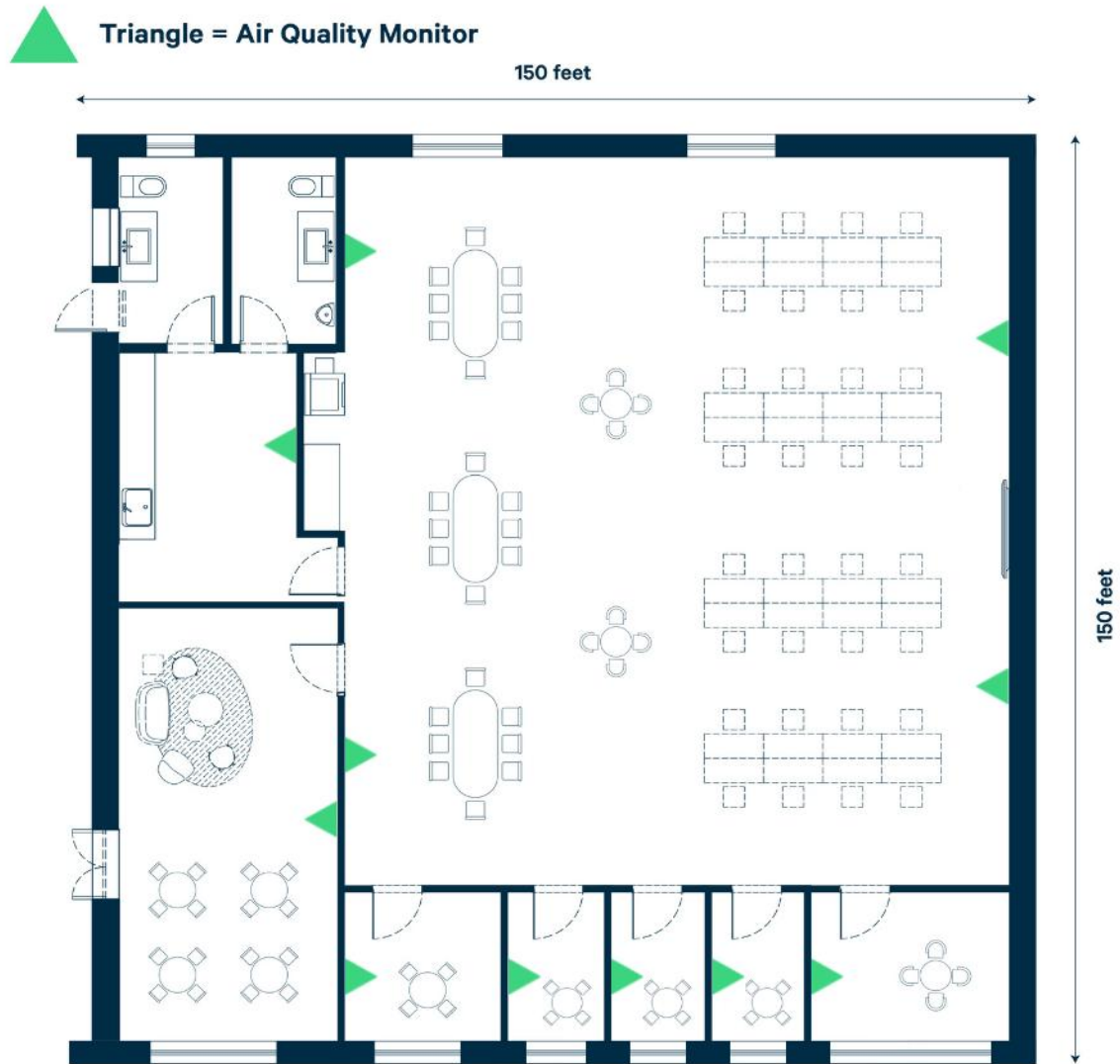


Image 1. Example of a 22,500ft² (2090m²) office space with multiple rooms.

Placement Guidelines

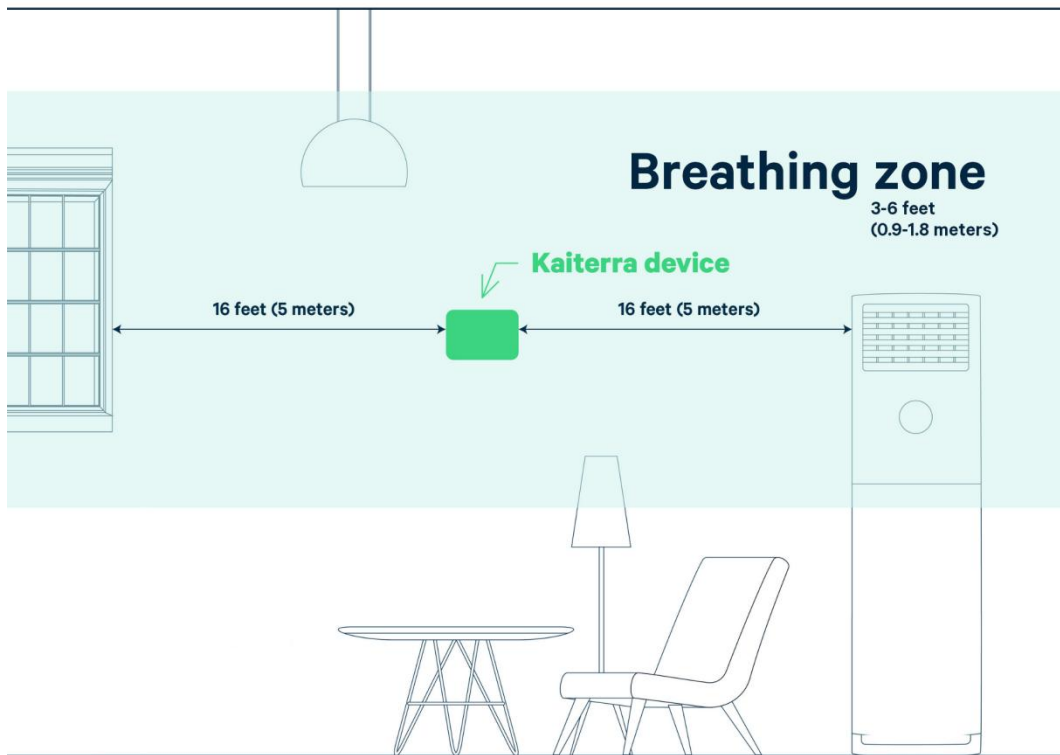


Image 2. A room demonstrating proper air quality monitor placement.

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 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.

*Note: this aligns with ASHRAE 62.1.

E. Hard-wired to a permanent power source (recommended but not mandatory).

Other things to consider:

- Air is drawn into the Sensedge from both the sensor modules on the bottom and the air intake on the top. It is vital that neither side of the device is 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 make sure to check their requirements so that your air quality monitor is properly installed to their specifications.

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.

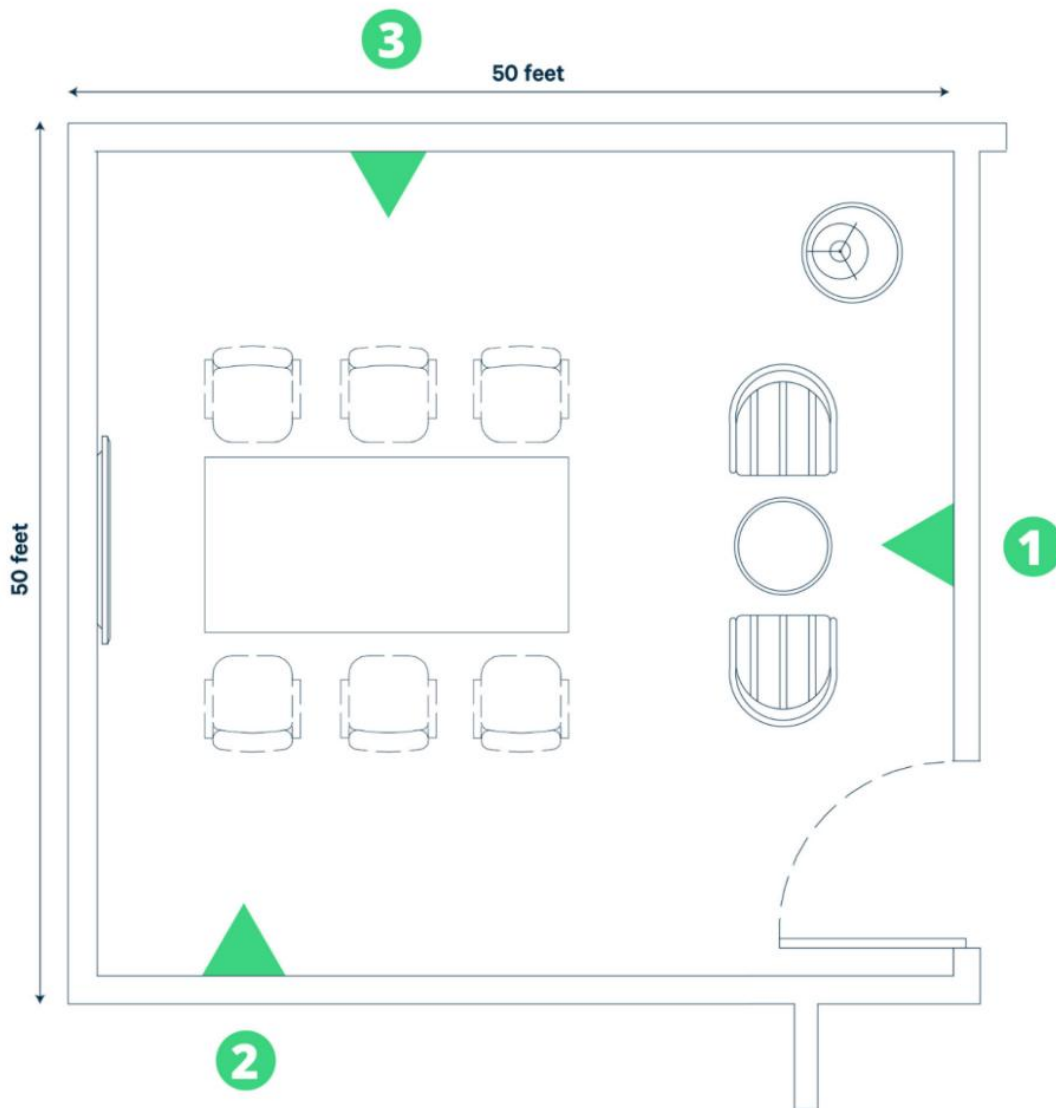


Image 3. A 2,500ft² (232m²) room with three (3) suggested AQM installation locations.

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.

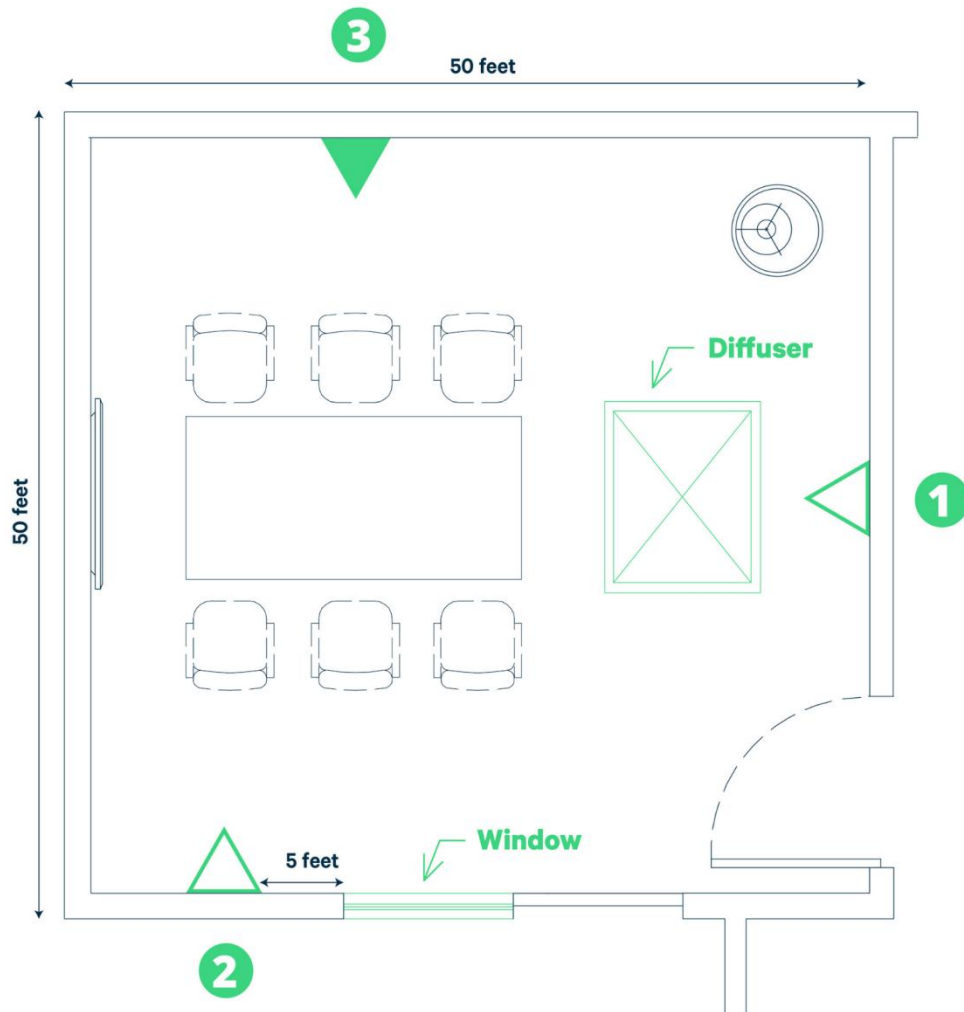


Image 4. A 2,500ft² (232m²) room with three (3) suggested AQM installation locations.

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

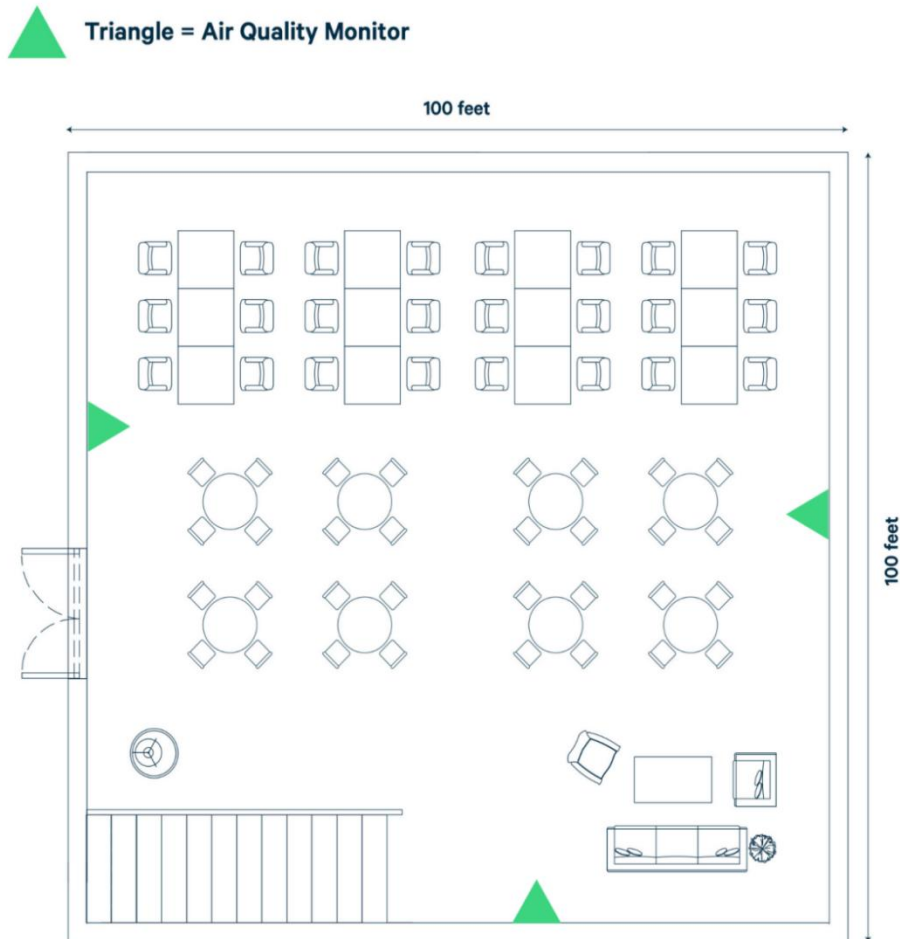


Image 5. A 10,000ft² (929m²) open space with three (3) AQMs installed for optimal air data coverage.

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

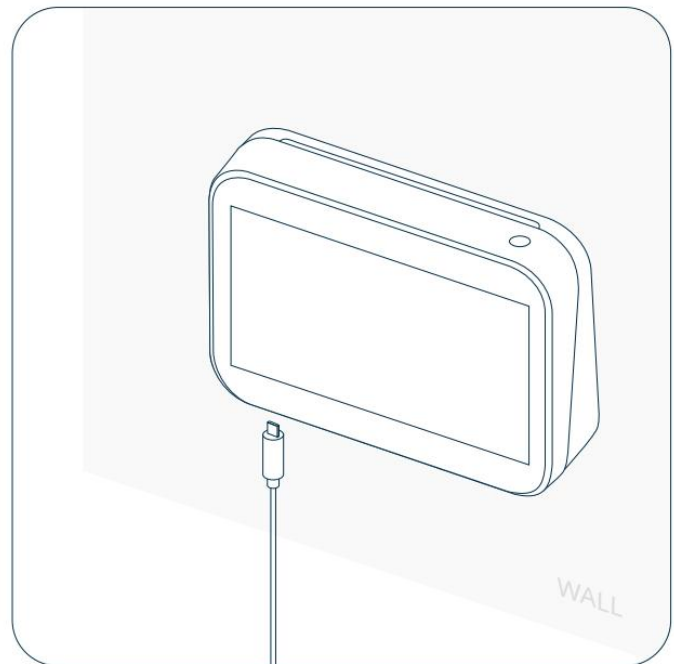
Depending on the enterprise air quality monitor you choose for your installation, you will need to have access to varying types of power in order to properly power your device(s). The Sensedge natively supports 100-240V AC via USB cable and adapter.

For third-party power options*, you can use a:

- DC 12V-5V USB converter
- $\geq 2A$ 5V Power over Ethernet splitter

Other things to note:

- The USB cable length is 6 feet (2 meters). This is the optimal length for the USB cable as any longer runs the risk of not sufficiently powering the device.
- If a third-party USB cable is used, the cable should be rated at 2.4A to ensure sufficient power is carried from the power adapter to the device.
- The wall plug adapter converts AC power to DC 5V at 1.8A, which is the required amount of power for the device.



***Note:** using third-party power adapters have not been regulated or tested for long term use. Please use caution when deciding on using any type of power converter with a Kaiterra product.

4.

Network Connectivity and Data Considerations

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

Our Kaiterra Sensedge supports the following:

- BACnet/IP via Wi-Fi or Ethernet
- Modbus TCP/IP via Wi-Fi or Ethernet
- Primary MQTT via Wi-Fi or Ethernet
- Secondary MQTT via Wi-Fi or Ethernet
- Open API via Wi-Fi or Ethernet via the Kaiterra Cloud

Some network connections may require additional wiring, such as a recommended Ethernet cable connection. 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:

[Sensedge BACnet User Manual](#)

[Sensedge Modbus User Manual](#)

[Secondary MQTT Documentation](#)

[API Documentation](#)

While multiple communications can be connected to simultaneously, we recommend, as a minimum, establishing either a Wi-Fi or Ethernet 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:

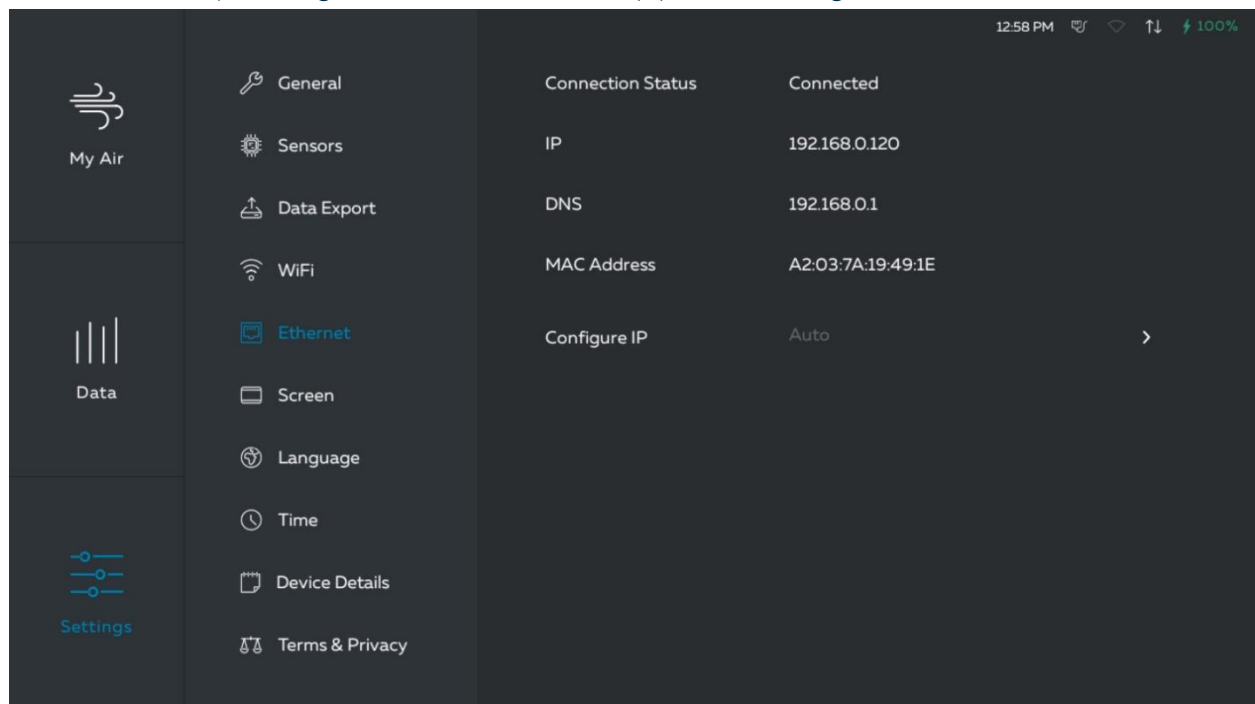
- MQTT server:
 - mqtt.kaiterra.com port 8884
 - mqtt.kaiterra.cn port 8884*
- API server:
 - api.kaiterra.com port 443
 - api.kaiterra.cn port 443*
- Firmware download:
 - Firmware version $\geq 1.15.0.2$
 - ◆ dl.kaiterra.com port 443
 - ◆ dl.kaiterra.cn port 443*
 - Firmware version older than 1.15.0.2
 - ◆ dl.kaiterra.com port 80
 - ◆ dl.kaiterra.cn port 80*
- NTP server:
 - time.kaiterra.com port 123
 - time.kaiterra.cn port 123*

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** checks to make 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 Sensedge can be discovered by navigating to **Settings** → **WiFi/Ethernet** depending on which connectivity you are using.

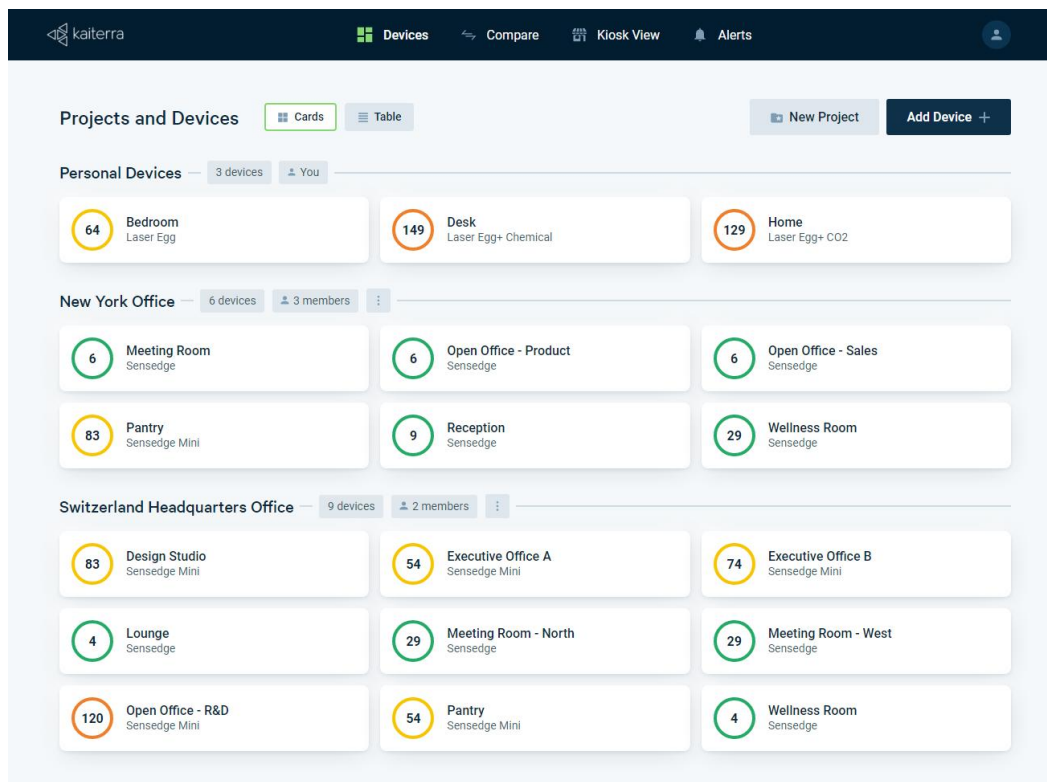


While Internet Network connectivity is recommended, our Kaiterra Air Quality Monitors can be used in offline settings. For example: BACnet/IP communication can be established via Ethernet, but the Ethernet connection does not have to connect online. If an offline communication is used, we do recommend regularly connecting online to check for firmware updates as they ensure device stability and functionality.

If desired, data from the Sensedge can also be locally retrieved via microSD card, allowing the device to be used completely offline with no communication protocols. Insert your microSD card and navigate to **Settings** → **Data Export** → **Storage** to download your data.

5.

Dashboard Setup



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

Go to dashboard.kaiterra.com and create an account. 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 Dashboard can be difficult. As a workaround, you can make use of the Kaiterra Live Air Phone App, which enables you to add each Sensedge device to the phone app via QR code and, when you are ready to add all of your devices to the Kaiterra Dashboard, you can scan the QR code on the dashboard with the phone app and they will add each device simultaneously.

To accomplish this, please do the following:

- Find and download the Kaiterra Live Air app on your smartphone from the app store
- On the Sensedge, navigate to **Settings → General → Pair Device** to display a QR code
- On the app, navigate to **Options → Add New Device → Sensedge**, scan the QR code from the Sensedge, and follow the on-screen instructions.
- Once you have added all of the Sensedge devices to the Live Air App, open up the Kaiterra Dashboard, click on “Add Device”, followed by “add via QR code”.

Link a device to your account

Project
Personal Devices

Device UDID
ex. 368127d1-0214-4f3c-973f-d3afae100003

Adding devices from the Kaiterra Live Air app? Click [here](#) to add via QR code.

Cancel Add Device

- On the app, navigate to **Options → Settings → Devices → Link to Cloud** and scan the QR code on the dashboard to add all of the devices on the Live Air app to the Kaiterra Dashboard.

Once all of the devices are added to the Kaiterra 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 Dashboard, please refer to our [Kaiterra Dashboard](#) guide.

6.

Device Setup

The Sensedge is shipped with the following components in order to complete your setup and installation*:

- 1x Sensedge Air Quality Monitor
- 2x Standard Sensor Modules for Particulate Matter (KM-100) and TVOC (KM-103)
- 1x Wall-mounting "Back Shell", including Wall Screws and Wall Anchors
- 1x USB Charging Cable and Wall Charger with multiple plug adapters for different countries
- 1x User Manual

After unboxing the device, make sure to insert both sensor modules into their module bays.

- The sensor module bays are located on the bottom of the device. The sensor modules can be inserted in either module bay.
 - However, we recommend placing the KM-103 sensor module in the right module bay for optimal performance.
 - The sensor modules can also be inserted while the device is turned on.
- When inserting, make sure the sensor modules have their pin connectors facing inward and the Kaiterra logo facing toward the screen.



- Press the sensor modules into their module bays. You will hear a click, indicating that they are fully inserted and locked in. If the device is turned on during insertion, the sensor module light will briefly light up, indicating a successful connection.

For installation instructions, please refer to our [Sensedge](#) installation guides.

7.

Device Configuration

Once the device is turned on, navigate to the appropriate pages under the **settings** tab of the device and follow the on-screen instructions. The most important settings to check are the following:

- In order to add the Sensedge to your Kaiterra Dashboard, you must have the device's **Unique Identifier (UDID)**. To find the device's UDID, navigate to **Settings → Device Details**
- In order to view the Sensedge on the Kaiterra Dashboard, it must be connected to the Internet.
For network connectivity, navigate to **Settings → WiFi/Ethernet**
- For other communication protocols, such as Secondary MQTT, BACnet, or Modbus, navigate to **Settings → Device Details → Connectivity**

We recommend going through all of the pages under the **Settings** tab to make sure the device is fully set up. However, the following settings are important to understand in a bit more detail:

- The Air Quality Index (AQI), which is found on the **Settings → General → AQI Standard** page, refers to the calculation of parameters that determine whether or not the air is good or bad. This calculation takes all of the pollutant values and determines the worst pollutant reading, which becomes a representation of your air quality. The various AQI standards reference different pollutants, most of which are not measured by our devices as these standards are intended as a measure of outdoor air quality.

- The Overall Index, however, focuses specifically on the parameters our devices measure to determine your indoor air quality. You can also enable or disable specific pollutants from its calculation, in case you want the air quality value to only reflect the calculation of specific parameters, such as CO2 or Particulate Matter.
- Please note that these AQI settings are local to the device. In order to change the AQI Standard on your dashboard, please navigate to your Dashboard Account Settings.
- For more information, please refer to our article on [Understanding Your Air Quality Readings](#).
- **Indoor vs Outdoor** is a button on the “My Air” tab, which allows you to compare the air quality readings of your Sensedge to the air quality readings in your city, which are provided by public air quality sensors in the area.
 - In order to enable this feature, you must navigate to the **Settings → General → Device Location** page and set your outdoor location to either “Closest”, which will locate the nearest public sensor data, or “Custom”, which will allow you to choose the city you want to compare your air quality data to.
- The **Settings → Time** page is a simple, yet critical function of your Sensedge device, as an inaccurate time setting can result in missing data points on both your device and the Kaiterra Dashboard.
 - We highly recommend turning on the “Automatic Date & Time” feature and setting the correct time zone as these settings will ensure the device remains accurate and that your data points arrive at your dashboard without issue.

For a complete walkthrough of all of the Sensedge Settings, please refer to our article on [Understanding Your Sensedge Settings](#).

8.

Resources

General

[Sensedge Introduction Walkthrough \(Video\)](#)

[Sensedge Settings Walkthrough \(Video\)](#)

[Sensedge Installation Guide](#)

[Sensedge BACnet User Manual](#)

[Sensedge Modbus User Manual](#)

[Sensedge Connectivity FAQs and Troubleshooting Guide](#)

Kaiterra Dashboard

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

Miscellaneous

[Secondary MQTT Documentation](#)

[API Documentation](#)

[Understanding Your Air Quality Readings](#)