# Sensedge

## Professional Indoor Air Quality Monitor


## Getting Started


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Settings

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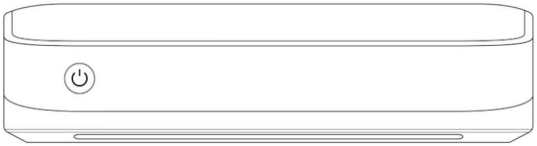
# Introduction to Sensedge

The Sensedge is a building-grade air quality monitor, designed to measure a range of pollutants and air quality parameters. The Sensedge supports multiple methods of data communication and has a wide range of features for data collection, analysis and export. Up to 50 million air quality readings can be stored on the device, and can be viewed using the embedded touch-screen, or exported for further analysis.

This user manual will provide a basic guide to the first use, installation, and basic troubleshooting of the Sensedge.

Further information, tutorials and troubleshooting can be found on the Kaiterra Support Portal, at http://www.kaiterra.com/support



## Externals and air flow

Air is drawn into the Sensedge from both the modules on the lower side, as well as the air intake on the upper side. It is vital that neither side of the device is covered, or the airflow blocked. Any changes in airflow may affect the readings and accuracy of the Sensedge.

## Connection ports

The Sensedge has four ports for connectivity:
**Micro-USB:** Used to supply power to the Sensedge. Only use the cable and charger/adapter supplied with the device.
**USB (type A):** For use with external accessories that require a standard USB connection. For a list of compatible accessories, visit the Kaiterra website.
**Micro-SD card slot:** The Sensedge supports SD cards for data export.
**Ethernet:** Used for data transfer via Ethernet. The Sensedge does not support PoE - the micro-USB port must be used for power.

## Accessories

The Sensedge may be shipped with the following accessories (dependent upon region and order details):
**Power cable and 2.4A, 5V adapter:** Used to provide power to the Sensedge. Never use an adapter or cable other than that shipped with the device.
**Ethernet cable:** The cable supplied with the device is optimised to fit inside within the Sensedge's wall mount and allow cables to run directly into the wall.
**Ethernet extension:** Used to extend the Ethernet port outside of the device. This may be necessary depending on the Ethernet cable used and the method of installation.
**Mini screw driver:** Used to remove and attach the Sensedge wall mount from the Sensedge body. The mini screw driver is not for use with the wall screws, and should not be used to mount the device on a wall.
**Wall screws (x3):** Used to mount the Sensedge on a wall or vertical surface.
**Miniature screws:** Used to keep the outer case connected to the body of the Sensedge.
**Sensor modules:** Used to measure a variety of pollutants and other parameters, these sensors are interchangeable and modular.

## Sensor modules

The Sensedge utilizes a modular design to allow for easy control and replacement of sensors. A CO2 sensor is built into the core of the device, and a variety of other sensors may be inserted using the two sensor bays on the lower side of the device.

To insert a sensor module, simply slide it into the bay, ensuring the Kaiterra logo on the aluminium casing is facing upwards. When inserted correctly, the module will click into place, and an LED light on the module's front will briefly flash green.

To remove a module, gently push on the left side of it. The module will slide further into the bay, before popping out. Do not push on the air intake/output of a module to remove it.

Sensors may be inserted in either sensor bay, and in any order. They may be swapped both when the Sensedge is powered on and operational, and when the device is turned off.

By default, the Sensedge is shipped with the KM-100 and KM-102 sensor modules, which together measure PM2.5, TVOC, temperature, and relative humidity.

## About the measurement

The following methods are used for measurement of pollutants and parameters:

**$CO_2$:** Non-dispersive infrared (NDIR)
**KM-100 module, $PM_{2.5}$:** Laser-based light scattering (mie principle)
**KM-102 module, TVOC:** Metal-oxide-semiconductor (MOS)
**KM-102 module, temperature and relative humidity:** CMOSens® technology

The Sensedge provides realtime measurements, thus it is important to consider other factors that may influence sensor measurement when taking a reading of air quality. Human breath within several meters of the device will impact both CO2 and TVOC measurements, and physically touching and interacting with the Sensedge can have a measurable impact on temperature.

Changes in airflow or currents in an indoor space can all have a measurable impact on the readings of the Sensedge, and correct usage is vital for accurate and reliable readings.

## Data buffer

The Sensedge takes readings of pollutants and measured parameters every second, and calculates a minute-by-minute average, which is recorded in the Sensedge's onboard memory. When connected to the Internet, these readings are uploaded once per minute. Should the data connection be lost for a period of time, all readings will be stored in the data buffer, and automatically uploaded to the cloud when the Sensedge reconnects. There is no maximum number of historical readings that can be stored in the data buffer and uploaded upon reconnection.

# Sensedge First Use

## Charging the device

The Sensedge contains a 5200mAh Lithium Ion battery, which can be charged via the micro-USB port. When turned on and charging, the Sensedge will display a charging icon in the status bar.

If the Sensedge is turned off, upon connection to power, the current battery level will be displayed on the screen for several seconds, before disappearing.

## Powering up the device

Before turning the Sensedge on for the first time, connect it to a power source using the micro-USB cable and adapter supplied. Upon connection to power, a battery level will be displayed on the screen. Ensure that the battery level is above 50% before powering on for the first time.

Power on the device by holding down the power button for 10 seconds, until the Kaiterra logo appears on the screen.

## Setting the language

Upon first use, the Sensedge will prompt users to select a language. Scroll through the options using the touchscreen, and confirm using the "Next" arrow on the screen. The language can be changed in the settings menu at any time. The screen may briefly flash once the language has been selected.

## Connecting to Wi-Fi

On first use, a Wi-Fi network can be selected for the device to use. Internet connectivity allows the Sensedge to store data in the cloud for monitoring, analysis and alerting purposes, and provides the Sensedge with vital information such as new software updates, and automated calibrations. For accurate results, it is highly recommended to connect the Sensedge to the Internet.

## Setting a PIN code

To prevent unauthorized use, the Sensedge can be locked using a PIN code. On first setup, the PIN code can be enabled or disabled. If enabled, users may select either the "Always" or "Only settings" mode.

By enabling a PIN code for “Always”, the device will not display any information when powered on, and a PIN code must be entered before any interaction may take place. This mode is suited to situations where all device access must be restricted to authorized users only.

By setting the PIN code to “Only settings”, the settings menu will be unavailable without entering the PIN code. This mode is suited to environments where multiple users may want to view data and readings on the device, but only a limited number of authorized users have access to the device settings.

Note: the only way to reset a forgotten PIN code is by factory resetting the device. For more details, see the factory reset section of this guide.

## Views

The Sensedge has three main views available: My Air, Data, and Settings. Views are switched between using the menu on the left side of the screen.

## Views: My Air

This is the default view displayed when the Sensedge is powered on, and provides an overview of realtime air quality. Realtime pollutants in their raw format are displayed on the right side of the screen, while an air quality index or other standard is used to display an overall reading in the center of the view.

By default the Kaiterra Overall Index is used, but this may be modified in the settings menu, to utilize a variety of air quality standards and indices.

The unit of measurement for each raw pollutant may also be modified in the general settings menu.

## Views: Data

This view is used to display historical air quality readings stored on the device. Readings can be viewed by the index selected in the settings menu, as well as by individual pollutants. The color of the data bars reflects the selected index or air quality standard, which can be changed in the settings menu.

When the device is first powered on, no data has yet been collected, and the historical data view will display "No Data". After one minute of data has been collected, readings will begin to appear on the screen.

Data is available in three different frequencies: daily, hourly, and per-minute. Cycle through the frequencies by tapping the selected frequency on the right menu, and navigate through the historical data by swiping left and right on the chart.

# Views: Settings

## General

Used to adjust basic settings of the device, such as the standards used for each pollutant, and basic user interaction settings.

## General > PIN

Used to enable or disable a security PIN code, and adjust the relevant settings.

**Enable:** Toggle is used to enable or disable the use of the PIN code on the device. When disabled, no PIN code will be requested from users at any point in time, and anyone with access to the device may interact with it.

**Require PIN:** Select "Always" to require the security PIN for all interaction with the device - this should be chosen for maximum security available. Selecting "Settings" will require a PIN code to interact with the settings page, but not with the My Air or Data views.

**Auto Lock:** The auto lock is used to define the duration of user inactivity after which the PIN code is required to interact with the device.

## General > Pair Device

Used to display a unique QR code for the device. This may be scanned by supported mobile apps to add the device or remotely view readings from the device. For details, see the guide or support for the app being used.

## Sensors

Modular sensors currently inserted into the two bays of the Sensedge will be displayed on this page. The model number of the module is displayed, along-

side the current readings of the sensor, and the module's health.

The health of a module refers to the lifespan of the module. Hours of usage, and the pollutant concentrations during this usage are recorded by each module, and used to calculate lifespan, and current health levels.

When the health of a sensor drops below 10%, the potential for drift in accuracy or module failure increases, and it is necessary to change the sensor module. For instructions, see the "Introduction to Sensedge" in this booklet.

Note: when a sensor is inserted, it may take several seconds to appear on this view.

## Data Export

Used to export historical data contained within the device or in the cloud. Three methods of data export are supported: e-mail, USB and SD card.

**E-mail export:** Used to send readings directly from the cloud to your e-mail. This is an easy way to receive historical air quality readings on your computer for analysis. Files are exported in .csv format, and can be directly opened in Microsoft Excel and other spreadsheet software. Data export via e-mail will only transfer readings that are stored in the cloud, and not readings that are stored locally on the device and unavailable in the cloud. If the Sensedge is connected to the Internet most of the time, this is the recommended method of data export.

**USB & SD card export:** Used to export readings stored locally on the Sensedge to a USB device or SD card inserted into the Sensedge. Historical readings are exported in .csv format. Data export via USB and SD card will only transfer readings that are stored on the device, and not readings in the cloud. If the Sensedge is primarily used offline, this is the preferred method for data export.

## Wi-Fi

The Sensedge supports 2.4G Wi-Fi connectivity, which can be enabled in the Wi-Fi settings view. Simply select the Wi-Fi network by tapping once, and enter the password by tapping on the password input.

The Sensedge will store previous Wi-Fi connections and connect automatically to a network, if available. To remove, or "forget" a Wi-Fi network, simply tap the "Forget" button next to the network name.

## Wi-Fi > Add Network (Hidden SSID)

Hidden networks (hidden SSIDs) are supported by the Sensedge. To connect, tap on the “Additional Settings” button at the bottom of the list of available networks, to enter the Add Network view. Enter the SSID, password, and select the encryption used to connect.

## Ethernet

When an Ethernet cable with an active internet connection is plugged into the Sensedge, the device will automatically switch from Wi-Fi to Ethernet.

## Screen

Used to adjust brightness of the screen, as well as the orientation. Orientation may be set to face either up, down, or adjust automatically with the orientation of the device (recommended).

## Language

Used to change the language of the device. A number of languages are supported, and may be modified at any point in time. Upon change of language the device’s screen may briefly dim as the interface is reloaded.

## Time

By default, the Sensedge is configured to automatically set the date and time when connected to the Internet. For seamless capture and storage of air quality data, it is important to ensure the date, time, and timezone are set correctly on the device.

If the Sensedge is used offline, without an Internet connection, please ensure that the date and time settings have been manually configured to the correct time.

Both 12h and 24h clocks are supported, and may be configured in this view.

## Device Details

Used to display details including the unique ID of the device, the serial number, and other manufacturing details.

## Device Details > Firmware Version

The current firmware version of the Sensedge can be seen in the device details page, as well as several settings regarding firmware updates. The Sensedge supports over-the-air (OTA) updates, so that the firmware running on the device may be updated. Firmware updaters make both new features as well as security upgrades available.

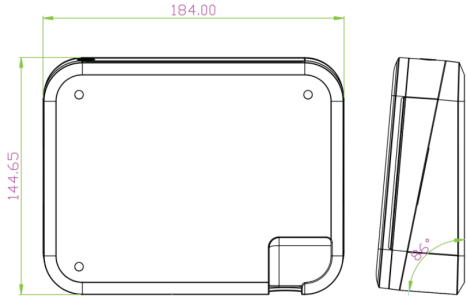
By default, auto-update is enabled, so that upgrades will be automatically installed when they become available online. For the best user experience, keep this setting enabled.

Tapping on the “check” button located next to the current firmware version will manually check for available updates, and if available, allow them to be manually installed.

It is highly recommended to keep the Sensedge up to date at all times.

# Mounting the Sensedge

The Sensedge may be used as a portable device, or mounted on a wall. Mounting the Sensedge is done by first mounting the backplate to the wall, using three screws. Once mounted, the main device may be inserted, by first inserting the upper side, and then the lower side. ***Always remember to insert and tighten the screw that holds the Sensedge closed when using the device, and when wall mounting it.***




Cables may be run down the wall, or run directly into the wall, through the backplate.

# Maintenance

The Sensedge contains no customer serviceable components, other than the modules inserted in the two module bays. Neither the modules, nor the Sensedge should ever be opened or taken apart. ***Opening the Sensedge or any of the modules immediately voids the warranty and may result in exposure to laser radiation, which can cause eye injury.***

The modular design of the Sensedge allows sensors with a limited lifespan, or sensors requiring regular calibration and maintenance, to be easily replaced, without the entire device being replaced.

Annual calibration of the device is not required, as each sensor module is individually calibrated and tested at production.

# Technical Specifications [1]

**$CO_2$ Sensor**

**Sensor type**
Non-dispersive infrared

**Accuracy [2] [3]**
±3% ±50ppm

**Resolution**
1ppm

**Range [4]**
400-2000ppm

**KM-102 Module [5]**
**TVOC**

**Sensor Type**
MOS

**Precision [6] [7]**
±15%

**Resolution**
1ppb

**Temperature**

**Range**
-20 - 100°C

**Accuracy**
±1°C

**Resolution**
1°C

**Relative Humidity**

**Range**
0-99%

**Accuracy**
±5%

**Resolution**
1%

**KM-100 Module [8]**
**$PM_{2.5}$**

**Sensor Type**
Light scattering (350nm)

**Precision [9] [10]**
±10% (<30µg/$m^3$: ±3µg/$m^3$)

**Resolution**
1µg/m3

**Range**
1-1000µg/$m^3$

**Measurable particle size**
0.3-2.5µm

**Connection**
Wi-Fi (2.4Ghz), Ethernet
Support for hidden SSIDs, CaptivePortal and proxy servers

**Data logging**
8GB of on-board memory
(>50,000,000 data points)
>100 years at 1 minute interval

**External storage**
Cloud-based, Micro-SD card, USB

**Log interval**
1 minute, 1 hour, 1 day

**Screen**
7" full color touchscreen

**Battery**
5200mAh (5 hours with screen powered on, 11 hours with screen powered off)

**Input voltage**
DC - 5V

**Input current**
1.8A

**Operational temperature** [11]
0 - 50°C

**Storage temperature**
-20 - 50°C

**Operational humidity**
5 to 95% RH, non-condensing

**Physical size**
184 x 146 x 48mm
(7.2 x 5.7 x 1.9in.)

**Product weight**
800g
(1.76lb)

## Endnotes

1. All specifications are at 2σ significance.
2. Accuracy is specified over operating temperature range. For accuracy in relation to absolute measurements, uncertainty of calibration gas mixtures (+/-1% currently) is to be added to the specified accuracy.
3. Accuracy is defined both at exit from factory, and also after 3 weeks of continuous operation in normal IAQ applications, utilizing ABC function. Rough handling and transportation might result in a reduction of sensor accuracy. With time, the ABC function will tune the readings back to the correct numbers.
4. Sensor is designed to measure in the range 400 to 2000ppm with specified accuracy. Exposure to concentrations below 400ppm may result in incorrect readings. Readings above 2000ppm will be displayed.
5. Included with Sensedge standard package.
6. Precision is defined upon all devices being powered on at the same instant, in the same environment.
7. TVOC measurement is relative, and defined in the range of 125 to 600ppb with specified accuracy. Exposure to extremely high concentrations of VOCs may result in incorrect readings.
8. Included with Sensedge standard package.
9. Accuracy is defined upon fifteen-minute averages. Due to non-uniform distribution of particulate matter, fluctuations may occur at higher measurement frequency.
10. The Sensedge is calibrated during the manufacturing process using a standardized aerosol mix. The default calibration is appropriate for most applications, as it simulates the wide variety of ambient aerosols found in urban locations. When connected to the Kaiterra cloud, by default, the Sensedge's calibration factor will automatically be adjusted according to the geographic location of the device, using cloud based calibration. Calibrations are updated in real time to ensure high accuracy as the composition and photometric response of the ambient aerosols changes. Because optical mass measurements are dependent upon particle size and material properties, there may be times in which a custom correction factor would improve your accuracy for a specific aerosol. When more accurate measurement data regarding specific aerosols is required, custom correction factors must be developed for said aerosol. A custom correction factor is a multiplier applied to raw data to more closely represent the desired results. Custom correction factors are linear and are good only for a specific aerosol and a specific application or work area. A custom correction factor can be developed by comparing a statistically valid number of side-by-side gravimetric and photometric samples.
11. When moving from a cold to a warm environment there is a risk of condensation. To avoid influence on the accuracy of the instrument, it is important to allow it to adjust to the environment for a few minutes before usage.

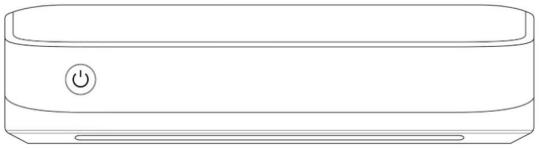
# 睿石介绍

睿石是一款建筑级空气质量检测仪，旨在检测一系列污染物和空气质量参数。睿石支持多种数据通信方式，并具有广泛的功能：如数据收集，分析和导出等。设备上可以存储多至5000万个空气质量读数，并可以使用嵌入式触摸屏查看，也可以导出进行进一步分析。

此手册为用户首次使用睿石提供安装和故障排除的指导。

更多信息、教程和疑难解答可以在Kaiterra官网的“客户支持”中查询，链接地址：http://www.kaiterra.com/support

## 外部和空气流动



空气从下方的两个模块以及上侧的进气口被吸入睿石。因此设备的任何一侧都不能被覆盖，并且气流不能被阻塞。气流的任何变化都可能影响睿石的读数和准确性。

## 连接端口

睿石具有四种连接端口：

**Micro–USB:** 用于睿石充电。仅可使用设备随附的数据线及充电器或适配器。

**USB (type A):** 用于连接外部设备。有关兼容配件的列表，请访问Kaiterra网站。

**SD卡槽：** 睿石支持使用SD卡导出数据。仅限使用 micro–SD卡（64GB以下）。

**以太网:** 用于通过以太网进行数据传输。睿石不支持PoE–micro–USB，此端口仅用于充电。

## 配件

睿石可能将会随附以下配件（具体会根据地域及订单详情）
**电源线及2.4A 5V适配器：**用于为睿石充电。请勿使用除设备随附外的适配器或电源线。

**以太网线：**随设备提供的网线经过优化，可安装在睿石的壁挂支架内，并允许将线直接插入墙壁。

**以太网扩展：**用于扩展设备外部的以太网端口。具体依据以太网线的使用及安装方法。

**迷你螺丝刀：**用于将壁挂支架从睿石中移开或安装。迷你螺丝刀不适用于墙壁螺丝，并且不能用于在墙上安装设备。

**墙壁螺丝（x3）：**用于将睿石安装在墙上或垂直表面上。

**微型螺丝：**用于将外壳固定在睿石机身上。

**传感器模块：**用于检测各种污染物和其他参数，这些传感器是模块化并可互换位置。

## 传感器模块

睿石采用模块化设计，便于控制及更换传感器。一个二氧化碳传感器内置于设备中，设备下方的两个传感器凹槽可插入各种其他的传感器。

如需插入传感器模块，只需轻推传感器进入凹槽，确保铝制外壳上的Kaiterra标志朝上即可。当正确插入后，模块将卡住，并且模块正面的LED灯会短暂闪烁且呈绿色。

如需移出模块，轻轻推动其左侧，模块在滑出凹槽前，会先进入凹槽更深一些。请勿按压模块的进风口/出风口。

传感器可以插入到任意传感器凹槽中，并且任意顺序插入均可。当睿石开机和运行时以及设备关闭时，传感器均可切换凹槽位置。

默认情况下，睿石随机附带KM–100和KM–102传感器模块，它们共同检测PM2.5、TVOC、温度和相对湿度。

## 关于检测

以下方法用于检测污染物及参数

**CO2:** 非分散红外技术

**KM–100 模块, PM2.5:** 激光散射 (mie principle)

**KM–102 模块, TVOC:** 金属氧化物半导体 (MOS)

**KM–102 模块, 温度和相对湿度:** CMOSens®技术

睿石提供实时检测，因此当获取空气质量读数时，考虑其他因素对传感器检测造成的影响非常重要。设备数米范围内人的呼吸会影响 CO2 和 TVOC的检测，身体触碰和与睿石交互产生的温度也会影响检测。

室内空气流动或电流变化会对睿石的读数造成检测影响，因此正确使用对于读数的准确性及可靠性至关重要。

## 数据缓冲区

睿石每秒钟获取污染物及检测参数，并且计算每分钟的平均值，记录在睿石自带存储器中。当连接网络后，读数每分钟上传一次。如果数据连接丢失一段时间，所有读数将被存储在数据缓冲区，当睿石重新连网后，数据将自动上传到云端。数据缓冲区可以存储不限数量的历史数据。

# 首次使用睿石

## 设备充电

睿石内置5200mAh锂离子电池，可通过micro–USB端口充电。当开机并充电时，睿石状态栏中会显示充电标识。

如果将睿石关机时接通电源，电池电量将在屏幕上显示几分钟，然后消失。

## 启动设备

首次开启睿石前，使用随附的Micro–USB线和适配器将其连接电源。连接电源后，电池电量将显示在屏幕上。首次开机时请确保电池电量高于50%。

长按设备电源键10秒，直至Kaiterra标志在屏幕上显示。

## 设置语言

首次使用，睿石将提示使用者选择语言。使用触摸屏滚动选项，使用屏幕上方“下一步”的箭头确认选项。也可以任意时间在设置菜单中更改语言。一旦选择语言，屏幕可能会短暂闪烁。

## 连接Wi–Fi

首次使用，可以选择设备将要使用的Wi–Fi网络。网络连接允许睿石在云端存储数据，以便监控、分析和警报；并为睿石提供重要信息，例如最新软件升级和自动校准。为使结果更加准确，强烈建议将睿石连网使用。

## 设置PIN码

为防止未经授权使用，睿石可以使用PIN码锁定。第一次设置时，可以启用或禁用PIN码。如果启用，使用者可选择“总是”或“设置”模式。

如果启用PIN码并选择“总是”，当设备启动后将不显示任何信息，并且与设备进行任何交互前均需输入PIN码。此模式适用于设备所有访问仅限被授权用户使用的情况。

如果PIN码选择“设置“选项，未输入PIN码则设置视图无法操作。此模式适用于多个用户想要查看该设备数据和读数的情况，但是仅限授权用户使用设备“设置”。

注意：如果忘记PIN码无法正常使用设备，唯一解决方法是将设备恢复出厂设置。

# 视图

睿石有三个主要视图可用：我的空气、数据和设置。使用屏幕左侧的菜单可以切换视图。

# 视图：我的空气

这是睿石开机后的默认视图，并提供实时空气质量的概述。原始格式的实时污染物显示在屏幕右侧，而空气质量指数或其他标准则在视图中间位置显示综合读数。

默认情况下，使用Kaiterra综合指数，但是可以在“设置”菜单中修改，以利用各种空气质量标准和指标。

每种原始污染物检测单位均可以在通用设置菜单中修改。

修改建议：默认情况下，使用Kaiterra综合指数。如果想使用各种其他空气质量标准和指标，可以在“设置”菜单中修改。

每种原始污染物检测单位均可以在通用设置菜单中修改。

# 视图：数据

此视图用于显示历史空气质量数据。这些显示包括在“设置”菜单中选择的空气质量标准以及各污染物的历史数据。数据柱的颜色表示所选定标准或指数下的空气质量程度。

当首次开启设备，尚未收集任何数据，历史数据视图将显示“无数据”。一分钟后数据被收集，读数将开始出现在屏幕上。历史数据以天、小时、分钟三种频率呈现。点击右侧菜单上的天、小时、分钟来切换查看，并通过在图表上左右滑动浏览历史数据

# 视图：设置

## 通用

用于调整设备基础设置，例如每种污染物的标准及基本的用户交互设置。

## 通用 > PIN

用于启用或禁用安全PIN码，调整相应设置。

**启用/禁用：**用于在设备上启用或禁用PIN码。禁用时，任何时候都不会向用户请求PIN码。

**使用PIN：** 选择“总是”选项，则在设备上进行所有操作均需提供PIN码。这项设置会让用户获得最大程度的安全性。当用户选择“设置”选项，则当进入“设置”菜单时，需要提供PIN码，而进入“我的空气”和“数据”视图则不需要提供。

**锁住显示屏：** 一段时间内用户不使用设备，设备即进入自动锁屏状态。之后，用户需要输入PIN码才能再次使用设备。

## 通用 > 配对设备

用于显示设备唯一的二维码。可通过支持睿石的手机APP来扫描此二维码，用于添加设备或者远程查看设备的读数。详情参见该APP的使用手册。

## 传感器

当前插入到睿石的两个凹槽中的模块化传感器将会在此界面上显示。模块型号以及当前传感器的读数和模块健康情况均会显示在此处。

模块健康程度是指模块使用寿命。使用时长，以及使用过程中的污染物浓度由每个模块记录，用于计算寿命和当前的健康水平。

当传感器的健康状况下降到10%以下时，精度下降或模块出现故障的可能性增加，此时需要更换传感器模块。详情参见本手册中的“睿石介绍”。

注意：当插入传感器后，可能需要几秒钟才能出现在此视图上。

## 数据导出

用于从设备或云端导出历史数据，本机支持三种数据导出方式：邮件、USB和SD卡。

**邮箱导出：**用于将云端存储的读数直接导出到你的邮箱。这是在你的电脑上获取历史空气质量读数用于分析的简单方法。文件以.csv格式导出，可以直接在微软表格或其他电子表格软件中打开。通过邮箱进行的数据导出只会传输存储在云端的读数，无法获取存储在本地设备中且云端不可用的读数。如果睿石大多数时间处于连网状态，则推荐此方法导出数据。

**USB&SD卡导出：**用于通过将USB设备或SD卡插入睿石中导出存储在本地设备中的读数。历史读数以.csv格式被导出。通过USB和SD卡导出数据只能传输存储在设备中的读数，无法获取云端读数。如果睿石主要脱机使用，则这是数据导出的最佳方法。

## Wi–Fi

睿石支持2.4GWi–Fi连接，可在Wi–Fi设置视图中启用。只需点击一下即可选择Wi–Fi网络，随后输入密码即可。

睿石将存储以前的Wi–Fi连接，如果该网络可用，将自动连接到该网络。如需删除或“忘记”Wi–Fi网络，只需点击网络名称旁边的“忘记”按钮即可。

## Wi–Fi > 添加网络（隐藏SSID）

睿石支持添加隐藏网络（隐藏SSIDS)。通过点击可用网络列表最下端的“其他设置“按钮，再进入“添加网络”界面，输入SSID、密码，并选择加密方式，点击“提交”即可进行网络连接。

## 以太网

将具有可用网络的以太网线插入睿石中时，设备将自动从Wi–Fi切换到以太网。

## 显示屏

用于调整屏幕亮度以及屏幕方向。方向可设置为向上，向下，或自动适应设备方向（推荐）。

## 语言

用于更改设备语言，目前支持多种语言，可在任意时间更改。更改语言后，界面重新加载可能会导致设备屏幕短暂变暗。

## 时间

默认情况下，睿石被设置为连网后自动设置日期和时间。为了无缝捕获和存储空气质量数据，确保设备上的日期，时间和时区设置正确是至关重要的。

如果睿石脱机使用，无法进行网络连接，请确保手动配置正确的日期和时间。

本机支持12小时制和24小时制，可在该视图中配置。

## 设备详情

用于显示设备详情，包括设备唯一ID，序列号以及其他出厂详情。

## 设备详情 > 固件版本

睿石当前固件版本可在设备详情页中查看，也可在该界面查看有关固件更新的相关设置。

睿石支持无线（OTA）更新，以便设备上运行的固件可以更新。固件更新包含新功能及安全升级。

默认情况下，自动更新已启用，以便新固件可用时自动安装。强烈建议保持该设置为启用状态。

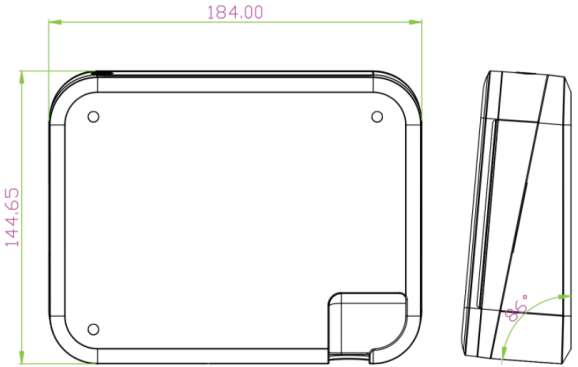
点击当前固件版本旁边的“检查”按钮，将手动检查可用更新，如果可用，则允许手动安装。

**强烈建议睿石始终保持最新版本。**

# 安装睿石

睿石可用作便携设备或安装到墙上。先通过使用三颗螺丝将壁挂外壳安装到墙上来完成睿石的安装。一旦完成安装，主设备可被放入，先放入上侧，再放入下侧。请始终记住：当睿石已放入壁挂外壳，在使用时，请务必确保螺丝已将睿石锁住在壁挂外壳上。

睿石使用的充电线或者网线可沿墙垂直向下置放，或通过壁挂外壳直接镶嵌入墙内。




# 维护

睿石不包含用户可维修的配件，除了可插入设备凹槽的两个模块。模块及睿石机身请勿擅自拆开。擅自拆开睿石或模块，质保期将立即失效，同时机内激光辐射可能导致眼睛受伤。

睿石模块化的设计可以为设备轻松替换寿命有限或经常需要标定的传感器，而无需更换整台设备。

无需对设备进行年度校准，每个传感器模块都在生产过程中单独进行过校准和测试。

# 技术规格 [12]

**$CO_2$ 传感器**

**传感器类型**
非分散红外

**准确性** [13] [14]
±3% ±50ppm

**分辨率**
1ppm

**范围** [15]
400–2000ppm

**KM–102 模块** [16]
**TVOC**

**传感器类型**
MOS

**精确度** [17] [18]
±15%

**分辨率**
1ppb

**温度**

**范围**
–20 – 100°C

**准确性**
±1°C

**分辨率**
1°C

**相对湿度**

**范围**
0–99%

**准确性**
±5%

**分辨率**
1%

**KM–100 模块** [19]
**$PM_{2.5}$**

**传感器类型**
激光散射 (激光350nm)

**精确度** [20] [21]
±10% (<30µg/$m^3$: ±3µg/$m^3$)

**分辨率**
1µg/$m^3$

**范围**
1–1000µg/$m^3$

**可检测的粒度**
0.3– 2.5µm

**连接**
Wi–Fi (2.4Ghz), 以太网
支持隐藏 SSID，强制主页及代理服务器

**数据记录**
8GB 机载内存(>50,000,000 数据点)
频率为一分钟的数据可存储>100年

**外置存储**
基于云端, SD卡, USB

**记录间隔**
1分钟, 1 小时, 1 天

**屏幕**
7”全色触摸屏

**电池**
5200mAh（屏幕常亮待机5小时，息屏待机11小时）

**输入电压**
DC – 5V

**输入电流**
1.8A

**操作温度**
0 – 50℃

**存储温度**[22]
–20 – 50°C

**操作湿度**
5 to 95% RH, 非冷凝

**物理尺寸**
184 x 146 x 48mm
(7.2 x 5.7 x 1.9in.)

**产品重量**
800g
(1.76lb)

12. 所有规格在两个标准偏差（2σ）。
13. 规定的准确性仅限在工作温度范围内。为使准确性更趋于绝对检测值，气体混合物公差（±1%）应被添加到所规定的的准确性中。
14. 准确性在工厂出厂时以及在正常室内空气质量应用中连续运行3周后利用ABC功能进行定义。粗暴的搬运和运输可能会导致传感器精度的降低。随着时间的推移，ABC功能会将读数调整回正确的数字。
15.传感器设计的指定准确度的检测范围为400到2000ppm。暴露在低于400ppm的浓度下可能导致读数不准确。高于2000ppm的读数仍会被显示。
16. 包含睿石标准包装
17. 在相同环境中同时开启所有设备的情况下，定义精度。
18. TVOC检测为相对值，指定准确度定义范围为125至600ppb。暴露在极端高浓度VOC环境下可能导致读数不准确。
19. 包含睿石标准包装
20. 准确性根据15分钟平均值定义。由于颗粒物分布不均匀，在较高的检测频率下可能会出现波动。
21. 睿石在制造过程中使用标准化的气溶胶混合物进行校准。默认标定在大多数场景下适用，因为它模拟了在城市地区发现的各种环境气溶胶。当连接到Kaiterra云端时，默认情况下，睿石的校准系数将使用云端标定，根据设备的地理位置自动调整。在环境气溶胶的成分和光度响应发生变化时，为确保具有高精度，睿石将实时更新校准。
由于光学检测取决于颗粒物大小和材料属性，因此可能有些时候自定义校正因子会提高对特定气溶胶的准确度。
当需要关于特定气溶胶的更精确的检测数据时，必须为所述气溶胶开发定制校正因子。自定义校正因子是应用于原始数据的乘数，以更接近期望的结果。自定义校正因子是线性的，仅适用于特定的气溶胶和特定的应用或工作区域。自定义校正因子可以通过比较统计有效数量的并排重量和光度采样来开发。
22. 当将设备从冷环境移动到热环境中，有结露的风险。为避免影响设备的准确性，在使用前将设备适应该环境几分钟是非常重要的。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