

AirAssure™ Indoor Air Quality Monitor



Model 8144

Operation and Maintenance Manual

P/N 6015658, Revision H
March 2023



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Part Number

6015658 / Revision H / March 2023

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Knowing that inoperative or defective instruments are as detrimental to TSI as they are to our customers, our service policy is designed to give prompt attention to any problems. If any malfunction is discovered, please contact your nearest sales office or representative, or call TSI's Customer Service department at (800) 680-1220 (USA) or (001 651) 490-2860 (International) or visit www.tsi.com.

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Cloud Software End User Licensing Agreement and Privacy Policy

Go to <https://tsi.com/terms/> to view the **TERMS OF USE & PRIVACY POLICY** link.

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Safety Information

Description of Caution/Warning Symbols

Appropriate caution/warning statements are used throughout the manual and on the instrument that require you to take cautionary measures when working with the instrument.

Caution



CAUTION

Failure to follow the procedures prescribed in this manual might result in irreparable equipment damage. Important information about the operation and maintenance of this instrument is included in this manual.

Warning



WARNING

Warning means that unsafe use of the instrument could result in serious injury to you or cause damage to the instrument. Follow the procedures prescribed.

Caution and Warning Symbols

The following symbols may accompany cautions and warnings to indicate the nature and consequences of hazards:

	Warns that the instrument contains a laser and that important information about its safe operation and maintenance is included in the manual.
	Warns that the instrument is susceptible to electrostatic discharge (ESD) and ESD protection should be followed to avoid damage.
	Indicates the connector is connected to earth ground and cabinet ground.



WARNING

- Use of components other than those specified by TSI® Incorporated (TSI®) may impair the safety features provided by the equipment.
- When mains power adapters are used, the equipment should be positioned so the mains plug will remain accessible for emergency disconnect.



CAUTION

- The AirAssure™ Indoor Air Quality monitor enclosure is designed for **INDOOR USE ONLY**. The monitor is **NOT** water or spray resistant.
- The power adapter provided with the AirAssure™ IAQ monitor is rated for indoor use only. **DO NOT** use any other power supply with the AirAssure™ IAQ monitor.



CAUTION

NEVER open the monitor when it is powered on or connected to the power adapter!

The monitor contains very sensitive sensors that are susceptible to electrostatic discharge (ESD) and ESD precautions should be followed to avoid damage.



NOTICE

Installation videos can be found on our website.

- 8144-2 <https://tsi.com/products/indoor-air-quality-meters-instruments/continuous-iaq-monitoring-instruments/airassure-8144-2-indoor-air-quality-monitor/>
- 8144-4 <https://tsi.com/products/indoor-air-quality-meters-instruments/continuous-iaq-monitoring-instruments/airassure-8144-4-indoor-air-quality-monitor/>
- 8144-6 <https://tsi.com/products/indoor-air-quality-meters-instruments/continuous-iaq-monitoring-instruments/airassure-8144-6-indoor-air-quality-monitor/>

NOTICE

The safety of any system incorporating the AirAssure™ IAQ monitor is the responsibility of the installer of the system.

Laser Safety

- AirAssure™ Indoor Air Quality monitors are Class 1 laser-based instruments.
- During normal operation, you will not be exposed to laser radiation.
- You will not be exposed to the laser radiation when the AirAssure™ IAQ monitor is disassembled.
- The PM sensor has a laser inside it. **DO NOT** open the PM sensor inside AirAssure™ IAQ monitor when the AirAssure™ IAQ monitor is powered.

Take these precautions:

- **DO NOT** remove any parts from the AirAssure™ Indoor Air Quality monitor unless you are specifically told to do so in this manual.



WARNING

The use of controls, adjustments, or procedures other than those specified in this manual may result in exposure to hazardous optical radiation.







WARNING

If the AirAssure™ IAQ monitor is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

When operated according to the manufacturer's instruction, this device is a Class 1 laser product as defined by U.S. Department of Health and Human Services standards under the Radiation Control for Health and Safety Act of 1968. A certification and identification label like the one shown below is affixed to each instrument.

Labels


Advisory labels and identification labels are attached to the instrument.

<p>1. Serial Number Label (back)</p>	 <p>AirAssure IAQ Model 8144 PN: 8144-6 SN: 814462021001 Wi-Fi 2.4 GHz MAC: A0-51-0B-6A-46-86 PWD: a9b3384f79b2 Contains FCC ID: 2AC7Z-ESP32WROVERE Contains IC ID: 21098-ESPWROVERE 5V ---1A (USB-C) 24VAC 50-60Hz 0.5A (Back) TSI Incorporated www.tsi.com Made in U.S.A.</p> <p>Device Wi-Fi 192.168.4.1</p>
<p>2. Laser Radiation Label (internal, on the PM sensor)</p>	
<p>3.  Safety Details</p>	<p>FCC ID: 2AC7Z-ESPWROVERE Contains IC ID: 2AC7Z-ESPWROVERE</p>
<p>4. European symbol for non-disposable item. Item must be recycled.</p>	

Reusing and Recycling



As part of TSI® Incorporated's effort to have a minimal negative impact on the communities in which its products are manufactured and used:

-  If instrument becomes obsolete, return to TSI® Incorporated for disassembly and recycling.

Chapter 1

Product Overview

TSI® Incorporated's AirAssure™ Indoor Air Quality Monitor is a real-time Particulate Matter (PM) and Gas monitor designed to provide accurate gas and mass concentrations as well as temperature, humidity, and barometric pressure measurements. The monitor is designed to be deployed in less than ten minutes and is intended for indoor air quality monitoring only.

Data from the sensor is available at www.tsilink.com. All you need is an internet connection and web browser. The AirAssure™ IAQ monitor connects to the internet using 2.4 GHz Wi-Fi® to upload data. Cloud data can be viewed in a web browser. There is no need to install an app on your smartphone. Logged data is also available on the internal microSD card accessible from the bottom of the device.

The AirAssure™ IAQ monitor comes with a PM sensor factory calibration, whose standards adhere to the same standards that are applied to other high-quality TSI® monitors like the DustTrak™ and AM520 models. The AirAssure™ IAQ monitors also come with self-diagnostics to enable you to run the monitor with greater than 95% run-time.

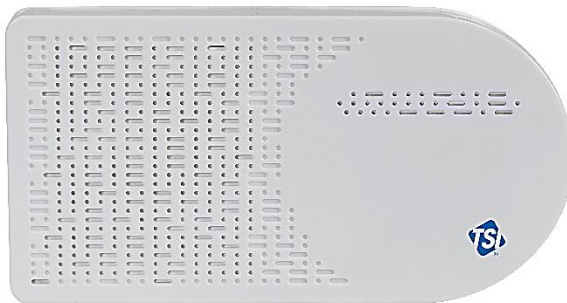









Figure 1: Front View of AirAssure™ IAQ Monitor

® Wi-Fi is a registered trademark of Wi-Fi Alliance.





Unpacking




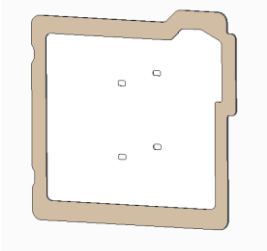
Compare all the components you received with those listed in the table below.

Item	Qty	Description
	1	AirAssure™ Indoor Air Quality Monitor
	1	USB Power Supply
	1	Country Specific Plug Adapter Kit
	1	2m USB-A to USB-C Cable
	1	24 VAC Terminal Connector
	1	32 GB microSD card (installed)
	1	Mounting Kit: (2 screw and plug sets, 8 tape strips, 1 level)

AirAssure™ IAQ Monitor Replacement Parts

Listed below are replacement items for the AirAssure™ Indoor Air Quality Monitor. Contact [TSI®](#) for purchase information.

Item	Part Number	Description
	814408	Replacement 2-Gas Variant Sensor Cartridge: tVOC, Temperature, Relative Humidity, and Barometric Pressure
	814401	Replacement 4-Gas Variant Sensor Cartridge: CO, tVOC, Temperature, Relative Humidity, and Barometric Pressure
	814402	Replacement 6-Gas Variant Sensor Cartridge: CO, O ₃ , tVOC, NO ₂ , and SO ₂ , Temperature, Relative Humidity, and Barometric Pressure
	814403	Replacement TSI® Calibrated PM Sensor

Item	Part Number	Description
 <p>A green printed circuit board (PCB) with a black plastic housing on the left side. A multi-colored ribbon cable is connected to the right side of the board. A black connector with four pins is attached to the end of the cable. A white label on the PCB reads '3400037'.</p>	814404	Replacement CO ₂ Sensor
 <p>A green PCB with a square brown sensor element in the center. A black connector is on the left side. Text on the PCB includes 'Sensor Lon. 6223423 U6'.</p>	814405	Replacement Formaldehyde Sensor
 <p>A collection of white power supply components including a main power supply unit, three different types of AC power adapters, and a USB-A to USB-B cable.</p>	814406	Replacement Power Supply Kit
 <p>A tan-colored rectangular frame with a white membrane filter inside. There are two small circular holes on the right side of the frame.</p>	814407	Replacement Membrane Filters (pack of 3)

Chapter 2

Setting Up

The AirAssure™ Indoor Air Quality Monitor is delivered fully assembled and ready to be mounted on an interior wall. Start by unpacking the device and its contents from the shipping package. The monitor is intended to be connected to local 2.4 GHz Wi-Fi® to access all cloud features, but it can be used without Wi-Fi® if needed as all data is recorded to a pre-installed microSD memory card accessible from the bottom of the case next to the USB-C port.

A quick start guide is shipped with each instrument. It provides the necessary steps to configure the Wi-Fi® settings for connecting the device to a local Wi-Fi® network and will also guide you through installation.

NOTICE

As long as a suitable microSD card is installed, the AirAssure™ IAQ monitor will store data on the card whether or not the unit is connected to Wi-Fi®. TSI® is not liable for corrupt data on the memory card.

NOTICE

If connection to the internet is lost, the AirAssure™ device will buffer and store data onto its internal memory for approximately 14 days (logged at 15 min. intervals), which will then be uploaded to the cloud once internet connection has been restored. Data older than that will be available only on the microSD card. Currently, customers cannot manually upload microSD card data to the TSI® Cloud. You will be notified on the cloud data if the AirAssure™ IAQ monitor has trouble writing to the microSD card.

NOTICE

The monitor does not have the capability to connect to public Wi-Fi® networks that require a second step of browser authentication, such as a free public hotel or airport network. A different network will need to be chosen.

NOTICE

Some corporate networks require the device MAC address for security. This can be found on the serial number label of the monitor.



CAUTION

NEVER open the monitor when it is powered on or connected to the power adapter!

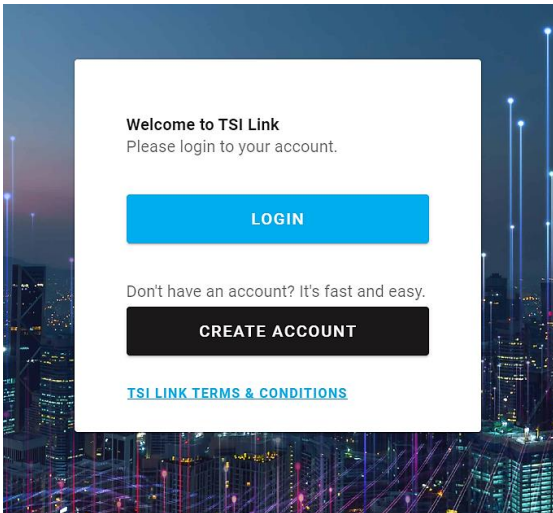
The monitor contains very sensitive sensors that are susceptible to electrostatic discharge (ESD) and ESD precautions should be followed to avoid damage.



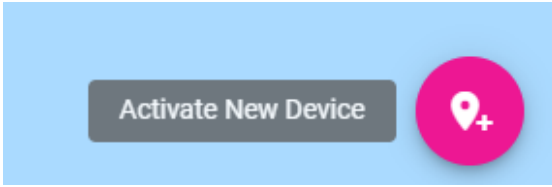
If using the microSD card only, you can skip the steps below for connecting the device to a Wi-Fi® network.

Activating a New Device(s)

1. Open the browser on your phone/computer and navigate to www.tsilink.com/.
2. Login using your TSI.com account credentials. If you do not have a TSI.com account, click on the **“Create Account”** button and create a new account.



3. Once you are logged in, click on the plus icon in the lower right. Hovering over it will show “Activate New Device.”



4. Enter the required information into the fields. The serial number can be found on the back of the device. You can also name the device, configure its location and whether or not you would like to make the data public.

A screenshot of a web form titled "Activate Device". The form contains several input fields and options. On the left, under "Device Details", there is a "Device Type" dropdown menu set to "AirAssure", a "Device/Location Name" field with "AirAssure Air Monitor", a "Device Serial Number" field with "81442299999", and a "Printed on the bottom of the device. No spaces." field with "11 / 11". On the right, under "Device Location", there is a "USE BROWSER LOCATION" link, a "Latitude" field with "45.1742755", and a "Longitude" field with "-93.1739992". Below these fields, there is a "Make Device Public" toggle switch (currently off) and an "Indoor Sensor" toggle switch (currently on). A note states: "Your device data will be shown on the map for other TSI Link customers. This only includes device location and measurements, and other customers cannot export any data." At the bottom, there is a "Convert an address to coordinates at" link with the URL "https://www.latlong.net/". A "CLOSE" button is at the bottom left and a "DONE" button is at the bottom right.

5. Click “Done” when finished.
6. Repeat as necessary for remaining devices.

Connecting AirAssure™ Monitor to a Wi-Fi® Network

For best results, set up the device before mounting it in a permanent location. However, ensure you have good Wi-Fi® strength in the final location. If access to Wi-Fi® is not available, data will always be stored on the included microSD memory card.

The AirAssure™ Indoor Air Quality Monitor can be powered by the USB wall plug power supply and USB-C cable for this part of the process. It is recommended to complete these steps prior to wall mounting, as access to the back of the device is required.

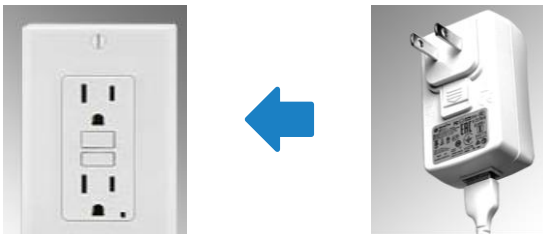
1. Remove the power supply, plug adapter kit, and USB-C cable from its packaging. Select your region's plug connector and mate it to the power supply by "snapping" the plug connector into the adapter.



2. Connect the other end of the USB cable to the USB-C port on the bottom of the monitor.






3. Connect the USB-A cable end into the power supply and then plug-in the power adapter to a nearby power outlet.



- The monitor should turn on as indicated by the light bar on the front. To connect the monitor to the internet, you first have to connect to the monitor's hot spot.



- Pulse yellow indicates that the monitor is in set up mode as a Wi-Fi® hotspot. **It will remain in this mode for 60 seconds.** If you need more time, simply unplug and plug the monitor back in again.

 LED	 Wi-Fi®	 Cloud
Pulse Yellow	Set up Mode	
Pulse White	Connecting	
Pulse Blue	Connected	Connecting
Solid Blue	Connected	Connected
Solid White	No connection	No connection

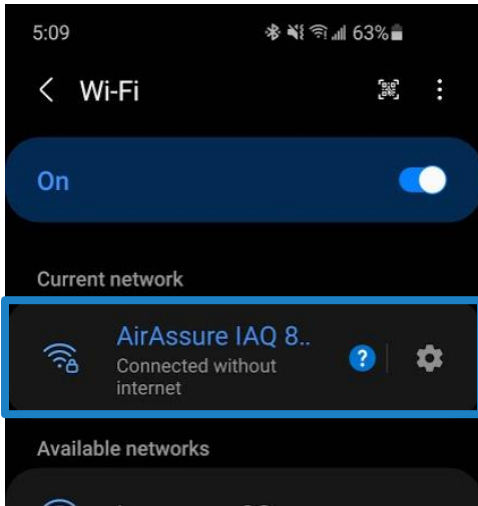
- Locate the label on the back of the monitor.



7. With your phone camera, scan the QR code at the top of the label to connect to the monitor's Wi-Fi® hotspot. You should be prompted to connect to a new Wi-Fi® network called "AirAssure IAQ 8144XXX..."



8. If you are not connected automatically, you can still connect manually by searching for Wi-Fi® networks and connecting to the one listed as "AirAssure IAQ 8144XXX..."



9. Once connected to the AirAssure™ IAQ monitor Wi-Fi® network, use your phone camera again to connect to the setup web page or open your phone browser and enter a URL of **192.168.4.1**.



10. You should see a web page like the one below. Select your home or office Wi-Fi® network from the list.

**TSI AirAssure™
IAQ Monitor Setup**

**SN: 81442110016 MAC:
C4:DD:57:A8:FE:A8**

**Connect AirAssure™ IAQ Monitor
to a Nearby Wi-Fi Network**

Choose Wi-Fi Network Name (SSID)
(refresh webpage to reload Wi-Fi Networks list)

(Select Wifi Network) ▼

11. Enter the local Wi-Fi® password and click **Save**.

Connect AirAssure™ IAQ Monitor to a Nearby Wi-Fi Network

Choose Wi-Fi Network Name (SSID)
(refresh webpage to reload Wi-Fi Networks list)

Inverness_Guest1

Wi-Fi Network Password
(leave blank if no password)

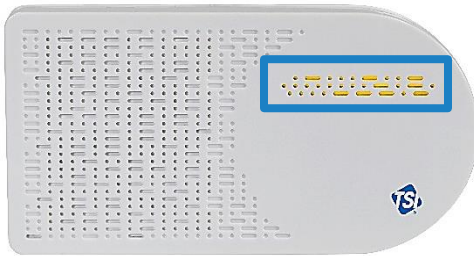
.....

Note: Use the password for your local Wi-Fi network. Do not use the Network Security Key from the device label.




Show Password


SAVE




12. The monitor should automatically power cycle and start again with a pulsing yellow LED light bar.



13. The process of connecting to your local internet will be reflected in the color sequence shown below. This may take several minutes.

 LED	 Wi-Fi®	 Cloud
Pulse Yellow	Set up Mode	
Pulse White	Connecting	
Pulse Blue	Connected	Connecting
Solid Blue	Connected	Connected
Solid White	No connection	No connection

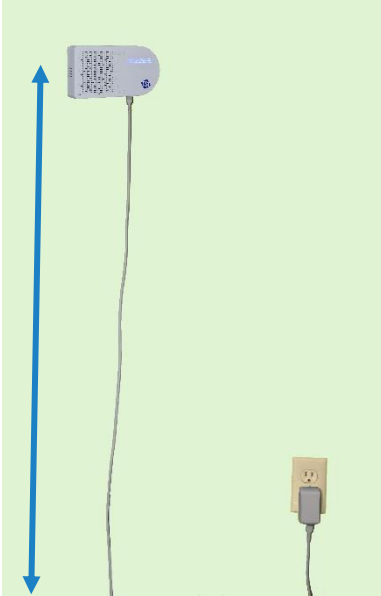
14. If all connections are made, the LED will be solid blue. 
15. You should now be able to see measurement data from the device. Be patient, as it may take a few minutes for the device to start reporting its data to the cloud.
16. If the LED light bar stops at solid white, review the steps above and repeat as needed or see the [“Getting Help”](#) section below.

 LED	 Wi-Fi®	 Cloud
Pulse Yellow	Set up Mode	
Pulse White	Connecting	
Pulse Blue	Connected	Connecting
Solid Blue	Connected	Connected
Solid White	No connection	No connection

Installing the AirAssure™ Indoor Air Quality Monitor

The AirAssure™ IAQ monitor can be mounted using screws or using double-sided tape (such as 3M® Command® strips). Power can be supplied using either the wall plug or building-supplied 24 VAC from inside a wall. Instructions for both are below.

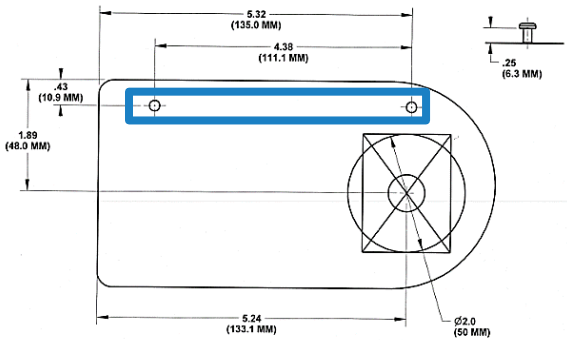
1. Typically locate the monitor 1.2 to 1.5 m (4 to 6 ft) above the floor to monitor the “breathing zone.”



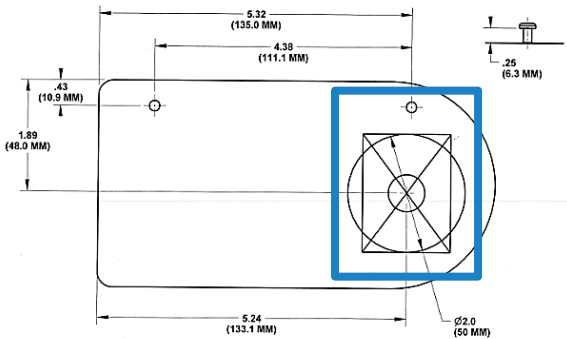
2. Double-sided tape (such as 3M® Command® strips) works well and can be removed and repositioned.



3. If using screws, position the template from the quick start guide and use the included level to mark the screw locations on the wall for mounting. If using a wall plug, install the screws and mount the monitor.



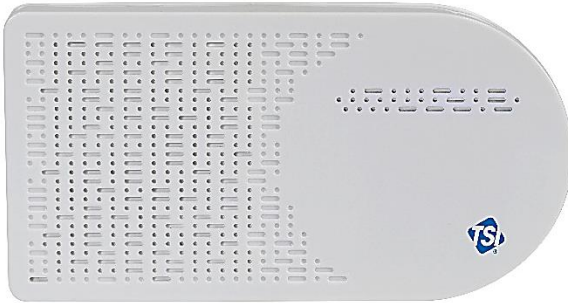
4. If using 24 VAC power, mark the cut-out guide area for the wiring feed through (large circle or rectangle).



5. Cut the hole and connect the wiring (22-16 AWG, 0.5-1.5 mm²) to the 24 VAC plug.



6. Before applying power to the connection, insert the 24 VAC plug into back of monitor and mount it on the wall.



7. If the screws need to be more secure, press gently on the two pads on top of the front cover and push down and away from the wall.



NOTICE

NEVER open the monitor when it is powered on or connected to the power adapter!

The monitor contains very sensitive sensors that are susceptible to electro-static discharge (ESD) and ESD precautions should be followed to avoid damage.






8. Tighten the screws as needed and close the cover again.






9. When power is now applied, the light bar on the monitor will illuminate and pulse yellow.



10. The process of connecting to your local internet will be reflected in the color sequence shown below. This may take several minutes. The LED light bar should be solid blue.

	 LED	 Wi-Fi®	 Cloud
↓	Pulse Yellow	Set up Mode	
	Pulse White	Connecting	
	Pulse Blue	Connected	Connecting
	Solid Blue	Connected	Connected
	Solid White	No connection	No connection

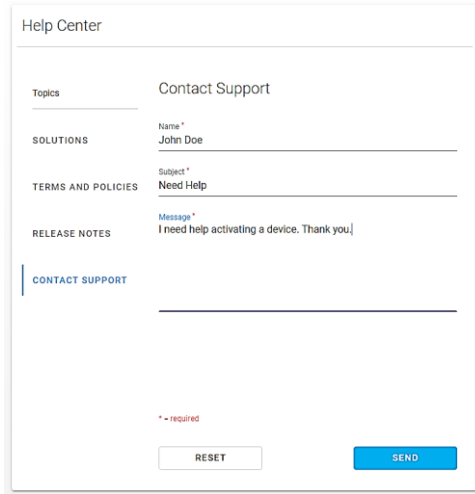
11. If the LED light bar stops at solid white, review the steps above and repeat as needed or see the [troubleshooting section](#) in Chapter 5 or the “[Getting Help](#)” section below.

	 LED	 Wi-Fi®	 Cloud
	Pulse Yellow	Set up Mode	
	Pulse White	Connecting	
	Pulse Blue	Connected	Connecting
	Solid Blue	Connected	Connected
	Solid White	No connection	No connection

Getting Help

Please check the Help Center at: www.tsilink.com

Click on **“Help”** and **“Contact Support.”** Send the support team a message by filling out the form and clicking **“Send.”**



The screenshot shows a web form titled "Help Center" with a "Contact Support" heading. On the left, there is a navigation menu with links for "TOPICS", "SOLUTIONS", "TERMS AND POLICIES", "RELEASE NOTES", and "CONTACT SUPPORT". The "CONTACT SUPPORT" link is highlighted with a blue vertical bar. The form fields include: "Name*" with the value "John Doe"; "Subject*" with the value "Need Help"; and "Message*" with the value "I need help activating a device. Thank you!". At the bottom, there are "RESET" and "SEND" buttons. A red asterisk with the text "* - required" is located above the buttons.

Technical Contacts

If you have any difficulty setting up or operating the AirAssure™ Indoor Air Quality monitor, or if you have technical or application questions about this system, contact Technical Support at TSI® Incorporated, 1-800-680-1220 (USA) or (651) 490-2860 or e-mail technical.services@tsi.com.

If the AirAssure™ monitor does not operate properly, or if you are returning the instrument for service, visit our website at tsi.com/service, or contact TSI® Customer Service at 1-800-680-1220 (USA) or (651) 490-2860.

International Contacts

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Chapter 3

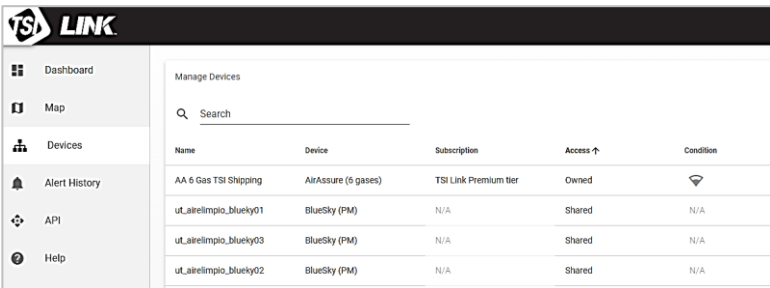
Operation


Overview

The AirAssure™ Indoor Air Quality (IAQ) Monitor's primary use is for indoor applications. It is designed to operate 24/7 when powered by a power outlet or 24 Volts AC low-voltage building power. Once you have setup your monitor(s) and connected them to a local wireless (Wi-Fi®) network, you can log into the TSI® Cloud platform, www.tsilink.com, to view the air quality in real time. It will give you insights into how the air quality varies over time inside of your indoor space. Monitoring your indoor air allows you to start seeing trends, which can lead to making more informed decisions, benefiting you and potentially the entire building/community.

How to View Data from one or more AirAssure™ IAQ Monitors

1. Go to www.tsilink.com and log in.
2. Click on the map and zoom in to the area where your AirAssure™ IAQ device pin is located.
3. Click on the device pin to view the current values.
4. Or click on the devices tab to view high-level readings of multiple devices side-by-side.



Name	Device	Subscription	Access ↑	Condition
AA 6 Gas TSI Shipping	AirAssure (6 gases)	TSI Link Premium tier	Owned	
ut_airelmpio_blueky01	BlueSky (PM)	N/A	Shared	N/A
ut_airelmpio_blueky03	BlueSky (PM)	N/A	Shared	N/A
ut_airelmpio_blueky02	BlueSky (PM)	N/A	Shared	N/A

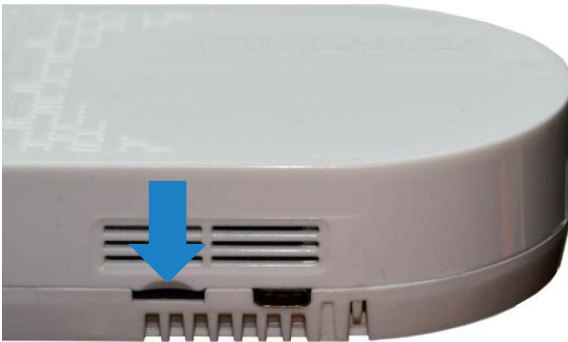
5. Please note to view data on the cloud right after you installed the AirAssure™ IAQ monitor, powered it **ON** and connected it to the TSI Link™ Solutions, please wait at least 15 minutes before you see a data point in the cloud.

How to Download Data from one or more AirAssure™ IAQ Monitors

1. Go to www.tsilink.com and log in.
2. Click on the map and zoom in to the area where your AirAssure™ IAQ device pin is located.
3. Click on the device pin.
4. Click on the history button.
5. Click on the three dots in the top left corner and select **Export CSV**.

How to Download Data from the microSD Card in the AirAssure™ IAQ Monitor

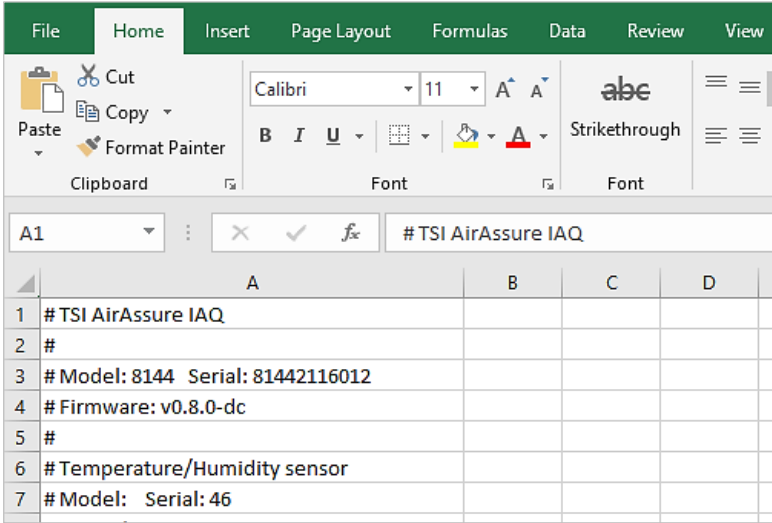
1. To avoid the remote possibility of corrupting data on the card, disconnect the power to the unit by disconnecting the USB cable from the power adapter.
2. The microSD card slot is located next to the USB connector. Remove the card by pressing in with a fingernail or tool until the card is ejected.



3. Insert the card into a computer (you may need a commonly-available adapter) and download the data. You have the options to erase and reinstall the card, insert a new card, or choose to not install a microSD card. If the AirAssure™ IAQ monitor has any issues writing to the card, an error flag will be activated on the cloud that action needs to be taken.
4. The 32 GB card provided will store approximately a maximum of 300 million data entries or the equivalent of hundreds of years of data.

Interpreting the Data Downloaded from the microSD Card or from the Cloud

Data downloaded from the AirAssure™ Indoor Air Quality Monitor from the microSD card or cloud is stored as an ASCII format file with the serial number and date as the filename and .csv as the extension (e.g. 81442110016-2020111.csv). This format is easily imported into spreadsheet and database programs.



The top line of the output in the file has header information such as model, serial number, firmware version, etc. Farther down there are descriptions of the data in each column along with the data. The actual output of the file will depend on the number and configurations of sensors installed in your particular device.

	A	B	C	D	E
58	Timestamp	System St	Temperat	Humidity	Temperat
59	UTC		C	%	inh
60	4/29/2021 21:16	1	24.2	27	0
61	4/29/2021 21:31	0	24	27	0

Most of them are self-explanatory but a few such as sensor status require further explanation that can be found in the Frequently Asked Questions (FAQs) section on the website.

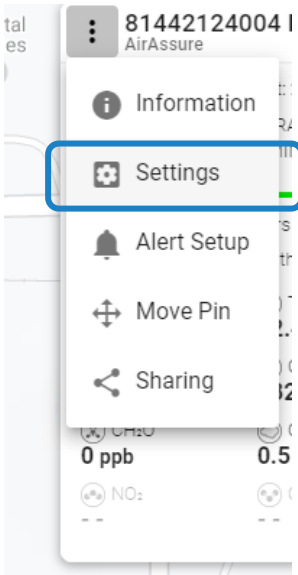
<https://tsi.com/resources/airassure-iaq-monitors-faqs/>

See [Appendix B](#): for Sensor and Device Status definitions.

Logging Interval Options and How to Change the Settings

By default, the AirAssure™ Indoor Air Quality Monitor will log a sample (data point) every 15 minutes. Available logging intervals include 1, 5, 10, 15, 30 and 60 minutes. The logging interval can be changed by logging into TSILINK.com and accessing the device settings. Some logging interval options may not be accessible, depending on your TSILINK.com subscription level.

Sampling frequency varies from sensor to sensor for the AirAssure™ Indoor Air Quality Monitor. For example, the PM (particulate matter) sensor samples at a rate of 1 Hz. The logged data that is reported on TSILINK and microSD card, is an average of the 1 second data points. Therefore, if the logging interval is set to every 1 minute, then the logged data is an average of the last 60 data samples. Second by second data is not stored on the microSD card and cannot be obtained or downloaded from the device.





Device Settings

GENERAL

LOCATION

CALIBRATION

Device/Location Name *

81442124004

11 / 25

Make Device Public

Your device data will be shown on the map for other TSI Link customers. This only includes device location and measurements, and other customers cannot export any data.

Indoor Sensor 

The AirAssure device is designed for indoor use only.

Logging Interval

1 minute average

Cleaning Interval

Daily

UNREGISTER DEVICE

This will remove the device from your account.

* = required

CANCEL

SAVE

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Chapter 4

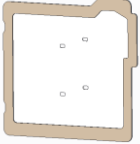



Maintenance

Replacement sensors can be ordered from TSI® Incorporated. Although sensor life times vary depending on the conditions they are exposed to, conservative recommended replacement intervals are listed below for each sensor:

NOTICE


Recommend replacement intervals are derived from the expected indoor conditions: Temperature (65 to 75°F/18 to 24°C) and Relative Humidity (30 to 50%).

Item	Part Number	Description	Recommended Replacement Interval
	814408	2-Gas Variant Sensor Cartridge: tVOC, Temperature, Relative Humidity, and Barometric Pressure	1 year
	814401	4-Gas Variant Sensor Cartridge: CO, tVOC, Temperature, Relative Humidity, and Barometric Pressure	1 year
	814402	6-Gas Variant Sensor Cartridge: CO, O ₃ , tVOC, NO ₂ , and SO ₂ , Temperature, Relative Humidity, and Barometric Pressure	1 year

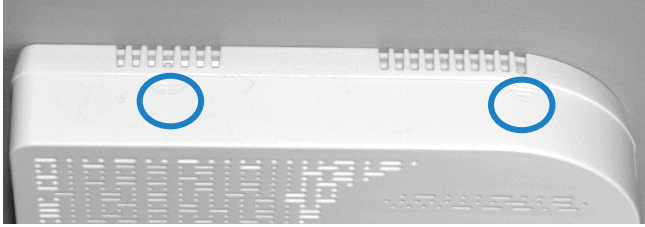
Item	Part Number	Description	Recommended Replacement Interval
	814407	Membrane Filters (Pack of 3)	Replace when replacing the gas sensors above
	814403	TSI® Calibrated PM Replacement Sensor	3 years
	814404	CO ₂ Replacement Sensor	3 years
	814405	Formaldehyde Replacement Sensor	1 year

1. Any maintenance should be performed only after powering the unit down by disconnecting the USB cable from the power adapter or removing the unit from the wall and disconnecting the 24 VAC power connector from the back panel.



CAUTION	
<p>NEVER open the monitor when it is powered on or connected to the power adapter!</p> <p>The monitor contains very sensitive sensors that are susceptible to electrostatic discharge (ESD) and ESD precautions should be followed to avoid damage.</p>	

2. There are two indents at the top of the unit indicating where to press down and out to separate the cover from the base. The cover will pivot from the bottom allowing the cover to be removed.



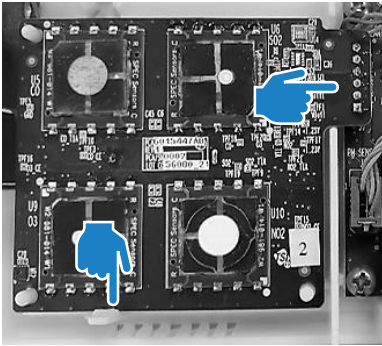
3. You can identify the sensors based on the table above and picture below. Detailed directions follow for each sensor.



Replacing the Multi-Sensor Cartridge and Membrane

1. Release the lever at the bottom-left of the board and lift the bottom of the PC board slightly away from the back panel.
2. Pull straight out from the back panel at the top and bottom of the connector on the right until the board is free.
3. Replace the old board with the new board.
4. Remove the old membrane filter on the cover of the monitor and replace it with a new membrane. This will extend the life of the sensors by protecting them from dust and debris.

5. Replace the cover, power up the monitor and connect it to the cloud to register the new sensors and their calibration values.



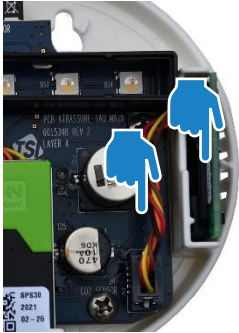
Replacing the PM Sensor

1. Unplug the connector on the left by pressing the locking clips in from the top and bottom and pulling the connector straight out.
2. Pull the sensor module from the top and pivot it away from the PC board.
3. Lift the PM sensor module up and away from the case.
4. Reverse the steps for the new sensor.
5. Replace the cover, power up the monitor and connect it to the cloud to register the new sensor and its calibration values.



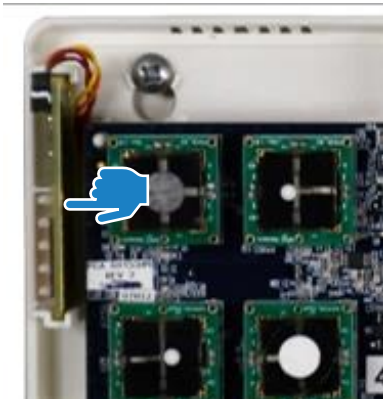
Replacing the CO₂ Sensor

1. Unplug the connector on the left by pressing the locking clips in from the top and bottom and pulling the connector straight out.
2. Pull the sensor module from the top and straight away from the case.
3. Reverse the steps for the new sensor.
4. Replace the cover, power up the monitor and connect it to the cloud to register the new sensor and its calibration values.

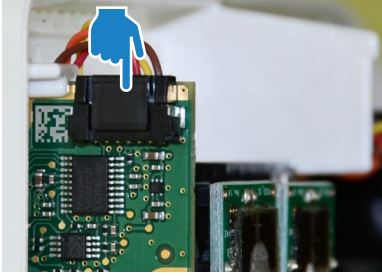


Replacing the Formaldehyde Sensor

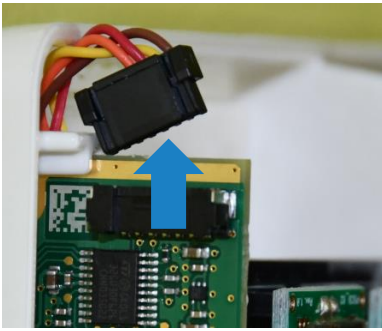
1. The formaldehyde sensor is located on the left side of the monitor on a separate PC-board.



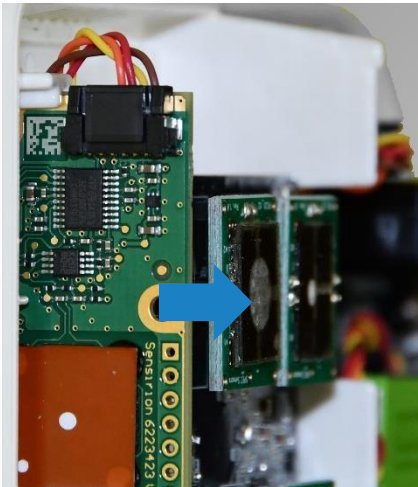
2. Depress the back of the cable connector (pushing into the page in the picture below).



3. Pull the connector from the top and up.



4. Pull the sensor module PC-board from the top and straight away from the wall. You may have to wiggle it up and down to release.



5. Reverse the steps for the new sensor.
6. Replace the cover, power up the monitor and connect it to the cloud to register the new sensor and its calibration values.




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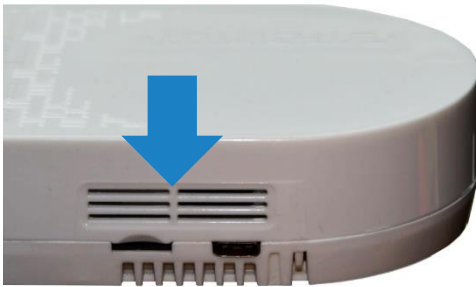
Chapter 5

Troubleshooting

Detailed troubleshooting and frequently asked questions can be found at <https://tsi.com/resources/airassure-iaq-monitors-faqs/>

The table below lists some symptoms, possible causes, and recommended solutions for common problems encountered with the AirAssure™ Indoor Air Quality Monitor.

Possible Cause	Corrective Action		
The AirAssure™ IAQ monitor does not turn on			
Bad Power Connection	Check all power connections from the outside of the Enclosure to the Monitor. If you are powering with 24 VAC, confirm that the proper voltage is present or try powering with the USB power supply. If using the USB power supply, try a different power supply and/or cable.		
The AirAssure™ IAQ monitor has no data on the TSI® Cloud			
Check the LED status bar	If the device is not connecting (solid blue after 2 minutes), check your local 2.4 GHz Wi-Fi® connection strength with another device like a phone. If there is a good signal, follow the directions in the Setting Up section to check the connection.		
	 LED	 Wi-Fi	 Cloud
	Pulse Yellow	Set up Mode	
	Pulse White	Connecting	
	Pulse Blue	Connected	Connecting
	Solid Blue	Connected	Connected
	Solid White	No connection	No connection

Possible Cause	Corrective Action
<p>Cannot connect to Wi-Fi® or the internet.</p>	<p>Note that AirAssure™ IAQ monitor can only connect to 2.4 GHz Wi-Fi® signals. Most Wi-Fi® routers provide several frequency channels. Please make sure you are connecting to the 2.4 GHz channel.</p> <p>The monitor does not have the capability to connect to public networks that require a second step of browser authentication, such as a free public hotel or airport network. A different network will need to be chosen.</p> <p>Some corporate networks require the device MAC address for security. This can be found on the serial number label of each monitor.</p> <p>The monitor does not support IEEE 802.1X connections.</p> <p>Additionally, the following firewall ports need to be available:</p> <ul style="list-style-type: none"> • DNS: 53 (UDP) • SNTP: 123 (UDP) • HTTPS: 443 (TCP) • MQTT: 8883 (TCP)
PM readings are unusually low	
<p>Plugged with dust or debris</p>	<p>Check the inlet and outlet ports next to the USB connection. If they are plugged, gently blow out debris with clean compressed air.</p> 
<p>Replace sensor</p>	<p>Sensor may be past its recommended replacement cycle.</p>

Possible Cause	Corrective Action
PM or gas readings are not correct	
Custom calibration factor is incorrect	Check the custom calibration factor on TSI® Link. Is the value correct? Was it changed by mistake?
No custom calibration factor	Values can be corrected by using a custom calibration factor. The custom calibration factor can be changed in the cloud.
Replace sensor	Sensor may be past its recommended replacement cycle (see maintenance section for recommended replacement cycle times).

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Appendix A

Specifications*

Overall	
Operating Temp Range	0 to 40°C (32 to 104°F)
Operating Humidity Range	15 to 95% non-condensing
Storage Temperature	5 to 30°C (41 to 86°F)
Case Dimensions	171 mm x 89 mm x 33 mm 6.75 in. x 3.5 in. x 1.3 in.
Weight	0.23 kg (0.5 lbs.)

PM Sensor (PM 2.5)	
Concentration Range	0 to 1000 µg/m ³
Measurement Resolution	1 µg/m ³
Counting Efficiency	50% at 0.3 µm and 98% at 0.5 µm
Accuracy	±10 % @ 100 to 1000 µg/m ³ when compared to a DustTrak™ DRX monitor
Zero Stability	±1 µg/m ³

Gas Sensors (if installed)	
CO ₂ Range	400 to 10,000 ppm
CO ₂ Resolution.....	1 ppm
CO ₂ Accuracy*	± 3% of reading + 30 ppm, typical
CO ₂ Sensor Technology.....	NDIR (Nondispersive infrared)
Formaldehyde Range.....	0 to 1000 ppb
Formaldehyde Resolution	1 ppb
Formaldehyde Accuracy*	±20% of reading + 20 ppb, typical
Formaldehyde Sensor Technology.....	EC (electrochemical)
tVOC Range	0 to 1885 mg/m ³
tVOC Resolution	0.001 mg/m ³ (tVOC)
tVOC Sensor Technology	Metal Oxide (i.e., solid state)

Gas Sensors (if installed)	
CO Range.....	0 to 1000 ppm
CO Resolution	0.1 ppm
CO Accuracy*	±15% of reading or ±15 ppb, whichever is greater
CO Sensor Technology	EC (electrochemical)
SO ₂ Range.....	0 to 10,000 ppb
SO ₂ Resolution	1 ppb
SO ₂ Sensor Technology.....	EC (electrochemical)
Ozone Range.....	0 to 20,000 ppb
Ozone Resolution	1 ppb
Ozone Sensor Technology	EC (electrochemical)
NO ₂ Range	0 to 20,000 ppb
NO ₂ Resolution	1 ppb
NO ₂ Accuracy*	±15% of reading or ±15 ppb, whichever is greater, typical
NO ₂ Sensor Technology	EC (electrochemical)

*Accuracy based on 40% relative humidity and 21°C temperature

Temperature Sensor	
Range	-40 to 125°C (-40 to 257°F)
Accuracy	±0.5°C (±32.9°F)

Humidity Sensor	
Range	0 to 100% RH
Accuracy	±3% RH

Barometric Pressure Sensor	
Range	8 to 35 inHg (270 to 1185 hPa)
Accuracy	± 0.12 inHg (± 4 hPa)

AC and DC Power Requirements	
24 VAC Back Panel	24 VAC, 50/60 Hz
USB-C	AC/DC Adapter Input: 100 to 240 VAC, 50 to 60 Hz AC/DC Adapter Output: 5 VDC
Power Consumption	< 5 W

Environmental/Installation Requirements	
Maximum Altitude.....	2000 meters (6,560 feet)
Pollution Degree.....	2
Installation/Overvoltage Category.....	II

**Specifications are subject to change without notice.*

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Appendix B

Status Flags and Error Codes

Below is a table of error codes that may be listed in the sensor status columns of the downloaded CSV file from the cloud and/or SD card. Any error codes, other than zero, indicate one of the below errors occurred during that logging interval.

The AirAssure™ firmware is taking readings from the sensors usually at a frequency greater than one time per second. What that means is that if an error code is reported, it may have only occurred once during logging interval. For example, a PM sensor error of 16, during a 5 min logging interval, may have only occurred 1 time during the 300 times the firmware was attempting to take a reading from the sensor. Therefore, use best judgement to determine if there is an actual sensor failure. If the device seems to be reporting data accurately, when compared to other AirAssure™ devices and/or a reference device, you may not have to take any action. If needed call TSI® Technical Support and they can help provide direction.

Type	Value	Definition	Actions/Resolutions
Device Status	0	No Errors	N/A
	1	Device was rebooted	No action required
	2	Data was not written to the SD card (SD card not present or write failed)	Confirm SD present and installed properly
	4	Cloud communication error	No action required
	8	Sensor board battery is low	If error persists may have to replace entire sensor cartridge, it is not possible to replace the coin battery on the backside of the sensor board

Type	Value	Definition	Actions/Resolutions
Device Status <i>(cont.)</i>	16	Device internal time has not been synced to the cloud in the last 24 hours	If error persists may have to replace entire sensor cartridge, it is not possible to replace the coin battery on the backside of the sensor board
	32	Device internal time value is invalid due to low battery, unpowered device and lack of cloud connection	If error persists may have to replace entire sensor cartridge, it is not possible to replace the coin battery on the backside of the sensor board
	64	Sensor board EEPROM failure. Some sensors may be disabled.	Replace sensor board
Sensor Status Messages (for all sensor types, such as CO ₂ , NO ₂ , O ₃ , CH ₂ O, Temp/RH, PM, etc.)	0	No errors	N/A
	1	Sensor is not factory calibrated	Replace sensor with factory calibrated sensor
	2	Sensor hardware fault	Power cycle device. Disconnect power and check sensor connections to ensure sensor cables are in good working condition and sensors are plugged in. If error persists, replace individual sensor or complete sensor cartridge
	4	Sensor communication error	Power cycle device. Disconnect power and check sensor connections to ensure sensor cables are in good working condition and sensors are plugged in. If error persists, replace individual sensor or complete sensor cartridge

Type	Value	Definition	Actions/Resolutions
Sensor Status Messages (<i>cont.</i>)	8	Sensor checksum (data corruption) error in data	Power cycle device. Disconnect power and check sensor connections to ensure sensor cables are in good working condition and sensors are plugged in. If error persists, replace individual sensor or complete sensor cartridge
	16	Data not available	Power cycle device. Disconnect power and check sensor connections to ensure sensor cables are in good working condition and sensors are plugged in. If error persists, replace individual sensor or complete sensor cartridge
PM Sensor Only (Additional Status Messages)	128	Skipped	N/A
	256	Fan RPM error	If problem persists, replace PM sensor
	512	Laser error	If problem persists, replace PM sensor
	1024	Fan blocked	Check for blockage on PM sensor, remove blockage if possible, otherwise replace PM sensor.
	2048	Cleaning cycle completed	Not an error. Informational only.

NOTICE

It is also possible that more than one error may occur during the logging interval. If this occurs, the codes are added together to produce the final code. Use math to determine what the individual codes are.

Examples:

Device status =	<u>Reported Code = 3</u> 3 = 1 + 2 = "Device was rebooted" + "Data not written to SD card" <u>Reported Code = 17</u> 17 = 1 + 16 = "Device was rebooted" + "Device internal time has not been synced to the cloud in the last 24 hours"
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Knowledge Beyond Measure.

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