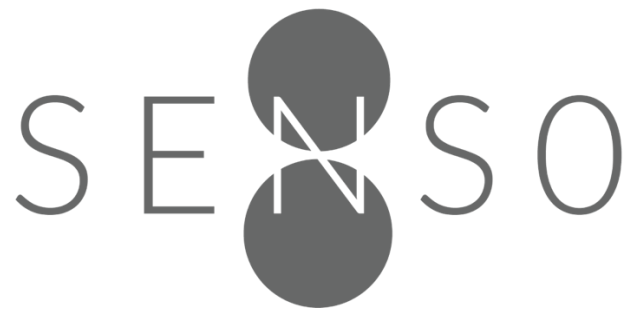




SENSO8

LoRaWAN IAQ Sensor

User Guide

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Introduction

SENSO8 LoRaWAN IAQ Sensor is an LPWAN wireless indoor air quality sensor which can detect indoor temperature, humidity, and a wide range of gases like carbon dioxide, ammonia and hydrogen sulfide. The sensor reads the environment data and uploads the data to the LoRaWAN server with a simple, open API.

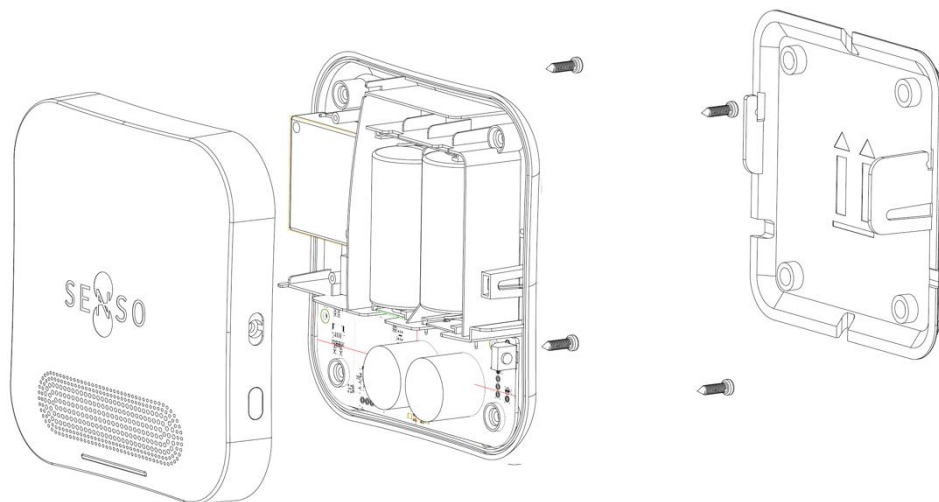
The user guide is applicable for the SENSO8 LoRaWAN IAQ Sensor models:

- LRS10701-xxxx

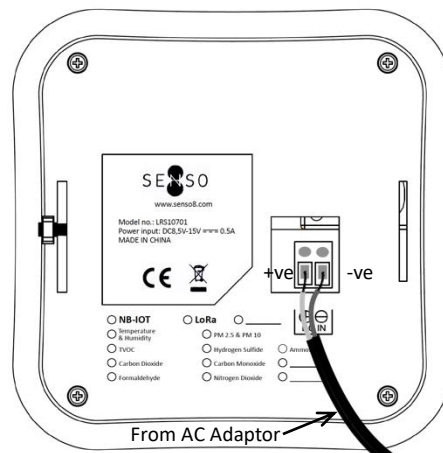


Sensor Setup

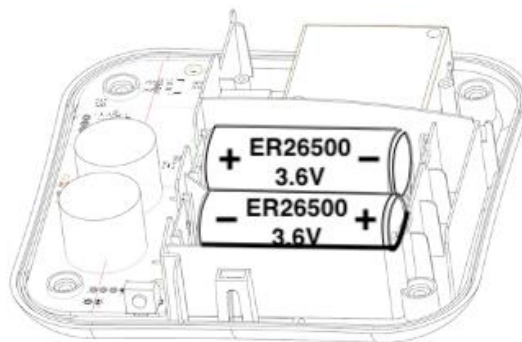
1. Make sure the sensor is not connected to any DC power supply.
2. Unfasten the screws and open the sensor's cover.



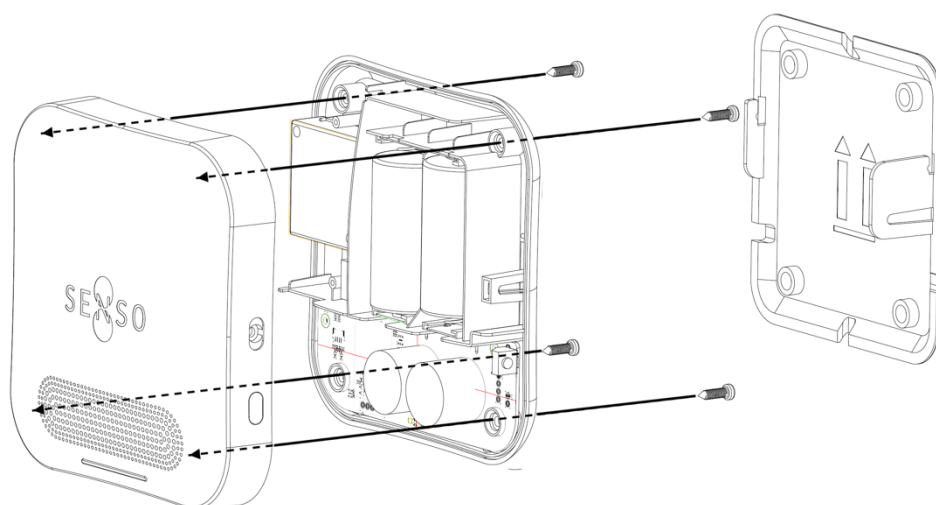
3. Connect the wires connecting to the AC adaptor (DC powered) to the terminal block on the bottom of the sensor.



Or, insert two ER26500 Li-SOCl₂ batteries into the battery compartment.



4. Put on the cover and fasten the screws on the corners.



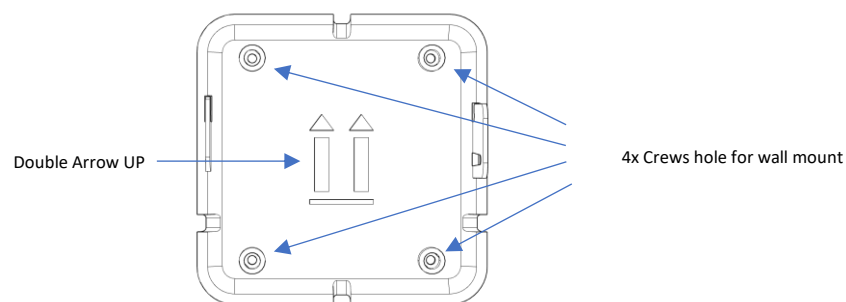
5. For the DC powered models (using the AC adaptor), the LED indicator on the top cover will light up once the adaptor is powered up.

For the battery powered models, press and hold the button on the side for 3 seconds to power on the sensor.

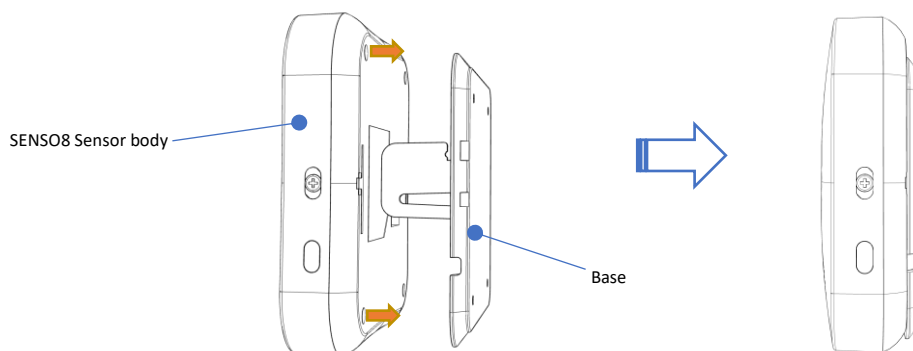
6. On power on, the sensor will send a data report. Check the server backend or dashboard to make sure the connection has been established and data can be successfully uploaded.

Installation

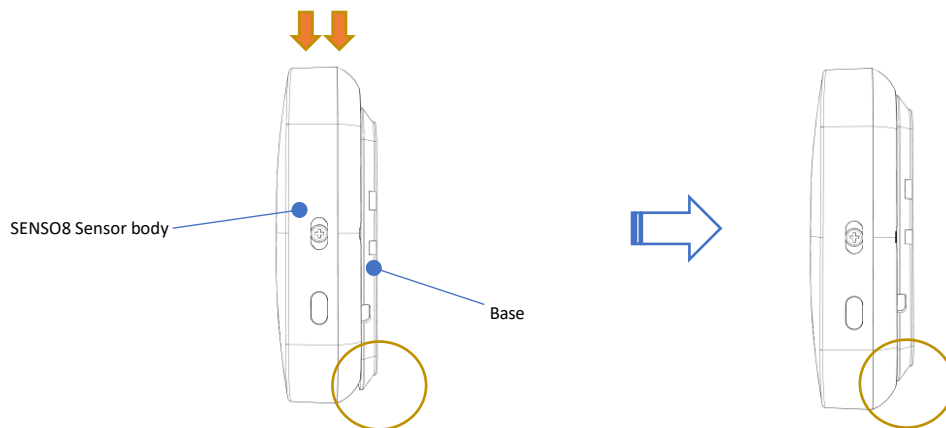
1. Perform a site survey and make sure the SENS08 IAQ sensor has a good LoRaWAN network coverage.
2. Mount the base of the sensor to the wall with the double arrows pointing upwards, and fix it with 4 screws.



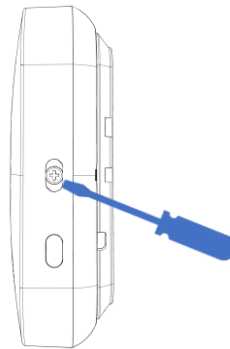
3. Attach the sensor main body to the base in the proper orientation as shown below.



4. Slide the sensor main body down until it is locked to the base.



5. Lock the sensor main body with a screw.



6. Power on the sensor
 - i. Plug the DC adaptor to the AC main, the sensor will power on automatically on DC supply (for DC supply models), OR
 - ii. Press the multi-function button for 3 seconds to power on the sensor (for battery operated models).
7. On power on, the sensor will publish a data report to the LoRaWAN server. Check the server backend or dashboard to make sure the connection has been established and data can be successfully uploaded.

Operating Instruction

Power On

- For DC supply models, the sensor powers on automatically when connected to the power supply.

- For battery powered models, press the multi-function button for 3 seconds to power on the sensor.
- The LED indicator will light up and the sensor will upload a data message to the LoRaWAN server.

Power Off

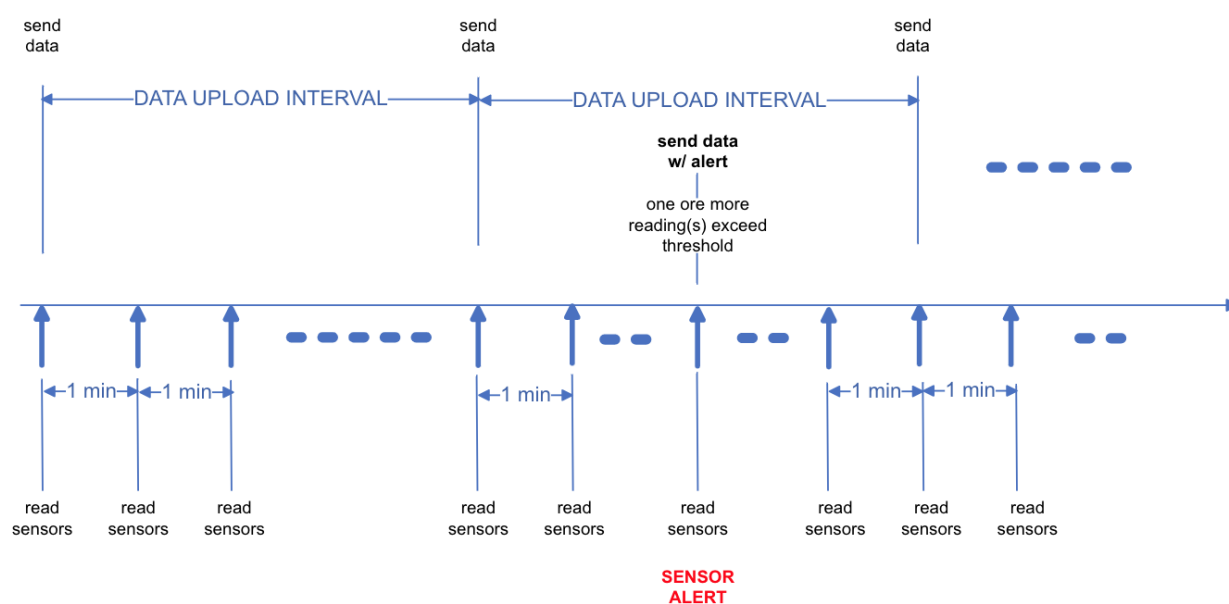
- Press and hold the multi-function button 5 seconds, the LED indicator will flash 3 times to indicate that it is shut down.

Report Latest Data

- Press the multi-function button briefly, the LED indicator will flash once. The sensor will upload the latest sensor data to the LoRaWAN server.

Sensor Operation

The sensor performs a sensor measurement (except PM sensor) every minute in the background. The PM sensor performs a measurement every 5 minutes when powered by DC supply and every 30 minutes when powered by batteries. If the reading exceeds either one of the thresholds, the sensor will send an uplink data to the network server immediately with the corresponding alert. Otherwise, the sensor will go back to sleep mode. When the data upload interval is reached, the sensor will send an uplink data with the latest sensors' reading.



Note: PM sensor measurement interval is 5 mins for DC supply and 30 mins for battery.

Configurable Sensor Settings

The following sensor settings are configurable via downlink data. The details of the data payload format can be found on the SENS08 LoRaWAN IAQ Sensor Data Payload Format Document.

Setting	Default Value	Unit
Data Upload Interval (minimum: 3)	10	min
High Temperature Threshold	30	°C
Low Temperature Threshold	18	°C
High Humidity Threshold	80	%
Low Humidity Threshold	40	%
Carbon Dioxide Concentration Threshold	1500	ppm
TVOC Concentration Threshold	435	ppb

Formaldehyde Concentration Threshold	200	ppb
Ammonia Concentration Threshold	2000	ppb
Hydrogen Sulfide Concentration Threshold	2000	ppb
Carbon Monoxide Concentration Threshold	12400	ppb
Nitrogen Dioxide Concentration Threshold	360	ppb
PM1.0 Concentration Threshold	Disable	ug/m3
PM2.5 Concentration Threshold	56	ug/m3
PM10 Concentration Threshold	254	ug/m3
LED ON/OFF Status	ON	-

LED Indicator

Device Status

Event	LED Pattern	Description
Powered On	Blue LED on	Device powered on, and uploading the first data. In OTAA mode, the LED will stay on until the sensor joined the network.
Powered Off	Blue LED flashes 3 times	Device powered off.
Report Latest Data	Blue LED on	The IAQ sensor is uploading the data when the function button is pressed.

Error Status

If the sensor is configured for the OTAA activation mode and it cannot join the LoRaWAN network in 3 minutes after power up, the LED indicator will be flashed in Blue for 2 minutes.

Air Quality Index Indicator

The LED indicator reports Air Quality Index during normal operation. The Air Quality Index (AQI) provides an indicator of the quality of the air and its health effects with a range of 0 to 500. The table below LED indicator colour and the corresponding AQI.

On battery powered sensors, the LED indicator flashes every 5 seconds. On DC powered sensors, the LED indicator has a breathing effect.

AQI	Category	LED Colour
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<=50	Good	
51-100	Moderate	
101-150	Unhealthy for Sensitive Group	
151-200	Unhealthy	
201-300	Very Unhealthy	
301-500	Hazardous	Flashing

Recommended Sensor Operating Lifetime

NH3	H2S	CO	NO2	HCHO	O3	TVOC	CO2	PM1.0/ PM2.5/ PM10	T/H
2 years	2 years	2 years	2 years	2 years	2 years	-	5 years	-	-

Troubleshooting Guide

Symptom	Fix
The LoRaWAN network server cannot receive data from the sensor.	Check the configuration (activation mode, frequency plan, device info and all security key) on the LoRaWAN server and the sensor. If there is any mis-match, the data cannot be sent to the LoRaWAN network server.
The sensor cannot be configured via downlink command.	Check the downlink command is sent as CONFIRMED downlink message.
The alert is not cleared when the reading is returned to the normal level.	For each alert, there is a hysteresis setting to prevent the alert from triggering repetitively when the reading fluctuates around the threshold. <i>Example:</i> If the high temperature threshold is 30, it will trigger an alert when the temperature is higher than 30. The alert will be cleared when the temperature falls below 29 (hysteresis is 1) rather than 30.

Warning and Personal Injury

Do not apply this product to safety protection devices or emergency shutdown devices, nor in any other applications that may result in personal injury due to product malfunction, unless explicitly authorized. Please refer to the product datasheet and user guide before installation, processing, use or maintenance of the product. Failure to comply with the recommendations may result in death and serious bodily harm. The company shall not be held liable for any damages resulting in personal injury or death. All the claims against the company managers and employees, agents, distributor and subsidiaries are hereby disclaimed, including all the costs and compensation costs, legal fees etc.

Revision History

Revision	Description	Date
1.0	Initial release.	10 Dec 2021
1.01	Added AQI indicator color table.	28 Jan 2022
1.1	Separate the user guide into NB-IoT and LoRaWAN versions.	20 Jun 2022

	Add sensor operations and configurable sensor settings.	
1.11	Insert information and drawings for installation	15 Mar 2023
1.12	Updated sensor setup drawing. Updated PM1.0 alert threshold. Added recommended sensor operating lifetime. Revised the default High Humidity Threshold from 70% to 80%	25 Apr 2023
1.13	Added diagram for DC power connection and batteries insertion.	22 Aug 2023
1.14	Added “Warning and Personal Injury” Section. Added note on PM sensor measurement interval.	20 Mar 2024