SENSO8 NB-IoT Temperature Sensor User Guide

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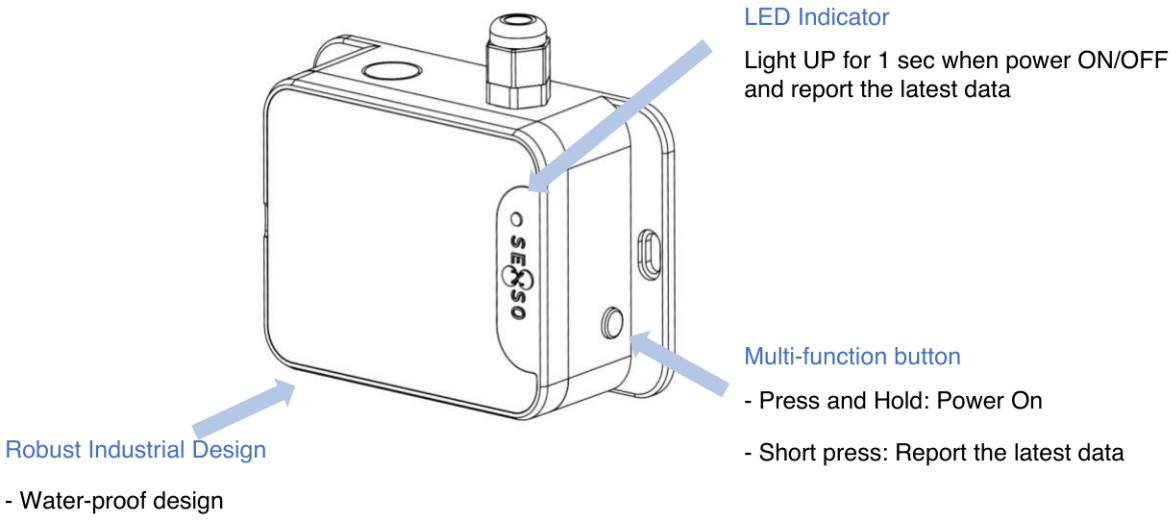
1. Introduction

Applicable Models:

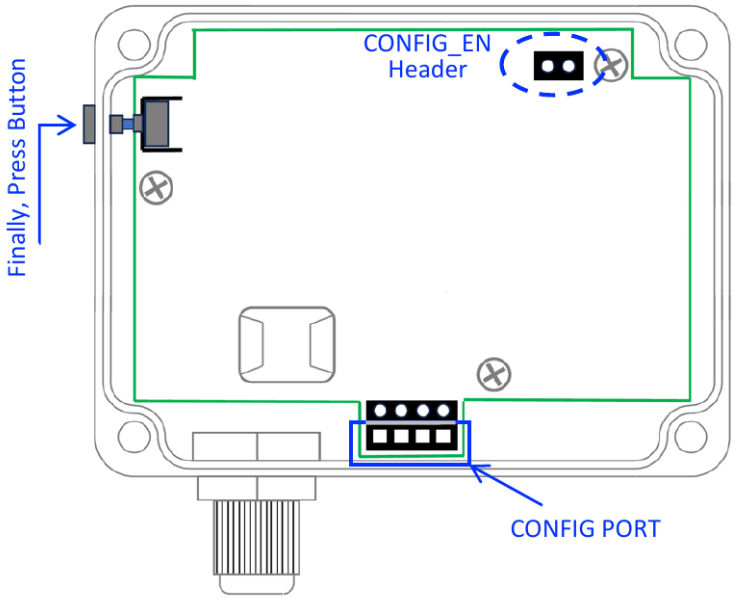
- SEN20200-0000
- SEN21200-0000



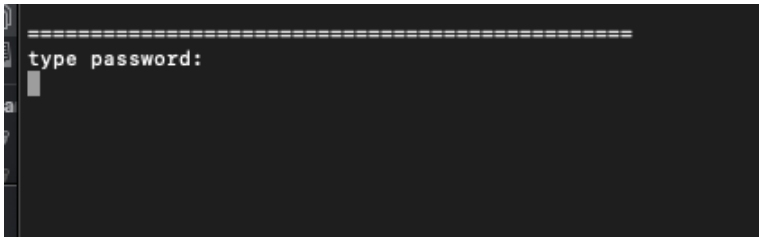
2. Sensor Configuration

1. Unfasten the screws on the corners and open the top cover.
2. Short the CONFIG_EN header with a jumper.
3. Connect a USB-to-UART converter to CONFIG PORT.

UART-to-USB	SENSO8
VCCIO	+3.0V
TXD	CONFIG_RX
RXD	CONFIG_TX
GND	GND



4. Open a serial terminal software on a computer and connect it to the USB-to-UART converter.
5. Insert an ER26500 battery to the battery holder and press the user button to power up the device.
6. Type the password when it prompts for it. Please contact your sales representative for the device password.



7. Then the configuration can be taken according to the requirements.

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Main Menu
1. Network Settings
2. MQTT Broker Settings
3. MQTT Client Settings
4. Device Settings
5. Change Password
6. Test Hardware
7. Test NB-IoT
8. Test RTC
9. Device Advanced Settings
A. Exit
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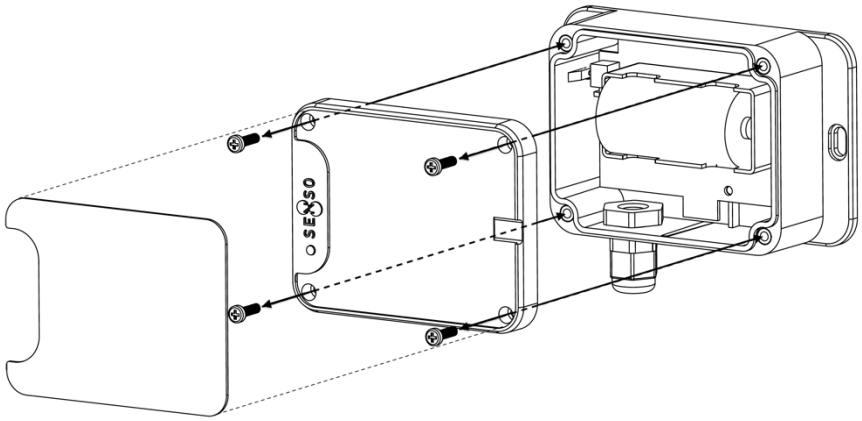
8. You can ask for the document of “SENSO8 NB-IoT UART Configuration Guide” from your sales representative for more information.

3. Sensor Installation

1. Unfasten the screws on the corners and open the top cover.



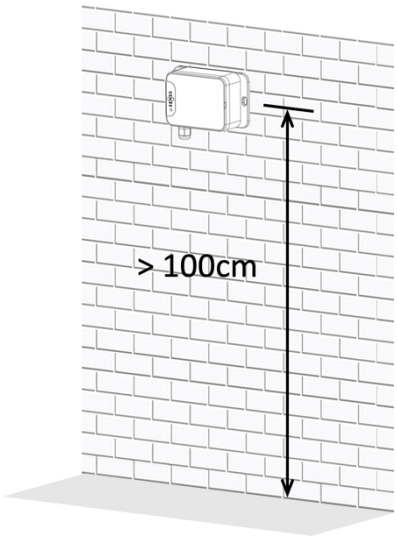
2. Remove the battery from the battery holder if it is installed.
3. Insert a nano-SIM to the SIM card socket next to the battery holder. **Make sure the direction of the nano-SIM is correct**.
4. Insert an ER26500 battery to the battery holder. **Make sure the polarity of the battery is correct as shown on the label on the battery holder**.

5. Make sure the CONFIG_EN jumper is not shorted.
6. Put on the top cover and fasten the screws on the corners.
7. Press and hold the multi-function button for a few seconds, the LED indicator on the top cover will light up.
8. On power up, the sensor will publish a data report and device configure report to the MQTT broker. For details of the report, please refer to the SENSO8 NB-IoT Temperature Probe Sensor API Document.

4. Installation Guideline

The sensor is intended for installation on interior walls of buildings. Avoid exposing the sensor to direct sunlight.

It should be installed with the cable gland facing the floor as shown below. The wires should be going through the cable gland, and make sure the cable gland is well fastened.



To ensure a good radio reception, it is suggested to install the sensor at a height of at least 100 cm from the floor. In addition, avoid installing the sensor near metal objects.

5. Operating Instruction

Power On

- Press and hold the multi-function button until the green LED indicator turn on.
- The sensor will upload a message to the data topic and a message to device configure topic.

Power Off

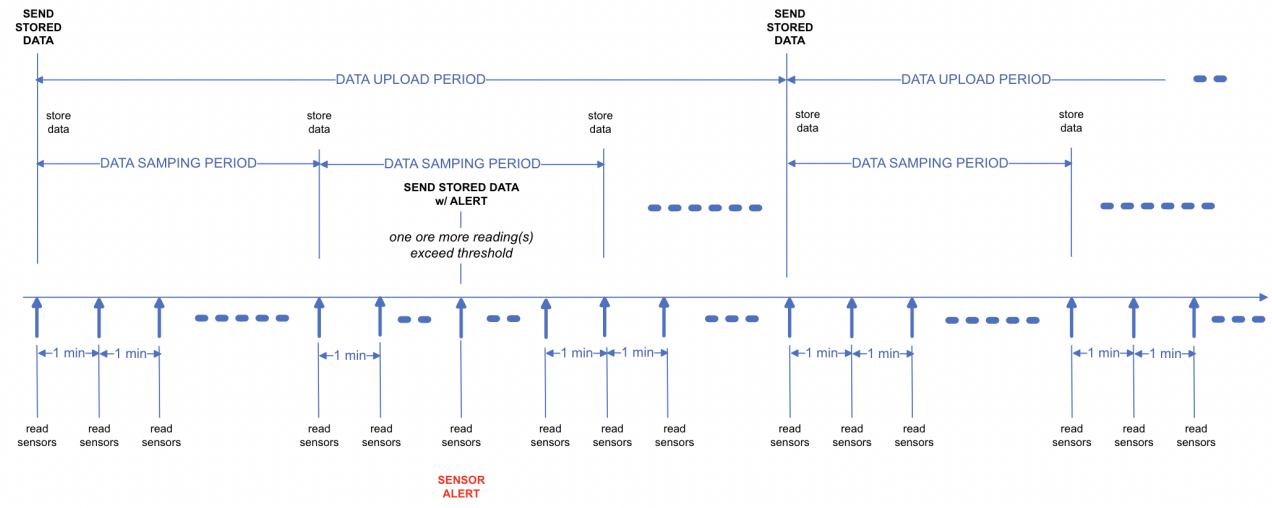
- The sensor does not need to power off. The SENSO8 sensor can only be powered off by removing the battery.

Report Latest Data

- Press the multi-function button briefly, the LED indicator will flash once. The sensor will upload a message to the data topic.
- During the upload, the sensor will not accept new request and the LED indicator will not flash on subsequent button presses. The upload lasts about 20 seconds to 2 minutes typically, depending on the signal quality and network carriers.

6. Sensor Operation

The sensor performs a temperature measurement every minute in the background. If the reading exceeds the thresholds, it will upload a message to the data topic immediately with the corresponding alert. Otherwise, the sensor will store the reading if the data sampling period is reached. If the data upload period is reached, the sensor will upload messages with the stored data to the data topic.



7. Configurable Sensor Settings

The following sensor settings are configurable via downlink data. The details of the data payload format can be found on the SENSO8 NB-IoT Temperature Humidity Sensor API document.

Setting	Default Value	Unit
Data Sampling Period	900	second
Data Upload Period	3600	second
High Temperature Threshold	30	°C
Low Temperature Threshold	18	°C

8. LED Indicator

8.1. Device Status

Event	LED Pattern	Description
Powered Up	Single LED flash	Device Powered Up
Report Latest Data	Single LED flash	The sensor will upload the sampled data when the multi-function button is pressed. (During the data upload, new button press is ignored)

8.2. Error Status

On power up, the sensor will initialize the radio and perform a data and device configuration upload to the MQTT broker. If an error occurs (around one minute after the sensor powered up), the LED indicator will flash in five seconds period to indicate the type of the error.

Event	LED Pattern	Description	Possible Problem/Fix
SIM Error	Single flash	Error reading SIM card.	• SIM card not inserted. • Incorrect SIM card direction.

Event	LED Pattern	Description	Possible Problem/Fix
Radio Module Error	Two flashed	Error initializing the NB-IoT module.	• Remove the battery, press and hold the multi-function button for a few seconds and power on the device again. • Check the battery voltage.
Radio Connection Error	Three flashes	Cannot establish the radio connection.	• SIM card not valid. • Incorrect APN setting. • Antenna connection problem. • Poor radio coverage.
TCP Connection Error	Four flashes	Cannot establish the TCP connection to the MQTT broker.	• Incorrect MQTT broker IP/URL or port number. • MQTT broker is not running.
MQTT Connection Broker	Five flashes	Cannot establish the MQTT connection to the broker.	• Incorrect username or password. • Poor radio signal quality
MQTT Subscription Error	Six flashes	Cannot subscribe to the topic for download control command.	• Incorrect ACL setting. • Incorrect username or password. • Poor radio signal quality
MQTT Publish Error	Seven flashes	Cannot publish to the topic for data or device configuration upload.	• Incorrect ACL setting • Incorrect username or password. • Poor radio signal quality

9. Troubleshooting Guide

Symptom	Fix
The temperature reading is abnormal.	Check the connection of the temperature probe (PT-100).
The sensor cannot be configured via download command.	Check the data upload time against the MQTT broker session expiry time. If data upload time is longer than the session expiry time, the session will expire and the broker will not keep the download data.
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 repeatedly when the reading fluctuating around the threshold. *Example*: If the high temperature threshold is 30°C, it will trigger an alert when the temperature rises above 30°C. The alert will be cleared when the temperature falls below 29°C (hysteresis is 1°C) rather than 30°C.

10. 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 my 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.

11. Revision History

Revision	Description	Date
1.0	Initial Release	Feb 2020
1.01	Remove unrelated humidity information in Troubleshooting Guide. Added Sensor Operation and Configurable Sensor Settings.	Jun 2022
1.02	Added information and drawings for installation.	Mar 2023
1.03	Insert information & drawings for CONFIG_EN & CONFIG PORT	Sept 2023

Revision	Description	Date
1.04	Add “Warning and Personal Injury” Section	Mar 2024
1.05	Added SEN21200 to the supported models	Jun 2024
1.06	Updated Installation Guideline	Sep 2024
2.0	First release on docs.senso8.com	Oct 2026