

SENSO8 LoRa Distance Sensor User Guide

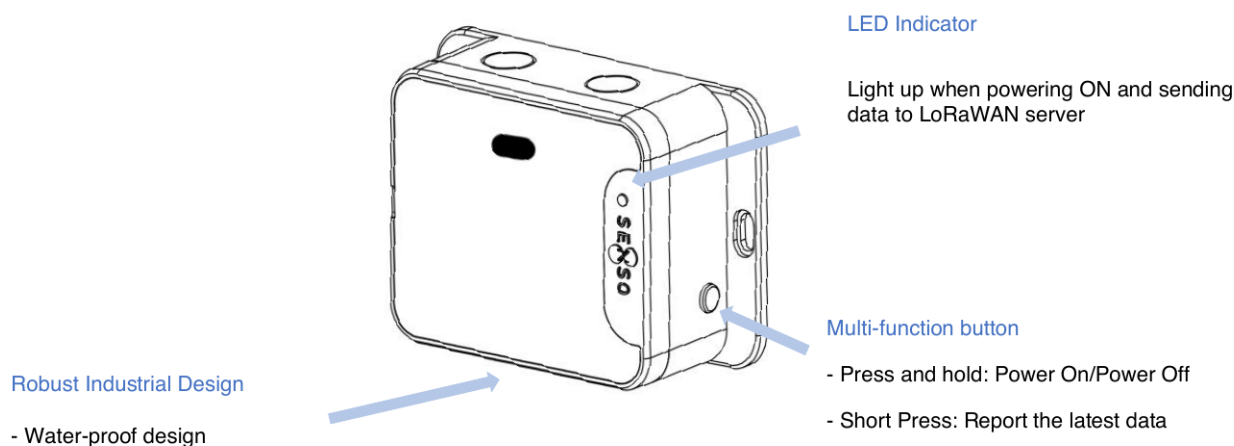
Table of Contents

1. Introduction	1
2. Sensor Configuration	2
3. Sensor Installation	3
4. Installation and Connection	4
5. Operating Instruction	5
6. LED Indicator	6
6.1. Device Status	6
6.2. Error Status	6
7. Sensor Operation	6
7.1. OTAA Re-joining	7
8. Configurable Sensor Settings	7
9. Troubleshooting Guide	7
10. Important Safety Instruction	8
11. Warning and Personal Injury	8
12. Revision History	9

1. Introduction

Applicable Model:

- LRS20LD0

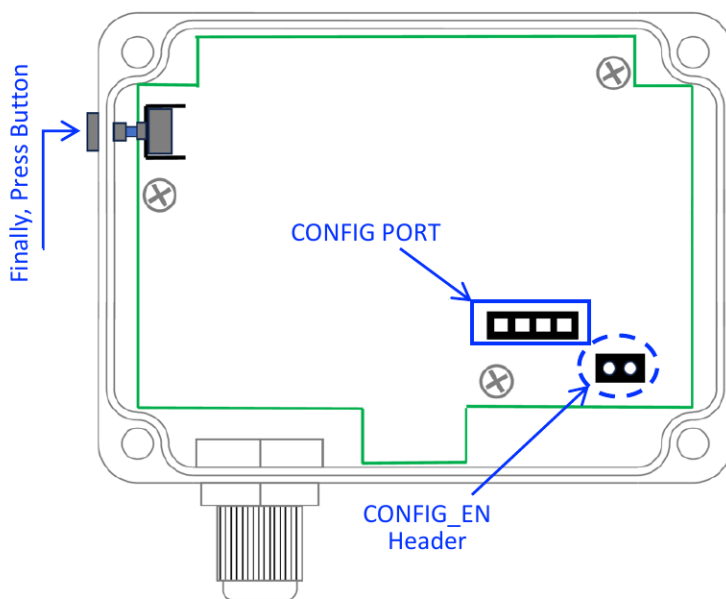


The LRS20LD0 distance sensor provides a simple and efficient solution for measuring the distance of an object in front of the sensor. It can check out whether any obstacle is present or not.

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.

```
=====
Device ID | 0123456789012345
Device EUI | 9876543210987654
Hardware Ver | 01
Firmware Ver | XX.YY.ZZZ
Build Date | DD:MM:YYYYY HH:MM:SS
=====
Password: _
```

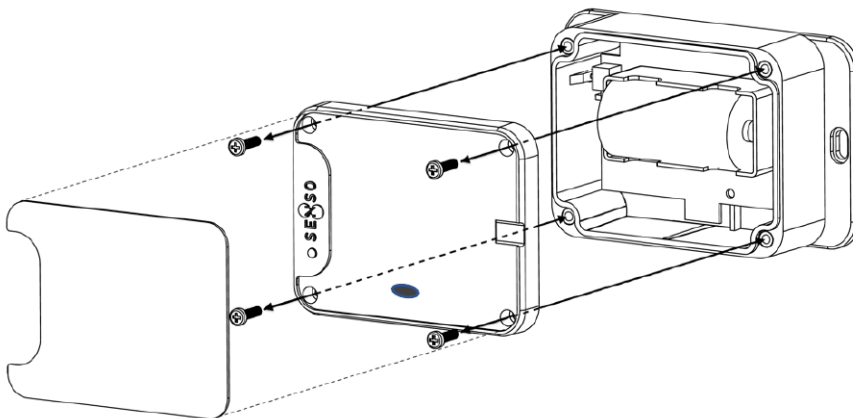
7. Then the configuration can be taken according to the requirements.

```
=====
Main Menu
1. Network Settings
2. Device Settings
3. Sensor Settings
4. Advance Settings
5. Change Password
6. Test Hardware
7. Test LoRa
x. Exit
-
```

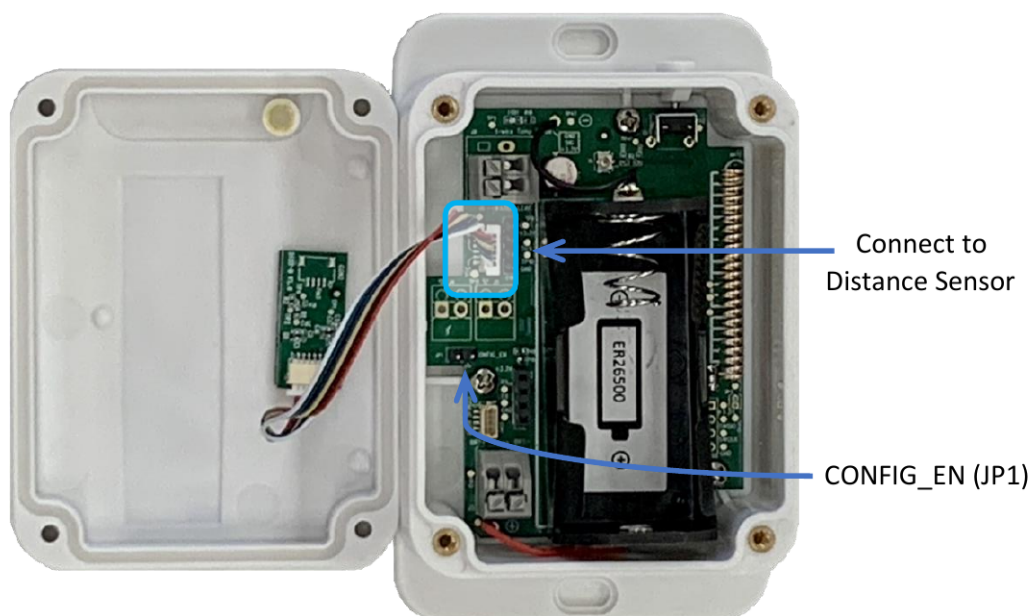
1. You can ask for the document of “SENSO8 LoRa UART Configuration Guide” from your sales representative for more information.

3. Sensor Installation

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



2. 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.**
3. Make sure the CONFIG_EN jumper (JP1) is not shorted.
4. Check the connection of the sensor.



5. Put on the top cover and tighten the screws at the corners.
6. Press and hold the multi-function button until the LED indicator on the top cover lights up. (Remark: If it is configured for the OTAA activation mode and it cannot join the LoRaWAN network in 3 minutes, the LED indicator will be flashed for 2 minutes.)
7. After powering up, the sensor will send a sensor data message to the LoRaWAN network server. About the detail of the reports, please refer to “SENSO8 LoRaWAN Sensor Data Payload Format Document”.

4. Installation and Connection

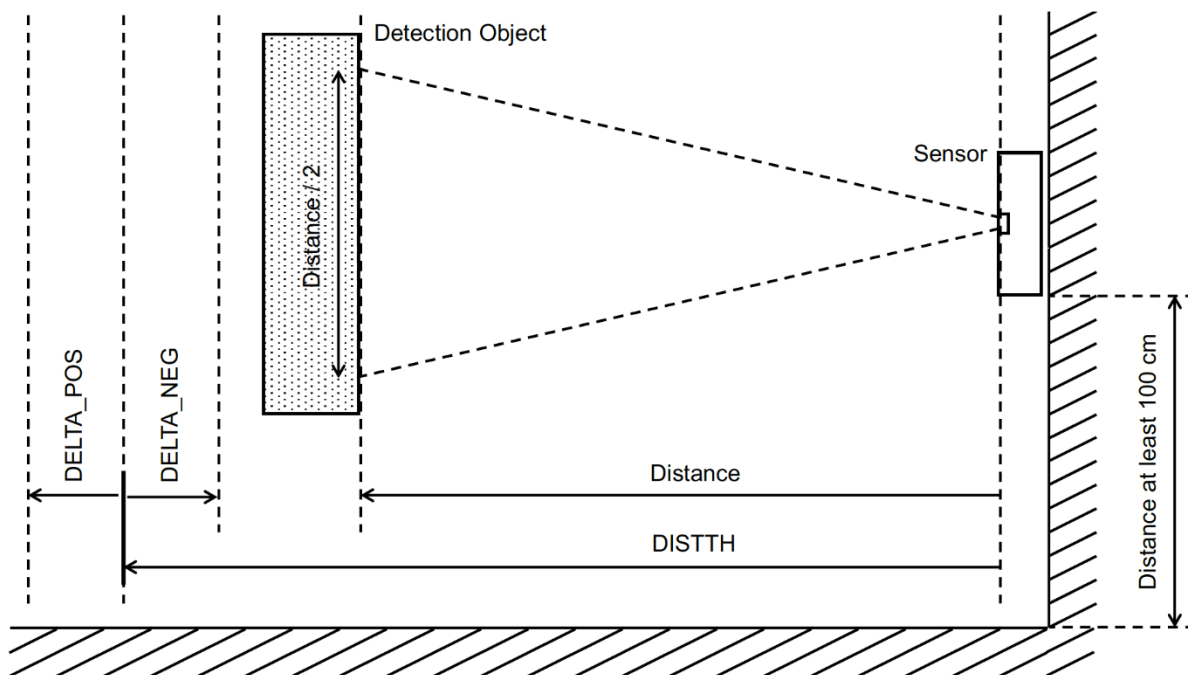
The Distance Sensor can be mounted on any location that the sensor window pointing to an area for monitoring “Occupied” (State 1) or “Vacant” (State 0). The maximum monitoring distance between the sensor and the area is 4000 mm (or 4 meters).



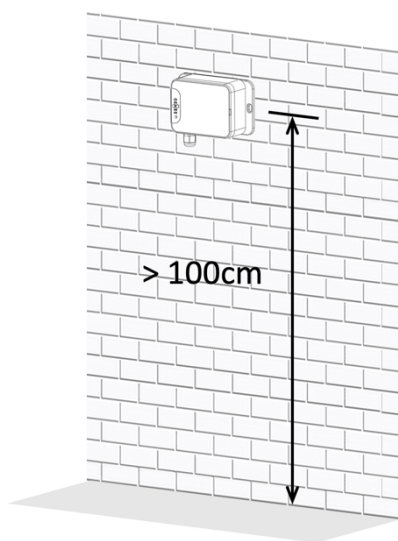
To avoid the occupancy state changes repeatedly when an object is hovering near the threshold distance, two parameters (DELTA_POS, and DELTA_NEG) can be set to provide a hysteresis mechanism as illustrated in the figure below.

State toggles from "0" to "1" when $\text{Distance} < (\text{DISTTH} - \text{DELTA_NEG})$

State toggles from "1" to "0" when $\text{Distance} > (\text{DISTTH} + \text{DELTA_POS})$



To ensure a good radio reception, install the sensor at a distance of at least 100 cm above the floor or from the wall. Avoid exposing the sensor to direct sunlight. In addition, do not install the sensor near any metal object.



5. Operating Instruction

Power On

- Press and hold the multi-function button until the LED indicator turns on.
- The sensor will send a sensor data report to the LoRaWAN network server.

Power Off

- Press and hold the multi-function button for 5 seconds. The LED indicator will flash 3 times indicating the sensor has been shut down.

Report Latest Data

- Press the multi-function button briefly, the LED indicator will flash once. The sensor will send a data report with **the last sampled data** to the LoRaWAN network server.
- The sensor will listen to any downlink command queued up on the LoRaWAN network server after sending the data. After receiving the downlink command, the sensor will send a response for the command.
- The sensor also sends data periodically according to the heartbeat setting.

6. LED Indicator

6.1. Device Status

Event	LED Pattern	Description
Powered Up	LED is turned on for a while	Device Powered Up
Report Latest Data	Single LED flash	The sensor will upload the sensor data report when the multi-function button is pressed.
Powered Down	LED flashes 3 times	Device Powered Off when the multi-function is pressed and hold for 5 seconds.

6.2. Error Status

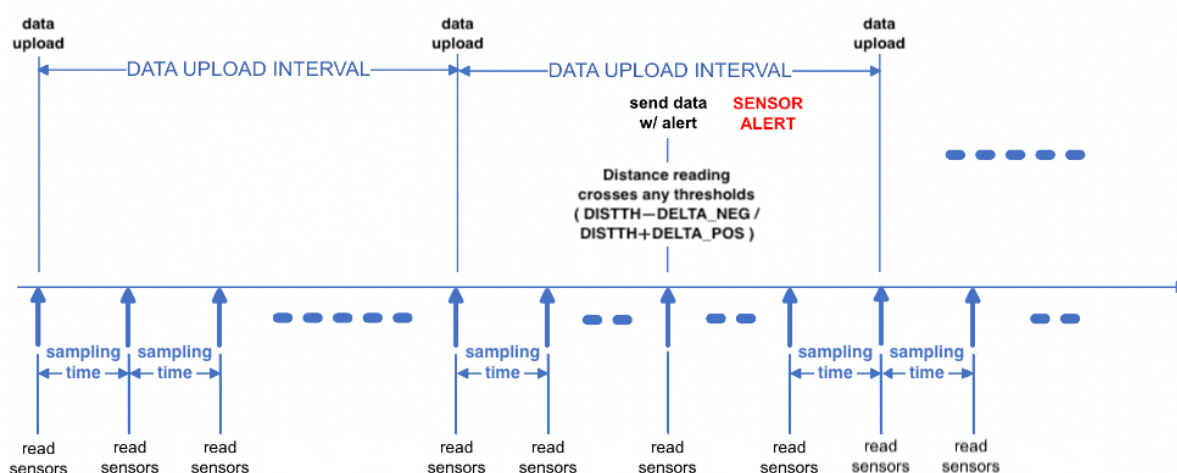
If it is configured for the OTAA activation mode and it cannot join the LoRaWAN network in 3 minutes during powering up, the LED indicator will be flashed for 2 minutes.

7. Sensor Operation

The sensor performs a distance measurement periodically (“Sampling Time” is a factory setting from 1.5 to 60 seconds) in background. Any stage change (either “from 0 to 1 for Distance < DISTTH – DELTA_NEG” or “from 1 to 0 for Distance > DISTH + DELTA_POS”) will trigger an interrupt from the sensor that will send a data report (Alert Report) immediately with the measured distance (DIST) and the Distance State Alert bit set in the EVT field.

The sensor always sends a data report (Heartbeat) if the data Upload Interval is reached. If it is idle (neither reading distance nor sending report), it is operated in the Sleep Mode.

The sensor also sends a data report if the multi-function button is pressed briefly. The **last sampled data** will be sent. The data is not sampled at the time button is pressed.



7.1. OTAA Re-joining

If the sensor is using OTAA mode, it will check the connection to the network server at least every 24 hours by sending a confirmed message. If the connection is lost, the sensor will start the re-joining mechanism to try establishing the connection again. To avoid draining the battery if the network server cannot be reached for an extended period, the sensor has a back-off mechanism for re-joining as illustrated in the table below.

Stage	Interval between re-join	Number of attempts
1	15 mins	4
2	6 hours	4
3	1 day	until re-join the network

8. 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 Data Payload Format](#) document.

Setting	Default Value	Unit
Data upload interval	10	minute
Distance threshold (DISTTH)	100	mm
Distance Negative delta (DELTA_NEG)	10	mm
Distance Positive delta (DELTA_POS)	0	mm

9. Troubleshooting Guide

Symptom	Fix
The LoRaWAN network server cannot receive data from the sensor.	<p>Check the configuration (activation mode, frequency plan, device info and all security keys) on the LoRaWAN server and the sensor.</p> <p>If there is any mis-match, the data cannot be sent to the LoRaWAN network server.</p>
The sensor cannot be configured via download 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.	<p>For each alert, there is a hysteresis (DELTA_NEG and DELTA_POS) used to prevent the alert from triggering repetitively when the reading fluctuates around the threshold (DISTTH).</p> <p><i>Example:</i></p> <p>For [DISTTH, DELTA_NEG, DELTA_POS] is [100, 10, 0], it will trigger a state change to “1” when distance reading is less than 90. The state will return to “0” when the reading is larger than 100.</p>

10. Important Safety Instruction

- Maximum Operating Temperature: +60°C
- CAUTION
 - Risk of fire or explosion if the battery is replaced by an incorrect type.
 - Disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery, that can result in an explosion.
 - Leaving a battery in an extremely high temperature surrounding environment that can result in an explosion or the leakage of flammable liquid or gas.
 - A battery subjected to extremely low air pressure that may result in an explosion or the leakage of flammable liquid or gas.

11. 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.

12. Revision History

Revision	Description	Date
1.0	Initial Release.	Oct 2022
1.01	<ul style="list-style-type: none"> • Add information and drawings for installation. • Add re-joining mechanism description. 	Mar 2023
1.02	<ul style="list-style-type: none"> • Add description of data sample on button press. 	Sep 2023
1.03	Add Important Safety Instruction section	Sep 2023
1.04	Add “Warning and Personal Injury” Section	Mar 2024
1.05	Updated Installation and Connection	Sep 2024
2.0	First release on docs.senso8.com	Oct 2026