LIGO-AIR series user guide

Version 1.0.3

I. General Introduction

This user guide provides detailed instructions for the proper installation of the LIGO AIR fuel level sensor. The guide is intended for technicians, engineers, system integrators and end-users who are responsible for installing and maintaining the sensor in a variety of fuel tanks and vehicles.

The LIGO AIR fuel level sensor is a precision device designed by SOJI Electronics to measure the level of fuel in tanks with high accuracy and reliability. Correct installation is critical to ensure optimal performancse and long-term durability.

Please read this guide thoroughly before beginning the installation process. Following the steps and recommendations provided will help you avoid common issues and ensure safe, effective operation of the sensor.

II. Important notes during sensor installation

- *Install the sensor in the direction of maximum signal transmission (the directional arrow on the sensor cover should point toward the receiving device).*
- *Minimum allowable length of the measuring probe is 150 mm.*
- *Make sure there is no metal plate covering the sensor head, as this may block Bluetooth signal.*
- *Ensure that the signal strength (RSSI) at the receiving device is not less than -80 dBm. In cases of weak signal, it is necessary to use a LIGO PRO or a LIGO AIR Adapter to ensure the transmission strength remains within the acceptable range.*
- *Change the default password provided by the manufacturer to prevent unauthorized access.*
- *Detailed instructions for using mobile application (LIGO BLE configurator) are described in detail in the 'LIGO BLE Configurator App User Guide' document.*

III. Product and accessories

No.	Description	Qty (pcs)
1	LIGO AIR Fuel Level Sensor. Standard lengths: 700, 1000, and 1500mm (for other customized lengths, please contact the manufacturer)	01
2	Oil filter	01
3	Gasoline-resistant rubber gasket	01
4	Bottom-stop and springs	01
5	Self-drilling screw M4.8x32mm	05
6	Rivet and screw M5x20mm	05
7	Protective cap	01
8	User manual	01

IV. Technical specifications

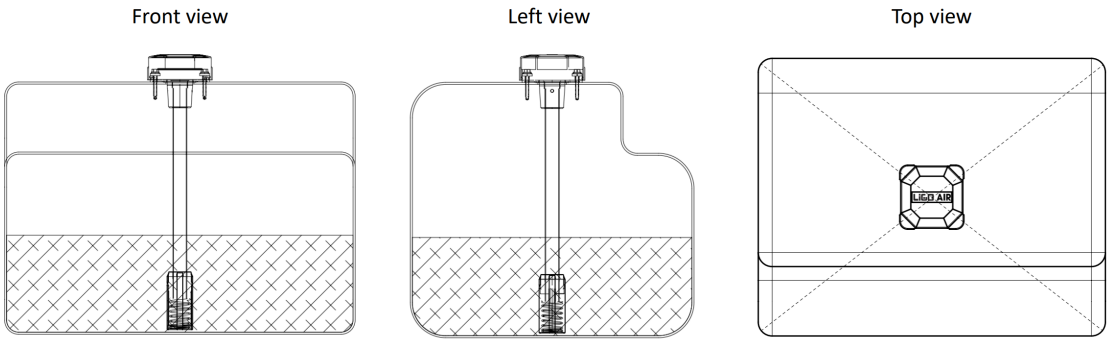
PARAMETER	LIGO AIR	LIGO AIR-PRO
Standard length (L), mm	700, 1000, 1500...up to 6000 mm	
Measuring error, %	± 0.5 %	
Bluetooth specs	*Bluetooth* 5.4, IEEE 802.15.4-2006, 2.4 GHz, -95 dBm sensitivity	
	TX power max: 6dBm	TX power max: ***19dBm***
Advertising Protocol	- SOJI Protocol (default) - Mielta Protocol (setting in mobile app) - Escort Protocol (setting in mobile app)	
Power supply: Built-in Battery Li-SOCL2	3.6V * 2600mAh(default) 3.6V * 3600mAh (optional)	3.6V * 3600mAh
Current consumption in working mode (uA)	9	27
Measurement interval (second)	From 5 to 10	
Advertising message interval (second)	From 5 to 10	From 10 to 15
Waterproof standard (Ingress protection rating, IP)	IP69K	
Operating temperature (°C)	-40...+85	
Resolution (bit)	12	
Accelerometer	Built-in	
Memory	Built-in 32Mb EEPROM	
Average sampling period, s	5 to 60	
Absolute error in temperature measurement within the entire temperature measuring range, °C	±2	
Average service life, years (expected)	10 years	
Storage condition	15°C to 30°C, RH < 60%	

V. Overview of sensor structure

VI. Preparation

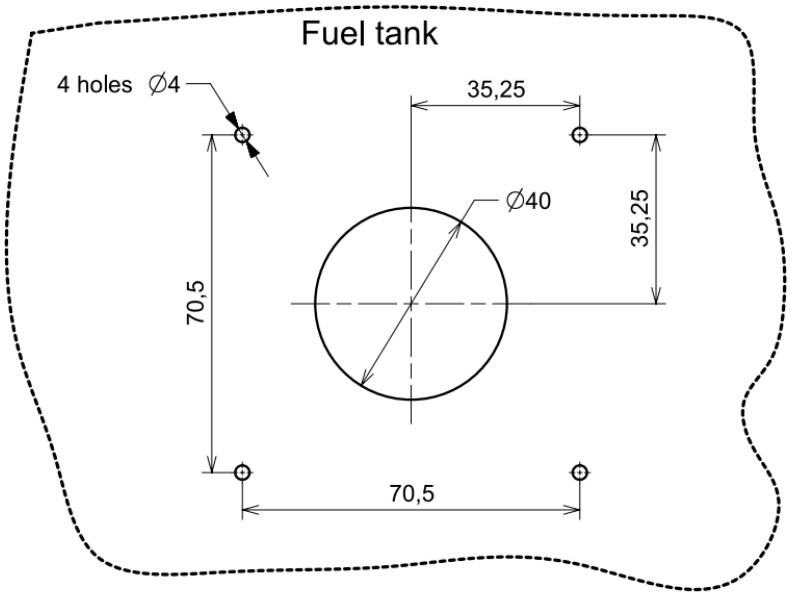
Fuel tank preparation

1. Empty the tank, clean and dry if necessary, In the case of gasoline fuel tanks, fuel vapors must be removed from the tank to prevent fire or explosion during installation.
2. Selecting the installation location for the LIGO AIR fuel level sensor, take the following requirements into account:
   - The sensor's installation location must be as close as possible to the tank's geometric center and at its deepest point.



   - The sensor's installation location must be as close as possible to the tank's geometric center and at its deepest point.
   - Ensure the sensor must avoid contact with reinforcement ribs and other equipment inside the tank.

3. Drilling a central hole (Ø42 mm), then drill four additional holes for mounting screws as shown in the figure bellow:



Notes: The mounting hole diameter depends on the material and thickness of the tank

- For fuel tanks with a wall thickness ≤3 mm, M5 rivet nut should be used. In this case, Drill 4 × Ø7 mm mounting screw holes.
- For fuel tanks with a wall thickness >3 mm, M4.8 self-tapping screw can be used. In this case, Drill 4 × Ø7 mm mounting screw holes.
- *Mounting holes positions must ensure the sensor could be install in the direction of maximum signal transmission (the directional arrow on the sensor cover should point toward the receiving device).*

Sensor preparation

1. Cutting sensor tube

   The length of the tubes should be calculated according to the following formula:

   L = H- 25 mm

   Where:

   L- tubes length after changing the length

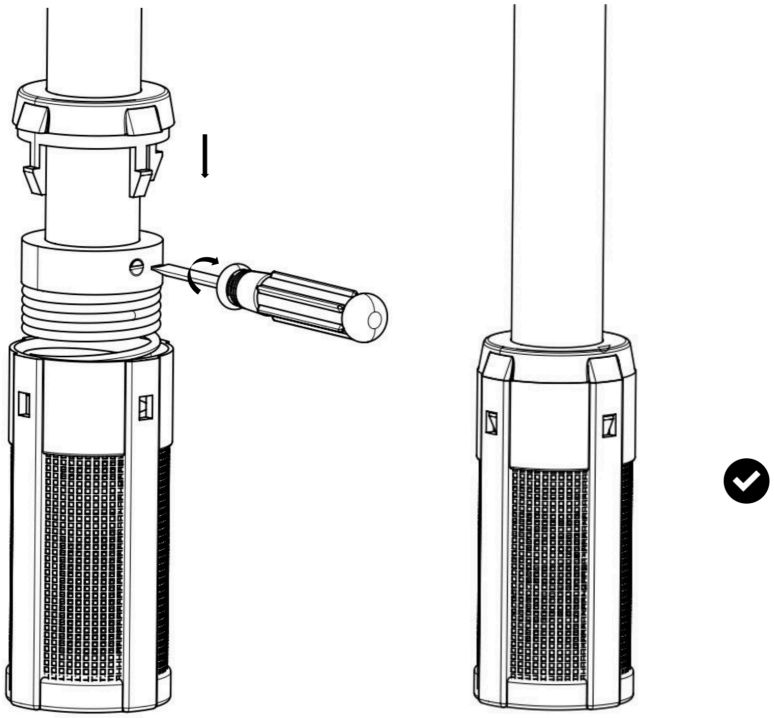
   H- height of the tank at the installation point.

   After cutting, remove any burrs and clean the tube using fuel.

Notes: The minimum length of the tubes should not be less than 150 mm (15cm)

2. Installing bottom-stop springs and filter

   Installing the bottom-stop and the oil filter in sequence, as shown in the figure below:

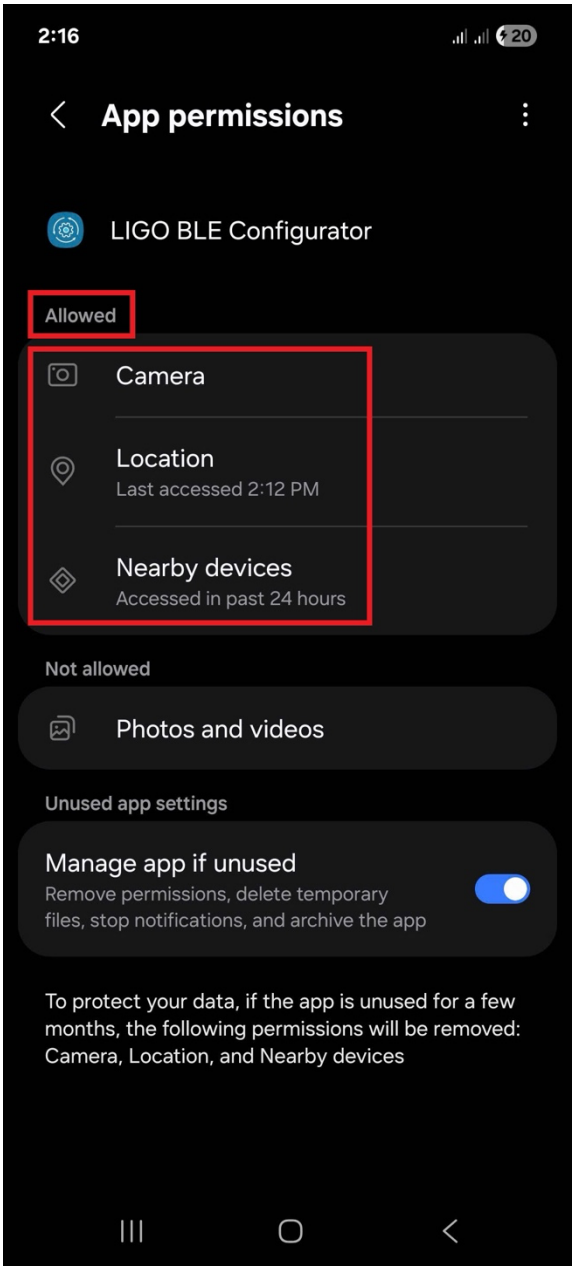


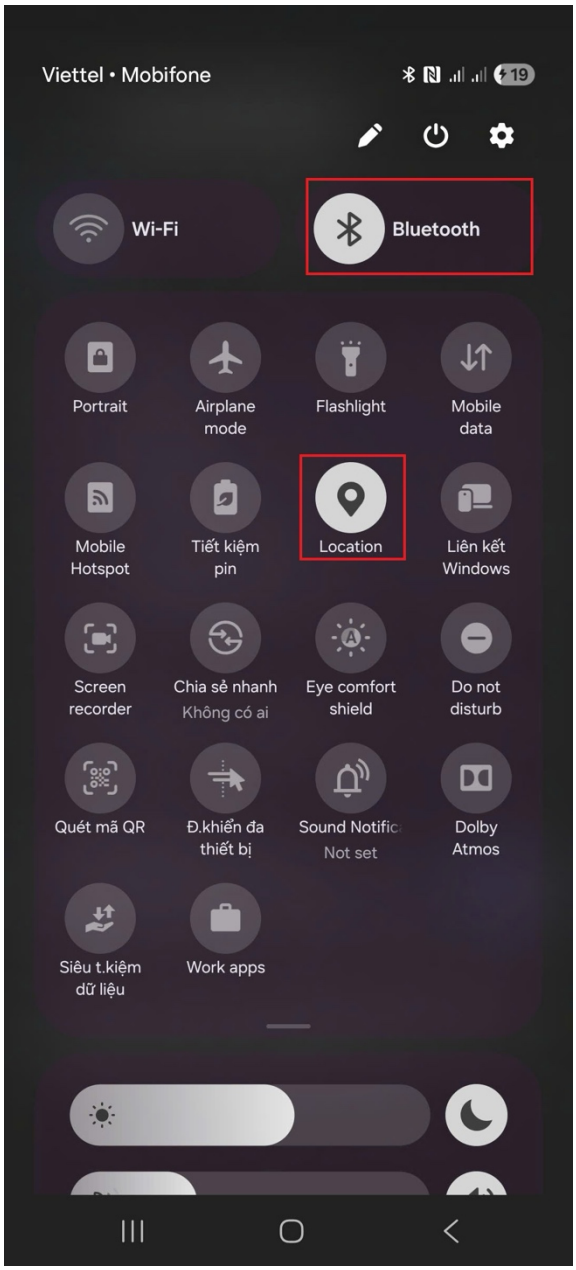
VII. Connecting sensor to smartphone and setting

To configure the LIGO AIR fuel sensor, please download **LIGO BLE Configurator** app on Appstore (for IOS) or CH Play (for Android devices).

Hereinafter LIGO BLE Configurator referred to as the “application” or "app".

Notes: *For full operation, you must confirm all the permissions requested by the app*

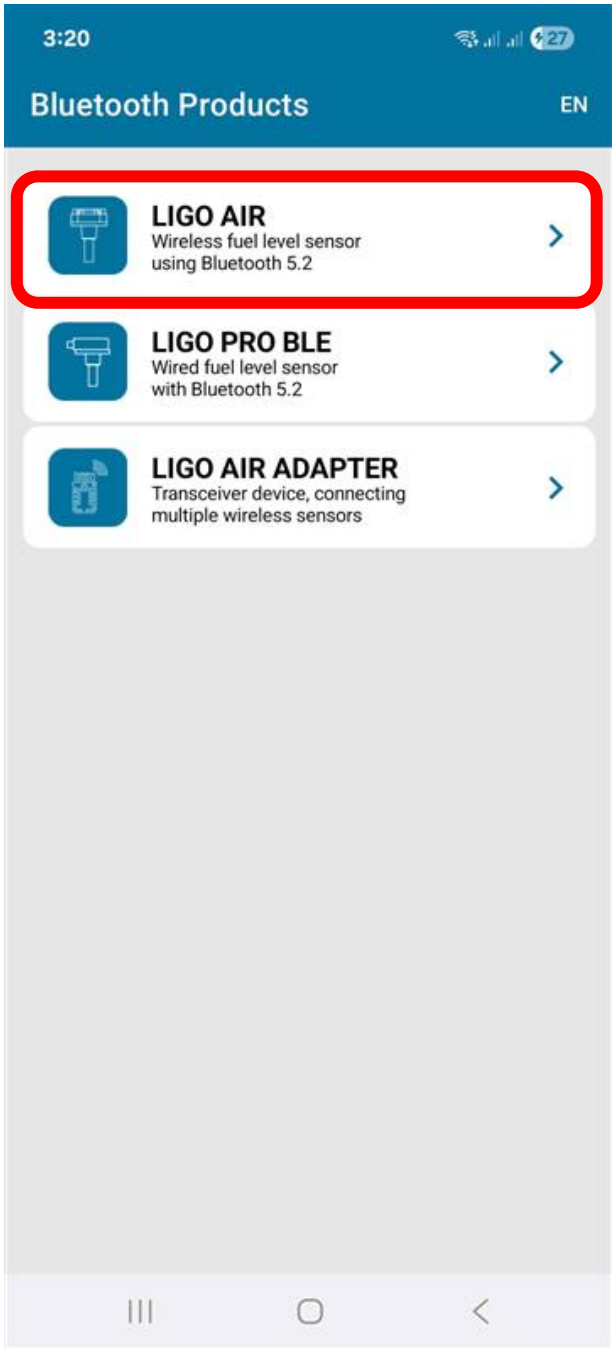




Confirm all the permissions request by program as above

1. Connecting sensor

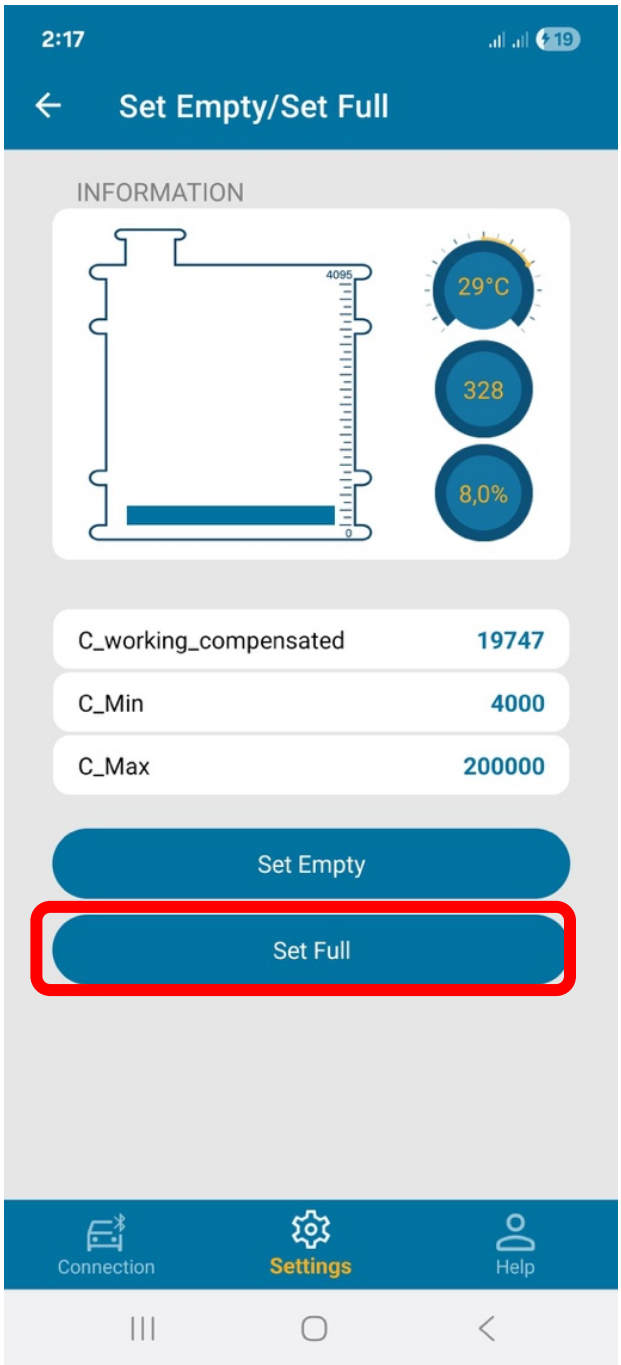
   Run the application and select the sensor you want to connect to, as shown in the pictures as below:



2. Set Empty and Set Full

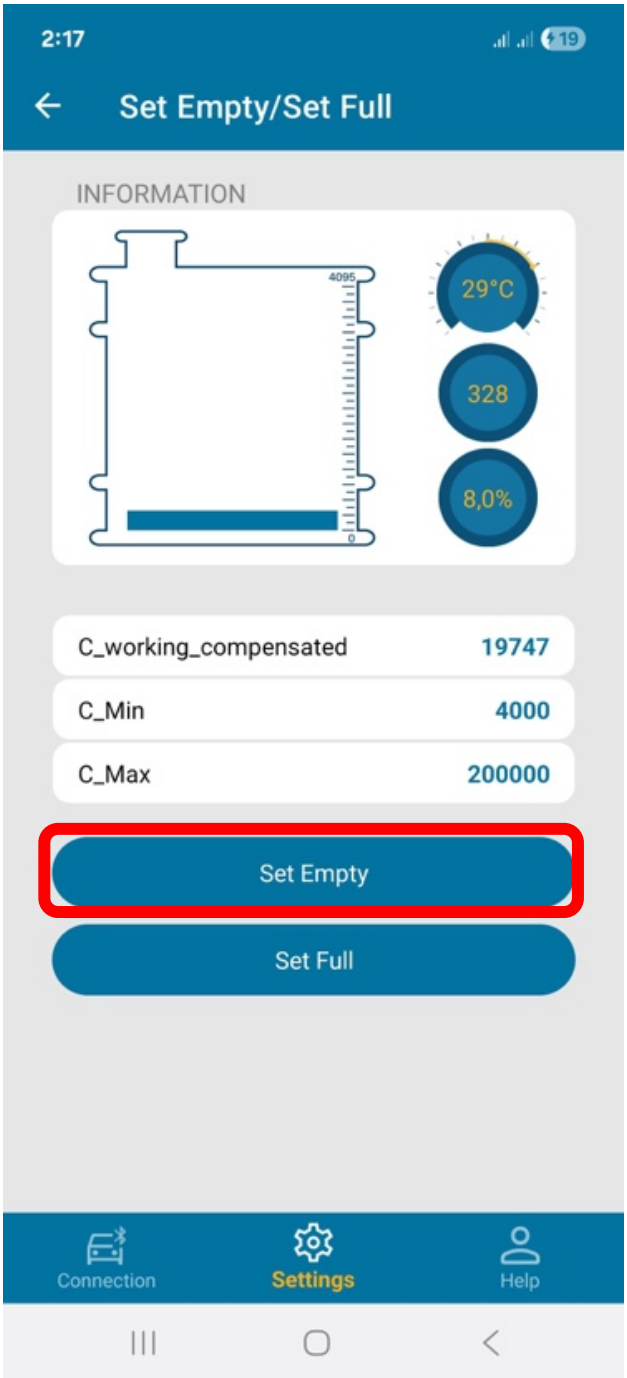
Step 1: Set Full

- Immerse the sensor in fuel until the fuel reaches the sensor flange
- Waiting for C_working value become stable and then press Set Full button



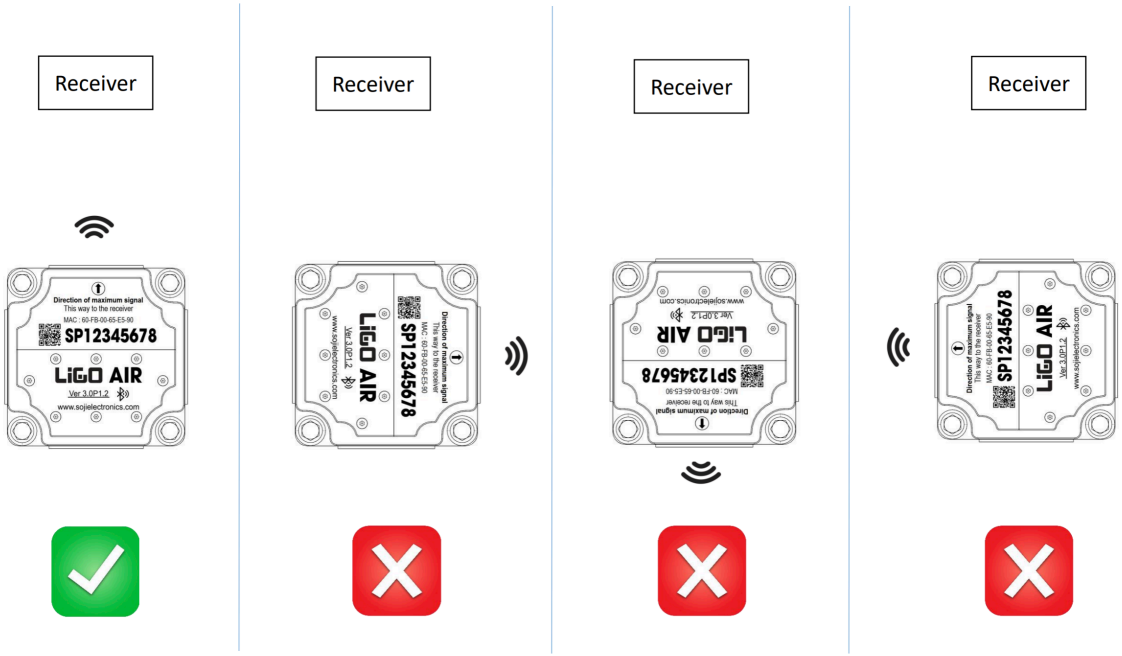
Step 2: Set Empty

- Remove the sensor from the fuel and wait for 1-2 minutes for fuel to drain from the measuring probe and then press Set Empty button.

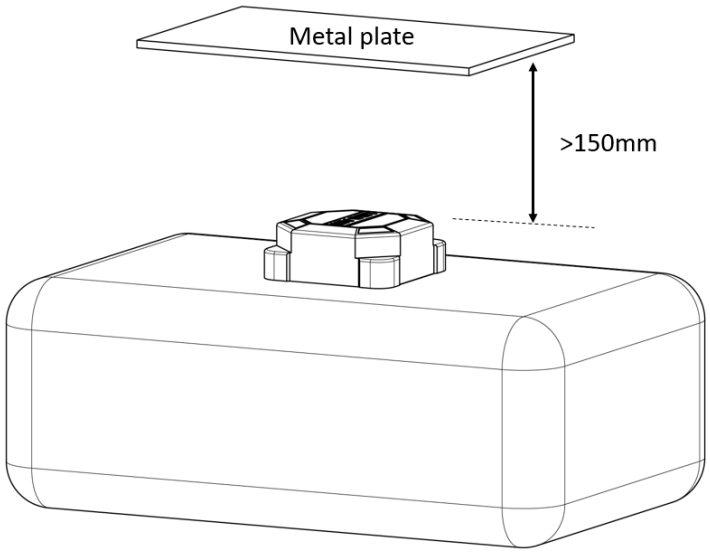


VIII. Installing sensor on the fuel tank

1. Applying the gasket sealant glue on fuel tank, gasket and sensor flange (using Fuel resistant RVT Silicone gasket maker).
2. Putting the LIGO AIR fuel sensor into the tank and secure fastening using the screws (using self-tapping screws or rivet nut depend on fuel tank thickness and material as mentioned above.



Notes: *Install the sensor in the direction of maximum signal transmission (the directional arrow on the sensor cover should point toward the receiving device).*



***Notes**: Ensure a minimum clearance of 200 mm between the top of the sensor and any overhead metal surface.*

IX. Solutions for long-range or in metal-obstructed environments

In some cases, when the distance between the sensor and the receiver is long or there are many metal obstacles causing signal attenuation, customers can choose the LIGO AIR PRO to increase transmission power or install the LIGO AIR Adapter at the receiver side to boost the signal received from the sensor.

Below is a comparison table of transmission distances between different types of sensors and receivers:

Device	Bluetooth signal range
LIGO AIR + Telematics (tracker) device	Standard distance
LIGO AIR + LIGO AIR Adapter	2 x Standard distance
LIGO AIR Pro + LIGO AIR Adapter	4 x Standard distance

X. Calibration table

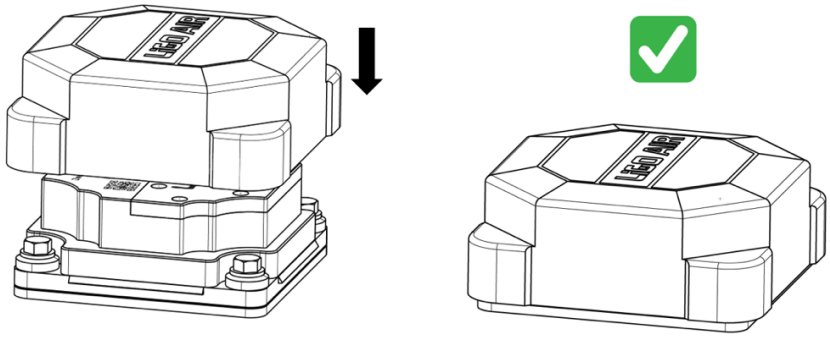
After installation, the sensor must be calibrated to ensure accurate volume measurement. Calibration table can be performed either on the platform (server) or locally on the sensor.

- Calibration table on the Platform (Server):
  The sensor sends raw level values (ranging from 0 to 4095) to the server via the telematic device. The platform uses a calibration table to convert these values into volume (liters).
- Calibration table on the Sensor:
  The sensor directly sends volume values (liters) based on the internal calibration table.

***Notes**: For LIGO AIR sensors, the manufacturer recommends performing calibration table on the platform.*

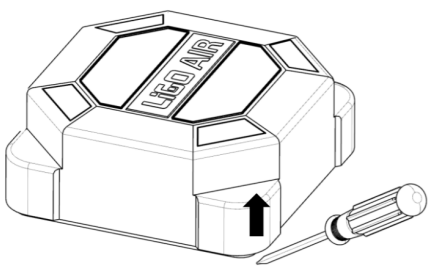
XI. Installing protective cap

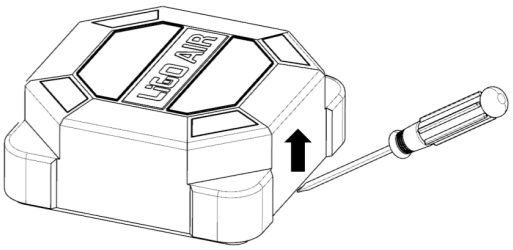
The protective cap should be installed after the sensor installation and calibration processes are completed. This cap helps prevent unauthorized access and protects the sensor from environmental factors such as sunlight, phisical impact…



Push the protective cap until it clicks into place, indicating that it is fully seated.

In cases when sensor inspection is required, the protective cap must be removed. Follow the removal procedure as shown as picture bellow:





***Notes**: Please ensure that no parts of the sensor are damaged while removing the protective cap.*

XII. Revision history

Date	Version	Description
18/06/2025	1.0	Initial Release
19/06/2025	1.0.3	Minor changes