LoRa/NB-IoT Smart Parking Sensor SLG-I3 Installation Manual

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Disclaimer

These installation guidelines are intended to be strictly recommendations and are not to serve as a step-by-step, fail-safe installation checklist. Selection of an experienced installer is the sole responsibility of the project owner. Cicicom Ltd does not accept any responsibility for any issues during installation

Table of Contents

1.Parking Sensor Overview

Cicicom's S-LG-I3 parking sensor precisely detects parking events by identifying changes in the magnetic field and "filters out" any electromagnetic interference, noise and drive-through vehicles, thus minimizing false parking indications. Furthermore, the magnetic module auto-calibrates at regular intervals, eliminating performance deterioration. The detection algorithm has been optimized after extensive testing to ensure peak performance while maintaining low-power consumption for the sensor and long battery lifetime of up to 10 years. The sensor is available in surface-mount and flush mount, is CE-RED, IK10, IP68, IPx9K and LoRaWAN certified and supports OTA firmware update.

S-LG-I3 demonstrates a unique feature, namely driver/vehicle identification by using a special wireless tag placed in the vehicle. That enables applications such as **parking violation detection and monitoring** through Cicicom's web platform and mobile apps.

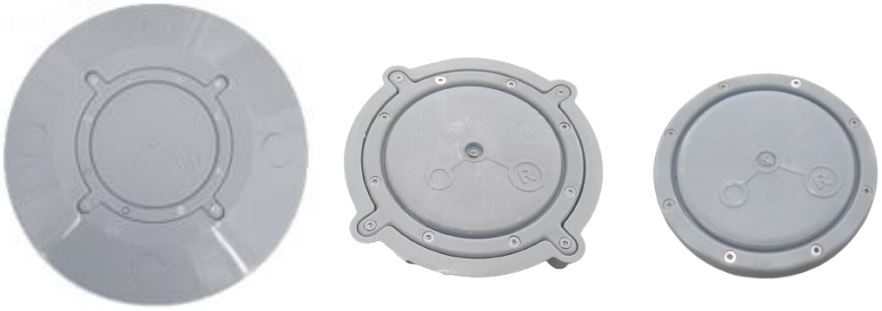

Figure-1: Parking Sensor models (Surface mount, Flush mount and In-ground)

1.1 Functionality

The Parking Sensor detects the vehicles parked on the parking spot. It can also identify the driver/vehicle that occupies the parking spot using a special wireless tag placed in the vehicle.

1.2 Communication

The Parking Sensor implements either LoRa-WAN technology to communicate through LoRa Gateways or NB-IoT technology.

2. LoRa Network Preparation (Disregard in case of NB-IoT model)

1. Power on the Gateway.
2. Connect the Gateway to Internet.
3. After the Gateway is powered on and operational make sure that the Parking Sensor is communicating with LoRa Gateway. (Section-7)
4. Reset the sensor (Section-7)

3. Parking Spot Preparation

3.1. Finding the center

1. The installation spot of the parking space must be cleared of debris with a broom.
2. Mark with chalk the center of the parking space using measuring equipment as described in Figure-2.

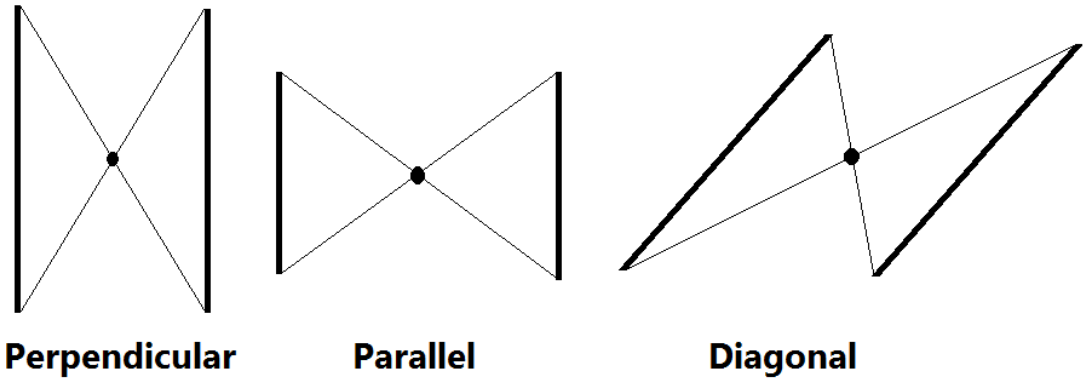

Figure-2: Measuring the Center of Parking Space

3.2. Orienting the antenna (Disregard in case of NB-IoT model)

For optimal reception, we recommend placing the sensor in the center of the parking spot, according to the orientation shown in Figure-3 below in respect to the gateway's antenna polarity.

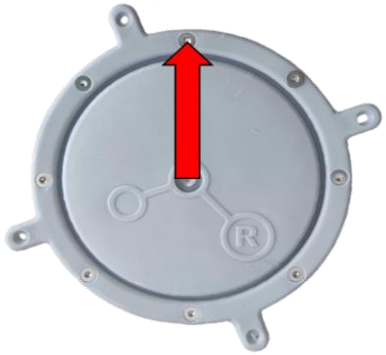

Figure-3: Sensor Orientation in respect to the LoRa gateway

It is important to understand that this placement orientation is a suggestion, and that the person responsible for the installation of the sensors should nonetheless run tests to ensure that the signal is not reflected nor blocked in any way and that the placement is indeed optimal.

4. Parking Sensor – Surface Mount

4.1 Required equipment

1. Measuring equipment
2. Portable drill
3. It is recommended to use drill bits 6.35 mm
4. Self-Tapping masonry screws 6.35 mm in diameter.
5. It is recommended to use low magnetic 6.35 mm bolts, and their equivalent washers.
6. A broom to clean the debri of the parking space
7. In cases where there is no permission to drill the pavement, you can use glue/adhesive. Instead of drill bits, masonry screws and bolts, use glue/adhesive.

4.2 Installing Surface Mount with Screws

This reffers to the installation procedure of a Parking Sensor Surface Mount using screws.

1. Place the Parking Sensor on the ground at the spot located as described in Section-3.
2. Mark the location of the holes of the Parking Sensor on the pavement with chalk.
3. Remove the Parking Sensor to give way for drilling
4. Drill the holes using Hammer Drill with 6.35 mm Drill Bit.
5. Insert the Self-Tapping Masonry Screws in to the drilled holes of the pavement.
6. Place the Parking Sensor on the ground with the holes of the Parking Sensor matching the holes on the pavement respectivelly.
7. Tighten the screws firmly along with their washers.
8. Reset the Parking Sensor (Section-7).


Do not drill through the holes of the Parking Sensor, the vibration generated has a risk of damaging the internal components.

4.3 Installing Surface Mount with Glue or Adhesive

This refers to the installation procedure of a surface parking sensor using glue or adhesive and should be performed in cases where there is no permission to drill.
(Cicicom recommends Sika (Sikaflex 11FC ALL IN ONE)

1. Use a broom to clean the debris of the parking space before applying glue to the parking sensor.
2. Clean the bottom of the Parking Sensor from sanding residue.
3. Apply the glue to the bottom of the Parking Sensor (apply only to red parts as shown in Figure-4 below).
4. Place the Parking Sensor on the ground at the spot located as described in Section-4 and press down on it firmly.

5. Apply an additional layer of glue around the sensor and the pavement for a stronger seal.
6. Reset the Parking Sensor (Section-7)

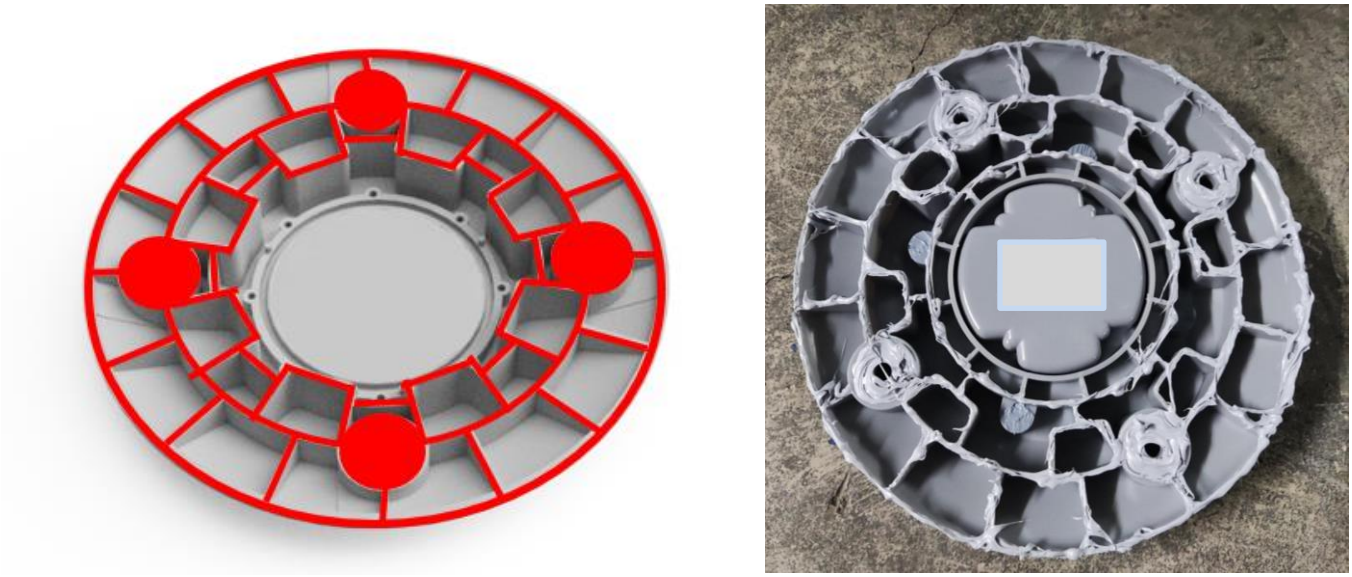

Figure-4: Applying glue to the bottom of the parking sensor

5. Parking sensor – In-ground

5.1 Required equipment

1. Measuring equipment
2. Level
3. Portable drill
4. Core drill bit with minimum diameter 12 cm
5. Sand
6. A Broom to clean the debri off the parking space
7. Epoxy. The Cicicom recommended epoxy is: Mapei Mapeflex PU65). Nonetheless, consulting a local road construction expert is highly advised since various environmental factors (e.g., temperature, sunshine, humidity etc.) can affect the choice of epoxy.

5.2 Installing the In-Ground Parking Sensor

This reffers to the installation procedure of an in-ground parking sensor.

1. Locate the center of the parking spot as described above in Section-3
2. Drill a hole using the core drill bit with hole depth of approx. 4.5 cm (Figure-5)
3. Remove everything from the drilled hole
4. Place sand inside the hole so that the depth from the surface is 3-3.5 cm and the top part of the sensor is maximum 5mm lower than the ground level. In no case should the sensor be higher than the ground level. (Figure-6)
5. Place the sensor in the hole and reset it using the magnet (Section-7, Figure-10). At this point make sure of the following:
    a. The sensor is level to the surface of the ground.
    b. After this point the sensor will not move for whatever reason
    c. The magnet has moved away from the sensor because it will perform a self calibration.
6. Cover the sensor with epoxy by applying it around and on top of the device. Be careful not to move the sensor from its place. Make sure all the holes are sealed till the ground level and that there is no hole or bump in that spot.
7. Wait for the epoxy to dry and harden (Figure-7), making sure that you have somehow documented where the R marked circle is, because you will need it in case you want to hard reset the sensor.

Figure-5: Drilling the hole

Figure-6: Placing sand in the hole

Figure-7: After the epoxy dries

6 Parking Sensor – Flush Mount

6.1 Required equipment

1. Measuring equipment.
2. Level.
3. Trowel.
4. Portable Drill.
5. Core drill bit with minimum diameter 15 cm.
6. A broom to clean the debri off the parking space.
7. Quick drying cement. Cicicom recommends: Duro Stick D'55 (or an equivalent reparative, resin-based, fiber-reinforced cement mortar with corrosion inhibitor).

6.2 Installing the Flush Mount Parking Sensor

This reffers to the installation procedure of flush mount parking sensor.

1. Locate the center of the parking spot as described in Section-3.
2. Drill a hole using the core drill bit with depth of approx 5 cm and a maximum diameter of 16 cm. That hole should fit the sensor-base bundle, with minimal spacing, as shown in the Figure-8 below.

Figure-8: Flush Mount Sensor fitting in the hole

3. Remove everything from the hole.
4. Using the trowel, completely fill the hole with cement, as shown in the Figure-9 below.

Figure-9: Hole filled with cement

5. Place the sensor-base bundle in the cement filled hole and firmly press down until it sits flush to the ground's level as shown in the Figure-10 below.
   Note 1: this step might need to be repeated 1 or 2 times until enough cement is displaced from the hole that the sensor-base bundle sits flush to the ground.
   Note 2: avoid cement getting in the outter groves between the base and the sensor as well as over the outter screw sockets of the base, since that will make uninstalling the sensor a challenge.

Figure-10: Sensor sitting in the hole, flush to the ground

6. Finally, using the trowel, remove the excess cement on the sensor's rim as shown in the Figure-11 below, and let dry as per the manufacturer's instructions.

Figure-11: Final State

Important Notice: *In this manual, different roadworking materials have been mentioned. Please bear in mind that consulting with roadworking specialists is heavily advised since all mentioned materials are Cicicom's SUGGESTION.*

7.Reseting the Parking Sensor

Surface

Flush

Figure-12: Reseting the sensor

On top of the sensor the reset spot is marked with R.

1. In order to perform correct reset make sure the parking spot is vacant and no ferromagnetic material is around it.
2. To reset the device place a magnet on the **R marked spot** on top of the sensor and remove it after at least 15 seconds. Now move the magnet away from the sensor by at least two (2) meters.
3. The sensor needs 15 seconds to initialize and perform an initial self-calibration. During this time, it is mandatory that no cars or magnetic materials are over the parking space and the sensor is not moved in whatever way. After the initial calibration is performed, the Parking Sensor will self-calibrate automatically at regular intervals.
4. After the initialization procedure is finished (approximately 15 seconds), the device will enter command mode for 1 minute. During this time, the device will accept bluetooth connections through the Android Control App.
5. To guarantee proper sensor operation, please follow the official “Android Control App Manual” (**manual versions v1.3. and above**)
6. After following the instruction in chapter 3 of the “Android Control App Manual” (**manual versions v1.3 and above**) the sensor will enter operation mode, after approximately one (1) minute and it will send a “boot” (code 56) payload to the gateway. The sensor is now ready to be used.

Surface Mount

Perform the final reset after the sensor has been installed on the parking spot.

In-Ground

Perform the final reset after the sensor has been placed in the hole before and after it is covered with epoxy.

Flush Mount

Perform the final reset after the sensor has been placed in the cement.

Before installing the sensor, it is essential to perform a reset in order to check its connectivity with the LoRa gateway. If you use your own LoRa gateway, make sure you received the initial "boot" payload after exiting command mode. The parking sensor may be used only after the initial "boot" payload is received.

The parking sensors try to join and establish connection with the gateway even when the gateway is offline. Therefore, it is advised to make them inactive by placing the magnet on top of the R marked circle when no LoRa network is available.

8. Proper product use

The guidelines for proper use and installation are the following:

1. **Primary Function**: The parking sensor is designed exclusively to detect the presence of vehicles within a parking spot.
2. **Installation Position**: For accurate detection and to minimize the risk of damage, the sensor must be installed at the center of the parking spot as described in Section 3. This central position ensures optimal performance and reduces the likelihood of the sensor being stepped on or driven over by vehicles entering or exiting the spot.
3. **Avoiding Damage**:
    - **Driving Speed**: The sensor is not designed to withstand high-speed impacts. Avoid driving over the sensor at great speeds over 5km/h.
    - **Physical Impact**: Prevent hitting the sensor with any items, which may cause damage or malfunction. Acts of vandalism, such as deliberate strikes, should be avoided.

4. **Maintenance**:
    - **Cleanliness**: Ensure the parking spot is clear of any debris, pebbles, or small rocks that may interfere with the sensor's operation. Debris and small rocks can be driven onto the sensor by vehicle tires, potentially causing damage. Regularly clean the area around the sensor to maintain its proper functionality.
5. **Environmental Conditions**:
    - **Weather Protection**: While the sensor is designed to withstand various weather conditions, extreme environments such as prolonged exposure to ice or excessive water accumulation may affect its performance.