Parking Pill

User manual & Installation guide

DO NOT OPEN PROTECTIVE COVER BEFORE THE INSTALLATION !

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1. Introduction

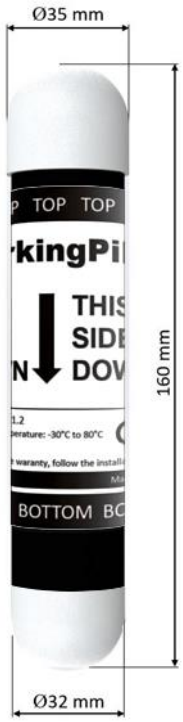
Parking pill offers an innovative and ergonomic vehicle detection solution. It is suitable outdoor city parking areas, indoor parking areas, streets and public areas. Parking pill is an inexpensive, fully integrated solution into the roadway. It offers the ability to build parking lots with an intelligent monitoring of parking capacity without a difficult assembly or any need for road modification. The parking sensor can be mounted into an existing road without the need to build an additional expensive infrastructure.

Parking pill provides information about the current occupancy of parking spot with the possibility for further data processing in GIS navigation systems, maps or specific administrative applications. The usage of parking sensors increases the parking comfort for any destination. The time savings are increased and the traffic in densely populated or industrial areas is decreased.

The mounting of Parking pill into an asphalt or concrete areas of parking spot is made in shape of a small cylinder of average 3.5 cm and the length of 16 cm. The electronic components of sensor are located in a hermetically closed plastic package which is suitable for an installation into the area of parking spot. The power source is dimensioned with a capacity that allows the functionality of parking sensor continuous operation for more then 7 years. The simple installation allows a quick sensor replacement and its repeated recycling.

Parking pill is fully compatible with LPWAN technology (Low-Power Wide-Area Network) – Sigfox.

2. Hardware description



Parking sensor

Technical specification	
Dimensions	35 mm diameter, 160 mm height
Power supply	Built-in Lithium batteries, 3,6V, 17 200 mAh
Protection	Waterproof IP68
Mounting	Fully hidden in the floor
Operating temperature	-30 to +80°C
Wireless connectivity	Sigfox
Antenna	Built-in 868 MHz antenna
Expected lifetime	> 7 years*
Battery self-discharge	Less than 2% after 1 year of storage
Transmission power	Up to +14 dBm
Microcontroller	STM32L0 series, ultra-low-power ARM MCU

*depending on frequency of change in the occupancy status of the monitored parking spot.

3. Modes of operation

Storage mode

At the beginning device is set to Storage mode until is turned on during installation. In this mode all components, except for the MCU, are turned off to minimize power consumption, so it's suitable for transport and storing after receiving the shipment.

Power-Up Sequence

To turn the device on, a protective cover must be removed. The Power-Up Sequence is triggered by daylight (or an artificial light) entering the unwrapped white bottom part of the device's enclosure. This method has been chosen for its simplicity while retaining low power consumption of the device and robustness of the enclosure. When light of sufficient intensity is detected, the MCU wakes up from deep sleep mode. To confirm power-up, signalling LED **in the transparent part (bottom)** of Parking Pill. The light will light up approximately 3 – 5 seconds and light up in a 20 seconds interval. This process can take up to one hour. Blinking light stand 1 hour throughout integration. Parking Pill will send a message 0x02 after the successful initialization and after it will switch to measurement mode.

Measurement mode

Parking pill spends most of the operational time in Measurement mode. In this mode, all the peripherals except MCU and magnetic sensor are powered down. The magnetic sensor repeatedly measures the values of ambient magnetic field. After each measurement an interrupt signal is sent to wake up the MCU from sleep mode. The MCU processes the measured data and the algorithm decides whether a change of state occurred. If not, the MCU goes back to sleep mode to save power. If change of state is detected, the device enters Data Transmission mode.

Data Transmission mode

In Data Transmission mode, radio module is switched on by the MCU and a message is transmitted. After successful transmission radio module is switched off and the device returns to Measurement mode. Parking pill can transmit seven different messages (Start, Network, Battery, Parking status, Car count, Error). Detailed description could find in Payload Data Description.

4. Recallibration

To recalibrate parking pill, you have to set downlink to **0100000000000000**. The downlink message is sent with the 04 message. During the recallibration process the parking lot should not be occupied.

Do not use any magnets for initialisation or recalibration!

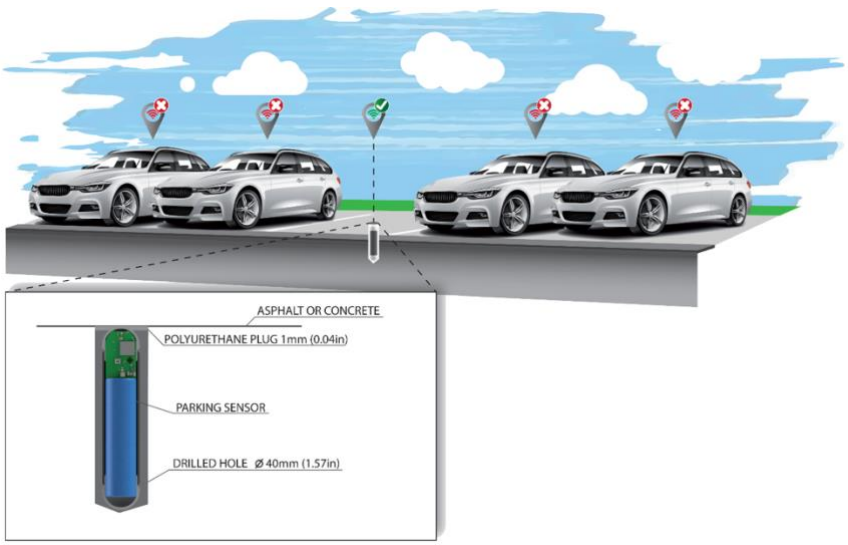
5. Placement and installation

Parking pill is installed under the surface of the parking spot and is designed so that its installation can be handled by one person. The assembly requires a cordless impact drill with SDS-Plus head set and SDS-Plus drill with a diameter of 40 mm and a working length of at least 180 mm. Parking pill must be installed into a rigid material such as concrete. **Parking pill must be installed to the dry hole!** Installation into non rigid materials may allow sensor movement and cause malfunction. Next, you'll need a polyurethane sealant (e.g. MAPEI MAPEFLEX PU21 or similar*) and sand with grain 0.3 mm to 1 mm with sharp edges. The whole installation does not take more than 10 minutes.

* You can use any available sealant for "bonding dilatation joints" in asphalt or concrete available in local supplies like Hornbach, Obi, Bauhaus, etc, just ask for any sealant as written above. We suggested one particular type that can be purchased in Slovakia, please adapt to what can be sourced locally.

The only requirements are:

- sealant shall do not harm / etch the polyethylene
- sealant shall be flexible



Step 1:

To assure the best detection, it is required to place the parking sensor into the centre of the parking spot (see Figure 1). Therefore, it is necessary to drill a hole with a diameter of 40 mm and a depth of 180 mm into the middle of the parking spot in the first step (see Figure 2). Then, remove all dust and small stones from inside the hole and confirm that the depth of the created opening is sufficient.

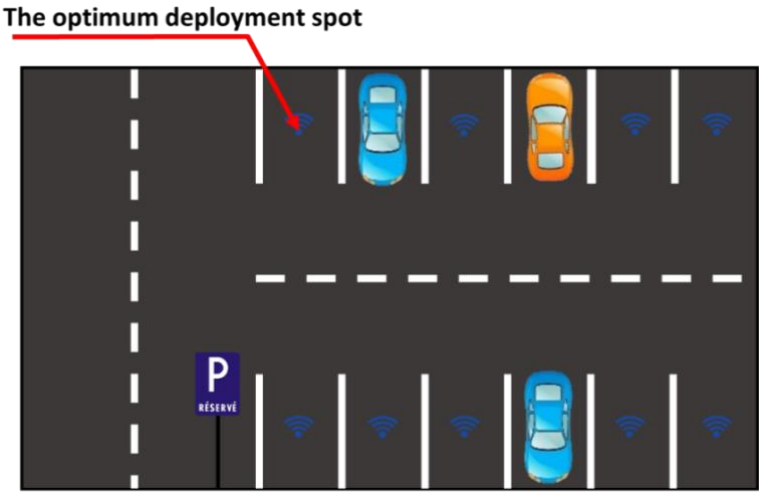


Figure 1: Optimal placement for Parking pill

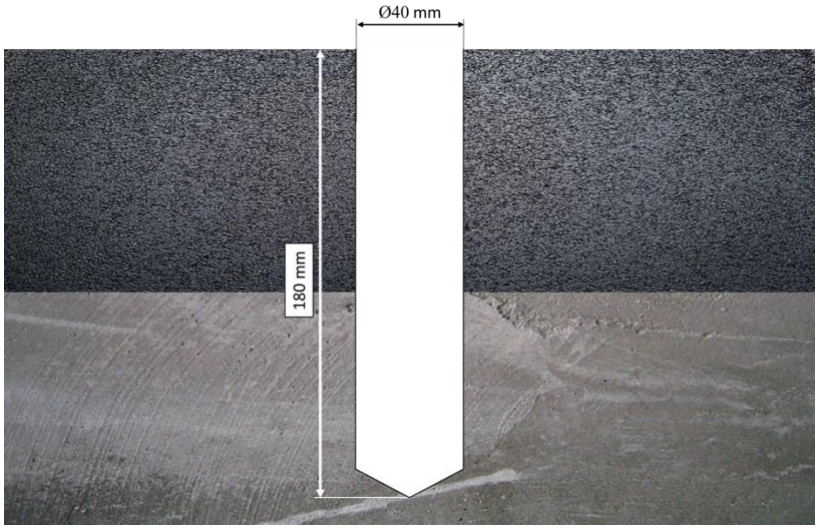


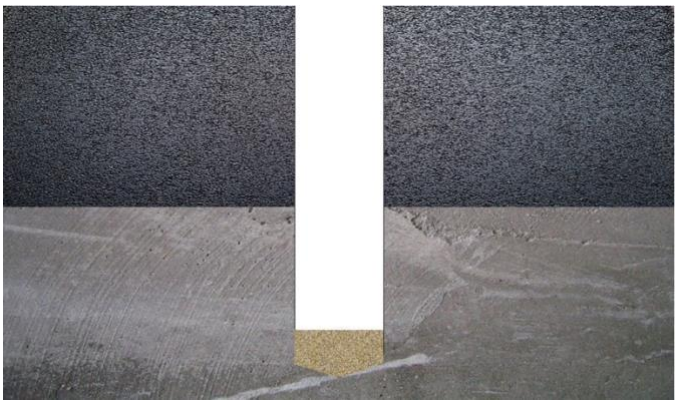
Figure 2: Dimensions of the opening for Parking pill

Step 2:

In this step is important to do a measurement of hole before opening a protective cover of Parking Pill. You could do it with a stick. If you are confident with a depth of hole, you can start with installation and you can open the Parking Pill.

To set correct installation depth fill bottom of the mounting hole with sand. Top of a sensor must be in between 2 mm to 5 mm below surface of a parking spot. It is imperative that the sensor is placed in the correct position (the arrow on the casing of the Parking pill must face down, also the blinking light is positioned on the bottom of the sensor).

Step 2a: Hole measurement



Step 2b: Opening and installing Parking Pill

Figure 3: Setting correct mounting depth

Step 3:

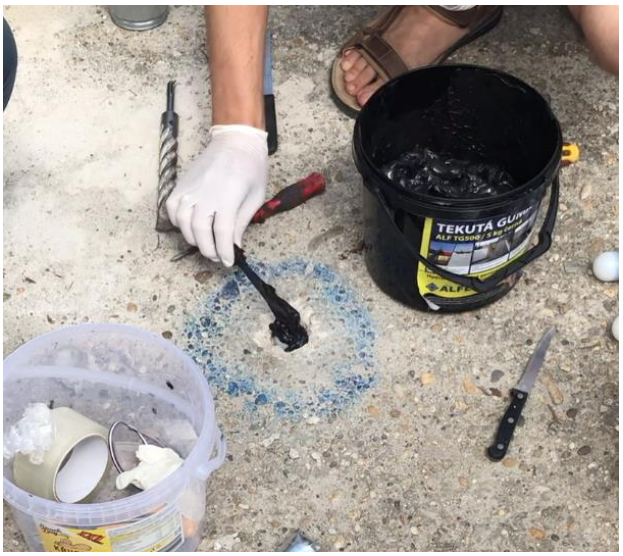
Fill the rest of the hole with sand. Keep the Parking pill in centre of a hole.

Figure 4: Hole filled with sand.

Step 4:

Final step is to cover hole with sealant. Pour the sealant MAPEI polyurethane MAPEFLEX PU21 or similar over the top of sensor as shown in figure 5. (See page 6)

Figure 5: Final step of installation



6. Operation mode

Image A: Basic screen

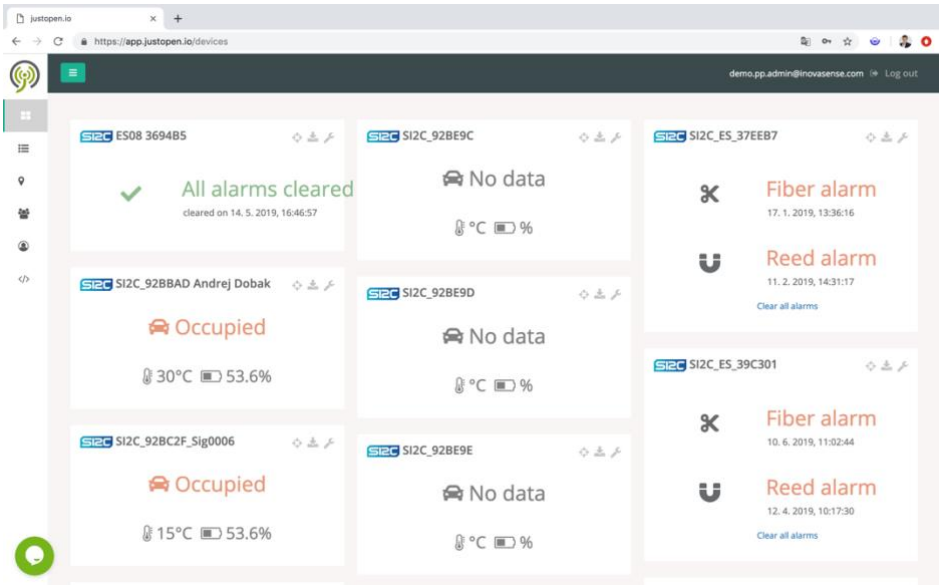


Image B: Device screen

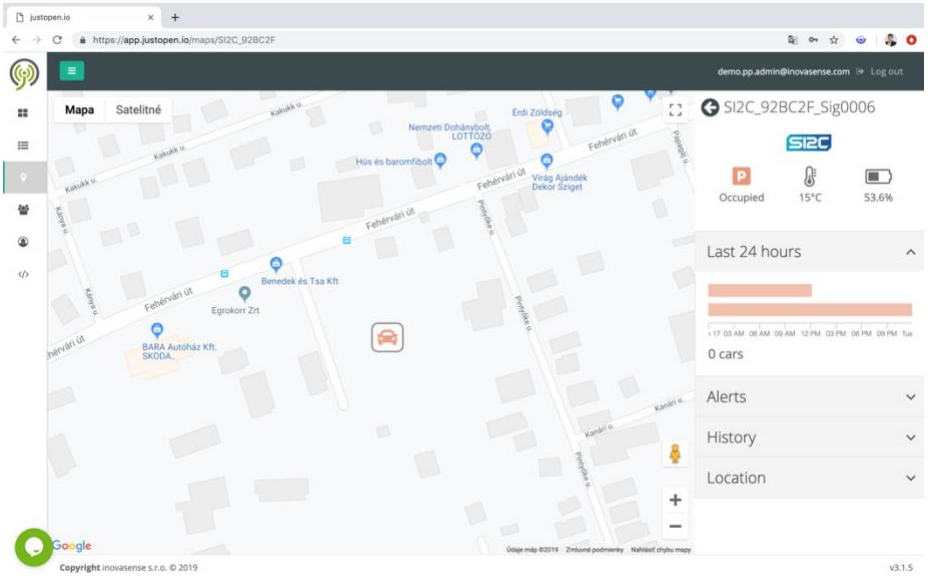


Image C: Alerts configuration (email alerts, SMS alerts)

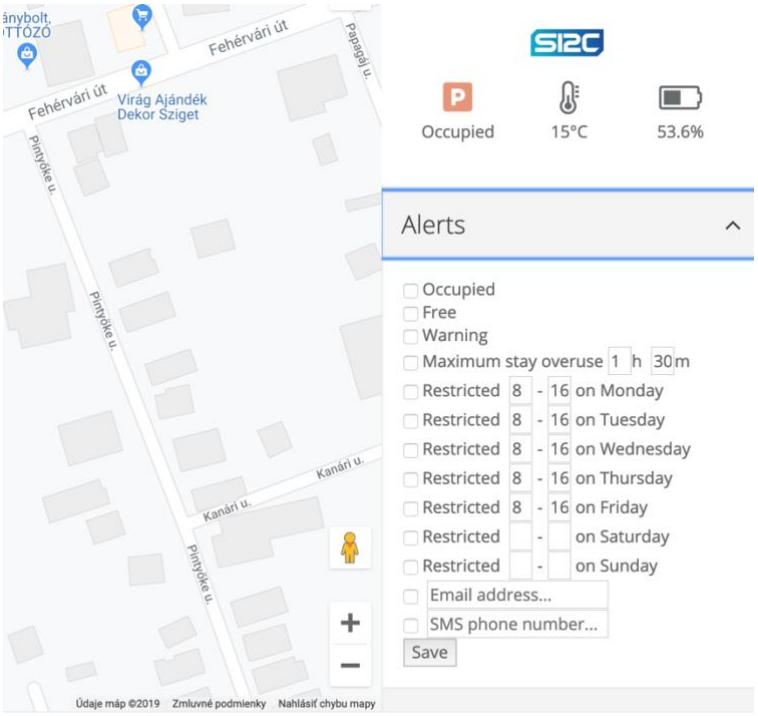


Image D: Messages history

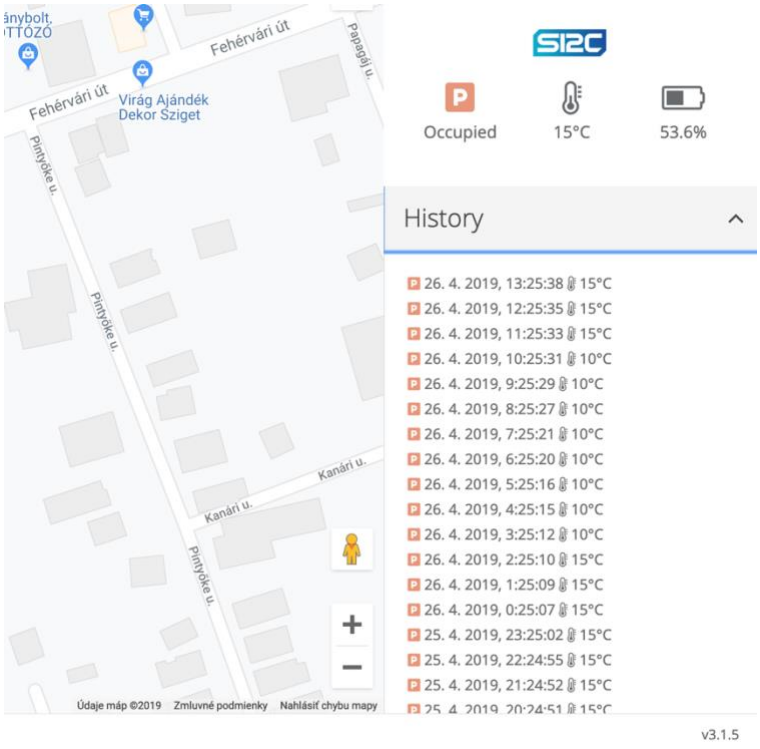


Image E: Location settings