



KF Series BLE Fuel Sensor Quick Start Guide

Version: V1.1

Date: Sept. 18, 2025

Change History

Version	Date	Editor(s)	Description
V1.0	May 20, 2025	Devin	Initial release.
V1.1	Sept. 18, 2025	Devin	Updated the commands for Bluetooth fuel sensor pairing and unpairing in Section 3.2.2.



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1. Introduction

The KF201S/KF202S/KF281S fuel level sensors, when connected to a compatible tracker such as the VL103M/VL802S, enable vehicle fuel level monitoring. This includes capabilities to detect fuel theft and refueling actions, making them suitable for the logistics industry and fleet management applications.



2. Specifications

NAME	KF201S	KF202S	KF281S
Bluetooth	BLE 5.0	BLE 4.0	BLE 5.0
Measurement Error	<1%FS	<1%FS	<1%FS
Battery	4000mAh	3600/2600 mAh	N/A
Power Supply	N/A	N/A	5-36V
Measuring Medium	Gasoline/diesel/lubricating oil/coolant	Gasoline/diesel/lubricating oil/coolant	Gasoline/diesel/lubricating oil/coolant

3. Preparing Tracker & Platform

3.1 Enable Sensor Search Function on Tracker

Send the following command to the tracker to enable its function for searching and connecting to KF2XXS series fuel level sensors:

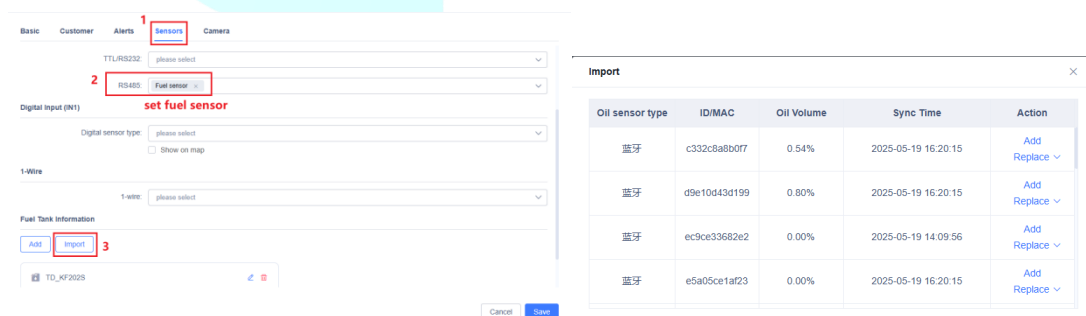
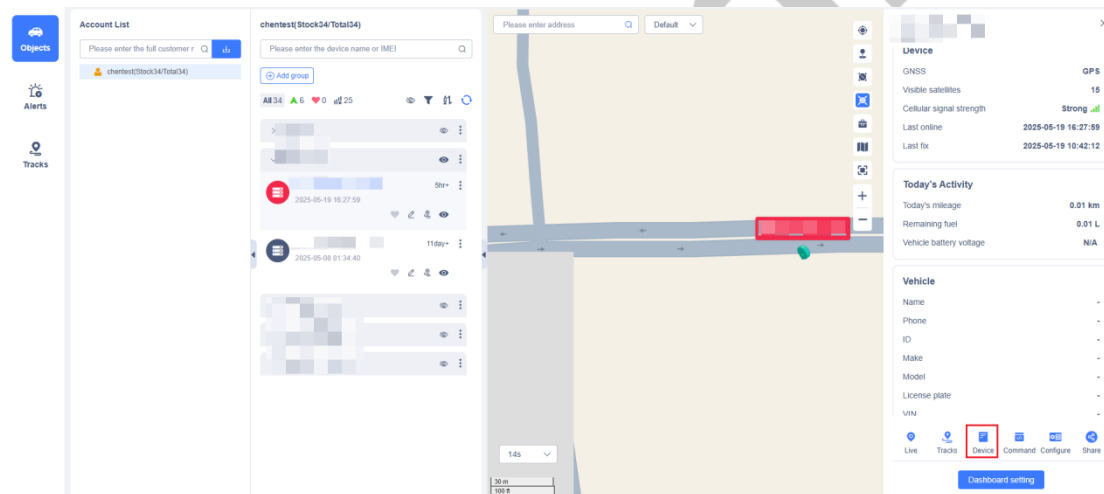
```
BT,FUEL,SW,KF201,ON#
```

3.2 Pair Tracker and Fuel Sensor

There are two methods for pairing the tracker with the fuel sensor:

3.2.1 Direct Upload

When this function is enabled on the tracker, it automatically scans for nearby fuel sensors and uploads their data to the platform. This fuel sensor data can then be viewed within the platform's "Import" settings.



3.2.2 Whitelist Filter Upload

By adding the MAC address(es) of specific fuel sensor(s) to the tracker's whitelist, the tracker will only report data from these authorized sensors.

```
BT, PAIR<, MAC1><, MAC2>.....<, MAC10>#
```

Add MAC addresses to the Bluetooth whitelist. Up to 10 MAC addresses can be added in a single command.

```
BT, UNPAIR<, MAC1><, MAC2>.....<, MAC10>#
```

Deletes MAC addresses from the Bluetooth whitelist. Up to 10 MAC addresses can be deleted by specifying their MAC addresses in a single command.

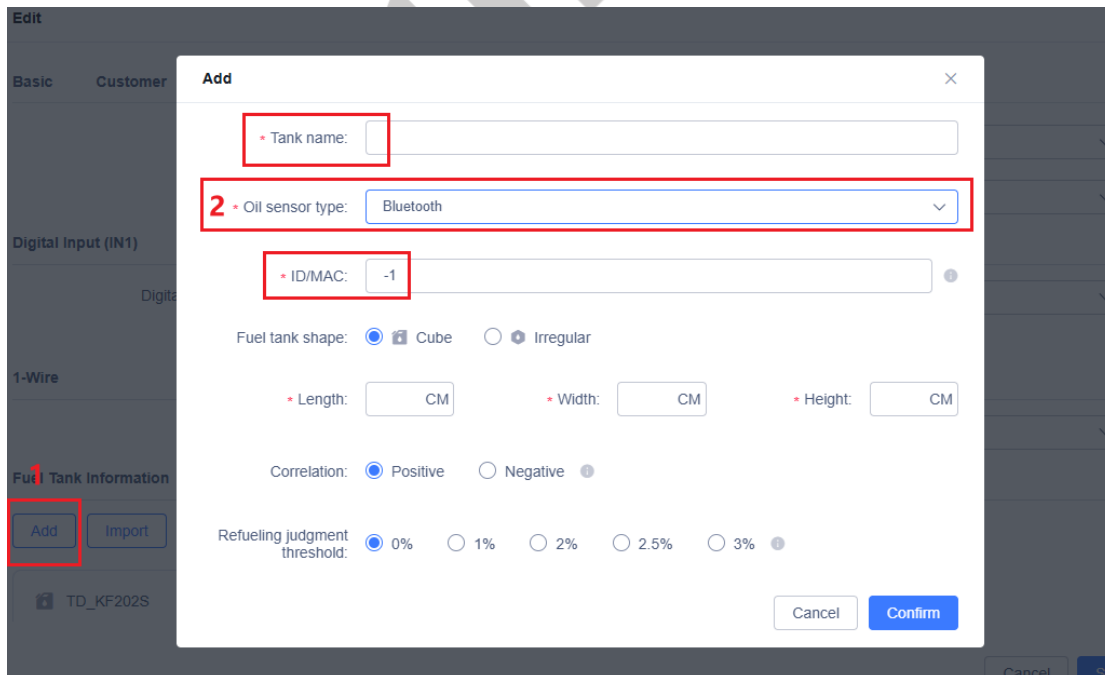
```
BT, UNPAIR<, SN1><, SN2>.....<, SN10>#
```

Deletes entries from the Bluetooth whitelist by the sensor's serial number. Up to 10 serial numbers can be specified in a single command.

```
BT, UNPAIR, ALL#
```

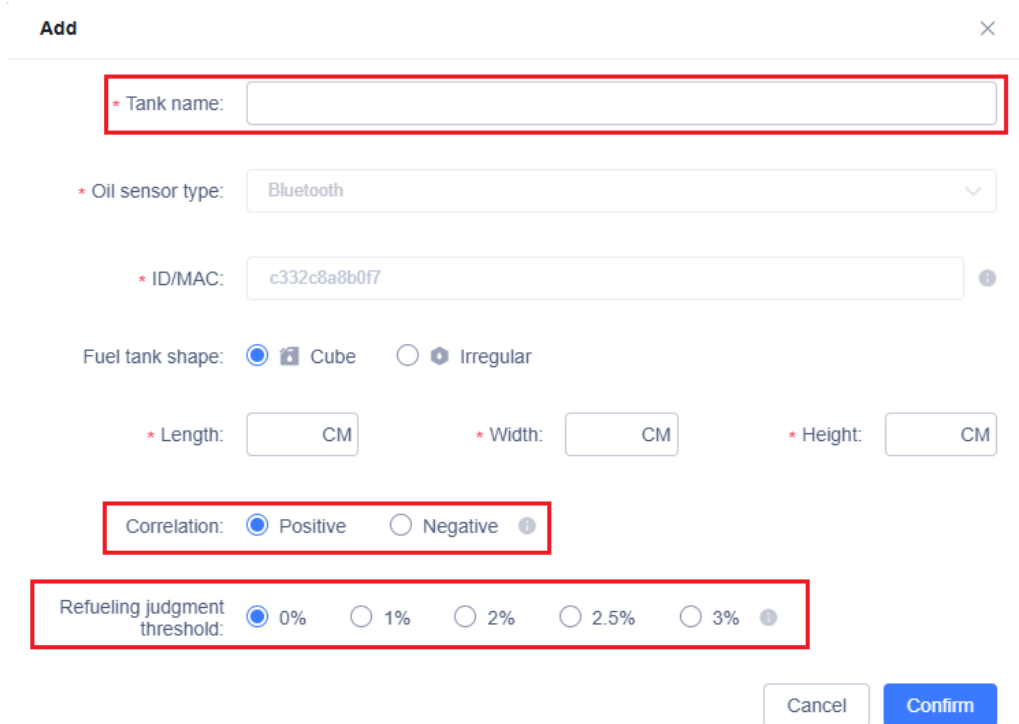
Clear all entries from the Bluetooth whitelist.

Platform operation for whitelisted sensors is similar to the Direct Upload method (Section 3.2.1), but you must first add the desired sensor MAC addresses to the tracker's whitelist using the commands above.



3.2.3 Platform Setup

In the platform's sensor add tab, you need to configure these parameters: Tank name, Fuel tank shape, and fuel theft and refueling judgement thresholds.



Add ×

* Tank name:

* Oil sensor type:

* ID/MAC:

Fuel tank shape: Cube Irregular

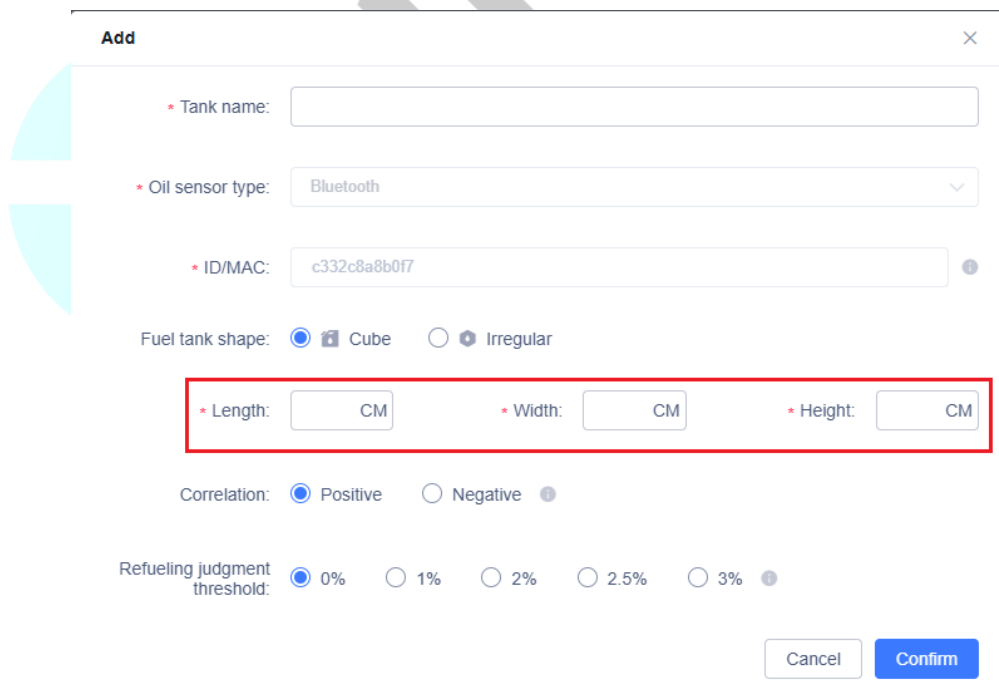
* Length: * Width: * Height:

Correlation: Positive Negative ⓘ

Refueling judgment threshold: 0% 1% 2% 2.5% 3% ⓘ

The platform supports two primary tank shapes for volume calculation:

- ① Cuboid (Rectangular): Requires entering the tank's internal length, width, and height.



Add ×

* Tank name:

* Oil sensor type:

* ID/MAC:

Fuel tank shape: Cube Irregular

* Length: * Width: * Height:

Correlation: Positive Negative ⓘ

Refueling judgment threshold: 0% 1% 2% 2.5% 3% ⓘ

- ② Irregular: Requires creating a calibration table by entering fuel volume percentages corresponding to various measured fill heights of the tank. (Placeholder for platform screenshot of irregular tank setup)

Add ×

* Tank name:

* Oil sensor type:

* ID/MAC:

Fuel tank shape: Cube Irregular

* 0%: * 25%: * 50%:

* 75%: * 100%: * total capacity:

Correlation: Positive Negative

Refueling judgment threshold: 0% 1% 2% 2.5% 3%

4. Preparing Sensor

Before calibrating the sensor, determine the required length of the sensor's measuring tubes based on the internal height of the fuel tank. Then, cut the tubes accordingly. The following steps show how:

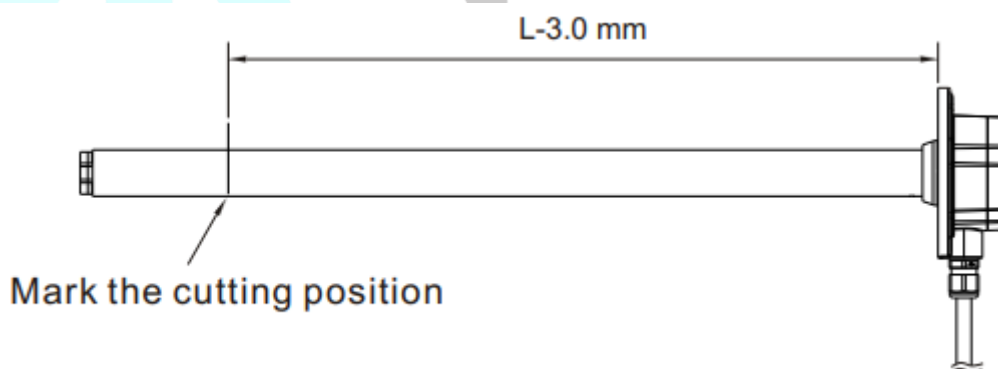
Step 1: Measure Tank and Determine Tube Length

Accurately measure the internal height of the fuel tank from the bottom to the point where the sensor will be mounted. The fuel sensor's measuring tubes should be cut to a length approximately 1 cm shorter than this internal tank height. This 1 cm allowance helps prevent installation issues due to measurement inaccuracies or tank irregularities. The measurement method is shown in the figures below.



Step 2: Mark and Cut the Sensor Tube

Based on the determined length, use a tape measure and a marker to clearly mark the cutting line on the sensor's measuring tube. Use a hacksaw to carefully cut the tube at the marked line.

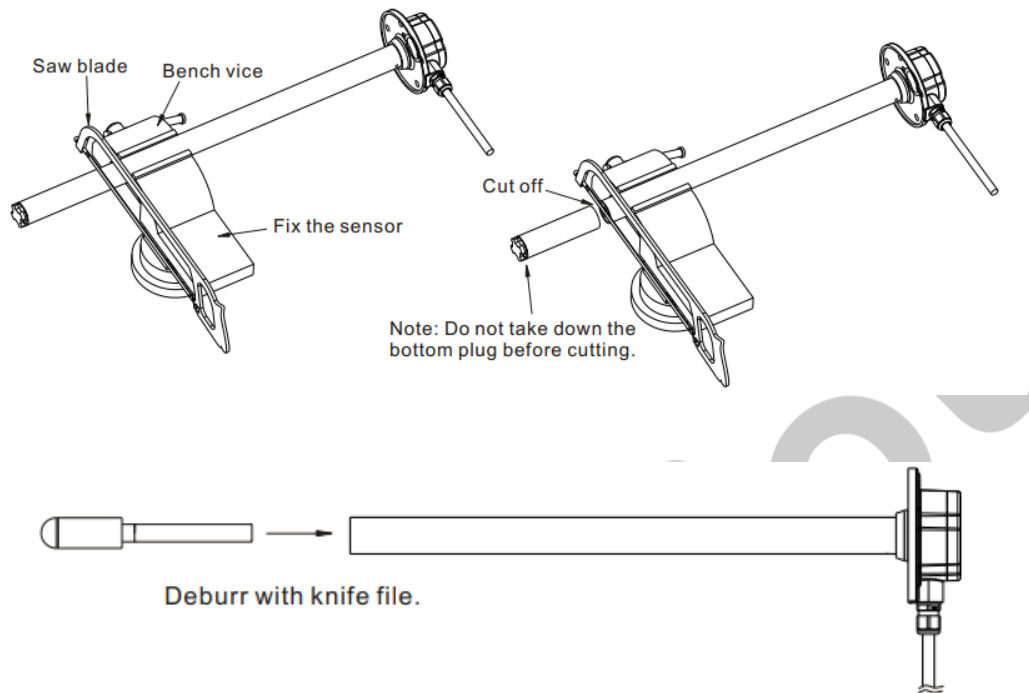


ATTENTION!!!

The minimum length of the measuring tubes must not be less than 25 cm (250 mm). Cutting them shorter may result in inaccurate readings or prevent proper calibration.

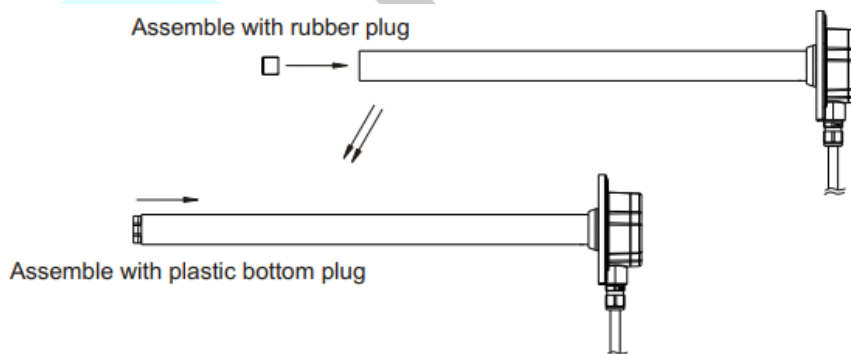
Step 3: Deburr Cut Edges

After cutting the tube to the desired length, carefully remove any burrs from the cut edge using a deburring tool or a sharp blade. Ensure the cut end are smooth, as shown in the figure below.



Step 4: Reinstall Bottom Plug

After cutting and deburring, remove the original bottom plug from the discarded section of the sensor tube. Securely reinstall this plug onto the end of the newly cut measuring tube, ensuring it is fitted tightly and correctly.



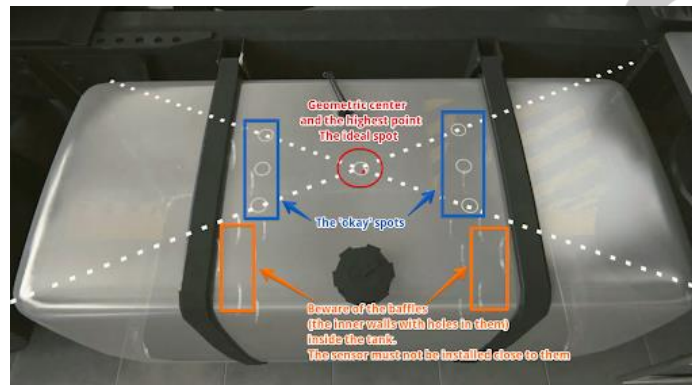
5. Preparing Tank

DANGER!!!

The following operations are NOT suitable for gasoline tanks due to the high risk of explosion. These instructions apply to diesel or similar, less volatile fuel tanks ONLY. Proceed with extreme caution and ensure all safety measures are followed.

Step 1: Locate Installation Point and Check for Obstructions

Locate the geometric center of the top surface of the tank. At this point, drill a small pilot hole (e.g., $\varnothing 3\text{mm}$). Insert a piece of stiff wire through the pilot hole to check for internal baffles, supports, or other obstructions directly below the chosen location.



Choosing a location for installing the fuel level sensor

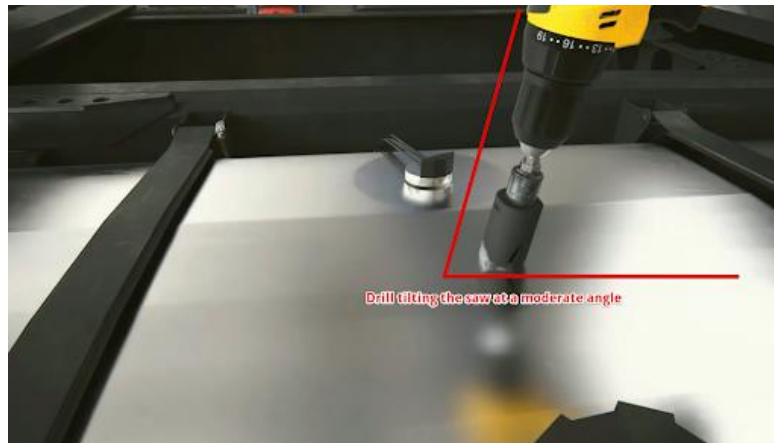


Drilling the tank and subsequent examination of the tank for the presence of obstructions

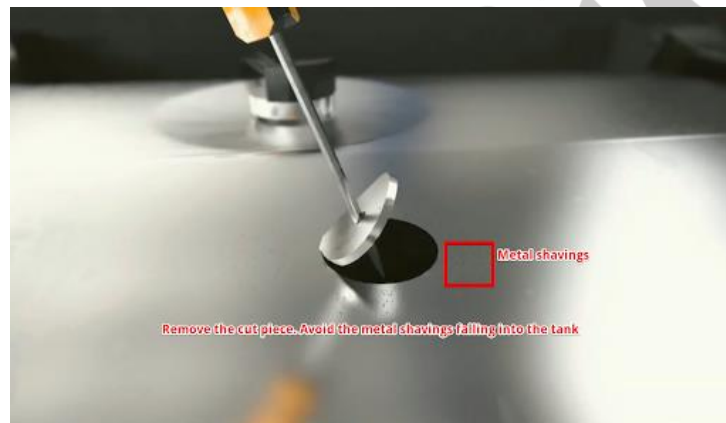
Step 2: Drill Mounting Hole

If the area below the pilot hole is clear of obstructions, enlarge the hole to $\varnothing 35\text{ mm}$ using a bimetallic hole saw. When drilling, keep the hole saw tilted slightly to prevent the cut disc from

falling into the tank. If drilling a metallic tank, use a magnet to catch metal shavings and prevent them from falling into the tank.



Drilling a hole at an angle



Removing a drilled disc

Step 3: Alternative Installation Location (If Necessary)

If it is impossible to install the sensor in the geometric center of the tank, select an alternative installation point as close as possible to the geometric center. This point should ideally coincide with a location representing the maximum fuel height in the tank. This helps minimize fuel level fluctuations caused by vehicle movement and ensures more consistent readings.

6. Preparing Calibration

All three sensor models (KF201S, KF202S, KF281S) can be calibrated using a dedicated mobile application. Note the difference in the apps required:

- KF202S: Calibrated using the "Escort Sensor Configurator" app.
- KF201S/KF281S: Calibrated using the "Ble Sensor" app.

KF202S Calibration (using Escort Sensor Configurator App):

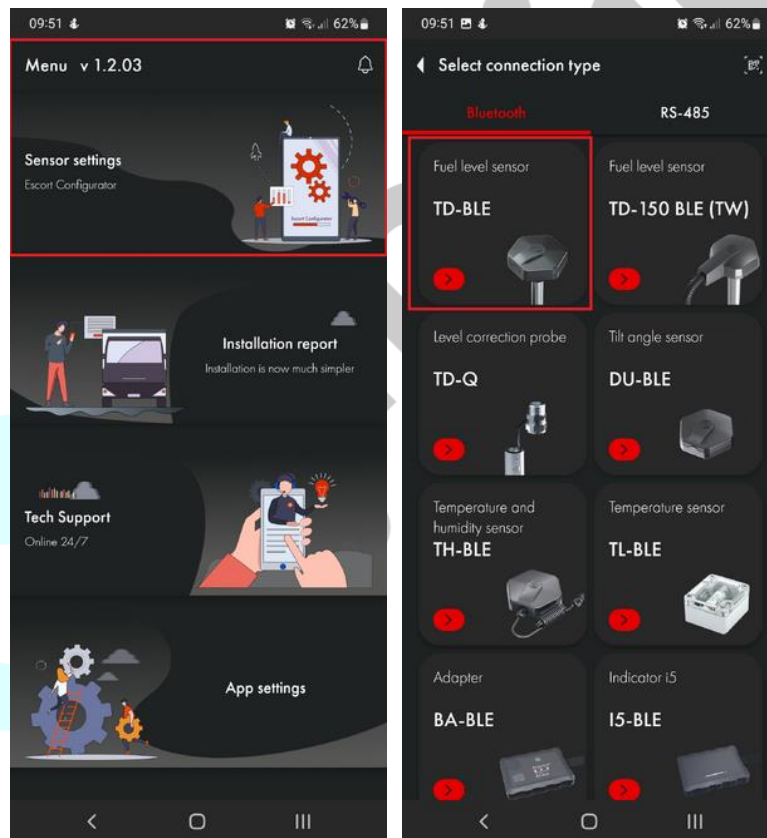
Download links:

GOOGLE PLAY:

<https://play.google.com/store/apps/details?id=ru.fmeter.config>

APPLE STORE :

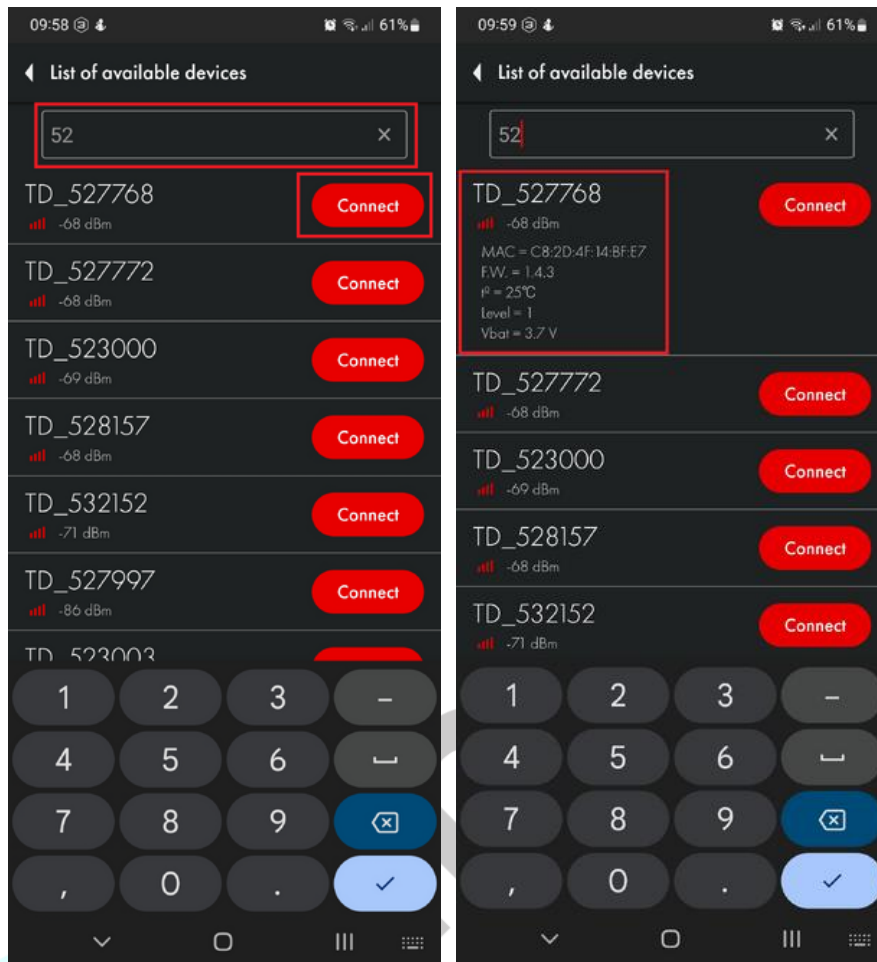
<https://apps.apple.com/ru/app/escort-sensor-configurator/id1483425085?l=en>



Connect to the sensor:

Find the required sensor in the app by entering the last 6 digits of its serial number (found on the sensor head).

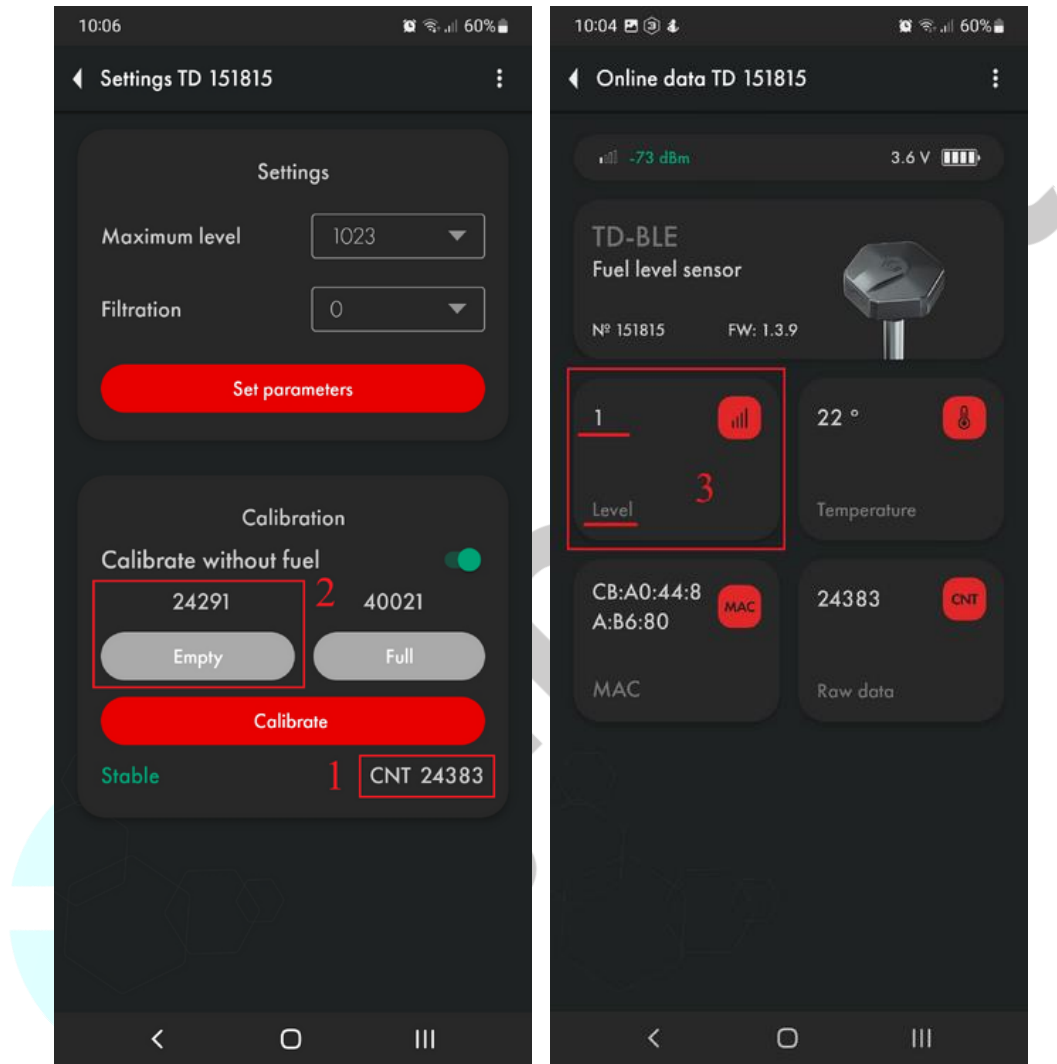
Alternatively, select the required sensor from the list of available Bluetooth devices in the app and tap the "Connect" button. On Android devices, tapping the sensor's name in the Bluetooth list may display raw advertising data packets.



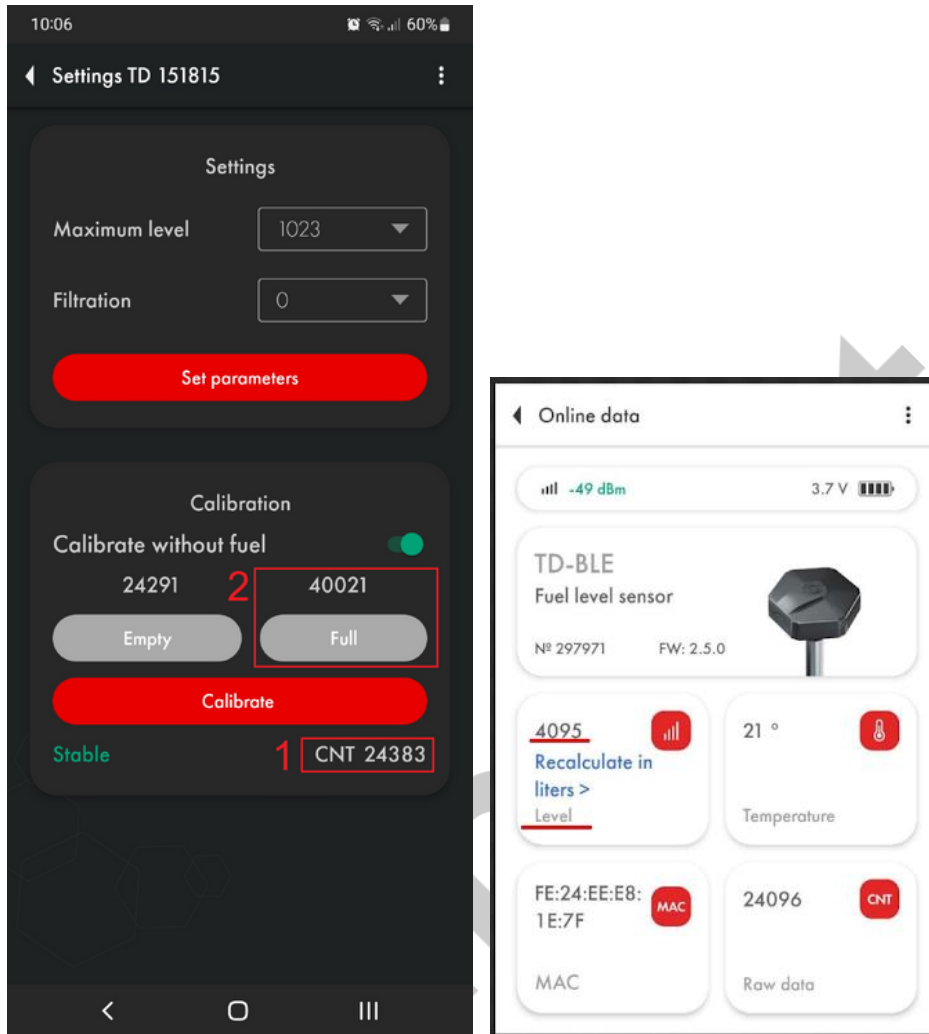
Calibration Process:

After cutting the sensor tube to the new length, you must recalibrate the sensor by setting new "Full" and "Empty" calibration values. The sensor's raw output value (often referred to as CNT or Level) changes based on the fuel level within its tube. This raw CNT value is then compared with the stored "Empty" and "Full" calibration values to determine the normalized fuel level.

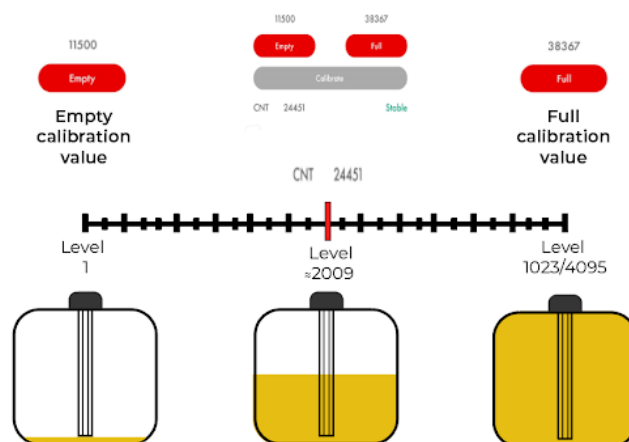
- When the tube is empty, if the raw CNT (1) is approximately equal to the 'Empty' calibration value (2), the calibrated output (3) will indicate empty.



- When the tube is full, if the raw CNT (1) is approximately equal to the 'Full' calibration value (2), the calibrated output (3) will indicate full.



The raw CNT value should increase as the fuel fills the tube, ranging from a value near the 'Empty' calibration point to a value near the 'Full' calibration point.



The sensor is initially calibrated for its original factory length. **After altering the tube length, recalibration is essential** to establish the new raw CNT values corresponding to the 'Empty' and 'Full' states for the modified length.

To perform calibration:

- Insert the provided plastic centralizer into the sensor tube.



- Calibrate "Full": Fill the sensor tube completely with fuel. This can be done by either:
 - a) Covering the drain holes at the bottom of the sensor (e.g., with electrical tape), inverting the sensor, and carefully filling the tube with fuel (this is often the preferable method).
 - b) Immersing the sensor vertically in a container of fuel until the fuel level reaches the sensor flange (ensure drain holes are open for this method).

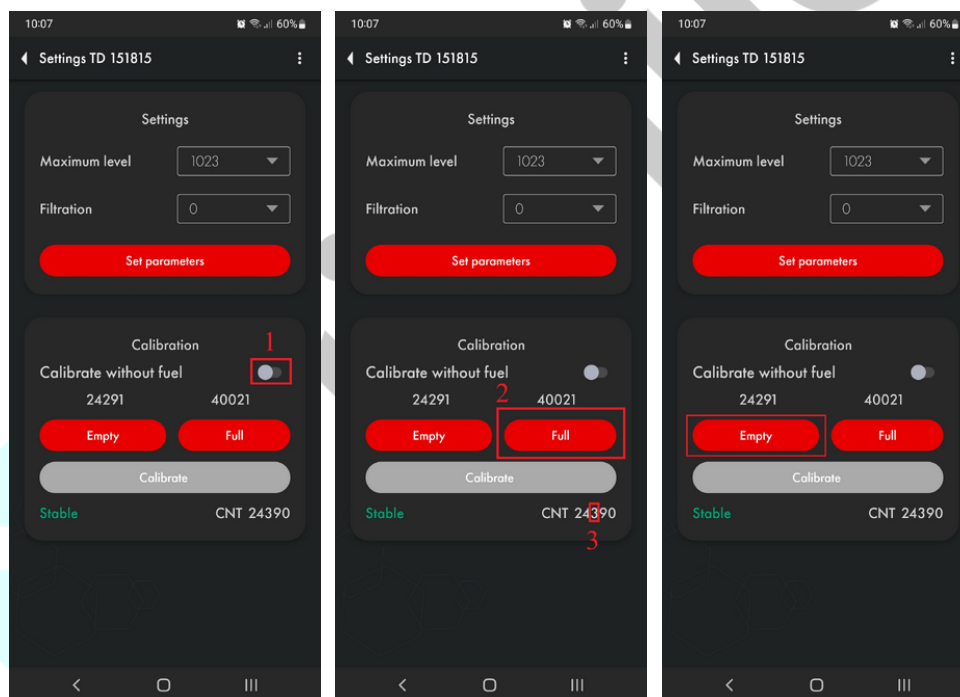


Closing drain holes, rotating sensor, and filling tube with fuel



Filling tube by immersing sensor in fuel tank (drain holes open)

- In the app, ensure the "Calibration without fuel" slider (1) is set to the inactive (OFF) position. With the tube completely full of fuel, wait for the raw CNT reading to stabilize. This means the value, particularly the last few significant digits, should remain constant for at least 2 minutes (3). Once stable, press the "Full" button (2) in the app.



KF201S/KF281S Calibration (using Ble Sensor App):

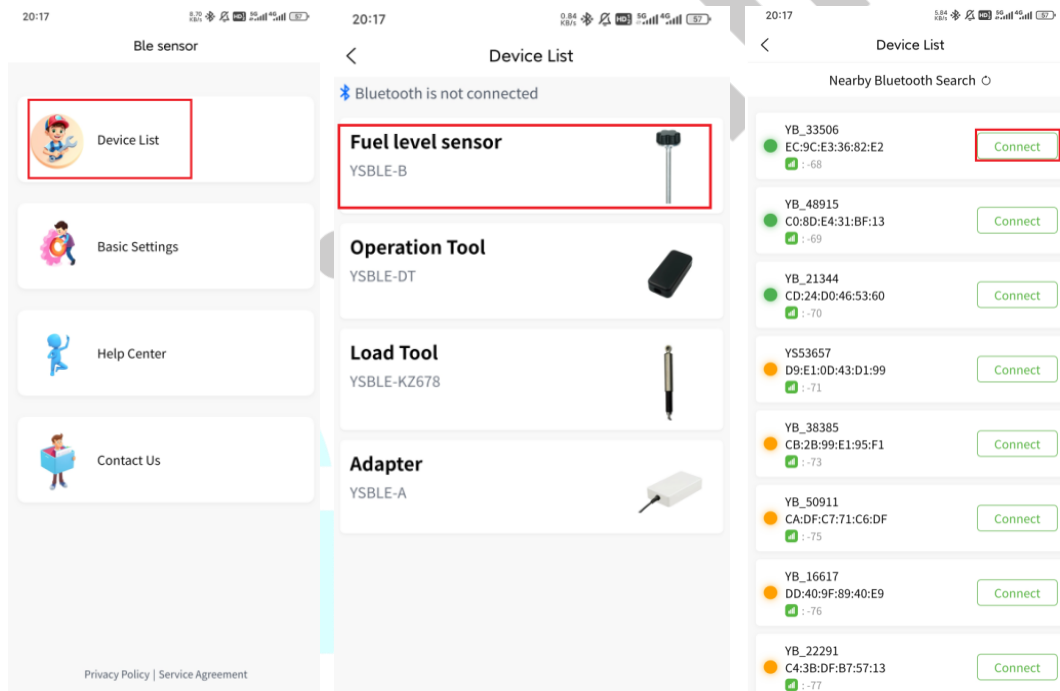
Please scan the QR code for the download link for the appropriate app.



The specific calibration steps are similar in principle to the KF202S. The app interface is described below.

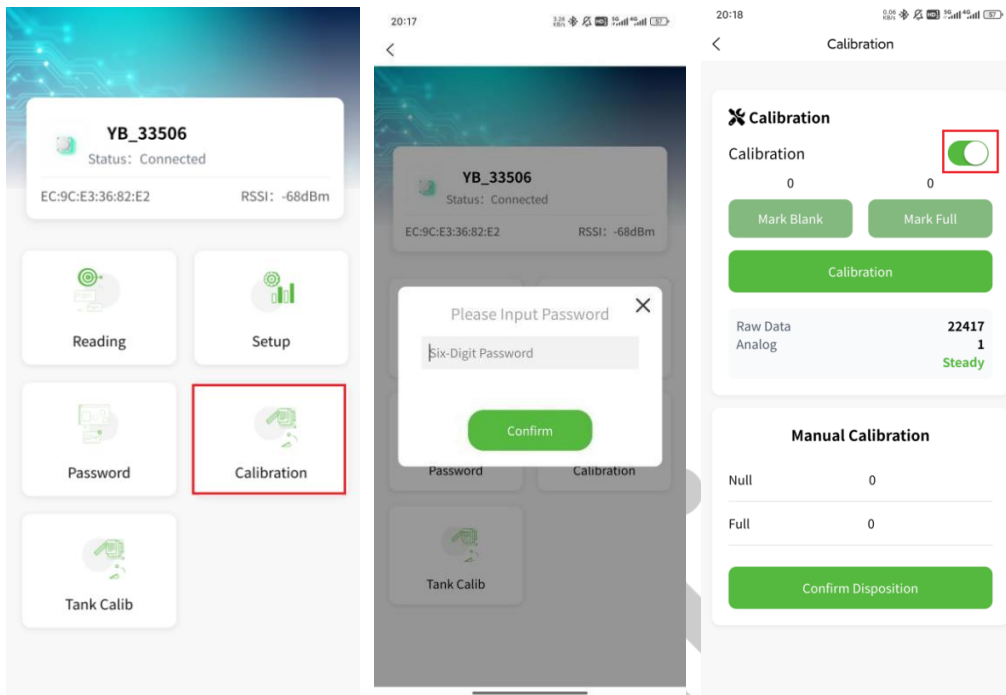
Step 1: Connect to the Device

Follow the highlighted area (e.g., red box) in the app diagrams for guidance on connecting to the device via Bluetooth.



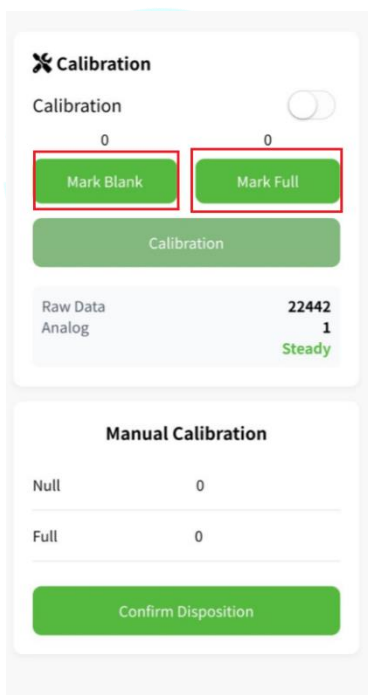
Step 2: Access Calibration Interface

Upon first connection to the app, you may need to set a 6-digit password for the sensor. When you enter the calibration interface, ensure the "Calibration" switch is turned OFF.



Step 3: Perform Empty/Full Calibration

Perform the "Empty" (Blank) and "Full" calibrations for the KF201S/KF281S following the same principles outlined for the KF202S:



- For "Full" calibration: Fill the sensor tubes completely with fuel and wait for the reading to stabilize before saving the "Full" point.
- For "Empty" calibration: Ensure the sensor tubes are completely empty and dry, wait for the reading to stabilize, then save the "Empty" point.

7. Installing Sensor Inside Tank

After the sensor tube has been adjusted to the correct length for the tank and the sensor has been successfully calibrated, it is ready for installation in the tank.

Insert the sensor (with its adjusted tube) into the previously drilled $\varnothing 30\text{-}35$ mm hole in the tank.

Ensure the provided gasket is placed between the sensor flange and the tank surface to create a proper seal. Secure the sensor to the tank using the screws from the installation kit. These screws should go into the $\varnothing 3\text{mm}$ pilot holes drilled earlier around the main mounting hole.



8. Command Instructions

8.1 Fuel Level Upload Interval

This command configures the fuel level data upload intervals based on the vehicle's ignition status (ACC ON/OFF).

FUELTIMER, P1, P2#

Parameter	Explanation	Setting Range	Default
P1	Upload interval when ACC ON	5-86400s	60s
P2	Upload interval when ACC OFF	0/5-86400s	600s

8.2 Fuel Theft Detection Settings

This command configures the parameters for fuel theft detection. An alarm is triggered if the rate of fuel level decrease exceeds the configured threshold (P3) within the specified monitoring duration (P4).

FUELSTEAL, P1, P2, P3, P4#

Parameter	Explanation	Setting Range	Default
P1	Function switch	ON/OFF	OFF
P2	Alert method	0/1/2 0: GPRS Only 1: SMS+GPRS 2: GPRS+SMS+CALL	0
P3	Fuel drop percentage threshold	1 to 100 (%)	10
P4	Monitoring duration for theft detection	1 to 60s	10

8.3 Refueling Detection Settings

This command sets, the parameters related to fuel theft detection. When the fuel drop rate is higher than the set value, the device will sound an alarm.

This command configures the parameters for refueling detection. An alarm is triggered if the rate of fuel level increase exceeds the configured threshold (P3).

FUELRISE, P1, P2, P3#

Parameter	Explanation	Setting Range	Default
P1	Function switch	ON/OFF	OFF
P2	Alert method	0/1/2 0: GPRS Only 1: SMS+GPRS 2: GPRS+SMS+CALL	0
P3	Fuel increase percentage threshold for refueling detection	1 to 100 (%)	10