

Why we design & produce UL212 BLE All-in-one Ultrasonic Fuel Level Sensor?

**More Fuel Theft
after Covid-19**



**Manage Fleet Fuel Bill
Over the Air**



**Increase Fuel Efficiency
Decrease Fleet Running Cost**



Challenges in Fuel Management

- a. Too Many Different Type of Vehicles and Truck Tanks
- b. Fuel Consumption Report manually recorded
- b. Unacceptable to draw holes in truck tank



Visible & Feasible Fleet Cost Study



Direct Waste Cost	InDirect Waste Cost
<p>1. Unnecessary idling, example 1 hour/day. 1 hour consumes 2Ltr of diesel</p> <p>The waste cost = 1.8USD/hour/day</p> <p>2. Moving at 120km/h instead of 100km/h increases fuel consumption by 10%. On Average truck consumption with 25L/100km, 500km/day, total consumption 125L/day</p> <p>The waste cost = $125 \times 10\% \times 80\% \text{ (time)} \times 0.9\text{USD} = \textbf{9USD/day}$.</p> <p>Average Waste Cost Per Year = $(1.8 + 9) \times 365\text{USD} = 3942/\text{truck}$</p>	<p>Average Daily Cost / Driver</p> <ul style="list-style-type: none"> ● Harsh Acceleration /High RPM: Waste more fuel ● Harsh Braking : Waste fuel, Reduces vehicle parts life time. ● Choosing Wrong Routes: Waste a lot fuel and time ● CANBUS/OBD Diagnostic Lost ● Adblue Low Level Alarm, Limited Torque or cannot Restart engine

Why NOT use CANBUS/OBD system to detect fuel?

1. CANBUS/OBD **CANNOT** monitor 7*24 fuel data



2. CANBUS/OBD **CANNOT** detect fuel theft after Ignition off



Why NOT use CANBUS/OBD system to detect fuel?

3. CANBUS/OBD **CANNOT** give same accuracy against fuel sensor

(1) Fuel Consumption VS Odometer (L/100km):

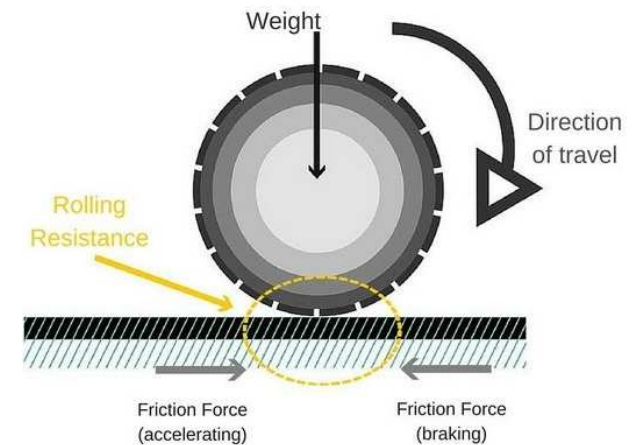
Relies on vehicle sensor generated odometer,

Affected by Tyer circumference change during driving, because of

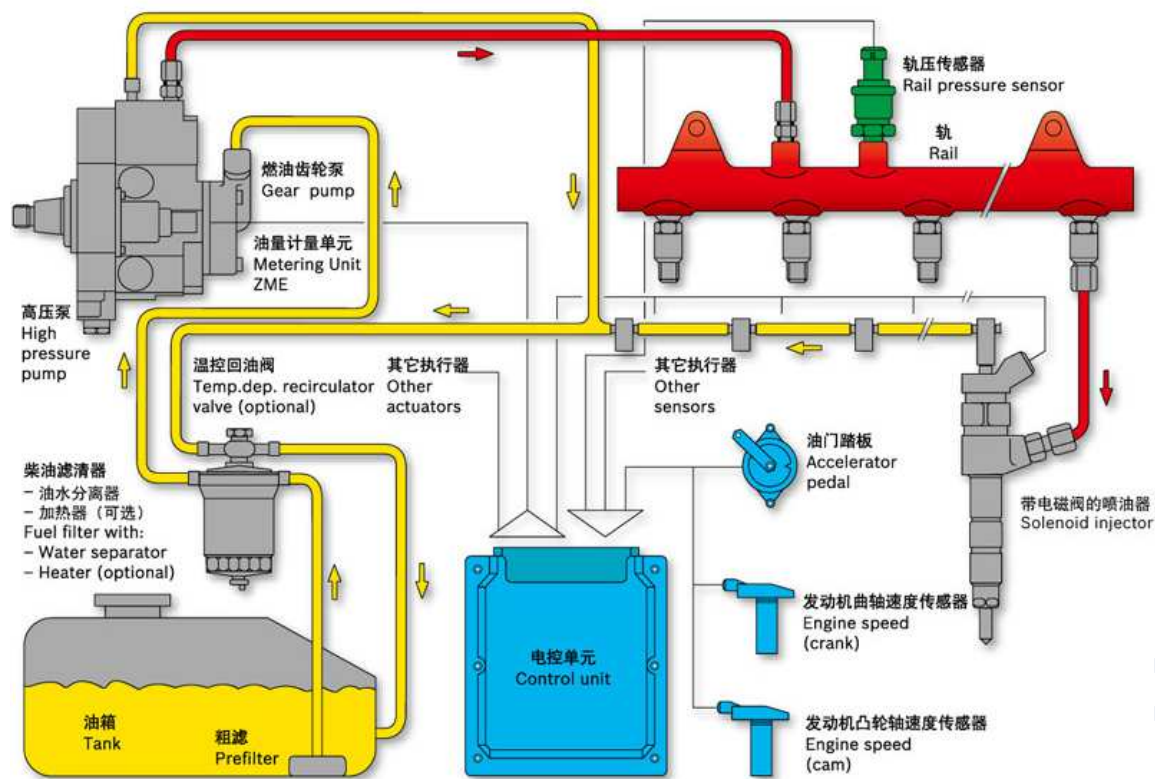
- **vehicle parameter(sensor)**
- **tyer pressure**
- **friction change.**

CANBUS Odometer difference against GPS Odometer will be more than 3%

(2) Fuel Level data from float sensor, which is analogue ohm signal, not true height in mm



Why NOT use CANBUS/OBD system to detect fuel?



(3) HPCR(High Pressure Common Rail System) gives high accurate fuel consumption(L/minute), but **cannot tell** :

- * **How much fuel left in tank?**
- * **How much in refueling?**

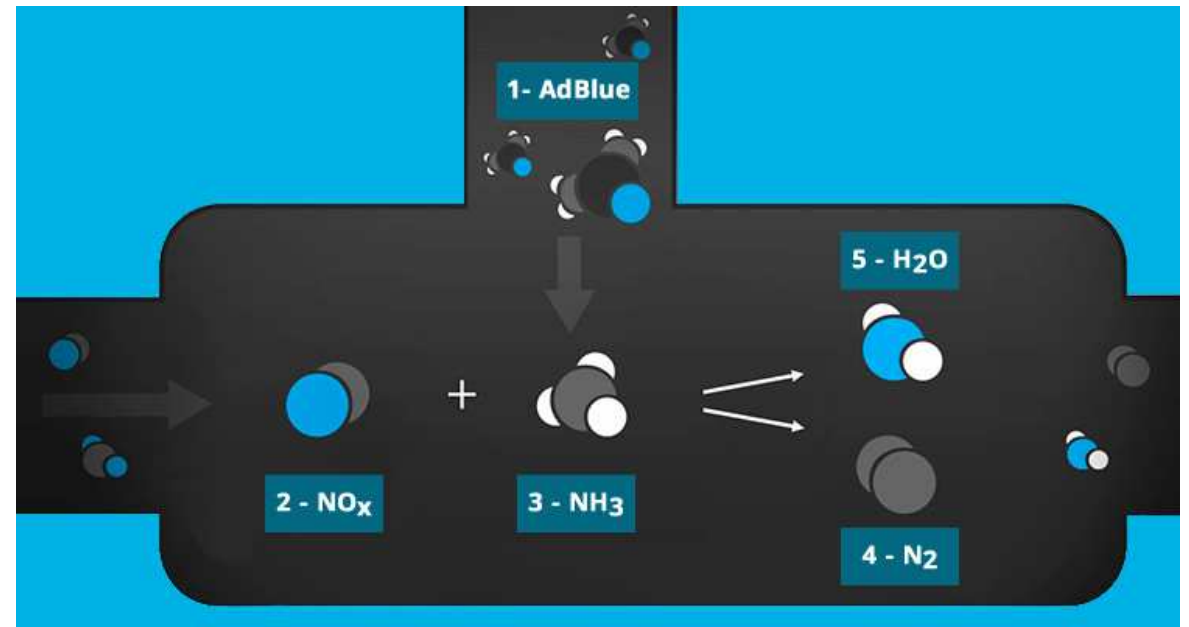
Adblue VS Fuel Consumption

In 2006, the technology successfully crossed into the European heavy-duty diesel market, where it enabled trucks to meet the Euro IV and V limits.



More info about Adblue please visit:

<https://www.carbuyer.co.uk/tips-and-advice/152834/what-is-adblue>



Selective catalytic reduction

When Run Out of Adblue:

1. Limited Torque & Speed ---Waste Fuel in high RPM
2. Engine cannot restart until refill Adblue

What is Advantages of Ultrasonic Technology?

Why NOT Resistance? Capacitive? Fuel Pressure?



1. No Drawing to avoid truck warranty & fleet safety issue(VS Capacitive fuel sensor, Fuel Pressure Probe)

2. All types of truck: Truck, Excavator (Fuel Pressure Probe easily blocked), Tractor, Trailer, Generator

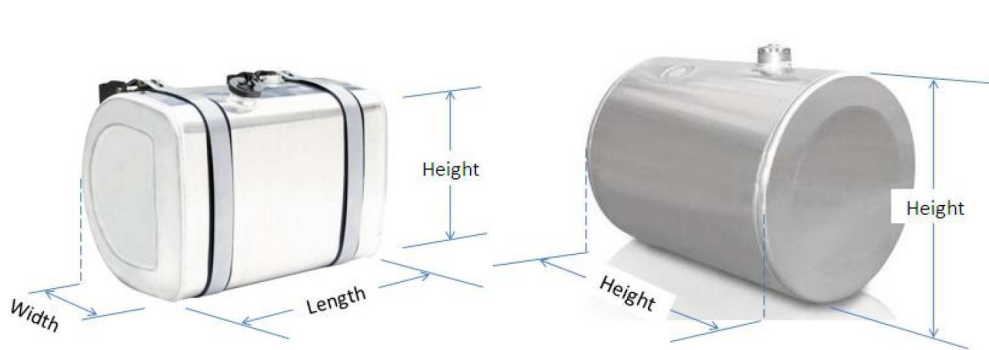
3. All types of tank: Metal/Iron/Aluminum/Fiber/Plastic/Stainless steel

4. All types of liquid: Diesel, Gasoline(Cannot Draw holes), Water, LPG, Adblue

5. Non-contact liquid: Avoid corrosion/dirty(All Capacitive fuel sensor has such issue)

6. 99.5% high accuracy

What is Advantages of Ultrasonic Technology? Why NOT Resistance? Capacitive? Fuel Pressure?



Truck



Excavator



Mining Truck



Mixer Truck



Generator

How does UL212 work?

Fuel thefts

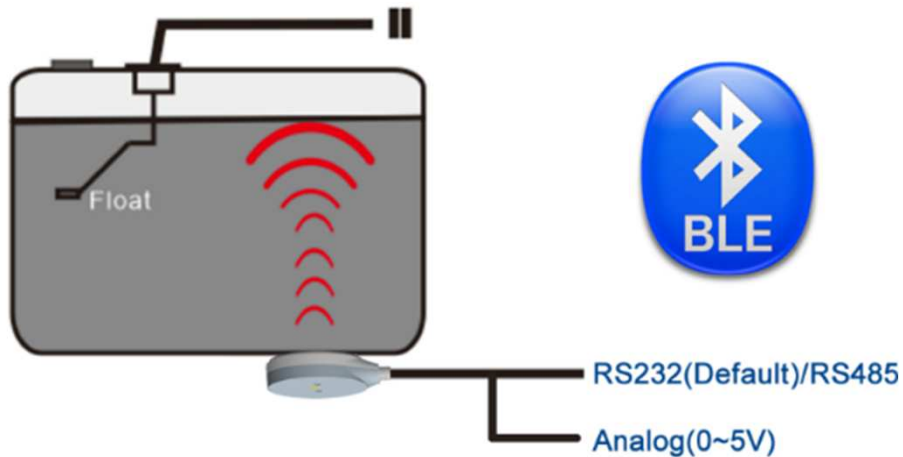
↓ **90%**

Monthly Fuel Cost

↓ **15%**

Fleet Efficiency

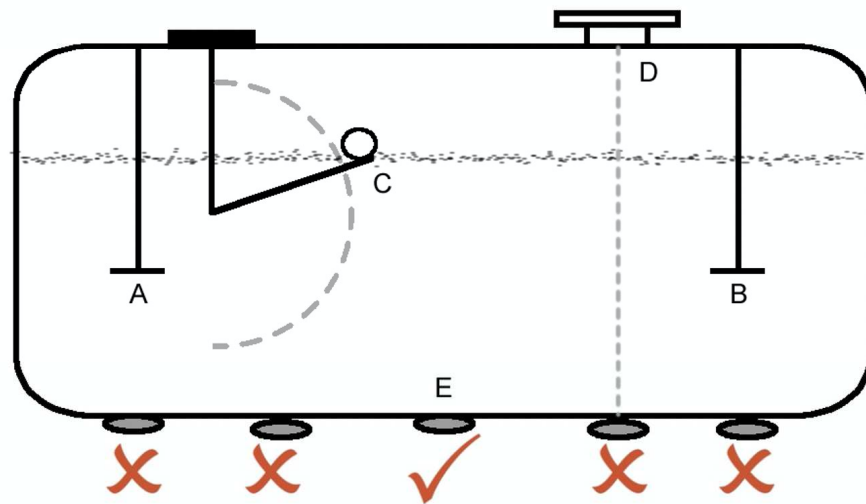
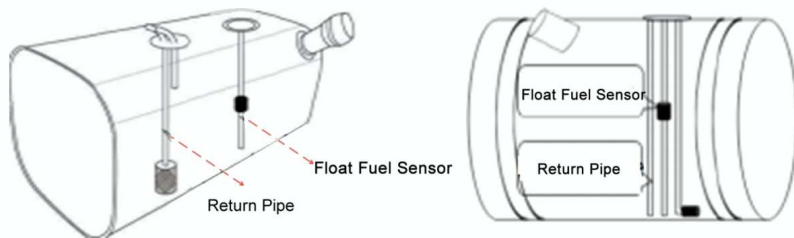
↑ **30%**



It uses ultrasonic probe to detect the fuel level height and carries out smart processing for height signal of fuel quantity through built-in program of the controllers box

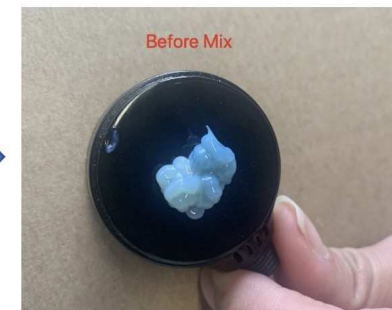
Then it sends the fuel height data to platform through GPS Tracker/Mobile DVR to generate the fuel quantity report after analysis.

How to install UL212?



- A,B: Original Tank Compartment
C: Original Tank Fuel Tube Float Range (Circle)
D: Refueling Port
E: Best Position for installation

Inject the AB Epoxy Glue on the probe, and mix AB glue for 20~30 second





How to Verify Installation Successfully?



Standard for best installation position

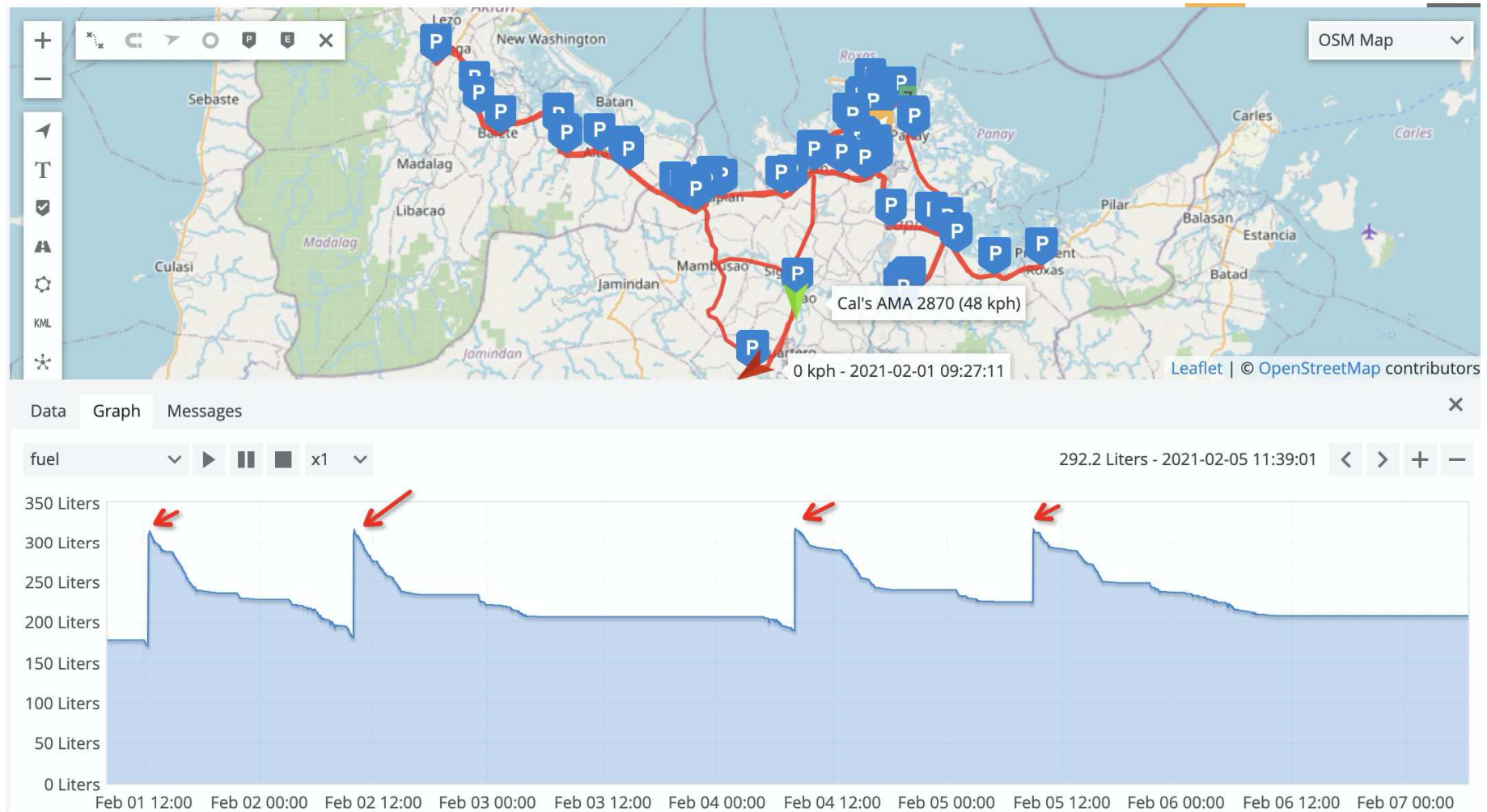
- Probe Show stable **GREEN** Light
(if flash red, you need hold and recheck other position)
- Mobile APP meets the following status:



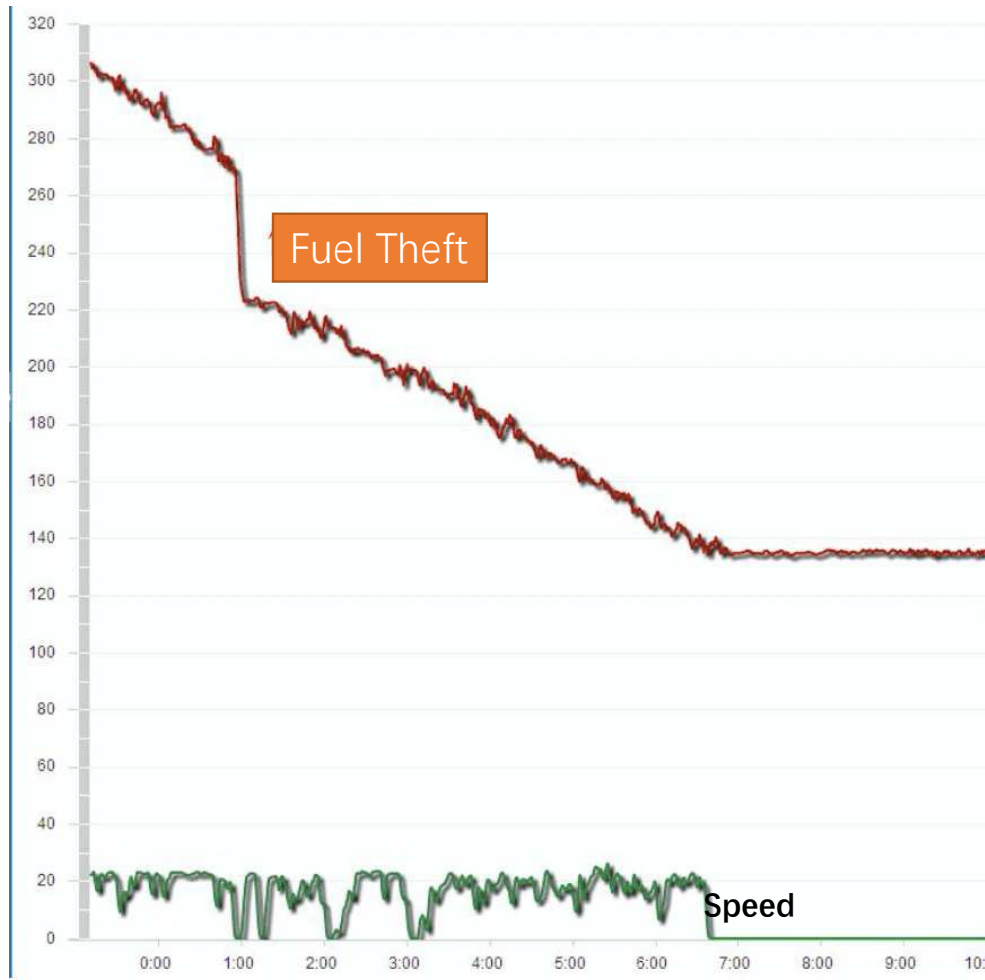
4:50 4G	
Firmware Version	29 38 °C
Real Time Height	1427mm
Smooth Height	1427mm
Signal Strength(better>60)	99
Valid Signal No	40
Tilt Angle(degree,must<)	4
Software Code(0:Normal,1:Error)	0
Hardware Code(0:Normal,1:Error)	0

- Real Time & Smooth Value are stable & close to real height
- Signal Strength more than 10 or stable
- Valid Signal Quantity is stable, more than 20
- Tilt Angle is less than 11 Degrees

How to Identify Refueling?



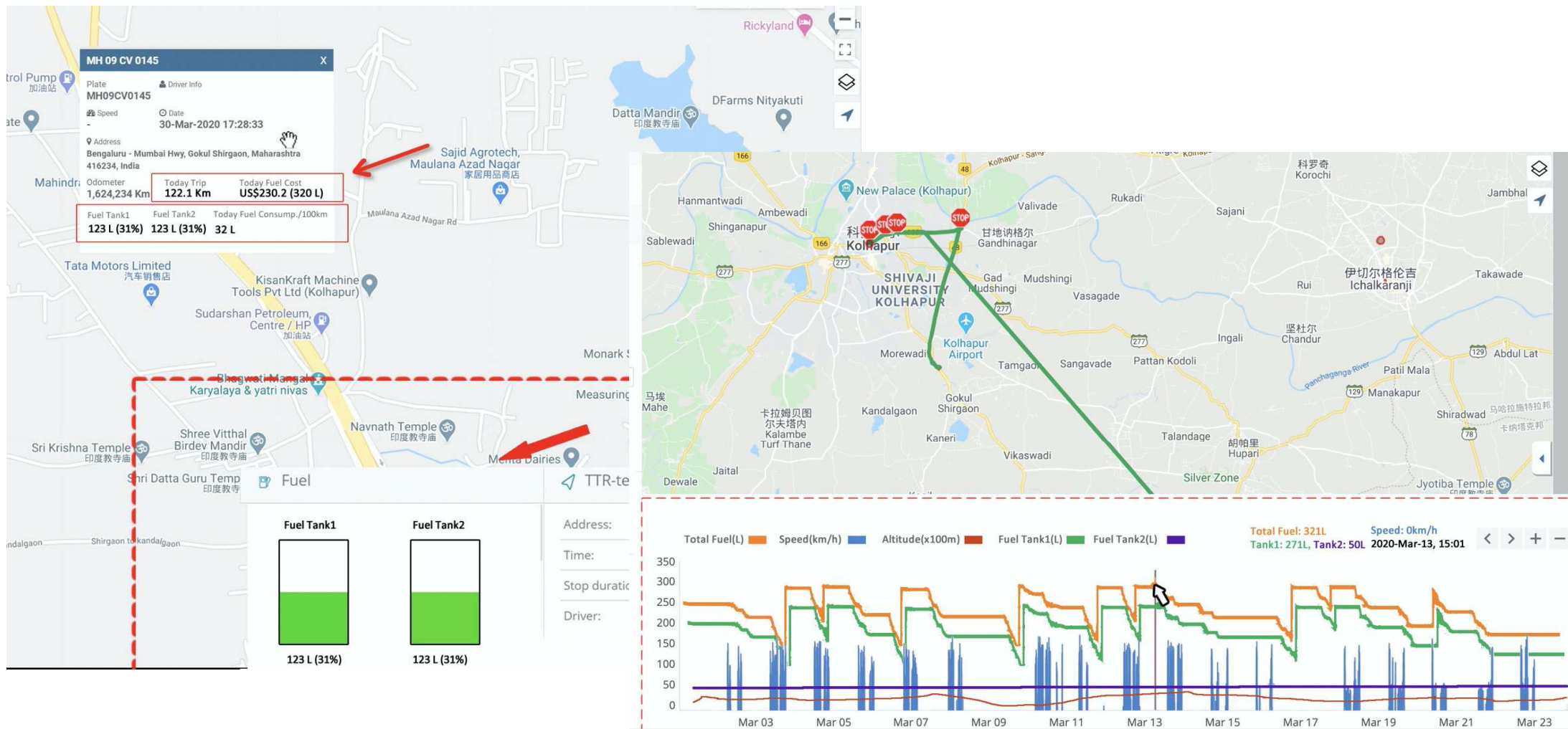
How to Identify Fuel Theft?



- Fuel Theft will happen when Ignition Off or Speed=0 normally
- Sometimes, driver will steal fuel with low speed around 3~5km/h

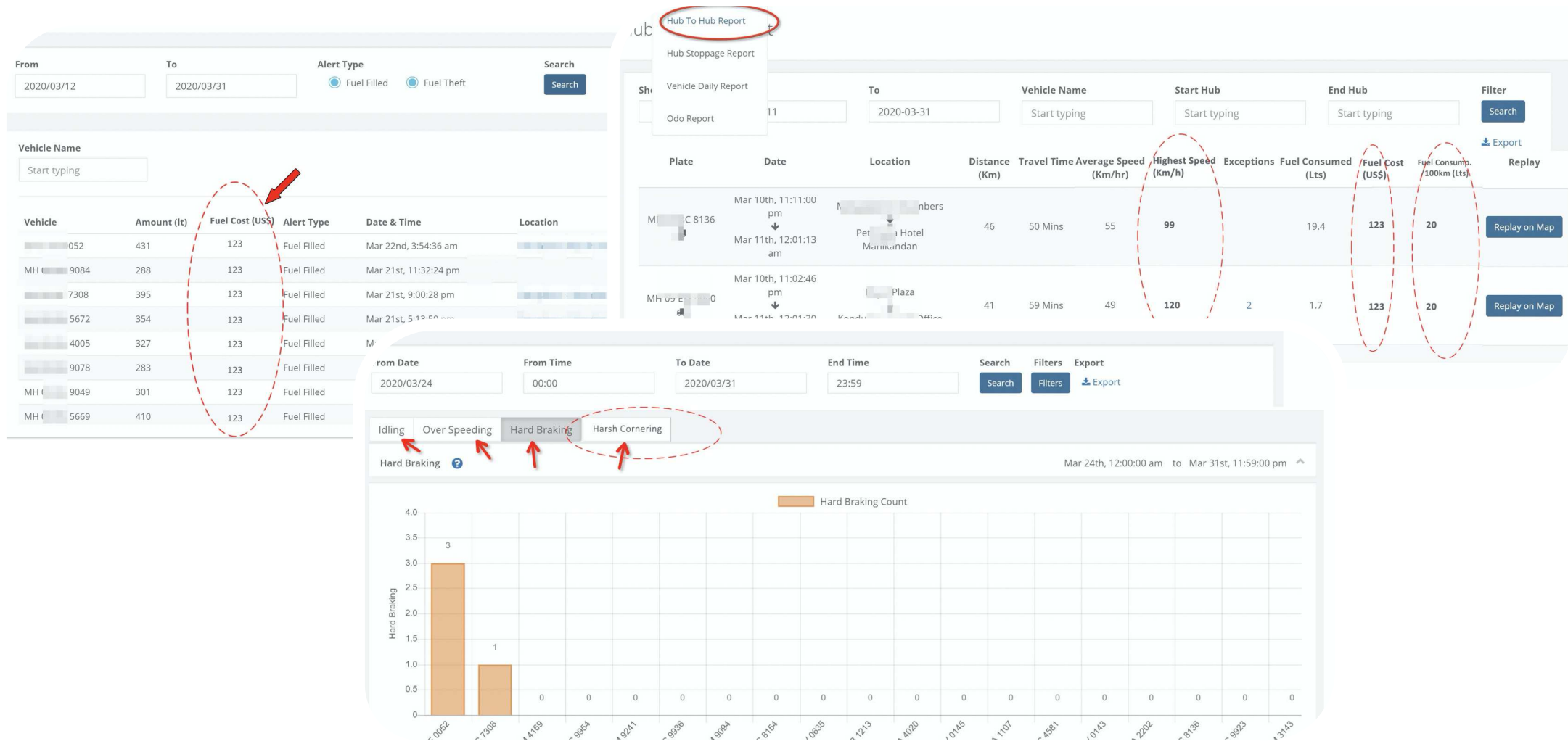
How to Manage Fleet Fuel Telematics (suggestions) ?

* Map Show



How to Manage Fleet Fuel Telematics (suggestions) ?

* Cost Report VS Driver Behavior

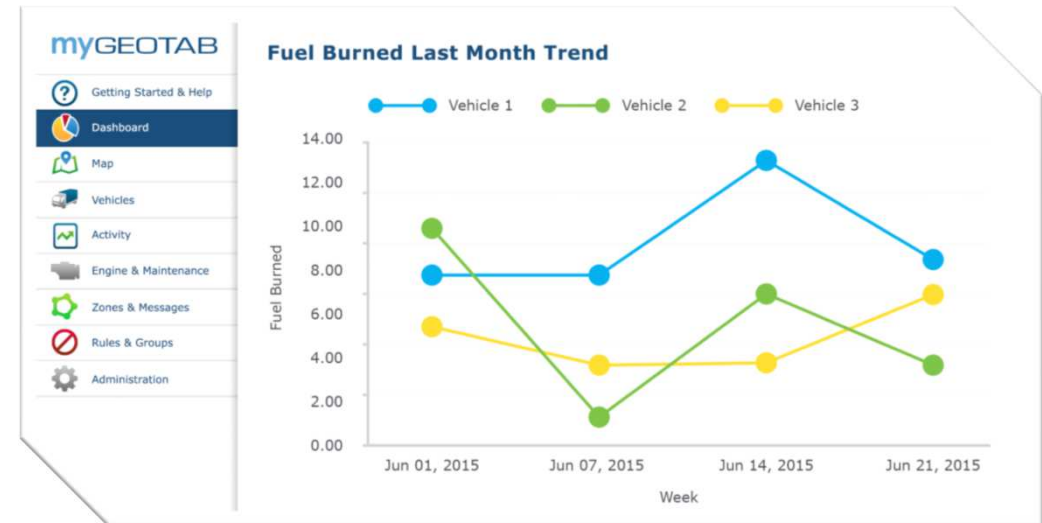


How to Manage Fleet Fuel Telematics (suggestions) ?

* Cost Report VS Driver/Truck Rating/Ranking

Petrol Cost - £1.38
Diesel Cost - £1.42
Idling Fuel Usage (L/Hr) - 1.8

Total Driving Time (hh:mm:ss)	Total Idle Time (hh:mm:ss)	Total Distance (mi)	Total Private Distance (mi)	Total Business Distance (mi)	Total Journeys	Fuel Type	Fuel Cost
02:19:28	01:51:37	28.7	0	28.7	13.0	Diesel	£10.91
12:34:57	00:11:40	252.2	0	252.2	68.0	Diesel	£65.52
01:46:28	00:21:34	27.3	0	27.3	5.0	Diesel	£6.77
02:59:27	00:48:25	48.4	0	48.4	7.0	Diesel	£12.46
02:00:59	00:00:00	29.2	0	29.2	8.0	Diesel	£7.52
02:07:59	00:07:18	37.5	0	37.5	6.0	Diesel	£8.37
02:50:02	00:48:23	46.9	0	46.9	14.0	Diesel	£12.14
~36:26	01:27:51	399.9	0	399.9	23.0	Diesel	£106.86
~23	00:55:39	246	0	246	32.0	Diesel	£65.80



What are the most important questions about ultrasonic technology?



- **Accuracy against Capacitive Fuel Sensor/CANBUS OBD?**

Similar as Capacitive Fuel Sensor, more accurate than CANBUS/OBD

- **Does it sudden drop /sudden rise?**

We have smooth Machine Learning(ML) algorithm to avoid this

- **Does it have data delay update problem?**

Our UL212 will report refueling & fuel theft in real time

- **Can it be used in Metal Tank ?**

Yes, most other Ultrasonic fuel sensor cannot, but UL212 transducer has strong Signal detection and automatic signal strength adjusting to avoid Resonance

- **Does it have Temperature Compensation?**

Yes

UL212 VS other FLS(Fuel Level Sensor)

		UL212	Other FLS
Hardware	Corrosion	PPS Industrial Plastic, Anti-Salt/Acid Corrosion, Explosion/Fire-proof	Aluminum or Metal housing, Easy Salt/Acid-Corrosion
	Waterproof	IP68	IP65~IP67
	-40°C Low Temp	-40°C cable harness	Only min -20°C cable harness
	Interface Low power consumption??	RS232 or RS485 & Analog 0~5V & Bluetooth BLE5.0	RS232 or RS485 or TTL

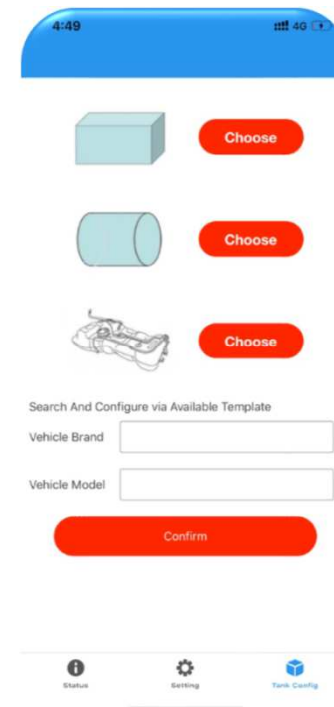
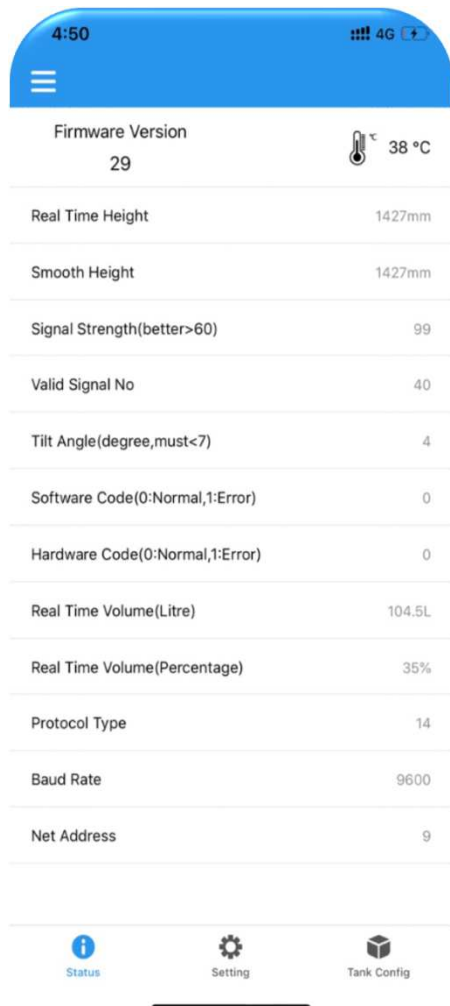
UL212 VS other FLS(Fuel Level Sensor)

Software/ Algorithm		UL212	Other FLS
	Data Fluctuation	Nope	Frequent
	Interference signal, Echo, Resonance(共振)	Well fixed	x
	Minimum Detected Height	3cm	5~8cm
	Maximum Detected Height	250 cm	100 cm
	Ultrasonic Transmitting Frequency	1Mhz	N/R
	Tank Thickness	Max 12mm	Max 3~5mm
	Fuel Theft IO Alarm	Support 5V High Level IO Output When fuel theft detected (protocol 19)	x
	Output both Volume & Height data	Yes (protocol 19)	x
	Protocol/Compatibility	Support almost all GPS brand/MDVR protocol	Support some M2M protocol

UL212 VS other FLS(Fuel Level Sensor)

		UL212	Other FLS
Configure/ Calibration	PC Tool	Support full PC Tool configure	Some support, others use LED Screen tool
	Mobile APP	IOS/Android via Bluetooth	X
Installation	Metal/Steel Tank	✓	X
	Aluminum Tank	✓	✓
	Fiber/Plastic Tank	✓	✓
	Irregular Tank	✓	✓

What UL212 Mobile APP can do?



Configure Volume Parameter

Rename sensor ID to be unique
Configure Temperature Compensation for different liquid
Change different protocol for fit different track/DVR

Diagnostic Sensor before/after installation

How Can Mobile CCTV Monitor Fuel Theft(GPS Tracker can use I/O Alarm)?



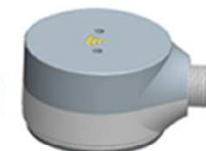
Ignition off



4G Smart Mobile DVR
Enter Sleeping Mode
with **0.2W** power consumption



Fuel Theft



Ultrasonic Fuel Sensor
Detects Fuel Theft



Mobile DVR will wake up and start recording
in 10 seconds.

**Fuel Theft Alarm Video Footage
will upload to server automatically**



Vehicle Number	Type	Start time	End time
00508282	File Upload Complete	2020-08-28 18:58:09	
00508282	File Upload Complete	2020-08-28 18:58:07	
00508282	Video/Image Upload Notification	2020-02-11 04:39:48	
00508282	Video/Image Upload Notification	2020-02-11 04:39:48	
282 IO_1		2006-02-11 04:43:05	2006-02-11 04:43:11

REMARKS: must work with T504 Mobile DVR
or other certified DVR

How to make UL212 output Volume directly to M2M devices?

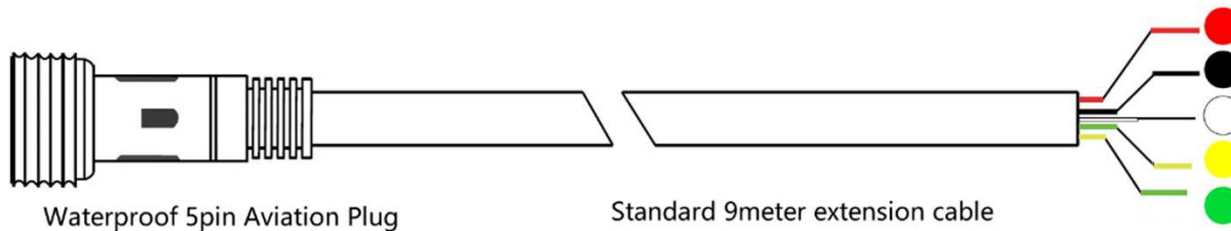
Protocol: 19

Baud Rate: 9600, Net Address:1

*TE,35,0027,0438,8400,0027,0438,0780,0,2805#

*	TE	35	0027	0438	84	0	0	0027	0438	0780	0	28	05	#
Command Head	Command Type	Firmware Version	Smooth Volume unit:0.1L	Smooth Height unit: 0.1mm	Signal Strength	Software Code 0: Normal 6: Refueling Alarm 9:Fuel Theft Alarm	Hardware Code 0:Normal	Real Time Volume unit:0.1L	Real Time Height unit: 0.1mm	Temperature (0780-400)*0.1℃=38℃	Status 0: Stop 1: Move	Valid Signals	Tilt Angle Hex	Command End

Ramrks: Green cable I/O Output will output 0.16V in normal status. And will output 5V for 30 seconds if detecting Fuel Theft.



Cable	Definition	Remarks
Red	Power Supply 9~36V DC+	Fuse must be used if connected to Power Battery
Black	Power GND, RS232/RS485 GND	
Yellow	RS232 TX (Default), or RS485B	Connect GPS/DVR RS232_RX, or RS485B
White	RS232 RX (Default), or RS485A	Connect GPS/DVR RS232_TX, or RS485A
Green	Analog Output 0~5V	Support all protocol except Protocol 08&19 (In protocol 08&19, Green cable will keep output 0V when working normally, but will output 5V high level trigger for 30 seconds when fuel theft alarm triggered)

What Benefit you can get from UL212?

Real Time Fuel Theft Detection & Alarm

Control Fleet Cost with online fuel consumption bill

Decrease Wasted Fuel & Abnormal Idling

Who are valuable M2M Hardware Partners of UL212?

- 2G/4G GPS Terminal(not all listed)



- 4G/5G Mobile Video Recorder(not all listed)

