Ultrasonic Fuel Level Sensor

Product Model: UL202-1/2

Catalog

1.Overview of Product

This Product is adopted by non-contact measurement of ultrasonic sensor technology, which is researched and developed by our company and it is initiated in China. It is also widely used in fuel consumption project and all products were sold abroad.

There are two models:UL202-1 and UL202-2, UL202-1 supports RS232 and UL202-2 supports RS485Introduction of Product.

2. Product introduction

2.1 Product Components

| Controlling box | Ultrasonic probe | Probe extension wire | User interface wire |

2.2 List of product component

List of Standard Component:

NO.	Component	Quantity	Unit	Reference
1	Controlling Box	1	set	
2	Ultrasonic Probe	1	piece	
3	Probe Extension Wire	1	piece	Default 8m. It need to be customized if longer than 8m
4	User Interface Wire	1	piece	Including power and data wire
5	Double-sided sticky tape	1	piece	
6	Ultrasonic couplant	1	box	
7	1.2M ribbon	2	piece	
8	15CM ribbon	10	piece	
9	Abrasive paper	1	piece	

List of Selective Component：

No.	Component	Unit	Reference
1	Specific glue	bottle	
2	Auxiliary installation tool	set	Including screen and wire

2.3 Technical Parameters

Working Voltage	9~36VDC
Max Power Consumption	0.8W/12VDC
Working Temperature	-40℃~+85℃ (Technical Grade)
Working Humidity	5%~90%
Measurement Range	It depends on the material and thickness of the vessel. The range is about 5~100cm for 5mm steel plate.
Pressure Range	≤0.8kg or 0.8MPa
Accuracy of Liquid Measurement	±0.5%
Connection	Providing analog voltage output,RS232 and RS485
Analog Parameter	Range of voltage: 0 ~5V,0 ~3V,1 ~5V,1 ~3V.Actual liquid height and voltage output are in proportion Maximum Voltage :VMAX; Minimum :VMIN; Output Voltage :V; Input Liquid Height : H; Measurement Length :L; H=(V - VMIN)/(VMAX-VMIN)*L

2.4 Features of Product

1. High accuracy.

    Resolution of sensor's measurement for fuel height is 0.1mm.And its measurement accuracy is ±0.5%. It keeps higher accuracy even in highest or coldest outside environment.

2. Excellent stability.

    Different from direct-contact measurement of float-type,pressure-type,magnetic sliding-type, fuel level sensor uses ultrasonic and non-contact measurement, which can avoid pollution and corrosion from fuel and keep stability in a long period of time.

3. Easy installment and maintenance.

    You only need to install the sensor probe on lower surface of fuel tank. You don't need to change its original measurement system or punch hole for it. Its original fuel meter operates as usual.

4. No pollution and lower consumption.

This non-contact measurement and non-punch hole for fuel tank can keep off pollution from fuel.

5. High reliability.

It can still work in bad environment and it is damp-proof, acid-proof, flame-retardant, anti-interference,intellectualized.This product can be used independently to check data from auxiliary display. It can also used with GPS,which sends data to background for statistics,analysis and query.

2.5 Application

This ultrasonic fuel level sensor can be used for all kinds of vehicle(logistics car/taxi/public bus/passenger bus) .It records refueling and fuel consumption in a digital way, which avoid fuel being stolen, wasting and enhance the efficiency,improved safety and reinforce management.

3.Installment

3.1 Description of Main Device

1) User Interface Wire Socket Definition

Foot	Function	Statement
1	Positive Power	9~36VDC
2	Negative Power	
3	NC	reserve
4	NC	reserve
5	UL202-1：TX UL202-2：B	UL202-1：RS232 Transmit UL202-2：RS485 Interface B
6	UL202-1：RX UL202-2：A	UL202-1：RS232 Receive UL202-2：RS485 Interface A
7	NC	reserve
8	NC	reserve
9	NC	reserve
10	NC	reserve
11	AOUT	Analog voltage output
12	GND	GND

1)LED Light definition

➢ LED1

Green light flash slowly: Probe is normal

Red light flash slowly: Probe is abnormal(probe off)

➢ LED2

Green light flash slowly: Power supply is normal

Red light flash slowly:Analog voltage output in abnormal

2) Ultrasonic probe socket

➢ The socket connects Probe Extension Wire and then probe.

3.2 User Interface Wire Description
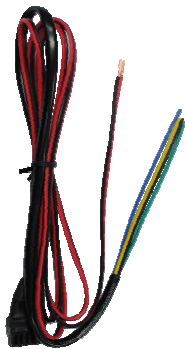
Wire Color	Function	Statement
Red	Positive Power	9~36VDC
Black	Negative Power	
Yellow	TXD/B	UL202-1：RS232 Tx UL202-2：RS485 (B)
Blue	RXD/A	UL202-1：RS232 Rx UL202-2：RS485 (A)
Green	AOUT	Analog voltage output
Black	GND	

3.3 Introduction of Display for Installment

1）Ketch of display

➢ Surface

It appears some digits when you connect the display and the probe is normal. This digit represents liquid height. As shown on the display, the liquid height is 15.9CM.

➢ Back

This the horizontal bubble,if it is the middle,it means the fuel tank is on the level.

2) Button description

➢ 【Button 1】：Keep pressing more than 2.4 seconds and release to access to loose installment mode

➢ 【Button 2】：Keep pressing more than 2.4 seconds and release to quit from installment mode

➢ 【Button 1】and【Button 2】：Keep pressing both Button 1 and 2 more than 2.4 seconds and release to access to strict installment mode

➢ Long Pressing means pressing more than 2.4 seconds and release

➢ Short Pressing means pressing more than 0.8 seconds and release

3) Description of strict installment mode

The screen shows different digit every 2 seconds after into strict installment mode.

One is liquid height,and another is situation code

liquid height   situation code（0、1、2）

➢ When it is suitable,the situation code is 2.

4) Description of loose installment mode

The screen shows different digit every 2 seconds after into loose installment mode.One is liquid height,and another is situation code

liquid height   situation code（0001、1001、2001）

➢ When it is suitable,the situation code is 1001 or 2001；

3.4 Installment Procedure

1）Installation Procedure

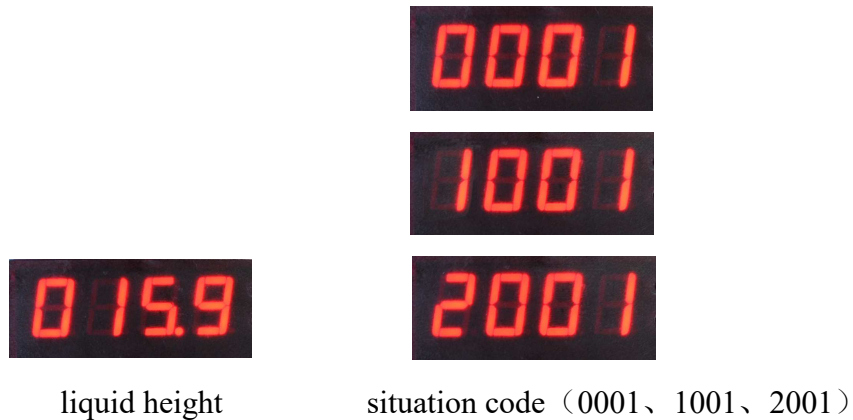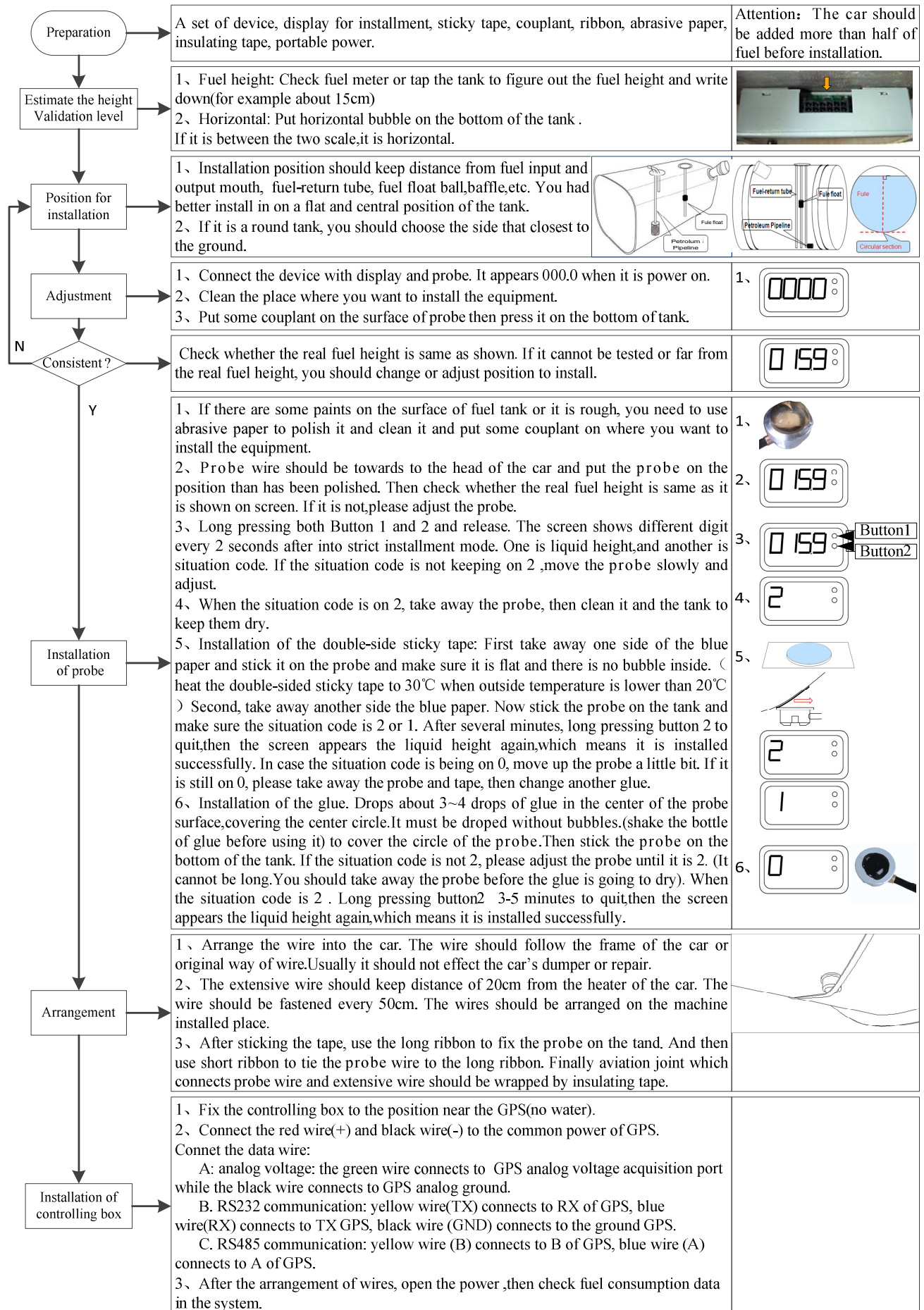|		
(Preparation)	A set of device, display for installment, sticky tape, couplant, ribbon, abrasive paper, insulating tape, portable power.	Attention：The car should be added more than half of fuel before installation.
Estimate the height Validation level	1、 Fuel height: Check fuel meter or tap the tank to figure out the fuel height and write down(for example about 15cm) 2、 Horizontal: Put horizontal bubble on the bottom of the tank . If it is between the two scale,it is horizontal.	
Position for installation	1、 Installation position should keep distance from fuel input and output mouth, fuel-return tube, fuel float ball,baffle,etc. You had better install in on a flat and central position of the tank. 2、 If it is a round tank, you should choose the side that closest to the ground.	
Adjustment	1、 Connect the device with display and probe. It appears 000.0 when it is power on. 2、 Clean the place where you want to install the equipment. 3、 Put some couplant on the surface of probe then press it on the bottom of tank.	1、 [0000]
Consistent ? (N / Y)	Check whether the real fuel height is same as shown. If it cannot be tested or far from the real fuel height, you should change or adjust position to install.	[0 15.9]
Installation of probe	1、 If there are some paints on the surface of fuel tank or it is rough, you need to use abrasive paper to polish it and clean it and put some couplant on where you want to install the equipment. 2、 Probe wire should be towards to the head of the car and put the probe on the position than has been polished. Then check whether the real fuel height is same as it is shown on screen. If it is not,please adjust the probe. 3、 Long pressing both Button 1 and 2 and release. The screen shows different digit every 2 seconds after into strict installment mode. One is liquid height,and another is situation code. If the situation code is not keeping on 2 ,move the probe slowly and adjust. 4、 When the situation code is on 2, take away the probe, then clean it and the tank to keep them dry. 5、 Installation of the double-side sticky tape: First take away one side of the blue paper and stick it on the probe and make sure it is flat and there is no bubble inside. （heat the double-sided sticky tape to 30℃ when outside temperature is lower than 20℃） Second, take away another side the blue paper. Now stick the probe on the tank and make sure the situation code is 2 or 1. After several minutes, long pressing button 2 to quit,then the screen appears the liquid height again,which means it is installed successfully. In case the situation code is being on 0, move up the probe a little bit. If it is still on 0, please take away the probe and tape, then change another glue. 6、 Installation of the glue. Drops about 3~4 drops of glue in the center of the probe surface,covering the center circle.It must be droped without bubbles.(shake the bottle of glue before using it) to cover the circle of the probe.Then stick the probe on the bottom of the tank. If the situation code is not 2, please adjust the probe until it is 2. (It cannot be long.You should take away the probe before the glue is going to dry). When the situation code is 2 . Long pressing button2 3-5 minutes to quit,then the screen appears the liquid height again,which means it is installed successfully.	1、 2、 [0 15.9] 3、 [0 15.9] Button1 Button2 4、 [2] 5、 [2] [1] 6、 [0]
Arrangement	1、 Arrange the wire into the car. The wire should follow the frame of the car or original way of wire.Usually it should not effect the car's dumper or repair. 2、 The extensive wire should keep distance of 20cm from the heater of the car. The wire should be fastened every 50cm. The wires should be arranged on the machine installed place. 3、 After sticking the tape, use the long ribbon to fix the probe on the tand. And then use short ribbon to tie the probe wire to the long ribbon. Finally aviation joint which connects probe wire and extensive wire should be wrapped by insulating tape.	

Installation of controlling box	1、 Fix the controlling box to the position near the GPS(no water).
	 2、 Connect the red wire(+) and black wire(-) to the common power of GPS. Connet the data wire:
	     A: analog voltage: the green wire connects to GPS analog voltage acquisition port while the black wire connects to GPS analog ground.
	     B. RS232 communication: yellow wire(TX) connects to RX of GPS, blue wire(RX) connects to TX GPS, black wire (GND) connects to the ground GPS.
	     C. RS485 communication: yellow wire (B) connects to B of GPS, blue wire (A) connects to A of GPS.
	 3、 After the arrangement of wires, open the power ,then check fuel consumption data in the system.	

2) Use display to help install and access to strict installation mode

➢ Strict Installment Mode: It shows situation code 2 when all parameters from probe reaches the requirement and and there is some reserve.

➢ Strict Installment Mode: It shows situation code 1001 or 2001 when liquid height from probe reaches the requirement.

➢ Ultrasonic probe and liquid height will self-adapt in software when access to strict installation mode or loose installation mode. The probe is fixed correctly or not based on situation code. When the situation code is 2or 2001,it means it is good. When it is 1 or 1001,it means not so good. If it was 0 or 0001, it means the probe has not been installed well. After the probe is installed,you should press 【Button 2】to quit installation mode to finish all steps.

3) There are two ways to fix the probe by using double-sided sticky tape or Specific glue.

➢ Double-sided sticky tape: For aluminium-alloy,steel and plastic fuel tank.

➢ Specific glue: For ferrous and galvanized sheet fuel tank

4) Safety information for installation

➢ The tank must be full or half of fuel before installation.

➢ It is optimum to heat the double-sided sticky tape to 30℃ when outside temperature is lower than 20℃. The tape's temperature resistance is from －40℃ to 105℃
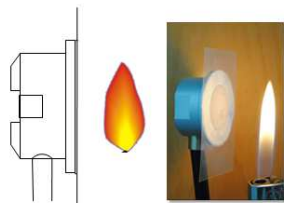
➢ To shake the bottle of specific glue before use it. When the outside temperature is lower than 20℃,you should heat the surface of probe or fuel tank to more than 30℃. This glue can be solidified in 5-10 minutes. And the left in bottle should be reserved in lower temperature 0~5℃

- When use analog voltage,the analog ground(black wire) needs to connect the ground wire of GPS.
- When use serial port, Tx,Rx,GND should be connected to GPS.
- Aviation joint which connects probe wire and extensive wire should be wrapped by insulating tape.
- It is not suitable to install when the tank has only half of fuel or the fuel is not horizontal. It will make mistakes.
- The controlling box and the probe cannot be transferred when access installation mode and exit successfully. If you want to transfer, you need to access installation mode again and let the probe and controlling box adjust to suitable parameter.

3.5 Common problems and guides

Problem	Guide
LED1 and LED2 doesn't work at the same time	Check the power of sensor，and the correct voltage is from 9V to36V；
LED1 flashes red light LED2 normal	Check the probe whether is fixed or not and whether the liquid height is lower than 10cm.
LED1 normal LED2 flashes red light	Disconnect to GPS to check the green wire of user interface，
LED1 normal LED2 dark or flash red	Check whether the power input is about 12V or 24V. If not,please supply power of 12V or 24V.
Screen doesn't work	Make sure the display is connected to sensor host and is being charged.
Liquid height parameter flutter	Check whether the liquid height is lower than 10cm or not.
Liquid height parameter shown on screen is different from actual parameter	The software of sensor uses the ultrasonic spreading speed to measure. If the liquid to be measured is water,you need to transfer the software setting or parameter on display. The water height is about *1.1.
The height does not change after adding or reducing fuel	1.Check whether the software self-adapt when the sensor access to installation mode 2.After adding fuel,the liquid height changing extent is lower than 3CM.

No curve tracing of fuel consumption on monitoring platform	1.Check the connection of USB is right or not and whether the GPS supports the fuel consumption 2.Check whether the monitoring platform demarcates the fuel quantity 3.Use computer serial port the read parameter configuration and check whether it is correct or not. And you can make configuration again through serial port. 4.If you adopt analog voltage parameter,you can measure the voltage of red wire and black wire. Make sure the liquid height is correct according to formula conversion.
Curve tracing stop moving.	1.If it appears 000.0 when the display is connected,please check the probe,power wire and power. 2.In case the power-supplying of sensor is normal while the the screen appears 000.0, please check the situation code presents 2 or 1. If it is 0, the probe must be off. 3.Suppose that the real liquid height is the same with as shown,you need to make sure your vehicle is horizontal. If it is horizontal, please access to self-adapt to the installment mode when it appears 2 or 1 and then quit.(Attention:The liquid height shall be half of fuel when access to installment mode)
Curve tracing is up and down	Connect the display and access to installation mode and make sure the probe is fixed well.

4.Statement of Software Treaty

4.1 Standard treaty of ultrasonic fuel level sensor

Example:

- ✧ *XD, start of text
- ✧ 411D, version for treaty,software,hardware.
- ✧ 01，revered function
- ✧ 6032，real output of serial port,it is shown as 60.32cm；The voltage is transferred by this parameter as analog output.
- ✧ 0603,represents the signal is 6，and the voltage is low
- ✧ 9002 revered function
- ✧ 6032 prompt parameter，It is shown as 60.32cm
- ✧ Null,revered function
- ✧ #,ending

2)More agreements will be made as required by customer.

5.After-sale Service

1. According to the nation's three guarantees,it is one-year free warrant and life-long maintenance.

2. All delivery expense should be paid by the sender in warrant period.