www.AKCP.com

Ultrasonic Fuel Level Sensor

User Manual

Help Version updated till firmware 405p & 1.0.3816

1) Introduction

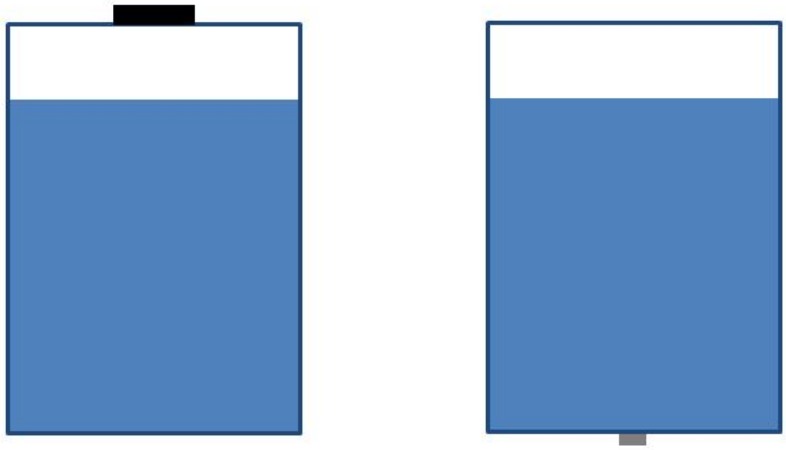
1. What is the AKCP Ultrasonic Fuel Level Sensor?

The AKCP Ultrasonic Fuel Level Sensor has been designed to integrate with the AKCP securityProbe and sensorProbe+ base units. The UFLS and UFLS-NI sensors are not compatible with the sensorProbe base units (SP2, SP4 or SP8). The Fuel Level Sensor is designed for measuring the percentage of liquid in linear and non-linear tanks not more than 2000mm in depth, such as backup generator fuel tanks.

The Ultrasonic Fuel Level Sensors must be connected directly to the AKCP securityProbe or sensorProbe+ units in order to function. The sensor is easily configured in the base units web user interface which will be covered later in this manual.

The Ultrasonic Fuel Level Sensors are available in two versions:

1) Invasive (UFLS) this is mounted on the top of the tank and requires the cutting of a hole and threading in order to bolt the sensor into place.
2) Non-Invasive (UFLS-NI) this mounts on the bottom of the tank and is held in place by Epoxy. It requires no cutting of the tank, making it easier to install.



UFLS UFLS-NI

2. How to use this manual

This manual is meant to provide the user with a step by step guide on how to configure and set up their sensor. It utilizes screen shots in an effort to make things simpler for the user to follow. It is split up into sections that form “mini tutorials”. These cover the basic set up and common configurations of the sensor, and give an introduction to its most useful features.

If you need any further information or help with using your unit then please contact us on support@akcp.com and one of our technical support staff will be pleased to help you with any information you require.

3. Package Contents

Your AKCP Ultrasonic Fuel Level sensor package contains the following items:-

- **1x AKCP Ultrasonic Fuel Sensor UFLS or UFLS-NI type (sender unit, leader cable & electronics module).**
- **12VDC power adapter & cord; connects to the electronics module (only for UFLS sensor; UFLS-NI is powered by the base unit).**
- **15Ft straight CAT5/6 extension cable (connects from the electronics module to the AKCP base units RJ-45 sensor port).**

4. The Fuel Sensor Unit types

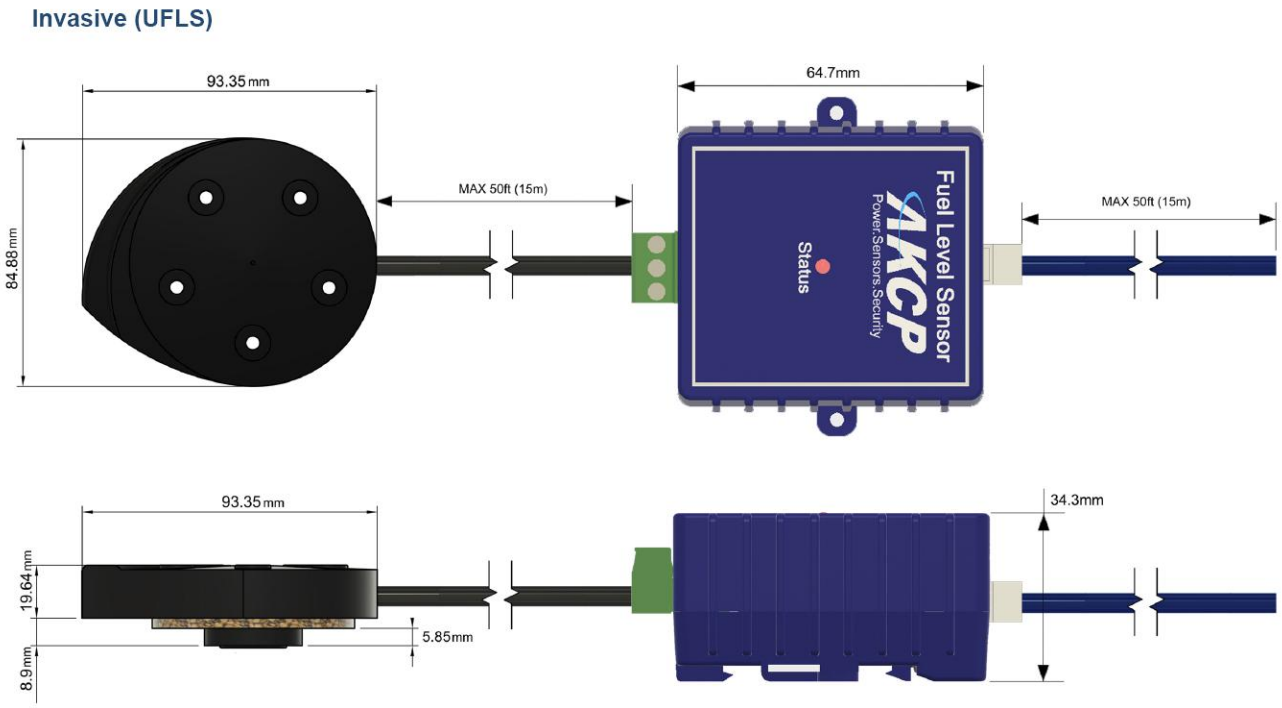
A) The Invasive Fuel Sensor Unit UFLS

Fig 1. AKCP Invasive Ultrasonic Fuel Level Sensor (UFLS)

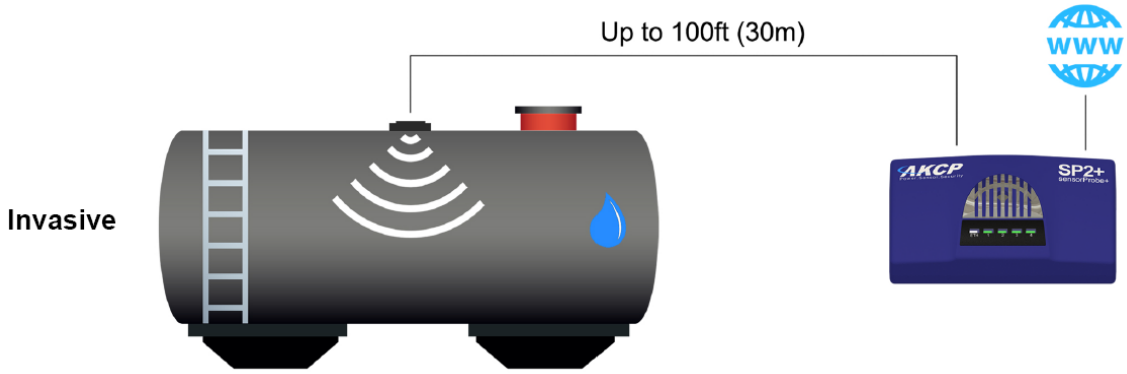
The front of the unit has one LED which indicates status. One end of the unit has the green phoenix connector for connecting the sensor or sender unit, while the other side has an RJ45 connection for connecting to the RJ-45 sensor port on your AKCP base unit via CAT5/6 cable which can be extended up to 100 feet.

The picture above shows the leader cable that connects from the electronics module to the ultrasonic sender unit. This cable should not be extended more than 12 feet.

Technical drawing



Application diagram

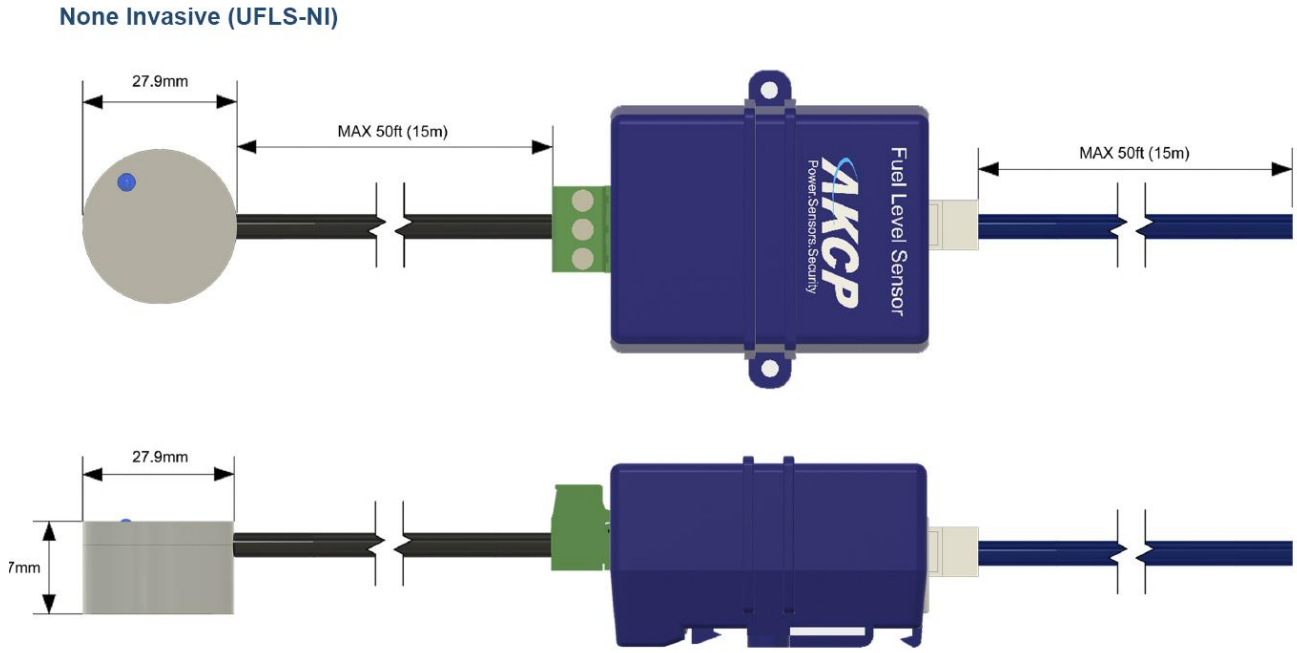


B) The Non-Invasive Fuel Sensor Unit UFLS-NI

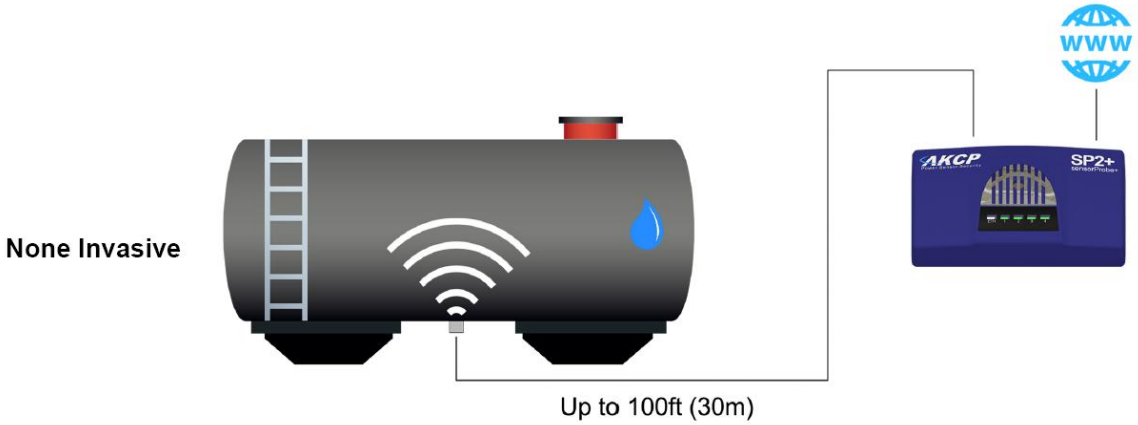
Fig 2. AKCP Non-Invasive Ultrasonic Fuel Level Sensor (UFLS-NI)

The front of the unit has one LED which indicates status. One end of the unit has the green phoenix connector for connecting the sensor or sender unit, while the other side has an RJ45 connection for connecting to the RJ-45 sensor port on your AKCP base unit via CAT5/6 cable which can be extended up to 100 feet.

Technical drawing



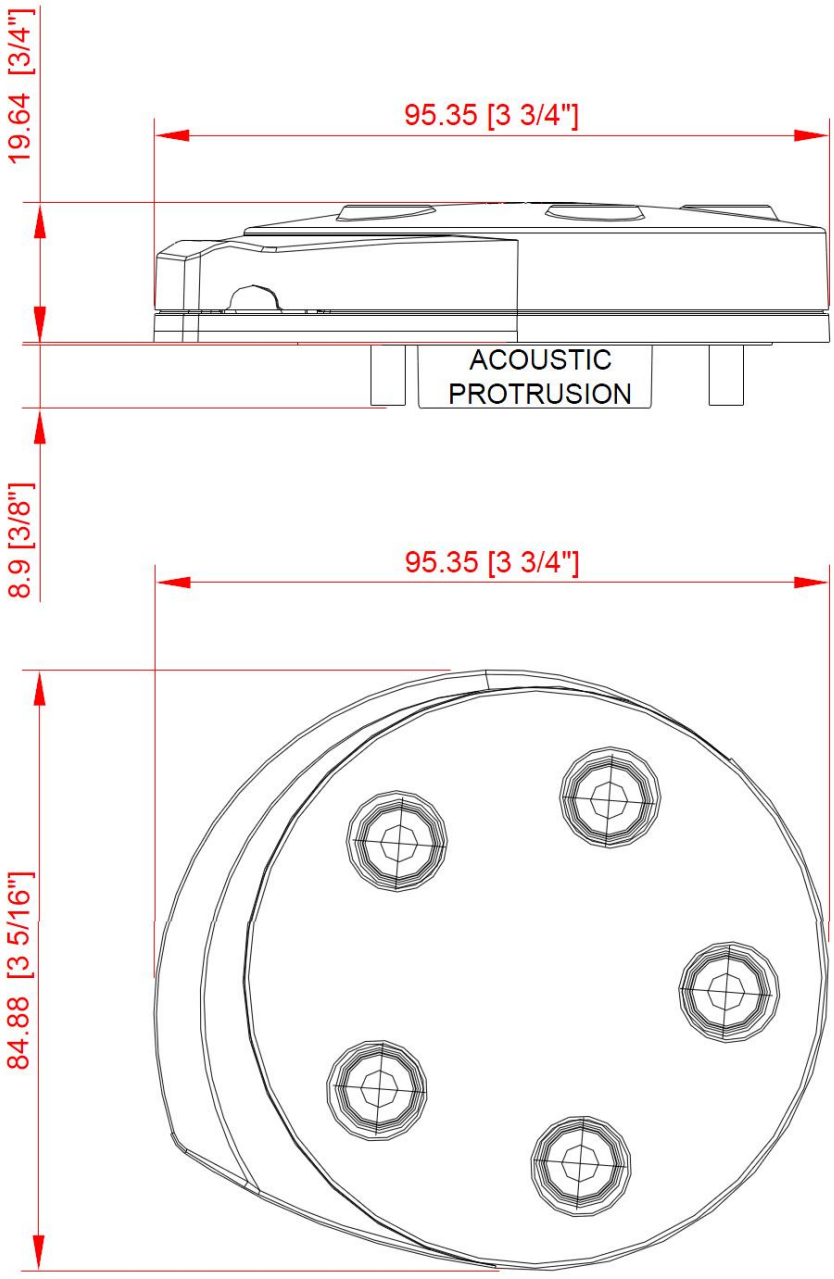
Application diagram



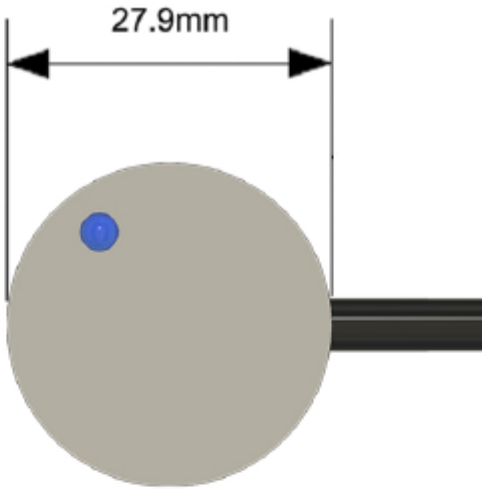
2) Tank Sensor & Hardware Installation

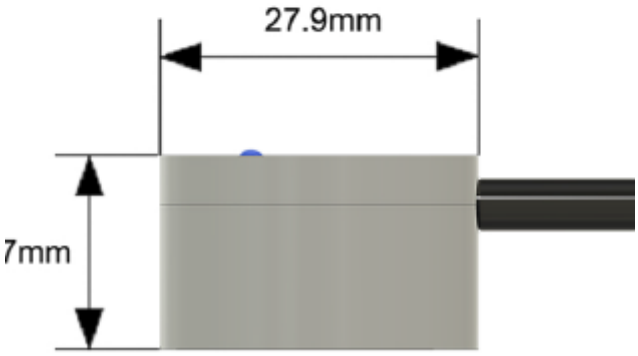
1. Unit Dimensions

A) Invasive UFLS



B) Non-Invasive UFLS-NI



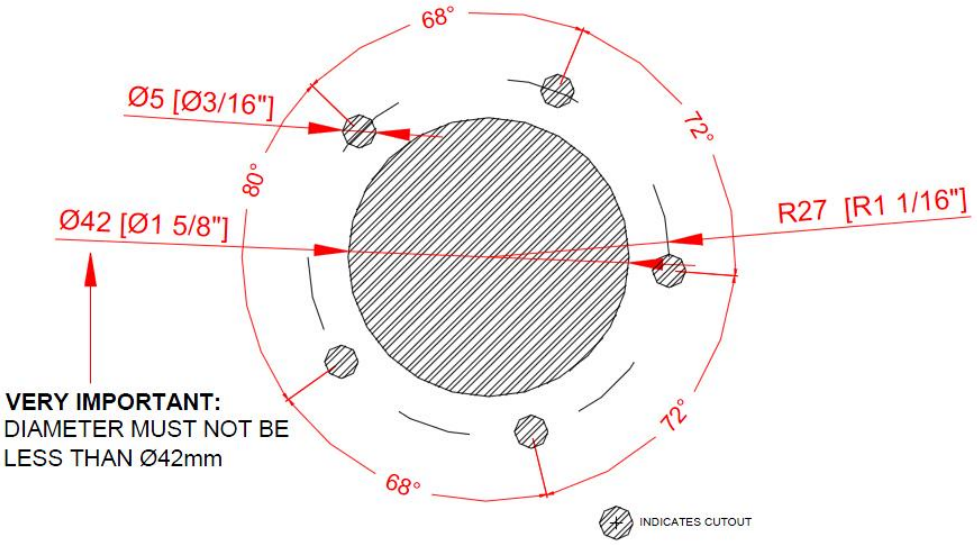


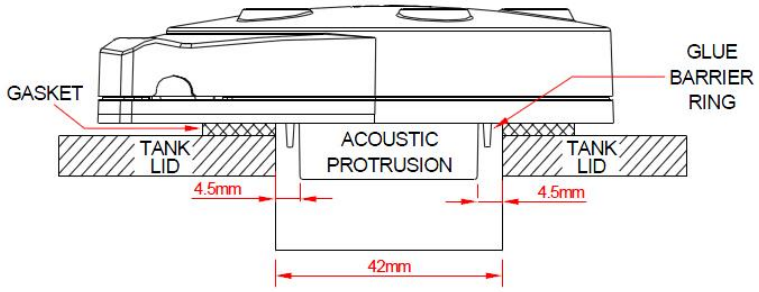
2. Mounting and installation

A) Invasive UFLS

Before we go any further it is important to read the following information in regards to installation.

1. **The sender must not be mounted closer than 150mm from the center of the sender to sides of the tank, baffles or other intrusions.**
2. **Only use on tanks greater than 200mm in depth but no greater than 2000mm deep.**
3. **Sender must be mounted parallel to the surface of the liquid.**
4. **Do not install on flexible tanks that may bulge/distort as fluid levels change.**
5. **Check the unit to insure it is calibrated to suit tank shape, depth and fluid type.**
6. **Make sure that sender protrusion is NOT in contact with any object including sealants when mounted.**
7. **Use gasket and fittings as provided.**
8. **Mount above deepest point of the tank.**

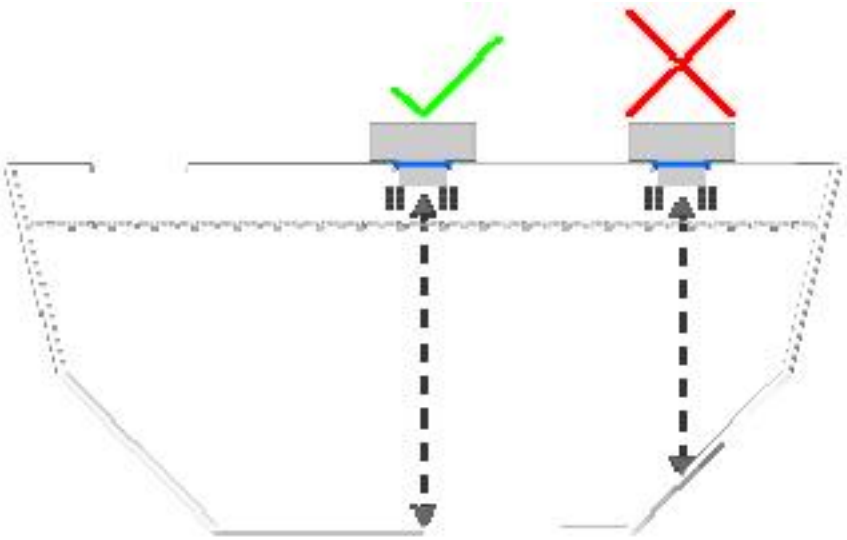




IMPORTANT
SIDE WALLS OF ACOUSTIC PROTRUSION MUST BE NO CLOSER THAN 4.5mm TO THE TANK SIDES OF THE CUTOUT HOLE

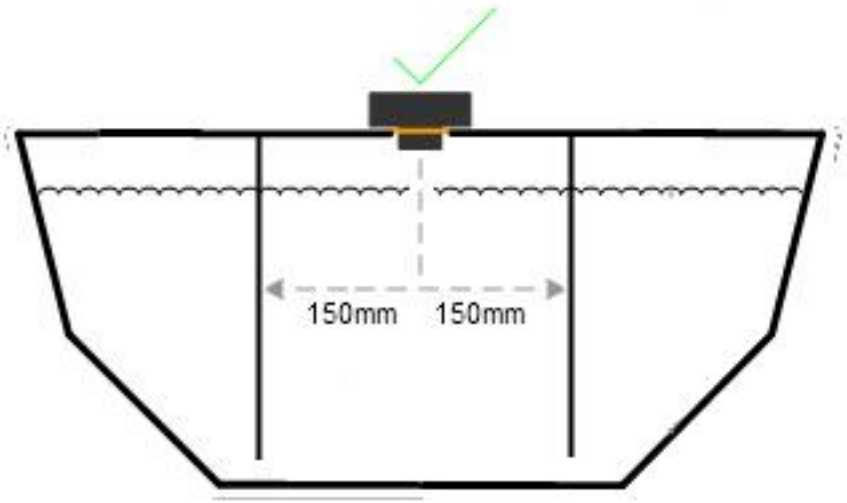
- The acoustic protrusion should be positioned in the tank aperture in the center of the hole. The protrusion should ideally be protruding into the tank and not be recessed in the hole. See drawing above.
- For tightening screws ensure base and washers are sitting flat. Tighten screw until screw head makes contact with the washer, and then tighten another 2 full turns. *Maximum torque for the mounting screws is 0.5 Newton meter.*

Note: Drawing is not to scale. Please use the tank gasket as a template and make sure the tank hole is 42mm.



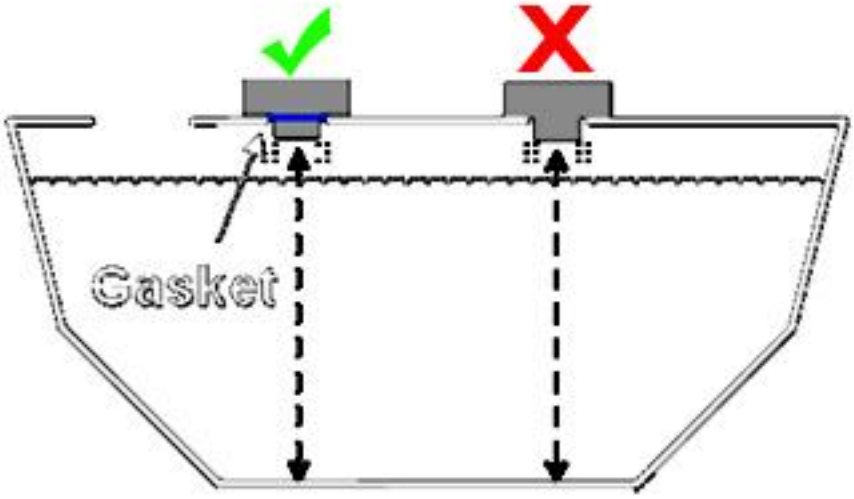
Case 1

The AKCP Invasive Fuel Sensor must be mounted at the deepest tank point! *It is recommended the sender is mounted in the middle of the tank, this is particularly important on low or no baffled tanks that are mounted in moving vehicles or vessels. This allows the sensor to average waves of fluid to the correct level when the depth is varying due to wave slop.*

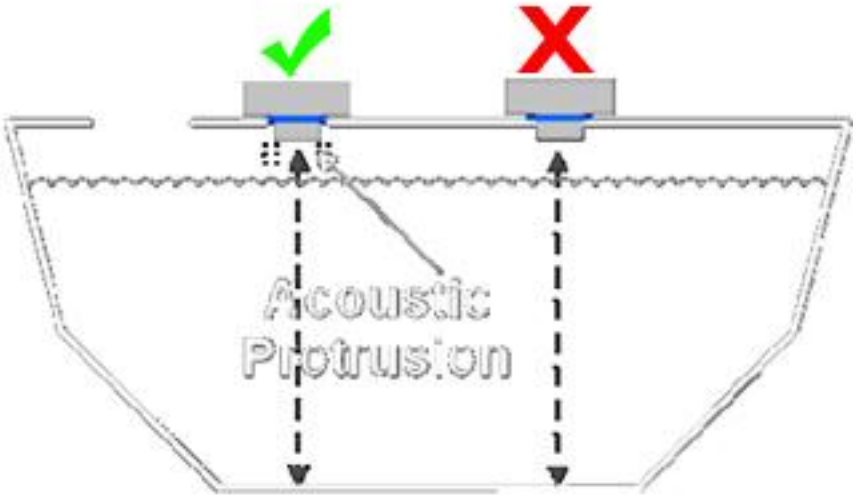


Case 2

AKCP Invasive Fuel Sensor must be mounted at least 150mm from a vertical tank baffle, tank walls and piping.



Case 3
Correct AKCP Gasket must be used! *Use 5 washers provided, washers must be placed under screw heads to prevent rubber lid damage.*



Additional Notes:- There is no minimal distance from the sensor (sender unit) to the surface of the fuel according the manufacturer information. However, we would recommend a distance of more than 10cm in order to avoid liquids to be in contact with the sensor or sender unit.
The UFLS must be mounted at least 150mm from a vertical tank baffle, tank walls and piping.

If the fluid splashes on the protrusion head of the UFLS, the UFLS will not be able to measure correctly the height of fluid in the tank.

Installation Pictures for Invasive UFLS

The two images above show the top of the generator fuel tank and drilling the hole for the fuel sensor.

The picture above shows the gasket positioning before drilling the holes to mount the fuel sensor onto the generator fuel tank.

The picture above shows the placement of the template before drilling the mounting holes into the fuel tank.

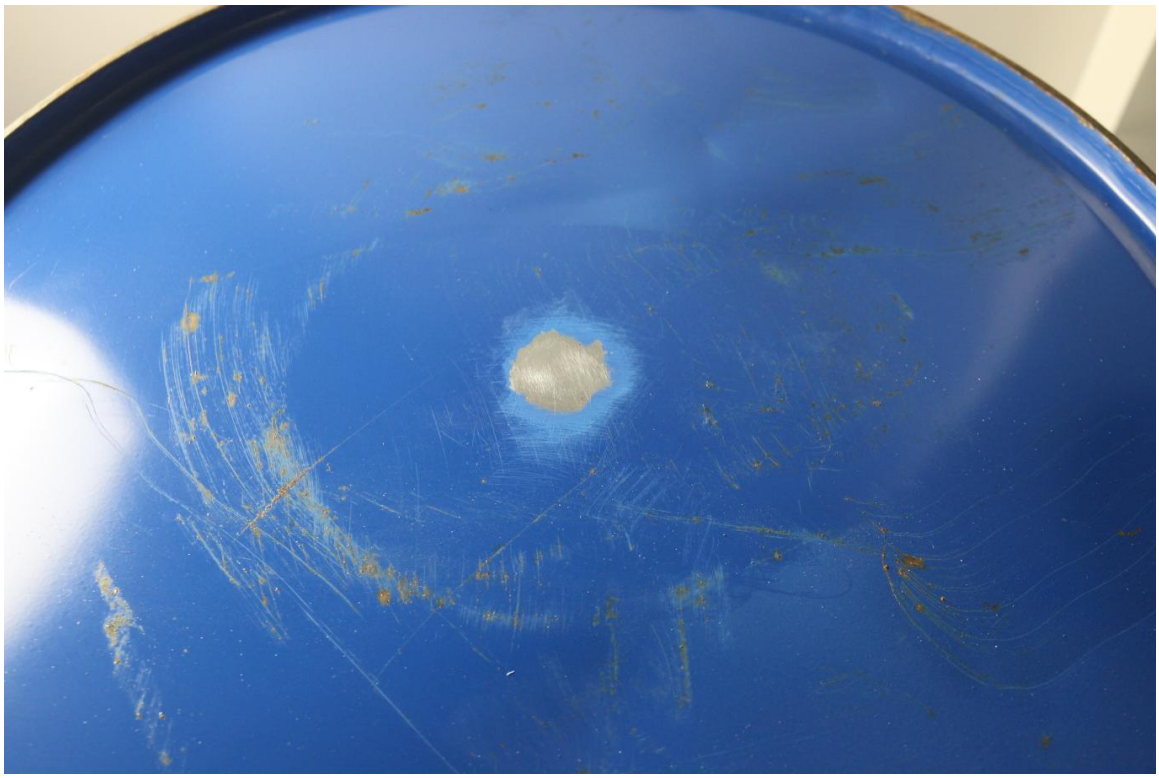
And finally installing the gasket and the sending unit (Ultrasonic Sensor) onto the tank and tightening down the mounting bolts.

B) Non-Invasive UFLS-NI

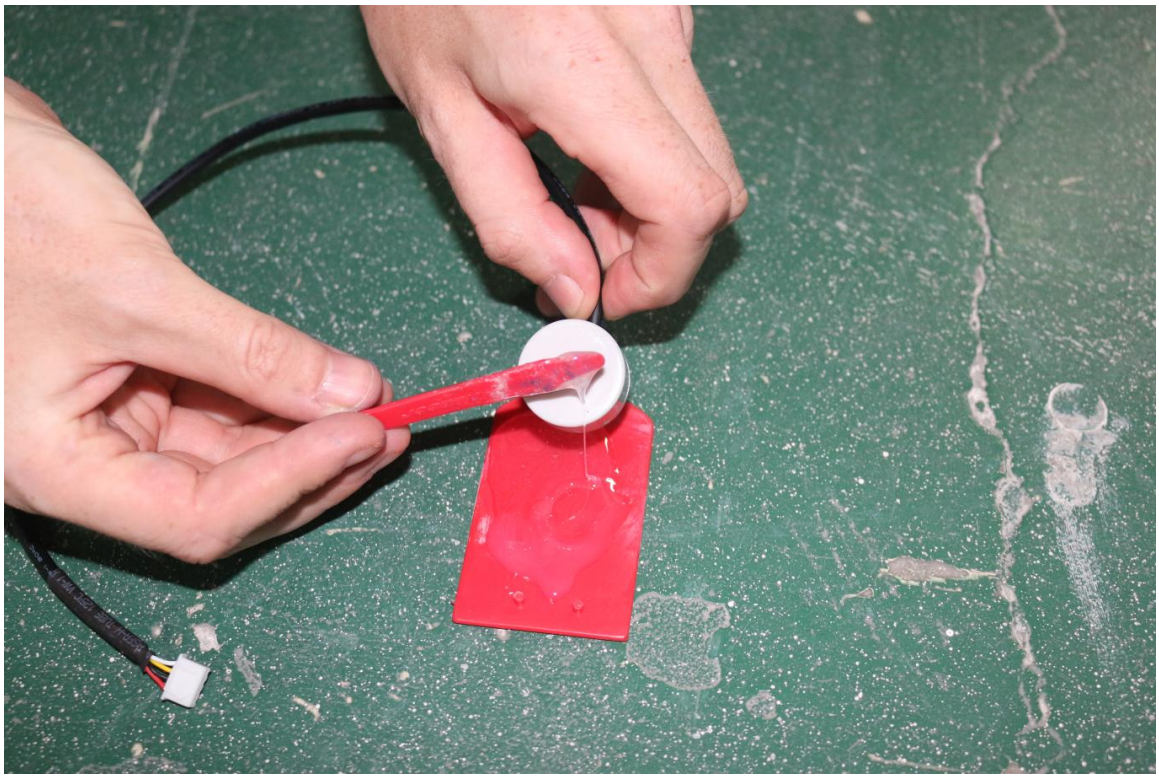
This sensor type mounts on the bottom of the tank instead of the top, and it doesn't require cutting of any holes. Please note the following:

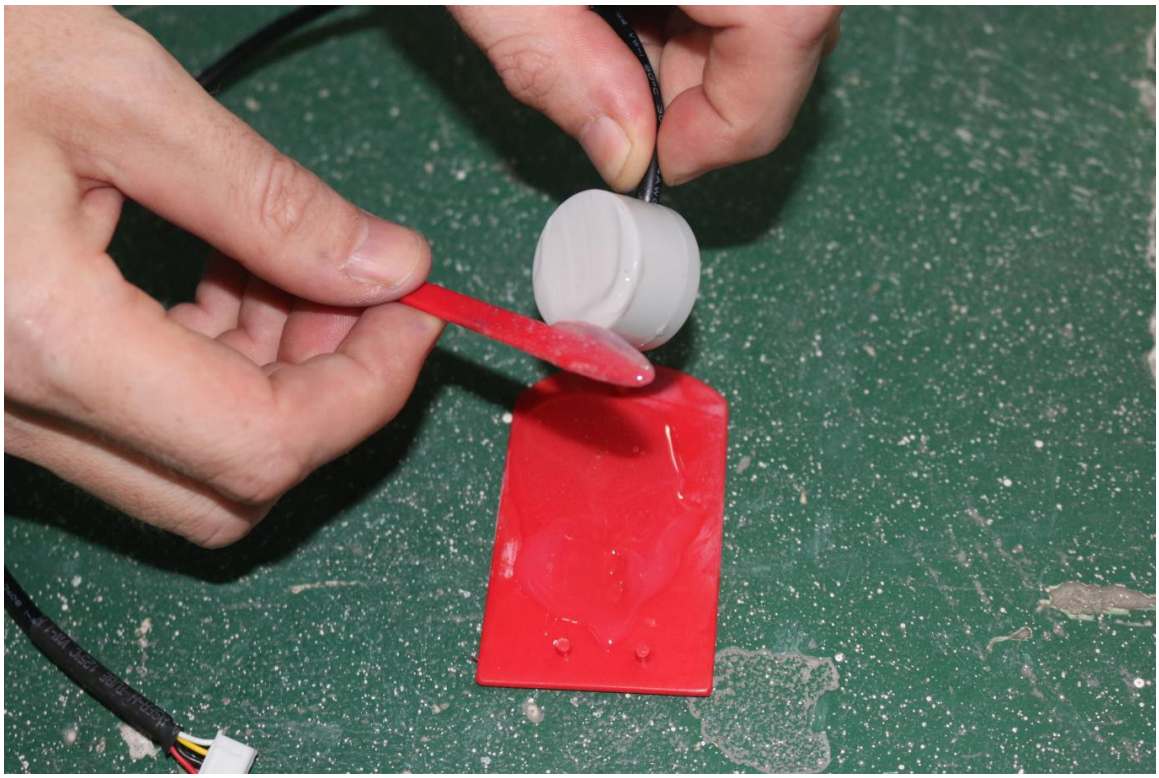
1. **The sender must not be mounted closer than 150mm from the center of the sender to sides of the tank, baffles or other intrusions.**
2. **Only use on tanks greater than 50mm in depth but no greater than 2000mm deep.**
3. **Sender must be mounted parallel to the surface of the liquid.**
4. **You must first clean and clear the mounting surface with sand paper.**
5. **You must use a coupling agent or gel between the sensor and the surface for ultrasound conductivity. The coupling agent could be Epoxy glue - make sure to avoid bubbles or impurity in the gel.**
6. **The sensor is powered by the base unit's sensor port, no external power required.**
7. **The container thickness should be less than 8mm for best performance.**
8. **Maximum distance between module and sensor : 450mm**
9. **Mount below the deepest point of the tank.**

Installation Pictures for Non-Invasive UFLS-NI

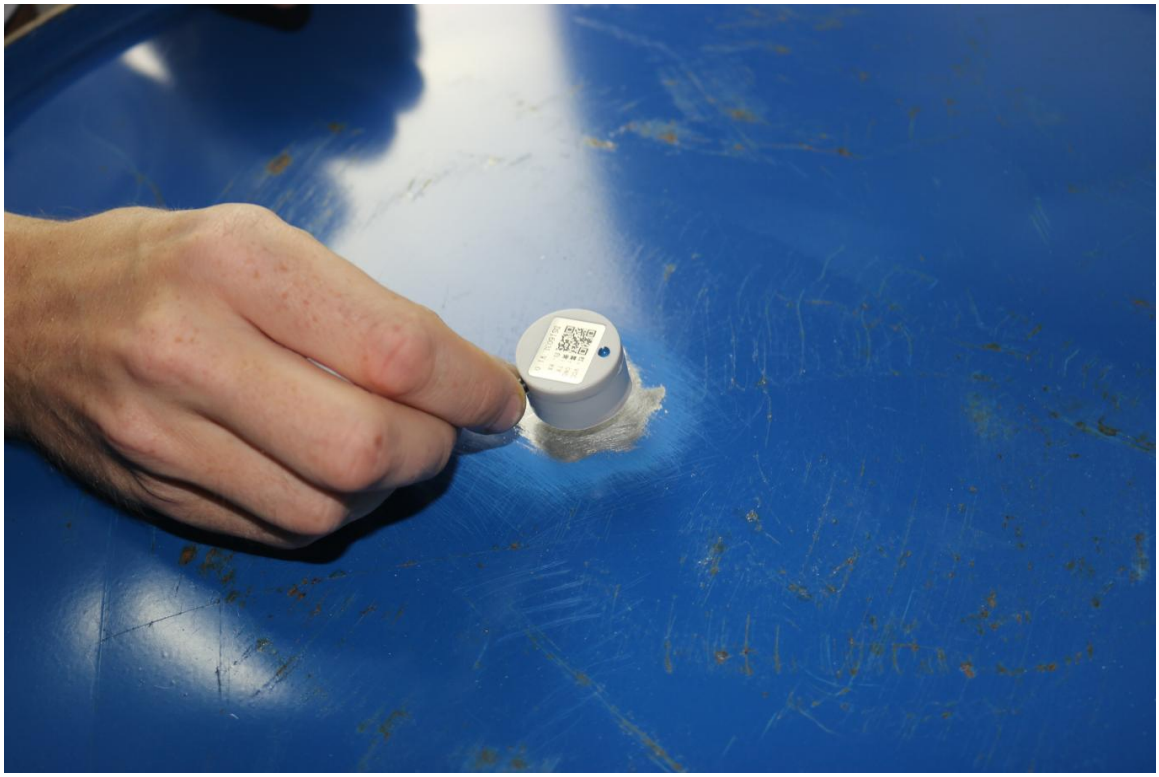


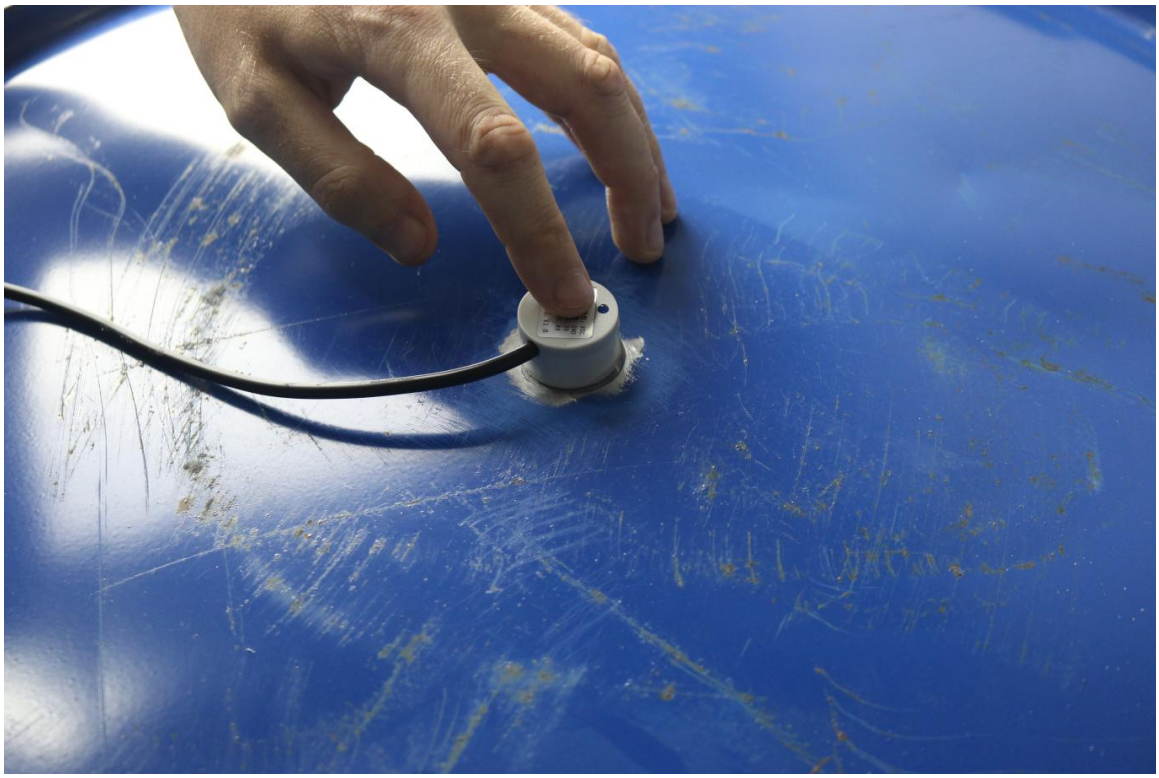
The 4 images above show the bottom of the fuel tank and preparing the surface for the fuel sensor installation.



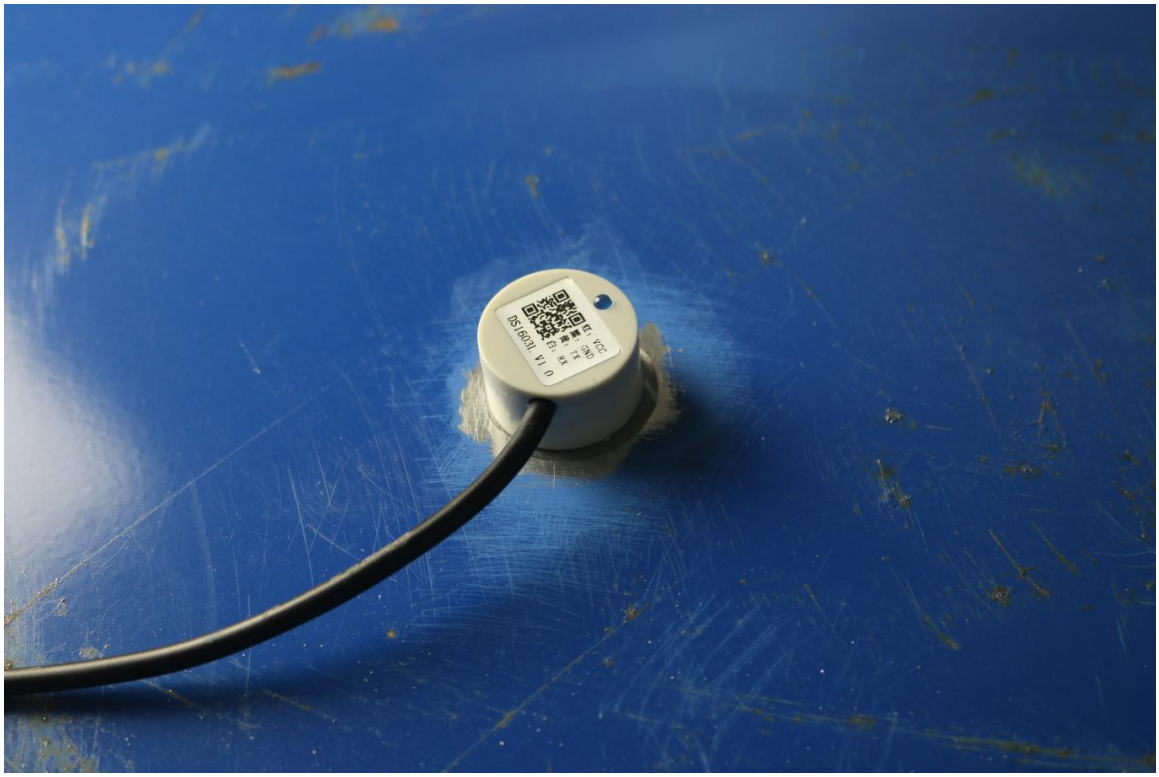


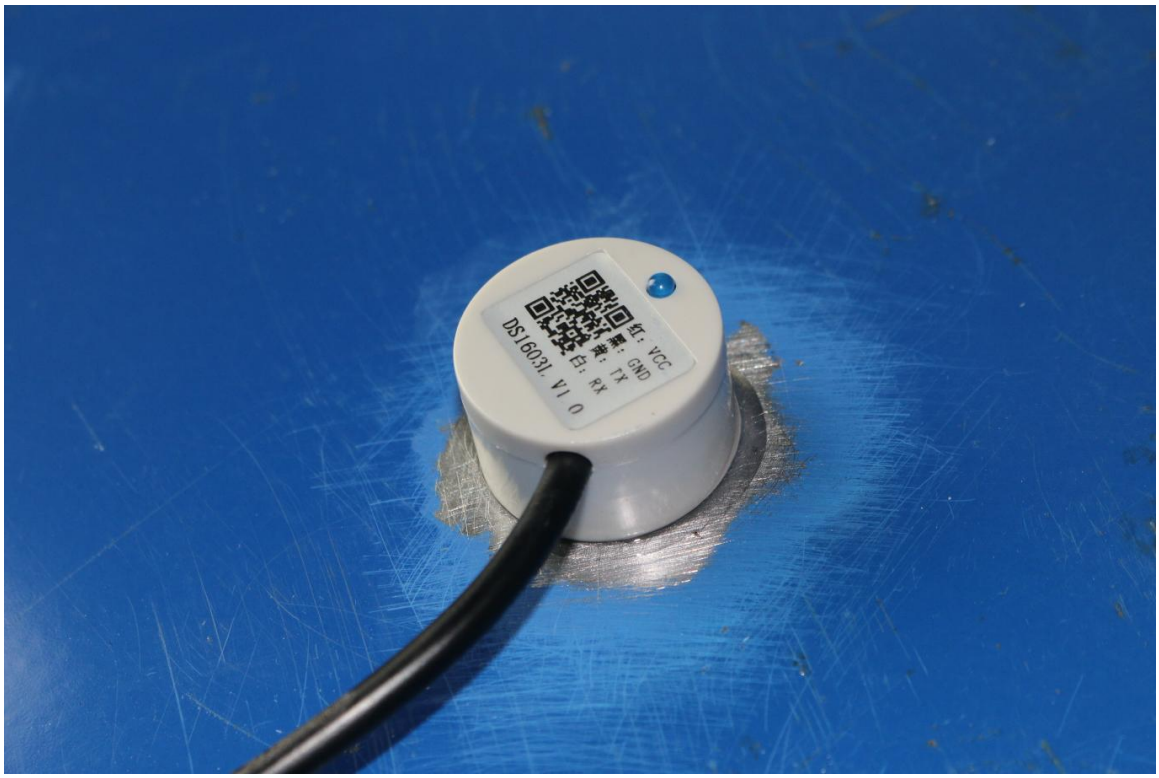
The 3 images above show the preparation of the Epoxy glue and applying it on the surface of the sensor, ensuring there are no air bubbles or uneven surface.

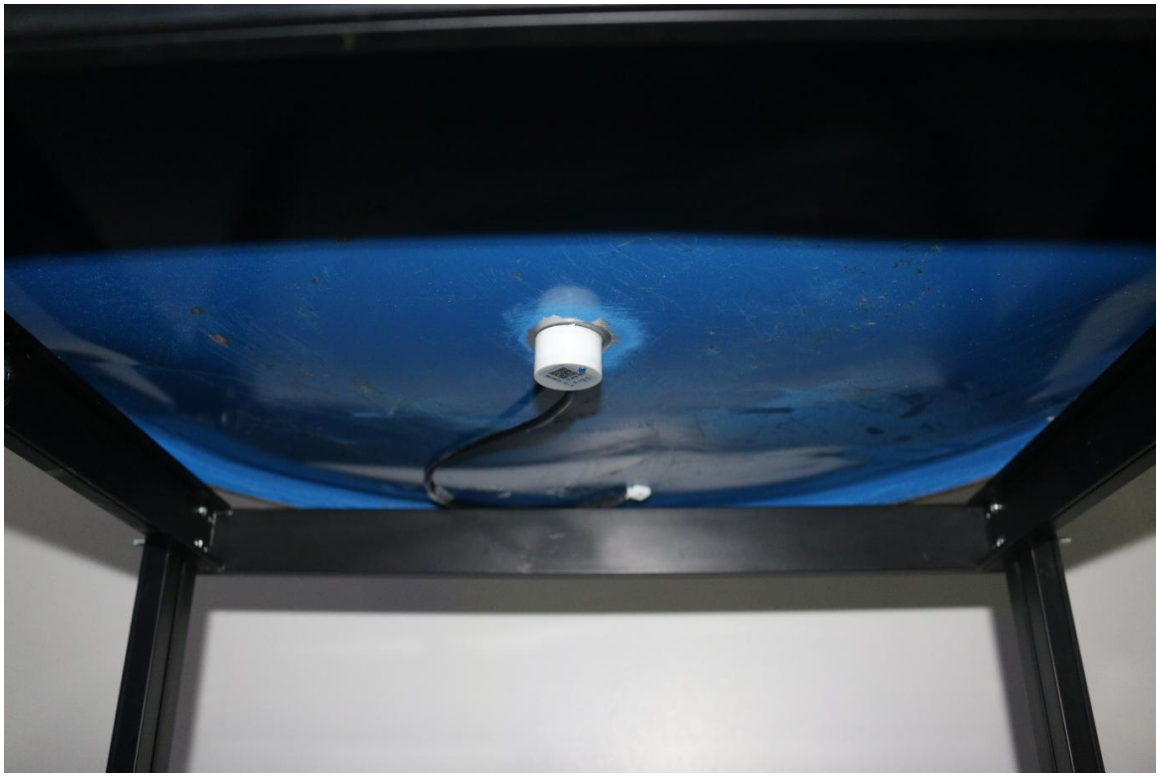


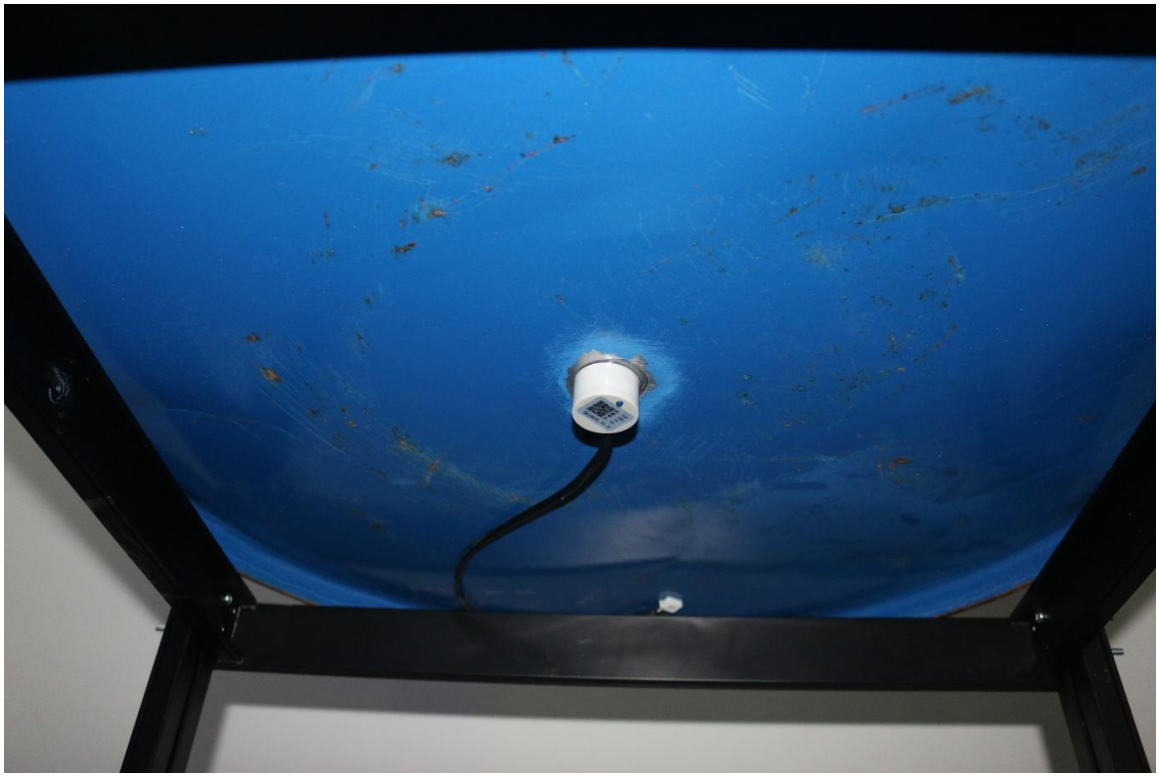


These 2 images above shows the final steps: to mount the sensor on the surface of the tank, and hold it in place securely while the Epoxy glue has dried.




红: VCC
黑: GND
黄: TX
白: RX
DS1603I. V1 0



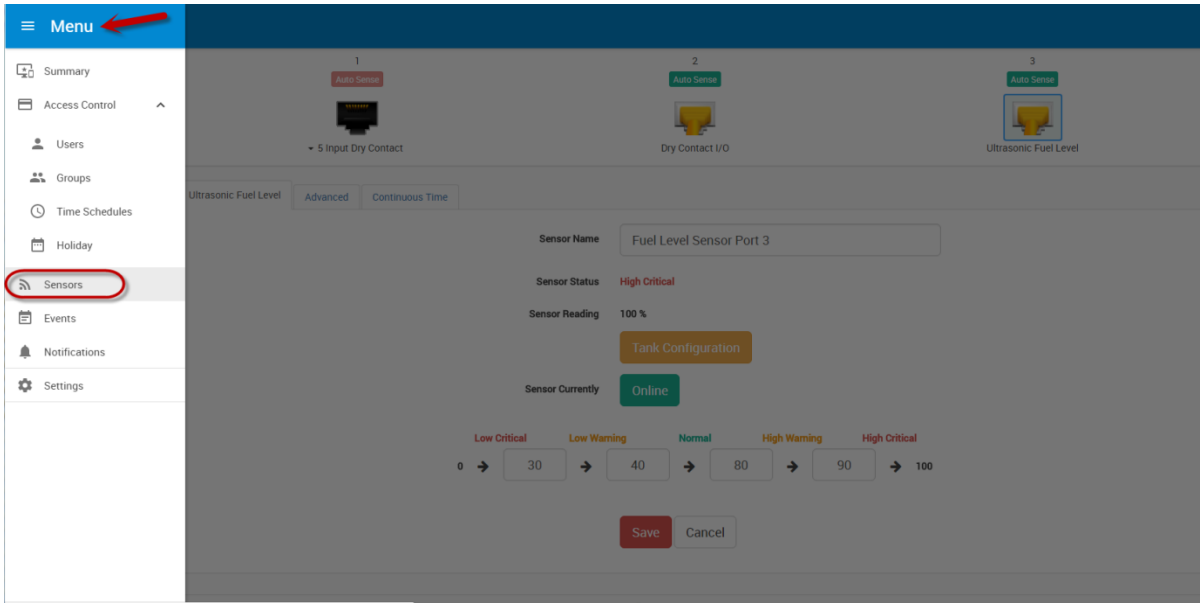


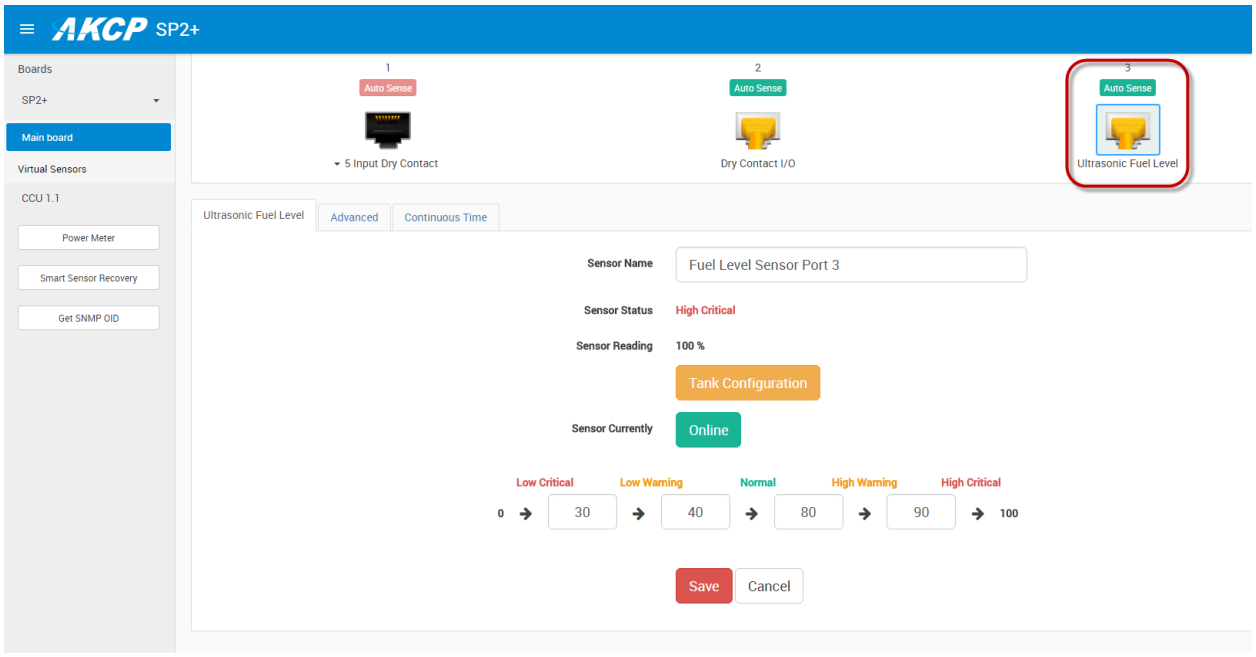
These last images show the correct installation of the UFLS-NI sensor on the bottom of the tank.

2) Sensor Setup for both sensor types

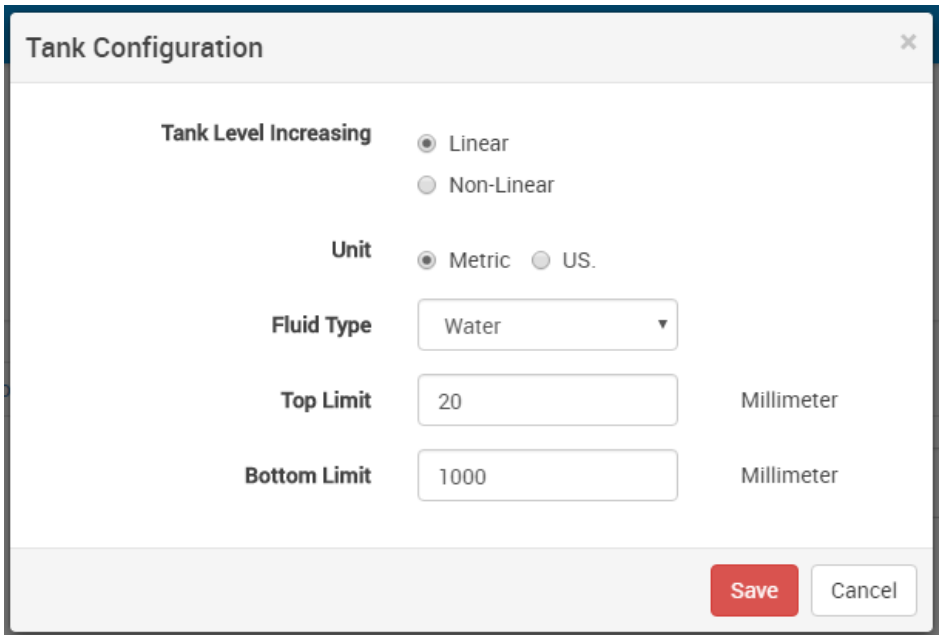
sensorProbe+ (SP2+ & SPX+) base units

To begin make sure you have connected your ultrasonic fuel sensor to the base unit via the RJ45 connection, then navigate to the web interface of your module. This is shown below:-



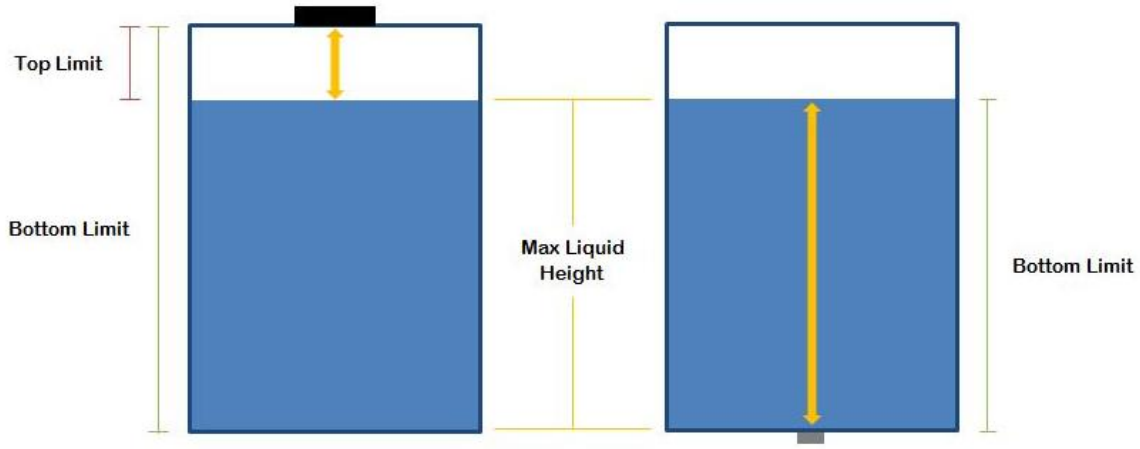


In the page shown above you can set your tanks alert threshold percentages. On the next page the Tank Configuration setup will be explained. It is very important to set your tanks correct configuration, either Linear or Non-Linear, or the sensor will not detect the fuel level properly.

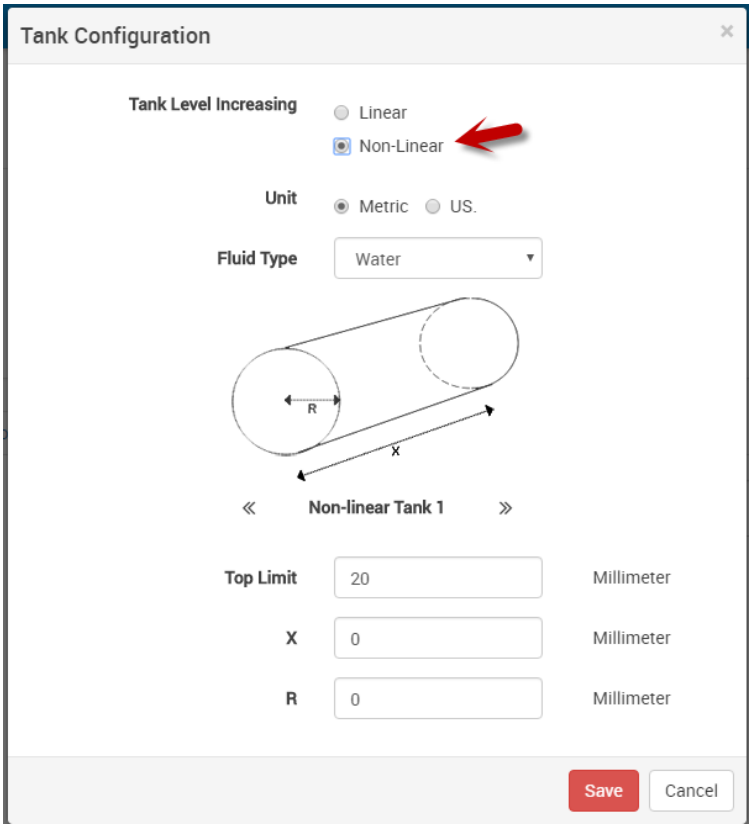


Note: On the "Tank Configuration", settings linear tank configuration:

- The top limit is the distance between the sensor and liquid inside the tank when it is full. *This value is only used for the Invasive UFLS type; the UFLS-NI (non-invasive) will ignore this setting.*
- The bottom limit is the distance between the sensor and liquid inside the tank when it is empty.

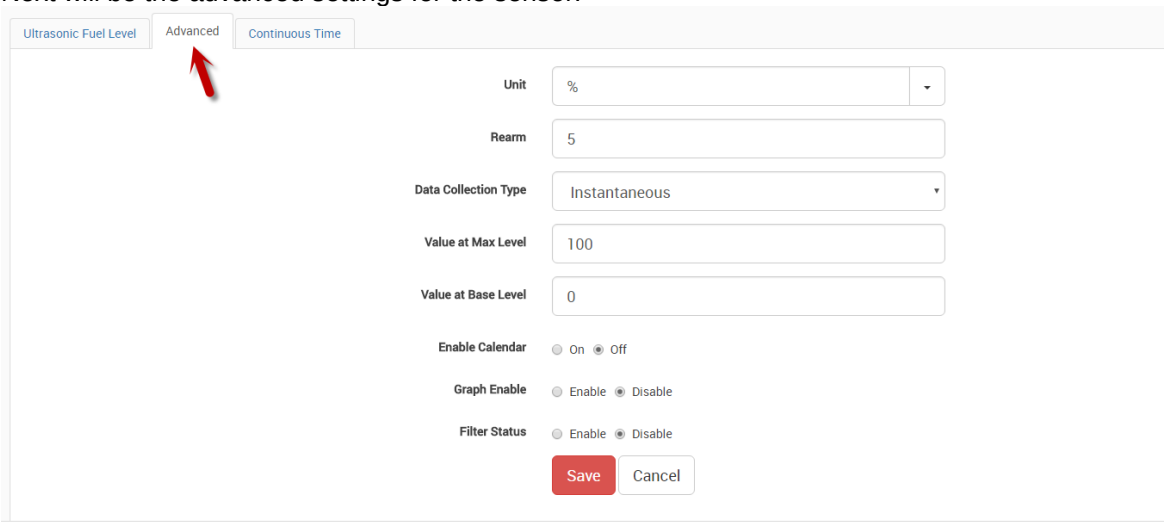


UFLS UFLS-NI



In the above Tank Configuration you will setup your tank if it is the Non-Linear type.

Next will be the advanced settings for the sensor.

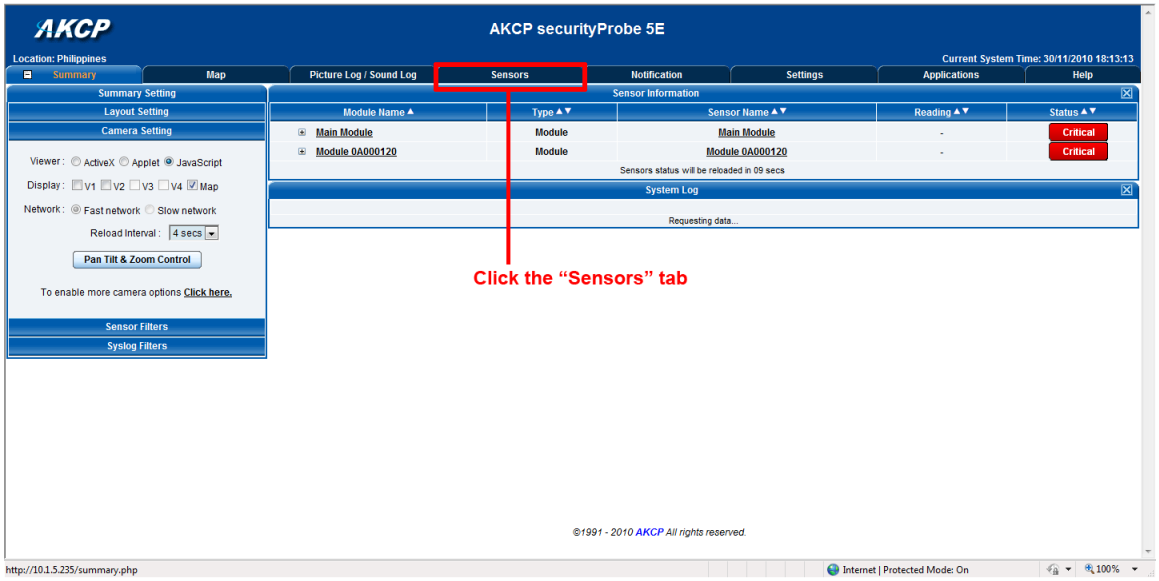


On the "Advanced Settings" the sensor actually displays by default the value in % of liquid in the tank. The Max and Base levels can be used to translate the % into quantity where the Base level is the quantity when the sensor reads 0% and Max level is the quantity when the sensor reads 100%.

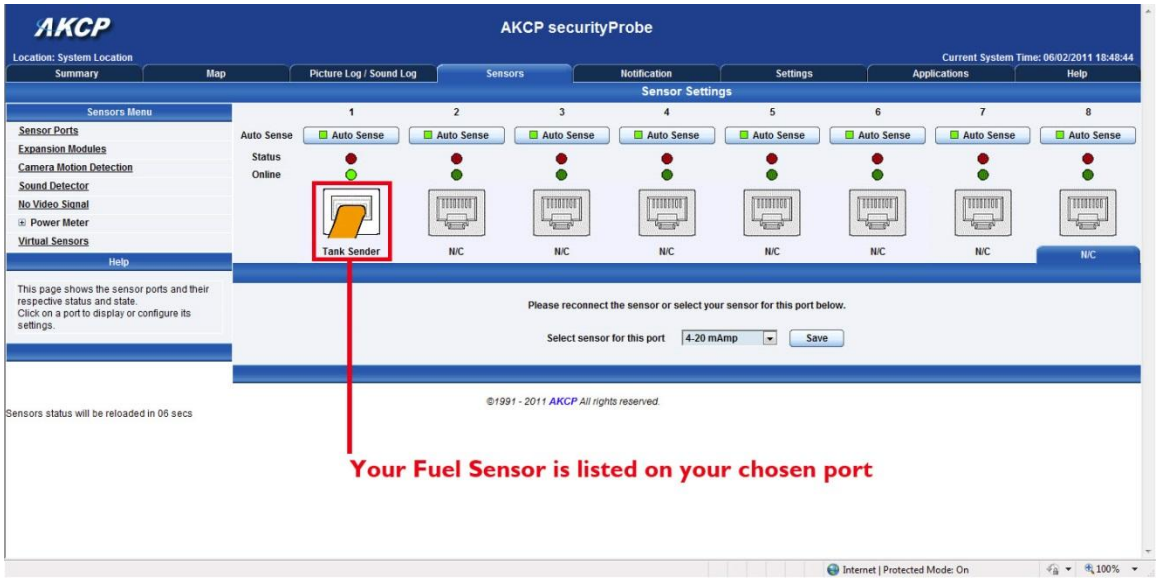
Please see below for the Continuous Time and Minimum Time feature settings as this is the same on both the securityProbe & SP+ units.

securityProbe base units

To begin make sure you have connected your fuel sensor to the base unit via the RJ45 connection, then navigate to the web interface of your module. This is shown below:-



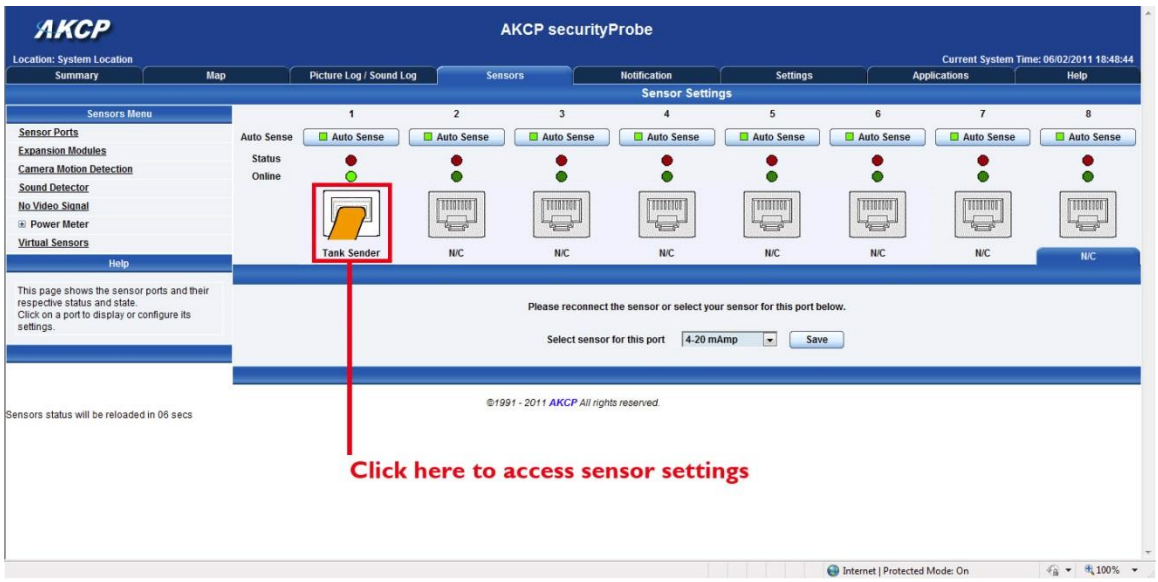
Once you have Clicked on the sensors tab you be taken to the following page:-



Now we know the sensor has been identified by the system we will take a look at the sensor settings.

1) Sensor Settings

We will now take a look at the settings of the Fuel sensor, follow the directions shown below:-

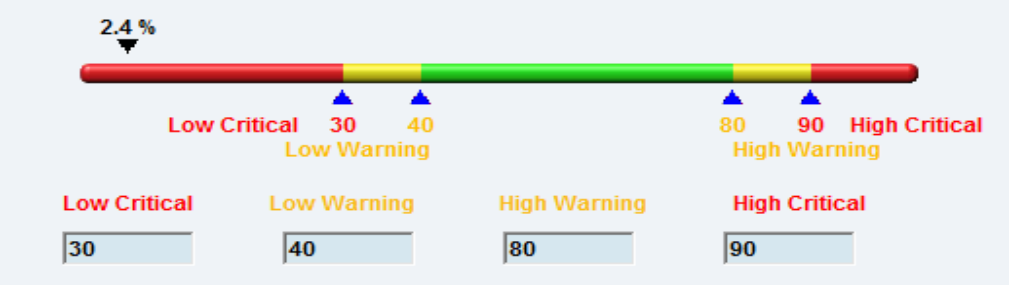


You will now be shown the sensor settings page for the Fuel sensor as shown in the image below:-

Let's take a look at these settings in more detail.

1. **Adjusting the thresholds of your sensor**

   You can manually adjust your notification thresholds by typing a value in the boxes, or by moving the blue arrows on the status bar:-



2. **Making your sensor Online or Offline**

   As with all AKCP sensors you can choose to either "online" or "offline" your sensor, this can be achieved by simply clicking this button:-

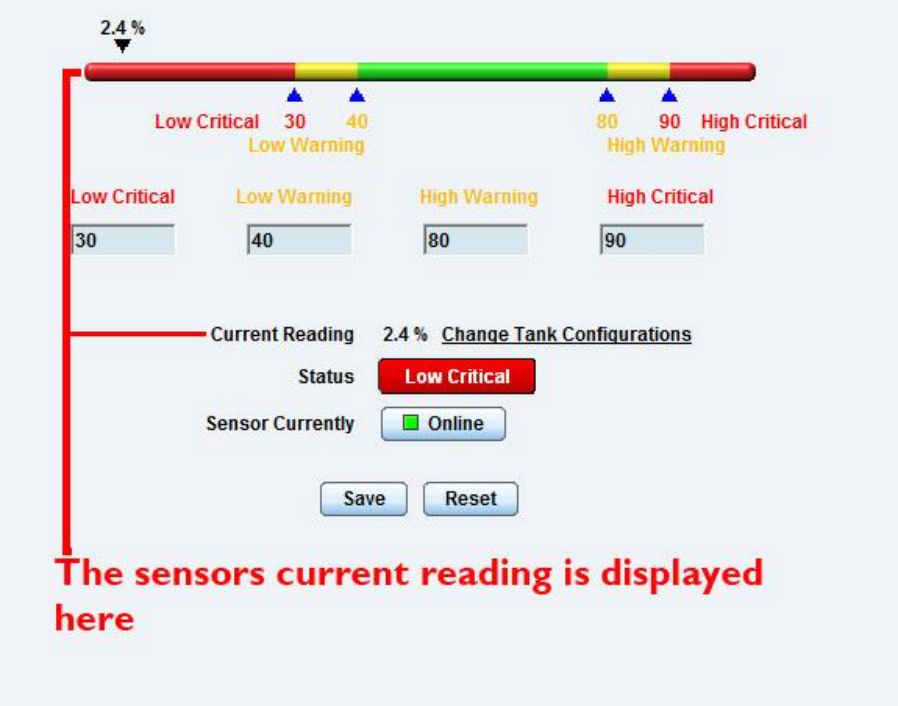
When you are done making changes remember to click "Save" or your changes will be lost.

3. Other Information on the settings page

As well as giving you options, the sensor settings page also displays information about your Fuel Level sensor. This is show below:-

Current Reading

This displays the reading of the Fuel Sensor at that moment.

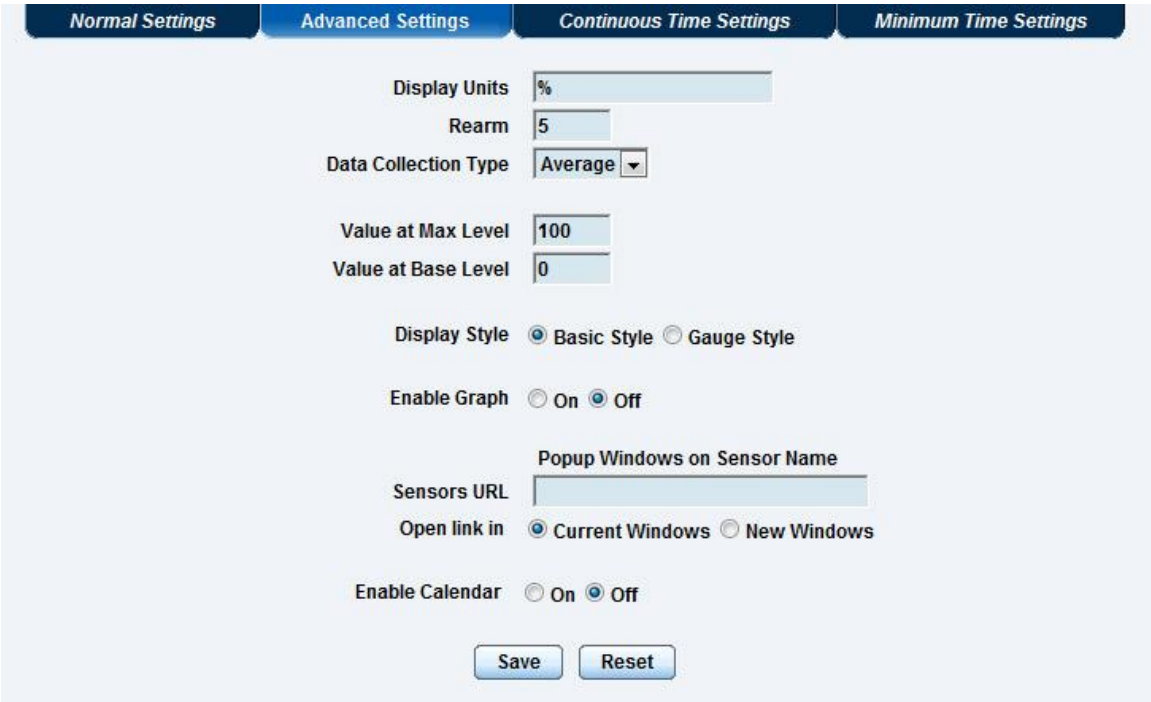


2. Advanced and further settings

The Fuel Sensor comes with an option for advanced, and continuous time settings, let's take a look at those now.

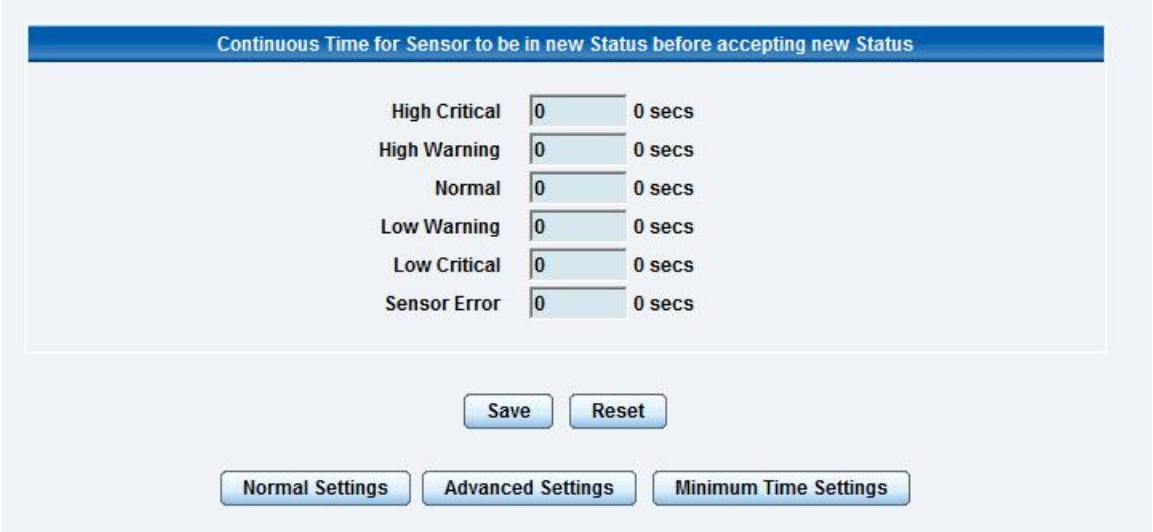
Advanced Settings

As you can see in the picture below advanced settings are very straight forward and require little explanation, most of the settings are the same as you find in other AKCP sensor options windows.



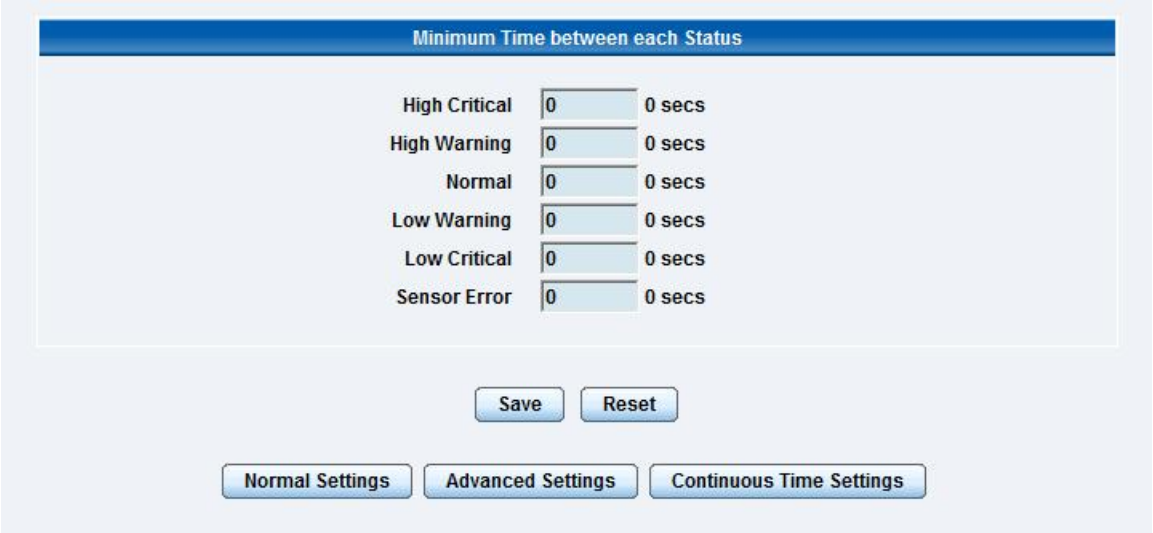
Continuous Time Settings

The continuous time settings window allows you to adjust the time for a sensor to be in a new status before the system accepts the new status.



Minimum Time Settings

The minimum time settings window allows you to adjust the minimum time between each status.



Technical Specifications

Common Technical Specifications

Tank Depth	All size tanks with liquid depth up to 2 meters
Liquid types	Works with fuels (Diesel, Kerosene etc), fresh water, grey water and black water
Base unit compatibility	Requires securityProbe 5E, E-Sensor8 EXP or sensorProbe+
Communications Cable	RJ45 jack to tank sender using UTP Cat 5 wire
Communications Cable Max. length:	50ft (15 meters)
Assembly and Calibration	Comes fully assembled, only needs calibration and installation
Supplied leader cable	Leader cable from tank sender to sensor box is 18 inches. Can be extended up to 50ft (15m)
Ships with a 15 foot CAT5 LAN extension cable	Ships with 15ft CAT5 sensor cable, can be extended up to 50ft (15m)
Manufacturers Warning	It is advised that the UFLS is not to be used with explosive chemicals of any kind.

Sensor LED behavior (common):

* ON: sensor is powered but no liquid is detected
* ON with slow blinking: sensor is working and detects liquid

Invasive Specific Specification

Mounting Pattern	Standard SAE 5 mounting hole for easy fit.
Minimum Tank Depth	Not suitable for tank liquid depths less than 200mm
Measurement Method	Acoustic sonic measurement
Tank Depth	0–2000 mm (6.5 ft)
Accuracy Distance	0–2000 mm (6.5 ft) at 2 mm accuracy
Full Scale Accuracy	+/- 2%-5% Full-Scale Accuracy
Mounting	SAE 5 stud mounting pattern with gasket, seal and screws (top mount only)
Tank Type Style	Metal and plastic with nonlinear capacity, with thickness less than 8mm
Operating Temperature	4°C to 65°C
Electrical	
Power Supply	Operates from 12 VDC External Power Suppler (included)
Current Draw	25 mA with 5 V gauge output
Ignition Protected	ISO 8846
Fire Resistance	Tested to ABYC, US Coast guard and ISO10088
Output types:	Analogue 10-180, 10-300, 240-33 ohm gauges and 0-5volt

Non Invasive Specific Specification

Minimum Tank Depth	Not suitable for tanks less than 50mm
Measurement Method	Acoustic sonic measurement
Tank Depth	0–2000 mm (6.5 ft)
Accuracy Distance	0–2000 mm (6.5 ft) at 2 mm accuracy
Full Scale Accuracy	±(3+H*0.5%) mm
Mounting	Epoxy Resin (Bottom mount only)
Tank Type Style	Metal and plastic with nonlinear capacity, with thickness less than 8mm
Operating Temperature	-15°C to 60°C
Electrical	
Power Supply	Operates at 5VDC powered from base units.
Current Draw	25 mA with 5 V gauge output

This concludes the Ultrasonic Fuel Level Sensor Manual.

Please contact support@akcp.com if you have any further technical questions or problems setting up your modem or your alerts.

Thanks for Choosing AKCP!