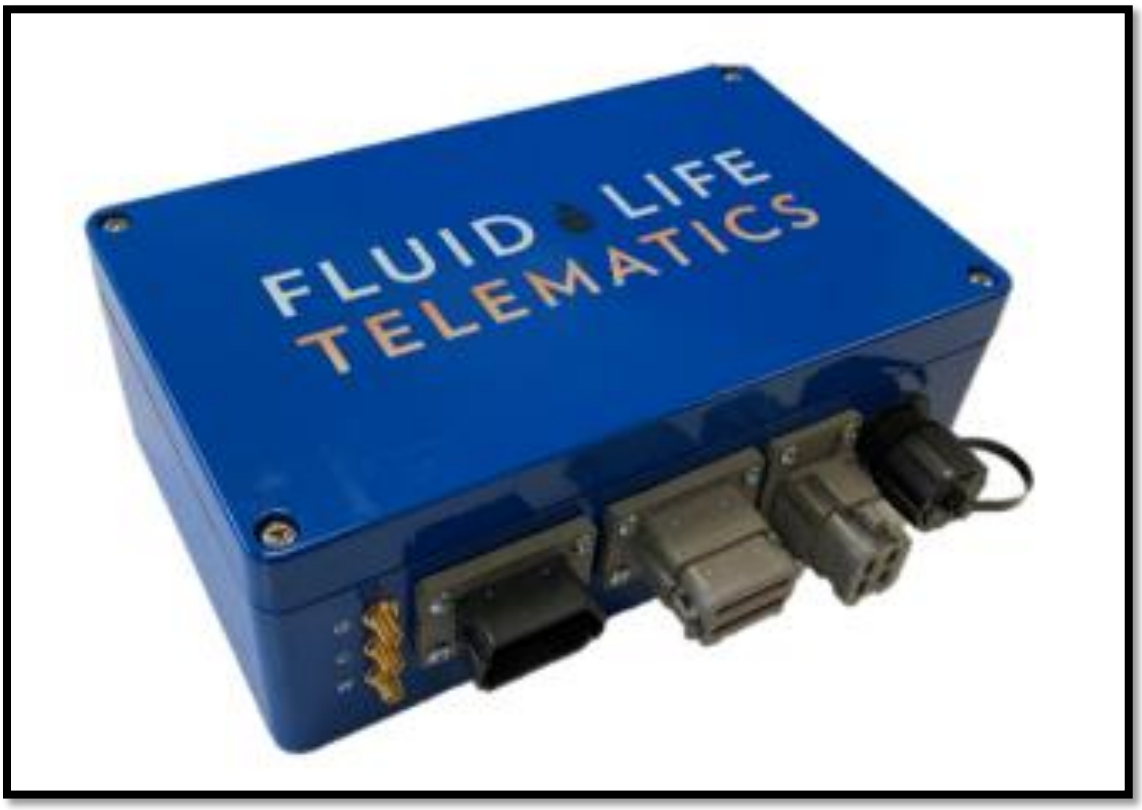
FLUID LIFE UCM TELEMATICS

Software Configuration Guide



myLab

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Telematics Module Overview

Fluid Life Telematics Modules are used to log and transmit oil sensor data from your machine components to our myLab™ web application. For mobile asset applications, it is also able to log and transmit ECM parameters and other OEM sensor data to further unlock your fleet potential.

Safety

This device ensures that personnel safety is not at risk when in operation if installed in compliance with the site-specific safety/installation procedures provided. The software configuration process of the module is enabled upon power-up of the device.

Federal Communications Commission (FCC) Compliance

The Fluid Life Telematics module fully complies with and is approved by the Federal Communications Commission (FCC). The FCC IDs for the module are 2AYWR-FLWIFI1 and 2AYWR-FLTEL1, Grantee Code is 2AYWR and the Equipment Product Codes are FLWIFI1 and FLTEL1 respectively.

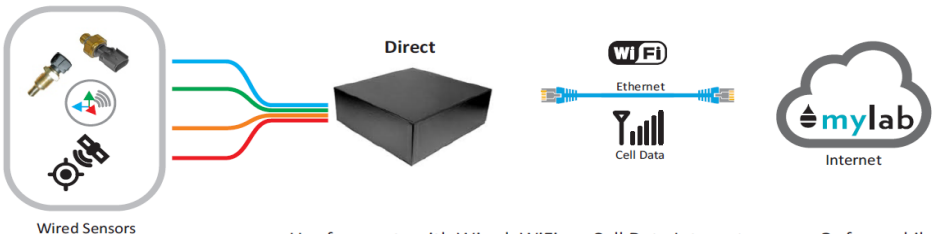
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

As per FCC §15.19(a)(3), this device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation**.**

Any changes not expressly approved by Fluid Life could void the user's authority to operate the equipment.

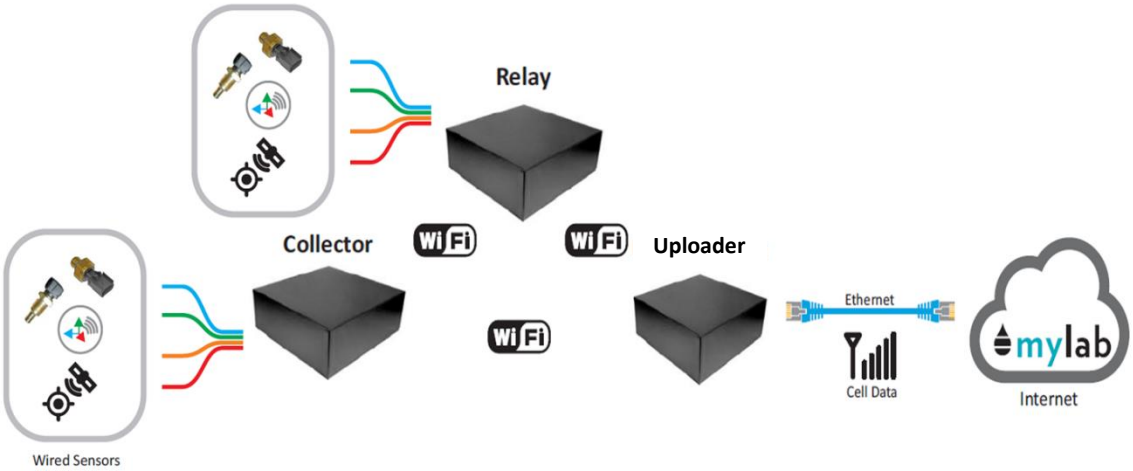
Telematics Module Communications Overview

Direct



- Use for assets with wired, Wi-Fi, or Cell Data internet access or for mobile assets that come into existing Wi-Fi range frequently
- One Telematics module configured as “Direct” box mode is required per asset

Mobile Assets

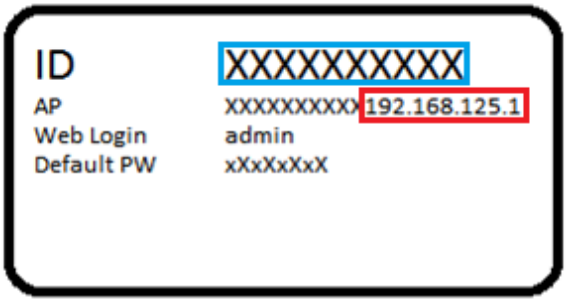


- Telematics modules used for mobile assets that do not come into range of a home base frequently. Relays are fitted to other mobile assets such as maintenance or fueling/lube truck that migrate between remote assets and a home base. Home base relay uploaders need Ethernet or Cell Data Internet access as Wi-Fi is used to transfer data from the collectors on the assets.
- Relays can optionally collect wired Telematics data themselves.
- One Collector is needed per asset, plus one or more relays, and one or more Uploader.
- Collectors can communicate to either a Relay or directly to an Uploader
- Relays do not communicate between each other.

Telematics Module Connection

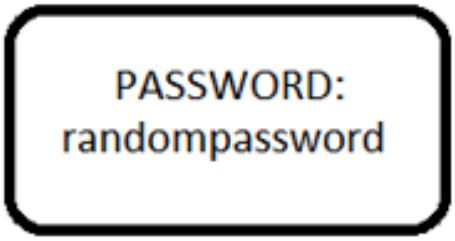
Connecting to the Module

1. Identify the IP address (outlined in **red**) and SSID (outlined in **blue**) from the label on the Telematics module that you wish to connect.



2. Find the broadcasted Wi-Fi network containing the SSID on the label followed by IP address. For example: Telematics module with the label above will broadcast **"XXXXXXXXXX192.168.125.1".**

3. Connect to the Telematics module using the password printed on the label described below



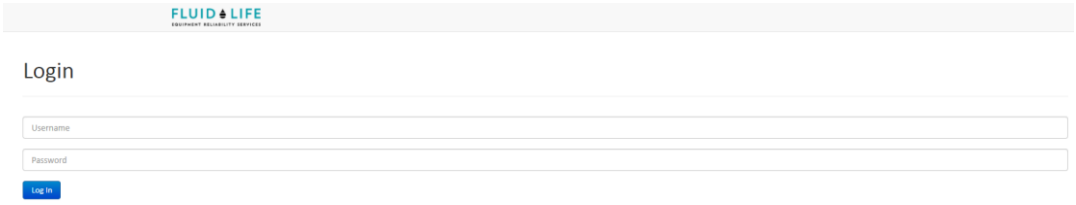
Note: Due to this being a wireless access to the device, the connection status may appear as follows and is acceptable.

Telematics Module Web Page Access

1. In an internet browser (ie. Chrome or Edge), type in the URL to access the Telematics module web page. The URL is the Telematics module IP Address followed by **":3000"** as shown below.

   Note: For example: for the module “XXXXXXXXXX192.168.125.1” you should type in “**192.168.125.1:3000**”

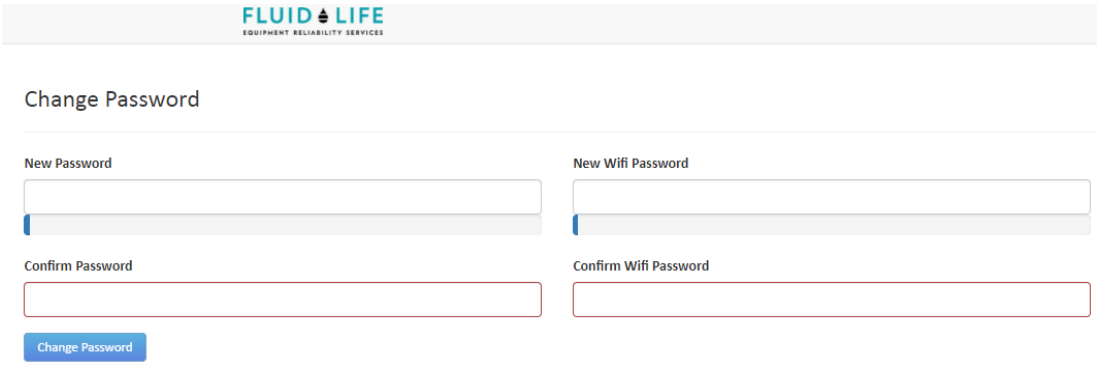
2. After gaining access to the web page, you will be prompted to a username and password page. The default username is **"admin"** and the default password is referenced on the label on the Telematics module (ie **“randompassword”**).



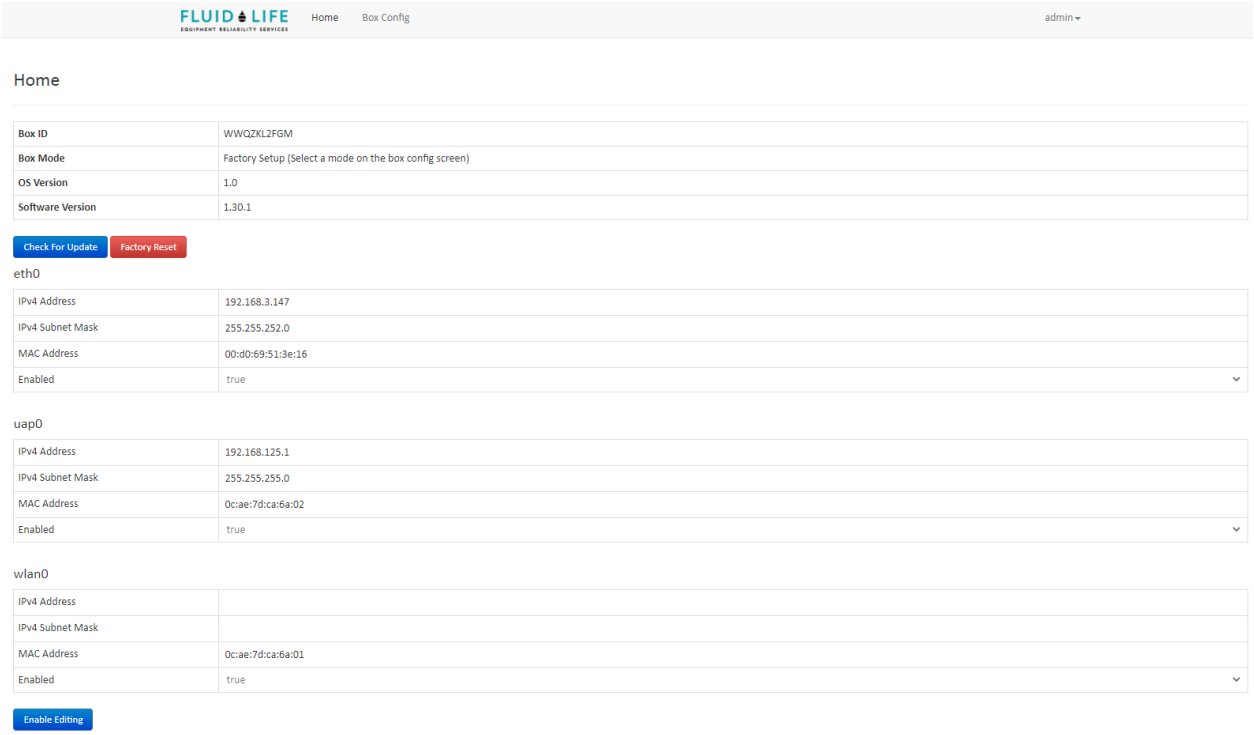
3. Upon a first Login, the user will be prompted to change the password. This is a mandatory step required to ensure secure access to the module for future access by users. The following fields will be displayed:

   - New Password: New password to login and access Telematics module configuration web page.
   - New Wi-Fi Password: New password for Wi-Fi access/connectivity to the Telematics module.

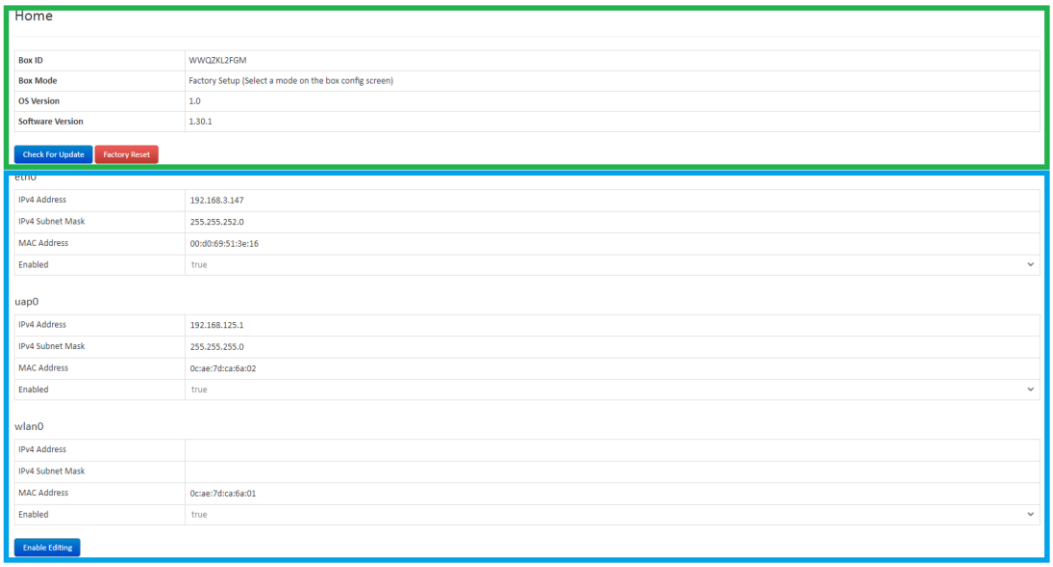
   Note:
   - It is recommended that these passwords are different from one another; however, permits the user to set them to be identical.
   - Following the password change, you will be required to refresh the page and reconnect to the Telematics module using the new passwords assigned.



4. Below you see the “Home” page highlighting the general Telematics module settings and configuration data.



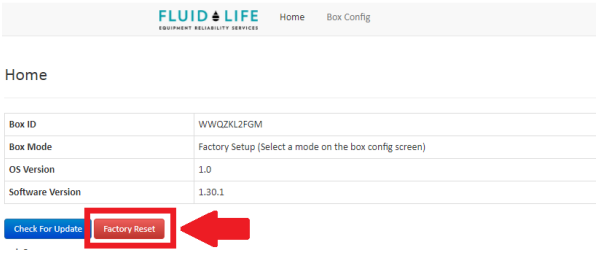
5. Highlighted in **green** is the section that contains general data and software configurations of the Telematics module and is **non-editable**. Highlighted in **blue** is the section that contains general data and software configurations of the Telematics module that **can be edited**.



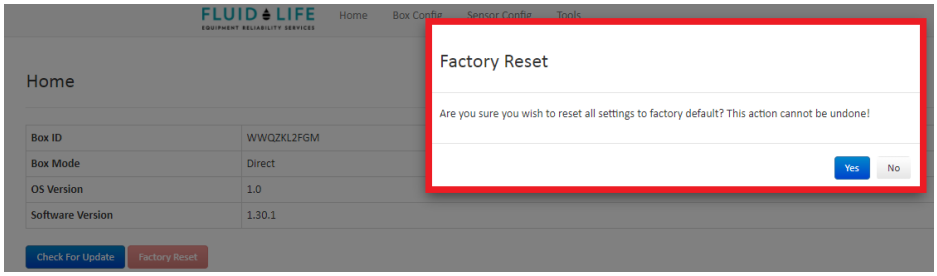
6. In order to edit the configuration parameters in the **blue** section above, click the “Enable Editing” feature as outlined below.

   Note: These tables are for advanced configuration only and do **not** need to be altered in order for the Telematics module to work properly.

7. The red “Factory Reset” button enables the Telematics module to revert back to factory mode setting which resets configuration parameters and the login credentials (to that referenced on the module label).



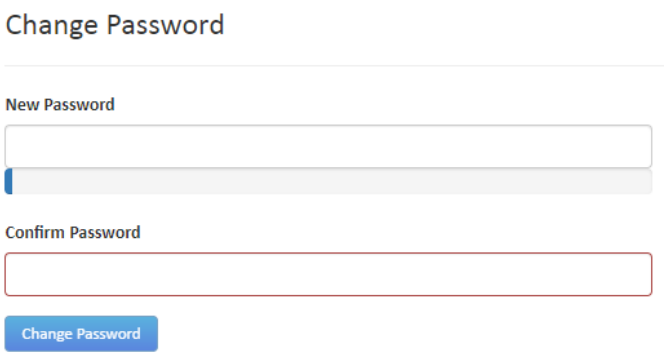
8. When clicking “Factory Reset”, the following message will be prompted on the screen to confirm system reset. Click “Yes” if you wish to proceed if required, otherwise click “No”.



Admin Feature

The “admin” dropdown comprises of the “Change Password” and “Log Out” buttons.

To change password, click “Change Password”. This will prompt a screen to reassign new password for logging into the Telematics module.

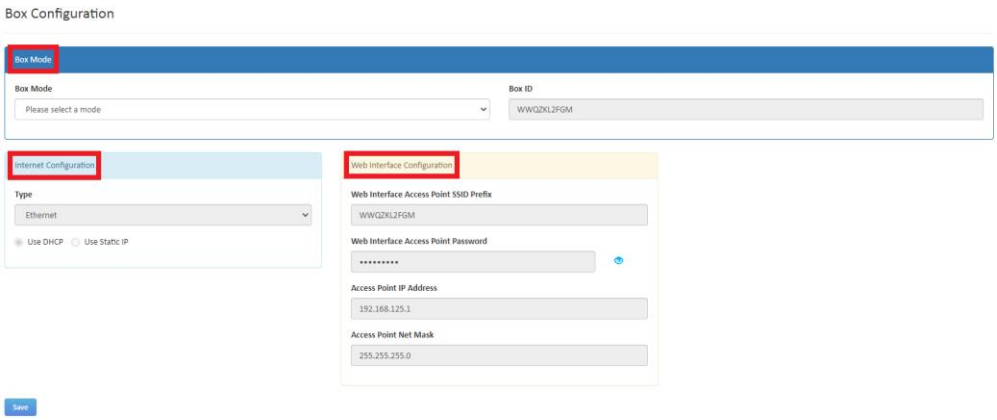


Telematics Module Configuration Overview

1. Click on the “Box Config” tab on the top ribbon highlighted in red to access the user configuration settings.

2. You will initially see a screen highlighting three sections for the box configuration:

    - **Box Mode:** Telematics module configuration mode for communications with other modules or *MyLab.*
    - **Internet Configuration:** Determines how the box will communicate to *MyLab.*
    - **Web Interface Configuration:** Configures the wireless access point of the Telematics Module for future connection.

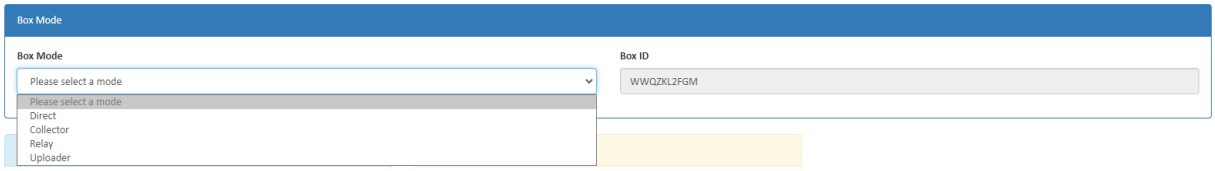


Box Modes

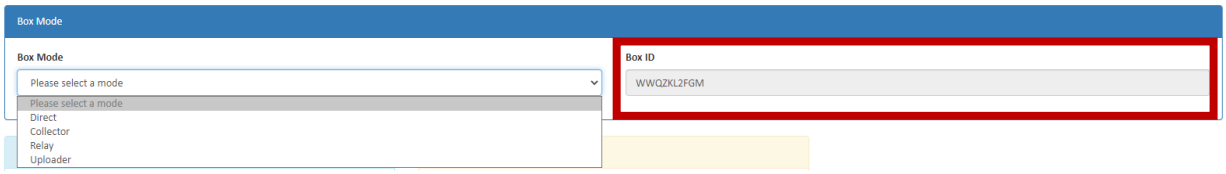
This is where the different box modes and associated settings may be selected, based on the intended purpose of the Telematics module.

1. Select the appropriate box mode for the chosen Telematics module. The configuration steps for the module rely on the selected box mode. Refer to the appropriate box mode configuration in the four sections outlined below:

    - Direct
    - Collector
    - Relay
    - Uploader



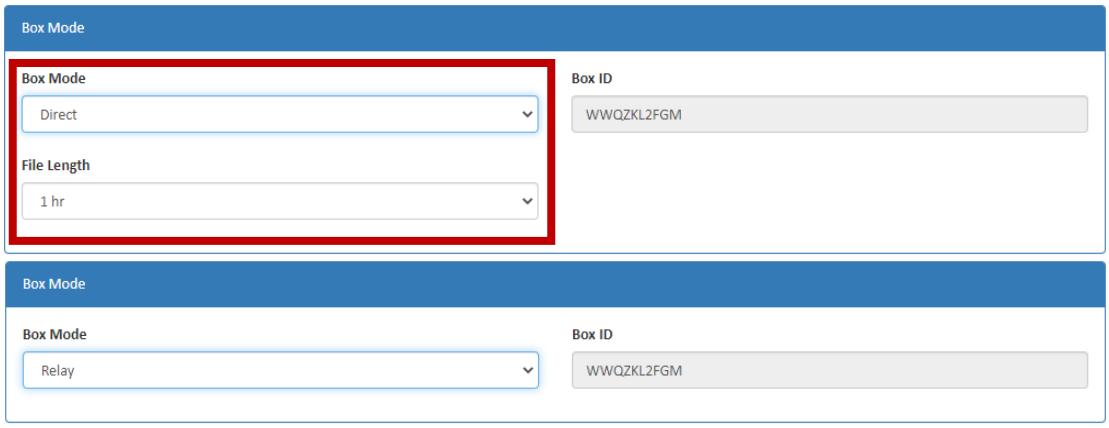
Note: The “Box ID” is a unique identifier across all boxes and can therefore not be changed.



2. The “File Length” feature determines the frequency at which the data files will be uploaded to *MyLab*.

    Note:

    - Direct and Collector box modes will allow “File Length” times between interval ranges of 10 min to 2 hours.
    - Uploader and Relay box modes do not collect data; therefore, will not permit “File Length” selection.



Telematics Module Configuration Procedure

Refer to **one** of the four following sub-sections below to ensure appropriate module configuration:

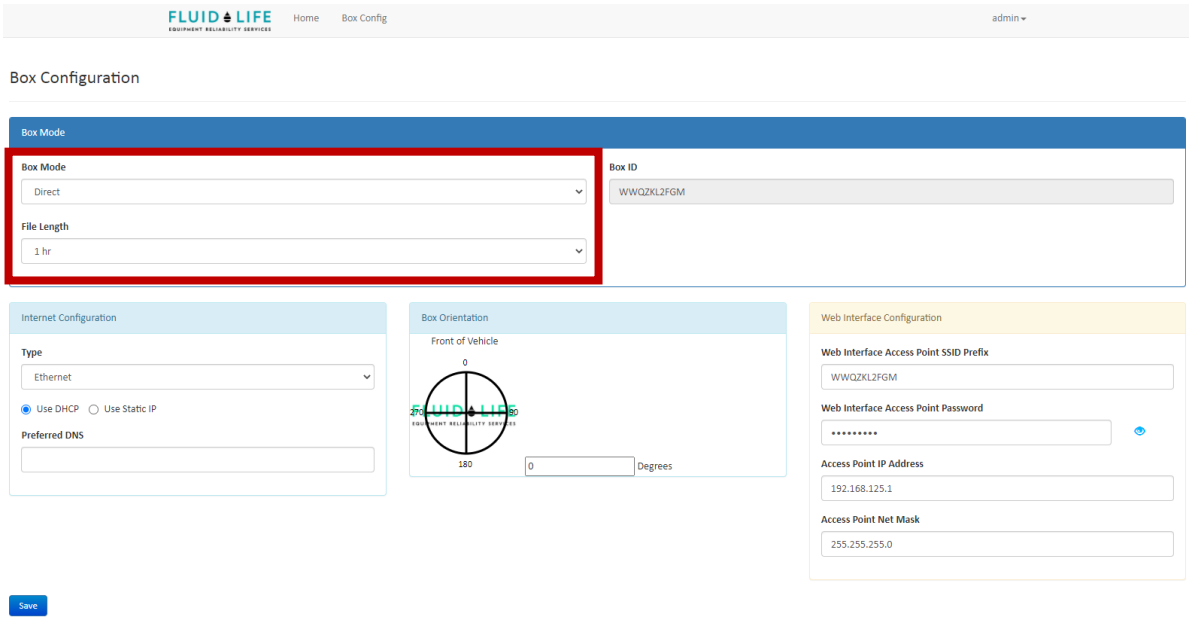
- Direct
- Collector
- Relay
- Uploader

For clarifications regarding Box Mode configuration required for the intended purpose of a specific module, refer to the “Telematics Module Communication Overview” section or consult a Fluid Life representative at 877.962.2400.

Direct Mode

1. For the “Direct” Box Mode configuration, the following screen will appear:

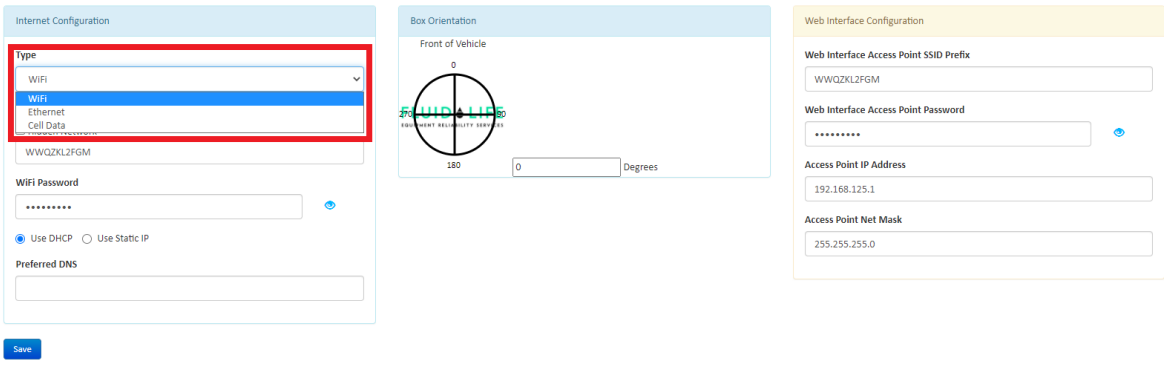
    - Select “Direct” in the dropdown menu from the available box modes.
    - Select the desired file length for data transfer frequency. Selecting shorter intervals will enable frequent data transfers to *MyLab*.



Internet Configuration

1. There are three available internet configuration options for the Telematics module to communicate to *MyLab*. Configure the module to **<u>one</u>** of the following for specific configuration steps:

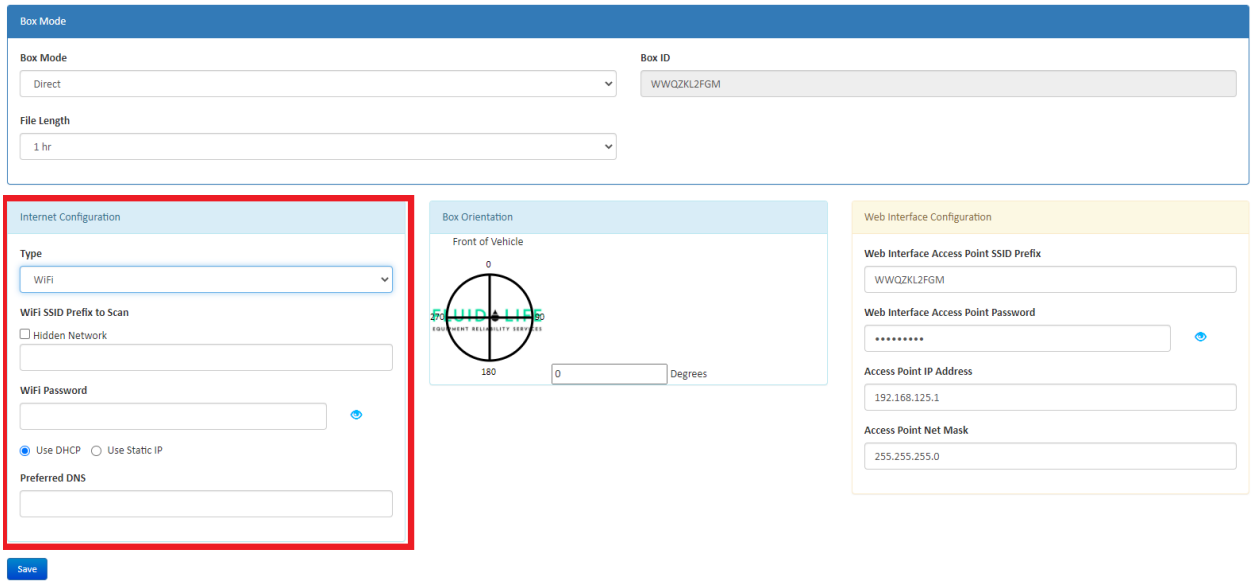
    - **Wi-Fi**: Wi-Fi requires access to the user's wireless network. This Includes the network name and password.
    - **Ethernet**: Ethernet requires an Ethernet cable connected from the Telematics module to the user's network.
    - **Cell Data**: Cellular requires an activated SIM card to access a cellular provider's network. You will need to configure the SIM cards' carrier country and provider. A custom cellular APN may also be used by selecting "Set APN Manually" if you require one, but is not necessary.



Wi-Fi

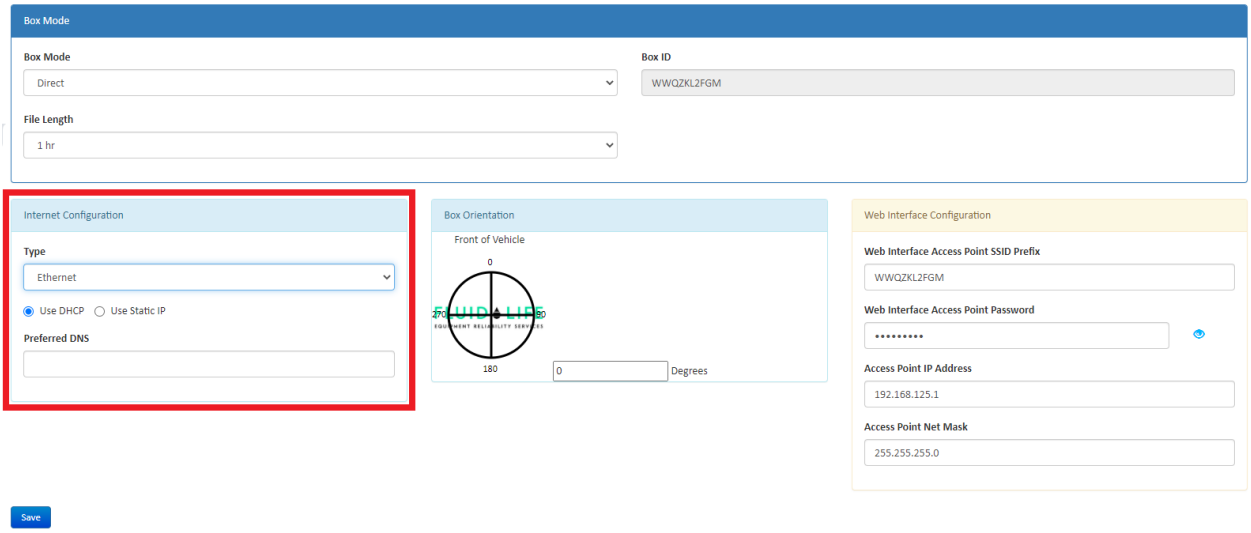
1. For the Wi-Fi internet configuration:

    - Set the “WiFi SSID Prefix to Scan” field as the desired Wi-Fi network name that the Telematics module connects to.
    - Set the “Wi-Fi password” field to the same one as that of the desired Wi-Fi network which the Telematics module connects to.
    - The DHCP, Static IP or Preferred DNS selection is based on end users’ preferred network protocol for this application. The configuration page defaults DHCP as the selected network protocol.



Ethernet

1. For the Ethernet internet configuration selected, verify that the DHCP, Static IP and Preferred DNS selection is based on end users’ preferred network protocol used for this application. The configuration web page defaults DHCP as the selected network protocol.



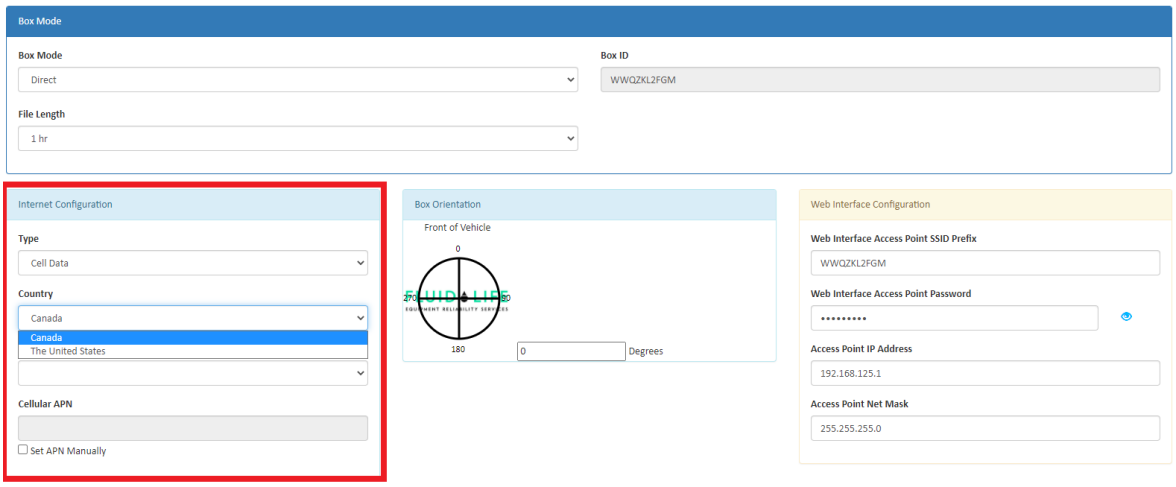
Cell Data

For the Cell Data internet configuration there is an option to select either Canada **or** USA, which lists the available cell network providers for each region.

1. Select the appropriate country in the dropdown for the SIM card

Note:

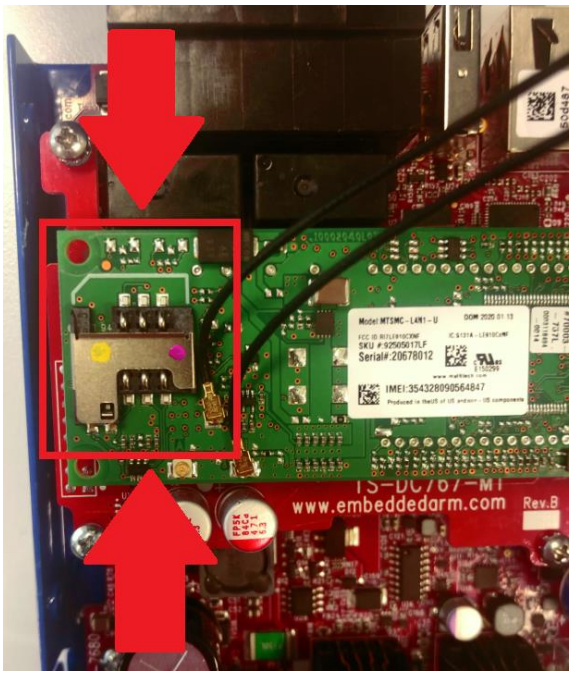
- Cell Data configuration requires an activated SIM card to access a cellular provider's network. You will need to configure the carrier's country and provider. A custom cellular APN may also be used by selecting "Set APN Manually" if you require one but is not necessary.
- Refer to the "SIM Card Installation" section for steps outlining proper SIM card installation method



Sim Card Installation

1. Verify that a standard size activated SIM card is used

2. Unscrew the Telematics module case to access the internal electronics which houses the modem. The modem contains a slot (as highlighted in the image) for the SIM card insertion.



3. Ensure that the SIM card is inserted in the same orientation as shown below and verify that it sits flush to the bottom of the slot with full contact.

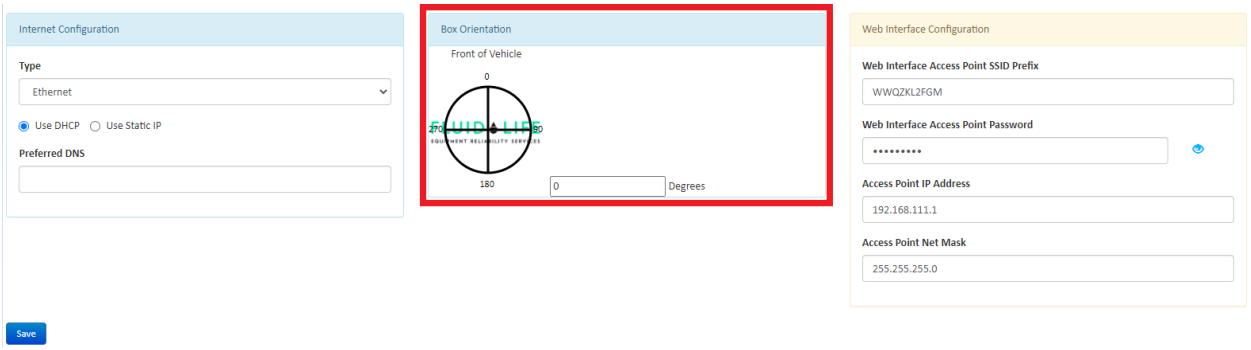
4. When complete, close and tightly fasten with module case with screws.

Box Orientation

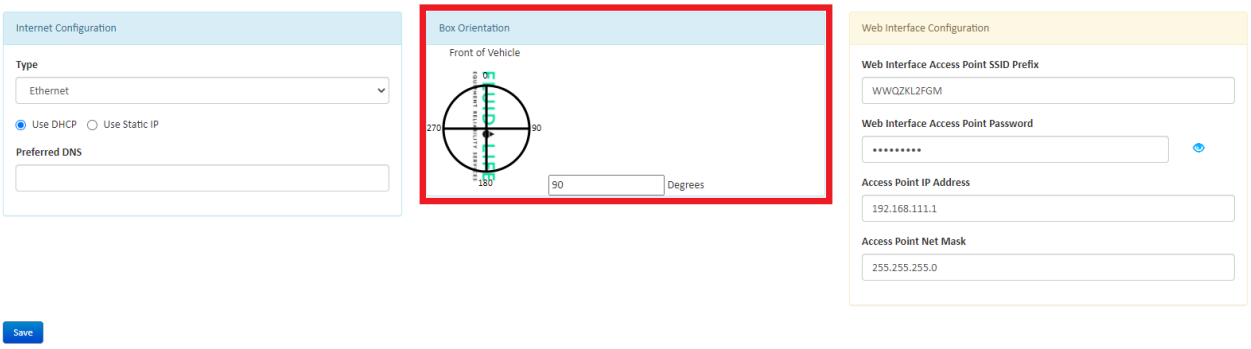
The Box Orientation configuration determines the physical orientation of the Telematics module installation with respect to the front of the equipment. This is referred to in “Degrees”.

For example, the Fluid Life logo on the Telematics module faces the front of the vehicle at 0 Degrees.

1. Enter a degree value in the field highlighted below



Note: The orientation of the Fluid Life logo on the Telematics module automatically adjusts to the value inputted into the software as shown in the example below.



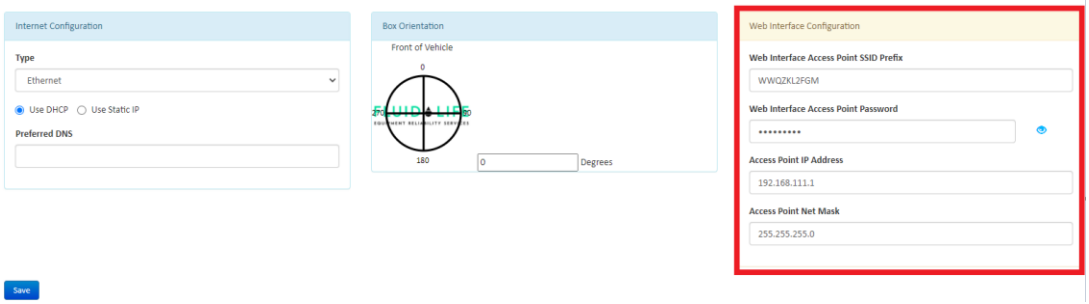
Web Interface Configuration

The “Web Interface Configuration” section configures the **wireless access point** to the Telematics module in order to access its web page.

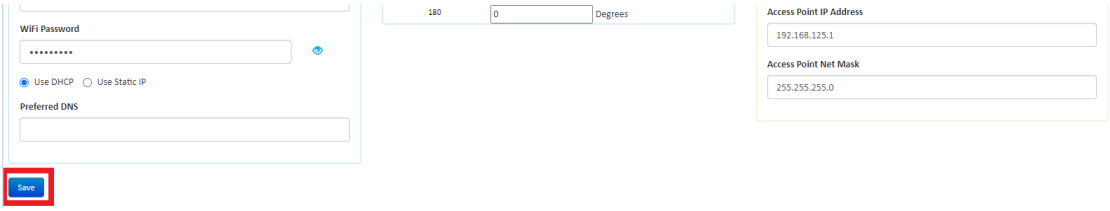
1. This section contains the following and configures the wireless access point of the Telematics module for future connection:

    - **Web Interface Access Point SSID Prefix:** This field is auto populated with the assigned Box ID on the Telematics module label. The prefix can be changed as desired and is recommended to be the company name or any other string that is quick and easy to identify in the list of Wi-Fi networks displayed when attempting to connect.
    - **Web Interface Access Point Password:** The new password reassigned upon first login is displayed here as default. This password will be used to access the wireless network upon saving the new settings.
    - **Access point IP address** (can be changed only if required)
    - **Access Point Net Mask** (can be changed only if required)

    Note: When multiple Telematics modules are set up to communicate with each other**,** ensure that the “Web Interface Access Point SSID Prefix” is **identical** across **<u>ALL</u>** Telematics modules, and the IP addresses are unique between each box mode (which is done by default prior to manually changing settings)



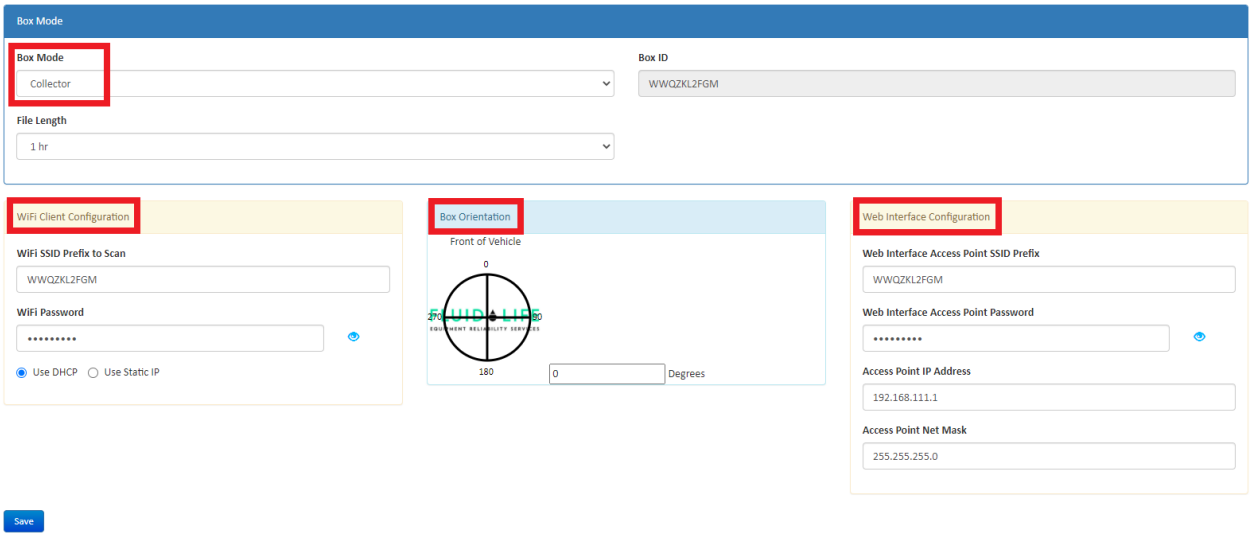
2. Click “Save” to save the configuration parameters for either Wi-Fi, Ethernet or Cell Data.



Collector Mode

The Collector box mode consists of three configuration parameters:

- Wi-Fi Client Configuration
- Box Orientation
- Web Interface Configuration



Wi-Fi Client Configuration

1. For the Wi-Fi Client configuration:
    - Set the “WiFi SSID Prefix to Scan” field as the desired Wi-Fi network name that the Telematics module connects to
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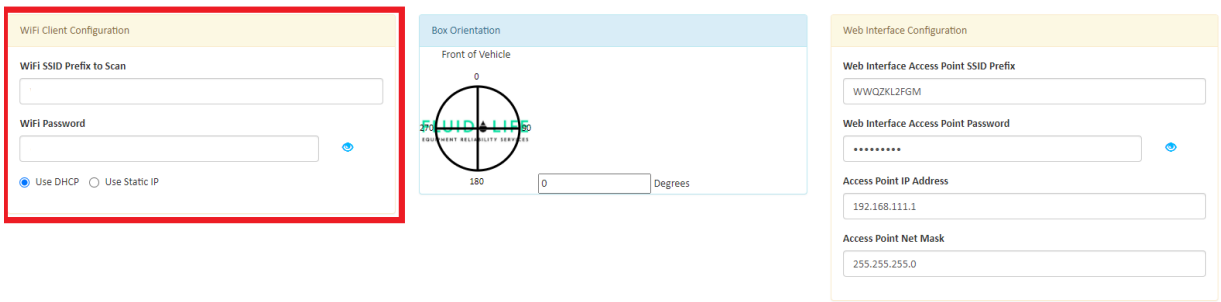

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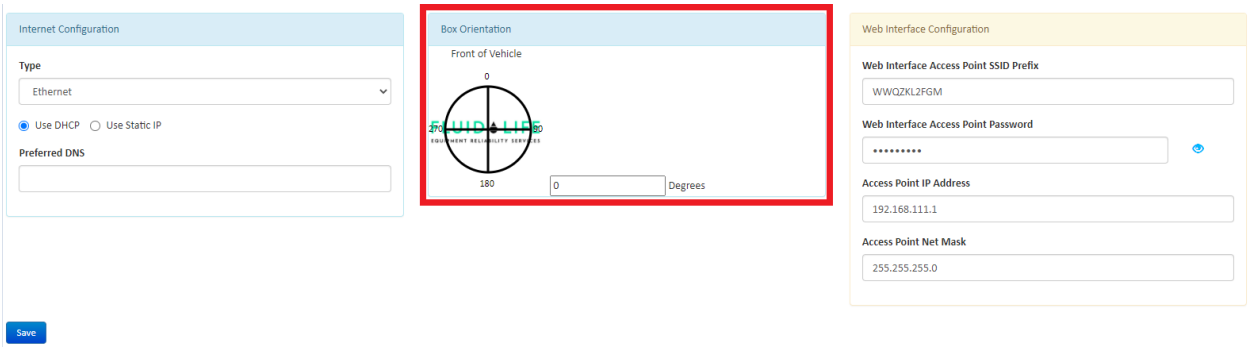
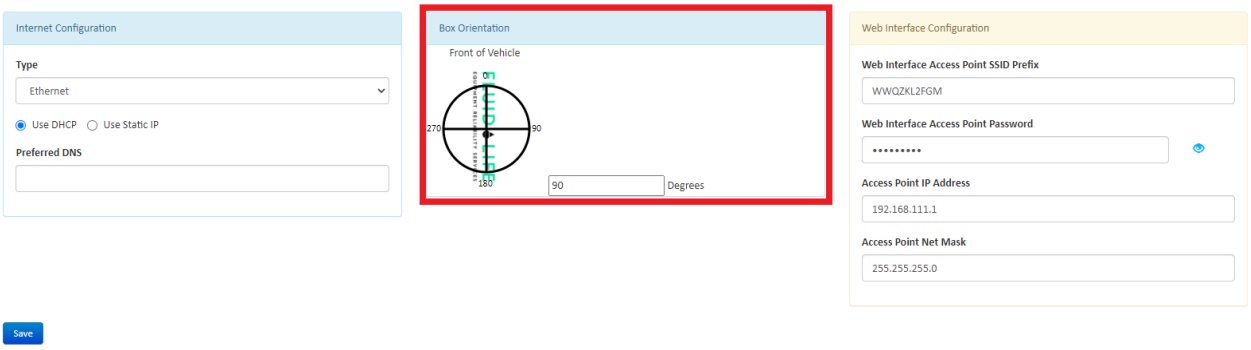
For example, the Fluid Life logo on the Telematics module faces the front of the vehicle at 0 Degrees.

1. Input the degree value setting in reference to front of the vehicle.



Note: The orientation of the box logo automatically adjusts to the degree orientation inputted into the software as shown below.



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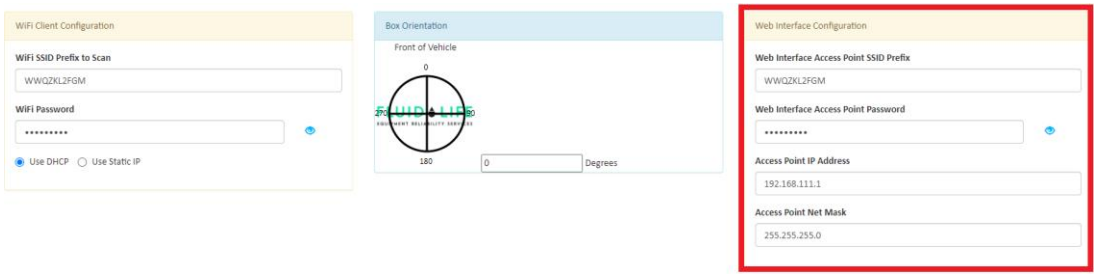
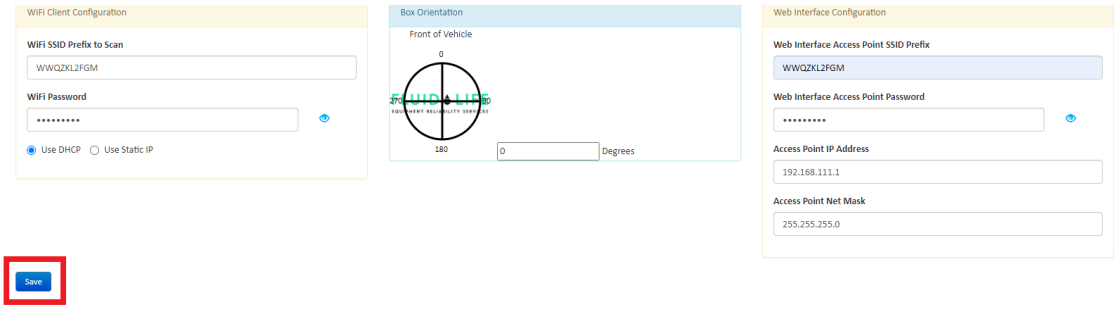
    - **Access Point Net Mask** (can be changed only if required)

    Note: When multiple Telematics modules are set up to communicate with each other**,** ensure that the “Web Interface Access Point SSID Prefix” is **identical** across **<u>ALL</u>** Telematics modules, and the IP addresses are unique between each box mode (which is done by default prior to manually changing settings)



2. Click “Save” to save configuration parameters.

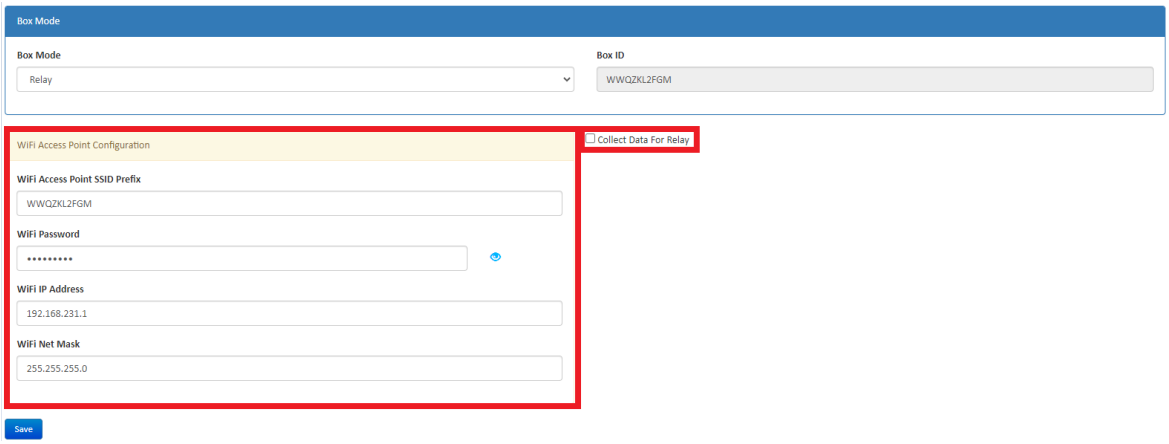


Relay Mode

Wi-Fi Access Point Configuration section determines how the box will communicate to another box **and** configures the wireless access point of the box for future connection. The module SSID or “Wi-Fi name” will be the “WiFi Access Point SSID Prefix” followed by the “Wi-Fi IP Address”

The Relay mode consists of:

- Wi-Fi Access Point SSID Prefix
- Wi-Fi Password
- Collect data for relay

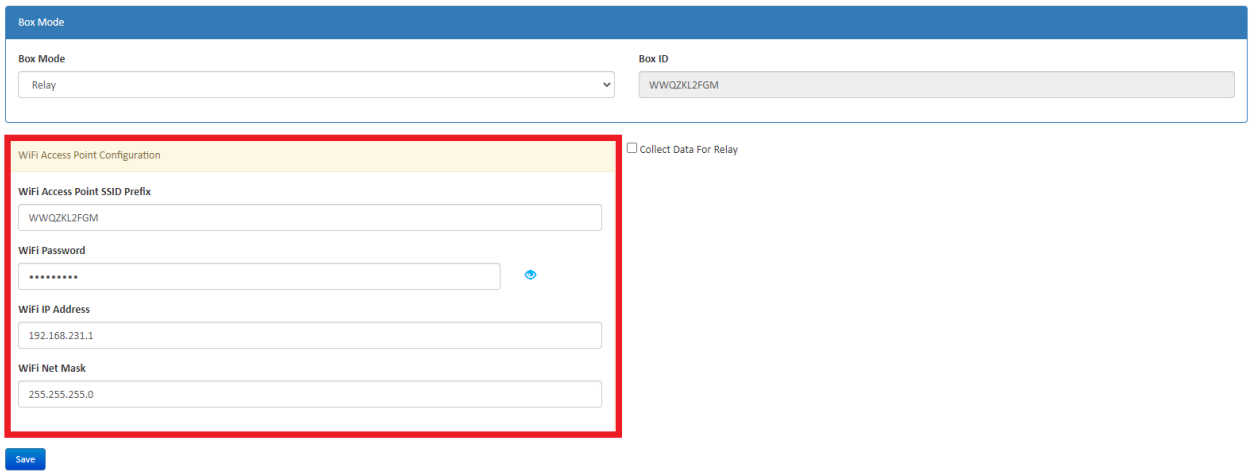


Wi-Fi Access Point Configuration

1. Ensure that the auto populated Wi-Fi Access Point Configuration fields are accurate.

   Note:

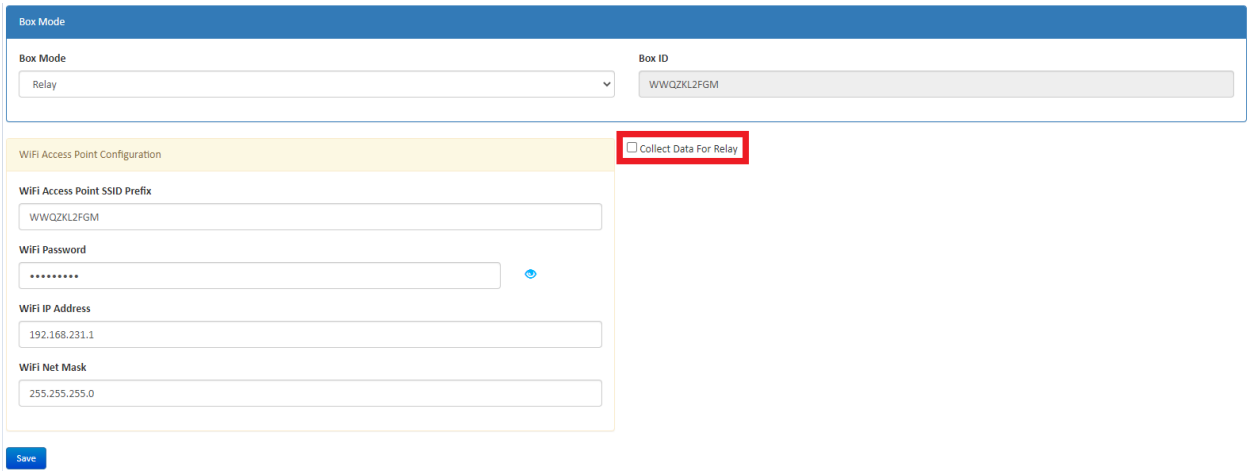
   - The Wi-Fi Access Point SSID Prefix refers to the SSID highlighted on the module label. This prefix must be set to be the same for all modules that will be communicating with each other. It is recommended to use a prefix that is recognizable (i.e. company name)
   - The Wi-Fi password is auto populated to the newly reassigned Wi-Fi password upon first login to Telematics Box Web. This field can be changed as desired. Make note of the password for future reference when logging in.
   - Wi-Fi IP Address (can be changed if required)
   - Wi-Fi Net Mask (can be changed if required)



Data Collection

“Collect Data For Relay” feature enables dual functionality for the Telematics module.

1. Ensure that the “Collect Data For Relay” option is selected only if the box is required to act as a **Collector and a Relay.**

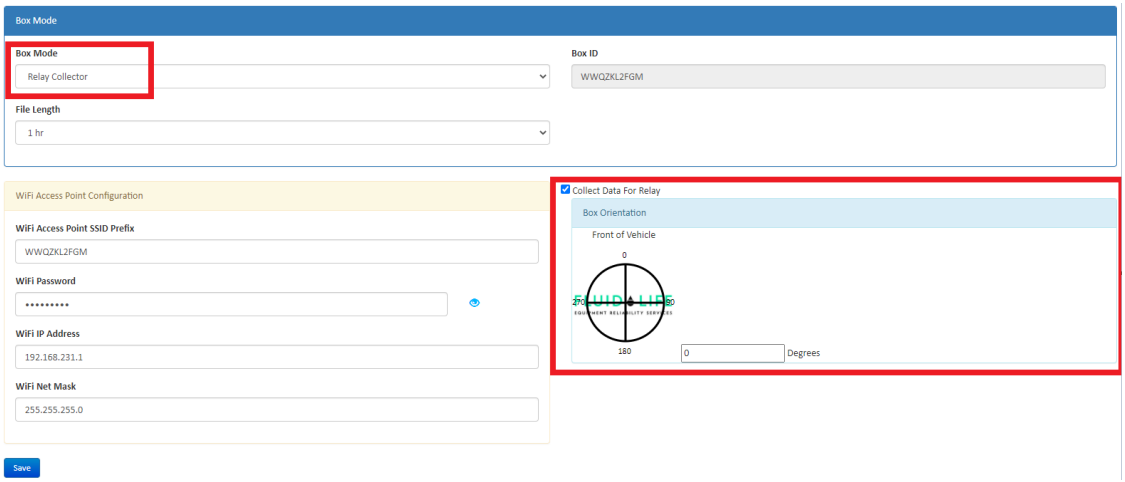


2. This will automatically update the box mode to “Relay Collector” as shown below. Selecting this will prompt a “Box Orientation” section in order to configure the rotation of the box once installed to allow flexibility of installation.

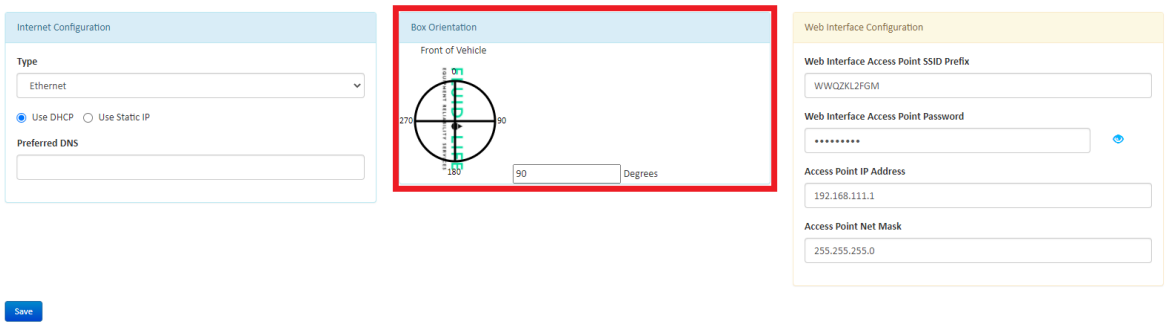
Note: The Box Orientation configuration determines the physical orientation of the Telematics module installation with respect to the front of the equipment. This is referred to in “Degrees”.

For example, the Fluid Life logo on the Telematics module faces the front of the vehicle at 0 Degrees.

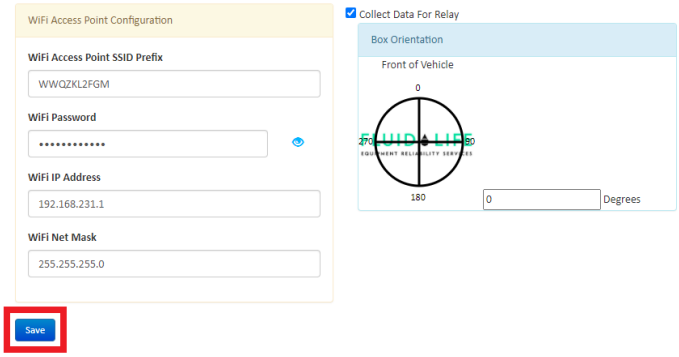
3. Input the degree value setting in reference to front of the vehicle.



Note: The orientation of the box logo automatically adjusts to the degree orientation inputted into the software as shown below.



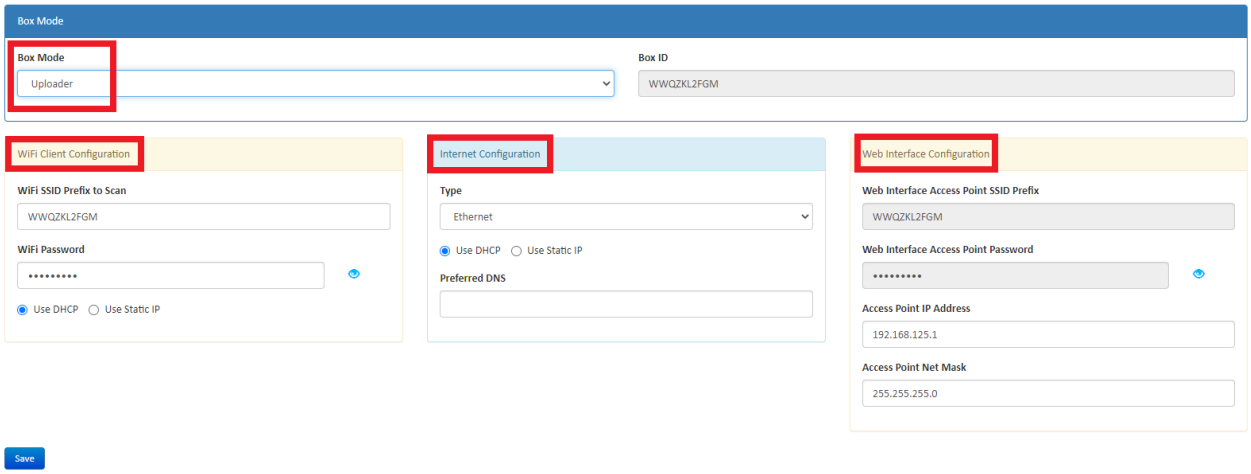
4. Click “Save” to save configuration parameters



Uploader Mode

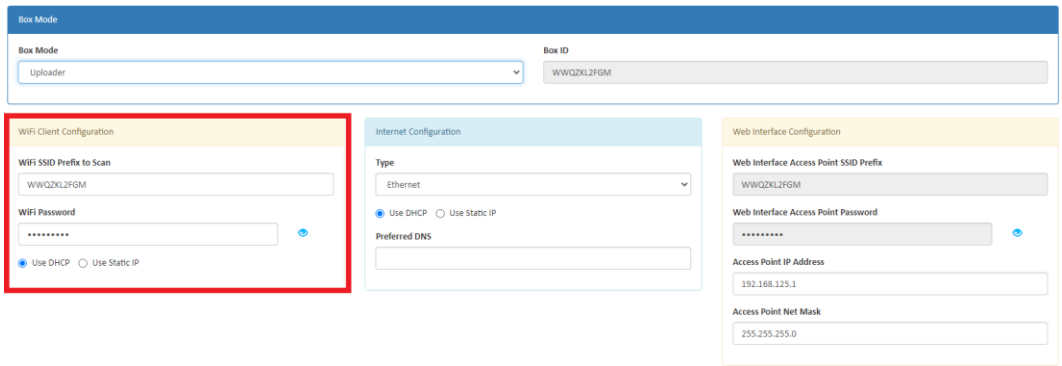
The uploader mode consists of three configuration parameters:

- Wi-Fi Client Configuration
- Internet Configuration
- Web Interface Configuration



Wi-Fi Client Configuration

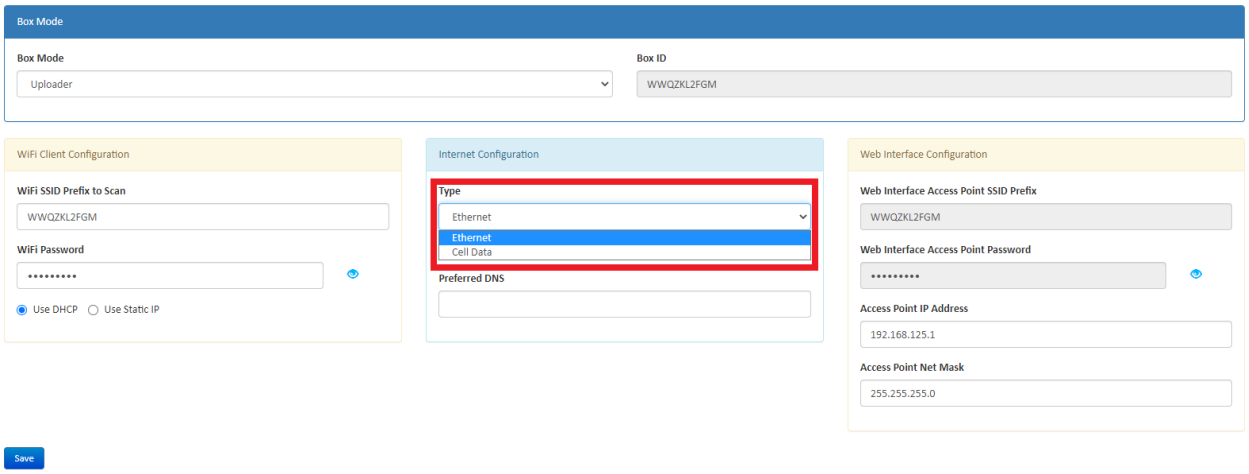
1. The “Wi-Fi SSID Prefix to Scan” field auto populates the Box ID on the Telematics module label. This should be changed to a desired prefix for relay/collector modules to connect to. The Wi-Fi Access Point SSID Prefix must be identical to the “Web Interface Access Point SSID Prefix”
2. The “Wi-Fi Password” field is auto populated with the new reassigned Wi-Fi password upon first login to Telematics Box Web. This has to be the same password that is configured on the relay/collector modules.



Internet Configuration

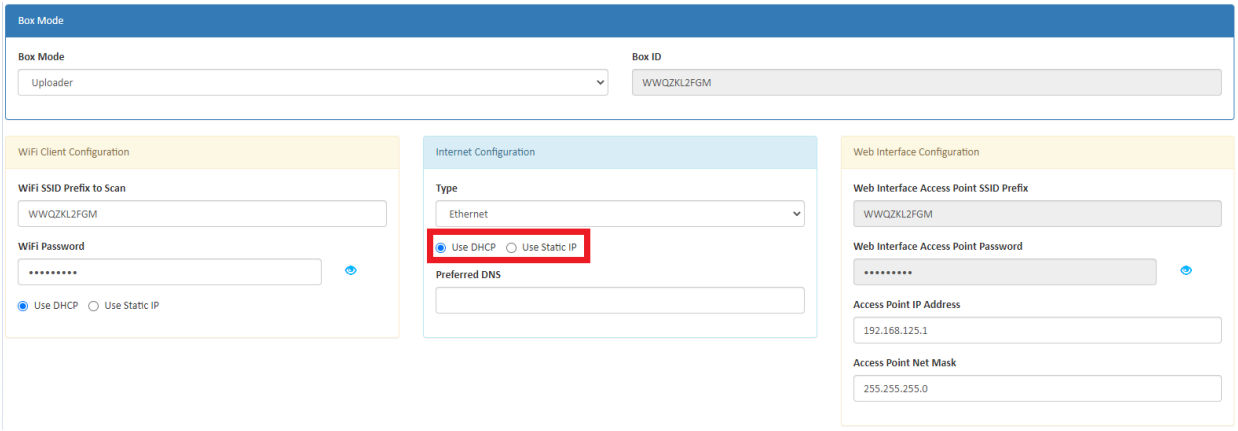
The “Internet Configuration” section determines how the Telematics module will communicate back to *MyLab*.

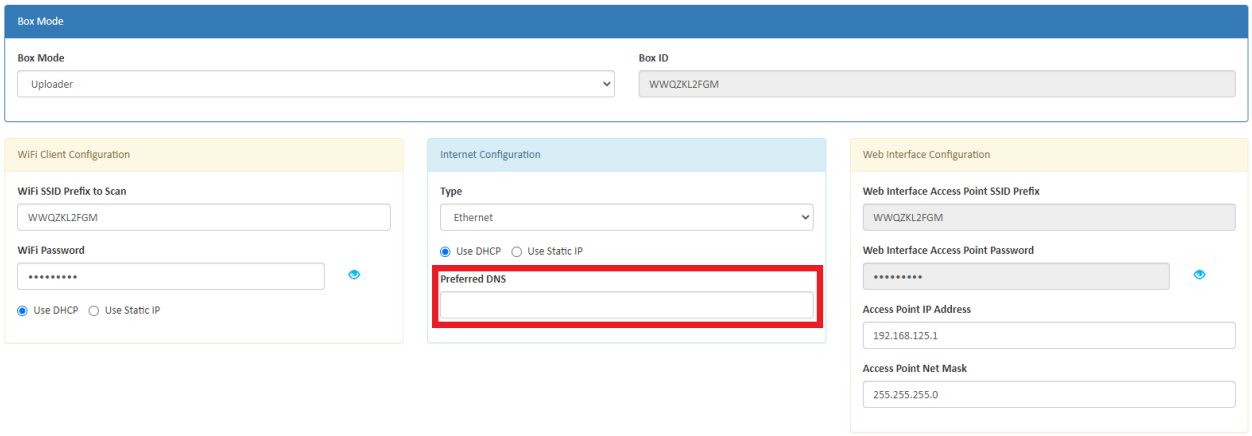
1. Select the internet configuration type to be either Ethernet or Cell Data.



Note: Ethernet selection requires an Ethernet cable connected from the box to the user’s network.

2. Verify that the DHCP or Static IP selection is based on end user’s preferred network protocol used for this application. Telematics Box Web defaults DHCP as the selected network protocol.



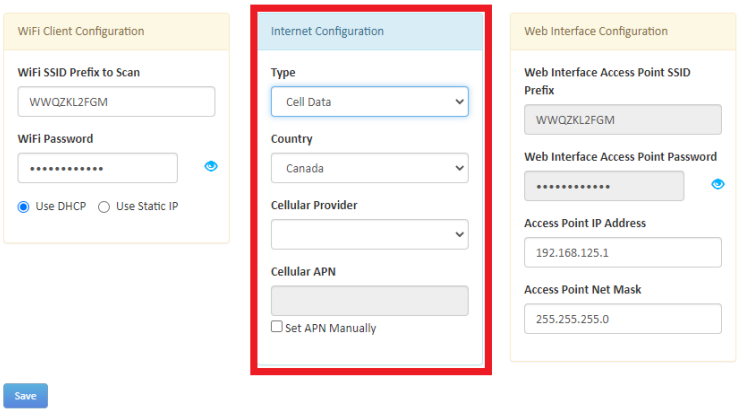


3. For the Cell Data internet configuration there is an option to select either Canada **or** USA, which lists the available cell network providers for each region.

   Select the appropriate country in the dropdown for the SIM card

   Note:

   - Cell Data configuration requires an activated SIM card to access a cellular provider's network. You will need to configure the carrier's country and provider. A custom cellular APN may also be used by selecting "Set APN Manually" if you require one but is not necessary.
   - Refer to the "SIM Card Installation" section in "Direct" box mode above for steps outlining proper SIM card installation method



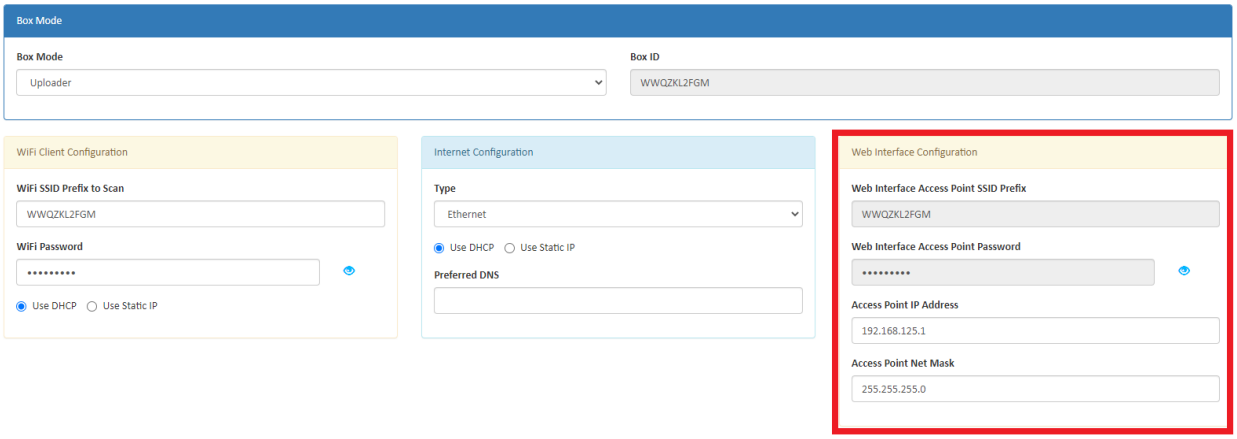
Web Interface Configuration

The “Web Interface Configuration” section configures the **wireless access point** to the Telematics module in order to access its web page.

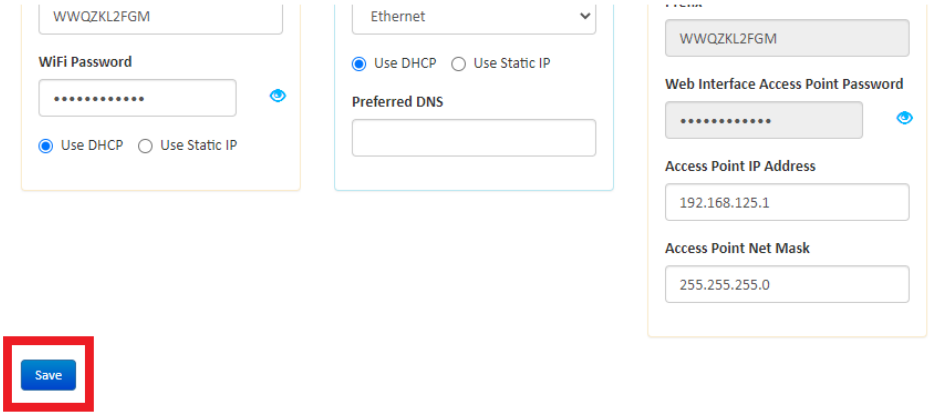
1. This section contains the following and configures the wireless access point of the Telematics module for future connection:

    - **Web Interface Access Point SSID Prefix:** This field is auto populated with the assigned Box ID on the Telematics module label. The prefix can be changed as desired and is recommended to be the company name or any other string that is quick and easy to identify in the list of Wi-Fi networks displayed when attempting to connect.
    - **Web Interface Access Point Password:** The new password reassigned upon first login is displayed here as default. This password will be used to access the wireless network upon saving the new settings.
    - **Access point IP address** (can be changed only if required)
    - **Access Point Net Mask** (can be changed only if required)

    Note: When multiple Telematics modules are set up to communicate with each other**,** ensure that the “Web Interface Access Point SSID Prefix” is **identical** across **<u>ALL</u>** Telematics modules, and the IP addresses are unique between each box mode (which is done by default prior to manually changing settings)

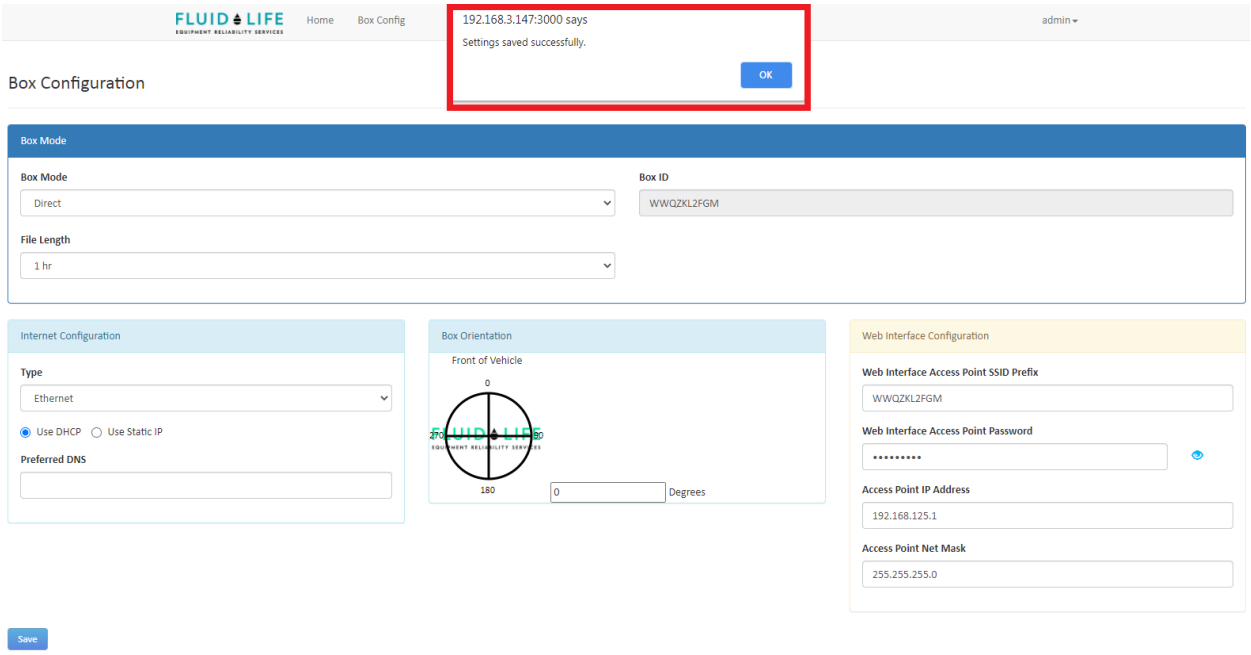


2. Click “Save” to save the configuration parameters



Saving Configuration Settings

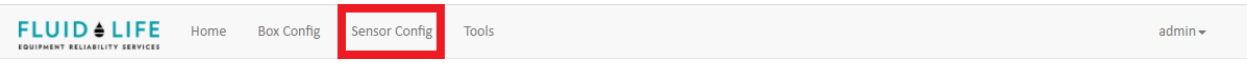
1. Once the configuration settings for the required box mode and configuration parameters have been chosen and applied after clicking “Save”, the following message should appear as a confirmation. Click “OK”.



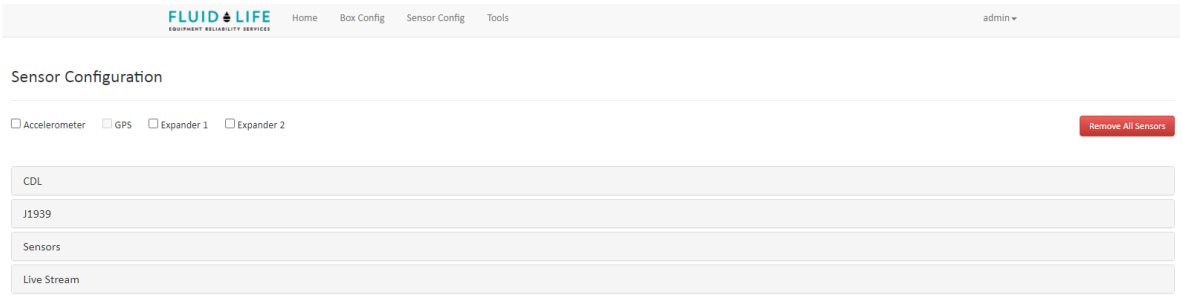
Sensor Configuration Overview

1. Upon saving the box configuration settings, you will be able to see the “Sensor Config” tab on the top ribbon. This allows the user to configure sensors for data analysis.

2. Click “Sensor Config” to begin the sensor configuration process.



3. The following screen will appear in the “Sensor Config” section of configuration web page:



Sensor Configuration Procedure

General Configuration

The sensor configuration section is available on any box mode that directly collects data:

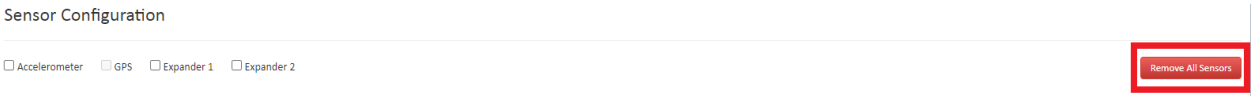
- Direct
- Collector
- Relay Collector

1. There are four options under Sensor Configuration for selection:

- **Accelerometer:** Enables the Telematics module's built-in accelerometer sensor data to be collected
- **GPS:** Enables the Telematics module's built-in GPS for location tracking
- **Expander 1 and 2:** Enables ten additional analog channels **per expander** for sensor communications.

1. Upon initial setup of the Telematics module, the only pre-configured sensors will be "Accelerometer" and "GPS"

2. The "Remove All Sensors" feature allows the user to remove the sensors that were added and/or configured if required.



CDL

Prior to adding CDL sensors, the Telematics module must determine what sensors are available on the CAT unit that it is installed on.

1. The scanning of available sensors can be done by selecting either the "Scan CDL" checkbox (for newer CAT models) or the "Scan CDL Using V2" checkbox (for older CAT models). By selecting "CDL Use V2," the "CDL" checkbox will be automatically selected.

Scan CDL

The screen shown below will appear when scanning for CDL to display the scanning progress:

Scan CDL Using V2

The screen shown below will appear when scanning for CDL using V2 to display the scanning progress:

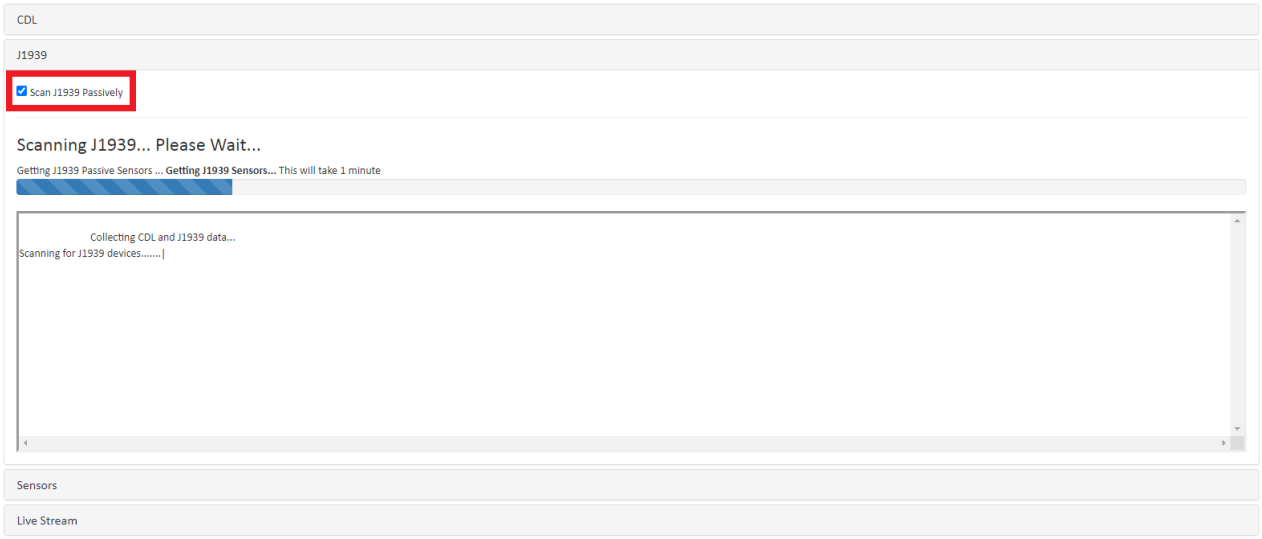
Note: Once scanning is complete, a new section under the “Sensors” section, labeled “Integrated Sensors” will appear where the scanned CDL sensors can be applied.

The “CDL Not Enabled” message will be displayed when neither of the two selections “Scan CDL” or “Scan CDL Using V2” are made

J1939

1. Select “Scan J1939 Passively” to scan for available J1939 sensors.

2. The screen shown below will appear when scanning for J1939 to display the scanning progress

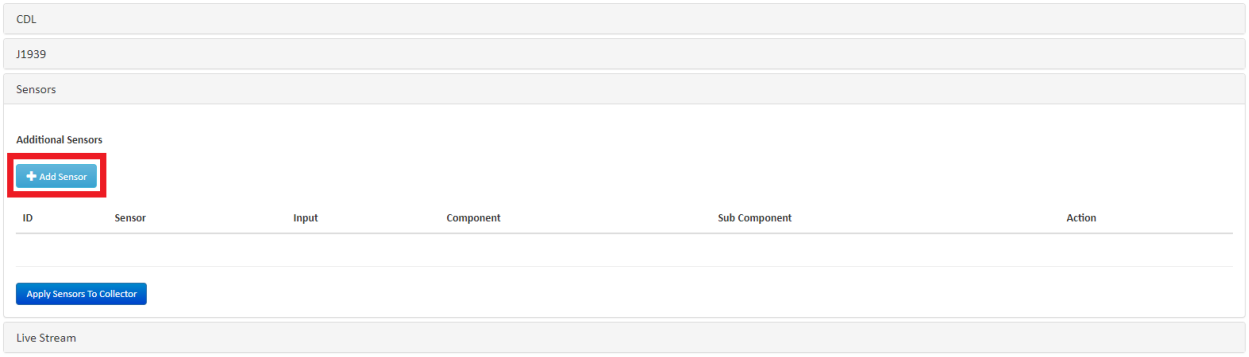


Note: Once scanning is complete, a new section under the “Sensors” section, labeled “Integrated Sensors” will appear where scanned J1939 sensors can be applied.

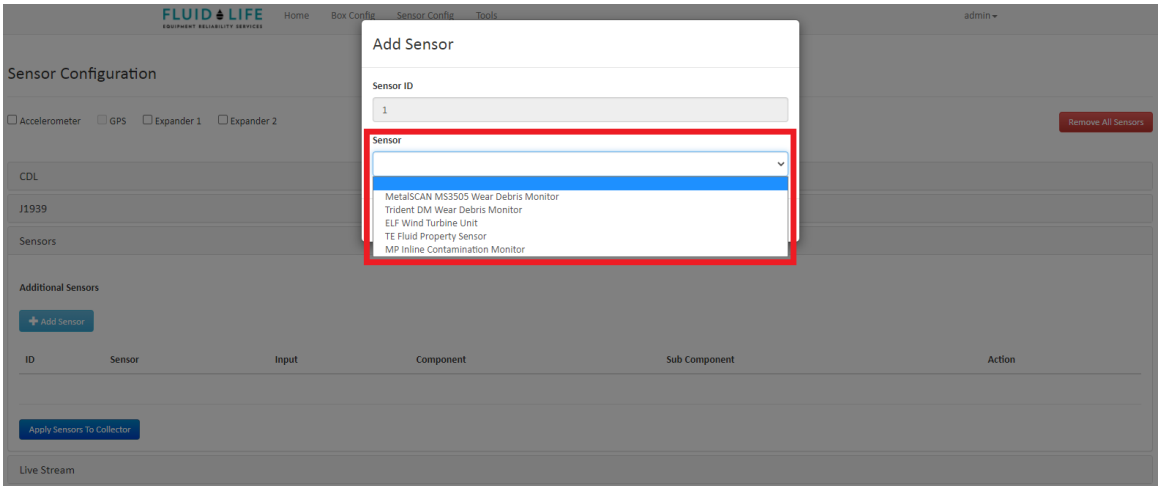
The “J1939 Not Available” message will be displayed when “Scan J1939 Passively” selection is not made

Sensors

1. Click the “Add Sensor” feature in the Additional Sensors section



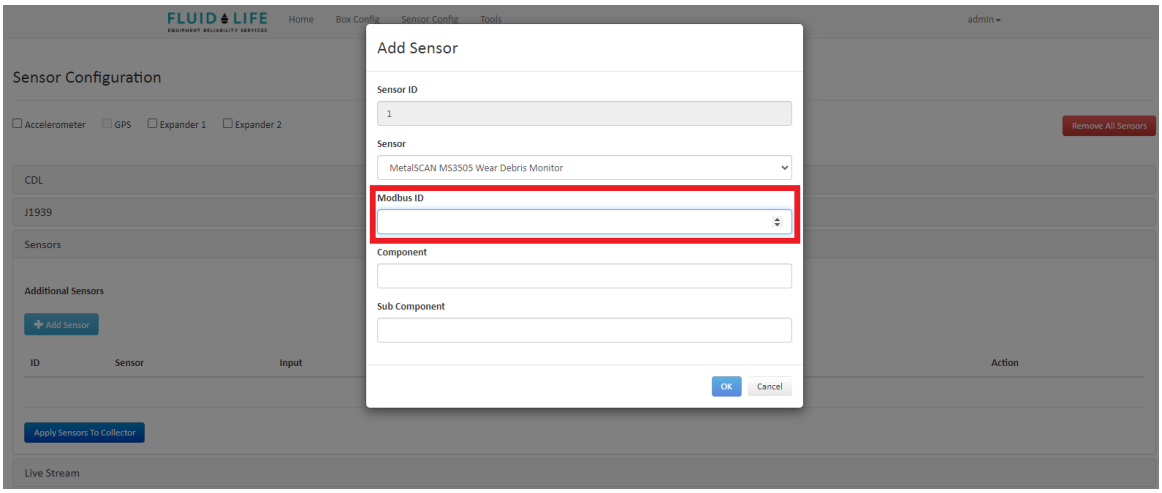
2. The following screen will appear to input the appropriate sensor from the dropdown menu:

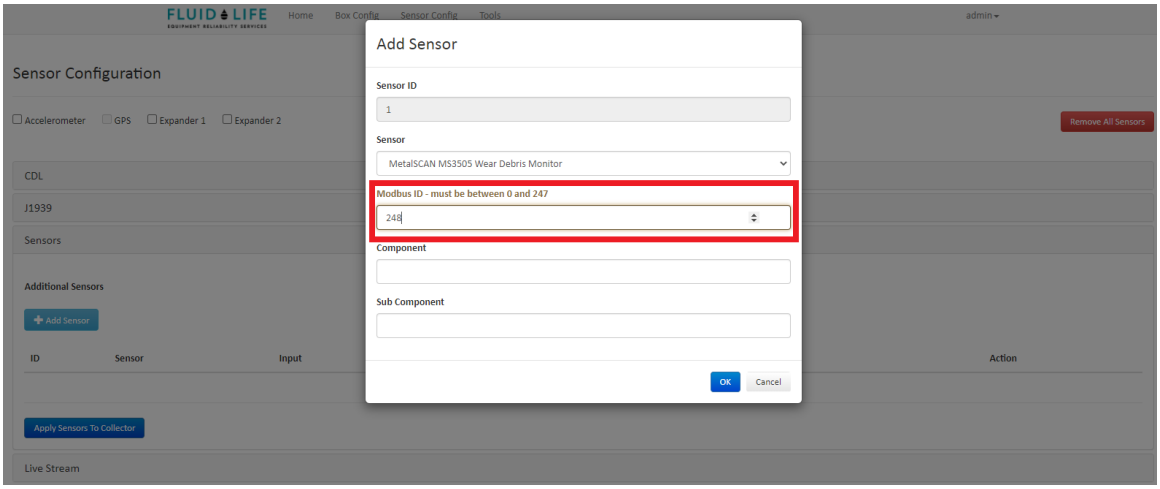


Modbus Sensors

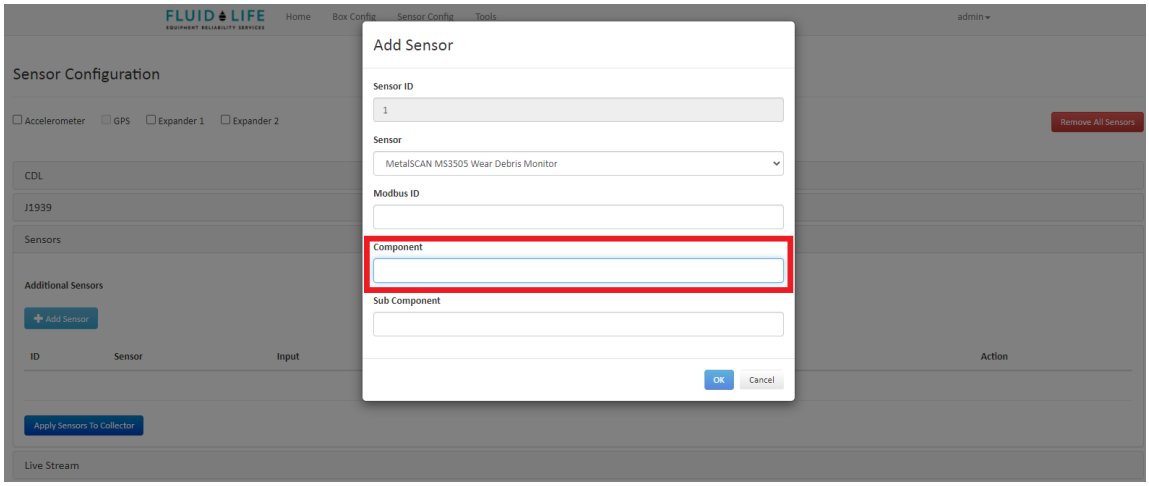
1. For Modbus sensors (ie. MetalSCAN MS3505 Wear Debris Monitor) the Modbus ID is required to be assigned.

   Note: A numerical ID between 0 and 247 can be assigned. If this requirement is not met, an error message will appear prompting for another input.

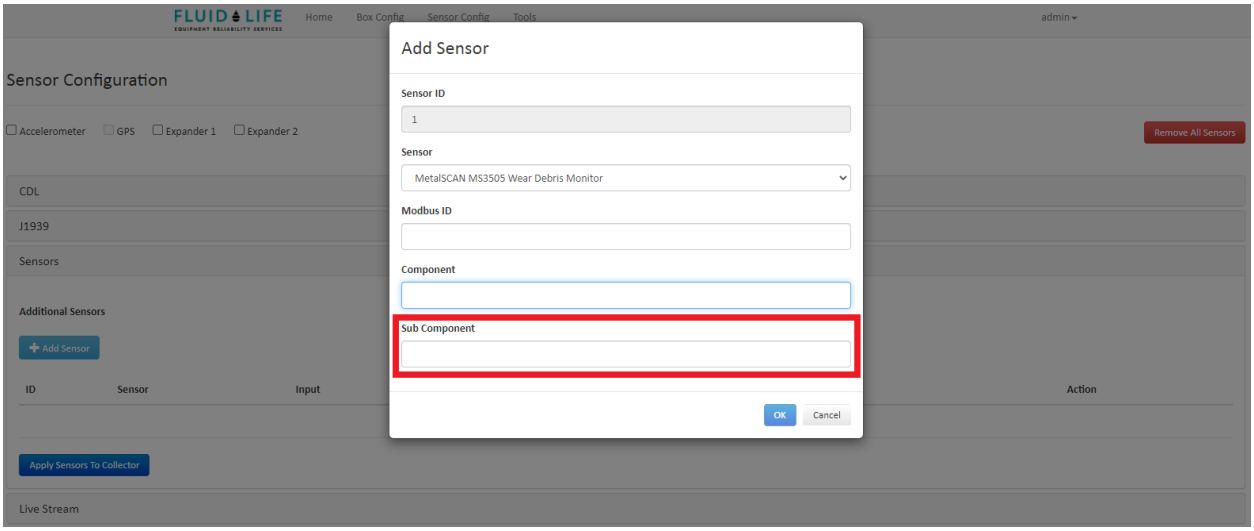




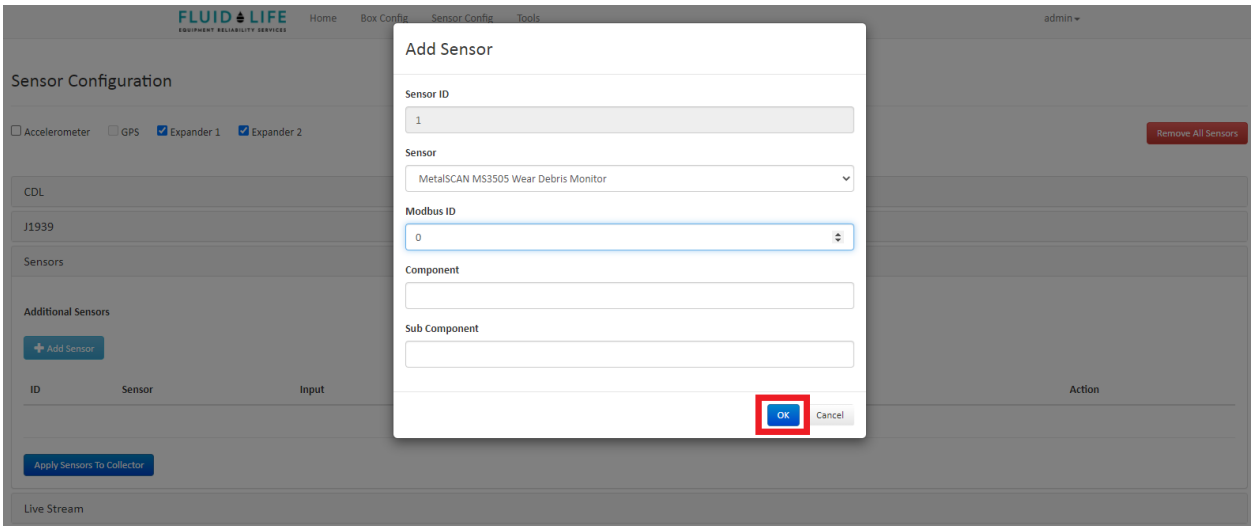
2. The “Component” field is the name assigned to the unit on which the Telematics module is being installed on. This is an **optional** field and can be inputted if required.



3. The “Sub Component” field is the name assigned to the specific sub component on the unit on which the Telematics module is being installed on. This is an **optional** field and can be inputted if required

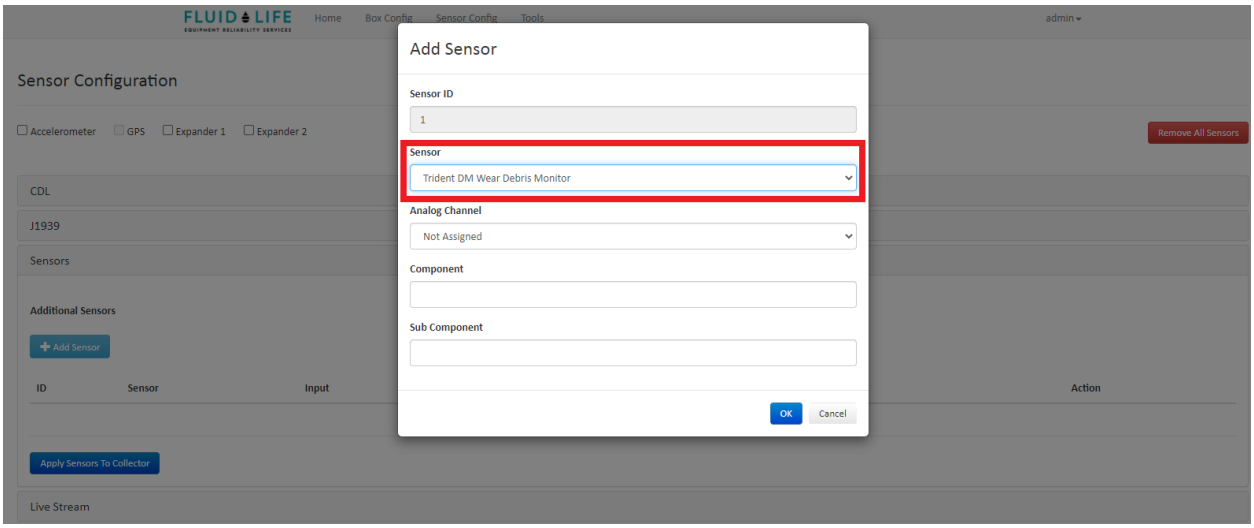


4. Click “OK” after applying all the configuration parameters

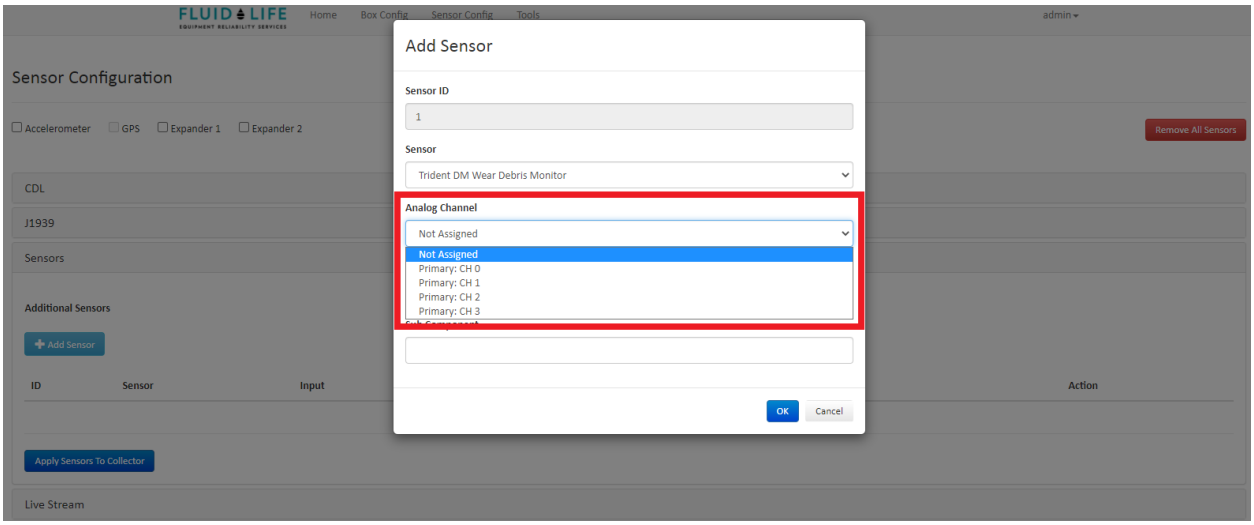


Analog Sensors

1. For Analog sensors chosen (ie. Trident DM Wear Debris Monitor), the following screen will appear:

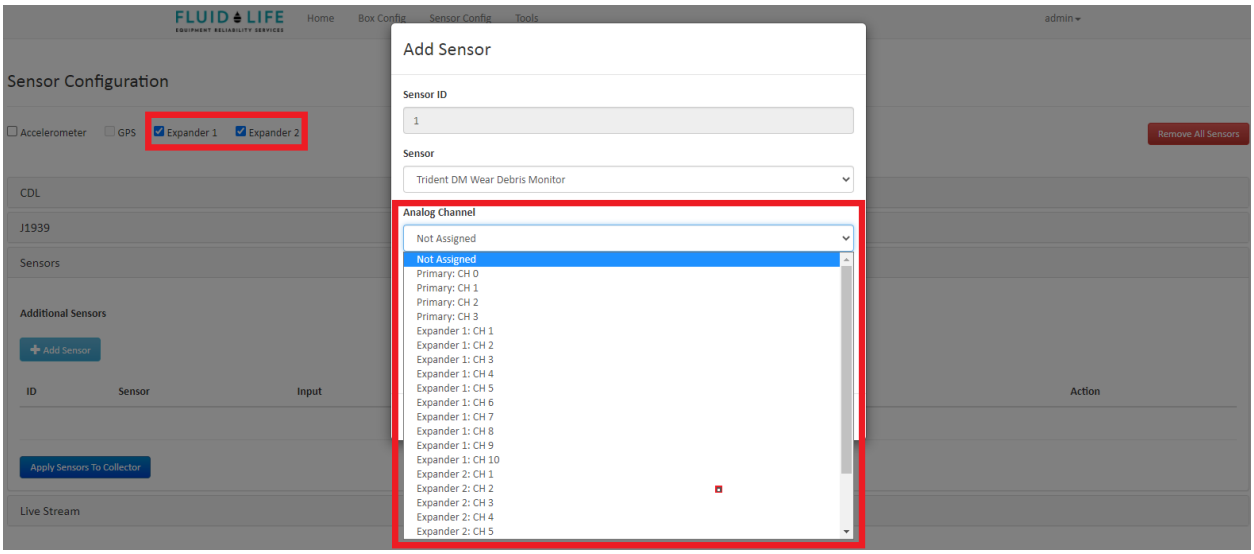


2. Choose the analog channel through which the sensor will communicate.

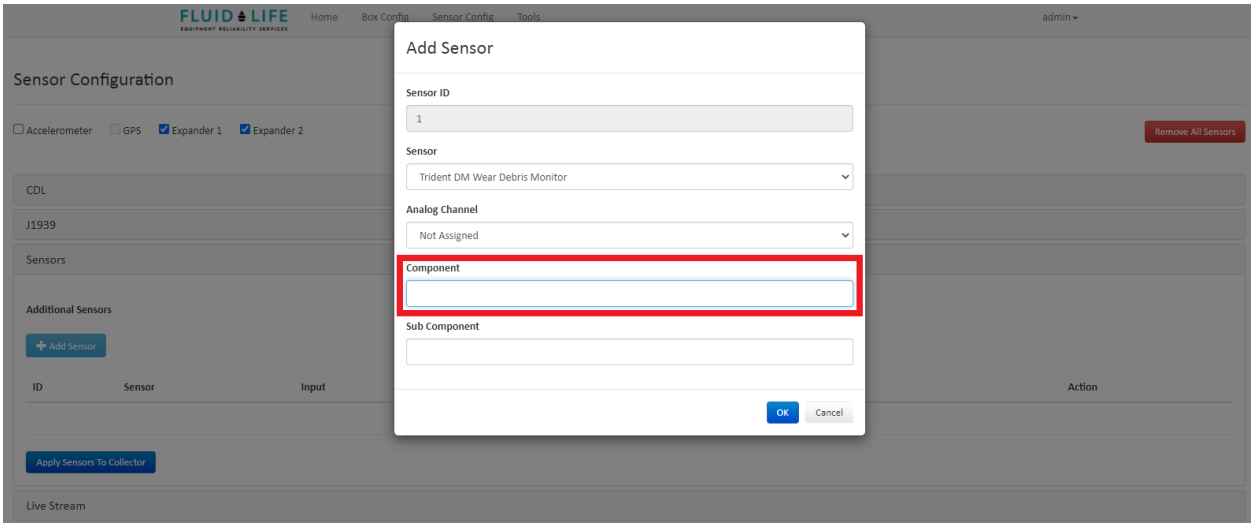


Note:

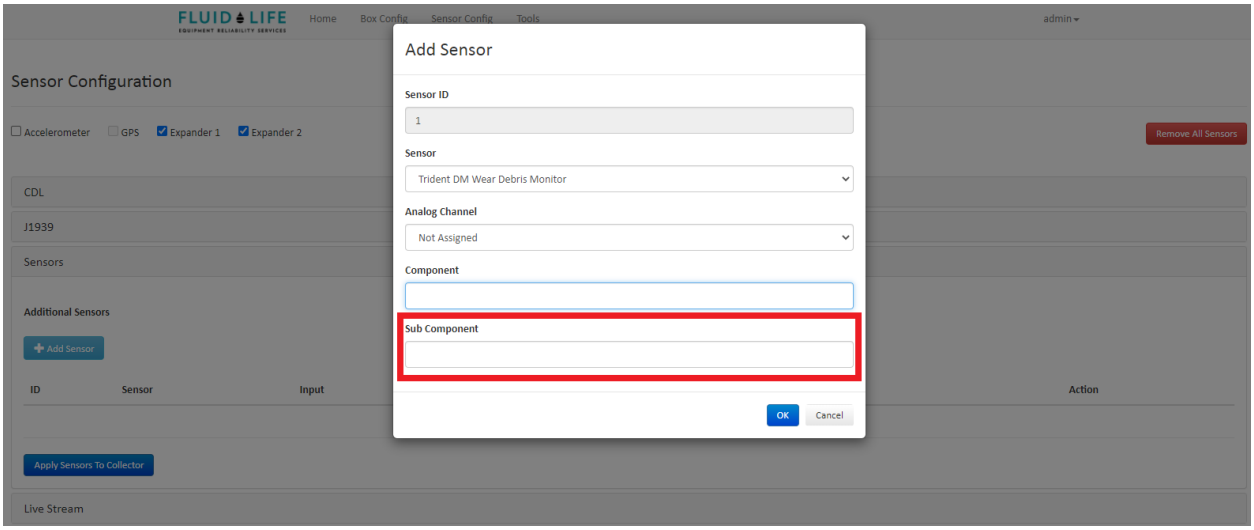
The “Expander 1 and Expander 2” selections highlighted in the box below will enable ten additional analog channels to be selected for communications



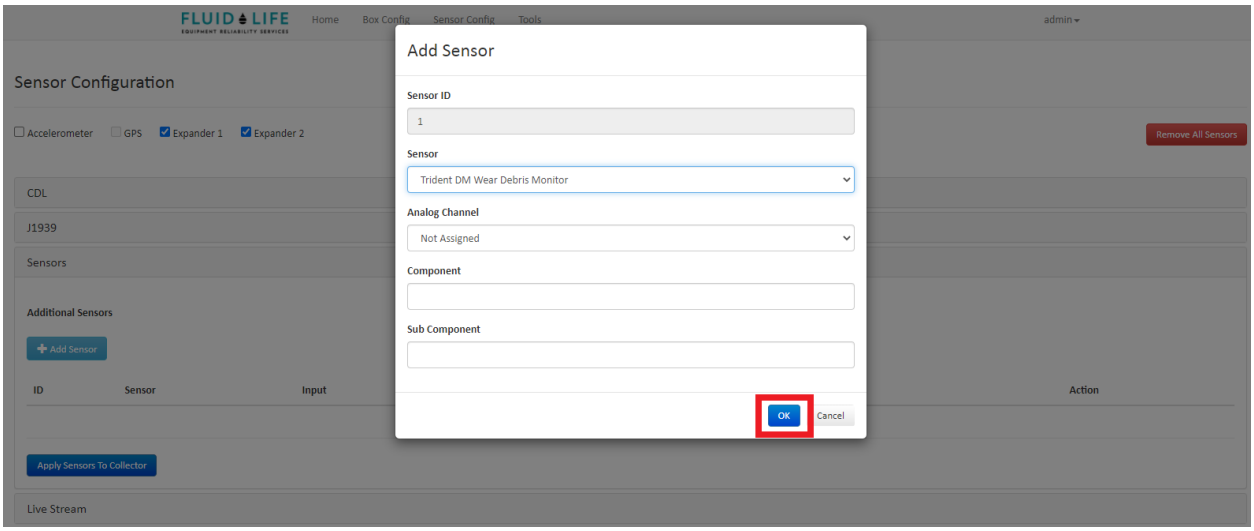
3. The “Component” field is the name assigned to the unit on which the Telematics module is being installed on. This is an **optional** field and can be inputted if required.



4. The “Sub Component” field is the name assigned to the specific sub component on the unit on which the Telematics module is being installed on. This is an **optional** field and can be inputted if required



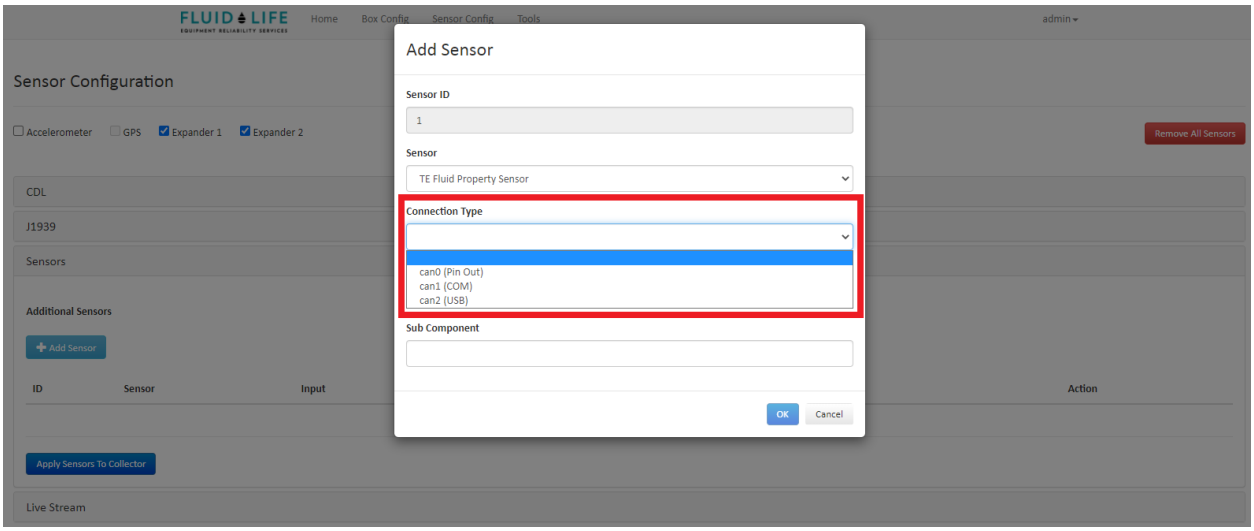
5. Click “OK” after the configuration parameters have been applied



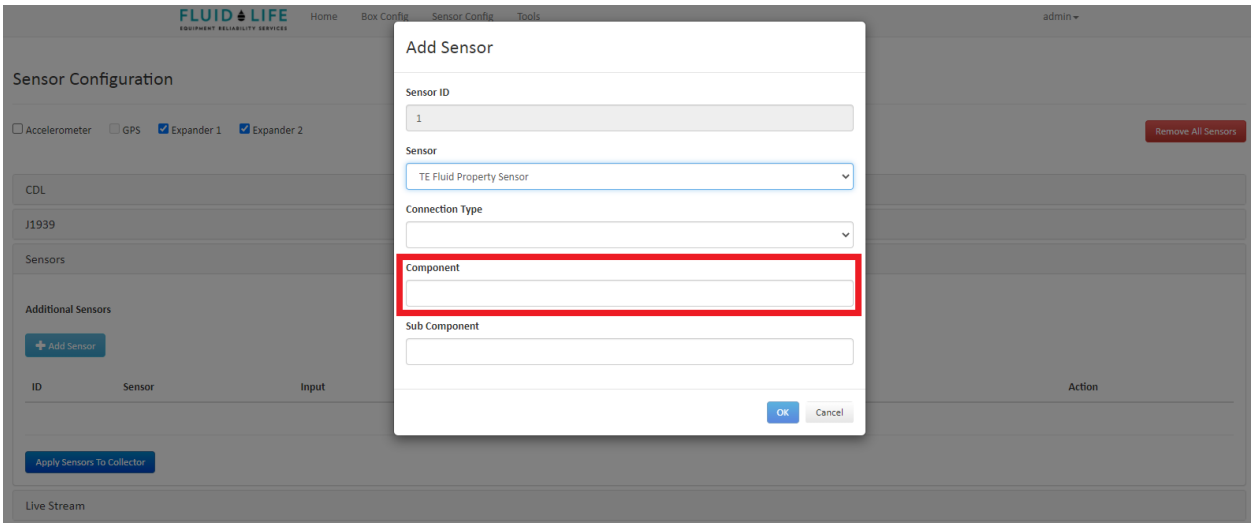
CANBUS Sensors

1. For Canbus sensors (ie.TE Fluid Property Sensor) the Connection Type is to be selected from the dropdown menu.

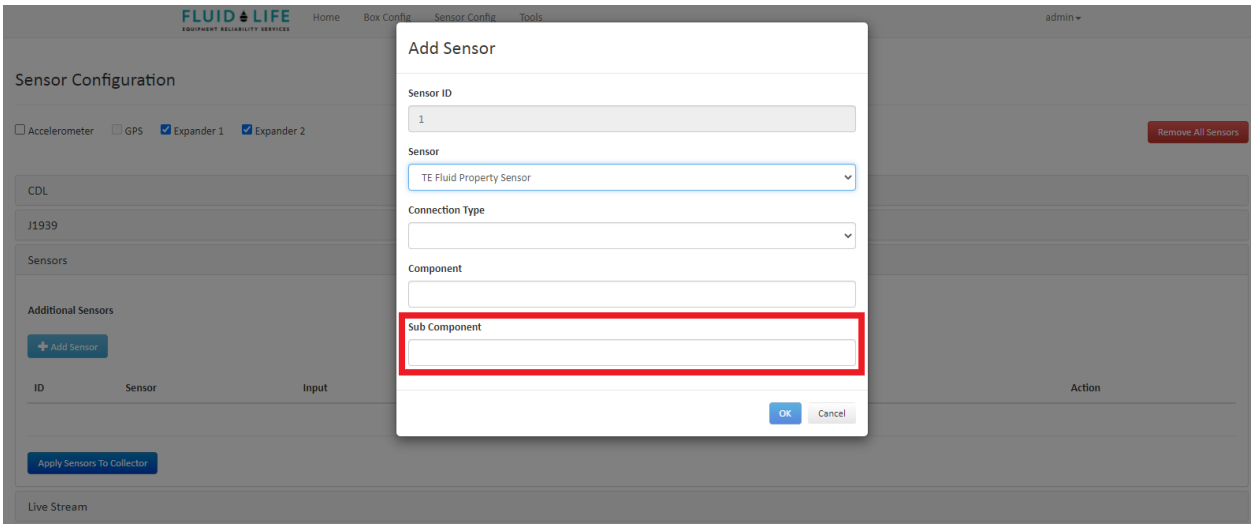
    - **Can0:** Pin Out is the CAN/CDL port on the Telematics module
    - **Can1:** COM port on the Telematics module used for Canbus sensor
    - **Can2:** USB port on the Telematics module used for communications for the Canbus sensor



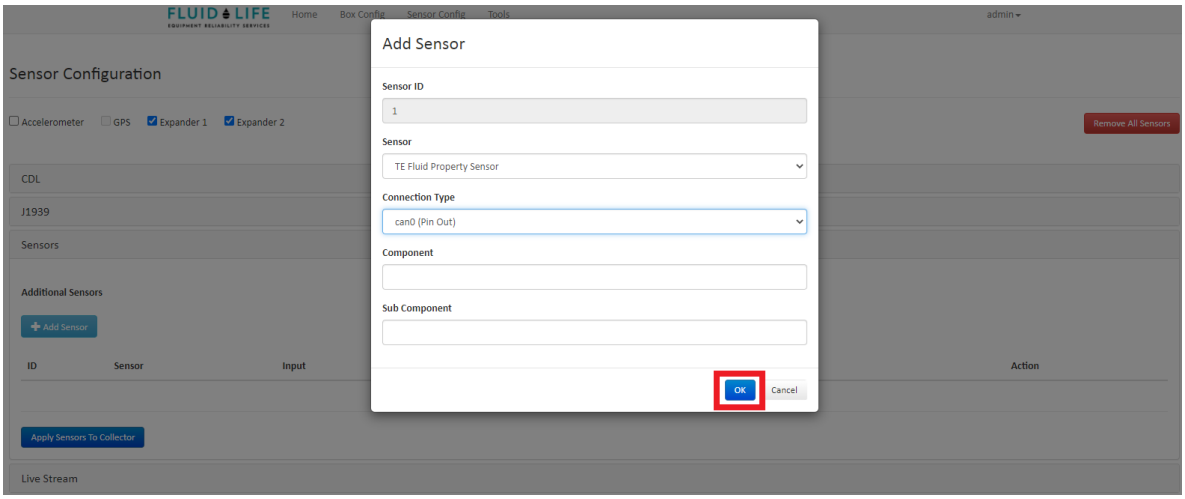
2. The “Component” field is the name assigned to the unit on which the Telematics module is being installed on. This is an **optional** field and can be inputted if required.



3. The “Sub Component” field is the name assigned to the specific sub component on the unit on which the Telematics module is being installed on. This is an **optional** field and can be inputted if required

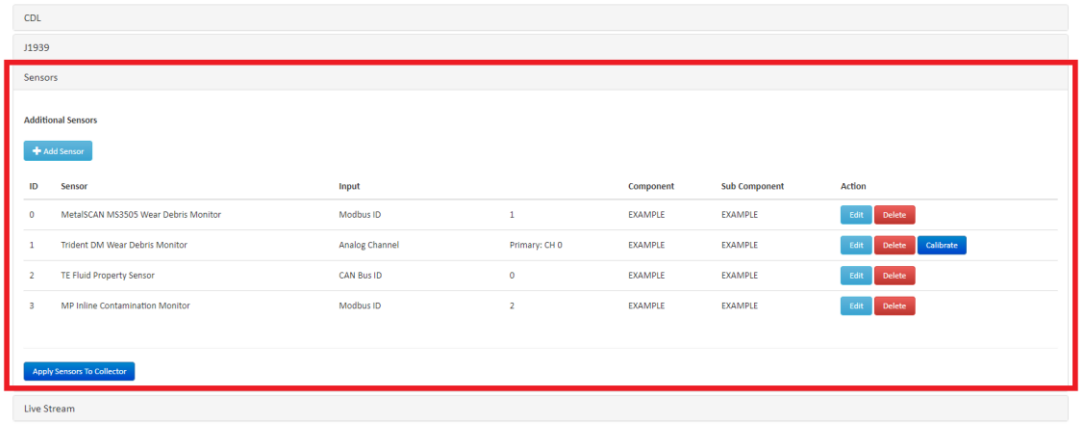


4. Click “OK” after applying all the configuration parameters.

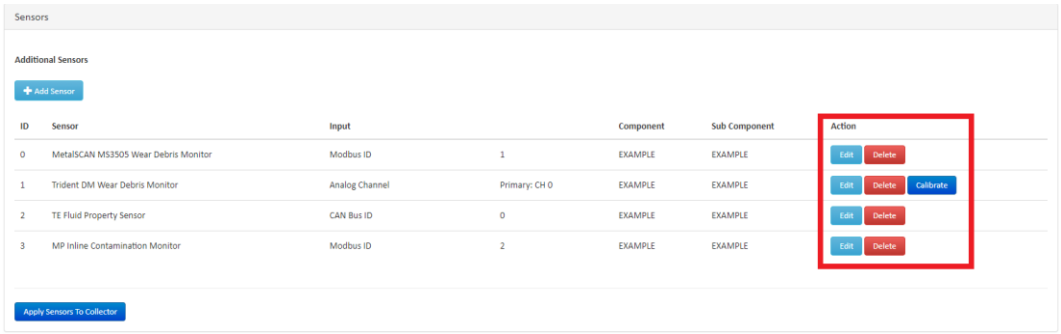


Applying Sensors To Collectors

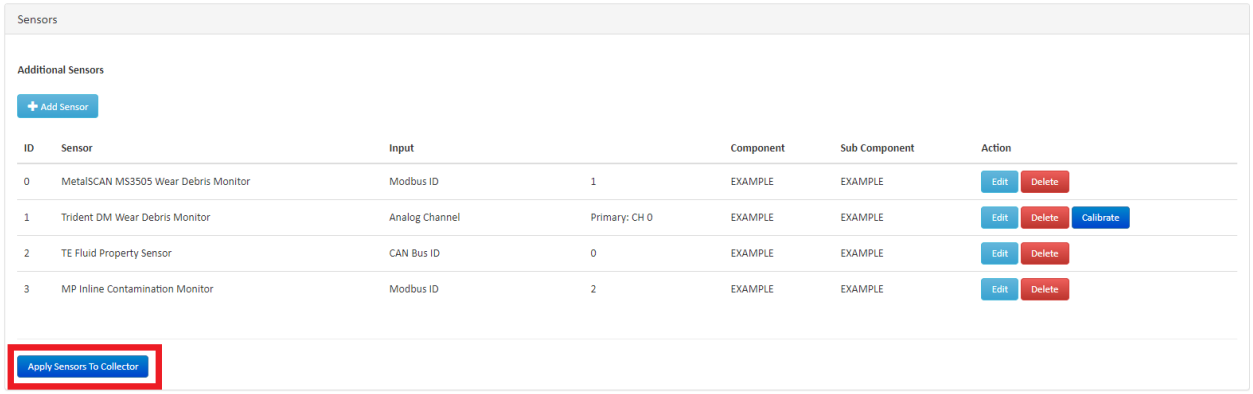
1. Once all sensors have been added the following screen will be displayed:



2. The “Action” section of the web page enables how to edit the previous configurations (ie. deletions or additions of previously added sensors)



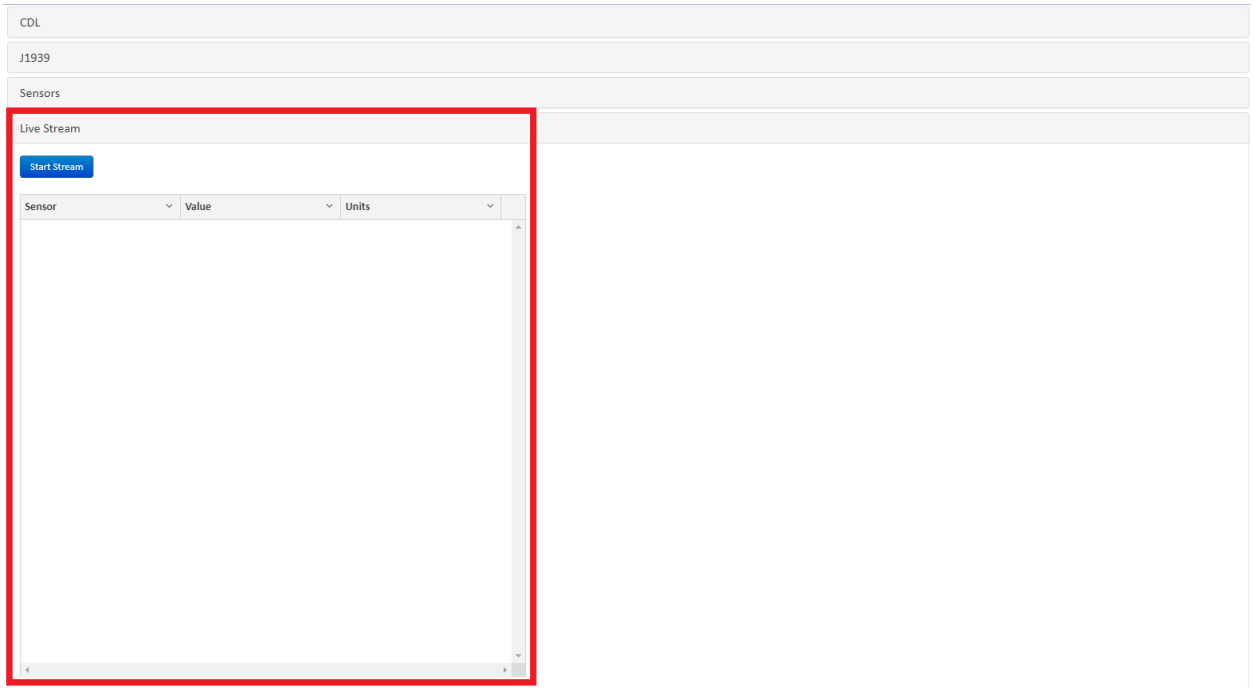
3. In order for data collection to occur with the chosen and configured sensors, click on “Apply Sensors To Collector”



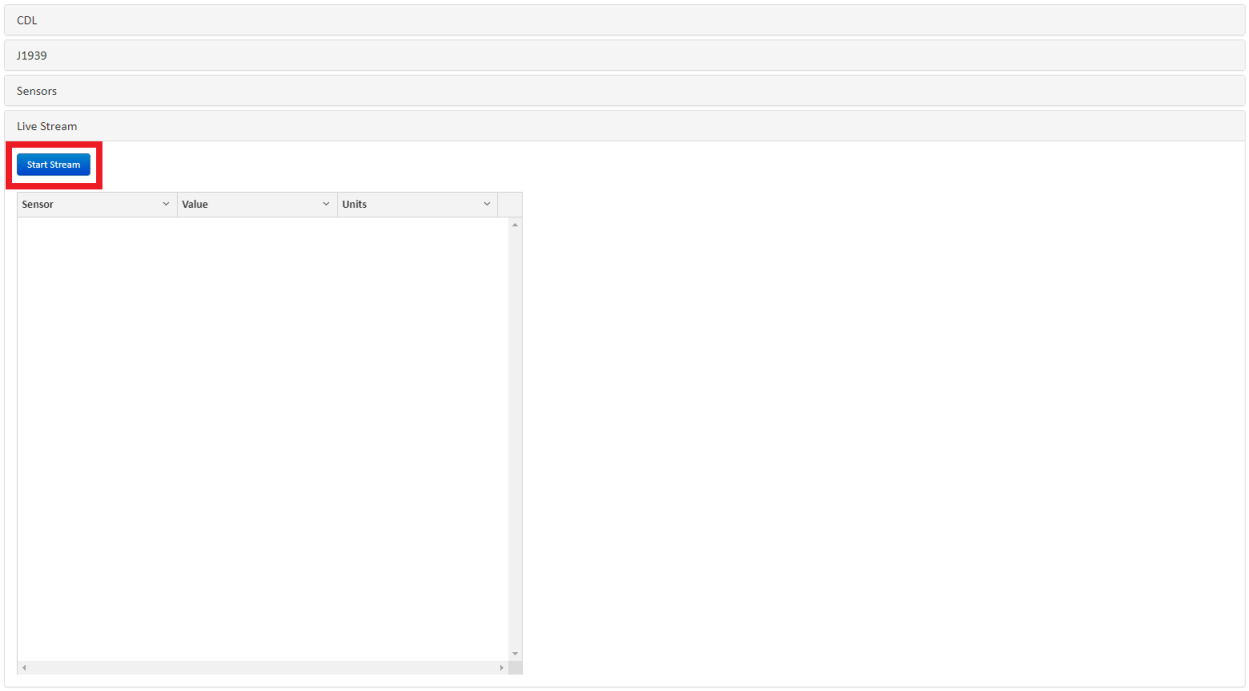
Note: Refer to the “Modbus Configuration” section below to complete the configuration process for Modbus sensors prior to proceeding to the next section.

Live Stream

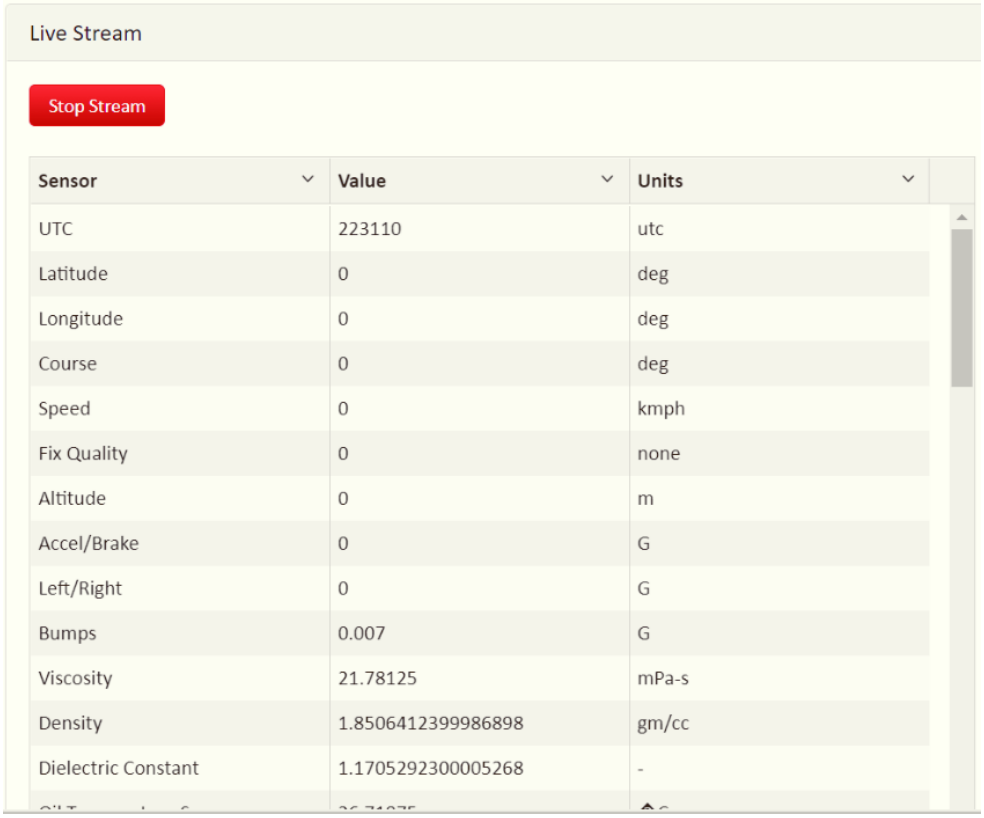
1. In order to check if sensors are collecting properly, click the “Live Stream” tab which will display the screen shown below



2. Click “Start Stream” to start streaming data through the added sensors.



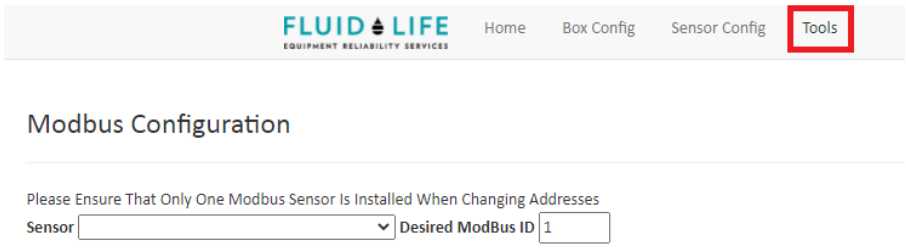
3. During live stream, the following screen will be displayed



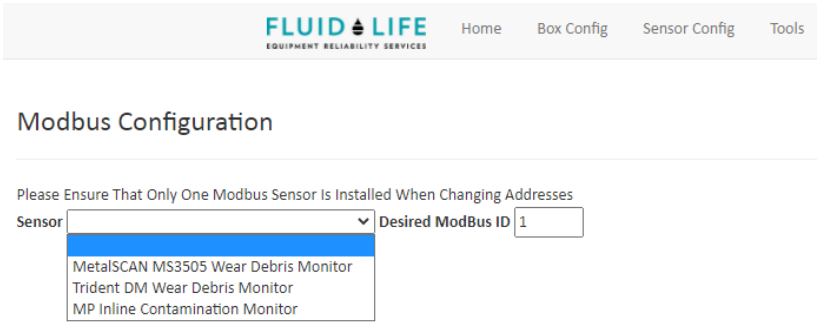
Modbus Configuration

This section applies to Modbus sensors only.

1. Click on the “Tools” tab as highlighted in red:

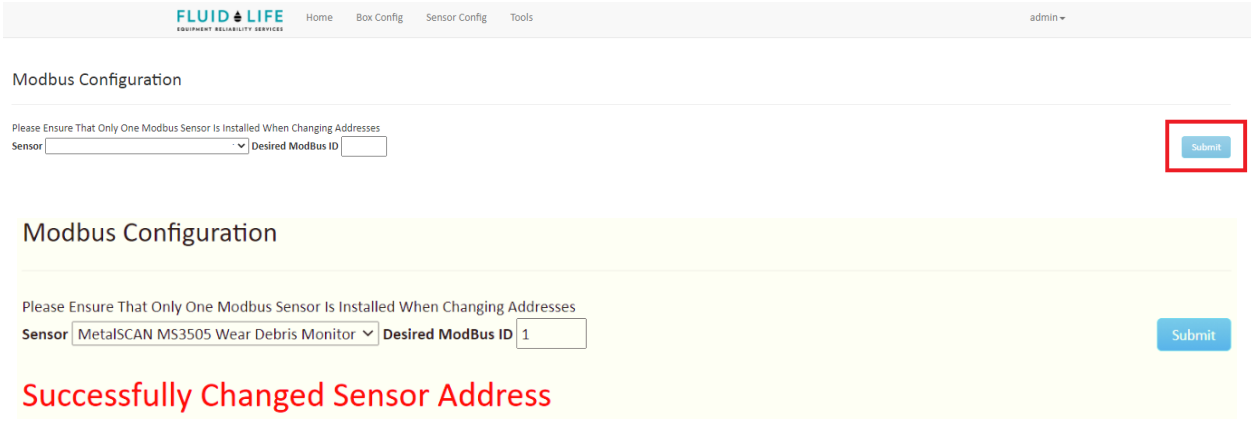


2. Select the sensor type that you wish to change the Modbus ID and enter the desired ID as shown below within the range of 1-247.



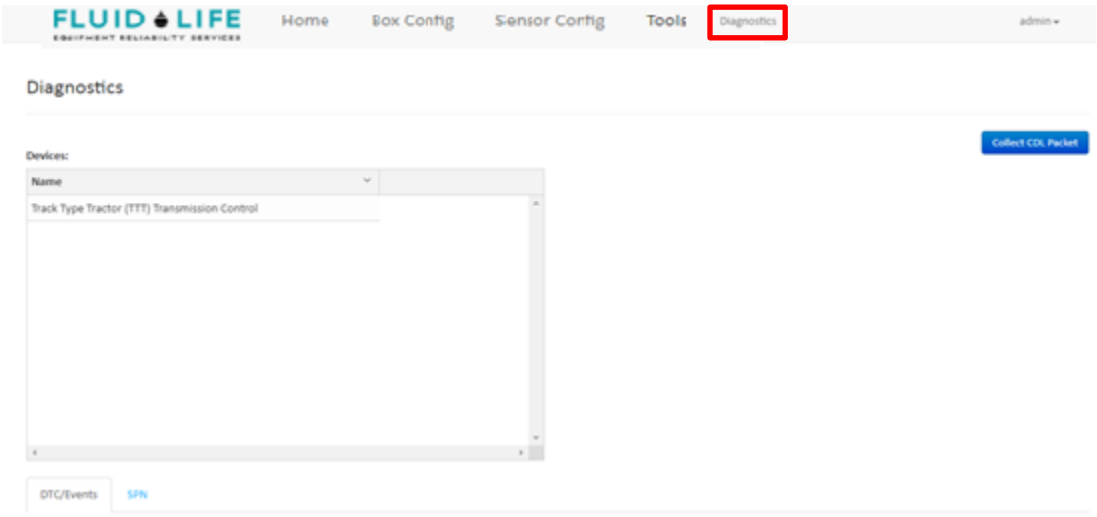
Note: When changing Modbus ID, ensure that **only one** Modbus sensor is connected to the Telematics module

3. Click “Submit” and wait for a success message to appear.

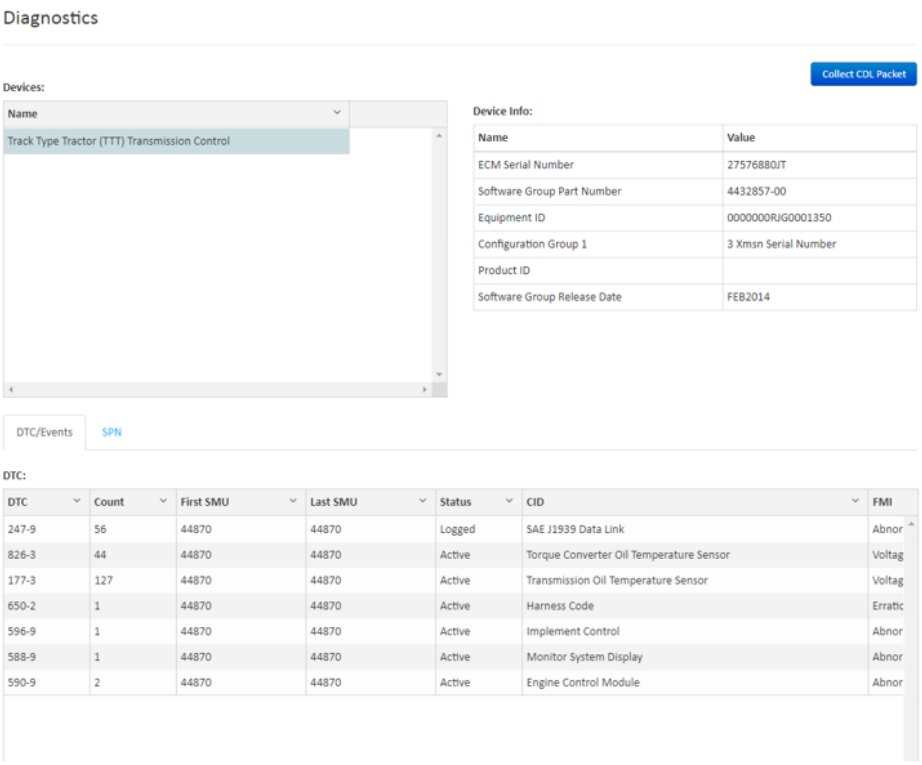


CDL Diagnostics

The diagnostics section (accessible from the “Diagnostics” header, circled in red) is available on any box mode that directly collects data (Direct, Collector, Relay Collector) **and** has already configured CDL.

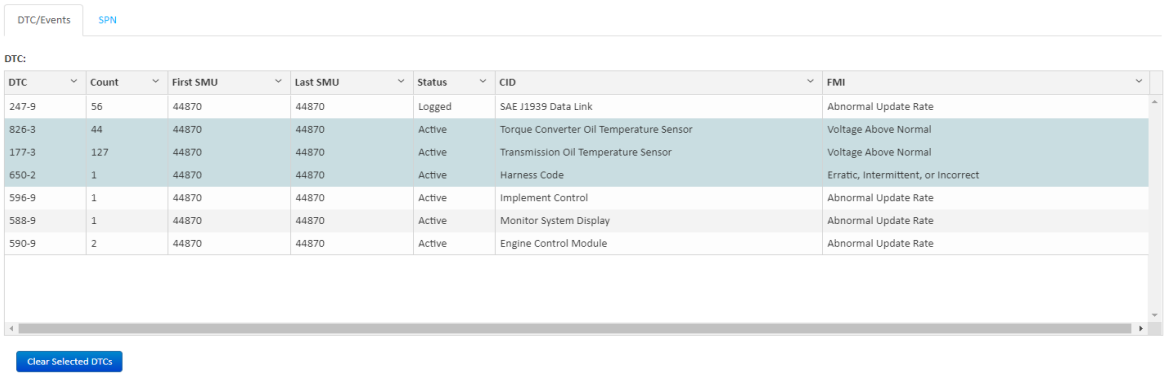


1. Selecting a device will automatically pull up all of its current info, DTCs and Events



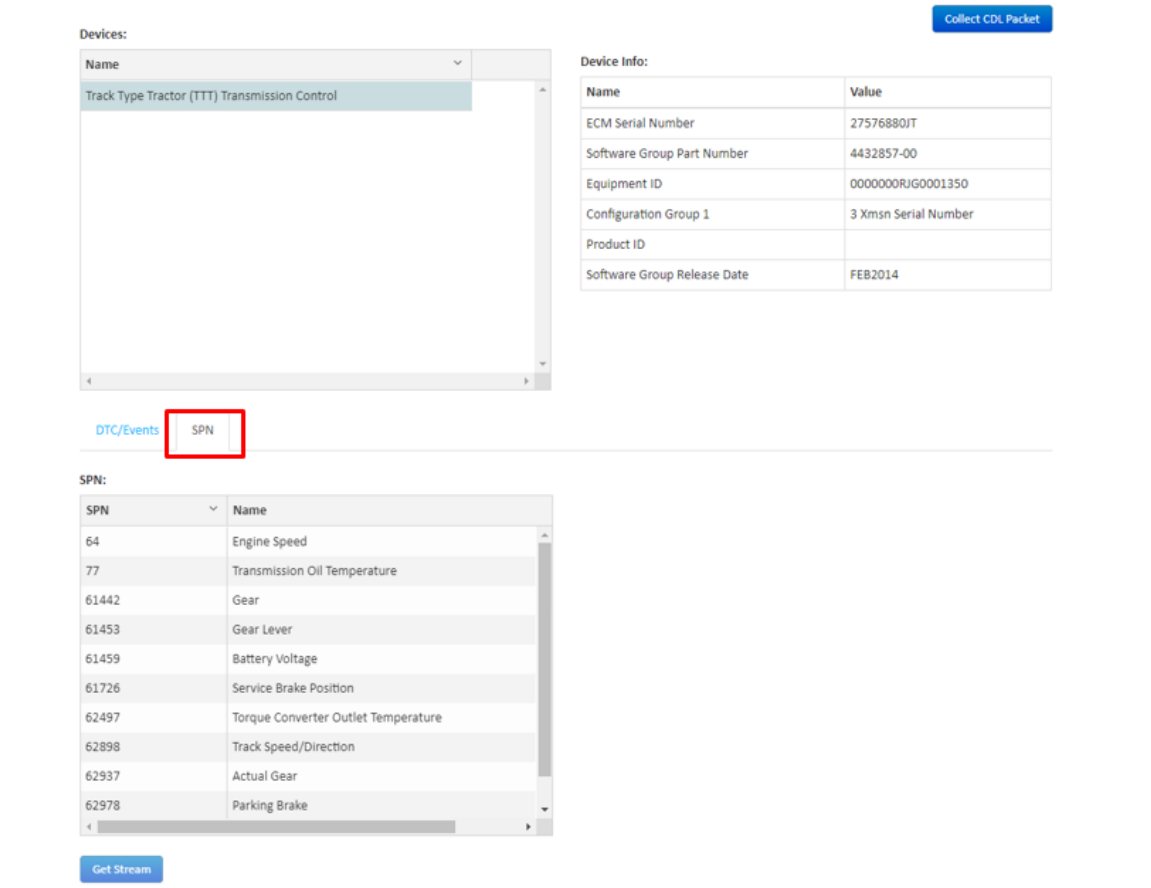
Device Info

1. Any number of DTCs may be cleared from the ECU by selecting the desired DTCs and then clicking “Clear Selected DTCs”

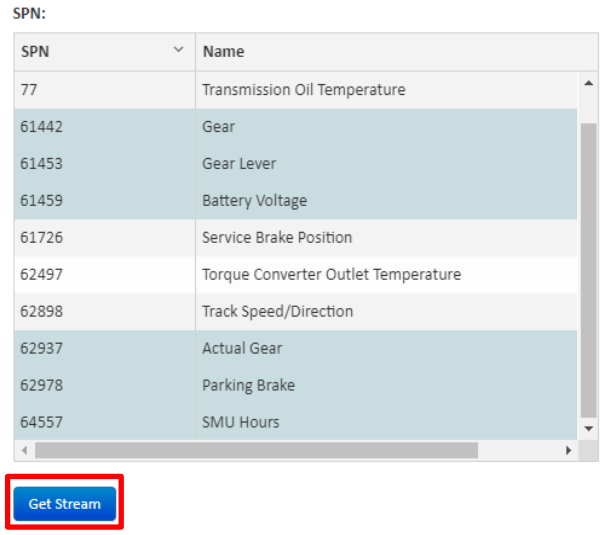


Streaming

1. You can view all SPNs for the selected device by clicking on the “SPN” tab (circled in red)



2. You can live stream any number of SPNs by selecting the ones you wish to stream and then clicking “Get Stream”

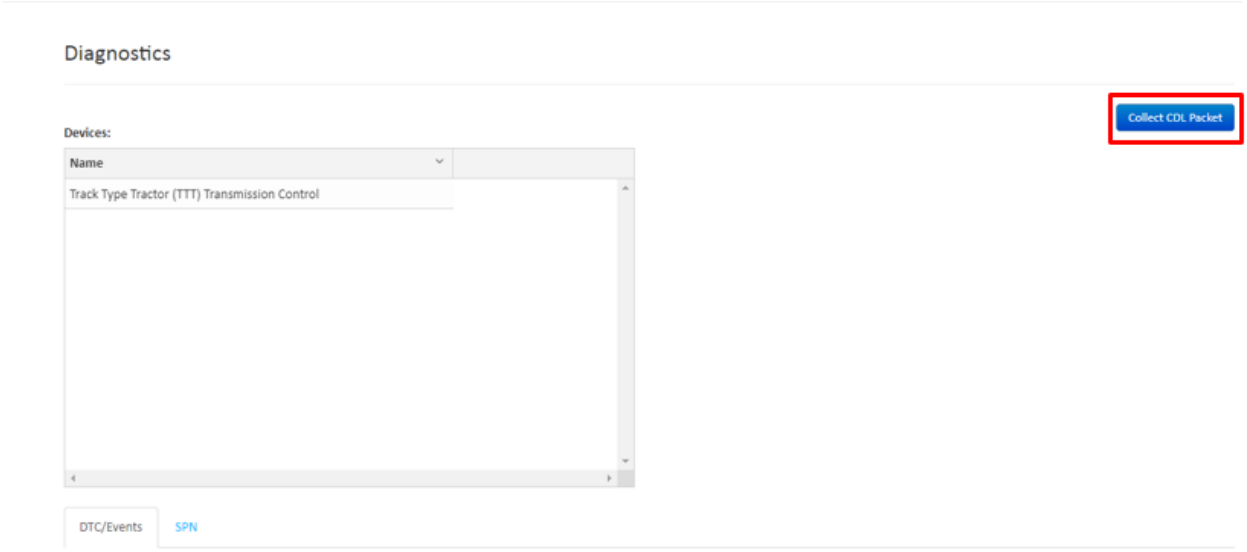


3. Once streaming has started, a table and a graph will appear. The graph will show the sensors value over time and the table will show its most recent reading for each streaming sensor

4. Streaming may be stopped at any time by clicking the “Stop Stream” button. The stream will also stop if the user selects a different device, leaves the page, or closes the browser

CDL Packet

If the user knows that there are additional sensors on a certain ECU that did not appear in the “Sensor Config” integrated sensor lists, the sensor has most likely not been yet mapped by Fluid Life. In order for Fluid Life to stay up to date on all available sensors, the user may collect raw data from the ECU and send it to Fluid Life for proper mapping. This can be done by selecting the “Collect CDL Packet” button (circled in red)



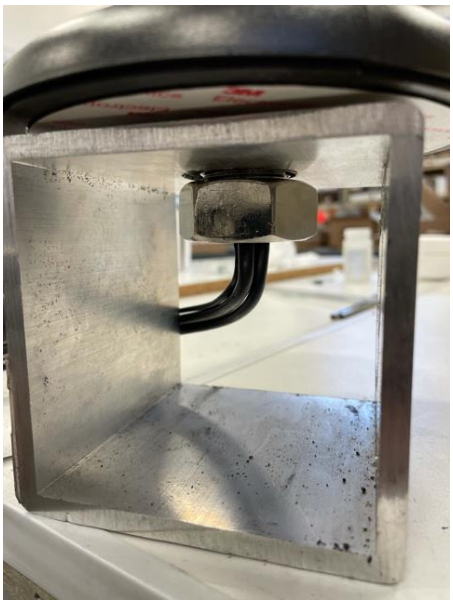
5. Once the CDL packet starts collecting, all other querying of this page will be disabled.
6. In order to stop collecting of CDL, the user will have to click the “Stop Collection” button. If this is not done within 30min, the packet will be zipped up on the box for access in a future time.
7. After stopping the CDL packet, the browser will automatically download the file called “cdlDump.txt.” The user may then email this file to Fluid Life for data mapping.

Antenna Mounting Guideline

Note: The antenna should be mounted at least 20cm (8in) from any nearby persons.

A typical antenna kit may come with:

- 1 Spartan Antenna (for Wifi, Gps and Cellular)
- 1 Antenna Mounting Cube Bracket
- 2 Mounting U-bolts
- 1 or more Wifi Antenna extension cable(s) and adapter(s)
- 1 or more GPS/Cell extension cable(s)



A general installation of the antenna using the item above would involve attaching the antenna to the Cube Bracket and using the U-bolts to attached the cube/antenna to pole. The antenna should be positioned so it has a clear view of the sky in order to get more reliable GPS information.

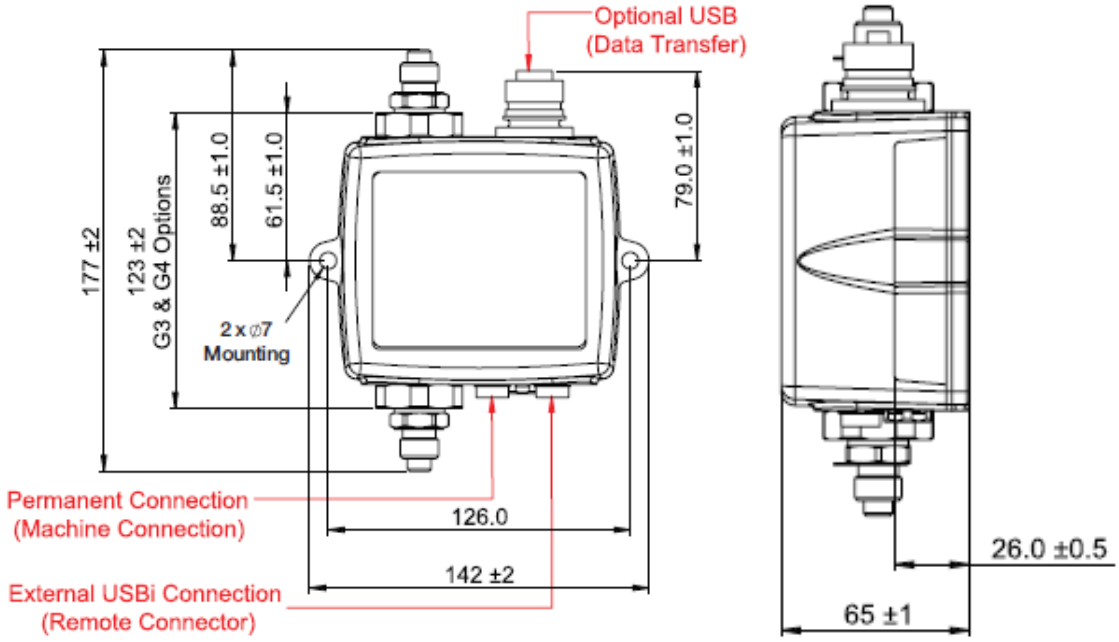
Extension cables can be used to extend the antenna cable length for longer runs.

UCM Sensors Introduction

Note: Each of the sensor details are directly referenced and highlighted in depth in the OEM sensor manuals. For additional access or reference to the sensor manuals, contact a Fluid Life representative at 877.962.2400.

Oil Cleanliness Sensor

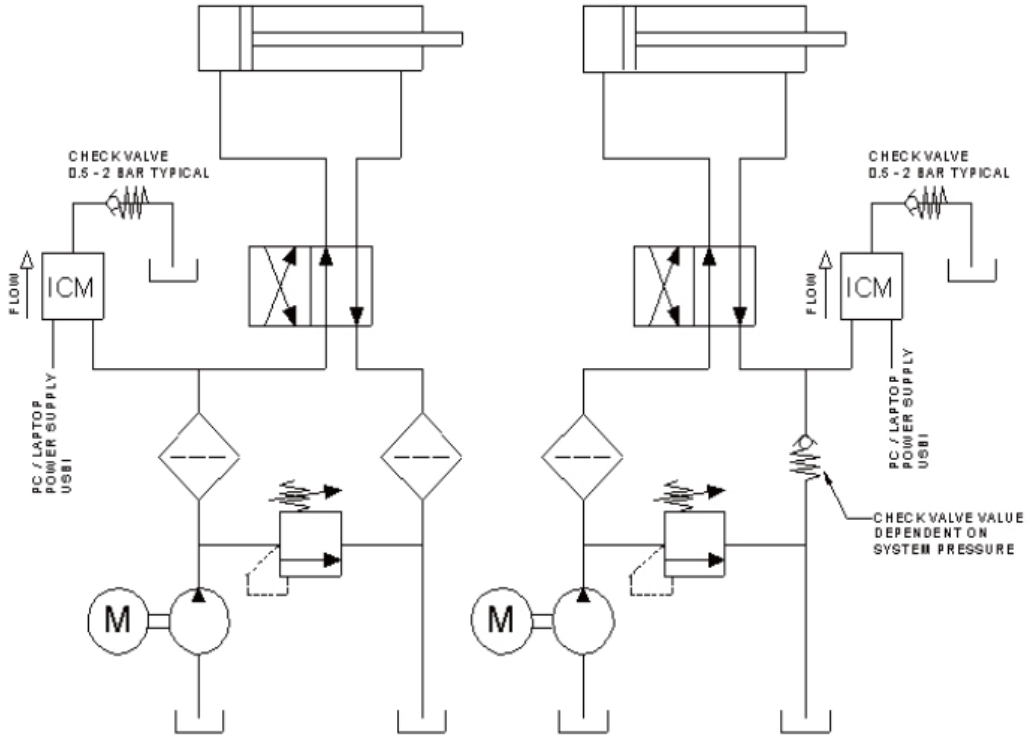
Sensor Specifications



Technical Data

Technology	LED Based Light Extinction Automatic Optical Contamination Monitor
Particle Sizing	>4,6,14,21,25,38,50,70 µm(c) to ISO 4406 1999 Standard
Analysis Range	ISO 4406: 1999 Code 0 to 25, NAS 1638 Class 00 to 12, AS4059 Rev.E. Table 1&2 Sizes A-F: 000 (Lower Limits are Test Time dependent)
Accuracy	± ½ code for 4,6,14um(c) ± 1 code for larger sizes
Calibration	Each unit individually calibrated with ISO Medium Test Dust (MTD) based on ISO 11171, on equipment certified by I.F.T.S. ISO 11943
Operating Flow Rate	20 - 400 ml/minute
Viscosity Range	≤ 1000 cSt
Fluid Temperature	From -25°C to +80°C
Maximum Pressure	420Bar
Test Time	Adjustable 10 - 3600 seconds. Factory set to 120 seconds. Start delay & programmable test intervals available as standard.
Moisture Sensing	% RH (Relative Humidity) ±3%
Temp Measurement	±3°C
Flow Rate Measurement	Indicator only
Data Storage	4000 test
Communication Options	RS485, RS232, MODBUS, CANBUS, 4-20mA time multiplex as standard
Ambient Temp Min/Max	From -25°C to 80°C non-K version - From -25°C to 55°C K version
Environment Protection	IP 65/67 versatile IK04 Impact Protection
Weight	1.6 kg
Electrical Supply	Voltage 9-36V DC
Power Consumption	<2.2 W
Outer Casing Finish	Polyurethane BS X34B. Colour BS381-638 (Dark Sea Grey)Approval: BS2X34A & BS2X34B, MM0114 & SP-J-513-083 T. II CI. A Per formance: MIL-PRF-85285

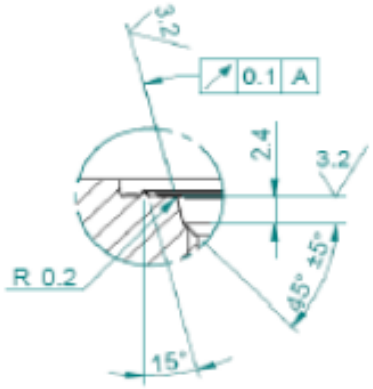
General Installation Guidelines

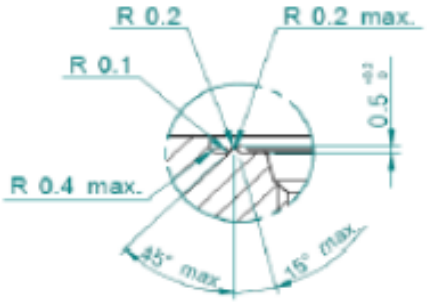


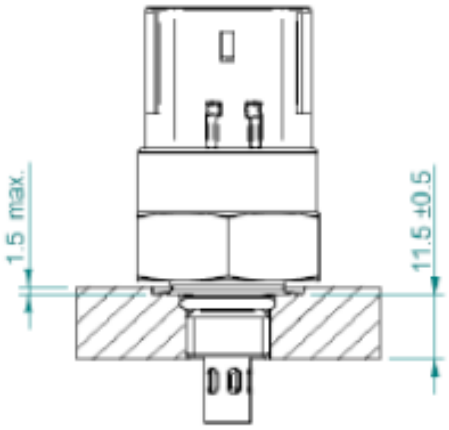
Note: This is a generalized OEM specific install recommendation and is subject to change based on factors such as process application and physical install locations.

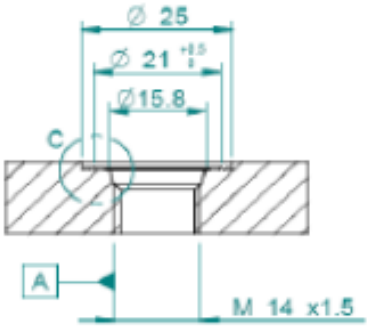
Fluid Property Sensor

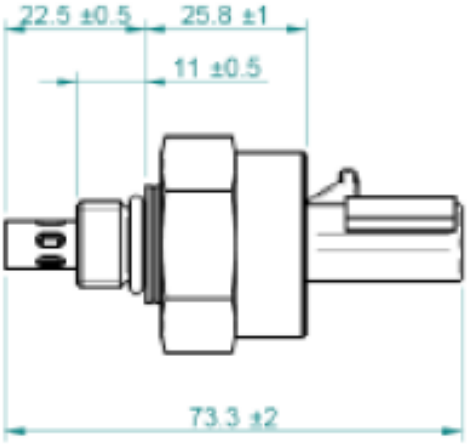
Sensor Specifications









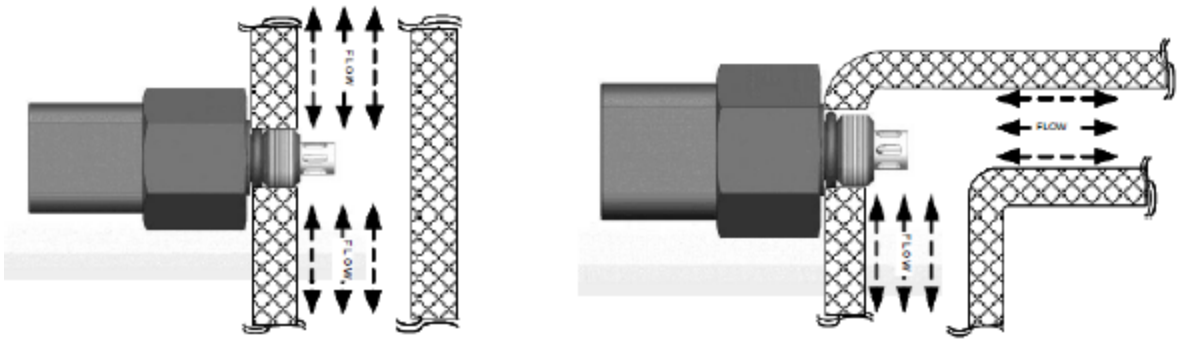


Dimensions outlined in millimeters

Technical Data

Technology	The FPS2800B12C4 is an oil property sensor that will directly and simultaneously measure the viscosity, density, dielectric constant and temperature of low conductivity fluids
Sensor Electronics Temperature	-40 to +125°C
Oil Temperature	-40 to +150°C
Pressure	0 bar ≤ P ≤ + 25 bars (375 psi)
Dynamic Viscosity	0.0 to 50.0 cP
Density	0.000 to 1.500 gm/cc
Dielectric Constant	1.00 to 6.00
Oil Temperature	-40°C to +150°C
Storage Temperature	-50 to + 150°C.
Vibration	0 to 20 Grms
Media Examples	Lubricants, Oils, Process fluids
Supply Voltage	Minimum 9 VDC; typically 12 or 24 VDC; maximum 36 VDC
Power Consumption	< 100mA, typical 70 mA for 12 VDC power supply
Mounting Torque	27Nm, +/- 5.4 Nm

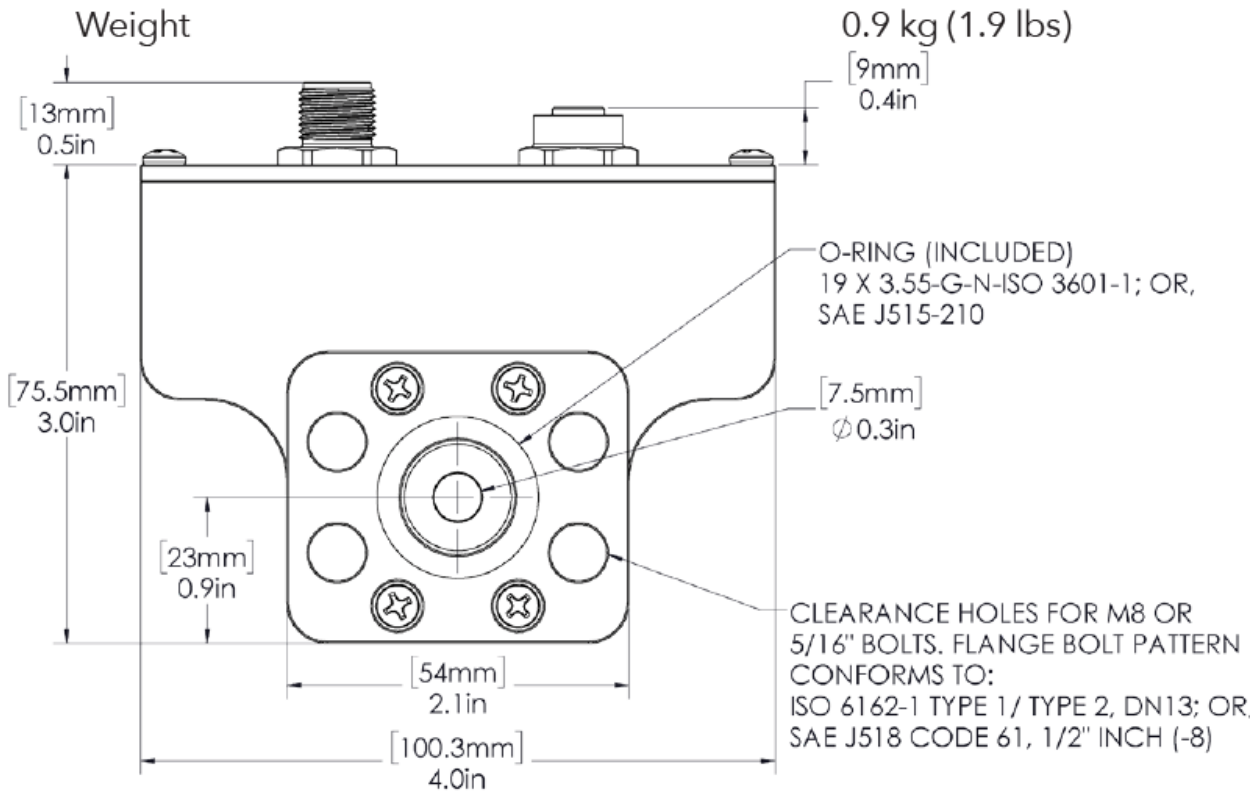
General Installation Guidelines

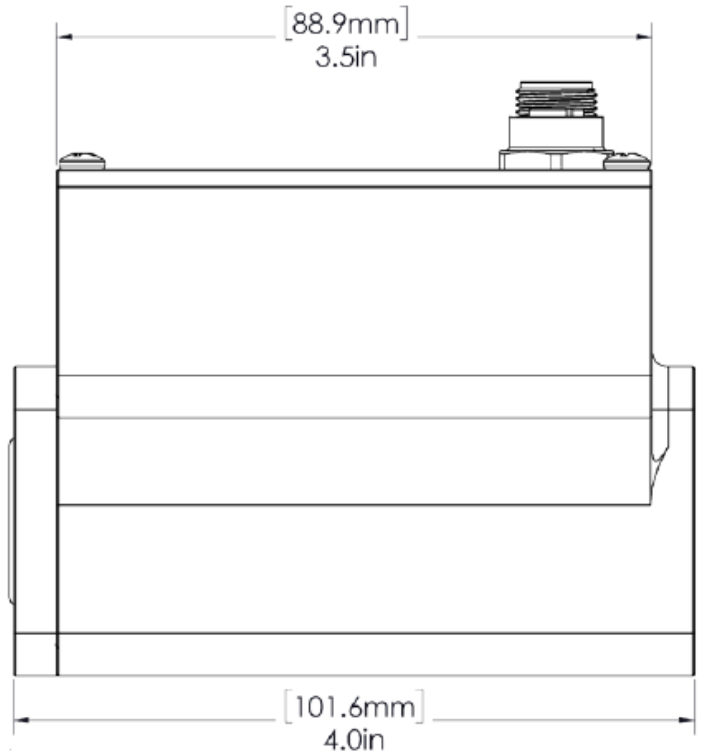


Note: The installation orientation determines optimal sensor performance. It is recommended to install the Fluid Property sensor inline within a steady flow stream (oil) and no introduction of air pockets/bubbles

Metallic Wear Debris Monitor

Sensor Specifications





Technical Data

Technology	Designed for in-line early detection of metal wear to determine severity and remaining useful life or critical equipment
Sensor Bore	8mm (3/8 inch)
Minimum Detectable Particle (sphere)	125µm Fe / 450µm NFe
Minimum Detectable Particle (ESD)	70µm Fe / 270µm NFe
Flow Rate	0.5 L/min - 12L/min (0.13 USGPM to 3.2 USGPM)
Flow Direction	Bi-directional
Maximum Particle Detection Rate	Configurable up to 100 particles/sec
Input Power Supply	18 to 30 VDC
Power Consumption	2.4W
Ethernet 10/100 Mbit/s	Modbus TCP
Serial RS-485 (Optional)	Modbus RTU
Particl Type Discrimination	Ferromagnetic (Fe) / Non-Ferromagnetic (NFe)
Particle Size Reporting	Configurable Fe / NFe size bins and Fe / NFe Rate
Particle Mass Reporting	Fe Mass and Fe Mass Rate
Equipment Condition Indication	Configurable Alarm and Warning Limits (Fe, NFe & Temperature)
Oil Pressure	Maximum 20 bar (300 psi)
Oil Temperature	-40°C to 85°C (-40°F to 185°F)
Ambient Temperature	-40°C to 70°C (-40°F to 158°F)
Vibration	10-50 Hz: 3mm (displacement) | 50-300 Hz: 15g (acceleration)
Fluid Compatibility	Hydraulic & lubrication oils; synthetic & mineral based; solvents & cleaning agents

General Installation Guidelines

The MetalSCAN MS3505 sensor is a rugged design with enclosed electronics and ruggedized connectors. However, the sensor is sensitive to excessive external structural loads, and therefore should not be subjected to external loads (either static or cycling, vibratory, etc.).

Pay special attention to the location of the sensor to ensure the following conditions are met:

- Within the lubricating oil system, the sensor should be positioned in the lubricating oil return line from the equipment upstream of any filter elements.
- Ensure there is clearance for installation and maintenance access, and there are no interferences between the sensor and existing components.
- Verify the O-rings are properly seated in the O-ring groves.
- Verify the correct sensor size and any flanges or fittings that are specified for the selected application.
- The sensor must be rigidly secured using the 4 mounting holes provided to support the sensor. The recommended bolt tightening torque is 24N-m for metric M8 bolts and 17ft-lb for imperial 5/16” bolts. Bolts should be torqued in a diagonal sequence in small increments to the appropriate torque level.
- The sensor should not be suspended from the attached lubricating oil piping or hoses.
- Ensure that there are no large bending forces being applied to the sensor once installed such as those that may be caused by unsupported pipes or hoses.
- The sensor should be kept away from large electromagnetic fields such as generators, motors, variable frequency drives, high voltage cables, cooling fans, strobe lights, yaw motors, and other similar equipment.
- Perform a leak check for all installed fluid system components including sensor, hoses, flanges or fittings, and adaptors.
- Perform a physical mounting integrity check to ensure the sensor and all installed lubrication system components will remain secure without leaking, becoming damaged, or suffer degraded service life or performance.
- Sensor must be installed in a location that will remain dry.