

OMNICOMM

Omnicom LLS 4 Fuel Level Sensors

User Manual

Omnicom Configurator 6

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Omnicom LLS 4 Fuel Level Sensors

General

This User Manual is designed for Omnicomm LLS 4 fuel level sensors.

Omnicom LLS 4 is a fuel level sensor with RS-232 and RS-485 interfaces.

While carrying out installation, observe the safety rules and regulatory requirements for this type of work.

Minimum allowable length of the measuring piece is 150 mm.

The dielectric permeability of the measured medium should be constant. Failure to comply with this requirement will lead to increased measurement error.

Warning!

LLS liquid level sensors are strictly prohibited to be used in any liquids that are not the factory grade carbon fuels, or contain: BIOFUEL, METHANOL, ETHANOL, UREA and similar aggressive components in pure form or as additives for factory grade carbon fuels for use in INTERNAL COMBUSTION ENGINES.

The wrong polarity (-) or (+) connection of power supply can damage or destroy the device. They are also prohibited for test or use in water and any other liquids that are not factory grade of carbon fuels.

For evaluation purposes, it is acceptable to use the sensor in any kind of mineral or lube oil.

Fit the plastic insulation cap on the end of the central rod after installation accordingly with installation guide.

To be installed, calibrated, tested only by qualified authorised person (i.e. installer, technician, mechatronic).

Technical Specifications

Parameters	Value
Power supply voltage, V	7 – 80
Power consumption, W	0,4
Measurement range, mm	0...700, 1000, 1500, 2000, 2500, 3000
Main reduced error of measurement of the sensor, %	±1
Relative humidity at 25 °C (without moisture condensation), %	From 5 to 95
Atmospheric pressure, kPa	From 84 to 107
Maximum relative humidity at 25 °C (without moisture condensation), %	100
Working temperature range, °C	From - 60 to + 85
Body protection rating	IP69k
Operating mode	Continuous
Internal filter size	From 0 to 30
Measurement time period, s	1
Overall dimensions, mm	78×74×(24+length of measuring piece)

Preparation

Parameters	Value
Weight, kg	Not more than 2
Average service life, years	8
Output interface for measured values	RS-232, RS-485
Programmable interface transmission rate, bit/s	2400, 4800, 9600, 19200, 38400, 57600, 115200
Digital reading range corresponding to the maximum level measurement value	1...4095
Digital reading range corresponding to the minimum level measurement value	0...1023
Temperature measuring range, °C	From - 40 to +80
Absolute error in temperature measurement within the entire temperature measuring range, °C	±2

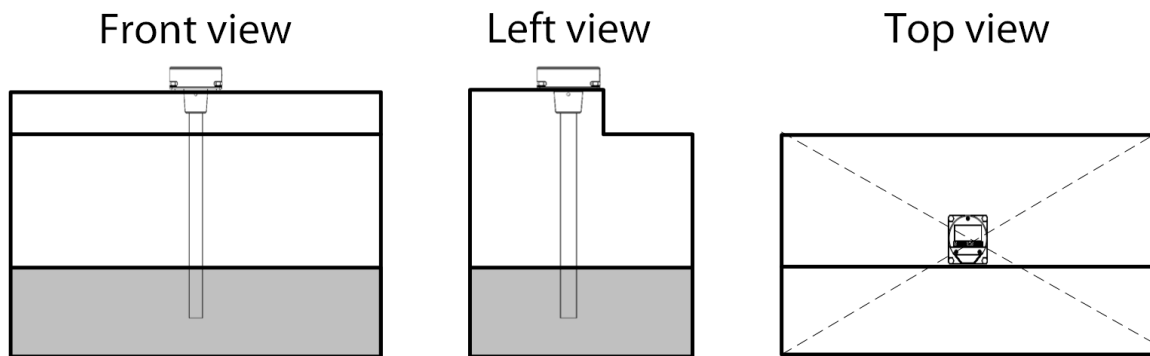
Preparation

Fuel Tank Preparation

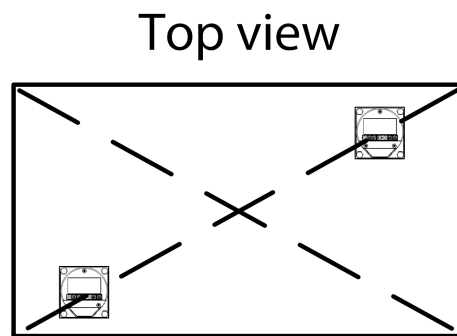
1. Select the location for Omnicomm LLS 4 sensor installation subject to the following requirements:

- Installation location should be as close as possible to the geometric center and placed at the deepest level of the tank:

Preparation

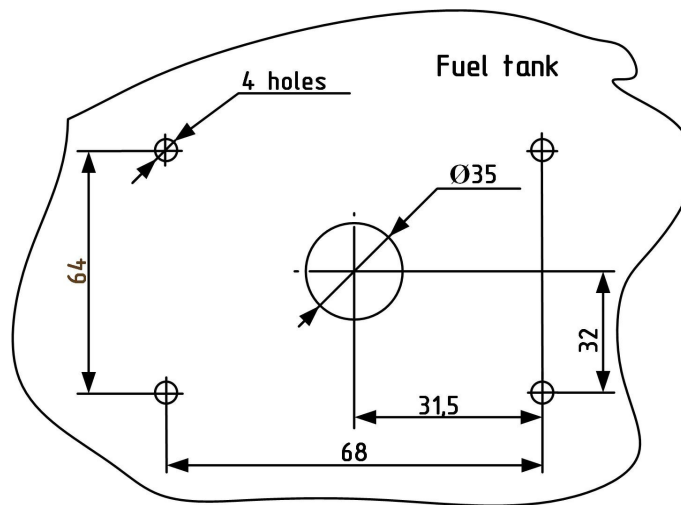


- When installed, the sensor should not be in contact with reinforcement ribs inside the tank
- Installation of two sensors in one tank allows for significant reduction of the fuel level dependence on the vehicle inclination angle:



2. Steam out the tank to ensure compliance with the safety rules
3. Drill out the central bore by bimetal core drill $\varnothing 35$ mm
4. Drill out four mounting holes according to the diagram:

Preparation



The mounting hole diameter depends on the tank material:

- $\varnothing 4$ mm – for metal tank with wall thickness over 3 mm (cut M5 thread)
- $\varnothing 7$ mm – for plastic and metal tank with wall thickness up to 3 mm (for rivets)
- $\varnothing 4$ mm – for plastic tank with wall thickness over 3 mm

Sensor Preparation

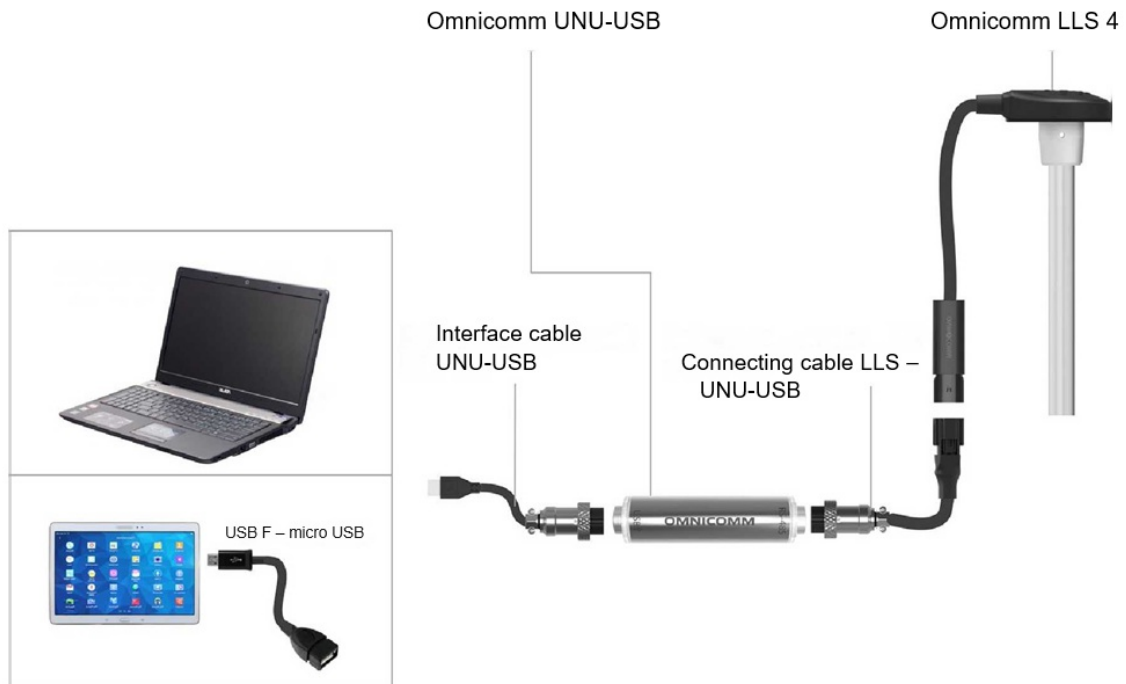
1. Measure the tank depth. Cut the sensor measuring piece so that its length is 20 mm less than the depth of the tank. Ensure that shearing line is perpendicular to the sensor longitudinal axis
2. Use oil-and-petrol resistant non-conductive sealant to fill the vendor furnished insulation cap up to 1/4–1/5 of its volume. Recommended sealants: PERMATEX™ MotoSeal® Black, ABRO™ Black, ABRO™ Red
3. Put the insulation cap on the Omnicomm LLS 4 sensor central rod

Setting

Setting

Connect the sensor to PC or tablet.

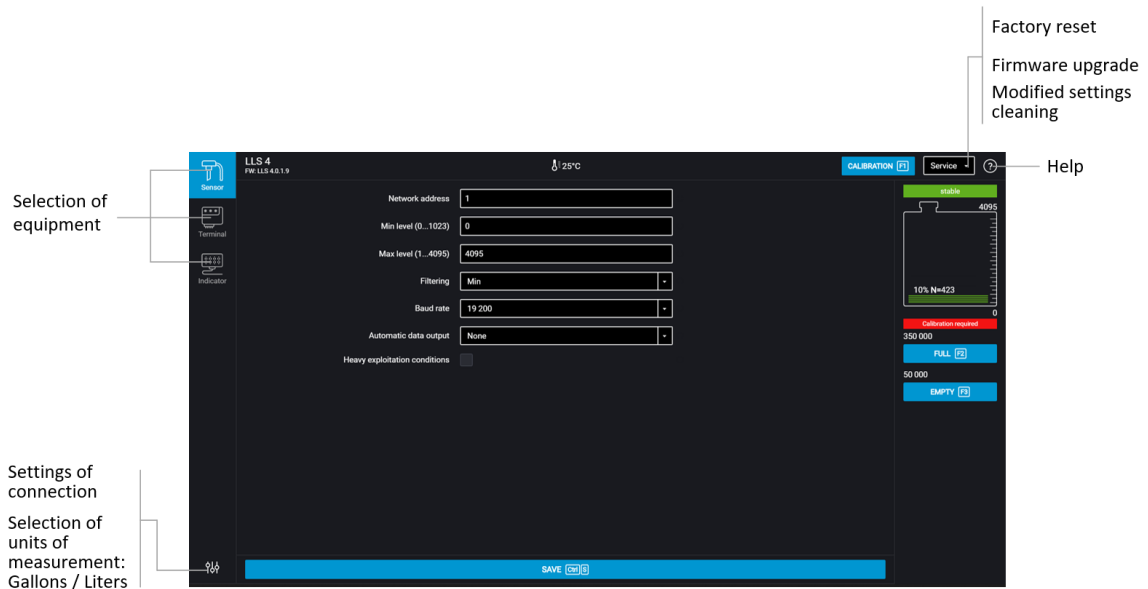
Connect Omnicomm LLS 4 sensors according to the diagram:



Launch Omnicomm Configurator on PC or tablet.

Setting

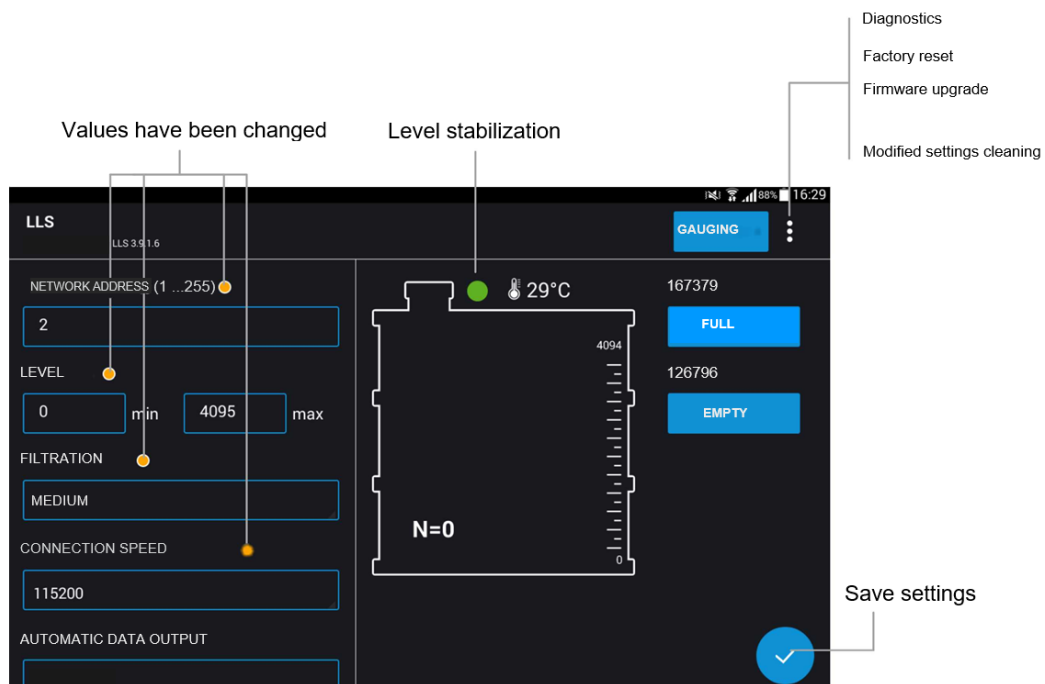
Omnicom Configurator (PC):



Fuel level is displayed without regard for filtration.

Setting

Omnicom Configurator (Android):



"Full/Empty" Calibration

Perform calibration in the fuel, in which the fuel level sensor Omnicomm LLS will operate.

1. Fill the measuring container with fuel
2. Immerse the Omnicomm LLS sensor in the fuel to the full length of the measuring piece
3. Wait for green indicator "Level Stabilized" to appear.
In the "Settings" tab, "Full/Empty Calibration" section, press "Full" button, then the value corresponding to the full tank will be set
4. Take the Omnicomm LLS sensor out of the container and allow the fuel to flow down the measuring piece for 1 minute. In the "Full/Empty Calibration" section, press "Empty" button, then the value corresponding to the empty tank will be set
5. Press the "Record to Device" button

Setting

Omnicom LLS 4 Sensor Setting

“Network address” (1 to 254) – set the network address for the Omnicomm LLS fuel level sensor. When several sensors are connected to one external device, they should have unique network addresses.

“Maximum level” (1 to 4095) – select the maximum reading for the LLS fuel level sensor. Default value – 4095.

“Minimum level” (0 to 1023) – select the minimum reading for the LLS fuel level sensor. Default value – 0.

“Filtration” – set the output signal filtration parameters:

- **“None”** – no filtration is performed. This option is used, when filtration is carried out by external device.
- **“Minimum”** – this filtration is used in stationary fuel storages and non-mobile machinery
- **“Medium”** – this filtration is used in case of vehicle's operation in normal road conditions
- **“Maximum”** – this filtration is used in case of vehicle's operation in severe road conditions

“Automatic data output” – select:

- **“No output”** – no independent data output (without request) is performed
- **“Binary”** – independent binary data output
- **“Character”** – independent character data output
- **“Data output interval”** (1 to 255 seconds) – set the independent data output interval

Automatic data output mode may be used only with maximum one Omnicomm LLS 4 sensor connected to one interface.

“Severe operating conditions” mode – switch on to enable additional filtration of measurement values taking into account the rough working conditions.

“Data rate” – select the rate for data exchange with external device. Default value – 19,200 bit/s.

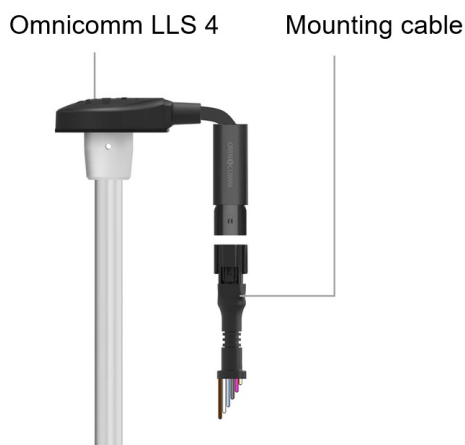
Installation and Connection

When installing the fuel level sensor onto the plastic fuel tank it is important to provide a secure electrical connection between the sensor's body and the frame of the vehicle. If this condition isn't met, it can lead to sensor malfunction caused by static electricity.

1. Put the vendor furnished mounting point gasket on the Omnicomm LLS sensor measuring piece
2. Put the Omnicomm LLS sensor into the tank and fix:
 - when fixing with rivets, use a rivet driver
 - when bolting, put on a seal (per bolt), a spacer and a spring washer
 - when fixing to plastic tanks with wall thickness over 3 mm, use vendor furnished self-tapping screws and a seal (per self-tapping screw)

3. Connect the Omnicomm LLS sensors to an external device according to the diagram:

Omnicomm LLS 4:



Functions of mounting cable wires

Name of signal	Wire Color
RS-485 A	Orange-white

Calibration

Name of signal	Wire Color
RS-485 B	Whitish-blue
RS-232 Tx	Pink
RS-232 Rx	Grey
+V Power	Brown
Ground	White

4. Connect the fuse holder to the LLS sensor power cable (brown wire) in close vicinity to the vehicle power supply circuit

5. Install the fuse in the fuse holder

6. If necessary, seal the bolt (self-tapping screw) and the connection

Several Omnicomm LLS 4 sensors will be connected side-by-side via the RS-485 interface.

Calibration

Calibration of the fuel tank is necessary to verify conformity of the color code issued by the Omnicomm LLS 4 sensor to the fuel volume in the particular fuel tank.

Calibration of the fuel tank is the fuel tank filling up – from empty to full, with certain filling interval, and recording the Omnicomm LLS 4 sensor readings in the calibration table.

A fuel tank may be calibrated by draining.

Calibration of a fuel tank with several Omnicomm LLS 4 sensors will be similar to calibration with one sensor. Before the calibration, add the necessary quantity of sensors and specify the network addresses. Calibration is performed for all sensors at the same time. Connect several sensors to PC or tablet using a KTZ splitter.

Calibration of the fuel tank with one Omnicomm LLS 4 sensor:

1. Empty the fuel tank

Calibration

2. Connect the sensor to PC or tablet according to the diagram in the [Setting](#) section
3. Launch Omnicomm Configurator on PC or tablet. Select “Calibration” operating mode

Omnicomm Configurator (PC):

Calibration table export

Calibration table import

Calibration table chart

Clear the table

← Calibration

Sensor No. 1
N = 2377
stable

Liters	Sensor No. 1
150	3800
130	3650
110	3112
90	2822
70	2555
50	800
30	600
10	520

By draining

Step 20

Tank volume 150

ADD A SENSOR [F7]

ADD ROW [Enter]

DELETE ROW [Del]

CONTINUE

Start / continue / finish calibration

If the sensor reading column is not displayed, press the “Add sensor” button. Select the type of sensor. Specify the network address set in the sensor during setting.

Fuel Level Sensor Installation Recommendations for Cylindrical Fuel Tanks

4. Set the flow interval in liters

If the tank geometry is not linear and / or has extended or narrow parts, it is recommended to calibrate such parts with a smaller interval applying lower dose measuring vessels (of higher resolution) to enhance precision.

5. Press the "Start/continue calibration" button

6. Fill in the fuel volume equal to the flow interval

Refueling should be performed with a measuring vessel or under liquid flow meter control with the set interval. The vessel should pass metrological calibration test.

7. Press "Add line"

The filling volume equal to the predefined flow interval will be displayed in the "Liters" column.

The value equal to the filling volume will be displayed in the "Sensor" column.

8. Press "Add line"

9. Repeat items 6, 7 and 8 according to the number of control points. The minimum recommended number of control points – 20. Use the "F2" key to export a calibration table with more than 65534 liters of fuel volume.

10. Press "Finish calibration" button

11. Save the calibration table in the calibration file (.ctb), Omnicomm Online (.xml) file in the Terminal or Indicator, by pressing the "Export" button

When performing the calibration table export to the Omnicomm Online (.xml) file, the "Export" window will open. Specify the Omnicomm LLS sensor number to display in Omnicomm Online.

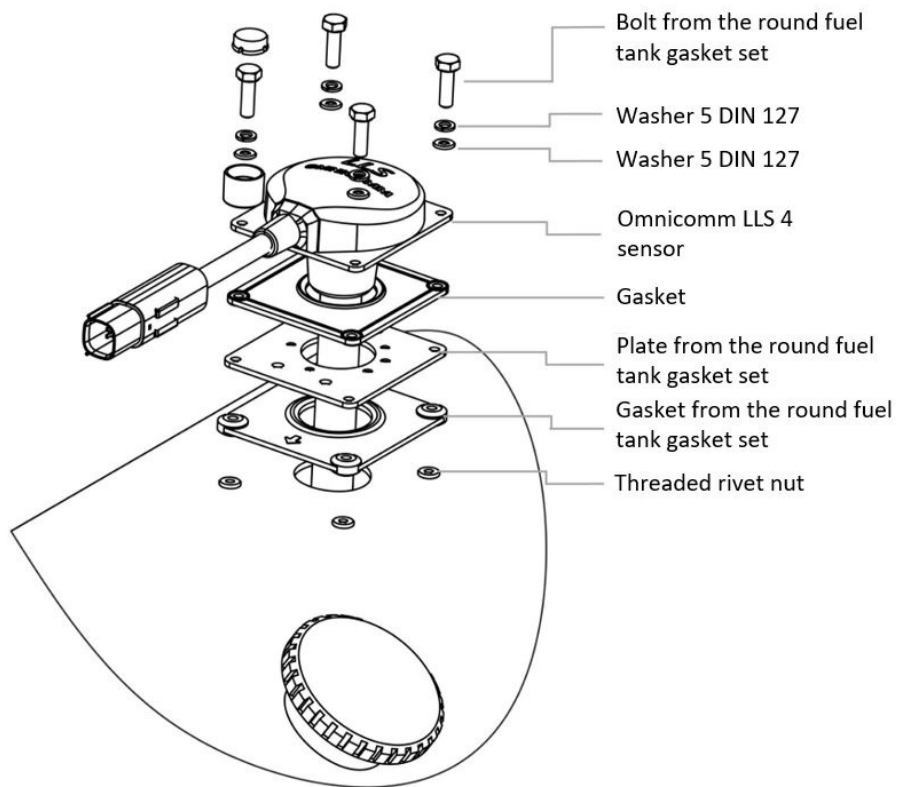
Fuel Level Sensor Installation Recommendations for Cylindrical Fuel Tanks

When installing the fuel sensor onto cylindrical fuel tanks with the diameter 420...710 mm it is necessary to purchase a set of gaskets for round fuel tanks.

Replace the plates, the gaskets and the bolts provided with the LLS 4 with gaskets and screws for the round fuel tank.

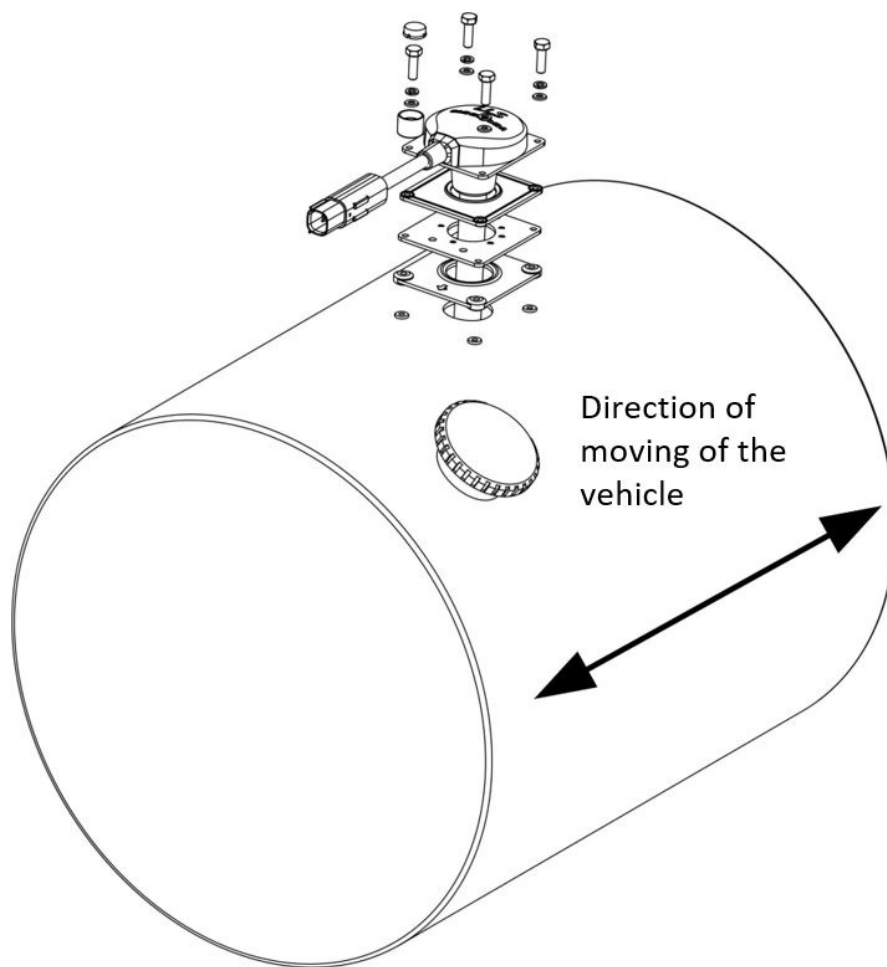
The installation sequence of Omnicomm LLS 4 fuel level sensors:

Fuel Level Sensor Installation Recommendations for Cylindrical Fuel Tanks



The sensor's cable should align with the direction of the vehicle or shall be located on the long side of the fuel tank.

Sealing



Sealing

For Omnicomm LLS 4 sensors the bolt or self-tapping screw and the connection may be sealed:



1. Install the bolt or self-tapping screw through a hole in the seal
2. Close the seal cover with a snap

Sealing

3. Enter the seal and cover numbers in the report

Put the sealing tie on the Omnicomm LLS 4 connector:

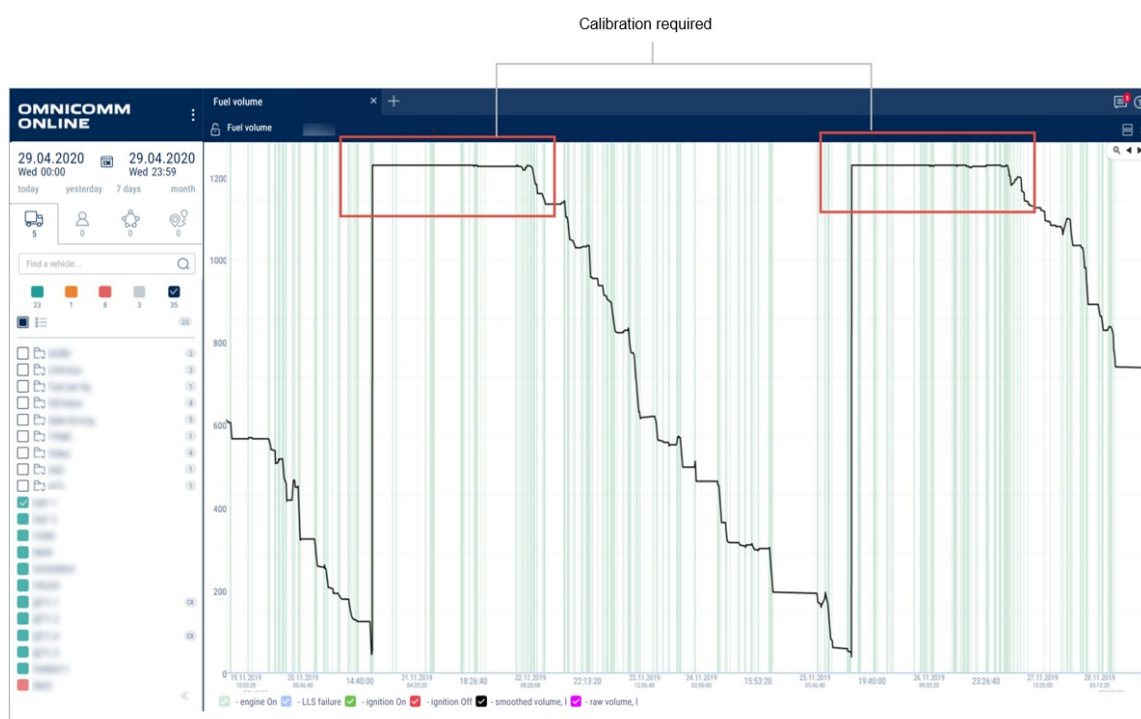


1. Connect the Omnicomm LLS 4 connector and the mounting cable connector until their typical clicking position
2. Run the seal flexible piece through the connectors
3. Run the seal flexible piece through the hole in the seal body
4. Tighten up the connection
5. Cut off the extended section of the seal flexible piece

Remote Correction of the Full/Empty Calibration

The Full/Empty recalibration of the Omnicomm LLS 4 fuel level sensor is required when the sensor calibration changes. It manifests as a discrepancy of readings from the sensor when the tank is empty or full (e.g., when fuel characteristics change, dirt accumulates on the measuring part during long operation, or the sensor is installed incorrectly).

Recalibration is required when a horizontal section appears in the Fuel Volume report in Omnicomm Online when the tank is full and the vehicle is moving, as shown below:



If recalibration is required, it is recommended to carry out service maintenance of the Omnicomm LLS 4 fuel level sensor. As a temporary measure, before the maintenance can be carried out and if the fuel level sensors are connected to Omnicomm terminals with firmware version FW309 and above, perform recalibration using SMS commands:

Remote Correction of the Full/Empty Calibration

Command			Designation
Command text in SMS	Reply to a command in SMS	Example of command / reply	
*GETCNTINFO#	GETCNTINFO LLS1: CNTmin1, CNTmax1, CNT_T LLS2: ...VID = 336xxxxxxx, where CNTmin1 , CNTmax1, CNT_current1 – “empty”, “full”, current values VID – terminal ID	LLS1: 90000, 172202, 129893 LLS2: 50000, 350000, 132485 VID=326001571	Request current CNT readings (“empty”, “full”)
*SETCNT pwd numlls CNTmin2 CNTmax2# where pwd – password to change terminal settings numlls – sensor network address CNTmin2 CNTmax2 – “empty” and “full” new values	SETCNT OK – SMS worked correctly SETCNT PWD ERR – wrong or no password entered SETCNT ERRVALUE – incorrect CNT values entered SETCNT ERRPARAM – incorrect SMS format	*SETCNT pass 1 42000 300000#	Set new CNT_empty/full values (CNTmin2 and CNTmax2)

Remote Correction of the Full/Empty Calibration

Command			Designation
Command text in SMS	Reply to a command in SMS	Example of command / reply	
*SETCNTFULL pwd numlls koef_empty# where pwd – password to change terminal settings numlls – sensor network address koef_empty – “empty” value change flag koef_empty = 0, then CNT_empty does not change koef_empty = 1, then CNT_empty increases by the same amount as CNT_full	SETCNTFULL OK – SMS worked correctly SETCNT PWD ERR – wrong or no password entered SETCNTFULL ERRVALUE – Conditions outlined in the Limitations were not met SETCNT ERRPARAM – wrong SMS format	*setcntfull pass 1 0#	Automatic correction of the CNT_empty/full values

Perform automatic correction of values on one sensor and only on a full tank. Fill a full tank and send the SMS command to the terminal. Corrected values must not differ from the set ones by more than 15%.

Appendix. List of equipment for Omnicomm LLS 4 fuel level sensors installation

Appendix. List of equipment for Omnicomm LLS 4 fuel level sensors installation

Nº	Name	Number
1	Bimetal core drill ø35 mm	1
2	Core drill shank	1
3	Metal drill ø7 mm or ø4 mm	1
4	Hacksaw	1
5	Spanner 8 mm	1
6	Tap M5 with holder	1
7	Snap-seal for bolt/self-tapping screw	1
8	Personal computer	1
9	Omnicomm Configurator program	1
10	Omnicomm UNU-USB (or UNU) setting device	1
11	DC power supply unit 10–15 V, 0.5 A (only with UNU used)	1
12	Measuring container	1
13	Fuel	

Appendix. List of equipment for Omnicomm LLS 4 fuel level sensors installation

№	Name	Number
14	Gauging container	1

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