

OMNICOMM

Omnicomm LLS-AF 4 Fuel Level Sensor

User Manual

Omnicomm Configurator 6

18.12.2018

Contents

3	General Information
4	Specifications
6	Preparation
6	Fuel Tank Preparation
8	Sensor Preparation
8	Setting
9	“Empty/Full” Calibration
10	Omnicom LLS-AF 4 Sensor Setting
11	Installation and Connection
12	Calibration
14	Sealing
16	<i>Appendix. List of Equipment for Omnicomm LLS-AF 4 Fuel Level Sensors Installation</i>

Omnicom LLS-AF 4 Fuel Level Sensor

General Information

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

Omnicom LLS-AF 4 is a fuel level sensor with analog and frequency 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).

Specifications

Specifications

Parameters	Value
Power supply voltage, V	7 – 45
Power consumption, W	Nominal – 0.6 Maximum – 0.9 During a short-circuit on an analog output – 1.6
Analog output:	
Output voltage range, V	0...20
Maximum output voltage, V	5...20
Minimum output voltage, V	0...15
Digital-to-analog conversion resolution, bit	12
Load resistance on analog output, Ohm	Not less than 2000
Output signal pulsation, %	Not more than 0.15
Frequency output:	
Output signal modulation	Frequency pulse
Output frequency range, Hz	30...2000
Maximum output signal frequency, Hz	100...2000

Specifications

Parameters	Value
Minimum output signal frequency, Hz	30...1900
Maximum load current at the frequency output in the "open collector" mode, mA	300
Resistance of the internal "pull-up resistor" to positive voltage supply, Ohm	1500
General information:	
Measurement range, mm	0...700, 1000, 1500
Basic reduced error of level measurement, %	±1
Ambient temperature, °C	From -40 to +80
Limit temperature, °C	-60 and +85
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
Ingress protection rating	IP69k
Operating mode	Continuous
Internal filter size	From 0 to 30

Preparation

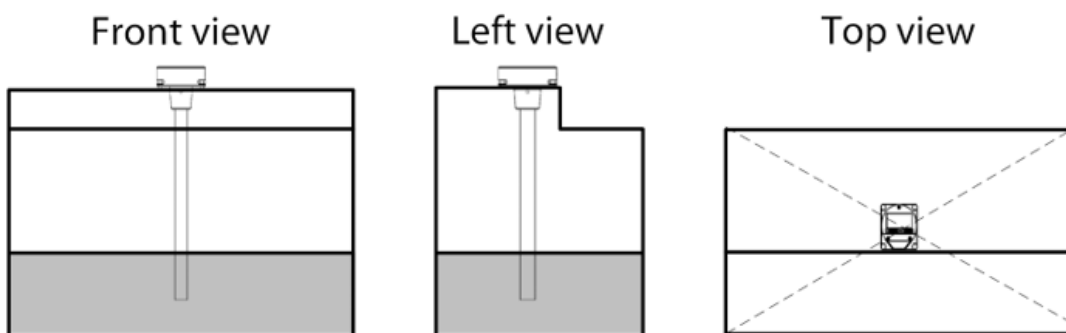
Parameters	Value
Measurement time period, s	1
Overall dimensions, mm	78×74×(24+length of the measuring probe)
Weight, kg	Not more than 2
Average service life, years	8

Preparation

Fuel Tank Preparation

1. Select the location for Omnicomm LLS sensor installation, taking into account the following requirements:

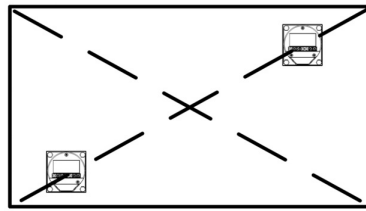
- The installation location should be as close to the geometric center as possible and be placed at the deepest level of the tank:



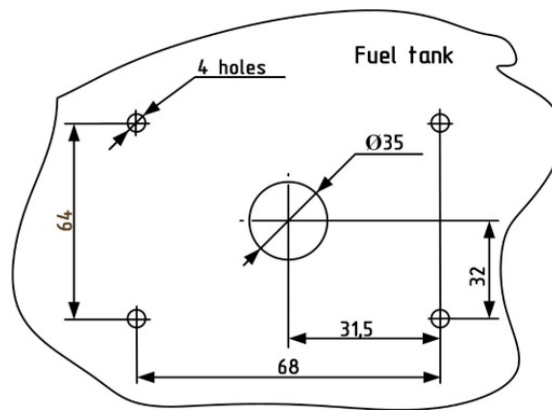
- When installed, the sensor should not be in contact with reinforcement ribs and existing equipment inside the tank
- Installing two sensors in one fuel tank allows to significantly reduce the dependence of the fuel level on the vehicle inclination angle:

Preparation

Top view



2. Steam out the tank to comply with safety regulations
3. Drill out the central bore using a bimetal core drill (or hole saw) $\varnothing 35$ mm
4. Drill out four mounting holes according to the diagram:



The mounting hole diameter depends on the material of the tank:

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

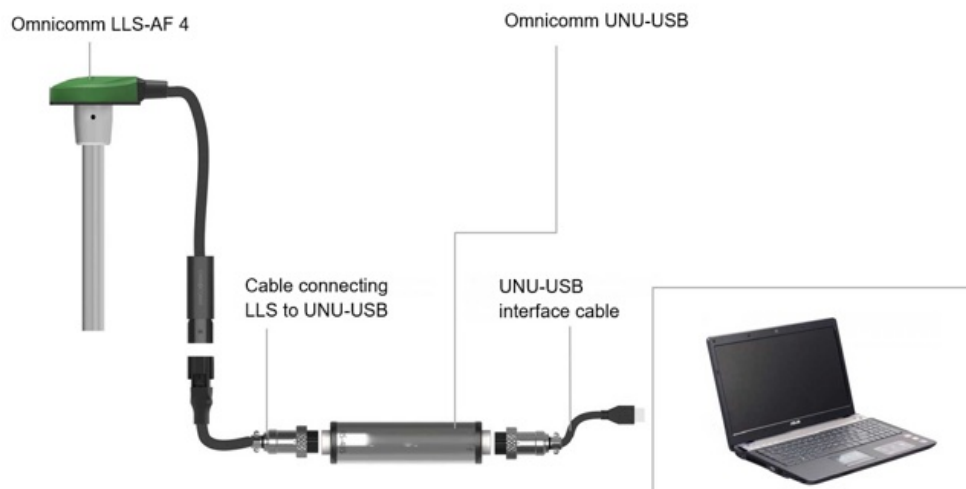
Setting

Sensor Preparation

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

Setting

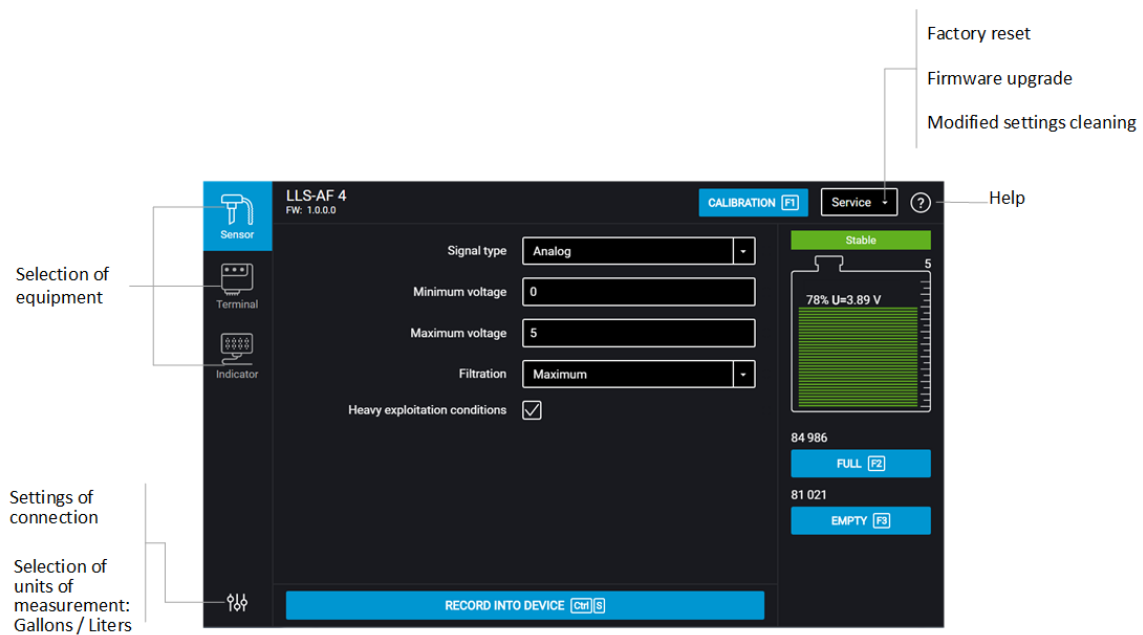
Connect the sensor to a PC according to the diagramm:



Run the Omnicomm Configurator program on your PC.

Setting

Omnicom Configurator (PC):



The fuel level value is displayed without filtering.

“Empty/Full” Calibration

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

1. Fill the measuring container with fuel
2. Immerse the sensor in the fuel to the full length of the measuring probe
3. Wait for the green indicator “Stable” to appear. Press the button “Full” to record the value corresponding to a full tank
4. Remove the sensor from the container and allow the fuel to drain from the measuring probe for 1 minute. Press the button “Empty” to record the value corresponding to an empty tank
5. Press the “Record into Device” button

Setting

Omnicom LLS-AF 4 Sensor Setting

In the tab "Settings" under "Custom parameters":

"Filtration" – set the output signal filtration parameters:

- "No" – filtration is not performed. Applies for cases when filtration is carried out by an external device
- "Minimum" – filtration applies for cases when the device is installed in stationary fuel storages and objects
- "Average" – filtration applies for cases when vehicles operate under regular road conditions
- "Maximum" – filtration applies for cases when vehicles operate under severe road conditions

"Severe operating conditions" – switch on if measurement values require additional filtration with account for severe operating conditions.

"Type of signal" – select "Analog" or "Frequency".

For the analog signal:

- "Max. voltage value (5 ... 20) V" – set the maximum voltage value. Default value – 5 V
- "Min. voltage value (0 ... 15) V" – set the minimum voltage value. Default value – 0 V

For the frequency signal:

- "Max. frequency value (100 to 2000) Hz" - set the maximum frequency value. Default value – 2000 Hz
- "Min. frequency value (30 to 1900) Hz" - set the minimum frequency value. Default value – 30 Hz
- "Pull-up resistor". Select "On" if, according to the manufacturer's instructions, the voltage signal is connected to the input of an external device. Select "Off" if the type of the connected signal is "dry contact" or "transistor NPN key"

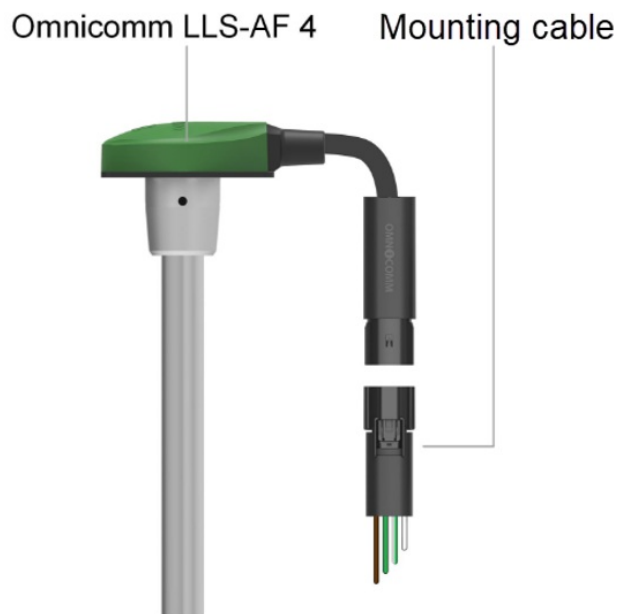
For the Omnicomm Terminals:

- Please select Frequency-based output in range 30...1053 Hz.

Installation and Connection

Installation and Connection

1. Put the mounting point gasket (included in the kit) on the Omnicomm LLS sensor measuring probe
2. Put the Omnicomm LLS-AF 4 sensor into the tank and secure it:
 - when securing with rivets, use a rivet gun (riveter)
 - when securing with bolts, first put a seal (one on each bolt), a spacer and a spring washer
 - when securing onto a plastic tank with wall thickness of more than 3 mm, use the self-tapping screws and a seal (one on each self-tapping screw), included in the kit
3. Connect the Omnicomm LLS sensors to an external device as shown in the diagram:



Name of signal	Wire Color
Analog-frequency output	Green
Power plus	Brown

Calibration

Name of signal	Wire Color
Ground analog signal	Green-white
Total (minus) power supply	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

Calibration

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

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

A container may be calibrated by draining.

In case of using third-party AVL terminals, it is recommended to get output readings from sensor directly from connected AVL terminal to avoid conversion or other mistakes related to conductivity.

Calibration of the tank with Omnicomm LLS-AF 4 sensor:

1. Empty the fuel tank
2. Connect the sensor to a PC according to the diagram in the [Setting](#) section
3. Run the Omnicomm Configurator program on your PC. Select "Tank calibration" operating mode

Calibration

Omnicom Configurator (PC):

Liters	Sensor #255 U = 0.05V stable
250	5
230	4.87
210	4.35
190	4.1
170	3.95
150	3.56
130	3.12

Calibration table export

Calibration table import

Calibration table chart

Clear the table

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 the setup.

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 with an amount of fuel equal to the flow interval

Filling 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 “Liters” column will display the filling volume equal to the predefined flow interval.

The “Sensor” column will display the value equal to the filling volume.

8. Press “Add line”

9. Repeat items 6, 7 and 8 according to the number of control points. The

Sealing

recommended minimum number of control points is 20

10. Press the “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 “Ex-port” window will open. Specify the Omnicomm LLS sensor number to display in Omnicomm Online

The calibration of a container with multiple LLS-AF sensors is performed separately for each sensor. To import a vehicle profile with multiple LLS-AF calibration tables into Omnicomm Online:

1. Perform the calibration process for each LLS-AF sensor
2. Export the calibration tables into an Omnicomm Online file (.xml) separately for each sensor. During the export, specify different numbers for each LLS-AF 4, starting from 1. Possible options: from 1 up to 4
3. Import the calibration tables into the terminal. In the terminal settings section “Fuel level sensors”, set the required number of sensors and select the “LLS-AF” sensor type
4. Export the vehicle profile from the terminal
5. Import the vehicle profile into Omnicomm Online

Sealing

For Omnicomm LLS sensors, the bolt or the self-tapping screw and the connection may be sealed as shown below:



1. Install the bolt or the 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

Install the seal-tie on Omnicomm LLS-AF 4 connector:



1. Connect Omnicomm LLS-AF 4 connector to the mounting cable until it clicks
2. Run the flexible part of the seal through the connectors
3. Run the flexible part of the seal through the hole in the seal body
4. Tighten up the connection
5. Cut off the extended section of the flexible part of the seal

Appendix. List of Equipment for Omnicomm LLS-AF 4 Fuel Level Sensors Installation

Appendix. List of Equipment for Omnicomm LLS-AF 4 Fuel Level Sensors Installation

Nº	Name	Quantity
1	Bimetal core drill \varnothing 35 mm	1
2	Core drill shank	1
3	Metal drill \varnothing 7 mm or \varnothing 4 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 when UNU is used)	1
12	Measuring container	1
13	Fuel	
14	Calibration container	1

Appendix. List of Equipment for Omnicomm LLS-AF 4 Fuel Level Sensors Installation

№	Name	Quantity
15	Seal-tie for Molex connector	1

OMNICOMM

info@omnicomm-world.com

www.omnicomm-world.com