OMNICOMM

Omnicomm LLS 30160, LLS-AF 4 Fuel Level Sensors

User Manual

Omnicomm Configurator 6

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Contents

Omnicomm LLS 30160, LLS-AF 4 Fuel Level Sensors

General Information

This User Manual is designed for Omnicomm LLS 30160 and Omnicomm LLS-AF 4 fuel level sensors.

Omnicomm LLS 30160 is a fuel level sensor with RS-232 and RS-485 interfaces.

Omnicomm 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.

Specifications

Parameters	Value	
	LLS 30160	LLS-AF 4
Power supply voltage, V	7 – 75	7 – 45
Power consumption, W	0,4	Typical – 0,6 Maximum – 0,9 During a short-circuit on an analog output – 1,6
Measurement range, mm	0…700, 1000, 1500, 2000, 2500, 3000	0…700, 1000, 1500
Basic reduced error of measurement of the sensor, %	±1	
Ambient temperature, °C	From -40 to +80	
Limit temperature, °C	-60 and +85	
Relative humidity at 25 °C (without moisture conden-sation), %	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	

Specifications

Parameters	Value	
	LLS 30160	LLS-AF 4
Operating mode	Continuous	
Internal filter size	From 0 to 30	
Measurement time period, s	1	
Overall dimensions, cm	78x74x(24+length of the measuring probe)	
Weight, kg	Not more than 2	
Average service life, years	8	

Omnicomm LLS 30160	
Output interface for measured values	RS-232, RS-485
Programmable interface transmission rate, bit/s	1200, 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, ℃	From -40 to +80

Specifications

Omnicomm LLS 30160	
Absolute error in temperature measurement within the entire temperature measuring range, ℃	±2

| Omnicomm LLS-AF 4	
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
Minimum output signal frequency, Hz	30…1900
Maximum load current at the frequency output in the "open collector" mode, mA	300

Omnicomm LLS-AF 4	
Resistance of the internal "pull-up resistor" to positive voltage supply, Ohm	1500

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:

Front view   Left view   Top view
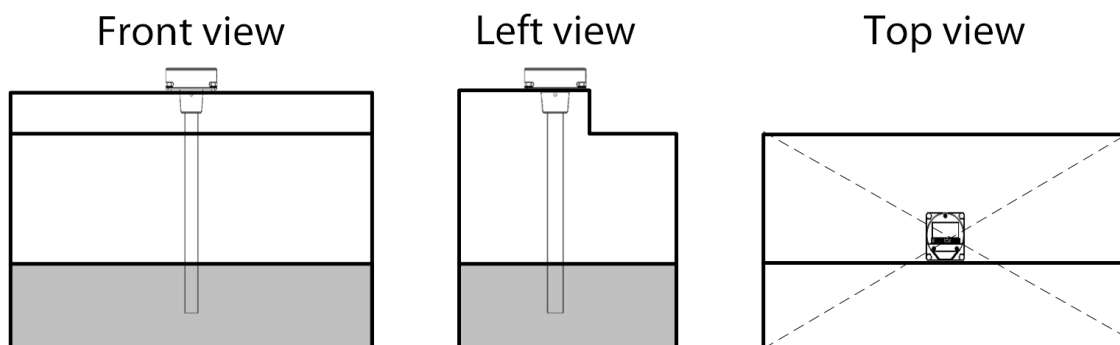
- When installed, the sensor should not be in contact with reinforcement ribs and existing equipment inside the tank

- Installing two sensors in one fuel tank allows to significantly reduce the de-pendence of the fuel level on the vehicle inclination angle:

Top view
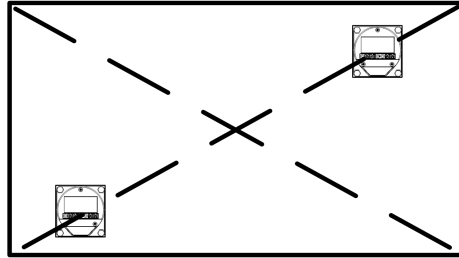
2. Steam out the tank to comply with safety regulations

3. Drill out the central bore using a bimetal core drill (or hole saw) ø35 mm

4. Drill out four mounting holes according to the diagram:
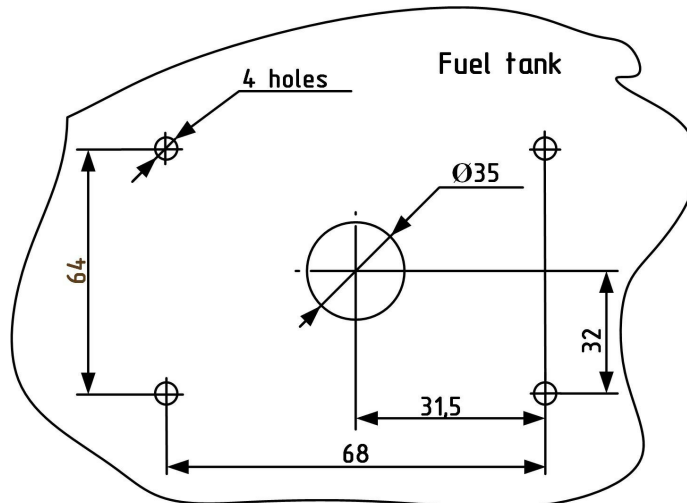
The mounting hole diameter depends on the material of the tank:

- ø 4 mm – for metal tanks with wall thickness over 3 mm (cut M5 thread)

- ø 7 mm – for plastic and metal tanks with wall thickness up to 3 mm (for rivets)

- ø 4 mm – for plastic tanks with wall thickness over 3 mm

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 sensor
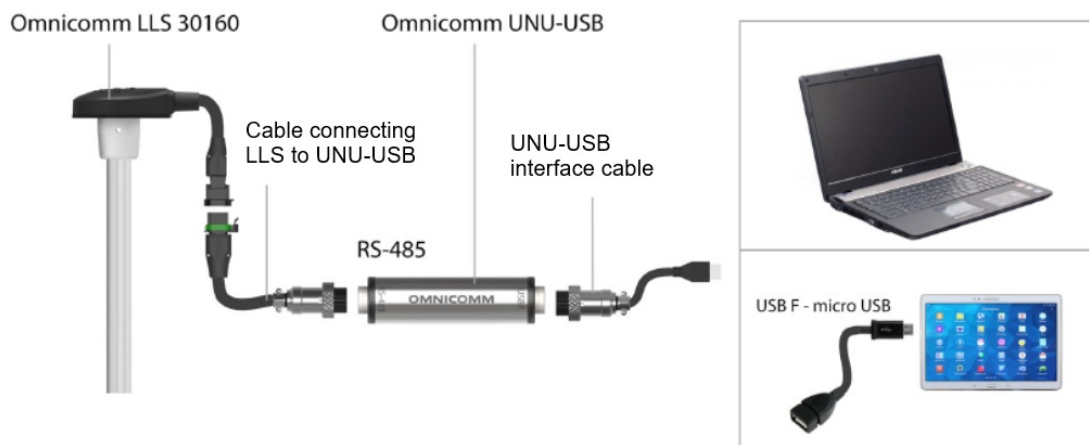
Setting

Connect the sensor to a PC or a tablet.

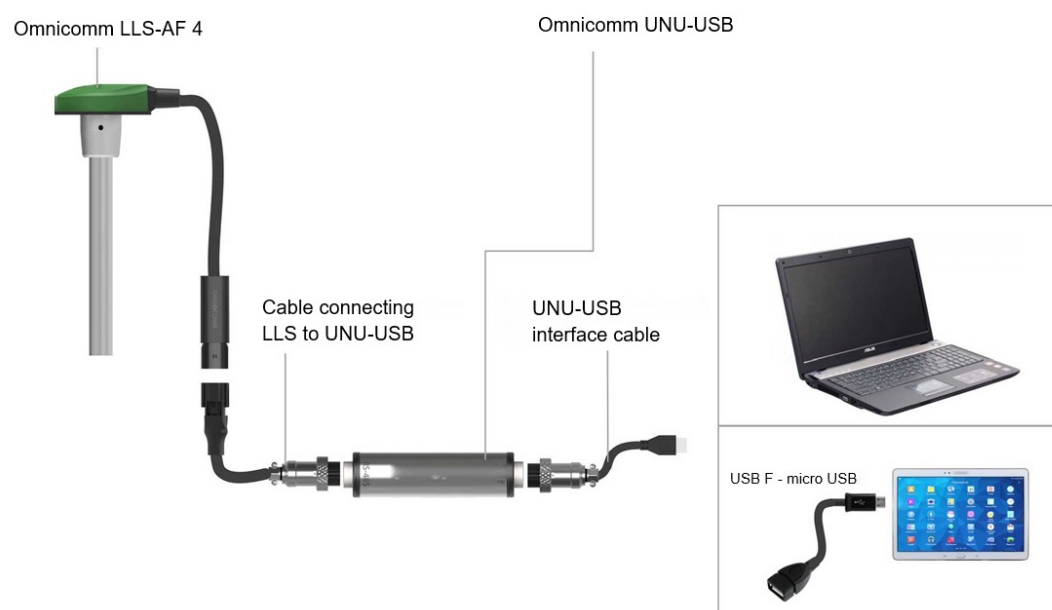Connect the Omnicomm LLS 30160 sensors according to the diagram:
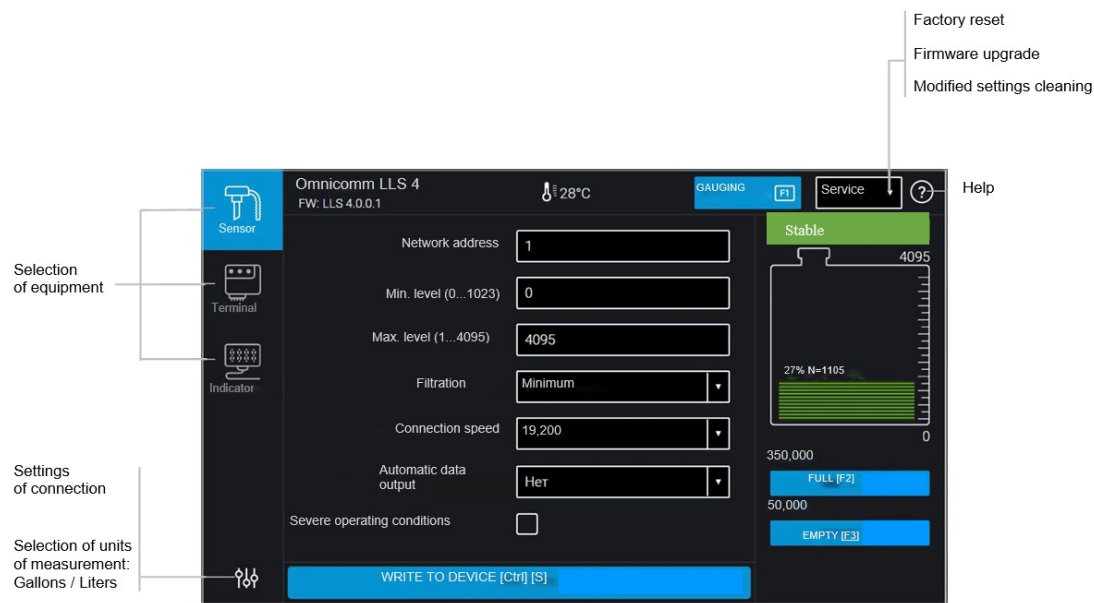

or
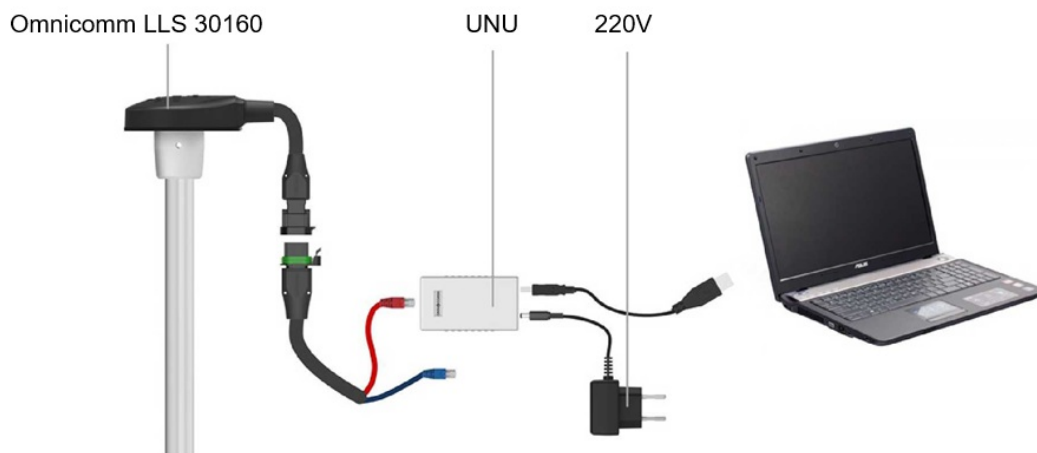
Setting

Connect the Omnicomm LLS-AF 4 sensors according to the diagram:

Run the Omnicomm Configurator program on your PC or tablet.
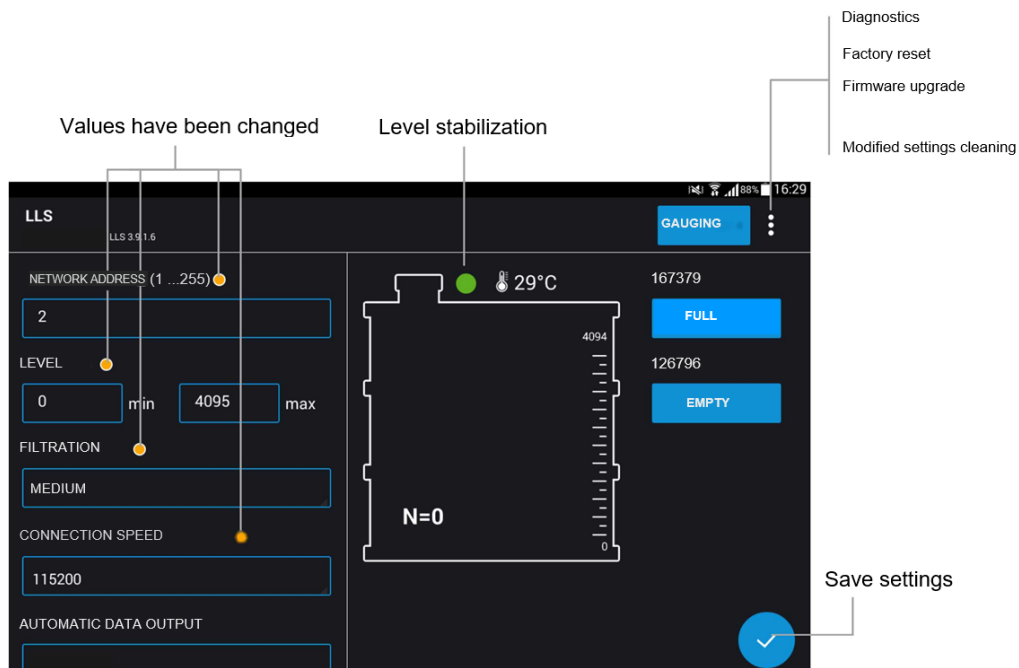
Setting

Omnicomm Configurator (PC):

The fuel level value is displayed without filtering

Omnicomm Configurator (Android):

Values have been changed

Level stabilization

Diagnostics

Factory reset

Firmware upgrade

Modified settings cleaning

Save settings

"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 "Write to Device" button

Omnicomm LLS 30160 Sensor Setting

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

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

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

"Filtration" – set the output signal filtration parameters as follows:

- "None"– no filtration is performed. This option is used, when the filtration is carried out by an external device.

- "Minimum"– this filtration is used in stationary fuel storages and non-mobile machinery

- "Medium"– this filtration is used when the vehicle operates in normal road conditions

- "Maximum"– this filtration is used when the vehicle operates in severe road conditions

"Automatic data output"– select:

- "No output" – no automatic data output (without request) is performed

- "Binary" – automatic binary data output

- "Character" – automatic character data output

- "Data output interval" (1 to 255 seconds) – set the automatic data output interval

The automatic data output mode may be used with no more than one Omnicomm LLS 30160 sensor connected to one interface.

"Severe operating conditions" mode – switch on to enable additional filtration of measurement values that takes rough working conditions into account.

"Data rate" – select the rate of data exchange with an external device. Default value – 19,200 bit/s.

Omnicomm LLS-AF 4 Sensor Setting

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

"Filtration" and "Severe operating conditions" parameters can be set similarly to Omnicomm LLS 30160 sensors.

"Type of signal" - choose between "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. Between 100 and 1053 Hz, when connecting to Omnicomm terminals. 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".

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 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:

Omnicomm LLS 30160 Sensors:
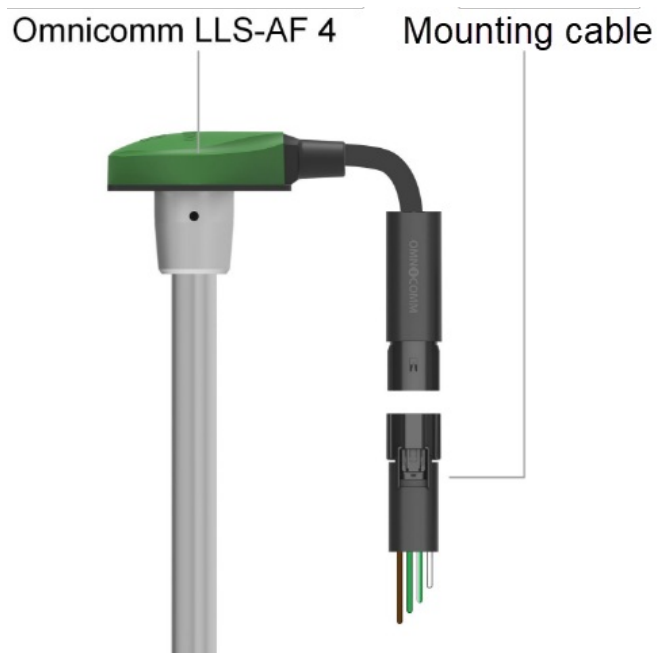
Installation and Connection
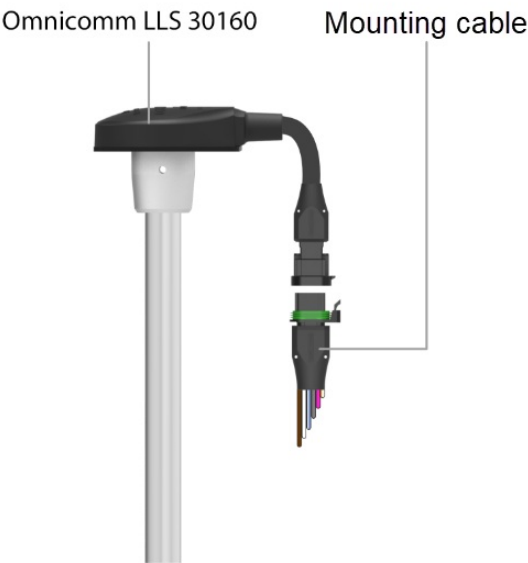
Functions of the mounting cable wires

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

Installation and Connection

Датчики Omnicomm LLS-AF 4:

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

Multiple Omnicomm LLS 30160 sensors must be connected side-by-side via the RS-485 interface.

Calibration

Calibration of the fuel tank is necessary to verify the conformity of the digital code issued by the Omnicomm LLS 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.

The calibration of a container with multiple Omnicomm LLS 30160 sensors is performed similarly to the calibration with one sensor. Before the calibration process, add the necessary quantity of sensors and specify the network addresses. Calibration is performed for all sensors at the same time. Connect multiple sensors to a PC or tablet using a KTZ splitter.

Calibration of the tank with one Omnicomm LLS sensor:

1. Empty the fuel tank

2. Connect the sensor to a PC or tablet according to the diagram in the Setting section.

3. Run the Omnicomm Configurator program on your PC or tablet. Select "Tank calibration" operating mode

Calibration

Omnicomm Configurator (PC):

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.

Calibration

Omnicomm Configurator (Android):

If during calibration the Omnicomm Configurator (Android) does not display all the connected Omnicomm LLS sensors, select "Refresh the list of devices" in the menu.

4. Set the flow interval in liters

> Perform filling using a measuring container or under control of a fluid flowmeter with a predefined interval. The container must have a metrological calibration test certificate.

5. Press the "Start/continue calibration" button

6. Fill with an amount of fuel equal to the flow interval

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

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 "Export" 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 Omni-comm Online:

1. Perform the calibration process for each LLS-AF sensor

Calibration

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

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

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

№	Name	Quantity
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 when UNU is used)	1
12	Measuring container	1
13	Fuel	
14	Calibration container	1

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

| №	Name	Quantity
	For Omnicomm LLS 30160	
15	Rotary seal	1
16	Seal wire 00.7 mm	up to 0.8 m.
	Для Omnicomm LLS-AF 4	
17	Seal-tie for Molex connector	1

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

3. Enter the seal and cover numbers in the report

Put the rotary seal on Omnicomm LLS 30160 connector:
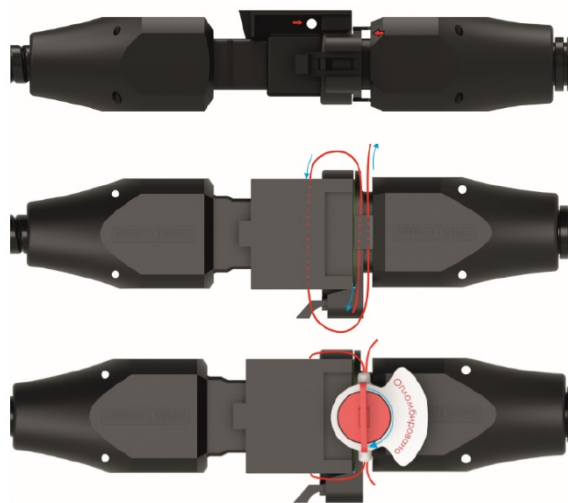
1. Put the sealing wire through the holes in the connectors and in the rotary seal

2. Twist the seal tab to tighten the wire

3. Tear the seal tab off

Sealing

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

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