RS485. Connection of ULM-31A Non-Contact Level Sensor

User Manual

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## Contents

Necessary Tools, Devices and Materials ........................................... 3  
General Information ................................................................................... 4  
Connection ULM-31A Sensor to Galileosky Tracking Devices .............. 6  
Setting the Tracking Device to Cooperate with ULM-31A .................... 8  
Setting up the Monitoring Software ......................................................... 11  
Appendix 1 .................................................................................................. 13
Necessary Tools, Devices and Materials

To connect the Galileosky tracking device (hereinafter – the tracking device) one should have:

1. Electrical tools.
2. Windows-based computer with the installed program of configuration of Galileosky tracking devices – “Configurator”. You can download the latest version of it here https://galileosky.com/podderzhka/programmyi.html
3. Installation kit of ULM-31А level sensor.
General Information

Galileosky tracking devices (hereinafter – tracking devices) have a function that enables to work with non-contact level sensors like ULM-31A sensor. You can find more information about the products and technical details of level sensors in the manufacturer’s site http://www.limaco.ru/

Operating principles of the device are the following – the level sensor is set on the tank roof, on a faucet flap. The device measures distance L from the aerials parabolic reflector to the surface of the product through the hole in the flap. Then it makes some calculations by formula U=H-L with H being the height of a tank. Datum surface of a level sensor measuring range is the lowest level of the sensor’s aerial reflector. (Pic. 2)
ATTENTION! Such functionality is implemented in the tracking devices by means of Easy logic technology (https://galileosky.com/products/easylogic.html). It is necessary to use tracking devices with support of Easy Logic. You can find out whether the tracking device supports Easy Logic or not in the following ways:

- in tracking device’s specification there should be abbreviation (Al) or sticker on the back of the device should have abbreviation (2) near IMEI (Pic.3).
- send Hardversion command to the tracking device, if you receive numbers different from zero after comma in response, algorithms are supported (example of reply: HARDVERSION=21,8243)

Firmware version should be not less than 229.15 for 4.x, 5.x; 1 for 7.0 and 12.10 Base Block tracking devices.

Pic. 3
Defining tracking device support of Easy Logic by the sticker
Connection ULM-31A Sensor to Galileosky Tracking Devices

Non-contact radar level sensor ULM-31A can be connected to the Galileosky tracking devices equipped with digital interface RS485 (4x, 5x, 7.0, Base Block versions) in accordance with the schemes presented in picture 4.

To cooperate with Galileosky tracking devices a unique address should be set with RS485 bus. The address is set by DIP switches on back plane of level sensor from 1 to 247 (Pic. 5). Before connecting, the level-sensor must be configured in ULM-Configuration software (provided together with the sensor).
RS485. Connection of ULM-31A Non-Contact Level Sensor
(version 3 dated April 5, 2018)

Pic. 5
Setting contacts of a tracking device connectors and the address DIP switches of ULM-31A level sensor
Setting the Tracking Device to Cooperate with ULM-31A

1. Connect ULM-31A to the tracking device;
2. Connect Galileosky tracking device to the computer and launch the Configurator;
3. Go to the tab “Settings” -> “Track” and select “Dynamic” parameter for the “Archive structure mode” (Pic. 6);

**ATTENTION!** For tracking devices Galileosky Base Block and 7.0 versions the setting of dynamic structure mode is not needed.

4. Go to the tab “Settings” -> “Protocol” and tick the options “User Tag 0” – “User Tag 5” (Pic. 7);

5. Go to the tab “Settings” -> “Digital inputs” and select “Disabled” for the parameter “RS485[0] peripheral type” (Pic. 8);

6. Save the settings in the tracking device clicking the “Apply” button;
7. Go to the tab “Commands” and type the command “script galileosky/ULM31A1”. As the downloading is finished the algorithms presence can be checked with the help of “script” command (Pic. 9).

**ATTENTION!** Algorithms are downloaded from the server that’s why a working SIM-card with GPR connection should be set in the tracking device.

8. Go to the tab “Troubleshooting”, tick “data transmission” and wait till the algorithms are installed by the tracking device: «GPRS.c.7gis.ru.Script download. Complete» (Pic. 10).

9. Go to Device tab and check the Easy Logic parameter and make sure it includes information on the algorithm (Pic 11).
10. Go to the tab “Commands” and with SETADDRESS command send the level sensor address on RS485, from which the data will be processed (Pic 12).

**ATTENTION!** Not more than 247 sensors can be connected to RS485 bus. Algorithm can work with only one sensor at a time. In case you need to get data from another level sensor connected to RS485 bus it is necessary to send the needed address with SETADDRESS command.

11. On the tab “Troubleshooting” select the option “Algorithm and script diagnostics”. In case you connected to the sensor the troubleshooting messages will not be received. In case there is a problem with receiving data from the sensor there would be shown messages presented on Picture 13.
RS485. Connection of ULM-31A Non-Contact Level Sensor
(version 3 dated April 5, 2018)

Setting up the Monitoring Software

Galileosky tracking device completes the polling of ULM-31A level sensor every 10 seconds, after that data transmission from ULM-31A sensor to the monitoring software is carried out in accordance with Galileosky protocol and doesn’t require extra adaptation. The data from the sensor are transmitted in user tags “User Tag 0 – User Tag 5” in the following order:

- Tag 0 - measures distance 1
- Tag 1 - measures distance 2
- Tag 2 - measured signal swing
- Tag 3 - testing measuring set (successful if less than 50)
- Tag 4 - measurement status
- Tag 5 - connection condition, in case of a connection mistake it will return the mistake number

Launch the monitoring software and make sure ULM-31A data are received by the software (Pic. 14).

In case of necessity you can create a free sensor in accordance with recommendations of monitoring software manufacturer (Pic. 15). The sensor transmits the information about the product level U (Pic. 2) which is measured by formula:

\[ U (\text{mm}) = \frac{(\text{Tag 1} \times 65536 + \text{Tag 0})}{10} \]
Connection of ULM-31A level sensor to the Galileosky tracking device is completed, the device is ready for use.

RSA “Galileosky”, LLC produces satellite monitoring equipment for GPS and GLONASS real time vehicles monitoring. The tracking devices determine the mobile object location recording the time and route as points with geographical coordinates and send the data to the server to be further processed and sent to the traffic controller panel.

In addition, a number of other vehicle parameters are recorded: the state of analog and discrete inputs of the tracking device and the state of digital interfaces.

The tracking devices can be used in any vehicle.
Appendix 1

Commands to work with algorithms.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMD 1</td>
<td>Collects the data from 119 registers beginning with 298. If successful it sends the collected data and a temporary address mark in 5 text messages.</td>
</tr>
<tr>
<td>CMD 2</td>
<td>Collects the data from 125 registers, beginning with 542. If successful it sends the collected data and a temporary address mark in 5 text messages.</td>
</tr>
<tr>
<td>WRITEREG register number, value</td>
<td>Records a value in the register’s number.</td>
</tr>
<tr>
<td>READREG register number</td>
<td>Reads the value from register number.</td>
</tr>
<tr>
<td>SETADDRESS number</td>
<td>Sets the address of the connected sensor. The number is set in decimal format in a range between 1 and 247.</td>
</tr>
</tbody>
</table>

Results of CMD1 and CMD2 commands are transmitted by the tracking device to the monitoring software (Pic. 17)

Pic. 16
Example of completing executive commands

Pic. 17
Example of a response to a command from Wialon