Service. Using filters to count passengers by presence sensors
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To work with filters for data processing the following tools, materials and equipment are required:

1. Electrical tools.
2. The Galileosky tracking devices of following versions:
   - Galileosky Base Block with firmware 19.1 or later;
   - Galileosky 7 with firmware 19.1 or later.
3. A computer running Windows with the installed service software for configuration of Galileosky tracking devices - "Configurator" of version 4.16.0 or later. We recommend you to install the latest version of the service software from our site https://galileosky.com/podderzhka/programmyi.html
Service. Using filters to count passengers by presence sensors

General Information

Satellite monitoring tracking devices (hereinafter - tracking devices) Galileosky Base Block and Galileosky 7.0 are fitted with filters to process the data received by the tracking device (Pic. 1).

This functionality allows performing mathematical transformations, changing the scales of the values and, as a result, sending the finished result in the required units of measurement to the monitoring software.

Attention! To use the mentioned functionality install and run the service software "Configurator" version 4.16.0 or later.

"Filters" can be used to count the number of passengers in the vehicle according to the signals received from the presence or seat belts sensors.
Sensors connection to the discrete-analog inputs of the tracking device

Presence sensor* and seat belt sensor** connection to the discrete-analog input of the tracking device can be done in accordance with the schemes, demonstrated in Pictures 2 and 3 respectively.

* Presence sensor is an analog limit switch, which opens or closes when it is exposed to a certain weight;
** Seat belt sensor is a limit switch, which opens or closes when the seat belt is fastened.
On these schemes limit switches SW1-SW14 are connected through the resistors R1-R14. If the limit switches work properly, the level of voltage supplied to the input of the tracking device changes. The measured voltage can be interpreted as the number of activated sensors and using these data, you can count the passengers.

The R15 resistor is an additional terminating resistor.

The VR1 stabilizer is necessary to stabilize the 12V voltage level in the sensors circuit, that helps to avoid the mistakes in calculation in the changing voltage conditions.

Attention! According to this scheme, we recommend you to connect not more than 14 sensors to one discrete-analog input of the tracking device. If you connect more sensors, it can lead to mistakes in calculation of the number of activated sensors.

The input, which is used for connecting sensors, must be configured to measure the mean value. For this purpose run the Configurator, go to the "Settings" tab "Ins/Outs" and configure chosen input in accordance with Picture 4.

![Pic. 4](image)

Discrete-analog inputs setting to measure the mean value.
Filter setting

To interpret the voltage measured in the input and to determine the number of activated
sensors the Filters tab of the Configurator software can be used.

Let's consider the setting of the “TarFilter”.

1. Connect Galileosky tracking device to the PC and launch the Configurator.
2. Go to the Filter tab of the Configurator and drag the following elements to the
 graphical plot area:
   - TarFilter;
   - Get Parameter;
   - Save Parameter.
3. Click on "Get:" and specify the variable, which value needs to be converted.
4. Click on "Saved to:" and specify the variable at which the value will be converted.
5. Then connect the filter elements with arrows. The result of the configuration is shown in
   Picture 5.

6. Click on “TarFilter” and put the voltage calculated on the input and the corresponding
   number of activated sensors. To ensure more accurate filter work we recommend
   measuring the voltage level for any possible number of sensors in ascending order
   beginning with zero value. An example of filling this table is shown in Pictures 6-8.
After all possible sensors condition are put into the table, it can look like as follows (Pic. 9):

Pic. 6
Calibration table. Measuring of zero value.

Pic. 7
Calibration table. Measuring of the first value.

Pic. 8
Calibration table. Measuring of the second value.
Attention! To avoid incorrect calculation the data received from sensors should be put into the calibration table in ascending order.

7. Name the filter and save it in local PC or in the server if you have user account to work with Easy Logic algorithms (Pic. 10). After you saved the filter you still can edit and remotely send it to Galileosky tracking device.
8. Upload the filter to the tracking device by clicking "USB upload" (Pic. 11);

9. Ensure that the data received from sensors are calculated in accordance with filter. To do it compare the value from the input, which was chosen for recording the results of filter work with the real number of activated sensors in the circuit (Pic. 12).

10. Configure the main packet for sending calculated data to the monitoring software.

Setting the filters to work with Galileosky tracking device is completed, the tracking device is ready for operation.

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.