Temperature and humidity sensor

ADM31

CONNECTION INSTRUCTIONS

Version 1.0

TECHNOTON

ADVANCED VEHICLE TELEMATICS

Contents

1 Purpose and General Information

This document contains information on specifications of ADM31 temperature and humidity sensor, as well as recommendations on its employment together with CANUp 27 Pro 3G Telematics gateway based on S7 Technology, within the Telematics system.

ADM31 temperature and humidity sensor (further on — ADM31) is designed for wireless monitoring the ambient temperature, level of illumination, level of humidity and detection of magnetic field in Vehicles or fixed facilities (refrigerators, insulated vans etc.).

Figure 1 — The external view of ADM31 temperature and humidity sensor

Key features of ADM31 sensor:

- Wireless transmission of data via **Bluetooth Low Energy** channel simultaneously to many receiving devices (Android-based smartphones/tablets, the Telematics terminal, the display in the driver's cabin);
- Operation within the Telematics system or independent operation;
- Transmission of data on current parameters at one time: temperature, humidity, illumination and magnetic field (Hall sensor);
- No signal cable– quick installation without a need of electrical connection;
- No signal cable — explosive and fire safety of the sensor is ensured without using additional modules of explosion protection;
- No signal cable – increase resistance to sabotage;
- Saving and storage of up to 19700 parameters in the non-volatile memory;
- Option to employ the sensor as BLE-tag of attached equipment;
- High digree of the sensor casing protection from dust and moisture (IP65);
- Replaceable battery.

IMPORTANT: You can find detailed information on ADM31 temperature and humidity sensor in its Operation manual.
The freely distributed ADM BLE-Configurator mobile application serves for wireless sensor configuration using a smartphone/tablet, as well as for reception of data on the current temperature, illumination, humidity presence/absence of magnetic field.

2 Main technical characteristics of ADM31 sensors

Table 1 — Main technical characteristics of ADM31 sensors

Parameter, measuring unit	Value
Wireless data interface	Bluetooth 4.1
Temperature range, °C	-30…+60
Temperature measurement error, °C	±0.5
Range of measurement of illumination, lux	0.01…83000
Humidity measurement range, %	0...100
Humidity measurement error, %	±4
Hall sensor type	Discrete, omnipolar
Radio interface frequency band, MHz	2400.0…2483.5
Transmission unit power (Tx Power), dBm	+4
Receiver sensitivity (Rx Power), dBm	-96
Number of messages saved in the non-volatile memory, pcs.	19700
Maximum working range in conditions of direct visibility, m	50
Replaceable battery type	CR2450
Period of operation using one battery, years, not less than	1
Dust and moisture protection class	IP65
Casing material	MABS
Overall dimensions, mm, not more than	76 (52 without flange) x 54 x 16
Mounting seat dimensions, mm, not more than	76 x 54
Weight, kg, not more than	35

3 Employment of ADM31 wireless sensors together with CANUp 27 Pro 3G Telematics interface

3.1 Preparation of ADM31 for operation

The lithium power battery for ADM31 sensor is supplied disconnected, in order to save its charge. To set the sensor into the operational mode (to activate it), you need to open its transparent cover and extract the insulating laying which is located under the battery. After that, in **no more than 30 s** ADM31 sensor will automatically switch into the operational mode.
ADM31 wireless sensors transmit data without the need of linking with the receiving device and acknowledgement of data reception. Data in the form of Advertising packets are transmitted automatically in the continuous mode with 15 s periodicity, by default. The data packet composition of ADM31 complies with ADM-BLE protocol.

IMPORTANT: To check the sensor activation, you may use the freely distributed ADM BLE-Configurator. You can install it from Google Play.

During the ADM31 sensor preparation for operation it should be noted that:

- Transparent sensor cover must be clean, because in case it is dirty, it may cause reduced accuracy of temperature and humidity measurement.
- It is not allowed to use abrasive agents and organic solvents to clean the sensor casing.
- The sensor should not be mounted close to heavy metal structures, because in this case, the data transmission range via the BLE radio channel may be reduced.
- To fix the sensor in the mounting location, we recommend to use two self-tapping screws or the two-sided Scotch tape.
- Before finally fixing the sensor, you need to check the level of the signal received from the sensor in the location where the terminal is mounted:
  - the level of the signal -100 dBm is critically low; in case of such a level of the signal, we recommend to change the sensor mounting location;
  - the level of the signal -70 dBm is considered normal for stable operation;
  - the level of the signal from -85 dBm to 90 dBm is considered sufficient for operation, but problems may occur, in case the conditions become slightly worse.
- The sensor is supplied with standard factory settings. If they are suitable for a specific application, there is no need for the additional sensor configuration using ADM BLE-Configurator.
- By default, the data transmission period set in the sensor is 15 s and all its inbuilt sensors are active except the Hall sensor which is activated separately. We recommend to activate the Hall sensor only in case you need it, because its use entails increased power consumption.

3.2 CANUP 27 Pro 3G connection for configuration to PC

IMPORTANT:
1) Before use, we **highly recommend to download** from the Technoton document centre and study the operation documentation for:
- CANUp 27 Telematics gateway;
- ORF-Monitor 4* Telematics service;
- CAN j1939/S6 Telematics interface.

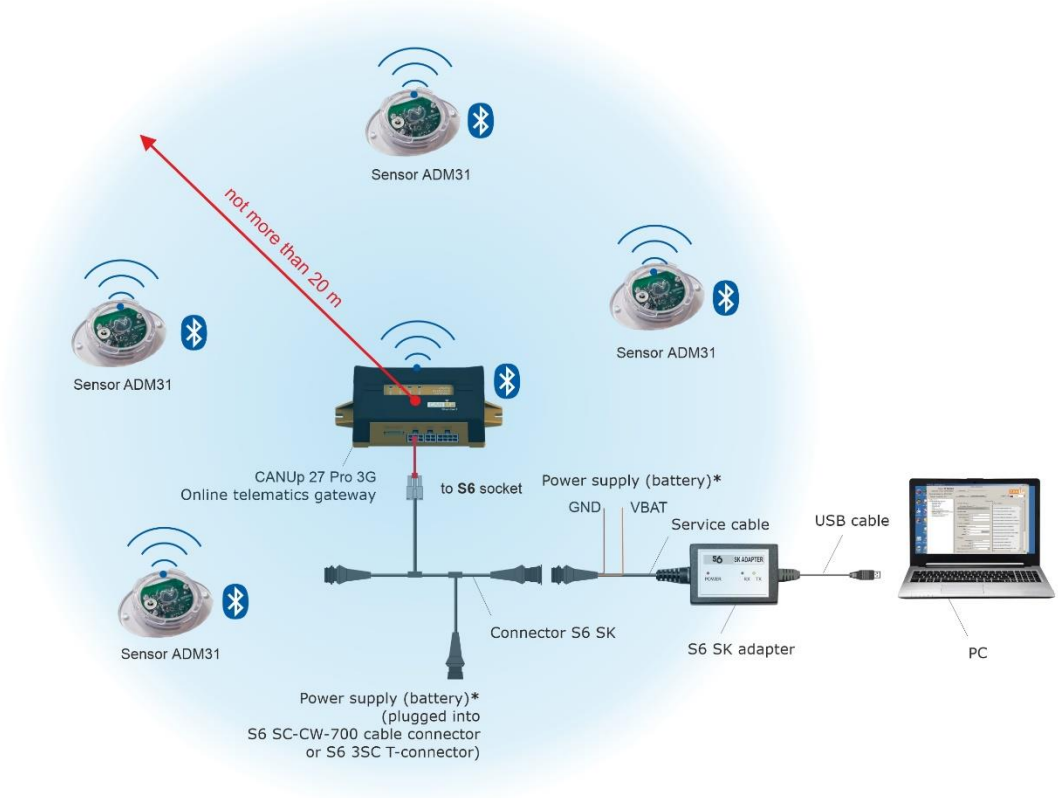
2) For work with ADM31 temperature and humidity wireless sensors, you need to use the Telematics gateway of CANUp 27 Pro 3G model with the firmware version **from 4.09** and higher.

CANUp 27 Pro 3G Telematics gateway is configured via K-Line interface (ISO 14230) for joint operation based on S7 Technology with ADM31 wireless sensors, in accordance with the diagram provided in Figure 1.

For configuration of CANUp 27 Pro 3G it is required to connect to PC with S6 SK service adapter. To run S6 SK is required to install Driver USB and special software Service CANUp (version **from 5.01** and higher).

Note — Installation file of software has the view as: Service_CANUp_X_X_Setup.exe. X_X corresponds to the version of software.

Description of S6 SK and requirements for PC can be found in CAN j1939/S6 Operation manual.



* For connecting power supply (battery) you can choose any of marked places.

Figure 1 — Diagram of connection to the PC of CANUp 27 Pro 3G which is to be configured

* Used in this document as an example. Work with other Wialon-based services is acceptable.

ATTENTION: To avoid any communication faults between CANUp 27 Pro 3G, ADM31 sensors and PC, make sure there are no sources of electromagnetic interference close to the workplace (running electric motors, welding equipment, high-power transformers, power lines, etc.).
Prior to connecting CANUp 27 Pro 3G to a PC, it is necessary to turn off electrical circuits of the Vehicle. To do this, use the battery switch or remove the battery terminals.

CANUp 27 Pro 3G connection to PC per the connection schemes in the following order:

1) Connect the adapter to CANUp 27 Pro 3G.
Plug of service cable of adapter is connected to S6 SK connector to **S6** socket. Power supply of CANUp 27 and service adapter can be either done through using free plug of S6 SK connector or using wires of service adapter (see figure 1).
2) Connect the adapter with USB cable to a free USB-port of your PC.
Note — Adapter can also be connected to USB-port of your PC after turning vehicle's electrical system ON and starting the software.
3) Connect power supply and ground wires to vehicle electrical system or battery.
4) Power on the vehicle (battery).

When working with CANUp 27 Pro 3G, Service CANUp software operates with data (PGN and SPN) from the S6 Database, detailed parameters are placed at the following web site http://s6.jv-technoton.com/ (to access S6 DB registration is required).

RECOMMENDATION: In case problems arise when operating the equipment, please, contact Technoton technical support service by e-mail support@technoton.by

3.3 Binding of ADM31 sensor to CANUp 27 Pro 3G Telematics gateway

Up to 4 pcs. of ADM31 wireless sensors can operate together with one CANUp 27 Pro 3G Telematics gateway based on S7 Technology (see the document CANUp 27 Telematics gateway. Operation manual). To bind ADM31 sensor to the Telematics gateway in order to receive data, you are to perform the following operations:

1) Select the required sensor, in accordance with its MAC-address, in the submenu of S7 Base FM of Service CANUp service software from the table **Available Bluetooth Device List** (up to 15 devices currently accessible for the BLE module of the Telematics gateway). The MAC-address of ADM31 sensor is specified on the label attached to the back side of its casing (see figure 2).

Figure 2 — Identifying the MAC-address of ADM31 sensor

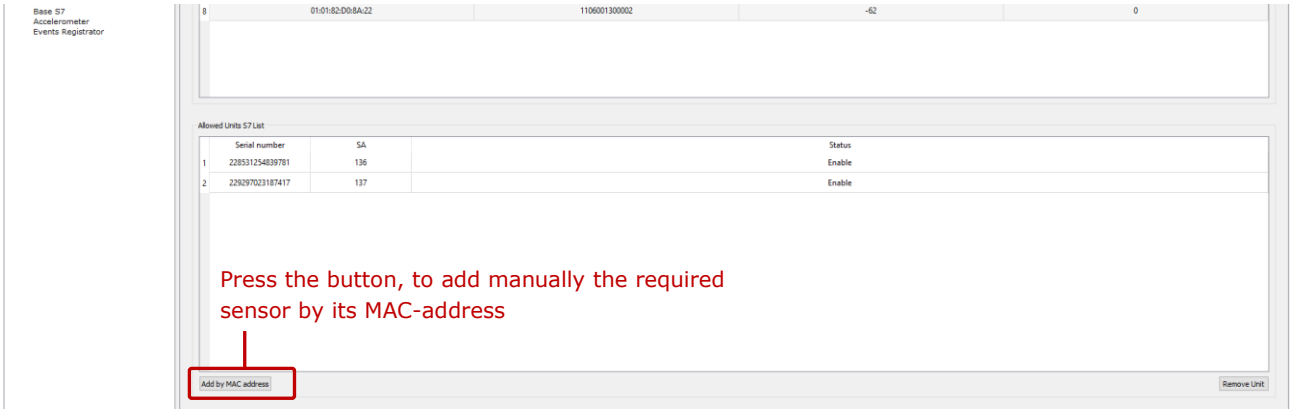
2) By drag-and-drop, copy the line with the selected sensor into the table **Allowed Units S7 List**. Each sensor is automatically assigned a unique network address (SA) from the number of vacant addresses for its identification by the Telematics gateway during its operation based on S7 Technology. Possible values of network addresses of ADM31 sensors may be assigned from the range **136…139**.

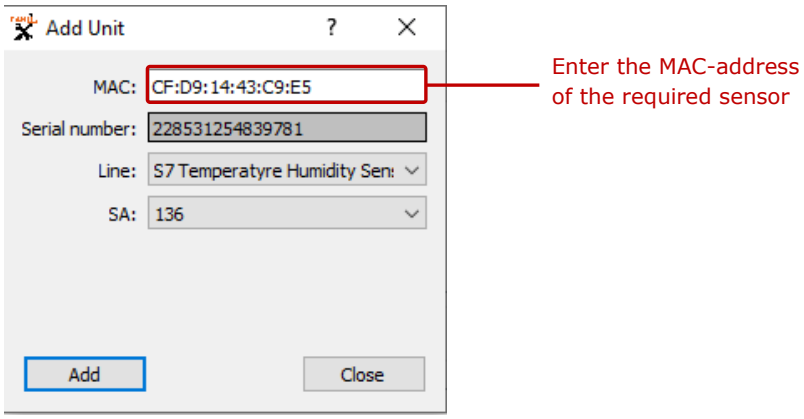
In case you need to replace the network address, click twice the line of the respective sensor. You may select a vacant network address in the window **Add Unit** that appears, choosing it from the dropdown list **SA**.

In case the required sensors are missing in the list of accessible devices, you may add them manually by pressing the button Add by MAC address and specifying the respective MAC-addreses in the window **Add Unit** (see figure 3).

The possibility to operate using S7 Technology is determined for each sensor added to the **Allowed Units S7 List**, in accordance with its accessibility status (**Enable/Disable**).

3) To complete binding the required ADM31 sensors to CANUp 27 Pro 3G Telemativcs gateway, you need to save the modified CANUp 27 Pro 3G profile settings in the Unit, in the Profile menu.





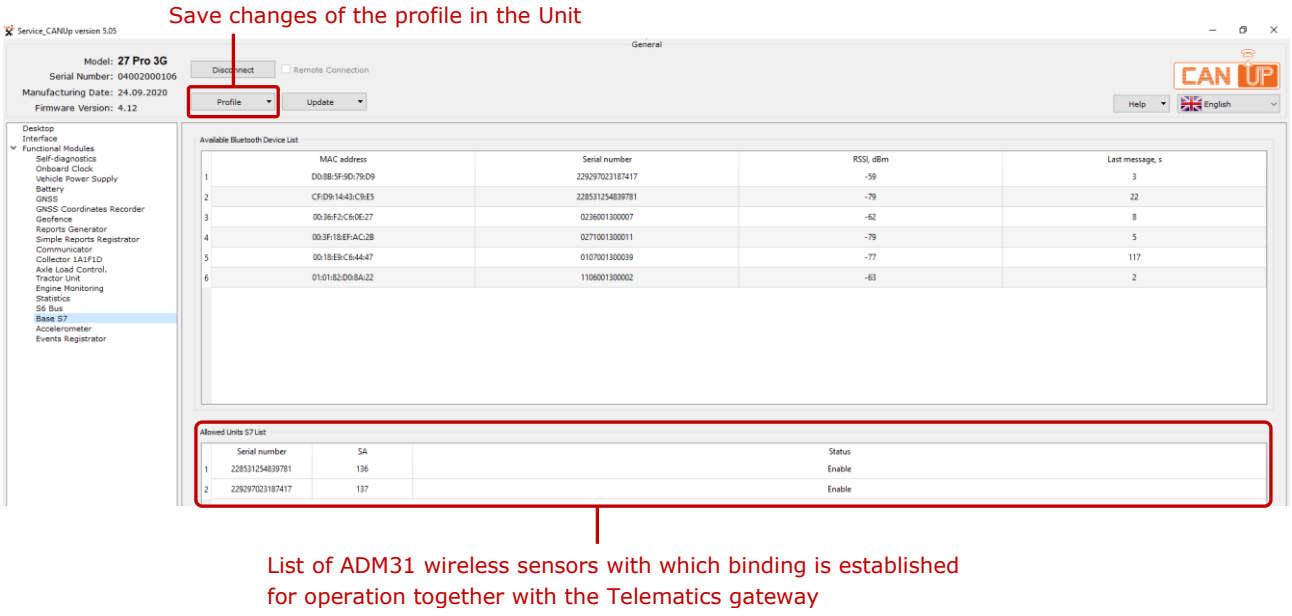


Figure 3 — Example of establishing the binding of ADM31 sensors for operation together with CANUp 27 Pro 3G Telematics gateway

3.4 Addition of data from ADM31 sensor to the Report of CANUp 27 Pro 3G Telematics gateway

To add the output data of ADM31 sensor into the Report of CANUp 27 Pro 3G Telematics gateway (see the document CANUp 27 Telematics gateway. Operation manual), you are to perform the following operations:

1) Select the **BD S6** data source in the submenu of the Reports generator FM of Service CANUp service software and add data (SPN) from the outgoing message (PGN) of the respective ADM31 wireless sensor.

The application level of the protocol of the wireless Units output messages conforms with S6 Database (see table 2).

Table 2 — Data composition of ADM31 output message

Field number	Length	Parameter	Name
Temperature / Humidity Sensor PGN 63521 (0xF821)			
1	1 byte	SPN 521492*	Software Version
2	2 bytes	SPN 167*	Charging System Potential (Voltage), V
4	1 byte	SPN 521703*	Temperature / Humidity Sensor Status
5	1 byte	SPN 521457	Temperature, °C
6	1 byte	SPN 354	Relative Humidity, %
7	2 bytes	SPN 521702	Illumination, lx
* In the process of preparation for introduction.			

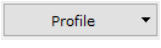
SPN values of the sensor output message may be calculated according to the formula (1), using attributes from table 3.

Parameter value = SPN Content · Factor (Resolution) + Offset (1)

Table 3 — Attributes for calculation of current values of ADM31 parameters

Parameter	Factor (Resolution)	Offset
SPN 521457	1	-
SPN 354	0.4	-50 °C
SPN 521702	1	-

2) For each SPN to be added to the Report, select the value **«S7»** from the dropdown list **Bus Marker**. Specify the network address of ADM31 sensor which is the source of SPN in the field **S6 Address (SA)** (see figure 4).

3) To complete the settings of the Telematics gateway Onboard report, you should save the modified settings of CANUp 27 Pro 3G profile in the Unit, in the menu 

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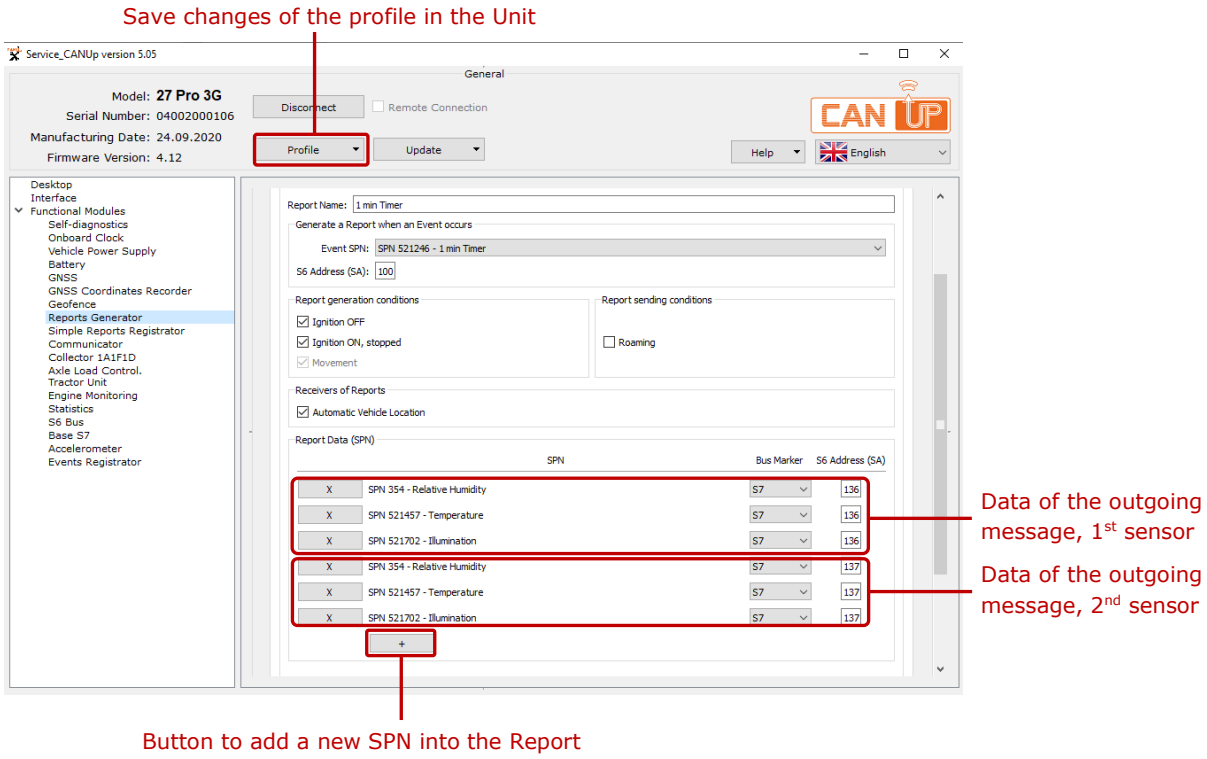


Figure 4 — Example of addition of data of outgoing messages from two ADM31 sensors into the Report of CANUp 27 Pro 3G Telematics gateway

3.5 Configuration of data transfer to the Telematics service

To configure the transfer of the Onboard report containing data from ADM31 sensor to ORF 4 Telematics service* by CANUp 27 Pro 3G Telematics gateway, you need to perform the following operations:

1) Register the Vehicle on which CANUp 27 Pro 3G gateway is mounted (see the document CANUp 27 Telematics gateway. Operation manual) in ORF 4 Telematics service in the following order:

- Connect CANUp 27 Pro 3G to the Internet in the submenu of Communicator FM of Service CANUp service software:
  - in case of using SIM card with PIN code protection, first, you have to unlock it (enter PIN code and remove the checkmark in the appropriate field);
  - enter Internet connection settings of the gateway GPRS modem (APN of mobile communication operator);
  - taking note of GPRS modem indications parameters make sure the modem is connected to Internet.

ATTENTION: For obtaining APN settings, contact service center of SIM-card provider.

- Enter settings for CANUp 27 Pro 3G with AVL Server.

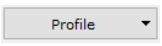
IMPORTANT: Data inserted into the fields of prefix (ID) should match with data inserted into the fields "Unique ID", they are entered during registration in the Telematics service.

- Check CANUp 27 Pro 3G authentication settings on the AVL Server to be sure that the Unit authentication is made successfully and there is connection with the AVL Server.

ATTENTION: If connection problems occur, contact Service administrator by e-mail support@technoton.by.

- In configuration of GNSS FM according to the settings of GNSS, check that built-in navigation receiver of CANUp 27 Pro 3G is working properly and receives data from satellite navigation.

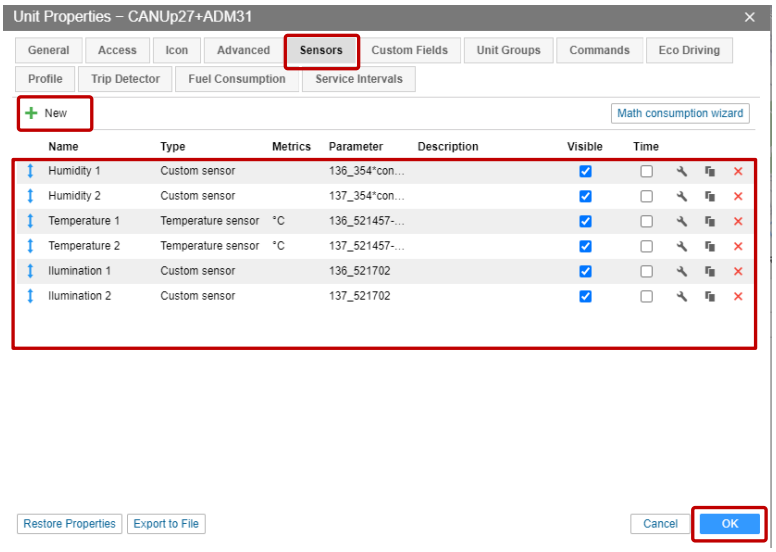
IMPORTANT: For good reception of navigation data it is necessary to **maximize the view of the sky** at the place where the CANUp 27 Pro 3G is being tested.

- Save the modified CANUp 27 Pro 3G profile settings in the 

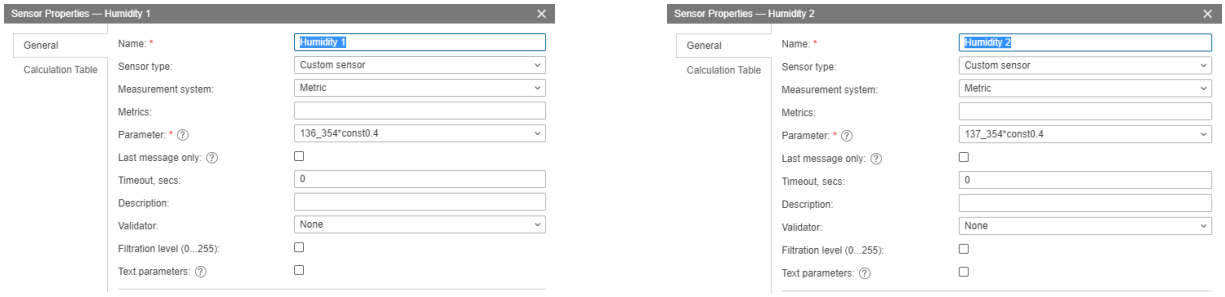
menu.

2) Having completed the Vehicle registration at ORF 4 Telematics service (see the document ORF 4 Telematics service. Operation manual), you are to create sensing elements in the **Unit Properties** window (**Sensors** tab) for ADM31 sensors which are mounted on the Vehicle. After that, enter settings of the respective monitored parameters for each of the sensing elements (**Sensor Properties** window) (see figure 5).

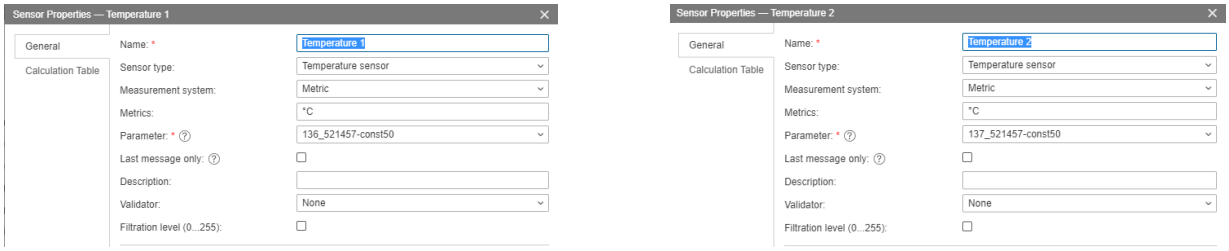
***** Used in this document as an example. Work with other Wialon-based services is acceptable.



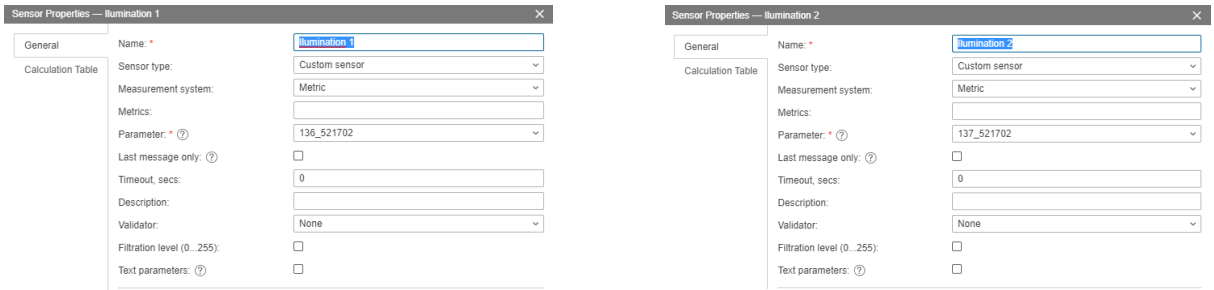
a) creation of sensing elements for the Vehicle equipped with two ADM31 sensors



b) configuration of Relative humidity sensing elements



c) configuration of Temperature sensing elements



d) configuration of Illumination sensing elements

Figure 5 — Example of configuration of monitored parameters from two ADM31 sensors in [ORF 4 Telematics service]

3) You must make sure of the correctness of the Report data displayed in ORF 4 Telematics service window (see figure 6).

If needed, you may check the data contained in the Report against the data on the display of the Android device using ADM BLE-Configurator mobile application (see figure 7).

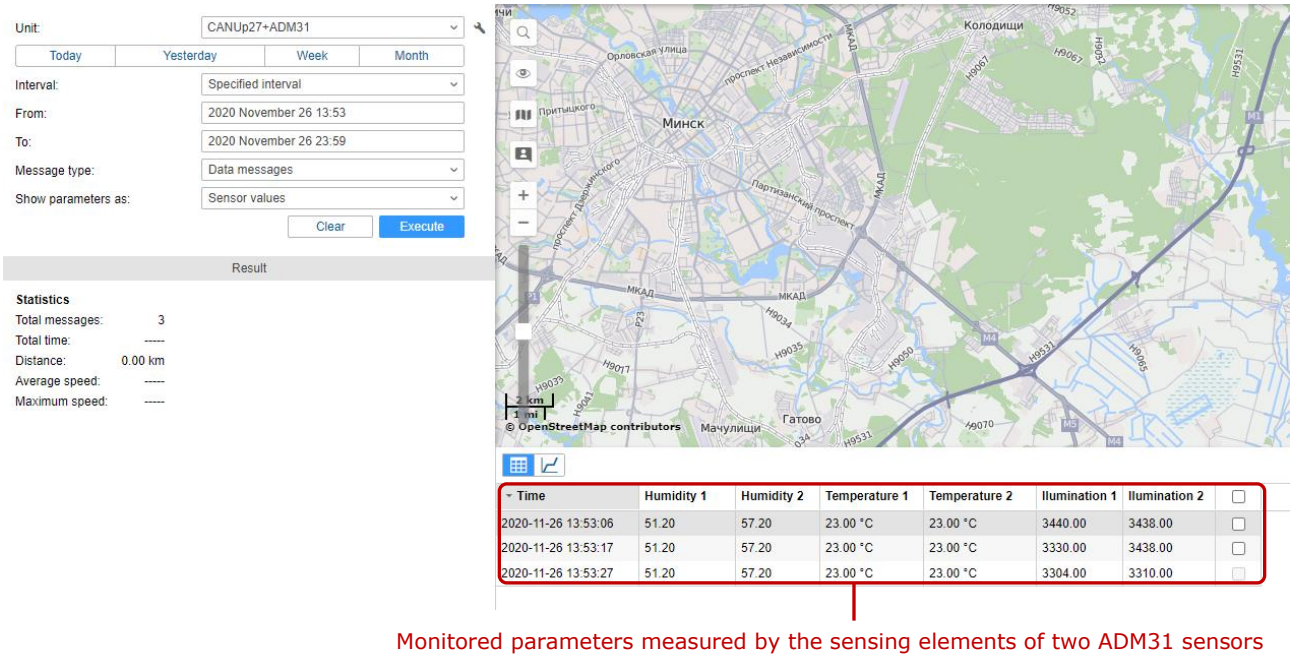


Figure 6 — Example of ORF 4 Telematics service periodical Report, with displaying monitored parameters from two ADM31 sensors

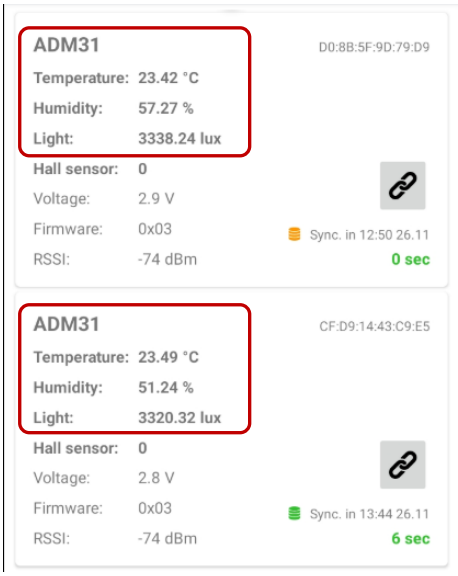


Figure 7 — Example of checking the monitored parameters from two ADM31 sensors using ADM BLE-Configurator mobile application

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