

WIRELESS (BLUETOOTH) SENSORS

USER MANUAL

WIRELESS RELAY

RELAY-BLE

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DEVICE PURPOSE

RELAY-BLE is a wireless immobilizer relay designed to add a wirelessly controlled (BLE) engine immobilization circuit to any security system.

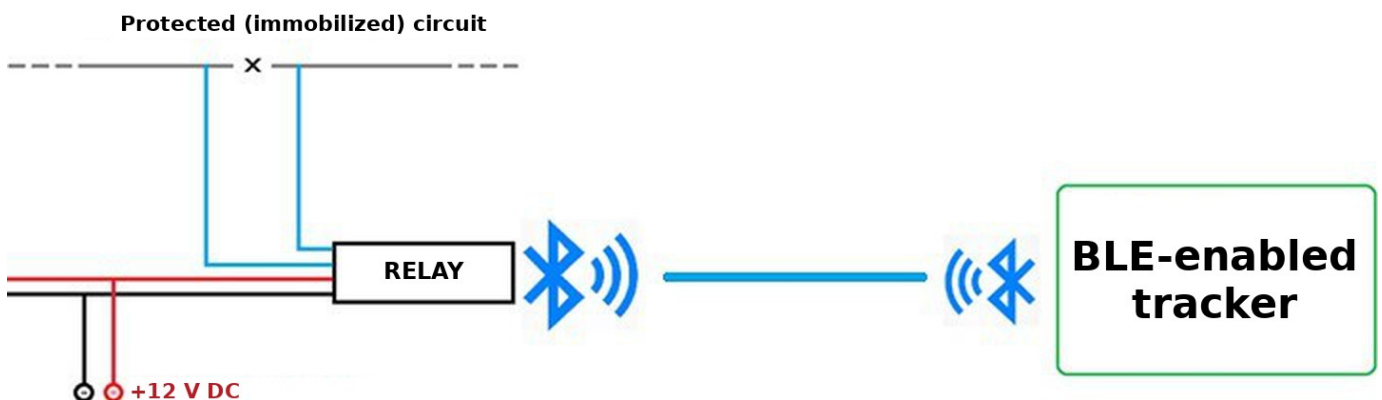
This solution enhances the anti-theft capabilities of the security system. The compact immobilizer relay can be concealed in the vehicle's standard wiring harness.

The kit is designed for all types of vehicles with a nominal +12 V onboard electrical system and a grounded negative battery terminal.

Diagnostics and configuration use the BlueTooth (BLE) wireless channel and the Sensor Configurator mobile application.

Data is sent to third-party devices via BlueTooth (BLE). The data format is described in the communication protocol section.

Connection options:



Connecting the relay

Red wire: +12 V DC from the battery. Connect to the battery or a vehicle wire that has a permanent +12 V supply.

Black wire: "GROUND". Connect to the negative battery terminal.

Two thicker wires: connect to the interrupted section of the protected immobilization circuit, as shown in the diagram above.

The device continuously listens to the radio channel and operates using Advertisement packets. To execute a command, transmit an Advertisement packet containing a specially formatted command record (see the protocol description).

TECHNICAL SPECIFICATIONS

The main technical specifications of the sensor are listed in Table 1.

Table 1 – Main technical specifications

Parameter	LS-BLE model
Sensor image	
Housing dimensions (excluding wires), mm	64 x 23.5 x 15
Supply voltage, V	7-15
Current consumption, mA	< 5
Maximum current switched by the immobilizer relay, A	20
Immobilizer relay response time to a command, s	< 3
Relay type	Normally closed (NC) (optional NO version)
Operating temperature range, °C	- 40 to + 85
Weight (excluding wires), g	20
Firmware update	Supported
Data transmission channel	BlueTooth
Range (under normal operating conditions without interference or obstacles), m	10-20 (radio channel)
Configuration, diagnostics	Mobile application

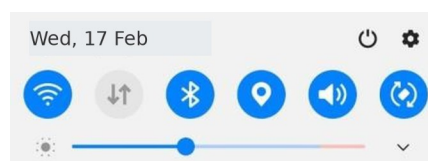
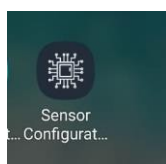
MOBILE APPLICATION – DOT SENSOR

The Sensor Configurator mobile application is provided for working with the fuel level sensor. It displays current data, allows settings to be changed and supports sensor calibration (tank filling).

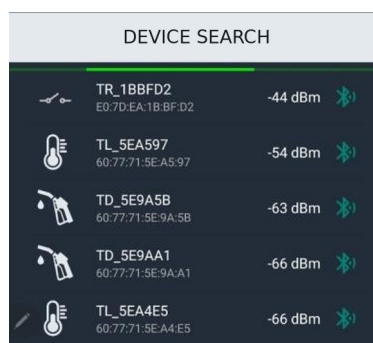
Procedure for working with the sensor using the application:

1. Download the application file (APK) and install it on a phone or tablet.

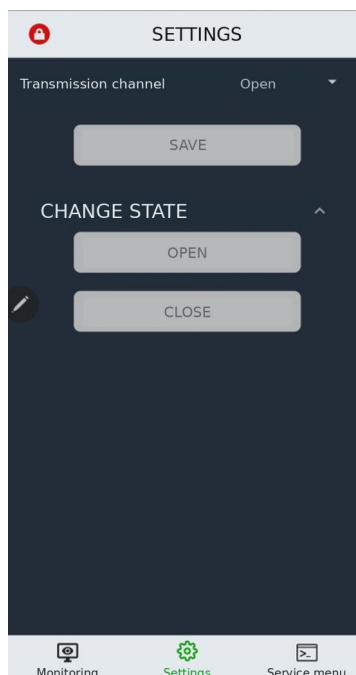
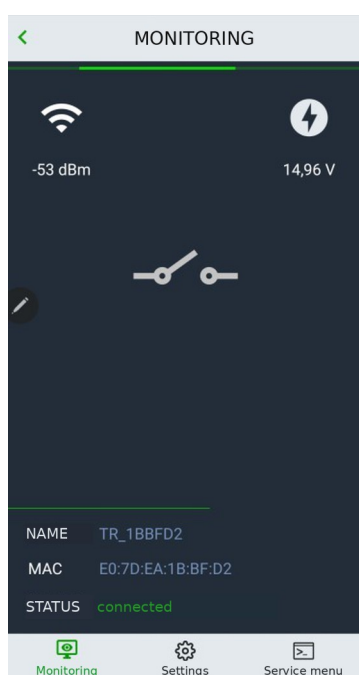
2. Launch the application and follow the instructions (enable BlueTooth and location services in the device settings).



3. The application scans for nearby sensors and lists them in the search window. Sensors are automatically sorted by signal strength, with icons identifying their types: fuel level sensor, temperature sensor, relay, etc.



4. Select the sensor you want to work with from the available devices.



5. At first launch, the application automatically reads the sensor settings and displays them in the relevant sections. After authorization, the user can change the sensor settings to suit the installation requirements.

The default password is “00000000”; it can be changed in the service menu.

6. The following settings are available to the user:

- **Transmission channel**

The “Transmission channel” field selects how data is transmitted over the BlueTooth wireless channel:

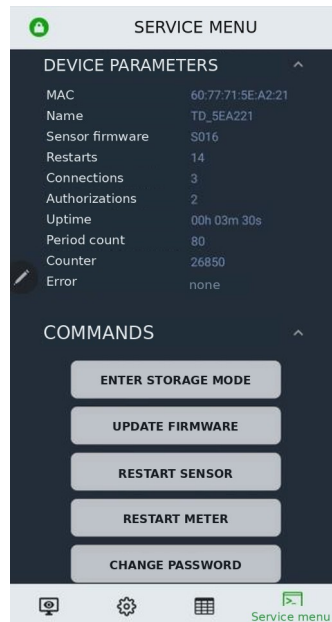
- “Open” – sensor data (level, temperature, battery voltage) is sent in advertising (broadcast) packets; see the protocol below. This mode is suitable for use with trackers.
- “Closed” – data is encrypted when connected via BLE Master. Not suitable for use with trackers.

Updating the sensor firmware

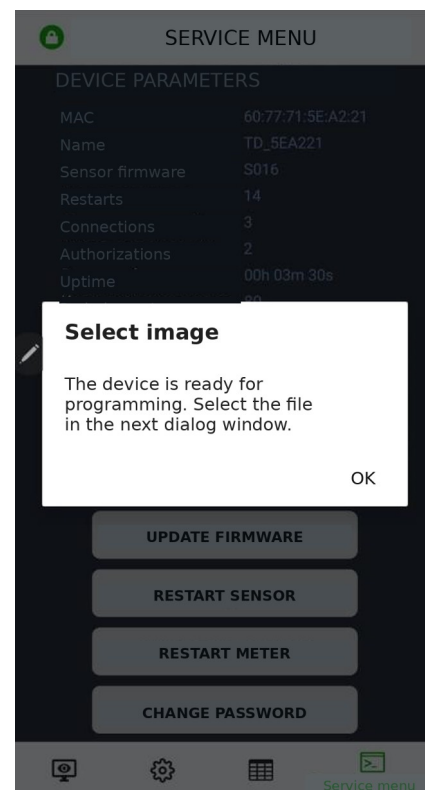
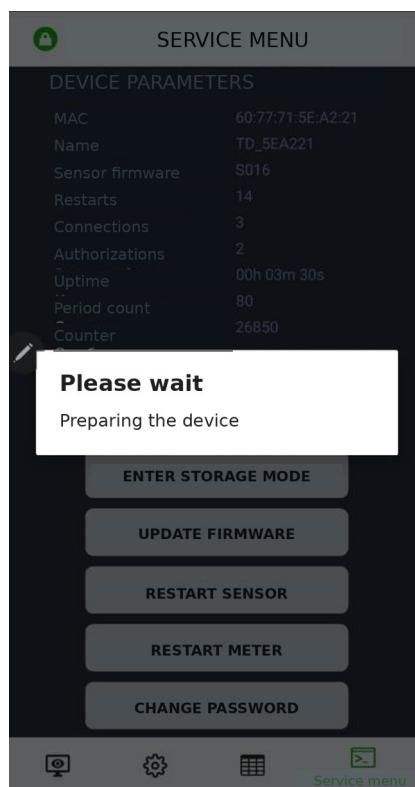
To update the fuel level sensor firmware, you need a firmware file with the bin extension.

To update the sensor firmware, follow these steps:

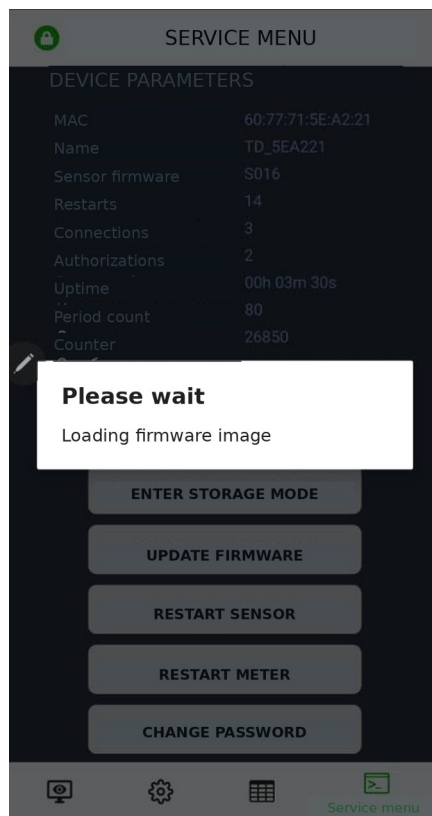
1. In the “Service menu”, select “Update firmware”.



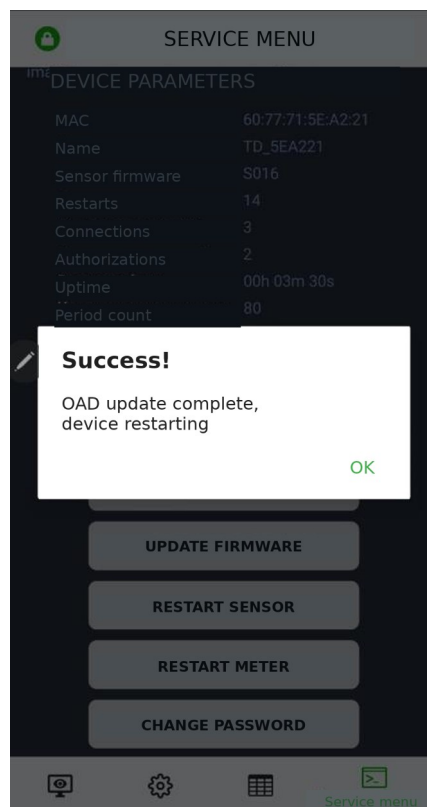
2. The sensor enters update preparation mode, after which you will be prompted to select a firmware file.



3. Select the firmware file and tap “Open” to start the update.



4. When the firmware update is complete, an information window appears: “Update complete, device restarting”. Tap “OK”.



BLUETOOTH (BLE) COMMUNICATION PROTOCOL

The sensor broadcasts advertising packets at regular intervals (0.5 s).

Example sensor packet (components are color-coded):

07FF160F640195150A0954525F314242464432

These packets carry two types of data:

- Manufacturer data – sensor parameters (level, temperature, etc.)

07FF - type 0xFF = “Manufacturer data”, length = 0x07

160F64019515 - payload transmitted by the sensor

Offset, bytes	Field size, bytes	Value	Description
0	2	0x160F	Prefix (manufacturer code)
+2	1	64h	Sensor type – relay
+3	1	00h...01h	Input state – circuit monitoring 0 – NC relay closed 1 – NC relay open
+4	1	00h...FFh	Battery voltage (value transmitted multiplied by 10) 95h = 149 or 14.9 V
+5	1	00h...FFh	Sensor firmware version 15h = 021

- Complete local name – sensor name

0A09 - type 0x09 = “Complete local name”, length = 0x0A

54525F314242464432

54525F314242464432 - data (TR_1BBFD2)

Example command to the sensor:

0EFF41D2BF1BEA7DE00701000000

These packets carry two types of data:

- Manufacturer data – sensor parameters

0EFF - type 0xFF = “Manufacturer data”, length = 0x0E

F41D2BF1BEA7DE00701000000 - payload transmitted to the sensor

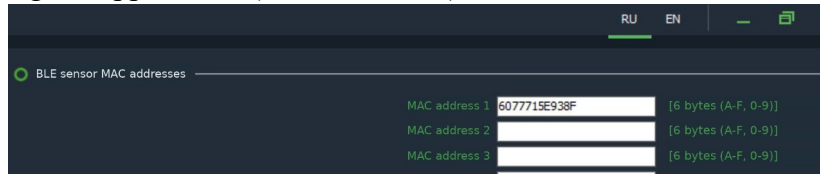
Offset, bytes	Field size, bytes	Value	Description
0	2	0xFF41	Prefix (manufacturer code)
+2	6	000000000000h	Relay MAC address (LSB first)
+8	1	07h...08h	Command type 07 – close NC relay 08 – open NC relay 09 – enter Silent mode* 0A – exit Silent mode*
+9	4	000000h... FFFFFFFFh	Command data (LSB first) Time in seconds for which the relay is to be closed. Valid range: 1 to 1000000 seconds. 01h = 1 second

*Silent mode – when this mode is enabled, the relay stops sending its advertising packets so that it cannot be detected by a scanner. It continues listening to the radio channel and processing commands.

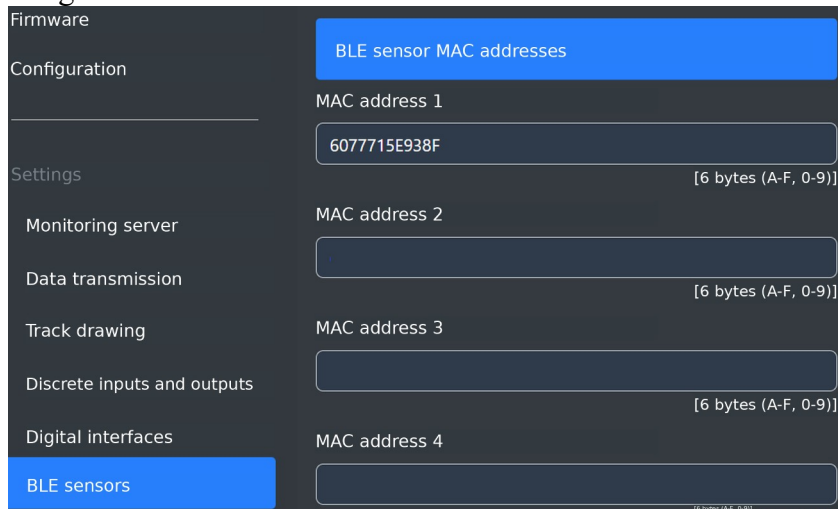
TRACKER (BLE) AND WIALON INTEGRATION

To use the relay, enter its MAC address in the tracker's BLE sensor address fields. Note the slot number: relay commands and status are associated with this slot.

For example, enter the relay MAC address in slot No. 1.
This can be done using the application (PC or Android)



or using the WEB configurator.



The relay is controlled by commands similar to those used for discrete outputs.

TCP command format:

08XXYY – XX – output number, YY – state (0 – close relay, 1 – open relay)

Important: XX uses an offset of 1; if the relay is in slot 1, then XX=00.

For our relay, command examples are: 080100 (close) or 080101 (open).

On the server, relay status can be monitored using the following parameters (WIALON example, parameters vs_13 and vs_14):

Relay in slot 1, state – closed

vs_13=1 – bit field indicating relay connectivity (bit 0 relay is online).

Important: an offset of 1 applies; relay in slot 1 means status bit 0.

vs_14=0 – bit field indicating the output state (1 – open, 0 – closed).

Important: an offset of 1 applies; relay in slot 1 means status bit 0.

Relay in slot 1, state – open

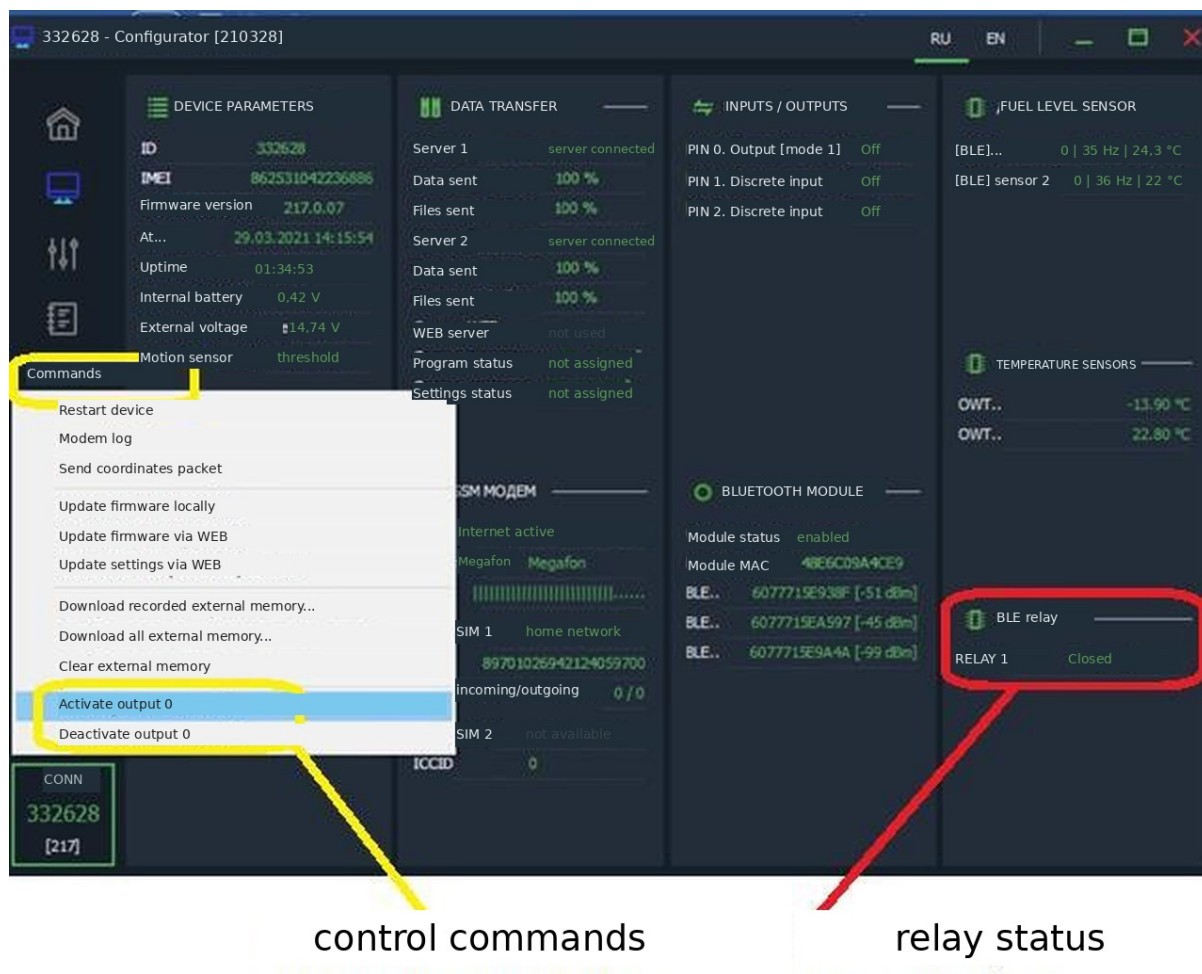
vs_13=1 – bit field indicating relay connectivity (bit 0 relay is online).

Important: an offset of 1 applies; relay in slot 1 means status bit 0.

vs_14=1 – bit field indicating the output state (1 – open, 0 – closed).

Important: an offset of 1 applies; relay in slot 1 means status bit 0.

Use the PC configurator to check operation of the relay together with the tracker.



WARRANTY TERMS

The equipment is designed for a long service life in autonomous, maintenance-free operation.

The warranty period starts on the date of initial installation, provided that installation is performed by an installer authorized by the equipment manufacturer. The initial installation date and installer details must be entered on the warranty card and certified with the installer's stamp.

WARRANTY REPAIR / REPLACEMENT IS NOT AVAILABLE IN CASES OF:

- Failure to follow the product operating instructions;
- Mechanical damage, whether external or internal;
- Faults caused by foreign objects, insects or liquids entering the equipment;
- Chemical, electrochemical, electrostatic or extreme thermal damage;
- Damage caused by power, communication or cable networks that do not comply with national standards;
- Damage caused by installing components that do not meet the manufacturer's technical requirements;
- Repair or preventive maintenance during the warranty period by persons not authorized by the manufacturer;
- Broken manufacturer seals on the equipment;
- Equipment malfunctions caused by external influences on the equipment or on the electrical circuit to which it is connected;
- Faults caused by third parties or other unforeseen circumstances unrelated to the equipment manufacturer's obligations.

PACKAGE CONTENTS

The sensor package contents are shown in Table 3.

Table 2 – Package contents

No.	Item	Qty	Notes
1	Sensor	1	
2	Packaging	1	
3	Product passport	1	

Note: The manufacturer reserves the right to change the package contents without impairing the device's consumer characteristics.