Immobilizer – heart of auto-theft protection sistem

For smart cars & smart car holders
Description of the Immobilizer

**Introduction**

Differences between security systems:
- PRIZRAK-510 — wire engine locking
- PRIZRAK-520 — wireless engine locking.

Functions of the Immobilizer:
- Protecting the vehicle from being stolen or hijacked
- Alert if the vehicle was tampered with

**Terms**

Programming button — one of the factory (default) buttons, with which the Immobilizer can be programmed (buttons specific to the vehicle can be found in the Integrator). Programmable button can be changed only within short time after installation of the Immobilizer. Also built in button can be used as programming button. (please see Immobilizer wiring diagram*).

Security — is a state of the Immobilizer, which is turned on after locking the doors in any way provided by the manufacturer of the vehicle (keyless entry system, remote control, rearming the alarm etc.) and turning factory security system. Secure state can be left by unlocking the doors with the original remote control or vehicles keyless access system or by entering the PIN code.

**Immobilizer feature**

Immobilizer is a feature designed to prevent vehicle from being stolen from parking space. PIN®Driver® goes into effect if ignition was switched off for more than 3 seconds. If PIN®Driver® feature is enabled and active it requires PIN code to be deactivated, otherwise engine will be locked:

- Engine will be switched off on attempt to move if speed control is enabled and supported by the vehicle.

**AntiHiJack feature**

AntiHiJack is the function that prevents the vehicle from being hijacked or stolen from the parking area. AntiHiJack enters the Guard mode in the following cases:
- The ignition was turned off for longer than 3 seconds (including a case when Immobilizer is off; if the Immobilizer was switched on, the Immobilizer will follow its algorithms)
- The driver’s door was opened.

Upon entering the Guard mode, AntiHiJack feature goes through a series of phases, and in case if the Guard mode was not deactivated, the feature will activate the engine lock.

Phases change only when the ignition is on. When the ignition has been turned on, the AntiHiJack feature will activate the engine lock and continue the feature operation when the ignition is back on.

The Guard mode of the AntiHiJack feature can be deactivated at any step by entering the PIN code.

The Guard mode phases are as follows:
- **Idle phase**
- **Warning phase**
- **Locking phase**

Idle phase: In this phase AntiHiJack follows two different algorithms depending on the availability of Speed control. If the Speed control is available, AntiHiJack waits until the vehicle covers a set distance from the moment of Guard mode activation. Upon that, AntiHiJack goes into the Warning phase. If the Speed control is not available, Idle phase consists of three stages:
- Waiting for the driver’s door to be closed
- Waiting for preset amount of brake presses to be made
- Pause before going to warning phase.

Warning phase consists of two steps:
- Warning the driver with the trill that they have to enter PIN code.
- Warning other drivers on the road of the possible hazardous situation due to the upcoming engine locking (10 seconds). It is carried out by vehicle hazard lights. Driver warning is still on. Locking phase. The engine lock is activated, the siren is turned on, and the hazard lights are activated. The siren and hazard lights will switch off in 15 seconds. AntiHiJack will be in locking phase until a new PIN code verification.

If <Safe mode> is enabled engine will be locked only if speed is lower than 30 km/h or on complete stop (depends on the settings of the safe stop).
Accelerator pedal lock (force to stop)

Feature will stop the vehicle if AntiHiJack was triggered minding safe lock settings. Vehicle has to support «speed control». At the end of the warning phase, if speed of the vehicle didn't increase within 5 seconds or brake pedal was pressed within 3 seconds, lock will activate for 2 seconds, then it will be lifted for 5 seconds. This will be repeated 5 times. Every repetition lock lift will be reduced for 1 second. On fifth repetition lock will be permanent.

**PIN code entry sequence**

- Turn on the ignition or start the engine
- Enter PIN code
- Wait for the confirming trill.

**Available PIN options**

Buttons 1, 2, 3, 4, 5, 6 are used here as an example. Request the list of available buttons in your vehicle at your shop.

**One-digit PIN:**
- 1
- 2
- 3
- 4
- 5
- 6

**Two-digit PIN:**
- ~2 second pause

**Single-button PIN entry**

When entering the PIN code keep in mind the entering sequence.

- One-digit PIN: 1
- Two-digit PIN: 1-1

**PUK code**

PUK code - 4-digit numbers under the scratch layer on the plastic card that came with the Alarm. PUK-code will disable all security features of the alarm. Use PUK-code only if you lost PIN-code. After PUK code is entered, all security functions of the Alarm will be deactivated regardless the selected authentication method.

**PUK-code entry**

PUK code is entered by the Programming button with a 2 second pause in between keystrokes.

- Entering sequence: Turn on the ignition or start the engine
- Enter PUK code
- Wait for the confirming trill.

**Maintenance mode**

Maintenance is an operation mode when all hijack protection and service functions of the Alarm are temporarily disabled.

The Alarm will notify of activation of the Maintenance mode as follows:

- When disarming, LED will turn on
- When the ignition is turned on, LED will go out
- Warning trill after PIN-code entry
- After the ignition is turned off, LED will light up and will be on for a while.

To activate or deactivate the Maintenance mode follow these steps:

1. Turn off the ignition.
2. Enter PIN code.
3. Press the Programming button 6 times (you should start within 10 seconds after verification).
4. Wait for confirmation of your actions:
   - If the Maintenance mode is on, the system will emit 1 audio signal, 1 light signal and a trill
   - If the Maintenance mode is off, the system will emit 2 audio signals, 2 light signals and a trill.

**Automatic deactivation of the Maintenance mode**

This function automatically disables the Maintenance mode after a 10 km run. So even if you forget to disable this mode in the service station, it will still be automatically disabled.

If Maintenance mode is activated by PUK code, it cannot be automatically disabled. If the vehicle does not support Speed control, automatic deactivation of this feature will not be available.

**Other options**

**Immobilizer has several options to make your vehicle more comfortable and secure.**

**Automatic window roll up**

The system can be programmed so that the vehicle windows are rolled up when engaging the lock.

**Setting the electromechanical hood lock**

You can install an optional (third-party) hood lock and program the Immobilizer to lock the hood when locking the vehicle, and open it only after enter PIN code.

**Central lock control**

If your vehicle does not have an integrated door lock activated when driving (locking) or turning off the ignition (unlocking), this option can be provided by the Immobilizer.
Connection

Immobilizer Inputs / Outputs functionalities are described in the Table 3. Connection pin numeration is indicated on fig. 1. Aside from outputs with set functions Immobilizer is equipped with two programmable outputs each of which can be assigned with one of 20 functions (see CAN bus adapter features table); These outputs are set for controlling an accessory hood lock. Output configuration is carried out via programming (see Immobilizer hardware functions programming (Menu 1)).

![Fig. 1. Enumeration of connector pins (view from the wiring side)](image)

<table>
<thead>
<tr>
<th>Socket</th>
<th>No.</th>
<th>Color</th>
<th>Function</th>
<th>Type</th>
<th>Current, mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-pin</td>
<td>1</td>
<td>Pink/Green</td>
<td>Brake lights condition control</td>
<td>Programmable output (+)</td>
<td>1,5</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>White/black</td>
<td>Engine locking/ Underhood unit control</td>
<td>Output (-)</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Brown</td>
<td>CAN-L vehicle data bus</td>
<td>CAN</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Brown/red</td>
<td>CAN-H vehicle data bus</td>
<td>CAN</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Blue/red</td>
<td>Alternate hazard lights control/autentification impulse (depending on the vehicle)</td>
<td>Programmable output (+/-)</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Black</td>
<td>Power supply</td>
<td>Ground</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Orange/white</td>
<td>Closing of hood lock via HCU-230</td>
<td>Programmable input (+)</td>
<td>1,5*</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Yellow/red</td>
<td>Connection in between the central unit and the relay</td>
<td>Communication channel</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Green/black</td>
<td>Control of position of a hood</td>
<td>Programmable input (-)</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Gray/yellow</td>
<td>Analog button/Positive button</td>
<td>Input (+)</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Gray/black</td>
<td>Reference ground/Negative button</td>
<td>Input (-)</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Red</td>
<td>Power supply</td>
<td>+12 V</td>
<td>1200/5**</td>
</tr>
</tbody>
</table>

Immobilizer pin connectors’ description

**Pins No. 1.** Brake lights control. It is used only in cases when vehicle CAN bus does not contain data on brake pedal position (see Integrator files). In such cases input No. 1 is to be connected to brake pedal terminal switch output. Should the CAN bus contain brake pedal position data the input’s function is lost and can be restored only when settings are reset to factory default ones.

**Pins No. 2.** “Engine lock” is connected to one of relay coil con-tacts, which is used for engine operation or ignition lock. The output can be set for controlling a normally-open or normally-closed relay. All Pin No. 3 and 4. “CAN-H and CAN-L vehicle data bus” are connected to vehicle CAN bus (see “Integrator files”). Programmable negative output (“Lock Impulse” by default).

**Pins No. 5.** “Alternate hazard light control” is used for hazard light controlling on vehicles where CAN bus control is not available. Please see Integrator files software product for information on vehicle-specific connection features.

**Pins No. 6.** “Ground” is connected to vehicle body in one of the loca-tions determined by vehicle manufacturer for original equipment ground connection.

**Pins No. 7.** Closing of hood lock via HCU-230. Incoming impulse on this input will lock hood lock via HCU-230. The function can used when you install an immobilizer in conjunction with third party equipment.

**Pins No. 8.** “Communication channel” is connected to positive polarity commutative voltage vehicle circuit that is used for communication with main unit and locking relay. Upon installing the Immobilizer it is necessary to check the communication in between the main unit and the relay.

**Pins No. 9.** “Control of position of a hood.” If data on the position of the hood absent in CAN-bus, please connect limit switch of the hood to this input.

**Pins No. 10 and 11.** Analog button/Positive button”. Depending on control button type choice one of the following functions is used:
- Analog button is connected to the corresponding vehicle wire at the steering wheel contact helix port (see Integrator files)
- Reference ground if analog button connected to the respective vehicle wire (see. Integrator)

**Pins No. 12.** Immobilizer power supply is connected through 3 A fuses to one of vehicle wires that has +12 V non-commutated voltage.

**Line-221 description and installation guidelines**

<table>
<thead>
<tr>
<th>Color</th>
<th>Note</th>
<th>Type</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>+12 V</td>
<td>Communication and power</td>
<td>1 A/20 mA*</td>
</tr>
<tr>
<td>Black</td>
<td>Ground</td>
<td>Power</td>
<td>—</td>
</tr>
<tr>
<td>Yellow/Black</td>
<td>Lock out</td>
<td>Common contact</td>
<td>10 A</td>
</tr>
<tr>
<td>Yellow/White</td>
<td>Lock out</td>
<td>Normally closed contact</td>
<td>10 A</td>
</tr>
<tr>
<td>Yellow/White</td>
<td>Lock out</td>
<td>Normally open contact</td>
<td>10 A**</td>
</tr>
</tbody>
</table>

* While transmitting data (pulses) up to 1 A. When receiving data up to 20 mA. ** Limited by cross section of the wire.

You can lock any suitable circuit in the vehicle. After installation it is recommended to check link between relay and Immobilizer.

Relay has a built-in accelerometer for vehicles that have no information about speed in the CAN-bus, and enables extra features for vehicles that have information about speed present in the CAN-bus:
- Lock the engine even if there is no speed information in the CAN-bus
- Accelerometer allows starting the engine and locking it if the vehicle began movement.
It is not recommended to install the relay in places that vibrate heavily during engine starting or launching. This can prevent movement detection due to excessive noise passed to the accelerometer. Factory default sensitivity settings mean that there are almost no vibrations transferred from the engine. After installing it, it is recommended to check sensitivity settings and adjust them if required.

**Immobilizer programming**

**Stage 1. Immobilizer interfacing with vehicle**

**Identifying the vehicle model**

Vehicles supported by the Immobilizer are divided into functional groups, each of which is divided into subgroups. All groups and subgroups are assigned with item ordinals (see Integrator files). Interfacing is the procedure of immobilizer detecting vehicle group and subgroup.

There are two interfacing options:

1. **Automatic interfacing**

After connecting with the vehicle CAN bus, supplying power, and performing a few other simple manipulations (for most vehicles those are ignition on/off and vehicle close/open via original remote control) the group and subgroup will be determined automatically. The user verifies an identified group and subgroup by listening to sound signals (group number – pause, subgroup number – pause). Interfacing sequence for each vehicle is detailed in the Integrator files.

If the group number is a two-digit number, each digit will be identified individually. For example, group 35 and subgroup 2 will produce the following sequence of sound signals: 3 long signals – pause (1 sec), 5 long signals – pause (2 sec), 2 short signals – pause (4 sec), etc.

2. **Forced interfacing**

This algorithm is used in extraordinary cases. Programming is carried out with the integrated Programming button. Prior to interfacing procedure initiation vehicle group must not be identified and CAN bus must not be connected. Programming will stop if Programming Button is not pressed within 60 seconds.

**Programming sequence:**

1. Power the Immobilizer and wait for an intermittent sound.
2. Once the system has been powered, within 10 seconds enter Menu 1 by pressing Programming button 10 times. If the procedure is carried out correctly, the Immobilizer will inform on this fact with three audible signals.
3. Enter menu option 1 – Vehicle model by pressing Programming button once. Immobilizer will inform on the option status with a repeated audible signal.
4. Enter the vehicle group number by pressing Programming button the corresponding number of times (see Integrator files).
5. Enter the vehicle subgroup number by pressing Programming button the corresponding number of times (see Integrator files).

If the group number is a two-digit number, enter the first digit, wait for 2 seconds, and then enter the second digit. From time to time the Immobilizer will emit a sequence of audible signals indicating the group number.

Verify that vehicle model was selected correctly by listening to audible signals:

- If the vehicle model has been chosen correctly, press the Programming button once. Audible signals will stop and the vehicle model will be programmed.
- If the vehicle model has been chosen incorrectly, press the Programming button twice. Repeat programming steps starting from step 4.

**Analog steering wheel buttons programming**

1. Once the Immobilizer has identified the model, turn the ignition on and wait for at least 5 seconds.
2. Press all the steering wheel and steering wheel column joysticks buttons (cruise control, central unit control, etc.) sequentially (one after another). Those buttons, which after being pushed receive a response audible signal, are available for use.
3. Turn the ignition off – an audible sound trill will be played.
4. Turn the ignition on.

Analog steering wheel buttons must be programmed within 15 minutes after the interfacing with the vehicle is completed. If 15 minutes have passed, initiate the reset sequence, and perform programming steps again.

**Testing the communication between the main unit and relay**

1. Turn the ignition on.
2. Enter PIN code, wait for confirmation.
3. Press the Programming button 10 times within 10 seconds after the authentication. Immobilizer will confirm menu access by three audible signals.
4. Select option 7 on Menu 1 by pressing the Programming button 7 times. The Immobilizer will confirm the selection by emitting a sequence of 7 audible signals.
5. Push the brake pedal and hold on for at least 10 seconds. After the Menu option has been accessed, the system will indicate it audibly (if the communication has been established – short duplex tone signals every 0.5 second; no communication – steady dual-tone signal).

To exit this Menu option, quickly press the brake pedal. To exit the Programming mode, turn the ignition off.

Operation of all main vehicle systems should be simulated in all available modes (ideally, the system operation should be checked with various combinations of powered devices):

- Turning climate control in various modes
- Changing rotation speed of the heater fan
- Changing operating modes of heating systems (seat heater in different power modes, window and mirror heating)
- Changing operating modes of lighting (main light, marker lights, and fog lights).

Special attention should be paid to communication checks during engine in high rpm. Engine speed should be adjusted up or down very smoothly, while constantly monitoring the system. Communication loss can occur in a very short range of engine rpm.

Isolated communication errors (occasional short-term jams, indicated by variable dual-tone signals) are allowed. If communication errors are frequent (dual-tone signal is on for more than 2 seconds), choose another connection circuit, since the tested connection does not guarantee a fail-safe operation of the system.

Testing can be performed with any pLine-221 relay (even the one that has been installed on another vehicle, with a different main unit). Though the Immobilizer will operate only with one specific pLine-221 relay associated with a specific main unit.

**Adjustment of accelerometer sensitivity**

1. Turn the ignition on.
2. Enter PIN code, wait for confirmation.
3. Press the Programming button 10 times within 10 seconds after the authentication. The Immobilizer will confirm menu access by three audible signals.
4. Select option 8 in Menu 1 by pressing the Programming button 8 times. Immobilizer will confirm the selection by emitting a sequence of 8 audible signals.

After engine starts let it run for at least 10 seconds.

**Programming of a digital button**

For further use of the digital button (positive and/or negative) complete the following steps:

1. Configure the Immobilizer to operate with digital buttons (see Menu 1, option 2). Note that this menu option can be modified only via an integrated button and prior to first PIN entering via analog or digital buttons. Any further modifications will be possible only after system reset.
2. Set the activated button as the Programming button by turning the ignition on, and pressing and holding the button for at least 5 seconds (until an audible signal is heard).
3. The digital button is to be programmed within 15 minutes after Immobilizer interfacing. If 15 minutes have passed, initiate the reset sequence, and perform programming steps again.

- You may install only one pLine-221 relay in the vehicle.
- Relay works as normally locked relay.
- If same circuit that is used for connection with the Immobilizer is locked, «Communication and power» has to be connected higher than lock point.
### Stage 2. Immobilizer configuration programming

At Stage 2 hardware settings and user settings of the Immobilizer are set, and a new PIN code is programmed. Three separate menus are used for programming (see Table 3). You can connect the Immobilizer to PC via a micro-USB port. This way you can easily update the software setting of the Immobilizer, set a new vehicle model, activate user settings, etc.

Programming can be carried out prior to installation of the Immobilizer, on the table, and after the installation, directly in the vehicle. To perform all the programming steps correctly download TECprog software from www.tecel.ru.

#### Table 3. Programming menu

<table>
<thead>
<tr>
<th>Name of the menu</th>
<th>Menu entering code</th>
<th>Number of audible signals</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menu 1</td>
<td>10</td>
<td>3</td>
<td>Immobilizer hardware settings configuration</td>
</tr>
<tr>
<td>Menu 1.2</td>
<td>11</td>
<td>6</td>
<td>Configuration of programmable inputs / outputs</td>
</tr>
<tr>
<td>Menu 2</td>
<td>12</td>
<td>4</td>
<td>User settings configuration</td>
</tr>
</tbody>
</table>

#### Menu 1. Hardware settings configuration

<table>
<thead>
<tr>
<th>No</th>
<th>Option</th>
<th>Setting range</th>
<th>Factory default</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vehicle model</td>
<td>–</td>
<td>–</td>
<td>Automatic setting. Vehicle group and subgroup can be set manually if required</td>
</tr>
<tr>
<td>2</td>
<td>Type of external buttons</td>
<td>1-2</td>
<td>1-analog; 2-digital. Outputs 10, 11</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Engine locking</td>
<td>1-5</td>
<td>2</td>
<td>Output 3 is set to: 1– normally open relay; 2 – normally closed relay; 3 – accelerator pedal interlock (enforcing a full stop); 4 – starter interlock (normally closed relay); 5 – HCU-230 hood module control</td>
</tr>
<tr>
<td>4</td>
<td>Engine locking via CAN bus</td>
<td>1-2</td>
<td>2</td>
<td>1 – ON; 2 – OFF. If this option is ON and available (see Integrator files), the engine locking feature will be assigned to CAN bus (no additional connections required)</td>
</tr>
<tr>
<td>5</td>
<td>Safety lock</td>
<td>1-3</td>
<td>1</td>
<td>1 – engine is locked regardless of speed; 2 – engine is locked at a speed less than 30 kmph; 3 – engine is locked at a full stop of the vehicle</td>
</tr>
<tr>
<td>6</td>
<td>Engine start jumper</td>
<td>1-2</td>
<td>2</td>
<td>1 – ON (engine will not start until PIN is entered); 2 – OFF</td>
</tr>
<tr>
<td>7</td>
<td>Testing communication between the main unit and relay (for PRIZRAK-520)</td>
<td>–</td>
<td>–</td>
<td>After the Immobilizer is installed it is necessary to test the communication between main unit and pLine-221 relay</td>
</tr>
<tr>
<td>8</td>
<td>Accelerometer sensitivity setting (for PRIZRAK-520)</td>
<td>1-4</td>
<td>1</td>
<td>Set automatically, but can be set manually if needed: 1 – impulse negative control; 2 – status negative control; 3 – impulse positive control; 4 – status positive control; 5 – lamps control (neg.)</td>
</tr>
<tr>
<td>9</td>
<td>Hazard lights control algorithm</td>
<td>1-5</td>
<td>–</td>
<td>After the Immobilizer is installed adjusts the sensitivity</td>
</tr>
<tr>
<td>10</td>
<td>Automatic hood locking within 2 minutes after the ignition is off</td>
<td>1-2</td>
<td>1</td>
<td>1 – ON; 2 – OFF. No Security option. This function is similar to input 'HCU-230 Hood locking'. No additional connections required for this function. Hood lock will be engaged automatically by HCU-230 within 2 minutes after the ignition is off</td>
</tr>
<tr>
<td>11</td>
<td>Time interval of Timer Channel (Comfort) feature</td>
<td>1-6</td>
<td>3</td>
<td>1 – 10 sec; ... 3 – 30 sec; ... 6 – 60 sec</td>
</tr>
<tr>
<td>12</td>
<td>Speed control</td>
<td>1-2</td>
<td>1</td>
<td>1 – ON; 2 – OFF. Sets the engine interlock trigger for PINTODrive® и AntiHiJack</td>
</tr>
<tr>
<td>13</td>
<td>Number of presses per brake pedal</td>
<td>1-7</td>
<td>3</td>
<td>Sets a number of presses to trigger the AntiHiJack feature. If speed control is enabled, the value set by this option is irrelevant</td>
</tr>
<tr>
<td>14</td>
<td>Settings for electromechanical relay integrated in CAN-relay</td>
<td>1-3</td>
<td>3</td>
<td>1 – normally open; 2 – normally close; 3 – not used</td>
</tr>
<tr>
<td>15</td>
<td>CAN-relay status check</td>
<td>1-7</td>
<td>–</td>
<td>1 – ready to work; 2 – not registered; 3 – registering; 4 – registration is not complete; 5 – no connection to CAN-relay; 6 – CAN-relay firmware needs to be updated; 7 – CAN-bus connection error</td>
</tr>
<tr>
<td>16</td>
<td>Resetting CAN-relay to factory default</td>
<td>1-2</td>
<td>–</td>
<td>1 – registered; 2 – no registration. To reset CAN-relay: press the programming button 1 time, wait for audio trill confirmation. The system will confirm what menu item is set with series of two audio and light signals.</td>
</tr>
</tbody>
</table>

#### Menu 1.2. Configuration of programmable inputs / outputs

<table>
<thead>
<tr>
<th>No</th>
<th>Type</th>
<th>Factory default settings</th>
<th>Setting range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Output 5 (+/–)</td>
<td>Hazard lights alternate control / PIN code pulse (for different vehicle models)</td>
<td>1-26 (see Table – Programmable Output)</td>
</tr>
<tr>
<td>2</td>
<td>Polarity of Output 5</td>
<td>2 – negative (LED off)</td>
<td>1-2</td>
</tr>
<tr>
<td>3</td>
<td>Input 1 (+)</td>
<td>1 – brake light status control</td>
<td>1-5 (see Table – Programmable Input Functions)</td>
</tr>
<tr>
<td>4</td>
<td>Input 7 (+)</td>
<td>4 – HCU-230 Hood locking</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Input 9 (+)</td>
<td>2 – hood control</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

1. Sets alarm values for any of 26 functions to Output5.
2. Polarity can be configured if any of the 26 functions is assigned to this output.
3. Individual configuration of alarm inputs – any of 5 functions can be assigned to each input.
Table 4. Immobilizer Programmable Output Functions

<table>
<thead>
<tr>
<th>No.</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Security</td>
<td>Generation of a constant level signal when in Security mode</td>
</tr>
<tr>
<td>2</td>
<td>Arming impulse (Security feature)</td>
<td>Generation of 0.8 sec impulse when entering the Security mode or triggering AntiHiJack feature</td>
</tr>
<tr>
<td>3</td>
<td>Disarming impulse (Security feature)</td>
<td>Generation of 0.8 sec impulse when leaving the Security mode</td>
</tr>
<tr>
<td>4</td>
<td>Authentication pulse</td>
<td>Emitting 0.8 sec pulse after PIN code is entered or in Maintenance mode (1 second after the ignition has been turned on)</td>
</tr>
<tr>
<td>5</td>
<td>Original alarm system panic</td>
<td>Generation of a constant level signal while original alarm system (if installed) is in alarm condition</td>
</tr>
<tr>
<td>6</td>
<td>Beeper panic</td>
<td>Generation of a 30 sec constant level signal in Security mode if one of the main zones (doors, hood, trunk) or any sensor is triggered. The signal stops after exiting the Security mode</td>
</tr>
<tr>
<td>7</td>
<td>Horn panic</td>
<td>Generation of a 30 sec impulse signal in Security mode if one of the main zones (doors, hood, trunk) is triggered or when arming/disarming the Security mode. This function applies to vehicles without integrated original alarm system. The signal stops after exiting the Security mode. This function can send an alarm signal to original horn of the vehicle</td>
</tr>
<tr>
<td>8</td>
<td>Doors, hood and trunk</td>
<td>Generation of a constant level signal if any of the preset doors, hood or trunk is triggered</td>
</tr>
<tr>
<td>9</td>
<td>Sensors ignoring</td>
<td>Constant level signal is generated while in Security mode if the trunk was opened via an original remote control or when Comfort feature is enabled. This function can disable sensors to prevent false alarms</td>
</tr>
<tr>
<td>10</td>
<td>Original buttons</td>
<td>Generation of a constant level signal when pressing a preset button of the vehicle</td>
</tr>
<tr>
<td>11</td>
<td>Ignition</td>
<td>Generation of a constant level signal when ignition is turned on (including engine startup)</td>
</tr>
<tr>
<td>12</td>
<td>ACC</td>
<td>Generation of a constant level signal when ACCs of the vehicle (1st key position; for some vehicles matches the ignition position) are on. The signal stops only after the key is out of the ignition lock. Can be used to power extra alarm systems or multimedia</td>
</tr>
<tr>
<td>13</td>
<td>Engine on</td>
<td>Generation of a constant level signal when the engine is on</td>
</tr>
<tr>
<td>14</td>
<td>Engine RPM</td>
<td>Generation of 1 impulse per second in proportion with engine crankshaft 20 rpm. RPM is estimate, not precise</td>
</tr>
<tr>
<td>15</td>
<td>Gearbox status</td>
<td>Generation of a constant level signal if transmission handle is in preset position (P, R, N, D*). For Easytronic gearbox the following positions are available: R, N, D*: automatic transmission – P, R, N, D*; manual transmission – only R</td>
</tr>
<tr>
<td>16</td>
<td>Vehicle is moving</td>
<td>Generation of a constant level signal if the speed exceeds some threshold value (differs for each vehicle, but generally the range is within 5 to 10 km/h)</td>
</tr>
<tr>
<td>17</td>
<td>Front parking sensors control</td>
<td>Generation of a constant level signal if the engine is on and the speed of the vehicle is less than 15 km/h</td>
</tr>
<tr>
<td>18</td>
<td>Rear parking sensors control</td>
<td>Generation of a constant level signal if the engine is on, transmission handle is in R-position, and the speed of the vehicle is less than 15 km/h</td>
</tr>
<tr>
<td>19</td>
<td>Moving speed</td>
<td>Generation of 1 impulse per second in proportion to 1 km/h of the vehicle speed. Speed value is estimate, not precise</td>
</tr>
<tr>
<td>20</td>
<td>Brake</td>
<td>Generation of a constant level signal when the brake pedal is pressed</td>
</tr>
<tr>
<td>21</td>
<td>Parking brake</td>
<td>Generation of a constant level signal when the vehicle is on hand brake</td>
</tr>
<tr>
<td>22</td>
<td>External lights</td>
<td>Generation of a constant level signal when external lights are on</td>
</tr>
<tr>
<td>23</td>
<td>Timer Channel (Comfort)</td>
<td>Generation of a constant level signal within 10-60 seconds after the Security mode is enabled. Time interval is set in increments of 10 seconds</td>
</tr>
<tr>
<td>24</td>
<td>Starter and test bus interlock</td>
<td>Generation of a constant level signal: if the bus is active, the signal will be on up to authentication; when AntiHiJack is triggered</td>
</tr>
<tr>
<td>25</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>26</td>
<td>Accelerator pedal interlock (enforcing a full stop)</td>
<td>Stops the vehicle if AntiHiJack feature was triggered provided the Safety Lock is enabled. Management of normally closed locking relay</td>
</tr>
</tbody>
</table>

*All handle positions for vehicle advancement (D, S, M, L, etc.).

Table 5. Immobilizer Programmable Input Functions

<table>
<thead>
<tr>
<th>No.</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brake light status check</td>
<td>Brake light status check (default). Activated if the vehicle CAN bus does not have brake pedal position data (see Integrator files). In such cases Input 1 must be connected to the output of brake pedal terminal switch</td>
</tr>
<tr>
<td>2</td>
<td>Hood status check</td>
<td>If CAN bus does not have data about hood position, this input must be connected to the hood terminal switch</td>
</tr>
<tr>
<td>3</td>
<td>Driver’s door terminal switch</td>
<td>Only when the CAN bus is unaware of the driver’s door status (see Integrator files).</td>
</tr>
<tr>
<td>4</td>
<td>HCU-230 Hood locking</td>
<td>By sending an impulse to this input, the system can engage an extra hood lock via HCU-230. This feature is helpful if the Immobilizer is used with equipment provided by others</td>
</tr>
<tr>
<td>5</td>
<td>Ignition check</td>
<td>The function applies only in cases when the correct data from CAN bus is not available. This situation may occur when certain vehicle circuits are jumpered. In this case Ignition control input is to be connected to the vehicle wire that has a constant level signal when the ignition is on. Connecting this input does not cancel ignition analysis via CAN bus. Ignition status is checked as ON when data is received by any informational channel (CAN bus or analog input)</td>
</tr>
</tbody>
</table>

Programming sequence

1. Turn the ignition on.
2. Enter PIN code, wait for confirmation.

If the vehicle has failed to travel 10 km after installation and factory default PIN code remained unchanged, it is allowed to use PIN code “2” for identity verification by pressing an integrated button.
Press the Programming button 10 times within 10 seconds after the authentication. The Immobilizer will generate a series of 3 audible signals.

3. Select the option from the menu by pressing the Programming button a required number of times (equal to the number of the option). The Immobilizer will acknowledge the option number by a series of audible signals.

4. Go to option setting by pressing and holding the brake pedal. The Alarm will notify of the option status by a series of audible signals of a changing duration.

5. To adjust the settings press the Programming Button the number of times matching the number of steps from the current status to the required one. For example, to go from option 3 (Engine locking) to option 13 (Number of presses per brake pedal) press the Programming button 10 times. The Immobilizer will acknowledge the selected function by audible signals. Please remember that from the last function the program will go to the first one. Release brake pedal to switch indication from status to a number of current menu option. Now you can move to programming the next function or exit the programming mode.

   Set any combination of doors, hood and trunk, which upon opening will generate a signal at a programmable output. For the purposes of this description, doors, hood and trunk are referred to as doors.
   With the brake pedal pressed go to option 8. The Immobilizer will generate 2 successive series of 8 audible signals, and then will emit irregular audible signals. After hearing the latter release the brake pedal. The Immobilizer will continue to emit intermittent audible signals. Open those doors (it can be done in advance), which are to be indicated by this output. All other doors should remain closed. Press brake pedal again. The Immobilizer will inform of the status by series of 8 signals, and the doors will be assigned to this output. If you do not press the brake pedal and abort programming, the Immobilizer will save previous settings. Release the brake pedal, while the Immobilizer goes back to indication of the option number.

   With the brake pedal pressed go to option 10. The Immobilizer will generate 2 successive series of 10 audible signals, and then will emit intermittent audible signals. With the brake pedal still engaged, press the required button (see Integrator files). If the Immobilizer recognized the button, it will stop emitting intermittent signals and go back to indicating option status by series of 10 signals. Release the brake pedal. Now the Immobilizer will indicate the option number. If you release the brake pedal before assigning a button, the Immobilizer will exit this option, save previous option settings, and go back to indication of the option number.

8. Programming algorithm for function 15 – Gearbox status. With the brake pedal pressed go to option 15. The Immobilizer will generate 2 successive series of 15 audible signals, and then will emit intermittent audible signals. While still holding the brake pedal, switch the transmission to required position: P, N, D* or R (you can move the handle to the required position in advance). For Easytronic gearbox the following positions are available: R, N, D*, automatic transmission – P, R, N, D*; manual transmission – only R. Release and press the brake pedal again. The Immobilizer will stop emitting intermittent signals and go back to indicating option status by series of 15 signals. Release the brake pedal, while the Immobilizer goes back to indicating menu option number. If you do not press the brake pedal and abort programming, the Immobilizer will save previous settings.

9. Go to configuring the next option by pressing the Programming button the number of times matching the number of steps from the current option to the required one. For example, to go from option 3 (Engine locking) to option 12 (Speed check) press the Programming button 9 times. Please note that when navigating the menu options, the first option follows the last one.

   The Immobilizer will exit programming mode and save all configuration settings in energy independent memory when ignition is turned off or within 60 seconds after last menu action if the brake pedal is released.

   *All handle positions for vehicle advancement (D, S, M, L, etc.).
User Settings Configuration

Menu 2. User settings

<table>
<thead>
<tr>
<th>No.</th>
<th>Type</th>
<th>Factory default settings</th>
<th>Number of audible signals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Immobilizer</td>
<td>On</td>
<td>1 – ON 2 – OFF</td>
</tr>
<tr>
<td>2</td>
<td>AntiHiJack</td>
<td>On</td>
<td>1 – ON 2 – OFF</td>
</tr>
<tr>
<td>3</td>
<td>AntiHiJack response delay</td>
<td>1</td>
<td>Range 1 to 10 1 – 100 m 10 – 1000 m. Sets the distance until the engine lock</td>
</tr>
<tr>
<td>4</td>
<td>Audio confirmation of authentication by PIN-code</td>
<td>On</td>
<td>1 – ON 2 – OFF</td>
</tr>
<tr>
<td>5</td>
<td>Automatic deactivation of Maintenance mode</td>
<td>Off</td>
<td>1 – ON 2 – OFF</td>
</tr>
<tr>
<td>6</td>
<td>Activation of Central Lock while driving</td>
<td>Off</td>
<td>1 – ON 2 – OFF</td>
</tr>
<tr>
<td>7</td>
<td>Deactivation of Central Lock after ignition turned off</td>
<td>On</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Automatic window roll up (Comfort feature)</td>
<td>On</td>
<td></td>
</tr>
</tbody>
</table>

Programming sequence

1. Turn the ignition on.
2. Enter PIN code, wait for confirmation.
3. Once the system has been powered, within 10 seconds enter the configuration menu by pressing the Programming button 12 times. If your actions are correct, the Immobilizer will confirm it by 4 audible signals.
4. Select the option from the menu by pressing the Programming button a required number of times (equal to the number of the option). The Immobilizer will acknowledge the option number by a series of audible signals.
5. Go to option setting by pressing and holding the brake pedal. The Immobilizer will notify of the option status by a series of audible signals of a changing duration.
6. Adjust option settings by pressing the Programming button the number of times matching the number of steps from the current status to the required one. Please remember that from the last function the program will go to the first one.
7. Release the brake pedal. Now you can move to programming the next function or exit the programming mode.
8. Go to configuring another option by pressing the Programming button the number of times matching the number of steps from the current option to the required one. For example, to go from option 2 (AntiHiJack) to option 6 (Activation of Central Lock while driving) press the Programming button 4 times. You can exit programming mode at any moment by turning off the ignition. A trill will sound. If no actions were taken within 60 seconds and brake pedal was released, the Immobilizer will exit programming mode.

You can exit programming mode at any moment by turning off the ignition. A trill will sound. If no actions were taken within 60 seconds and brake pedal was released, the Immobilizer will exit programming mode.

- If the vehicle has travelled 10 km after installation, and factory default PIN code remained unchanged, it is allowed to use PIN code “2” for identity verification by pressing an integrated button.
- To change method of authentication (option 9) you must enter PUK-code: you can find it under the opaque cover on the plastic card. No audible signals are generated before entering the PUK-code. Afterwards a trill will sound, and the system will indicate the option number.

- PUK-code as a means for changing the authentication method is not required if:
  1. the vehicle travelled less than 10 km after installation of the Immobilizer (Speed Control is available).
  2. the ignition was not active for more than 20 minutes after installation of the Immobilizer (Speed Control is not available)

Changing PIN code

1. Turn the ignition on.
2. Enter PIN code, wait for confirmation.
3. Press the Programming button 10 times within 14 seconds after the authentication. Wait for confirmation by 1 audible signal.
4. Set the new PIN code by using any combination of buttons. Now you can use the buttons. Pressing is confirmed by an audible signal.
5. Wait for confirmation by 1 audible signal.
6. Re-enter the new PIN code.
7. Wait for confirmation.

- 2 audible signals and a sound trill mean that the PIN code has been changed and the Immobilizer has left the PIN code changing mode.
- Sound alert means that the PIN code has not been changed: An error occurred while entering a new PIN. Repeat PIN changing procedure starting from step 4.

You can exit the PIN code changing mode anytime by turning the ignition off.

- You cannot change PIN to «1» – a single push of a button.

Reassigning Programming Button

1. Reset all settings to factory default.
2. Run the Immobilizer interfacing procedure.
3. If analog steering wheel buttons are used please define them (see above for the description of this procedure).
4. In order to assign any of the buttons recognized by the Immobilizer as the Programming button, press the selected button and hold it for at least 5 seconds until a long audible signal is heard.

The Programming button can be assigned within 15 minutes after the Immobilizer interfacing with the vehicle.
**Examples of programming**

**Example 1**

**Objective:** Change the factory settings of the Immobilizer. Set Output 2 – Engine locking – to normally open relay control.

**Execution:**
1. Turn the ignition on.
2. Enter PIN code, wait for confirmation.
3. Once the system has been powered, within 10 seconds enter Menu 1 by pressing Programming button 10 times. If your actions are correct, the Immobilizer will confirm it by 3 audible signals.
4. Select Option 3 – Engine locking – from Menu 1 by pressing Programming button 3 times. The Immobilizer will acknowledge the selection by a sequence of 3 audible signals.
5. Enter Option 3 menu by pressing and holding the brake pedal. The Immobilizer will indicate the setting by 2 repeated audible signals since the current (factory) setting is normally closed relay control.
6. Select «normally open relay control», by pressing Programming button 4 times. The Immobilizer will notify the selection of this option by a single audible signal.
7. Exit the programming mode by turning the ignition off.

**Example 2**

**Objective:** Change the factory settings of the Immobilizer. Extend the Anti HiJack activation distance from 100 to 300 meters.

**Execution:**
1. Turn the ignition on.
2. Enter PIN code, wait for confirmation.
3. Once the system has been powered, within 10 seconds enter Menu 2 by pressing Programming button 12 times. If your actions are correct, the Immobilizer will confirm it by 4 audible signals.
4. Select Option 3 – AntiHiJack response delay – from Menu 2 by pressing Programming button 3 times. Immobilizer will confirm the selection by emitting a sequence of 3 audible signals.
5. Enter Option 3 menu by pressing and holding the brake pedal. The Immobilizer will inform you on the option setting by repeated single audible signals because the current (factory) setting is 1 (which stands for 100 meters distance).
6. Adjust the setting of option 3 by pressing the Programming button 2 times, i.e. increase the option value by 2 increments (1 + 2 = 3). Immobilizer will acknowledge the selection by emitting a sequence of 3 audible signals (i.e. 300 m).
7. Exit the programming mode by turning the ignition off.

**Resetting to factory default settings**

There is a procedure of resetting the programmable settings, where all vehicle model settings are removed from Immobilizer’s permanent memory while PIN code and all other programming options are returned to factory settings.

**For vehicles with Immobilizer:**
1. De-energize the Immobilizer.
2. Press and hold the integrated button (see «Immobilizer wiring diagram»).
3. While holding the button, energize the Immobilizer. The Immobilizer will start emitting an intermittent audible sound.
4. Release the button and wait for the audible signal to stop.
5. Turn on the ignition. Enter PIN-code, a trill will be made.
6. Wait for an intermittent signal meaning the system was reset to factory default settings. Switch the power off.

**For vehicles without Immobilizer:**
Resetting can be done in three ways:
1. using an integrated button if the default PIN «2» has not been changed and the vehicle has not travelled more than 10 km after installation.
2. using the button and PUK.
3. By installing the Alarm in the same vehicle as it was installed before (if you know the PIN-code).

**Procedure for first two options:**
1. Press and hold the integrated button (see «Immobilizer wiring diagram»).
2. While holding the button, energize the Immobilizer. The Immobilizer will start emitting an intermittent audible sound.
3. Release the button and wait for the audible signal to stop.
4. If the vehicle has travelled less than 10 km after installation, and factory default PIN remained unchanged, it is allowed to use PIN code “2” by pressing an integrated button. Otherwise enter PUK. A trill will sound.
5. Wait for an intermittent signal meaning the system was reset to factory default settings. Switch the power off.

⚠️ The protective layer can be removed and PUK can be entered only by the registered user.
Immobilizer wiring diagram

PRIZRAK 500 v7

X1 Port (12-pin)

- yellow/red: Program. output (+)
- orange/white: Program. input (+)
- pink/green: Program. input (+)
- white/black: Input (+)
- green/black: Output (-)
- brown: CAN-H
- brown/red: CAN-L
- grey/yellow: Analog button
- grey/black: Analog button
- blue/red: Output (+/-) with variable polarity
- blue: Ground
- red/black: Power supply 12V

Link to pLine relay

Connect to vehicle circuit with switching / non-switching voltage +12V

HCU-230 Hood locking

Brake light status check

Engine Lock (factory setting)

Hood module control

Set option Engine locking to value 5 (see Hardware settings configuration). To activate Engine Lock use Output 2 HCU-230 (yellow).

TP-BUS – digital bus for serial communication and connection of additional devices by TEC Electronics

Hood module control

Set option Engine locking to value 5 (see Hardware settings configuration). To activate Engine Lock use Output 2 HCU-230 (yellow).

Wireless pLine-221 relay (for PRIZRAK 520/540)

- No more than one relay is allowed
- Algorithm changes are not allowed

Hood status check

Subject to vehicle status

- Alternate hazard lights control
- Identity verification

Engine Lock (factory setting)

TP-BUS – digital bus for serial communication and connection of additional devices by TEC Electronics

Wireless pLine-221 relay (for PRIZRAK 520/540)

- No more than one relay is allowed
- Algorithm changes are not allowed

Hood status check

Subject to vehicle status

- Alternate hazard lights control
- Identity verification

Engine Lock (factory setting)

TP-BUS – digital bus for serial communication and connection of additional devices by TEC Electronics

Wireless pLine-221 relay (for PRIZRAK 520/540)

- No more than one relay is allowed
- Algorithm changes are not allowed

Hood status check

Subject to vehicle status

- Alternate hazard lights control
- Identity verification

Engine Lock (factory setting)

TP-BUS – digital bus for serial communication and connection of additional devices by TEC Electronics

Wireless pLine-221 relay (for PRIZRAK 520/540)

- No more than one relay is allowed
- Algorithm changes are not allowed

Hood status check

Subject to vehicle status

- Alternate hazard lights control
- Identity verification

Engine Lock (factory setting)

TP-BUS – digital bus for serial communication and connection of additional devices by TEC Electronics

Wireless pLine-221 relay (for PRIZRAK 520/540)

- No more than one relay is allowed
- Algorithm changes are not allowed

Hood status check

Subject to vehicle status

- Alternate hazard lights control
- Identity verification

Engine Lock (factory setting)

TP-BUS – digital bus for serial communication and connection of additional devices by TEC Electronics

Wireless pLine-221 relay (for PRIZRAK 520/540)

- No more than one relay is allowed
- Algorithm changes are not allowed

Hood status check

Subject to vehicle status

- Alternate hazard lights control
- Identity verification

Engine Lock (factory setting)
Use the picture to draw arrangement of alarm units. This can help when trying to find specific units.

Keep this sketch out of the reach of third parties.
### Standard scope of delivery

<table>
<thead>
<tr>
<th>Designation</th>
<th>Quantity, pcs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central unit</td>
<td>1</td>
</tr>
<tr>
<td>A set of wiring harness</td>
<td>1</td>
</tr>
<tr>
<td>pLine-221 relay (only for PRIZRAK-520)</td>
<td>1</td>
</tr>
<tr>
<td>Reminder card</td>
<td>1</td>
</tr>
<tr>
<td>User manual</td>
<td>1</td>
</tr>
<tr>
<td>Warranty certificate</td>
<td>1</td>
</tr>
<tr>
<td>Connection diagram</td>
<td>1</td>
</tr>
<tr>
<td>Packing</td>
<td>1</td>
</tr>
</tbody>
</table>

### Specifications and operating conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply voltage, V</td>
<td>9 ... 15</td>
</tr>
<tr>
<td>Maximum current consumption in standby mode, mA</td>
<td>5</td>
</tr>
<tr>
<td>Maximum current consumption in standby mode, mA</td>
<td>1200 (for PRIZRAK-520)/200 (for PRIZRAK-510)</td>
</tr>
<tr>
<td>Operating temperature, °C</td>
<td>–40 ... +85</td>
</tr>
<tr>
<td>Storage temperature, °C</td>
<td>–40 ... +85</td>
</tr>
<tr>
<td>Maximum relative air humidity, %</td>
<td>95</td>
</tr>
</tbody>
</table>