

INTELLECTUAL
t h e f t p r e v e n t i o n
S Y S T E M

520

PRIZRAK

TECHNICAL
SPECIFICATION



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Глава I. Immobilizer Description

Introduction

Prizrak-520 intellectual theft prevention system (hereinafter referred to as **Immobilizer**) is designed for vehicle theft prevention should such an incident occur while the vehicle is parked or should hijacking be the case. Besides, the Immobilizer is equipped with additional service features: Comfort feature control, electro-mechanic hood lock control and central locking control.

Immobilizer includes pLine-221 wireless lock relay. The relay is controlled via original vehicle wiring



The vehicle cannot be equipped with more than **one** pLine-221 relay.

Programming button – one of original buttons of the vehicle used for programming the immobilizer (see Integrator files for information on which button is used in each given vehicle). When using the Immobilizer, the Programming button is not redefined. The button can be redefined only during the installation of the Immobilizer in the vehicle. The button integrated in the Integrator files' case can be used as Programming Dutton.

Security – it is the condition of Immobilizer that is entered by locking the vehicle's doors in any way provided by the vehicle manufacturer (with the lock cylinder on driver's door, keyless access system, remote control, or re-arming etc.) that includes arming of the original vehicle alarm. Secure condition is left by unlocking the doors with the original remote control or vehicle keyless access system and by entering the PIN code.

Comfort feature – is the original function that allows not only lock-

ing vehicle's doors but also closes the vehicle's windows (possibly with the sun roof) with the original remote control and (or) with the key.

Speed control – allows setting the locking activation algorithm for Immobilizer and Anti HiJack features. Speed control can be activated and de-activated in user settings programming menu. Certain vehicles may not support this feature (please see Integrator files for details).

Guard mode – is an active operation mode of Immobilizer and Anti HiJack features: should one of these features enter the Guard mode, it is necessary to enter the correct PIN code; otherwise the Engine locking will occur.

Engine locking – is the locking and preventing the vehicle's engine from operation with help of a relay.

PIN and PUK codes

PIN code

PIN code is a secret combination of original vehicle button(s) pressings. Please see the Integrator files for the list of original buttons perceived by the Immobilizer. PIN code needs to be entered prior to driving the vehicle.

PIN code is a one-, two-, three- or four-digit number. Each digit is a figure from 1 to 9.

PIN code can be promptly changed numerous times by both technical specialists during Immobilizer installation or by you during day-to-day vehicle use.



Factory default settings

PIN code – 2 is entered with the Programming button – see Integrator files. Upon Immobilizer installation the factory-set PIN code is to be changed for the purposes of providing the proper secrecy level. If the PIN code is not changed, a beep tone will be activated after factory-set PIN code entering in order to remind the necessity of PIN code changing.

PUK code

In case if the vehicle owner loses the PIN code, the Immobilizer supports the entering of the PUK code.

PUK code completely replaces the PIN code but cannot be changed during operation.

PUK code is located under the protective layer on the plastic card. PUK code entering is carried out by Programming button with 2-second pause after each digit. PUK code can be entered with the integrated Programming button and with the original vehicle button assigned as the Programming button.



Only the vehicle owner must know the PUK code.

Upon successful PUK code entering a new PIN code can be programmed.

PIN code entering

PIN code is entered with vehicle ignition and engine on by steadily pressing the original vehicle's buttons. When entering one of the PIN digits, please make sure that pressing or pause duration is no longer than 1 second.

Please keep the pause of approximately 2 seconds in between the digits. If you made a mistake while entering the PIN code, please wait for longer than 3 seconds and re-enter the PIN code.

PIN code entering sequence:

- ◇ Turn the ignition and engine on Enter the PIN code
- ◇ Wait for audible confirmation trill

Available PIN code options

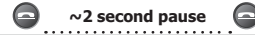
◀, ▶, +, -, ⏻ - buttons are used as an example. Please refer to the Integrator software files for the list of buttons perceived by the unit.

Single-button PIN code entering

One-digit PIN code:



Two-digit PIN code:



Multiple buttons PIN code entering

When entering the PIN code you need to keep in mind the button pressing sequence

One-digit PIN code:



Two-digit PIN code:



Immobilizer feature

Immobilizer feature is designed for preventing the vehicle from being stolen from its parking area. Immobilizer enters the Guard mode when the ignition is turned off for longer than 30 seconds. If the Immobilizer feature is in Guard mode then it is necessary to enter the correct PIN code otherwise the engine will be locked:

- ◇ The engine will be turned off right after the vehicle starts moving if the Speed control is on and is supported by the vehicle.

- ◇ The engine will be turned off within 5 seconds after the ignition has been turned on if the Speed control is off or is not supported by the vehicle.

Immobilizer can leave the Guard mode and the engine lock can be unlocked by entering the PIN code without turning the ignition off prior to the procedure.

You do not need to enter the PIN code again if the ignition has been off for less than 30 seconds.

Anti HiJack feature

Anti HiJack is the function that prevents the vehicle from being hijacked or stolen from its parking area.

Anti HiJack enters the Guard mode in the following cases:

- ◇ The ignition has been turned off for longer than 30 seconds (in case if Immobilizer feature was not on; if it was on then the Immobilizer will follow its algorithms).
- ◇ Driver's door has been opened.

Upon entering the Guard mode, Anti HiJack feature passes a sequence of phases and in case if the Guard mode has not been deactivated, the feature will activate the Engine locking.

Changing of phases takes place only when the ignition is on. When ignition has been turned off the Immobilizer will save its current condition and will continue its operation when the ignition is back on.

Anti HiJack's Guard mode can be deactivated at any phase by entering the PIN code.

Guard mode includes the following phases:

- ◇ Idle phase
- ◇ Alarm phase
- ◇ Locking phase

Idle phase. In this phase Anti HiJack follows two different algorithms depending on the availability of Speed control.

If the Speed control is available, Anti HiJack waits until the vehicle covers a set distance from the moment of Guard mode activation. Upon that, Anti HiJack goes into the Alarm phase.

If the Speed control is not available, Idle phase consists of three stages:

- ◇ Waiting for driver's door closing
- ◇ Waiting for a certain number of brake pedal pressings
- ◇ Pause before Alarm phase initiation

Alarm phase. This phase consists of two stages:

- ◇ Driver warning on the necessity of entering the PIN code (10 seconds). It is carried out by an audible sound alert.
- ◇ Warning the other drivers on the road on the possible hazardous situation due to the upcoming engine locking (10 seconds). It is carried out by vehicle hazard lights warning the other drivers.

If at any of the stages mentioned above attempts of entering the PIN code shall occur, the stage's duration may be increased up to 20 seconds, but the overall phase duration cannot be longer than 30 seconds.

Locking phase. Engine locking is activated. Hazard lights will be on for 15 seconds. Anti HiJack will be in the locking phase until the PIN code is entered.

! When safe locking mode is on (see Immobilizer hardware settings programming (Menu 1) section), Engine locking will be activated only if the vehicle's speed is 30 km/h or less. If the vehicle speed exceeds 30 km/h the Immobilizer will wait for speed decrease for an unlimited amount of time (while the vehicle is moving). As soon as the speed goes as low as 30 km/h the immobilizer will lock the engine

Use of safe locking mode allows mitigating the risk of collisions when Engine locking is activated.

When the ignition is off Anti HiJack turns the hazard lights and audible driver warning signals off. If the Immobilizer feature has not entered the Guard mode (see the Immobilizer feature section) then, upon the next ignition activation Anti HiJack will activate audible driver warning and hazard lights for 15 seconds. In the meantime Anti HiJack feature allows starting the engine but will prevent driving following the same algorithms as Immobilizer feature.

If the Immobilizer feature has entered the Guard mode, then, upon ignition's deactivation Anti HiJack feature will stop its operation and Immobilizer will follow the algorithms of Immobilizer feature.

Maintenance mode

Maintenance mode is an operation mode when all theft prevention and service functions of Immobilizer are temporarily deactivated.

With Maintenance Mode on, entering the PIN code is not needed when driving the vehicle, which is helpful when the car needs to be put for maintenance in the service center. Still, in order to enter the Programming mode, it is necessary to enter the PIN code.

When the ignition is turned on in Maintenance mode, a long audible tone is sounded that reminds on the fact that the Immobilizer is in maintenance mode. The audible tone can be turned off for secrecy level increase.

In order to activate or deactivate the Maintenance mode you need to do the following:

- 1 Turn the ignition on Enter the PIN code and wait for confirmation
- 2 Press and release the Programming mode button 6 times (start doing it no later than 10 seconds after PIN code entering). Please wait for confirmation that you have successfully performed the actions:
 - ◇ 1 audible signal and 1 sound trill mean that the Maintenance mode is ON.
 - ◇ 2 audible signals and 1 sound trill mean that the Maintenance mode is OFF.
- 3 Turn the ignition off.

Additional features

The Immobilizer has additional features improving the vehicle security level.

Comfort feature control

The Immobilizer can be programmed so that the vehicle's windows are closed when the vehicle's security is Armed. Please see Integrator files for supported vehicles.

Electro-mechanic hood locks control

The Immobilizer allows closing an accessory hood lock simultaneously with vehicle locking and opening the hood lock when the PIN code has been entered.

Central locking control

If the vehicle is not equipped with the following functions:

- ◇ Doors locking during driving
- ◇ Doors unlocking upon turning the ignition off They can be carried out by the Immobilizer.

Please see Integrator for list of supported vehicles.

Глава II. Connection

Immobilizer Inputs/Outputs

Immobilizer Inputs / Outputs functionalities are described in the Immobilizer port description Table. 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)).

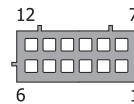


Рис. 1. Port connector pins enumeration from wiring viewpoint

Table 1. Immobilizer port description

No.	Color	Type	Function	Current, mA
1	Brown/red	CAN	CAN-H vehicle data bus	–
2	White/black	- output	Engine locking	150
3	Gray/green	- output	Programmable negative output (Lock Impulse by default)	50
4	Gray/blue	- output	Programmable negative output (driver authentication by default)	50
5	Blue/red	+/- output	Alternate hazard lights control ¹⁾	150
6	Black	power supply	Ground	– ²⁾
7	Brown	CAN	CAN-L vehicle data bus	–
8	Pink/Green	+ input	Brake lights condition control ³⁾	1,5
9	Yellow/red	-	Communication channel ⁴⁾	–
10	Gray/yellow	+ input	Analog button/Positive button	–
11	Gray/black	- input	Reference ground/Negative button	–
12	Red	power supply	+12 B	1200(3,5) ⁵⁾

¹⁾ – Is an output with convertible electrical polarity. Polarity is set automatically upon unit interfacing with the vehicle. This output is used for alternate hazard lights control in vehicles that do not support CAN bus control.

²⁾ – Useful current of output No. 6 depends on connected load of the negative outputs.

³⁾ – Input No. 8 is to be connected only in vehicles where CAN bus does not contain data on brake pedal position (see Integrator files).

⁴⁾ – Upon Immobilizer installation it is necessary to check the connection in between the central unit and the relay.

⁵⁾ – Maximum useful current rate in transfer (impulse) and idle modes is indicated. It may vary depending on demand in output No. 5. Outputs No. 2, 3, 4 are protected from short circuit, inductive eruptions, overheating and maximum demand surpassing.

Immobilizer pin connectors' description

Pins No. 1 and 7. "CAN-H and CAN-L vehicle data bus" are connected to vehicle CAN bus (see "Integrator files").

Pin No. 2. "Engine lock" is connected to one of relay coil contacts, which is used for engine operation or ignition lock. The output can be set for controlling a normally-open or normally-closed relay

Pin No. 3. Programmable negative output ("Lock Impulse" by default).

Pin No. 4. Programmable negative output ("Vehicle owner authentication" by default).

Pin 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.

Pin No. 6. "Ground" is connected to vehicle body in one of the locations determined by vehicle manufacturer for original equipment ground connection

Pin No. 8 "(+) input". 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. 8 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.

Pin No. 9. "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.

Pin No. 10 "(-) input. 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).

- ◇ Positive button is connected to the positive button (the one controlled by +12V voltage). It is used in case if there are no original vehicle buttons perceived by the Immobilizer.

If the vehicle has original buttons controlled via CAN bus that are perceived by the Immobilizer, this input may be discarded.

Pin No. 11 (-) input. Depending on control button 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).
- ◇ Negative button is connected to the negative button (the one controlled by ground fault). It is used in case if there are no original vehicle buttons perceived by the Immobilizer.

If the vehicle has original buttons controlled via CAN bus that are perceived by the Immobilizer, this input may be discarded.

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

pLine-221 relay description and installation recommendations

Table 2. Relay outputs description

Color	Type	Function	Current
Red	Communication channel and power supply	+12 B	1 A/10 mA 
Black	Power supply	Ground	–
Violet	–	Locking output	10 A
Violet	–	Locking output	10 A


 Transfer mode (impulse): up to 1 A. Reception mode: 10 mA.

Communication channel outputs of the central unit and the relay need to be connected to vehicle circuit with commutated positive polarity voltage. The signal is to be present in this circuit when the engine is one (e.g., ignition circuit, fuel pump, nuzzles, ignition coils etc. can be used). The circuit that is used for communication in between the central unit and the relay can be blocked (or other vehicle circuit suitable for these purposes). Relay locking outputs are connected to the circuit breaking in any order (it is irrelevant which one of them is connected before the breaking and which one is connected after it). Upon Immobilizer installation it is necessary to check the connection in between the central unit and the relay.

The relay is equipped with a built-in accelerometer that is necessary for vehicles that don't have vehicle movement data in their CAN buses and that also allows operating additional features for vehicles that have movement data in their CAN bus. The features are as follows:

- ◇ Engine locking even in case if due to some reasons the central unit receives wrong data on vehicle speed from the bus.

- ◇ Available accelerometer allows starting the engine in case if the connection in between the central unit and relay has been lost along with stopping the engine after the driving had begun.

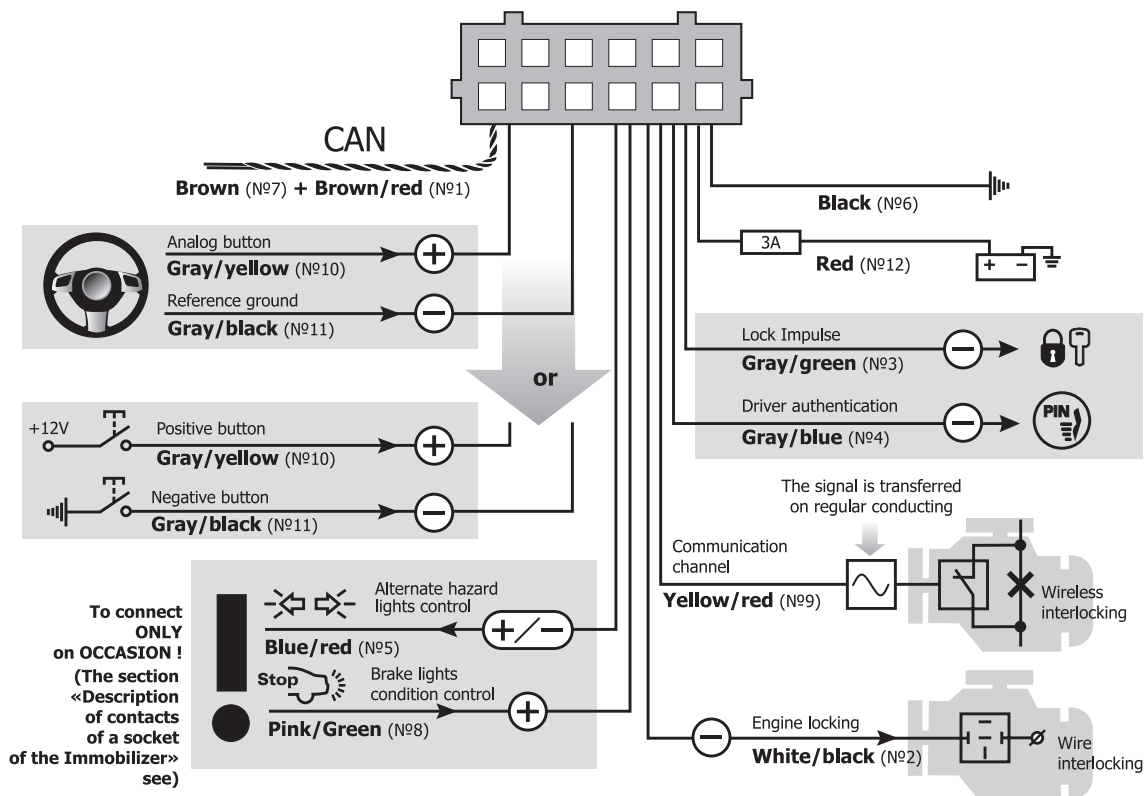
 It is not allowed to install more than one pLine-221 relay.

The relay should not be installed on vehicle parts that are subject to engine starting and operation vibrations. Such installation may compromise vehicle movement identification due to a significant amount of noises overlaying the useful signal.

Factory-set sensitivity setting is based on the assumption that the relay is located and fixed in a way that engine operation and starting vibrations' transferred to the unit are minimized.

Upon Immobilizer installation it is necessary to check accelerometer sensitivity settings and adjust them should it be necessary.

PRIZRAK-520 Immobilizer connection diagram (factory default settings)



Immobilizer programming

Immobilizer programming is carried out with Programming button.

Programming stage one.

Immobilizer interfacing with the 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

In order to automatically interface the Immobilizer with the vehicle it is necessary to carry out a set of actions (see Integrator files). Upon vehicle identification algorithm is launched the Immobilizer emits a constant audible signal.

If the Immobilizer identifies only the vehicle group, then it will stop emitting the constant signal and will periodically emit series of audible signals, where the number of signals will correspond with the group number.

If the Immobilizer identifies both the group and subgroup of the vehicle, then it will inform on the completion of vehicle interfacing with an audible sound trill and will emit three series of audible signals where the number of long signals corresponds with the group number and the number of short signals corresponds with the subgroup number.

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 shall not be pressed within 60 seconds.

Programming sequence:

- 2.1 Power the Immobilizer and wait for discontinuous signal.
- 2.2 Enter Menu 1 by pressing and releasing the Programming button 10 times (this needs to be done no later than 10 seconds after the system has been powered). If the procedure is carried out correctly, the Immobilizer will inform on this fact with three audible signals.
- 2.3 Enter menu option No. 1 – Vehicle model – by pressing the Programming button once. The Immobilizer will inform on option condition with 1 audible signal series.
- 2.4 Enter the vehicle's group number by pressing the Programming button for the corresponding number of times (see Integrator files). The Immobilizer will periodically emit series of audible signals where the number of signals corresponds with the group number.
- 2.5 Enter the vehicle's subgroup number by pressing the Programming button for the corresponding number of times (see Integrator files).

Verify that the vehicle model has been chosen correctly with help of audible signals (group number – pause, subgroup number – pause):

- ♦ 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, then press the Programming button twice. Repeat the programming procedure beginning from p. 2.4.

Analog steering wheel buttons programming

In order to use the analog steering wheel buttons please do as follows:

- ♦ Right after the Immobilizer identifies the vehicle model, turn the ignition on and wait for no less than 5 seconds.
- ♦ Press all the steering wheel and steering wheel column joysticks' buttons (cruise control, central unit control etc.) sequentially (one after another). The buttons, upon pressing of which and audible signal will be heard, are available for use.
- ♦ Turn the ignition off; an audible sound trill will be played.
- ♦ Turn the ignition on.
- ♦ Assign the Programming button from available ones by pressing and holding it for no less than 5 seconds (until an audible signal will be heard).

Communication check between the central unit and pLine-221 relay

- 1 Turn the ignition on.
- 2 Enter the PIN code and wait for confirmation.
- 3 Press and release the Programming button 10 times (you must commence this procedure not later than 10 seconds after the PIN code entering). The Immobilizer will notify that you have entered the menu by three audible signals.
- 4 Select menu option 9 (see Immobilizer hardware functions configuring (Menu 1)) by pressing and releasing the Programming button 9 times. The Immobilizer will inform you on the option number by series of 9 audible signals.
- 5 Press the brake pedal and hold it for longer than 10 seconds. Upon option entering an audible indication will be activated (if the connection is up, you will hear short double single-tone signals with 0,5 second period; if the connection is down you will hear a constant two-tone signal).
- 6 It is necessary to emulate the use of main vehicle systems in all the modes possible (system operation check with different combinations of electrical units on is preferred):
 - ♦ Climate system activation in different modes;
 - ♦ Heater fan rotation speed changing;
 - ♦ Heating equipment operation mode changing (seats heating in different output modes, windows and side rear view mirrors heating);
 - ♦ Lighting equipment operation mode changing (main lights, external lights, fog lights).

Special attention needs to be paid to communication check during engine highrpm speed operation. You should steadily increase and decrease the engine rpm speed and constantly control the system's operation. Communication failures may occur in a narrow range of engine rpm speed.

Single communication failures (occasional short-time failures indicated by two-tone signal) are acceptable. If there are constant communication failures due to any conditions (two-tone signal lasts more than 2 seconds) please choose another circuit for connection, for the checked location does not guarantee stable system operation

- 7 In order to leave this menu option press the brake pedal for a short period of time. Then, in order to leave the Programming mode, turn the ignition off Accelerometer sensitivity setting

- 1 Turn the ignition on.
- 2 Enter the PIN code and wait for confirmation.
- 3 Press and release the Programming button 10 times (you must commence this procedure not later than 10 seconds after the PIN code entering). The Immobilizer will notify that you have entered the menu by three audible signals.
- 4 Select menu option 10 (see Immobilizer hardware functions configuring (Menu 1)) by pressing and releasing the Programming button 10 times. The Immobilizer will inform you on the option number by series of 10 audible signals.
- 5 Press the brake pedal and hold it for longer than 10 seconds. The unit will commence the identification of current sensitivity settings (factory setting is 1 – maximum sensitivity).
- 6 Carry out a test engine launch and make sure that it operates steadily when its rpm speed is insignificantly changed (within 2000 rpm). If the locking is activated right after engine start or during acceleration manipulations or other vehicle controls please set the next (lower) sensitivity level by a single press of Programming button and repeat the test. It is recommended to start the engine at least 3 times in order to make sure that the Engine locking does not occur at the selected sensitivity level.



Let the engine run for at least 10 seconds after starting.

- 7 Upon setting completion turn the ignition off and wait for 3 seconds until you hear a sound trill indicated that the programming mode has been deactivated

Programming stage two.

Immobilizer configuration programming.

At stage two Immobilizer hardware functions and user settings are changed and a new PIN code is programmed. Three independent menus are used during programming (see Programming menu table).

Table 3. Programming menu

Name	Menu entering code	Audible signals number	Function
Menu 1	10	3	Immobilizer hardware settings configuration (see page 7)
Menu 2	12	4	Immobilizer user settings configuration (see page 9)
Menu 3	14	1	PIN code changing (see page 10)

Immobilizer hardware features programming (Menu 1)

Programming is carried out in accordance with Immobilizer hardware features programming (Menu 1) table.

Table 4. Hardware features programming (Menu 1)

No.	Option name	Setting range	Factory default settings	Notes
1	Vehicle model	–	–	–
2	Changes locking	1–4	2	1-Public, 2-OFF, 3-User, 4-Admin
3	Engine locking	1–3	2	1- normally open relay control 2- normally closed relay control 3- reserved by manufacturer
4	Safe locking mode	1–2	2	1-Safe locking mode on 2- Safe locking mode off
5	External buttons type	1–2	1	1- Outputs No. 10 and 11 are used as analog buttons 2- Output No. 10 and 11 are used as digital buttons
6	Hazard lights control algorithm	1–6	–	1- control via CAN bus 2- impulse negative control 3- status negative control 4- impulse positive control 5- status positive control 6- lamps control
7	(-) Output No. 3	1–20	2	Programmable negative output (Lock Impulse by default)
8	(-) Output No. 4	1–20	20	Programmable negative output (owner authentication by default)
9	Main unit and relay communication check	–	–	–
10	Accelerometer sensitivity setting	1 – 4	1	1- maximum accelerometer sensitivity 2- high accelerometer sensitivity 3- low accelerometer sensitivity 4- minimum accelerometer sensitivity

Annotations to Table 4

p. 1 Vehicle model allows forced selection of vehicle group and subgroup.

p. 2 Change locking allows prohibiting the Immobilizer hardware features reprogramming.

This point has 4 conditions:

- 1 **Public** – reprogramming prohibition is set for all menu options except for 2;
- 2 **OFF** – prohibition is removed and all options can be reprogrammed;
- 3 **User** – prohibition is set for all the options aside from 1. Password needs to be entered in order to remove prohibition (see below);
- 4 **Admin** – prohibition is set for all menu options. Password needs to be entered in order to remove prohibition.

Settings 1 (Public) and 2 (OFF) can be set with Programming button. Settings 3 (User) and 4 (admin) and the password can be set only while programming the Immobilizer with a PC or TECPROG original programming unit. User or Admin prohibition can be removed only with TECPROG upon entering the password. You can go from User mode to Public mode in order to prohibit the reprogramming of all the options except for 2. In this case you can go only back from Public mode to User mode.

Resetting to factory default settings leads to resetting of only the options, reprogramming of which has not been password protected.

In any condition of option No. 2 you can access the menu, navigate all the options and check every option's condition

p. 3 Engine locking allows setting the output No. 2 for normally open relay.

p. 4 Safe locking mode. With this mode on, Engine locking will be activated only if the vehicle speed is 30 km/h or less.

p. 5 External buttons type. Depending on the buttons used:

- ◇ Inputs No. 10, 11 are used for connecting analog (steering wheel) buttons
- ◇ Inputs No. 10, 11 are used for connecting digital (positive/negative) buttons

p. 6 Hazard lights control algorithm allows setting the required control algorithm. In the majority of cases the algorithm is set automatically during vehicle interfacing.

p. 7 (-) Output No. 3 is a programmable negative output (Lock Impulse by default).

p. 8 (-) Output No. 4 is a programmable negative output (driver authentication by default).

p. 9 Central unit and relay connection check. Upon Immobilizer installation it is necessary to check the communication in between the central unit and pLine-221 relay.

p. 10 Accelerometer sensitivity setting. Upon Immobilizer installation it is necessary to set the accelerometer sensitivity.

Programming sequence

- 1 Turn the ignition on.
- 2 Enter the PIN code and wait for confirmation.
- 3 Enter Menu 1 by pressing and releasing the Programming button 10 times (you need to do this no later than 10 seconds upon PIN code entering). The Immobilizer will notify of menu accessed by three sound trills.
- 4 Select menu option by pressing and releasing the Programming button for the number of times corresponding with the menu option number. The Immobilizer will inform on menu number by series of audible signals.
- 5 Go to option setting by pressing and holding the brake pedal. The Immobilizer will inform you on the option setting by series of audible signals, and their duration will change.
- 6 Change the option setting by pressing and releasing the Programming button for the number of times necessary for moving from the current setting number to the required setting number in the option (e.g., in order to change function No. 2 (Lock Impulse) with function No. 16 (External lights) you need to press and release the programming button 14 times. The Immobilizer will inform on the new option setting with series of audible signals. It is necessary to consider that during navigation in the option the first number goes after the last one. Release the brake pedal; the Immobilizer will indicate the current setting and then the current menu option number. Now you can proceed with programming the next option and leave the programming mode.
 - 6.1 6.1. Function No. 7 Doors, hood and trunk programming algorithm (applicable only for options No. 7 and 8 of Menu 1).
 - 6.1.1 Set any combination of doors, hood and trunk, the opening of which will cause the Immobilizer to form a signal on the programmable output. For the purposes of this description doors, hood and trunk are simple referred to as doors.
 - 6.1.2 With the brake pedal pressed go to option number 7 settings. Immobilizer will inform on option condition twice with series of 7 audible signals, after which it will start emitting irregular audible signals. When you hear irregular audible signals, release the brake pedal. The Immobilizer will continue emitting irregular audible signals. Open the doors that are to be identified on this output, the rest are to be closed (you can open the doors in advance). Press the brake pedal again. Immobilizer will inform on option setting change with series of 7 signals and the doors will be assigned to this output. If the brake pedal is not pressed and current option programming is left, the Immobilizer will save its previous condition. Release the brake pedal and the Immobilizer will go to option number indication.
 - 6.2 Function No. 8 Original button programming algorithm (applicable only for options No. 7, 8 of Menu 1).
 - 6.2.1 With the brake pedal pressed go to option number 8 settings. Immobilizer will inform on option condition twice with series of 8 audible signals, after which it will start emitting irregular audible signals. When you hear irregular audible signals, press the required button while holding the brake pedal (for the list of buttons of the given model, please see Integrator files). If the Immobilizer has perceived the button, it will stop emitting irregular audible signals and will start indicating the option setting number with series of 8 audible signals. Release the brake pedal, the Immobilizer will indicate menu option number. If the brake pedal is released prior to the button is pressed, the Immobilizer will save its previous condition and will start indicating the menu option number
 - 6.3 Function No. 9 Transmission condition programming algorithm (applicable only for options No. 7, 8 of Menu 1).
 - 6.3.1 With the brake pedal pressed go to option number 9 settings. Immobilizer will inform on option condition twice with series of 9 audible signals, after which it will start emitting irregular audible signals. When you hear irregular audible signals, change the transmission to the required position: P, N, D^{*} or R (transmission handle can be set in the necessary position in advance); for robotized transmission the positions are R, N, D^{*}; for manual transmission only R position is available. Release and press the brake pedal again. The Immobilizer will stop emitting irregular audible signals and will start indicating the option setting number with series of 9 audible signals. Release the brake pedal, the Immobilizer will indicate menu option number. If the brake pedal is released prior to the button is pressed, the Immobilizer will save its previous condition.
- 7 In order to go to next menu option programming press and release the Programming button for the number of times necessary for navigation from the required option (e.g., in order to navigate from option No. 2 to option No. 8 in Menu 1 press and release the Programming button 6 times). Important note: when navigating menu options, the first option follows the last one.

Exiting the programming mode. 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.).

Table 5. CAN bus adapter functions

Function		Function description
No.	Name	
1	Security	Constant level signal is formed while Immobilizer is in Security mode
2	Lock Impulse	0.8 second long impulse is formed when Immobilizer is entering the Security mode
3	Unlock Impulse	0.8 second long impulse is formed when Immobilizer is leaving the Security mode
4	Panic 1	Constant level signal is formed while the original car alarm (if the vehicle is equipped with it) is in alarm mode.
5	Panic 2 Perimeter security	30 seconds long constant level signal is formed if one of the following zones is triggered: doors opening, hood opening (if CAN bus has the corresponding data or input No. 8 is connected), trunk. The function can be applied in vehicles that are not equipped with original alarm system. The signal stops when vehicle is not in Security mode any longer.
6	Panic 2-K Perimeter security with claxon output	30 seconds long constant level signal is formed if one of the following zones is triggered: doors opening, hood opening (if CAN bus contains the corresponding data or input No. 8 is connected), trunk. The function can be applied in vehicles that are not equipped with original alarm system. The signal stops when vehicle is not in Security mode any longer. This feature is used for sending an alert signal to the original vehicle claxon.
7	Doors, hood and trunk	Constant level signal is formed if one of preset doors, hood (if CAN bus contains the corresponding data or input No. 8 is connected) or trunk is opened.
8	Original button	Constant level signal is formed if the preset vehicle button is pressed (see Integrator files application).
9	Transmission condition	Constant level signal is formed if transmission handle is set in preliminarily programmed position (P, R, N, and D). For robotized transmission the positions are R, N, D; for manual transmission only R position is available.
10	Sensor ignoring	Constant level signal is formed when the trunk is open in Security mode if the trunk has been opened with the original remote control. Also the signal is formed for the purposes of Comfort function. The function's purpose is to deactivate the sensors in order to prevent false alarms.
11	Ignition	Constant level signal is formed when ignition is turned on (including engine starting).
12	ACC	Constant level signal is formed when vehicle ACC are on (1st key position, may match with ignition on certain vehicles). It is turned off only when the ignition key is out of ignition lock. Can be used for correct accessory multimedia system power management.
13	Engine on	Constant level signal is formed when the engine is on.

Function		Function description
No.	Name	
14	Vehicle is moving	Constant level signal is formed if the vehicle speed has exceeded a certain threshold value (depends on vehicle and varies in the range of 5 to 10 km/h).
15	Brake	Constant level signal is formed when the brake pedal is pressed.
16	External lights	Constant level signal is formed when the external lights are on.
17	Engine rpm	Impulse signal is formed. Its impulse sequence frequency is proportional to the engine crankshaft rotation frequency. 1 impulse per second corresponds with 20 crankshaft rpm. The signal's purpose is to determine the approximate and not precise rpm value.
18	Movement speed	Impulse signal is formed. Its impulse sequence frequency is proportional to the vehicle speed. 1 impulse per second corresponds with 1 km/h speed. The signal's purpose is to determine the approximate and not precise speed value.
19	Parking brake	Constant level signal is formed when the vehicle is on hand brake.
20	Driver authentication	0.8 second long impulse is formed when the correct PIN code has been entered and in Maintenance mode 1 second after ignition has been turned on even if the PIN code had not been entered.

Immobilizer user settings programming (Menu 2)

Programming is carried out in accordance with table Immobilizer user settings configuring (Menu 2).

Table 6. Immobilizer user setting configuring (Menu 2)

No.	Description	Current option setting ¹⁾			
		Factory default settings	On	Off	Range
1	Immobilizer feature	On	1	2	—
2	Anti HiJack feature	On	1	2	—
3	Speed control	On	1	2	—
4	Number of brake pedal pressings	3	—	—	From 1 to 7
5	Anti HiJack feature response delay	1	—	—	From 1 to 10
6	PIN code entering audio confirmation	On	1	2	—
7	Maintenance mode audio indication	On	1	2	—
8	Central locking when driving	Off	1	2	—
9	Central lock unlocking when ignition is turned off	Off	1	2	—
10	Automatic windows closing	On	1	2	—

¹⁾ — number of audio signals is indicated.

Annotations to Table 6

p. 1. "Immobilizer feature" allows turning the Immobilizer feature on or off.

p. 2. "Anti HiJack feature" allows turning the Anti HiJack feature on or off.

p. 3. "Speed control" allows setting the lock activation algorithm for Immobilizer and Anti HiJack features.

p. 4. "Number of brake pedal pressings" allows setting the brake pedal pressings number necessary for Anti HiJack feature responding. If the Speed control is on, the setting of p. 4 does not affect anything.

p. 5. "Anti HiJack feature response delay" allows setting the distance before locking (Speed control is on) or time before locking (Speed control is off). The time is set by 20 second intervals; the distance is set by 100 meter sections. For example, if the option setting is 3, then:

- ◇ Locking activation delay is 60 seconds;
- ◇ Distance before locking is 300 meters.

p. 6. "PIN code entering audio confirmation" allows turning PIN code entering audio confirmation on or off.

p. 7. "Maintenance mode audio indication" allows turning Maintenance mode audio indication on or off.

p. 8. "Central locking when driving" allows turning the automatic central locking when driving feature on or off.

p. 9. "Central lock unlocking when ignition is turned off" allows turning the automatic central lock unlocking upon ignition feature deactivation on or off.

p. 10. "Automatic windows closing" allows turning automatic windows closing during vehicle locking on or off.


Programming sequence

- 1 Turn the ignition on Enter the PIN code and wait for confirmation (see PIN code entering section)
- 2 Enter Menu 2 by pressing and releasing the Programming button 12 times (start doing this no later than 10 seconds upon PIN code entering). If all operations have been carried out correctly, the Immobilizer will inform on this fact by 4 audible signals (see Programming menu table).
- 3 Beginning from point 4, programming algorithm is analogical with the one described in Immobilizer hardware features configuration (Menu 1), except for points 6.1, 6.2, 6.3.

PIN code changing

- 1 Turn the ignition on.
 - 2 Enter the PIN code.
 - 3 Press the Programming button 14 times. Wait for Immobilizer's confirmation by 1 audible signal.
 - 4 Set the new PIN code by using any combination of buttons perceived by the Immobilizer (see Integrator files). When entering a new PIN code, each pressing perceived by the Immobilizer is confirmed by the audible signal for further controlling assistance.
 - 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 and the Immobilizer has left the PIN code changing mode. A mistake has been made when entering the new PIN code confirmation and it is necessary to repeat the PIN code changing procedure starting from p. 1.
- You can exit the PIN code changing mode anytime by turning the ignition off.

Programming button changing

- 1 Reset all settings to factory default.
 - 2 Interface the Immobilizer with the vehicle.
 - 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 perceived by the Immobilizer as the Programming button, press the selected button and hold it for longer than 5 seconds until a long audible signal will be heard.
-  Programming button can be assigned within 15 minutes after Immobilizer interfacing with the vehicle.

Programming examples

Example 1

Objective: You would like to change the factory settings of the Immobilizer: set output No. 2 Engine locking to control the normally open relay.

Execution:

- 1 Turn the ignition on.
- 2 Enter the PIN code and wait for confirmation.
- 3 Enter Menu 1 by pressing and releasing the Programming button 10 times. If you have performed all the actions correctly, the Immobilizer will notify you of it with 3 audible signals.
- 4 According to Immobilizer hardware functions configuring (Menu 1) option No. 3 Engine locking is to be selected. To do so, press and release the Programming button 3 times. The Immobilizer will inform you on the selected menu option number by series of 3 audible signals.
- 5 Enter option No. 3 by pressing and holding the brake pedal. The Immobilizer will inform you on the option setting by repeated double audible signals because the current (factory set) option setting is "normally closed relay control".
- 6 Select "the normally open relay control" by pressing and releasing the Programming button twice, for the second setting is followed by the third. The Immobilizer will inform you on the option setting with series of 1 audible signal.
- 7 Exit programming mode by turning the ignition off.

Example 2

Objective: You would like to change the factory settings of the Immobilizer: to increase the Anti HiJack activation distance from 100 to 300 meters.

Execution:


- 1 Turn the ignition on.
- 2 Enter the PIN code and wait for confirmation.
- 3 Enter the Immobilizer setting mode by pressing and releasing the Programming button 12 times (start doing it no longer than 10 seconds after entering the PIN code). If you have performed all the actions correctly, the Immobilizer will notify you of it with 4 audible signals.
- 4 Select the programming option for setting the Anti HiJack activation distance. According to Table 1 "Immobilizer settings" option No. 5 is to be selected. To do so, press and release the Programming button 5 times. The Immobilizer will inform you on the selected menu option number by series of 5 audible signals.
- 5 Enter option No. 5 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 set) option setting is 1 (which stands for 100 meters distance).
- 6 Change option No. 5 setting by pressing and releasing the Programming button twice, therefore increasing the option setting by 2 (1+2=3). The Immobilizer will inform you on the option setting with series of 3 audible signals (300 meters).
- 7 Exit the setting mode by turning the ignition off.


Resetting to factory default settings

Immobilizer has a procedure of resetting the programmable settings, where all vehicle model settings are removed from Immobilizer's energy independent memory and PIN code and all other programming options are returned to factory original values.

If certain or all menu options are password protected (see Immobilizer user settings programming (Menu 2), p. 2), only the options that are not prohibited will be reset. The remaining ones will keep their current values.

In order to reset to factory default:

- 1 Remove power supply from Immobilizer
- 2 Press and hold the integrated Programming button
- 3 Connect the power supply while holding the button. Immobilizer will emit irregular audible signals.
- 4 Release the button and wait until the signals stop.
- 5 Turn the ignition on and enter the current PIN code .
- 6 An audible trill will be heard, which indicates that resetting to factory default has been completed.
- 7 Remove the power supply and disconnect the Immobilizer from CAN bus.

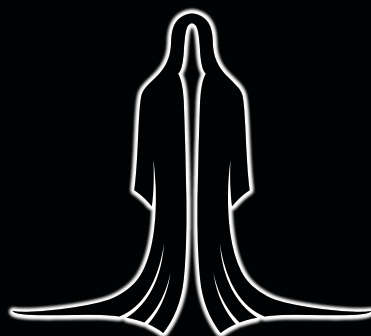
 If the Immobilizer is not installed in the vehicle, please enter the PUK code with the integrated Programming button.

Standard delivery package

Name	Quantity, pcs
Central unit	1
pLine-221 relay	1
Wiring harness with port	1
Compact disc	1
Connection scheme	1
User manual	1
Warranty certificate	1
Reminder card	1
Packaging	1

Technical characteristics

Parameter	Value
Power supply voltage, V	9 ... 15
Maximum current drain in standby mode, mA	3,5
Maximum current drain, A	1,2
Operating temperature °C	- 40 ... + 85
Storage temperature °C	- 40 ... + 85
Maximum relative air humidity, %	95



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The product is manufactured in accordance with TC 4372-008-78025716-11.
Certificate of conformity No. POCC RU. AB75. B00423
The product corresponds with the requirements of the following regulations:
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