

Lock-security

Multifunctional Device to Block a Lock Bolt

CERTIFICATE

SOS.425513.1811-01 PS

(short version)



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Functionalities of *Lock*-security blocker:

- The device operates with virtually any mechanical locks regardless of the year of their manufacture and installation.
- Even in case of a simple lock, the secrecy of the locking device can be made so high that it would be virtually impossible to open it by manipulative methods.
- The effectiveness of brute-force methods of unlocking is reduced thanks to creating a rigid tie “door leaf – lock bolt - door frame”.
- The device has the functions of early response locks, making it possible to detect even a small bolt displacement when the lock is fully closed.
- It provides a continuous monitoring of the door leaf against tampering/burglary (for example, using an angle grinder) by means of a motion IR sensor connected to the device.
- It ensures the operation using an alarm pushbutton, a siren, an outside-mounted LED indicators of current condition, as well as various actuators connected to the controlled relay output of the blocker.
- It transmits SMS notices of abnormal events that occur in the *door + lock* protective structure, as well as SMS replies to queries about the current condition of both the lock and the device itself to the mobile phones whose numbers have been entered in the memory of the device.

The novelty of the device has been confirmed by both Ukrainian and Russian patents (see video presentation on <https://www.youtube.com/watch?v=XVaESITbv6s>)

Interstate Standard GOST 5089-2011, *Locks, latches and cylinder mechanisms – Specifications* specifies the basic requirement for door locks as follows: *The design of mortise and rim locks should be such that at an attempt to unlock them in a destructive way the lock has to withstand and remain operable or be destroyed but so as to exclude entry to the protected space* (Subsection 5.7.4.7 of this standard).

The topical character of this requirement is confirmed by the appropriate statistic data according therewith almost every second illegal entry into citizens' apartments occurs through front doors by unlocking the locks installed at them (see, for example, <http://www.videogsm.ru/kvartirnie-krazhi.html>).

Known in the art are a lot of ways to make the crude-force opening methods of such locks more difficult. The most effective whereof provide an additional fixation of the bolt to the door frame after it has been inserted into the hole of the strike plate (see for example U.S. Patent 3,919,869 of November 18, 1975). The implementation of this method provides for not a one-sided but rather a two-sided fixation of the bolt of a fully closed lock: to the door leaf by the locking mechanism of the lock and to the door frame by the *locking device/blocker* installed in its cavity. As a result, the bolt becomes a *tie*, which prevents effectively the lock from being unlocked both when the locking mechanism is destroyed and in case of an attempt of pushing the door leaf away from the door frame.

The advantages of this method include the fact that it does not require disassembling of the lock (for refining of its secret and/or locking mechanisms) and considerably increases the resistance of the *lock+blocker* locking device to manipulative methods of unlocking since the latter has its own secret mechanism supplementing the secret mechanism of the lock. The secret of the electronically controlled blocker is easier to elevate than that of any mechanical lock unlocked with keys.

You are holding in your hands the Certificate for an innovative multifunctional blocking device that is capable not only to protect reliably a mortise lock of the front door of your apartment against an authorized unlocking but also to implement a number of additional, rather useful security functions.

The multifunctional blocking ***Lock-security burglar alarm device for doors equipped with a bolt lock*** (Ukrainian Patent for an Invention No.112511) was created based on ***Device for blocking of the bolt of a lock*** (Ukrainian Patent for an Invention No. 114136) and ensures a reliable monitoring of not only a mortise lock of virtually any design and year of manufacture but also of the door itself wherein it has been installed.

Unless the context otherwise required, the terms used in this document have the following meanings and the abbreviations used herein stand for the following:

'Protective structure' means a door provided with a lock, which door is installed for the purpose of security in order to limit or to exclude any entry into a certain area (see Section 3.1 of GOST 5089-2011).

'Lock' means an article used to lock the protective structures, which possesses prescribed security properties and is an inseparable member of the protective structure (Section 3.2 of GOST 5089-2011).

'Strike plate' means a part with an aperture for the entry of a deadlock/bolt, which part is designed to lock a door leaf (Section 3.13 of GOST 5089-2011).

'Deadbolt/Bolt' means a part of a lock, which serves to fix a door leaf in a closed position through entry into the strike plate (Section 3.17 of GOST 5089-2011).

'Lock-security device' means a multifunctional electromechanical device designed to block a lock bolt (hereinafter called the *blocker* or, simply, *device*).

'Blocker rod' means a movable part of the device, which accomplishes blocking the lock bolt through the insertion of a *locking member* of the blocker rod into a *recess* at the bolt.

'EM' stands for an electromagnet of the blocker, which ensures the unblocking of the lock bolt through raising the bolt to remove its *locking member* out of the recess at the bolt.

'Locking device' means a *lock* + *blocker* locking device.

'External unblocking devices' means users' mobile phones, a DS or RFID reader, a pushbutton with normally open contacts.

'PS' stands for an 'external power supply' (for example, a AC/DC converter).

'SB' stands for a 'storage battery'.

'UPS' stands for an 'uninterruptible power supply' (PS + SB with its recharging device).

'SA' stands for a 'security announcer', for example, an motion IR sensor or a vibration sensor.

'LA' stands for an 'external light enunciator (for example, a LED).

'AA' stands for an 'external audio enunciator (for example, a siren).

'AB' stands for an 'alarm button' with normally open contacts (i.e., contacts open in the initial condition).

'Boozer' means a miniature audio enunciator built in the device.

'Users' means any persons who are granted with the right to block/unblock the lock bolt, as well as with the possibility of activating the SA once the bolt has been blocked.

'Principal User' means a person who, in addition to one and all rights of ordinary users, has the exclusive right to program/correct the parameters of the multifunctional device, as well to request both current values of these parameters and the condition of the protective structure as a whole.

'Installer' means a person who performs the installation and *activation* of the device.

'Activation of the device' means an automatic choice and assignment of an operation mode of the blocker with an original firmware of the controlling microcontroller.

'DTMF commands' are produced by the users through a consecutive pressing pushbuttons at

the digital keyboard of their prone following its connection to the GSM module of the blocker.

'*SMS command*' means SMS messages sent from the Principal User's phone (those from the phones of ordinary users are not received) for the purpose of altering the operation conditions of the blockers, as well as for that of programming its operating parameters.

'*SMS notices*' means SMS messages, which are produced by the device upon the occurrence of any nonroutine events (for example, upon pressing the alarm button, a SA operation, a supply voltage drop down to a dangerously low value, the reduction of balance of the account of the SIM card installed in the GSM module below a programmatically set level, about the impossibility to comply with an SMS command or DTMF command, *etc.*) and are sent to the Principal User's phone.

'*SMS replies*' are produced by the blocker and sent, in the form of SMS messages, to the Principal User in reply to his/her *SMS requests* (for example, about current operation conditions, parameters prescribed, a signal level in the blocker installation area, a balance of the account of the SIM card, *etc.*).

INTRODUCTION

This Certificate contains a brief description of the *Lock*-security multifunctional device designed to block the bolt of mortise locks, as well as the basic requirements for its installation and warranty service terms and conditions.

1. PURPOSE

The device is designed to *block* the bolt of mortise locks with a user's hand and to unblock it subsequently by commands that come from the external unblocking devices, as well as to *monitor* the current conditions of both lock and the door leaf into which it has been installed.

2. TECHNICAL CHARACTERISTICS

2.1. The blocker is powered from an external UPS (or SB) having its output voltage of 12 ± 2.5 Vdc.

2.2.....

2.8. The overall dimensions of the device without taking the dimensions of the strike plate are not more than 95 mm x 48 mm x 25 mm.

2.9. The device is designed for a continuous round-the-clock operation in premises

3. OPERATION MODES

The blocker ensures operation in 13 modes, ten of which are its *basic modes* and three of which are its *emergency modes*.

3.1. 3 options of the prescription of the basic operation modes of the device are provided for:

a) An *initial* prescription, which is performed by the blocker in an automated mode once it is activated (i.e., when the device the microcontroller whereof has the original firmware is turned on for the first time) and is determined completely by the composition of unblocking devices, which are connected to the blocker.

b) A *correcting* prescription, which is performed automatically following power supply to the device, which operated previously without the GSM module, once this module is installed (to be performed when the power supply is turned off!).

c) A *current* prescription, which may be performed many times in the use of the blocker by SMS commands sent from the Principal User’s phone (this being only possible if the lock + blocker locking system is in a strictly determined condition and the GSM module is present in the device composition).

Table 1 shows the list of the basic operation modes of the blocker in reference to the composition of unblocking devices connected thereto.

The operation of the blocker in each of the basic modes is described in detail in the respective *Instructions for Operating the Device*.

3.2. The device goes automatically to an emergency operation mode in the following events:

- Complete de-energization of the blocker.
- The appearance of problems with the GSM module or mobile communication.
- Problems with the RFID reader which is designed by and commercially available from TOV “VKF HAG” and whose operability is monitored permanently by the device (unlike non-monitored standard RFID readers).

Following the elimination of any of the above-listed problems, the blocker returns automatically to the operation mode that preceded the emergency one (for more information about operation in the emergency modes, please refer to the *Instructions for Operating the Device* that correspond to each basic operation mode).

Table 1

	Unblocking Methods	Comments
1	<i>Unblocking with the help of a mobile phone</i>	
1.1	By a call from a phone of any of the users which is rejected by the device	
1.2	By a call with sending a 2-character DTMF code	00-99, by default 21
2	<i>Unblocking by external command devices, which do not require the use of mobile communication</i>	
2.1	By pressing a secretly installed pushbutton	

2.2	By entering a PIN code (from three to 10 digits) using the pushbutton installed at the outside of the front door	By default 321
2.3	Using RFID cards read by the standard RFID readers or by touching the DS reader with a charm	Up to 99 cards or charms
2.4	Using RFID cards read by the RFID reader designed by and commercially available from TOV “VKF HAG”	Up to 99 cards
3	<i>Unblocking with the help of a mobile phone and an additional command from one of the external unblocking devices</i>	
3.1	DTMF + pressing a secretly installed pushbutton	
3.2	DTMF command + entry of PIN code (from three to 10 digits) using the pushbutton installed at the outside of the front door	By default 321
3.3	DTMF + RFID card read by the standard RFID reader or a charm read by the DS reader	Up to 99 cards or charms
3.4	DTMF + RFID card read by the RFID reader designed by and commercially available from TOV “VKF HAG”	Up to 99 cards

4. DESCRIPTION OF THE DEVICE

4.1 The device comprises the following inputs (see External Connection Diagram in the last page of this Certificate):

4.2 In any operation mode of the blocker, the *lock + blocker* locking device is always in one of the two conditions:

a) The lock *is blocked*, i.e., the lock bolt is closed *completely*, the locking member has been inserted into the recess at its upper edge (a blind hole or a cross recess), and the bolt position is *monitored continuously*.

b) The lock *is unblocked*, i.e., the lock bolt is unblocked and its position *is not monitored* (this condition occurs always when the handle of the blocker rod is at the topmost position, as well as when the lock is open or closed not completely).

4.3 The launch of locking is independent on the assigned operation mode of the device and is performed by jerking the rod *by hand* down to the stop and then up again with releasing the rod knob in any position other than the highest position. As a result, the EM device is powered up for a programmable time (5 to 60 sec., hereinafter called the “*lock closing delay*”) and its magnetic field raises the rod to the middle position when the locking member of the rod would not prevent the bolt from moving while the lock is closing with the key.

4.4 The blocking is completed by disabling the EM power supply at the moment of complete insertion of the bolt into the strike plate, as a result of which the rod under the action of its weight goes down and its blocking member enters the recess at the upper surface of the bolt. The result will be as

follows:

a) *successful* if the lock was *completely* closed as early as before the end of the lock closing delay and the locking member of the rod has entered the bolt recess

(The user on the outside of the door will be informed of the successful completion of blocking by two short flashes of the LA followed by a non-blinking light);

b) *unsuccessful* if the lock has not been closed completely by the end of this time and the locking member has fallen not into the recess on the surface of the bolt but onto its top edge or even in front of its end face.

4.5 It is possible for the user to check the result of blocking by trying to turn the key to open (which he must do before the end of the lock closing delay time).

4.6 In any operation mode of the device, the lock can be easily and quickly unblocked from the inside of the door by simply raising the handle of the rod with finger up to the stop, this meeting the fire safety requirements for the locks of front doors of premises.

4.7 At least once a day (as well as every time the device is turned on), the blocker automatically checks the presence of the SA (e.g., an IR sensor or vibration sensor) and sends to the following SMS notice "Sensor connected/not connected" depending on the result of this check to the Principal User.

4.8 When the SA *is connected* to blocker and the lock is *blocked*, the device may be in one of two *security* modes of the *door + lock* protective structure:

a) Sensor polling *is enabled* (i.e., the sensor is activated and monitors continuously the door leaf and surrounding area);

b) Sensor polling *is prohibited* (when the lock is unblocked, the sensor polling will be always prohibited).

4.9 Users can activate the SA connected to the blocker during the programmed delay time for sensor activation (5-250 sec., by default = 30 sec.), which countdown starts immediately after the end of the locking delay time.

At the same time the Principal User has also a additional possibility of permitting or prohibiting remotely, at any time, SA polling by sending the SMS command *1# or *0# from his/her mobile phone.

The device notifies the user of the successful activation of the SA with three LA flashes followed by a non-blinking glow, and the Principal User also notifies the user by sending the SMS notice thereto.

The algorithm of SA activation by users is determined by the current operation mode of the device and is described for each of them in the corresponding editions of the *Instructions for Operating the Device*.

4.10 The reaction of a correctly mounted device to even a small (approx. 1 mm) displacement of the lock bolt and/or to the SA operation depends on the selected operation mode and is described in detail in the corresponding editions of *Instructions for Operating the Device*.

4.11 The users' actions when unblocking the lock (as opposed to blocking) are determined by the selected operation mode of the device (see in the corresponding editions of the Instructions for Operating the Device).

4.12 Users' actions during *emergency* unblocking are also determined by the selected operation mode of the blocker and are described in detail in the corresponding editions of *Instructions for Operating the Device*.

5. ACTIVATION AND PROGRAMMING

5.1 The programming of the blocker begins with its activation, during which the operability of the EM + rod electromechanical assembly is *checked* automatically, unblocking devices connected to the blocker are *identified*, and the corresponding operation mode is automatically *assigned* to them (see under 3).

5.2 The programming of operation parameters of the blocker may be repeatedly carried out during its operation, provided that the device is successfully activated.

5.3 The list of operation parameters that can be changed during the service of the blocker is determined by the selected mode of its operation. Methodologies of their programming/reassignment are different for each of the modes and therefore are given in the corresponding editions of *Programming Instructions*.

Important: The maximum possible number of programmable parameters of the device during its operation is available only when operating with the GSM module (i.e., when operating Mode 1 or Mode 3).

In this case the blocker may not only receive SMS commands and DTMF commands from the Principal User to alter the operation parameters of the device, but also send SMS reports on their execution to him/her, respond to queries about previously set device parameters and current condition of the blocker (open; closed, but not blocked; closed and blocked), as well as notify the Principal User immediately using SMS notices of any abnormal events with the *door + lock* protected structure.

Important: Alarm SMS notices that come to the Principal User's phone number are always *duplicated* by the call to his/her phone that does not require "lifting the handset", which increases the chance to draw his/her attention to them.

6. OPERATION OF THE DEVICE

6.1 While the procedure of blocking the lock bolt by the device is the same for all of the operation modes of the device and does not depend on the external unblocking devices connected to it (see under 4.3 and 4.4 above), the procedure of *unblocking* the bolt is determined by the chosen operation mode of the blocker.

6.2 Operation modes 1 and 3 are *preferable* not only for programming the device, but also for operating it.

Mode 3 has the greatest opportunities, as it is the only mode that allows increasing the total secrecy of the *lock + blocker* locking device up to the level that exceeds significantly the secrecy of modern ATMs.

For example, when unblocking the bolt of the device operating in Mode 3.4 (see Table 1) and opening the lock, users have to overcome 4 security levels:

- a) To call from one of the mobile phones, the ten-digit numbers whereof were previously *recorded* into the memory of the device (calls from "alien" phones will be rejected).
- b) After connection to the GSM module of the blocker, send to it as a DTMF command the 2-digit *PIN code* assigned by the Principal User to activate the next unblocking device connected to the blocker, for example, a RFID reader.
- c) Attach a pre-registered RFID card to the reader, this initiating the sending of the next unblocking command to the blocker.
- d) And, finally, after the device unblocks the bolt by lifting the rod, open it with the standard *key*.

Whilst a conventional ATM has only two security thresholds: a RFID card and a 4-digit PIN code.

6.3 Less protected, but economically attractive for many users will be operation in Mode 2 (i.e., without the GSM module) with the possibility of unblocking the lock bolt or by pressing the *hidden* pushbutton (Mode 2.1), or by entering a *PIN code* by means of the pushbutton installed on the outer side of the front door (Mode 2.2).

The operation of the lock in each of the 10 modes is described in detail in the corresponding editions of *Instructions for Operating the Device*.

7. SAFETY PRECAUTIONS

When installing and operating the security device, should be complied with.

8. INSTALLATION AND PREPARATION FOR OPERATION

8.1 The specifics of the installation of the blocker are that the location of its installation in the door frame should be tied to the hole in the strike plate where the bolt to be blocked is inserted to...

8.2 When being installed, the device is placed in the door frame cavity and fixed to it in one of the following ways:

- To the strike plate (see Fig. 1) if the door frame is solid, e.g. made of timber (In this case it is advisable to use a strike plate with additional stiffening ribs.).

- Directly to the door frame if this has a hollow metal section (see Figs. 2 and 3).

8.3 To assess whether the lock previously installed in the door can function as a part of the *lock + blocker* locking system, it is necessary to:

8.3.1

8.4.

You may make the laboriousness of installing the blocker considerably easier and, at the same time, ensure the necessary accuracy of its installation by marking the holes for fastening the device to the metal door frame with the help of a flat *template* (95 mm × 25 mm), which is included into the delivery set.

Operations to install the blocker into solid timber and hollow metal door frames differ markedly from each other and are, therefore, described in different *Installation Instructions*.

9. DELIVERY SET

No.	Description	Quantity
1	<i>LOCK</i> -security device	1
2	Certificate with warranty card	1
3	Template for marking installation holes	1
4	M4x8 screw for fastening the device to a metal door frame	4
5	Call button with integrated contacts for connection of emergency unblocking power supply	*
6	GSM module	*
7	External UPS	*
8	DS reader with a “Touch memory” charm	*
9	RFID reader with a RFID card 125 kHz	*
10	12 Vdc 0.5 A outside-mounted siren	*
11	A motion IR sensor with two additional $2 \pm 0,02$ k Ω resistors	*

*) To be supplied under a separate purchase order

10. ACCEPTANCE CERTIFICATE

The **Lock-security** multifunctional device Series No..... complies with the respective technical documentation and is deemed fit for service

11. MANUFACTURER’S (SUPPLIER’S) WARRANTY

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Fig.1 Blocker for timber door frames



Fig.2 Blocker for metal door frames



Fig.3 "Lock + blocker" locking system

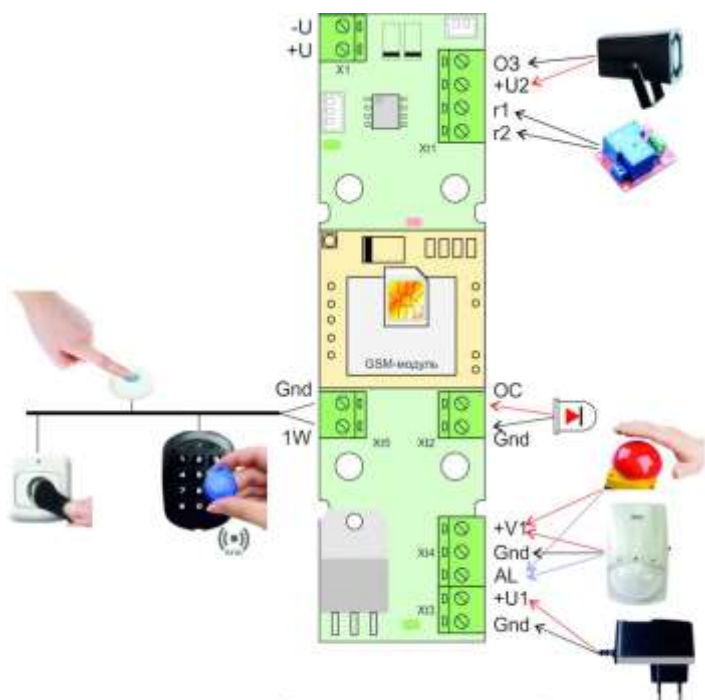


Схема внешних соединений

GSM-модуль – GSM module

Diagram of external connections