



# RADIO CHANNEL PACK

# VEGA RK-2.4

## User manual

The Vega RK-2.4 pack consists of two RF tags, a wireless locking relay, and a reader that can communicate with tags and relays over the air.

The reader can be used both with tags without relays and with relays without tags, depending on the specific task.

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## INTRODUCTION

This manual applies to a pack of interacting devices (hereinafter - VEGA RK-2.4), consisting of two radio tags, a wireless locking relay, and a reader that works with tags and relays via radio channel produced by Vega-Absolute LLC and defines the order of installation and connection, and contains a description of the settings and functionality.

The manual is intended for specialists who are familiar with the rules for performing repair and installation work and who have professional knowledge in the field of electronic and electrical equipment.

## 1 DESCRIPTION AND PRINCIPLE OF OPERATION

The Vega RK-2.4 pack consists of two RF tags, a wireless locking relay, and a reader that can communicate with tags and relays over the air.

The pack is intended for use in conjunction with a monitoring device that controls the locking relay, using the reader as an intermediary.



Fig. 1.1. External view of the RK-2.4 pack (from top to bottom - blocking relay, RF tag, reader).

## 2 SPECIFICATION

### LOCKING RELAY

Parameter	Value
Housing dimensions, mm	55 x 20 x 10
Ingress protection rating	IP53
External supply voltage, V	9...12
Operating temperatures, °C	– 40...+85
Operating frequency band, MHz	2400...2525
Maximum switching current, A	10
Maximum switching voltage, V	16
Operating consumption with closed circuit, transceiver receiving, mA	17

### RF TAG

Parameter	Value
Housing dimensions, mm	41 x 30 x 5
Ingress protection rating	IP54
Battery CR2032 3V	220 mAh
Operating temperatures, °C	– 40...+85
Operating frequency band, MHz	2400...2525
Consumption current in sleep mode, µA	1,8...2
Minimum battery life, years	1,5

### READER

Parameter	Value
Housing dimensions, mm	45 x 21 x 12
Ingress protection rating	IP53
External supply voltage, V	12
Operating temperatures, °C	– 40...+85
Operating frequency band, MHz	2400...2525
Consumption current, no more, mA	20
Relay control input	1
RF tag presence output	1

### 3 GET STARTED

#### CONNECTION DIAGRAM

The figure below shows the connection diagram. The exchange of the reader with tags and relays is carried out over the radio channel. The reader is connected to the monitoring device via 4 wires: the VCC output of the reader is connected to the battery, the other three outputs of the reader are connected to the monitoring device. The locking relay is powered from a 12 V source, which may not be associated with the reader's power supply (there may be own power supply of any vehicle unit, for example, the power supply circuit of a gasoline pump). The blocking relay is included in the required blocking power circuit.

The reader works with a relay regardless of tags. Therefore, if necessary, the pack can be organized both for working with tags only or for working only with relay.

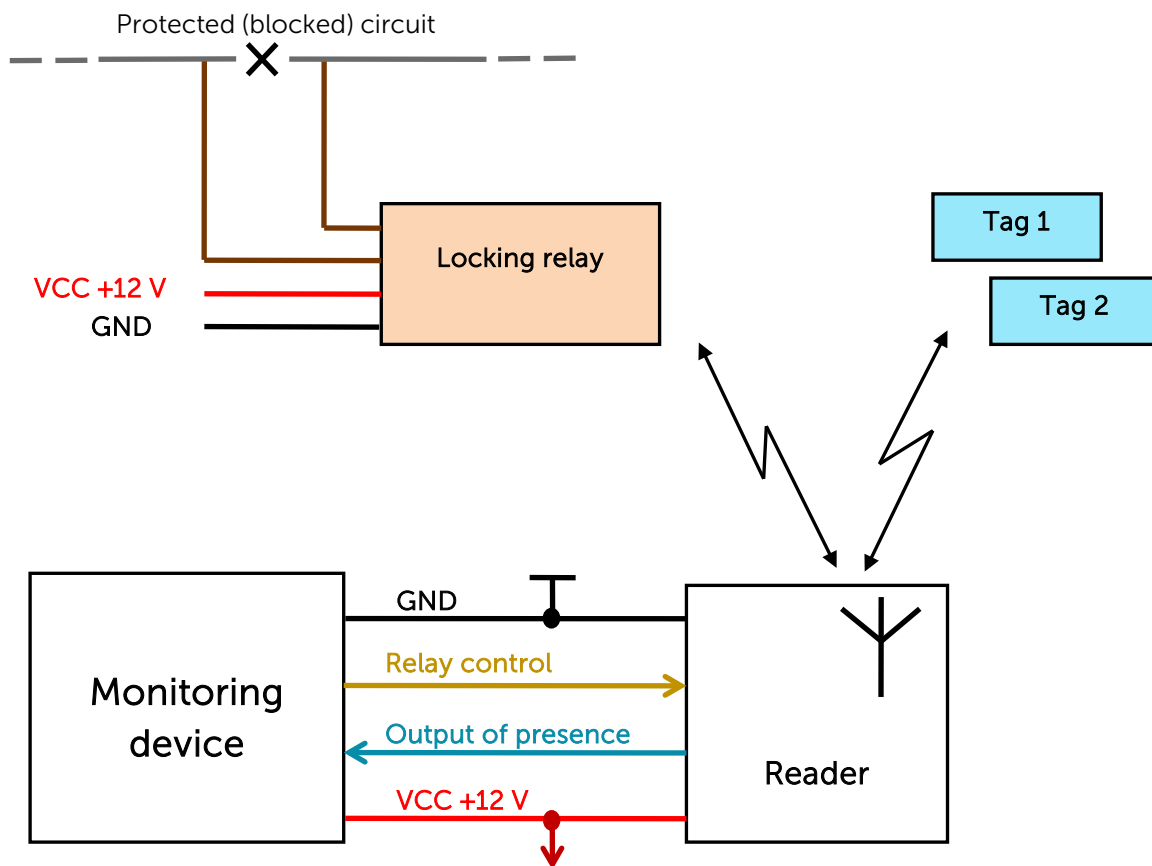


Fig. 3.1. Connection diagram.

Contact	Color	Description
<b>Relay</b>		
1	Brown	Power contact
2	Brown	Power contact
3	Red	Power 12 V
4	Black	Ground -
<b>Reader</b>		
1	Black	Ground -
2	Yellow	Relay control input, control voltage 12 V
3	Blue	Output of presence of the tag, open-collector type
4	Red	Power 12 V

### WIRELESS LOCKING RELAY

The locking relay is receiving, waiting for radio commands from the reader. If the relay is in the "locked" state, then the motion sensor is active and upon motion detection the relay breaks the power circuit for a while. If the state is "unlocked", then the motion sensor is inactive, and the power circuit is not broken. One of the advantages is that the relay is controlled entirely by radio, there is no need to connect the relay to the general power supply of the standard wiring to which the reader is connected.

### RF TAGS

The tag communicates once a second. The tag has two operation modes: programming and normal. Programming mode is used to register tags into the reader. The programming mode is turned on for 1 second only when the tag is powered on (battery is inserted), then the tag is switched on to normal operation mode, in which the tag communicates with the reader once a second.

### READER

When a registered tag is detected in the visibility zone, it sets a signal to the presence output. On a command from the monitoring device, transmits to the relay a command to block / unblock. The reader has two modes: normal mode and programming mode. There is a special button on the reader board to enter the programming mode.



## 4 OPERATION DESCRIPTION OF THE READER WITH LOCKING RELAY

Each time the signal at the reader control input (lock / unlock) changes, a wireless command is sent to lock / unlock the relay. If the relay is not in sight or the relay is not energized, then the command from the reader is repeated for 15 seconds. On the other hand, when the power is turned on, the relay independently requests the blocking status from the reader for 15 seconds. If it was not possible to contact the reader (for example, it was removed by the hijacker), then the relay automatically turns on the blocking.

In the event of a fall at the control input of the reader, a command to block is sent, at a rising edge at the input, an unblock command is sent.

### MOTION DETECTOR IN LOCKING RELAY

A motion sensor is implemented in the relay, which selects exactly the movement of the car, does not respond to vibrations of a running engine (on a running engine, the circuit will break precisely during movement). The sensor does not react to the wind swinging the car, to blows on the body, to sound pops.

### OPERATION DESCRIPTION OF THE RELAY

After turning on the relay requests the blocking status (BS) independently for 15 seconds. For the duration of these 15 seconds, the blocking status is taken from the non-volatile memory, and if the previous status from the non-volatile memory was active, then the motion control starts immediately 5 seconds after the relay is turned on. If the previous blocking status from the non-volatile memory was inactive, then within 15 seconds while the status request is in progress, the movement is not controlled, the circuit is normally closed. If there is no response from the reader within 15 seconds, the relay automatically sets the active blocking status and motion control starts. When power-up on the first successful exchange, it receives a blocking status, repeated requests are not performed.

1. The relays can be installed in different circuits of the car, powered (12V) not only from the ignition, but also from other circuits (for example, the power supply circuit of a gasoline pump, or a circuit with a possible power interruption during motion). In some devices, it happens that the power is regulated by an automatic control unit and turns off during inactivity of the device. Usually, installers connect the relays to the power of these devices and, therefore, the power to the relay may not appear simultaneously with the ignition, including disappear periodically. When power is applied, the relay must have an actual blocking status, therefore, when starting, the relay requests the reader for the blocking status independently.

2. If the monitoring device and the reader are removed by the hijackers or are de-energized, the relay, upon switching on (in most cases when the ignition appears), will

try to communicate with the reader for 15 seconds, if the reader does not respond, it will automatically set the blocking status and start motion control.

## 5 RELAY AND TAGS REGISTRATION

### ALERT SIGNALS OF THE READER

The following information signals are used for data transmission.

In programming mode:

- 1 impulse – 1 tag is registered in the reader
- 2 impulses – 2 tags are registered in the reader
- 3 impulses – 3 tags are registered in the reader
- 4 impulses – relay is registered in the reader
- 5 impulses – tag reader entered programming mode

In normal mode:

- zero level (0 V) – tag has been detected
- one level (12 V) – tag is absent

### TAG REGISTRATION

Tags and relays are registering together in one programming mode.

When switching on, the tag makes a request for registering. If the registration of the first tag was successful, the detector will signal this with one active impulse at the presence output. If the registration of the second tag was successful, then two impulses at the presence output, if the third registration was successful, then three impulses at the presence output. All impulses go with a period of 1 second (duty cycle = 2), and their number shows the number of tags already written into the reader.

Up to three marks can be entered into the system memory. Three memory cells are used to store codes of three tags. The first registerable tag is stored in the 1st cell, the second in the 2nd, the third in the 3rd. Before registering, it is necessary to remove the batteries from the tags and remove other tags from the system identification zone.

To register the tags, it is necessary to put the reader into the programming mode (hold the button for 5 seconds and wait until 5 pulses appear at the presence output). To remain the reader in the programming mode, you must constantly hold the button down. If the button is released and no longer pressed, the reader will exit programming mode after 12 seconds. Pressing the button in programming mode prolongs programming mode by 12 seconds. It is necessary to insert the battery into the tag which needed to be registered. When try to write the fourth tag, the first will be

overwritten, and the fourth tag will be entered into the first memory cell. An attempt to re-register a mark already registered in the current session will not lead to deletion of other marks, the tag will be overwritten in the cell where it was already registered.

If at least one new tag is registered into the system (after entering the programming mode, i.e., in a new programming cycle), then all codes of previously registered tags are automatically overwritten (protection against programming foreign tags, for example, in a service center). Therefore, in each new programming session, all tags that are supposed to be used must be re-written into the system. If the system was in programming mode, but no new tags was registered (there was an automatic or forced exit from the programming mode), then all old tags remain valid.

## RELAY REGISTRATION

The wireless relay, like the tags, must be registered in the system. A new relay received from the factory is "nulled" (without registration). Only a nulled relay can be registered. How to reset the relay is described in the section below «Nulling» of the relay». When turned on, the "nulled relay" is registered into the reader. If more than one relay is registering, then it is advisable to register each relay separately for making sure that each relay is registered.

To register switch the reader into the programming mode (hold the button for 5 seconds, in the same way as for the tags; the relay can be registered together with the tags). Next, apply power to the assigned nulled relay, if the relay is registered, then 4 impulses will appear at the presence output. Then apply power to the next nulled relay, successful registration will also be signaled by the reader with four impulses at the presence output. Without exiting the programming mode, you can immediately register the tags, but it should be remembered that registering at least one tag will lead to the deletion of old tags from memory.



**When registering new relays, the old ones are not deleted, but are written to the next memory cell (maximum 5 cells)**

If all five cells are filled, then the sixth relay will not be registered. During normal operation, the reader requests all the relays written in the memory cells. If during normal operation the relay could not be contacted 50 times, then the cell of this relay is marked as deleted, but the relay remains in memory, the reader waits for the possibility of its appearance in the system. But after entering the programming mode and register at least one relay, then all relays marked as deleted will be overwritten. In their cells can be overwritten by new relays.

After releasing the button, the reader will exit the programming mode after 12 seconds.

## «NULLING» OF THE RELAY

To reset an already registered relay, it is necessary to reverse its polarity. Reverse polarity of the power supply means + 12V to the black wire and ground to the red wire. The relay will start, reset its registration, and click the key 3 times. Nulled relay can be registered again, if the relay is not nulled, then it does not make registering requests at startup.



**When connecting the relay, it is necessary to observe the polarity (red + 12V, black - ground). Otherwise, the relay will be deleted, and you will need to register the relay.**

## 6 STORAGE AND TRANSPORTATION RULES

The VEGA RK-2.4 kit should be stored in its original packaging in heated rooms at a temperature from +5 °C to +40 °C and a relative humidity of no more than 85%.

Transportation of kits is allowed in covered cargo compartments of all types at any distance at temperatures from -40 °C to +85 °C. After transporting the devices at negative temperatures, it is recommended to keep them at room temperature for 24 hours before using them.

## 7 DELIVERY SET

VEGA RK-2.4 is supplied with the following configuration:

Wireless relay – 1 pc.

Reader – 1 pc.

RF tag – 0-2 pcs.<sup>1</sup>

Battery CR 2032 – 0-2 pcs.<sup>2</sup>

Factory certificate – 1 pc.

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<sup>1</sup> The number of RF tags may vary in depend on the order conditions

<sup>2</sup> The number of batteries corresponds to the number of supplied RF tags

## 8 WARRANTY PACKAGE

The manufacturer guarantees the functionality of the kit for 3 years from the date of sale.

The manufacturer is obliged to provide repair services or replace a failed device within 3 years from the date of sale.

The consumer is obliged to comply with the conditions and rules of transportation, storage and operation specified in this user manual.

The warranty does not apply for:

- batteries;
- devices with mechanical, electrical and / or other damage and defects arising from violation of the conditions of transportation, storage and operation;
- incomplete devices;
- devices with traces of repair outside the manufacturer's service center;
- devices with traces of oxidation or other signs of liquid entering the product case.

In the event of a warranty case, you should contact the service center:

630008, Novosibirsk, Kirova str., 113/1.

Phone number: (383) 206-41-45.





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