TRACKING DEVICE

VEGA M-300/310

User Manual

Document Information	
Title	Tracking device
Document type	User Manual
Document number	B01-M200-01
Revision and date	02 от 24.09.2018

This document applies to the following products:

Product name	Type number
Vega M	Vega M-300
	Vega M-310

Revision History

№	Date	Name	Comments
01	11.10.2017	KEV	Document creation date
02	24.09.2018	KEV	Functions correction (112 deleted)

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INTRODUCTION

This manual is designated for tracking devices Vega M-300 and Vega M-310 (hereinafter – the device) manufactured by LLC Vega-Absolute and provides information on powering and activation procedure, control commands and functions of the device.

Work with the device does not require special training or professional skills. This user manual contains all necessary information for efficient operation.

1 DESCRIPTION AND OPERATION

Vega M-300 (Vega M-310) off-line tracking device is designed to track a protected object by means of automatically sent messages with the movement and stop points of the object in case unauthorized movement is detected, or should the object leave the specified zone, or by the request of the owner.

A protected object means any personal property that is valuable to its owner:

- Vehicles - cars, motorcycles, bicycles, boats, yachts, etc.
- Animals – pets, domestic and breed animals, etc.
- Construction machinery - cranes, trucks, etc.
- Containers, coaches and wagons, baggage suitcases, etc.

Vega M-300 and Vega M-310 are the same but in different housings, M-300 means IP54 and M-310 means IP67.

The tracking device is able of long off-line operation with high level of security, does not require external connections. Being in sleep mode most of time, the device is difficult to detect visually or with radio scanners. The device sends information to the owner one to three times per day and waits for commands for 5 minutes, then switches back to sleep mode.

If the device works with factory settings, the battery life can reach 2 years.

Figure 2 - Physical form of Vega M-300 (top figure) and Vega M-310 (bottom figure).

2 SPECIFICATION

Parameter	M-300	M-310
Housing dimensions, mm	70x40x20	85x60x22
Ingress protection rating	IP54	IP67
Operational temperatures, °C	– 40...+85	
Off-line operation in the following modes: - «Background» - «Tracking»	 2 years 2 weeks	

The tracking device has the following functions:

- Parameter setting through SMS-messages and personal page at the web-site: vega-m.com
- Customizable notifications of the object start moving or cross the specified geofence borders
- Accurate positioning of the object
- Automatic clock adjustment according to GPS / GLONASS satellites
- Automatic balance control of the SIM-card and notification of decreasing below a specified level
- Monitoring of the ambient temperature

3 INTENDED USAGE

ACTIVATION

The activation procedure as follows:

STEP 1

Open the cover of the device and insert the micro-SIM-card in the slot. The device shall be powered off at this step.

The side of the SIM-card with the beveled corner shall be pointed inward the slot

STEP 2

Insert the CR123 batteries into the battery compartment.

Observe the polarity. The batteries in the device are connected in parallel, i.e. they shall be oriented in one direction

The red indicator starts flashing (**double flashings every 3 seconds**) - registration in the GSM network. After registration in the GSM network, the indicator starts **frequently flashing** - the device is ready for activation.

STEP 3

There are three ways to activate the device:

1. Call the SIM-card number of the device. The device hangs up the incoming call and remembers the phone number from which the call has been made as the owner's phone number. This method is only possible if the device SIM-card supports voice communication.
2. Send an SMS-message with the text **1234*35*** to the SIM-card number of the device - the device remembers the phone number from which the message has been received as the owner's phone number.

3. Send an SMS-message with the text **1234*35#+XXXXXXXXXX*** to the SIM-card number of the device, where **+ XXXXXXXXXX** is the phone number that the device shall remember as the owner's phone number.

Make a call or send an SMS-message to the SIM-card number of the device within 5 minutes

Otherwise the inactivated device switches to emergency mode in 5 minutes and starts flashing every 8 seconds. In this case, repeat activation procedure starting from step 2

STEP 4

After an incoming call or an SMS, the device automatically identifies the phone number and sends an SMS-message with the current device settings. The description of the parameters see chapter "Settings".

Then the device turns on the GPS / GLONASS receiver and switches to the satellite search mode to identify its own location. The indicator is flashing every 3 seconds.

To search satellites and identify the coordinates, it is recommended to place the device in a place where the sky is clearly seen, e.g. if the device is activated in a room, bring it to the window

Every time the device identifies its coordinates, it also identifies the current time and adjusts its internal clock through satellites. Time setting takes the time zone into account, which is set by the parameter **"P".** The default parameter is 03, which means +3 hours to GMT.

STEP 5

After identifying the coordinates, the device registers again in the network and sends an SMS-message with the coordinates of the device. After sending the coordinates, the device switches to standby mode, waiting for SMS-messages with settings or

commands from the user. The device stays 5 minutes in this mode and then switches to sleep mode and operates in the "BACKGROUND" mode. While waiting for SMS with settings and commands, the indicator is flashing three times every three seconds.

If the device is enabled, when changing the batteries or pressing the «reset» button on the top of the device, do not perform step 3

If after turning off the device the SIM-card has been changed to another one, repeat all steps, i.e. re-activate the device

OPERATION MODES

BACKGROUND MODE

The "BACKGROUND" mode is the basic mode of the device operation. In this mode, the device is inactive most of the time. The device becomes active only during communication sessions from one to three times per day, depending on the settings. The time of the main session and the quantity of the device's communications are set in parameters "**24**" and "**12**" respectively. The default settings are configured so that the device communicates once a day at 12.00.

The device identifies its coordinates only during the main session (parameter "**24**", see table 1). During additional communication sessions (parameter "**12**", see table 1) the device switches on only for receiving possible SMS-commands and synchronizing with the server. You can obtain the coordinates in the intermediate session by sending an SMS-command with the text **"500"** or **"09"** to the device. If the command is sent from the unknown number, add the device PIN ("**XXXX500**" or "**XXXX09**") before the command. The default PIN is 1234.

When the command **"500"** is received, the device identifies and sends coordinates in the text form (see Appendix, example No. 4).

When the command **"09"** is received, the device identifies and sends coordinates in the form of an active Internet link. By clicking the link the user can see the location of the object in Google or Yandex-maps.

WORK WITH RADIO TAGS

RADIO TAGS ADDITION

Radio tags addition is able from owner's phone number only

The device delivered with one added radio tag. Maximum number of radio tags that may be added at the device memory is three. For addition of radio tags at the device memory, you should to make the next steps.

STEP 1

Open the device cover and press the start button. All radio tags shall be power off at this step including radio tags added before – they will be added again.

STEP 2

Wait for indication – triple flashing and send SMS-command **PIN*64*** to the device phone number, after that the device switches into radio tags addition mode. Indication will be as frequent flashing and the message will come to the owner's phone number: "Insert the battery in radio tag".

STEP 3

The device searches around the radio tags during 5 minutes. At that time, you should to insert the battery in the radio tag. The message will come to the owner's phone number: "Radio tag No. ... has been added", No. varied from 1 to 3 in depending on radio tag sequence number. Then the device is waiting for 1 minute the next commands and switches to the background mode.

Every time of activation the radio tags addition procedure all the previous radio tags are deleted from the device memory and must be added again

When the radio tags addition procedure is activated the motion sensor automatically ON

RADIO TAGS CONTROL

To delete all the radio tags from the device memory you should to send the SMS-command «**001**» from the owner's phone number.

To OFF the radio tags search you should to send the SMS-command «**002**» from the owner's phone number.

To ON the radio tags search you should to send the SMS-command «**003**» from the owner's phone number.

WORK WITH WIRELESS RELAY

WIRELESS RELAY ADDITION

Wireless relay addition is able from owner's phone number only

Before addition wireless relay at the device memory you should be certain that relay power is OFF.

To add the wireless relay at the device memory you should to send the SMS-command **PIN*65*** to the device phone number, after that the device activates the relay addition procedure. Indication will be as frequent flashing and to the owner's phone number will come message with text: "Supply power on the relay". The device searches around the wireless relay during 5 minutes. At that time, you should to supply power 12V on the relay: red is plus, black is minus. The message will come to the owner's phone number: "Wireless relay has been added". Then the device switches to the background mode at once.

RELAY ERASING

If the relay has worked with another device then you must to erase relay before you will add that relay at the new device. For erasing relay, you should to supply reverse polarity power 12V on the relay: plus on black wire, minus on the red. If you do it all right then relay makes triple sound and it means that relay has erased.

RELAY CONTROL

To delete all radio tags and relay from the device memory you should to send the SMS-command «**000**» from the owner's phone number.

Forced relay blocking is made by SMS-command «**007**» or «**666**» from the owner's phone number. If the relay power supply is absent then at the owner's phone number comes the message "**Command**

accepted". When the power will appear the relay executes the command and at the owner's phone number comes the message "**Engine locked**".

Single time relay blocking OFF - «**911**» from the owner's phone number.

Automatically relay blocking mode OFF until the next communication period - «**999**» from the owner's phone number.

Relay can work in two modes the one of which is setting up by function «**60**» (See table 1). Function has 0 value by default and relay does not blocking automatically while there is a motion without radio tag.

If function value equal to 1 then the relay receives the blocking command in case of motion without radio tag. Relay receives the command and breaks the circuit (for example, circuit of gasoline pump power) during 15 seconds and in case of motion detecting only by the internal motion sensor. Blocking may be OFF when radio tag will appear or by the phone command.

RELAY CONNECTION

It is recommend to connect the relay in an important circuit of which breaking will entail vehicle stopping. Relay has four wires:

- red – power +12V, it is recommend to connect the power such way as power appears when engine ON;

- black – ground;

- brown – two normally closed contacts, which must be connected at the breaking circuit (for example, circuit of gasoline pump power, see figure 3).

Current carrying capacity of the relay – 9A.

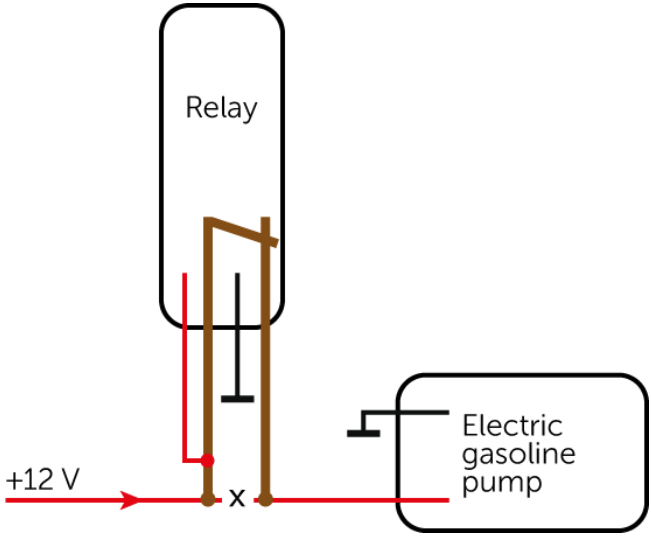

Figure 3 – Scheme for connection wireless relay into circuit of gasoline pump power.

PROTECTION METHODS

PROTECTION WITH MOTION SENSOR

When enabling this function, the device switches on and identifies its coordinates when the object with the sensor starts moving. Parameters **"38", "47", "T", and "C"** are responsible for the operation of the sensor (see the chapter "Settings").

The motion sensor has four settings:

- Motion sensor is OFF
- Motion sensor is continuously ON

The sensor is ON by default.

При срабатывании датчика движения устройство выходит из спящего режима и осуществляет поиск прописанных радиометок. В случае, если радиометка найдена, устройство уходит в спящий режим. Если радиометки не найдены отрабатывается тревожный сценарий. Порядок действий устройства при срабатывании датчика движения в отсутствие радиометки следующий.

1. The device makes a phone call to the owner's phone number. When the owner of the device answers the call, the device announces **"Alarm! The motion sensor has triggered"**. After this the device remains connected for 30 seconds. Within this period, you can send a command to the device to turn off the motion sensor for several hours by pressing the combination of keys **X***, where X is a digit from 1 to 9. For example, if you want to turn off the sensor for 6 hours, press 6* after alarm announcement.

If the owner's phone is unavailable or the owner does not answer the call within 30 seconds, the device sends an SMS with the text **"Motion sensor has triggered!".**

2. Then the device identifies and sends its coordinates to the user in the form of SMS or to the server (depending on the parameter **"G",** see Table 1). After that the device remains connected for 3 minutes to receive possible SMS-commands and switches to the sleep mode.

3. After this procedure, the device powers off the motion sensor, and does not respond to movements for the time period set in parameter **"47"** (ignoring period of the motion sensor, see Table 1). The default value for this parameter is **5 minutes.**

4. After the ignoring period, the sensor switches on again. Next time the sensor triggers, the device again identifies and sends its coordinates to the user. In this case, the call and the message "Motion sensor has triggered!" are not sent.

5. If there is no movement for 5 minutes after the motion sensor triggers, the device switches from the sleep mode, identifies and sends its coordinates to the user so that the user can determine where the tracking object has stopped.

SETTINGS

This chapter describes the parameters available for changing with SMS-commands. Commands can be sent both from the owner's phone and from another phone (only with the device PIN before the main command). **PIN** means a four-digit PIN, the default value is **1234**.

Table 1.

39	PIN (by default **1234**)
	SMS-command: **PIN*39#XXXX***
	Example. PIN changed from 1234 to 7777: **1234*39#7777***
35	Phone number, where the device sends messages
	SMS-command: **PIN*35#+7XXXXXXXXXX***
	Example. Phone number changed to +72222222222: **1234*35#+72222222222***
58	The balance threshold at which the device sends a message "Balance: Value" (by default **50**)
	SMS-command: **PIN*58#XXX**
	Example. Threshold setting 100: **1234*58#100***
59	The balance request code. Detected automatically if the SIM-card is of MTS, Beeline, Megaphone, or Tele2 cell operator
	SMS-command: **PIN*59#*XXX#***
	Example. Balance request code setting *111#: **1234*59#*111#***
24	Main session time (by default – random value)
	SMS-command: **PIN*24#hhmm**
	Example. Main session time setting 13:00: **1234*24#1300***

N	The period for automatic identification of coordinates by satellites (at all other times the coordinates are identified by the GSM base stations)
	SMS-command: **PIN*N#X***
	Example. Period setting: 6 days: **1234*N#6***
12	Communication frequency (by default **1**)
	SMS-command: **PIN*12#X*** where X = 1...3 1 – every 24 hours 2 – every 12 hours 3 – every 8 hours
	Example. Communication frequency setting: every 8 hours: **1234*12#3***
P	Time zone (by default **03**)
	SMS-command: **PIN*P#XX*** (P – in Latin)
	Example. Time zone setting +7 (Novosibirsk): **1234*P#07***
00	Coordinates form in SMS (by default **3**)
	SMS-command: **PIN*00#X*** where X = 0...3 0 – dd,ddddd 1 – ddmm,mmm` 2 – ddmm` ss,ss`` 3 – internet link
	Example. Form setting dd,ddddd: **1234*00#0***
38	Operation mode of the motion sensor (by default **1**)
	SMS-command: **PIN*38#X** or **38X** where X = 0...1 0 – OFF 1 – continuously ON

	Example. Sensor ON: **1234*38#1*** или **381**
60	Automatically relay blocking ON/OFF (**0** – by default)
	SMS-command: **PIN*60#X*** where X = 0...1 0 – wireless relay do not blocked automatically 1 – wireless relay is blocked automatically
	Example. Automatically blocking ON **1234*64#1***
47	Ignoring time of the motion sensor triggering (by default **5**)
	SMS-command: **PIN*47#X** where X=5...99
	Example. Ignoring time setting: 6 minutes: **1234*47#6***
G	Messages (by default **1**)
	SMS-command: **PIN*G#X*** where X = 1...3 1 – only SMS 2 – only to the server 3 – SMS + server
	Example. Messages sent only to the server: **1234*G#2***
K	The device code changed (by default is stated in the device label)
	SMS-command: **PIN*K#X*** Latin letters and digits are allowed (from 1 to 32 symbols)
	Example. The device code setting: kod321: **1234*K#kod321***
S	The radio tag search duration (**0** – by default)
	SMS-command: **PIN*S#X*** where X = 0...1 0 – 5 seconds 1 – 10 seconds
	Example. Set the radio tag search time is 10 seconds: **1234*S#1***

The following settings are designated only by the experienced users

IP	Setting of the IP-address and server port, where the data from the device are sent
	SMS-command: **PIN*IP#xxx.xxx.xxx.xxx:yyyyy***
	Example: Set IP 123.123.123.123 and port 55555 **1234*ip#123.123.123.123:55555***
T	Motion sensor sensitivity per amplitude
	SMS-command: **PIN*T#xx*** where x=0...40
	Example. Sensitivity per effect amplitude 15: **1234*T#15*** T– in Latin
C	Double control of the sensor motion (by default **0**)
	SMS-command: **PIN*C#x*** where x=0...1 Checking algorithm of false triggering: 0 – OFF 1 – ON
	Example. Double control of the motion sensor OFF: **1234*C#0*** C – in Latin

PARAMETERS FOR WORK WITH WIALON

The device supports data exchange using the WIALON protocol. Table 2 shows the device parameters for working with this protocol.

Table 2.

w	Work start by WIALON (by default - OFF)
	SMS-command: **PIN*w#X***
	Example. Data transfer by WIALON protocol ON: **1234*w#1***
wip	Setting of IP-address and WIALON server port
	SMS-command: **PIN*wip#XXX.XXX.XXX.XXX:YYYYY***
	Example. IP Setting: 193.193.165.165 and port 20332: **1234*wip#193.193.165.165:20332***
wdp	The device password setting for server access by WIALON protocol
	SMS-command: **PIN*wdp#XXXXX**
	Example. Password setting 12345: **1234*wdp#12345***

INDICATION

The indication is carried out by one red LED, which flashing depends on the state of the device. The values of the various indication types see Table 3.

Table 3.

Frequent flashings	Waiting for an incoming call or SMS while the device is activated
Double flashings every 3 seconds	Registration in the GSM network
Flashings every 3 seconds	Coordinates search, GPS / GLONASS runs
Triple flashings every 3 seconds	The device is activated, waiting for SMS-commands
One short, one long flashing	GPRS runs
Flashing every 8 seconds	Error
Two long and three short flashings	USB runs
Four flashings every 3 seconds	Reflashing of the device

SMS-COMMANDS

The tracking device is controlled, operation modes and protection methods are changed with the SMS-commands. The description of the SMS-commands see Table 4.

Table 4.

007 **or** 666 **- from the owner's phone number** XXXX666 **or** XXXX007 **– from the unknown number**	Wireless relay lock mode ON
999 **- from the owner's phone number** XXXX999**– from the unknown number**	Protection mode OFF and relay lock mode OFF until the next communication period («**24**» function)
911 – **from the owner's phone number** XXXX911 – **from the unknown number**	One time wireless relay blocking OFF and device still working in relay lock mode ON
500 **- from the owner's phone number** XXXX500**– from the unknown number**	Send the coordinates and the device status in the text form
09 **- from the owner's phone number** XXXX09 **– from the unknown number**	Send the coordinates and the device status in the form of Internet link
380**- from the owner's phone number** XXXX380**– from the unknown number**	Motion sensor OFF
381 **- from the owner's phone number** XXXX381 **– from the unknown number**	Protection ON with motion sensor. Motion sensor continuously works

000- from the owner's phone number XXXX000 – from the unknown number	Delete all radio tags and wireless relay from the device memory
001- from the owner's phone number XXXX001 – from the unknown number	Delete all radio tags from the device memory
002- from the owner's phone number XXXX002 – from the unknown number	Radio tags search OFF
003- from the owner's phone number XXXX003 – from the unknown number	Radio tags search ON
XXXX*up*	Refreshing of the device firmware
XXXX*40*	Send the device main settings
XXXX*42*	Send the device additional settings. See Appendix, Example 2
XXXX*43*	Send the device settings for work with WIALON. See Appendix, Example 3
XXXX*64*	Radio tag addition
XXXX*65*	Wireless relay addition

WORK WITH THE WEB-SITE

For more efficient and convenient work with the device, register on the web-site: **vega-m.com** and bind your tracking device to your personal page.

You can activate the device using the site with the "Quick Start" button (see Figure 2). Click the button and follow the step by step instructions.

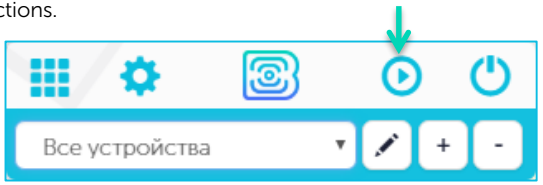

Figure 2 – "Quick Start" button in the personal page on vega-m.com (shown with an green arrow).

4 TRANSPORTATION AND STORAGE REQUIREMENTS

The tracking device shall be stored in its original packaging in heated room at temperatures +5°C to +40°C and relative humidity less than 85%.

The tracking device shall be transported in covered freight compartments of all types at any distance at temperatures -40°C to +85°C. If the device is transported at temperatures below zero, hold it at room temperature for 24 hours before operation.

5 COMPLETE SET

The Vega M-300 tracking device is delivered complete with:

1. Tracking device – 1 pc.
2. Wireless relay – 1 pc.
3. Radio tag – 1 pc.
4. Power supply for radio tag – 1 pc.
5. Double-sided red tape – 1 pc.
6. Factory certificate – 1 pc.

The Vega M-310 tracking device is delivered complete with:

1. Tracking device with 3 neodymium magnets on the backside – 1 pc.
2. Wireless relay – 1 pc.
3. Radio tag – 1 pc.
4. Power supply for radio tag – 1 pc.
5. Factory certificate – 1 pc.

6 WARRANTY

The manufacturer guarantees normal operation of the tracking device for 36 months from the date of sale.

The manufacturer undertakes to repair or replace the failed device within 36 months from the date of sale.

The consumer undertakes to comply with the terms and conditions of transportation, storage and operation specified in this user manual.

Warranty does not apply to:

- batteries;

- the device with mechanical, electrical and / or other damages and defects caused by violation of the transportation, storage and operation requirements;

- the device lacking any part of the kit;

- the device with traces of repair performed not by the manufacturer's service center;

- the device with traces of oxidation or other signs of liquids leaking inside the device.

APPENDIX

EXAMPLES OF SMS-MESSAGES SENT BY THE DEVICE

EXAMPLE OF DEVICE SETTINGS MESSAGE	EXPLANATION
39 1234	PIN of the device 1234
35 +79131112233	Owner's phone number
SUT	Device works in a background mode
N=0	Number of days between navigation determinates
M2	Number of added radio tags is 2
R	Relay added
A/h 40 %	Battery charge is 40 %
58 50	Balance limit is 50
59 *102#	Balance request code is *102#
24 1200	The main communication time is 12:00
P 06	Device time zone is +6
00 3	Form of coordinates at the SMS is Internet link
12 3	The device wake up 3 times at the day
03 0	Device language is Russian
38 1	Motion sensor ON continuously

47 5	Ignorable time of motion sensor after triggering is 5 minutes
G 3	Data transferring SMS + server
4/4	GSM signal is maximum, excellent
SMS=1	Number of send SMS from the device activation
ID 3422525	Device ID

EXAMPLE OF MESSAGE WITH ADDITIONAL SETTINGS	EXPLANATION
T = 10	Motion sensor sensitivity per amplitude = 10
C = 1	Double control of motion sensor (protection from the false alarm) – O
IP 11.22.33.44:5555	IP address and port of the server where the device sends messages
Ver A: 22	Firmware version is 22
Ver B: 1	Loader version is 1
IMEI: xxxxxxxxxxxx	IMEI device number

EXAMPLE OF MESSAGE WITH WIALON SETTINGS	EXPLANATION
WIALON: 1	Work by WIALON is ON
IP 193.193.165.165:20332	IP address of WIALON server
Password 12345	Device password for connection to the server by WIALON protocol

EXAMPLE OF MESSAGE WITH COORDINATES	EXPLANATION
18.03.16 06:26:07	The date and the time of coordinates determination
55 34` 23,34`` 082 43` 23,45``	coordinates
Sat = 1	Number of used satellites
Ts = 01:15	Time of coordinates determination
40 km/h	Velocity
A=123	Azimuth of motion
T = 25	Environment temperature
A/h = 40%	Battery charge
12 = 1	Device wakes up from sleep mode once at the day
4/4	GSM signal level is maximum
Bal=235	Balance
MCC=250 etc.	GSM gateway parameters: MCC, MNC, LAC, CID

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