



LoRaWAN Device

# VEGA SI-13

User manual



## Document Information

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This document applies to the following products:

Product line	Product name
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	Vega SI-13-485

## Revision History

Revision	Date	Name	Comments
01	23.03.2017	KEV	Document creation date
02	14.04.2017	KEV	Photos were added, minor edits
03	10.05.2017	KEV	New photos of the appearance
04	29.05.2017	PKP	A little change at the communication protocol
05	21.06.2017	KEV	Technical characteristics were changed
06	05.09.2017	KEV	Part "Vega LoRaWAN Configurator" was added, and some additions at the communication protocol
07	23.10.2017	KEV	Minor edits
08	04.05.2018	KEV	Edits concerning the field of application with meters with pulse outputs, minor edits, new illustrations in the " <a href="#">Operation</a> " part
09	21.12.2018	KEV	" <a href="#">Transparent mode operation</a> " and " <a href="#">Marking</a> " parts added, device AppEui added in <a href="#">specification</a>
10	21.05.2019	KEV	Typo in <a href="#">communication protocol</a> fixed in bit field decoding table – bits 6 and 7
11	14.08.2019	KEV	Typo on the 28 <sup>th</sup> page in the '5' packet description
12	06.07.2020	KEV	Scheduled revision of the document, minor changes
13	23.09.2020	KEV	Device <a href="#">logic</a> changes, new <a href="#">mode</a> for external devices pooling, changes in the communication <a href="#">protocol</a>

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## INTRODUCTION

This manual is designated for Vega SI-13-232 and Vega SI-13-485 modems (hereinafter – the modem) manufactured by Vega-Absolute OOO and provides information on powering and activation procedure, control commands and functions of the modem.

This manual is targeted at specialists familiar with installation work fundamentals for electronic and electrical equipment.



**To provide the stable radio between the gateway and the end device it is recommend avoiding the device installation in the places which are barriers for the radio signal getting through like a reinforced floors and walls, a basement, an underground facilities and wells, a metal case etc.  
The necessary stage for the network deploying including a big quantity of end devices is a radio planning work with nature experiments**

Vega-Absolute OOO reserves the right to make changes to the manual related to the improvement of equipment and software, as well as to eliminate typos and inaccuracies, without prior notice.

The current revision of the manual describes the functionality, characteristics and protocol implemented in the latest firmware version of the device.

# 1 DESCRIPTION AND OPERATION

## DEVICE DESCRIPTION

Vega SI-13 has two design options, varying by data exchange interface:

- Vega SI-13-232 with RS-232 interface;
- Vega SI-13 -485 with RS-485 interface.

Vega SI-13 modem is designed for counting of pulses incoming to 2 independent inputs, further accumulating and transmitting of this information via the LoRaWAN protocol to the gateway through wireless communication within 860-1000 MHz frequency band.

In addition, Vega SI-13 can be used as a security device - all inputs can be configured as security inputs.

The modem can be used for any utilities' meters and industrial equipment with RS-232 and RS-485 interfaces or pulse outputs, including water-, electricity-, and heat meters. Vega SI-13 can work as a wireless modem in the transparent mode or pool meters by itself.



**Equipment with NAMUR pulse output is not supported**

De-bouncing logics with 5 msec time constant is integrated in the modem. The pulse counting is carried out for frequencies up to 200 Hz.

The modem is powered by an 8...36 V external power supply.

## FUNCTIONAL

Vega SI-13 modem is class C device (LoRaWAN classification) and has the following features:

- Operation as LoRaWAN <-> RS-232 or LoRaWAN <-> RS-485 wireless modem
- Independent polling of external equipment by custom commands
- ADR support (Adaptive Data Rate)
- Sending of confirmed packets (configurable)
- Inputs can be switched to «security» mode for connection to external leakage and safety sensors, etc.
- Communication in case of security inputs actuation
- Temperature measurement

## MARKING

Device marked with sticker that contain the next information:

- Device model;

- DevEUI;
- Month and year of manufacture;
- QR-code containing DevEUI for automatized count.

Sticker located in three places – on device case, in factory certificate and on the packing box.

Besides, there is an additional sticker located on the packing box and contains:

- Information about firmware version;
- QR-code containing DevEUI and keys for device registration in network via OTAA method.

## 2 SPECIFICATION

### Main

Double-contact digital inputs	up to 2
Maximum input frequency	200 Hz
Security inputs	up to 2
Interface	RS-232 or RS-485
USB-port	yes
Operating temperatures	-40...+85 °C
Built-in temperature sensor	yes

### LoRaWAN

LoRaWAN class	C
Quantity of LoRaWAN channels	16
Frequency band	RU868, EU868, IN865, AS923, AU915, KR920, US915, KZ865, custom (EU868 based)
Activation type	ABP or OTAA
Communication period	1, 6, 12 or 24 hours
Type of the LoRaWAN antenna	internal
Sensitivity	-138 dBm
Radio coverage in restrained urban conditions	up to 5 km
Radio coverage within line of sight	up to 15 km
Transmitter power by default	25 mW (configurable)
Maximum transmitter power	25 mW

### Power

External power supply	8...36 V
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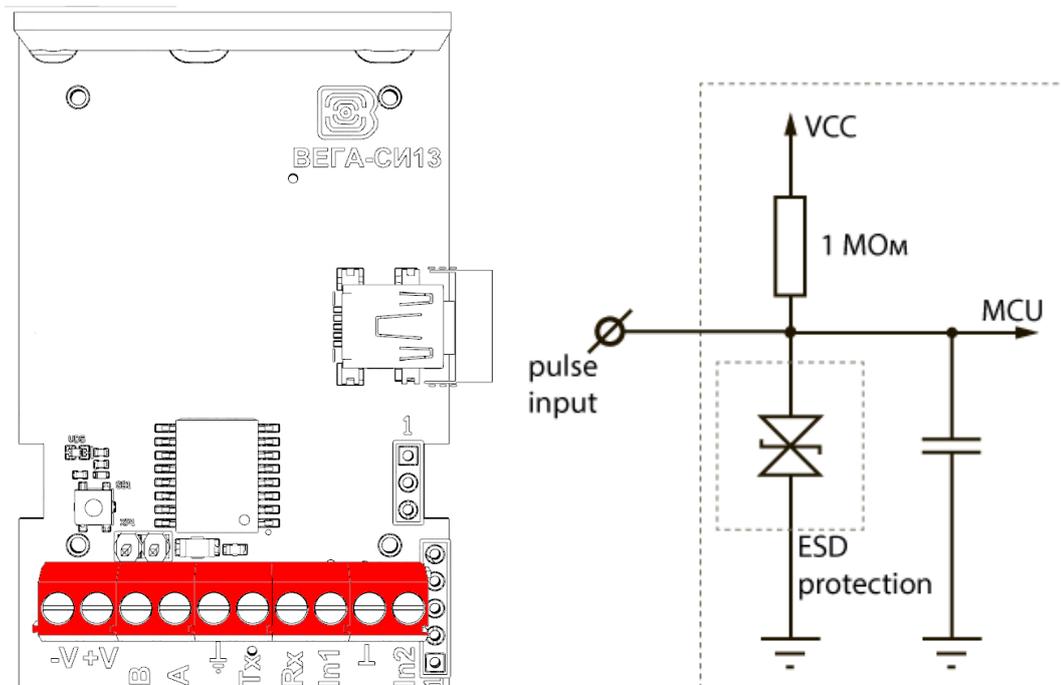
### Case

Housing dimensions	95 x 50 x 45 mm
Ingress protection rating	IP65
Mounting	clamp fastening to the support, DIN-rail, wall-mounting

## 3 OPERATION

### CONTACTS

When connecting a modem to external devices, consider the internal circuitry of its pulse inputs shown below.



The modem has 10 contacts, see table below:

Contact	Description
-V	Power -
+V	Power +
B	RS-485 B
A	RS-485 A
Tx	RS-232 TX
Rx	RS-232 RX
⏏, ⏏	Signal ground
In1, In2	Pulse inputs 1 and 2

Ground "⏏" contact is used for connecting of RS-232 or RS-485; ground "⏏" is used for connecting of pulse inputs 1 and 2.

The modem pulse inputs are used to connect circuits with the following types of NO contacts:

- reed switch (Herkon);
- mechanical pushbutton;
- open-collector output.

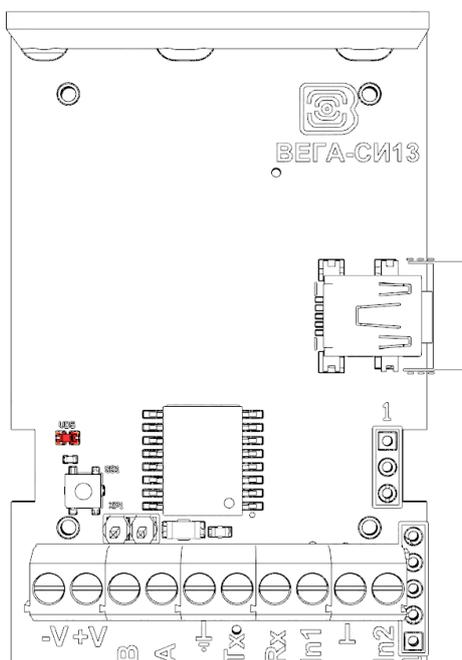


**Equipment with NAMUR pulse output is not supported**

Any input can be configured for work in the "Security" mode with special software when connected to the modem via USB. In this case, the device does not count pulses at the "Security" input, but only monitors its closure. Should the "Security" input close, the device is activated and sends an alarm message to the network.

## INDICATION

There is one red LED on the terminal board. The indication is only used when the device is activated in the LoRaWAN network.



### LED signal

### Meaning



Series of short flashings

Linking to the network



One long flashing

The device connected to the network and is in active mode



Three long flashings

Linking to the network is unsuccessful or the device switched to the «Storage» mode



In case the device fails to connect the network, it automatically switches to the "Storage" mode

## INITIAL STARTUP

Vega SI-13 supports two activation methods in the LoRaWAN network - ABP and OTAA. Select one of the methods using "Vega LoRaWAN Configurator" application (See part 4).

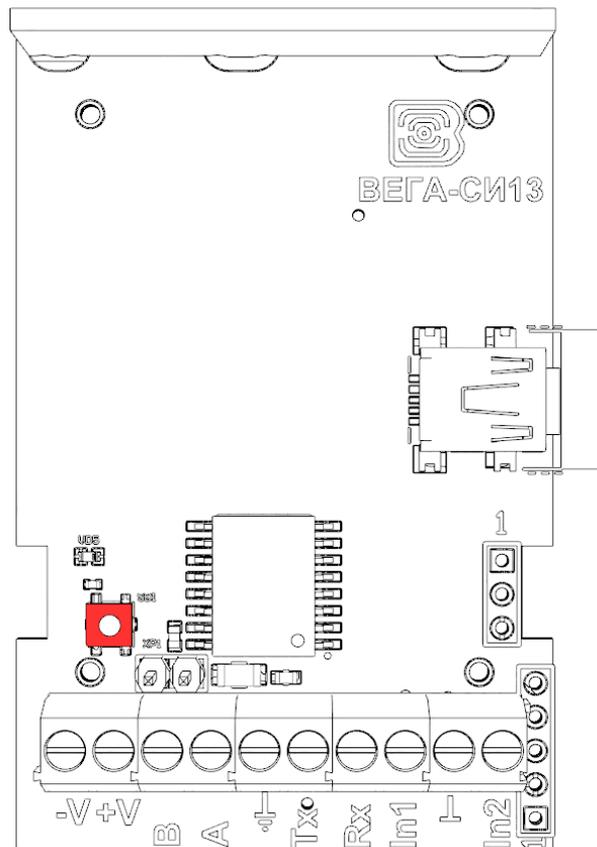
**1. ABP.** After pressing the start button, the device immediately starts working in the "Active" mode.

**2. OTAA.** After pressing the start button, the device makes three attempts to connect to the network within the set frequency band. After the activation in the LoRaWAN network is confirmed, the device sends a signal (LED flashing for 3 seconds) and switches to the "Active" mode. If all attempts fail, the modem switches to the "Storage" mode.

Hold the start button pressed (min. 5 seconds) to switch the device from the "Active" mode back to the "Storage" mode.



When switching to the "Storage" mode, all readings from the pulse inputs accumulated in the device memory are reset



## TRANSPARENT MODE OPERATION

For enable using modem in conjunction with various software systems dispatching of meters and industrial equipment, there is an ability to operating in a transparent mode. In this mode, the modem operates as a simple communication channel between the LoRaWAN network server and connected external device. SI-13 can receive data from the LoRaWAN network for external devices and transfer them to the RS-232/RS-485 interface without any processing. If the external device responds to the request, the modem sends the received data back to the network, also without processing, as one or more packets.

Thus, in transparent mode, the modem does not form a request and does not process the response from the metering device. The duty to form requests and analyze the responses lies entirely on the external application that works with SI-13 through the LoRaWAN network.

To provide device operation in the transparent mode it is necessary to install "LoRa2TCP" application downloading on the [iotvega.com](http://iotvega.com). There is a manual about initial setting of the transparent mode on the device page.

## INDEPENDENT POOLING MODE

Vega SI-13 can operate in the mode of an independent pooling of any connected through RS interface devices. You need to create and set up the required commands and suspected responses in the «Vega LoRaWAN Configurator» application. After that, the modem pools the connected device with the specified period from 1 to 65535 seconds. When the modem receives one of the suspected responses, it may send a packet into the LoRaWAN network. See details in [part 4](#).

Since requests and responses are configured manually, the Vega SI-13 modem can poll any connected devices using any protocol via the RS-232 or RS-485 interface.

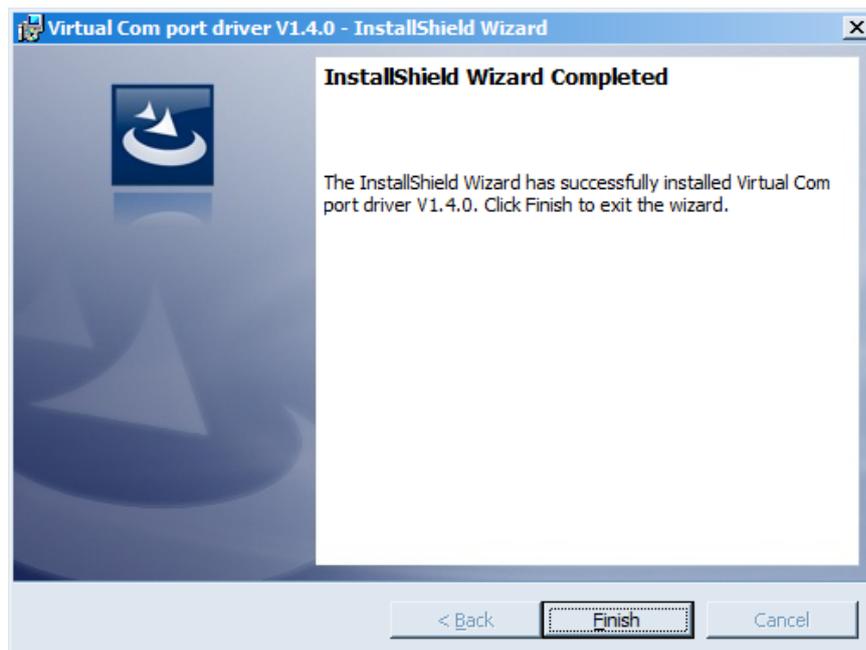
## CONNECTING VIA USB

The modem can be adjusted with the "Vega LoRaWAN Configurator" application (See part 4).

Before connecting the device to the computer for the first time, you must install the driver for the COM port **stsw-stm32102**, which can be downloaded from [iotvega.com](http://iotvega.com). After running the executable file **VCP\_V1.4.0\_Setup.exe**, the installer window will appear:



In this window, you need to click **Next**, then **Install**, and then the installation will begin. When the installation is completed successfully, the following screen appears:



After pressing **Finish**, the driver is ready for operation, - it is possible to connect the modem via USB.

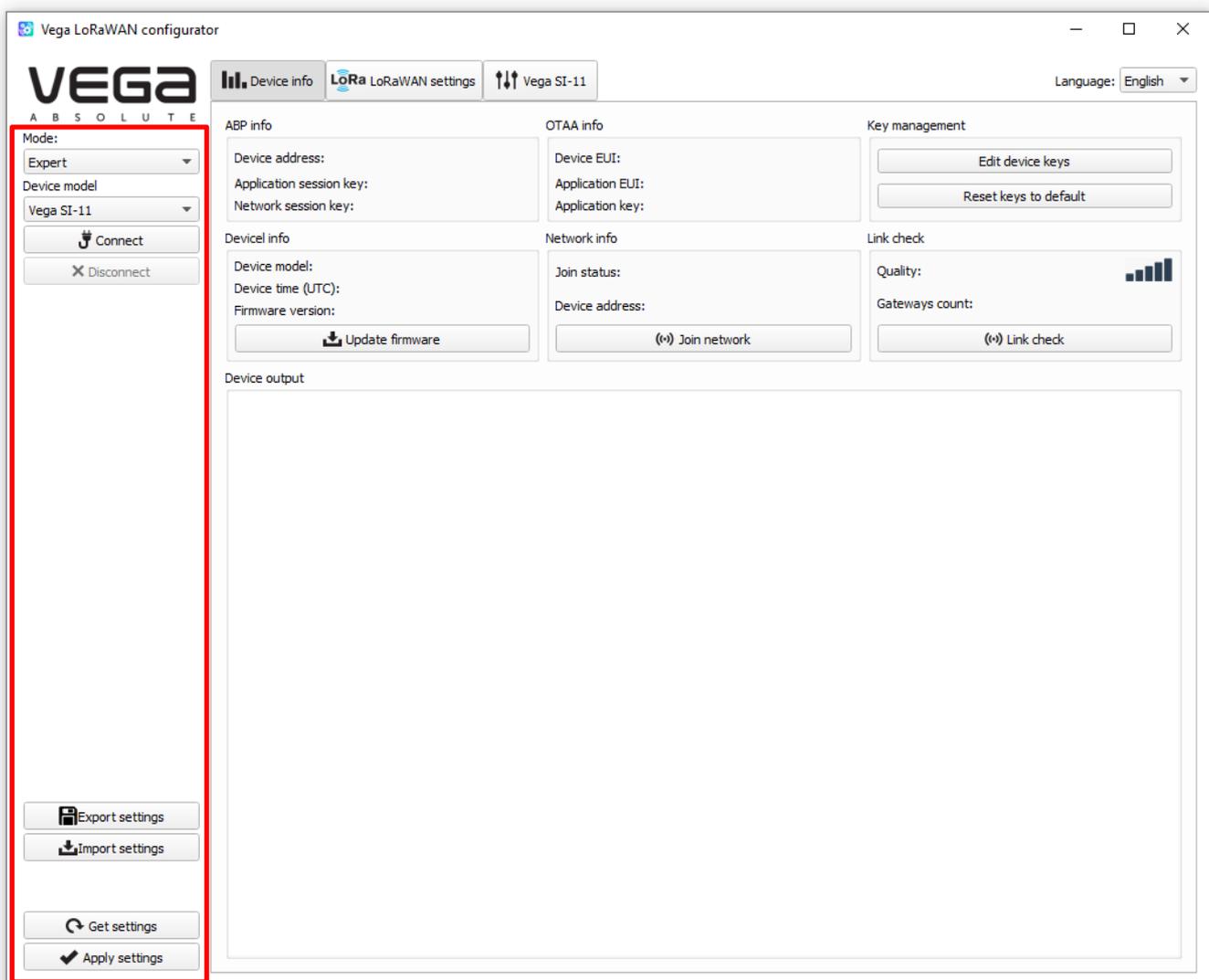
## 4 VEGA LORAWAN CONFIGURATOR

The "Vega LoRaWAN Configurator" application (hereinafter referred to as the configurator) is intended for setting up the device via USB.

The configurator has two modes of operation - "Simple" and "Expert". In the "Simple" mode, only basic settings are available. In the "Expert" mode, the basic settings, advanced settings, and the ability to check the coverage area of the signal from the gateways are available. Next, the work of the application is considered in the "Expert" mode.

### INTERFACE OF THE APPLICATION

The "Vega LoRaWAN Configurator" application does not require the special installation. When the executable file is launched, the window for working with the application appears.



The left side menu allows you to switch between the "Simple" and "Expert" operating modes, select a device model, connect to, or disconnect from a device.

The buttons "Export settings" and "Import settings" allow you to save a set of settings to a file and then load them from a file.

The buttons "Get settings" and "Apply settings" are needed to display the current device settings in the program and to save the changed settings in the device memory, respectively.

The application window contains three tabs – Device info, LoRaWAN settings and device settings.

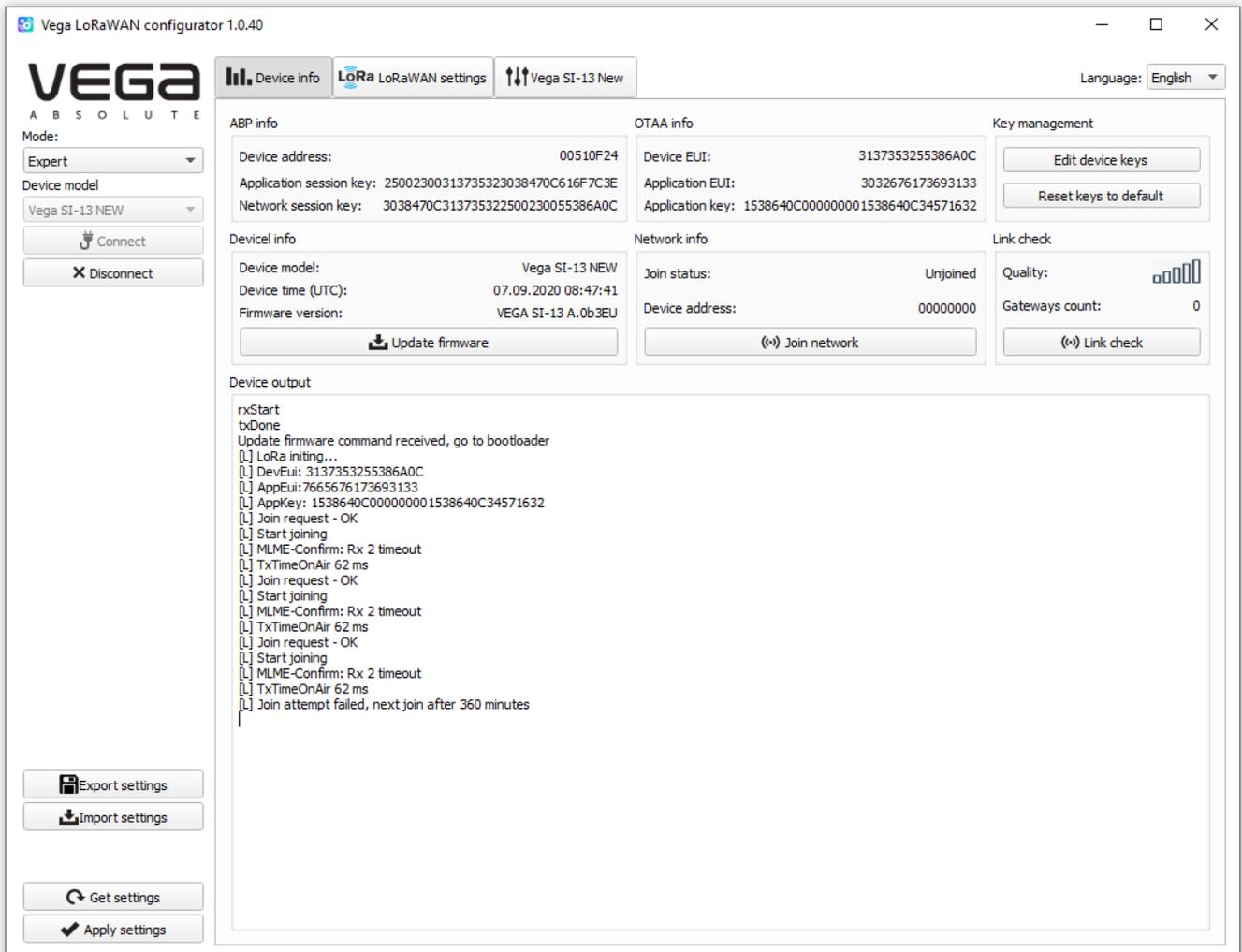
The language selection menu is in the upper right corner.

## CONNECTION TO THE DEVICE

For the connection to the device, perform the following steps:

1. Connect the USB cable to the device.
2. Start the "Vega LoRaWAN Configurator" application.
3. Click the "Connect" button in the menu on the left.

The application automatically recognizes the type of device, and the device selection menu becomes inactive.

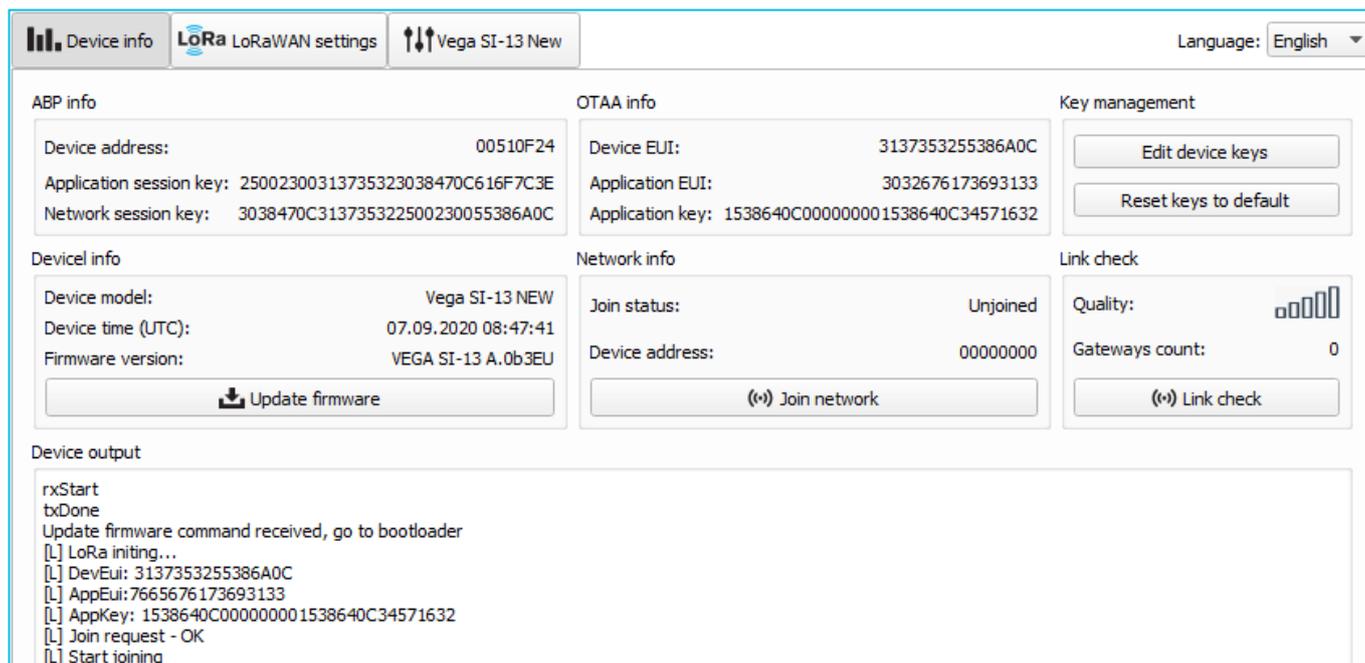


To read the settings from the device, you need to click the "Get settings" button, until this point the application will display the default settings or from the last connected device.

After making the necessary changes to the settings, you should click the "Apply settings" button and only then disconnect from the device with the "Disconnect" button.

**"DEVICE INFO" TAB**

The "Device info" tab displays information about the device, its status, and also the data needed to register the device in the LoRaWAN network.



**ABP info** - displays the data necessary to register the device in the LoRaWAN network with ABP method (Activation By Personalization).

**OTAA info** - the data required to register the device in the LoRaWAN network with OTAA method (Over The Air Activation) is displayed.

**Key management** (not displayed in the "Simple" mode) - allows you to change the factory keys to register the device on the network, and reset the keys back to the factory settings.

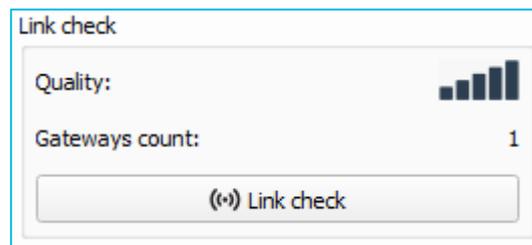
**Device info** - the configurator reads information about the device model, its firmware and automatically corrects the device's time when connected to it.

**Update firmware** - allows you to select the firmware file from your computer's hard drive and load it into the device. The device will automatically disconnect from the configurator when the download is complete. The current version of the device firmware can be downloaded from [iotvega.com](http://iotvega.com).

**Network info** - shows whether the device connecting to the LoRaWAN network and its network address.

**Join network button** - launch the LoRaWAN network connection procedure with the previously selected ABP or OTAA method. If the device is already connected to the network, reconnection procedure will occur.

**Link check** (not displayed in the "Simple" mode) - when pressed, the device sends a special signal to the LoRaWAN network, in response to which the network informs it of the number of gateways that received this signal and the signal quality. This button only works when the device is connected to the network.



**Device output** (not displayed in the "Simple" mode) - monitoring the device status, all events in real time are displayed.

**"LORAWAN SETTINGS" TAB**

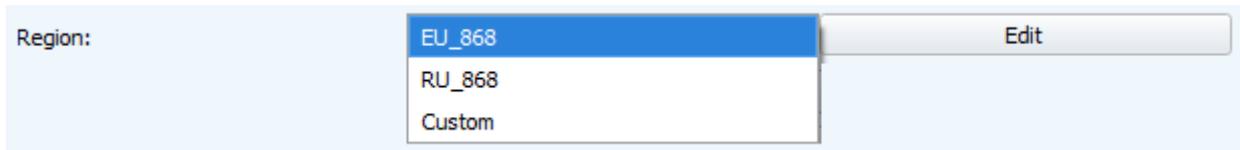
The "LoRaWAN Settings" tab allows you to configure various parameters of the LoRa network.



The screenshot shows the "LoRa LoRaWAN settings" tab. It includes a navigation bar with "Device info", "LoRa LoRaWAN settings", and "Vega SI-13 New". A language dropdown is set to "English". The main settings area contains the following fields:

- Region: Custom (dropdown), Edit button
- Activation type: OTAA (dropdown)
- Confirmed uplinks: Unconfirmed (dropdown)
- ADR: Disabled (dropdown)
- RX1 offset: 1 second (dropdown)
- Join accept delay 1: 5 seconds (dropdown)
- Uplink number of transmission: 1 time (dropdown)
- TX power: 14 dBm (dropdown)
- TX datarate: DR5 SF7 BW 125 (dropdown)

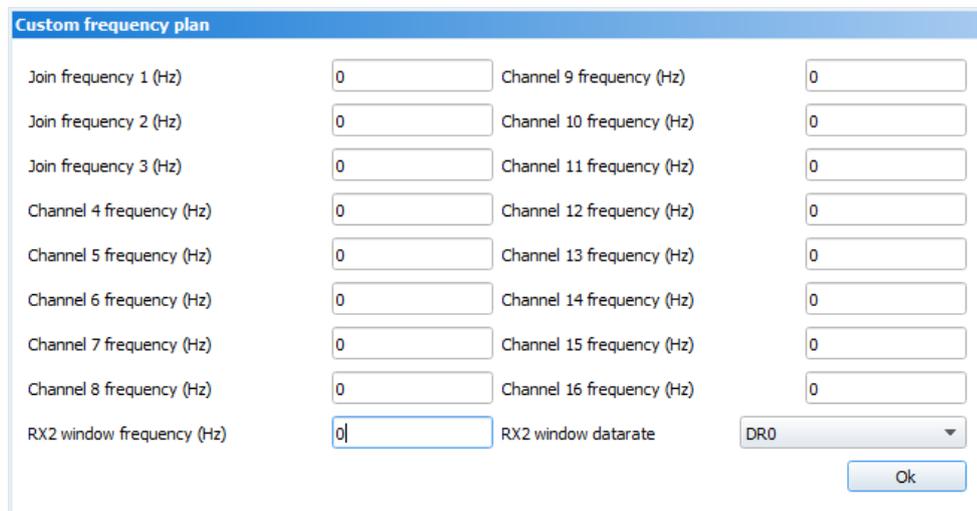
**Region** - allows you to select one of installed frequency plans or specify a custom frequency plan. Custom frequency plan is EU-868 based.



The close-up shows the "Region:" label and a dropdown menu with three options: "EU\_868" (highlighted in blue), "RU\_868", and "Custom". An "Edit" button is visible to the right of the dropdown.

In the device frequency plan, only those channels are active by default, on which sending requests for connection to the network (join channels). The remaining channels (that the device should use) can be transferring by the LoRaWAN network server during the device activation procedure (only OTAA).

If you select "Custom" in the "Region" field, you must manually specify the frequencies that the device will use. To do this, click the "Edit" button, the channel frequency editing window will appear:



The "Custom frequency plan" dialog box contains the following fields:

- Join frequency 1 (Hz): 0
- Join frequency 2 (Hz): 0
- Join frequency 3 (Hz): 0
- Channel 4 frequency (Hz): 0
- Channel 5 frequency (Hz): 0
- Channel 6 frequency (Hz): 0
- Channel 7 frequency (Hz): 0
- Channel 8 frequency (Hz): 0
- RX2 window frequency (Hz): 0
- Channel 9 frequency (Hz): 0
- Channel 10 frequency (Hz): 0
- Channel 11 frequency (Hz): 0
- Channel 12 frequency (Hz): 0
- Channel 13 frequency (Hz): 0
- Channel 14 frequency (Hz): 0
- Channel 15 frequency (Hz): 0
- Channel 16 frequency (Hz): 0
- RX2 window datarate: DR0 (dropdown)

An "Ok" button is located at the bottom right of the dialog.

This frequency band allows you to set up to 16 channels, as well as the frequency and speed of the second receiving window.



**The first three channels and the second receiving window parameters are mandatory. Without these parameters the custom frequency band will be considered empty**

**Activation type** – selecting ABP or OTAA device activation method.

Activation type:	<input type="text" value="OTAA"/> <input type="text" value="ABP"/>
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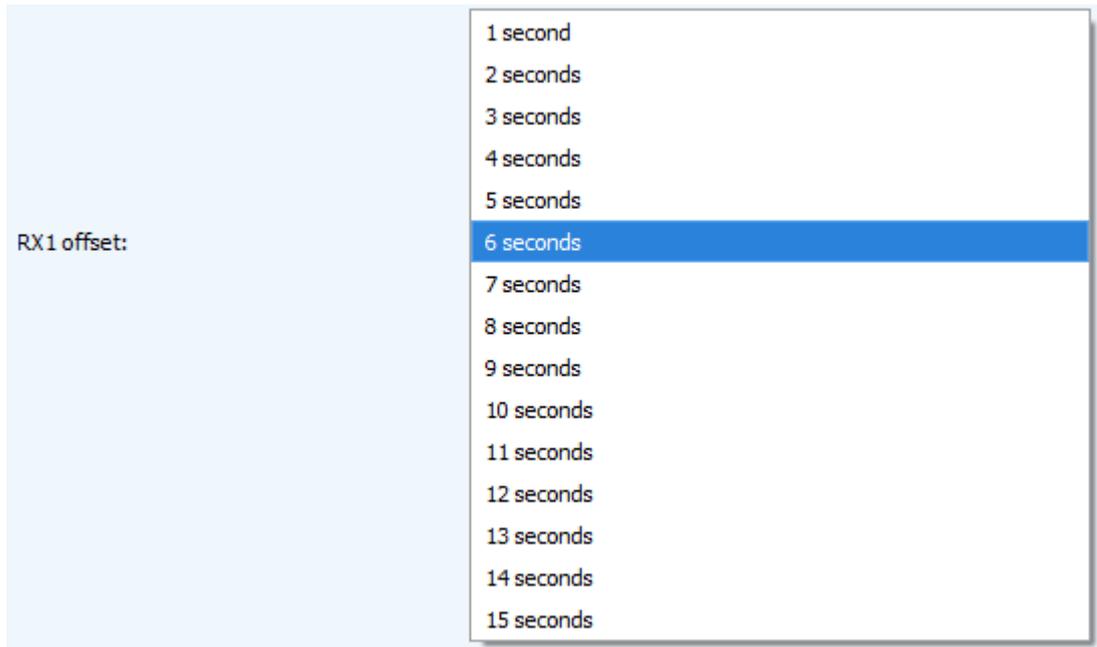
**Confirmed uplinks** – when you choose "confirmed", the device will retry sending the packet until it receives the server confirmation, or until the "Uplink number of transmission" is over (see below).

Confirmed uplinks:	<input type="text" value="Confirmed"/> <input type="text" value="Unconfirmed"/>
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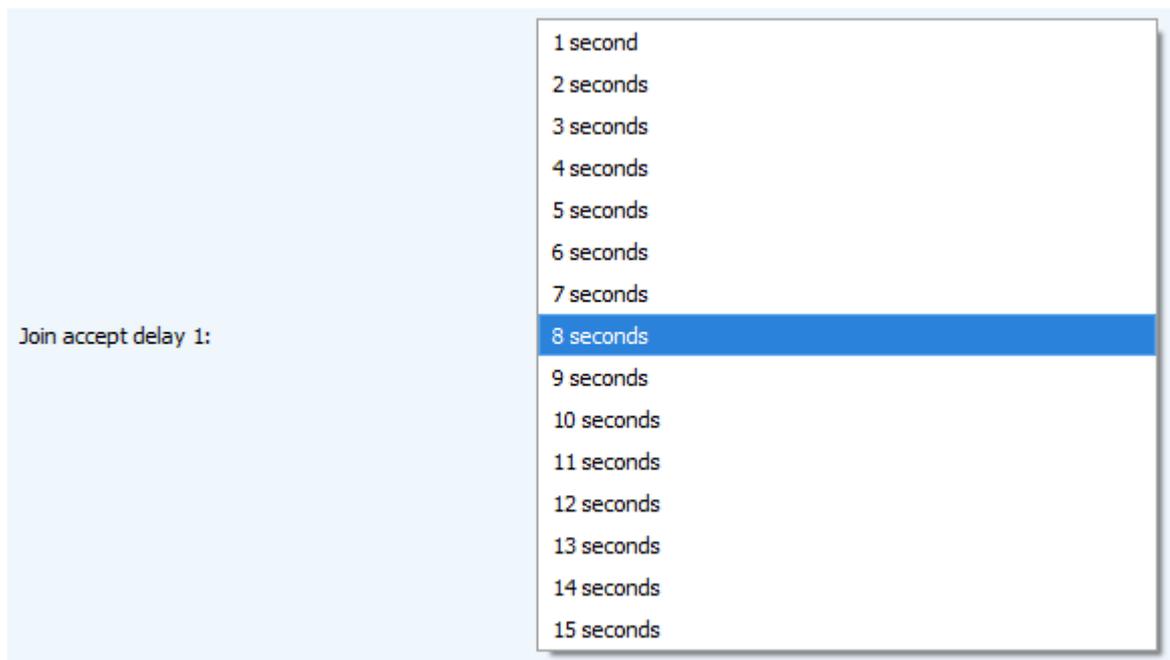
**ADR** – this option activates the Adaptive Data Rate algorithm for automatic control of the data transfer rate from the LoRaWAN network side. The higher the quality of the signal received by the network, the higher the speed will be installed on the device. This option is recommended only on permanently installed devices.

ADR:	<input type="text" value="Enabled"/> <input type="text" value="Disabled"/>
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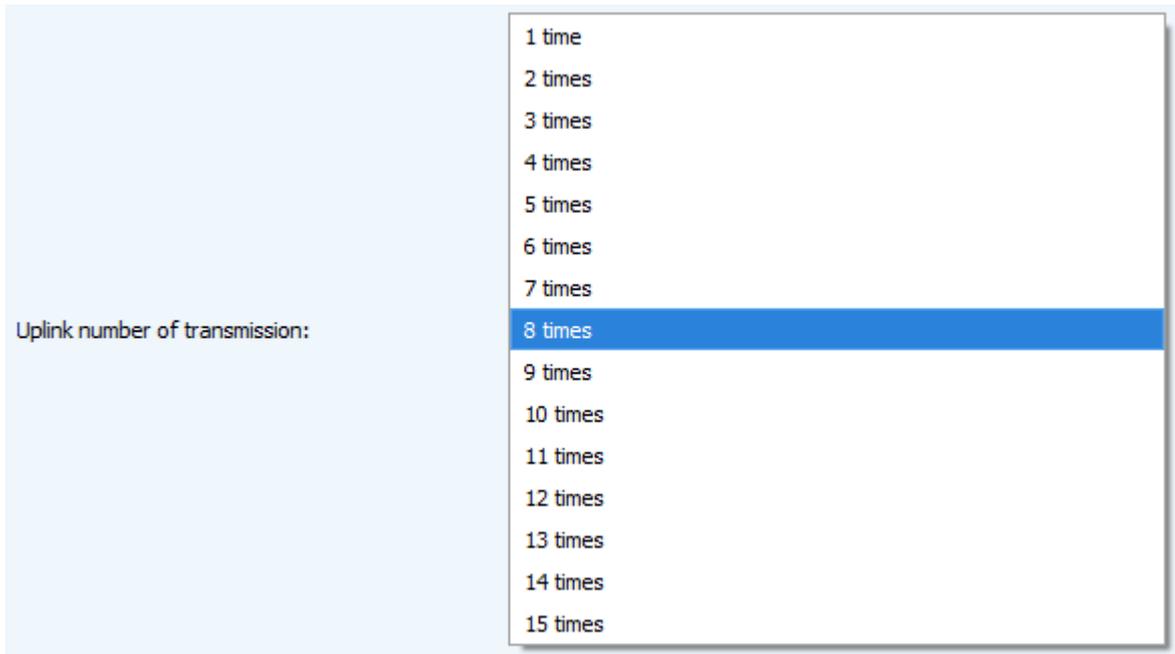
**RX1 offset** (not displayed in the "Simple" mode) – specifies the time between end of packet transmission and first receiving window opening. The second receiving window always opens after 1 second after the first.



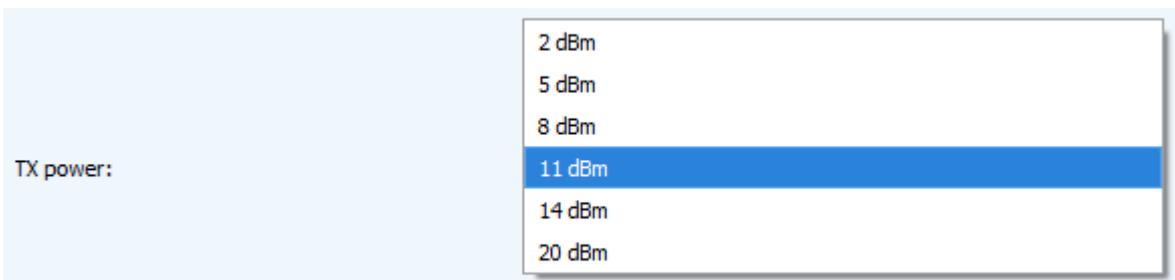
**Join accept delay 1** (not displayed in the "Simple" mode) – sets the time that the device will open the first receiving window to receive confirmation for the join request from the LoRaWAN network. The second window always opens after 1 second after the first.



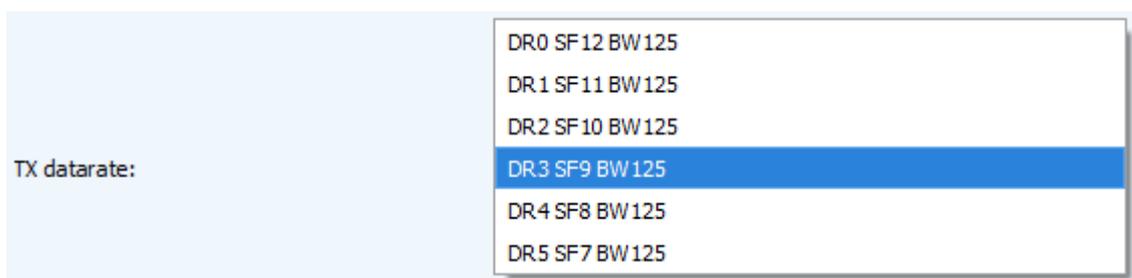
**Uplink number of transmission** (not displayed in the "Simple" mode) – if the "Confirmed uplinks" function is disabled, the device will simply send each packet as many times as specified in this setting. If "Confirmed uplinks" is enabled, the device will send packets until it receives a confirmation or until it sends as many packets as specified in this setting.



**TX power** (not displayed in the "Simple" mode) – the device RF transmitter power is adjusted to this value when sending packets to the LoRaWAN network. This option can be changed by the network server.

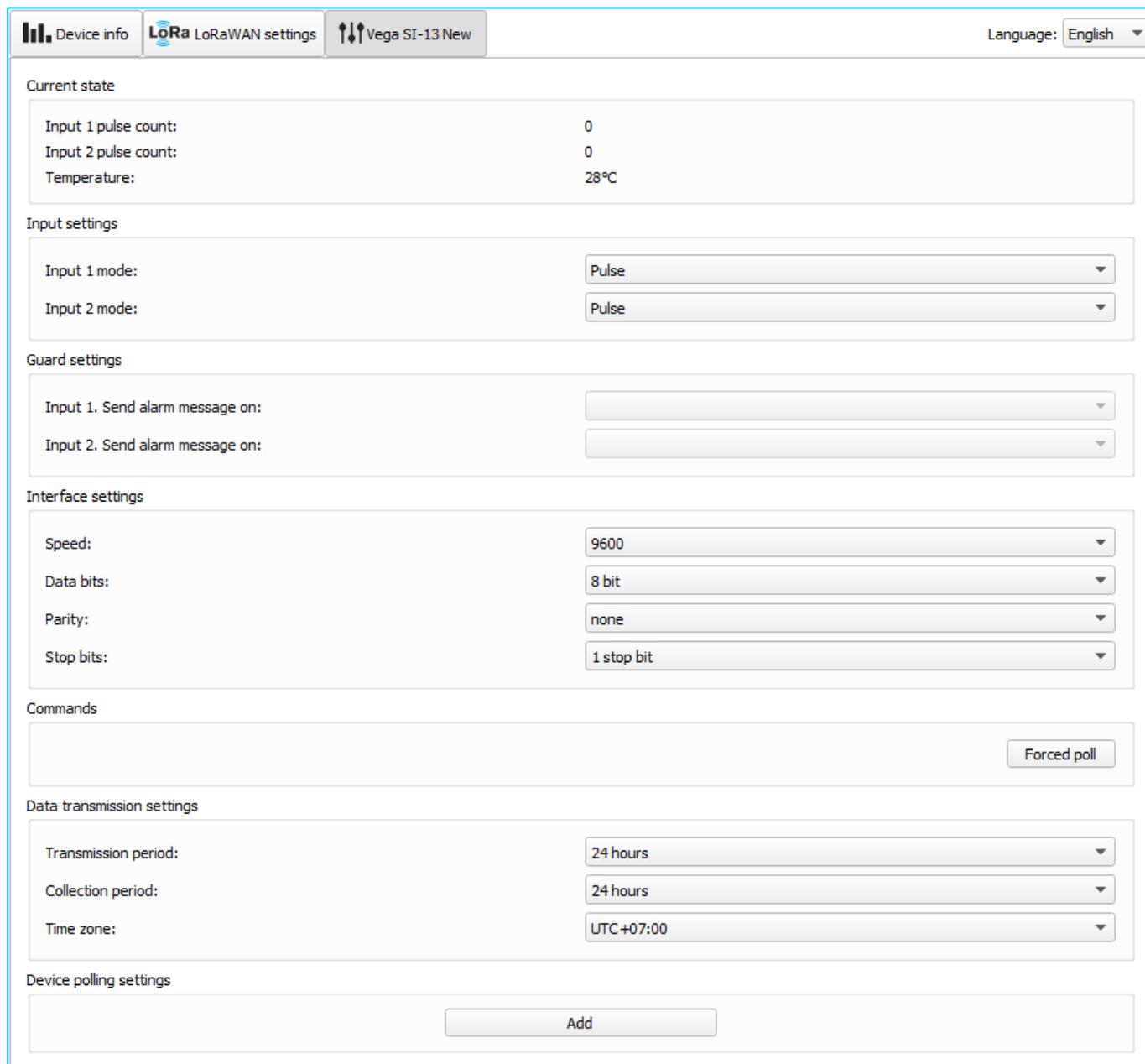


**TX datarate** (not displayed in the "Simple" mode) – the device transmission datarate at which it will transfer packets to the LoRaWAN network. This speed can be changed by the network server if the ADR algorithm is enabled.



“VEGA SI-13” TAB

The “Vega SI-13” tab contains the settings of the connected device.



The screenshot shows the configuration interface for the Vega SI-13 device. At the top, there are three tabs: "Device info", "LoRa LoRaWAN settings", and "Vega SI-13 New" (which is selected). A language dropdown menu is set to "English".

The main content area is divided into several sections:

- Current state:** A table showing "Input 1 pulse count: 0", "Input 2 pulse count: 0", and "Temperature: 28°C".
- Input settings:** Two dropdown menus for "Input 1 mode:" and "Input 2 mode:", both currently set to "Pulse".
- Guard settings:** Two dropdown menus for "Input 1. Send alarm message on:" and "Input 2. Send alarm message on:", both currently empty.
- Interface settings:** Four dropdown menus for "Speed:" (9600), "Data bits:" (8 bit), "Parity:" (none), and "Stop bits:" (1 stop bit).
- Commands:** A text input field and a "Forced poll" button.
- Data transmission settings:** Three dropdown menus for "Transmission period:" (24 hours), "Collection period:" (24 hours), and "Time zone:" (UTC+07:00).
- Device polling settings:** A text input field and an "Add" button.

**Current state** – displays the current parameters of the device - the number of counted pulses at the inputs and the temperature.

To reset the collected readings from device memory, it is necessary to put the device in the "Storage" mode by pressing the button on the board for a long time (more than 5 seconds) (see section "Initial startup").

**Input settings** – allow you to change the operation of the pulse inputs from the counting of pulses to the security mode and back. When transferring the input to the security mode, the device will send an alarm packet to the network (See part 5, packet 2) whenever

this input is closed. The maximum possible frequency of sending alarm packets is one per 10 seconds.

**Guard settings** – allows setting up the work of security inputs, namely, what kind of security input state changing is reason to send an alarm message: short, open, or both.

**Interface settings** – RS-232 or RS-485 interface settings depending on the type of the connected device.

**Commands** - contains the "Forced poll" button - when pressed, starts the polling procedure according to the settings.

**Data transmission settings** - the period of transmission with which the current readings packet is transmitting (see part 5, packet 1).

**Device polling settings** - a section that allows you to configure commands for polling any external devices. To do this, click the "Add" button. The fields for configuring the command to poll the device appear. To switch the command into Modbus format, you need to check the "Modbus frame" checkbox. In this format, the command will change, and the checksum will be generated and verified automatically.

Device polling settings

Request:

Mask:

Pattern:

Action:       Polling interval, s:       Wait time, s:        Modbus frame

Device polling settings

Address:       Function:       Data:

Mask:

Pattern:

Action:       Polling interval, s:       Wait time, s:        Modbus frame

**Request/Address** – polling command field.

**Mask** – a mask that will be applied to the response of the connected device, byte-by-byte.

**Pattern** – pattern that will be compared byte-by-byte with the result of masking the response of the connected device.

**Action** – what type of packet to send to the server if the received data matches the set pattern.

## 5 COMMUNICATION PROTOCOL

This part describes the SI-13 data exchange protocol with LoRaWAN network. SI-13 uses the LoRaWAN port 2 for uplink and downlink messages.



**In fields consisting of several bytes, the little-endian byte order is used**

### VEGA SI-13 MODEM TRANSMITS THE FOLLOWING TYPES OF PACKETS

1. Packet with current readings, sent regularly

Size in bytes	Field description	Data type
1 byte	Packet type, 00 – current packet, alarm packet 01-04 by the logic of RS485/232, FC – by the guard input 1, FD – by the guard input 2	uint8
4 bytes	Packet time (unixtime)	-
1 byte	Temperature, °C	int8
4 bytes	Input 1 reading (depending on the type – number of pulses or status: 0 – open, 1 - closed)	uint32
4 bytes	Input 2 reading (depending on the type – number of pulses or status: 0 – open, 1 - closed)	uint32
4 bytes	<i>Reserve</i>	-

2. Data packet from an external device, received via RS-232 or RS-485 interface

Size in bytes	Field description	Data type
1 byte	Packet type, this packet = FE	uint8
1 byte	Sequential number of the setting in the configurator (counting starts from 0)	uint8
1 byte	Total data size received via interface	uint16
1 byte	Sequence number of the packet (in the case of transmission of several packets, when the data does not fit into one)	uint8
Array	Data [1-40 bytes]	-

The LoRa data transfer technology limits the maximum packet size, depending on the speed of packet transmission. If the data received through the external interface cannot be transmitted in one packet, they are split into several packets, which are transmitted sequentially.

### 3. Packet with time correction request, sent every seven days on LoRaWAN port 4

Size in bytes	Field description	Data type
1 byte	Packet type, this packet == 255	uint8
4 bytes	Time of the modem at a moment of the packet transmission (unixtime UTC)	uint32

After receiving this type of package, the application can send to modem the packet with time correction.

### 4. Information packet, transmitted when registering in the network or upon request to LoRaWAN port 195

Size in bytes	Field description	Data type
1 byte	Packet type: 195	uint8
1 byte	Transmit reason: «0» - registration on the network, «1» - by the request	uint8
16 bytes	Manufacturer code, in ASCII	uint8
16 bytes	Device model, in ASCII	uint8
4 bytes	Firmware release date, unixtime (big endian byte order)	uint32
2 bytes	Board revision (always 0xFFFF)	uint8
2 bytes	Firmware version (high byte - major, low byte - minor). Example: 0x0301 - firmware version 3.1	uint8
2 bytes	Protocol version (high byte - major, low byte - minor). Example: 0x0200 - protocol version 2.0	uint8
1 byte	Battery charge, %	uint8
4 bytes	Number of packets sent over the air (big endian byte order)	uint32

### 5. Settings packet – transmitting on LoRaWAN port 3

Size in bytes	Field description	Data type
1 byte	Packet type, this packet == 0	uint8
2 bytes	ID of parameter	uint16
1 byte	Data length (len)	uint8
len bytes	Parameter value	-----
2 bytes	ID of parameter	uint16
1 byte	Data length (len)	uint8
len bytes	Parameter value	-----
...	...	...
2 bytes	ID of parameter	uint16
1 byte	Data length (len)	uint8
len bytes	Parameter value	-----

**VEGA SI-13 MODEM RECEIVES PACKETS OF THE FOLLOWING TYPES**

1. Real-time clock adjustment – send by application on LoRaWAN port 4

Size in bytes	Field description	Data type
1 byte	Packet type, this packet = 255	uint8
8 bytes	The value in seconds for which you need to adjust the time. Can be positive or negative	int64

2. Packet with request of Information packet – sent on LoRaWAN port 195

Size in bytes	Field description	Data type
1 byte	Any value between 0x00 - 0xFF	uint8

3. Packet with request of settings – sent by application on LoRaWAN port 3

Size in bytes	Field description	Data type
1 byte	Packet type, this packet == 1	uint8

Answering that packet, the device will send the packet with settings.

4. Packet with settings is identical to such packet from device

Size in bytes	Field description	Data type
1 byte	Packet type, this packet == 0	uint8
2 bytes	ID of parameter	uint16
1 byte	Data length (len)	uint8
len bytes	Parameter value	-----
2 bytes	ID of parameter	uint16
1 byte	Data length (len)	uint8
len bytes	Parameter value	-----
...	...	...
2 bytes	ID of parameter	uint16
1 byte	Data length (len)	uint8
len bytes	Parameter value	-----

The package with settings sent to the device may not contain all the settings supported by the device, but only the part that needs to be changed.

Table of ID of SI-22 parameters and these possible values

ID of parameter	Description	Data length	Possible values
4	Confirmed uplinks	1 byte	1 – confirmed 2 – unconfirmed
8	The number of packet resending	1 byte	from 1 to 15
16	Communication period	1 byte	1 – 1 hour 2 – 6 hours

			3 – 12 hours
			4 – 24 hours
			5 – 5 minutes
			6 – 15 minutes
			7 – 30 minutes
20	Interface speed	1 byte	1 – 4800
			2 – 9600
			3 – 14400
			4 – 19200
			5 – 38400
			6 – 57600
			7 – 115200
			8 – 300
			9 – 600
			10 – 1200
			11 – 2400
49	Data collection period	1 byte	1 – 1 hour
			2 – 6 hours
			3 – 12 hours
			4 – 24 hours
			5 – 5 minutes
			6 – 15 minutes
			7 – 30 minutes
55	Time zone, in minutes	2 bytes	from -720 to 840

## 6 STORAGE AND TRANSPORTATION REQUIREMENTS

Vega SI-13 modem shall be stored in the original packaging in heated room at temperatures +5°C to +40°C and relative humidity less than 85%.

The modem shall be transported in covered freight compartments of all types at any distance at temperatures -40°C to +85°C.

## 7 CONTENT OF THE PACKAGE

The modem is delivered complete with:

1. Vega SI-13-232 modem – 1 pc.

Screw – 4 pcs.

Factory certificate – 1 pc.

2. Vega SI-13-485 modem – 1 pc.

Screw – 4 pcs.

Factory certificate – 1 pc.

## 8 WARRANTY

The warranty period for the device is 5 years from the date of sale.

The manufacturer is obligated to provide repair services or replace the failed device during the entire warranty period.

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:

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

In the event of a warranty claim, contact the service center:

113/1, Kirova Str., Novosibirsk, 630008, Russia.

Tel.: +7 (383) 206-41-35.



[vega-absolute.ru](http://vega-absolute.ru)

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