



Pulse Counter

VEGA SI-22

User manual



Document Information

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02	22.01.2019	KEV	" Marking " part added, device AppEui added in specification , setting "by the air" description, communication protocol changed, content of the package changed
03	24.01.2019	KEV	Inaccuracy in communication protocol fixed – packet type for packets with settings and request of settings
04	30.05.2019	KEV	Content of the package changed
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06	13.12.2019	KEV	AppEui default value is changed, changes in communication protocol , information about the cable gland is added
07	09.04.2020	KEV	Changes in communication protocol
08	15.09.2020	KEV	AppEui devices have been removed from specification , changes in functionality , added temperature thresholds, changes in communication protocol
09	23.10.2020	KEV	We add version number for the communication protocol

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INTRODUCTION

This manual is designated for Vega SI-22 pulse counter (hereinafter – the counter) manufactured by Vega-Absolute OOO and provides information on powering and activation procedure, control commands and functions of the counter.

This manual is targeted at specialists familiar with installation work fundamentals of 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.

1 DESCRIPTION AND OPERATION

DEVICE DESCRIPTION

Vega SI-22 pulse counter is designed for counting of pulses incoming to 4 independent inputs, further accumulating and transmitting of this information in the LoRaWAN network.

In addition, Vega SI-22 can be used as a security device - pulse inputs can be configured as security inputs.

The pulse counter can check the specified temperature range. When configuring the device, you can set the low and high thresholds for permissible temperature values. When the temperature value goes beyond the range, the modem starts an extraordinary communication session. The data collection period for operation within the temperature range and outside is configurable separately.

The pulse counter can be used for any utilities' meters and industrial equipment with pulse output of herkon type or open-drain type contact.



Equipment with NAMUR pulse output is not supported

Vega SI-22 has ability to connect an external temperature sensor for taking temperature readings from objects which require such control.

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

The counter is powered by a 3400 mAh built-in battery.



**The device is powered by a non-rechargeable lithium-thionyl chloride (LiSOCl₂) battery
Attempts to charge the battery may result in fire**

COMUNICATION AND DATA COLLECTION ALGORITHM

The readings collecting from the meter with a configurable period from 5 minutes to 24 hours. The readings stored in the device memory and transmitting during the next communication session with the LoRaWAN network.

The adjustable data transfer period can be from 5 minutes to 24 hours. Data transferring in random point in time during set period. At the next communication session, the device starts sending accumulated packets with readings, from the earliest to the latest.

If the measured temperature values go out the specified temperature range, the data transmission period remains unchanged, if the "Immediately send data when temperature is out of range" parameter is not active. If this parameter is active, then within two minutes after the temperature value goes out the specified range, a message with an alarm flag will be generated and transmitted. Each next generated message according to the data collection period will also be transmitted immediately until the temperature value returns into the specified range.

It is also possible to separately configure the data collection period for the case when the measured temperature values go out the specified temperature range.

With the "Confirmed uplinks" option turned on, the device will send the next packet only after receiving a confirmation of the delivery of the previous one. If such confirmation has not received after the fulfilled in the settings uplink number of transmissions, device completes the communication session until the next one according to the schedule. In this case, the device continues to collect data according to the data collection period and store it in memory. Non-transmitted packets remain in the device memory until the next communication session.

With the "Confirmed uplinks" option turned off, the device just sends all accumulated packets to the network in order from the earliest to the latest. There are no checks of package delivery in this mode. There are no non-transmitted messages in the device memory.

The internal clock is set automatically when device connected to the "Vega LoRaWAN Configurator" via USB, also adjustable via LoRaWAN.

FUNCTIONAL

Vega SI-22 pulse counter is A class device (LoRaWAN classification) and has the following features:

- ADR support (Adaptive Data Rate)
- Sending of confirmed packets (configurable)
- Two operating modes: "Active" and "Storage"
- Inputs can be switched to «security» mode for connection to external leakage and safety sensors, etc.
- Ability to connect an external temperature sensor
- Unscheduled sending of an alarm packet when the temperature goes out the specified range
- The ability to set a shortened data collection interval for the case when the measured temperature values go out the specified temperature range
- Time referencing of readings by internal clock
- Communication in case of security inputs actuation
- Charge measuring of the built-in battery (%)

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 4
Maximum input frequency	200 Hz
Security inputs	up to 4
USB-port	micro-USB, type B
Operating temperatures	-40...+85 °C
Ability to connect an external temperature sensor	yes

LoRaWAN

LoRaWAN class	A
Quantity of LoRaWAN channels	16
Frequency plan	RU868, EU868, IN865, AS923, AU915, KR920, US915, KZ865, custom (EU868 based)
Activation type	ABP or OTAA
Communication period	5, 15, 30 minutes, 1, 6, 12 or 24 hours
Data collection period	5, 15, 30 minutes, 1, 6, 12 or 24 hours
Memory amount for storing packets	200 packets
Type of the LoRaWAN antenna	external
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	100 mW

Power

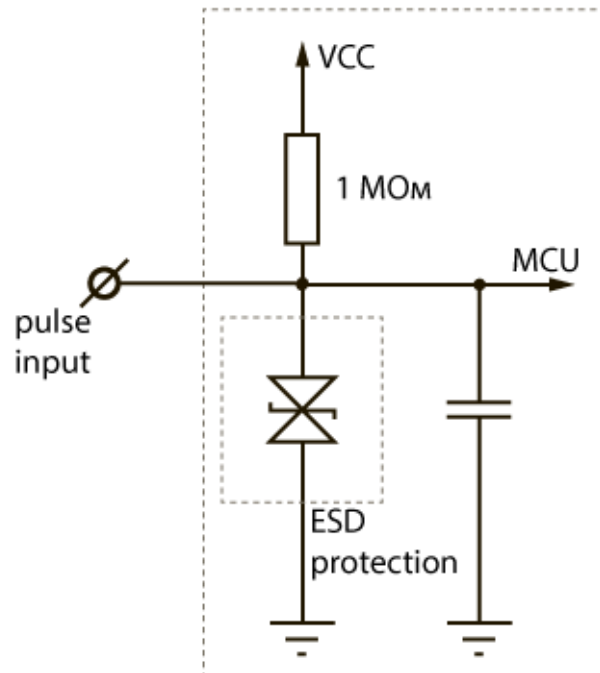
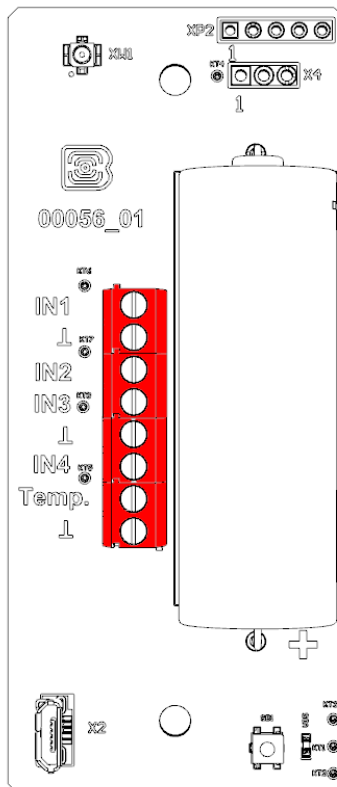
Built-in battery	3400 mAh
Warranty number of packets sent by the device, not less	80 000

Case

Housing dimensions (without cable gland and SMA-connector)	95 x 95 x 50 mm
Ingress protection rating	IP65

3 OPERATION

CONTACTS



The pulse counter has 4 pairs of contacts and it can connect circuits with the following types of NO contacts:

- reed switch;
- mechanical pushbutton;
- open-drain output.



Equipment with NAMUR pulse output is not supported

Polarity effects only "open collector" circuits.

Pulse inputs can be configured for work in the "Security" mode via the "Vega LoRaWAN Configurator" application. In this mode, the device does not count pulses at the "Security" input, but only monitors its status. Should the "Security" input trigger, the device is activated and sends an alarm message to the network.

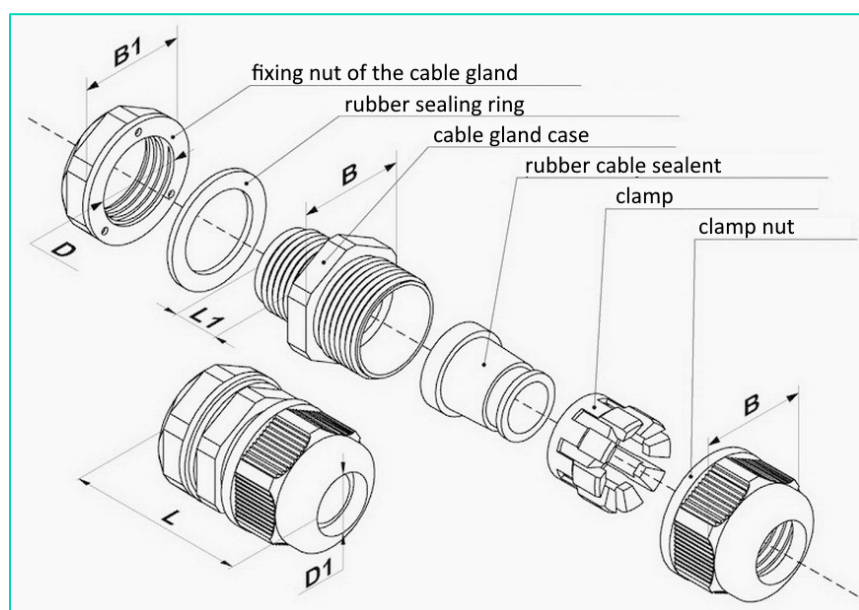
When connecting a radio modem to external devices, consider the internal circuitry of its pulse inputs shown above.

Also, there are a couple of contacts on the board for connection an external thermistor, it is contacts «Temp.» and « \perp ». It is necessary to configure sending parameters for thermistor readings in the «Vega LoRaWAN Configurator» application.

The device case has a cable gland of M12 size, for which the cables and wires fit with circular cross-section with a diameter of 5...6 mm. Inside the cable gland there is a sealant ensuring compliance with the declared Ingress Protection rating of the device case.

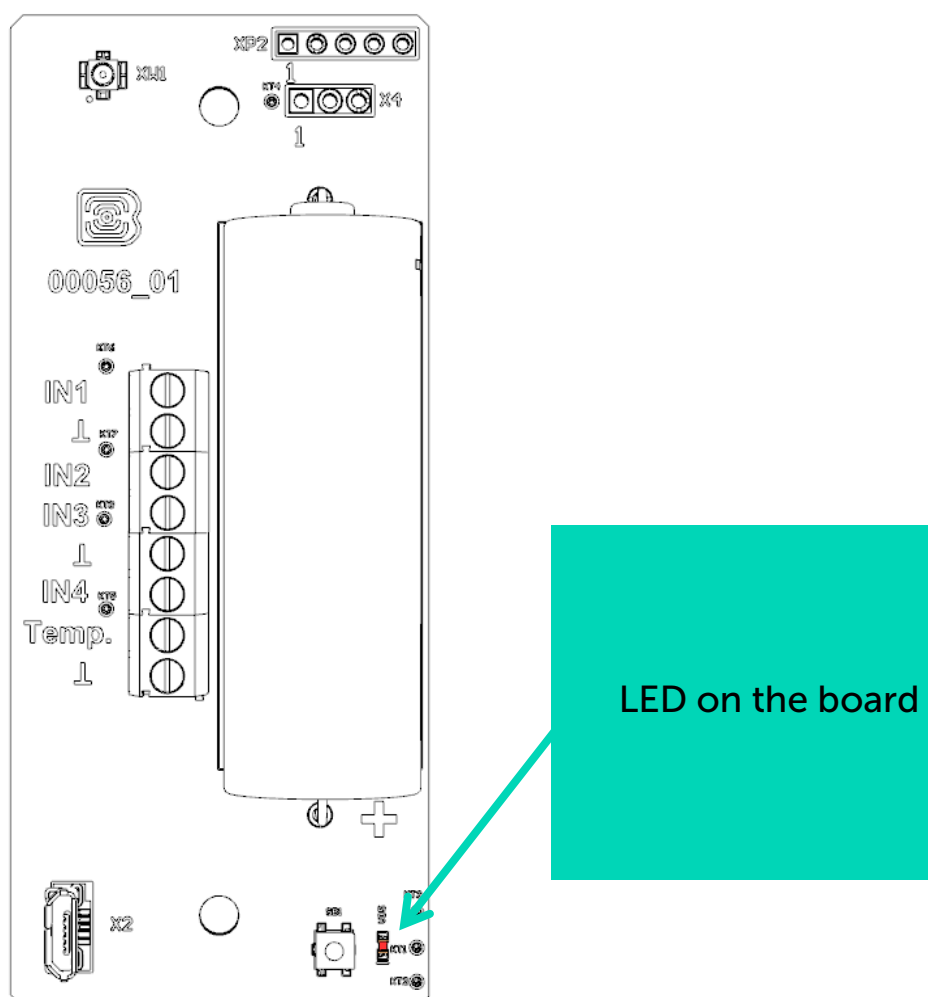





When removing the sealant, as well as when installing wires of a different diameter or cross-section, device performance may deteriorate until failure due to moisture entering the case



INDICATION

There is one red LED on the board. The indication is only used when the device is activated in the LoRaWAN network and when the operating modes are changed.



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 of connection attempt fail, the device will continue to accumulate data and will attempt to connect to the network every 6 hours

INITIAL STARTUP

Vega SI-22 pulse counter is constantly ON, but it can operate in a special "Storage" mode, designed for storage and transportation. The device does not regularly transmit data to the network in this mode. Before use switch the counter from the «Storage» mode.

Vega SI-22 supports two activation methods in the LoRaWAN network - ABP and OTAA. Select one of the methods using the «Vega LoRaWAN Configurator» application (see part 4).

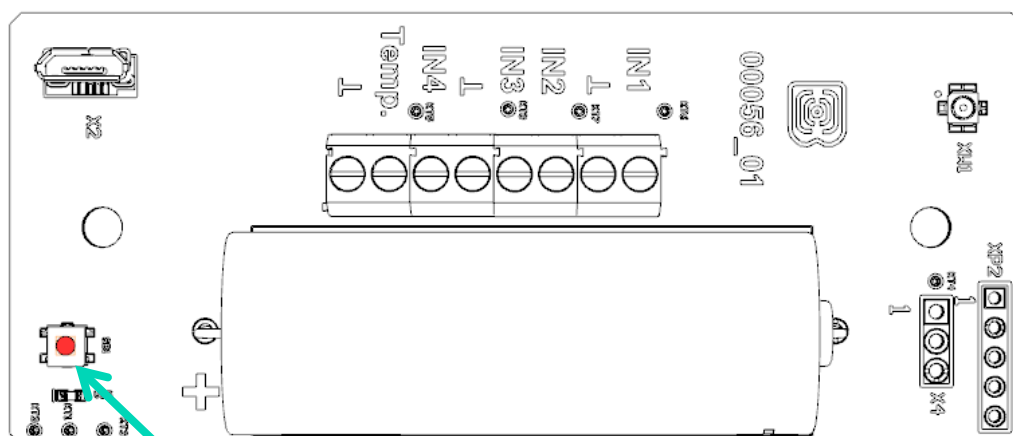
1. ABP. After pressing the start button, the device immediately starts working in the "Active" mode.

2. OTAA. After pressing the start button, the device makes three attempts to connect to the network within the set frequency plan. 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 counter will continue to accumulate data and will attempt to connect to the network every 6 hours.

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



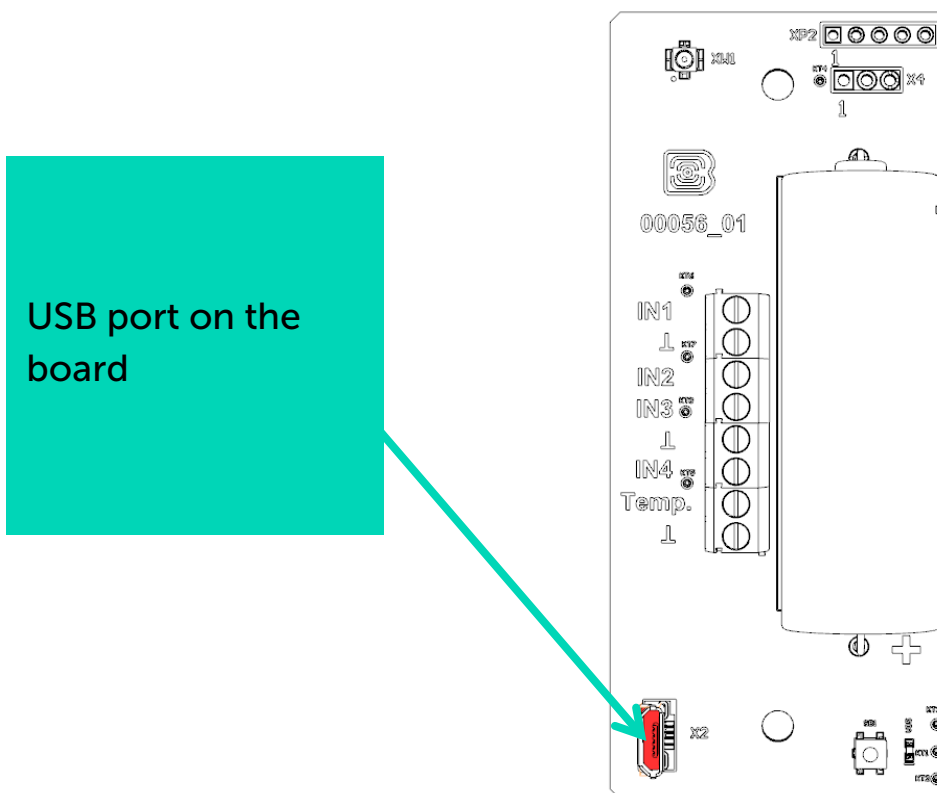
When switching to the "Storage" mode, all readings from the pulse inputs accumulated in the device memory are reset



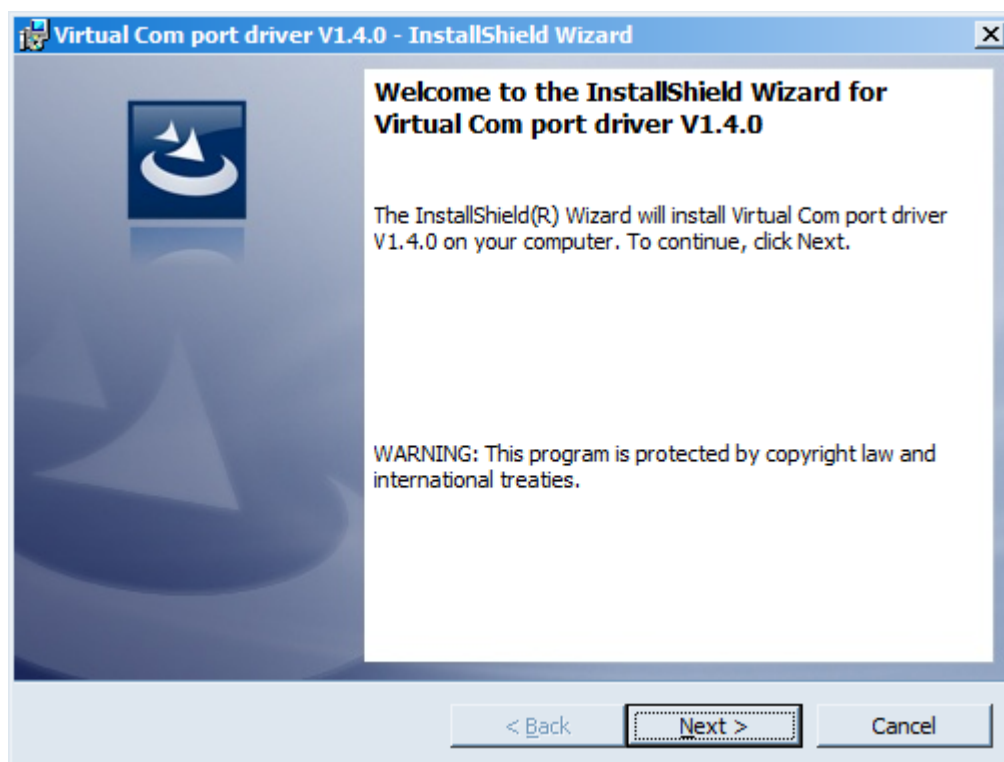
Push start button
on the board

CONNECTING VIA USB

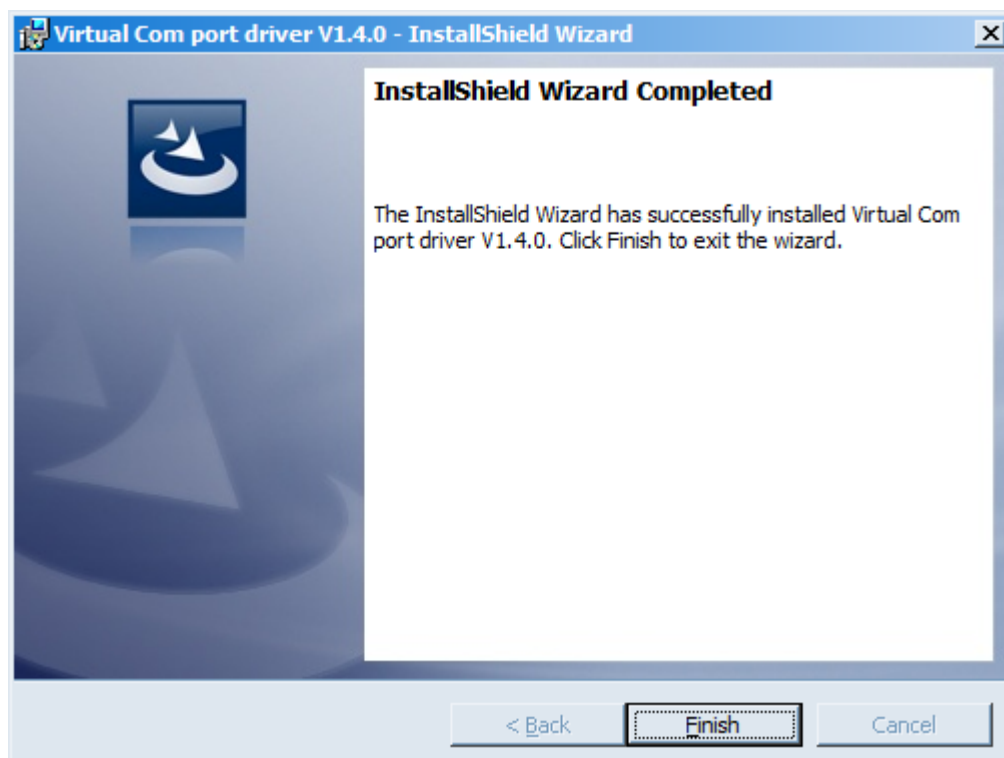
The pulse counter can be adjusted with the "Vega LoRaWAN Configurator" application (See part 4).



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 download from 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 complete successfully, the following screen appears:



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

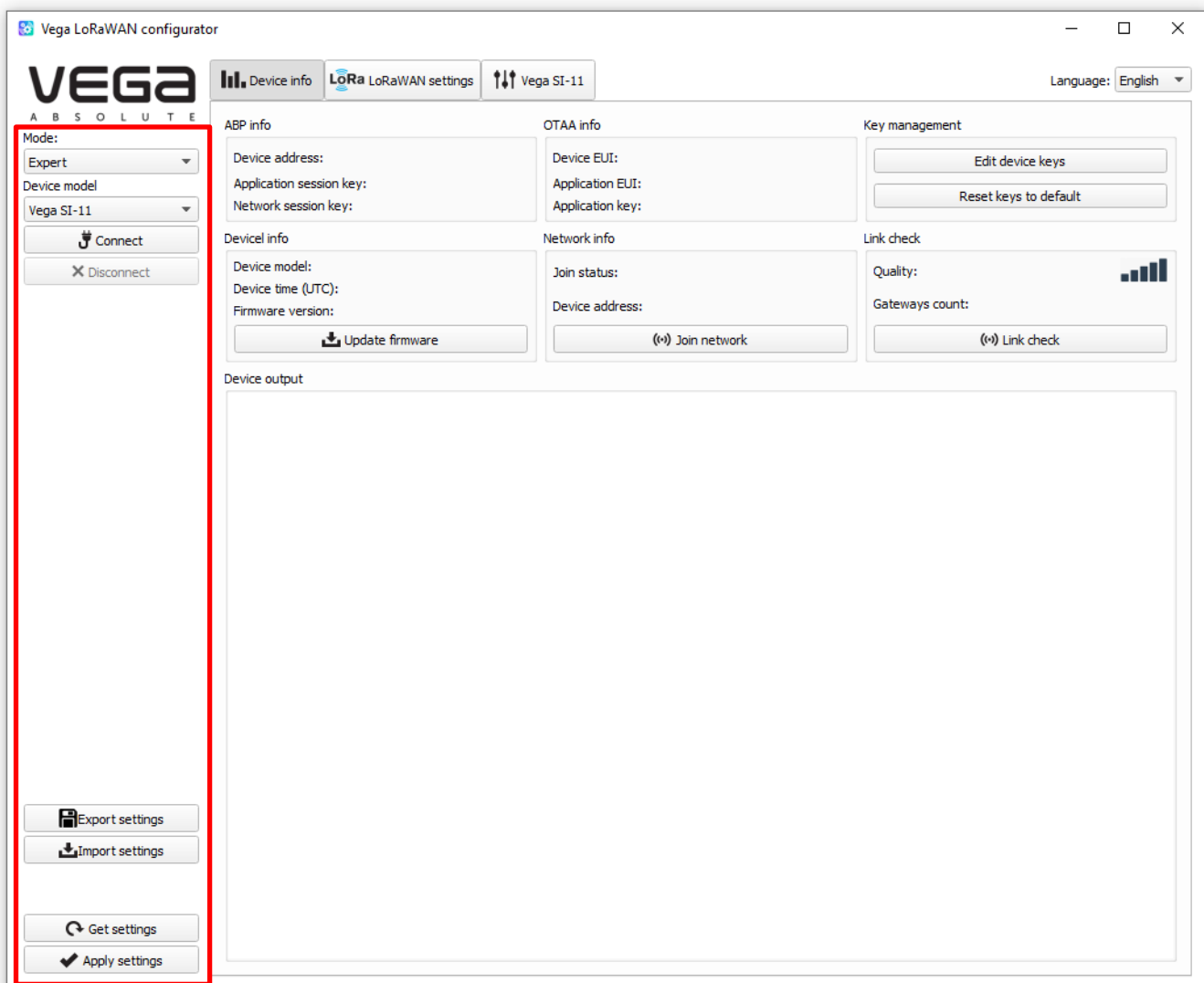
4 VEGA LORAWAN CONFIGURATOR

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 considering in the "Expert" mode.

INTERFACE OF THE APPLICATION

The "Vega LoRaWAN Configurator" application does not require the special installation. When the executable file launching, 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.

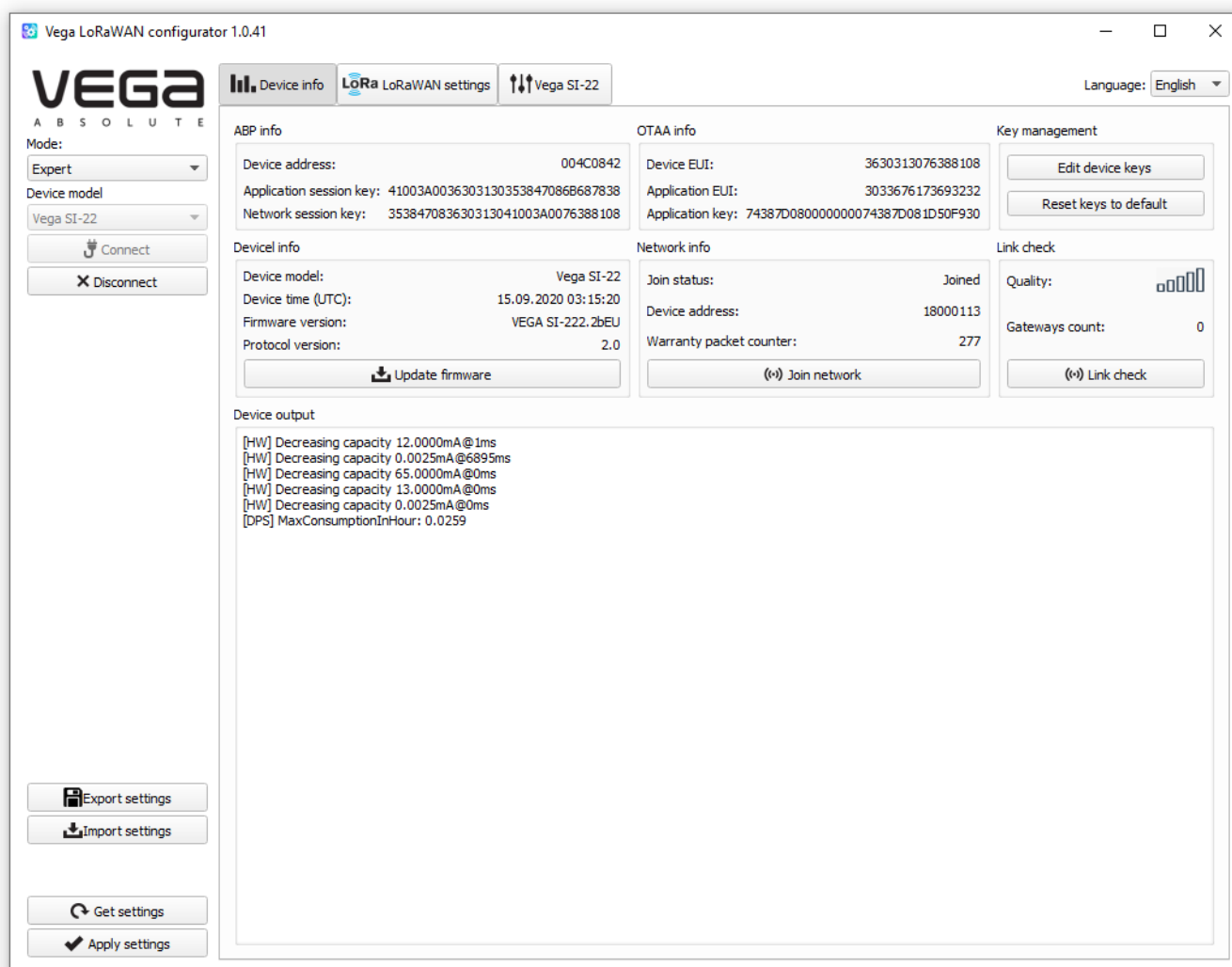
The language selection menu is in the upper right corner.

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.

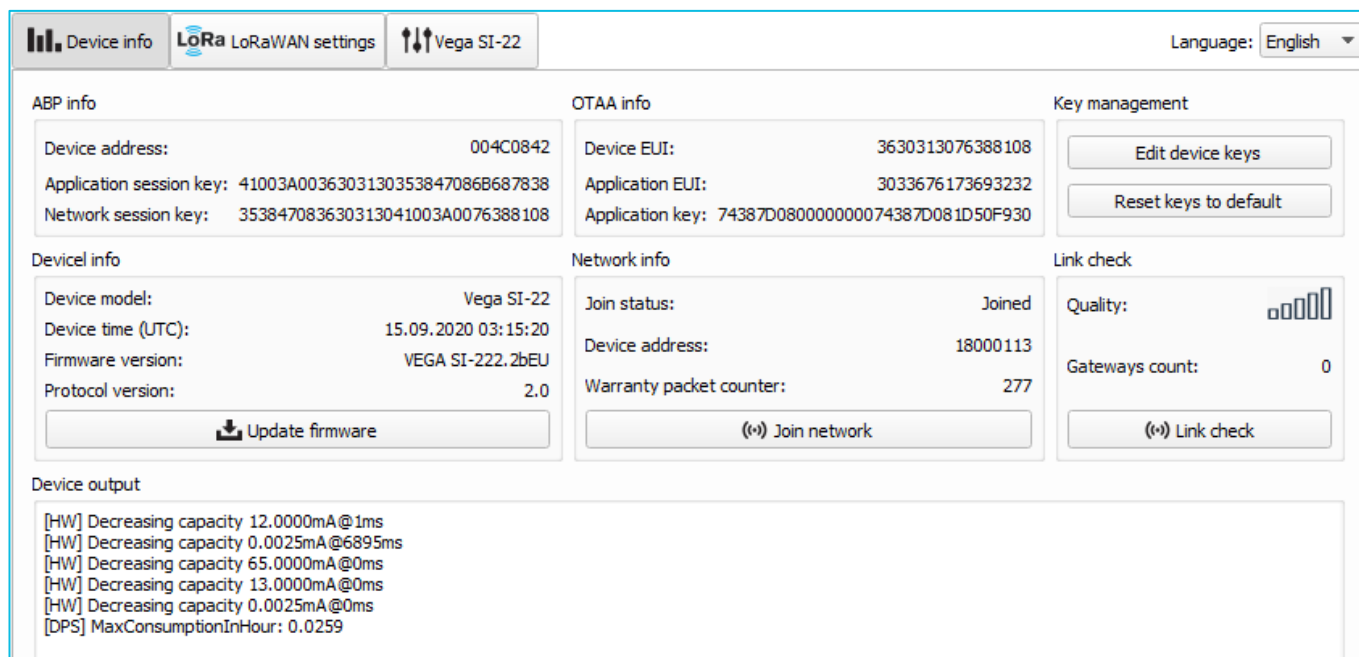


To read the settings from the device, you need to click the "Get settings" button, until this point the application will display the default settings or from the last connected device.

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 the data needed to register the device in the LoRaWAN network.



The screenshot shows the 'Device info' tab with the following sections:

- ABP info:** Device address: 004C0842, Application session key: 41003A00363031303538470868687838, Network session key: 353847083630313041003A0076388108.
- OTAA info:** Device EUI: 3630313076388108, Application EUI: 3033676173693232, Application key: 74387D08000000074387D081D50F930.
- Key management:** Buttons for 'Edit device keys' and 'Reset keys to default'.
- Device info:** Device model: Vega SI-22, Device time (UTC): 15.09.2020 03:15:20, Firmware version: VEGA SI-222.2bEU, Protocol version: 2.0. Includes an 'Update firmware' button.
- Network info:** Join status: Joined, Device address: 18000113, Warranty packet counter: 277. Includes a 'Join network' button.
- Link check:** Quality: (signal strength bars), Gateways count: 0. Includes a 'Link check' button.
- Device output:** A log showing hardware and power system status, such as '[HW] Decreasing capacity 12.0000mA@1ms' and '[DPS] MaxConsumptionInHour: 0.0259'.

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.

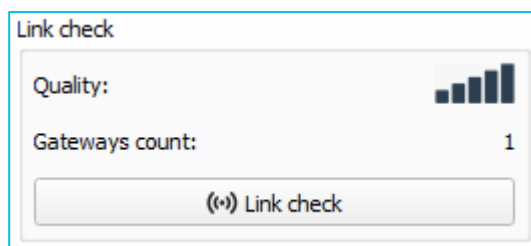
Device info - the configurator reads information about the device model, its firmware and protocol version, also automatically corrects the device's time when connected to it.

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 download from iotvega.com.

Network info - shows whether the device is connected 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.

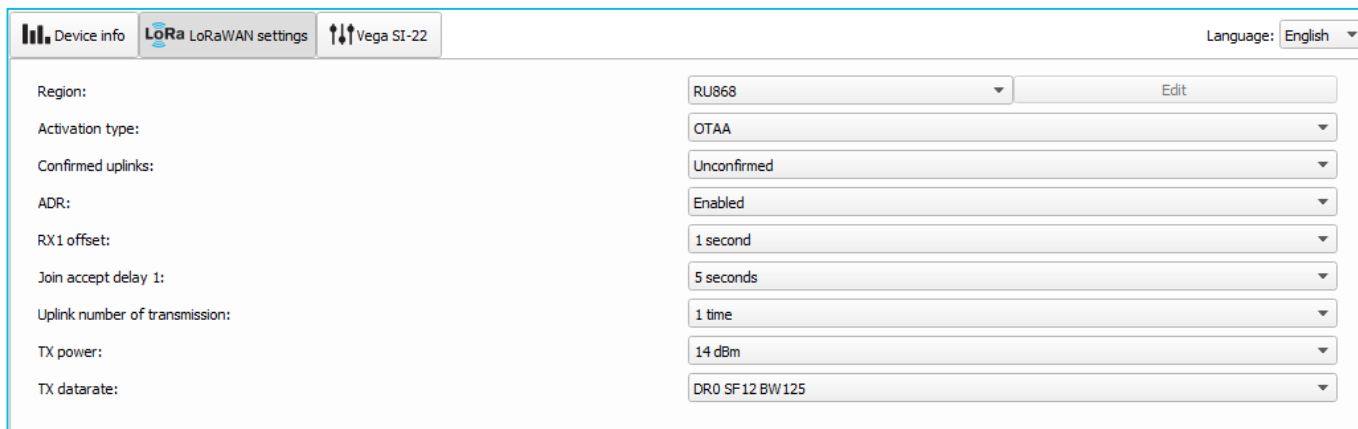
Link check (not displayed in the "Simple" mode) - when pressed, the device sends a special signal to the LoRaWAN network, in response to which the network informs it of the number of gateways that received this signal and the signal quality. This button only works when the device is connected to the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



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

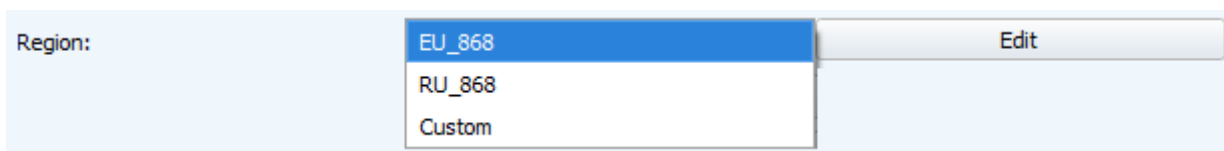
"LORAWAN SETTINGS" TAB

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



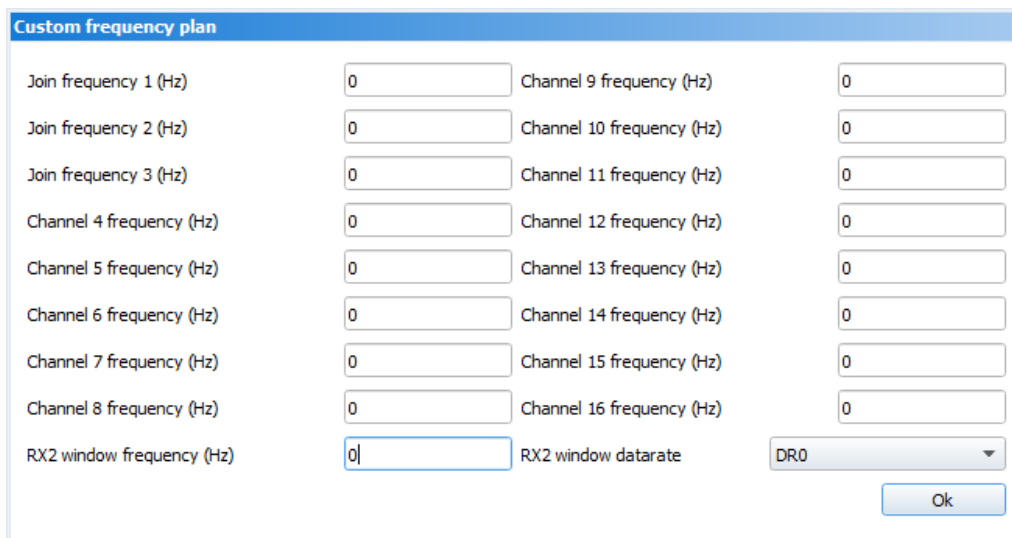
Region:	RU868	Edit
Activation type:	OTAA	
Confirmed uplinks:	Unconfirmed	
ADR:	Enabled	
RX1 offset:	1 second	
Join accept delay 1:	5 seconds	
Uplink number of transmission:	1 time	
TX power:	14 dBm	
TX datarate:	DR0 SF12 BW125	

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



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:



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

Ok

This frequency plan 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 plan will be considered empty

Activation type – displays ABP or OTAA device activation method.

Activation type:	<div>OTAA</div> <div>ABP</div>
------------------	--------------------------------

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:	<div>Confirmed</div> <div>Unconfirmed</div>
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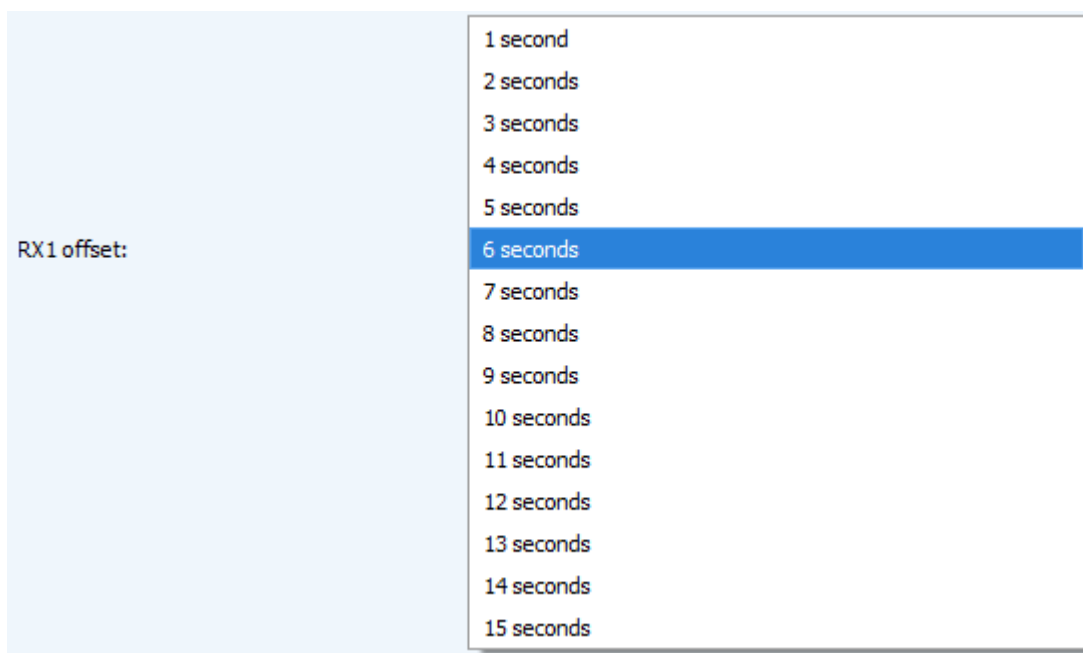


If you choose to send a packet without confirmation, the modem will not know whether the packet is delivered or not

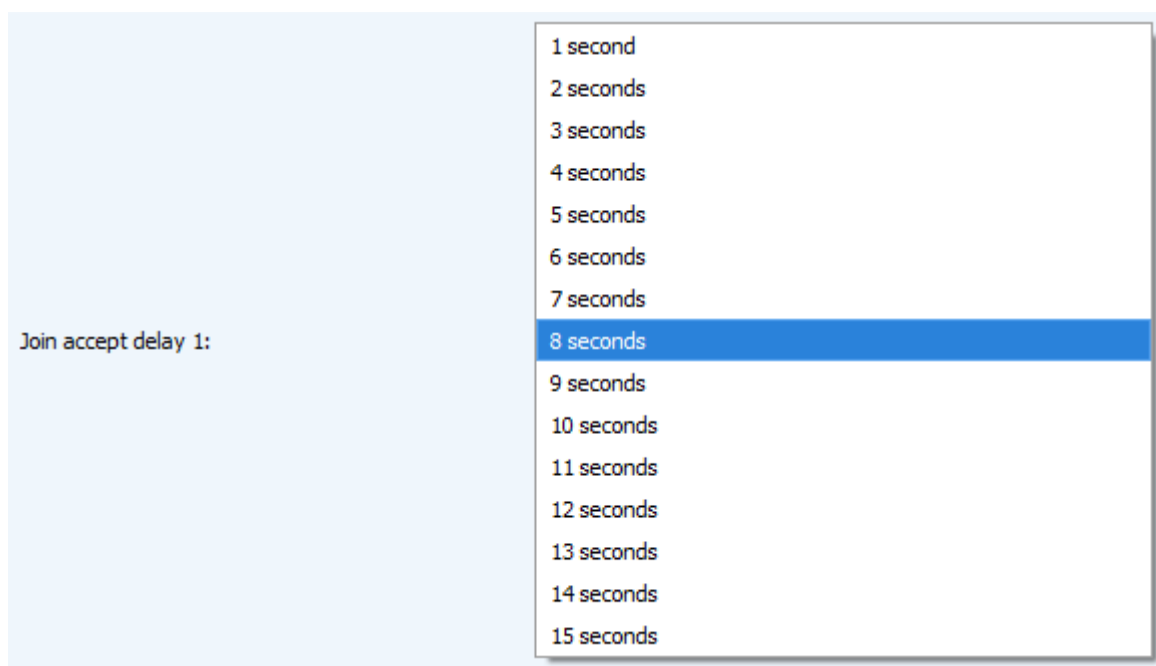
ADR – this option activates the Adaptive Data Rate algorithm for automatic control of the data transfer rate from the LoRaWAN network server side. The higher the quality of the signal received by the network, the higher the speed will be installed on the device. This option is recommended only on permanently installed devices.

ADR:	<div>Enabled</div> <div>Disabled</div>
------	--

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 while OTAA mode active. 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 option. 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 option.

Uplink number of transmission:	<div>1 time 2 times 3 times 4 times 5 times 6 times 7 times 8 times 9 times 10 times 11 times 12 times 13 times 14 times 15 times</div>
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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 power:	<div>2 dBm 5 dBm 8 dBm 11 dBm 14 dBm 20 dBm</div>
-----------	--

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.

TX datarate:	<div>DR0 SF12 BW125 DR1 SF11 BW125 DR2 SF10 BW125 DR3 SF9 BW125 DR4 SF8 BW125 DR5 SF7 BW125</div>
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"VEGA SI-22" TAB

The "Vega SI-22" tab contains the settings of the connected device.

 Device info
  LoRaWAN settings
  Vega SI-22

Language: English

Current state

Input 1 pulse count:	0
Input 2 pulse count:	21
Input 3 pulse count:	17
Input 4 pulse count:	13
Temperature:	27°C
Battery level:	97%

Input settings

Input 1 mode:	Guard
Input 2 mode:	Pulse
Input 3 mode:	Pulse
Input 4 mode:	Pulse
Temperature low threshold:	25
Temperature high threshold:	40

Guard settings

Input 1. Send alarm message on:	short
Input 2. Send alarm message on:	short
Input 3. Send alarm message on:	short
Input 4. Send alarm message on:	short

Data transmission settings

☐ Immediately send data when temperature is out of range

Collection period when temperature is out of range:	5 minutes
Collection period:	15 minutes
Transmission period:	30 minutes
Time zone:	UTC+07:00

Current state – displays the current parameters of the device - the number of counted pulses at the inputs, the external thermistor temperature, and the battery level.

To reset the pulse count at the inputs, 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 – allows setting up the current mode of inputs from pulse to guard 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 triggered. The maximum possible frequency of alarm packets generation is one per second. Here you can set the values of the high and low temperature thresholds.

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

Data transmission settings – a group of parameters that allows you to configure the collection and transmission periods, and the time zone for the internal clock of the counter will be set which.

If the measured temperature values go out the specified temperature range, the data transmission period remains unchanged, if the "Immediately send data when temperature is out of range" parameter is not active. If this parameter is active, then within two minutes after the temperature value goes out the specified range, a message with an alarm flag will be generated and transmitted. Each next generated message according to the data collection period will also be transmitted immediately until the temperature value returns into the specified range.

The readings are read from the connected device at 00.00 on the internal clock of the device if the data collection period is set to 24 hours, at 00.00 and at 12.00, if the period is 12 hours and so on. All readings are stored in the device memory until the next communication session. The data transfer period can be adjusted from 5 minutes to 24 hours. Data transfer is carried out by a random time at the selected period. At the next communication session, the device starts sending accumulated packets with readings, from the earliest to the latest.

With the "Confirmed uplinks" option turned on, the device will send the next packet only after receiving a confirmation of the delivery of the previous one. If such confirmation is not received after the fulfilled in the settings uplink number of transmissions, device completes the communication session until the next one according to the schedule. In this case, the device continues to collect data according to the data collection period and store it in memory. Non-transmitted packets remain in the device memory until the next communication session.

With the "Confirmed uplinks" option turned off, the device just sends all accumulated packets to the network in order from the earliest to the latest. There are no checks of package delivery in this mode. There are no non-transmitted messages in the device memory.

5 COMMUNICATION PROTOCOL – VERSION 2.0

This part describes the last version of the communication protocol for SI-22 data exchange with LoRaWAN network. You can see the device protocol version number in the “Configurator” application in the “Device info” tab.




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

VEGA SI-22 PULSE COUNTER TRANSMITS THE FOLLOWING TYPES OF PACKETS

1. Packet with current readings, sent regularly or by event on LoRaWAN port 2

Size in bytes	Field description	Data type
1 byte	Packet transmitting reason	uint8
1 byte	Battery charge, %	uint8
4 bytes	This packet time (unixtime UTC)	uint32
2 bytes	Temperature in °C multiplied by 10 (sign value)	int16
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	Input 3 reading (depending on the type – number of pulses or status: 0 – open, 1 - closed)	uint32
4 bytes	Input 4 reading (depending on the type – number of pulses or status: 0 – open, 1 - closed)	uint32
1 byte	Temperature is out of range («0» - NO, «1» - OUT OF RANGE)	uint8t
1 byte	Low temperature threshold (from -128 ° C to +127 ° C)	int8t
1 byte	High temperature threshold (from -128 ° C to +127 ° C)	int8t



If thermistor is not connected to the pulse counter (contacts «Therm» and «»), in the «Temperature» field will be sent an -1000 °C value for breakage or fault indication
 When thermistor has a short circuit, in the “Temperature” field the value - 1270 °C will transmit

The counter has internal clock and calendar; time and date on which are preset on the factory and it may be corrected during exploitation. Forming of packets with the current readings is going on for the time moments, which is multiple to the set data collection period:

- 1 hour period: the readings of the beginning of the current hour are sent;
- 6 hours period: 00:00, 06:00, 12:00, 18:00 readings are sent;
- 12 hours period: 00:00, 12:00 readings are sent;
- 24 hours period: the readings of 00:00 of the current day are sent.

" Packet transmitting reason " bit field decoding

Size in bytes	Field description
0	Transmitting by the schedule
1	Input 1 triggered
2	Input 2 triggered
3	Input 3 triggered
4	Input 4 triggered
5	Temperature went out of range

Time zone considered during collection data from an external meter.

2. 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.

3. Settings packet – transmitting on LoRaWAN port 3 when settings request command was received, or device was connected to the network

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-22 PULSE COUNTER 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 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.

3. 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
12	Input 1 mode	1 byte	1 – pulse 2 – guard
13	Input 2 mode	1 byte	1 – pulse 2 – guard
14	Input 3 mode	1 byte	1 – pulse 2 – guard
15	Input 4 mode	1 byte	1 – pulse 2 – guard

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
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
78	Data collection period when temperature is out of the thresholds	1 byte	1 – 1 hour 2 – 6 hours 3 – 12 hours 4 – 24 hours 5 – 5 minutes 6 – 15 minutes 7 – 30 minutes
79	Immediately send data when temperature is out of range	1 byte	0 – OFF 1 – ON
80	Low temperature threshold	1 byte	from -128 to +127
81	High temperature threshold	1 byte	from -128 to +127

6 STORAGE AND TRANSPORTATION REQUIREMENTS

Vega SI-22 pulse counter shall be stored in the original packaging in heated room at temperatures $+5^{\circ}\text{C}$ to $+40^{\circ}\text{C}$ and relative humidity less than 85%.

The counter shall be transported in covered freight compartments of all types at any distance at temperatures -40°C to $+85^{\circ}\text{C}$.

7 CONTENT OF THE PACKAGE

The pulse counter is delivered complete with:

Vega SI-22 pulse counter – 1 pc.

LoRaWAN antenna – 1 pc.

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

Warranty does not apply to:

- power supplies of devices sending more than 80,000 packets,
- 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.



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