

LORAWAN CONVERTER

VEGA TP-11

User Manual

Vega TP-11 converter is used for reading of values from metering instruments via 4-20 mA current loop interface and further transmitting of this data to the LoRaWAN network.

Vega TP-11 has also two security inputs and two 'open drain' outputs.

Document Information

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03	26.10.2017	KEV	External devices connection was added
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07	04.02.2019	KEV	Changes in specification , in communication protocol , in device operation logic , in warranty , " Marking " and " Indication " parts added

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INTRODUCTION

This manual is designated for Vega TP-11 device (hereinafter – device, converter) manufactured by Vega-Absolute LLC and provides information on powering and activation procedure, control commands and functions of the device.

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



The device shall be installed and adjusted by qualified specialists in order to ensure proper operation of the device

1 DESCRIPTION AND OPERATION

DEVICE DESCRIPTION

The device Vega TP-11 is designed for reading of values from devices via 4-20 mA current loop interface and further accumulating and transmitting of this data to the LoRaWAN network.

Converter can be used for any sensors and industrial equipment with 4-20 mA interface, temperature sensors, waste sensors, pressure sensors.

The converter is powered by a 6400 mAh built-in battery with service life up to 10 years, provided data transmitted once a day. The converter can be powered by the 10...36 V external power supply.



There is a function of current value range control in the device while external power supplying. During device setting via "Vega LoRaWAN Configurator" application, you may set allowed current value low and high thresholds. When current value measurements are out of specified current value range then extraordinary communication session appears. Data collection periods when measurements in current value range and out are set independently.

Converter is an autonomic device and provides connected sensors with 24 V power via 4-20 mA interface.

Vega TP-11 has two 'open-drain' outputs so it can be used as a control device. Also device has two security inputs.

COMUNICATION AND DATA COLLECTION ALGORITHM

The readings collecting from an external device 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.

Data collection period when measurements are out of specified current value range set independently and may be equal from 5 minutes to 24 hours.

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.

When measurements are out of specified current value range the communication period still the same if parameter "Immediately send data when current is out of range" is not active.

If that parameter is active and external power supplying then the alarm message will forming and sending during 2 minutes after the moment of current value measurements are out of specified range. If external power not supplying then the converter will detect exceeding the specified limits during the following data collection session according the schedule only but the modem will send that data immediately too. Every following message, which will form according to the data collection period, also will have sent immediately until the current value measurements are back in 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 have not received after the fulfilled in the settings uplink number of transmission, 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 TP-11 converter can be either of class A or class C (LoRaWAN classification) and has the following features:

- Automatic change from A class to C class when powered from an external power supply
- ADR support (Adaptive Data Rate)
- Sending of confirmed packets (configurable)
- Extra communication in case of security inputs actuation
- Extra communication in case of current value measurements are out of specified range
- Temperature measurement by the internal temperature sensor

- Charge measuring of the built-in battery (%)
- Ability to configure security input triggering on short, open or both of this cases
- Ability to set different data collection period for case of current value measurements are out of specified range
- Immediately data sending at moment of message forming for case of current value measurements are out of specified range

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

Current loop 4-20 mA interface	1
Security inputs	2
'Open-drain' outputs	2
USB-port	mini-USB, type B
Operating temperatures	-40...+85 °C

LoRaWAN

AppEui by default	3032676174703131
LoRaWAN class	A or C
Quantity of LoRa channels	16
Frequency band	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
Antenna connector	SMA
Sensitivity	-138 dBm
Radio coverage in restrained urban conditions	max 5 km
Radio coverage within line of sight	max 15 km
Transmitter power by default	25 mW (configurable)
Maximum transmitter power	100 mW

Power

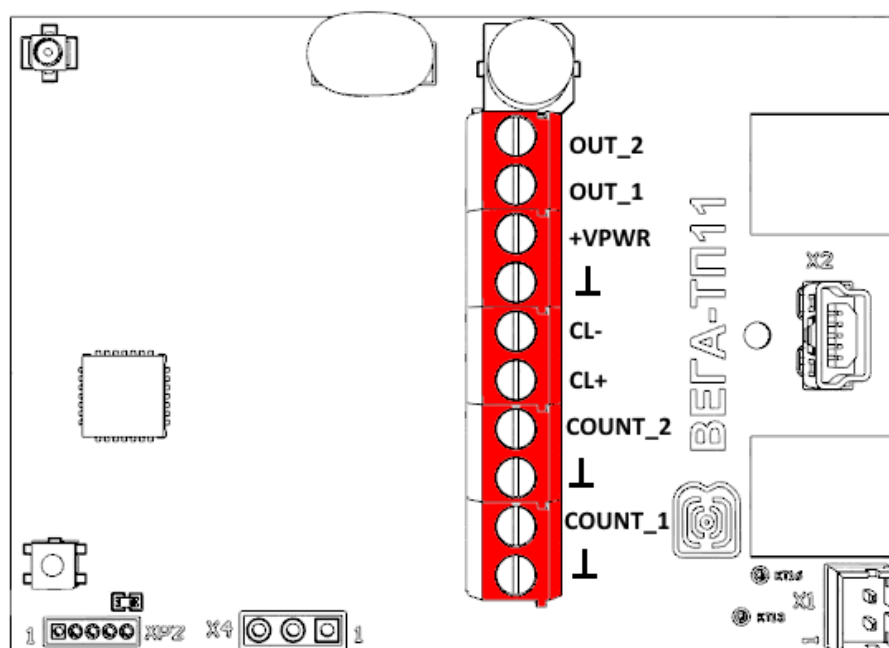
Built-in battery	6400 mAh
External power supply	10...36 V
Accuracy of current measurement	±1.2 %
4-20 mA interface power supply	24 V
Warranty number of packets sent by the device, not less	20 000

Case

Housing dimensions	95 x 80 x 65 mm
Ingress protection rating	IP65
Mounting	clamp fastening to the support, DIN-rail, wall-mounting

3 OPERATION

CONTACTS



Converter has 10 contacts, see table below:

Contact	Designation on the board	Description
1	OUT_2	Open-drain output 2
2	OUT_1	Open-drain output 1
3	+VPWR	Power "+"
4	⌴	Power "-"
5	CL-	4-20 mA "-"
6	CL+	4-20 mA "+"
7	COUNT_2	Security input 2
8	⌴	Ground
9	COUNT_1	Security input 1
10	⌴	Ground

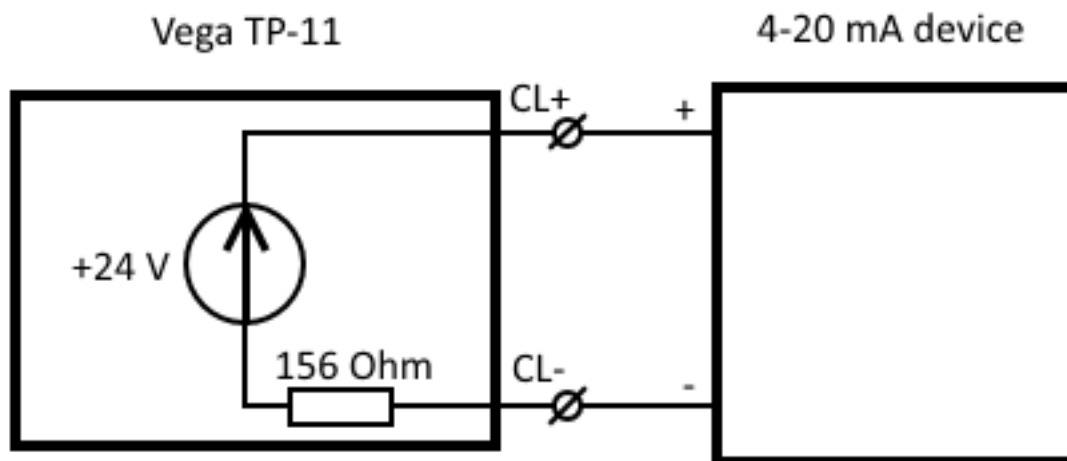
Ground contacts 8 and 10 are used for connection of security inputs COUNT_1 and COUNT_2.

Security inputs of the device are used to connect circuits with the following types of NO contacts:

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

While security input connected the device monitors its state change (closure/unlocking or both of it – depend on the settings). Should the security input triggering, the device is activated and sends an alarm message to the network.

For connect an external sensor contacts CL+ и CL- are used. Connection scheme see on the picture below.

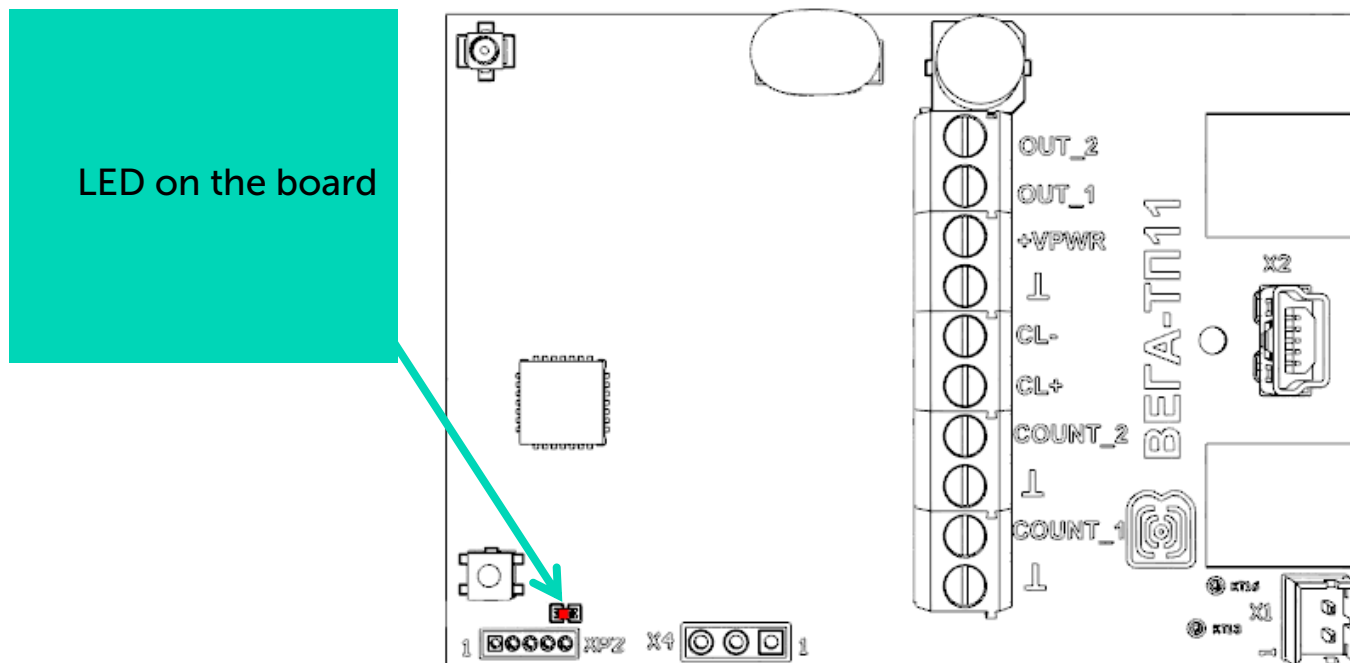


In order to save the battery life of the converter, the 24 V supply voltage is not continuously supplied. The 24 V voltage is applied to the 4-20 mA device a few seconds before the polling is performed so that the sensor can turn on and set the current corresponding to the measured parameter. This time, the so-called "startup time", is a configurable parameter from the configurator and can be set from 1 to 60 seconds.

The outputs OUT_1 and OUT_2 operate on the principle of open-drain and can be used to control external devices, such as electric cranes, lighting, sirens and so on. The load capacity of each output is no more than 200 mA.

INDICATION

There is a 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

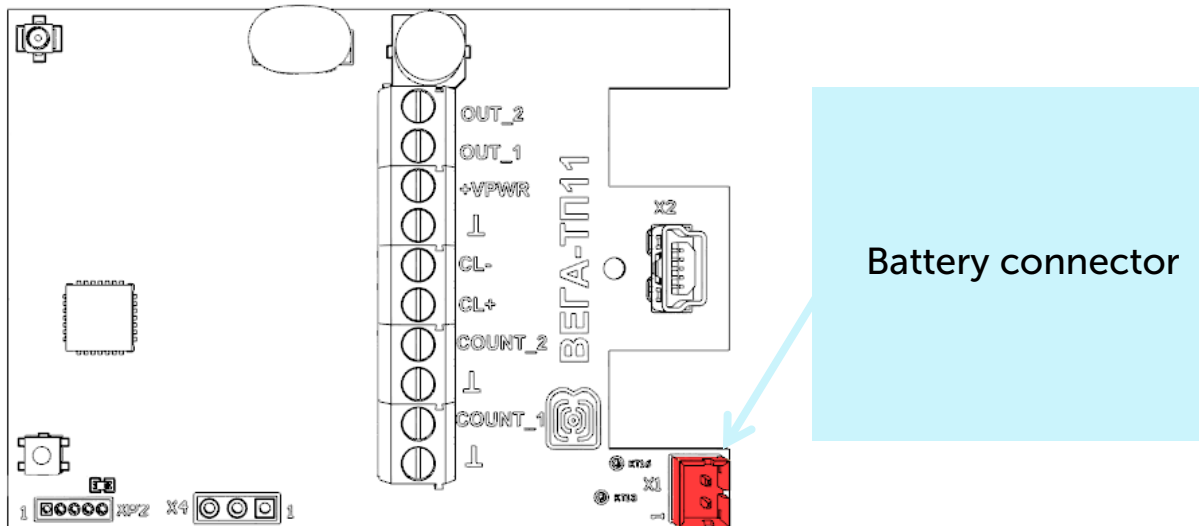
Linking to the network is unsuccessful or the device switched to the «Storage» mode



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

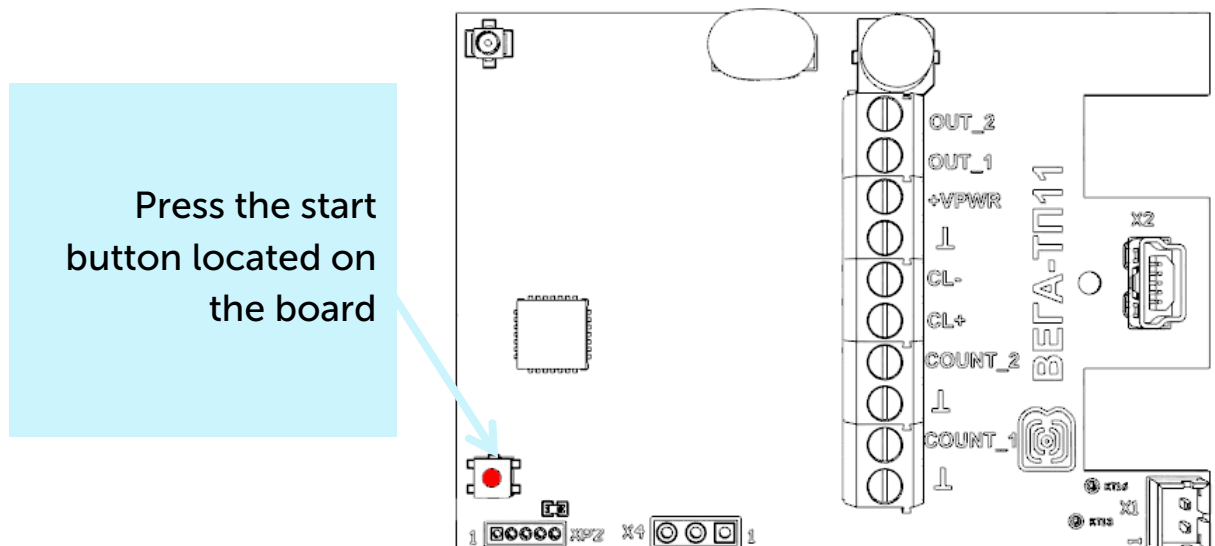
INITIAL STARTUP

Vega TP-11 can be powered from either an external power source or built-in battery. To operate from the built-in battery, you must connect the battery connector to the power connector on the board.



The converter 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 5 seconds) and switches to the "Active" mode. If all attempts fail, the converter became to the "Storage" mode.

To transfer the device from the "Active" mode to the "Storage" mode, you can use the long press of the start button (more than 5 seconds).



Before connecting the device to the network, make sure that its registration data is entered in the network - Device EUI, Application EUI and Application Key for OTAA, or Device address, Application session key and Network session key for ABP

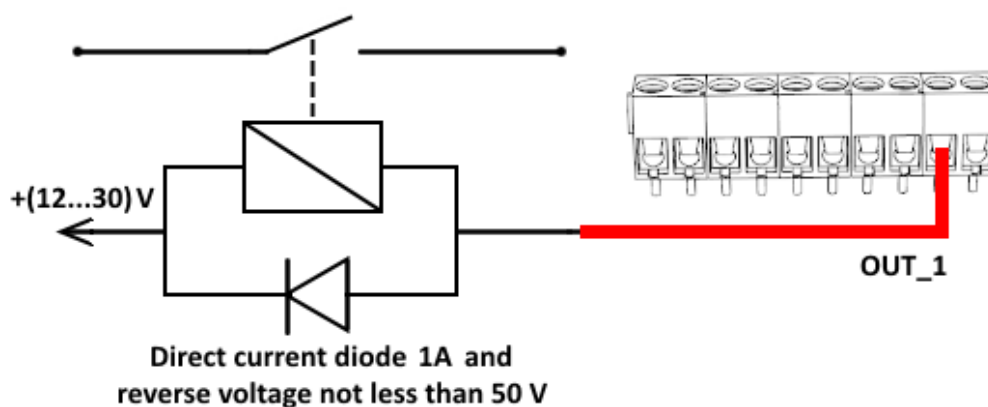
EXTERNAL DEVICES CONNECTION

The actuators are connected to the converter via outputs OUT_1 and OUT_2, which are of the open-drain type.



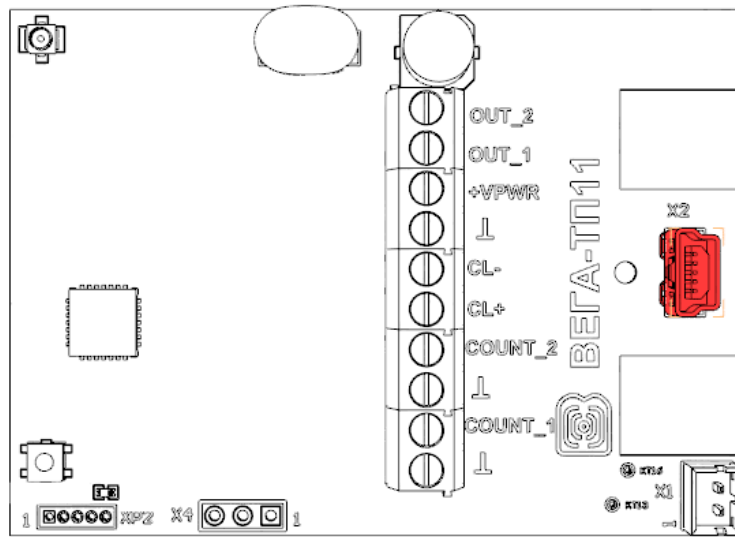
Permissible load for each digital output is 200 mA

To increase the load on the device outputs, it is necessary to use an external relay. The relay connection scheme is shown below.

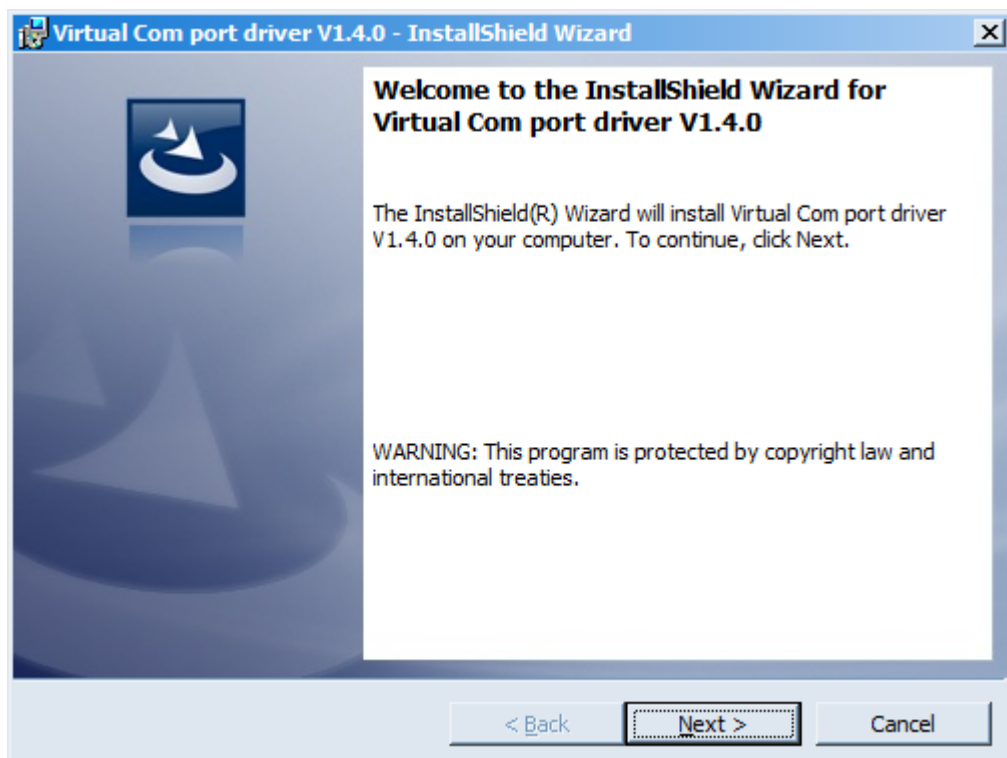


CONNECTING VIA USB

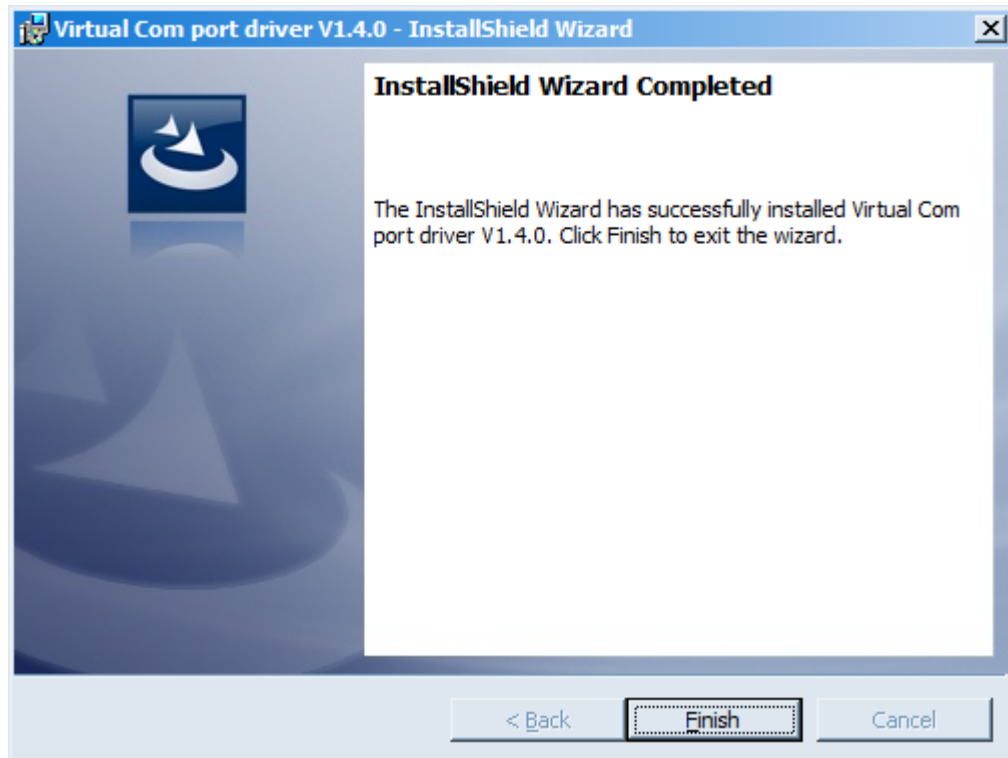
Vega TP-11 adjusted with the "Vega LoRaWAN Configurator" application (See part 4).



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. 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 converter via USB.

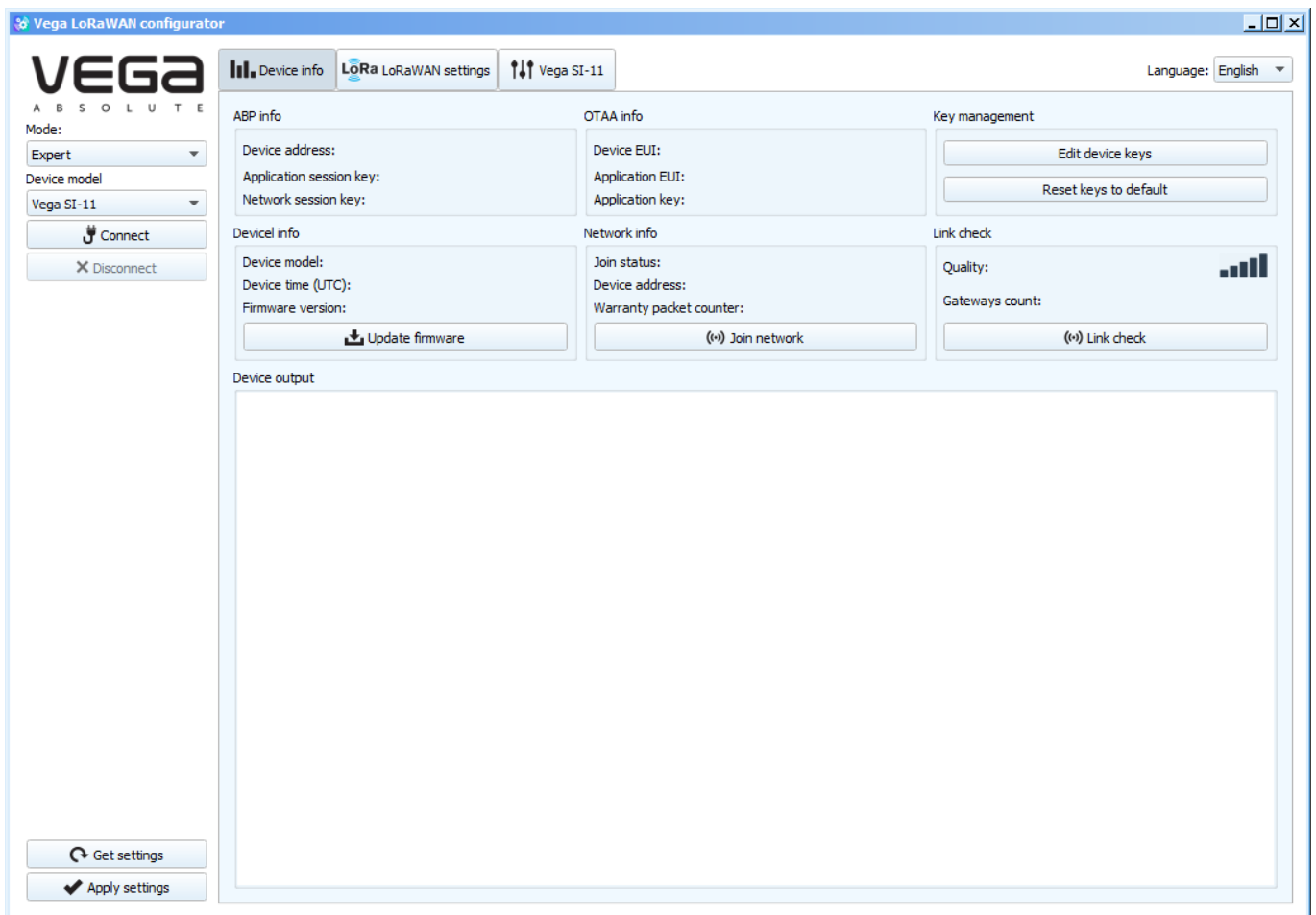
4 VEGA LORAWAN CONFIGURATOR

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 menu on the left allows you to switch between the "Simple" and "Expert" modes, select the device model, connect to the device or disconnect from it, get and apply settings.

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

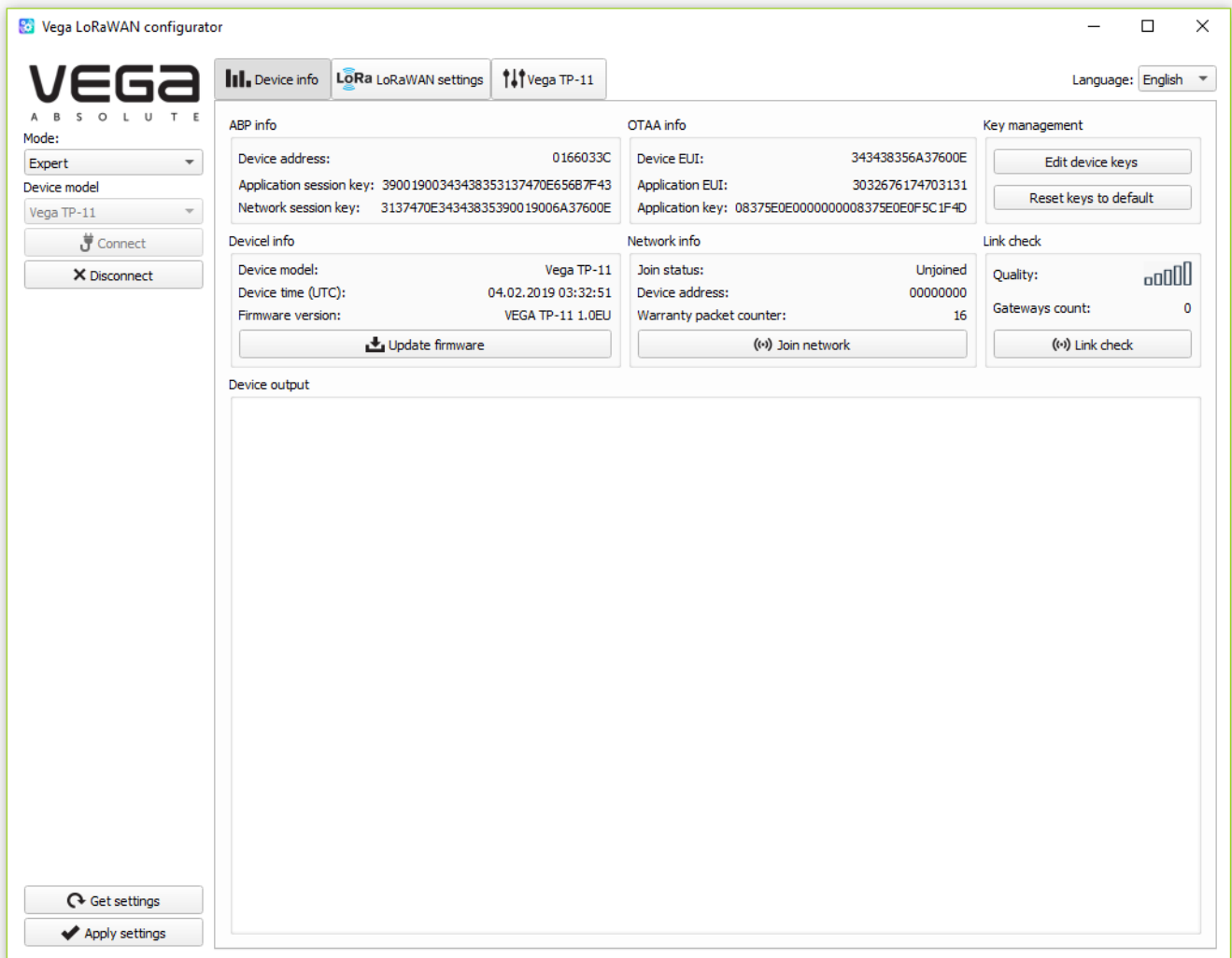
The language selection menu is in the upper right corner.

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 current status, and also the data needed to register the device in the LoRaWAN network.

The screenshot shows the 'Device info' tab of the Vega TP-11 configurator. The interface includes a top navigation bar with tabs for 'Device info', 'LoRa LoRaWAN settings', and 'Vega TP-11'. A language dropdown is set to 'English'. The main content area is divided into several sections:

- ABP info:** Displays Device address (0166033C), Application session key (39001900343438353137470E656B7F43), and Network session key (3137470E34343835390019006A37600E).
- OTAA info:** Displays Device EUI (343438356A37600E), Application EUI (3032676174703131), and Application key (08375E0E0000000008375E0F5C1F4D).
- Key management:** Includes buttons for 'Edit device keys' and 'Reset keys to default'.
- Device info:** Displays Device model (Vega TP-11), Device time (UTC) (04.02.2019 03:32:51), and Firmware version (VEGA TP-11 1.0EU). It includes an 'Update firmware' button.
- Network info:** Displays Join status (Unjoined), Device address (00000000), and Warranty packet counter (16). It includes a 'Join network' button.
- Link check:** Displays Quality (represented by a signal strength icon) and Gateways count (0). It includes a 'Link check' button.
- Device output:** A large empty text area for logs or output.

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.

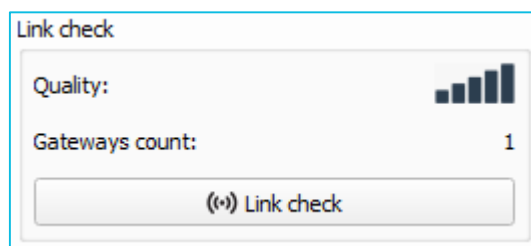
Device info - the configurator reads information about the device model, its firmware and automatically corrects the device's time when connected to it.

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.

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 occurs.

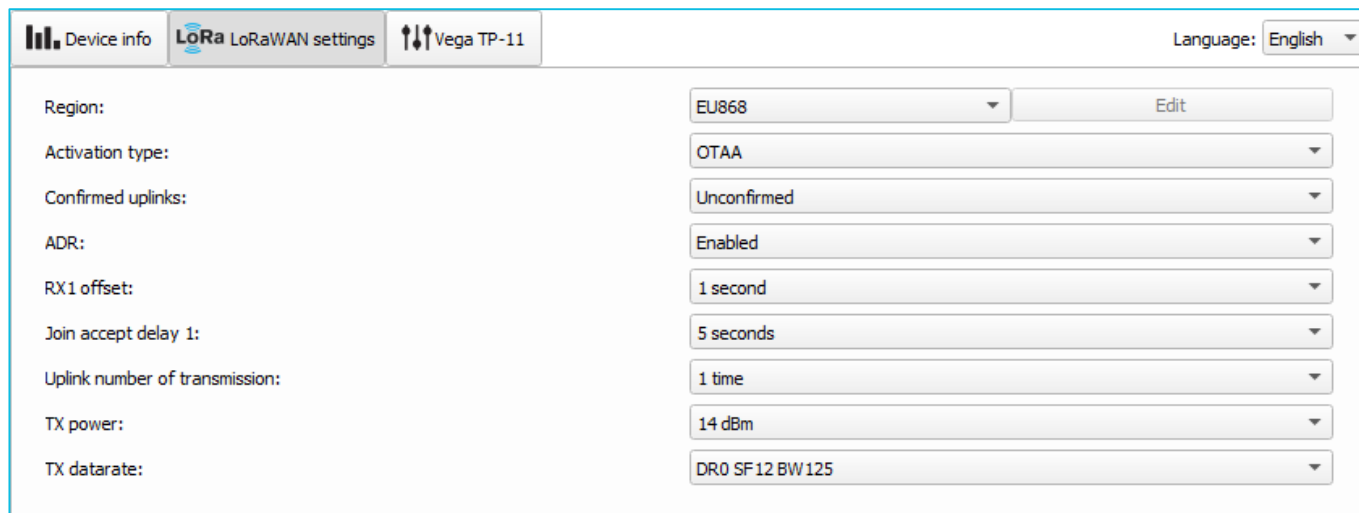
Link check (not displayed in the "Simple" mode) - when pressed, the device sends a special signal to the LoRaWAN network, in response to which the network informs it of the number of gateways that received this signal and the signal quality. This button only works when the device is connected to the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



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

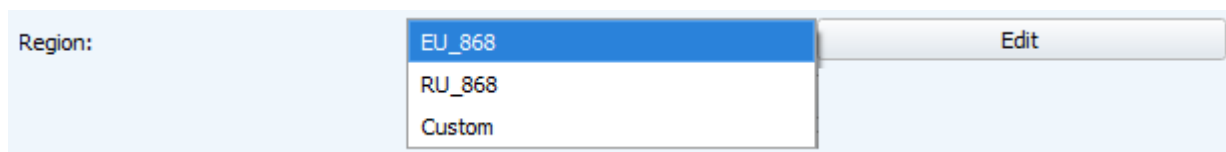
"LORAWAN SETTINGS" TAB

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



Parameter	Value	Action
Region:	EU868	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.



Region	Action
EU_868	Edit
RU_868	
Custom	

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 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:	☐ OTAA ☐ 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:	☐ Confirmed ☐ Unconfirmed
--------------------	--

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:	☐ Enabled ☐ Disabled
------	---

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.

RX1 offset:

- 1 second
- 2 seconds
- 3 seconds
- 4 seconds
- 5 seconds
- 6 seconds**
- 7 seconds
- 8 seconds
- 9 seconds
- 10 seconds
- 11 seconds
- 12 seconds
- 13 seconds
- 14 seconds
- 15 seconds

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.

Join accept delay 1:

- 1 second
- 2 seconds
- 3 seconds
- 4 seconds
- 5 seconds
- 6 seconds
- 7 seconds
- 8 seconds**
- 9 seconds
- 10 seconds
- 11 seconds
- 12 seconds
- 13 seconds
- 14 seconds
- 15 seconds

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:	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

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:	2 dBm
	5 dBm
	8 dBm
	11 dBm
	14 dBm
	20 dBm

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:	DR0 SF12 BW125
	DR1 SF11 BW125
	DR2 SF10 BW125
	DR3 SF9 BW125
	DR4 SF8 BW125
	DR5 SF7 BW125

«VEGA TP-11» TAB

The “Vega TP-11” tab contains the settings of the connected device.

The screenshot displays the 'Vega TP-11' settings tab. At the top, there are three tabs: 'Device info', 'LoRa LoRaWAN settings', and 'Vega TP-11' (which is selected). A language dropdown menu is set to 'English'. The interface is divided into four main sections:

- Current state:** A table showing real-time data:

Temperature:	21
Battery level:	100
Current LoRaWAN class:	CLASS A
- Guard settings:** Configuration for alarm triggers.
 - Input 1. Send alarm message on: short
 - Input 2. Send alarm message on: short and open
 - Current low threshold, mA * 100: 200
 - Current high threshold, mA * 100: 2500
- Data transmission settings:**
 - ☐ Immediately send data when current is out of range
 - Transmission period: 24 hours
 - Collection period: 6 hours
 - Collection period when current is out of range: 30 minutes
 - Time zone: UTC +00:00
- External sensor settings:**
 - Sensor startup time, sec: 5

Current state – displays the current parameters of the device - the internal temperature of the device, the battery level and the current LoRaWAN class.

Guard settings – allows to setting security inputs. Alarm message can be sent by the short or open security circuit or in both of these cases.

“Current low threshold” and “Current high threshold” parameters allow setting current value range, when the measurements are out of which the device will switch in alarm mode. Data collection period may be setting independently for that mode in a group of parameters “Data transmission settings”.

Current threshold set in mA multiplied by 100. In picture above, you can see the low threshold value is 200 and high – 2500. It means the low threshold of current value is 2 mA and high is 25 mA.

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 device will be set which.

When measurements are out of specified current value range the communication period still the same if parameter "Immediately send data when current is out of range" is not active.

If that parameter is active and external power supplying then the alarm message will forming and sending during 2 minutes after the moment of current value measurements are out of specified range. If external power not supplying then the converter will detect exceeding the specified limits during the following data collection session according the schedule only but the modem will send that data immediately too. Every following message, which will form according to the data collection period, also will have sent immediately until the current value measurements are back in 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 have not received after the fulfilled in the settings uplink number of transmission, 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.

Data collection period when measurements are out of specified current value range set independently and may be equal from 5 minutes to 24 hours.

External sensor settings – allows to set the startup time for external sensor supply. Startup time value can be varying from 1 to 60 seconds.

5 COMMUNICATION PROTOCOL

This part describes the TP-11 data exchange protocol with LoRaWAN network.



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

CONVERTER TP-11 TRANSMITS THE FOLLOWING TYPES OF PACKETS

1. Packet with current readings from connected heat meter, sent regularly or by the request or by the one of "Reason of sending message" field events

Size in bytes	Field description	Data type
1 byte	Packet type, this packet == 1	uint8
1 byte	Battery level, %	uint8
1 байт	Превышение лимитов («0» – нет превышения, «1» - есть)	uint8
4 байт	Время снятия показаний, передаваемых в данном пакете (unixtime UTC)	uint32
1 byte	Current device temperature	uint8
2 байт	Current low threshold (mA*100)	uint16
2 байт	Current high threshold (mA*100)	uint16
1 byte	Reason of sending message	uint8
1 byte	TP-11 inputs/outputs state	uint8
2 bytes	Measurement current of connected sensor (mA*100)	uint16

"Reason of sending message" field codes

Code	Value
0x00	Sending packet by the time
0x01	By the security input 1 triggering
0x02	By the security input 2 triggering
0x03	External power state was change
0x04	Измеряемый параметр вышел за пределы установленные лимитами
0x05	Передача по запросу

"Inputs/outputs state" bit field decoding

Bits	Field description
0 bit	Power (0 – battery, 1 – external)
1 bit	Security input 1 (0 - unclosed, 1 – closed)
2 bit	Security input 2 (0 - unclosed, 1 – closed)
3 bit	Output 1 (0 – off, 1 – on)
4 bit	Output 2 (0 – off, 1 – on)
5 bit	reserve (always 0)
6 bit	reserve (always 0)
7 bit	reserve (always 0)

2. Packet with data about state changes of the outputs OUT_1 or OUT_2

Size in bytes	Field description
1 byte	Packet type, this packet == 5
1 byte	Battery charge, %
1 byte	Output number (1 или 2)
1 byte	Output state (0 - off, 1 - on)

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

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

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

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

Size in bytes	Field description	Data type
1 byte	Packet type, this packet == 0	
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	-----

CONVERTER TP-11 RECEIVES PACKETS OF THE FOLLOWING TYPES

1. Query of readings log send by application on LoRaWAN port 2

Size in bytes	Field description
1 byte	Packet type, this packet == 2

Upon receiving this package, the converter will perform an extraordinary polling of connected sensor and send packet with current state.

2. Output on command send by application on LoRaWAN port 2

Size in bytes	Field description
1 byte	Packet type, this packet == 3
1 byte	Output no. (1 - 2)
1 byte	Output on time in seconds (1...255), (0 – forever on).

Upon receiving this package TP-11 will close the correspond output and transmits the packet with current readings.

3. Output off command send by application on LoRaWAN port 2

Size in bytes	Field description
1 byte	Packet type, this packet == 5
1 byte	Output no. (1 - 2)

Upon receiving this package TP-11 will uncloze the correspond output and transmits the packet with current readings.

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

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

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

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

Answering that packet the device sent the packet with settings.

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

Size in bytes	Field description	Data type
1 byte	Packet type, this packet == 0	
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 TP-11 parameters and these possible values

ID of parameter	Description	Data length	Possible values
4	Confirmed uplinks	1 byte	1 – confirmed 2 – unconfirmed
5	Adaptive data rate	1 byte	1 – on 2 – off
8	Uplinks number of transmission	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
38	Guard input 1, Send alarm message	1 byte	1 – on short 2 – on open 3 – short and open
39	Guard input 2, Send alarm message	1 byte	1 – on short 2 – on open 3 – short and open
48	Sensor startup time	1 byte	From 1 to 255
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
85	Current low threshold, in mA*100	2 bytes	from 200 to 2500
86	Current high threshold, in mA*100	2 bytes	from 200 to 2500

6 STORAGE AND TRANSPORTATION REQUIREMENTS

Vega TP-11 shall be stored in the original packaging in heated room at temperatures +5°C to +40°C and relative humidity less than 85%.

The converter 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

Vega TP-11 device is delivered complete with:

Converter Vega TP-11 – 1 pc.

Antenna LoRa – 1 pc.

Screw 3x16 – 6 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:

- power supplies of devices sending more than 20,000 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.

