LORAWAN® DEVICE

VEGA SI-13

USER MANUAL

DOCUMENT REVISION	FIRMWARE VERSION
17	2.0b

CONTENTS

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.

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 DEVICE PURPOSE AND OPERATION PRINCIPAL

DEVICE PURPOSE

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 in the LoRaWAN® network.

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 poll meters by itself.

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

Equipment with NAMUR pulse output is not supported

OPERATION ALGORITHM

Vega SI-13 operates in modes listed below:

"Storage" – is a mode for storing and transporting. In this mode the device does not communicate regularly with the network.

"Active" – is a main mode of device operation.

Vega SI-13 supports two activation methods in the LoRaWAN® network - ABP and OTAA. Select one of the methods via the "Vega LoRaWAN Configurator" application (see "User Manual" on the program).

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

OTAA method. 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 5 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 (more than 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

The device forms the data packet with current state with a configurable period from 5 minutes to 24 hours. The packets stored in the device memory and transmitting during the next communication session with the LoRaWAN® network.

Examples

If the data collection period is set to 24 hours, the packet is formed at 00.00 on the internal clock of the device.

If the data collection period is 12 hours, then at 00.00 and at 12.00, and so on.

The adjustable data transfer period can be from 5 minutes to 24 hours. When beginning of communication session, the device starts sending packets with readings from the earliest packet. The time of data transmitting cannot be specified, it's defined in random way for every device in chosen period of transmission from the moment of connection to the network.

Example

Transmission period is 30 minutes, and device was started at 16:40 by the internal device clock. In random way the device calculates data transmitting time and set it at 16:41 in the half-hour period from 16:40 to 17:10. Thus, packets from this device will transmit at 16:41, at 17:11, at 17:41, at 18:11 and so on every 30 minutes by the internal device clock.

The internal clock is set automatically when you connect to the device via USB, also can be adjust via LoRaWAN® network.

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 via the ModBus RTU protocol
- 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 following information:

- Device model;
- DevEUI;
- Month and year of manufacture;
- Certification marks.

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 device activation keys in the LoRaWAN® network, production date and other identifiers.

2 SPECIFICATION

DEVICE 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	mini-USB, type B
Operating temperatures	-40...+85 °C
Built-in temperature sensor	yes
LORAWAN®	
LoRaWAN® class	C
Quantity of LoRa channels	16
Frequency plans supported by default	RU868, EU868, KZ865, custom (EU868 based)
Frequency plans available as order option	IN865, AS923, AU915, KR920, US915
Activation type	ABP or OTAA
Communication period	5, 15, 30 minutes, 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)
POWER	
External power supply	8...36 V
CASE	
Device dimensions, no more than	90 x 49 x 46 mm
Ingress protection rating	IP65
Mounting	Clamp fastening to the support, DIN-rail, wall-mounting
PACKAGE	
Dimensions	95 x 50 x 46 mm
Weight	0.071 kg

DEFAULT DEVICE SETTINGS

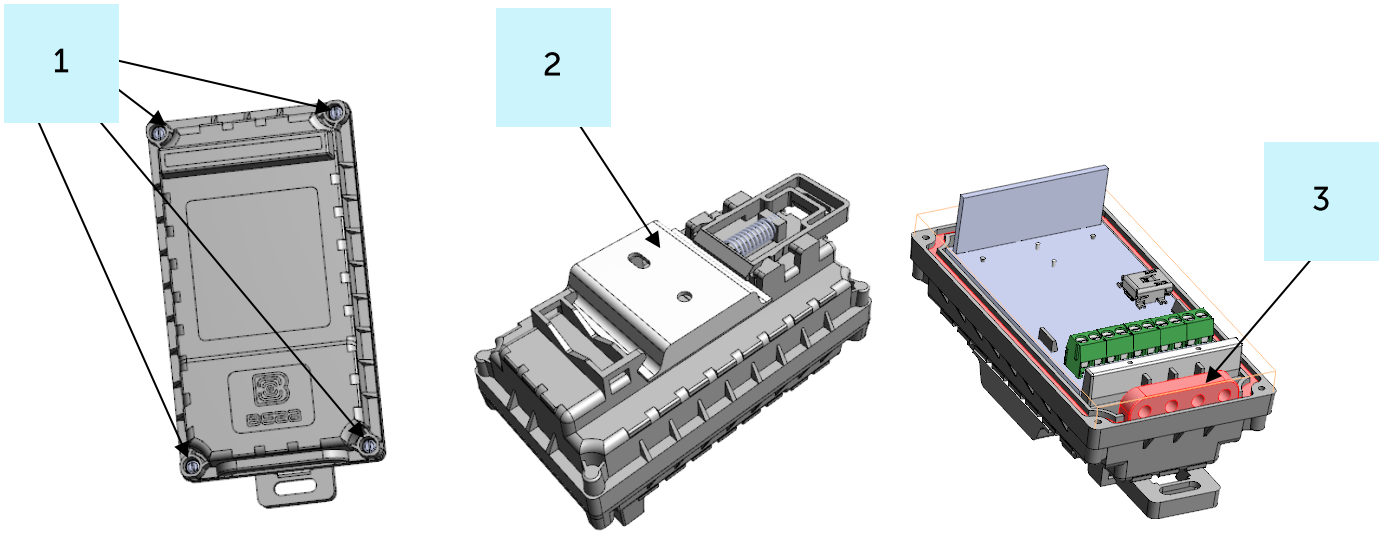
PARAMETER	VALUE
Frequency plan	RU868
Activation type	OTAA
Adaptive Data Rate (ADR)	ON
Confirmed Uplinks	OFF
Rx 1 Delay	1 second
Join Accept Delay	5 seconds
Uplink number of transmissions	1
Data rate	DR0
Power	14 dBm
Communication period	24 hours
Collecting data period	24 hours
Time zone	UTC +00:00
Inputs operate in mode	pulse

For changing the device settings, you need to connect to it with “Vega LoRaWAN Configurator” application. You can download app on the iotvega.com site in SOFT section as well as User Manual for configurator. Go to the app page.

3 OPERATION

DEVICE APPEARANCE

Vega SI-13 is represented in small plastic case which has four screws and mounting for DIN-rail.

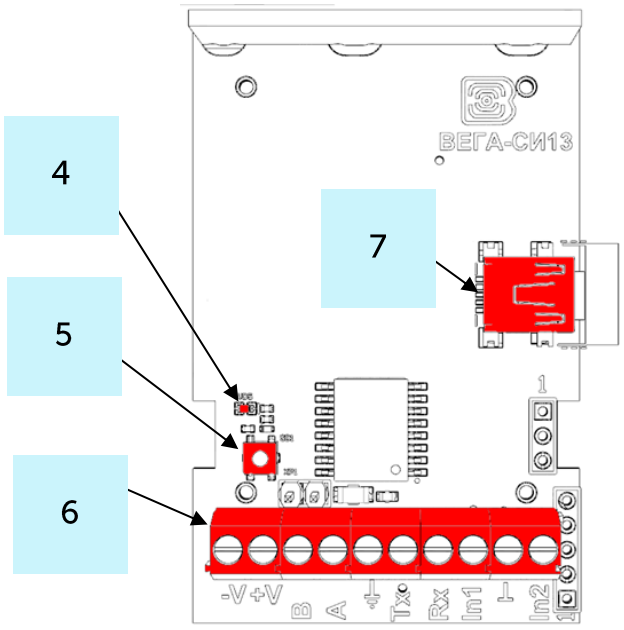


1 – screw ø 2 mm x 8 mm, cross

2 – DIN-rail with mounting holes ø 3 mm

3 – silicone gasket without through holes, ensuring the protection rating of the device case IP65.

All of elements for manage and indication as well as connecting contacts are placed on the board inside the case.



4 – LED indicator

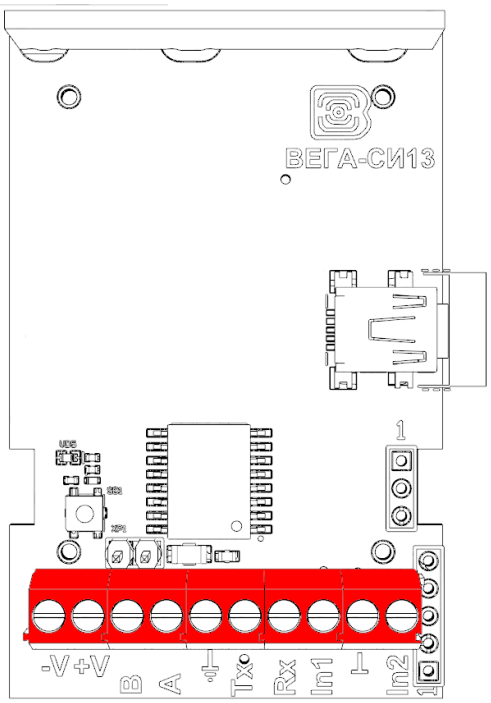
5 – launch button

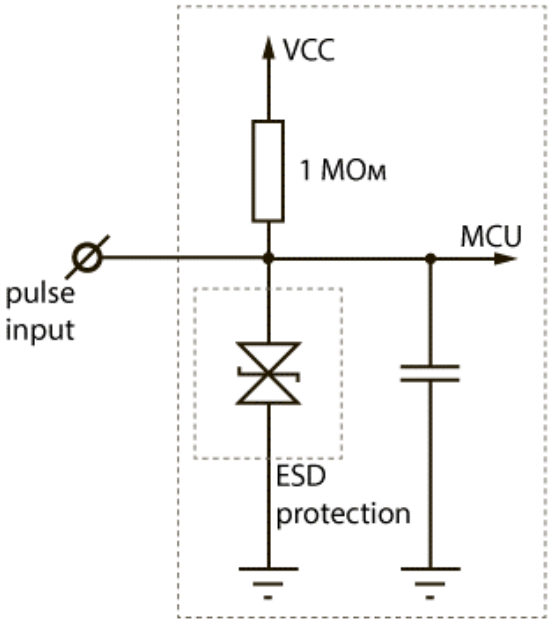
6 – contacts

7 – USB-port

CONTACTS DESCRIPTION

When connecting a radio 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.

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 pulse counter has 2 pairs of contacts that is allows to connect circuits with the following types of NO contacts:

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

Equipment with NAMUR pulse output is not supported

Polarity effects only "open collector" circuits.

To reset all readings from the pulse inputs accumulated in the device memory you need to switch the device to the "Storage" mode by holding the start button pressed (min. 5 seconds).

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.

The maximum possible frequency of sending alarm packets is one per 1 second.

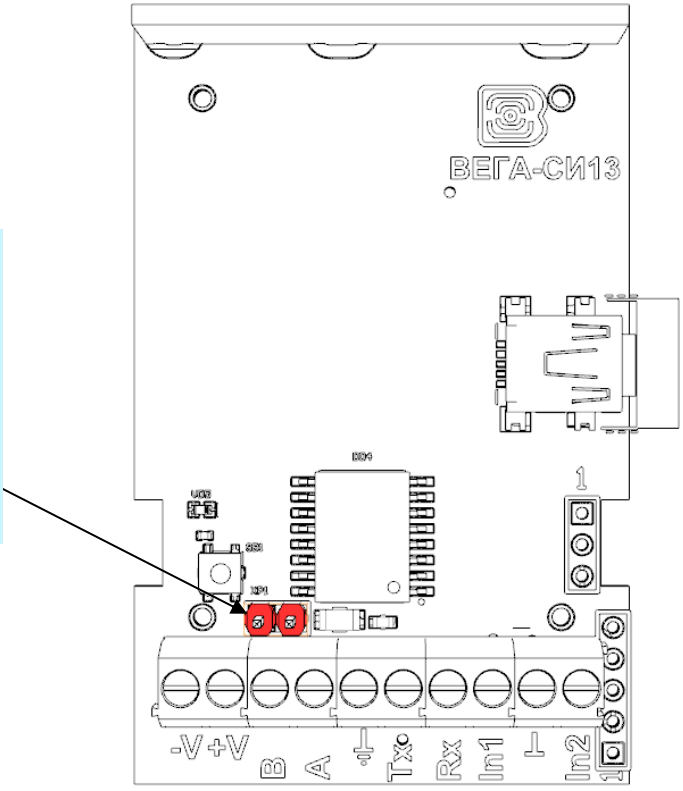
CONNECTION OF TERMINATOR

Terminator installed on the board is a resistor with nominal of 120 Ohm which is inactive by default.

For resistor activation you need to install a jumper at the XP1 connector on the board.

Terminator is used for defense from distortion in long transmission lines RS-485, therefore it must be activated when line is longer than 100 meters.

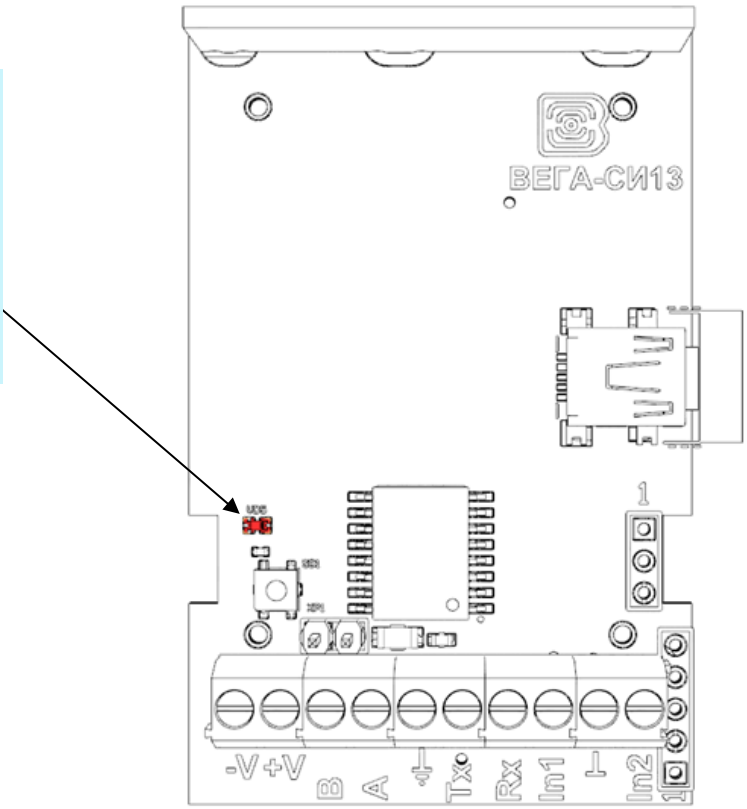
Location of XP1 connector on the board



LED INDICATIONS

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

LED location on the board



LED SIGNAL		MEANING
	Short flashings	Linking to the network in progress
	One long flashing during 5 sec	The device has been successfully connected to the network and is in active mode
	Three flashings each by 1 sec	Linking to the network has been failed 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

MOUNTING RECOMENDATIONS

To provide the stable radio between the gateway and the end device is recommended 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.

Before starting mounting work, you must make sure that the latest firmware version is installed on the equipment

For mounting you will need:

- cross-shaped screwdriver ⊕;
- awl;
- wire stripper;
- laptop.

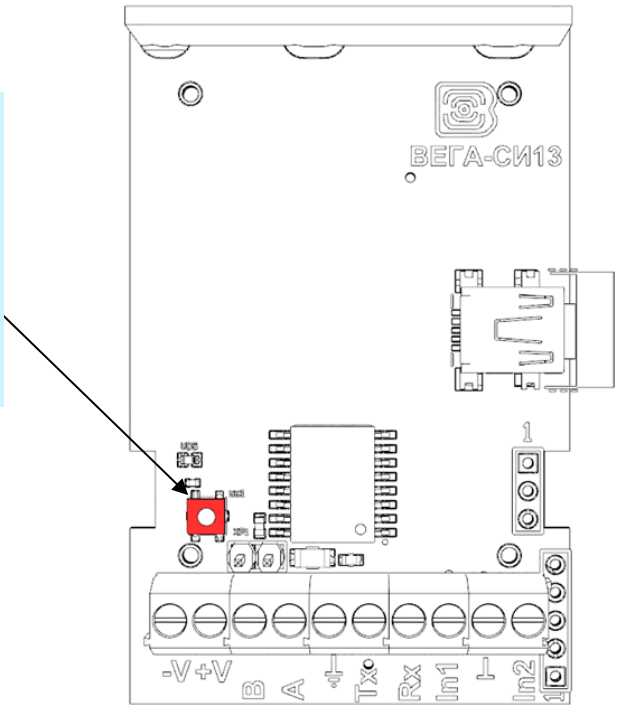
Step by step mounting be like:

1. Setting the devices and connecting them to the network are usually carried out in the office (see Network Deployment Manual).
2. Determination of suitable places for mounting at the object with a network tester.
3. De-energizing the connected equipment, metering devices, etc.
4. Making holes in the silicone gasket for wires - strictly according to the number of wires. It must be remembered that the wire must be of circular cross-section and no more than 3 mm in diameter.

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

5. Connecting all necessary wires to the SI-13 contacts.
6. Device launching – switching to the “Active” mode and registration in the network.

Location of the launch button on the board



7. By the laptop you can make sure that the device successfully sends the data.
8. Before assembling the device, it is necessary to reset the pulses accumulated during testing and connection by switching the device to the "Storage" mode by pressing the button for 5 seconds.
9. Start the device by pressing launch button.
10. Assembling the device.
11. DIN-rail mounting or another available way to mount the device on the object.

TRANSPARENT MODE OPERATION

For enable using modem in conjunction with various software systems dispatching of meters and industrial equipment, there is an ability to operate in a transparent mode. In this mode, the modem operates as a simple communication channel between the LoRaWAN® network server and connected external device. Vega 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 Vega SI-13 via LoRaWAN® network.

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

In Vega SI-13, the transparent mode is always available, regardless of the settings.

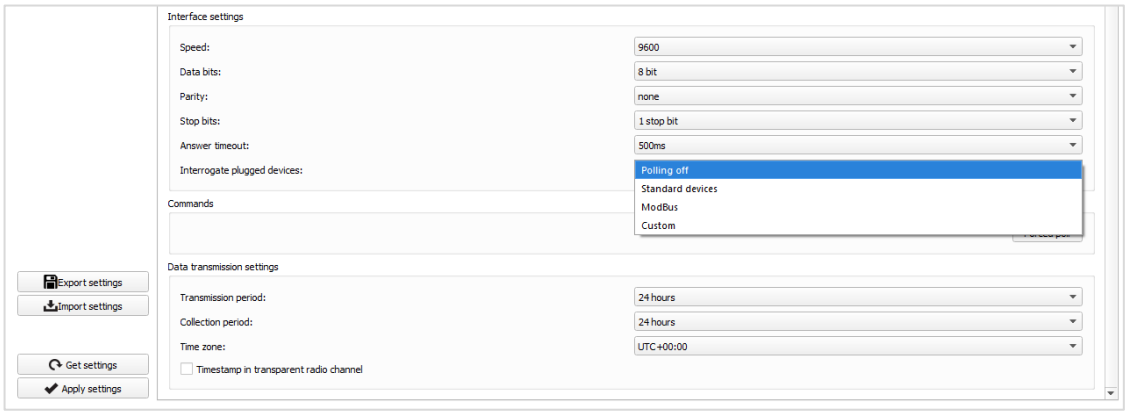
INDEPENDENT POLLING MODE

Vega SI-13 can operate in the mode of an independent polling of any connected via 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 polls the connected device with the specified period from 1 to 65535 seconds or according to the standard data collection period.

When the modem receives one of the suspected responses, it may send a packet into the LoRaWAN® network.

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.

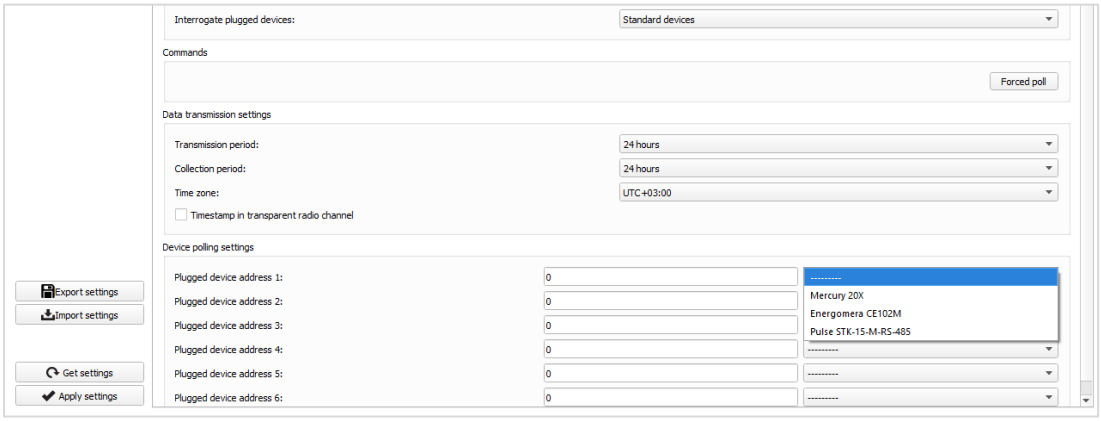
To configure the independent mode, select the required item in the "Vega SI-13 232 rev.2" or "Vega SI-13 485 rev.2" tab in the "Interrogate plugged devices" drop-down menu.



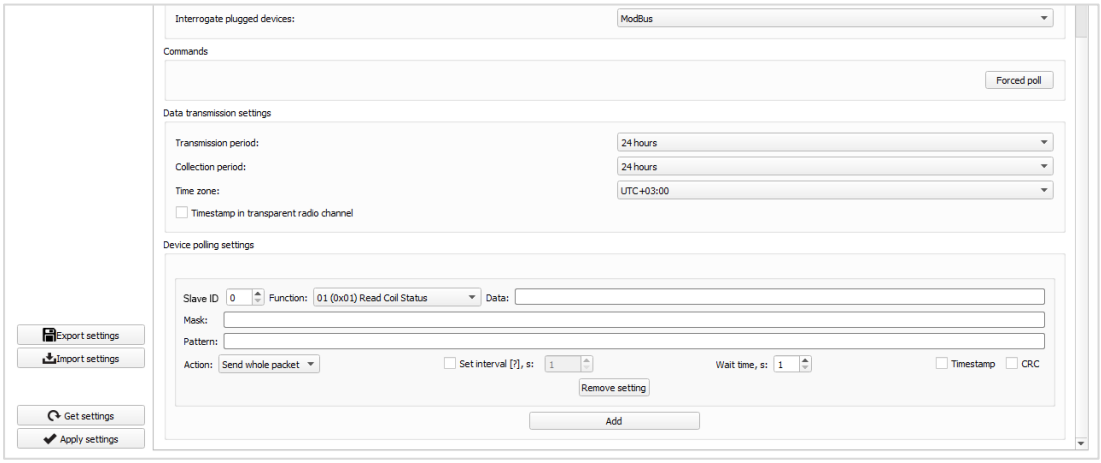
In the independent mode, there can be 4 working options. In all modes, a “transparent mode” is active and periodically sending data about accumulated impulses, alarms and other parameters of the Vega SI-13 device.

Polling off. In this case, independent polling of connected devices is not performed.

Standard devices. A mode that allows you to configure polling of up to 6 devices of supported types.



ModBus RTU. Data exchange with the device connected to the Vega SI-13 takes place using the ModBus RTU protocol. If necessary, this mode can be configured using the "Add" button. In the drop-down menu, you can configure the following settings:



Slave ID – address of the connected device.

Function – register polling function via ModBus RTU protocol.

Data - a field in which the PDU should be written according to the ModBus RTU protocol, as well as the checksum, if the CRC flag is not set in the settings group of this request.

CRC – flag, the setting of which allows you to automatically calculate the checksum and include it in the request. When the CRC flag is set, the checksum is also checked in the responses of the connected device. But sending a response to the LoRaWAN® network is done without the CRC field.

Wait time – a parameter responsible for the time of waiting for a response after sending a request. If the response from the connected device is not received within the specified period, then a packet with the relevant information is sent to the LoRaWAN® network.

Set interval – enabling this option allows you to set the period for sending a request to the interface of the connected device more flexibly than it is offered in the format of standard data collection and transmission periods.

Mask – a mask that is superimposed on the response from the connected device.

Pattern – a sequence of bytes with which the response from the connected device is compared.

Examples

Option 1 (full match):

In response to the request, the connected device sent such a data packet: *010203040506070809* (9 bytes of data)

Pattern registered by the user:
019999990506070809 (9 bytes of data)

Mask registered by the user:
FF000000FFFFFFFF (mask size – 9 bytes)

FF – indicates that this byte from the data packet from the connected device is fully compared with the pattern

00 – means that this byte is not compared with the pattern

\01\02\03\04\05\06\07\08\09
\FF\00\00\00\FF\ FF\ FF\ FF\FF
\01\99\99\99\05\06\07\08\09

Option 2 (no match):

Device response: *010203040506070809* (9 bytes of data)

Mask: FF000000FFFFFFFF (mask size – 9 байт)

Pattern: *019999990506070101* (9 bytes of data)

\01\02\03\04\05\06\07\08\09
\FF\00\00\00\FF\ FF\ FF\ FF\FF
\01\99\99\99\05\06\07\01\01

If matched – parameter, the value of which allows you to determine what should be done with the response of the connected device after comparing with the pattern. Send if matched or don't send. If there is no match, the packet is not sent to the LoRaWAN® network.

Custom. In this mode, the user is prompted to register requests that will be sent to the interface of the connected device with a set period. The user can set any sequence of bytes, which allows him to independently organize work with a device whose exchange protocol is not supported in SI-13. For fine-tuning, you must click the "Add Setting" button.

The functionality of the Mask, Pattern and other parameters is similar to the independent mode via the ModBus RTU protocol (p. 17).

4 COMMUNICATION PROTOCOL – VERSION 2.0

This part describes the recent review of SI-13 data exchange protocol with LoRaWAN® network. Protocol version is displayed in «Vega LoRaWAN Configurator» in the "Information" tab.

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 or upon request on LoRaWAN® port 2

Size in bytes	Field description	Data type
1 byte	Packet type 00 – current packet 01 – by security input 1 02– by security input 2	uint8
4 bytes	Packet time (unixtime)	uint32
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
1 byte	Basic settings value (bit field)	uint8

Bit field decoding «Basic settings value»

Bit	Value
0 bit	Packet Confirmation Request 0 - off, 1 – on
1 bit	Input 1 mode: 0 – pulse, 1 - security
2 bit	Input 2 mode: 0 – pulse, 1 – security
3,4,5 bit	Communication period: |3 == 0|4 == 0|5 == 0| - 5 minutes |3 == 1|4 == 0|5 == 0| - 15 minutes |3 == 0|4 == 1|5 == 0| - 30 minutes |3 == 1|4 == 1|5 == 0| - 1 hour |3 == 0|4 == 0|5 == 1| - 6 hours |3 == 1|4 == 0|5 == 1| - 12 hours |3 == 0|4 == 1|5 == 1| - 24 hours
6,7 bit	Interface operation mode: |6 == 0|7 == 0| - only transparent mode |6 == 1|7 == 0| - survey of metering devices |6 == 0|7 == 1| - ModBus |6 == 1|7 == 1| - custom

2. Data packet from an external device for “Transparent Mode” and “Custom”
   Sent on LoRaWAN® port 2

Size in bytes	Field description	Data type
1 byte	Packet type, this packet = 13 - packet with data from an external device for the modes "Transparent Mode" and "Custom"	uint8
1 byte	Sequential number of the setting in the configurator (counting starts from 0)	uint8
2 bytes	Total data size received via interface	uint16
1 byte	Data size in this packet	uint8
1 byte	Sequential number of the packet (in the case of transmitting several packets, when the data does not fit into one)	uint8
1 byte	Total number of the packets	uint8
Array	Data [1-39 bytes]	-

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

3. Data packet from an external device for “ModBus” mode
   Sent on LoRaWAN® port 2

Size in bytes	Field description	Data type
1 byte	Packet type, this packet = 04 - packet with data from an external device for the mode "ModBus"	uint8
1 byte	Sequential number of the setting in the configurator (counting starts from 0)	uint8
2 bytes	Total data size received via interface	uint16
1 byte	Data size in this packet	uint8
1 byte	Sequential number of the packet (in the case of transmitting several packets, when the data does not fit into one)	uint8
1 byte	Total number of the packets	uint8
2 bytes	Address of the first register	uint16
Array	Data [1-37 bytes]	-

4. Data packet from an external device for “Transparent Mode” and “Custom” with timestamp
   Sent on LoRaWAN® port 2

Size in bytes	Field description	Data type
1 byte	Packet type, this packet = 05 - packet with data from an external device for the modes "Transparent Mode" and "Custom"	uint8
4 bytes	Time of the modem at a moment of the packet generation (unixtime UTC)	uint32

1 byte	Sequential number of the setting in the configurator (counting starts from 0)	uint8
2 bytes	Total data size received via interface	uint16
1 byte	Data size in this packet	uint8
1 byte	Sequential number of the packet (in the case of transmitting several packets, when the data does not fit into one)	uint8
1 byte	Total number of the packets	uint8
Array	Data [1-39 bytes]	-

5. Data packet from an external device for “ModBus” mode with timestamp
   Sent on LoRaWAN® port 2

Size in bytes	Field description	Data type
1 byte	Packet type, this packet = 06 - packet with data from an external device for the mode "ModBus"	uint8
4 bytes	Time of the modem at a moment of the packet generation (unixtime UTC)	uint32
1 byte	Sequential number of the setting in the configurator (counting starts from 0)	uint8
2 bytes	Total data size received via interface	uint16
1 byte	Data size in this packet	uint8
1 byte	Sequential number of the packet (in the case of transmitting several packets, when the data does not fit into one)	uint8
1 byte	Total number of the packets	uint8
2 bytes	Address of the first register	uint16
Array	Data [1-37 bytes]	-

6. Packet with data from the electricity meter
   Sent on LoRaWAN® port 2

Size in bytes	Field description	Data type
1 byte	Packet type, this packet = 07 - poll of the electricity meter	uint8
1 byte	Device type 01 - Energomera 102M, 02 - Mercury 206	uint8
4 bytes	Serial number of the metering device	uint32
1 byte	Request result (1 – success, 0 - failure)	uint8
4 bytes	Time of the modem at a moment of the packet generation (unixtime UTC)	uint32
4 bytes	Readings tariff 1	uint32
4 bytes	Readings tariff 2	uint32
4 bytes	Readings tariff 3	uint32
4 bytes	Readings tariff 4	uint32

7. Packet with data from the heat meter
   Sent on LoRaWAN® port 2

Size in bytes	Field description	Data type
1 byte	Packet type, this packet = 08 - poll of the heat meter	uint8
1 byte	Device type 03 – Pulse STK-15	uint8
4 bytes	Serial number of the metering device	uint32
4 bytes	Time of the modem at a moment of the packet generation (unixtime UTC)	uint32
8 bytes	The amount of consumed heat energy, W	uint64
4 bytes	Total volume of heat medium, l	uint32
4 bytes	Operating time, h	uint32
2 bytes	Current flow temperature °C*100	uint16
2 bytes	Current reverse flow temperature °C*100	uint16
2 bytes	Current medium consumption, l/h	uint16
4 bytes	Current medium consumption, l/h	uint32
4 bytes	Power, W	uint32
1 byte	Medium[1] (environment)	uint8

8. Packet transmitted when there is no response from the connected metering device

Size in bytes	Field description	Data type
1 byte	Packet type, this packet = 09 – no response from the device	uint8
1 byte	Sequential number of the setting in the configurator	uint8
1 byte	Device type 01 - Energomera 102M, 02 - Mercury 206, 03 - Pulse STK-15	uint8
4 bytes	Serial number of the metering device	uint32

9. Packet transmitted when there is no response from the device to ModBus or a user request
   Sent on LoRaWAN® port 2

Size in bytes	Field description	Data type
1 byte	Reason for transmitting packet = 10 - no response to user or ModBus request	uint8
1 byte	Sequential number of the setting in the configurator	uint8

[1] The medium (environment) field is encoded according to the MBUS protocol (protocol section 8.4.1 Measured Medium Variable Structure)

10. Packet transmitted when restoring exchange with the metering device
Sent on LoRaWAN® port 2

Size in bytes	Field description	Data type
1 byte	Reason for transmitting packet = 11 - exchange with the metering device restored	uint8
1 byte	Sequential number of the setting in the configurator	uint8
1 byte	Device type 01 - Energomera 102M, 02 - Mercury 206, 03 - Pulse STK-15	uint8
4 bytes	Serial number of the metering device	uint32

11. Packet transmitted when the exchange with the metering device is restored by means of a user or ModBus request
Sent on LoRaWAN® port 2

Size in bytes	Field description	Data type
1 byte	Reason for transmitting packet 12 - exchange with the device has been restored by user or ModBus request	uint8
1 byte	Sequential number of the setting in the configurator	uint8

12. 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.

13. 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, this packet == 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 (most significant - major, least significant byte - minor). Example: 0x0301 - firmware version 3.1	uint8
2 bytes	Protocol version (most significant byte - major, least significant - minor). Example: 0x0200 - protocol version 2.0	uint8
1 byte	Battery charge, % (for Vega SI-13 always 0)	uint8
4 bytes	Number of packets sent over the air (big endian byte order)	uint32

14. Diagnostic information package

Sent by the device on port 85. A diagnostic package that exists for the purpose of providing technical support. A detailed description is not provided.

15. 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 byte	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. Diagnostic packet request

Send by application on LoRaWAN® port 85

Size in bytes	Field description	Data type
1 байт	Any value within 0x00 – 0xFF	uint8

3. 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

4. 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 == 01	uint8

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

5. Packet with settings

   Sent by application on LoRaWAN® port 3, 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 byte	Parameter value	-----
...	...	...
2 bytes	ID of parameter	uint16
1 byte	Data length (len)	uint8
len bytes	Значение параметра	-----

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-13 parameters and these possible values

The table contains values in DEC, when sending, these values must be converted to HEX

ID of parameter	Description	Data length	Possible values
4	Confirmed uplinks	1 byte	1 – confirmed 2 – unconfirmed
8	Uplinks number of transmissions	1 byte	from 1 to 15
16	Communication period	1 байт	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 байт	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

5 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.

6 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.

7 WARRANTY

The manufacturer guarantees that the product complies with the current technical documentation, subject to the storage, transportation and operation conditions specified in the "User Manual".

The warranty period is 36 months.

The warranty period of operation is calculated from the date of sale marked in the product factory certificate, and from the release date when such a mark is absent. During the warranty period, the manufacturer is obliged to provide repair services or replace a failed device or its components.

The manufacturer does not bear warranty obligations in the event of a product failure if:

- the product does not have a factory certificate;
- the factory certificate does not have an TCD stamp and / or there is no sticker with information about the device;
- the serial number (DevEUI, EMEI) printed on the product differs from the serial number (DevEUI, EMEI) specified in the factory certificate;
- the product has been subject to alterations in the design and / or software which are not provided for in the operational documentation;
- the product has mechanical, electrical and / or other damage and defects arising from violation of the conditions of transportation, storage and operation;
- the product has traces of repair outside the manufacturer's service center;
- the components of the product have internal damage caused by the ingress of foreign objects / liquids and / or natural disasters (flood, fire, etc.).

The average service life of the product is 7 years.

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

119A, Bol'shevistskaya Str., Novosibirsk, 630009, Russia.

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

e-mail: remont@vega-absolute.ru

DOCUMENT INFORMATION	
Title	LoRaWAN Device Vega SI-13
Document type	Manual – Translation from Russian
Document number	V02-SI13-01
Номер и дата последней ревизии	17 of 28 March 2022

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 PKP	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 "Operation" part
09	21.12.2018	KEV	"Transparent mode operation" and "Marking" parts added, device AppEui added in specification
10	21.05.2019	KEV	Typo in communication protocol fixed in bit field decoding table – bits 6 and 7
11	14.08.2019	KEV	Typo on the 28th page in the '5' packet description
12	06.07.2020	KEV	Scheduled revision of the document, minor changes
13	23.09.2020	KEV	Device logic changes, new mode for external devices polling, changes in the communication protocol
14	06.08.2021	PAV	Scheduled revision of documentation. New warranty conditions, new parts
15	08.02.2022	KEV	New part "Connection Of Terminator"
16	11.03.2022	KMA	New protocol version
17	28.03.2022	KMA	Minor edits

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