Electronic Water Meter SHVE, SGVE with LPWAN 868 VEGA radio channel

(the second generation[1])

User Manual

1 In production since December 2020

CONTENTS

INTRODUCTION

This manual is developed for electronic water meters SHVE, SGVE (hereafter – meter, device) and contains a description about specification, functionality, interfaces, configurator application and communication protocol and some other data which is necessary to meters exploitation.

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

ATTENTION! The meter shall be installed and adjusted by qualified specialists to ensure proper operation of the device.

1 TECHNICAL DESCRIPTION

1.1 PURPOSE

SHVE, SGVE meters (fig. 1) are designed to measurement of drinking flowing through the pipeline water volume according to СанПиН 2.1.4.1074-2001 with the temperature from 0,1 to 30 °C for cold water meters (SHVE) and from 0,1 to 90 °C for hot water meters (SGVE with a pressure of water in pipeline no more than 1.0 MPa (10kg/sm) and further collection and transmitting of this data to LoRaWAN network via radio frequency band 860-1000 MHz.

SGVE meters are multipurpose and may be used as for measurement of cold as hot water volume, but SHVE meters are only for cold water.

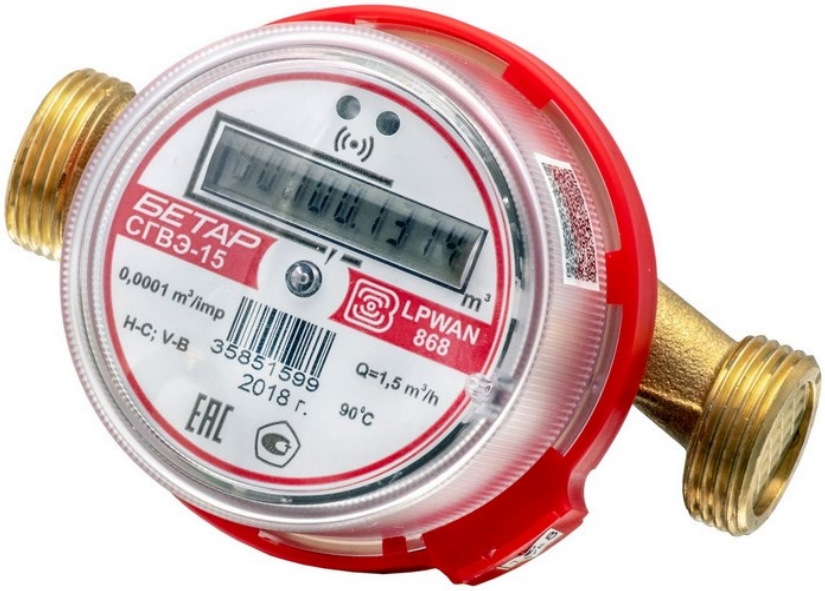

Figure 1 — Appearance of meter

1.2 FUNCTIONS

Meters support the next functions:

- displaying the counted water consumption in cubic meters via the LED indicator;
- fixation of external magnetic field influence (electronic magnetic seal);
- control of internal battery charge;
- control of temperature inside device case (reference Information);
- registration of random reverse flow of water (displaying the counted water modulo consumption in forward and the reverse direction via the LED indicator);
- leak fixation (continuous consumption < 0.3 cubic meter per 30 minutes);
- fixation of a breakthrough (continuous consumption > 0.3 cubic meter per 30 minutes);
- binding an emergency situation to the date and time and its saving;
- testing in the manufacture and changing the parameters of the meter during operation through the optical port;
- pre-configured schedule for transmitting the collected data in the LoRaWAN network via radio communication (choice the communication period);
- pre-configured schedule for the data collection and saving in the internal memory (choice the data collection period);
- emergency transmitting of the collected data (extraordinary session);

- emergency transmitting of the alarm message in case of one of the next emergency situations:
  - fixation of external magnetic field influence;
  - low internal battery charge;
  - leak fixation (continuous consumption < 0.3 cubic meter per hour);
  - fixation of a breakthrough (continuous consumption > 0.3 cubic meter per hour).
- there are two operation modes (“Storage” and “Operation”);
- control of the battery passivation level and automatic depassivation when it is necessary.

1.3 SPECIFICATION

The main specification is shown in the table 1.

Table 1

Parameter		Value	
Basic			
Meter type		SHVE-15	SGVE-15
Nominal diameter, mm		DN15 (15 mm)	
Ambient temperature, °C		+5…+55	
Relative humidity of ambient air, %		от 0 до 100	
Ambient pressure range, kPa		от 86 до 106	
Temperature class		T30	T90
Maximum admissible pressure		MAP10	
Pressure loss		Δ_p 63	
Flow profile sensitivity classes		U0/D0	
Ratio Q_3/Q_1 (HR/VR)		100/50	
Flow rate HR/VR, m^3/h	Maximum Q_4	2,0/2,0	
	Permanent Q_3	1,6/1,6	
	Transitional Q_2	0,025/0,051	
	Minimum Q_1	0,016/0,032	
Capacity of indicator, m^3		99999,9999	
Resolution of the reading, m^3		0,0001	
Reverse water flow		The meter does not allow measurements in the reverse flow. It is recommended to install a non-return valve.	
Average service life of the meter, years		12	
Interface		Optical port, LoRaWAN radio channel	
Weight of one pulse on the optical port, m^3		0,000025	0,000050
Pulse duration at the optical port, µs		100	
Radio			
Protocol		LoRaWAN	

Parameter		Value	
Specification		1.0.3	
Nominal transmitter power, mW		25 (configurable)	
LoRaWAN device class		A	
Number of LoRa channels		16	
Frequency plan		RU868, EU868, IN865, AS923, AU915, KR920, US915, KZ865, custom (EU868 based)	
Activation type		ABP and OTAA	
Communication period, h	Configurable, h	1, 6, 12, 24	
	Service	By the event (Hall sensor closing)	
	Recommended, h	12	
Data collection period, h		1, 6, 12, 24	
Black box, messages		200	
LoRa antenna type		Internal	
Sensitivity, dBm		-138	
Radio coverage in restrained urban conditions, km		Up to 5	
Radio coverage within line of sight, km		Up to 15	
Power			
Power source		Internal, Lithium Battery 3.6 V	
Battery size		A (ER17505 or LS17500)	
Operating time from the battery power, years		Up to 6 (with communication and data collection periods are equal to 12 hours)	
Replacement period		The factory-installed battery must be replaced after an initial calibration interval of 6 years	
Case			
Length, mm		110	130
Height, mm		70	75
Connecting dimensions, inch		G3/4-A	G1-A
Ingress protection rating		IP54 (ГОСТ 14254-2015)	
Weight without kit assembly parts, kg, max		0,5	

1.4 OPERATION PRINCIPLE

Operation principle based on measurement of the impeller turnovers number. Impeller located in a flow part of meter and rotated by water flowing. The impeller turnovers number is proportionally to water flowing volume. A bipolar magnet is molded into the impeller. Counting Hall sensor takes information about the impeller turnovers number from bipolar magnet.

Meter always on, but there is in a low power consumption mode most of the time.

2 DESCRIPTION OF BASIC FUNCTIONS

2.1 READINGS DISPLAYING

The device has LED indicator on a faceplate for visual displaying of the readings (fig. 2). Readings are displayed in cubic meters up to the fourth decimal point on a cumulative total.

During the operation of the meter, the number of packets sent over the radio channel is displayed on the LED indicator every 2 minutes, while the "**SP**" symbol is displayed in the most significant bit (on the far left).

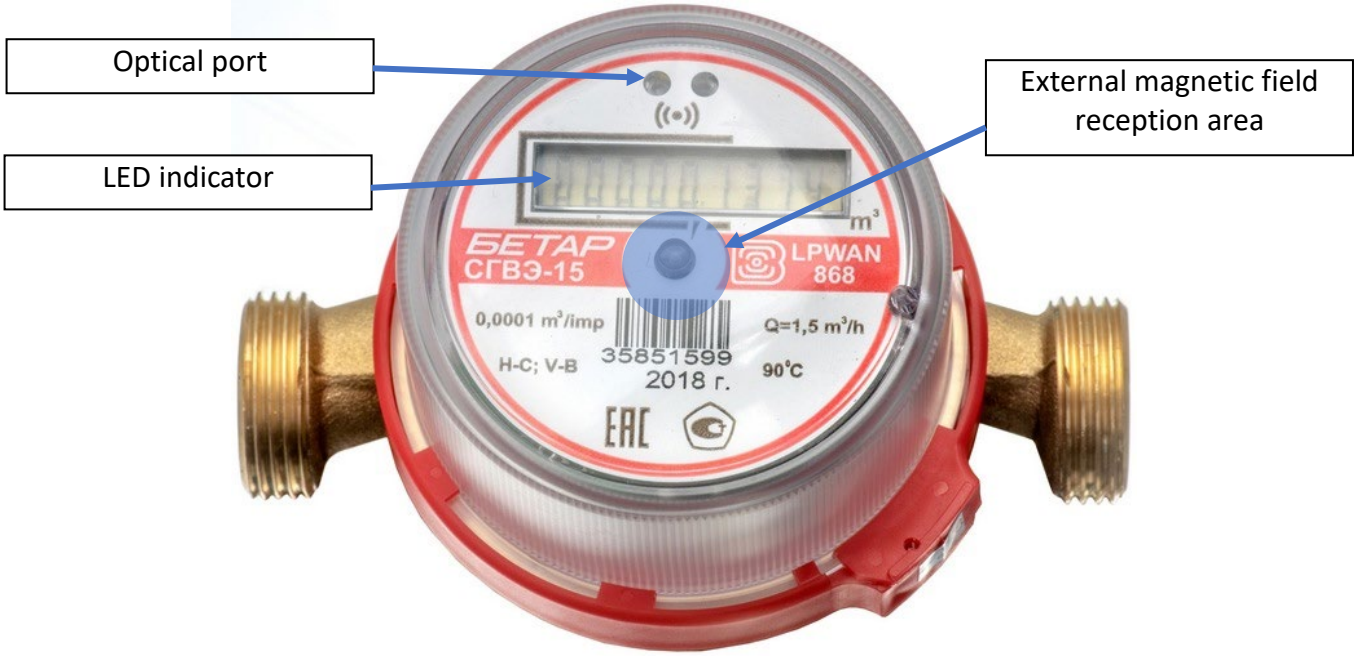

Figure 2 — Device basic elements

When the meter is turned on for the first time, the following parameters are displayed one by one on the LED indicator (each one for the 5 seconds):

- name of the built-in software of the meter;
- software version number;
- software ID (check sum);
- method of check sum calculation;
- serial number of the meter in the "SXXXXXXXX" format (for example, "S40488568");
- date of the meter verification in the "Id dd.mm.yy" format (for example, "Id 01.01.20").

2.2 METER'S OPERATION MODES

To optimize energy consumption, the meter has two operation modes:

- "Storage" - the metrological part works (the meter measures the volume and displays the accumulated water consumption in cubic meters), the communication part does not work (the meter does not transmit data via the radio channel). In the "Storage" mode, the LED indicator displays readings in the "CXXXX.XXXX" format (for example, "C0008.7802");
- "Operation" - the metrological and communication parts work.

The meter is supplied by default in the "Storage" mode, to remove from which it is necessary to bring the external magnet for 15-20 seconds to the area of reception of the external magnetic field, see p.2.5.

2.3 OPTICAL PORT

There is an optical port (fig. 2) for connection to computer, which also used for testing. The adapter "Opticalport-USB" connected to the USB-port of computer carries out connection between the optical port and computer.

"Vega LoRaWAN Configurator" application allows reading and changing the meters parameters. See detailed application description in a part 3.

The opto-emitter of the optical port is used as a technological optical pulse output for checking the meter during production. During operation, the meter is verified by the comparison method.

2.4 INTERNAL CLOCK

Time on internal clock may set automatically when the device connects to the "Vega LoRaWAN Configurator" application and may corrected via LoRaWAN network.

"IoT Vega TimeCorrector" application carries out an autocorrecting procedure via LoRaWAN network. The device sends time correction request once a week.

2.5 ELECTRONIC MAGNETIC SEAL

The meter has a Hall sensor for fixing of the external magnetic field and it is located under faceplate of the device (fig.2). That function named as an electronic magnetic seal.

From the 1st second of external magnetic field influence, which strong enough, the meter LED indicator displays warning symbol "**b**" at the high order digit place (first index) but readings still displaying.

If the external magnetic field influence continues more than 5 minutes, then device locks LED indicator and send emergency message with lock flag. Herewith, the LED indicator displays warning symbol "**b**" but readings not displaying. Only the dispatcher via the LoRaWAN network can unblock a LED indicator using a special command.

There are device controlling functions, which activated by a magnet getting on external magnetic field reception area in table 2.

Table 2

Time of external magnetic field influence	Event	Comment
Less than 2 seconds	Optical port activation for 20 seconds	After 20 seconds, the optical port is deactivated if it is not in use
From 15 to 20 seconds	Emergency communication session, switching from "Storage" mode	While communication session the LED indicator displays warning symbol "**p**" at the high order digit place but readings still displaying
5 minutes and more	Lock of the LED indicator	The LED indicator displays warning symbol "**b**" but readings not displaying

2.6 LORAWAN

2.6.1 CONNECTION TO THE NETWORK

Meter supports two activation methods in the LoRaWAN network:

- **ABP (Activation By Personalization)** – meter sends data to the LoRaWAN network according to pre-configured schedule (every 12 hours by default).

- **OTAA (Over The Air Activation)** – meter makes three trying to connect the network with configured frequency plan (RU868 by default). The meter will begin to send data when it receives the LoRaWAN activation confirmation. If all attempts fail, the meter will continue to accumulate data and will attempt to connect to the network every six hours.

By default, meter makes attempts to connect to the network with OTAA method once a day until it connected to the server. You can change default settings via “Vega LoRaWAN Configurator” application (see part 3.5).

You can initiate emergency communication session including activation by a magnet getting on external magnetic field reception area for 15-20 seconds (fig.2).

2.6.2 CLASS A DEVICE

Meter is class A device (by LoRaWAN classification) and has the following features:

- ADR («Adaptive Data Rate»);
- sending of confirmed messages (configurable);
- storing undelivered messages in device memory while sending messages with confirmation;
- adjustable data collection and transmission periods;
- temperature measurement;
- charge measuring of the built-in battery in %.

2.6.3 COMMUNICATION AND COLLECTION PERIODS

2.6.3.1 COMMUNICATION PERIOD

Communication period may be equal to 1, 6, 12 and 24 hours. Device sends data in random point in time during set period:

- If communication period equal to 1 hour, then during the next hour;
- If communication period equal to 6 hours, then during the next 6 hours;
- If communication period equal to 12 hours, then during the next 12 hours;
- If communication period equal to 24 hours, then during the next 24 hours.

2.6.3.2 DATA COLLECTION PERIOD

Data collection period may be equal to 1, 6, 12 and 24 hours. Meter saves data in the internal memory with time by the internal clock:

- at 00.00 when the period is equal to 24 hours;
- at 00.00 and at 12.00 when the period is equal to 12 hours;
- at 00.00, 6.00, 12.00 and 18.00 when the period is equal to 6 hours;
- at the beginning of current hour when the period is equal to 1 hour.

The readings are stored in the meter memory until the next communication session; maximum number of saved messages is 200. At the next communication session, the device starts sending accumulated messages, from the earliest to the latest.

With the "Confirmed uplinks" option turned off, the device just sends all accumulated messages to the network in order from the earliest to the latest. There is no check of package delivery in this mode. Non-transmitted messages do not save in the device memory.

With the "Confirmed uplinks" option turned on, the device will send the next message 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, the meter 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 messages remain in the device memory until the next communication session.

3 “VEGA LORAWAN CONFIGURATOR” APPLICATION

3.1 OPERATING MODES

The "Vega LoRaWAN Configurator" application (hereinafter – application, 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.

ATTENTION! Full functionality becomes available after password entering. You can see only DevEUI and no available any settings or other information without the password. The “Send Password” command is placed in the “Commands” field in the “Vega SHVE/SGVE v.2” tab. A password is provided upon request. Instructions for providing LoRaWAN keys and passwords for metering devices manufactured by OOO PKF "BETAR" can be downloaded on the websites iotvega.com and betar.ru in the relevant sections.

3.2 APPLICATION INTERFACE

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 (fig. 3).

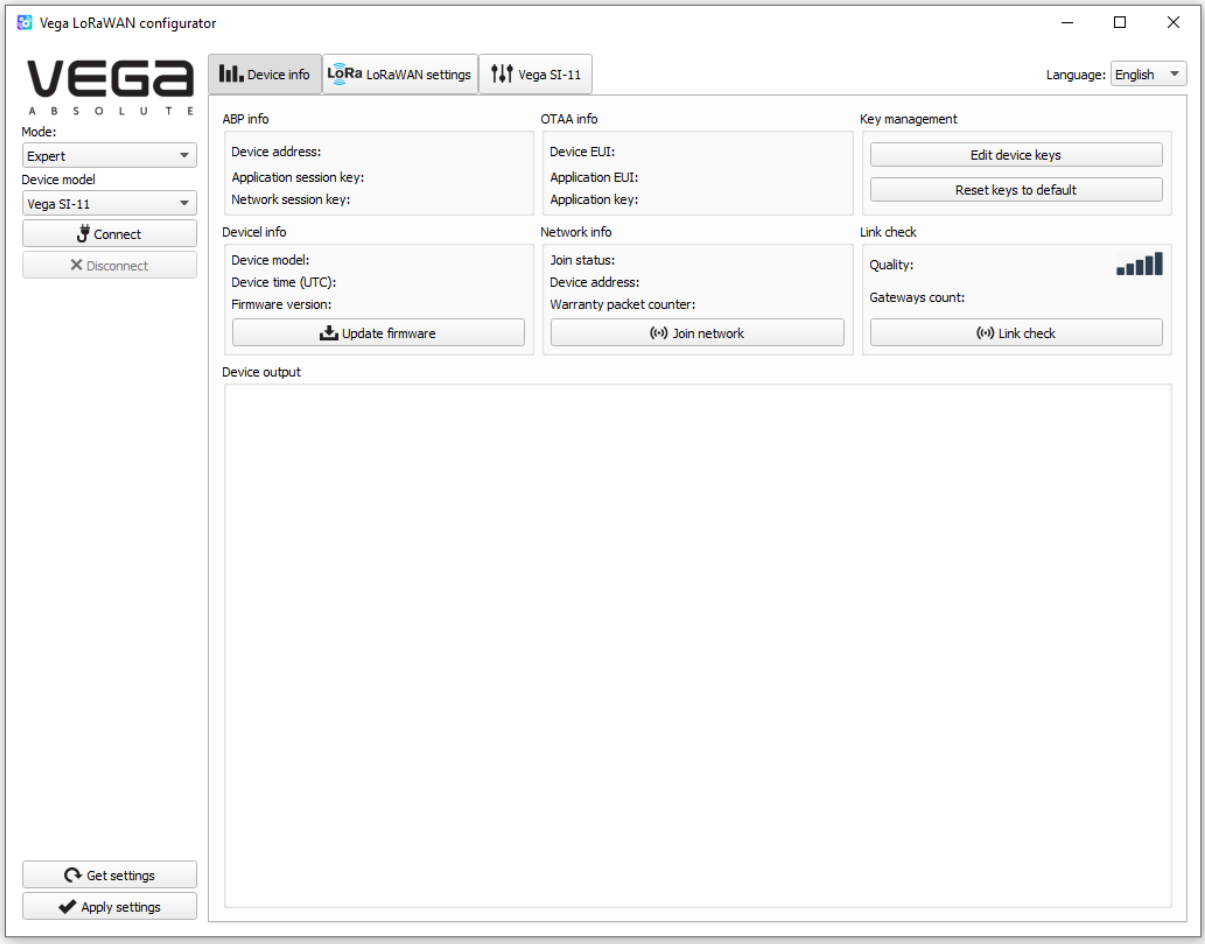

Figure 3 — Application workplace

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.

3.3 CONNECTION OF METER TO COMPUTER

3.3.1 ADAPTER CONNECTION, DRIVER INSTALLING

Meter has the optical port for connection to computer, which also used for testing. The adapter “Optical port-USB” connected to the USB-port of computer carries out connection between the optical port and computer.

Before connecting the device to the computer for the first time, you must install the driver for the adapter «**MCP2200 Windows Driver**», which can be downloaded from iotvega.com. After running the executable file **McphCdcDriverInstallationTool.exe**, the installer window will appear (fig. 4).

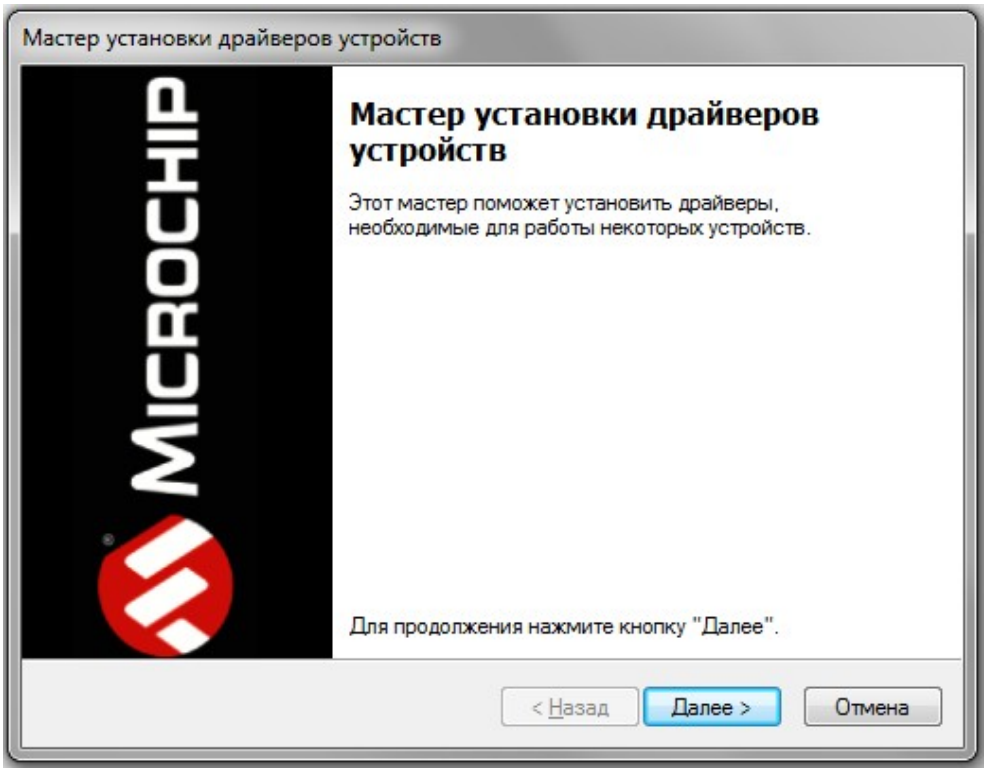

Figure 4 — Window «Мастер установки драйверов устройств»

In this window, you need to click «Далее». In the window that appears, agree to the terms of the license agreement, then «I accept» and «Далее» (fig. 5). The installation will begin after that.

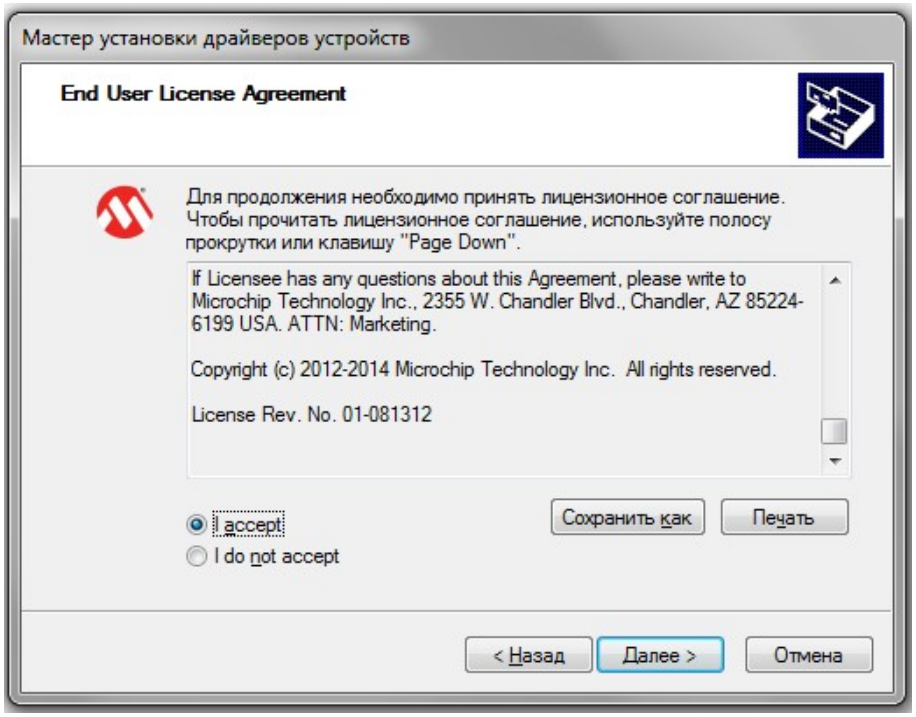

Figure 5 — Driver installing

After finish of install process the window will appears (fig. 6). After pressing «**Готово»** adapter “Opticalport-USB” is ready for operation.

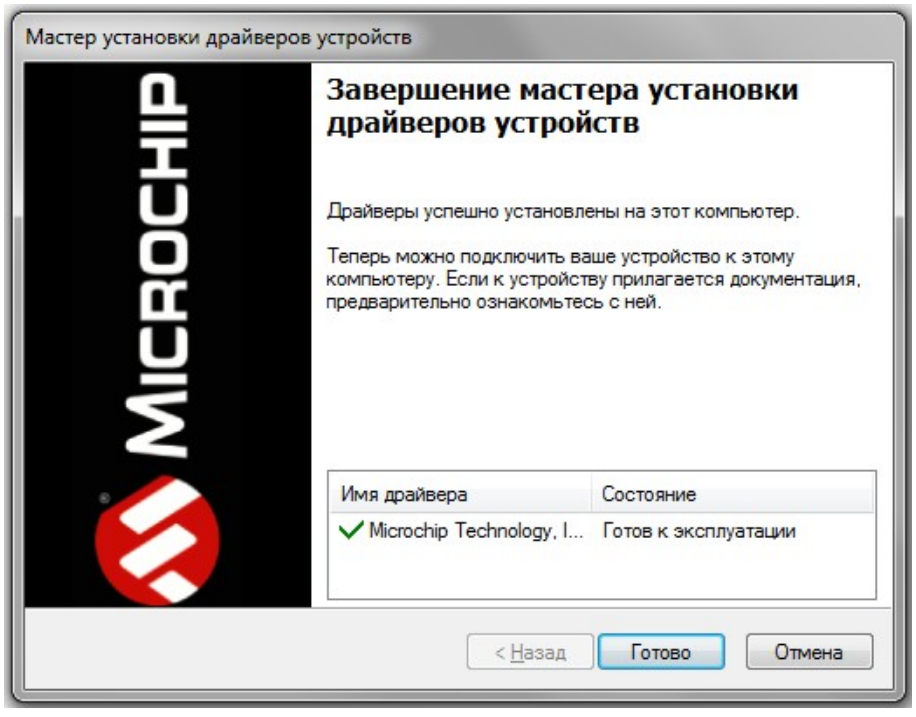

Figure 6 — Driver installing successfully

3.3.2 OPTICAL PORT ACTIVATION

Launch the program and activate optical port.

For optical port activation the magnet getting on external magnetic field reception area during short time (less than 2 seconds). Whereupon the optical port activates for the 20 seconds. “Optical port-USB” adapter must be located and fixed for an operation time as it shown on figures 7,8.

Figure 7 — “Optical port-USB” adapter location in relation to meter_ General view

Figure 8 — “Optical port-USB” adapter location in relation to meter_ Close-up

At the main window of the application, you need to choose the device model (“Vega SHVE/SGVE v.2”), COM-port number and press “Connect” button (fig. 9) while optical port is active.

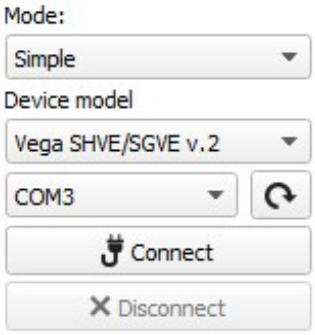

Figure 9 — The main settings view for connection the device

Application connects to the device and device selection menu becomes inactive.

To read the settings from the device, you need to click the "Get settings" button (fig. 10), until this point the application will display the default settings or from the last connected device.

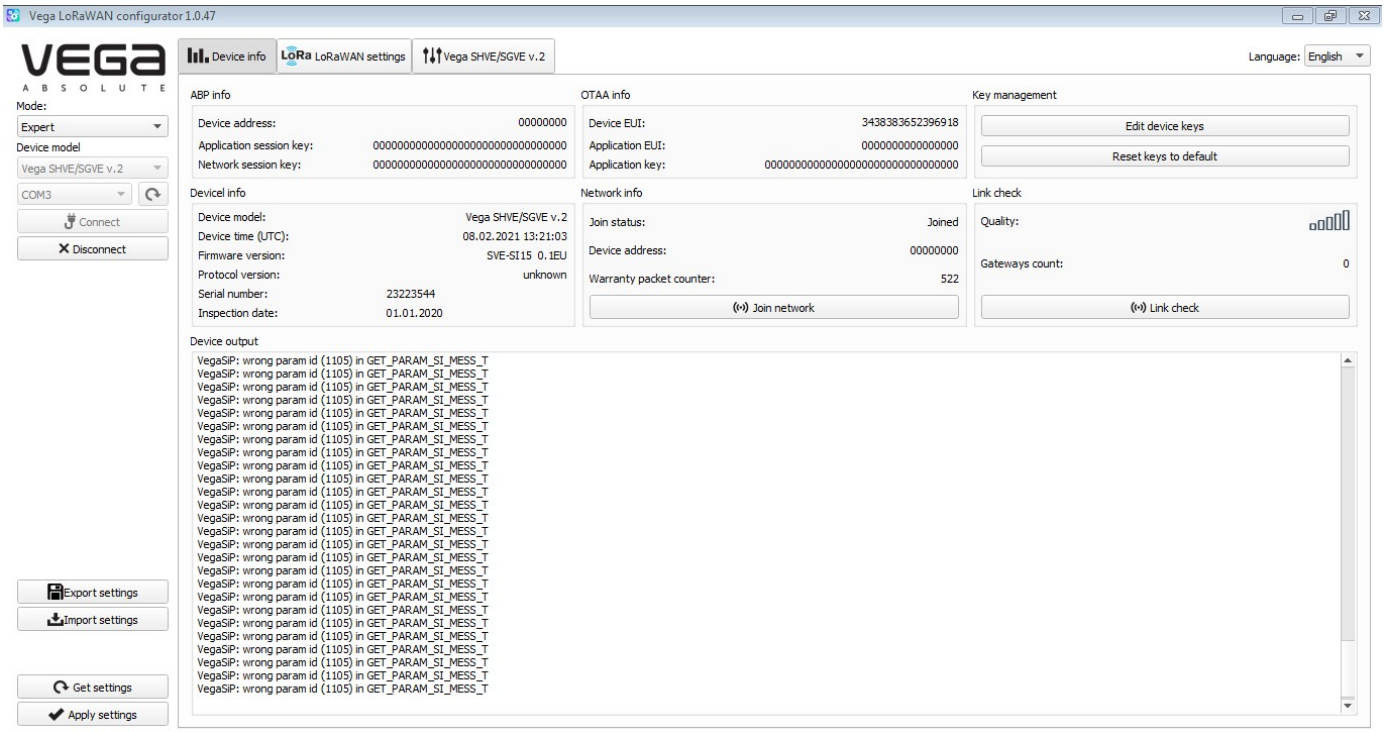

Figure 10 — “Device info” tab

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.

3.4 “DEVICE INFO” TAB

3.4.1 BASIC DESCRIPTION

The "Device info" tab displays network information about the device, - there are basic information (Device info field), current state (Network info, Link check), keys for device activation in LoRaWAN network (ABP info, OTAA info, Key management), log (Device output).

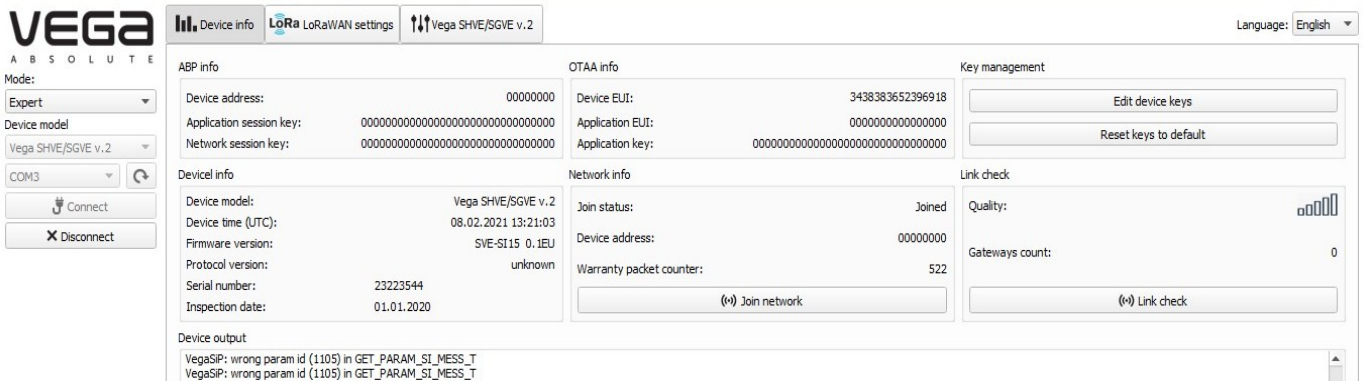

Figure 11 — “Device info” tab

3.4.2 FIELDS DESCRIPTION

3.4.2.1 «ABP info» – displays the data necessary to register the device in the LoRaWAN network with ABP method (Activation By Personalization).

3.4.2.2 «OTAA info» – displays the data necessary to register the device in the LoRaWAN network with OTAA method (Over The Air Activation).

3.4.2.3 «Key management» (not displayed in the "Simple" mode) – allows you to change the factory device activation keys or reset the keys back to the factory settings (fig. 12).

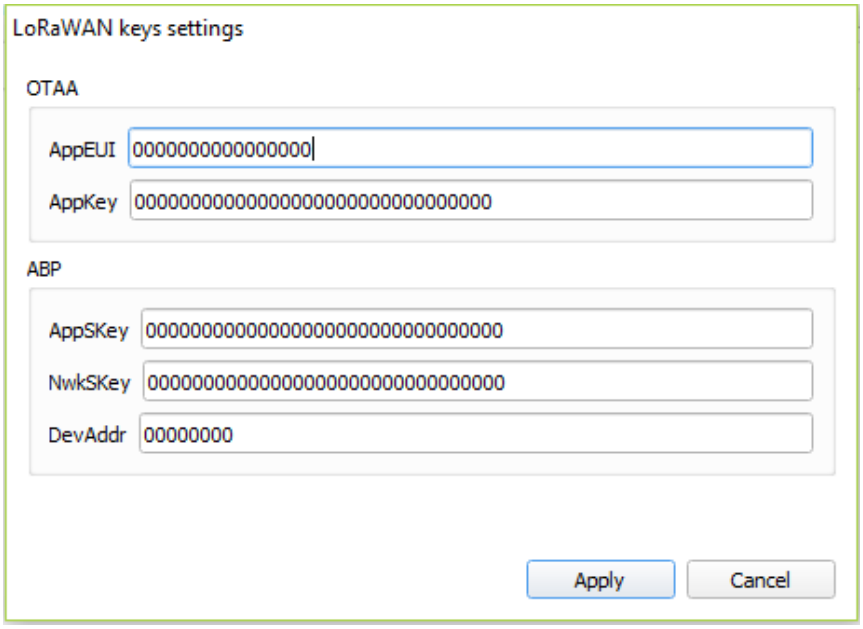

Figure 12 — “Edit device keys” window at “Key management” field

3.4.2.4 «Device info» – displays information about the device model, its firmware version and time in UTC (+0.00), factory number and meter verification date.

ATTENTION! The date of the meter verification does not correspond to the current**.**

3.4.2.5 «Network info» – shows whether the device connecting to the LoRaWAN network and its network address.

3.4.2.6 «Join network» button – launch the LoRaWAN network connection procedure with the previously selected ABP or OTAA method. If the device is already connecting to the network, reconnection procedure will occur.

3.4.2.7 «Link check» button (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 about the number of gateways that received this signal and the signal quality (fig. 13). This button only works while the device is connecting to the network.

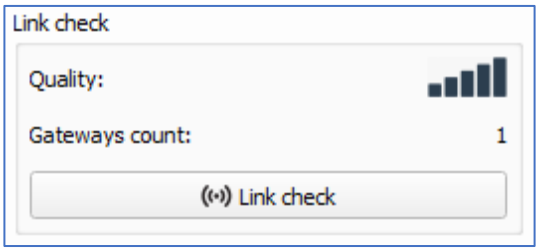

Figure 13 — “Link check” field

3.4.2.8 «Device output» (not displayed in the "Simple" mode) – monitoring the device status, displaying all events in real time.

3.5 “LORAWAN SETTINGS” TAB

3.5.1 BASIC DESCRIPTION

The "LoRaWAN Settings" tab allows you to configure various parameters of the LoRa network (fig. 14).

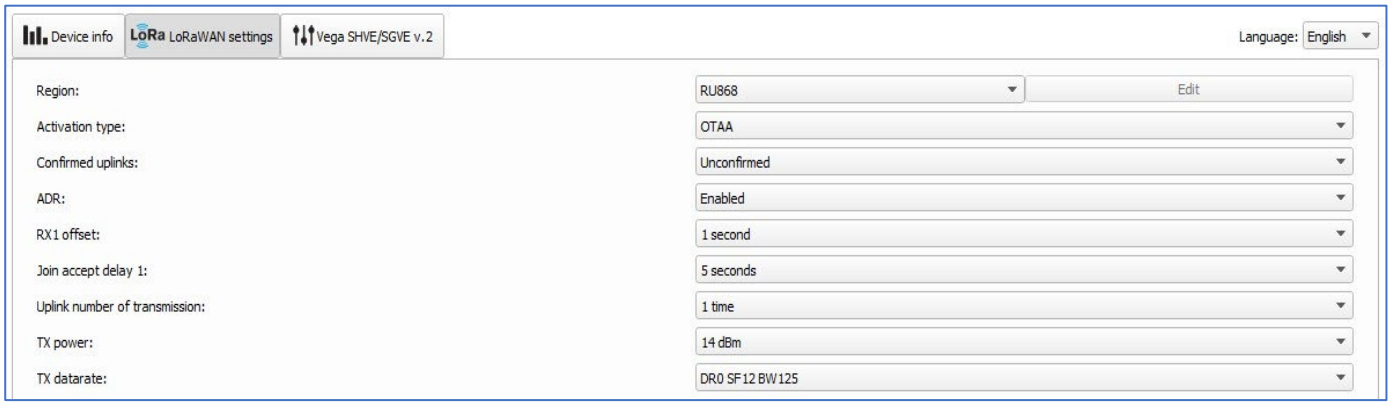

Figure 14 — “LoRaWAN settings” tab

3.5.2 FIELDS DESCRIPTION

3.5.2.1 «Region»

“Region” allows you to select RU868, EU868, KZ865 or specify a custom frequency plan (fig. 15).

Figure 15 — Region choice

The meter supports the frequency plans specified in table 3.

Table 3

Frequency plan[2]	Channel	Frequency	Modulation
EU868	1	868.1	MultiSF 125 kHz
	2	868.3	MultiSF 125 kHz
	3	868.5	MultiSF 125 kHz
	RX2	869.525	SF12 125 kHz
RU868	1	868.9	MultiSF 125 kHz
	2	869.1	MultiSF 125 kHz
	RX2	869.1	SF12 125 kHz
KZ865	1	865.1	MultiSF 125 kHz
	2	865.3	MultiSF 125 kHz
	3	865.5	MultiSF 125 kHz
	RX2	867.5	SF12 125 kHz
Custom	Set with application		

2 By default, the device supports two frequency plans and the custom, but it is possible to order firmware for other frequency plans: IN865, AS923, AU915, KR920, US915, KZ865

In the EU868, RU868 and KZ865 frequency plans by default, only those channels are active 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 (fig. 16).

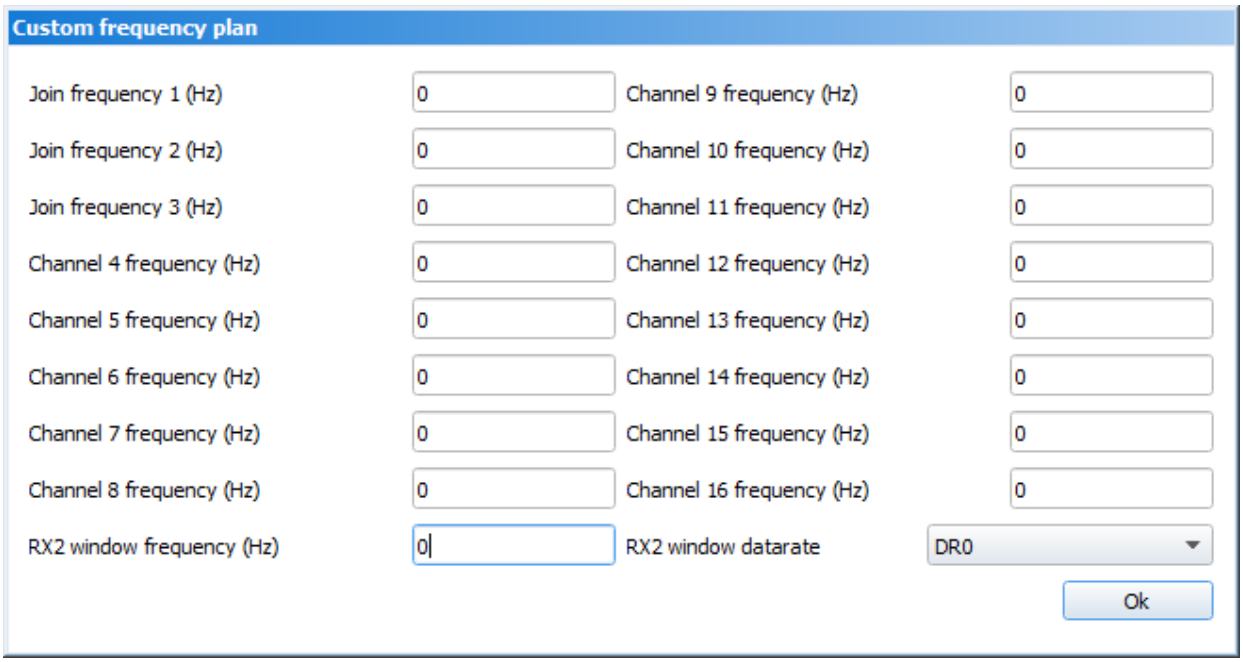

Figure 16 — Custom frequency plan window

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

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

3.5.2.2 «Activation type» - allows setting up ABP or OTAA device activation method.

3.5.2.3 «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 p. 4.5.2.7). If the confirmation does not receive, then meter saves all non-transmitted messages until the next communication session.

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

3.5.2.4 «ADR» – this option activates the Adaptive Data Rate algorithm for automatic control of the data transfer rate from the LoRaWAN network side. The higher the quality of the signal received by the network, the higher the speed will be installed on the device.

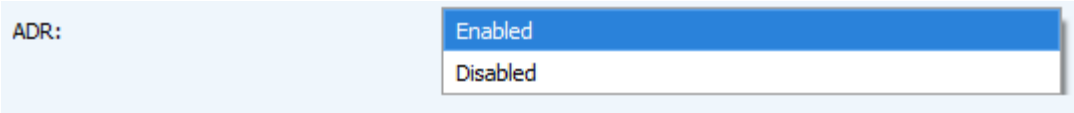

Figure 17 — ”Adaptive Data Rate” function

3.5.2.5 «RX1 offset» (not displayed in the "Simple" mode) – specifies the time between end of packet transmission and first receiving window opening (fig. 18). The second receiving window always opens after 1 second after the first.

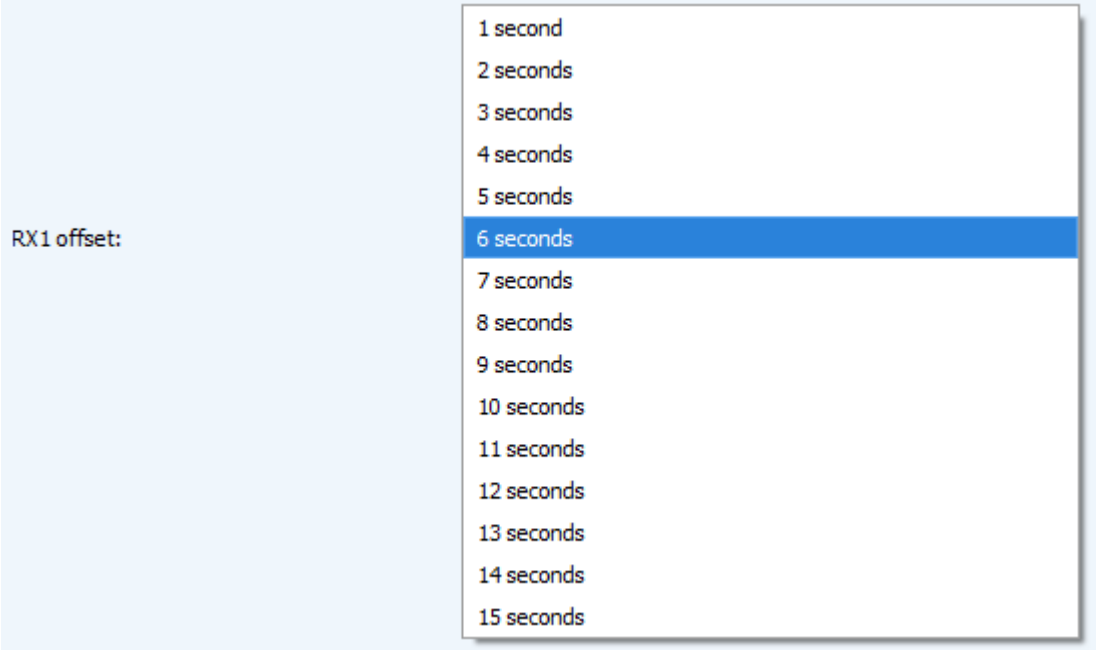

Figure 18 — Choice of the time for opening the first receiving window

3.5.2.6 «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 (fig. 19). The second window always opens after 1 second after the first.

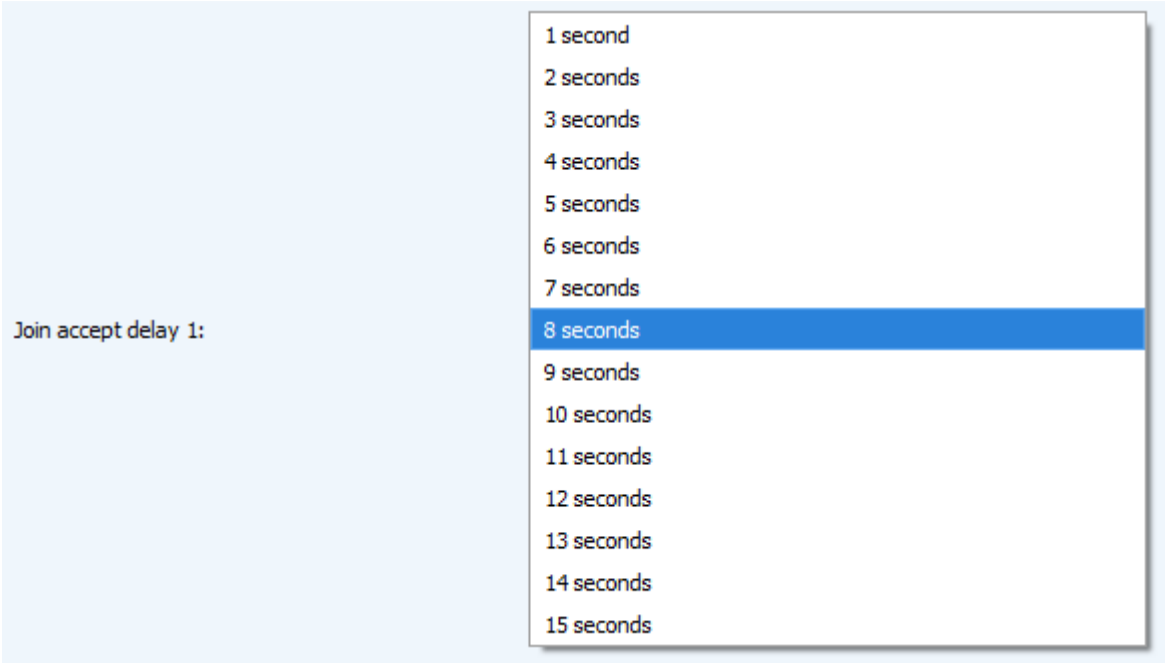

Figure 19 — Choice of the time for opening the first receiving window for join accept receiving

3.5.2.7 «Uplink number of transmission» (not displayed in the "Simple" mode) – sets the number of uplink during the one communication session (fig. 20). 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" function is enabled, the device will send packets until it receives a confirmation or until it sends as many packets as specified in this option.

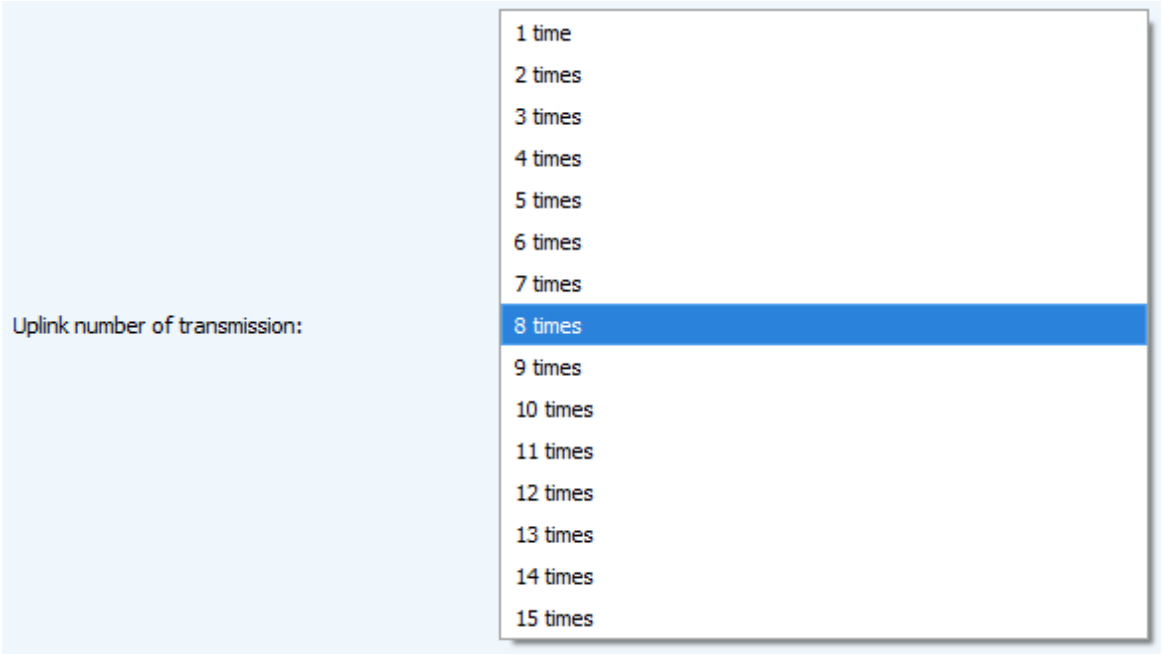

Figure 20 — Choice of the uplink number

3.5.2.8 «TX power» (not displayed in the "Simple" mode) – the device RF transmitter power has adjusted to this value when sending packets to the LoRaWAN network (fig. 21). This option can be change by the network server.

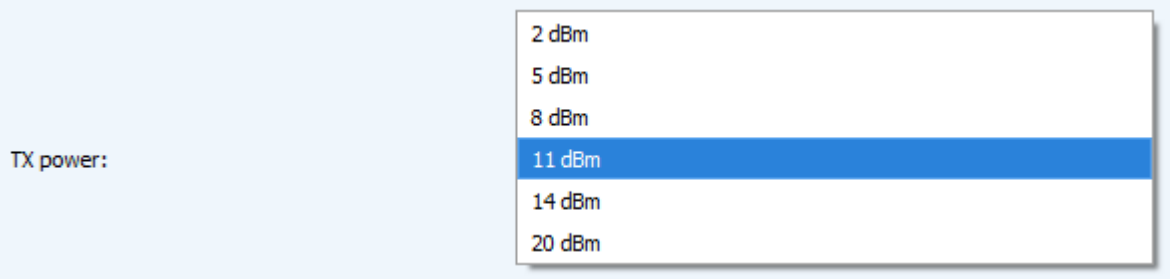

Figure 21 — Choice of the TX power

3.5.2.9 «TX datarate» (not displayed in the "Simple" mode) – the device transmission datarate at which it will transfer packets to the LoRaWAN network (fig. 22). This speed can be changed by the network server if the ADR algorithm has enabled.

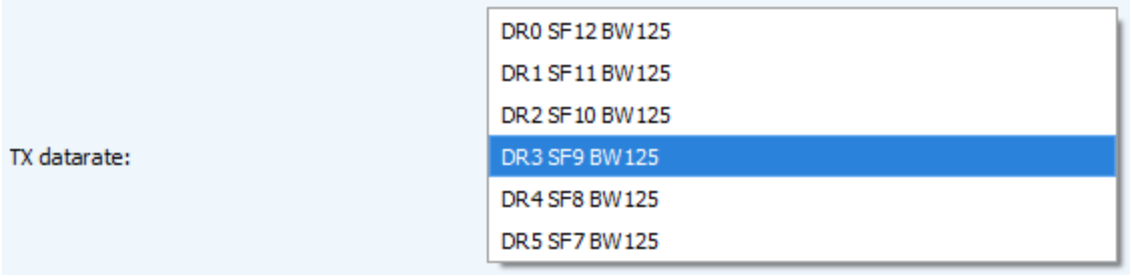

Figure 22 — Choice of the TX datarate

3.6 “VEGA SHVE/SGVE V.2” TAB

3.6.1 BASIC DESCRIPTION

“Vega SHVE/SGVE v.2” tab contains the special settings and parameters of the connected device (fig. 23).

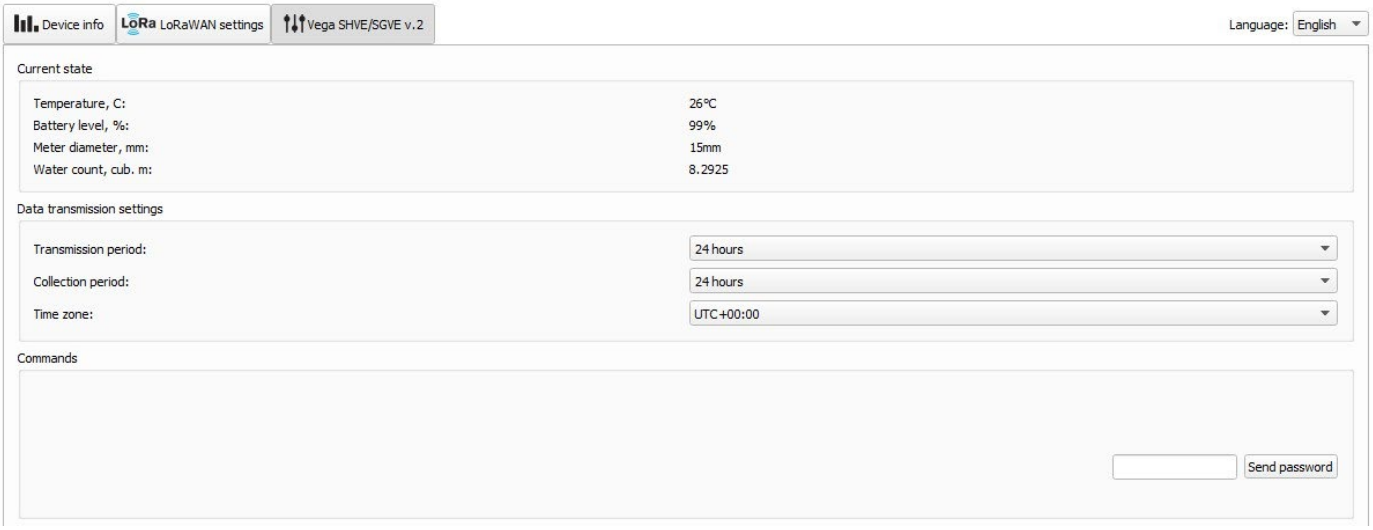

Figure 23 — “Vega SHVE/SGVE v.2” tab

3.6.2 FIELDS DESCRIPTION

3.6.2.1 «Current state» – displays the current parameters of the device (temperature, battery charge, meter diameter, current readings).

3.6.2.2 «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 modem will be set which.

Transmission (communication) period may be equal to 1, 6, 12 and 24 hours.

Data collection period may be equal to 1, 6, 12 and 24 hours.

3.6.2.3 «Commands» – displays the “Send Password” command.

3.7 DEVICE SETTINGS BY DEFAULT

In the table 4 the device settings by default are shown.

Table 4

Parameter	Value
Communication period	12 hours
Data collection period	12 hours
Time zone	UTC +03:00
Frequency plan	RU868
Activation method	OTAA
“Confirmed Uplinks” function	OFF
Adaptive Data Rate (ADR)	ON
Transmitter power	14 dBm
Uplink number	1
Operation mode	Storage

4 LORAWAN COMMUNICATION PROTOCOL

4.1 TRANSMITTING MESSAGES

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

4.1.1 MODEM TRANSMITS PACKETS WITH THE FOLLOWING TYPES

Message with current readings has generated with pre-specified collection period and transmits on LoRaWAN port 2 in according with the schedule. Message structure shown in table 5.

Table 5

Size in bytes	Field description	Data type
1 byte	Packet type, this packet == 1	uint8
1 byte	Battery charge, %	uint8
1 byte	Temperature, ^{o}C	int8
1 byte	External magnetic field 1 – fixed 0 – not fixed	uint8
1 byte	LED indicator lock flag 1 – LED indicator locked 0 – LED indicator unlocked	uint8
4 bytes	Time of the readings at that packet (unixtime UTC)	uint32
1 byte	Leak flag (continuous consumption < 0.3 cubic meter per 30 minutes) 1 – leak 0 – normal	uint8
1 byte	Breakthrough flag (continuous consumption > 0.3 cubic meter per 30 minutes) 1 – breakthrough 0 – normal	uint8
4 bytes	Current readings (in cubic meters multiplied by 10 000)	uint32

When taking readings, the time zone specified in the settings considered.

4.1.2 TIME CORRECTION REQUEST

Time correction request send once a day on LoRaWAN port 4. Message structure shown in table 6.

Table 6

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

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

4.1.3 PACKET WITH CURRENT SETTINGS

Transmits on LoRaWAN port 3. Message structure shown in table 7.

Table 7

Size in bytes	Field description	Data type
1 byte	Packet type, this packet == 0	uint8

2 bytes	Parameter ID	uint16
1 byte	Data length (len)	uint8
len byte	Parameter value	-----
2 bytes	Parameter ID	uint16
1 byte	Data length (len)	uint8
len byte	Parameter value	-----
…	…	…
2 bytes	Parameter ID	uint16
1 byte	Data length (len)	uint8
len byte	Parameter value	-----

4.2 MODEM RECIEVES PACKETS WITH THE FOLLOWING TYPES

4.2.1 PACKET WITH SETTINGS REQUEST

Received on LoRaWAN port 3. The message structure is shown in Table 8.

Table 8

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

4.2.2 PACKET WITH SETTINGS

Received on LoRaWAN port 3. The configuration package is completely identical to the package from the device. The message structure is shown in Table 9.

Table 9

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

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

Setting IDs and their possible values are shown in Table 10.

Table 10

Setting ID	Description	Length	Possible values
3	Activation type	1 byte	1 – OTAA 2 – ABP
4	Confirmed uplinks	1 byte	1 – confirmed 2 – unconfirmed
8	Uplinks number of transmissions	1 byte	from 1 to 15
16	Communication period	1 byte	1 – 1 hour 2 – 6 hours 3 – 12 hours 4 – 24 hours
49	Data collection period	1 byte	1 – 1 hour 2 – 6 hours 3 – 12 hours 4 – 24 hours
55	Timezone in minutes	2 bytes	from -720 to 840

4.2.3 UNLOCK LED INDICATOR COMMAND

Sending on LoRaWAN port 2. Message structure shown in table 11.

Table 11

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

4.2.4. TIME CORRECTION

Sending on LoRaWAN port 4. Message structure shown in table 12.

Table 12

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