



Communicator

LX2M-Qx

Installation and programming manual

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Release date:	26/10/2023

Firmware version:	2.17.0
Version of the EBS Config 2.0:	1.21.5
Version of the OSM.Server:	1.5.07.033

DECLARATION OF CONFORMITY



We, EBS Ltd. Co. declare with full responsibility that the LX2M-Qx communicator meets all requirements provided for in the Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014. A copy of Conformity Declaration is available at: www.ebssmart.com.

IMPORTANT INFORMATION



This crossed out dustbin symbol indicates that when the last user wishes to discard the product at the territory of European Union, it shall be utilized at an authorized and approved collection point. It applies both to the device and accessories marked with this symbol. Do not discard these products along with unsorted municipal wastes.

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Policy of the device manufacturer is to constantly develop the product. The manufacturer reserves the right to make modifications and changes without prior notice in respect of any model functions described in this document.

Depending on programming of devices there are varied available functions. Further details available at Distributor of devices.

Under any circumstances the Manufacturer shall not bear responsibility for any data or income loss, or any other peculiar, accidental or indirect damages caused in any way.

MANUFACTURER

EBS Sp. z o.o.
59 Bronislawa Czecha St.
04-555 Warsaw, POLAND
E-mail : dws@ebssmart.com
Technical support: support@ebssmart.com
Webpage: www.ebssmart.com



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1. BASIC INFORMATION

The LX2M-Qx communicator is a modern device enabling data transmission to the monitoring station in a mobile network (GSM/LTE) in real time. The communicator is designed in such a way that it can be connected to the control panel using a telephone line.

In addition, a distinguishing feature of the LX2M-Qx series are the fully programmable connectors at the configuration stage, where the installer can define whether the connector is to behave as an input or as an output using the program "EBS Config 2.0".

Communication of the device with the monitoring station can be performed indirectly using OSM.Server software and EBS OSM communication protocol (available formats: XML, SIA, CID, FAST4).

The connection to the monitoring station makes it possible to transmit data from the alarm control panel via Contact ID (DTMF) or SIA.

With a telephone line, the LX2M-Qx communicator works with all the most popular alarm systems.

The use of packet data transmission allows to reduce the costs of alarm system operation. It is also possible to send text messages to private mobile phone numbers.

Data transmission security was ensured using modern encryption methods. 256-bit encryption keys and the AES method (*Advanced Encryption Standard*) were used. For this reason, receiving such a transmission is possible with the use of the OSM.Server monitoring system receiver.

The transmitters can be programmed:

- locally with the use of a computer and a dedicated program 'EBS Config 2.0'
- remotely
 - via GPRS / LTE link
 - via SMS commands,

2. FUNCTIONAL AND TECHNICAL SPECIFICATIONS

Transmission channels		GPRS, LTE-FDD, SMS
Backup server		YES (GPRS, SMS)
User notifications		SMS (5 phone numbers)
Communication watchdog		YES
Partitions		2
Simulated PSTN line		YES
Protocols supported by telephone input		SIA, ContactID
Outputs / Inputs		4 connectors with configurable role - inputs or output
Inputs		4
Output functions		- mobile network watchdog - mobile data watchdog - no connection to server - no cellular signal - when incoming call detected form stored number - reaction on state of one of the inputs
+12V power output		-
Size of the event buffer		-
Number of system events stored in history		min. 5000
GPRS/SMS transmission protection		AES encryption
Status LEDs (functions)		4 LEDs (GSM signal level signalling, device status, DTMF communication)
Configuration		Remote: GPRS/LTE / SMS, CSD,
		Local: from PC (wire required: GD-PROG, SP-PROG or MINI-PROG-BT)
Remote firmware update		YES
Remote management of the arming status of the alarm control panel		YES (via the EBS Security mobile application)
Remote update of the alarm control panel software (downloading)		-
Phone line protection		YES
Card supported		Nano SIM
Supported modems		LX2M-Q30, LX2M-Q31 (protective blister pack version) - Modem Quectel EG915U-EU Bands LTE: B1, B3, B5, B7, B8, B20, B28 Bands GSM: B2, B3, B5, B8; LX2M-Q40, LX2M-Q41 (protective blister pack version) - Modem Quectel EG915U-LA Bands LTE: B2, B3, B4, B5, B7, B8, B28, B66 Bands GSM: B2, B3, B5, B8;
Power supply parameters	Supply voltage:	13.8 VDC (acceptable: 12-14 VDC)
	DC consumption for 13.8VDC	Medium: 50 mA for 4G; 50 mA for 2G Maximum: 300 mA
Dimensions		PCB: 83 x 50 mm
Operating temperature		-10°C ... +55°C
Operating humidity		5% ... 93%
Standards		CE

3. ASSEMBLY AND WIRING

Switch power off to perform any connection.

3.1. Connecting LX2M-Qx

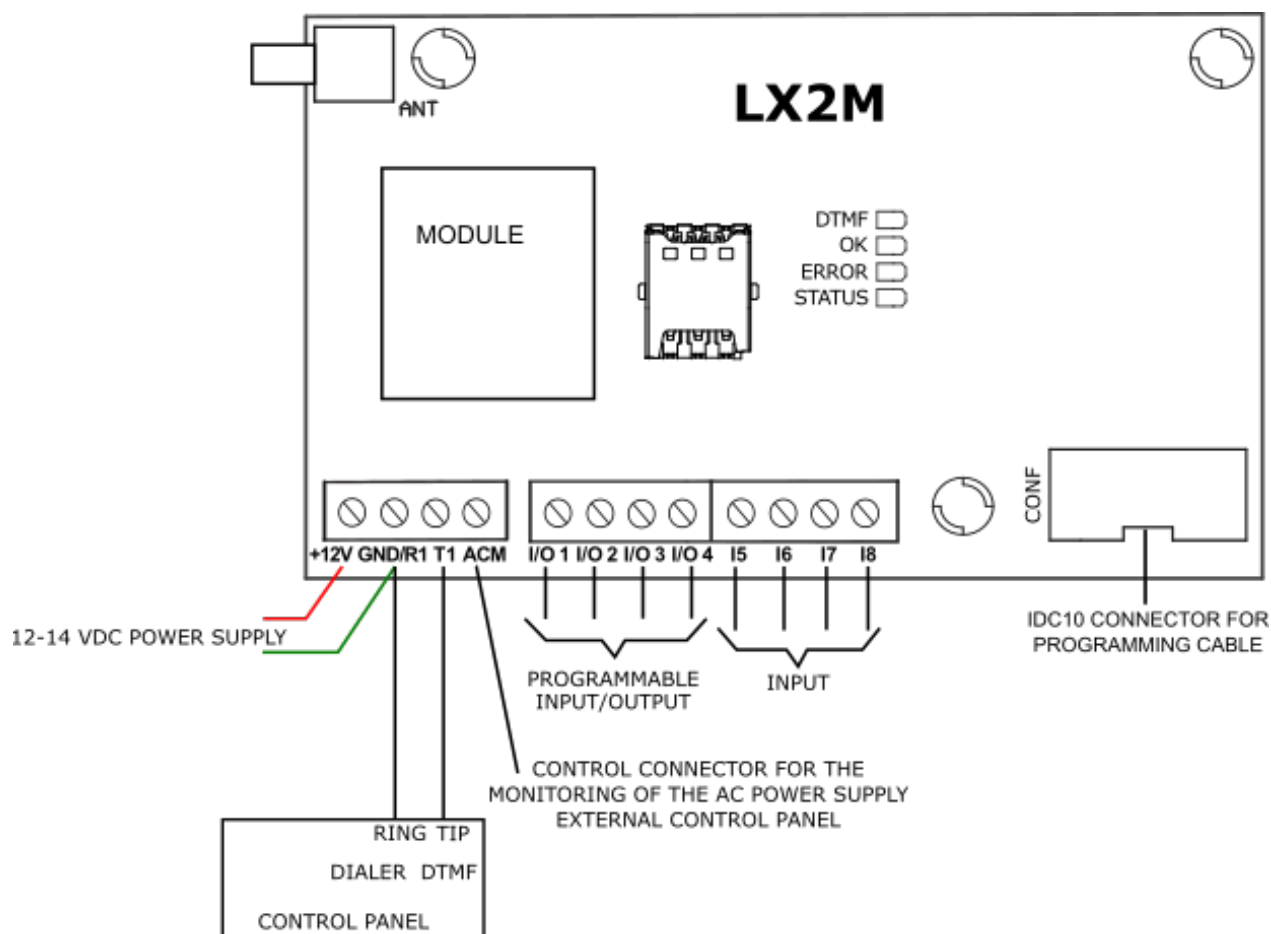


Fig. 1. PCB Communicator board.

Wire connections should be done carefully to avoid short circuits or breaks in the circuits. Connection points should be protected from the atmospheric conditions.

Use the figure above to connect the transmitter terminals with the following connections:

Terminal	Description of connectors
+12V	Positive 12-14VDC supply pole
GND/R1	Common connector for the negative pole of the power supply, the ground of the device (for inputs and outputs) and for connecting the telephone communicator of the control panel.
T1	Connection for connecting a telephone communicator of the alarm control panel.
ACM	Control connector for monitoring the AC power supply to an external control panel. If this connector is connected to the control panel AC connector, the communicator can verify the presence of power in the control panel.
I/O 1 – I/O 8	Role configurable connectors where the installer, using the "EBS Config 2.0" program, can define whether the

	connector is to behave as an input or as an output. If configured as an input, the connector behaves as a typical signal input. If configured as an output, the connector behaves as a typical OC output.
I5 – I8	Signal inputs. For connection to control panel outputs (e.g. testing of output activation).

Length of the wires connecting between the transmitter and control panel must not exceed 3m.

The connectors configured as Outputs are OC type. Do not connect the output directly to a positive voltage relative to the ground. Do not apply a voltage higher than 12V. The maximum current that can be controlled, should not be greater than 100mA.

Don't connect power supply when GSM antenna isn't connected, because it can cause permanent damage of GSM modem.

The procedure for programming the transmitter (see chapter 6).

3.2. Input configuration

NOTICE! The presence as well as the number of inputs on the communicator depends on its configuration! At the installation stage, configure the appropriate number of inputs (see section 7.4). The maximum number of zones is 8.

Inputs IN1 – IN5 might work as normally closed (NC) or normally open (NO). Additionally inputs might be configured as single end-of-line (EOL-NO or EOL-NC) with resistors $2.2\text{k}\Omega$ or as double end-of-line (DEOL-NO or DEOL-NC) with resistor $1.1\text{k}\Omega$. Examples of connecting sensors to the inputs in various configurations are shown in figure 6.

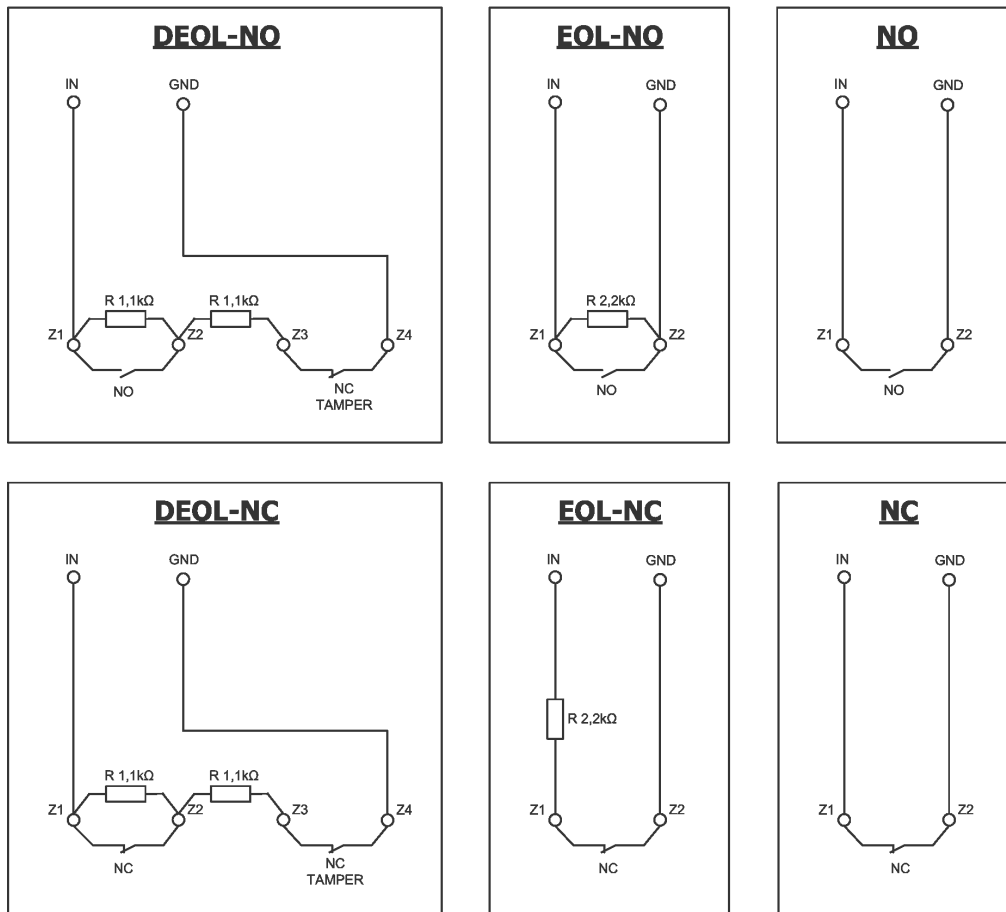


Fig. 6. Examples of connecting sensors to the inputs in various configurations

4. QUICK START PROCEDURE

NOTE:

Do not insert SIM card before the first programming of transmitter as it may block the card if PIN code is required for the card.

This chapter is purposed for users that possess experience regarding cellular network data transmission systems and who work with OSM.Server receiver for monitoring system. Other users shall skip this chapter and go to chapter 5 of this Manual.

As many users possess protected facilities spread at vast locations, local programming of transmitter is not always available (with PC computer and programming cable).

Two phases comprise programming in this option:

- a) sending to transmitter of main parameters (with SMS) that enable connection to receiver (OSM.Server system).
- b) full configuration of device with remote programming (GPRS transmitter configurator and OSM.Server).

Quick start procedure:

- a) insert into device SIM card with PIN code 1111 or disabled PIN code,
- b) connect power supply for module,
- c) send to SIM card number with SMS parameters related to connection of device to receiver (OSM.Server)
- d) waiting for moment, when device indicates connection to OSM.Server

Note: Connection to receiver is possible if the device was registered into it. Registration procedure has been described in OSM.Server Operation Manual.

- e) complete, remote programming with EBS Config.

SMS text message shall provide the following information:

<transmitter's service code> ■ *SERVER=<server address>* ■ *PORT=<server port>* ■
APN=<access point name> ■ *UN=<user ID number>* ■

PW=<user password>

Where:

■: space (every parameter shall be separated with space – blank character)

<transmitter's service code>: factory settings – **1111**

<server address>: address of communication server purposed for collection of transmitter signals e.g. 89.123.115.8. In case address is provided as domain e.g. block.autostrada.com, SMS message shall include DNS1 parameter (address of main DNS server)

<server port>: Number of port in server that receives messages from a device

<access point name>: defines access point name to GSM network.

If private network is used, SMS message shall provide the following parameters:

UN=<user ID number> and *PW=<user password>*.

Exemplary SMS is as follows (if we use public network and provide server address as IP):

1111 ■ SERVER=89.123.115.8 ■ PORT=6780 ■ APN=internet ■ UN= ■ PW=

Where:

■: space character

5. OPERATION

.A device can be configured to maintain communication via GPRS / UMTS / HSPA network or SMS messages. Communication mode is configurable – see chapter 7. for more information. As a result the transmitter may be used only at the territory covered with mobile phone operator network.

If status of inputs is the same as programmed one (NO or NC) a device stays in a rest. Change of status on any input results in immediate signal transmitting of this event by the device.

Note:

Each connector configured in the device as an input can be individually defined as normally open (NO) or normally closed (NC). It means that when in NO, input shorting will be an active state and, a non-shorting will be an active state in NC.

To avoid an excessive cost of use related in particular to false alarms a device possesses a programmable analysis of inputs.

All inputs respond only to states change which means that transmitting will follow only if an active state is on input and maintains during programmed minimum time. Maintenance of active state longer than a minimum time will result in single indicating. Another input activation (another transmitting) is possible only after input reached based state.

Number of messages sent in SMS mode is limited (limit includes also text messages or answers to orders sent by user). This function provides for cost reduction by limiting messages e.g. in case of damage of sensor connected to any input. After passage of programmed time new messages will be sent but only in a number determined by the user.

Text message on events sent to private phone numbers may be edited.

Configuration of transmitter for cooperation with an control panel's phone communicator requires entering into memory a phone number for which transmitter is to answer.

All programmable parameters are saved in memory and in case of voltage drop that are not lost. Supply of power starts the transmitter with saved settings.

6. CONFIGURATION PROGRAM

6.1. Initial remarks

The **EBS Config 2.0** application is provided for programming the control panels and communicators produced by EBS using programming devices and remotely via UMTS/LTE. Thanks to a thought-out interface and grouping of tabs, using the app is simple and configuring the device itself is easy and effortless.

6.2. PC technical requirements

Minimum requirements for computer system where configuration software is to be installed are the following:

Hardware:

- CPU 1 GHz or better, 32-bit (x86) or 64-bit (x64),
- 1 GB RAM (for the 32-bit version) or 2 GB RAM (for the 64-bit version)
- 4.5 GB HDD space.

Software:

- Operating system: Windows 7 or newer,
- .NET Framework 4.6.1 or newer.

6.3. Smartphone technical requirements

EBS Config 2.0 is currently only available for Android smartphones. Android version at least 5.1 or newer is required for correct installation and operation of EBS Config 2.0 mobile application.

6.4. Installation

If you have a SIM card with a pre-programmed PIN code other than 1111, you should first configure the device using the EBS Config 2.0 by entering the pre-programmed PIN code to the card and only then insert the SIM card into the device. Otherwise, the card may be blocked (incompatibility of PIN codes).

If you have a SIM card with a disabled PIN code or the PIN code is 1111, you can insert the SIM card into the device at any time.

6.4.1. PC

Download **EBS Config 2.0** for the PC from www.ebssmart.com. After downloading and opening the downloaded file, the installation process will start, during which you should choose the installation language, enter data, define the location of the program components (default location is C:\Program Files\EBS\) and create the shortcuts to the program (on the desktop or on the quick launch bar).

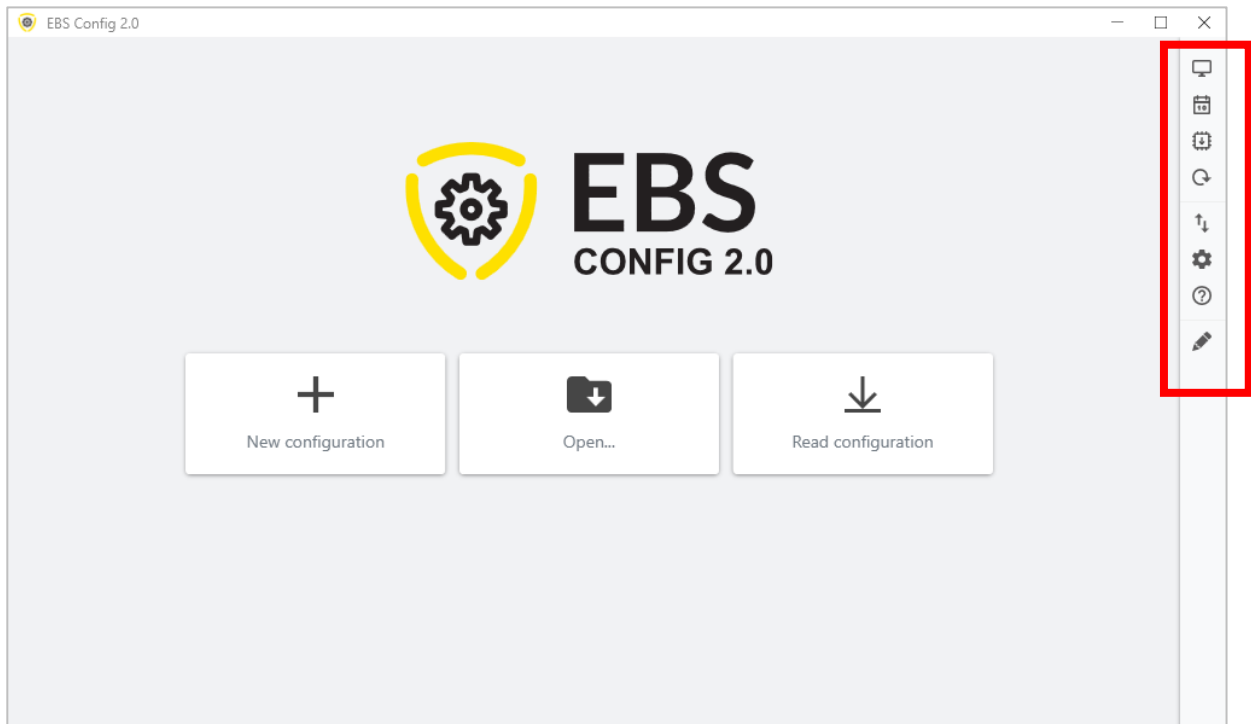
6.4.2. Smartphone

Download **EBS Config 2.0** for the smart phone from Google Play. After completing the installation process, you can open the app and start configuration. EBS Config 2.0 interface for the mobile version is the same as for desktop version.

6.5. General menu

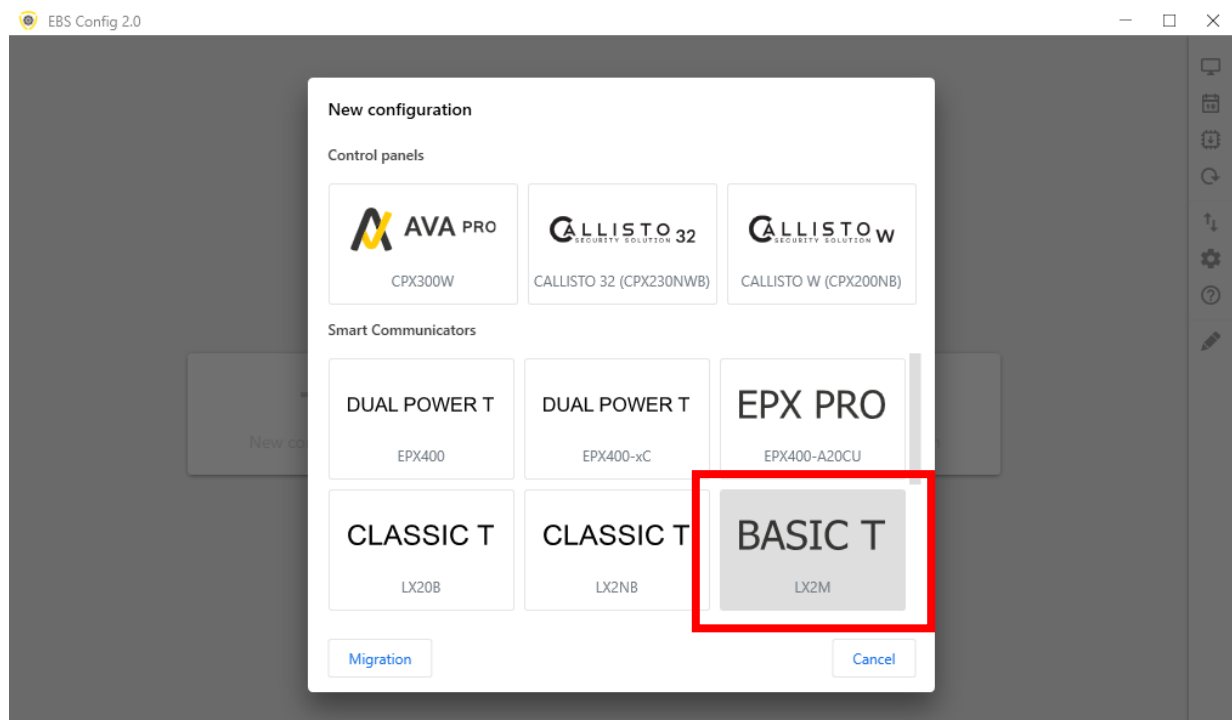
After installation and program starting a main view shall be displayed on screen.

General menu is on the right side of the program screen.



6.5.1. New configuration +

Opens a new set of parameters for the other kind of devices – control panels and transmitters. With this option, you can edit the configuration parameters of the proper device. For LX2M-Qx select Basic T LX2M:



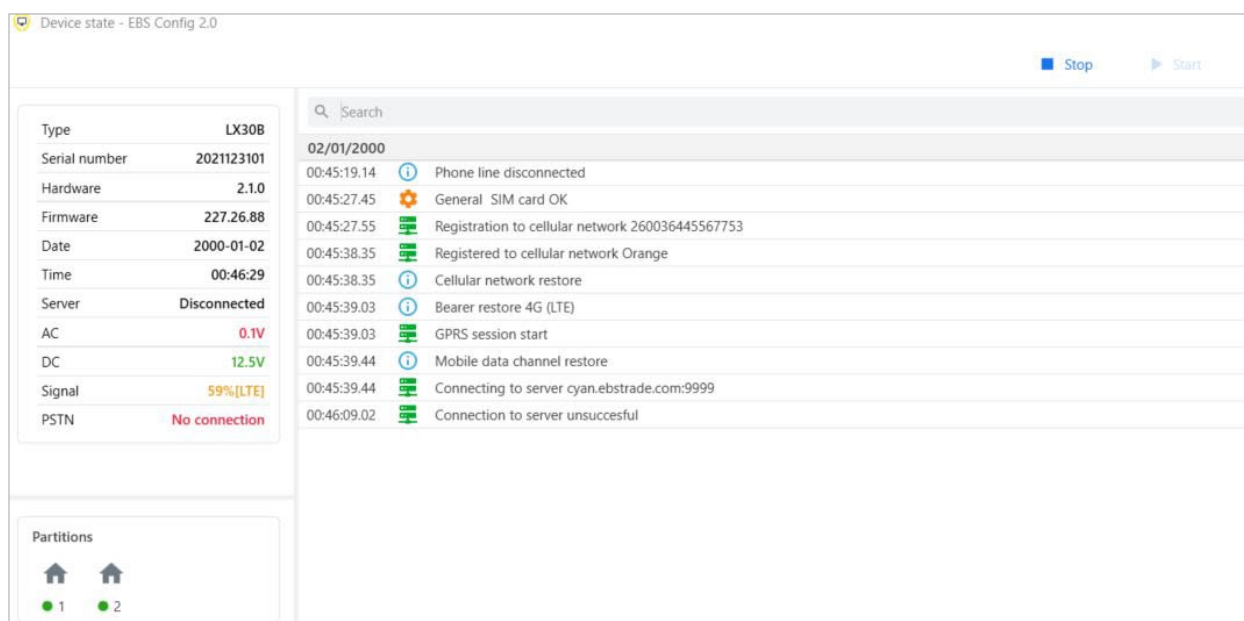
6.5.2. Open...

If you have a file with saved settings, these data can be used to program another device. First of all, specify the catalogue where the file was stored, and then specify the file name. The obtained data set can be modified by the user. Send the read and possibly modified data to the alarm panel by switching it into the programming mode using a dedicated programming device.

6.5.3. Save as...

If you program a number of devices in different configurations, you do not need to remember each of them. You can save on your hard drive all the device settings under a specific name and read them later. This feature saves all information from the configuration windows to the drive. After calling the function a dialogue box appears asking for the file name. The default data is saved with the following extension: **.cmi**.

6.5.4. Device state



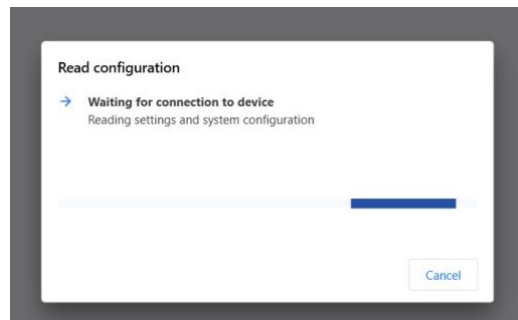
The "Device state" window includes information about the device: serial number, hardware version, firmware, set date and time. Additionally, the following parameters can be monitored in real time:

- Status of server connection,
- Status of DC power,
- The GSM/LTE network signal level,
- Status of the wired inputs,
- Status of the wired outputs,
- Arming mode.

6.5.5. Read configuration

This function reads the information stored in the device memory. Depending on the defined connection type (see chapter 6.5.10 Connection settings), you will be able to read the history remotely via LTE/HSPA+, and locally using Bluetooth (SP-PROG-BT, MINI-PROG-BT) and an RS232 (SP-PROG,GD-PROG) after switching the

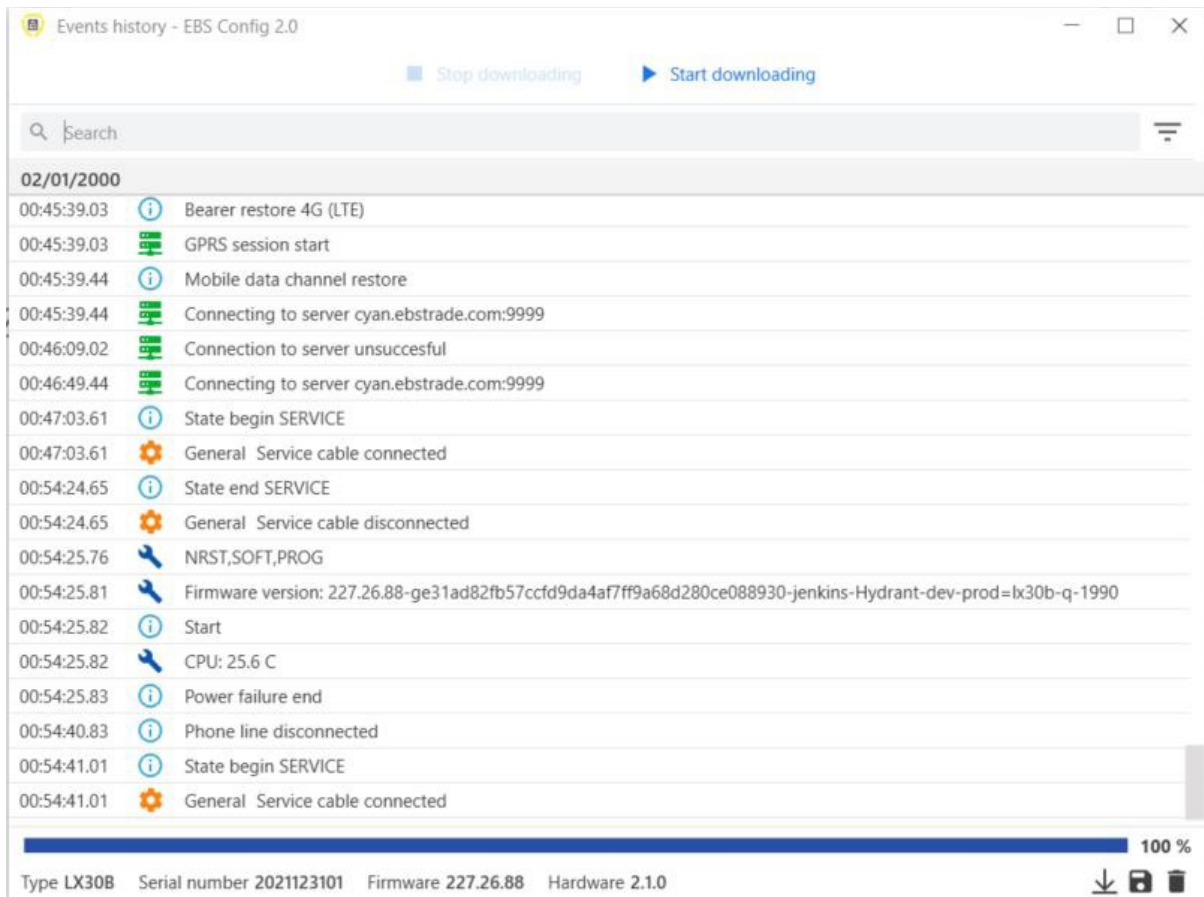
communicator into the programming mode (only MINI-PROG-BT automatically switches to programming mode). By clicking "Read configuration" button, you can start downloading the settings saved in the communicator's memory, with a message bar containing successful/failed reading shown at the bottom of the app. Data downloaded from the device can be stored and used later for other devices.



6.5.6. Write configuration

This function is similar to the above, but it allows you to send settings and configuration to the device memory (select "Settings and system config" option). You can also set the date and internal clock for the device (use field "Device time and date"). By clicking "Send" button, you can start sending the defined data, with a message bar containing successful/failed sending information shown at the bottom of the app.

6.5.7. Events history



This function allows you to read approx. 5000 recent technical events stored in the device memory. Depending on the defined connection type (see chapter 6.5.10 Connection settings ) , you will be able to read the history remotely via LTE/HSPA+, and locally using Bluetooth (SP-PROG-BT, MINI-PROG-BT) and an RS232 port (SP-PROG,SP-PROG-BT, GD-PROG). After successful reading of the history, you can search for events by entering names in the field marked with a magnifying glass. It is also possible to filter data by event type and date which enables quick navigation through events.

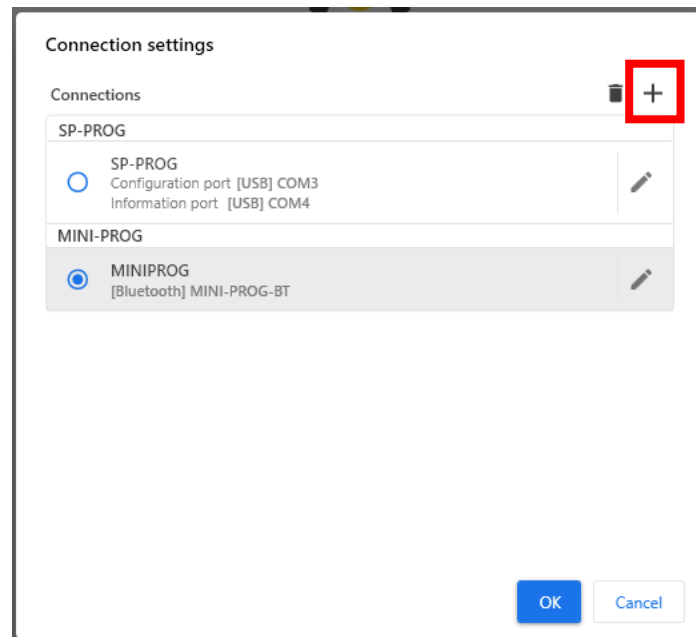
6.5.8. Firmware update

The device has a built-in bootloader, so that you can change the module software for the newer. In the window displayed, browse to the location of the file and press "Update".

6.5.9. Restoring factory settings

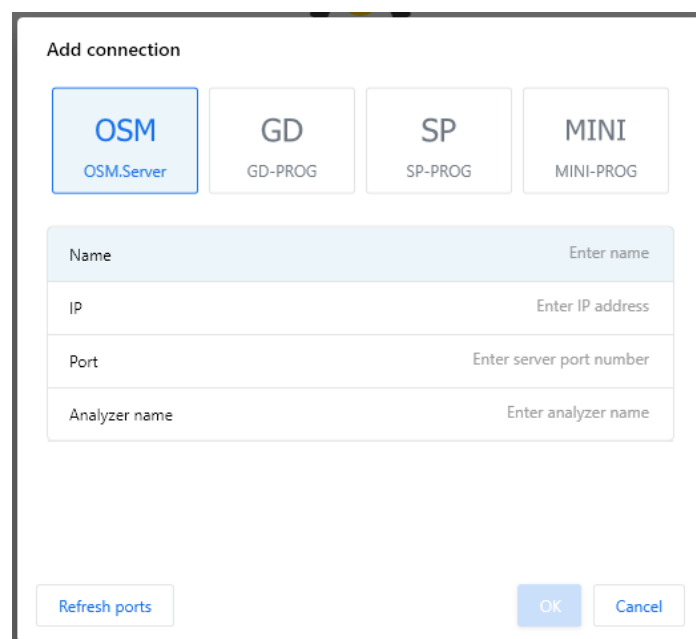
Use this option to restore default system configuration. All data you entered will be deleted and replaced with factory defaults. The users and devices added to the communicators **will not be deleted** but their configuration will be deleted.

6.5.10. Connection settings



Click on  to display a window with the available connection methods shown:

- **OSM.Server** – type of remote connection with an OSM.Server via GSM/LTE;



You can define the following parameters using this window:

- IP address of an analyser
- Port to be monitored by the analyser for commands, e.g. 9000
- Name of the analyser e.g. primary

which apply to the settings of a receiver of the OSM.Server monitoring system.

The connection will be saved after clicking "OK". From now on, the program will allow you to remotely connect to the device and also to read and store parameters in the device memory.

- **GD-PROG** – type of local connection working with a programming device by the same name with a single COM port assigned.
- **SP-PROG** – this type of connection includes two programming devices:
 - SP-PROG equipped with a micro USB and RS232 ports, with two COM ports assigned. One is a configuration port for use during programming, and the second is information port for use during monitoring of the status of communicators.
 - SP-PROG-BT, equipped with a micro USB, RS232 ports and a Bluetooth module. When connected using a cable, it is the same as with SP-PROG. When using Bluetooth, set the same port number both for *Configuration port* and *Information port*, which will be used for communication.
- **MINI-PROG-BT** – a type of local connection working with a programming device by the same name with a single COM port assigned.

If the new ports have not been displayed automatically after connecting the programming device, press "Refresh ports".

When using the Bluetooth connection, the first step is to pair the programming device (SP-PROG-BT, MINI-PROG-BT) with the PC/smart phone. Select the correct device from the list of identified devices ready for connecting. The correct device is the one plugged into the communicator.

Only after pairing the programming device with a PC an open port will be shown in EBS Config assigned for communication between the programming device and a PC.

6.5.11. Application settings

In this window, you can select one of application languages and select a colour scheme.

6.5.12. EBS Config 2.0 – Info



Select this item to view a window with additional information:

- app version;
- telephone number to EBS Technical support;
- a link for sending comments.

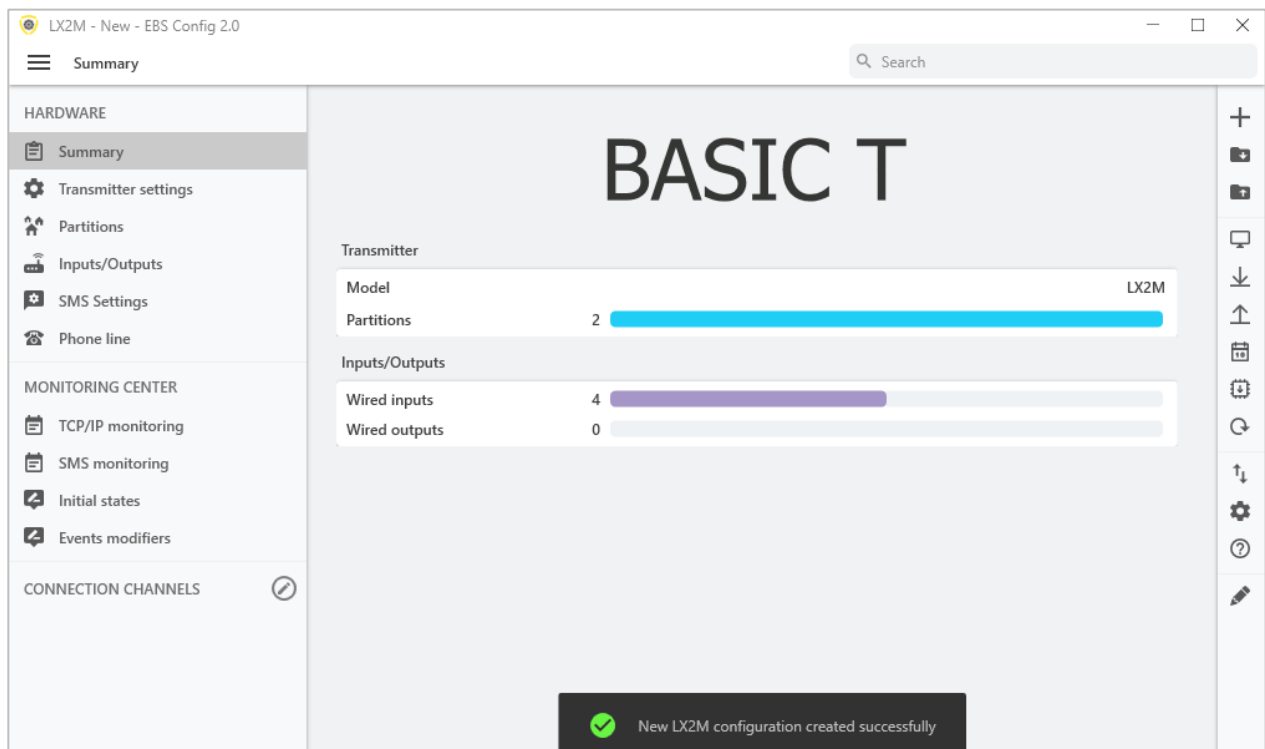
7. PROGRAMMABLE PARAMETERS

In this chapter, you will find detailed and exhaustive descriptions of all the programmable parameters which determine the operation of the device.

7.1. Summary

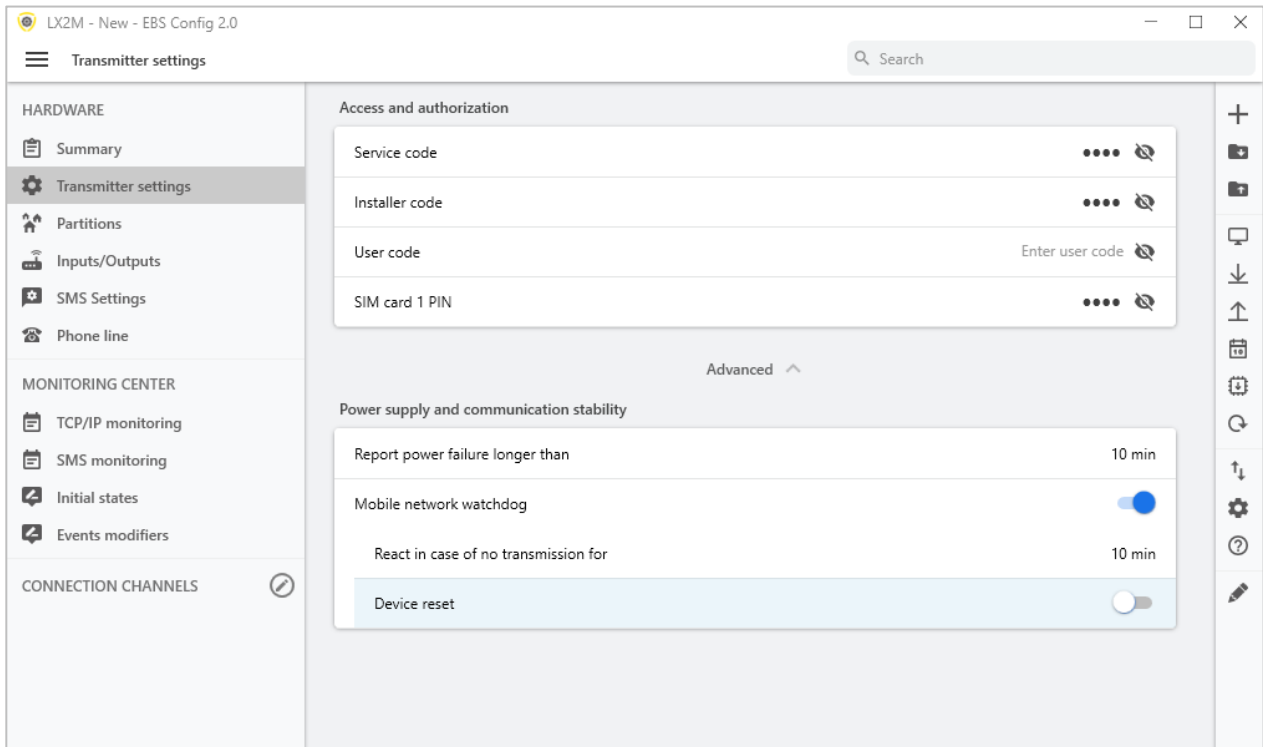
This tab contains the following information:

- Device model, serial number, installed modules,
- Number of partitions created in the system and number of connected wired ports,
- Number of wired inputs/outputs.



7.2. Communicator (transmitter) settings

After opening the tab, the main parameters of the device are shown for the first. Clicking on the "Advance" below, shows the remaining parameters.



7.2.1. Service Code

This code provides the highest level access to the system. It is used both for local programming of the device and also for remote controlling (in TCP/IP or SMS mode). Factory setting is **1111**. During the first starting of device (programming) it shall be changed. Code may consist of up to seven alpha numerical characters.

7.2.2. Installer code

Allows restricted access to the parameters of device. When installer code is used following groups of parameters are unavailable: Access, Transmission, Restrictions, SMS notifications, RS232, Link control, and Phone line. An unauthorized attempt to access to this parameters causes error notification.

Default installer code: **2222**.

7.2.3. User code

This code is used to authenticate the user who registers the communicator with the EBS Security mobile application. It must be entered during registration.

NOTE! If the code was not defined while programming the communicator, entering it during the first registration of the device in the EBS Security application will cause the code to be stored in the device. Subsequent change of the code can be done only via EBS Config 2.0.

7.2.4. SIM Card 1 PIN

As a device operates via UMTS network, SIM card is indispensable and it may be received from phone operator. Before the first use PIN code of SIM card shall be

programmed for operation in given communicator. PIN code is indispensable for automatic system launching. In case of card without PIN code, it is possible to enter any value e.g. 0000.

If you enter wrong PIN number after inserting card and switching on communicator, the system will not launch and you may be able to use card after entering PUK card only (with use of any GSM mobile phone).

Factory setting of PIN in communicator is **1111**.

7.2.5. Power supply and communication stability

7.2.5.1. Report power failure longer than

Here, define the period after which a power loss will be reported.

7.2.5.2. Mobile network watchdog

This option enables automatic reaction of a control panel after loss of connection with a GSM mobile network or when GPRS/LTE transmission becomes impossible.

Two additional fields will appear after activating this option:

- React in case of no transmission for

Here, define the period of waiting until modem reset after detecting loss of network connection (no transmission).

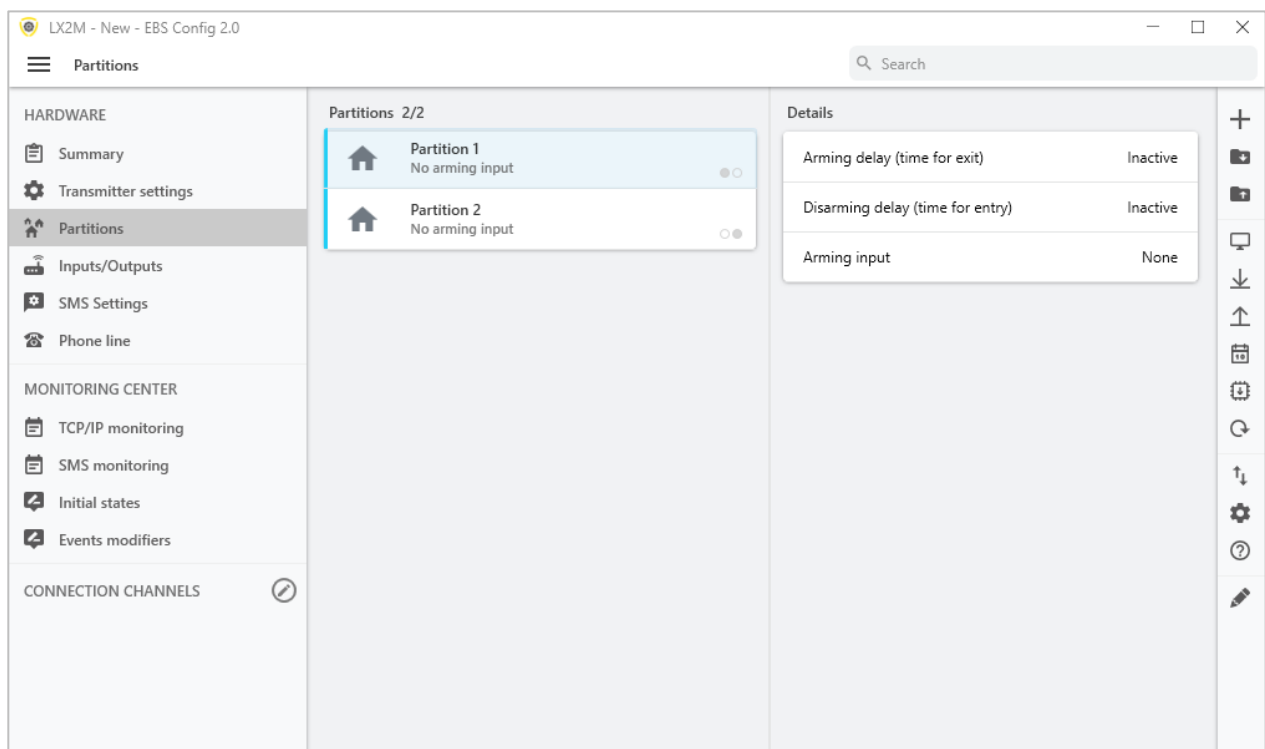
- Device reset

Here, define the period of waiting until device reset (not just a modem reset) after detecting loss of network connection (no transmission).

7.3. Partitions

Using partitions you may configure which inputs will be monitored depending on state of one of the inputs (arming). If arming input is not active then all changes of the state of the input assigned to partition will be ignored. For the active arming input all

changes of the state of the input assigned to partition will be monitored and processed in a normal way.



7.3.1. Arming dalay (time for exit)

After clicking on this option, additional list will show, where you can set the time for exit. Partition inputs will be monitored when this configured time elapses after partition input had been armed.

7.3.2. Disarming dalay (time for entry)

After clicking on this option an additional list will show, where you can set the time for entry. Time after which alarm will be generated after delayed input had been armed and partition to which delayed input belongs will not be disarmed.

7.3.3. Arming input

After clicking on this option, partition arming input can be selected. To selected input, arming device (remote controller receiver output or electronic keypad NO/NC output for instance) is connected. When this input is armed, partition is armed (after Exit Time, see below). When arming input is disarmed, partition is disarmed.

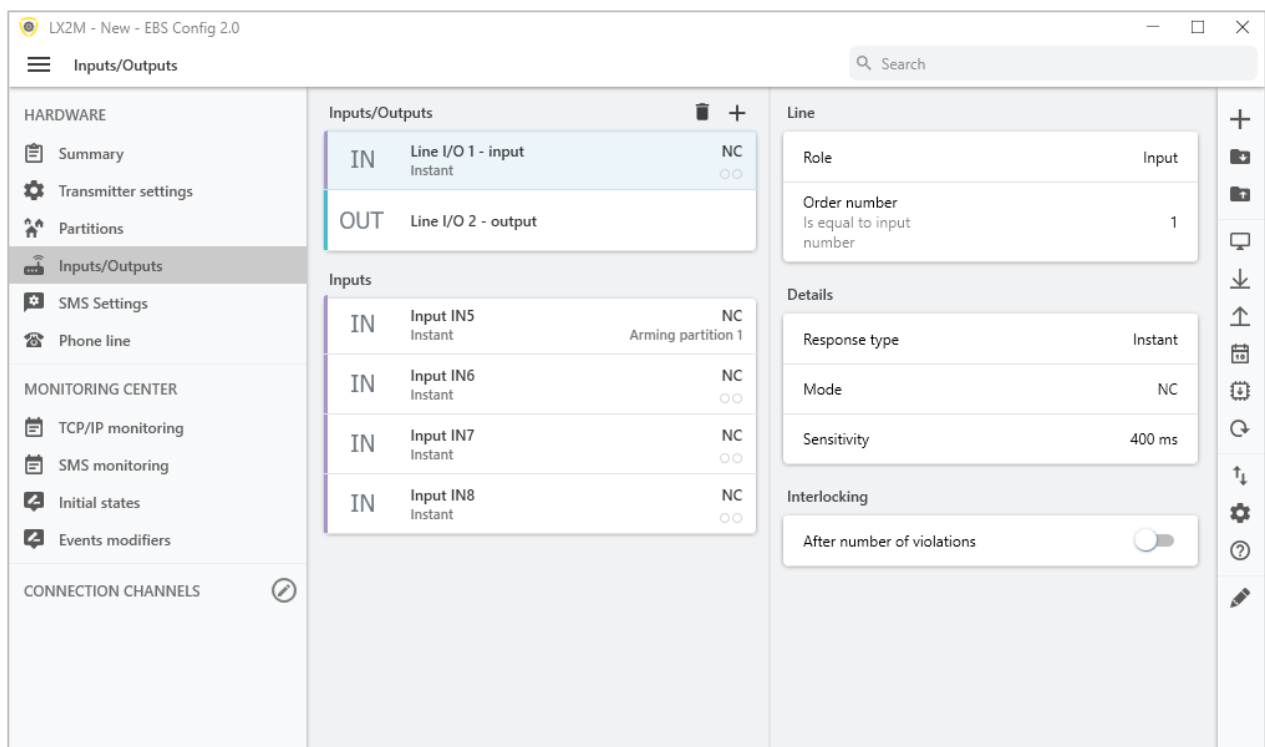
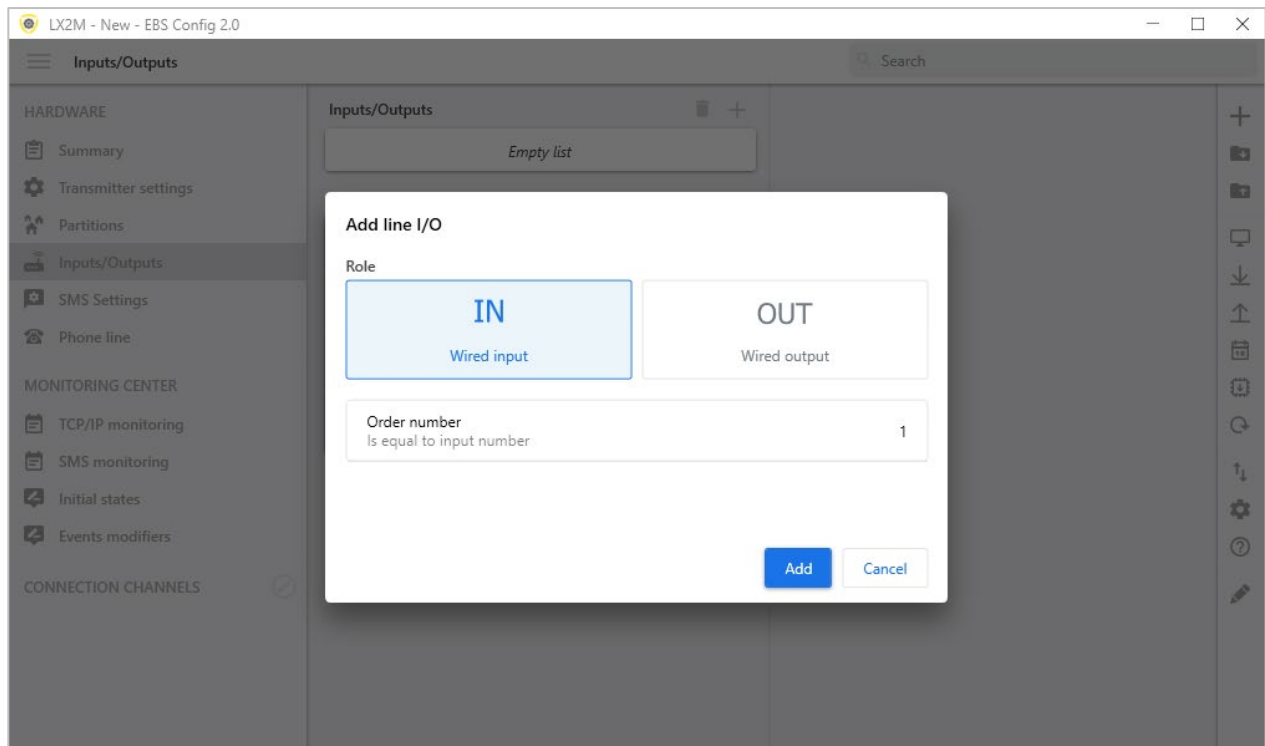
7.3.4. Connected wired inputs

Assigning input to partition means that it is monitored only when partition to which input belongs is armed. Input can be assigned up to one partition. Arming inputs can not be assigned to any partition. If input is not assigned to any partition, it acts as 24 hours input – it is monitored regardless of partitions state.

7.4. Inputs/Outputs

The communicator has w inputs and 4 wire connectors that can be configured as inputs or as outputs. The "Input/Output" option allows to configure the communicator in accordance with the requirements of the user.

To add 4 more input click "+" then "IN", set the input sequence number and click Add button. To add output (max 4) click "+" then "OUT", and also set the output sequence number and click Add button.



7.4.1. Wired inputs

If a connector is defined as an input (in the 'Role' field, 'Input' is selected from the drop-down list), the parameters appropriate to the inputs appear in this tab and can be configured. These parameters are identical for both fixed wired inputs (IN5-IN8) and those with a configurable role (I/O 1 - I/O 4).

7.4.1.1. Response type

- **Locked** — refers to a permanently blocked input. A input will not send any information about the change of the input's status.
- **Instant**— violating the input will result in an immediate alarm if the system is armed.
- **Delayed** — delayed input switches on associated output, ie. generates alarm, after expiry of Entry time, but only when partition to which input belongs will not be disarmed before Entry time period.

7.4.1.2. Mode

The parameter describes input configuration and stable state of input. Any change of that state causes alarm message to be sent. The following configuration types are available: NO / NC / EOL-NO / EOL-NC / DEOL-NO / DEOL-NC.

NC type input must be closed for the whole time. Line interruption causes its induction.

NO type input remains open. It activates when closed.

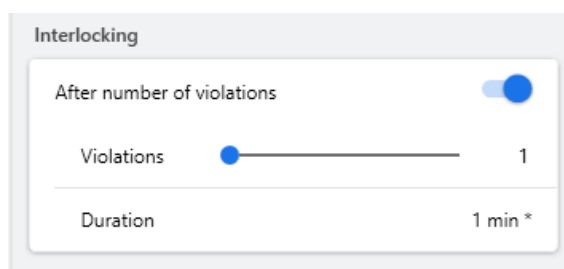
EOL and DEOL (single end-of-line resistor and double end-of-line resistor) differ with 1 or 2 resistors allowing distinguishing alarm from sabotage.

7.4.1.3. Sensitivity

This parameter means minimum time for change maintenance at input so that it would be detected by communicator. Default setting is 400ms.

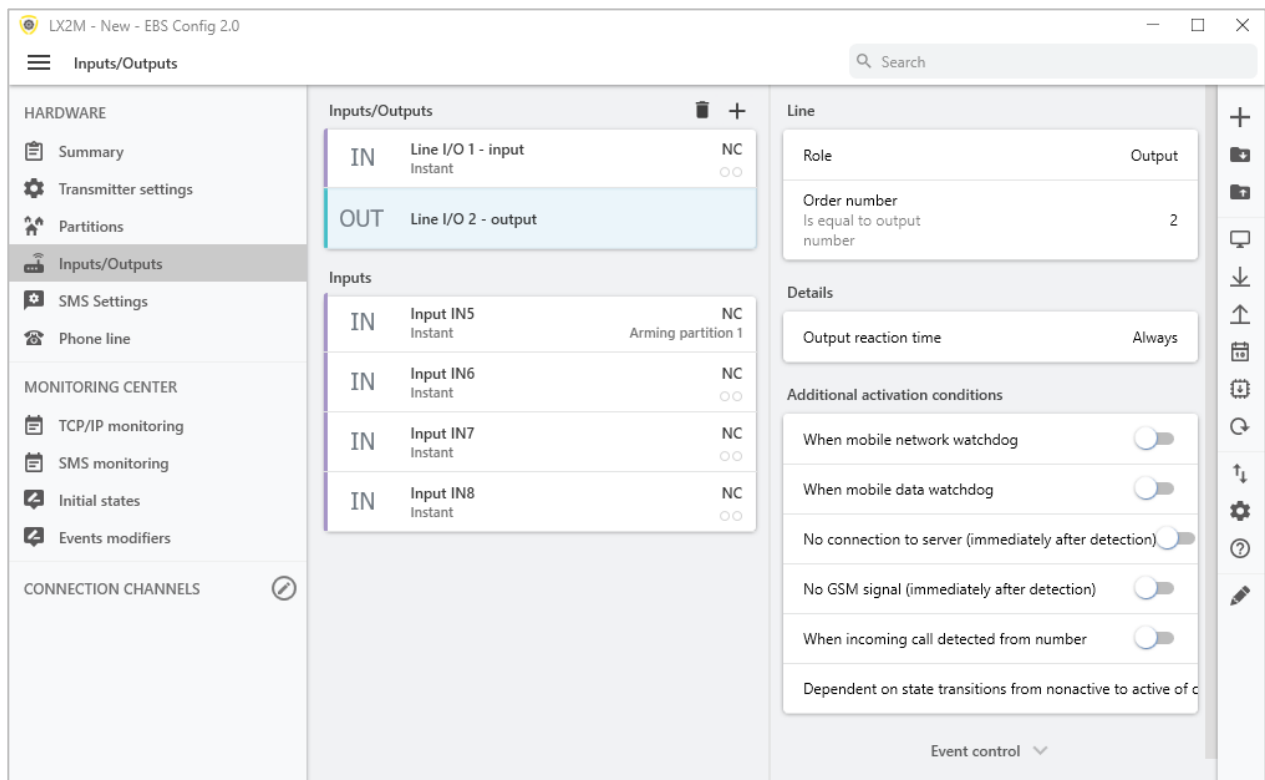
7.4.1.4. Interlocking – After number of violations

With this option you can lock any input of connector, and as a result condition changes on this input will be ignored and will not be reported to monitoring station. Selecting this option will result in displaying an additional items *Violations* with a slider for setting a lock for input after a specific number of violations (input state change) from 1 to 100, and *Duration* where you have to set duration time for lock of the input.



7.4.2. Wired output

If a connector is defined as an output (with 'Output' selected in the 'Role' field), this tab offers the following configuration options.



7.4.2.1. Output reaction time

Thanks to this option you may choose output operation mode. There are two operation modes available:

- always – connection follows for indefinite time – up to the moment of disconnection of power for module or remote command which switches output off,
- for the specific time – connection follows for time defined by user.

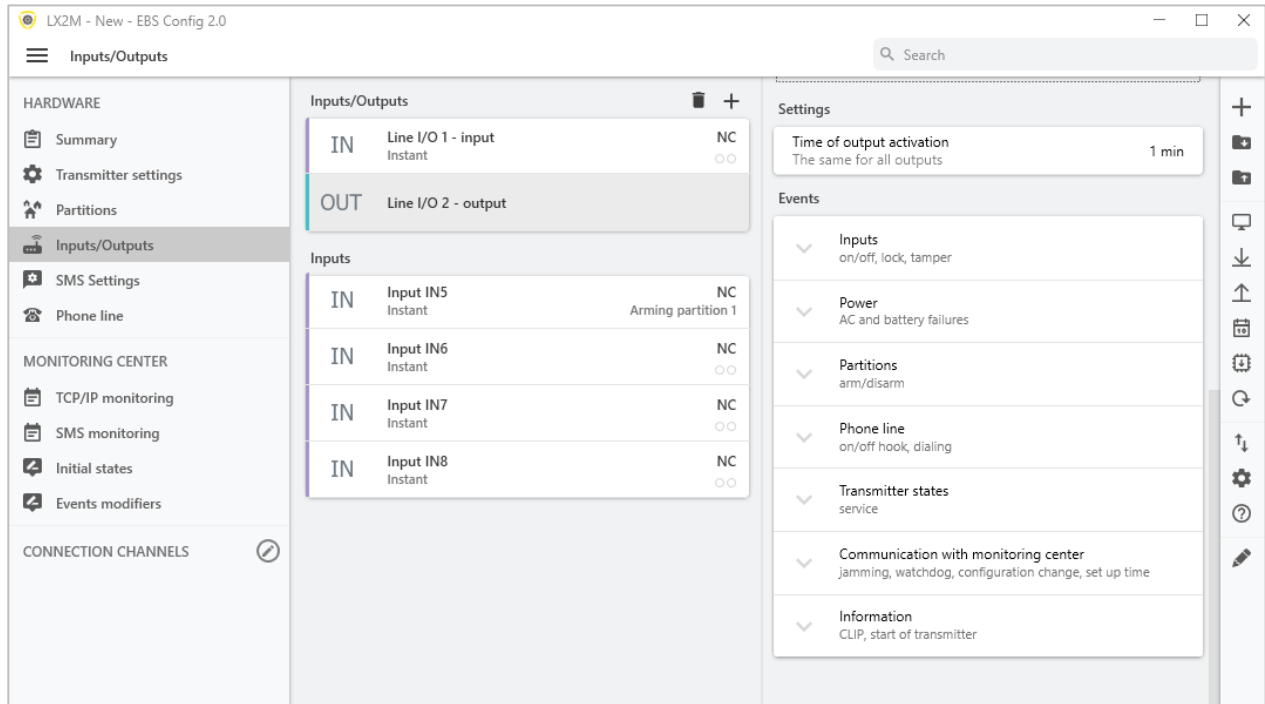
7.4.2.2. Additional activation conditions

In this section you can define conditions for activating of outputs.

User can set following conditions:

- When mobile network watchdog - activation of the output when connector has registered loss of cellular network,
- When mobile data watchdog – activation of the output when connector has registered loss of mobile transmission,
- No connection to server (immediately after detection),
- No GSM signal (immediately after detection),
- When incoming call detected from defined telephone number,
- Dependent on state transitions from nonactive to active of the inputs.

7.4.2.3. Event control



Note: Do not use the basic output configuration and the advanced output control at the same time!

In the "Event control" you may define separately the behavior of each of the outputs, depending on events taking place. "Advanced outputs control" differs from the existing basic "Outputs configuration" by:

- making it possible to not only to turn on but also to turn off the output
- output can be activated temporarily for specified amount of time
- there is a complete list of events for which you can define the behavior of the output.

In particular, the basic configuration of existing options: "No GSM signal (immediately after detection)" and "Dependent on state transitions from non-active to active of one of the inputs" should not be used with their replacements "[Off] GSM" and "[On] Input x". The use the basic configuration of outputs and "Advanced outputs control" at the same time, may cause unexpected behavior of the communicator.

Advanced Event Types:

- Inputs (on/off, lock, tamper);
- Power (power and battery failure);
- Partitions (arming/disarming);
- Telephone line (call initiation/termination, picking up/putting down the handset, dialing);
- Transmitter status (service);
- Communication with monitoring center (jamming, data transmission control, configuration change, time setting);
- Informational (Clip, start of transmitter - communicator);

7.5. SMS Settings

The screenshot shows the 'SMS Settings' window in the LX2M - New - EBS Config 2.0 application. The left sidebar contains a navigation menu with categories: HARDWARE (Summary, Transmitter settings, Partitions, Inputs/Outputs, SMS Settings, Phone line), MONITORING CENTER (TCP/IP monitoring, SMS monitoring, Initial states, Events modifiers), and CONNECTION CHANNELS. The main area is titled 'SMS Settings' and contains a search bar. The 'SMS handling' section includes a dropdown for 'Accept SMS commands' (set to 'From anyone') and a table for 'Validity period of outgoing SMS messages' with columns for the setting name and its value (all set to 'Maximum'). The 'Limits' section has a toggle for 'Active' (checked) and a slider for 'Maximum quantity' (set to 10). Below this is a 'Counter reset' button (set to 1 hour) and several toggle switches for 'Tests sent to server periodically', 'Events sent to server', 'SMS notifications sent to user', and 'Answers for SMS commands'. At the bottom, the 'SMS forwarding' section shows '0/5' entries and an 'Empty list' message. A vertical toolbar on the right side of the main area contains various icons for adding, deleting, and editing settings.

A user can limit remote access to a device via text message to the selected phone numbers. When you create a list of phone numbers (max. 5), you can only control the device using those numbers.

Available options:

- **From all:** Communication is possible with any phone number.
- **Do not accept:** Communication is impossible.
- **From selected numbers:** The communication will be possible only from the phone numbers which are in the list. You can define up to 5 numbers.

After selecting "Allow only selected", you can access edit field. Add numbers into the field and then click "Add" to move the number to the table below. Place the cursor in the line with a number and click "Delete" button to delete a number from the table.

The option "Delete all" will clean the whole table.

NOTE: Authorisation of an incoming text message involves making comparison between the sending number and the numbers from the table. It is allowed to enter only a part of a number to a table, such as 1234. In such a situation, all numbers including this sequence, such as 600123456 or 601234567 will be authorised.

NOTE: If you use a modem integrated with OSM.Server to send a text message, then the number of this modem must be included in the list.

7.5.1. Validity period of outgoing SMS messages

User may limit time for the GSM operator to deliver information via SMS when recipient is unavailable due to out of GSM signal coverage for example. Time limit is defined separately for the following groups of information:

- SMS test to server
- SMS events sent to server
- SMS events sent to user
- Answers to commands

Selection is to be made from scrolled down values by clicking on arrow besides selection area. Allowable options: 5, 10, 15, 30 minutes; 1, 2, 6, 12 hours; 1, 7 days, MAX (meaning no specified time).

7.5.2. Limits

In this section you can limit the number of text messages to be sent by the device. Extra fields will be shown after selecting option "Active":

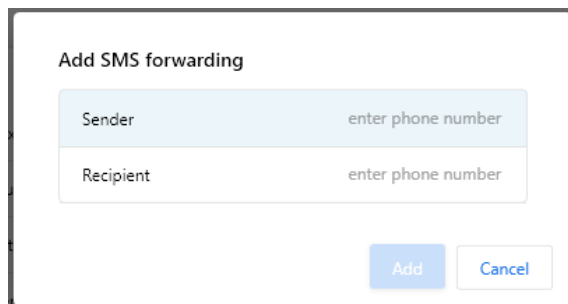
- **Maximum number** — in this field you can define the number of text messages per time unit (see the parameter Resetting the counter). This option prevents the user from sending too many messages, e.g. in case of a failure.
- **Resetting the counter** — in this field you can define the period for resetting the counter of sent text messages: from 5 minutes to 3 days.

The following types of information may be subjected to limitations (depending on the fact whether it is selected or not):

- Cyclical tests sent to the server,
- Events sent to the server,
- Events sent to the user,
- Answers to text message commands

7.5.3. SMS forwarding 0/5

The device is able to transmit the received text messages to the specified phone numbers (max. 5) according to set rules. This function may be necessary for example in case of text message notifications of your account status. To add the rules, press **+**. In the displayed window, you can enter up to 5 rules applying to transferring text message commands:



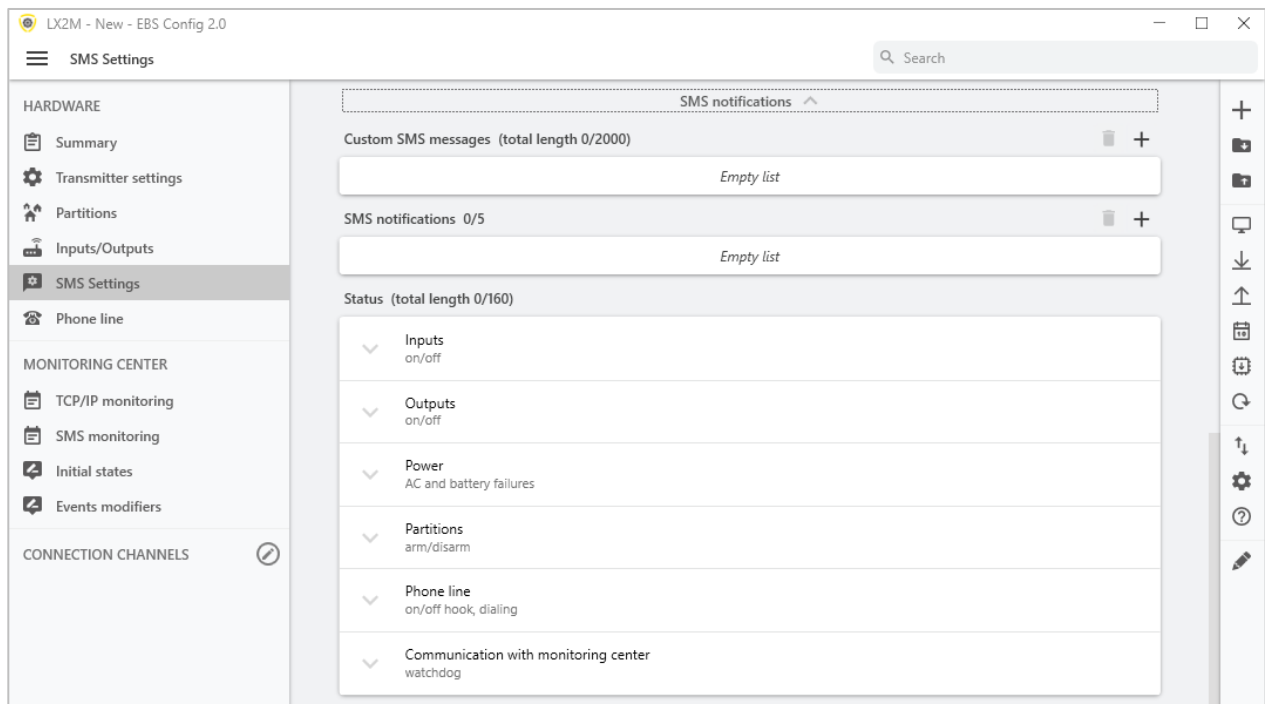
The screenshot shows a dialog box titled "Add SMS forwarding". Inside the dialog, there are two input fields. The first field is labeled "Sender" and has the placeholder text "enter phone number". The second field is labeled "Recipient" and also has the placeholder text "enter phone number". At the bottom right of the dialog, there are two buttons: "Add" and "Cancel".

Each rule comprises a pair: a fragment of the sender's phone number and a valid phone number of the recipient. A fragment of the sender's phone number can, in extreme cases, consist of an empty string, which means ability to match any phone number. Processing of the rules is carried out according to the set sequence from the beginning to the end, i.e. the result of processing one rule does not affect processing of the subsequent rules. This also means that the text message can be sent to several

phone numbers, or that the same message can be sent several times to the same number. Such a case occurs if the condition imposed on the sender's phone number is met for at least two rules with the same number of the recipient.

NOTE: The user takes responsibility for the proper administration of numbers so that no loop could create in text messaging.

7.5.4. SMS notifications



7.5.4.1. Custom SMS messages

In this section you can add a new (by pressing **+**) and edit already defined (by pressing **✎**) the text of unique SMS messages that can be assigned to the events below in the "Status" section. The total maximum message length is 2000 characters.

7.5.4.2. SMS notification 0/5

In this section you can define up to 5 numbers for users who will be informed about selected events using the defined SMS messages that have been assigned to them. To do this, press **+** and define the phone number in the window that appears, select the type of events to be sent and confirm then by clicking *Add*:

Add SMS notification

Phone number

enter phone number

Events

Inputs

on/off, lock, tamper

Outputs

on/off

Power and battery

AC and battery failures

Partitions

arm/disarm

Phone line

start/stop connection, on/off hook, dialing

Transmitter states

service, SIM cards

Add

Cancel

The user has the option of defining messages to be sent to private telephone numbers in the event of an event (e.g. a change in the status of an input). At the same time, it is important to bear in mind the introduction of restrictions in this respect.

7.6. Phone line

The device is equipped with a PSTN phone line connector. It may be used to transmit data from an alarm control panel. For proper operation, define the parameters described below.

LX2M - New - EBS Config 2.0

Phone line

Search

HARDWARE

Summary

Transmitter settings

Partitions

Inputs/Outputs

SMS Settings

Phone line

MONITORING CENTER

TCP/IP monitoring

SMS monitoring

Initial states

Events modifiers

CONNECTION CHANNELS

Phone line settings

Report off-hook time longer than

Inactive

Report when intervals between dialed digits of phone number are longer than

Inactive

Generate dialtone

440

Detect off-hook after

100 ms

DTMF phone numbers

First number

Second number

7.6.1. Phone line settings

7.6.1.1. Report off-hook time longer than

This option is being used if in configuration "PSTN line – LX2M – Alarm Control Panel" there are not other telecommunication devices. If such device will be connected and telephone number will be dialled (and a call will follow) after expiry defined time limit (counted since conclusion of last digit dialling) the communicator sends a message. This operation prevents unauthorised installation of additional devices.

7.6.1.2. Report when intervals between dialled digits of phone are longer than

This option is being used if in configuration "PSTN line – LX2M – Alarm Control Panel" there are not other telecommunication devices. If such device will be connected and telephone number will be dialled (and a call will follow) after expiry defined time limit (counted since conclusion of last digit dialling) the communicator sends a message. This operation prevents unauthorised installation of additional devices.

7.6.1.3. General dialtone

Some alarm control panels require that during a receiver picking up a tone of dialling was actuated. To enable cooperation with a communicator it is possible to make a communicator to generate such tone.

7.6.1.4. Detect off-hook after

The default value for the delay detection off-hook is 100ms. You can define your own delay value by choosing option "After" and giving the number in milliseconds.

7.6.2. DTMF phone numbers - First and Second numbers

To provide for proper cooperation between a communicator and a control panel in DTMF mode determination of some parameters is required. The below described functions are analogous to the both telephone numbers that may be saved in the device memory.

7.6.2.1. DTMF phone number

This is a number that has been saved in memory of an alarm control panel. If the panel is to transmit information on an event it shall dialled this number. Transmission of this information via LTE/HSPA+ will be possible if this number will be identical as a number entered into the communicator.

7.6.2.2. Handshake delay

This defines time after which a communicator generates confirmation to an alarm control panel for correct phone number dial. Default setting is 2.0 sec. European Standard determines this value at 0.5 to 12.5 sec.

7.6.2.3. Protocol

Select protocol of data transmission used by an alarm control panel and that is acceptable for monitoring station. Available options: ContactID and SIA.

Note:

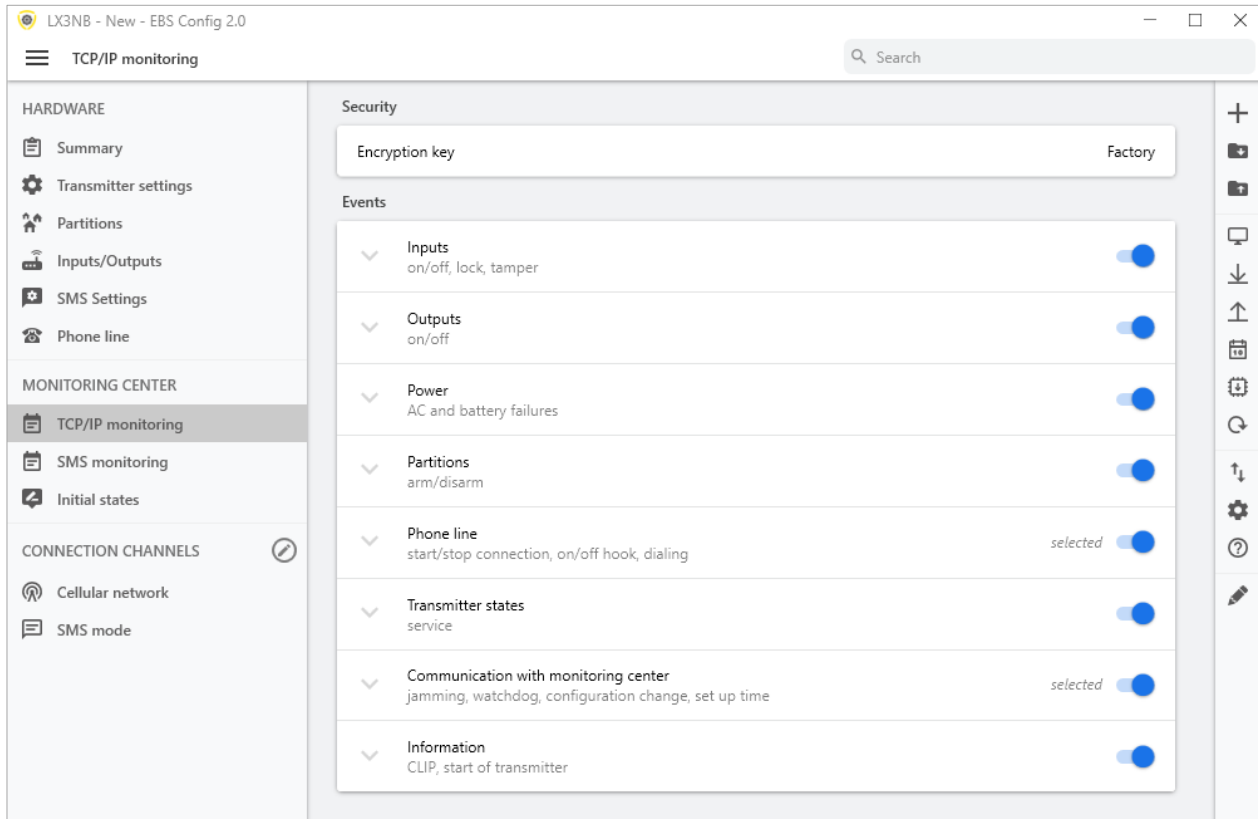
1) For all protocols you may use following options:

- [Enable SMS sending] which means that in case of no LTE/HSPA+ connection, data will be sent via SMS (if this mode will be accessible).
- [Don't transmit data when external phone line is available] which means that when the external PSTN line is available then it will be used during transmission from the control panel.

2) [Disable CRC checking] option may be used for ContactID format. Some control panel generate improper messages regarding a control sum for transmitted data, the device is not able to confirm collection of data, and as a result the panel tries to send them again (until execution of all determined trials). Select this option to avoid the above mentioned.

8. MONITORING CENTER

8.1. TCP/IP and SMS monitoring



8.1.1. Security – Encryption key

For the purpose of maximum security of transmission, data is encrypted with AES key. This option may be used for GSM/LTE and SMS transmission.

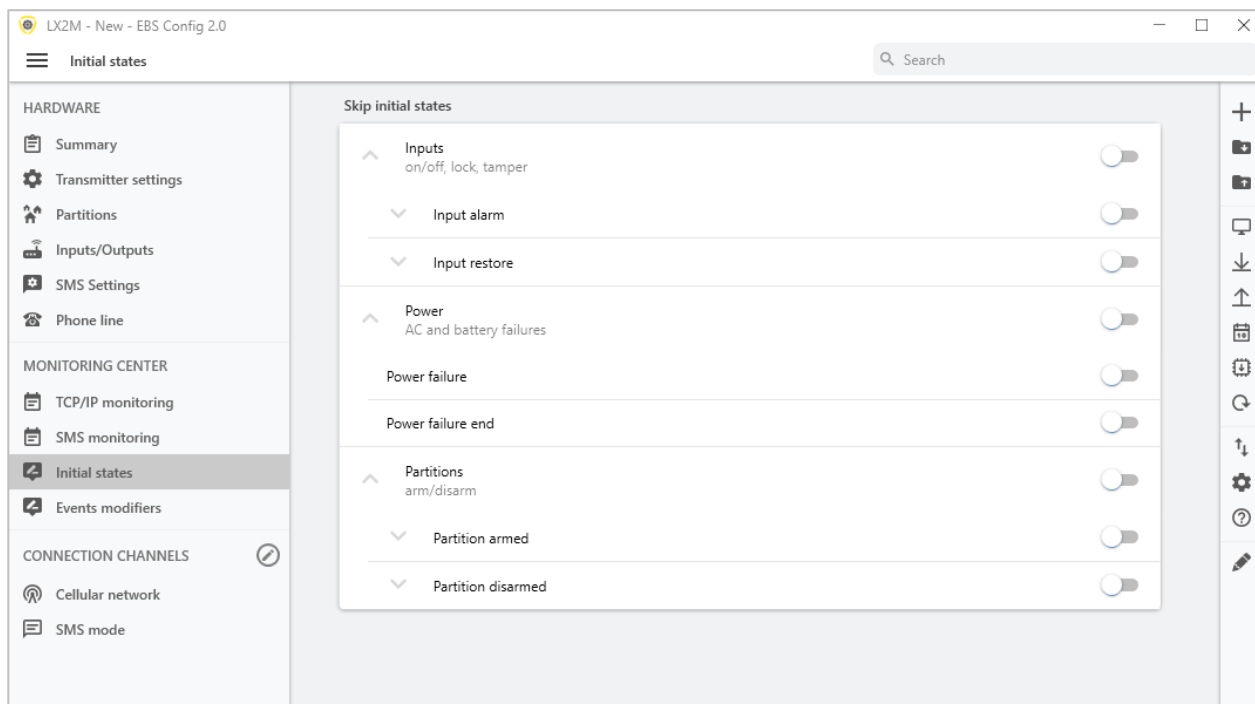
After selection of encrypted transmission you may use your own code (256 bits – signs 0-9 and A-F) or use default settings.

8.1.2. Events

In this section, you can define the signals generated by the device to be transferred to a monitoring station by every device added. These are the following pieces of information:

- On/Off, lock, tamper inputs,
- On/Off outputs,
- Power failures,
- Partitions arm/disarmed,
- Start/stop connection, on/off hook, dialing,
- Communicator states
- Communication with the monitoring center — information about update of time, configuration changes, start and finish of jamming, etc.;
- Information — information about the start of a control panel, CLIP, about entering an incorrect code, etc.;

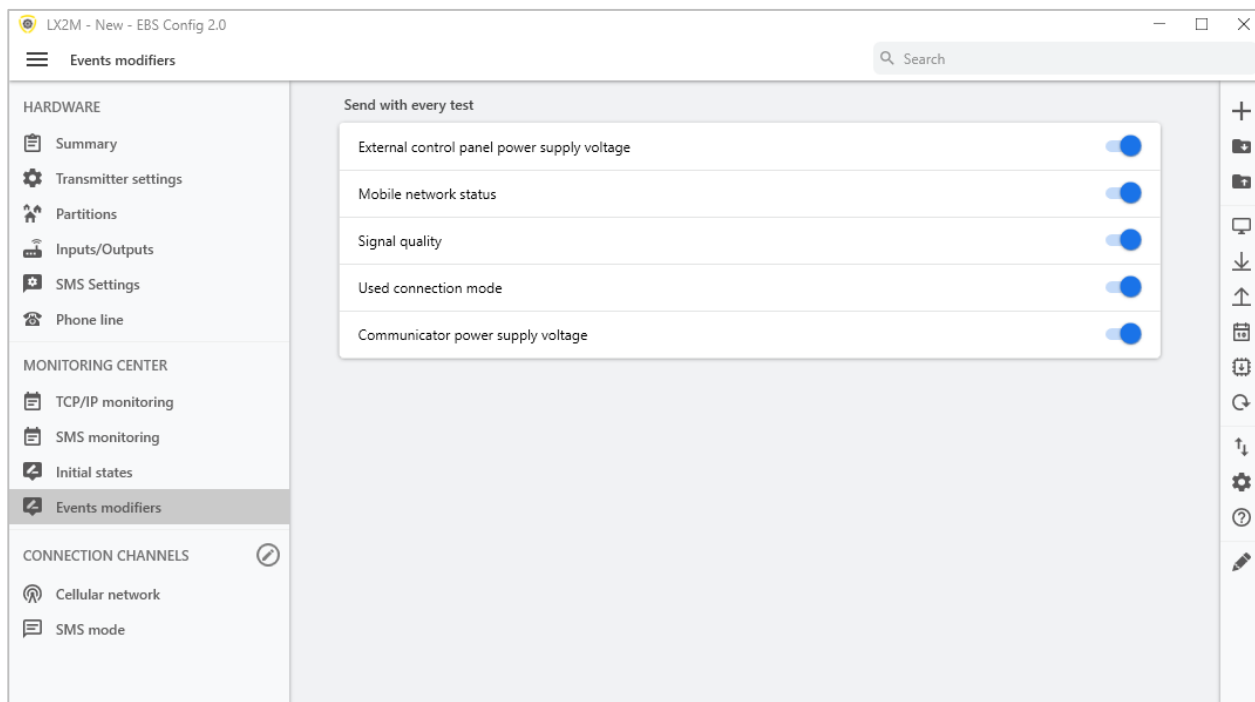
8.2. Initial states



8.2.1. Skip initial states

This option allows for locking of sending of information on status of active inputs at power connection. Information on inputs will be sent to server after the first change from inactive to active status.

8.3. Events modifiers

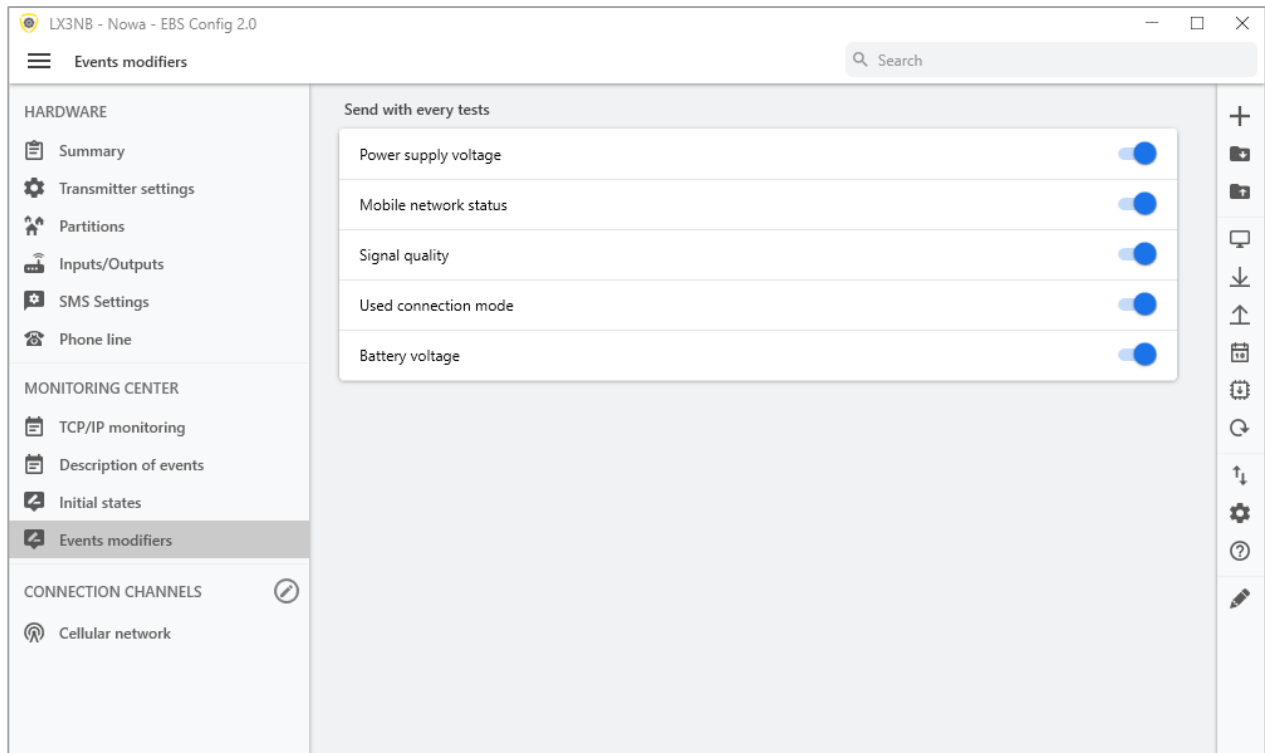


Modifiers are additional and optional information, attached to test events, sent from the communicator to the Monitoring Station (OSM server) using cellular data transmission.

This information is a valuable source of data about the operating conditions of the device, such as:

- Power supply voltage of the external control panel,
- Mobile network status,
- Signal quality,
- Used connection mode,
- Power supply voltage of the communicator.

Note: Using of the modifiers slightly increases the number of data sent over the GSM/LTE network.



9. COMMUNICATION PATHS

To Select the communication connection channels, click  and select appropriate items.



Next step is to define Primary channel. Possible options are listed below:

- Cellular network,
- SMS,
- Unused.

The backup channel is configured similarly, but possible options exclude the already chosen communication path for the Primary channel. To save changes, click "Save".

Now, under  icon, defined communication paths will be displayed.

During normal operation, the device uses Primary channel to transfer data. In the case of problems with primary channel, the device will switch to backup channel.

9.1. Cellular network

If SIM card has been inserted into the SIM holder, the tab will look like this:

9.1.1. Servers

In this section, define parameters for the base and for backup server, if used. If *Backup server* option is selected, additional parameters will be displayed and options for backup server settings and rules for cooperation with the main server.

Server Address

It is the IP address of the monitoring system receiver (OSM.Server) or a computer which has the "Communication Server" software installed, e.g. 89.123.115.8. The address can be specified as a domain name of the server.

Server port

Specifies the server port assigned to receive data from the device.

APN

This parameter depends on the LTE/UMTS network operator whose LTE/HSPA+ services you are going to use. It specifies the name of the access point to the LTE/HSPA+ network. It is possible to get a private access point. In this case, the name of the access point will be provided by your UMTS/LTE network operator.

NOTE: The use of a private APN improves the system security.

User ID

It is usually not required with public APNs. If you have a private APN, you should ask your provider for this parameter (you will need it to access the LTE/HSPA+ network).

User's password

It is usually not required with public APNs. If you have a private APN, you should ask your provider for this parameter (you will need it to access the LTE/HSPA+ network).

DNS1, DNS2

Identifies DNS addresses (the domain name system). If you provided the main or secondary server's address as a domain, at least one DNS address must be specified.

9.1.2. Connection

9.1.2.1. Test events period

The device transmits, with the specified interval, the "Test" signal, which informs the monitoring station that the device is working. Click this field to open the list of available values: from 20 seconds to 8 hours. Select the item "Custom" and you can enter any value included in the above period.

9.1.2.2. Primary server

Interval between successive connection attempts

If the device cannot connect to the main server, then after time defined in this field elapses, the device will perform another attempt.

Number of connection attempts with server before switching to backup server

In this field, enter the number of attempts with time interval set (parameter above) the device will try to connect the main server in case of failure. After performing the defined number of attempts (from 1 to 100), the device will start procedure for connecting with a backup server.

This option is enabled only when the secondary server has been defined.

Always try to connect to the primary server first

Activating this option means that the device will try first to connect to the primary server, regardless of the definition of parameters for the secondary server (in particular the number of connection attempts). This option has higher priority than the parameters for backup server.

9.1.2.3. Backup server

Interval between successive connection attempts

If the device cannot connect to the backup server, then after time defined in this field elapses, the device will perform another attempt.

Number of connection attempts with server before switching to base server

In this field, enter the number of attempts with time interval set (parameter above) the device will try to connect the backup server in case of failure. After performing the defined number of attempts (from 1 to 100), the device will start procedure for connecting with a base server.

This option is enabled only when the secondary server has been defined.

Disconnect after

Selecting this box will mean that the device will disconnect with the secondary server after the pre-defined period of time. The rest of the procedure depends on the parameter: "Always try to connect to the primary server first". If this option is enabled, the device will attempt to connect to the primary server. If it is disabled, the device will complete the procedure of connecting to the secondary server, and if that fails, it will attempt connecting to the primary server.

9.1.3. Connection stability

9.1.3.1. Mobile data watchdog

This option enables automatic reaction of the communicators after it has registered loss of mobile transmission. Two additional fields will appear after activating this option:

React when a transmission is lost

Here, define the period of waiting until modem reset after detecting loss of network connection (no transmission).

Reset device

Here, define the period of waiting until device reset (not just a modem reset) after detecting loss of network connection (no transmission).

9.2. SMS Mode

The Text message mode may act as an autonomous data transmission channel as well as a backup channel for GSM/LTE mobile transmission. If one SIM card has been inserted into the GSM/LTE module, this tab will look like this:

In the case shown, the device will switch to SMS mode in case of problems with another connection channels.

9.2.1. Phone number

Enter the number of GSM/LTE modem connected to monitoring station OSM.Server here. Text messages will be sent to that number regardless if only this data communication route has been configured and when the device experiences problems with GSM/LTE transmission.

Leaving this field empty or entering only one digit (including 0), the device will never switch to Text message mode.

9.2.2. Test events period

Define here the period for sending the "Test" signal to inform the monitoring station that the device is active. Click this field to open the list of available values: from 1 minute to 8 hours. Select the item "Custom" and you can enter any value included in the above period.

9.2.3. Fast event mode

In case of a loss of the GSM/LTE connection all information on upcoming events will be instantly sent by text message, even if the device have not switched to the Text message mode yet.

10. DEVICE PROGRAMMING

Programming of device is possible with "EBS Config 2.0" configuration program described in chapter 5. To program the device establish connection with a device. Depending on connection mode there are two ways for programming.

10.1. Local programming

To program a device locally follow the procedure:

- a) Connect PROG joint (on printed circuit) with COM computer port by way of service wire, defined in option -> RS-232.
- b) Connect power supply to terminals **+12V** and **GND**. After connection and detection of programming wire a module shall signal this with LED diodes: a green one shall flash and red one shall flicker.
- c) Launch software and define device options (description is in chapter 6 of this Manual). Provide right PIN code for SIM card.
- d) Save settings into memory of device. Saving course is displayed in special window.
- e) After saving disconnect power supply and disassembly service wire.
- f) Insert SIM card. Connect module wiring pursuant to guidelines from chapter 4. Turn power supply on.
- g) The device is ready to transmit data.

10.2. The first programming of device

As the device does not have defined access parameters in respect of GPRS network and OSM.Server, programming shall be begun with providing parameters. Irrespectively of providing these parameters the first operation shall be registration of device in OSM.Serverdata base.

Before remote programming user shall check that the device is furnished with SIM card and is connected to power supply. User shall know serial number of device and phone number for SIM card.

Follow the procedure:

- a) With the use of OSM.Server console position cursor on proper device in "Devices" tab.
- b) Click "Config." option and then select "Set Configuration" function to display list of parameters.
- c) Enter server address, server port and APN. Click OK and system shall send to device provided parameters (SMS).
- d) Wait till device addresses server (in "Devices" tab it will be marked with green colour).
- e) Launch software and define options of device (description is provided in chapter 7 of this Manual).
- f) Select "Send" to display a new window and select remote connection (GPRS tab). Save settings in memory of device. Saving course is displayed on special window.
- g) After saving completion close configuration wizard.
- h) The device is ready to transmit data.

10.3. Reprogramming of device

As the device has defined access parameters in respect of GPRS network and OSM.Server, it is possible to program device at any time.

If device is installed in secured object and is furnished with SIM card and connected to power supply follow the procedure:

- a) Launch configuration wizard and define options of device (description is provided in chapter 7 of this Manual).
- b) Select "Send" to display a new window and select remote connection (GPRS tab). Save settings in memory of device. Saving course is displayed in special window.
- c) After saving completion close configuration wizard.
- d) The device is ready to transmit data according to new settings.

11. RECEIVING OF SMS MESSAGE

GPRS module receives specially prepared SMS. If received SMS is not correct it will be automatically cancelled and device will not operate any action. The device uses an encrypted protocol for transmission.

11.1. Description of the protocol

The following format of message is acceptable allowing to send some commands with one SMS (every command shall be separated with SPACE):

SERVICE CODE **COMMAND** **COMMAND**

Where:

SERVICE CODE - device service code
- SPACE
COMMAND - order (see the table below)

List of commands:

DISC	Disconnects active TCP connection.
KILL	Reset modem.
RESET	Resets device. Note: all unsent events will be lost.
OUT=outNr,state	Turn on or turn off outputs. outNr specifies output number, state specifies requested output state (0 – switched off, 1 – switched on). <u>Examples:</u> <i>OUT=3,0</i> – output I/O 3 off <i>OUT=4,1</i> – output I/O 4 on
CMD=[timeout],command	Issues AT command to GSM modem and sends response back. Optional timeout parameter defines time for modem response. Time determined in seconds and ranges from 1-30 seconds. If timeout isn't specified, 3 seconds is assumed.
DESC	Returns device description, serial number (hexadecimal number) and firmware version.
GETSTATUS	Returns device status. The message content depends on what was configured at the programming stage in the "SMS Notifications" tab, the "Status" submenu. In reply about status a device shall send one SMS message containing proper text defining inter alia actual output , input state, power supply, phone line.
GETPARAM=parameter_name	Gets inquired parameter :SERVER, PORT, APN, UN, PW, DNS1, DNS2, SMS, SMSPERIOD
GETCFG	Gets primary communication parameters of device in form: SERVER:PORT,APN UN PW,DNS1
APN=apn	Access point to GPRS network via SIM 1 cards. Parameter should be obtained from mobile network operator. If APN address contain space sign put it with "", e.g. "my apn".
UN=un	APN user name for SIM 1 card. Parameter should be obtained from mobile network operator. If APN user name contain space sign put it with "", e.g. "my user name".
PW=pw	APN password for SIM 1 card. Parameter should be obtained from mobile network operator. If APN

	password contain space sign put it with "", e.g. "my password".
SERVER=server	Primary server address; it can be in form of IP or domain name address.
PORT=port	Primary server port number.
SMS=phone_number	Server phone number. When there is GPRS failure, SMS with events will be sent to this number.
SMSPERIOD=time	Defines in minutes time between SMS test messages sending to the server.
RLIMIT	Removes automatic temporary locks on all inputs
DT=YY/MM/DD,hh:mm:ss	Set time in the transmitter. Time must be specified in a format compatible with the field on the left.
FLUSH=x	Flushes events buffer, where x : 2 – system events history

Note: DESC, CMD, GETSTATUS, GETPARAM, GETCFG commands require separate SMS, so one command with only one SMS.

Samples of commands and device reaction:

Parameters setting:

1111■APN=general.t-mobile.uk■SERVER=89.112.43.78■PORT=6670■
SMS=500445566■SMSPERIOD=25

Parameters verification:

Inquiry: 1111■GETCFG
Answer: 89.112.43.78:6670,general.t-mobile.uk■,

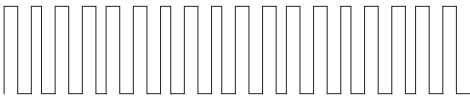
Inquiry: 1111■GETPARAM=SMS
Answer: 500445566

12. LED DIODES INDICATION

4 LED diodes mounted directly on printed circuit, are purposed to show actual condition of the device.

12.1. Logging to GSM network

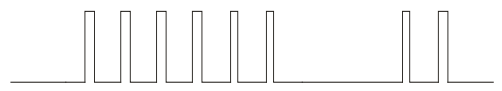
Once SIM card has been inserted into the device and power supply was turned on logging to GSM system follows.

Description	LED Diodes	
		
	OK (green)	ERROR (red)
Logging to GSM		

12.2. GSM range

Flickering of a green diode OK indicates GSM signal (1-8 flickers).

Device operation mode is signalled with a green diode on during 2 seconds once the range was detected. If after signalling range diode will not flash for 2 seconds the device is in SMS mode. Range indication is interrupted during data transmission, and after sending of data again GSM range is being indicated.

Description	LED Diodes	
		
	OK (green)	ERROR (red)
GSM range = 8 GPRS mode		
GSM range = 6 SMS mode		

12.3. Data transmission

During data transmission a green diode OK indicates data transmitting.

Description	LED Diodes	
	OK (green)	ERROR (red)
GPRS Transmission		
SMS Transmission		

12.4. Receiving of DTMF data

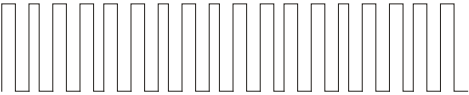
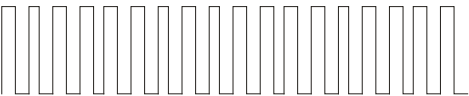
Diodes marked as DTMF and STATUS indicate actual condition during receiving data from a control pane.

LED Diode	Signalling
STATUS	
DTMF	(HandShake) (KissOff) 6 digits of phone 16 digits ContactID

12.5. Programming

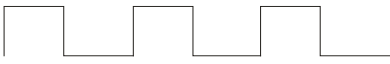
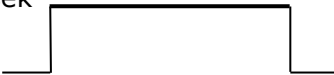
After detection of programming wire, diodes indicate programming.

Description	LED Diodes	
	OK (green)	ERROR (red)

Connected Service wire		
Programming in CSD mode		

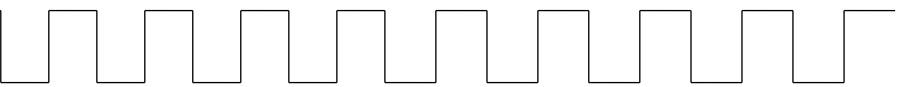
12.6. Firmware updating

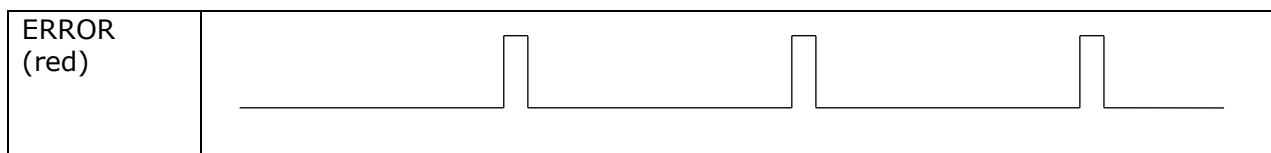
During programming bootloader operating is indicated. If error follows during updating there is bootloader in device and another programming of device is possible.

Description	LED Diodes	
	OK (green)	ERROR (red)
No program in device	 (1/sec)	
Software updating		
Received firmware decoding	10 sek 	

12.7. SIM card error

In case of SIM card problems, device states this with OK and ERROR LEDs.

LED diode	Signalling	
	OK (green)	ERROR (red)
OK (green)		



12.8. System error

During operating errors may follow. Any error is indicated by constant flashing of a red diode ERROR and mostly it means communication problem with modem or SIM card.

13. CHANGELOG

<i>Date / Version</i>	<i>Description</i>
05.01.2023/1.0	First version of manual
26.10.2023/1.1	Title page update: EC2 version change; Update of the "Communication Channels" chapter: renamed to "Communication Channels", changed description, replaced screenshots