User’s manual

SG-E1
SG-W1
SG-W1A
series
of smart
gateways

iskra.eu

Version 1.00 January 2025 • Valid from FW version 2.09

Security Advices and Warnings

Please thoroughly review this chapter, carefully inspecting the equipment for any potential damages that may have occurred during transport. It is essential to become familiar with the equipment before proceeding to install, energize and work with an SG.

This chapter deals with important information and warnings that should be considered for safe installation and handling with the device in order to assure its correct use and continuous operation.

Everyone using the product should become familiar with the contents of chapter »Security Advices and Warnings«.

If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

PLEASE NOTE

This booklet contains instructions for installation and usage of SG, which include handling with dangerous currents and voltages, therefore it should be installed, operated, serviced and maintained by qualified personnel only. ISKRA, d.o.o. assumes no responsibility concerning the installation and utilization of the product. If there is any doubt regarding installation and use of the system in which the device is used for measuring or supervision, please contact a person responsible for installation of such system.

Before installing

Check the following before installing the device:

- Nominal voltage.
- Terminals integrity.
- Protection fuse for voltage inputs (recommended maximum external fuse size is 10 A).

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Used symbols on devices' housing and labels

SYMBOL	EXPLANATION
	**DANGER** Indicates proximity of hazardous high voltage, which might result in serious injury or death if not handled with care.
	**WARNING** Indicates situations where careful reading of this manual is required and following requested steps to avoid potential injury is advised.
	Compliance of the product with directive 2002/96/EC, as first priority, the prevention of waste electrical and electronic equipment (WEEE), and in addition, the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste. It also seeks to improve the environmental performance of all operators involved in the life cycle of electrical and electronic equipment.
	Compliance of the product with European CE directives.
	Compliance of the product with UK Conformity Assessed (UKCA) directives.

Disposal

It is strongly recommended that electrical and electronic equipment (WEEE) is not deposited as municipal waste. The manufacturer or provider shall take electrical and electronic equipment waste free of charge. The complete procedure after lifetime should comply with the Directive 2002/96/EC about restriction on the use of certain hazardous substances in electrical and electronic equipment.

Table of contents

1 BASIC DESCRIPTION AND OPERATION

This chapter presents all relevant information about the SG required to understand its purpose, applicability and basic features related to its operation.

In this chapter, you will find:

1.1 Description of the device

The SG series of smart gateways is designed to seamlessly integrate various equipment into a communication network. Each gateway is equipped with two built-in optical (IR) communication ports and RS485 serial communication using the MODBUS protocol. RS485 facilitates efficient data transmission, enabling connectivity of the gateway within an RS485 network. This allows for communication with diverse equipment such as energy meters, latching switches, and power monitoring devices.

Additionally, the SG series includes inputs for pulse and temperature sensors (Pt1000).

The SG series includes inputs for pulse and temperature sensors (Pt1000). The SG-W1 version offers Wi-Fi communication capabilities, while an alternative model, the SG-W1A, includes an external antenna for enhanced wireless connectivity.

For Ethernet connectivity, the SG-E1 model comes standard with RJ45 ports. Users have the option to activate Wi-Fi communication via settings, though this will deactivate Ethernet functionality when Wi-Fi is active.

1.2 Appearance

1 **RJ-45 terminal** *can be utilized either for RS485 communication(SG-W1/A) or for Ethernet communication (only for SG-E1)*

2 **RS485 communication**

3 **IR communication port** *(one on each side)*

4 **DIN-rail fitting**

5 **External antenna** *(only for SG-W1A)*

6 **Multifunctional green, red, orange LED**

7 **Power supply 230V AC**

8 **Pulse counter and temperature sensor (Pt1000) input**

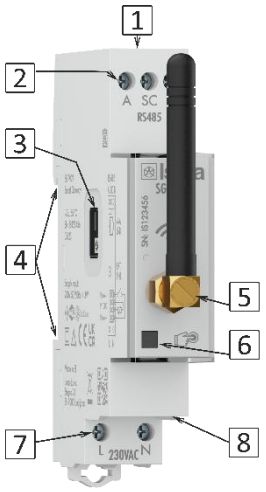

Figure 1: Appearance of smart gateway SG

A built-in LED diode indicates different operation states of the SG. A capacitive touch button is built-in for reset and factory reset of a gateway (see chapter 0). Connecting terminals are built to be fastened according to EN 60715 standard. The SG interface with corresponding equipment enables setting and reading the instruments.

1.3 SG application

The SG can be used in a variety of applications including:

- Single-phase single point metering and control.
- Three-phase single point metering and control.
- Connecting different devices via IR communication and RS485 communication.
- Monitoring single or multiple devices.

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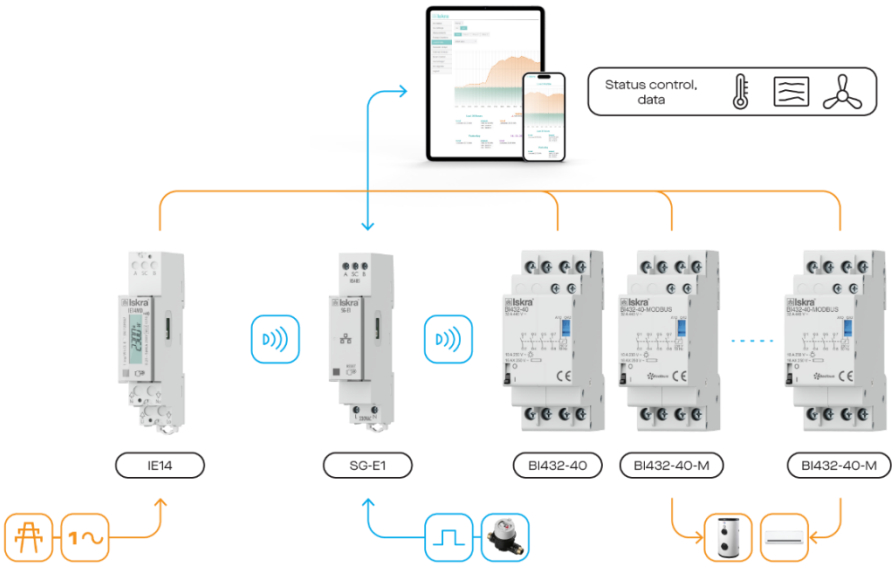

Figure 2: Connection diagram for SG. It is connected to an energy meter (on the left side of the SG) and to latching switch (on the right side of the SG) by IR communication. It is possible to read and control data with a computer or mobile phone.

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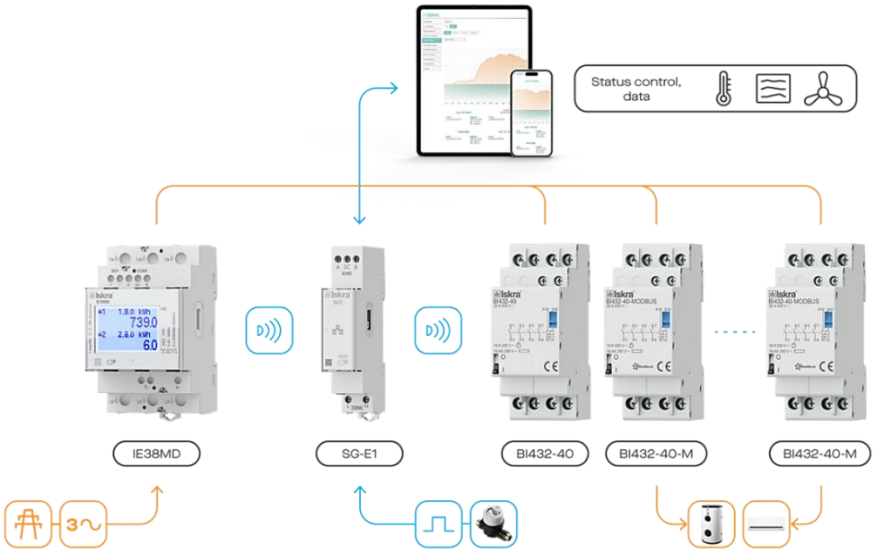


Figure 3: Connection diagram for SG for connection to three-phase energy meter. It is connected to an energy meter (on the left side of the SG); to one latching switch (on the right side of the SG) by IR communication and to two latching switches by RS485 communication

1.4 Main features

- AC mains power supply.
    - Nominal supply voltage (U_n) from 85 V to 265 V AC or 85 V to 300 V DC.
    - Nominal frequencies 50 Hz and 60 Hz.
- Multifunctional front LED.
- RS485 serial communication.
- IR serial communication (2 ports).
- Wi-Fi communication.
- Ethernet communication (valid only for SG-E1)
- 1-DIN rail width mounting according to EN 60715.
- Pulse and temperature input.
- SG-W1A operates with an external antenna, which can be replaced with other antennas compatible with SMA connector.

2 CONNECTION

This chapter provides the instructions for SG connection. Please be aware that both handling and connection of the device involve dealing with dangerous currents and voltages and should therefore be performed ONLY by a qualified person using appropriate equipment. ISKRA, d.o.o. does not take any responsibility regarding the use and connection. If there are any doubts regarding the connection and usage of the device within the system, please contact a person responsible for such installations.

In this chapter you will find:

2.1 Mounting

The SG is intended only for DIN-rail mounting. It should be mounted on a DIN-rail between an energy meter and latching switch.

WARNING!

SG is sealed with a warrant label. The warranty is void if the case is opened or the label is damaged.

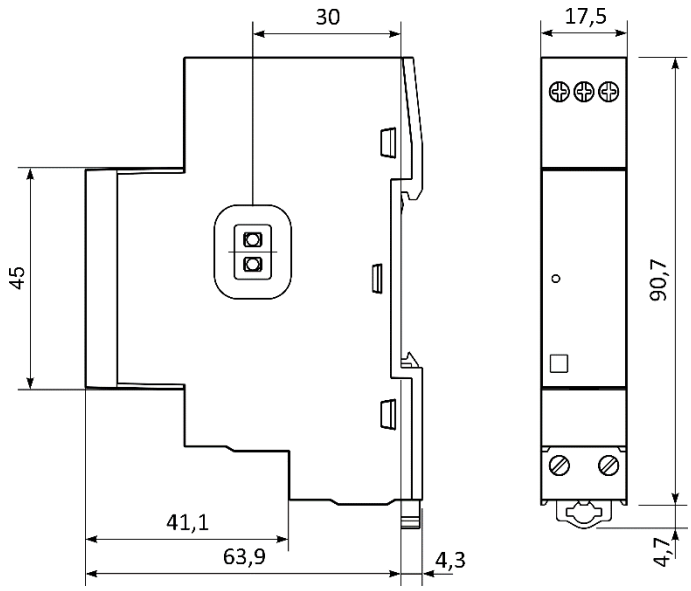


Figure 4: Dimensional drawings of SG-W1 and E1

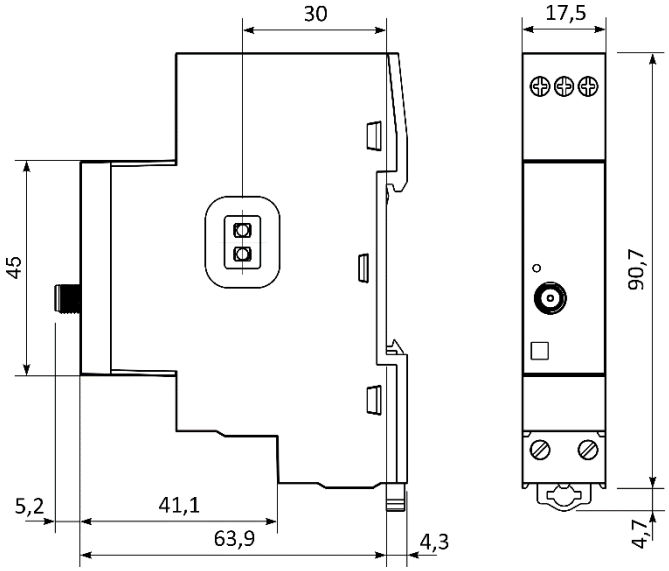


Figure 5: Dimensional drawings of SG-W1A with an external antenna

2.2 Electrical connection

WARNING!

Installation must be carried out and inspected by a specialist or under their supervision. Wrong or incomplete connection of voltage or other terminals can cause non-operation or damage to the device.

1. **Verify Voltage Compatibility**: Ensure the device's power supply input is compatible with your mains voltage. The nominal voltage range is **85 V to 265 V AC** or **85 V to 300 V DC**.
2. **Fuse Recommendation**: Install a protective fuse (maximum size **10 A**) on the power input line to safeguard the device.
3. **Connecting Power**:
    - Locate the terminal block labelled **L (Live)** and **N (Neutral)**.
    - Strip approximately **6 mm** of insulation from the wires.
    - Secure the wires to the respective terminals with a torque of **0.5-0.6 Nm**.

Note: Ensure all wires are firmly fastened to avoid loose connections that could lead to malfunction.

2.3 Network connection

The Smart Gateway supports two network connection types:

- Wi-Fi:
  Operates on the 2.4 GHz frequency band using IEEE 802.11b/g/n standards.
  Suitable for installations without wired infrastructure.
  Supports automatic IP address assignment via DHCP or manual configuration of a static IP.
- Ethernet (SG-E1 Only):
  Features a wired connection through an RJ45 port, compliant with IEEE 802.3 standards.
  Offers a stable and reliable network connection, ideal for critical installations requiring consistent communication.

Both connection types are configurable via the Smart Gateway's web interface.
Only one connection type (Wi-Fi or Ethernet) can be used at a time.

2.4 External devices connection

SG enables you to connect external devices, using RS485 or IR. It also has integrated pulse counter and analog input for PT1000 temperature sensor.

RS485 Devices:

RS485 is the primary communication method for connecting devices to the Smart Gateway (SG) via the MODBUS protocol. Up to 16 RS485 devices can be added. RS485 is designed for reliable long-distance communication in noisy environments, and its differential nature ensures data integrity.

Required Wiring Configuration:

- **Twisted Pair Cable**: RS485 communication must use a **twisted pair cable** to minimize electromagnetic interference (EMI) and ensure stable communication.
- **Daisy-Chain Wiring**: The devices should be connected in a **daisy-chain** configuration. Each device is connected in series, meaning each device in the chain has two communication wires (A and B), which are connected from one device to the next.
- **Termination Resistors**: If the devices are located at the ends of the network, use termination resistors (typically 120Ω) across the A and B terminals of the first and last devices in the chain to avoid signal reflection.

IR Devices

In addition to RS485, the SG supports two **IR (infrared) communication ports**. Left IR is assigned for communication with Energy meters and right one is assigned for communication with Bistable switches. Simply install IR capable device beside smart gateway on DIN rail.

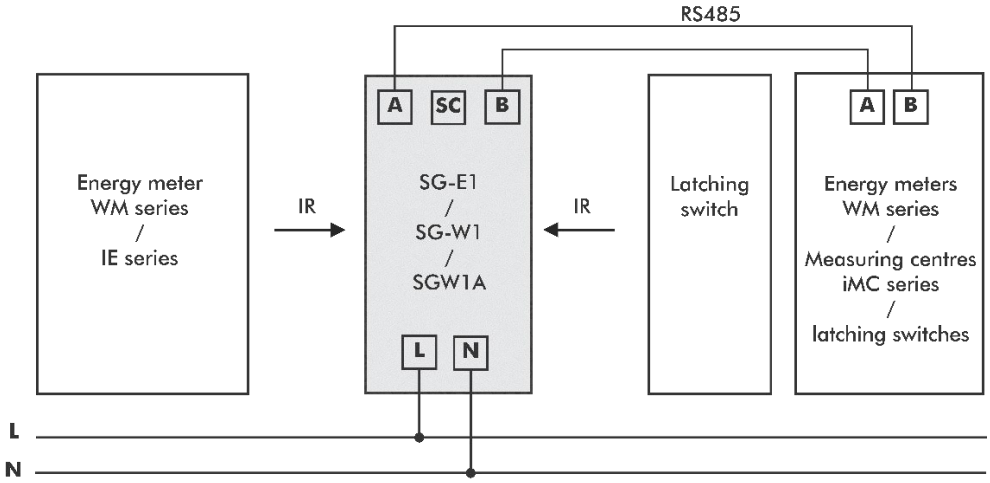


Figure 6: IR and RS485 connection of SG

PLEASE NOTE

Strong external light source can interfere with IR communication.

Pulse input and PT1000 temperature sensor

Connect Pulse sensor and PT1000 according to below schematic

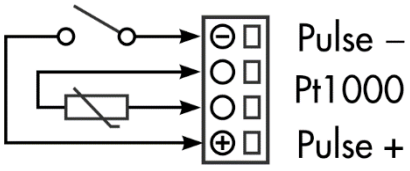


Figure 7: Pulse and temperature sensor connector pinout

PLEASE NOTE

Check labels on the side of the meter to check what modules are built in.

3 FIRST STEPS

Set up of an SG is very transparent and user friendly. Numerous settings are organized in groups according to their functionality.

In this chapter you will find basic programming steps:

3.1 Introduction

The flowchart below illustrates the first few steps for clearer understanding of network connection.

PLEASE NOTE

The SG-E version automatically connects to Ethernet upon first power-up unless configured otherwise. To connect the SG-E to a Wi-Fi network, use the function menu (refer to chapter 0) to enter provisioning mode or adjust settings through the web interface.

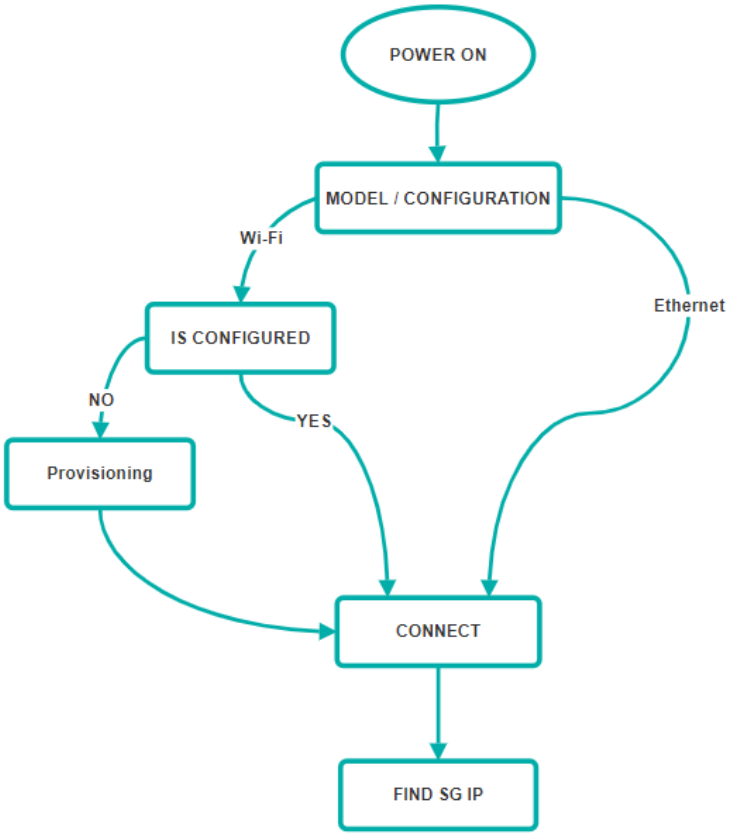


Figure 8: SG connection process flowchart

3.2 Connecting SG to Wi-Fi Network

After mounting the SG on a DIN-rail and supplying it with AC power (powering up the device), the next step is to connect the SG to a Wi-Fi network, a process known as provisioning. When the SG is powered on for the first time, it automatically enters provisioning mode. If it has previously been connected to a Wi-Fi network, you can enter provisioning mode using the function menu.

To connect the SG to a Wi-Fi network, you will need a smartphone or computer with Wi-Fi connectivity. When the orange LED blinks rapidly, it indicates that the SG is in provisioning mode. During this time, the SG sets up a Wi-Fi access point.

The SG's Wi-Fi access point is named using its serial number in the format ISXXXXXX, where X represents numbers.

Steps to Connect:

- **Enable Wi-Fi** on your smartphone or computer.
- **Locate the Wi-Fi Network** named with the serial number format ISXXXXXX.
- **Select the Network** to connect.

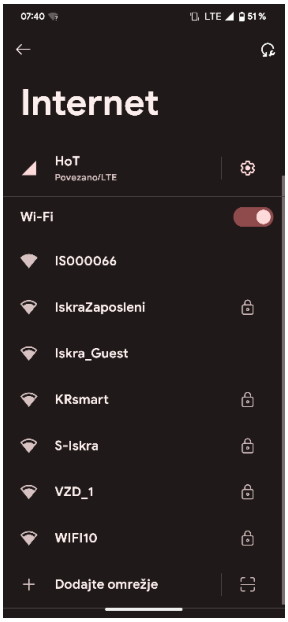


Figure 9: SG Access point on android phone

Device-Specific Instructions

Android:

When connected to the SG's access point, you should be automatically redirected to its web interface. If this automatic redirection does not occur (common for older devices), you may receive a notification. Clicking on this notification should open the web interface.

iOS:

Manually open your internet browser. The web interface will then open automatically.

Computer:

If computer is not connected to any other network it should automatically open web interface. If computer is connected to any other network with internet access please use:

Alternative Access Methods

If the steps above do not work:

Open your web browser and navigate to `http://isxxxxxx/` where "xxxxxx" is replaced with your SG's serial number. For example:

For serial number IS001010: `http://is001010/`

Or use `http://192.168.4.1/` as another access method.

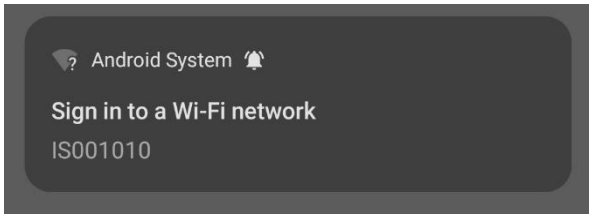


Figure 10: Android prompt to redirect to SG Web interface

Once the web interface opens, navigate to the **SG Settings menu.**

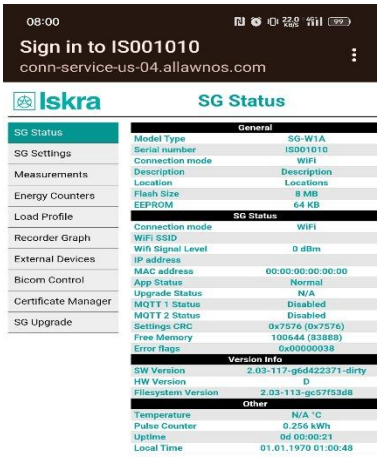


Figure 11: SG Web interface

Click on the **Scan for available networks** button.

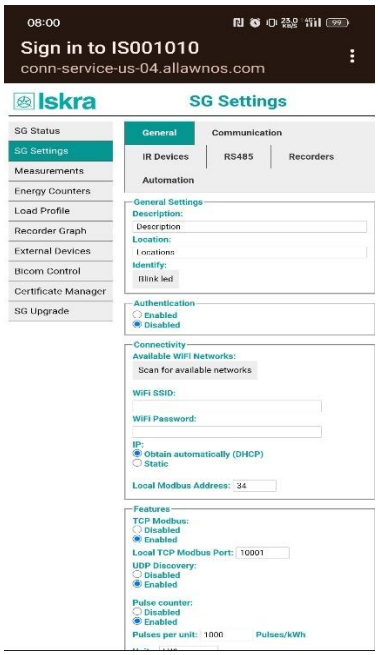


Figure 12: SG Web interface Settings

- Select your desired Wi-Fi network from the list.
- Enter the network password.
- **Save the settings.**

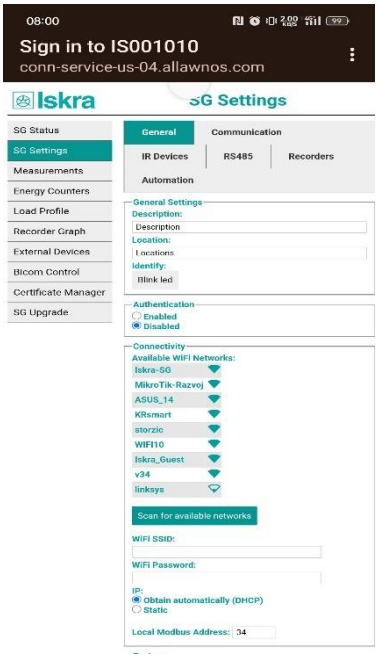


Figure 13: SG scanned available Wi-Fi networks

To access the web interface after provisioning: Use a listed method below to obtain SG's IP address.

3.3 SG IP address

After the previous step is completed successfully, SG will connect to the Wi-Fi network. This process also applies to the Ethernet version, which connects via Ethernet.

To successfully connect to the web interface, the device must be connected to the same network that was previously configured on the SG

To access the SG web interface after provisioning process, use the network IP address assigned to the SG.

There are several methods to identify SG's network IP address:

1. Using the **serial number** as the network address.
2. Using **MiQen** configuration software (**Browse Ethernet devices**).
3. Utilizing the Android network scanning application.

3.3.1 *Using serial number as network address*

The easiest way to find the SG's IP address is by entering the serial number into the browser's search bar and checking the SG Status Segment under IP Address.

Example: If the serial number is IS000039, use http://is000039/ to access the SG's IP address. If this example does not work, you can also try http://is000039.local/.

Note: This method may not always work as it depends on the configuration of your network and computer.

3.3.2 *Find IP using network scanning applications*

If you are using smartphone, you can use one of the network scanning application from Google Play Store or Apple's App store. Your smartphone must be connected to same Wi-Fi network as SG.

3.3.3 *Find IP on router*

To check the IP address of the SG using your router, log in to your router's web interface using a browser. Navigate to the DHCP client list or connected device section. Look for the device name or MAC address associated with the SG. The corresponding IP address will be listed next to it.

3.3.4 *Find IP address with MiQen*

MiQen software is a tool for complete configuration and monitoring of ISKRA measuring instruments. Remote operation is possible by means of serial (RS485/RS232), USB or TCP/IP communication. The interface consists of six segments (Connection, Settings, and Measurements, Analysis, My devices and Upgrades). These segments can be accessed by means of six icons on the left side.

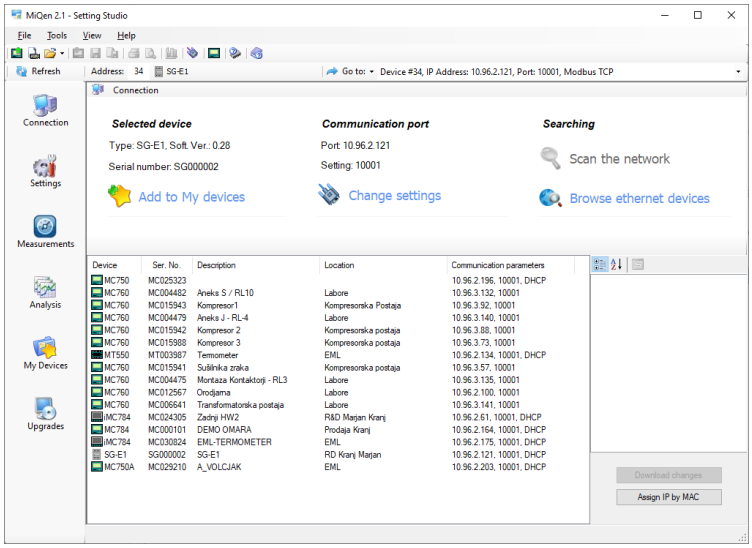


Figure 14: MiQen configuration and monitoring software

For further managing those segments, icons on the top bar can be utilised:

- READ SETTINGS : displays all device's settings
- READ MEMORY : data is read directly from a device's internal memory
- OPEN : data is read from a local database
- DOWNLOAD SETTINGS : changes should be confirmed by pressing this button when finished programming
- SAVE : the file settings will be saved
- EXPORT : data can be exported to an Access data base, Excel worksheets or as a text file
- PRINT : data listing can be exported into PDF file or printed on a paper

- PRINT PREVIEW : preview of a PDF file
- GRAPHICAL ANALYSIS : measurements can be shown in a graphical form
- COMMUNICATION PORT SETTING : under communication form
- INTERACTIVE INSTRUMENT : additional communication feature of a device allows interactive handling with a dislocated device as if it would be operational in front of a user)
- MEMORY INFO : shows available memory since last official data transfer
- HELP : for more detailed information how to handle a device

The latest version of MiQen software can be downloaded from ISKRA d.o.o. website https://www.iskra.eu/.

PLEASE NOTE

MiQen has a very intuitive help system. All functions and settings are described in Info window on the bottom of MiQen window. In MiQen Help file, detailed instructions about software usage, connection, and communication with a different type of devices, driver installation, etc. are described.

MiQen has the ability to search for network devices. Your PC must be connected to the same network as SG! All settings can be programmed using MiQen software.
Start MiQen application and click on Browse Ethernet devices.

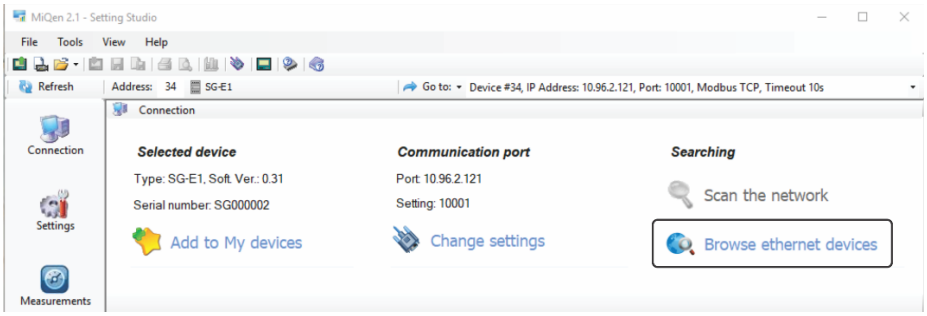


Figure 15: Browse Ethernet devices selection

MiQen scans Wi-Fi network and displays the results. A list of all detected devices on your network is given. Double-click on selected device and MiQen will establish a connection with it.

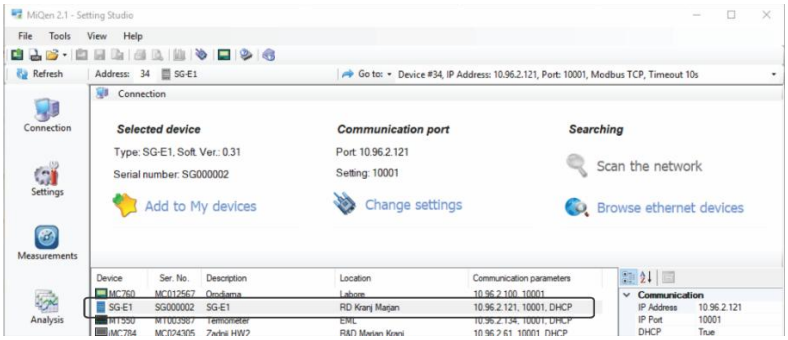


Figure 16: List of all detected devices. Double click on SG device

PLEASE NOTE

If you cannot see your device, click on Browse Ethernet devices again.

3.4 Configuring SG with MiQen configuration SW

Start the MiQen application and then click on Change settings under Communication port. There are two ways to connect MiQen to SG, via Wi-Fi or via the RS485 connection.

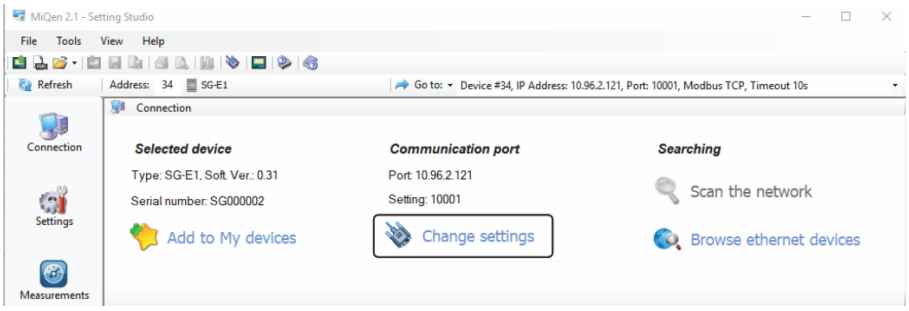


Figure 17: Change settings selection

3.4.1 Connecting MiQen to SG via IP address

To connect in this mode, follow these steps:

1. Obtain the IP address of the SG (refer to chapter 3.3).
2. Enter the SG IP address, IP port (default is 10001), and click OK.
3. Set SG address to 34 in the top bar and click Refresh.

If the SG was detected by MiQen using "Browse Ethernet devices," you can simply double-click on it to initiate the connection.

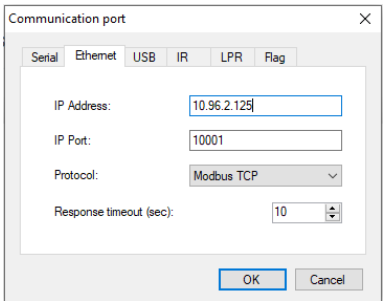


Figure 18: Communication port for connecting MiQen to SG via IP address

3.4.2 *Connecting MiQen to SG via RS485*

This connection works only is SG's RS485 port is configured as a slave (Default setting). If you enable RS485 devices in settings, RS485 on SG becomes master and you cannot use RS485 port for settings.

To connect via RS485, follow these steps:
Wire your RS485 adapter to the SG's RS485 port.
Set the communication port to the COM port where your RS485 adapter is connected.
Default speed: 115200 bits/s
Default Parity: None
Default Stop bits: 1
Click OK.
Set SG's address to 34 and click Refresh.

If the SG was detected by MiQen using "Scan the network," you can simply double-click on it to initiate the connection.

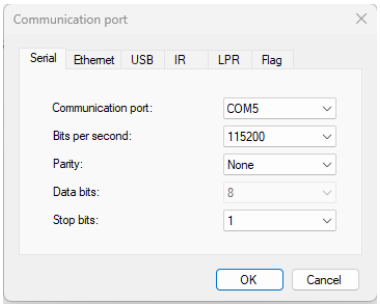


Figure 19: Communication port for connecting MiQen to SG via RS485

3.4.3 *Connecting to SG*

If settings are correct, you can see SG under Selected device. Click on *Settings* icon and click *Read settings*.

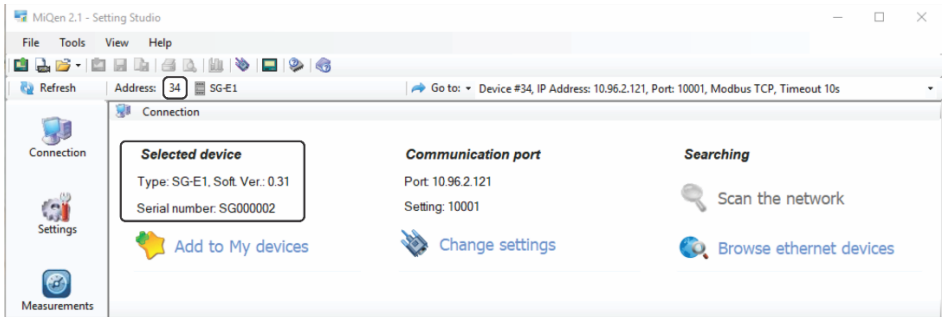


Figure 20: Set address to 34

Figure 21: Read settings selection

MiQen will download settings and you can check and set settings.

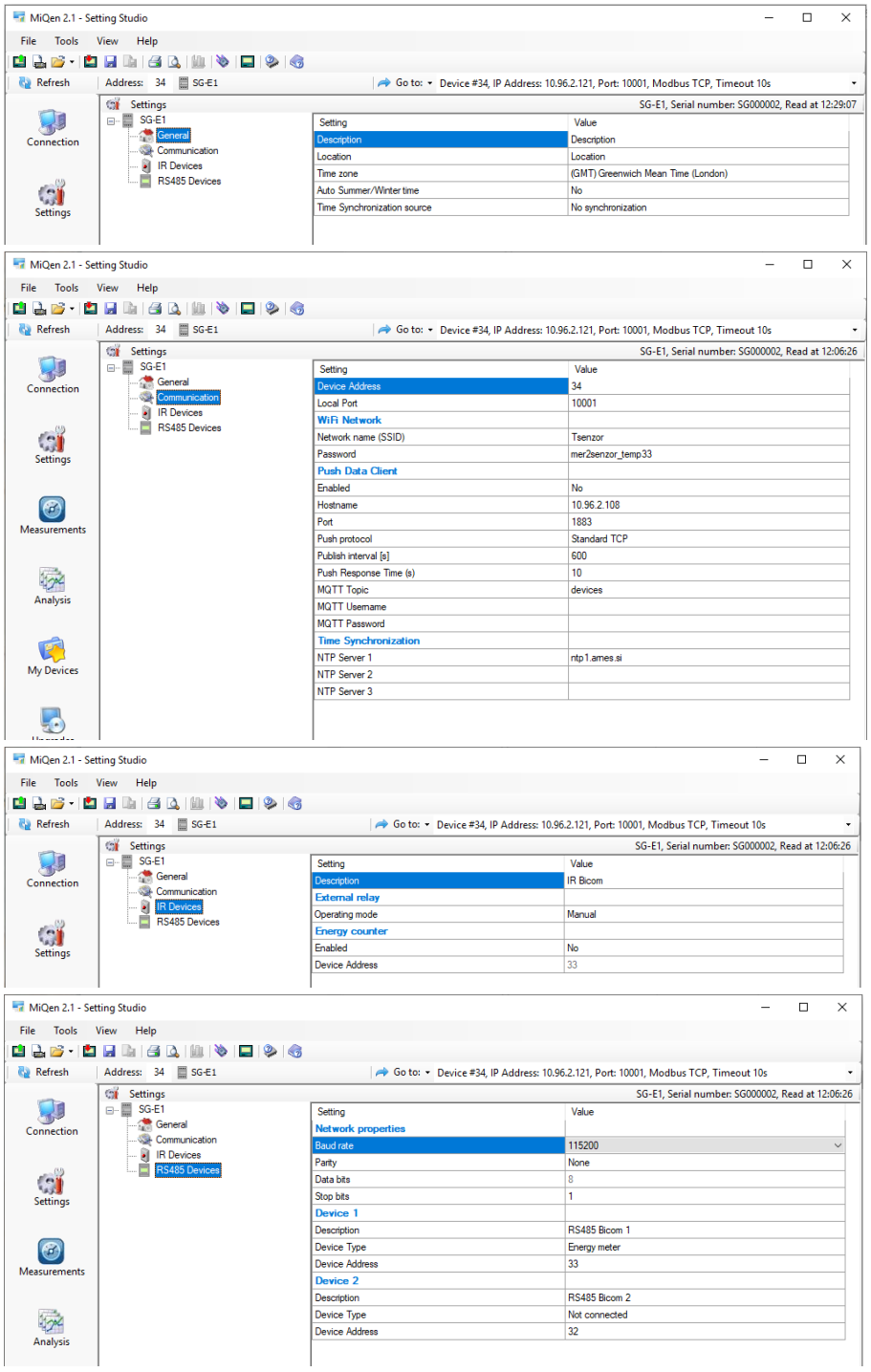


Figure 22: SG settings inside MiQen software

WARNING!

If MiQen is connected to SG via RS485, it will lose connection if you change Device Type from not connected to any other type.

4 SG FUNCTIONS

This chapter details the various functions available for the SG series devices, focusing on configuration, monitoring, and automation capabilities provided through the web interface.

Below are the key sections covered in this chapter:

4.1 SG WEB interface

The SG web interface is designed for configuring the SG and providing comprehensive functionality, including:

- Displaying statuses
- Configuration
- Viewing measuring data
- Viewing load profiles
- Controlling Bicom switches
- Viewing recorder graphs
- And more

This interface allows users to manage and monitor various aspects of the SG's operation efficiently.

4.1.1 *Status page*

The SG Status page provides essential device status information, including:

- Current software versions
- Temperature readings
- Pulse counter status
- Connected Wi-Fi details

This page serves as a central hub for monitoring key aspects of the SG's operational status.

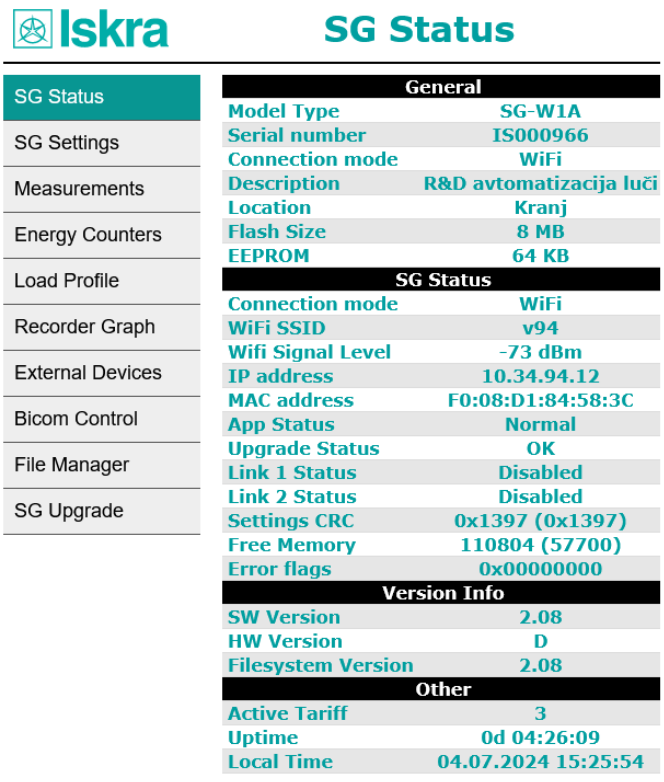


Figure 23: SG status interface

4.1.2 *SG Settings*

The SG Settings segment includes the following sections:

- General
- Communication
- IR Devices
- RS485
- Recorders
- Automation

4.1.2.1 *General*

In the "General" section:

- **General Settings**: Users can specify the name and location of the device to personalize its identification.
- **Blink LED**: This button triggers a rapid blinking mode for the selected SG's LED for approximately 30 seconds. It helps users visually identify the SG they are working on.
- **Authentication**: Enables web interface lock. When enabled, users can set username and password for accessing the web interface.
  Default credentials:
  Username: **admin**
  Password: **iskra**
- **Connectivity**: Allows users to manage Wi-Fi connectivity by scanning and selecting networks from a displayed list.
- **Features**: Additional sensors, counters, and automation can be enabled or disabled. Ensure all connected devices are enabled for proper data recognition and collection by the SG.
- **Time Settings**: enables adjustments to time zone, device time synchronization period, and other related settings. Remember to save any modifications made.

These settings provide users with control over device identification, security, connectivity, feature management, and time synchronization within the SG web interface.

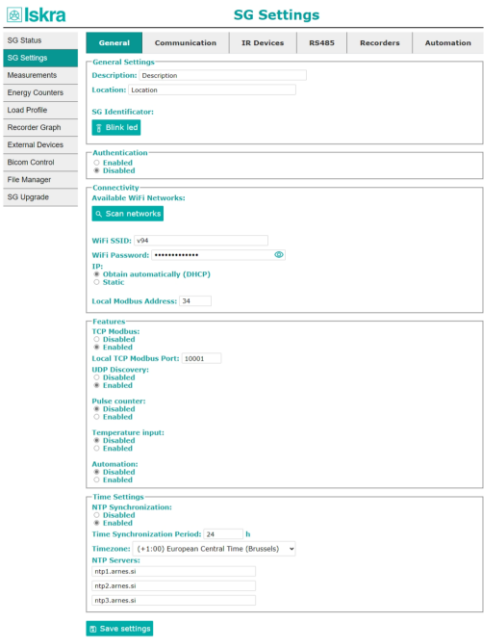


Figure 25: SG settings tab

4.1.2.2 *Communication*

In the Communication section, users can configure MQTT settings, including:

- Specifying the MQTT server address
- Setting the port number
- Selecting the desired protocol (e.g., MQTT over TCP or MQTT Secured)
- Providing authentication details and passwords

Similar settings apply to the Standard TCP push/public link, with the addition of configuring the push timeout.

These settings are used to enable the SG to send measurements to the user's external programs, ensuring seamless integration and data transmission according to specified protocols.

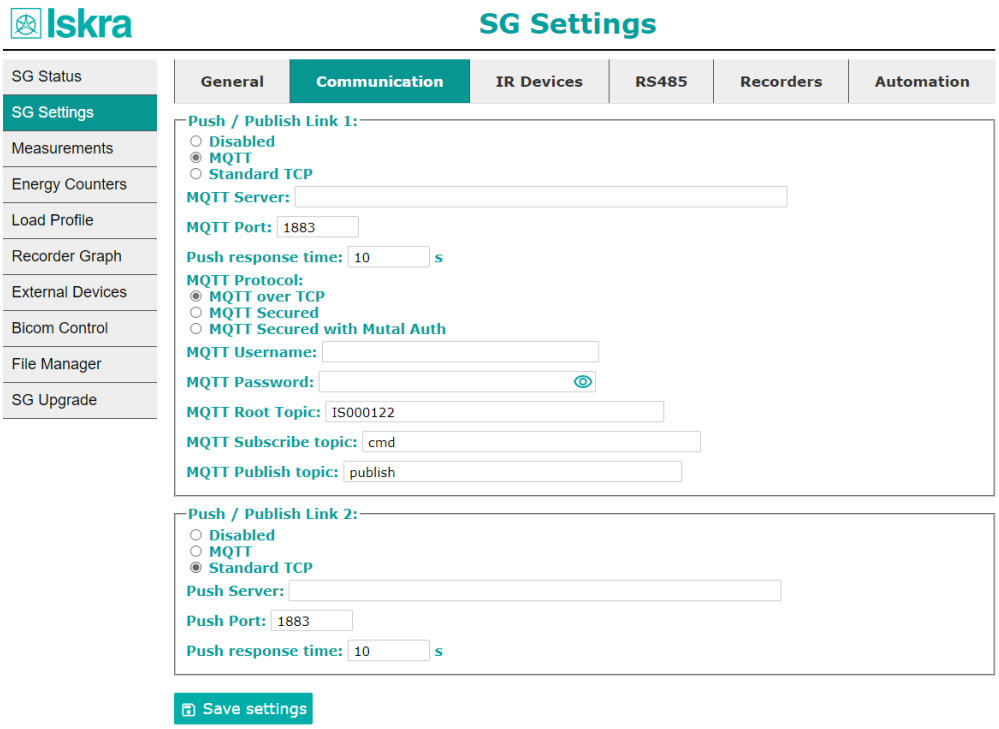


Figure 24: SG settings communication tab

4.1.2.3 *IR Devices*

The "IR Devices" section is designed for managing energy counters and Bicom relays connected via IR sensors. Users can enable or disable these devices and access additional settings such as push/publish intervals and time synchronization.

Once enabled, users can configure settings for each device, including time synchronization. It's important to note that manual activation is required on the web page when a new device is connected to the SG. Failure to enable the device in the settings menu will result in the SG not recognizing it, thereby preventing configuration and data viewing.

The "Clear" button (only on HW versions D or newer), located on the right, deletes smart gateway's load recorder data, more information about that in chapter 4.1.5.

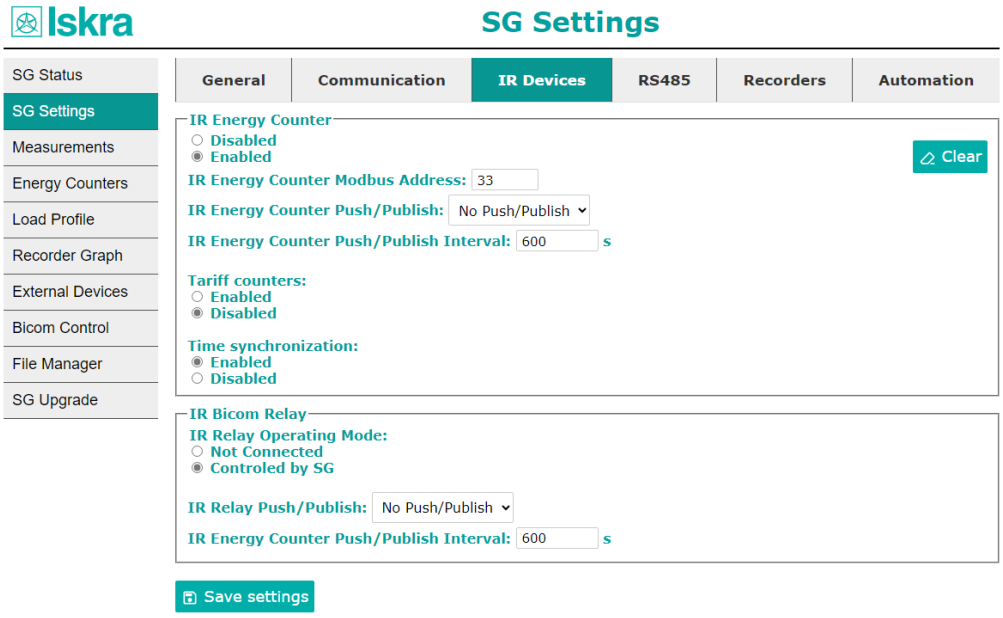


Figure 25: SG settings IR devices tab

4.1.2.4 RS485

The RS485 section allows users to search for and configure devices connected via RS485. Users can add devices manually or automatically.

To automatically add a new device:

Click on "Scan for RS485 devices." This action initiates a scanning process to detect newly connected devices. This feature facilitates the easy integration and management of RS485-connected devices within the SG system.

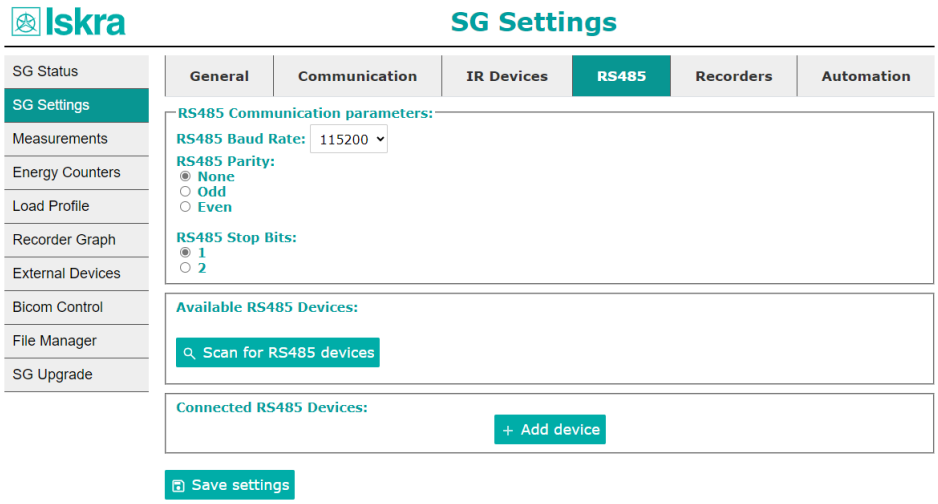


Figure 26: SG settings RS485 tab

Once the available devices are displayed, users can add them to the system and adjust the settings accordingly.

When using the "Add all devices" button, all scanned devices will be added simultaneously, eliminating the need for individual address assignment and configuration as devices will be configured automatically.

This process simplifies the integration of RS485-connected devices into the SG system.

The communication parameters have to match with the parameters of the connected devices to ensure an efficient communication.

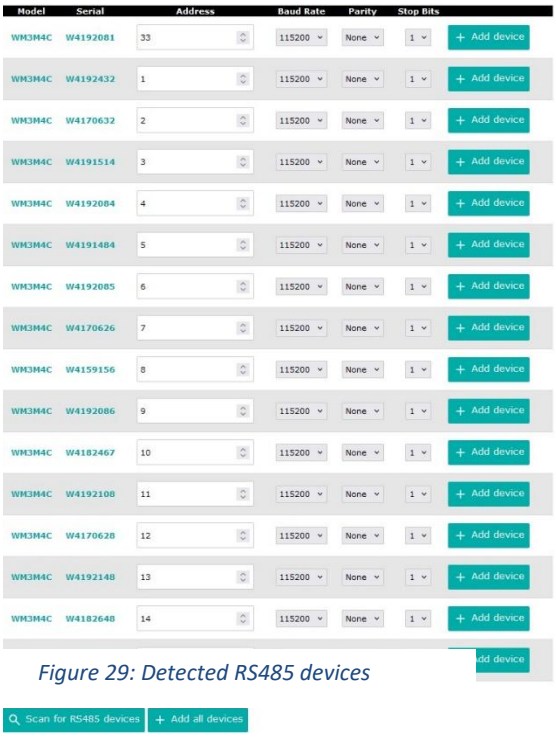


Figure 29: Detected RS485 devices

4.1.2.5 Recorders

The Recorders tab displays and allows configuration of the Smart Gateway's Recorder functionality. Depending on the hardware version of the Smart Gateway, it supports a different number of recorders.
Each recorder can capture daily, monthly, and yearly histories of an energy meter, power quality analyser, or pulse counter's readings, triggered daily at midnight. Users select the device to use as the data source and its specific counter using the "Select Device" button and Counter dropdown menu.
The "Clear" button, located on the right, deletes all recorder data.
Once a recorder is configured, its data can be viewed in graphical form under Recorder Graph. Users can also export data in CSV format for further analysis.
This setup allows users to monitor and analyse consumption trends efficiently through the SG's web interface.

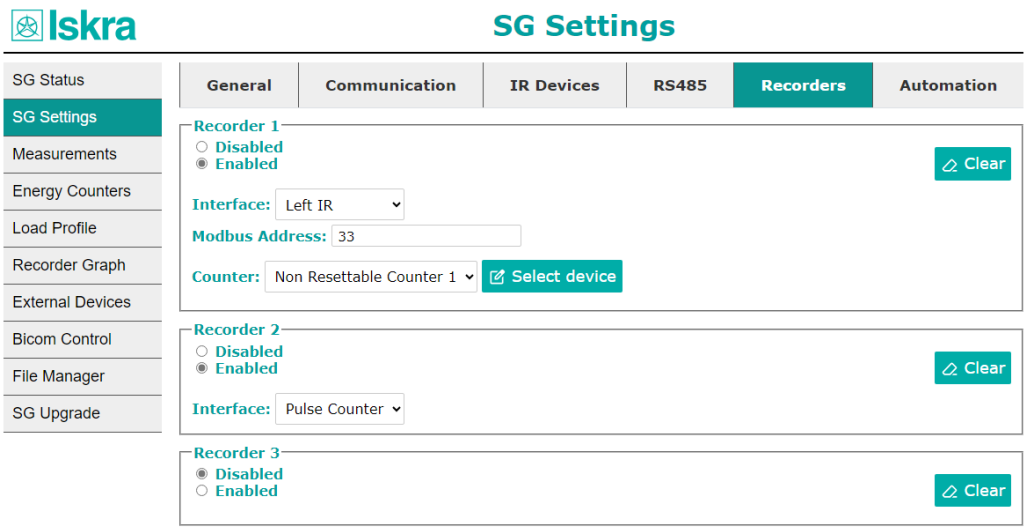


Figure 27: SG settings recorders tab

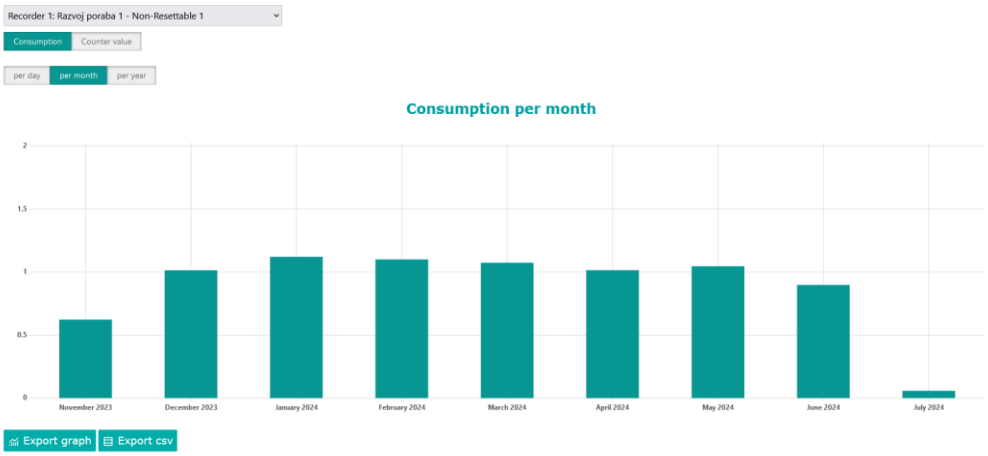


Figure 28: Recorder monthly consumption graph

4.1.3 *Measurements*

At the top of the page, users can choose between different devices to access specific measurement data as per their requirements. Basic information about the selected device is also displayed.
Within this segment of the page, users can view data for each phase separately as well as the total power.
This detailed information helps users monitor and manage their consumption efficiently.

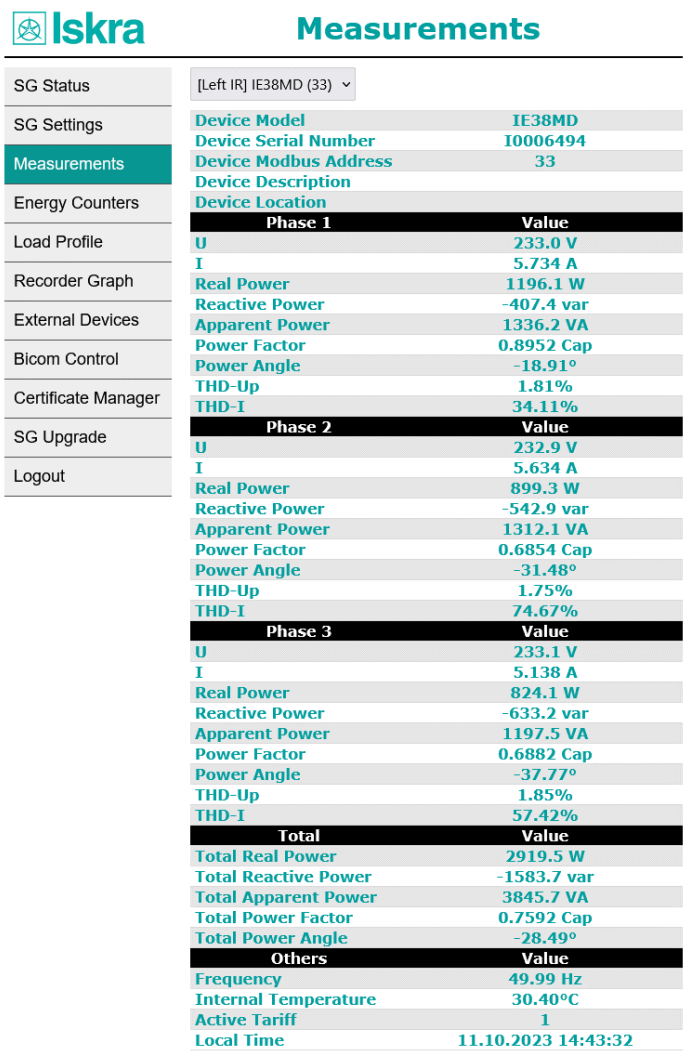


Figure 29: Measurements tab

4.1.4 *Energy Counters*

The Energy Counters tab displays energy counter values for connected devices, providing users with a clear overview of energy consumption data. At the top of the page, users can select which device measurements connected to the SG they wish to view.

Within the page, the measurements of non-resettable and resettable counters are separated for better interpretation of the data. This separation allows users to easily distinguish between total accumulated energy and energy measured over a specific period.

Figure 30: Counters tab

4.1.5 *Load Profile*

The Load Profile tab showcases energy measurements over time (last 24 hours) at 15-minute intervals, providing users with detailed insights into energy usage patterns. It offers several graph display options to customize the view:

- **Graph Type**: Toggle between Bar or Line graphs for visual representation.
- **Graph Mode**: Choose between normal or calculated graphs.
- **Refresh Rate**: Select Static or Auto refresh (which updates every 5 minutes automatically).
- **Display Options**: Choose different phases, devices, or days (today/yesterday) for display.

At the bottom of the page, daily statistics are displayed to show the consumption of each day, including both import and export data. These features allow users to analyse energy consumption trends effectively.

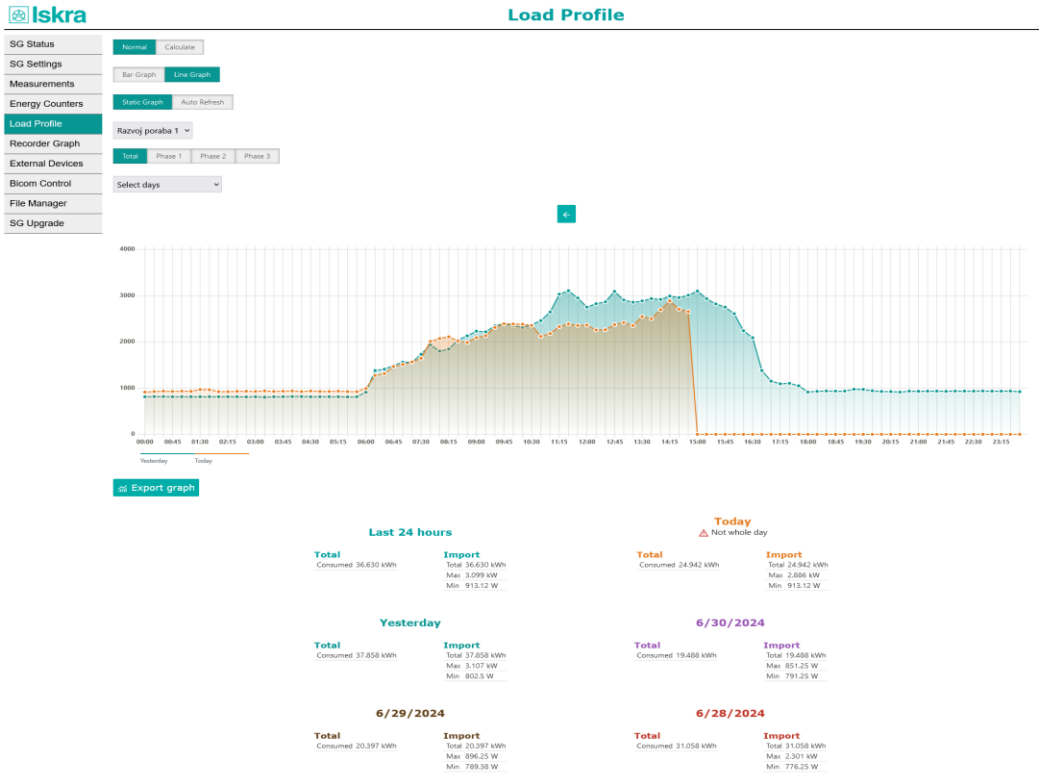


Figure 31: Load profile graph

PLEASE NOTE

The load profile data is obtained from the energy meter and will be lost if the energy meter loses power. For hardware version D or newer, the Smart Gateway includes an internal Load Recorder that can extend energy meters load profile for up to 56 hours. If the energy meter has stored more data, the system will use the data from the energy meter. However, in the event of a power loss, only the data stored on the Smart Gateway's Load Recorder will be retained, not all data from the energy meter.

4.1.5.1 Calculate

The Calculate function allows you to add/subtract multiple measurement combinations, spanning across different devices. The “Show/Hide Equation” buttons reveal or hide the section meant for adding or editing different calculations.

Clicking on “Add” prompts a new window to appear, offering customizable options. In this window, you can select the desired devices for display and specify the operators to be applied between them. This can be edited later using the edit icon

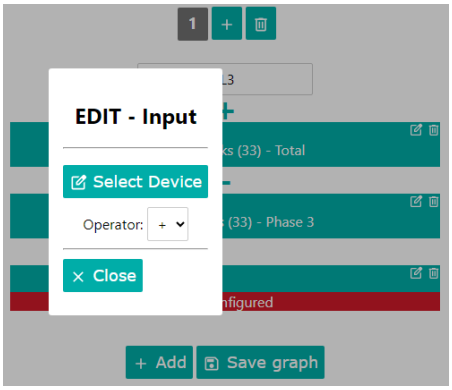


Figure 32 Load profile calculate function

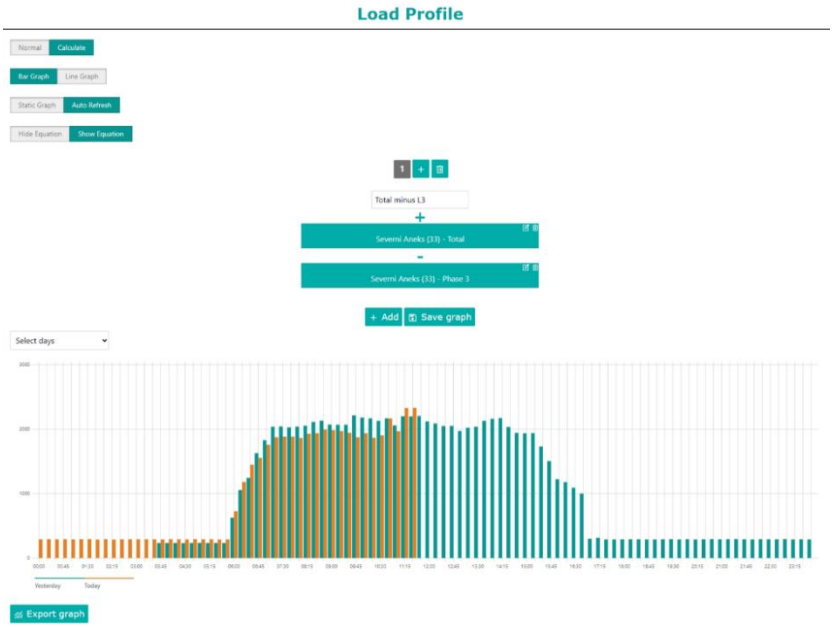


Figure 33 Load profile calculate function

Clicking on the + button, a different equation can be added with a corresponding graph. For each equation you can assign a unique name and choose which one to display later on.

4.1.6 Recorder graph

Recorder graph page displays the consumption or counter values over time. Within the top bar, users can select the specific recorder they wish to analyse though the displayed graph. Additionally, users can select scope of the graph, ranging from daily to yearly consumption metrics.

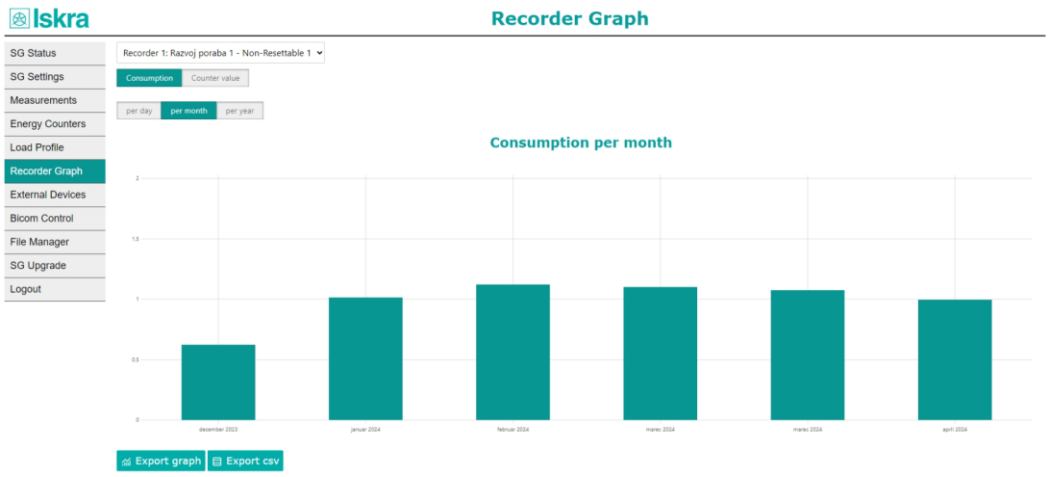


Figure 34: Recorder graph monthly consumption

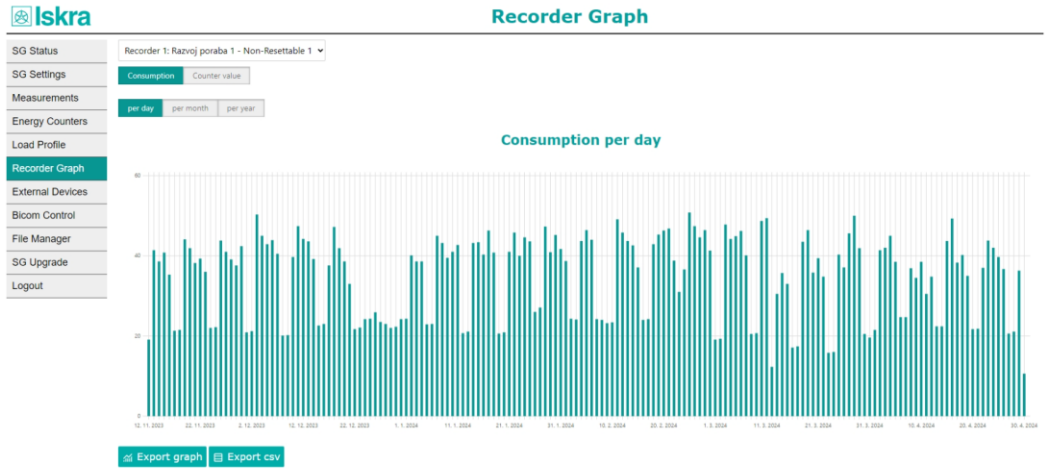


Figure 35: Recorder graph daily consumption

4.1.7 *External Devices*

The External Devices page displays all devices currently connected to the SG, including their serial numbers, models, Modbus addresses, and descriptions. Users can view and modify the device descriptions as needed. Up to 18 devices can simultaneously connect to one SG, comprising two over IR and 16 over RS485 communication.

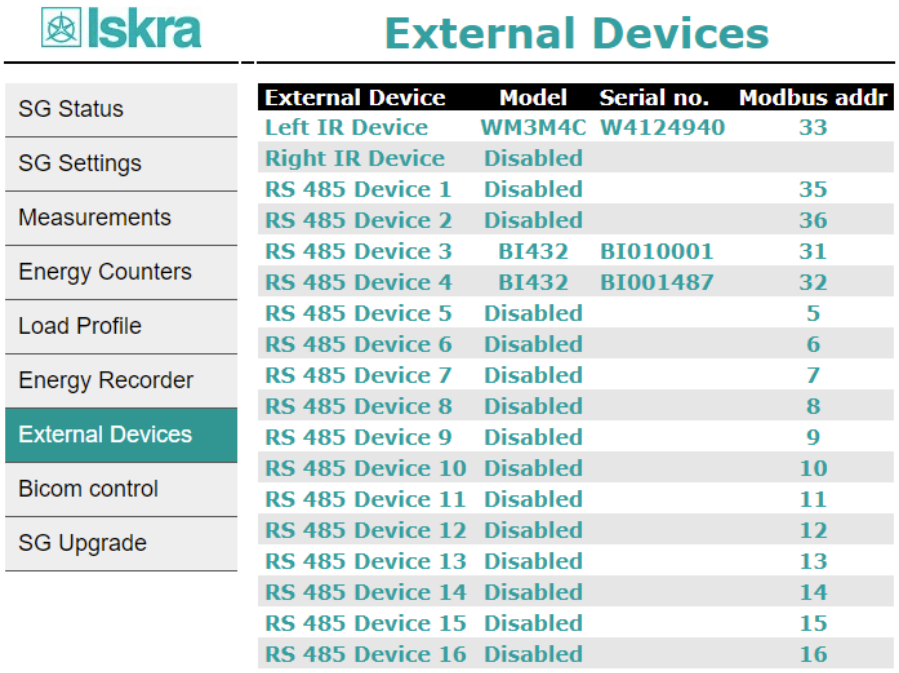


Figure 39: External devices tab

4.1.8 *Bicom control*

The Bicom Control tab enables users to view the current states of Bicom devices and control them by switching them on/off or toggling.

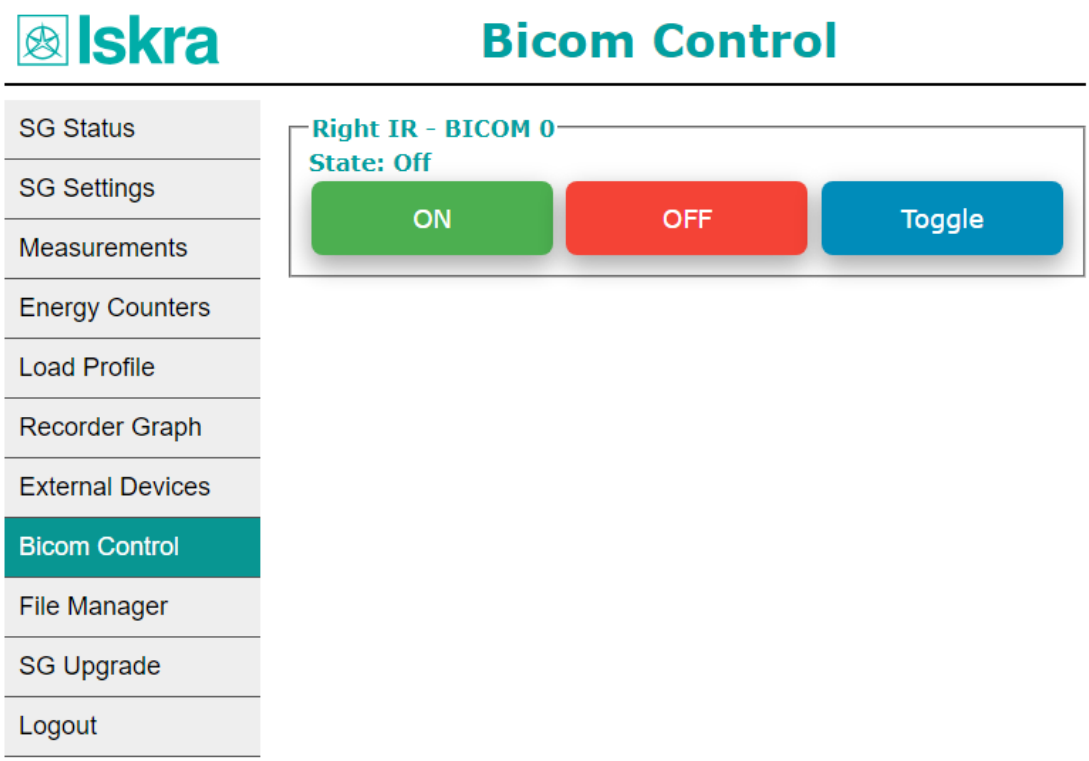


Figure 36: Bicom control tab

4.1.9 *Upgrade*

SG supports firmware upgrades via an HTTPS web server. To initiate an upgrade, users must input the URL of the upgrade file provided by our support team and click the "Start Upgrade" button.
For update versions **2.01 and older**, a certificate for web server verification is required. The certificate (.pem file) must be available on the internal filesystem of the SG. If no certificate is present on the device, navigate to the File Manager tab and add the certificate file. After adding the certificate to the File Manager and entering the URL of the upgrade file, users can press the "Start Upgrade" button.

For versions **above 2.06**, the Smart Gateway will automatically check if an update is available and prompt the user with an option to update.
Following this action, the upgrade process should initiate, indicated by the red LED on the SG blinking. **Once the LED ceases blinking red, refresh the website and wait 1 minute before making any adjustments to the settings, otherwise, the SG will revert back to the old firmware.**
.

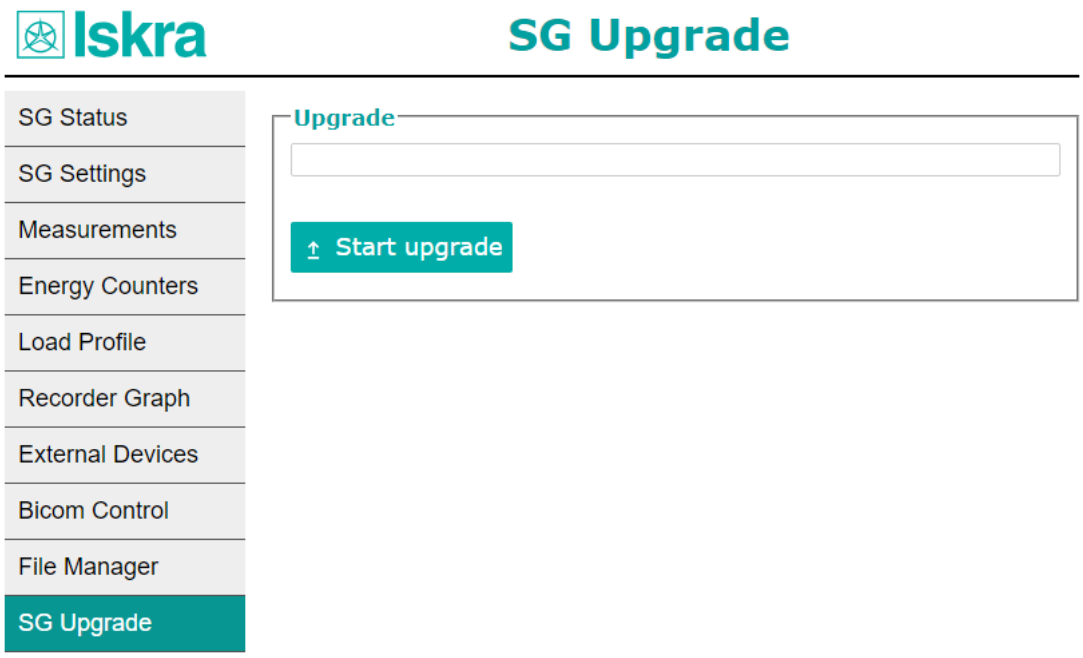


Figure 37: Upgrade tab

WARNING!

When Start Upgrade button is clicked SG is redirected to status page. If not, wait a few seconds and try again.
Please note that default settings may be reinstated after an upgrade. Provisioning might also need to be repeated.

4.1.10 *File manager*

In the File manager page, users can add or delete the files necessary for SG's functioning.
To perform an upgrade, server certificate must be present on an SG. Certificate file can be uploaded with the File manager.

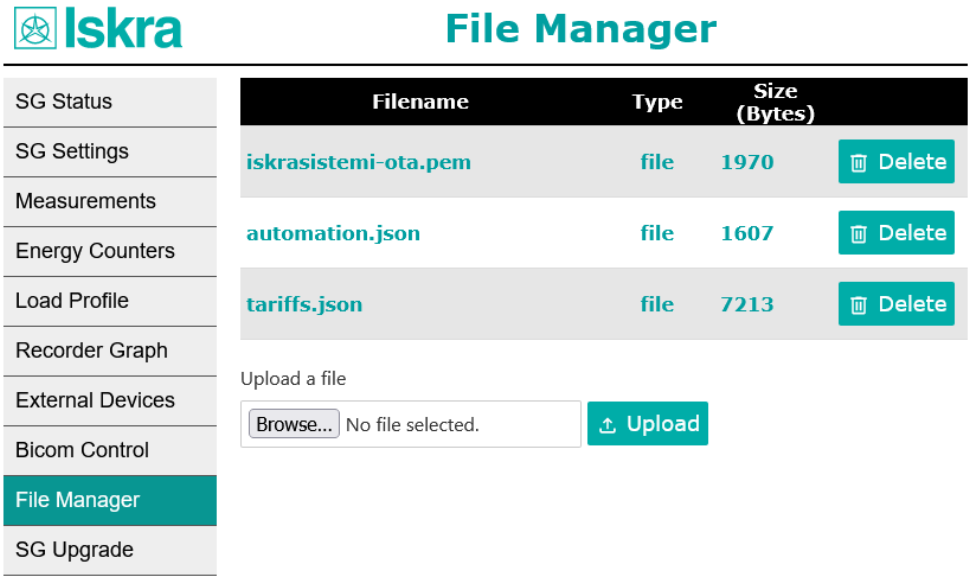


Figure 38 File Manager tab

4.2 REST API

The Smart Gateway (SG) also provides a RESTful API, allowing users to access the measurements of connected devices in JSON format. This API facilitates seamless integration with external systems and applications, enabling data retrieval and analysis.

List of REST API endpoints:

Method	Endpoint	Description
POST	*/api/auth*	Used for authentication purposes
GET	*/api*	Status information
GET	*/api/blink*	Blink procedure
GET	*/api/settings*	Get settings
POST	*/api/settings*	Change settings
GET	*/api/wifi/scan-networks*	List of available Wi-Fi networks
GET	*/api/devices*	List of connected devices
GET	*/api/measurements/{id}*	Energy/PQ meter measurement data
GET	*/api/counters/{id}*	Energy/PQ meter counter data
GET	*/api/bicoms*	List of connected Bicom devices and its states
POST	*/api/bicom*	Bicom control
GET	*/api/rs485/scan-devices*	Scan for available RS485 devices
POST	*/api/rs485/set-parameters*	Set scanned RS485 device com parameters
GET	*/api/recorders*	List of set recorders
GET	*/api/recorder/{id}*	Recorder data
GET	*/api/load_profile{id}*	Load profile data
POST	*/api/rs485/set-parameters*	Set scanned RS485 device com parameters

4.3 Push/Publish system

The SG can publish measurements from up to 17 devices to cloud systems using the following supported protocols:

- MQTT (JSON data format)
- Iskra's proprietary push to MiSmart system (XML data format)

Each SG is capable of pushing measurements from 17 devices: one via IR and up to 16 via RS485. Additionally, each device can be configured to push data to two different push/publish systems.
For example, each device can publish measurements to two different MQTT brokers, each with its own configurable time interval. The MQTT payload format is consistent with the REST API, as described in chapter 4.2.

4.4 Function menu (Factory Reset, Provisioning …)

4.4.1 *Function button*

The SG features a capacitive touch sensor as a function button, supporting two types of interactions: single press and hold.
Long press - Touch and hold the button for 10 seconds. This action is used for **entering the function menu and executing menu functions**.
Short press - Touch and release the button after 2 seconds. This action is used for **navigating through the function menu**.

4.4.2 *Function menu*

With **long press (10 seconds)** -> enter the function menu; Entering into function menu is signalized by **changing LED colours** in following order: green-orange-red-orange-green. After that the LED blinks fast indicating selected function (see table below).
With **short press (2 seconds touch)** -> switch from one selected menu function to another.

Function	Blinking LED
Reboot device	Green
Wi-Fi Provisioning mode	Orange
Factory reset	Red

To execute selected function **long press (10 second)** the function button. Function execution will be indicated **by changing LED colours** in the following order: green-orange-red.
The device exits the function menu one minute after the last button press.
Factory reset example:

1. Press and hold function button for 10 seconds (long press) to enter function menu which will be signalized by **changing LED colours**.
2. Do a **short press** of 2 seconds to move through function menu **twice** so LED will start quickly blinking RED
3. Press and hold function button for 10 seconds (long press) to execute selected function which will be signalized by **changing LED colours**.
4. SG will restart and will be restored to factory defaults

4.5 Automation

The Automation feature lets users implement custom control logic, enabling actions based on Boolean logic defined by blocks. These actions can include switching BICOM switches, writing to Modbus registers, or publishing messages to MQTT. Input parameters can include measurements from energy meters, current temperatures from sensors, time settings (such as current hour, minute, day in month, day in week, day in year), pulse counter readings, Modbus register data from any device connected to RS485, and tariff information (supported by HW D).
With this feature, users can create automations such as:

- Switching on loads if excess PV energy is available
- Activating loads based on specific tariffs or times
- Controlling devices based on temperature thresholds
- And more

The Automation feature provides flexibility for implementing complex control strategies tailored to specific operational needs through the SG's web interface. It supports hysteresis, allowing for smoother transitions in control actions**. Automations are executed 1 second after the previous execution.**
These modes can be configured separately for each automation. Additionally, each automation can be individually enabled or disabled based on user needs.
One SG can operate many automations simultaneously as long as the actions do not contradict each other, allowing for comprehensive control over multiple processes within the same system.

When you first open the automation tab, a simple template is already open and ready to be configured. User interface is divided in 2 parts:

- **Condition**: Located on the left side, determine what actions should be triggered based on Boolean logic.
- **Actions**: On the right side, actions are divided into "**On True**" (executed when the condition results as True) and "**On False**" (executed when the condition results as False).

A description or name of every automation is recommended and can be set in the “Automation description” bar.

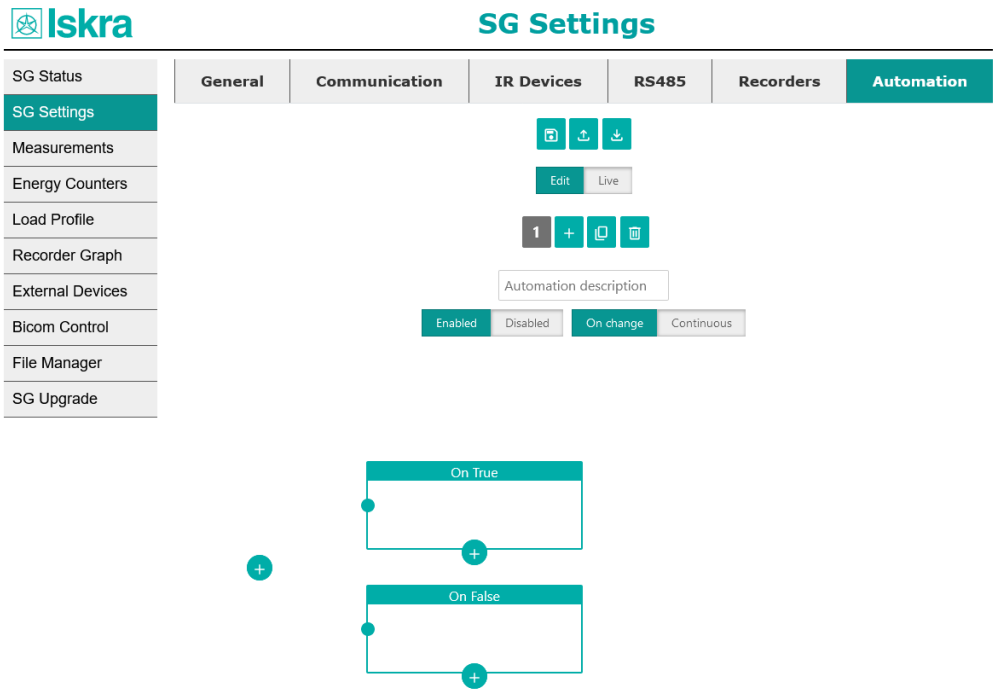


Figure 39 SG settings: Automation opened for first time

4.5.1 *Buttons*

From left to right: Save, Export, Import.

- *Export: All automations will be downloaded in .json format and can be used on different SGs.*
- *Import: Automation from a computer can be imported.*

From left to right: 1st automation, 2nd automation, Add, Duplicate, Erase

- *1, 2: automation selector (selected automation will be displayed)*
- *Add: a new automation is added*
- *Duplicate: elected (greyed) automation will be duplicated under a new number at the end of the list*
- *Erase: the selected (greyed) automation will be deleted*
- *Edit: the logic can be written and edited*

- *Live: real time actions are shown, indicating the ones that are currently true/executed (green) and the ones false/not executed (red)*

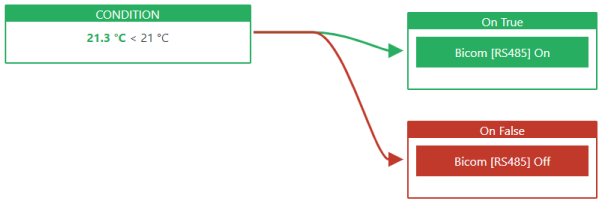


Figure 44: Preview condition status

- *Enabled: Selected automation is enabled*
  Disabled: Selected automation is disabled

- *On Change:* Actions triggers only when the condition result changes for the first time (Recommended)
  Continuous: Actions triggers each time automation is executed
  (forces the state of bistable switch)

4.5.2 *Building the logic*

Every automation is built from the highest hierarchy level to the lowest. By clicking the "+" icon on a block, new blocks can be added. Newly added block is always attached to the left, creating a new level in the logic hierarchy. Keep in mind that all levels must end with a condition on the left side.
To add a new block on the same level without creating a new hierarchy level, select the "+" button from the logic gate on the right.
For example:

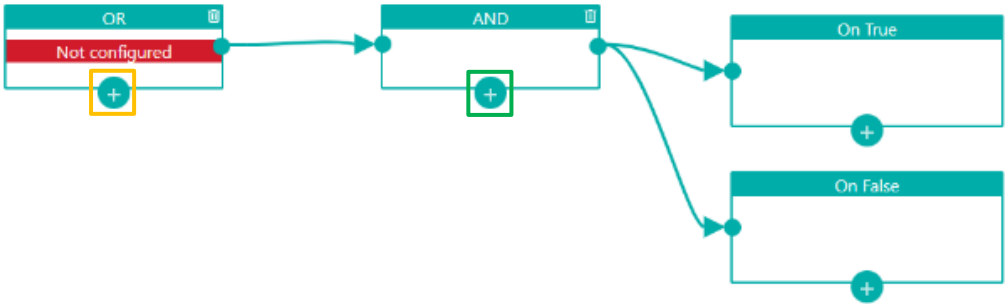


Figure 45: Adding logic blocks

- *To add a new level of gates to this logic, the ⊕ from the left "OR" gate is selected – marked in orange.*
  Clicking on the orange marked ⊕ gave us a drop down menu where we selected "AND" logic gate which appeared on the left.

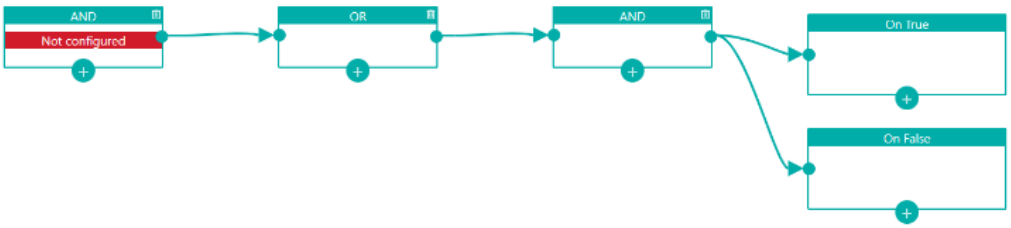


Figure 46: Added chained AND block

- *To add a logic gate to the same level as the "OR" gate, the ⊕ from the right "AND" gate is selected – marked in green:*
- *Clicking on the green marked ⊕ gave us a drop down menu where we selected "AND" logic gate which appeared on the left under the existing "OR" logic gate.*

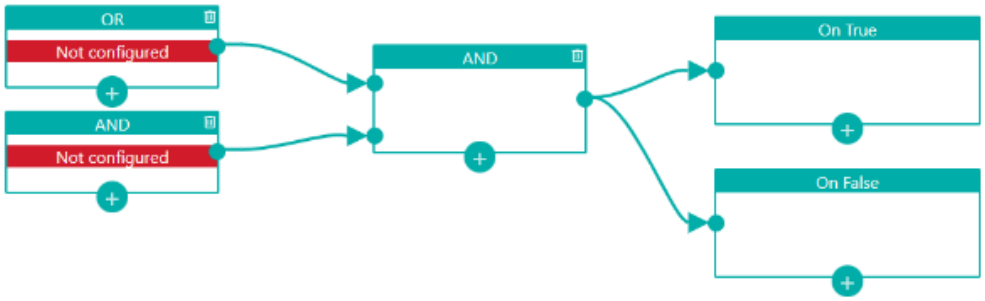


Figure 47: Added parallel AND gate

In logic gates, when you set a condition, it acts as the input parameter, resulting in either 'true' or 'false,' and becomes the leftmost block in the hierarchy. This means you cannot add any more conditions to the left of it.

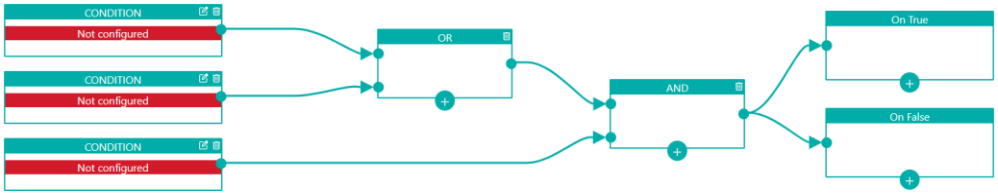


Figure 48 Added conditions.

4.5.3 *Conditions*

A condition block in automation system allows users to create comparison equations using various input data sources. This input data can include:

- Measurements from energy meters
- Current time
- Temperature readings from connected sensors
- Pulse counter values
- Current tariff information
- Register values from any RS485 connected device

Users can perform operations, such as addition or subtraction, on these values. This capability is particularly useful in scenarios like managing energy consumption, where you might have two energy meters (one for house consumption and another for PV (photovoltaic) production). By subtracting the house consumption from the PV production, users can automate actions based on excess solar power availability. Condition block also supports hysteresis.
The result of the condition block is a Boolean value (True/False), determined by the equation the user sets. This equation is compared to a fixed value chosen by the user using a comparator.

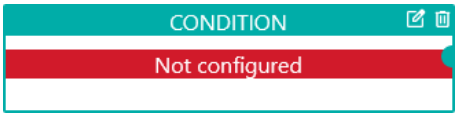


Figure 49: Added condition not yet configured

To set up a condition, you have to select the icon. Then the "Edit - condition" window is displayed and you can select what property you want to use and configure operator if you want to add or subtract it.

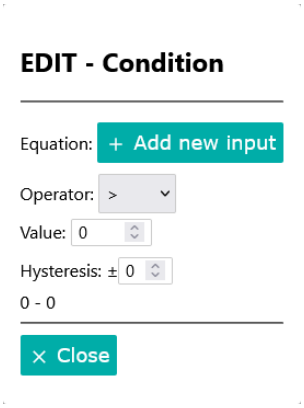


Figure 50: Empty condition

Figure 51: Condition with added first input

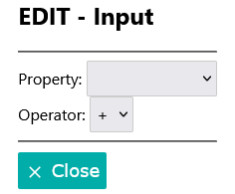


Figure 52: input configuration

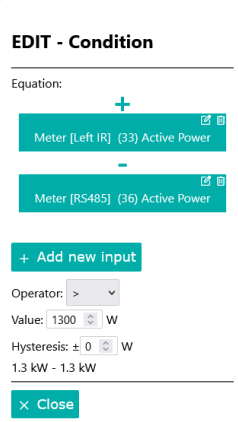


Figure 53: Example of subtraction of active power in condition

4.5.4 *Actions*

The two blocks on the right are the action blocks ("On True" / "On False"). To configure the actions that will occur when the condition is true or false, users need to select the appropriate button and click the 'Action' button, which will display a 'Not Configured' box inside the block.

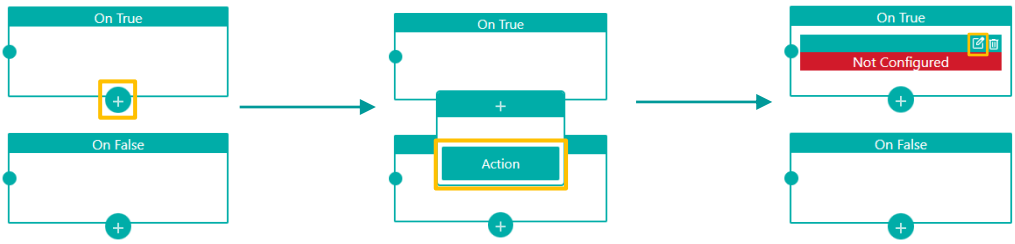


Figure 54: Adding new action

To set up an action, you have to select the icon. Then the "Edit - action" window is displayed you can choose what action you want to execute and configure it.

4.5.4.1 *Bicom*

Choosing "Bicom" action lets you control the bistable switch Bicom on, off or toggle it. Click on select device to easily select Bicom device.

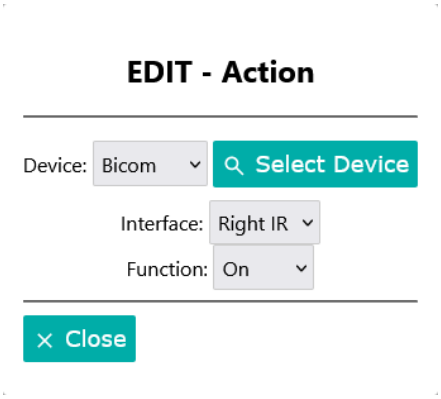


Figure 55: EDIT – Action – select device

4.5.4.2 *MQTT*

Choosing "MQTT" action let's you publish custom message to desired subtopic in your own MQTT server which you configured in web interface SG settings in "Communication" tab.

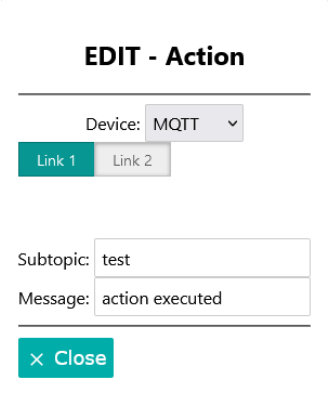


Figure 56: EDIT – Action - MQTT

4.5.4.3 *Modbus*

Choosing “Modbus” action enables you write to any device which supports Modbus (RS485). User enters the coresponding slave address of the desired device, specify the register, and select the value type. If 32-bit values are chosen, the system will also write to the next register, as registers are 16-bit.

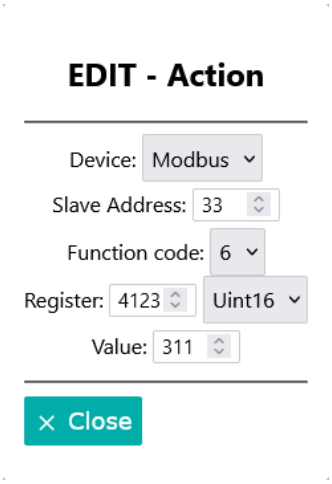


Figure 57: EDIT – Action - Modbus

4.5.5 *Live Preview*

The Live Preview feature provides real-time visual feedback on the status of each condition and action block within the automation logic. It indicates whether conditions are met (True/False) and shows which actions are triggered.

- If a condition is true, the corresponding blocks and arrows turn green, indicating that the condition is met.
- If a condition is false, the corresponding blocks and arrows turn red, showing that the condition is not met.

Input condition values are also displayed, offering additional insight into the current state of each condition. By using the Live Preview, users can identify and troubleshoot issues in their automation logic. It provides a clear, color-coded visualization of the automation flow, aiding in the refinement of automation rules and ensuring optimal performance and reliability.

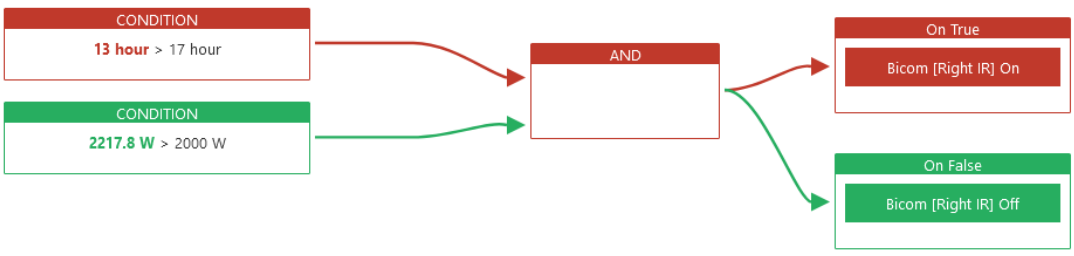


Figure 58: Condition false

4.5.6 *Examples*

4.5.6.1 *Energy meter based HVAC automation*

This example demonstrates how to automate actions based on real-time power measurements from a power meter.

Conditions:

- **Power Condition:** Power consumption from a power meter exceeds 10 kW.

Actions:

Actions (On True):

- **Action 1:** Activate high-efficiency mode on HVAC system.
- **Action 2:** Disconnect non-essential loads.
- **Action 3:** Publish an MQTT message.

Actions (On False):

- **Action 1:** Activate normal operation for HVAC system.
- **Action 2:** Reconnect non-essential loads.
- **Action 3:** Publish an MQTT message.

Explanation:

- **Conditions:** Monitors the real-time power consumption from the power meter. If power consumption exceeds 10 kW, this condition becomes true.
- **Actions:** When the condition is true, actions are triggered to optimize energy usage by activating high-efficiency modes and reducing consumption of non-essential devices. When false, it activates normal mode and enables non-essential loads.

Guide:

- Create new automation and add condition block

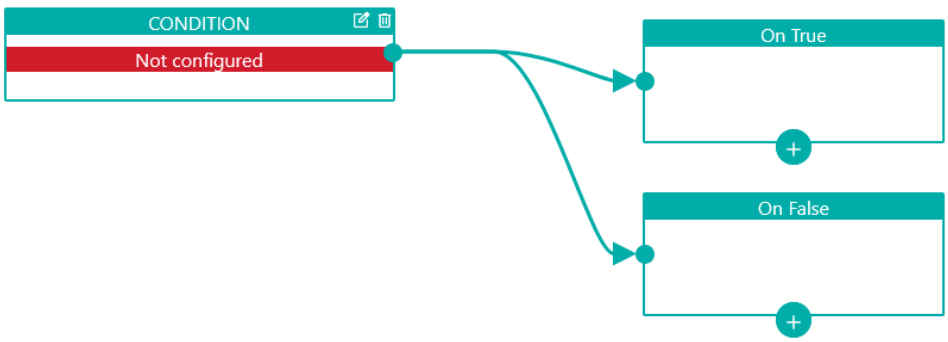


Figure 59: Condition block added

- Edit condition and add new input to the equation and configure it so it takes total active power from energy meter

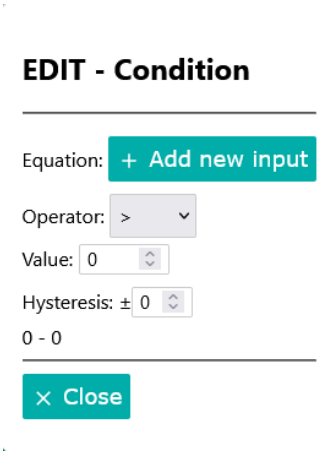


Figure 60 Add new input to condition block

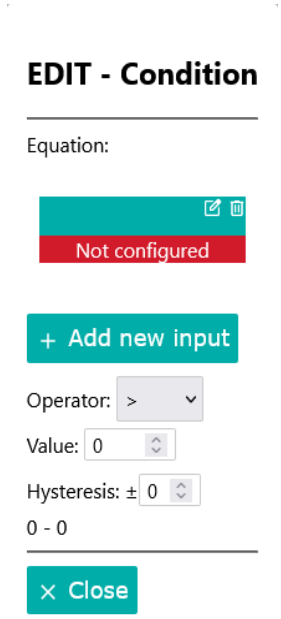


Figure 61 New input added to condition block

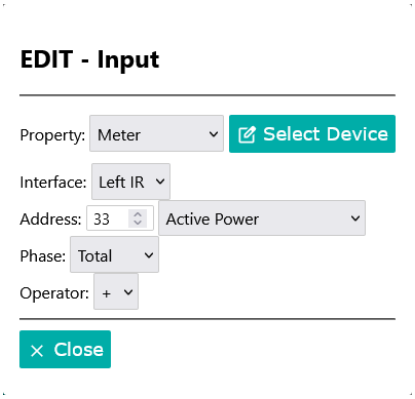


Figure 62 Configure input

- Set the condition so that power must be greater than 10000 W and adjust the hysteresis according to your specific needs.

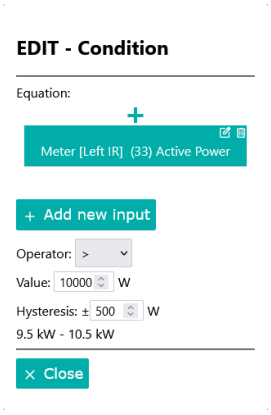


Figure 63: Configured condition

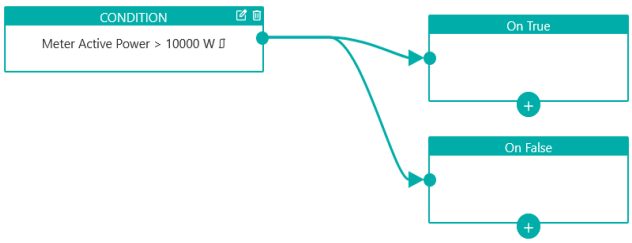


Figure 64: Configured condition

Configure the following actions for On True:

- Enable high-efficiency mode on the HVAC system.
- Turn off Bicom switches.
- Publish a message to MQTT.

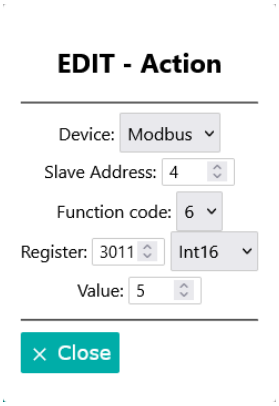


Figure 65 Configure modbus action

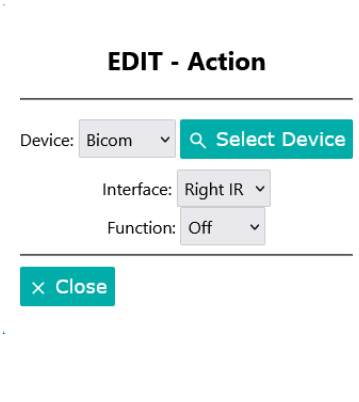


Figure 66 Configure bicom action

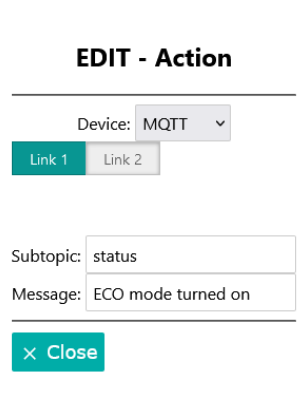


Figure 67 Configure MQTT action

Configure the following actions for On False:

- Disable high-efficiency mode on the HVAC system.
- Turn on Bicom switches.
- Publish a message to MQTT.

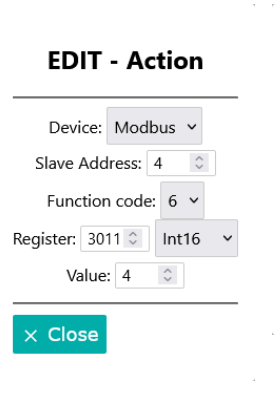


Figure 68 Configure modbus action

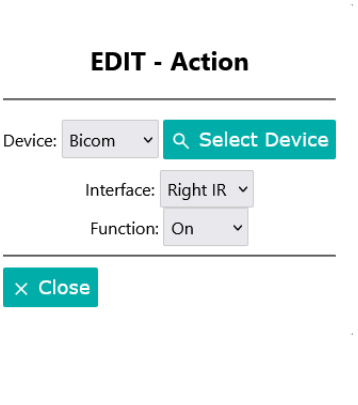


Figure 69 Configure bicom action

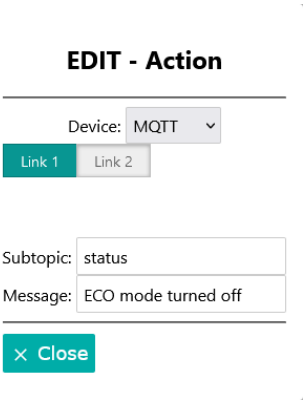


Figure 70 Configure MQTT action

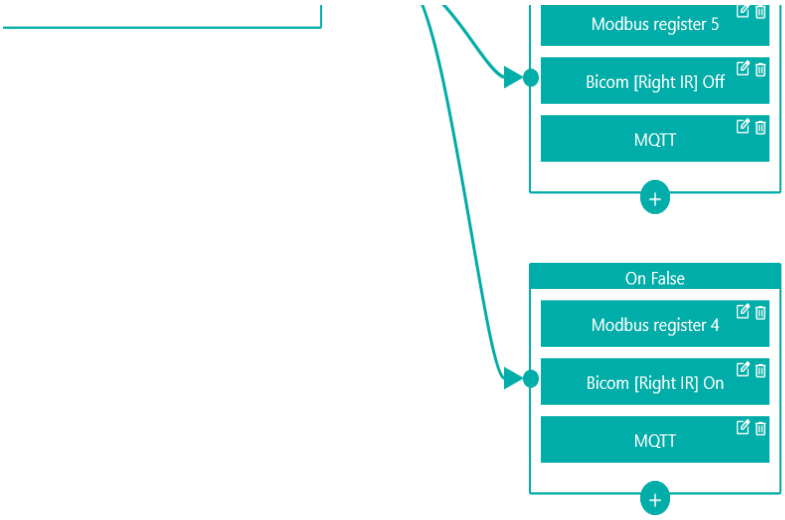


Figure 71: Final configuration

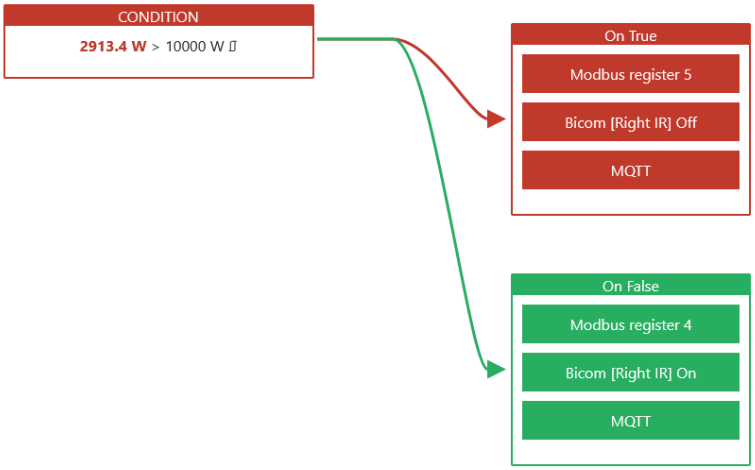


Figure 72: Condition false

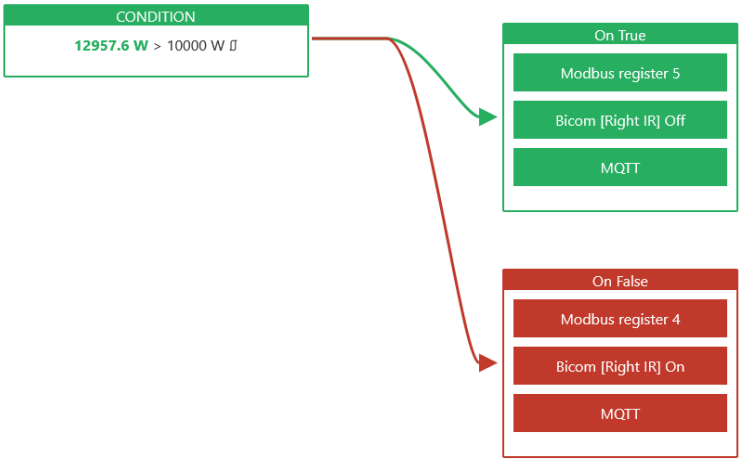


Figure 73: Condition true

4.5.6.2 *Heater control*

This example demonstrates how to automate actions based on real-time power measurements from a power meter.

Conditions:

- **Time Condition: Time must be between 6:00 and 16:00 and**
- **Power Condition:** Power consumption from a power meter is below 5 kW.

Actions:

Actions (On True):

- **Action 1:** Activate heater.

Actions (On False):

- **Action 1:** Deactivate heater.

Explanation:

- **Conditions:** Checks if time is between 4 and 16 o'clock and Monitors the real-time power consumption from the power meter. If current time is in correct range and power consumption is less than 5 kW, this condition becomes true.
- **Actions:** When the condition is true, activate heater and when false, deactivate it.

Guide:

- Create new automation and add AND logic block

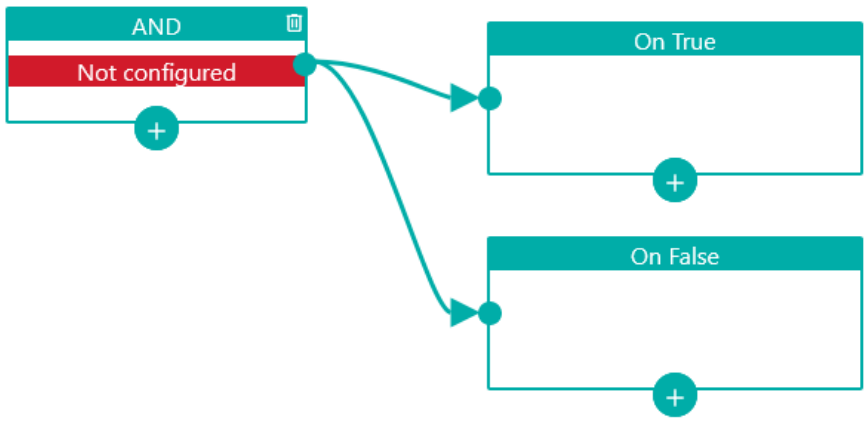


Figure 74: "And" block added

- Add 2 time conditions to the AND logic block, one checking if current hour is greater than 6 and another one that is checking if current hour is less than 16.

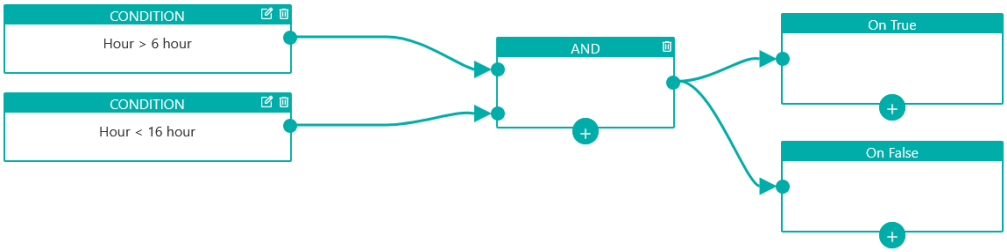


Figure 75: Hour conditions added

- Add another condition to AND logic block that will check if Active power is below 5 kW

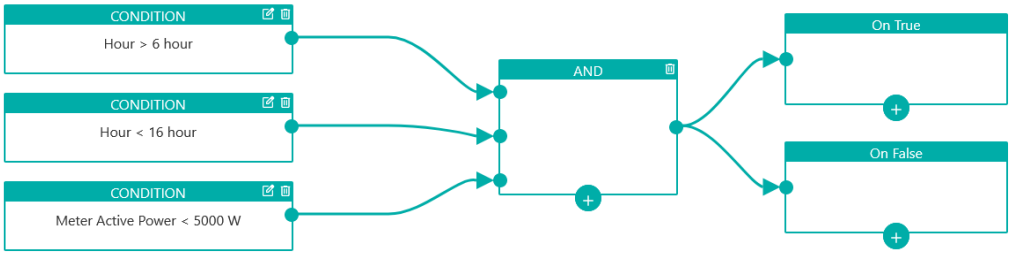


Figure 76: Power condition added

- Add action that will activate Bicom to the **On True** block and one that will deactivate Bicom to the On False block

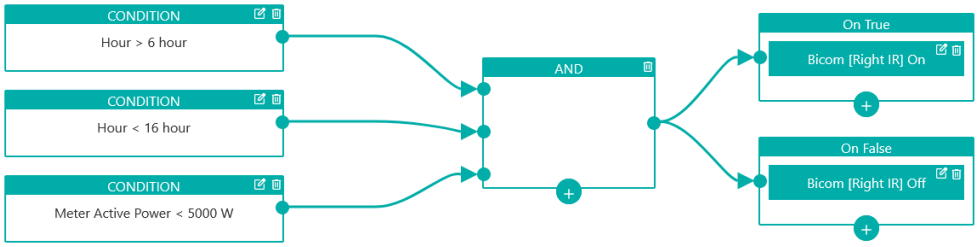


Figure 77: Final configuration

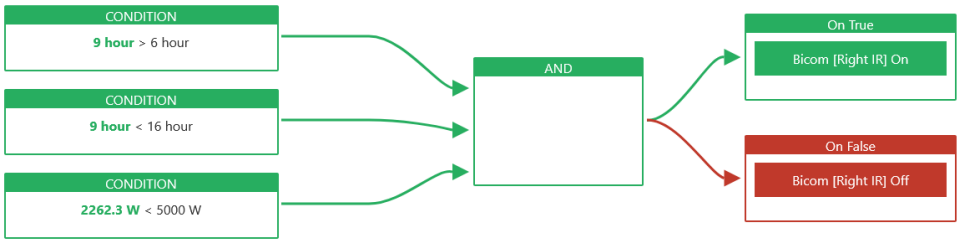


Figure 40: All conditions are true, so On True actions are being executed

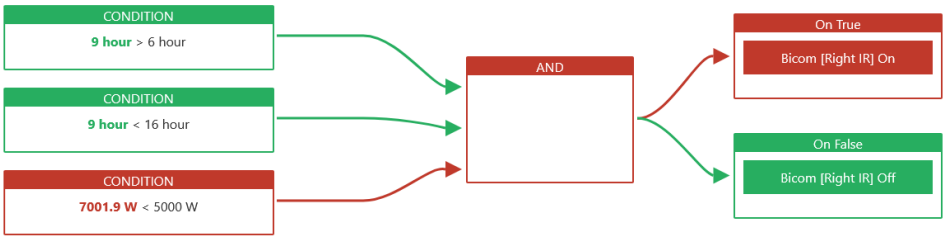


Figure 41: Time condition is true but consumption condition is false, so On False actions are being executed

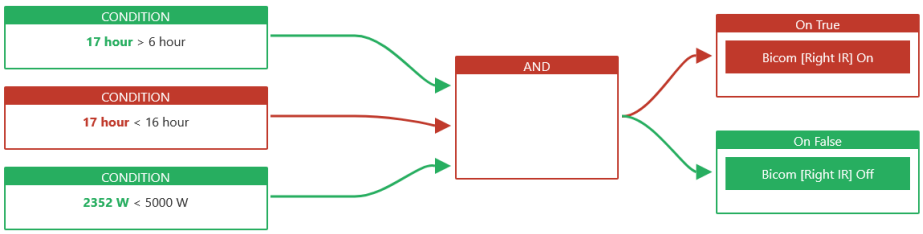


Figure 80: Time condition is false, but consumption condition is true, so On False actions are being executed

4.6 Tariffs

The tariff feature enables users to set up to **5 different tariffs**, each with its own unique name and price.

This feature is available only for **Smart Gateway** hardware versions greater than **D** and is utilized when the user has enabled "Tariff counters" **on at least one** energy meter or power quality meter.

PLEASE NOTE

The tariff counters are intended for informative viewing only and should not be relied on for billing, as they are not part of the meter's primary functionality and may not provide accurate readings.

4.6.1 *Configuring Tariffs*

To set up tariffs:

- Navigate to the **Tariff settings** section.
- Press the **+icon** to add a tariff.
- Enter the **name** of each tariff.
- Specify the **price** for each tariff.
- To delete a tariff, click the **Delete** button.

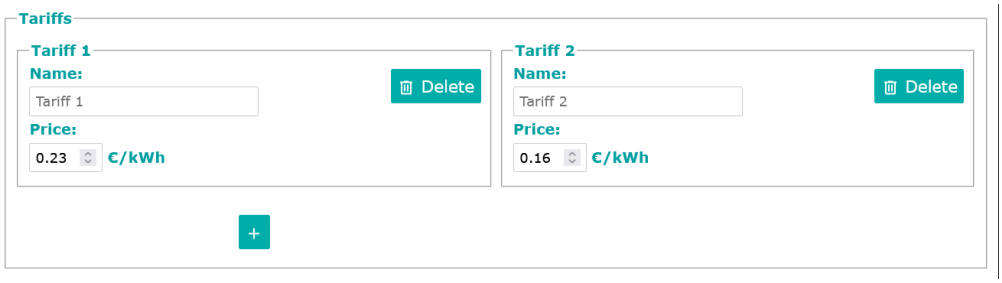


Figure 81: Tariffs added

4.6.2 *Settting Up Seasons*

Users can create **Seasons** to control when specific tariffs are activated:

- Press the **+icon** to add a season.
- Enter a **name** for the season
- Specify a **start date** for the season
- Select the **mode** (Workday, Weekend, or Holiday) to define when this season applies.
- Each season has its own **schedule settings**, allowing users to specify which tariff is used during certain hours for that particular season.

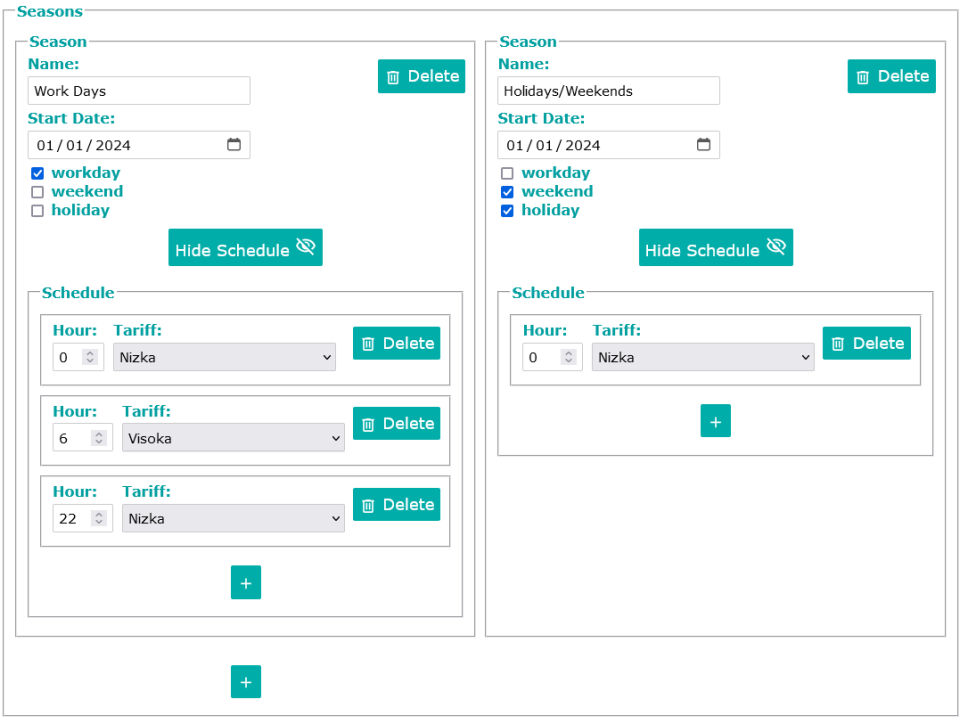


Figure 82: Added 2 seasons and their schedule

4.6.3 *Defining Holidays*

Users can create a list of holidays for tariff management:

- Enter the name of the holiday.
- Specify the date of the holiday.
- If the holiday lasts longer than one day, set the duration.
- Indicate wheter the holiday is an annual event or a one-time occurrence.

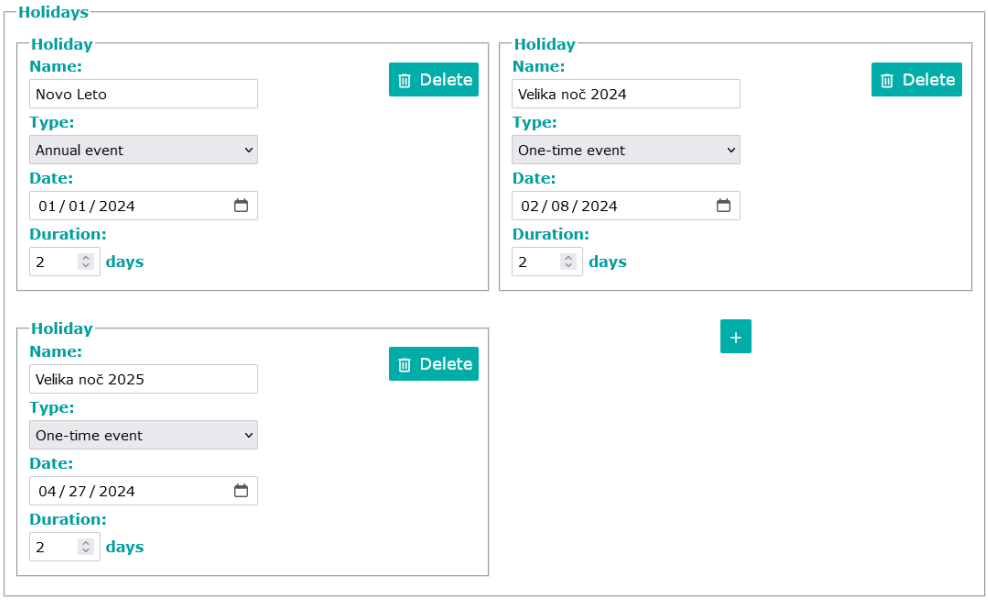


Figure 83: *Example of 3 configured holidays New Year (Annual) and Easter (One-Time event as date changes)*

4.6.4 *Using Current Tariff for Automation*

The current tariff can also be utilized within the Automation feature. Users can create automations based on the active tariff to optimize energy consumption or trigger specific actions when certain tariffs are in effect.

4.7 MQTT

SG can receive MQTT commands published to $root topic/$subscribe topic. Topics are settable in communication settings. MQTT commands must be in JSON format. List of MQTT commands:

4.7.1 *Status*

`device/status/hello`: Publishes a "hello world" message with device details.

Example:

```
{
 "hello": "hello world",
 "serial number": "IS001093",
 "model_type": "SG-E1",
 "sw_ver": "1.0.0",
 "hw_ver": 1
}
```

4.7.2 *Error*

`device/error`: Publishes error messages.

Example:

"Error: Left IR Energy meter not responding"

4.7.3 *Reboot command*

```
{
  "data": {
        "cmd": "reboot"
  }
}
```

4.7.4 *GET settings*

GET settings command respond to status subtopic of set publish topic

```
{
"data": {
          "cmd": "get_settings"
        }
}
```

4.7.5 *GET measurements*

Measurements from connected devices can be read with measurements command. Argument “addr” is Modbus address of device. Address 0 is used for IR device. User can alternatively use “index” argument that corresponds to device index

```
{
"data": {
       "cmd": "measurements",
        "addr": 0
        }
}
```

4.7.6 *GET counters*

Energy counters from connected devices can be read with counters command. Argument “addr” is Modbus address of device. Address 0 is used for IR device. User can alternatively use “index” argument that corresponds to device index

```
{
"data": {
       "cmd": "counters",
        "addr": 35
        }
}
```

4.7.7 *Bicom command*

Bicom command is used to manipulate bistable switches. Address 0 is used for IR device.
“val” argument can have are: “on”, “off” and “state”. “state” will report Bicom status

```
{
  "data": {
         "cmd": "bicom",
         "addr": 32,
         "val": "on"
  }
}
```

4.7.8 *Detect 485 devices command*

Command is used to detect devices connected to RS485 interface. This command responds to status subtopic of set publish topic

```
{
"data": {
    "cmd": "detect_485_devices",
  }
}
```

4.7.9 *Modbus commands*

Following Modbus commands are supported on SG:

- Read Modbus registers
- Write single Modbus register
- Write multiple Modbus registers

Every command supports addressing by Modbus address or by serial number.

4.7.9.1 *Read Modbus command*

```
{
"data": {
    "cmd": "modbus_read",
    "modbus_address":33,
    "reg":  40156,
    "no_regs": 1
    }
}
```

Response is:

```
{
       "cmd": "modbus_read",
       "modbus address":   33,
       "register":  40156,
       "number of registers":    1,
       "values":    ["0x0002"]
}
```

4.7.9.2 *Write Modbus single register*

```
{
"data": {
    "cmd": "modbus_write_single",
    "modbus_address":33,
    "reg":  40156,
    "value": 0
    }
}
```

4.7.9.3 *Write Modbus multiple registers*

Values are in byte format and number of bytes should be odd.

```
{
"data": {
    "cmd": "modbus_write_multi",
    "modbus_address":33,
    "reg":  40101,
    "values": [65, 66]
    }
}
```

Response is:

```
{
"data": {
    "cmd": "modbus_write_multi",
    "serial_number":"MC024305",
    "reg":  40101,
    "values": [65, 66]
    }
}
```

4.8 Integration to Home Assistant Ecosystem

Users can enhance their smart home experience by integrating Smart Gateway into the open source Home Assistant ecosystem. https://www.home-assistant.io/

From version 2024.10, Home Assistant you can integrate Iskra energy meters and power quality analysers via SG. You can now monitor energy usage, automate management, and track detailed electrical parameters via Home Assistant's interface. The integration works with **Smart Gateway** (RestAPI). Devices are automatically detected, allowing easy setup for efficient energy monitoring in homes or businesses.

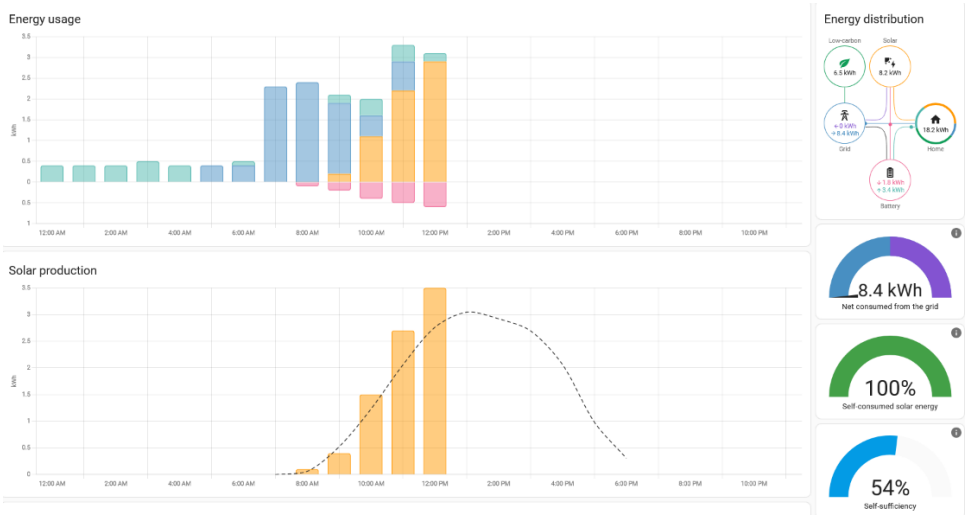


Figure 84: Example Dashboard Configuration in Home Assistant

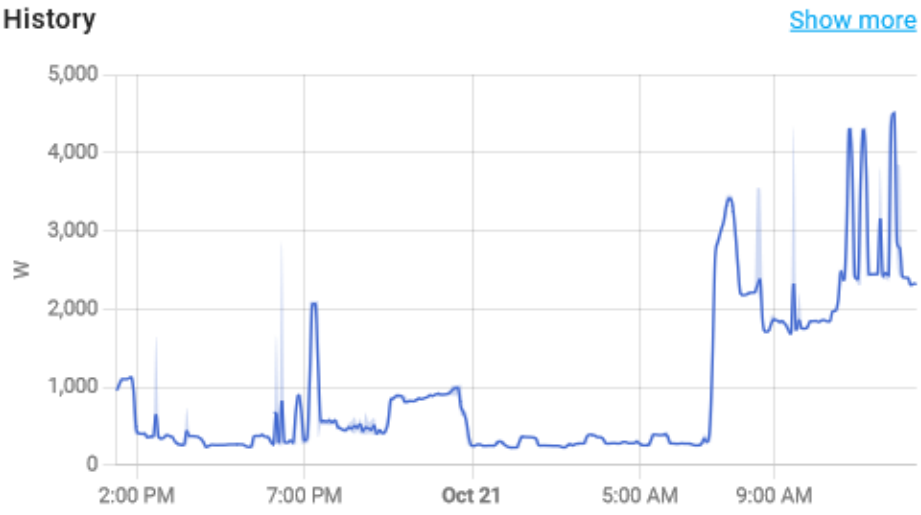


Figure 85: Example graph of load power

4.8.1 *Integration to Home Assistant*

Follow these steps to integrate your Iskra meters using the Smart Gateway REST API:

- **Step 1: Add the Iskra Integration**

Open Home Assistant.

Navigate to *Settings* > Devices & Services.

Click on *Add Integration* and search for Iskra.

Figure 86: Add integration button

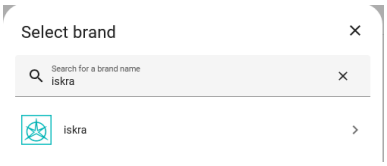


Figure 87: Select brand

- **Step 2: Enter IP Address and Select Connection Type**

Enter the *IP address* of the gateway.

Select *RestAPI* as the connection type.

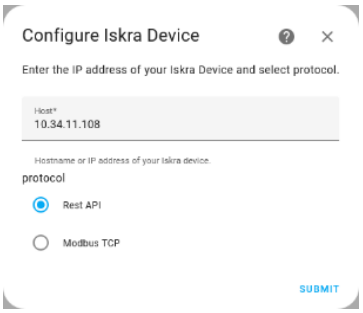


Figure 88: Configure Iskra Device

If necessary, provide your *login credentials*.

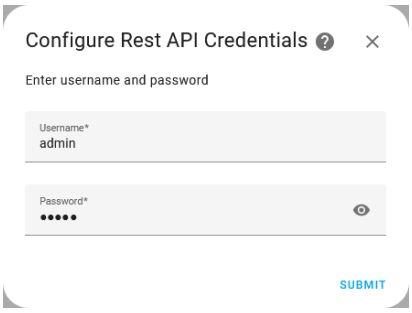


Figure 89: Configure Rest API credentials

All devices configured on the Smart Gateway will be automatically added to Home Assistant.

Figure 90: Successful configuration

- **Step 3: Automatic Device Discovery**

Once connected, Home Assistant will *automatically detect* Iskra's devices configured in the Smart Gateway web interface and begin acquiring data.

Available Data

The integration will create the following entities for monitoring:

➢ **Total Measurements:**

- Total Active Power (W)
- Reactive Power (var)
- Apparent Power (VA)
- Power Factor

➢ **Phase-specific Measurements:**

- Active Power (W)
- Voltage (V)
- Current (A) for each phase

➢ **Additional Sensors:**

- Frequency (Hz)
- Energy counters (resettable/non-resettable) for Wh/varh/VAh

Data updates occur every minute, providing a detailed overview of energy usage.

- **Step 4: Utilizing the Data**

Once your sensors are set up, you can:

- Visualize them on your dashboard.
- Track energy consumption trends.
- Create automations, such as:
    - Triggering alerts for high power usage.
    - Setting up actions based on voltage drops or energy metrics.

5 TECHNICAL DATA

In the following chapter, you will find detailed technical specifications for the operation of the SG:

5.1 Mechanical characteristics of input

Rail mounting according DIN EN 60715.

Terminals	*Max. conductor cross-sections*
Contacts capacity:	*0.5 mm^2 ... 3 mm^2*
Connection screws:	*M3*
Recommended / Max torque:	*0.5 / 0.6 Nm*
Length of removed isolation:	*6 mm*

5.2 Power Supply input

Nominal voltage U_n:	*From 85 V to 265 V AC or 85 V to 300 V DC*
Power consumption:	*< 3 W*
Nominal frequency f_n:	*50 Hz and 60 Hz*
Length of removed isolation:	*6 mm*

5.3 LED

Colour:	
Green:	*Slow blinking = operational state,* *Fast blinking = connecting state*
Red:	*Fast blinking = upgrading*
Orange:	*Slow blinking = provisioning mode,* *Fast blinking = provisioning mode, WiFi device connected to SG's AP*

5.4 Wi-Fi

Protocol:	*802.11 b/g/n*
Data rate:	*150 Mbps*
Adjustable transmitting power:	*20.5 dBm*

5.5 IR Serial communication

Type:	*IR*
Speed:	*19200 bit/s*
Frame:	*8, N, 1*
Protocol:	*MODBUS RTU*

5.6 Ethernet (only for SG-E1)

- Compliant with IEEE 802.3/802.3u (Fast Ethernet)
- Compliant with ISO 802-3/IEEE 802.3 (10 BASE-T)

5.7 RS485 Serial communication

Type:	*RS485*
Speed:	*1200 bit/s to 115200 bit/s (default 115200 bit/s)*
Frame:	*8, N, 1*
Protocol:	*MODBUS RTU*

5.8 Pulse input

The **Pulse input** is an active input designed to detect pulses or short circuits between the **Pulse+** and **Pulse-** pins.	
Rated voltage:	*3.3V*
Short circuit current	*0.1mA*

5.9 Temperature sensor (Pt1000) input

Measuring method:	two wire connection
Input range with programmable ratings:	
RTD sensors limit values:	*200 Ω - 10 kΩ*
Measuring voltage:	*≤ 1 V*
Minimum temperature range:	*100 K*
Minimum differential resistance:	*400 Ω (1000 Ω -> 1400 Ω)*
Lead resistance:	*< 10 Ω per lead*
Consumption:	*< 0.5 VA*

5.10 Safety and ambient conditions

According to standards for IEC 60950.

Temperature and climatic condition according to EN 62052-11.

Dust/water protection:	*IP50*
Operating temperature:	*-25 °C … +55 °C*
Storage temperature:	*-40 °C … + 70 °C*
Enclosure:	*self-extinguish, complying UL94-V*

5.11 **EC Directives Conformity**

EU Directive on EMC **2014/30/EU**

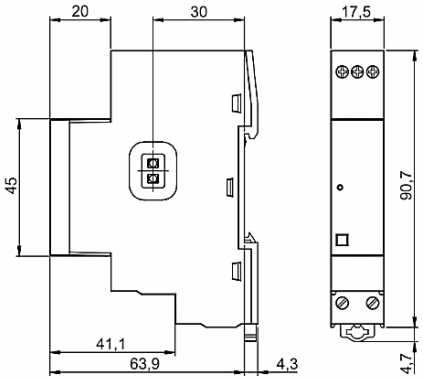
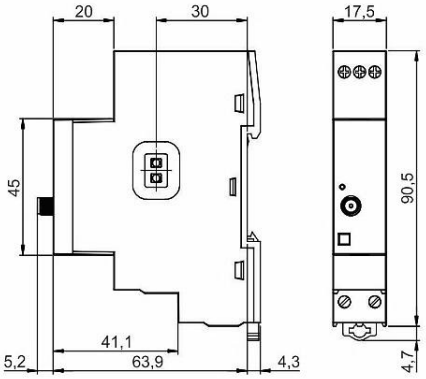
EU Directive on Low Voltage **2014/35/EU**

EU Directive WEEE **2002/96/EC**

EU RED Directive **2014/53/EU**

5.12 **Dimensions**

Dimensional drawing:

Construction	***Appearance (SG-E1/W1)***	***Appearance (SG-W1A)***
Dimensions	All dimensions are in mm 	

6 ABBREVIATION/GLOSSARY

Abbreviations are explained within the text where they appear the first time. Most common abbreviations and expressions are explained in the following table:

Term	***Explanation***
Ethernet	*IEEE 802.3 data layer protocol*
MODBUS	*Industrial protocol for data transmission*
MiQen	*Setting Software for ISKRA instruments*
PI	*Pulse input module*
AC	*Alternating quantity*
IR	*Infrared (optical) communication*
Pt1000	*Temperature sensor*
PQ	*Power Quality*

List of common abbreviations and expressions

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