WIRELESS SENSORS TECHNOLOGY

Universal IoT Gateway

Product Manual

PM_UNIVERSAL_IOT_GATEWAY_E01B

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IV. Introduction

1. Overview

The Universal IoT Gateway product is a device that enables communication between the transmitters of Tekon's DUOS and PLUS product family, as well as third-party transmitters, with IoT platforms through integration with REST API (Tekon IoT Platform) and MQTT (third-party platforms). The Universal IoT Gateway also uses Modbus TCP/IP and Ethernet communication protocols for sending and receiving data to clouds and the Modbus RTU protocol for communications in local networks.

This device features a web interface, the **Universal IoT Gateway Interface**, designed to assist in the configuration, integration of devices, visualization, data export, and alarm configuration. Additionally, it allows for data storage using an internal memory of 8 GB.

2. Accessories / Informative Material Included

Software Pack:

Modbus RTU Master and TCP/IP Client Pack;

Alarms and Notifications Pack;

Node-RED Pack.

Accessories:

Tinymesh protocol external RF antenna (included);

External GSM antenna (included in the aluminum case);

External Wi-Fi antenna (included in the aluminum case);

RS-485 converter cable (optional);

Power supply (optional);

ABS case mounting and fixing accessory (optional).

Informative Material:

Datasheet;

Product manual.

3. Symbols

CE	The Universal IoT Gateway complies with European legislation and harmonized European standards for electronic products, allowing free circulation within the internal market of the European Union.

	If the device becomes obsolete and unused, please do not dispose of it in traditional waste. Place the device in an appropriate electronic waste disposal bin.
	This symbol exhibits especially important guidelines regarding the installation and operation of the device. Carefully read any information related to this symbol. Failure to comply with the guidelines indicated by this symbol may cause accidents, damage, or equipment destruction.

4. Product References

Reference	Product
PA222410100	UNIVERSAL IOT GATEWAY TK-UGW-868-ABS
PA222410101	UNIVERSAL IOT GATEWAY TK-UGW-915-ABS
PA222410102	UNIVERSAL IOT GATEWAY TK-UGW-868-ABS-GSM
PA222410103	UNIVERSAL IOT GATEWAY TK-UGW-915-ABS-GSM
PA222410200	UNIVERSAL IOT GATEWAY TK-UGW-868-ALU
PA222410201	UNIVERSAL IOT GATEWAY TK-UGW-915-ALU
PA222410202	UNIVERSAL IOT GATEWAY TK-UGW-868-ALU-GSM
PA222410203	UNIVERSAL IOT GATEWAY TK-UGW-915-ALU-GSM

V. Product

This topic describes the technical and physical characteristics of the Universal IoT Gateway.

5. Technical Data

Processor	Arm Quad Core Cortex-A72 64-bit SoC
I/O	Wi-Fi LAN: 2.4 GHz Radio wireless interface 868/915MHz (used by Tekon transmitters) Mobile: 3G/4G cellular modem (optional) Serial: RS-485 Ethernet: 100/1000 Mbps
Memory	8 GB eMMC flash
Protocols	Modbus RTU, Modbus TCP/IP, MQTT
Display	128 x 160 color pixels
Power Supply	12 to 30 V DC
Operating Environment	–10 to 50°C
Dimensions	131×51×131 mm (ABS CASE) 151×61×150 mm (ALUMINIUM CASE)

6. Technical Drawings

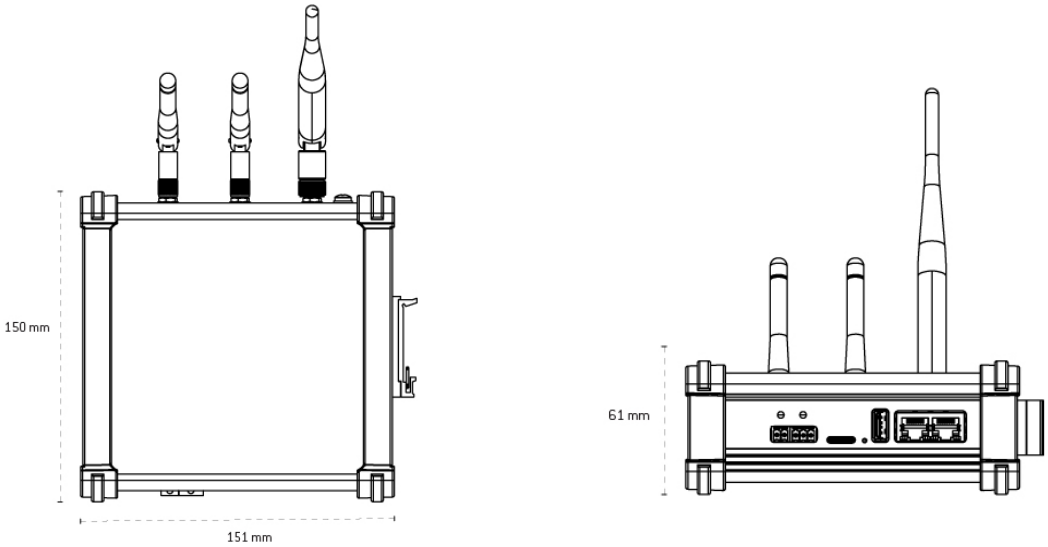

Figure 1 - Dimensions of the Universal IoT Gateway with aluminum case.

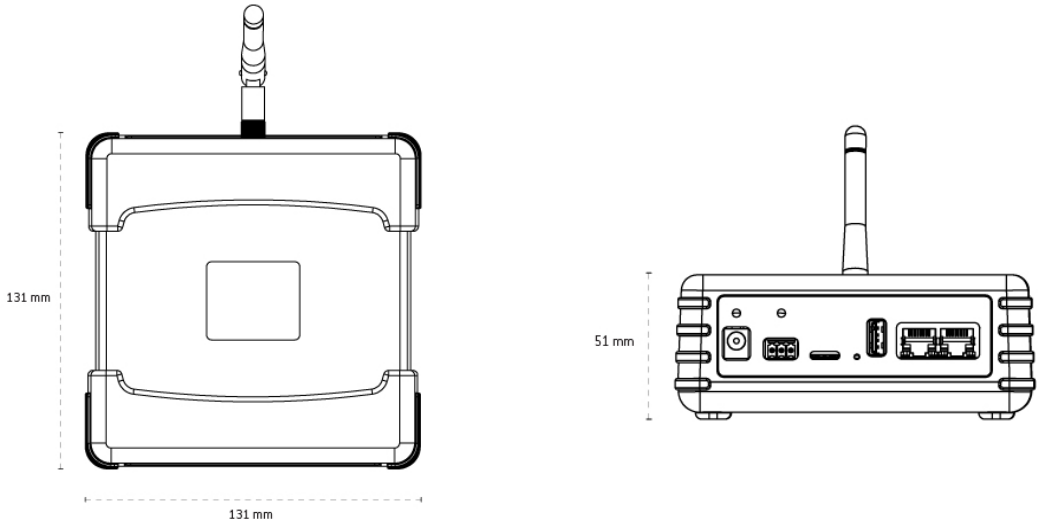

Figure 2 - Dimensions of the Universal IoT Gateway with ABS case.

7. Connections

The different versions of the Universal IoT Gateway have external connections characterized by communication interfaces.

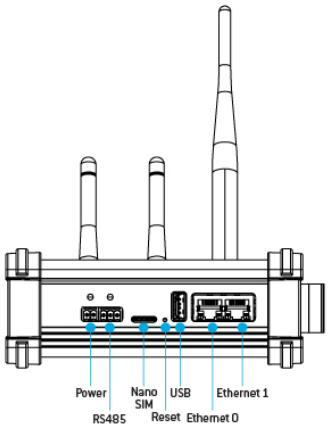

Figure 3 - Physical connections of the Universal IoT Gateway with aluminum case.

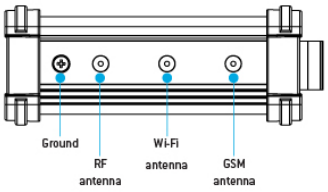

Figure 4 - Physical connections of the antennas of the Universal IoT Gateway with aluminum case.

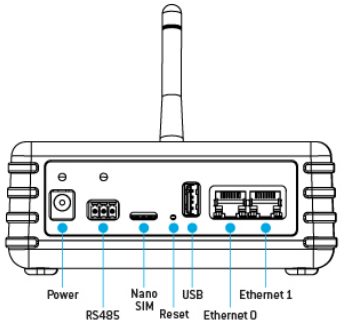

Figure 5 - Physical connections of the Universal IoT Gateway with ABS case.

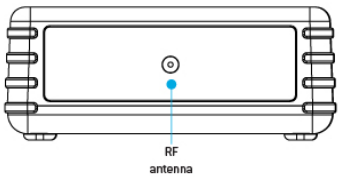

Figure 6 - Physical connections of the antenna of the Universal IoT Gateway with ABS case.

Modbus and Power

The RS485 port of the Universal IoT Gateway allows communication through the Modbus protocol.

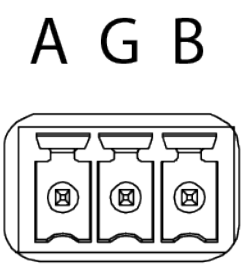

Figure 7 - RS485 connections (ABS case)

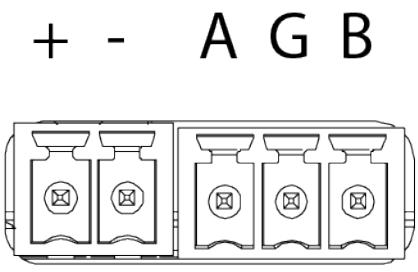

Figure 8 - Power and RS485 connections (aluminum case)

The 2-pin power connector is only available in the version with the aluminum case.

8. Reset Button

The Universal IoT Gateway has a reset button that resets the gateway to factory settings. To do this, press the button for 10 seconds, and information about the process will appear on the display. Once completed, the display will show the factory settings.

Additionally, the reset button allows you to change the information displayed on the screen with just one click.

9. LED Indicators

The Universal IoT Gateway has a set of LEDs that represent the various behaviors to which the device is exposed. The attached table describes the relationship of each LED, listed from left to right of the technical drawing.

Table 1 – LEDs color and description.

LED	Descrição
Red Power LED	Power connection OK.
Red RS485 LED	RS485 port communication - Transmitter
Green RS485 LED	RS485 port communication - Receiver

10. Label

The Universal IoT Gateway is identified with a label Figure 9, which contains information about the product's characteristics necessary for configuration purposes:

- Tekon’s name and website;
- Product reference and serial number;
- Device designation;
- ID of the device’s pre-configured network;
- Pre-configured wireless channel;
- Wi-Fi network ID;
- Wi-Fi network access password;
- Ethernet 0 port MAC address;
- Ethernet 1 port MAC address;
- Wi-Fi MAC address;
- Certification and safety symbols;
- Corporate group’s name and address.

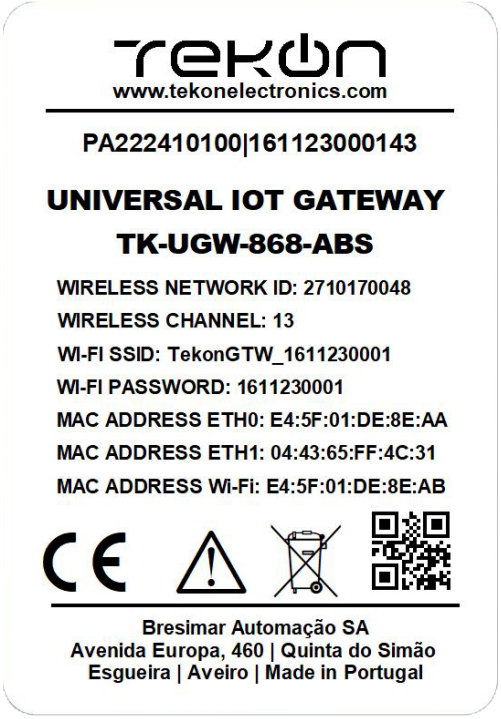

Figure 9 - Example of a Universal IoT Gateway label.

11. Web interface characteristics

The **Universal IoT Gateway Interface** is a platform designed to assist in the configuration, integration, and visualization of real-time monitoring data.

The interface provides users with the ability to adapt the Universal IoT Gateway to their needs, verify which datasources (e.g., transmitters and/or sensors) are connected, their characteristics and settings. It also allows to see data from the datasources, as well as exporting it in different formats.

11.1 Universal IoT Gateway Configuration

The interface includes, by default, four configuration pages for the gateway itself, where equipment characteristics can be consulted and customized to adapt to various conditions.

11.2 Data collection and Customized Visualization

Data collection and visualization are presented by datasource, allowing for quick consultation of their operation.

11.3 Real-time monitoring

Monitoring is performed in real-time, enabling integration with IoT platforms.

11.4 Data visualization and export

The Universal IoT Gateway Interface allows data selection and visualization, as well as exporting it in different formats (PNG, JPG, XLSX, CSV, and PDF).

11.5 User Types

The Universal IoT Gateway Interface allows the use of two types of users: an administrator profile with permission to use all interface features and a viewer profile, which allows viewing connected datasources and exporting data.

VI. Updates

Firmware and software updates can be performed by the user or by Tekon Electronics and will be available to the customer on the Tekon Electronics website (see Device Update). In case of a severe error, contact technical support to evaluate the problem with your device.

VII. Initial Configuration

12. System Requirements

The correct use of the Universal IoT Gateway depends on a set of requirements that must be ensured.

13. Wireless Network

The dedicated wireless network created by the Universal IoT Gateway allows direct access to the device for consultation and configuration. By connecting to the dedicated wireless network, you can access the device interface and navigate to IP address 192.168.128.1. If using mobile devices, make sure to turn off mobile data.

VIII. Access

Access to the **Universal IoT Gateway Interface** can be done in two different ways, Wi-Fi or Ethernet.

To connect via **Wi-Fi**, access the network defined on the device label by Wi-Fi SSID (TekonGTW_XXXXXXXXXX, Figure 10) with the right password. Once connected, access the **IP address 192.168.128.1** in a web browser, which corresponds to the address in access point mode (AP Mode).

Figure 10 – Universal IoT Gateway Network.

To communicate via **Ethernet**, connect your PC to the device using a network cable in the ETH0 port of the Universal IoT Gateway. You can verify the IP address of the Universal IoT Gateway using the command line on your computer by entering ipconfig and pressing Enter. Then you can view the device's IP address and enter it in your preferred browser to access the Universal IoT Gateway Interface.

All the variables mentioned above can be changed once communication with the Universal IoT Gateway is established through the interface.

14. Login and Logout

Logging in and out are very simple and quick processes. By accessing the Universal IoT Gateway Interface through the Wi-Fi network or via the IP address, the login page shown in Figure 11 should appear in the web browser.

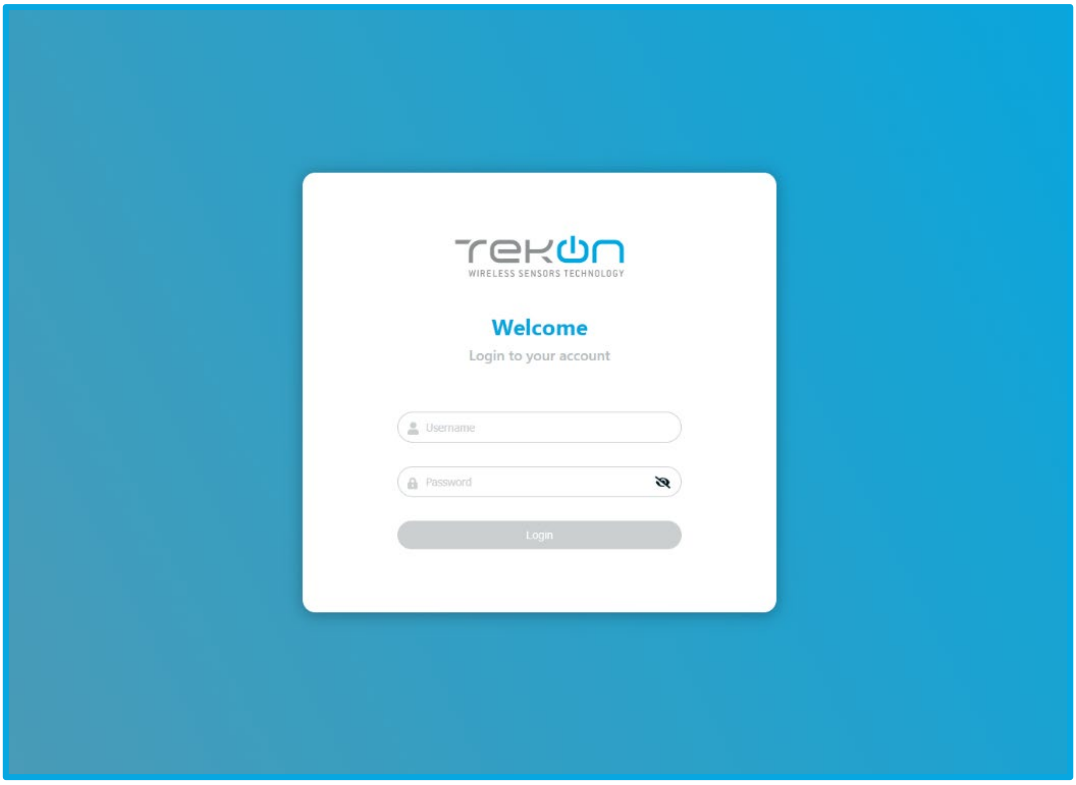

Figure 11 – Login Page.

The initial device credentials are as follow:

Administrator Profile	Viewer Profile
Username: admin **Password:** tekon	**Username:** viewer **Password:** viewer

Note: Credentials can be changed by following the steps described in the User Management chapter.

If the credentials are entered incorrectly, the error shown in Figure 12 will appear.

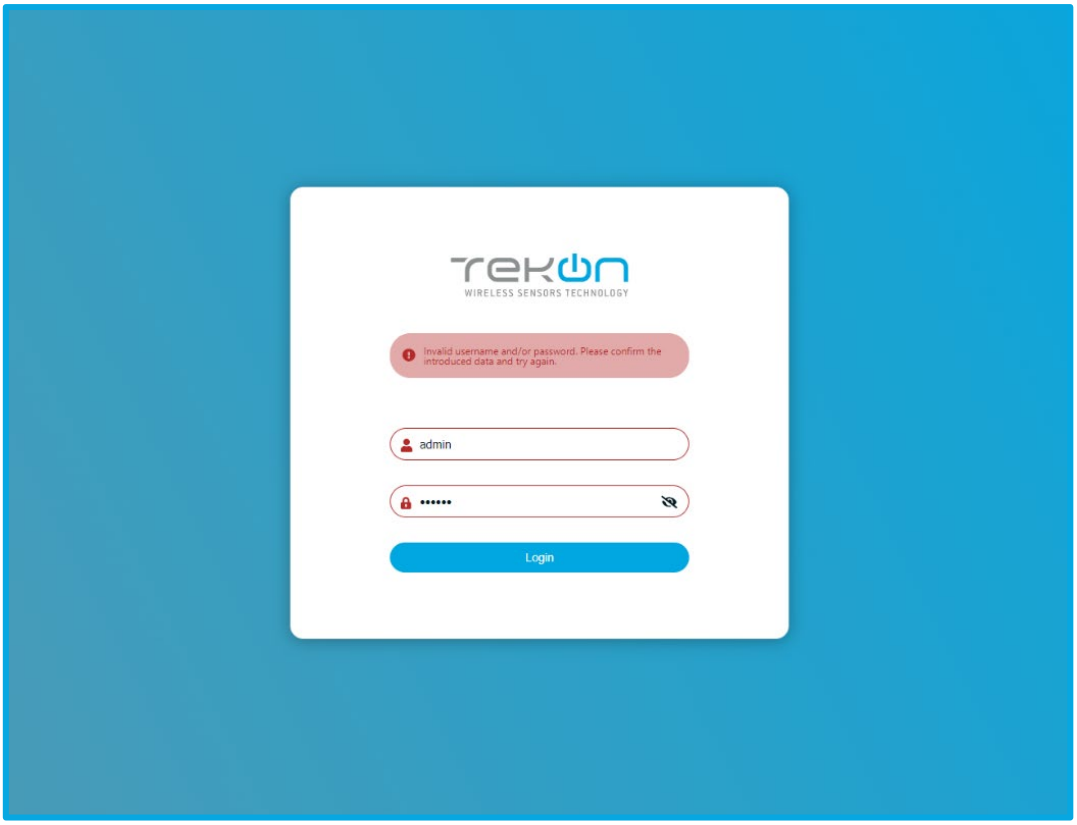

Figure 12 – Login Page with Incorrect Password or Username.

After logging in with the correct credentials, you will be directed to the *Datasources* page.

Note: The session has an expiration period of one hour, so it may be necessary to resume the session due to inactivity on the interface.

To log out, access the Menu on the right side of the page header, click on the arrow ▼ (Figure 13), and choose the Logout option. Then, a window (Figure 14) will appear to confirm the session termination.

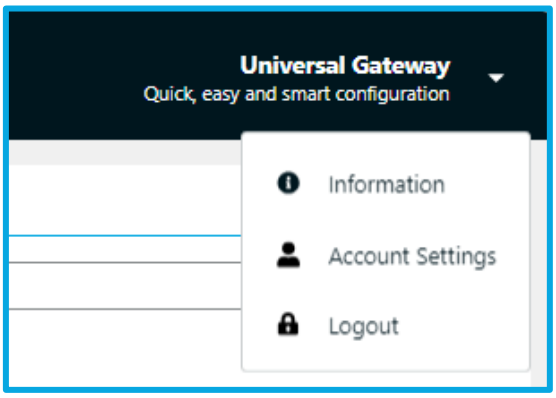

Figure 13 – Side Menu with logout option.

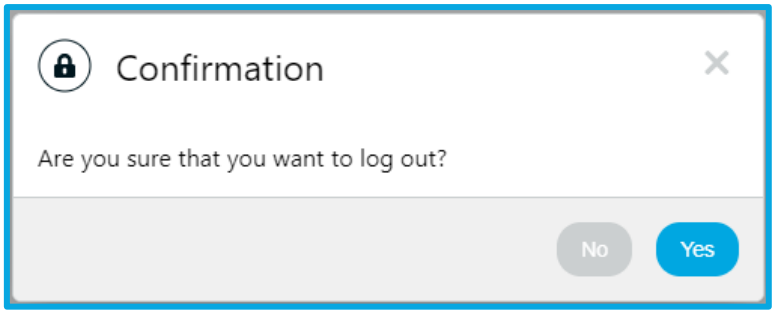

Figure 14 – Logout Confirmation Window.

IX. Web Interface

15. User Management

It is possible to create users with different access permissions to the Universal IoT Gateway Web Interface. There are 2 available user profiles:

- **Administrator**: Permissions for device configuration, datasource configuration, alarm and notification settings, data export, and user configuration.
- **Viewer**: Permissions for data viewing and exportation.

To configure users, access the menu in the upper right corner and go to the Account Settings, Figure 15:

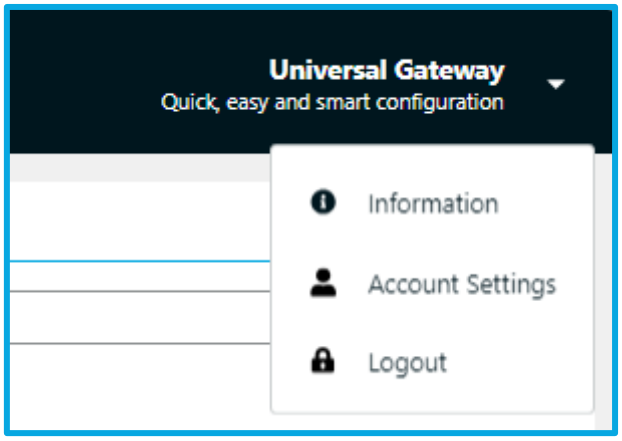

Figure 15 - Sidebar Menu with user settings option.

To create a user, the Administrator must define the username, password, and select the user profile, Figure 16.

Figure 16 – User creation section.

The defined users are presented in a user list (Figure 17), where the **Administrator** can edit (✎) and delete (🗑) all users, and the **Viewer** can edit (✎) their own profile.

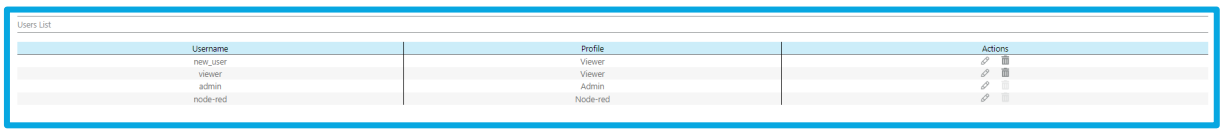

Figure 17 – User list section.

The **Administrator** can edit (✎) the username, password, and select the user profile for all users available in the list (Figure 18).

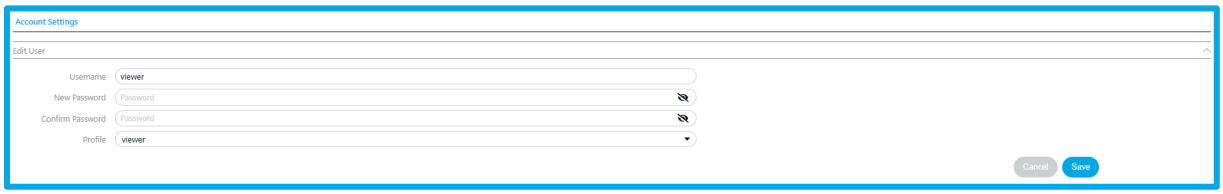

*Figure 18 – User edit section - **Administrator.***

The **Administrator** can also delete a user (🗑), where a window will appear to confirm the deletion (Figure 19).

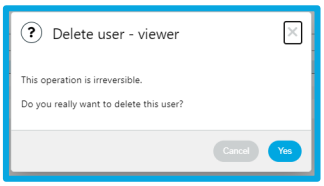

Figure 19 – User deletion confirmation window.

The **Viewer** can only edit their own username and password (Figure 20).

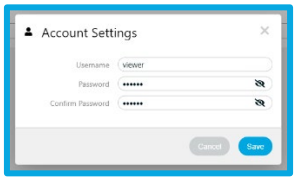

*Figure 20 – User edit window - **Viewer**.*

If you have activated the Node-RED Pack module, there will be a node-red user that cannot be deleted. This user can be edited by the administrator to change the login password for the node-red platform (see Node-RED section).

A maximum of 2 users with the Administrator profile and 5 with the Viewer profile can be created.

16. *Datasources* Menu

16.1 Home Page

After logging in, the page shown in Figure 21 appears. On the left side is the list of datasources connected to the Universal IoT Gateway in order of ID (defined in the Tekon Configurator, see 16.2 *Add* new *datasource* section). The sidebar can be hidden to expand the rest of the page.

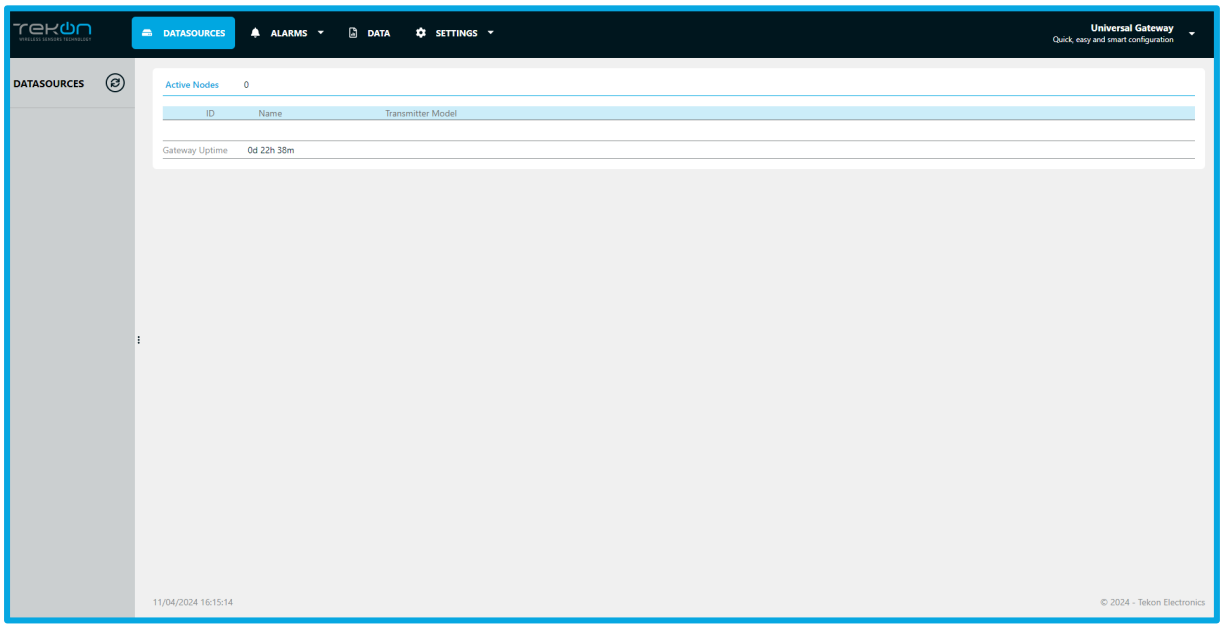

Figure 21 – Home page (Datasources).

16.2 Add new *datasource*

To add a new datasource from Tekon's DUOS and PLUS product family, simply configure the transmitter in the Tekon Configurator (Figure 22) with the wireless network and wireless channel defined on the Universal IoT Gateway label.

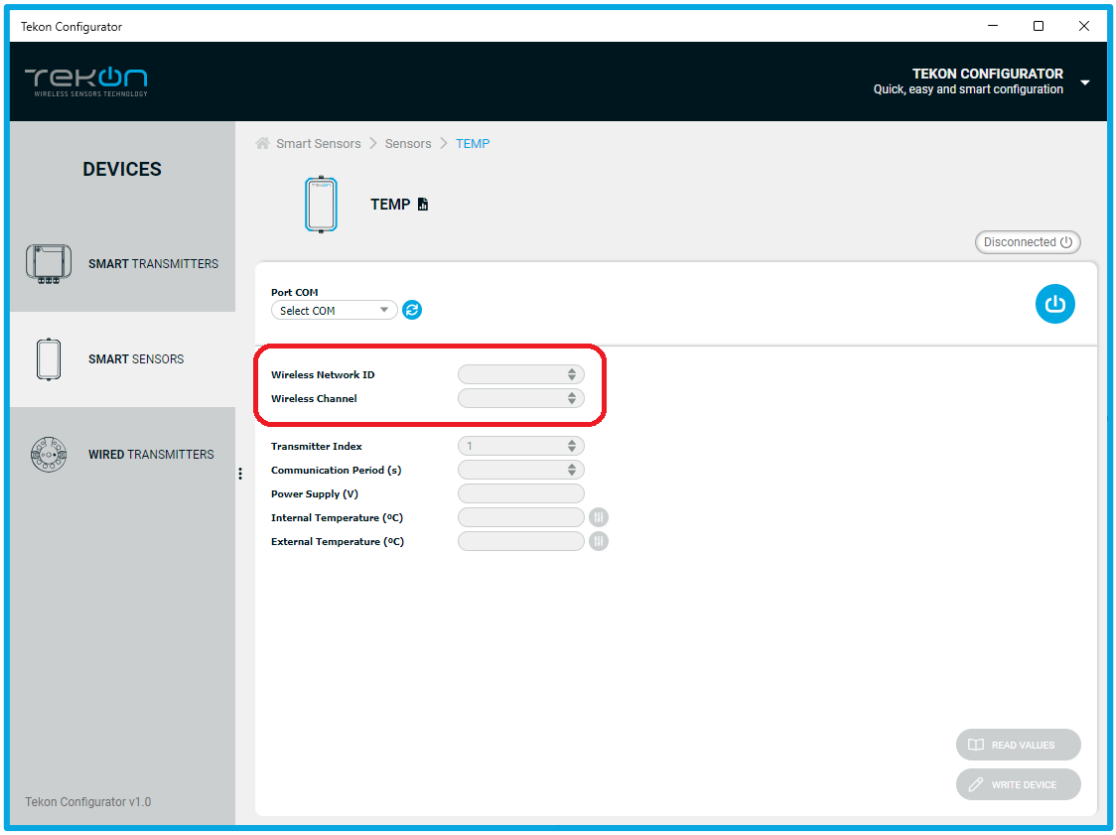

Figure 22 – Transmitter configuration page in the Tekon Configurator.

Once the configuration is complete and data transmission starts, the device will appear in the gateway interface. If this process is taking too long, refresh the interface page.

Note: It is possible to have devices with the same ID if they are from different families (DUOS and PLUS).

16.3 Data Visualization by Device

To access the data of a specific device, just click on the respective datasource. A page similar to the one shown in Figure 23, will appear, divided into 4 sections:

- *Settings: configuration of the graphical data display;*
- *Measurements: graphical presentation of real-time collected data;*
- *Datasource Properties: display of non-editable datasource properties;*
- *Datasource Settings: configuration of the device's editable properties.*

To return to the previous page of the Universal IoT Gateway web interface, select the datasource again from the list on the left or click again on the Datasources header.

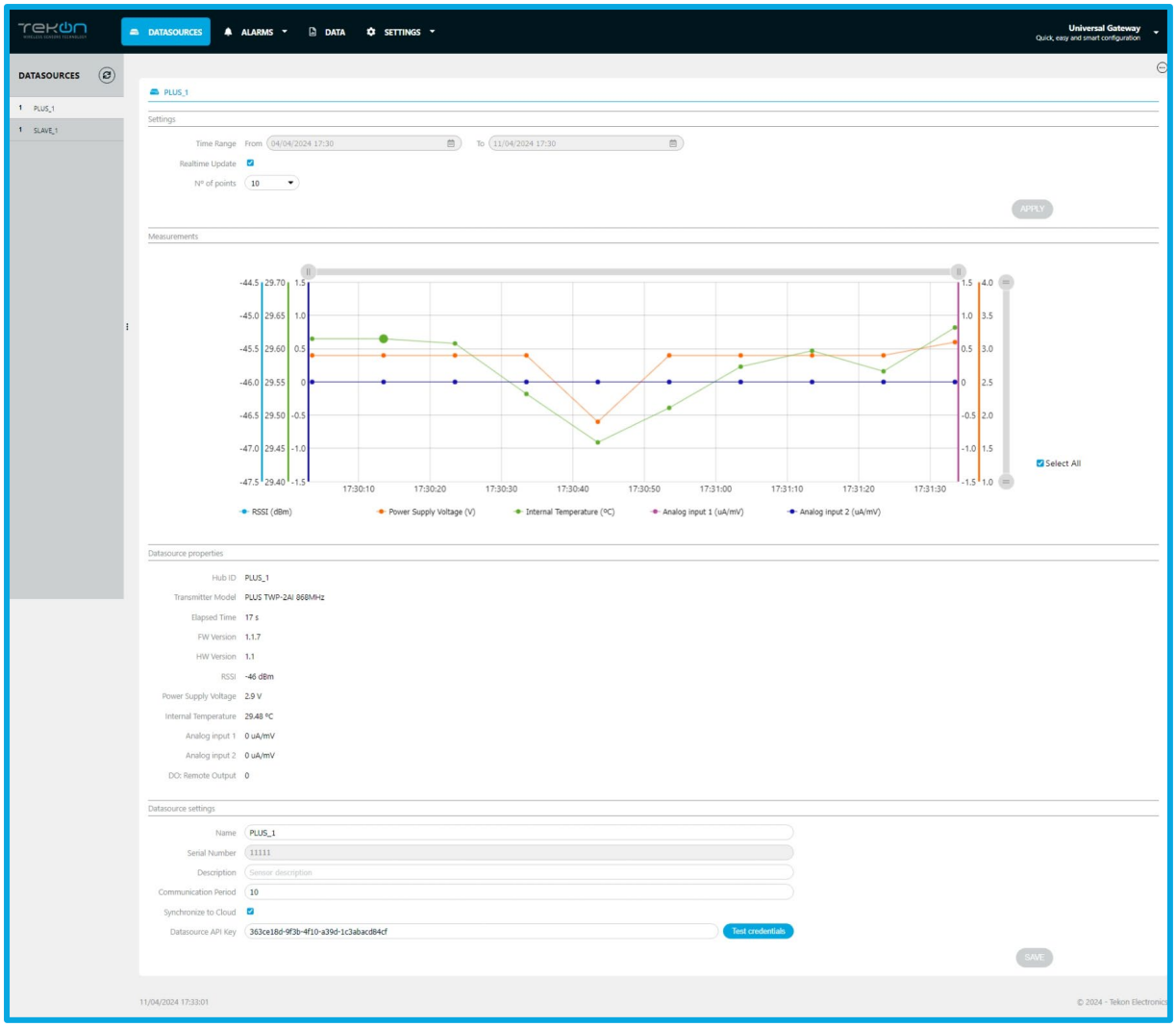

Figure 23 – Selected Datasource page

In the Settings section, you can configure the time interval and the number of points (10, 20, or 50) for the graphical representation of data. Additionally, there is a real-time update option where you can view datasource data in real-time. After configuring the settings, you should click on to change the graphical representation according to the new settings.

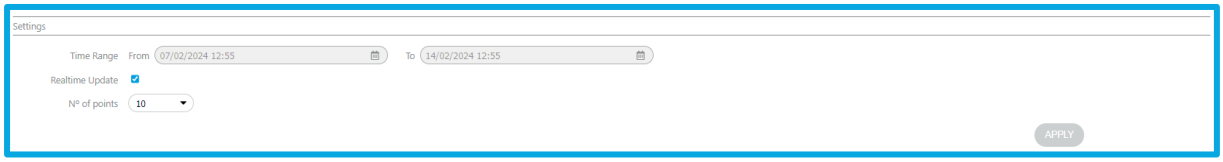

Figure 24 – Settings section on the datasource page.

In the Measurements section, the graphical representation of datasource data is available with all its variables. If you want to view only one variable, you can hide the others by clicking on the legend (Figure 25). To see all variables again, select the checkbox Select All to the right of the graph.

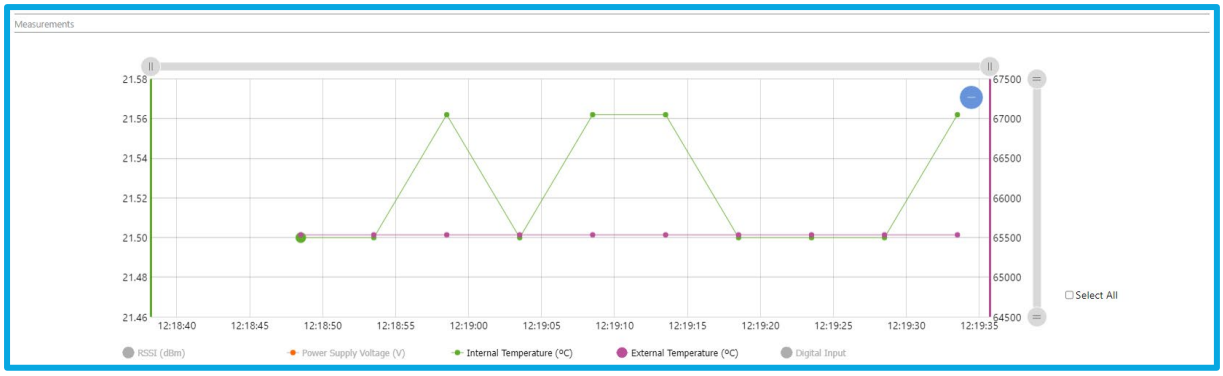

Figure 25 – Measurements section on the datasource page.

You can also change the graph scale with the respective gray bars or with the mouse scroll. To return to the initial scale, click on the symbol in the upper right corner of the graph (Figure 26).

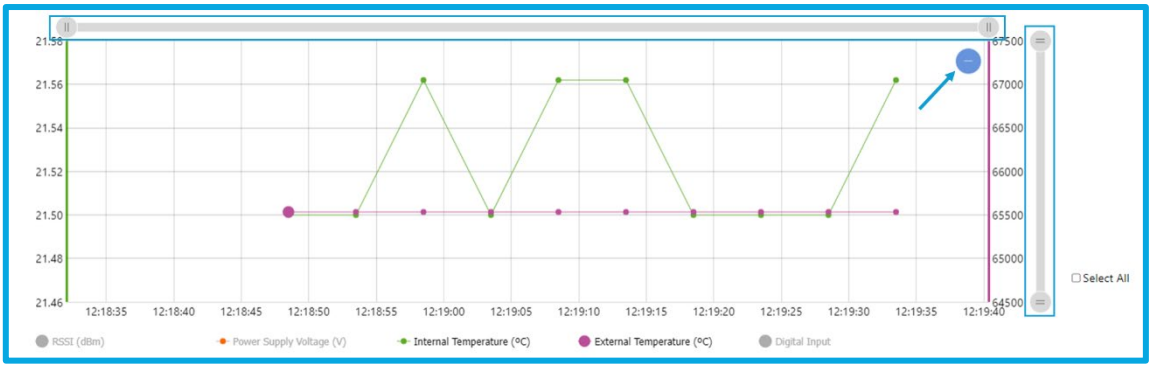

Figure 26 – Graph in the Measurements section on the datasource page.

In the Datasource Properties section, you can check the non-editable properties of the datasource as shown in Figure 27. The elapsed time is always being updated according to the defined communication period and informs about the time that has passed since the last data reception. It is also possible to see the latest values received from the datasource variables.

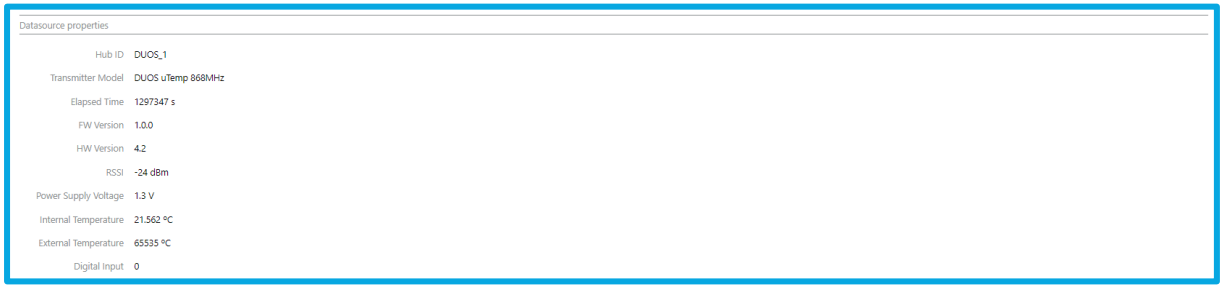

Figure 27 – Datasource Properties section on the datasource page..

In the Datasource Settings section, you can view and edit datasource settings, namely the name, description, and communication period of the datasource (Figure 28). To save the changes, you must click the button SAVE.

Note that when changing the communication period, it only takes effect after the next datasource communication.

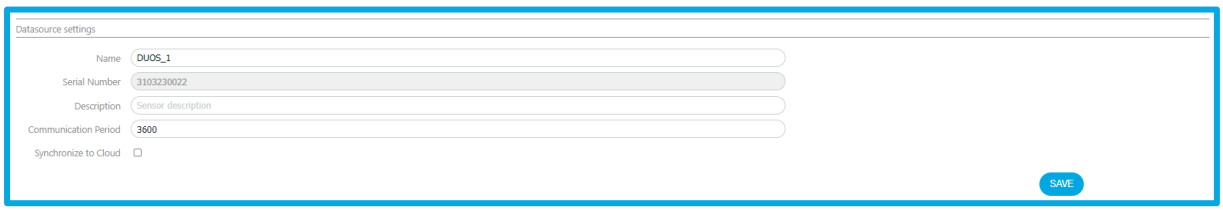

Figure 28 – Datasource Settings section on the datasource page.

16.4 Sync Datasource to the Cloud

In the Datasource Settings section, you can sync or not sync the datasources with the cloud. To sync and send data to the Tekon IoT Platform, you need to activate the sync checkbox and add the corresponding API key (Figure 29). However, you must first follow the steps in the 18.3 Cloud section.

Figure 29 - Datasource Settings section on the datasource page with Cloud sync.

The datasource API key is retrieved from the platform when the respective datasource is created. Create a datasource on the Datasources page of the Tekon IoT Platform by clicking on + Add datasource.

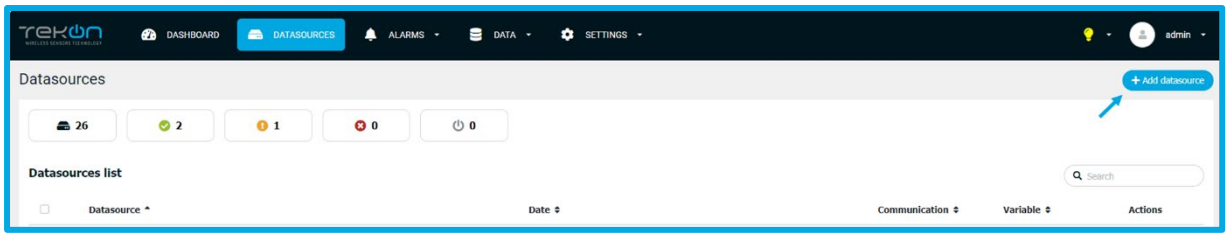

Figure 30 – Datasources section on the Tekon IoT Platform.

When creating the datasource, copy the API key by clicking on Copy, and complete the creation of the new datasource.

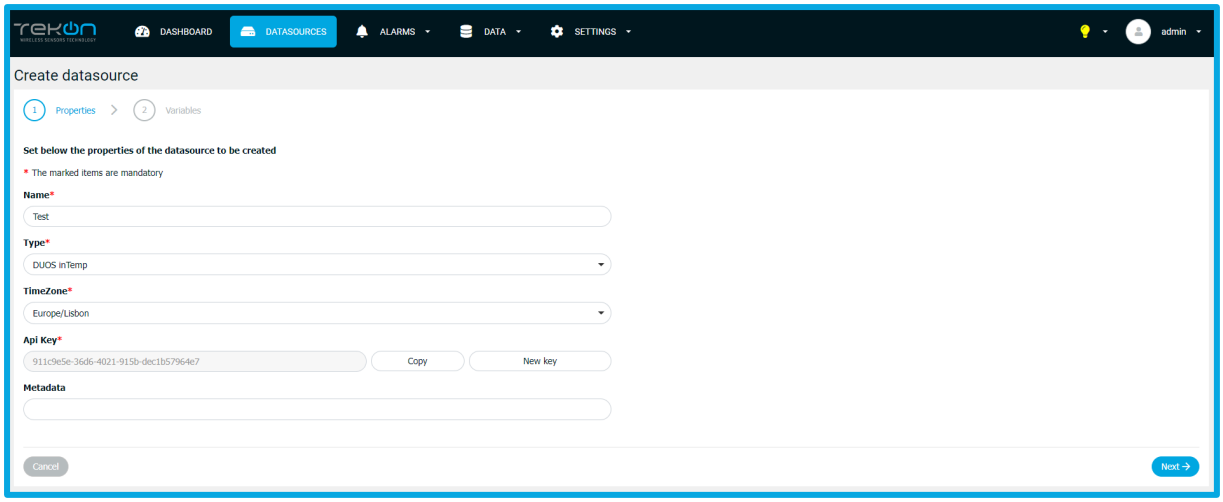

Figure 31 – Creating a datasource on the Tekon IoT Platform.

Then return to the Datasource Settings section on the datasource page and paste the API key. Test these credentials by clicking on Test credentials. If successful, a check symbol will appear, then save the changes by clicking on SAVE. If an error symbol appears, confirm the API key and the gateway internet connection.

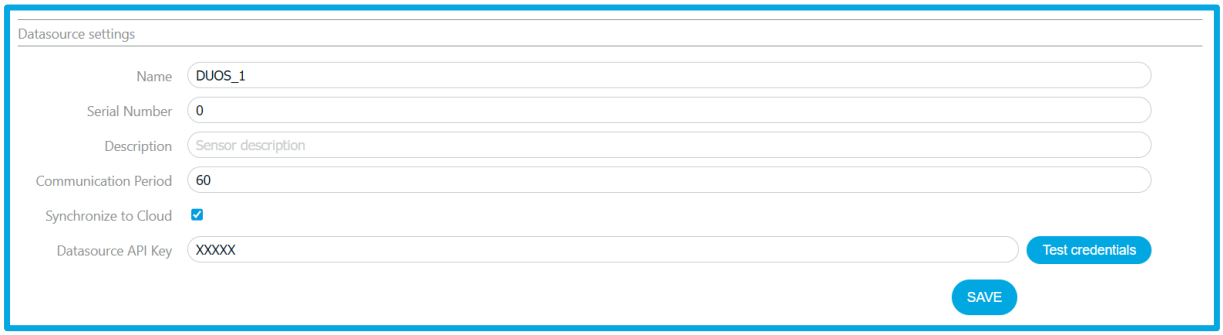

Figure 32 - Datasource Settings section on the datasource page with Cloud sync and API key.

16.5 Delete *datasource*

In the upper right corner, there is a symbol ⋯ (Figure 33), that allows you to delete the selected datasource. In the sidebar list of datasources, a similar symbol appears when hovering over the datasource, clicking on it performs the same function.

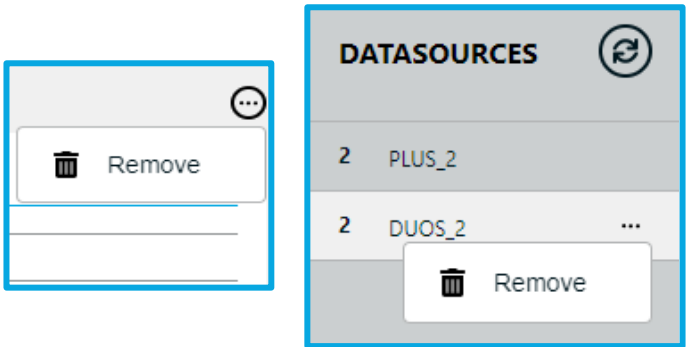

Figure 33 – Options to delete a Datasource on the selected Datasource page.

17. Data Menu

The Data page allows viewing different variables simultaneously from different datasources and exporting them in five different formats, Figure 34.

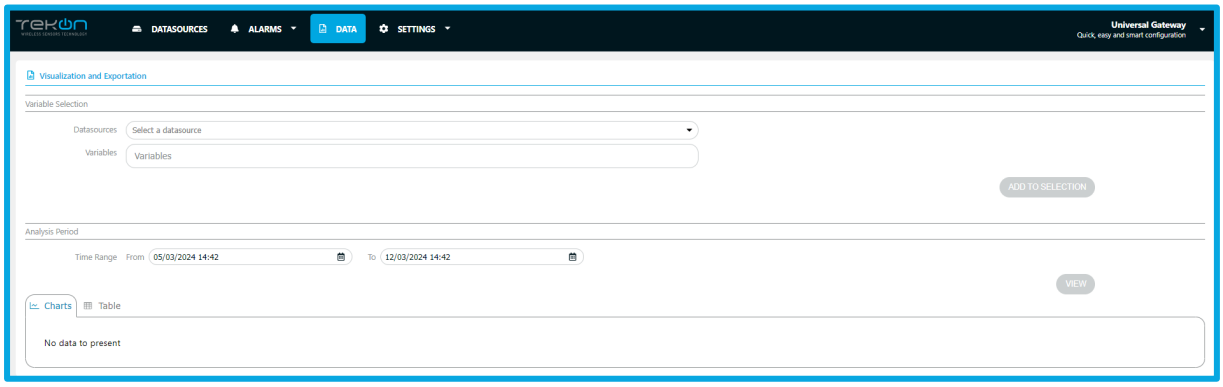

Figure 34 – Data Viewing and Export page.

To start the data viewing and export process, select the desired datasource, Figure 35, then select the respective variables, Figure 36 and Figure 37.

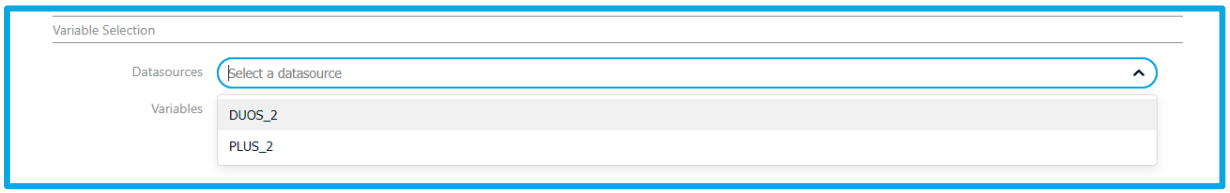

Figure 35 – Section to select the Datasource for viewing and/or export.

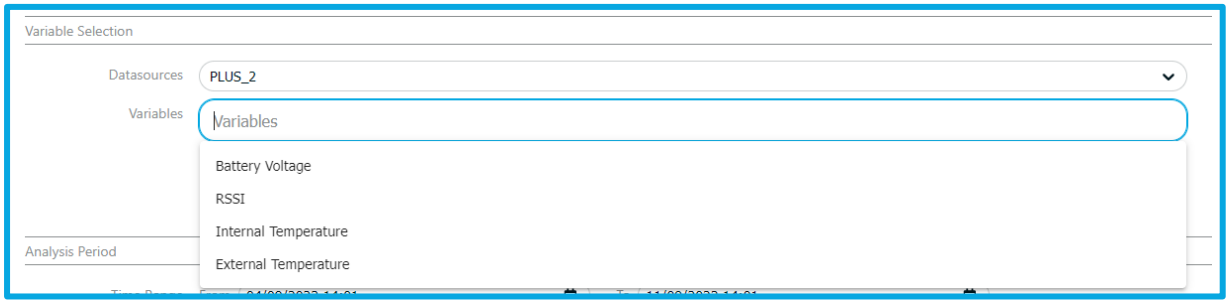

Figure 36 – Section to select the variables for viewing and/or export.

Figure 37 – Section to select different variables for viewing and/or export.

To add these variables to the data list for viewing, press the button ADD TO SELECTION, Figure 38. To continue adding variables from other datasources, repeat the previously described process as many times as necessary until all desired variables are obtained.

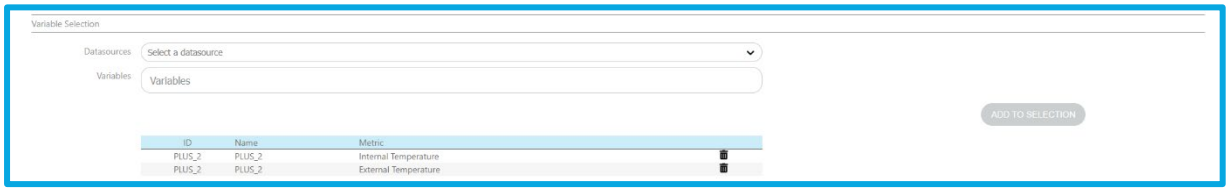

Figure 38 – Section of variables added to the list on the Data Viewing and Export page.

After choosing the list of variables to be displayed, you need to select the time interval for which you want to view the data and click the button VIEW to generate the graph and table, as shown from Figure 39 to Figure 41. The graph can be exported in two formats, PNG and JPG, and the tabulated values can be saved in three types of files, XLSX, CSV, and PDF. To export, just click the button EXPORT AS and choose the export format. Note that the graphic only allows for a maximum of 100 points.

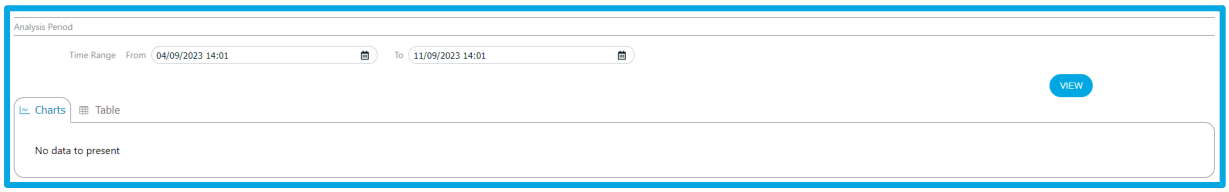

Figure 39 – Section to define the data viewing/export period.

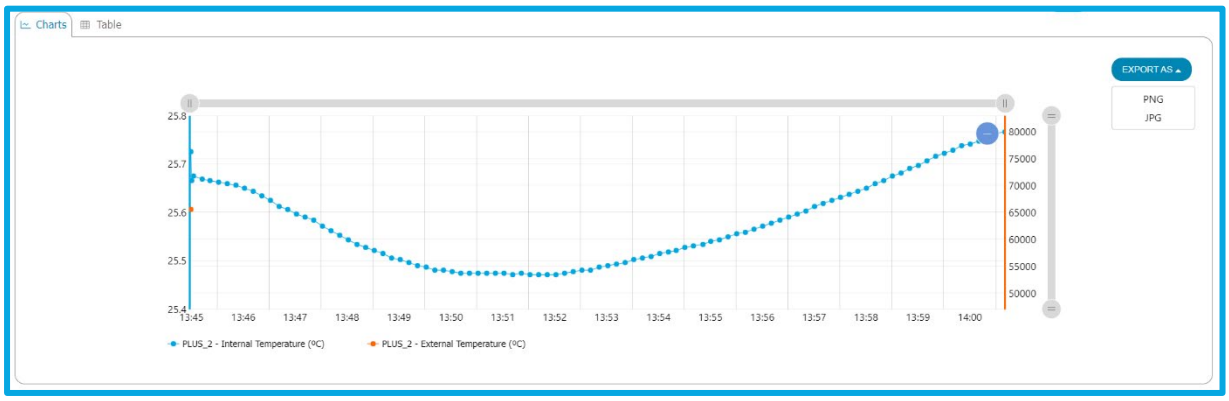

Figure 40 – Graphic for PNG and JPG export.

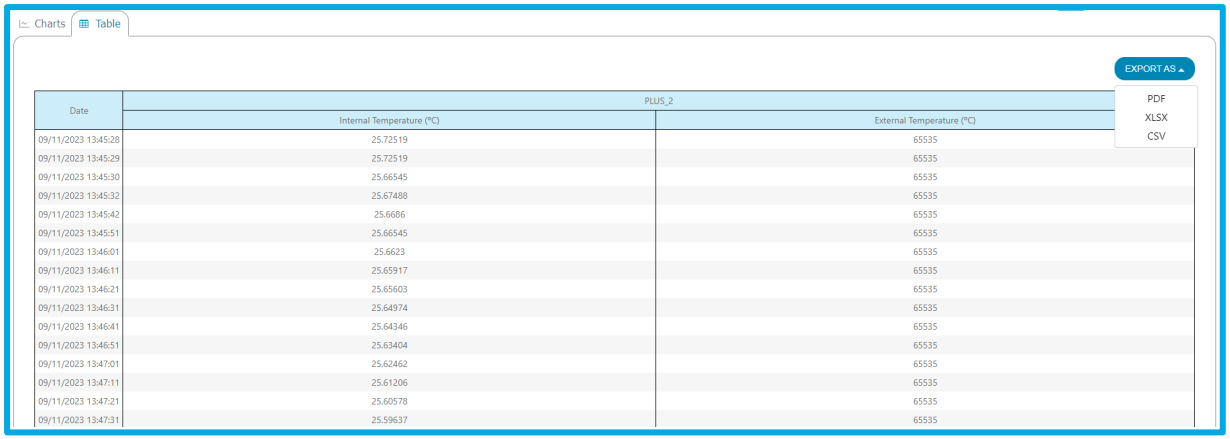

Figure 41 – Table for Export in PDF, XLSX, and CSV.

18. Settings Menu

In the Universal IoT Gateway interface, under the Settings tab, Figure 42, you can configure various equipment parameters according to the user's needs.

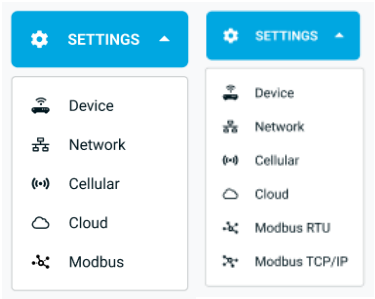

Figure 42 - Settings tab menu with the Modbus RTU Master and TCP/IP Client Pack inactive (left) and active (right).

18.1 Device

This settings page is divided into three sections, as shown in Figure 43:

1. Device Settings: view the Universal IoT Gateway settings (versions, serial number, country, and device name), the country and device name can be edited. To install new versions of the device, you can access the Tekon website from this page to download the update file (Download Center - Tekon Electronics). To perform the update, follow the steps in the Device Update.
2. Date and Time Settings: set the device date and time, manually or based on the NTP protocol. When syncing with the NTP server, you can edit the server field, as shown in Figure 44 e Figure 45, and the user can test if the entered server is correct before saving the changes.
3. RF Settings: view the radio module's Part Number and edit the Wireless Network ID and channel to configure communications through the radio module with the wireless transmitters (for more details see 16.2 *Add new datasource*).

Whenever you make changes to these settings, you must save them by clicking the button SAVE.

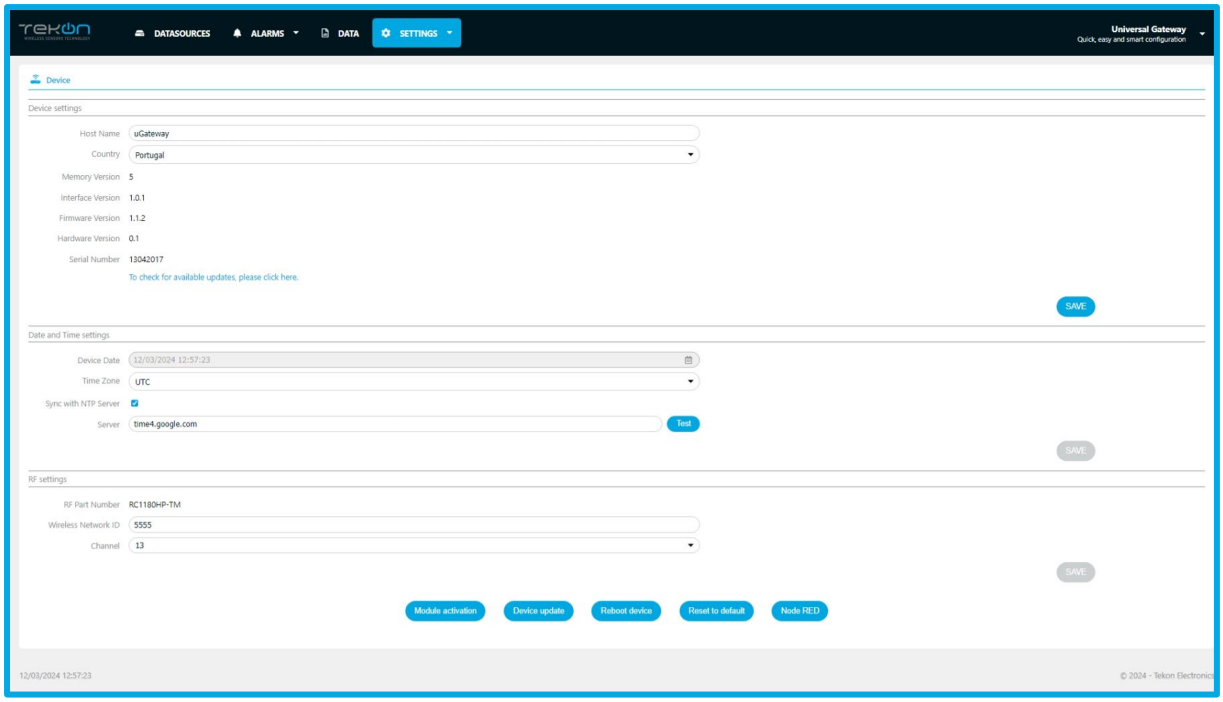

Figure 43 – Device Settings page.

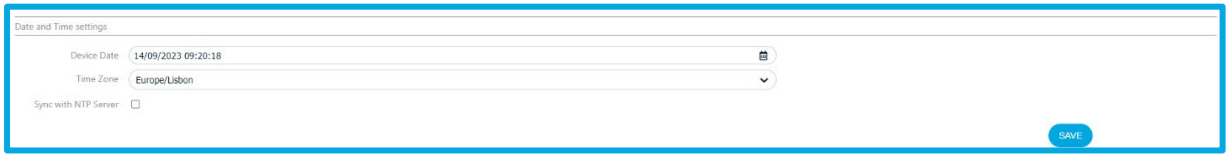

Figure 44 – Section to configure date and time with NTP disabled.

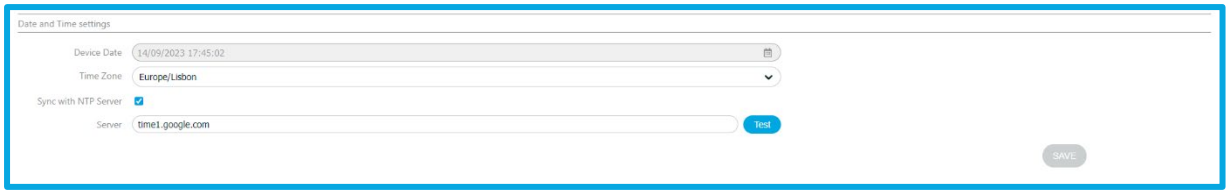

Figure 45 – Section to configure date and time with NTP enabled.

At the end of the device settings page, there are five buttons as shown in Figure 46.

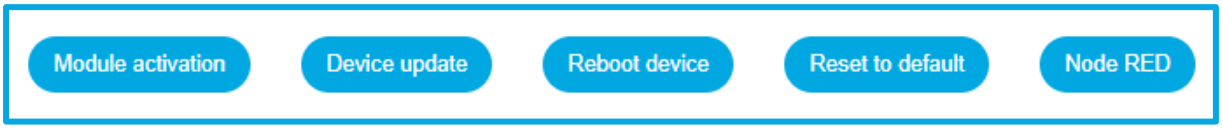

Figure 46 - Actions available on the Device Settings page.

Module Activation

The button Module activation allows the activation of advanced modules previously purchased by the user:

- Modbus RTU Master and TCP/IP Client Pack;
- Alarms and Notifications Pack;
- Node-RED Pack.

Upon purchasing an additional module, keys are provided to activate it. By clicking the button Module activation a window will appear (Figure 47), where you should enter the provided key, test it, and if valid, apply the key to unlock the module. You should then receive a success or failure message regarding the module unlock.

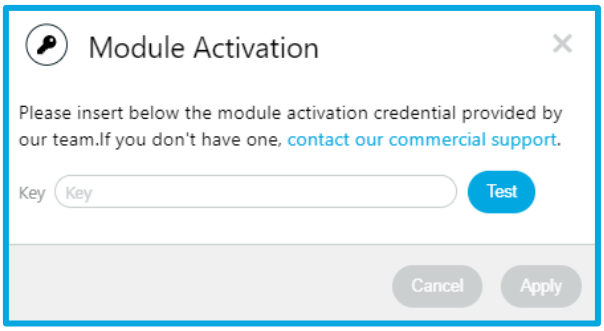

Figure 47 – Page to activate advanced modules.

If the message is unsuccessful and the key is valid, please contact Tekon technical support (support@tekonelectronics.com). If the message is successful, you can close the window or activate another module if desired. To ensure proper functionality, a reboot is required after activating the modules (see Reboot section). Then, wait for the system to restart and log in.

Device Update

The button Device update allows remote firmware and software updates when a new version is released. Pressing the button Device update opens a new window to upload a *raucb* file (Figure 48), which can be downloaded at the following link: Download Center – Tekon Electronics. The user can view the update progress as shown in Figure 49.

To complete the device update, a reboot is required. To do this, the user must select the button Reboot, Figure 49. Then wait for the system to restart and log in.

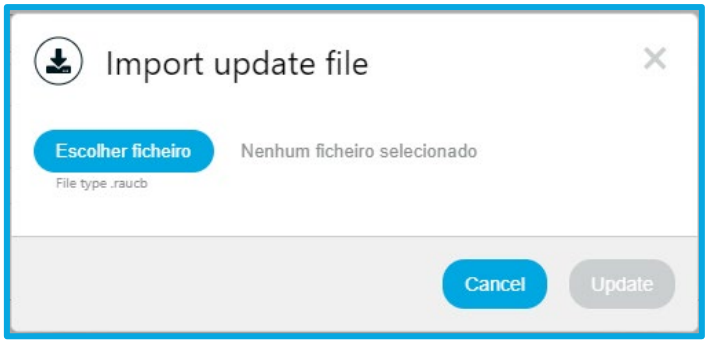

Figure 48 – Page to upload raucb file for device update.

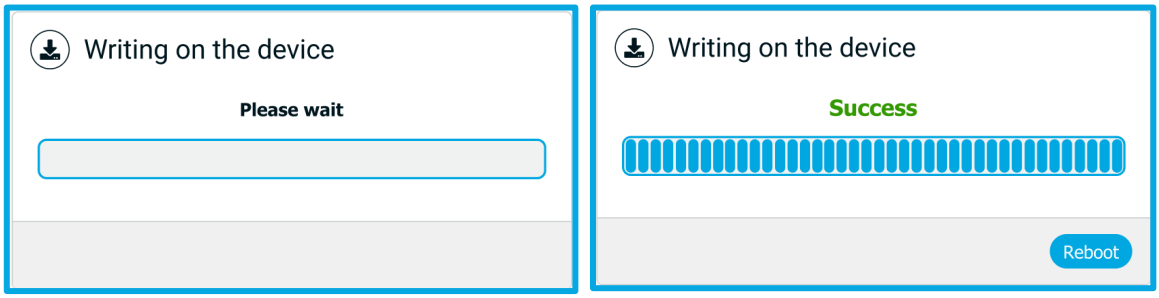

Figure 49 – Pages to view update progress and completion.

Reboot

Clicking the button Reboot device, will restart the device. The user will be redirected to a page to confirm the reboot. After confirming, wait for the system to restart and log in.

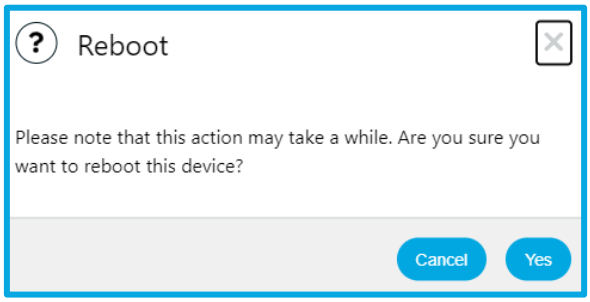

Figure 50 – device reboot confirmation page.

Reset to Default

The button Reset to default allows resetting the device to factory settings. The user will be redirected to a page to confirm the reset, Figure 51.

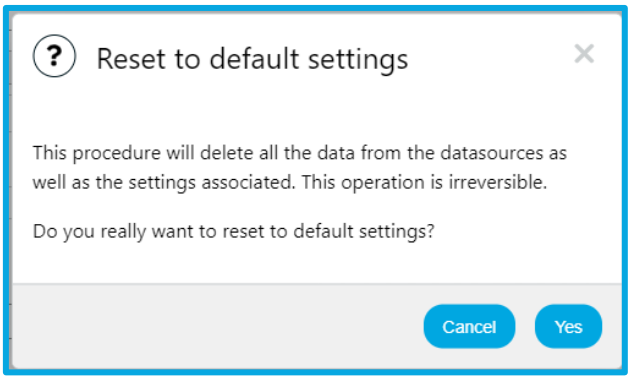

Figure 51 – Page to confirm settings reset.

Clicking Yes, to proceed with the reset, will redirect the user to a page (Figure 52) to wait for the necessary changes and the subsequent device reboot. Once the reboot is complete, the user will be automatically redirected to the login page.

Figure 52 – Page for Universal IoT Gateway reboot.

Node-RED (optional)

If you have activated the Node-RED Pack module, you will have access to the button Node RED. Clicking this button will direct you to the Node-RED interface where you can add flows and functions (Figure 53). See the Node-RED section for further steps on how to use Node-RED.

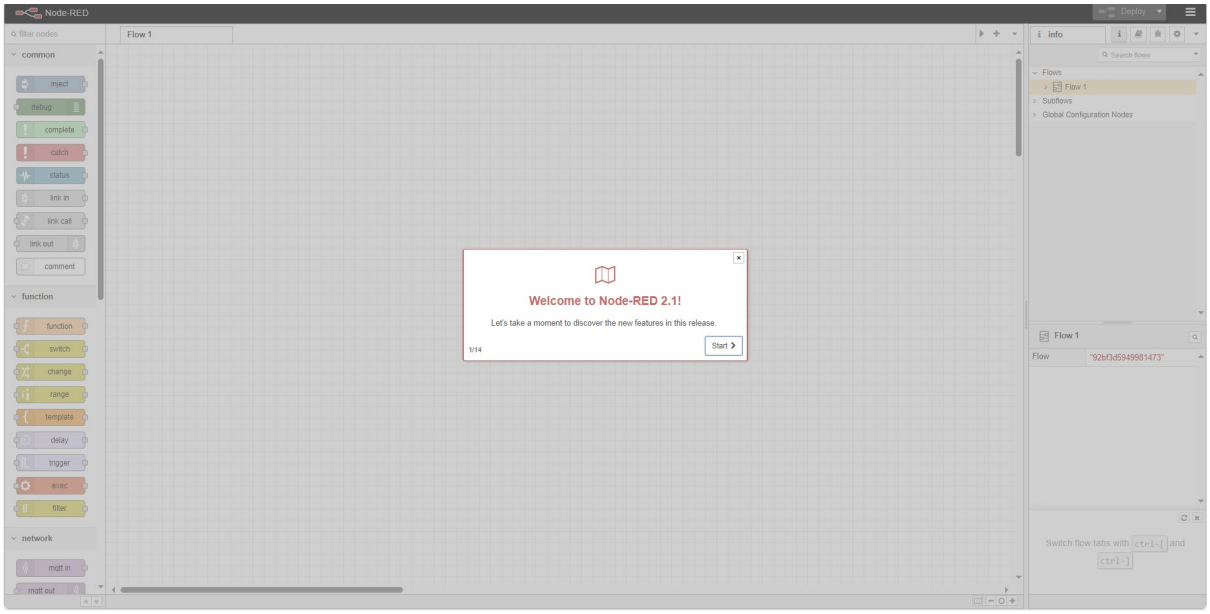

Figure 53 – Node-RED interface page.

18.2 Network

In the Settings tab, you can customize various network configurations related to the **Universal IoT Gateway** (Figure 54):

- *Ethernet 0*
- *Wi-Fi*
- *DNS*
- *HTTP Proxy*

Similar to other configurations, the checkbox generates, or blocks fields as needed, allowing for more secure configuration.

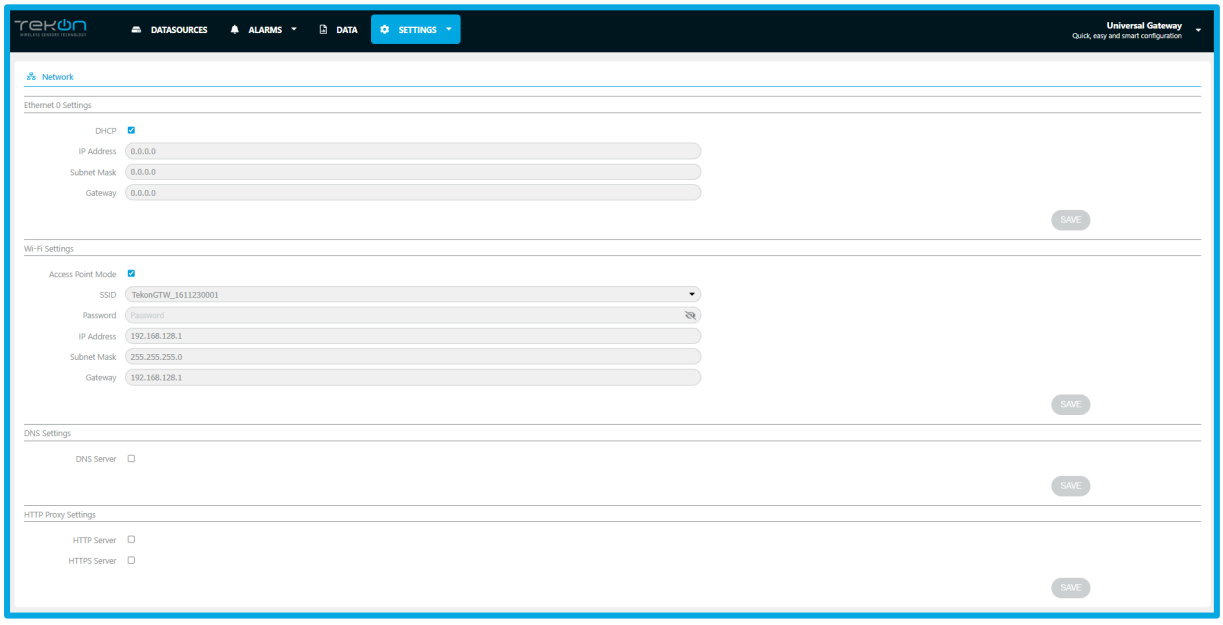

Figure 54 – Page to configure the device network.

Ethernet 0

Through the ETH0 port, you can access the Universal IoT Gateway. On this page, you can edit the IP Address, Subnet Mask, and gateway IP fields. This editing is only possible with DHCP (Dynamic Host Configuration Protocol) disabled (Figure 55). With DHCP enabled, the above fields become non-editable, and the device automatically configures the respective settings (Figure 56). Whenever you make changes to these settings, you must save them by clicking the button SAVE.

Figure 55 – Section to configure Ethernet 0 network with DHCP disabled.

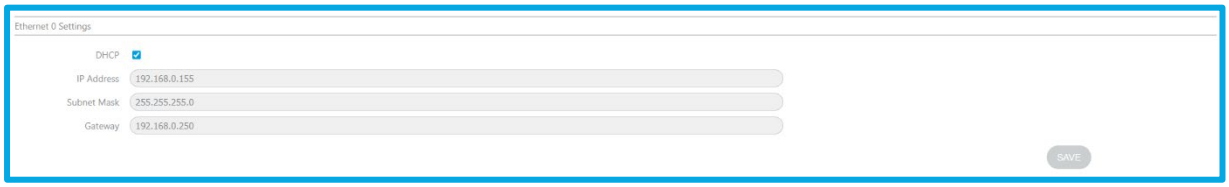

Figure 56 – Section to configure Ethernet 0 network with DHCP enabled.

Wi-fi

To access the Universal IoT Gateway via Wi-Fi, connect to the network defined on this page (Figure 57) using the **IP address 192.168.128.1** in the web browser, which corresponds to the address when access point mode (AP Mode) is enabled. With access point mode (AP Mode) disabled, you can connect the device to an available Wi-Fi network by entering the SSID (service set identifier) and the network password (Figure 58). To see the password, click the symbol . When the connection is established, you can check the signal level on the symbol . Whenever you make changes to these settings, you must save them by clicking the button SAVE.

Figure 57 – Section to configure Wi-Fi with Access Point Mode enabled.

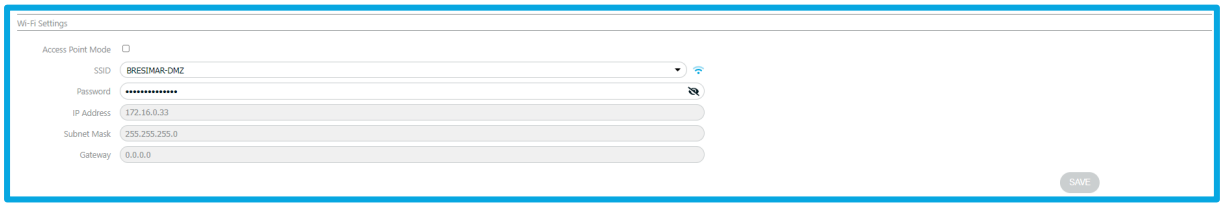

Figure 58 – Section to configure Wi-Fi with Access Point Mode disabled.

DNS

The gateway also allows activating or deactivating the DNS (Domain Name System), optimizing interface performance and security, Figure 59. With DNS enabled, you can configure the address, Figure 60.

Figure 59 – Section to configure DNS: disabled.

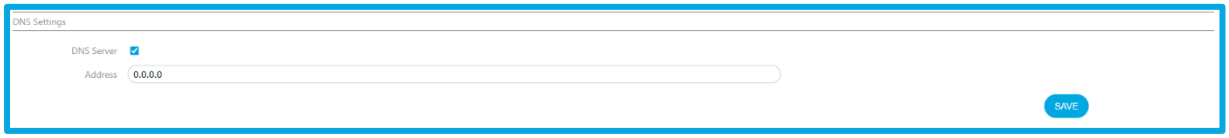

Figure 60 – Section to configure DNS: enabled.

HTTP Proxy

The gateway allows configuring the HTTP Proxy, which filters content in network traffic. This configuration can also be disabled, if necessary, Figure 61.

Figure 61 – Section to configure HTTP Proxy: disabled.

The device supports proxy for both HTTP and HTTPS servers, where you can configure their addresses and ports, Figure 62.

Figure 62 – Section to configure HTTP and HTTPS Proxy: enabled.

18.3 Cloud

On the Cloud page, you can configure the Universal IoT Gateway to communicate with the **Tekon IoT Platform** or third-party platforms via the REST protocol, Figure 63. To do this, activate the cloud platform sync, edit the server URL fields, and enter the corresponding API key (Figure 64). Whenever you make changes to these settings, you must save them by clicking the button SAVE.

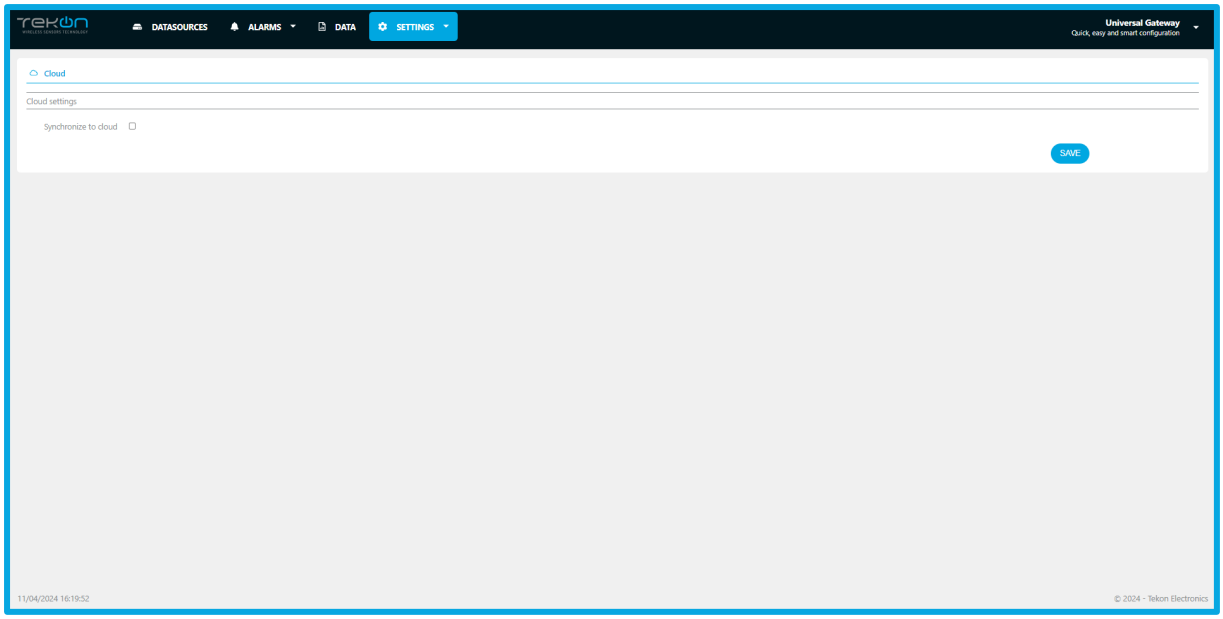

Figure 63 – Cloud Settings page.

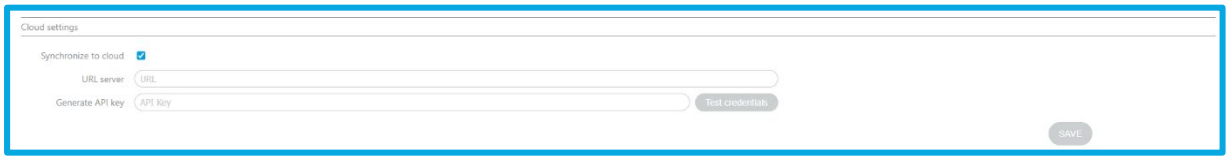

Figure 64 – Cloud configuration section with Cloud Checkbox enabled.

On the Tekon IoT Platform, the URL server is the link to the instance you purchased, and the API key is generated when you create the device user. On the Tekon IoT Platform, create the universal gateway user on the Administration page in the Settings menu (Figure 65), by clicking the button + Create User (Figure 66).

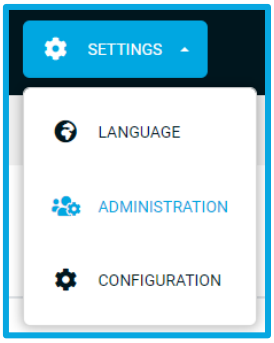

Figure 65 - Settings tab menu on the Tekon IoT Platform.

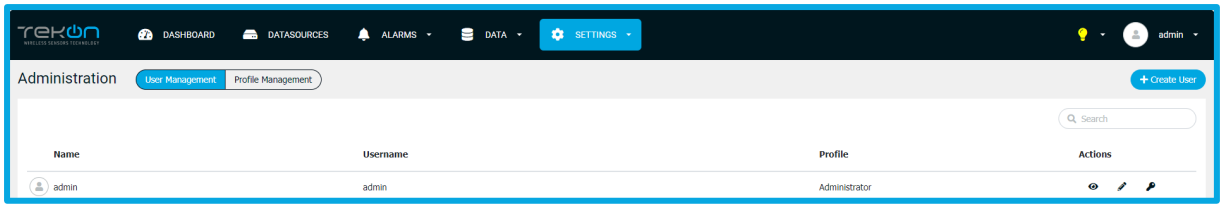

Figure 66 – Administration page on the Tekon IoT Platform.

You can edit the user parameters as desired, but the user profile should be Gateway. In the communication details, generate the API key by clicking New key and then copy the generated key by clicking Copy. If you want to generate a new key, discard the created key by clicking the symbol and create the API key again.

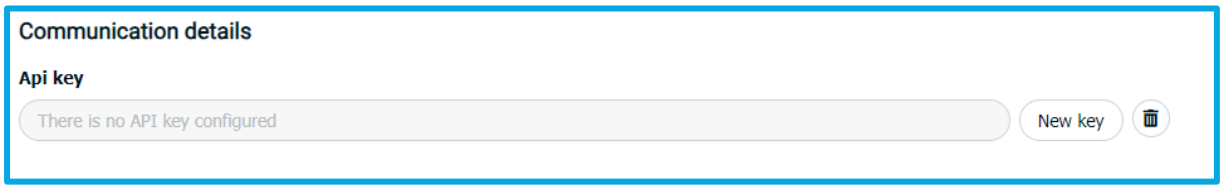

Figure 67 – User creation section on the Tekon IoT Platform.

After copying the API key, return to the Cloud Settings section of the gateway interface and paste the API key (Figure 68). Test these credentials by clicking Test credentials. If successful, a check symbol will appear, then save the changes by clicking SAVE.

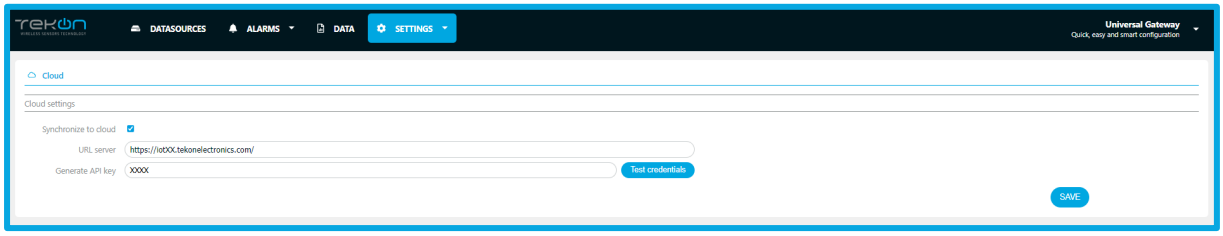

Figure 68 - Cloud Settings page with Cloud sync and API key

18.4 Modbus

In the base version of the Universal IoT Gateway, the Modbus protocol is implemented in Slave mode (Modbus RTU) and Server mode (Modbus TCP/IP), Figure 69. In this case, the gateway receives requests to send data from the datasources of Tekon's DUOS and PLUS transmitters.

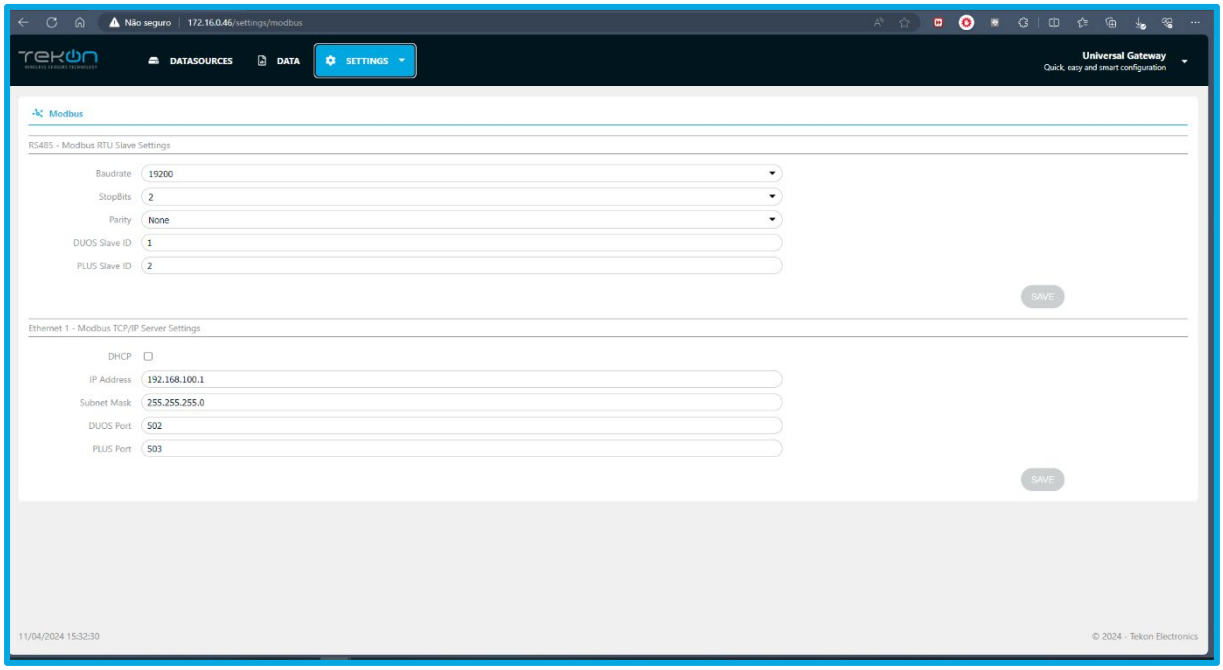

Figure 69 – Modbus Settings page in the base version of the device.

To connect Modbus RTU, you need to connect the Universal IoT Gateway to the master via the RS485 connector. In the interface, you can configure the baud rate (4800 to 115200 bps), parity (even or odd), stop bits (1 or 2), and the Slave IDs for the DUOS and PLUS product families, Figure 70. Whenever you make changes to these settings, you must save them by clicking the button SAVE.

Figure 70 – Modbus RTU section on the Modbus Settings page in the base version of the device.

To connect Modbus TCP/IP, you need to connect the Universal IoT Gateway to the client via the ETH1 connector. In the interface, you can define whether DHCP is enabled or disabled. If DHCP is disabled, the IP Address and Subnet Mask fields are editable, Figure 71. With DHCP enabled, the connection settings are defined automatically. The port fields for DUOS and PLUS are always editable. Whenever you make changes to these settings, you must save them by clicking the button SAVE.

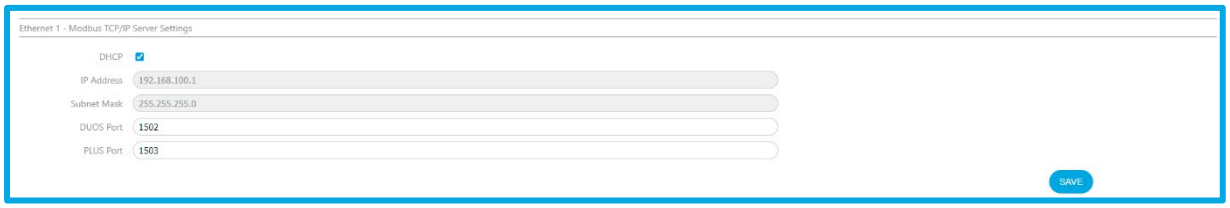

Figure 71 – Modbus TCP/IP section on the Modbus Settings page in the base version of the device.

18.5 Modbus RTU Master (opcional)

With the Modbus RTU Master and TCP/IP Client Pack activated, you can define in the interface whether the Universal IoT Gateway will operate in master or slave mode in Modbus RTU communication. If slave mode is selected, the configuration is as described in the 18.4 Modbus section.

If master mode is selected, the gateway will send requests to various devices (slaves), and you need to connect the gateway to these devices using the RS485 connector. In the interface, you can add and configure slaves, and their data will be stored as Generic Datasource. Configuring the Universal IoT Gateway as Modbus RTU Master begins by specifying the baud rate (4800 to 115200 bps), stop bits (1 or 2), parity (even or odd), and timeout, Figure 72. After configuring, save the settings by clicking the button SAVE.

Note: If you want to return to slave mode, change the mode in this section and save the change by clicking the button SAVE.

Figure 72 – Modbus RTU window section to configure Modbus RTU Master.

The next step is to add the slave by clicking the button ADD SLAVE and defining the Slave ID and Scan Rate (periodicity in seconds for reading data), Figure 73. After configuring, save the settings by clicking the button SAVE.

Figure 73 - Modbus RTU window section to configure the slave.

After saving the specifications, you must specify the request to the Slave by clicking the button ADD POOL. In the pool, you must define:

- starting address of the Modbus register;
- number of registers;
- Modbus function (Coils, Discrete Inputs, or Holding Registers).

After this initial configuration, click APPLY to apply the configuration in the representation of the registers below, Figure 74. When one of the three initial fields is changed, the table is updated by clicking APPLY.

Note: The Modbus register address uses Base 0 notation. If your equipment uses Base 1, you should subtract one unit from the address.

In the register table, you can edit the representation format, register grouping order, and the name of the Modbus field corresponding to the variable name in the created datasource, Figure 74. Figure 73. After configuring, you can test the settings by clicking the button READ. The Universal IoT Gateway will start requests to the Slave after saving the settings by clicking the button SAVE in the pool.

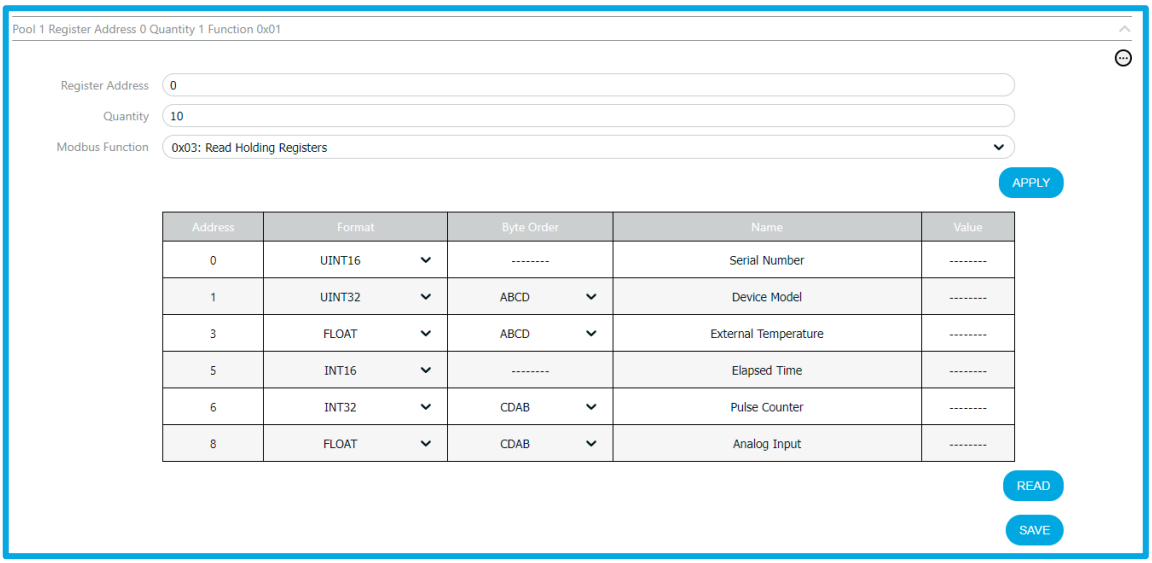

Figure 74 - Modbus RTU window section to configure Modbus RTU addressing.

Multiple requests with different parameters (pool) can be defined for each slave, Figure 75. If you have multiple devices with identical parameters, you can clone the slave to avoid configuring all pools again. To clone, click the symbol ⋯ in the slave tab and select Clone.

Figure 75 – Modbus RTU window section for configuring slave requests.

18.6 Modbus TCP/IP Client (optional)

With the Modbus RTU Master and TCP/IP Client Pack activated, you can define in the interface whether the Universal IoT Gateway will operate in client or server mode in Modbus TCP/IP communication. If server mode is selected, the configuration is as described in the 18.4 Modbus section.

If client mode is selected, the gateway will send requests to various devices (servers), and you need to connect the gateway to these devices using the ETH1 connector. In the interface, you can add and configure servers, and their data will be stored as Generic Datasource. Configuring the Universal IoT Gateway as Modbus TCP/IP Client begins by specifying the IP of the ETH1 interface with either a fixed IP or DHCP assignment, Figure 76. After configuring, save the settings by clicking the button SAVE.

Note: If you want to return to server mode, change the mode in this section and save the change by clicking the button SAVE.

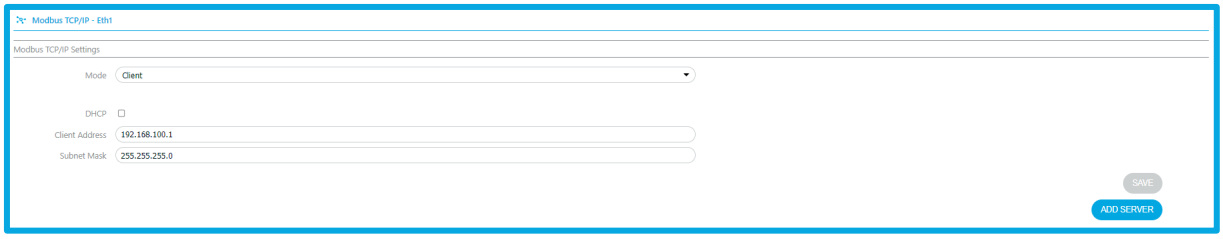

Figure 76 - Modbus TCP/IP window section to configure Modbus TCP/IP Client.

The next step is to add the server by clicking the button ADD SERVER and defining the Server Address, port, Unit ID, Scan Rate (periodicity in seconds for reading the Server data), and the Response Timeout in milliseconds, Figure 77. After configuring, save the settings by clicking the button SAVE.

Figure 77 - Modbus TCP/IP window section to configure the server.

After saving the specifications, you must specify the request to the server by clicking the button ADD POOL. In the pool, you must define:

- starting address of the Modbus register;
- number of registers;
- Modbus function (Coils, Discrete Inputs, or Holding Registers).

After this initial configuration, click APPLY to apply the configuration in the representation of the registers below, Figure 78. When one of the three initial fields is changed, the table is updated by clicking APPLY.

In the register table, you can edit the representation format, register grouping order, and the name of the Modbus field corresponding to the variable name in the created datasource, Figure 78. After configuring, you

can test the settings by clicking the button READ. The Universal IoT Gateway will start requests to the servers after saving the settings by clicking the button SAVE in the pool.

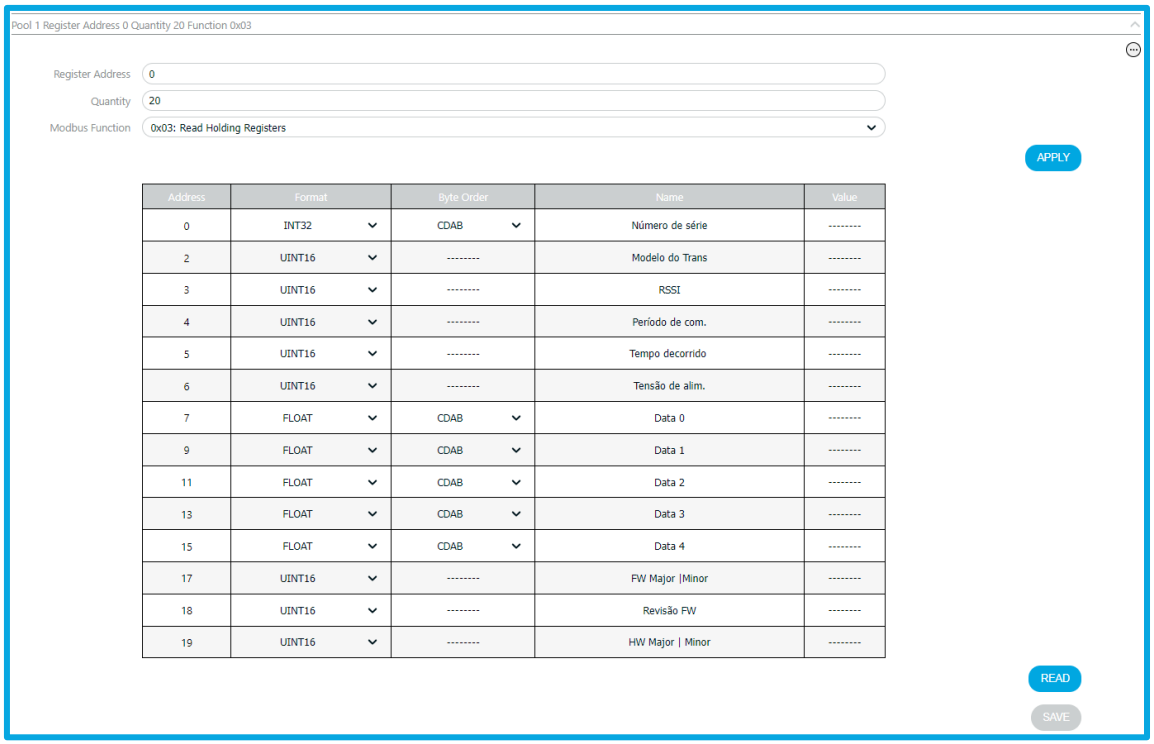

Figure 78 - Modbus TCP/IP window section to configure Modbus TCP/IP addressing.

Multiple requests with different parameters (pool) can be defined for each server, Figure 79. If you have multiple devices with identical parameters, you can clone the server to avoid configuring all pools again. To clone, click the symbol ⋯ in the server tab and select Clone.

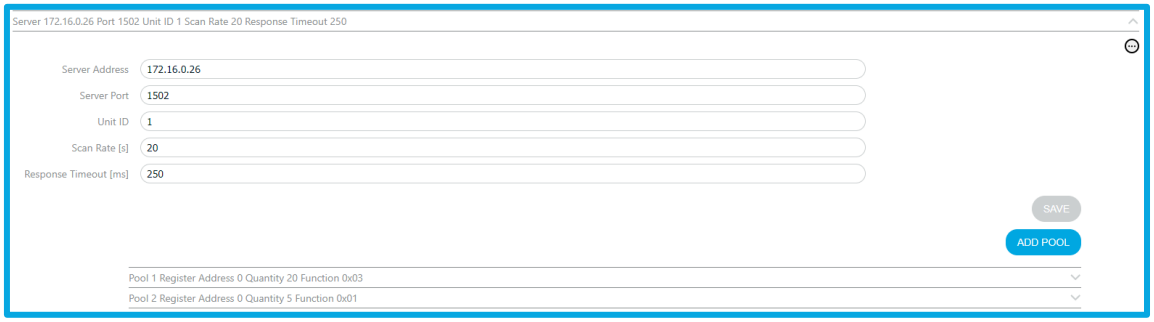

Figure 79 - Modbus TCP/IP window section to configure server requests.

18.7 Cellular (optional)

If the Universal IoT Gateway is the version with 3G/4G GSM, this page is unlocked. On this page, you can configure the 3G/4G GSM module and view the signal strength in dBm, as shown in Figure 80.i In the settings, you can change the APN (Access Point Name), Username, and Password of your 3G/4G GSM service, i.e., the service of the SIM card placed in the Universal IoT Gateway. Whenever you change the settings, save them by clicking on SAVE. Once the connection is established, you can see the signal strength in dBm on this page and on the device's display.

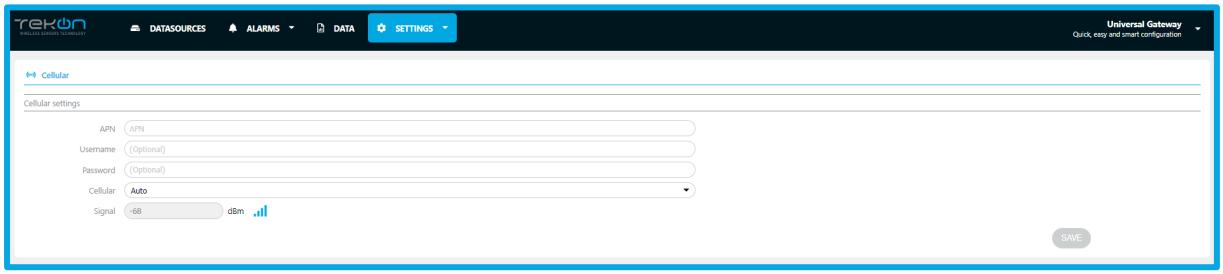

Figure 80 – Cellular Settings Page.

19. Alarm Menu (optional)

If the Universal IoT Gateway has the Alarms and Notifications Pack unlocked, the ALARMS tab will appear in the page header, allowing you to configure value or inactivity alarms for any of the data sources, as well as send notifications via email and/or SMS. In the alarm's menu, you will have the configuration of alarms, email service, and SMS service (Figure 81).

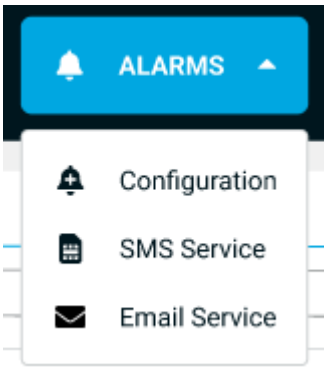

Figure 81 – Alarms tab Menu.

19.1 Configuration

In the alarm configuration, you can choose the type of alarm (**Value** or **Inactivity**) and the data source you want to monitor.

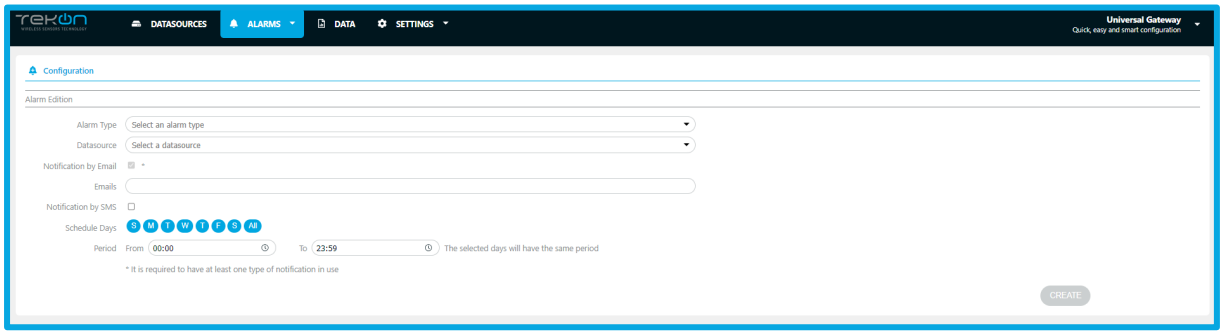

Figure 82 - Alarm Configuration Page

For a value alarm (Warning), it is necessary to define the variable, the comparison method, and the value to compare. The options for the comparison method are shown in Figure 83. The inactivity alarm (*Error*) occurs when the data source is not receiving data. For all types of alarms, it is also necessary to configure the number of occurrences to trigger the alarm and specify the days of the week and the hours when the alarm is active, Figure 84.

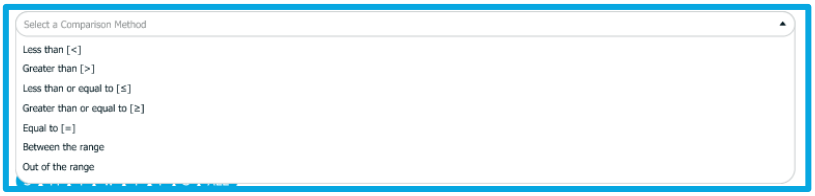

Figure 83 – List of comparison methods in value alarm configuration.

Figure 84 – Value alarm configuration section.

Configuring an alarm requires defining a method for sending notifications. By default, the email sending method is selected, and it is necessary to define the recipients of the alarm notifications. Alternatively, or

additionally, SMS sending can be configured, and it is necessary to specify the contacts for the notifications, Figure 85. At the end of the configuration, click on CREATE to save the alarm.

Figure 85 - Inactivity alarm configuration section.

Configured alarms are displayed in two lists, Warnings List and Errors List. The Warnings list includes configured value alarms, and the Errors list includes inactivity alarms, Figure 86. In this list, you can view the monitored data source, alarm description, alarm schedule, and notification contacts. The administrator can edit the alarm by clicking on , copy the settings to create a similar alarm by clicking on , and delete the alarm by clicking on .

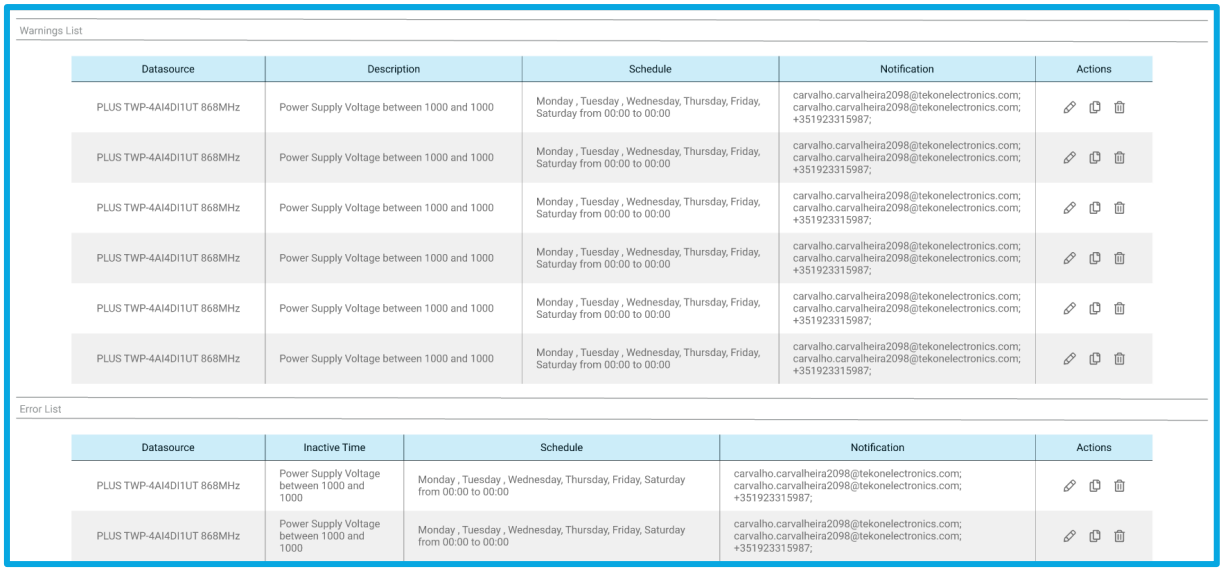

Figure 86 – Configured alarms list section.

19.2 SMS Service

SMS notifications can be made using an external service selected by the user, Figure 87. In this case, you only need to configure the service provider, account name, API key, and the SMS sender name.

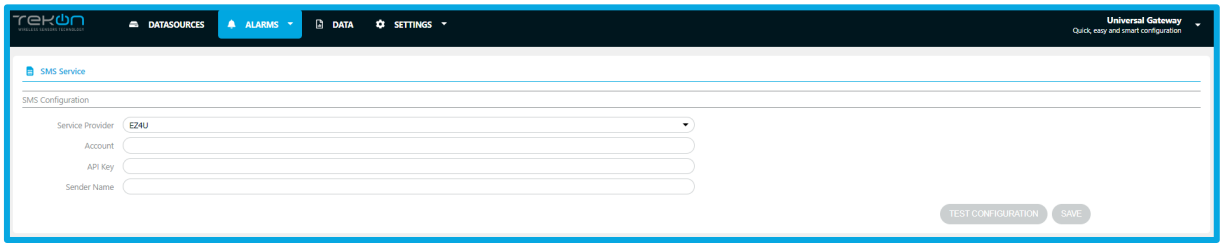

Figure 87 - SMS service configuration page for alarm notifications with an external service.

With the gateway version with GSM, the SMS service for alarm notifications can be done using the SIM card provided by the user. In this case, you only need to configure the SMS sender name, Figure 88.

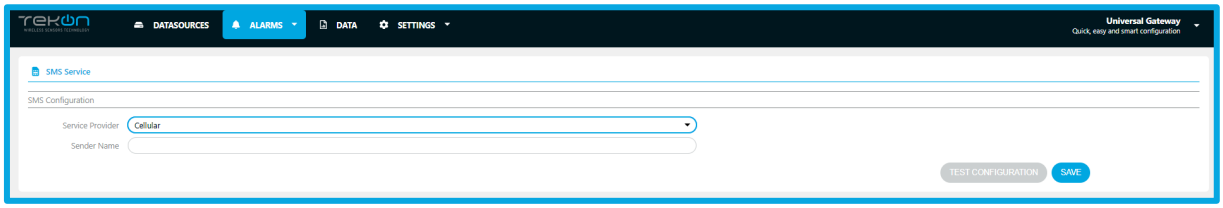

Figure 88 - SMS service configuration page for alarm notifications with the device's GSM module.

In both cases, after configuring or making any changes, perform the corresponding test to ensure that this service is operational. To perform the test, click on TEST CONFIGURATION. A window will appear to enter the phone number to verify if the SMS service is functional. After testing, save all changes by clicking on the button SAVE.

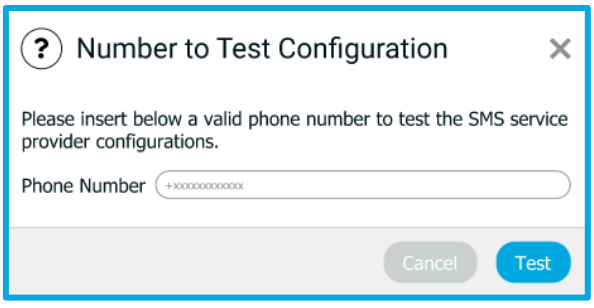

Figure 89 – SMS service configuration test page.

19.3 Email Service

The email service for receiving alarm notifications can be configured on the page shown in Figure 90. You can configure the email sending server (e.g., smtp.gmail.com), email service port, server access username, sender address, and server access password.

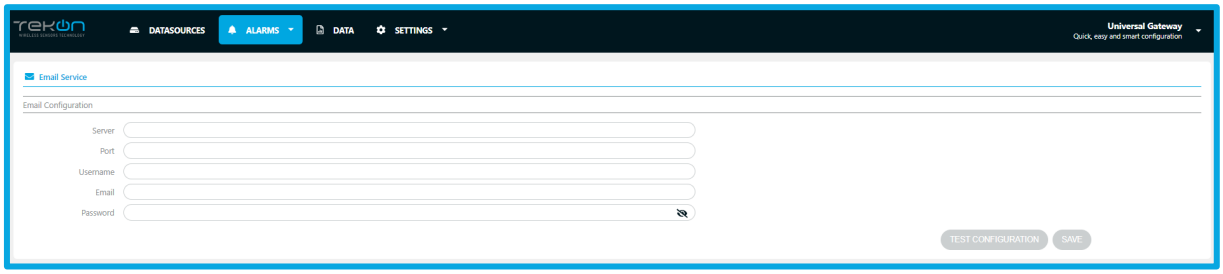

Figure 90 – Email service configuration page for alarm notifications.

To validate the email sending through the configured server, click on TEST CONFIGURATION. A window will appear to enter the email to verify if the email service is functional. After testing, save all changes by clicking on the button SAVE.

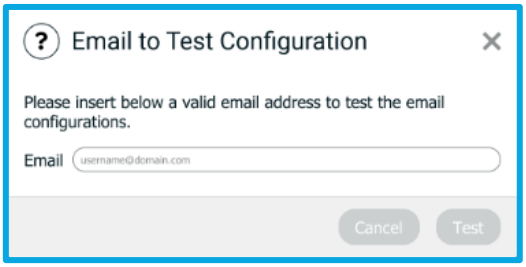

Figure 91 - Email service configuration test page.

The alarm notification email sent by the Universal IoT Gateway is exemplified in Figure 92.

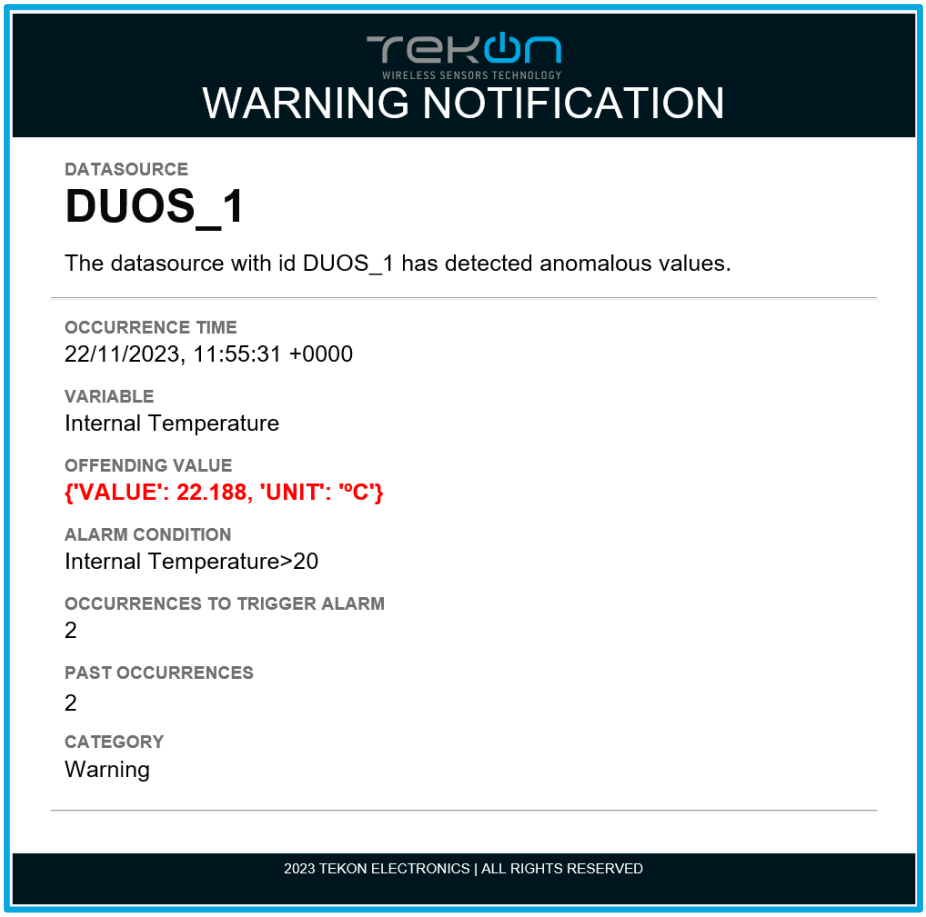

Figure 92 – Example of a value alarm email notification.

X. Third-party platform integration

MQTT

The Universal IoT Gateway allows access to the MQTT Broker and subscription to data source topics. The MQTT Broker starts with the device, and manual activation is not necessary.

The available data in the various MQTT Broker topics are the data from the PLUS and DUOS transmitters. If the device has the Modbus Master/Client unlocked, you can also access data from Modbus RTU Slave or TCP/IP Server devices designated with GENERIC datasource.

The credentials to access the MQTT Broker are as follows:

- **IP Address:** Address of the Eth0 or Wi-Fi interface in Client mode
- **Port:** 1883
- **User:** tekon_gtw_subscriber
- **Password:** tekon_gtw_mqtt

To access data sources, here are some examples of MQTT subscriptions:

- datasources/#
- datasources/plus/#
- datasources/plus/2
- datasources/duos/#

- datasources/duos/3
- datasources/generic/#
- datasources/generic/6
- datasources/generic/192.168.1.123

20.Node-RED

To access the Node-RED interface, you can follow the settings page (Node-RED (optional) section), or you can open the web browser and enter the device's IP address followed by port 1880, Figure 93.

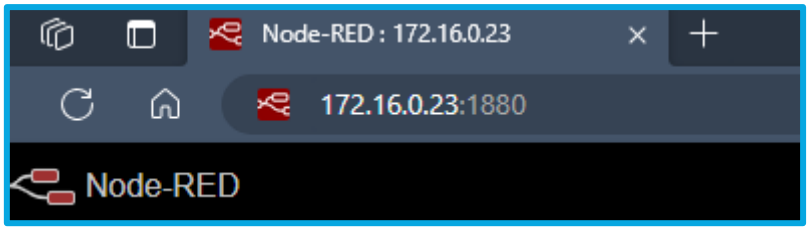

Figure 93 – Link to access the Node-RED page.

You will need to enter the user credentials that can be found on the user management page (User Management section).

Figure 94 – Window to enter credentials to access the Node-RED page.

To access the MQTT Broker via Node-RED, follow these steps:

1. Add the mqtt in node to the Flow and configure the node with the values and parameters from the figures and click on Add, and:
    - **Server**: *localhost*
    - **Port**: *1883*
    - **Username**: *node_red*
    - **Password**: *node_red*
    - **Topic**: *datasources/#*

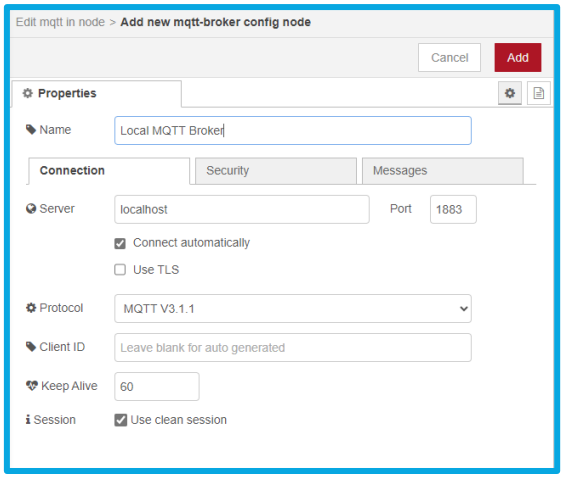

Figure 95 - MQTT Server configurations.

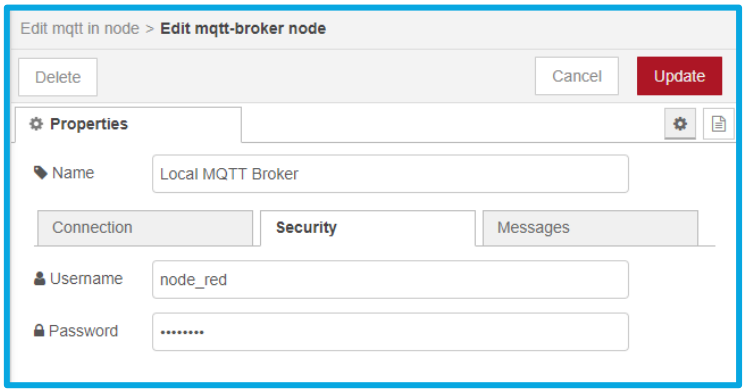

Figure 96 - MQTT Server configurations.

2. Click on Done;

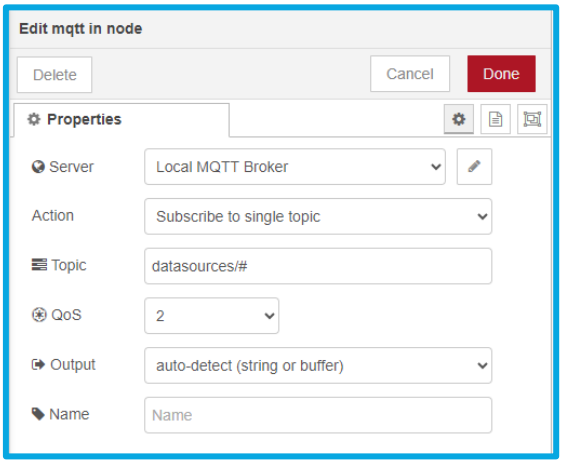

Figure 97 - MQTT Node configuration.

3. Add the Debug node and connect the nodes to each other;

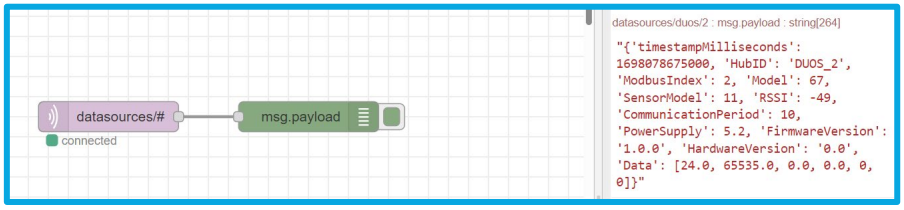

Figure 98 - Flow and Debug Message.

4. Click on *Deploy*;
5. After a few seconds, with a DUOS transmitter communicating with the Gateway, data reception should start.

XI. Front display

The display on the **Universal IoT Gateway** is used to display information about various functions and connections enabled by the hardware and software. Every 5 seconds, a new informative window is displayed, Figure 99 to Figure 107.

Display window	Description	Possible values
	IP address of Ethernet port 0.	IP address created by the network
	IP address of Ethernet port 1.	Modbus TCP/IP address

Figure 99 - Ethernet port 0 information.

Figure 100 - Ethernet port 1 information

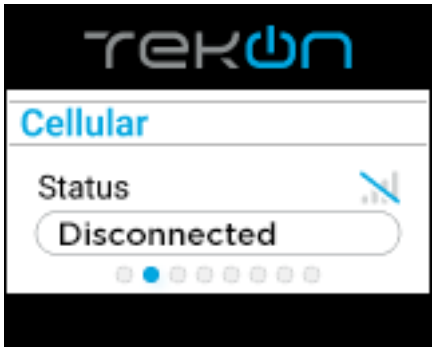

Figure 101 - GSM connection information.

Information about the 3G/4G GSM communication	1. Unavailable (not available on the device) 2. Disconnected 3. 3G/4G 4. Signal strength

Figure 102 - Wi-Fi connection information.

Wi-Fi connection status.	1. Disconnected 2. Connected (client mode) 3. AP Mode (connected in AP mode) 4. Signal strength

Figure 103 - Wi-Fi connection IP address.

Wi-Fi connection IP address. Through this IP, you can access the device's web interface.	IP address created by the network.

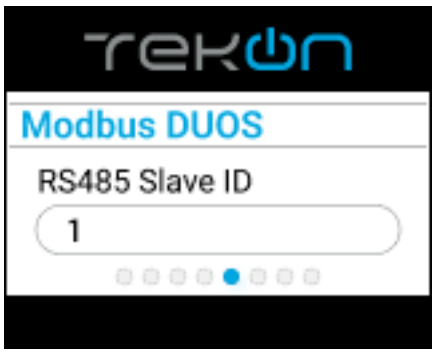

Figure 104 - DUOS devices slave information.

Slave address for connecting to DUOS devices.	Default: 1 (configurable) Disabled (Modbus RTU in Master mode).

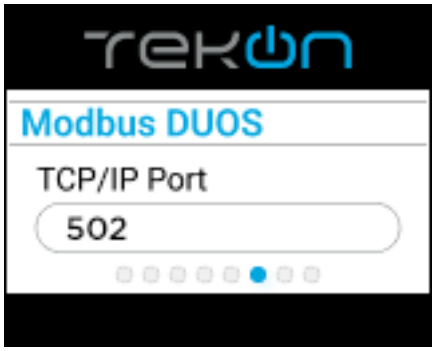

Figure 105 - DUOS devices port information.

Access port for DUOS devices.	Default: 502 (configurable) Disabled (Modbus TCP/IP in Client mode).

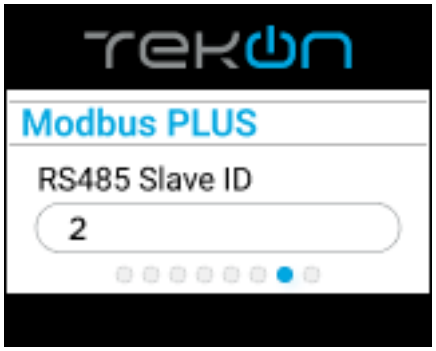

Figure 106 - PLUS devices slave information.

Slave address for connecting to PLUS devices.	Default: 2 (configurable) Disabled (Modbus RTU in Master mode).

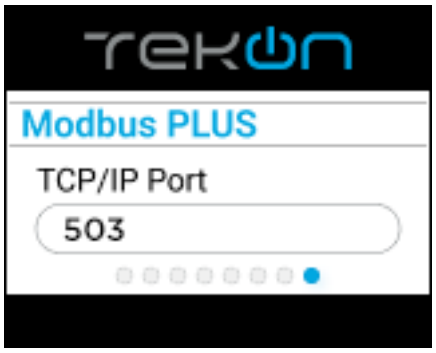

Figure 107 - PLUS devices port information.

Access port for PLUS devices.	Default: 503 (configurable) Disabled (Modbus TCP/IP in Client mode).

XII. Revision History

Changes made in previous versions	
VERSION	
P01B	Review of the device configuration process Information on the firmware update process

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