

**UNIVERSAL
IOT
GATEWAY**

PRODUCT MANUAL

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Introduction

Overview

The Universal IoT Gateway product is a device that enables communication between transmitters from Tekon's DUOS and PLUS product families and third-party transmitters with IoT platforms through integration with REST API (Tekon IoT Platform) and MQTT (third-party platform). The Universal IoT Gateway also utilizes the Modbus TCP/IP and Ethernet communication protocols for data transmission to and from the cloud and the Modbus RTU protocol for local network communications.

This device features a web interface, known as the Universal IoT Gateway Platform, designed to assist with configuration, equipment integration, data visualization and export, and alarm configuration. Additionally, it allows data storage using an internal 8 GB memory.

Accessories / documents included

Software Pack:

Modbus RTU Master and TCP/IP Client pack;

Alarms and Notifications pack;

Node-RED and MQTT Broker pack.

Accessories:

External RF antenna for Tynymesh protocol (included);

GSM external antenna (included in the aluminum case);

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

RS-485 converter cable (optional purchase);

Power supply (optional purchase);

Mounting and fixing accessory for ABS box (optional purchase).

Documents:

Datasheet;

Product Manual

Symbols



The Universal IoT Gateway complies with European legislation and harmonized European standards for electronic products and can circulate freely within the internal market.



If the device becomes expendable and unused, please do not place it in the traditional trash. Place the device in an appropriate electronic waste depository.



This symbol denotes especially important guidelines regarding the installation and operation of the device. Carefully read any information relating to this symbol. Failure to follow the guidelines indicated by this symbol may cause an accident, damage or destruction of the equipment.

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

Product

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

Technical Data

Processor	Arm Quad Core Cortex-A72 64-bit SoC
I/O	WiFi 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)

Technical Drawings

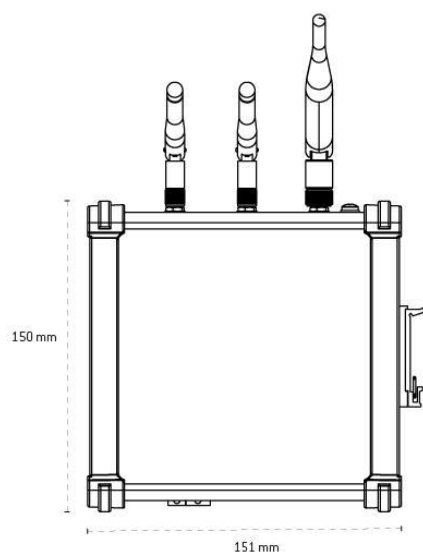


Figure 1 - Universal IoT Gateway dimensions with Aluminum Housing

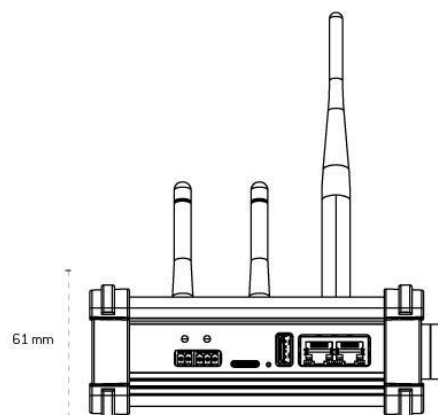


Figure 2 - Universal IoT Gateway dimensions with Aluminum Housing

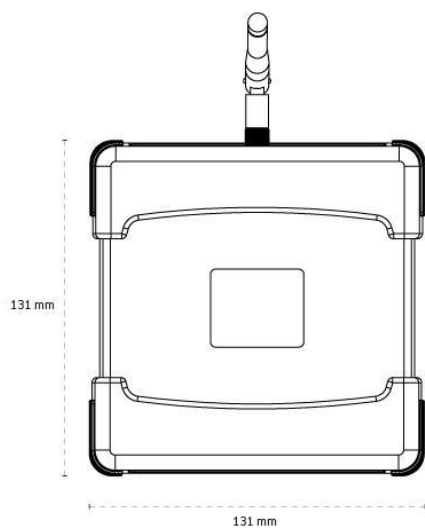


Figure 3 - Universal IoT Gateway dimensions with ABS Housing

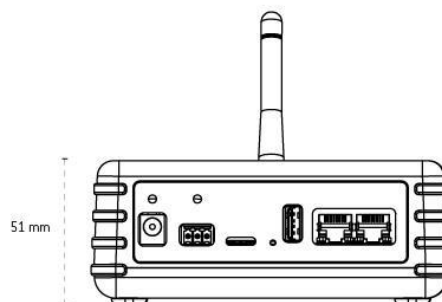


Figure 4 - Universal IoT Gateway dimensions with ABS Housing

Connections

Universal IoT Gateway versions have external connections characterized by communication interfaces.

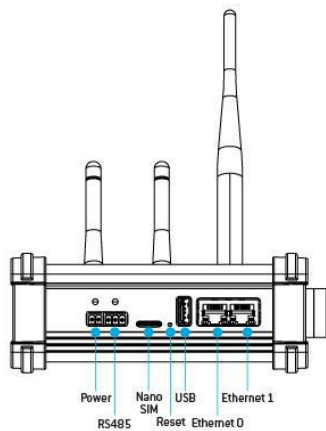


Figure 5 - Universal IoT Gateway physical connections with aluminum case

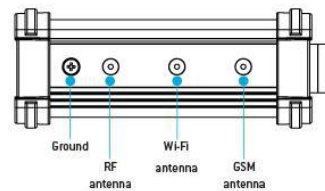


Figure 6 - Physical connections of the Universal IoT Gateway antennas with aluminum housing

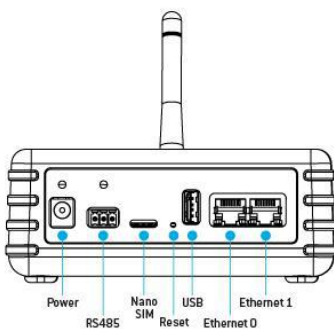


Figure 7 - Universal IoT Gateway physical connections with ABS case

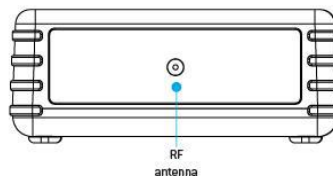


Figure 8 - Physical connections of the Universal IoT Gateway antennas with ABS housing

Reset Button

The Universal IoT Gateway features a reset button that reconfigures the gateway to factory settings. To do this, you should press the button for 5 seconds, and information about the completion of this process will appear on the display. Once it's completed, the display will show the factory settings.

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

LED lights

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

Table 1 - LED color and description.

LED	Description
Red power LED	Connection to source OK.
Red RS485 LED	RS485 port communication - Transmitter
Green RS485 LED	RS485 port communication - Gateway

Label

The Universal IoT Gateway is identified with a label that contains information about the product features required for configuration purposes:

- Tekon name and website;
- Tekon internal reference of the product;
- Internal designation of the device;
- Network ID previously configured on the device;
- Configured wireless channel;
- WiFi network ID;
- Password for accessing the Wi-Fi network;
- MAC address of Ethernet port 0;
- MAC address of Ethernet port 1;
- WiFi MAC address;
- Certification and security symbols;
- Name of the business group and address.

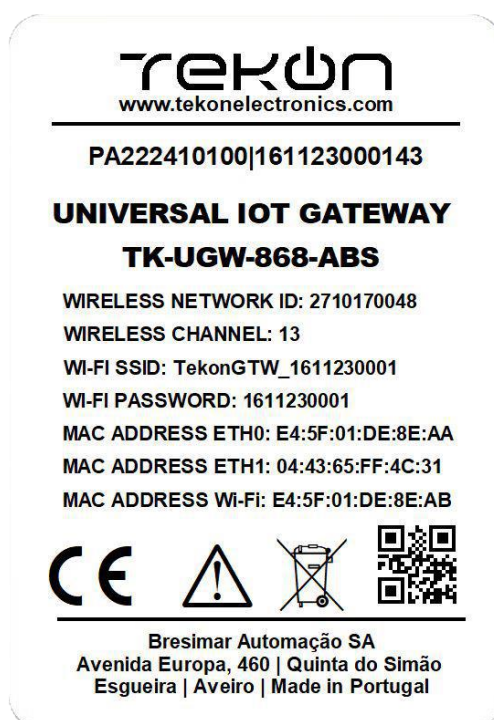


Figure 9 - Universal IoT Gateway label example

Web interface features

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

The interface offers users the conditions to adapt the Universal IoT Gateway to their needs, check which datasources (transmitters and/or sensors) are connected to it and their characteristics and configurations. It also allows you to view data from datasources as well as export it in different formats.

Universal IoT Gateway configurations

The interface accommodates by default 4 configuration pages of the gateway itself, where you can consult equipment characteristics and customize it to adapt to different conditions.

Personalized data collection and visualization

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

Real-time monitoring

Real-time monitoring is already an imperative basis for applications complemented with IoT platforms.

Data export and analysis

The **Universal IoT Gateway Platform** allows data export with data from different data sources allowing for data comparison and more targeted analysis. Export can be performed with different formats (PNG, JPG, XLSX, CSV and PDF).

User types

The **Universal IoT Gateway Platform** allows the use of 2 types of users, an administrator profile where all interface resources are allowed to be used, and another viewing profile that only allows you to view the connected datasources and export their data.

Updates

Firmware and software updates are reserved exclusively to Tekon Electronics. In case of a severe error, contact technical support to assess the problem with your device.

Default settings

Systems requirements

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

Wireless

The dedicated wireless network created by the Universal IoT Gateway allows access to the device directly for consultation and configuration, namely the IP address that was assigned by the network to which it is connected via the Ethernet port. When connecting to the dedicated wireless network, you can access the equipment interface by accessing IP 192.168.128.1. If you are using mobile devices, make sure you have mobile data turned off.

Access

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

To connect via **Wi-Fi**, you must access the network defined on the label by Wi-Fi SSID (TekonGTW_XXXXXXXX, Figure 10) with the respective password. After establishing a connection, access the IP address **192.168.128.1** in the web browser, which corresponds to the address in access point mode (AP Mode).

To communicate via **Ethernet**, you need to know the IP address of the Universal IoT Gateway and enter it in your preferred browser to log in and see the next step.

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

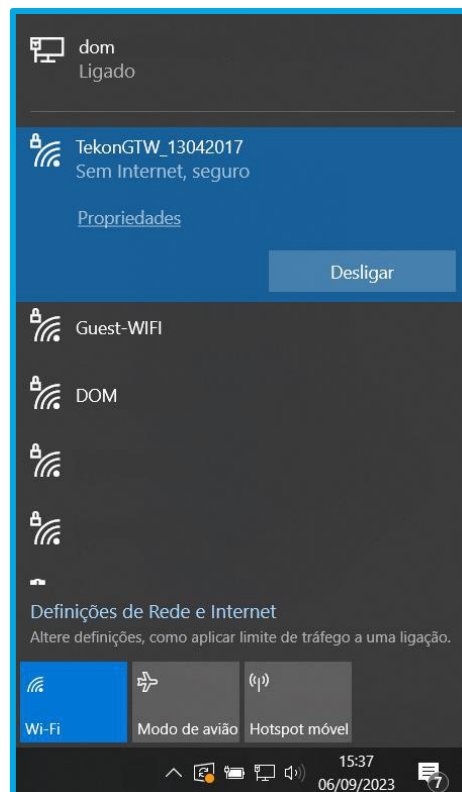


Figure 10 – Universal IoT Gateway network

Log in and out

Both logging in and logging out are very simple and quick processes. When accessing the Universal IoT Gateway Platform via the Wi-Fi network or via the IP address in the web browser, the page shown in Figure 11 should appear to log in. After logging in, you will be redirected to the Datasources page shown below.

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

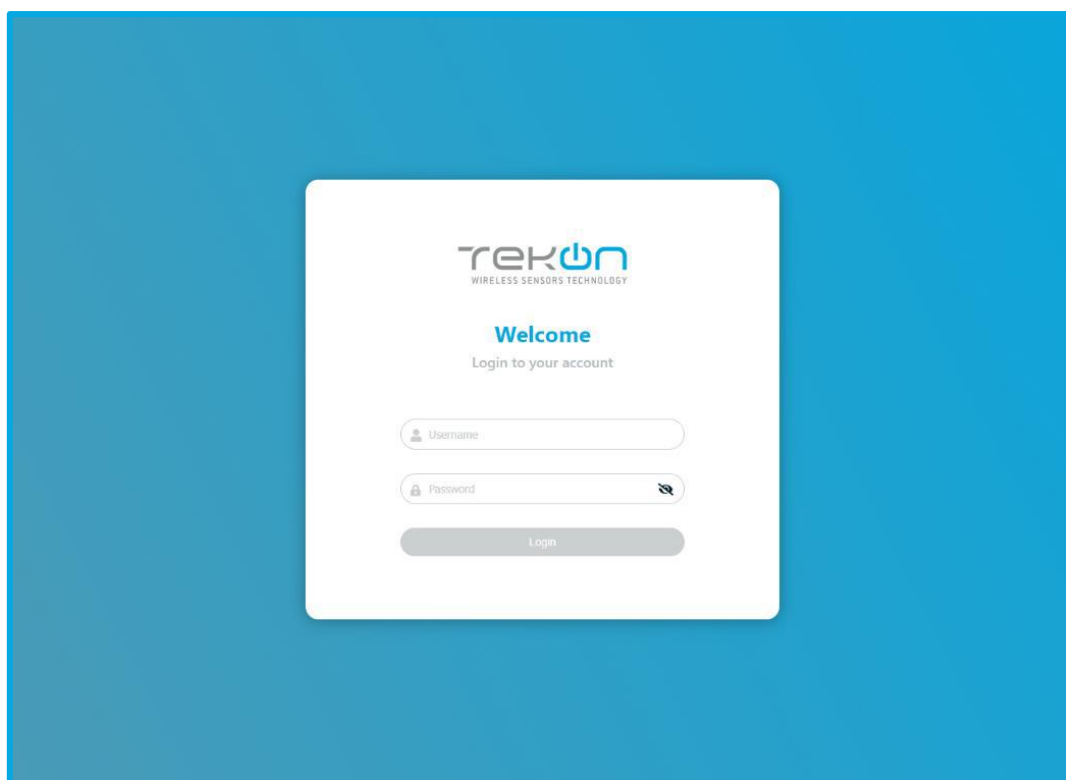


Figure 11 – Login page

The credentials to be used are as follows:

Administrator profile	User profile
Username: admin Password: tekon	Username: viewer Password: viewer

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

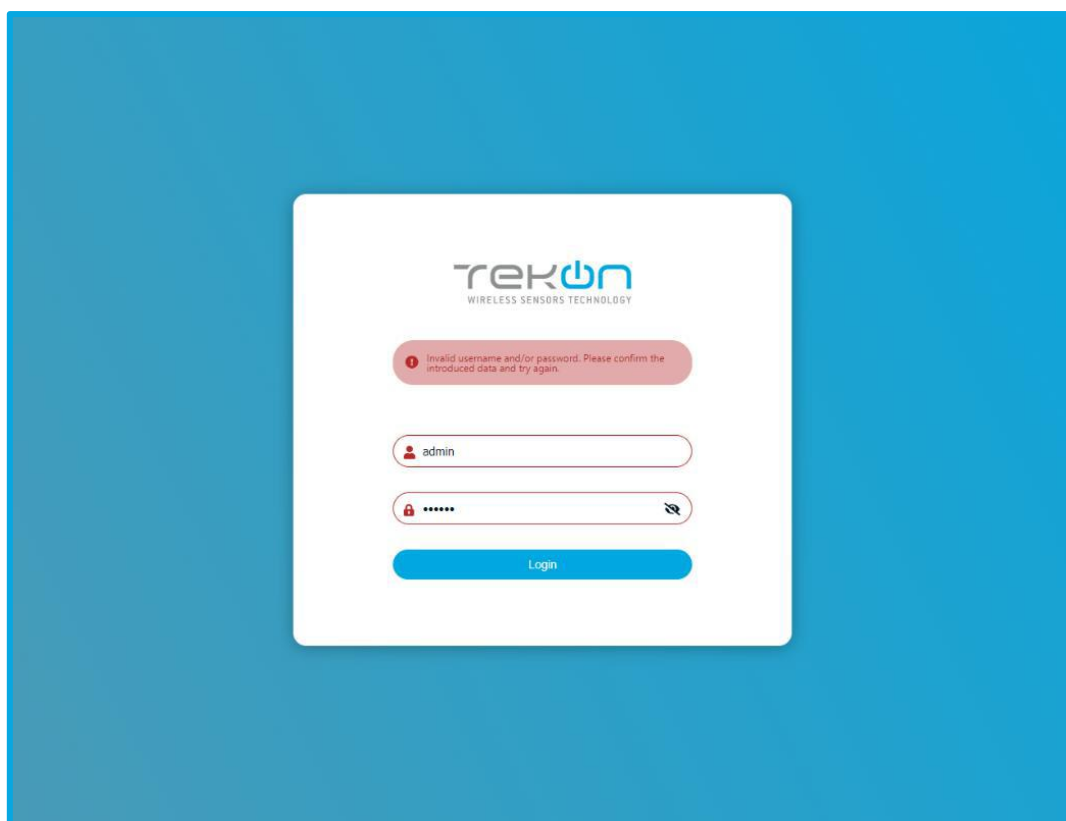


Figure 12 – Wrong Password or Username

After logging in, you will be redirected to the Datasources page (as presented in the next section).

Note: The session has a one-hour expiration period, so you may need to resume the session due to inactivity on the interface.

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

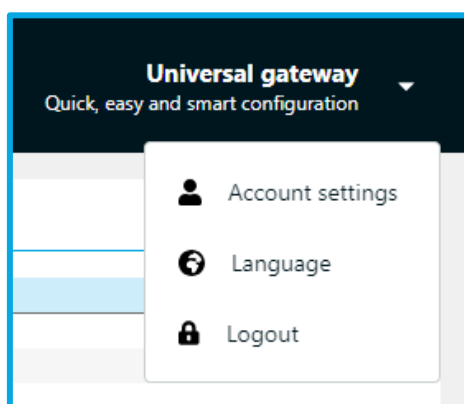


Figure 12 – Side menu with logout option

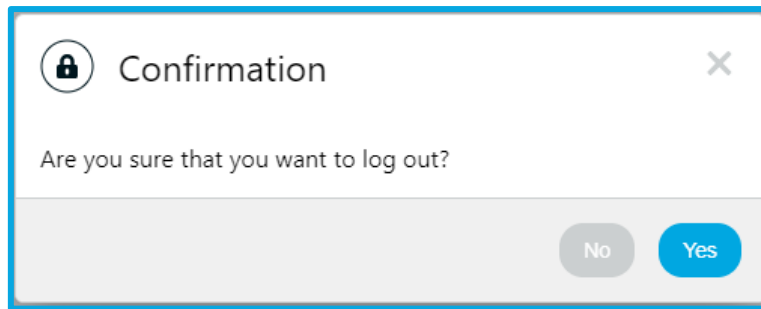


Figure 13 – Logout confirmation pop-up

Web interface

Users Management

It is possible to create multiple users with different access permissions to the Universal IoT Gateway's web interface. There are two user profiles:

- **Administrator:** Permissions for equipment configuration, datasource setup, alarm and notification configuration, data analysis and export, and user configuration.
- **Viewer:** Permissions to access the Datasources page for data viewing and the Analysis and Export page.

For user configuration, you should access the menu in the upper-right corner, as shown in Figure 15.

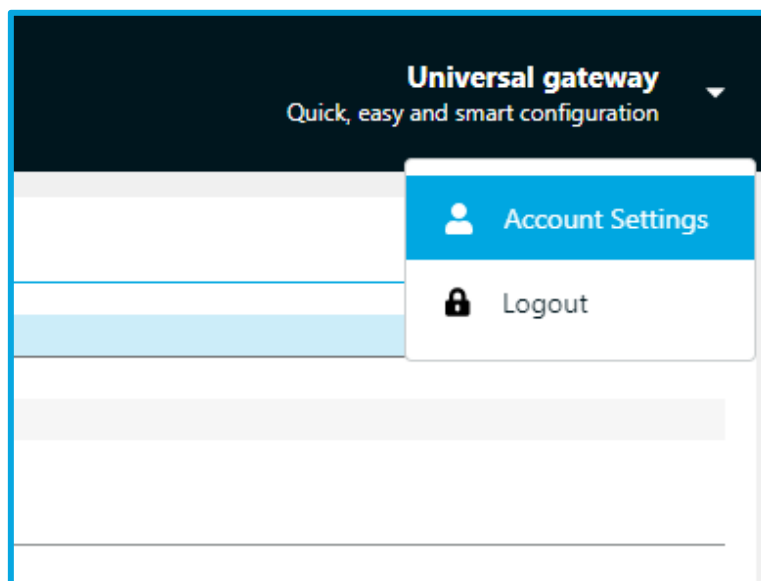
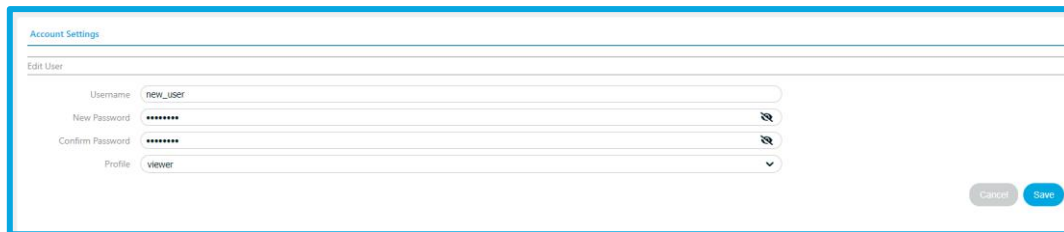


Figure 15 - User settings

To create a user, you need to define the username, password, and select the user profile, as shown in Figure 16.



Account Settings

Edit User

Username: new_user

New Password: [masked]

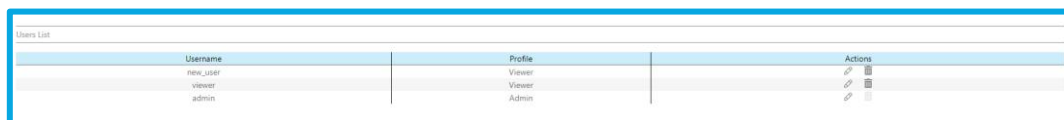
Confirm Password: [masked]

Profile: viewer

Cancel Save

Figure 16 - Username and password

The defined users are listed where you can edit and delete users, as shown in Figure 17.



Username	Profile	Actions
new_user	Viewer	[edit] [delete]
viewer	Viewer	[edit] [delete]
admin	Admin	[edit] [delete]

Figure 17 - User profiles

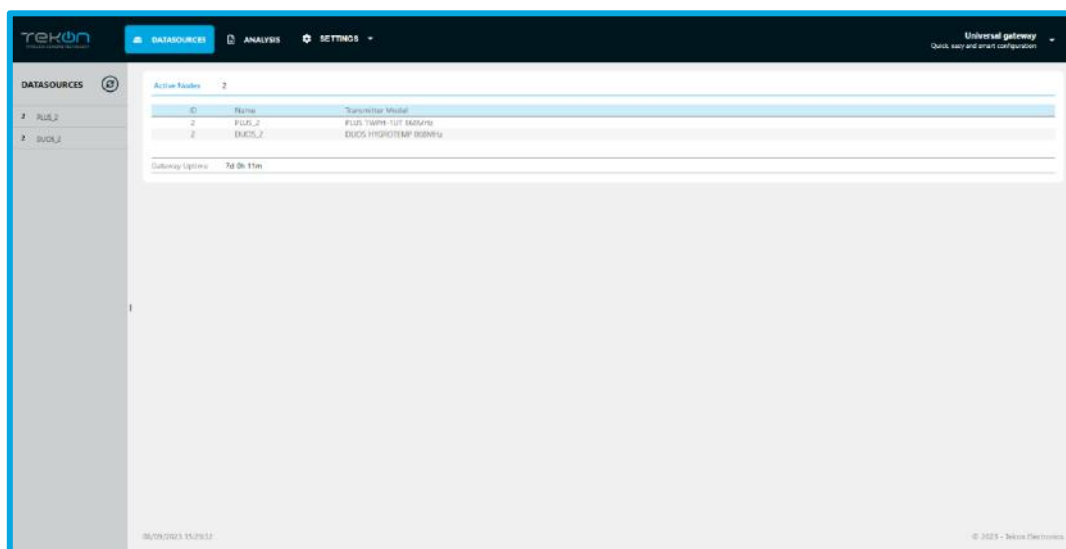
Up to a maximum of 2 users with the Administrator profile and 5 users with the Viewer profile can be created.

Datasources Menu

Homepage

After logging in, the page shown in Figure 18 will appear. This page, on the left side, displays a list in order of ID (previously defined in the Tekon Configurator) and allows you to view the datasources (transmitters and/or sensors) that are communicating with the Universal IoT Gateway.

To add a datasource, simply configure the transmitter in the Tekon Configurator with the wireless network and wireless channel defined on the Universal IoT Gateway's label. Once the configuration is complete and data transmission begins, the device will appear on the gateway's interface. If this process is taking some time, you may need to refresh the page. There may be devices with the same ID if they are from different families, such as DUOS and PLUS, for example.



TEKON Universal gateway Quick, easy and smart configuration

Datasources

Active Datasources: 2

ID	Name	Transmitter Model
2	PLUS_2	PLUS TWIN-TOT BATTERY
2	DUOS_2	DUOS HYPERSTAR BATTERY

Gateway Options: Refresh

08/09/2023 15:28:52 © 2023 - Tekon Electronics

Figure 18 - Homepage (datasources)

View Data

To access data from a specific device, simply search the list and click on the respective ID. A page similar to the one shown in Figure 19 should then appear, where the information is divided into 4 categories:

1. *Settings*: configure the period of data displayed on the graph;
2. *Measurements*: view data graphically;
3. *Datasource Properties*: consult non-editable datasource properties;
4. *Datasource Settings*: configure device variables.

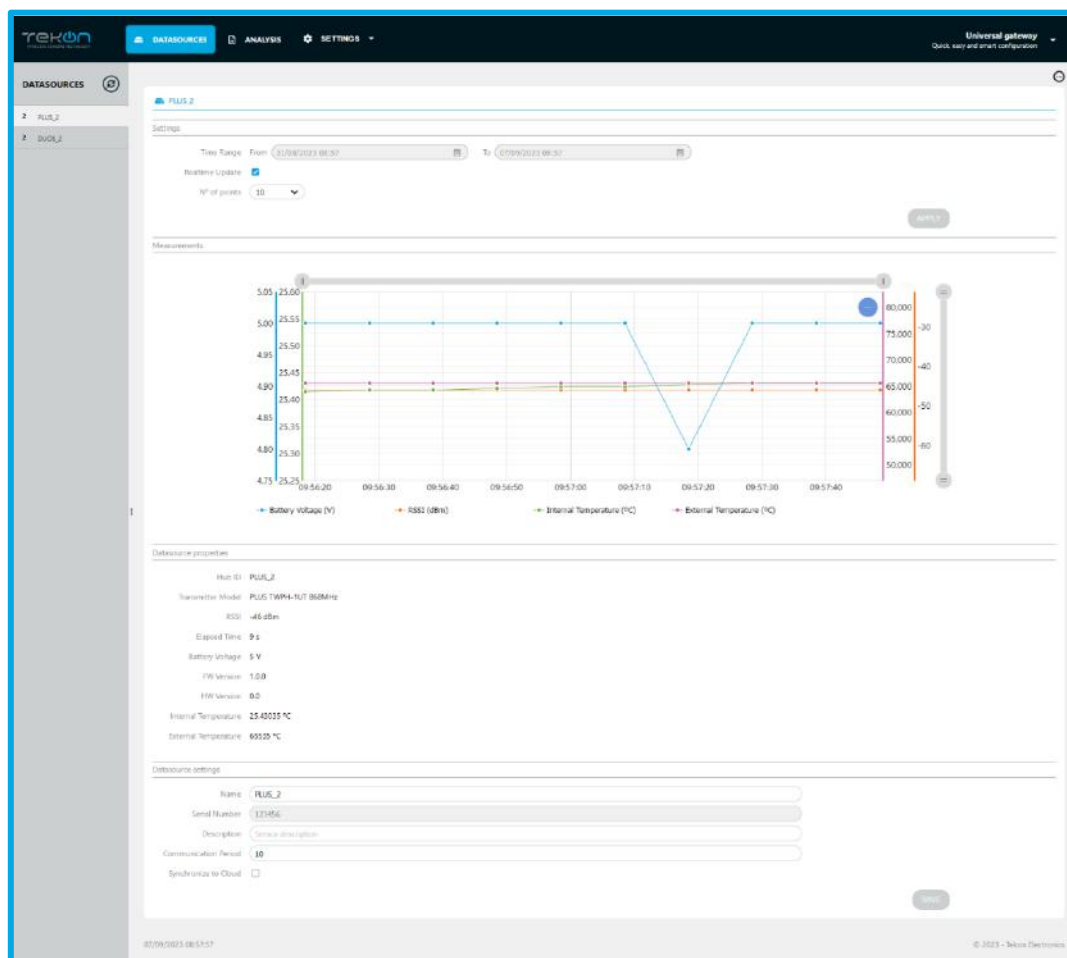


Figure 14 – Datasource page

In the top left corner, there is a menu (Figure 20) that allows you to delete the selected datasource, and in the side list, when hovering over the datasource, a menu also appears, which, when opened, presents the same function. This side list, visible on the left (Figure 20), can be hidden to allow the expansion of the rest of the page.

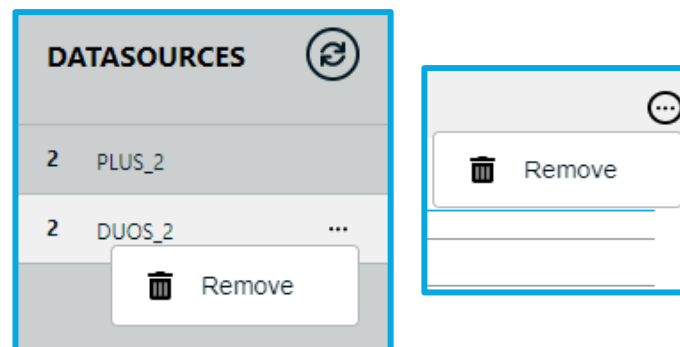


Figure 15 – Datasource page

To return to the previous page in the Universal IoT Gateway web interface, simply deselect the *datasource* in the list presented on the left or click again on the "Datasources" header.

Data analysis and Export

This page allows you to simultaneously view data from different devices and also export the data in five different formats. To do so, there must be data stored or transmitters communicating with the Universal IoT Gateway.

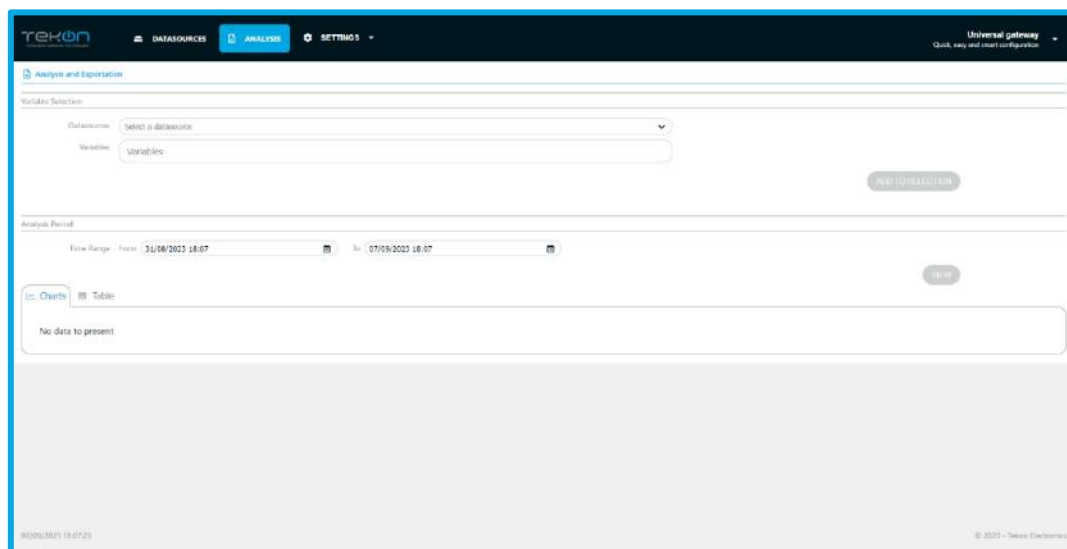


Figure 16 – Analysis and Data export page

To start the data visualization and analysis process, you must choose the *datasource* whose variables you want to select as shown in Figure 22, then choose the desired variables (Figure 23). Afterwards, you need to enter them in the list of properties to be displayed by pressing the "ADD TO SELECTION" button, see Figure 24. To continue adding variables from other *datasources*, simply repeat the process described previously the number of times necessary, until you obtain all the variables intended.



Figure 22 – Select Datasource

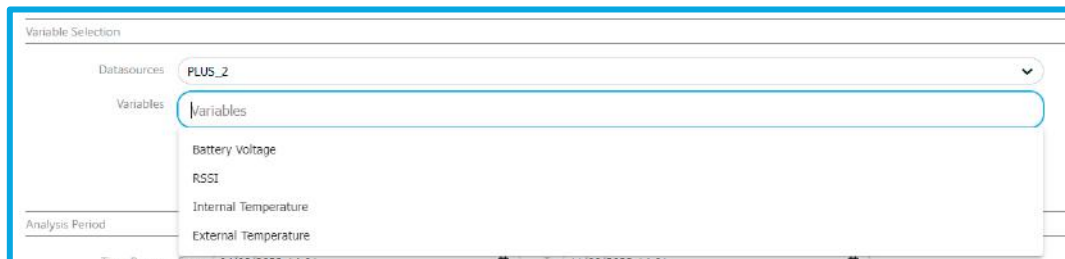


Figure 173 – Select Variables

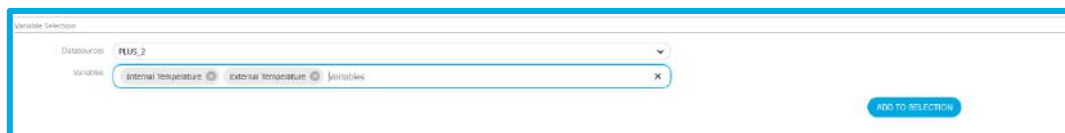


Figure 18 – Variables selected

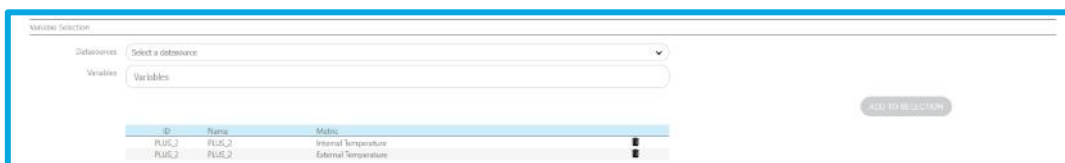


Figure 19 – List with variables

After selecting the list of variables to display, you need to choose the time interval for which you want to view the data and click the "VIEW" button to generate the chart and table, as can be seen from Figure 26 to Figure 28. The chart can be exported in two different formats, PNG and JPG, and the tabulated values can be saved in three different types of files, XLSX, CSV, and PDF.

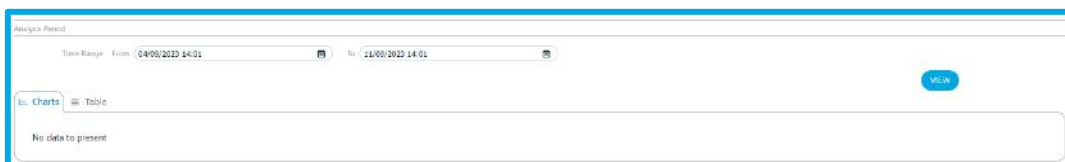


Figure 20 – Analysis period

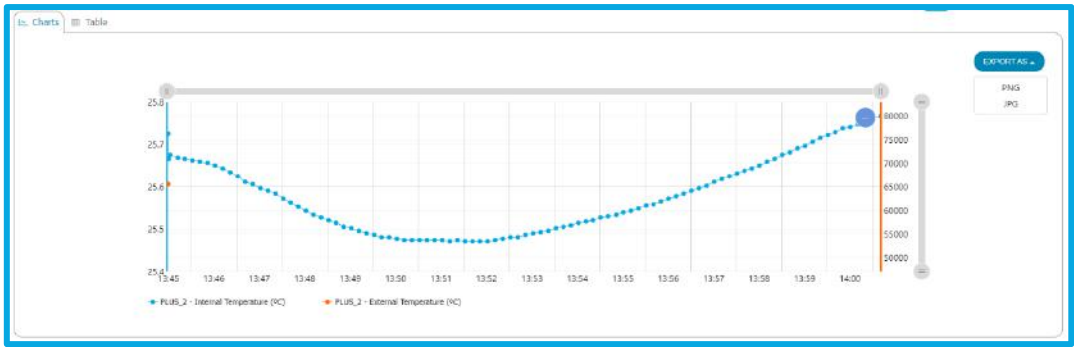


Figure 27 – Graphic for export in PNG and JPG

Date	Internal Temperature (°C)	External Temperature (°C)
09/11/2023 13:45:28	25.72519	65535
09/11/2023 13:45:29	25.72519	65535
09/11/2023 13:45:30	25.66545	65535
09/11/2023 13:45:32	25.67488	65535
09/11/2023 13:45:42	25.6686	65535
09/11/2023 13:45:51	25.66545	65535
09/11/2023 13:46:01	25.6623	65535
09/11/2023 13:46:11	25.65917	65535
09/11/2023 13:46:21	25.65603	65535
09/11/2023 13:46:31	25.64974	65535
09/11/2023 13:46:41	25.64346	65535
09/11/2023 13:46:51	25.63404	65535
09/11/2023 13:47:01	25.62462	65535
09/11/2023 13:47:11	25.61306	65535
09/11/2023 13:47:21	25.60578	65535
09/11/2023 13:47:31	25.59637	65535

Figure 21 – Table for Export in PDF, XLSX and CSV

Settings

In the web interface of the Universal IoT Gateway, on the Settings tab (Figure 29), it is possible to configure various equipment parameters according to the user's needs.

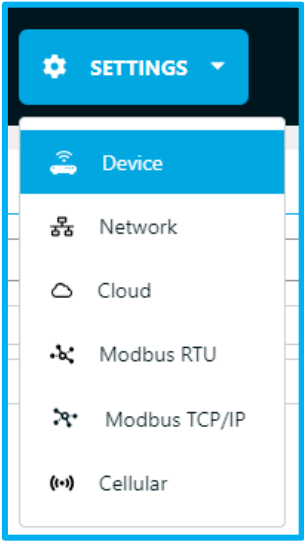


Figure 29 - Menu of Settings tab

Device

The device settings page is divided into three sections, as can be seen in Figure 30:

1. **Device Settings:** Display of Universal IoT Gateway settings, including version, serial number, country, and device name.
2. **Date and Time Settings:** Configuration of the device's date and time, either manually or based on the NTP protocol. In the case of the latter, the field to edit the server only appears when the checkbox is active, as shown in Figure 30 and Figure 31, allowing the user to test if the entered server is correct before saving the changes.
3. **RF Settings:** Verification of the Part Number and editing of the channel and Wireless Network ID for transmitter communication configuration.

The screenshot shows the 'Device Settings' page of the Universal IoT Gateway. The page has a dark blue header with the 'tekwin' logo and navigation tabs: DATASOURCES, ANALYSIS, and SETTINGS (active). The main content area is divided into three sections: 'Device settings', 'Date and Time settings', and 'RF settings'. Each section has a 'SAVE' button. The 'Device settings' section includes fields for Host Name (UGateway), Country (Portugal), Memory Version (0), Interface Version (0.1.0), Firmware Version (1.0.0), Hardware Version (0.1), and Serial Number (13042017). The 'Date and Time settings' section includes Device Date (07/09/2023 18:05:36), Time Zone (Europe/Lisbon), and a checkbox for 'Sync with NTP Server' which is checked. The 'RF settings' section includes RF Part Number (RC1160HP-TM), Wireless Network ID (300803), and Channel (13). At the bottom, there are buttons for 'General's default', 'Device's update', 'Factory', and 'Module's activation'.

Figure 30 – Device Settings page

This screenshot shows the 'Date and Time settings' section with the 'Sync with NTP Server' checkbox disabled. The fields show Device Date as 14/09/2023 09:28:18 and Time Zone as Europe/Lisbon. The 'Save' button is at the bottom right.

Figure 31 – NTP Checkbox disable

This screenshot shows the 'Date and Time settings' section with the 'Sync with NTP Server' checkbox enabled. The fields show Device Date as 14/09/2023 17:45:02 and Time Zone as Europe/Lisbon. The 'Save' button is at the bottom right.

Figure 32 – NTP Checkbox enable

System update

At the end of this configuration page (Figure 30), there are four buttons as shown in Figure 33, each corresponding to an update action.

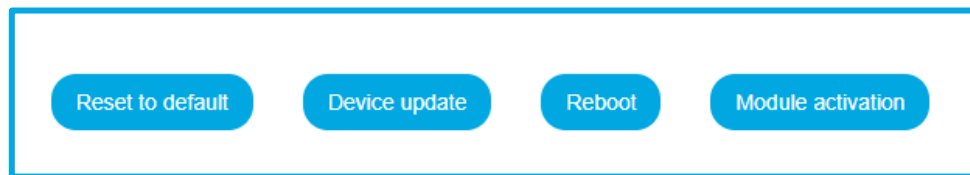


Figure 22 - Actions available

Reset to Default

In the first button (from left to right, "Reset to default"), you can reset the device, restoring it to factory settings. Clicking on this button will bring up an informative window in the center of the page, as shown in Figure 34.

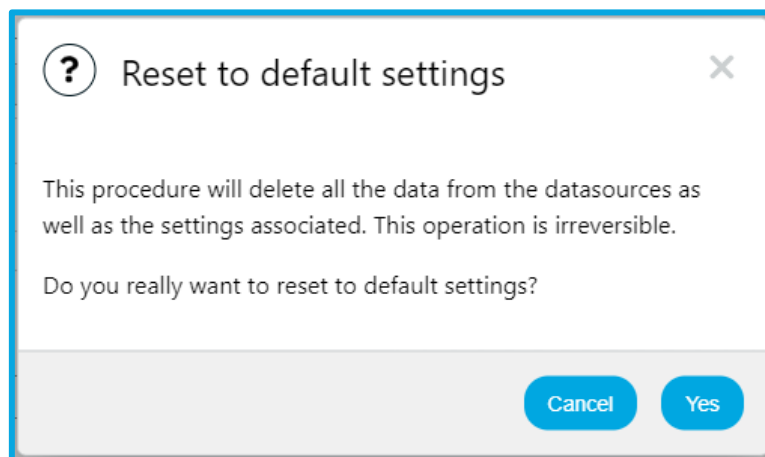


Figure 23 - Settings reset confirmation

When clicking "Yes" to proceed with the reset, the user will be redirected to a page similar to the one seen below, where they will have to wait until the device finishes making the necessary changes and the subsequent reboot. Once the reboot is complete, the user will be automatically redirected to the login page.

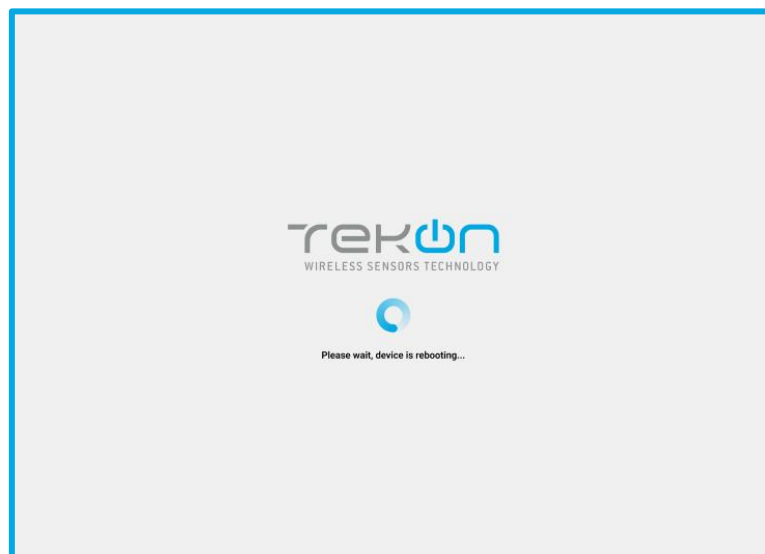


Figure 35 - Universal IoT Gateway startup screen

Device Update

The second button (from left to right, "Device update") allows for remote firmware and software updates when a new version is released. Pressing this button brings up a new window for the user to upload a raucb file and initiate the update, as shown in Figure 36. During this process, the user is provided with progress information, as can be seen in Figure 37 and Figure 38.

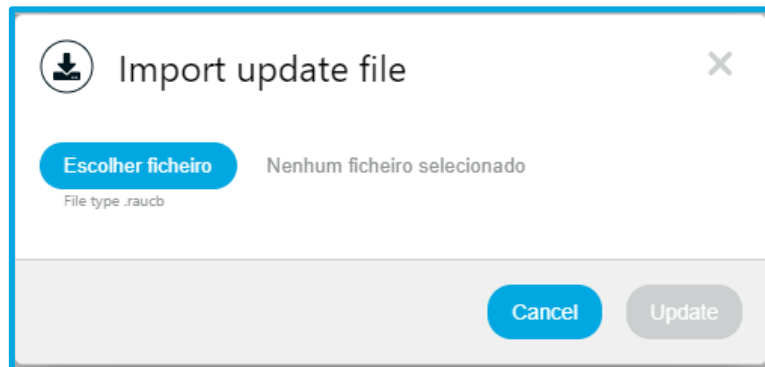


Figure 24 - Select file to update

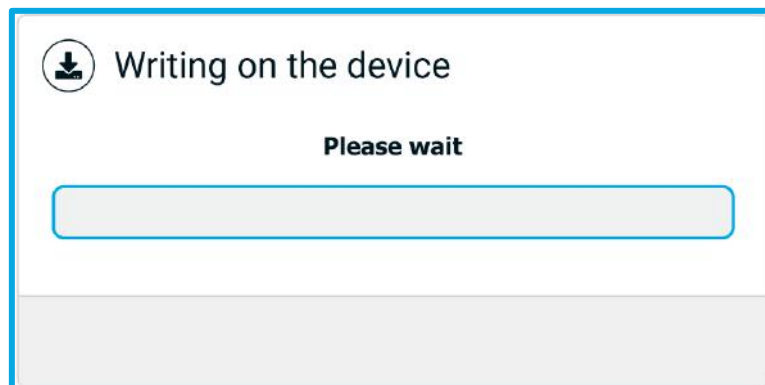


Figure 37 – Update status

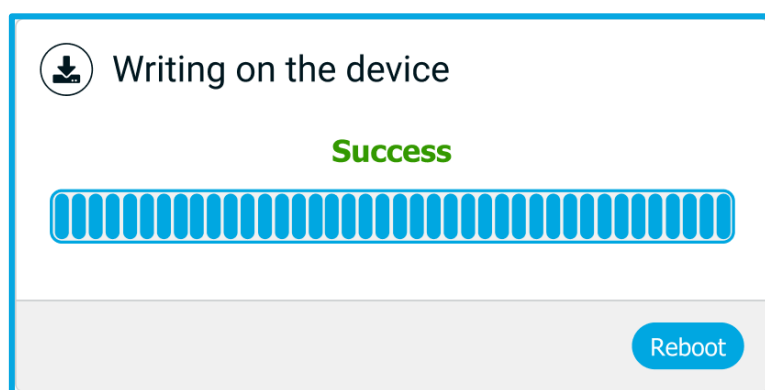


Figure 38 – Update finished

To complete the device update, a reboot is required, and for this, the user should select the button labeled "Reboot," as shown in Figure 38. As previously mentioned, you will need to wait for the system to restart and then log in again.

Reboot

By clicking on the "Reboot" button, the device will be rebooted, the user will be redirected to a page where they must wait for the system to restart where they will be asked to log in again.

Module Activation

Finally, there is the "Module Activation" button, which allows the user to activate various advanced modules that have been previously purchased. When a module is purchased, credentials are provided that must be entered to activate it. Clicking on the "Module Activation" button will bring up a window, as shown below in Figure 38, where you should enter the provided credentials, test them, and if they are valid, save them.

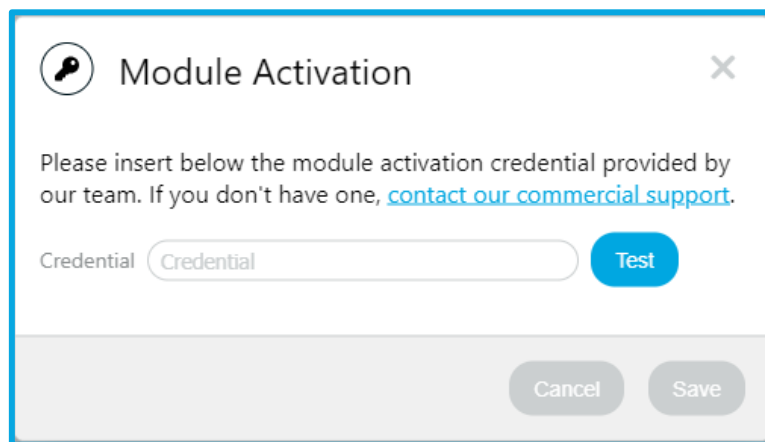
A screenshot of a "Module Activation" dialog box. The dialog has a title bar with a key icon and the text "Module Activation". Below the title bar, there is a message: "Please insert below the module activation credential provided by our team. If you don't have one, [contact our commercial support](#)." Below this message is a text input field labeled "Credential" with the placeholder text "Credential". To the right of the input field is a blue "Test" button. At the bottom of the dialog are two buttons: "Cancel" and "Save".

Figure 25 – Key for module activation

After recording, a success or failure message will appear in the still open window. If the message is unsuccessful and the credentials are valid, please contact our team. If successful, you can close the window or activate another module if you wish.

At the end of activation, to ensure the correct functioning of all modules, the equipment must be rebooted.

Network

It is also possible to customize several sectors of the Universal IoT Gateway network within which:

1. Ethernet 0 Settings
2. Wi-Fi Settings
3. DNS Settings
4. HTTP Proxy Settings

As with the configuration, the checkbox generates additional fields as needed or locks others, allowing for a more secure setup, as shown in Figure 40 to Figure 48.

Network

Ethernet 0 Settings

DHCP ☒

IP Address: 192.168.0.135

Subnet Mask: 255.255.255.0

Gateway: 192.168.0.250

SAVE

Wi-Fi Settings

Access Point Mode ☒

SSID: 9864C79A_E3B333E7

Password: password

IP Address: 192.168.128.1

Subnet Mask: 255.255.255.0

Gateway: 192.168.128.1

SAVE

DNS Settings

DNS Server: ☐

SAVE

HTTP Proxy Settings

HTTP Server: ☐

HTTPS Server: ☐

SAVE

09/09/2023 15:06:43 © 2023 - Tekwin Electronics

Figure 40 – Network Settings page

Ethernet 0 Settings

DHCP ☐

IP Address: 192.168.0.135

Subnet Mask: 255.255.255.0

Gateway: 192.168.0.250

SAVE

Figure 41 – DHCP Checkbox inable

Ethernet 0 Settings

DHCP ☒

IP Address: 192.168.0.135

Subnet Mask: 255.255.255.0

Gateway: 192.168.0.250

SAVE

Figure 26 – DHCP Checkbox enable

Wi-Fi Settings

Access Point Mode ☒

SSID: Select channel...

Password: password

IP Address: 192.168.128.1

Subnet Mask: 255.255.255.0

Gateway: 192.168.128.1

SAVE

Figure 43 – Access Point Mode Checkbox enable

Wi-Fi Settings

Access Point Mode ☐

SSID: Select channel...

Password: password

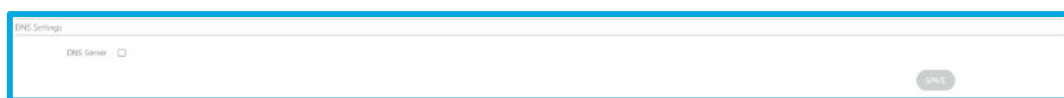
IP Address: 192.168.128.1

Subnet Mask: 255.255.255.0

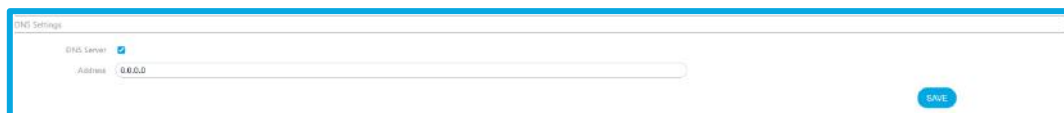
Gateway: 192.168.128.1

SAVE

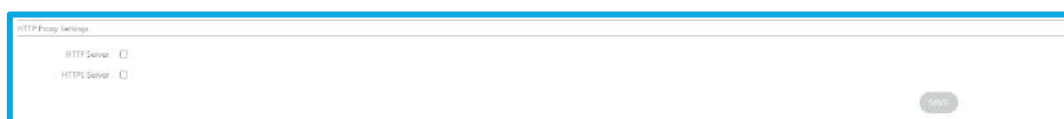
Figure 27 – Access Point Mode Checkbox disable



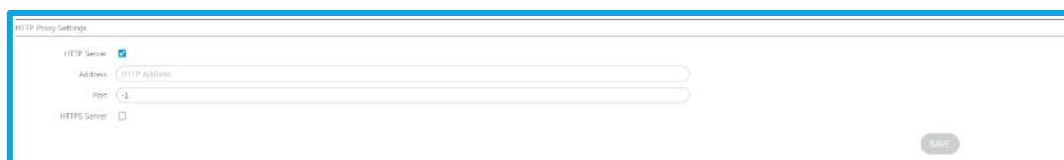
The screenshot shows the 'DNS Settings' page. At the top, there is a header 'DNS Settings'. Below it, there is a checkbox labeled 'DNS Server' which is unchecked. At the bottom right, there is a 'SAVE' button.

Figure 28 – DNS Checkbox disable

The screenshot shows the 'DNS Settings' page. At the top, there is a header 'DNS Settings'. Below it, there is a checkbox labeled 'DNS Server' which is checked. Below the checkbox, there is a text input field labeled 'Address' with the value '0.0.0.0'. At the bottom right, there is a 'SAVE' button.

Figure 29 – DNS Checkbox enable

The screenshot shows the 'HTTP Proxy Settings' page. At the top, there is a header 'HTTP Proxy Settings'. Below it, there are two checkboxes: 'HTTP Server' and 'HTTPS Server', both of which are unchecked. At the bottom right, there is a 'SAVE' button.

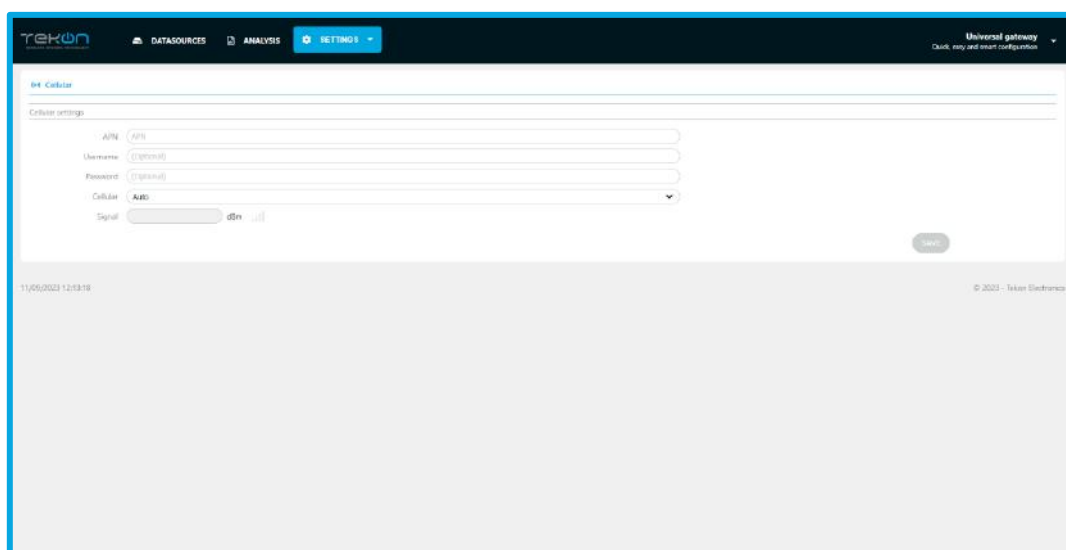
Figure 30 – HTTP Checkbox disable

The screenshot shows the 'HTTP Proxy Settings' page. At the top, there is a header 'HTTP Proxy Settings'. Below it, there are three checkboxes: 'HTTP Server' (checked), 'HTTP Address' (with a text input field), and 'HTTPS Server' (unchecked). At the bottom right, there is a 'SAVE' button.

Figure 31 – HTTP Checkbox enable

Cellular (optional)

This page allows you to configure the GSM 3G/4G module and also view the strength of the received signal.



The screenshot shows the 'Cellular Settings' page in the Tekwon Universal Gateway interface. The page has a dark blue header with the Tekwon logo and navigation tabs: 'DATASOURCES', 'ANALYSIS', and 'SETTINGS'. The 'SETTINGS' tab is selected. Below the header, there is a section titled 'Cellular settings'. It contains several input fields: 'APN' (with a dropdown menu), 'Username' (with a dropdown menu), 'Password' (with a dropdown menu), 'Cellular' (with a dropdown menu), and 'Signal' (with a dropdown menu). At the bottom right, there is a 'SAVE' button. The footer of the page shows the date '11/05/2023 12:53:18' and the copyright notice '© 2023 - Tekwon Electronics'.

Figure 49 – Cellular Settings page

Cloud

On the Cloud page, in the Settings tab, you are allowed to set up the **Universal IoT Gateway** to communicate with the **Tekon IoT Platform** or even third-party platforms. To do this, simply activate the checkbox and fill in the URL field for the desired platform and the corresponding API key, as shown in Figure 50 and Figure 51.

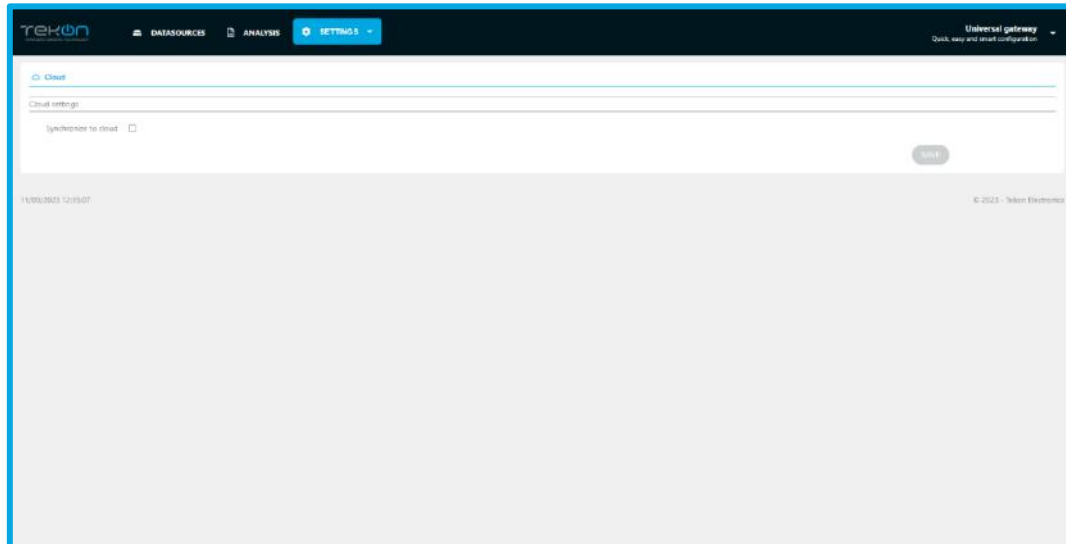


Figure 50 – Cloud Settings page

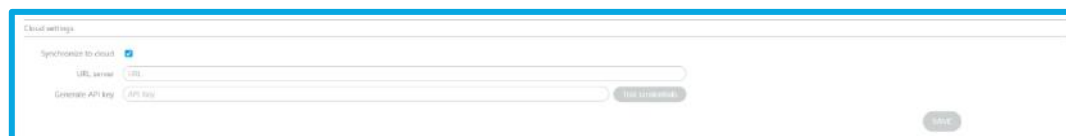


Figure 51 – Cloud Checkbox enable

Modbus RTU Slave & TCP/IP Server

The Modbus protocol is implemented in this version of **Universal IoT Gateway** only in Slave mode for Modbus RTU and in Server mode for Modbus TCP/IP.

For Modbus RTU it is possible to configure the baudrate, parity, stopbits and Slave ID, respectively for the DUOS and PLUS families.

Regarding Modbus TCP/IP, you can define whether DHCP is active or not and fill in the fields presented below (IP Address, Subnet Mask, and the DUOS and PLUS ports), as shown in Figure 52 to Figure 54.

The screenshot shows the 'SETTINGS' page of the Universal IoT Gateway. The 'AC Modbus' section is active, displaying two configuration panels. The top panel, 'RS485 - Modbus RTU Slave Settings', includes fields for Baudrate (19200), Stopbits (2), Parity (None), DUCS Slave ID (1), and PLUS Slave ID (2), with a 'SAVE' button. The bottom panel, 'Ethernet 1 - Modbus TCP/IP Slave Settings', includes a checked 'DHCP' checkbox, IP Address (192.168.100.1), Subnet Mask (255.255.255.0), DUCS Port (1502), and PLUS Port (1503), with a 'SAVE' button. The footer shows the date '15/06/2023 12:16:57' and copyright '© 2023 - Tekon Electronics'.

Figure 52 – Modbus Settings page

This close-up view of the 'RS485 - Modbus RTU Slave Settings' section shows the following configuration: Baudrate set to 19200, Stopbits set to 2, Parity set to None, DUCS Slave ID set to 1, and PLUS Slave ID set to 2. A 'SAVE' button is located at the bottom right of the section.

Figure 32 – Modbus RTU Settings

This close-up view of the 'Ethernet 1 - Modbus TCP/IP Slave Settings' section shows the following configuration: The 'DHCP' checkbox is checked, IP Address is 192.168.100.1, Subnet Mask is 255.255.255.0, DUCS Port is 1502, and PLUS Port is 1503. A 'SAVE' button is located at the bottom right of the section.

Figure 33 – Modbus TCP/IP Settings

Modbus RTU Master

If the **Universal IoT Gateway** has the Modbus RTU Master and TCP/IP *Client* pack unlocked, as shown in Figure 55, it is possible to add and configure *Slaves*, where the information will be stored as a *Generic Datasource* with the possibility of sending it to the Tekon IoT Platform.

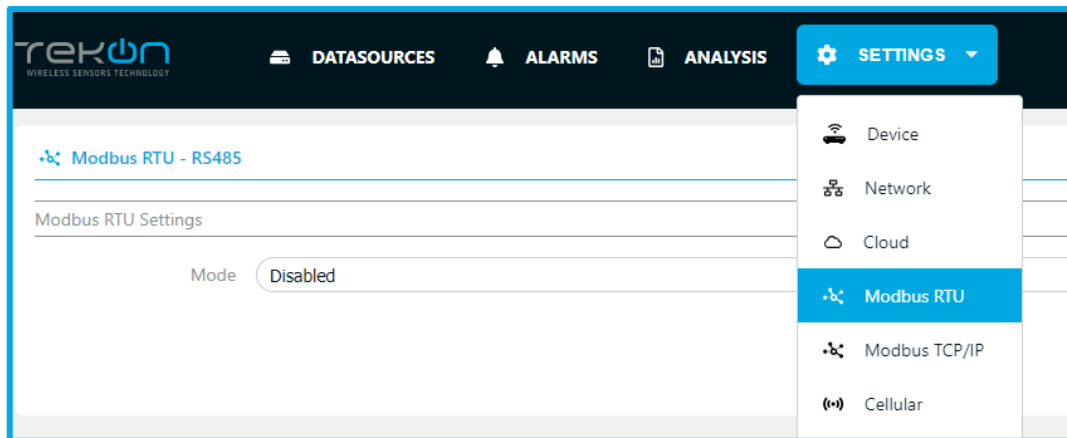


Figure 55 - Modbus RTU settings

Configuring the Universal IoT Gateway as a Modbus RTU Master begins by specifying the baud rate, parity, stop bits and timeout.

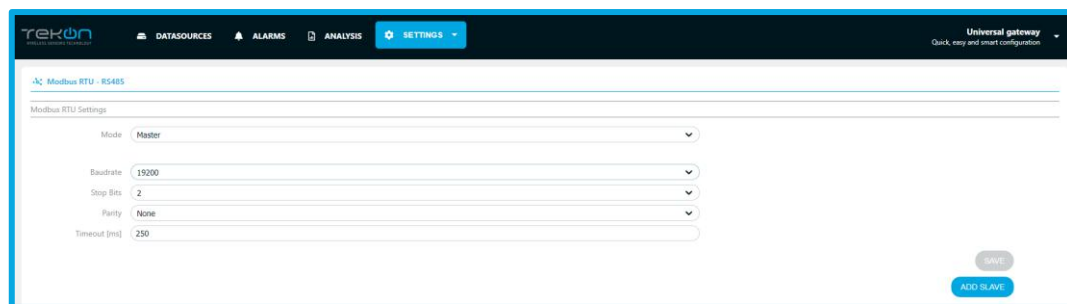


Figure 34 - Modbus RTU window

The next step will be to add the Modbus RTU Slave by defining the Slave ID and the frequency (in seconds) of reading data from the Slave (Scan Rate):

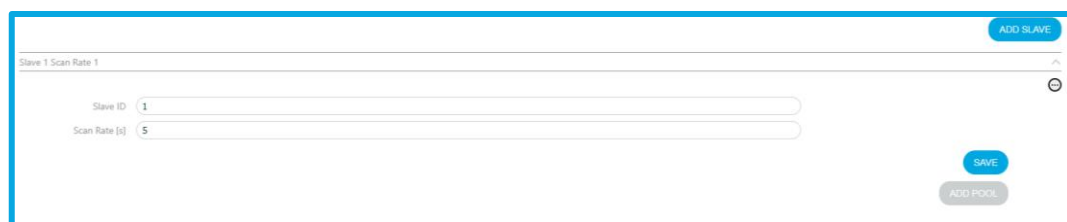


Figure 35 - Slave ID and communication period

Next, you must specify the request to be made to the *Slave* regarding the starting address of the Modbus register, the number of registers and the Modbus function as well as the register representation format and the grouping order of the registers, when applicable, and the name of the Modbus field that will correspond to the name of the variable in the created *datasource*.

When one of the three initial fields is changed, the table is updated by clicking APPLY.

Address	Format	Byte Order	Name	Value
0	UINT16	-----	Serial Number	-----
1	UINT32	ABCD	Device Model	-----
3	FLOAT	ABCD	External Temperature	-----
5	INT16	-----	Elapsed Time	-----
6	INT32	CDAB	Pulse Counter	-----
8	FLOAT	CDAB	Analog Input	-----

Figure 36 - Modbus RTU address

The READ button allows you to test the configuration defined in the previous steps. The Universal IoT Gateway initiates requests to the *Slave* after saving the configurations. Multiple requests with different parameters can be defined for each *Slave*, as shown in Figure 58.

Pool 1 Register Address 0 Quantity 10 Function 0x03

Pool 2 Register Address 0 Quantity 3 Function 0x01

Pool 3 Register Address 15 Quantity 4 Function 0x03

Figure 37 - Modbus RTU requests

Modbus TCP/IP Client

If the **Universal IoT Gateway** has the Modbus RTU Master and TCP/IP *Client* pack unlocked, it is possible to add and configure Servers, where the information will be stored as a *Generic Datasource* with the possibility of sending it to the Tekon IoT Platform, as shown in Figure 59.

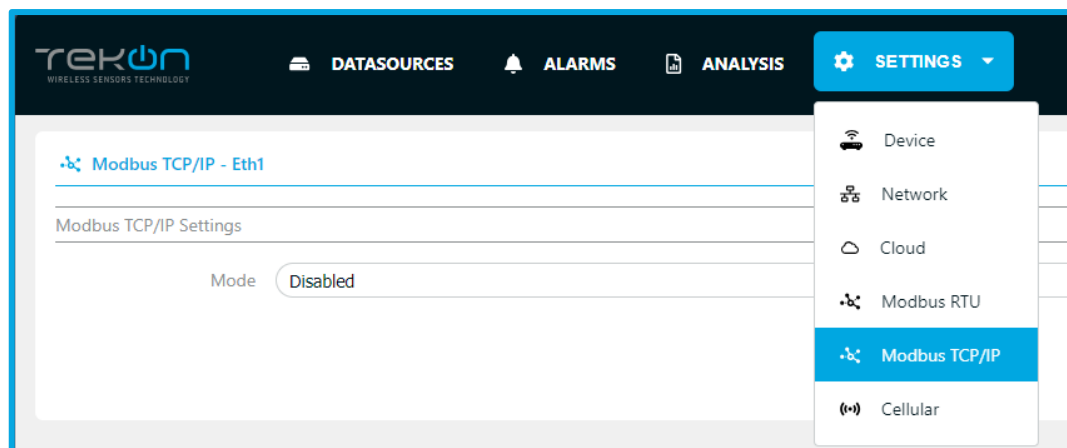


Figure 60 - Modbus TCP/IP settings

Configuring the Universal IoT Gateway as a Modbus TCP/IP Client begins by specifying the IP of the Eth1 Interface with a fixed IP or assignment via DHCP.

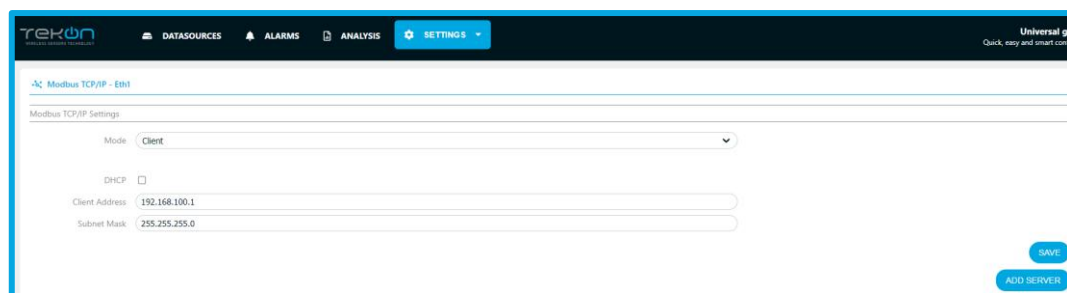


Figure 61 - Modbus TCP/IP window

The next step will be to add the Modbus RTU Server by defining the Slave Address, the port, the Unit ID, the frequency (in seconds) of reading data from the Server (Scan Rate) and the Response Timeout:



Figure 62 – Configurable settings

Next, you must specify the request to be made to the Server regarding the starting address of the Modbus register, the number of registers and the Modbus function as well as the register representation format and the grouping order of the registers, when applicable, and the name of the Modbus field that will correspond to the name of the variable in the created datasource.

When one of the three initial fields is changed, the table is updated by clicking APPLY.

Pool 1 Register Address 0 Quantity 20 Function 0x03

Register Address

0

Quantity

20

Modbus Function

0x03: Read Holding Registers

APPLY

Address	Format	Byte Order	Nome	Valor
0	INT32	CDAB	Número de série	-----
2	UINT16	-----	Modelo do Trans	-----
3	UINT16	-----	RSSI	-----
4	UINT16	-----	Período de com.	-----
5	UINT16	-----	Tempo decorrido	-----
6	UINT16	-----	Tensão de alim.	-----
7	FLOAT	CDAB	Data 0	-----
9	FLOAT	CDAB	Data 1	-----
11	FLOAT	CDAB	Data 2	-----
12	FLOAT	CDAB	Data 3	-----
15	FLOAT	CDAB	Data 4	-----
17	UINT16	-----	FW Major Minor	-----
18	UINT16	-----	Revisão FW	-----
19	UINT16	-----	HW Major Minor	-----

READ

SAVE

Figure 63 – Modbus address

The READ button allows you to test the configuration defined in the previous steps. The Universal IoT Gateway initiates requests to the Server after saving the configurations.

Several requests with different parameters can be defined for each Server.

Server 172.16.0.26 Port 1502 Unit ID 1 Scan Rate 20 Response Timeout 250

Server Address

172.16.0.26

Server Port

1502

Unit ID

1

Scan Rate [s]

20

Response Timeout [ms]

250

SAVE

ADD POOL

Pool 1 Register Address 0 Quantity 20 Function 0x03

Pool 2 Register Address 0 Quantity 5 Function 0x01

Figure 38 – Modbus validation

Alarms and Notifications

If the **Universal IoT Gateway** has the Alarms and Notifications Pack unlocked, you will see the ALARMS tab in the page header, and it is possible to configure value or inactivity alarms for any of the datasources, as well as send email or SMS notifications, as shown in Figure 64.

The screenshot shows the 'Alarms' configuration page in the Universal IoT Gateway interface. The page has a dark blue header with the 'tekon' logo and navigation tabs for 'DATASOURCES', 'ALARMS', 'ANALYSIS', and 'SETTINGS'. The 'ALARMS' tab is active. Below the header, the 'Alarms' section is titled, and the 'Alarm Configuration' form is displayed. The form includes the following fields: 'Alarm Type' (a dropdown menu with 'Select an alarm type'), 'Datasource' (a dropdown menu with 'Select a datasource'), 'Notification by Email' (a checkbox that is checked), 'Emails' (a text input field), 'Notification by SMS' (a checkbox that is unchecked), 'Schedule Days' (a row of seven buttons labeled S, M, T, W, T, F, S, S), and 'Period' (two time input fields: 'From 00:00' and 'To 23:59'). A blue 'CREATE' button is located at the bottom right of the form. A small note at the bottom of the form states: '* It is required to have at least one type of notification in use'.

Figure 39 – Alarms and notifications

Creating an alarm requires defining the Alarm Type (Value or Inactivity) and the datasource. For a value alarm, it is also necessary to define the variable, the comparison method, the value, the number of occurrences to trigger the alarm and specify the days of the week and the time at which the alarm is active.

The screenshot shows the 'Alarms' configuration page with the 'Alarm Configuration' form filled out. The form includes the following fields: 'Alarm Type' (Value), 'Category' (Warning), 'Datasource' (DUOS_1), 'Variable' (Internal Temperature), 'Comparison Method' (>), 'Value' (20), 'N° of Occurrences' (2), 'Notification by Email' (checked), 'Emails' (example@domainexample.com), 'Notification by SMS' (unchecked), 'Schedule Days' (S M T W T F S S), and 'Period' (From 08:00 To 19:00). A blue 'CREATE' button is located at the bottom right of the form. A small note at the bottom of the form states: '* It is required to have at least one type of notification in use'.

Figure 40 – Alarm Configuration

Configuring an alarm requires defining a method for sending notifications. By default, email sending is selected, and it is necessary to define the recipients of the alarm notifications. The sending of SMS can be configured, alternatively or additionally, and it is necessary to specify the contacts receiving the notifications.

Alarms

Alarm Configuration

Alarm Type

Inactivity

Category

Error

Datasource

DUOS_1

Inactivity Time (s)

30

Notification by Email

☐

Notification by SMS

☒ *

Phone Numbers

+351987654321;

Schedule Days

SMTWTFS All

Period

From 00:00 To 23:59

The selected days will have the same period

* It is required to have at least one type of notification in use

Figure 41 – Notifications Configuration

The configured alarms are presented in two lists, "Warnings list" and "Errors list." The "Warnings" list includes value alarms that have been defined, while the "Errors" list includes inactivity alarms, as shown in Figure 67.

Alarms

Alarm Configuration

Alarm Type

Select an alarm type

Datasource

Select a datasource

Notification by Email

☐ *

Emails

Notification by SMS

☐

Schedule Days

SMTWTFS All

Period

From 00:00 To 23:59

The selected days will have the same period

* It is required to have at least one type of notification in use

CREATE

Warnings List

Datasource	Description	Schedule	Notification	Actions
DUOS_1	Internal Temperature > 20	Monday, Tuesday, Wednesday, Thursday, Friday from 08:00 to 19:00	example@domainexample.com	<div></div>

Errors List

Datasource	Inactivity Time	Schedule	Notification	Actions
DUOS_1	30	Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday from 00:00 to 23:59	+351987654321	<div></div>

Figure 42 – Configured Alarms

The alarm notification email sent by the Universal IoT Gateway is exemplified in Figure 69:

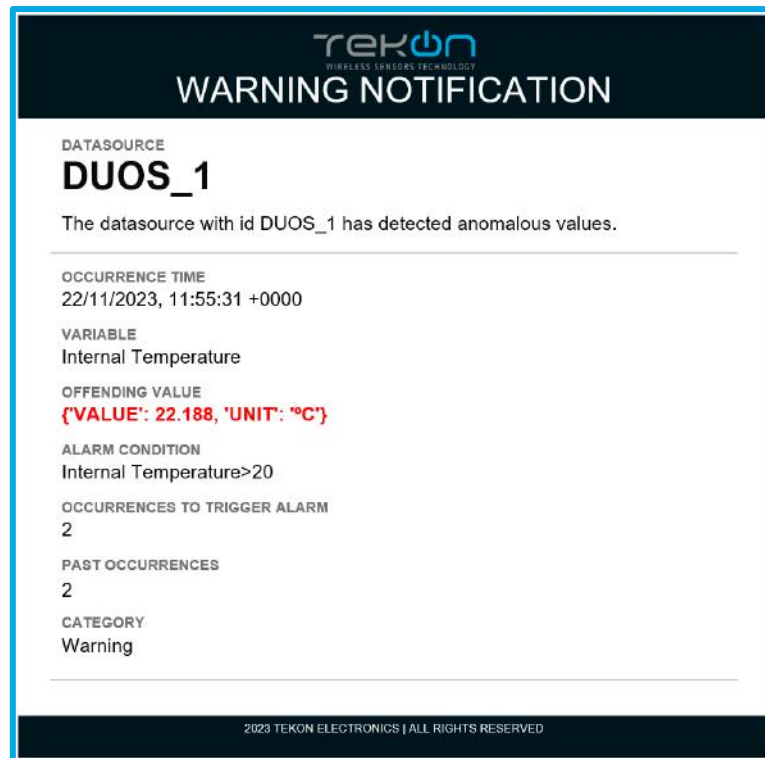


Figure 43 – Alarm Email

Integration with third-party platforms

MQTT

If the Universal IoT Gateway has the MQTT Pack unlocked, it is possible to access the MQTT Broker and subscribe to data topics from the datasources.

MQTT Broker starts together with the equipment, there is no need for manual activation.

The data available in the various MQTT Broker topics are data from PLUS and DUOS transmitters and Modbus RTU Slave or TCP/IP Server equipment designated with GENERIC Datasource.

Note: Modbus Master/Client functionality is optional.

The MQTT Broker access credentials 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

Subscription Examples MQTT Topics:

1. datasources/#
2. datasources/plus/#
3. datasources/plus/2
4. datasources/duos/#
5. datasources/duos/3
6. datasources/generic/#
7. datasources/generic/6
8. datasources/generic/192.168.1.123

Node-RED

To access the Node-RED interface, open the web browser and enter the IP address of the equipment followed by port 1880:

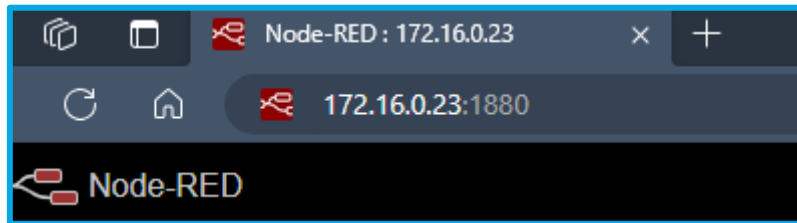


Figure 70 - Node-Red access

Access to MQTT Broker via Node-RED:

1. Add the mqtt in node to Flow and configure the node with the values and parameters of the figures and click Add:
 - a. Server: *localhost*
 - b. Port: *1883*
 - c. Username: *node_red*
 - d. Password: *node_red*
 - e. Topic: *datasources/#*
2. Click on Done;
3. Add the Debug node and connect the nodes to each other;
4. Click on *Deploy*;
5. After a few seconds, with a DUOS transmitter communicating with the Gateway, you will begin to receive the data.

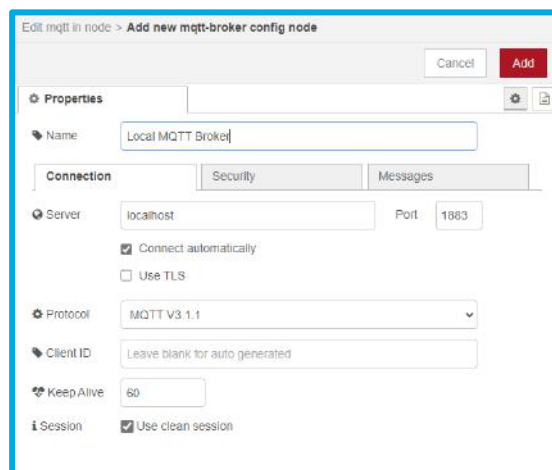
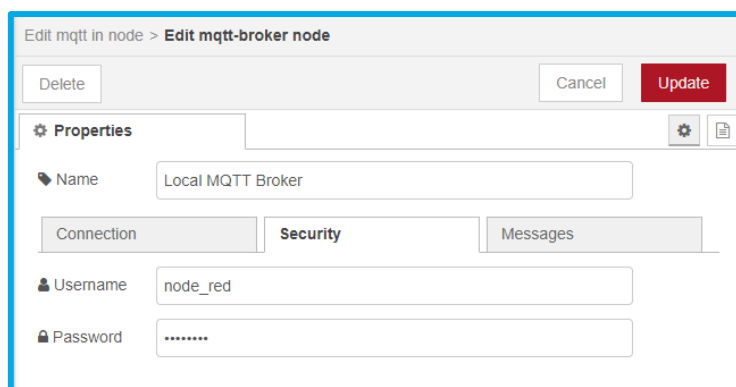
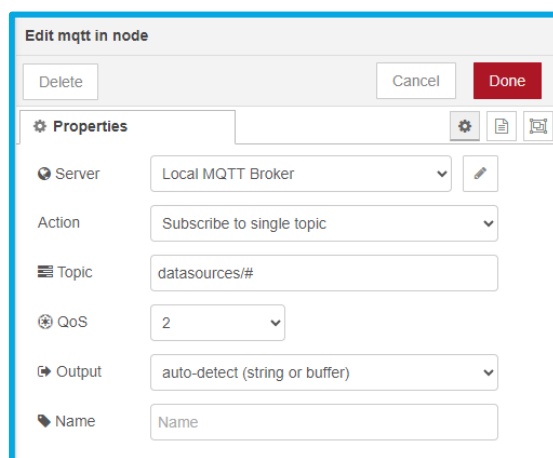


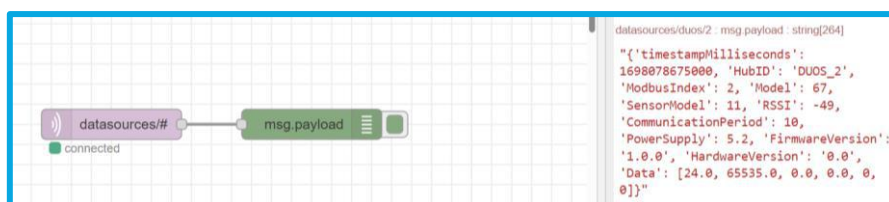
Figure 44 - MQTT server configurations



The image shows a dialog box titled "Edit mqtt in node > Edit mqtt-broker node". It has three buttons at the top: "Delete", "Cancel", and "Update". Below the buttons is a "Properties" section with a gear icon and a document icon. The "Name" field is set to "Local MQTT Broker". There are three tabs: "Connection", "Security", and "Messages". The "Security" tab is selected, showing "Username" as "node_red" and "Password" as "*****".

Figure 45 - MQTT server configurations

The image shows a dialog box titled "Edit mqtt in node". It has three buttons at the top: "Delete", "Cancel", and "Done". Below the buttons is a "Properties" section with a gear icon, a document icon, and a list icon. The "Server" field is set to "Local MQTT Broker" with a dropdown arrow and an edit icon. The "Action" field is set to "Subscribe to single topic" with a dropdown arrow. The "Topic" field is set to "datasources/#". The "QoS" field is set to "2" with a dropdown arrow. The "Output" field is set to "auto-detect (string or buffer)" with a dropdown arrow. The "Name" field is set to "Name".

Figure 46 - MQTT node configurations*Figure 47 – Flux and debug message*

Display

The display present on the Universal IoT Gateway is used to display information about various functions and connections made possible by the hardware and software. Every 5 seconds a new information window is displayed.


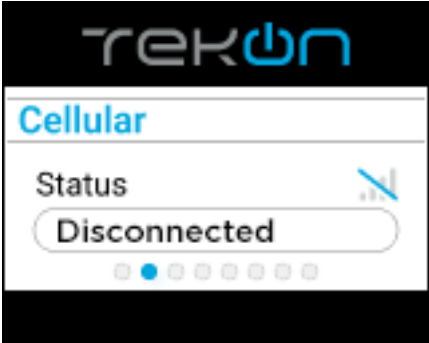
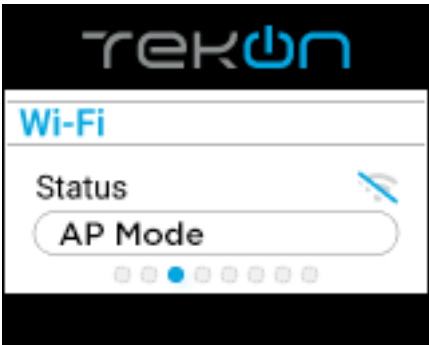
Display	Description	Possible Values
	IP address of ethernet 0 port	IP address created by the network
	Information about 3G / 4G communication	<ol style="list-style-type: none"> 1. Unavailable (is not available on this model) 2. Disconnected 3. 3G/4G 4. Signal strength
	Connection status to the gateway via Wi-Fi	<ol style="list-style-type: none"> 1. Disconnected 2. Connected (cliente mode) 3. AP Mode (connected by AP mode) 4. Signal strength

Figure 48 – Information about Ethernet 0 port

Figure 49 – Information about cellular connection

Figure 77 - Information about Wi-Fi connection



Figure 50 - IP address connecting to Wi-Fi

IP address of the Wi-Fi connection. Using this IP it is possible to access the equipment's web interface.

IP address created by the network

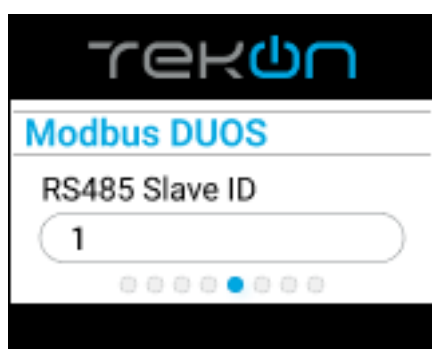


Figure 51 - Information about the slave of DUOS equipment

Slave address for connecting to DUOS devices

1. Default: 1 (configurable)
2. Disabled (Modbus RTU on Master mode)

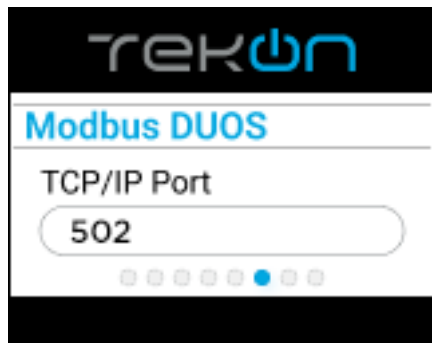


Figure 52 - Information about the port of DUOS equipment

Access port for DUOS devices

1. Default: 502 (configurable)
2. Disabled (Modbus TCP/IP on Client mode)

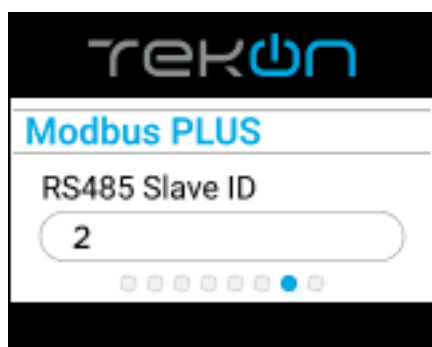
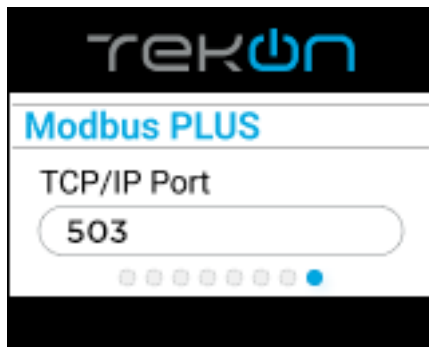


Figure 53 - Information about the PLUS equipment slave

Slave address for connecting to PLUS devices

1. Default: 2 (configurable)
2. Disabled (Modbus RTU on Master mode)



Access port for PLUS devices

1. Default: 503 (configurable)
2. Disabled (Modbus TCP/IP on Client mode)

Figure 54 - Information about the PLUS equipment port