Tekon
WIRELESS SENSORS TECHNOLOGY

**DUOS
IOT
GATEWAY**

**PRODUCT
MANUAL**

UM_DUOS_GAT_IOT_E01A

Index of contents

Index of figures

Index of tables

Informations

This document provides, in detail, all the information about the Duos IoT Gateway. The installation and configuration for the primary application of the product are described in the document "Installation Guide - DUOS" that follows with this product or can be accessed on our website. Tekon Electronics recommends reading this manual before starting any type of configuration or installation of the product.

Legal Notice

Any part of this document may be reproduced in any way without the permission of the owner. The contents of this document are subject to change without notice, due to continued progress in methodology, design, manufacture or necessary corrections. Tekon Electronics is not responsible for any error or damage resulting from any misuse of this document and / or by third parties.

NOTE: This equipment is not entitled to protection against harmful interference and must not cause interference in duly authorized systems.

If you would like more information about the products of Tekon Electronics, contact us or contact an official representative closest to your location. To find the location of our official representatives, check our website, through the link
https://www.tekonelectronics.com/en/contacts/local-distributors/

Technical Support

https://www.tekonelectronics.com/en/support/

Mobile Phone
+351 933 033 206

Email
support@tekonelectronics.com

Skype
support@tekonelectronics.com

Whatsapp
+351 933 033 206

1. Introduction

1.1.   Overview

The Duos IoT Gateway was developed to enable the communication of the transmitters of the DUOS wireless product family with several IoT platforms on the market, through integration with REST API. As an IoT device developed by Tekon Electronics, the Duos IoT Gateway has a native integration with the Tekon IoT Platform.

The gateway uses the Modbus TCP / IP and Ethernet communication protocols for sending and receiving data to clouds and the Modbus RTU protocol for communications on local networks.

1.2.   Accessories / information material included

Along with the Duos IoT Gateway, follow the following materials:

Accessories:

Ethernet cable;

External antenna;

RS-485 converter cable (optional buy);

Mounting and fixing accessory (optional buy);

Technical documents:

Datasheet;

Product manual;

1.3.   Symbology

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

	If the device becomes unnecessary and unused, please do not dispose of it in traditional trash. Place the device in an appropriate waste bin.

	Use a QR code reader to access information about the Duos IoT Gateway.

1.4 Product references

Reference	Name
PA160410220	DUOS WIRELESS GATEWAY 868MHZ IoT
PA160410240	DUOS WIRELESS GATEWAY 868MHZ IoT WH
PA160410260	DUOS WIRELESS GATEWAY 915MHZ IoT
PA160410280	DUOS WIRELESS GATEWAY 915MHZ IoT WH

2. Product

This topic describes the technical and physical features of DUOS IoT Gateway.

2.1.   Technical specifications

Radio Specifications	868 MHz	915 MHz
Range	Up to 4 Km LoS	
Minimum communication distance	3 m @ 27 dBm (500mW)	
Radio transmit power	0 to 27 dBm	8 to 27 dBm
Radio receiver sensitivity	-97 to -110 dBm	
Frequency band	868,05 to 869,95 MHz	902,5 to 927,0 MHz
Wireless channels	16	50
Radio transmission rate	1,2 to 76,8 kbit/s	
Modulation	GFSK	
Encryption method	AES 128 (Advanced Encryption Standard)	

Wireless network	
Maximum transmitters	55
Maximum hops	13

Antenna	868 MHz	915 MHz
Range	¼ λ dipole with SMA connector, 50 Ohms and + 3 dBi gain	

Power Supply
External power supply with 12V DC ± 5%
Maximum current draw of 250 mA

Serial communication (RS-485)	
Protocol	Modbus RTU (Slave)
Interface	RS-485
Baudrates	4,8 kbps to 115,2 kbps
Data format	8 data bits, no parity/even/odd, 1/2 stop bit
Available modbus addresses	1 to 247

Ethernet communication port	
Interface	Porta Ethernet (RJ45)
Speed	100Mbps
IP address	Dynamic (provided by network DHCP server) or Static (default) IP
Protocol	Modbus TCP/IP (Server/Slave)
Modbus TCP/IP port	1502
Proxy	Configurable

IoT connectivity
Integration with Tekon IoT Platform
REST API

Casing	
Dimensions	142 x 73 x 34,5 mm
Weight	100 g
Material	ABS UL94HB/Silicone
Protection index	IP40

Operating environment
–10 °C to 60 °C
95% maximum relative humidity (non-condensing)

Factory default settings	868 MHz	915 MHz
Frequency	869,525 MHz	915,000 MHz
Radio transmit power	27 dBm	
Radio transmission rate	76,8 kbit/s	
Wireless channel	13	26
Wireless network ID	Serial number	
Wireless device ID	Serial number	
Configuration time window at startup	10 seconds	
Serial Communication	RS-485 / Modbus	
Modbus Address	1	
Baudrate |Bits|Parity |Stop Bits	115200|8|None|2	
Baudrate (config)|Bits|Parity|Stop Bits	19200|8|None|2	
Fixed Ethernet IP	192.168.100.1	
Proxy	None	
NTP server	pt.pool.ntp.org	
WiFi access point		
IP	192.168.128.1	
Login	admin	
Password	admin	
SSID	WGW4IOT_<SerialNumber>	
DHCP	Enabled	

2.2.   Technical Drawings

The Duos IoT Gateway has a compact format compared to the identical category products on the market.
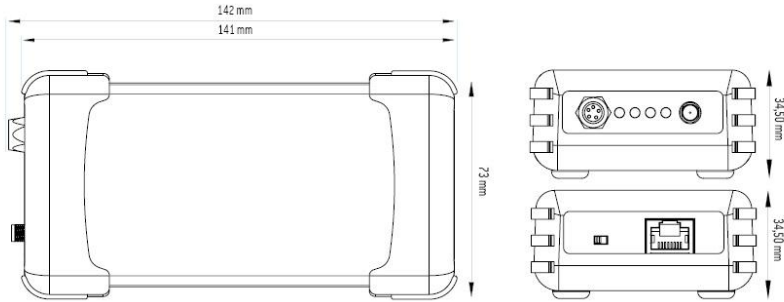
Figure 1 - Technical dimensions of Duos IoT Gateway

2.3.   Connections

The physical inputs on the product are located at each end.
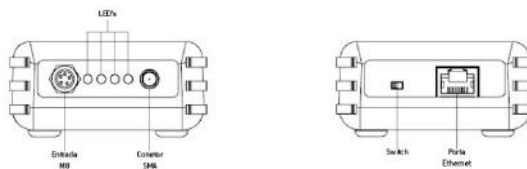
Figure 2 - Physical inputs and interfaces of Duos IoT Gateway

2.4.   LED Indicators

The DUOS IoT Gateway has a set of LEDs that represent the different behaviors that the device is subject to. The attached table shows the list of each LED, listed from left to right of the technical drawing.

LED	Description
Green LED	Data reception via radio or wireless
Red LED	Data transmission via radio
Blue LED	General status of operations
Red LED	RS485 port communications

Table 1 - LED's colour and description

2.5.   Label

The DUOS IoT Gateway is identified with a label that contains information characteristic of the product and necessary for identification and configuration purposes:

- Tekon name and website;

- Tekon's internal product reference;

- Internal device designation;

- Network ID previously configured on the device;

- Wireless channel configured;

- Certification and safety symbols;

- Business group name and address;

Figure 3 - Example of a label pasted on Duos IoT Gateway

2.6   Web interface features

Web-based administration

The gateway services and the transmitters network can be quickly configured through a web-based service.

Role-based access control

Access to the web-based service is restricted only to registered users. The security policy is based on the authentication mechanism through the username and password with a function permission scheme that sets the level of access to certain resources and the authorization to perform certain operations.

Modbus *slave-server*

Support for Modbus RTU protocol (through RS-485 port) and TCP (Ethernet port). The gateway exposes a Modbus slave (RS485) or Modbus server (TCP / IP) providing all the information of the transmitters connected in a map of holding registers.

Integration with cloud service providers

The DUOS IoT Gateway is incorporated in the Internet of Things, connecting to an application running in the cloud through an IoT platform. Native integration with Tekon IoT Platform. It can be integrated into other external platforms through the REST API interface.

Event-driven, scalable, distributed architecture

Inter-communication between the internal services of the gateway is achieved through a distributed architecture and controlled by events. Messages delivered to multiple recipients at once are carried accross the TCP protocol, which allows applications outside the gateway's network to have access.

3. Updates

Firmware and web interface updates for the Duos IoT Gateway are reserved exclusively for Tekon Electronics. In case of a severe error, contact technical support to assess the problem with your device.

4. Initial configuration

4.1. System requirements

The right use of DUOS IoT Gateway is relying on a set of requirements that must be guaranteed.

4.2. Wireless network

The dedicated wireless network created by the DUOS 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 to the gateway interface by accessing IP address 192.168.128.1. If you are using mobile devices, make sure you have your mobile data turned off.

More information on how to perform these steps can be found in the **DUOS Installation Guide**, in topic 5, available for consultation on the Tekon Electronics website.

5. Web interface

The DUOS IoT Gateway web interface is a tool that provides a graphical interface for the user to access the main features of the device in a convenient way. Their use is different depending on the level of user permissions.

Figure 4 - Duos IoT Gateway web interface login page

Permissions

The access to the platform is restricted to registered users. Users are identified as being administrators or regular users. The permissions associated with the user type limit the action within the tool. The following table shows the limitations for the type of user.

Feature	Permission / Role	Regular user	Administrator
Sensor Network	Sensor Hub: access sensor hubs list	x	x
	Sensor Hub: order sensor hub list	x	x
	Sensor Hub: filter sensor hub list	x	x
Sensor Hub	Measurements: access measurements tab	x	x
	Measurements: apply the default filter	x	x
	Measurements: filter by date and time	x	x
	Measurements: filter by sensor type	x	x
	Measurements: visualize in real-time	x	x
	Properties: access properties tab	x	x
	Properties: update name		x
	Properties: update communication period		x
	Properties: update status		x
	Properties: update description		x
	Properties: forward sensor measurements to the Cloud		x

	Properties: delete sensor hub		x
	Modbus: access the Modbus tab	x	x
Settings	Communication module: access communication module tab	x	x
	Communication module: update baudrate		x
	Communication module: update description		x
	Communication module: update slave id		x
	Communication module: update parity, data bits and stop bits		x
	Users: access user tab	x	x
	Users: update existing user details	x	x
	Users: add new user		x
	Users: delete existing user		x
	Data Import/Export: access data import/export tab	x	x
	Data Import/Export: export sensor measurements	x	x
	Data Import/Export: export sensor measurements for a specific timeframe or sensor hub	x	x
	Data Import/Export: import data base structure		x
	Data Import/Export: export database structure		x
	Network: access network tab	x	x
	Network: know which IP network interfaces are active	x	x
	Network: configure and test ntp server		x
	Network: configure proxy server		x
	Cloud Service: access the Cloud Service tab	x	x
	Cloud Service: access the Cloud Service Provider configuration		x
	Cloud Service: update Cloud Service Provider details		x
	Cloud Service: validate authentication credentials		x
	Cloud Service: update status		x
	Monit: access Monit tab	x	x
	System: access system tab		x
	System: update hostname		x
	System: update time zone		x
	System: reboot the system		x
	System: shut down the system		x
	System: reset to factory default settings		x

Table 2 - Permissions for each type of user

Home

The **Home** page is the home page presented to the user after logging in. The page information is divided into two blocks. The list of sensors that are connected to the gateway and its status and an overview of the system status.
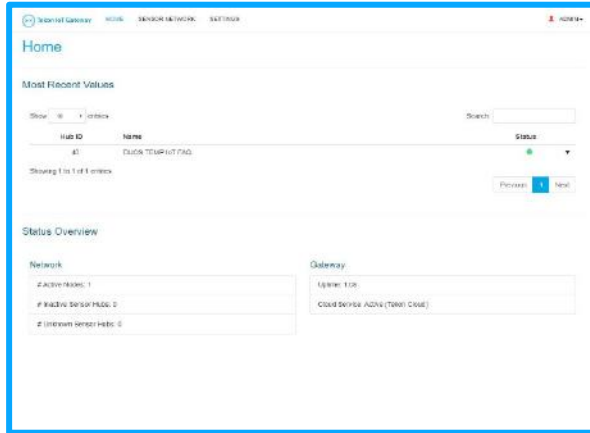
Figure 5 - Web interface home

Most Recent Values

At the top of the page, we have the *Most Recent Values* table that includes the hub registers grouped with the DUOS IoT Gateway, at the time of configuration. Each row in this table matchs to a hub. Each row contains the following fields about the hubs:

Fields	Description
Hub Id	Number that identifies the hub
Name	Hub name
Status	Hub status

Table 3 - Hub listing fields

On the right side of each record, there is an arrow ▼ that allows access to the details of the records of the hub.

Figure 6 - Detailed information on hub registers

Status Overview

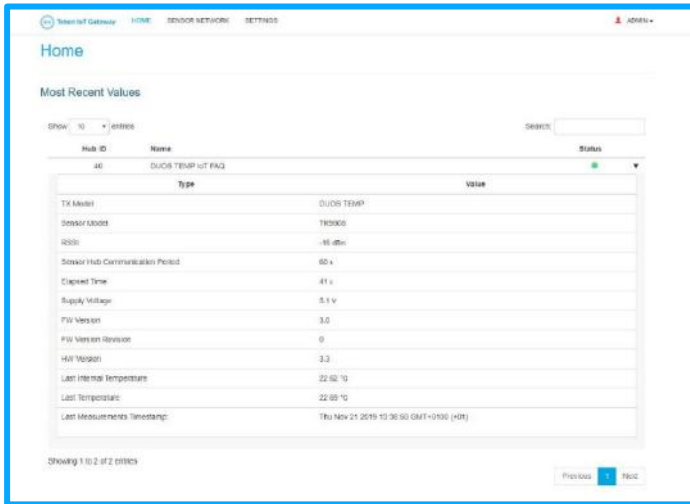At the bottom of the page, there is an overview of the network status, which provides a brief description of the network and gateway status.

Figure 7 - Network and gateway overview

Sensor Network

The network is featured by transmitters associated with the DUOS IoT Gateway. This page lists all transmitters on the network. The listing is organized by various terminal parameters.
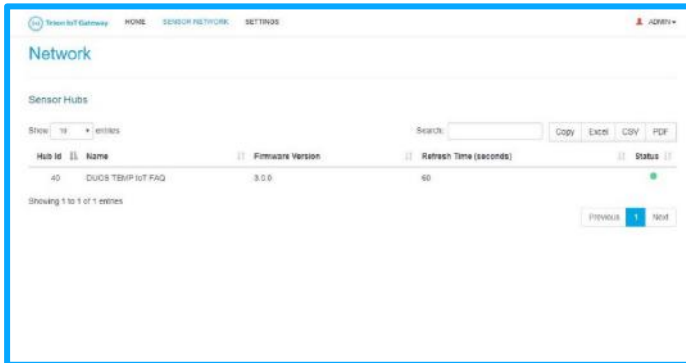

Figure 8 - Network of sensors associated with the Duos IoT Gateway

Fields	Description
Hub Id	Number that identifies the hub
Name	Name assigned to the hub
Firmware Version	Firmware version loaded on the hardware
Refresh Time (seconds)	Update time of registers in seconds
Status	Hub status

Table 4 - Network hubs listing

The list of associated sensors can be copied or exported. The *Copy*, *Excel*, *CSV* and *PDF* buttons exemplify the options available.

The user can access the individual information of each transmitter. When you click on the listed register, you automatically access the device's detail page. Depending on the permissions, the information can be consulted and edited. The *Measurements* tab displays measurements taken by the sensor. The *Properties* tab contains all the properties and allows you to configure them. Finally, the *Modbus* tab shows the table with all the information from the modbus registers.
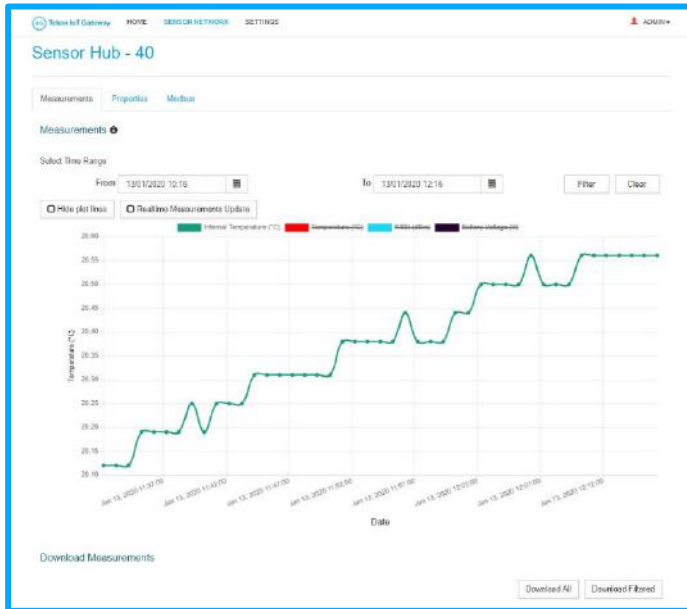
Figure 9 - Graph with the latest registers of the hub

Measurements

The graph on this page shows the transmitter registers that are being received by the gateway. The available filters restrict the user's window of interest and select the variables to be displayed.

NOTE: the graph shows the latest registers. Whenever a new value appears, the oldest is removed from the graph.

Filters
1.1 Default filter

The default filter displays all measurements from the last two hours received by the gateway, from this particular hub. To apply the default filter, click on the **Clear** button at the top of the graph.

1.2 Filter by date and time

The date and time filter allows the display of registers that are between the agreed time intervals.

How to apply the filter with start date until actual time

1. In the **From** filed, click on the icon 📅 to open the calendar window;
2. Select the day, month and year for the start date;
3. Within the calendar window, click on the clock icon 🕐 to open the time selection window. This step is optional. When the time is not selected, the selection is made automatically according to the current local time.
4. Select the hours and minutes;
5. Clean the information in the **To** field and click on *Filter*.

How to apply the filter with a time interval

1. In the **From** filed, click on the icon 📅 to open the calendar window;
2. Select the day, month and year for the start date;
3. Within the calendar window, click on the clock icon 🕐 to open the time selection window. This step is optional. When the time is not selected, the selection is made automatically according to the current local time.
4. Select the hours and minutes;
5. In the **To** field, click on the icon 📅 to open the calendar window;
6. Replicate steps 2 to 4;
7. Click on *Filter*.

1.3 Filter by sensor type

At the top of the measurements graph, click on the sensor type label (Internal Temperature, Temperature, RSSI, Battery Voltage, etc.) to enable or disable the visibility of the data in the graph. When the tag is crossed out (for example, ~~RSSI~~), this parcel is hidden.

Figure 10 - Options to filter data in the chart

Viewing options

2.1 See graphic lines

Set from the beginning, the values are displayed on the graph through points that are positioned according to the value and date of registration. To hide the line drawn through the points, click the ***Hide plot lines*** button at the top of the graph.
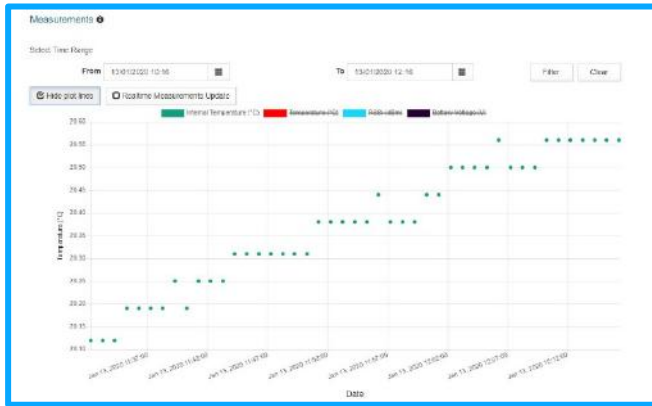
Figure 11 - Hub chart with hidden lines

2.2 Enable real-time measurements updates

In addition to viewing the measurement history, you can view the measurement log in real time. Click on *Realtime Measurements Update* button, located at the top of the graph. When you activate this option, the **From** and **To** fields are empty since the records are appearing in real time.
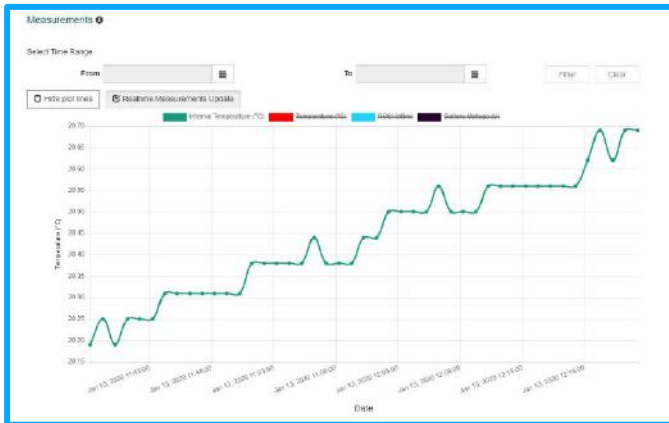
Figure 12 - Option to update the chart with new registers

The graph will be updated as measurements arrive at the gateway from the hub that we are currently visiting.

To disable this option, click on *Realtime Measurements Update* button again.

Properties

Select which hub you want to consult. In the top menus of the hub page, click the **Properties** tab. This page lists the information related to the hub.


Figure 13 - Hub properties page

Fields	Description
Name	Hub name
System Id	Communication protocol id
Network Id	Communication protocol network id
Firmware Version	Hub firmware version
Communication Period (seconds)	Communication period in seconds
Status	Hub state
Description	Hub additional information
Synchronize to Cloud	Sync enable/disable button of sensor hub

Table 5 - Properties page fields and description

3.1 Change hub name

Change the text field with the desired information. UTF-8 characters are allowed.

3.2 Change communication period

Set the communication period you want for the hub. Only numeric characters (0 to 9) are accepted and always values bigger than zero.

3.3 Change hub status

The hub status indicates if DUOS IoT Gateway is storing the hub registers. The status can be of 2 types:

ACTIVE	Allows to store the received registers.
INACTIVE	Disables the possibility to store the received sensor registers. All other registers are discarded.

Table 6 – Possible hub states

From the menu list, choose the state you want to assign to the hub and click on the *Update* button to save the changes.

NOTE: by default, the initial state of the hub is "Active".

3.4 Update description

Insert the text in the *Description field*. UTF-8 characters are allowed.

3.5 Enable sending registers to the Cloud

When a hub is initially registered at the gateway, sending data to the cloud is disabled by default.

To redirect data to the cloud, change *Synchronize to Cloud* state to **ON**.

To deactivate, click on the *On* button which will be replaced by the *Off* button.

Click on the *Update* button to save your changes.

NOTE: for this feature to be applicable, you must have at least the Tekon Cloud cloud service configured and validated.

3.6 Delete a hub

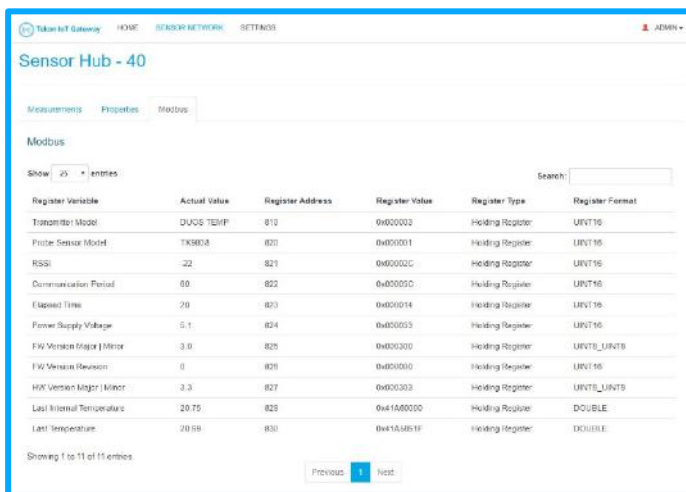Click on *Delete*. A pop-up window will show up, click on *YES, DELETE* to confirm the action.

NOTE: this operation is irreversible. The measurements and the map of modbus registers are deleted.

Modbus

In the **Modbus** tab, the modbus parameters of the transmitters that are associated with the DUOS IoT Gateway are displayed. Select which hub you want to consult. In the top menus of the hub page, click on the **Modbus** tab. This page lists the information related to the hub.

Fields	Description
Register Variable	Transmitter registration variable
Actual Value	Value registered for the variable
Register Address	Register modbus address
Register Value	Register values in hexadecimal format
Register Type	Type of object linked to the register
Register Format	Register data format

Table 7 - Modbus data

Figure 14 - Hub modbus registers

Settings

In this menu we have access to advanced system configurations such as the configuration module preferences, management of user permissions and credentials, data export, import and export configuration files, list of the modbus register map, configuration of cloud services, monitoring the state of the gateway services, reset and shut down the system, etc. To access the **Settings** menu, click on the button with the same name in the menu at the top of the page.

The **Settings** menu is arranged in several tabs that are presented in this order:

- **Communication Module**: communication module settings;
- **Users**: users management;
- **Data Import/Export**: export sensors measurements, database structure with gateway configuration and import gateway configurations;
- **Network**: network interfaces;
- **Cloud Services**: configure cloud services;
- **Monit**: service access monitoring tool;
- **System**: system configuration and control;

NOTE: **each task that will be described in the following steps can only be performed by users with Administrator permissions or users with custom permissions.**
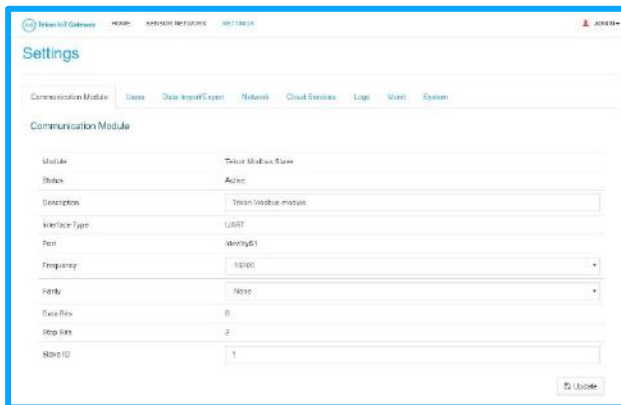

Figure 15 - Communication Module page of web interface

4.2 Communication Module

In this tab, it's possible to perform the following tasks:

- Update the communication frequency of the module;
- Update module description;
- Update the slave module ID;
- Update parity;

NOTE: changing parameters of the communication module such as parity or communication speed can result in strange behaviour and leave the system inoperable. These parameters must be changed by specialized personnel.

4.2.1 How to update the module description

The description configuration can be used to establish the context of a communication module.

In the **_DESCRIPTION_** field, insert the desired text. UTF-8 characters are accepted.

4.2.2 Update the modbus communication speed

The communication speed is expressed in bits per second (bps) or in frequency (Hz), it refers to the number of bits that the gateway and the communication module exchange per unit of time

In the **_BAUDRATE_** field, click on the configured option and select one of the available values in the selection box that will be displayed.

NOTE: this field should only be changed if the equipment's settings are modified with the Tekon Configurator software. The settings applied in Tekon Configurator must be replicated in this tab.

4.2.3 Update parity value

The parity configuration is directly related to communication via Modbus protocol.

In the **Parity** field, click on the configured option and select the desired value in the selection box that will be displayed.

4.2.4 Update slave module ID

The slave id is used to identify the slave address of the modbus.

In the **SLAVE ID** field, enter a single slave address between values 1 and 247.

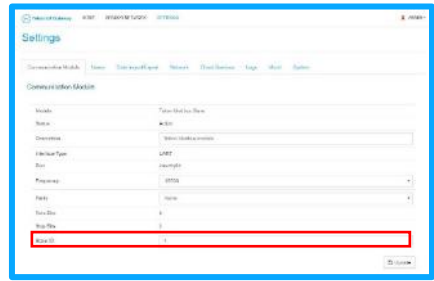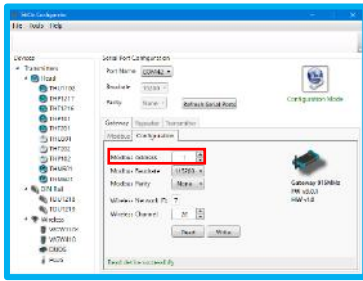**NOTE: this feature is only available on base Omega2 + gateways.**

Table 8 - Modbus address identification fields

4.3 Users

In this tab, it is possible to manage all users who can use the gateway's web interface.

The *USERS* tab allows to:

- Edit information of existing users;
- Delete users;
- Create users;

Each user has the following attributes:

- **Username** – username used to log in;
- **Password** – password that validates the username in the session;
- **First name** – user's first name;
- **Last name** – user's last name;
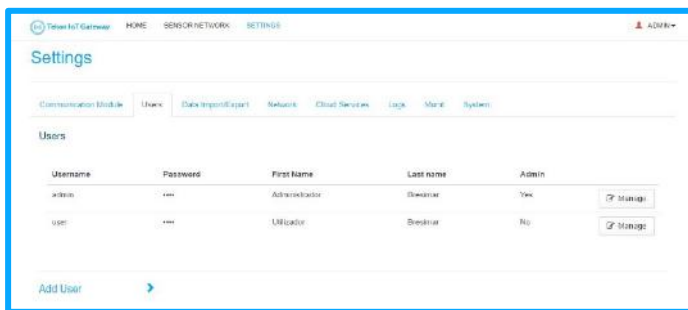- **Admin** – indication if user has administrator permissions;

Figure 16 - Page with list of registered users

4.3.1 Access USERS tab

Inside the main **SETTINGS** menu, click on the **USERS** tab.

You will be directed to a page like the one shown above.

4.3.2 Update user details information

1. In the table where all registered users are listed, on the right side, click on **MANAGE** in the user register that you want to edit.

2. A form will appear as shown below.

Figure 17 - Form to update user information

3. Do your changes. Please note the following conditions:

- **FIRST NAME** and **LAST NAME** attributes are optional. It can be left blank.

- the role of Administrator can be assigned by clicking on the **ADMIN** checkbox**.**

4. Click on *Update* to save the changes.

NOTE 1: username and role of administrator cannot be changed.

NOTE 2: When you make changes to your own user account, your session will be closed, and you will be automatically redirected to the login page.

NOTE 3: if your user type of account is REGULAR USER, in this tab, you can only update your own information.

4.3.3 Add a new user

To create a user, you must fill a form. Click on **ADD USER>** header to reveal the form.

Fill in **USERNAME** and **PASSWORD** fields. The username cannot be the same as any existing one. You can optionally fill in the fields **FIRST NAME** and **LAST NAME**;

Click on the **ADMIN** checkbox if you want to assign administrator permissions to the new user. Click on **ADD** button to create the user account.

Figure 18 - Form to create a new user

4.3.4 Delete user

1. In the table where all registered users are listed, on the right side, click on **MANAGE** in the user register that you want to edit.
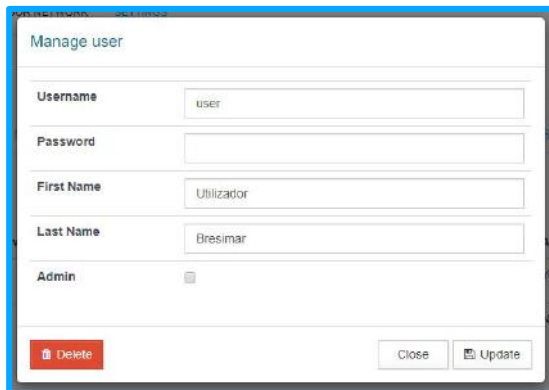
2. A form will appear as shown below.

Figure 19 - Form to delete user

3. Click on *DELETE*.

NOTE: the predefined administrator cannot be deleted.

4.4 Data Import/Export

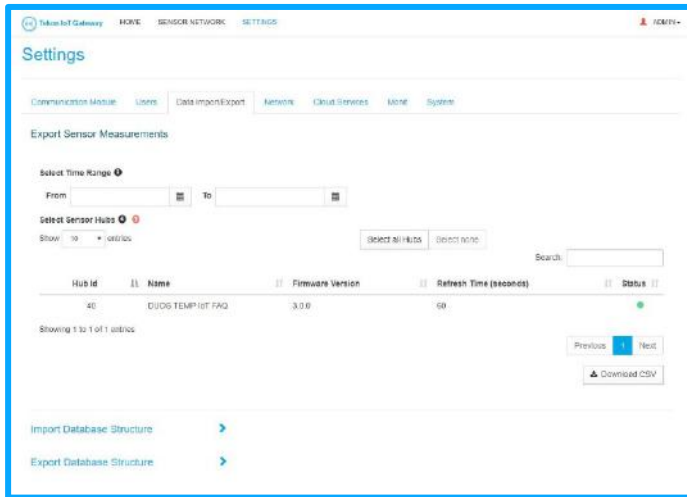On *SETTINGS* menu, select the tab *DATA IMPORT/EXPORT*.

Figure 20 - Page to export data and import database

4.4.1 Export sensor measurements

1. On the main menu *SETTINGS*, click on the tab *DATA IMPORT/EXPORT*.

2. Click on the sensor hubs from which the registers will be exported. Use the shortcut CTRL + Click to select multiple hubs or click on **SELECT ALL HUBS,** if you want to select all hubs. If you choose to select all hubs and want to undo the selection, click on **SELECT NONE**.

3. Click on *DOWNLOAD CSV* button to export the data.

4.4.2 Export sensor registers from a specific date or hub

In addition to exporting all measurements registered in the system, it is possible to export registers for a specific time interval for a single sensor.

- **Exportar registers from a date until now**

1. In the **From** field, click on calendar icon (📅) to open the calendar window;
2. Select day, month and year for the start date;

3. On the calendar window, click on the clock icon (⏱) to open the time selection window. This step is optional. When the time is not selected, the selection is automatically made according to the current local time;
4. Select hours and minutes;
5. Select the hub that will provide the registers. Use CTRL+Click to select multiple hubs or click on **SELECT ALL HUBS**, to select all hubs available;
6. Leave the field **TO** blank and click on **DOWNLOAD CSV**

- Export registers from a time interval

1. In the **From** field, click on calendar icon (📅) to open the calendar window;
2. Select day, month and year for the start date;
3. On the calendar window, click on the clock icon (⏱) to open the time selection window. This step is optional. When the time is not selected, the selection is automatically made according to the current local time;
4. Select hours and minutes;
5. In the **To** field, click on the calendar icon to open the calendar window;
6. Replicate steps 2 to 4.
7. Select the hub that will provide the registers. Use CTRL+Click to select multiple hubs or click on **SELECT ALL HUBS**, to select all hubs available
8. Click on **DOWNLOAD CSV.**

4.4.3   Import a database structure

1. Click on the **IMPORT DATABASE STRUCTURE** header to reveal this section;
2. Click on **BROWSE…** button to open a window for file search;
3. Select the ".sql" file;
4 Click on **IMPORT SQL**

4.4.4   Export a database structure

1. Click on **EXPORT DATABASE STRUCTURE** header to reveal this section;
2. Click on **DOWNLOAD SQL** to extract the ".sql" file with the database structure;
3. As an option, you can choose to delete saved settings from cloud services or hubs from the database. To do so, select **CLOUD SERVICES** or **SENSOR HUBS** respectively, from the **EXCLUDE** section;

4.5   Network

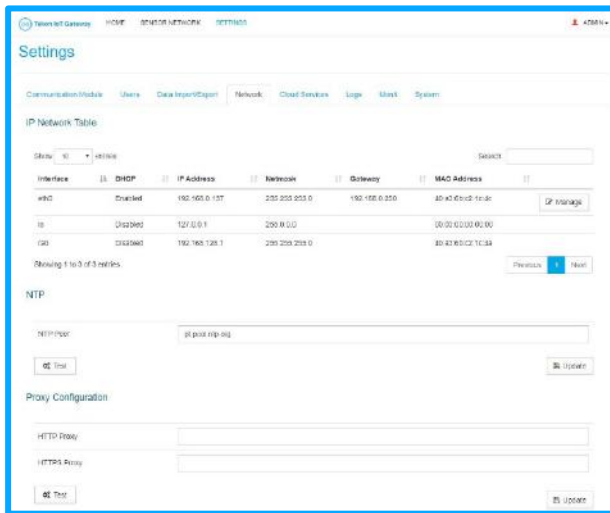Within the **SETTINGS** menu, select the **Network** tab.

Figure 21 - Network information

On this page we find the network interfaces of the device, the configuration of the network time protocol and the parameters for the configuration of a proxy.

4.5.1   IP Network Table

On this page section, is presented a table that lists the several interfaces of the gateway network and their status or configuration. The interfaces are listed based on the following parameters.

Interface parameters	Description
Interface	Network interface name
DHCP	DHCP protocol status associated with the interface for automatic or manual IP assignment
IP Address	Current interface IP address
Netmask	Network mask address
Gateway	IP address of the network gateway (in most common installations, refers to the DHCP server)
MAC Address	Interface MAC address

Table 9 - Fields with network information and description

Figure 22 - IP Network Table section

4.5.1.1   eth0 interface management

Within the **eth0** interface, referring to the ethernet interface of the DUOS IoT Gateway, it is possible to configure the DHCP, IP Address, Netmask and Gateway parameters. This feature allows the assignment of the gateway IP, within the network, to occur automatically or manually.

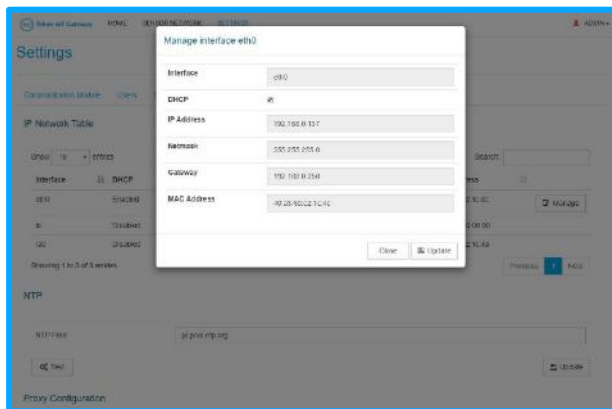Click on the ***MANAGE*** button to open the interface configuration window.

Figure 23 - DHCP activation

In the **eth0** interface management window, for the IP Address, Netmask and Gateway parameters to be editable, you must uncheck the DHCP parameter checkbox validation.
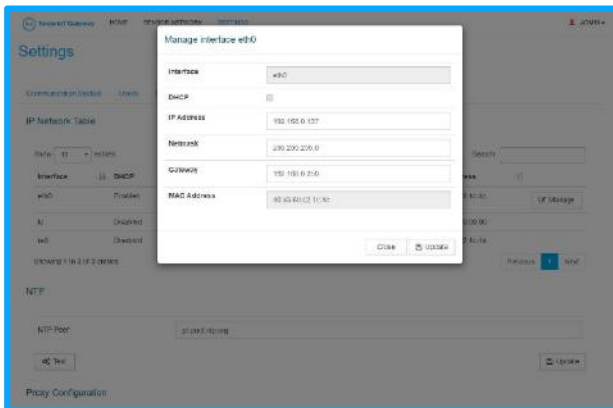
Figure 24 - DHCP deactivation

NOTE: for the IP assignment to our device to be done automatically by the network server to which it is connected via the ethernet port, must keep validation in the DHCP parameter checkbox. If the IP assignment occurs automatically, the parameter value will be "Enabled". If you choose to manually assign the IP, the value returned will be "Disabled".

4.5.2   NTP

The acronym NTP stands for Network Time Protocol, which assumes the role of establishing the time window that the server is using as a reference associated with recording the date and time of all processes.

You can choose to use the time server configured on your network server or choose to use an external server.

Figure 25 - Network Time server configuration
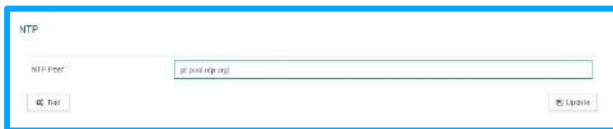
You can enter an address identical to the one in the image above or you can include a time server using its IP address. At the end of the configuration, you can test the connection to the time server using the **Test** button.

If the connection fails, the error message **Invalid NTP** will be displayed. If the defined server is valid, the message displayed will be **Valid NTP**.

4.5.3   Proxy Configuration

The user chooses to include a proxy server as an intermediary. The supported proxy servers are from HTTP or HTTPS type.

Figure 26 - Proxy server configuration

4.6 Cloud Services

In this tab, the credentials are configured and tested to enable the sending of data to the Tekon IoT Platform.

Within **SETTINGS** menu, click on the **CLOUD SERVICES** tab.

Figure 27 - Page to configure the connection to Tekon IoT Platform

The connection with the Tekon IoT Platform is made through the configuration of gateway and hubs, individually.

4.6.1   Configure gateway connection

To connect the gateway to the platform, you must have the following data:

Server URL – platform url;

API Key – unique identifying key used to authenticate the gateway on the Tekon IoT Platform, from an existing user on the platform with permissions to send data;

After gathering this data, follow these steps:

1. Insert the data gathered in the corresponding fields;
2. Click on the *Status* button. The button should go from **Off** to **On.**
3. Click on *Update* to save changes.

Figure 28 - Connection to the Tekon IoT Platform

On the **TEST CREDENTIALS** button, you can test the platform connection credentials defined in the upper fields. If the connection is successful, the message "Authentication Ok" will be displayed. If the connection is not viable, the error message "Authentication Failed" will be displayed to the user.

The **Validate Credentials** option, allows the credentials to be given as valid and saved in the database as the correct ones. If the credentials have not been tested and are incorrect, the connection will not be made.

4.6.2   Configure hubs connection

In this section you will find the list of hubs that are connected to the gateway. The list consists on the Hub ID, the hub name and the communication status of the hub.

NOTE: for the hub to be ready to communicate with the platform, its status must be "Cloud Synchronization On". If this status does not match, please follow the steps in 3.3

In order for the available hubs to communicate with the Tekon IoT Platform, you must have the following data:

> **API Key** – API KEY key of the datasource that is configured on the platform;

After gathering the necessary information, follow these steps:

1. Select the hub that you pretend to configure;
2. Insert the **API Key** from the platform datasource;
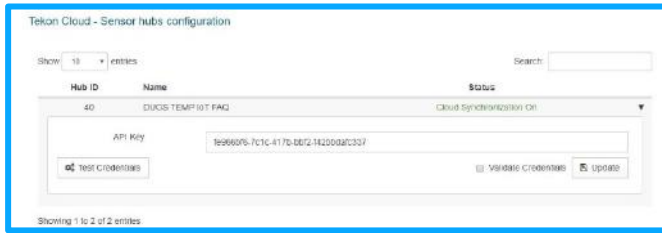3. Click on *Update* to save changes.

Figure 29 - Hub configuration for connection to the Tekon IoT Platform

On the **TEST CREDENTIALS** button, you can test the platform connection credentials defined in the upper fields. If the connection is successful, the message "Authentication Ok" will be displayed. If the connection is not viable, the error message "Authentication Failed" will be displayed to the user.

The **Validate Credentials** option, allows the credentials to be given as valid and saved in the database as the correct ones. If the credentials have not been tested and are incorrect, the connection will not be made.

4.7 Monit

The DUOS IoT Gateway follows with a web monitoring tool provided by third parties, called **Monit**, which allows monitoring the status of the process, files, directories and other system resources. The **Monit** tool is configured to monitor critical services necessary for the normal functioning of the gateway. In the event of an error, **Monit** will note the occurrence and put in place steps to recover, such as, for example, automatically restarting the monitoring services whenever they are unexpectedly closed.

4.7.1 How to access Monit

1. On the *SETTINGS* menu, click on the *MONIT* tab;
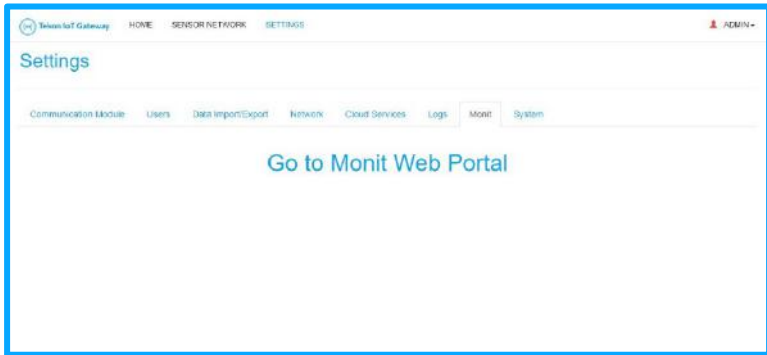2. Click on *Go to Monit Web Portal* link.

Figure 30 - Page with the link to Monit Web Portal

1. In the new window, place the access credentials provided below;

Username	admin
Password	bresimar

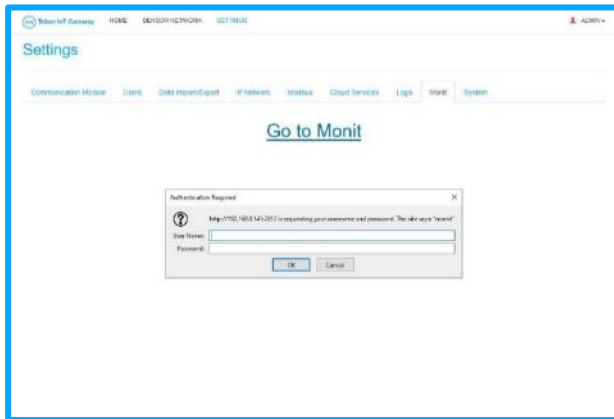*Table 10 - Credentials for access*

Figure 31 - Window to enter credentials

2. Click on **OK** to validate credentials;
3. It will be redirected to the **Monit** interface, the **Monit Service Manager**;

Figure 32 - Monit Service Manager page
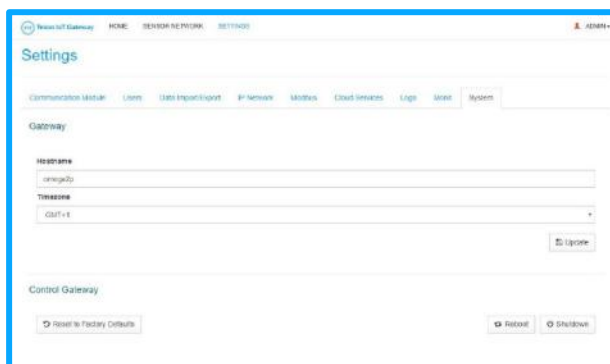
The **Status** column of the table that lists the monitored process indicates whether or not the process is functioning normally.

NOTE: the description of how to use the Monit tool is out of focus in this manual. You can find more information on the tool owner's documentation page: https://mmonit.com/documentation/

4.8 System

In this page you will have access to information about the DUOS IoT Gateway. You can also perform control actions on the device since the factory settings are reset and the gateway is restarted and shut down.

To access this section of the interface, within the **SETTINGS** menu, click on the **SYSTEM** tab.

Figure 33 - General settings of web interface

4.8.1 Update hostname

1. In the **HOSTNAME** text field, type the new name you want for the device. Only alphanumeric characters (A-Z; a-z; 0-9) are accepted;

2. Click on **UPDATE** to apply the change. The system will automatically restart for the change to take effect immediately.

3. Follow the presented instructions.

NOTE: the hostname identifies the gateway of the local IP network. Once changed, the gateway can be detected and accessed on the local IP network through the new hostname with the suffix ".local"

4.8.2 Update timezone

1. Click in the field below the name *Timezone*.

2. From the menu of listed options, choose the timezone you want to set.

3. Click on **UPDATE** to apply the change. The system will automatically restart for the change to take effect immediately.

4. Follow the presented instructions.

4.8.3 Reboot the system

1. In the Control Gateway section, click on **Reboot**;
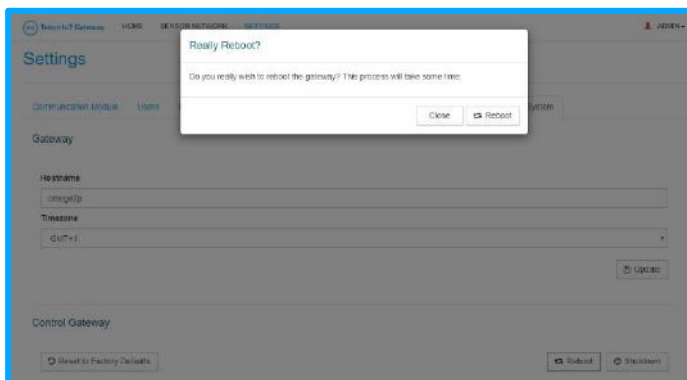
Figure 34 - Reboot system option

2. Follow the presented instructions.

4.8.4 Shutdown the sistema

1. In the Control Gateway section, click on *Shutdown*;
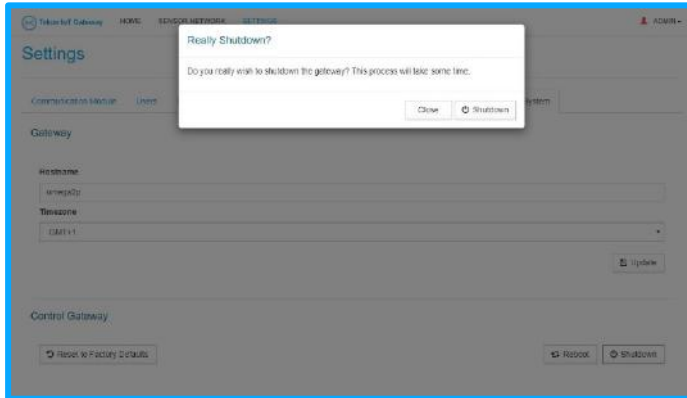
Figure 35 - Option to shutdown the system

2. Follow the presented instructions.

NOTE: this procedure does not turn off the DUOS IoT Gateway. It just turns off all the services.

4.8.5 Reset factory settings

ATTENTION: this action resets the system settings to their initial state. Any changes made will be discarded in this process.

1. In the Control Gateway section, click on *Reset to Factory Defaults*;

2. A validation window will appear. Click on **Reset** to continue. The system will automatically restart for the change to take effect immediately.

Figure 36 - Reset initial settings on the web interface

3. Follow the presented instructions.

4.9 Modbus connections

The DUOS IoT Gateway has a Modbus layer that allows the customer to connect via the RS-485 port or the Ethernet interface. The connection parameters to the Modbus server are as follows:

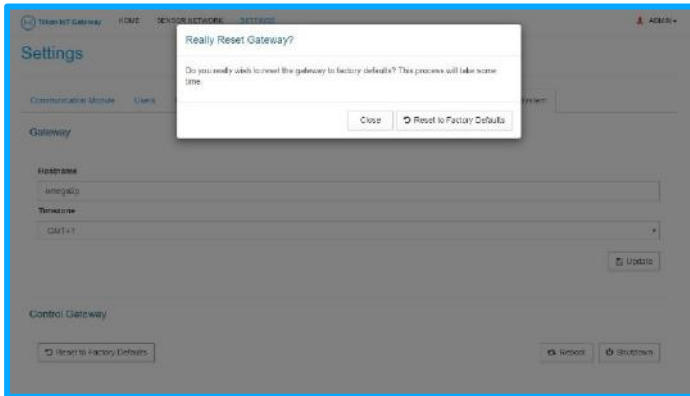| Modbus RTU	Modbus TCP
Rate: 115200 Parity: None Data bits: 8 Stop bits: 1	Address: gateway IP address Port: 1502

Table 11 - Data for connection via Modbus

Once connected, requests for reading and writing can be carried out in the registers. Currently, the allocation of addresses to registers follows the protocol in the following table.

Description	Address
Transmitter model	(Transmitter device ID - 1) x 21
Probe sensor model	(Transmitter device ID - 1) x 21+1
RSSI	(Transmitter device ID - 1) x 21+2
Communication period	(Transmitter device ID - 1) x 21+3
Elapsed time	(Transmitter device ID - 1) x 21+4
Power supply voltage	(Transmitter device ID - 1) x 21+5
FW version Major|Minor	(Transmitter device ID - 1) x 21+6

FW version revision	(Transmitter device ID - 1) x 21+7
HW version Major|Minor	(Transmitter device ID - 1) x 21+8
Data 0	(Transmitter device ID - 1) x 21+9
Data 1	(Transmitter device ID - 1) x 21+11
Data 2	(Transmitter device ID - 1) x 21+13
Data 3	(Transmitter device ID - 1) x 21+15
Data 4	(Transmitter device ID - 1) x 21+17
Data 5	(Transmitter device ID - 1) x 21+19

Table 12 - Modbus map

Can find more information on data transmission via Modbus from the DUOS IoT Gateway in the product datasheet. You can find the datasheet, on the Tekon Electronics website, through the upper menu Download Center >> Product Datasheets >> Datasheet - DUOS Gateway IoT.

6. Troubleshooting

6.1 IP address not automatically assigned

When the DUOS IoT Gateway is connected to the network via the Ethernet port, the network must be prepared to automatically assign an IP to the device.

If this step is not done automatically, there is no DHCP server, which provides and assigns IP addresses automatically, on your network. Check your network for a DHCP server.

Verifique o estado do parâmetro DHCP, na interface **eth0**. Se o valor devolvido for igual a *Disabled*, clique no botão *Manage* presente no fim do registo. Na nova janela exibida, clique na caixa de validação em frente ao parâmetro *DHCP*, e em seguida clique em *Update*.

Check the status of the DHCP parameter, on the **eth0** interface. If the returned value is equal to **Disabled**, click on **Manage** button at the end of the register. In the new window that appears, click on the validation box in front of the **DHCP** parameter, and then click on **Update**.

6.2 The device is not sending data to the Tekon IoT Platform

Check if the hub status is ACTIVE;

Start by checking if the gateway is receiving data from the transmitters. Click on the Sensor Network item in the main menu, select a hub and on the Measurements tab analyze if some data is being registered.

Make sure the **Synchronize to Cloud** field on the hub page is ON;

Check if the Tekon Cloud **Status** field is in ON mode (see topic 4.6.1 Configure gateway connection)

Check if you have filled in the API Key field in the Tekon Cloud area and the hub (s) that should be communicating. (See point 4.6 Cloud Services)

6.3   Cannot access to the gateway web interface

Check the access credentials. The username is admin and the password is admin. If you have changed your access data and have not registered it, contact Tekon Electronics technical support.

7.   Certifications

The Duos IoT Gateway is a device manufactured in compliance with the following standards:

EN 61326-1 – Class B – Industrial requirements

EN 300 220-2 V3.1.1

EN 301 489-1 V2.2.0

EN 301 489-3 V2.1.1

8.   Glossary

Terms	Definition
DHCP	*Dynamic Host Configuration Protocol:* used to configure network identifiers automatically.
Gateway	Device with physical interfaces capable of communicating with networks and devices using different protocols and processing and storing internal or external data locally in the long term.
Ethernet	Connection architecture of local networks based on sending packets.
Communication Module	Plug-in that provides wired or wireless connection to local or remote sensors, respectively, through the communication protocol. The communication modules can be connected directly to the expansion of the bus (physical interface) of the gateway, to increase its communication resources.
Cloud Service Provider	External or third-party entity hosted on the Internet, providing IoT services. The main features of an IoT

	platform are device management, remote data storage, access to historical data and real-time monitoring.
Modbus	Data communication protocol used in industrial automation systems.
NTP	Network Time Protocol. Used to keep a system's timekeeping synchronized with a time server.
Sensor hub	Device that supports one or more sensors capable of periodically obtaining measurements for different variables.
IoT	Internet Of Things

Tekon Electronics

Avenida Europa, 460
Quinta do Simão – Esgueira
3800-230 Aveiro – Portugal
T. +351 234 303 320
M. +351 937 270 062

sales@tekonelectronics.com

www.tekonelectronics.com