WIRELESS SENSORS TECHNOLOGY

TEKON IOT PLATFORM

USER MANUAL

UM_TEKON_IOT_PLATFORM

TEKON ELECTRONICS | AVEIRO, PORTUGAL
P.: +351 234 303 320 M.: +351 933 033 250 E.: sales@tekonelectronics.com

TEKONELECTRONICS.COM

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OVERVIEW

Tekon IoT Platform is an user-friendly platform designed to assist in digital transformation, integration and visualization of data from the real time monitoring process. The integration of devices that control a wide spectrum of variables allows the optimization of processes and productivity management.

The customizable interface offers to the users the conditions to build graphical analysis that most effectively responds to their business needs.

Multi-device access makes it accessible from anywhere at any time.

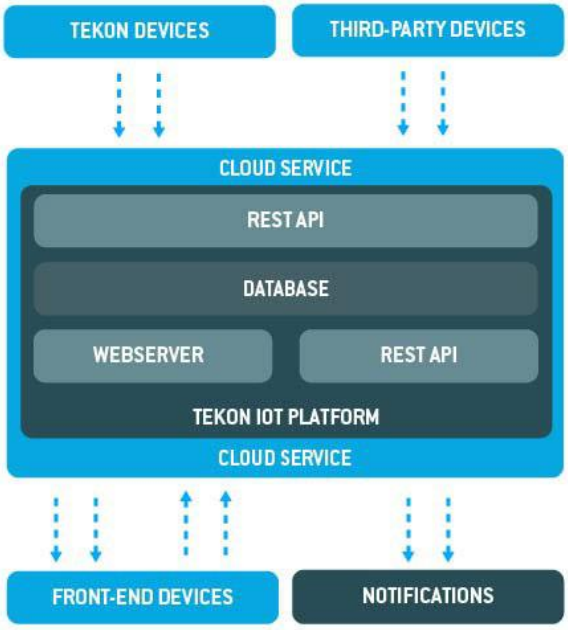


Figure 1 - Tekon IoT Platform architecture

Main features

Connection to third-party devices

The growing emergence of IoT devices for process monitoring applications has motivated the possibility of the integration of third-party devices **Tekon IoT Platform**, thus providing a supportive and complementary platform for other solutions.

Data collection and custom visualization

Data collection, aggregation and visualization are user-friendly processes, making **Tekon IoT Platform** adjustable for any business. The concern for having vital business information organized in an interface is filled with the elaboration of custom dashboards.

Advanced user management

Platform management can be defined by multiple users with different usage permissions. **Tekon IoT Platform** enables the configuration of user profiles with customizable permissions for different areas of the platform.

Notification system and configurable alarms

Customizing notifications and alarms makes real-time monitoring a more cost-effective asset. Tekon IoT Platform allows you to customize an email and sms service to receive notifications when the logged values are outside the limits set in the configured alarms.

Data export

Real-time access to information is a deciding factor in innovative organizations. Tekon IoT Platform allows you to export data based on your displayed log history. This feature allows data analysis to help interpret snapshot data.

Real time monitoring

Real-time monitoring is already an imperative basis for applications supplemented with IoT platforms. By using it, you can achieve improved process performance and reduce unexpected troubleshooting costs.

VARIABLE TYPES

The variables assigned to each of the data types identify the type of process that we want to view. Based on **Tekon Electronics** products tailored to connect directly to the platform, there are some standard variables that have been added to make it easy to assign them to datasources.

Model – transmitter model;

Sensor Model – sensor model in the transmitter;

RSSI – received signal strength indication;

Communication Period – time interval between each communication, in seconds;

Elapsed time – elapsed time since last communication, in seconds;

Power supply voltage – supply voltage of the transmitter;

Firmware version – transmitter firmware version;

Hardware version – transmitter hardware version;

Internal Temperature – temperature measured by internal sensor;

External Temperature – temperature measured by external sensor;

Humidity – relative humidity measured by the external sensor;

CO2 – carbon dioxide concentration measured by external sensor;

CO2 Average – average value of carbon dioxide measured by external sensor;

Digital Input – digital input status;

Process variables such as *"Internal Temperature"*, *"External Temperature"*, *"Humidity"*, *"CO2"*, *"CO2 Average"* and *"Digital Input"* that are characteristic of some datasource types associated with the **Tekon Electronics** products, have properties open for edition.

Generic variables

In addition to the variables previously defined in the platform, you can define new variables to receive data from other **Tekon Electronics** products or from third-party devices.

This variables model definition, which becomes more comprehensive, is divided into sections that allow the optimization of data visualization.

Value Type

This parameter corresponds to the data type assignment to each variable.

Unity

Each application has different reference units for each process. In this field the user can choose the appropriated units to associate with the variables.

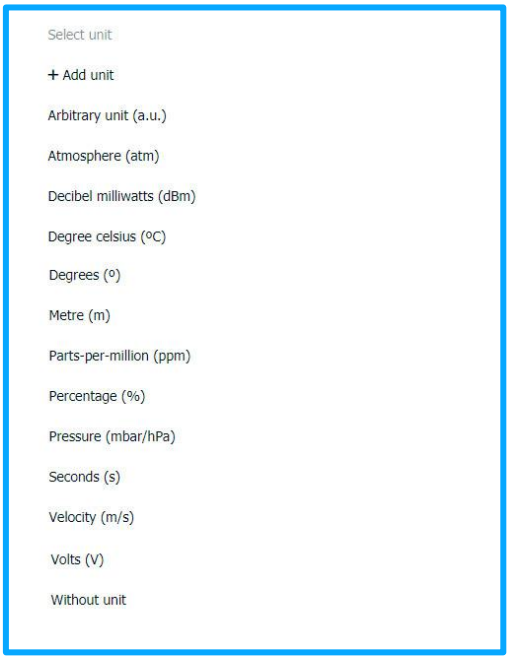


Figure 2 - Variable list

The user has permission to add new units for process characterization. To do this you need to set the unit name and symbol.

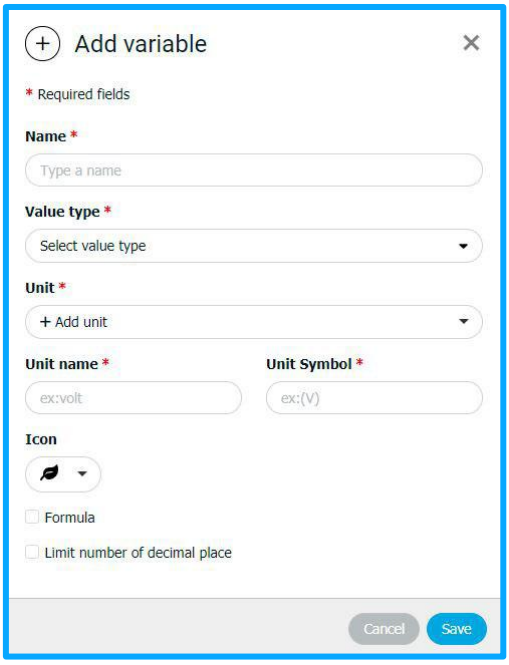


Figure 3 - Add variable window

Icon

This parameter defines an icon that characterizes the type of variable to be monitored. The options that are made available have been set to be as objective as possible.

Figure 4 - Available icons to match with variables

Generic variables set based on the data type have a formula used to set this value.

Linear Equation

Linear equations are used to find a final value from which the calculation derives from gain and offset values. The existence of linear equations relations between a quantity allows us to calculate the value that defines this relationship.

The implemented formula refers to the equation **y=mx+b**. In this context, “m” represents the gain and “b” represents the offset. A practical example for applying such variables may be the conversion of temperature from degrees Celsius to Fahrenheit.

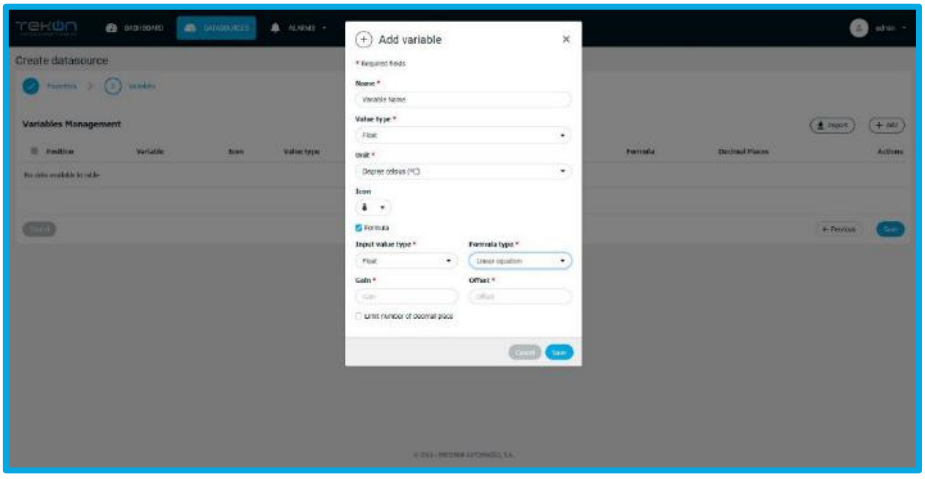


Figure 5 - Linear equation application

4 – 20 mA

In this format, analog current output signals from transmitters are transformed into reference values for several variables such as temperature, humidity or CO2.

0 – 10 V

As in the previous example, analog current output signals from transmitters into reference values for several variables. You must set the minimum and maximum values for each of the variable types. In short, it is to establish reference values for converting the output signals.

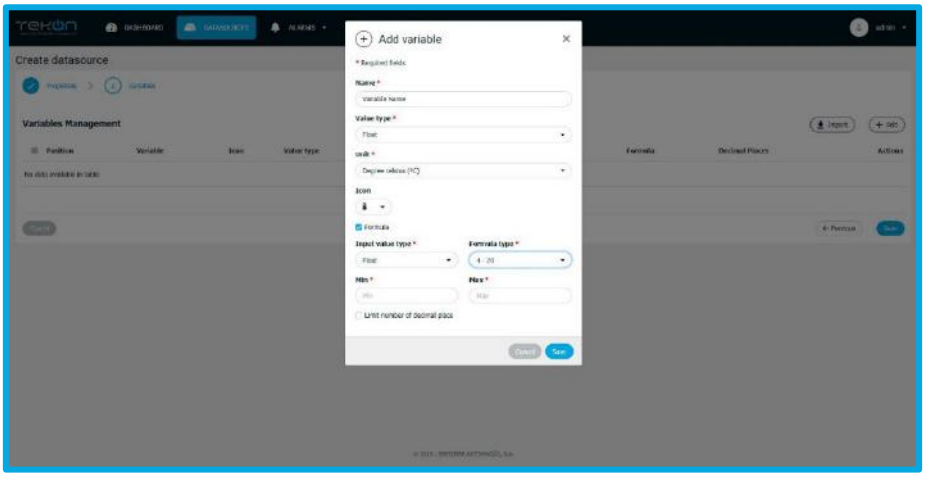


Figure 6 - 4-20 and 0-10 variables

Boolean Replacement

The "*Boolean Replacement"* formula type consist in setting condition values to return the reference values for Boolean data – true or false.

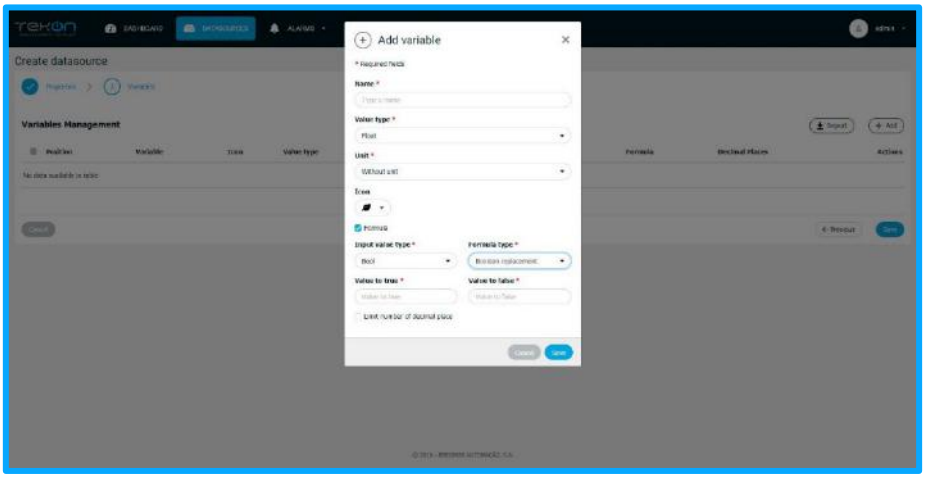


Figure 7 - Boolean replacement formula

Scale

The "Scale" formula type consists of seting the minimum and maximum scale values for displaying a variable and configuring the values corresponding to each position. This option is ideal for performing a linear conversion using two points.

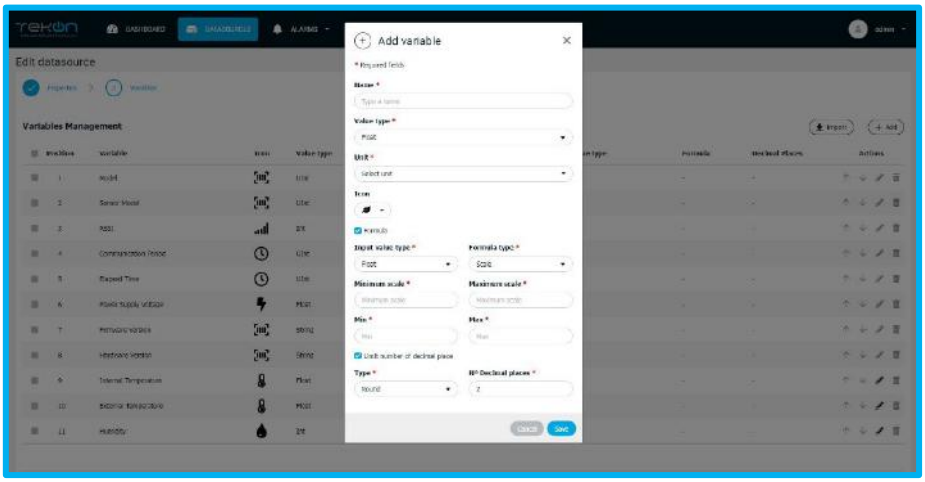


Figure 8 - Scale formula configuration

Limit number of decimal place

This field allows you to limit the number of decimal places of the variable value. The option is mandatory in some data types, which will be selected by default, optional in other aspects and not applicable in some variables, namely “String” and “Bool”.

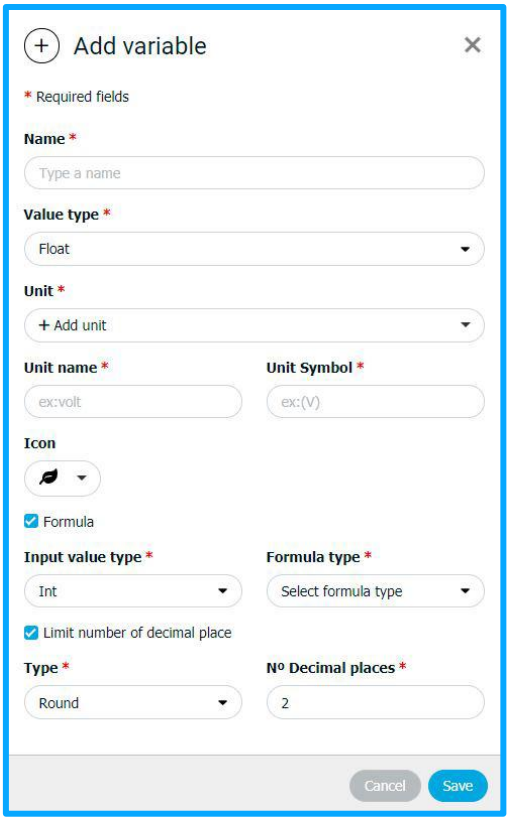


Figure 9 - Limit number of decimal place

Limitation of decimal places can occur by two ways:

- **Round**: rounds the value to the number of set decimal places. By default, the number of decimal places may be set to 0 or 2;

- **Truncate**: The number of decimal places set in this parameter will result in the number of places after the comma that will be displayed. All other values that could be viewed are completely deleted.

NOTE: compared to the "Round" type of decimal place imitation, unnecessary digits are eliminated, but there is no rounding process in the last square.

Figure 10 - Decimal limits type selection box

DASHBOARDS

Dashboards are a versatile way to group and graph the information resulting from monitoring processes. Widgets are the tools that allow you to configure the graphical interfaces of the monitoring process variables. Each dashboard can be made up of several widgets and uniquely organized by the user.

For example, you can create a dashboard that bundles graphs of datasources placed on the factory floor, or, from a more advanced viewpoint, you can create a dashboard with widgets targeted for a better mobile experience.

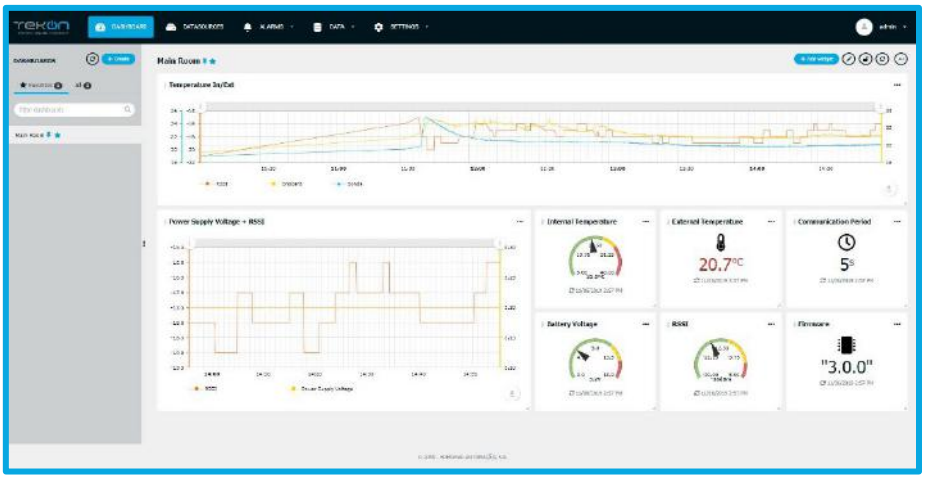


Figure 11 - Tekon IoT Platform dashboard

Create a dashboard

Dashboards can be created at any time through a simple one-step process.

Upon the dashboards are created, the possibility of editing these information boards is open to some options. All options can be viewed and grouped at the top of the dashboard.

Figure 12 - Dashboard options

Let's explain the possibilities of each one of the options.

Change dashboard name

At this point we have the possibility to edit the name of the dashboard.

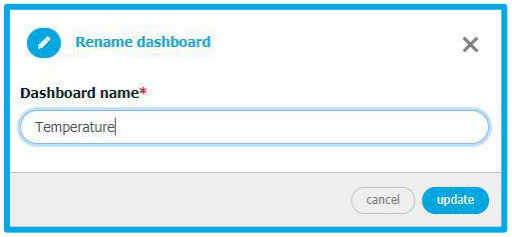


Figure 13 - Change dashboard name

Lock/unlock dashboard

Dashboards can be locked to prevent other users from editing. This feature is only available to users with full control of dashboards. When the dashboard is locked, editing options are limited, leaving only the option to unlock the dashboard or update widgets in the graphical environment.

Figure 14 - Options to lock dashboards

Update graphic environment widgets

At any time, the user can update their graphical environment.

Other options

Still applied to dashboards, there are alternative options available to the user.

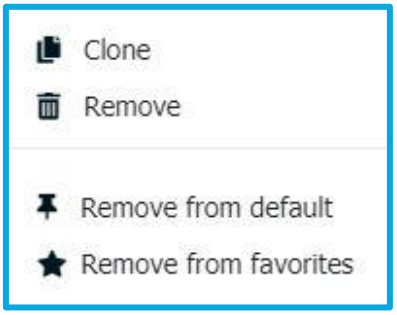


Figure 15 - Additional dashboard options

Clone

The user can clone this dashboard, creating a new dashboard filled with the widgets configured in the reference dashboard. The dashboard name and preference options are editable.

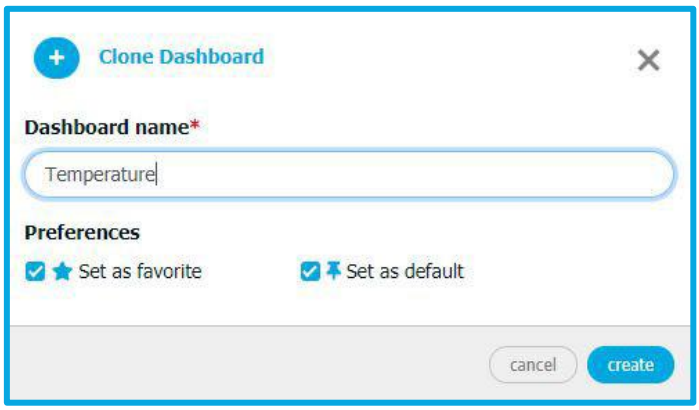


Figure 16 - Main window for cloned dashboard

Remove

User can delete the dashboard from their platform. Dashboard preference and highlight choices let you organize these elements.

Remove from/Add to default – can set the dashboard as default to show as the main graphic interface in the platform;

Remove from/Add to favourite – by flagging or removing a dashboard as part of your favourites, you will be inserting or removing that information board from a section that initially lists the favourite dashboard and makes them available to the user.

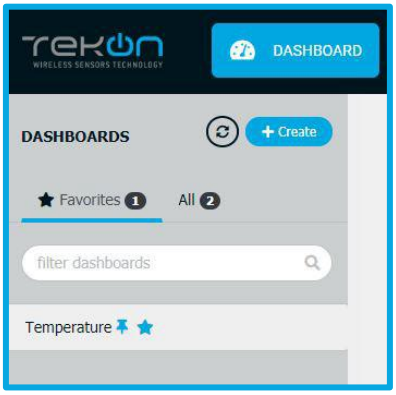


Figure 17 - Dashboards marking and listing

DATASOURCES

Datasources are the primary sources of all information that can be presented on the **Tekon IoT Platform**. Datasources may be sensors from **Tekon Electronics** or may be configured to represent data from third-party devices. The datasource configuration is divided between **Properties** and **Variables**.

Properties

Within the datasource properties, device identification information can be set.

- **Name**: name that identifies the datasource in the platform;

- **Type**: type of datasource. To find information about datasource types, go to the chapter TYPES OF DATASOURCES;

- **Time Zone**: select a continent and reference location. It is automatically with the user time zone;

NOTE: the option selected in this field will serve as a reference for setting alarm time intervals.

- **Api Key**: the information in this field is automatically generated by the system. This is a unique datasource ID, such as a fingerprint. You can learn more about this feature in the API KEYS chapter.

You have two features directly related to this attribute. You can copy the text in the field by clicking the **Copy** button. You can also generate another *Api Key* by clicking the **New Key** button.

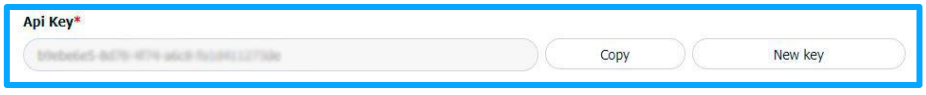


Figure 18 - API Key field

- **Metadata:** you can add relevant information about the datasource. This information will not be viewed on any other occasion.

Variables

In this second step of datasources configuration, you can set the variables applied to each datasource.

NOTE: Although you have the possibility to set the variables you may think relevant, this step has a direct relation with the datasource type that you chose before. Some datasource types already have variables assigned by default. By choosing one of these datasource types, the variables will be automatically loaded into this repository.

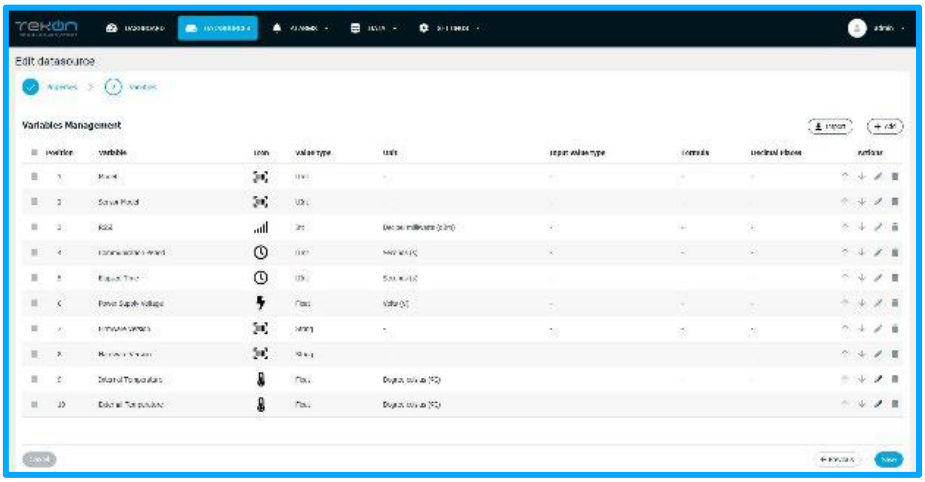


Figure 19 - Datasource configuration pages

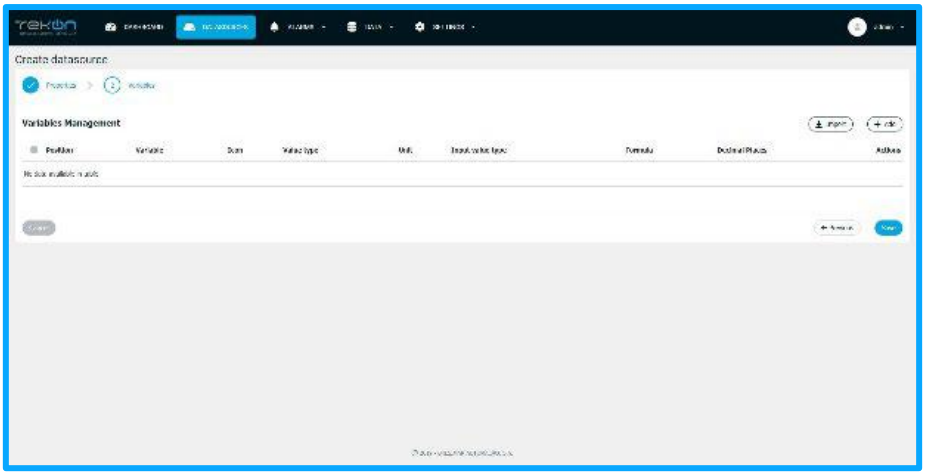


Figure 20 - Datasource configuration pages

The variables configuration process can take place in two different ways. You can rely on the import of variables or add variables filling in all their parameters.

Figure 21 - Datasource variable options

Variable import

Importing variables into a new datasource decrees the assignment of variables based on settings made in other datasources already existing in the platform.

To use this feature, you can choose the datasource that is the basis for importing variables. The next step is selection of variables intended to be added to the new datasource. By default, the import selects all the variables from the datasource chosen in the previous step.

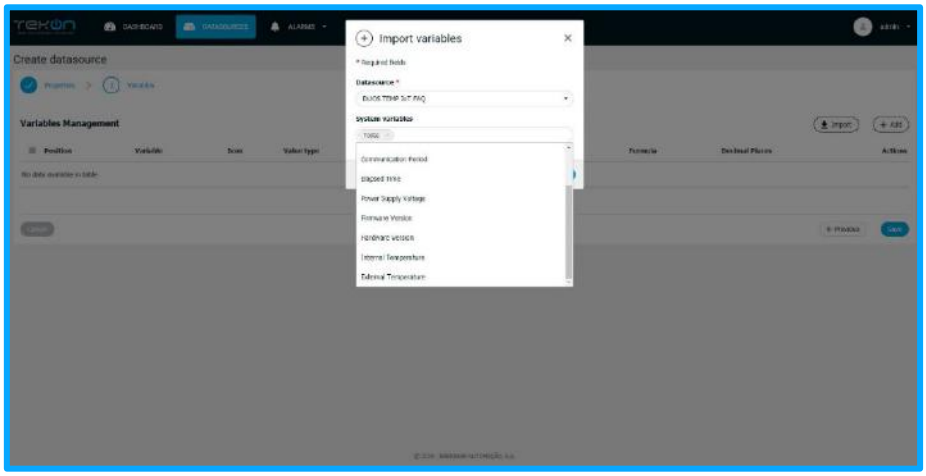


Figure 22 - Variables import options

Figure 23 - Options available for variables

NOTE: By importing the variables, the actions of management are all active to allow their customization.

Add variables

Adding variables is identical to the process of creating generic variables. You can see all the necessary steps in the **GENERIC VARIABLES** chapter.

Types of datasources

The datasource types available for configuration on **Tekon IoT Platform** make the application inclusive for both **Tekon Electronics** products and third-party product configurations.

DUOS TEMP

DUOS TEMP datasources are configured for temperature monitoring using the **DUOS TEMP** product from the DUOS product family. The variables provided are automatically generated and set ensuring that user has access to all parameters supported by the transmitter. The reference variables of this product, "*Internal Temperature*" and "*External Temperature*" are the only ones with an open configuration and editable to the user.

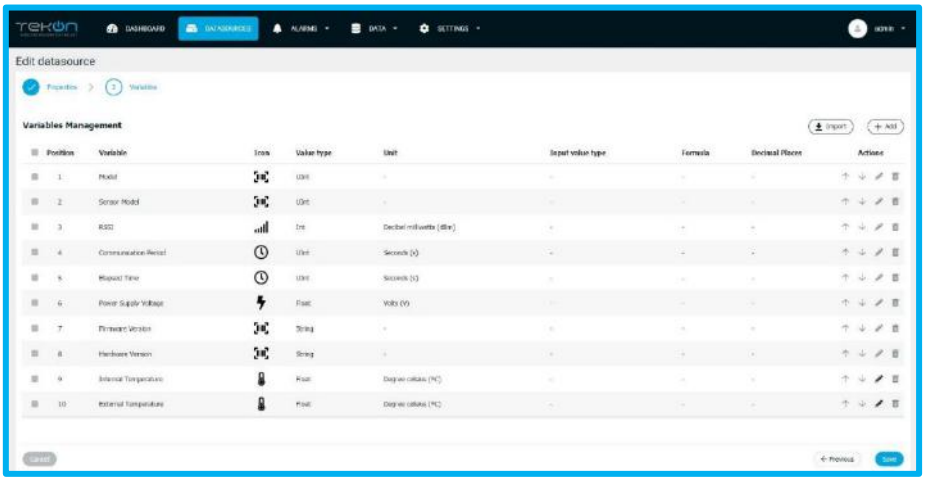


Figure 24 - Page of DUOS Temp variables

DUOS HYGROTEMP

Like the datasource type referred to in the previous section, **DUOS HYGROTEMP** datasources are tailored to match **DUOS HYGROTEMP** transmitters with **Tekon IoT Platform**.

Together with the "*Internal Temperature*" and "*External Temperature*" variables in this datasource model, the "*Humidity*" variable gives to the user the same edit permissions, closing the configuration edit to the remaining variables, which are set and set automatically.

The values of "*External Temperature*" and "*Humidity*" variables are recorded through an external probe coupled to the transmitter. On the other hand, the "*Internal Temperature*" is recorded by an internal probe incorporated in the transmitter.

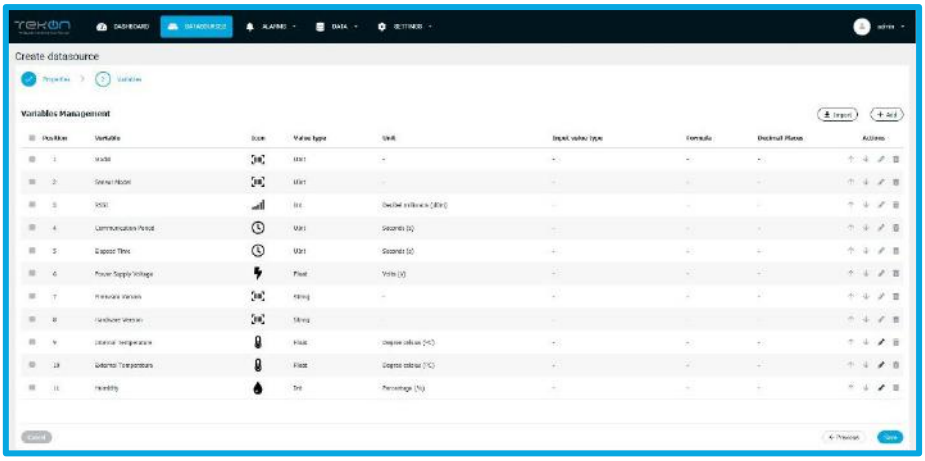


Figure 25 - Page of DUOS Hygrotemp variables

DUOS CO2

DUOS CO2 datasources relate the **DUOS CO2** transmitter to the **Tekon IoT Platform**. In this model, the variables enabled with editing properties are "*Internal Temperature*", "*CO2*" and "*CO2 Average*". The last two references are related to the measures recorded through the external probe, and the first variable is measured by the transmitter internal probe.

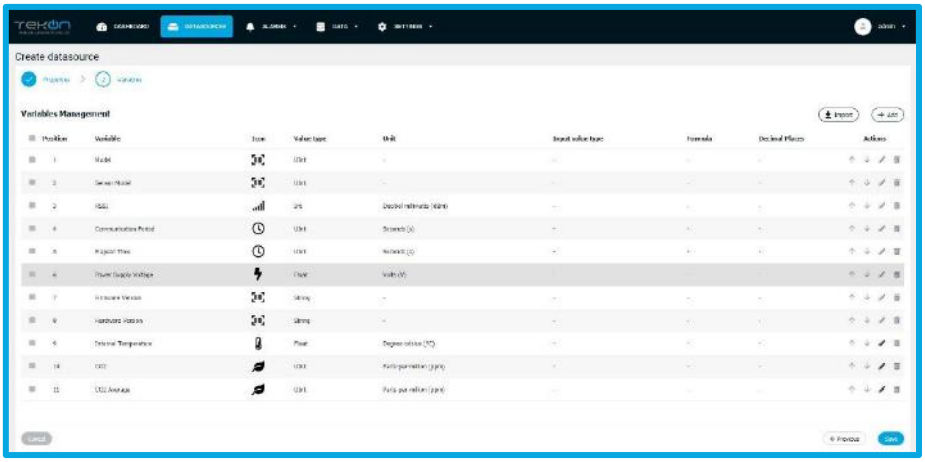


Figure 26 - Page of DUOS CO2 variables

DUOS DI+TEMP

Datasources configured with the **DUOS DI+TEMP** type integrates all **Tekon Electronics DUOS DI+TEMP** transmitters with the **Tekon IoT Platform**. Event detection logging via a digital input is done through the "*Digital Input*" variable, pre-set in the configuration and editable, together with the "*External Temperature*" and "*Internal Temperature*" variables.

The "*Counter*" variable is assigned to the list of available variables to record the number of events that occur in Digital Input.

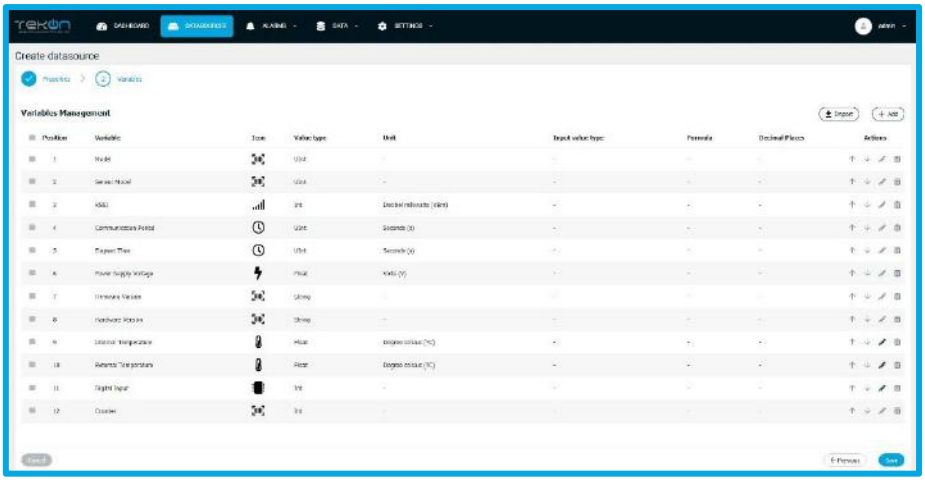


Figure 27 - Page of DUOS Di+Temp variables

DUOS inAirQuality

DUOS inAirQuality datasources link the **DUOS inAir** transmitter with **Tekon IoT Platform**. In this model, the variables enabled with editing properties are *"Internal Temperature", "Relative Humidity", "CO2", "CO2 Average"* and *"Atmospheric Pressure".*

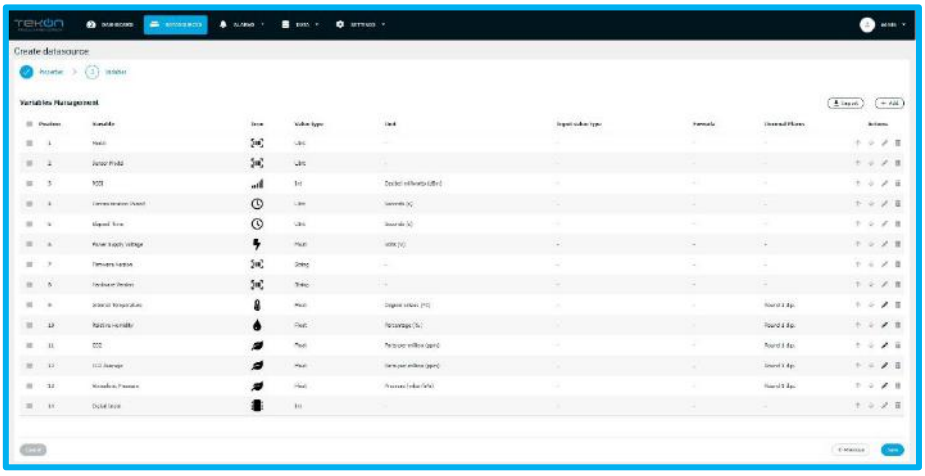


Figure 28 - Page of DUOS inAirQuality datasource variables

DUOS inCO2

DUOS inCO2 datasources link the **DUOS inCO2** transmitter with **Tekon IoT Platform**. In this model, the variables enabled with editing properties are *"Internal Temperature", "CO2", "CO2 Average"* and *"Atmospheric Pressure".*

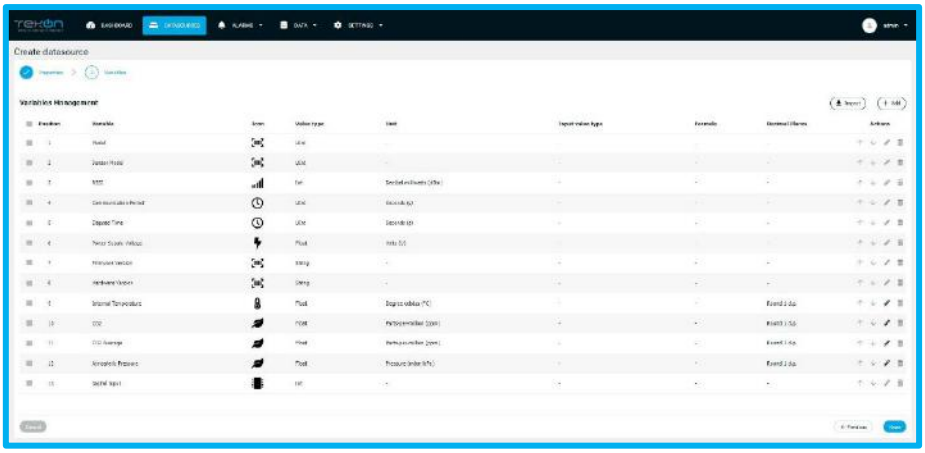


Figure 29 - Page of DUOS inCO2 datasource variables

DUOS inHygroT

DUOS inHygroT datasources link the **DUOS inHygrotemp** transmitter with **Tekon IoT Platform**. In this model, the variables enabled with editing properties are *"Internal Temperature"* and *"Relative Humidity"*.

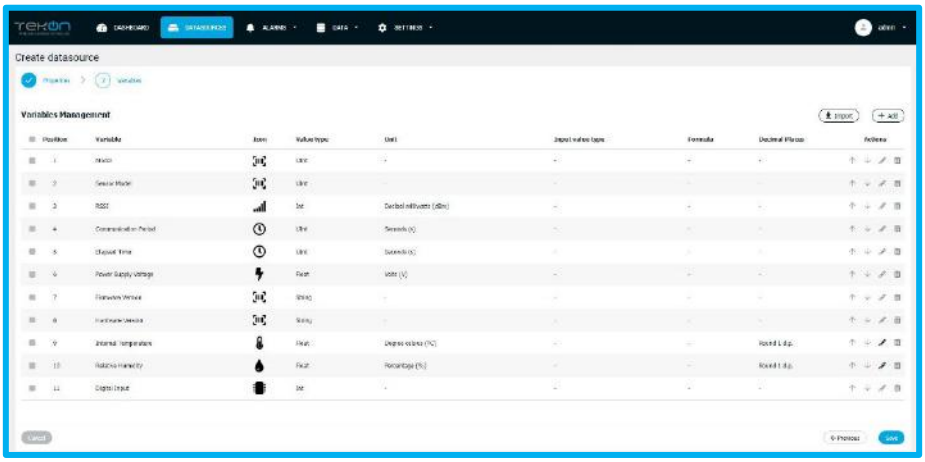


Figure 30 - Page of DUOS inHygroT datasource variables

DUOS inTemp

DUOS inTemp datasources link the **DUOS inTemp** transmitter with **Tekon IoT Platform**. In this model, only the *"Internal Temperature"* variable is enabled with editing properties.

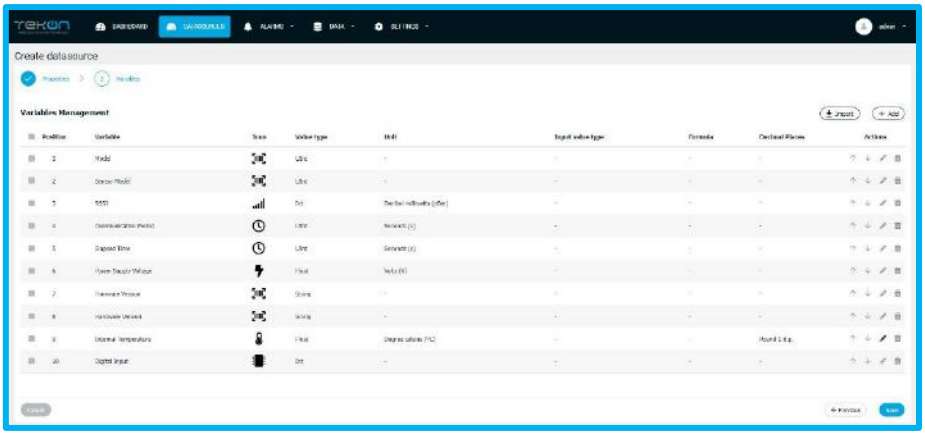


Figure 31 - Page of DUOS inTemp datasource variables

DUOS uTemp

DUOS uTemp datasources link the **DUOS uTemp** transmitter with **Tekon IoT Platform**. In this model, the variables enabled with editing properties are *"Internal Temperature"* and *"External Temperature"*.

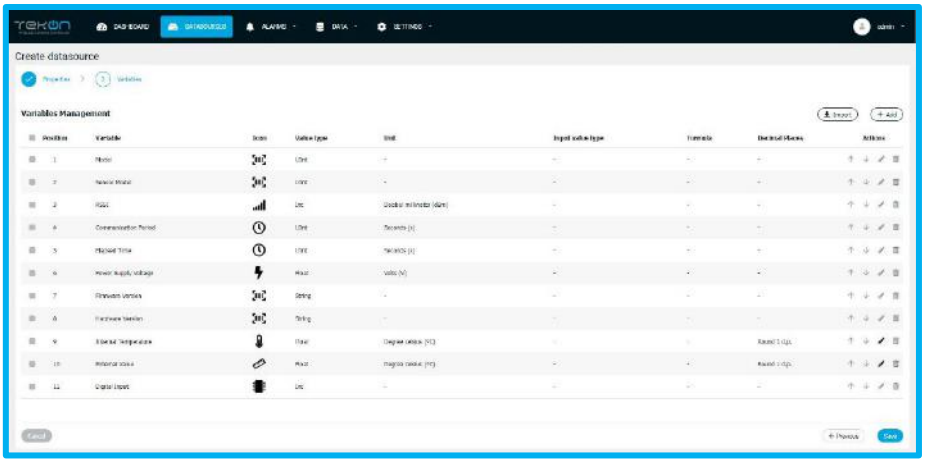


Figure 32 - Page of DUOS uTemp datasource variables

DUOS MultiTemp

DUOS MultiTemp datasources link the **DUOS MultiTemp** transmitter with **Tekon IoT Platform**. In this model, the variables enabled with editing properties are *"Internal Temperature", "Temperature 1", "Temperature 2", "Temperature 3", "Temperature 4"* and *"Temperature 5"*.

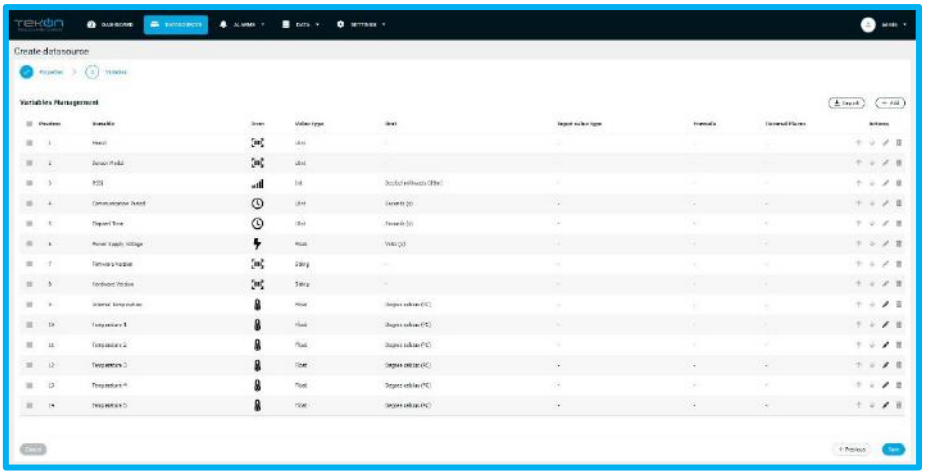


Figure 33 - Page of DUOS MultiTemp datasource variables

PLUS

The datasource configuration with the **PLUS** type is intended for the integration of transmitter from **Tekon Electronics** PLUS product family. The variables initially set in this datasource model only refer to the transmitter information, where variables like "*RSSI*", "*Communication Period*", "*Power Supply Voltage*" and others are already set.

The integration of variables that transpose process monitoring into **Tekon IoT Platform** is custom made using generic variables, where you define the type of data, the units corresponding to the monitoring process and the appropriate formula for converting data values measured for the desired unit.

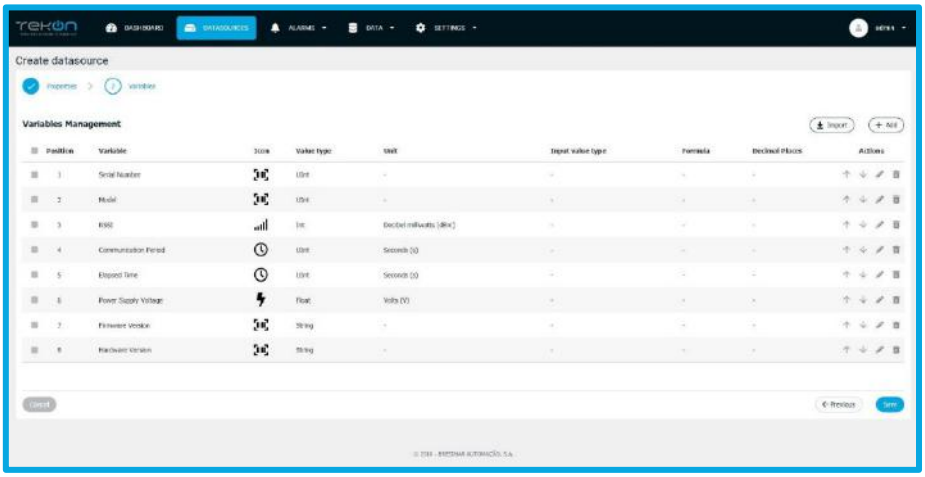


Figure 34 - Page of PLUS datasource variables

PLUS 1AI

PLUS 1AI datasources relate the **PLUS 1AI** transmitter to the **Tekon IoT Platform**. In this model, the variables enabled with editing properties are "*Internal Temperature*", "*Analog Input 1*" and "*DO: Remote Output*". The first variable is recorded by the transmitter's internal temperature probe. The last two references are related to the value of the analog input and the remote output, respectively.

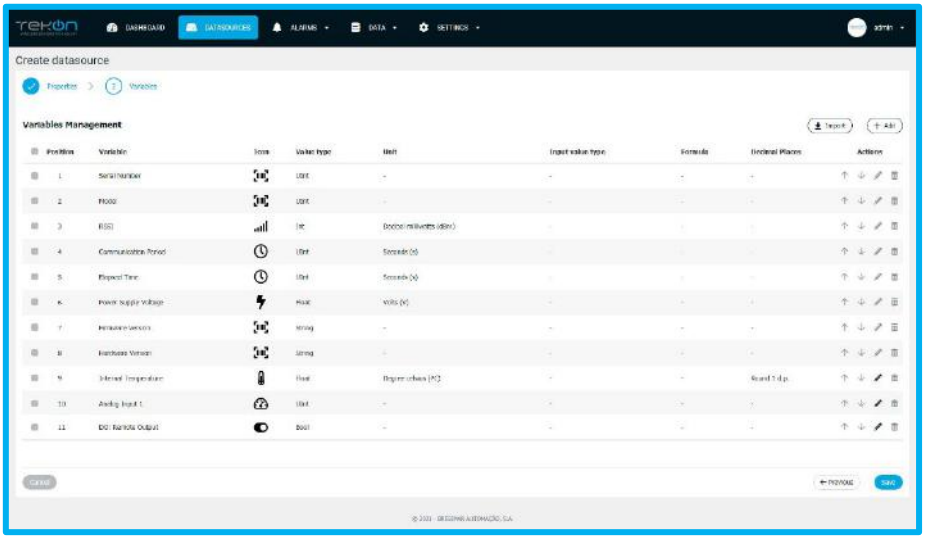


Figure 35 - Page of PLUS 1AI datasource variables

PLUS 2AI

PLUS 2AI datasources relate the **PLUS 2AI** transmitter to the **Tekon IoT Platform**. In this model, the variables enabled with editing properties are *"Internal Temperature"*, "*Analog Input 1*", *"Analog Input 2"* and *"DO: Remote Output".* The first variable is recorded by the transmitter's internal temperature probe. The remaining 3 references are related to the value of the analog inputs and the remote output, respectively.

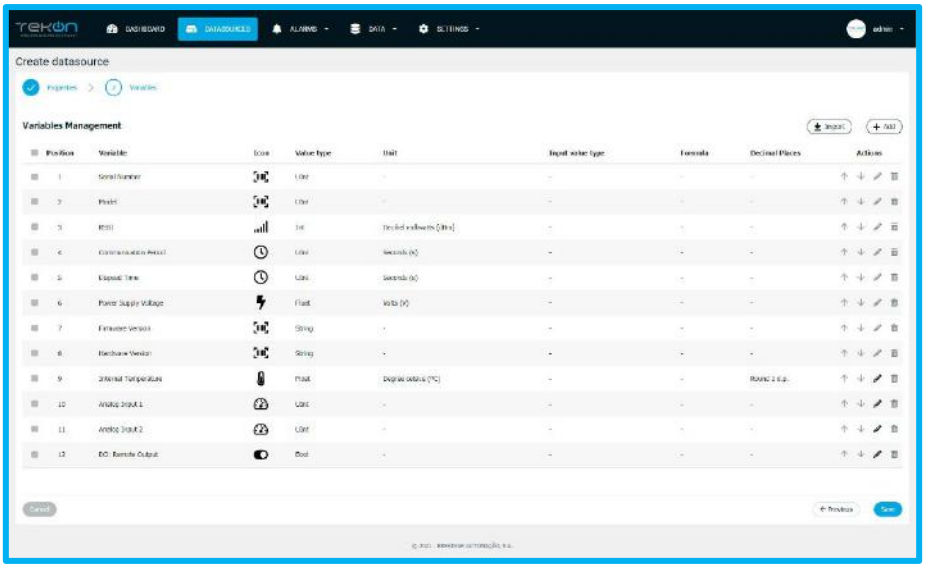


Figure 36 - Page of PLUS 2AI datasource variables

PLUS 1DI

PLUS 1DI datasources relate the **PLUS 1DI** transmitter to the **Tekon IoT Platform**. In this model, the variables enabled with editing properties are *"Internal Temperature"*, *"Pulse Counter 1"*, *"DO: Remote Output"*, *"Reset Pulse Counter 1"* and *"Digital Input 1 State"*. The first variable is recorded by the transmitter's internal temperature probe. The remaining references are related to the value of the digital input when used as a pulse counter, of the remote output, reset of the pulse count and status of the digital input, respectively.

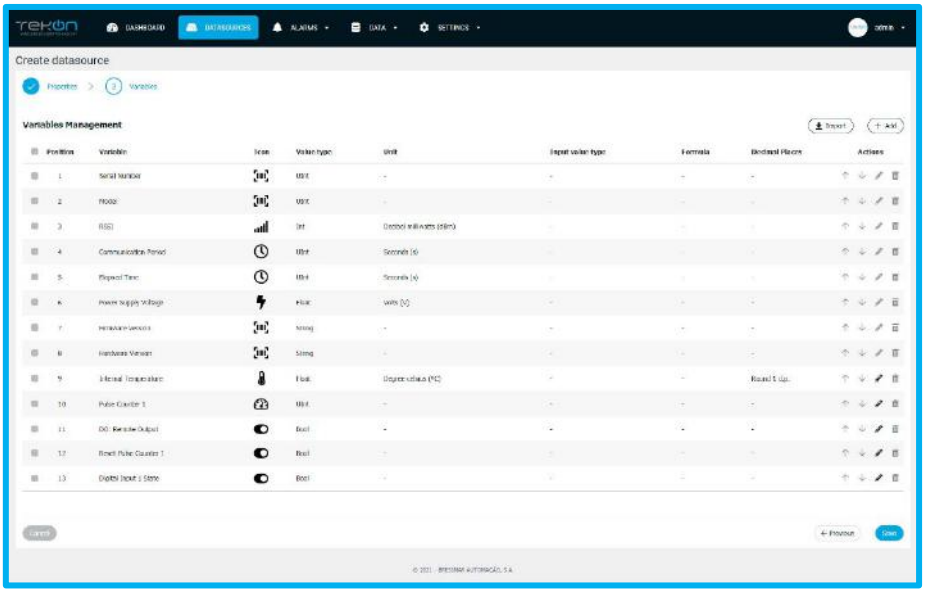


Figure 37 - Page of PLUS 1DI datasource variables

PLUS 2DI

PLUS 2DI datasources relate the **PLUS 2DI** transmitter to the **Tekon IoT Platform**. In this model, the variables enabled with editing properties are *"Internal Temperature"*, *"Pulse Counter 1"*, *"Pulse Counter 2", "DO: Remote Output", "Reset Pulse Counter 1", "Reset Pulse Counter 2", "Digital Input 1 State"* and *"Digital Input 2 State"*. The first variable is recorded by the transmitter's internal temperature probe. The remaining references are related to the value of the digital inputs when used as pulse counters, the remote output, resetting the pulse count of the digital inputs and states of the digital inputs, respectively.

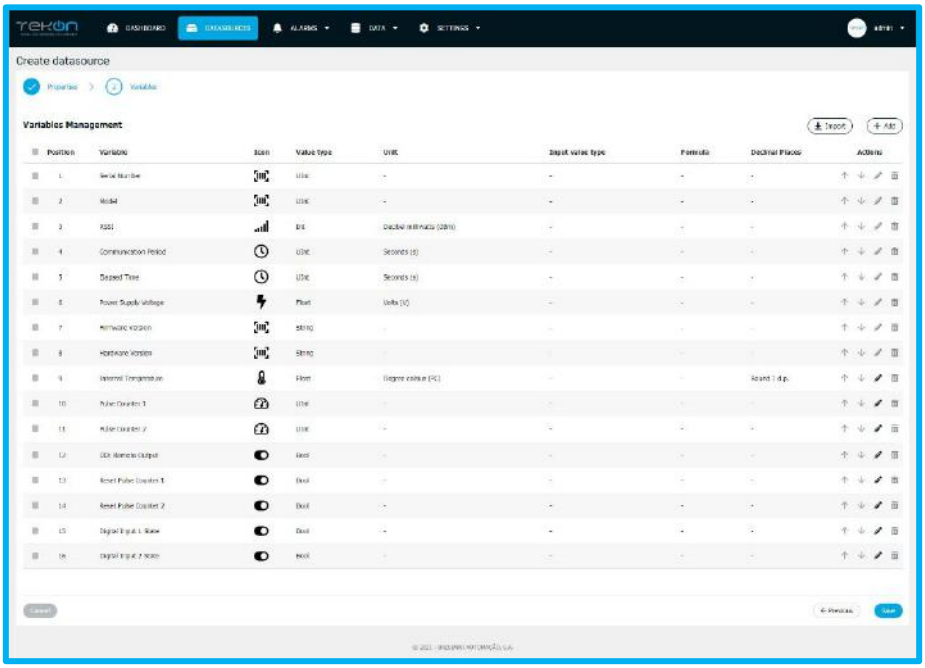


Figure 38 - Page of PLUS 2DI datasource variables

PLUS 1UT

PLUS 1UT datasources relate the **PLUS 1UT** transmitter to the **Tekon IoT Platform**. In this model, the variables enabled with editing properties are *"Internal Temperature", "External Temperature 1"* and *"DO: Remote Output".* The first variable is recorded by the transmitter's internal temperature probe. The last two references are related to the value of the external temperature input and the remote output, respectively.

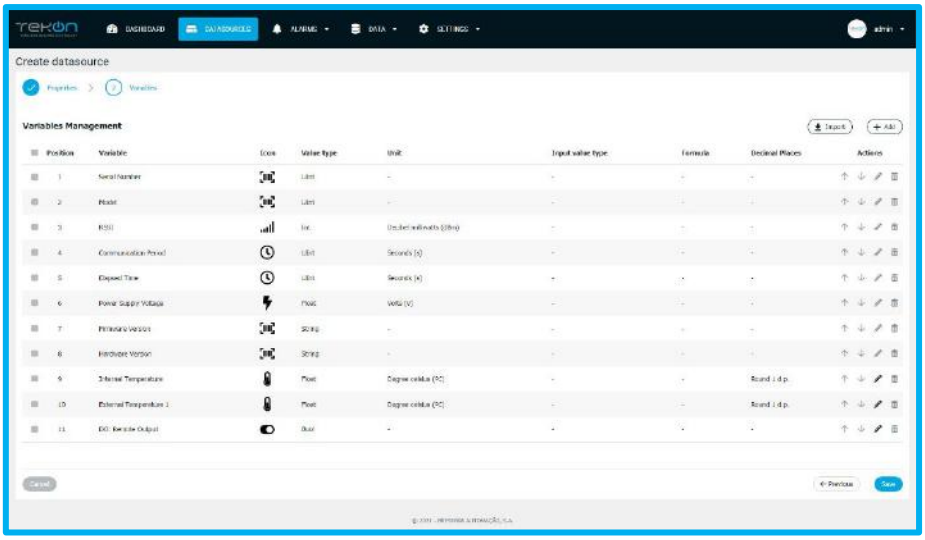


Figure 39 - Page of PLUS 1UT datasource variables

PLUS 2UT

PLUS 2UT datasources relate the **PLUS 2UT** transmitter to the **Tekon IoT Platform**. In this model, the variables enabled with editing properties are *"Internal Temperature", "External Temperature 1", "External Temperature 2"* and *"DO: Remote Output"*. The first variable is recorded by the transmitter's internal temperature probe. The remaining references are related to the value of the temperature inputs and the remote output, respectively.

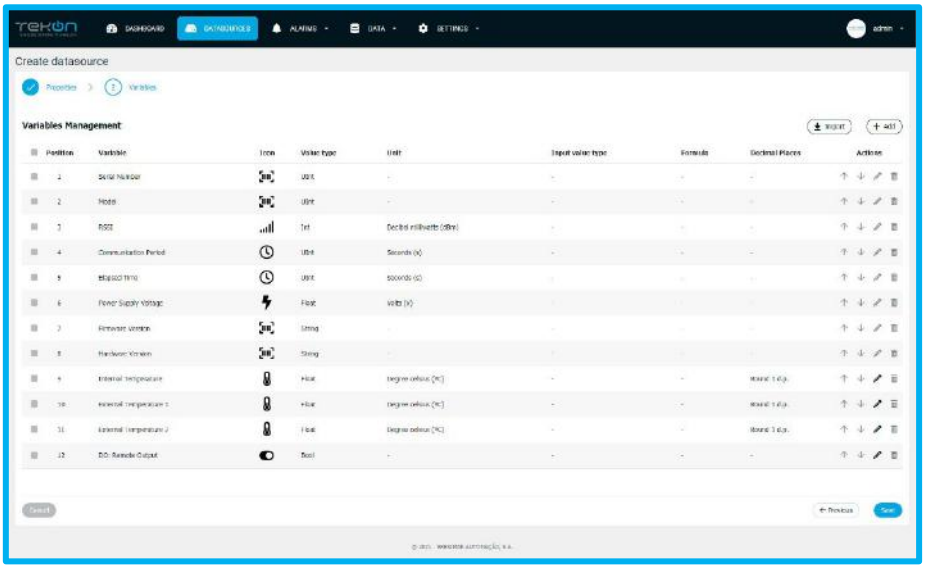


Figure 40 - Page of PLUS 2UT datasource variables

PLUS 4AI

PLUS 4AI datasources relate the **PLUS 4AI** transmitter to the **Tekon IoT Platform**. In this model, the variables enabled with editing properties are *"Internal Temperature", "Analog Input 1", "Analog Input 2", "Analog Input 3", "Analog Input 4", "DO: Remote Output", "DO : External Power "* and *"DI: Comm Trigger"*. The first variable is recorded by the transmitter's internal temperature probe. The following four references are related to the value of the four analog inputs. The last three variables are related to the remote output, the digital output for external power and the digital communication trigger input.

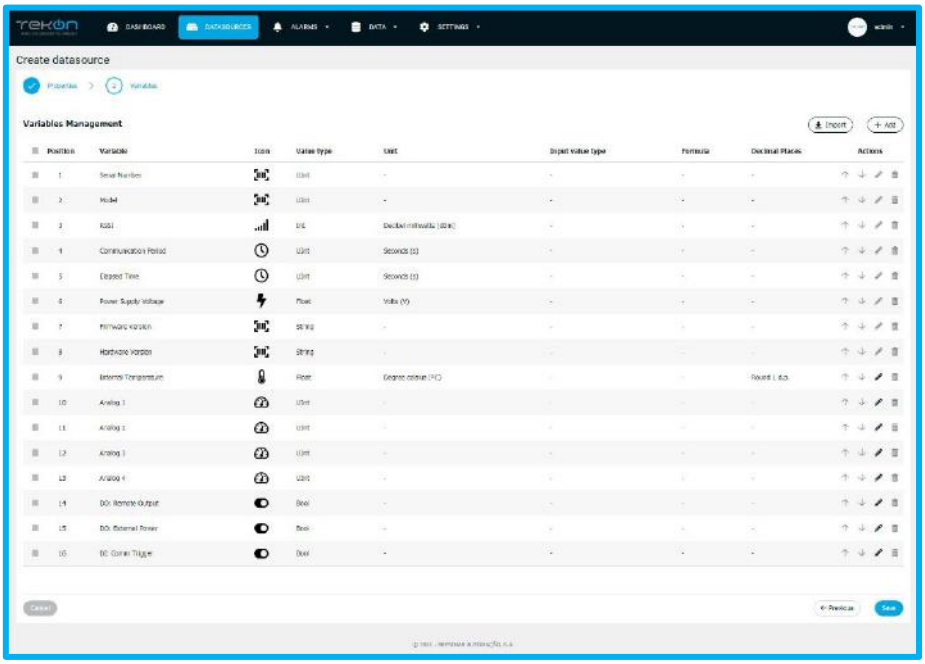


Figure 41 - Page of PLUS 4AI datasource variables

PLUS 4AI4DI1UT

PLUS 4AI4DI1UT datasources relate the **PLUS 4AI4DI1UT** transmitter to the **Tekon IoT Platform**. In this model, the variables enabled with editing properties are *"Internal Temperature", "Analog Input 1", "Analog Input 2", "Analog Input 3", "Analog Input 4", "DO: Remote Output", "DO : External Power "," DI: Comm Trigger "," Digital Input 1 "," Digital Input 2 "," Digital Input 3*" and *"Digital Input 4"*. The first variable is recorded by the transmitter's internal temperature probe. The following four references are related to the value of the four analog inputs. The following three variables are related to the remote output, the digital output for external power and the digital communication trigger input. The last four variables are related to the value of the digital inputs.

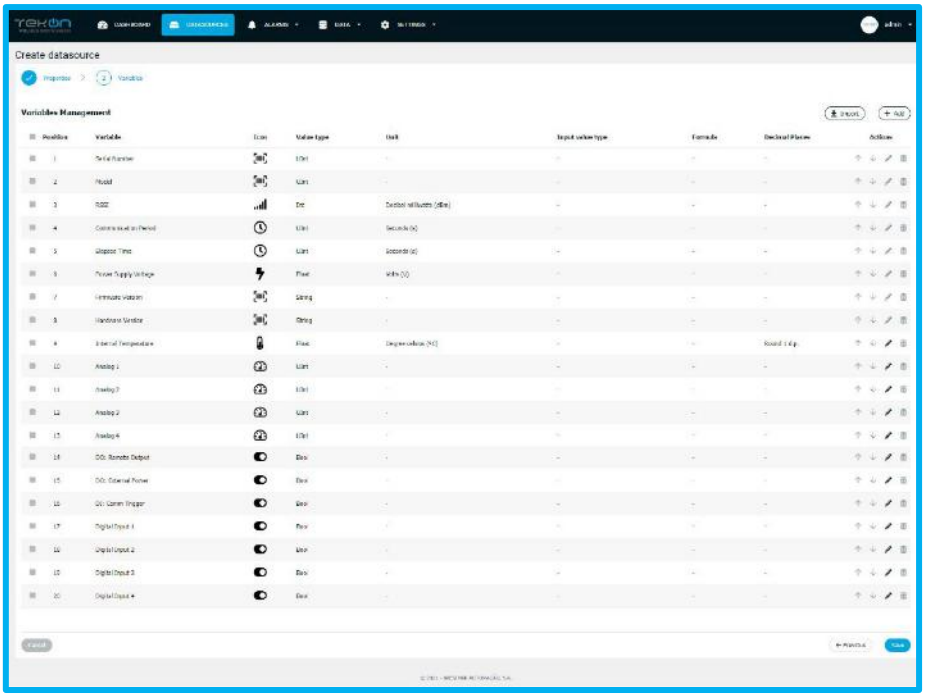


Figure 42 Page of PLUS 4AI4DI1UT datasource variables

PLUS TWPH-1UT

PLUS TWPH-1UT datasources relate the **PLUS TWPH-1UT** transmitter to the **Tekon IoT Platform**. In this model, the variables enabled with editing properties are *"Internal Temperature"* and *"External Temperature"*. The first variable is recorded by the transmitter's internal temperature probe. The other variable records the temperature value registered at the temperature input.

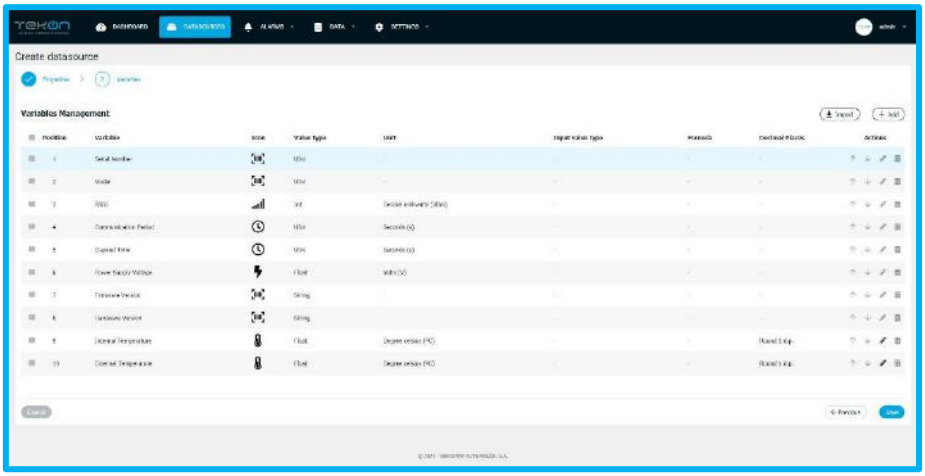


Figure 43 - Page of PLUS TWPH-1UT datasource variables

Datasources listing

Inside the platform, after click on **DATASOURCES** menu, the user has access to the listing of all datasources entered in the system. In this section, changes can be made to the datasources already configured and view their status.

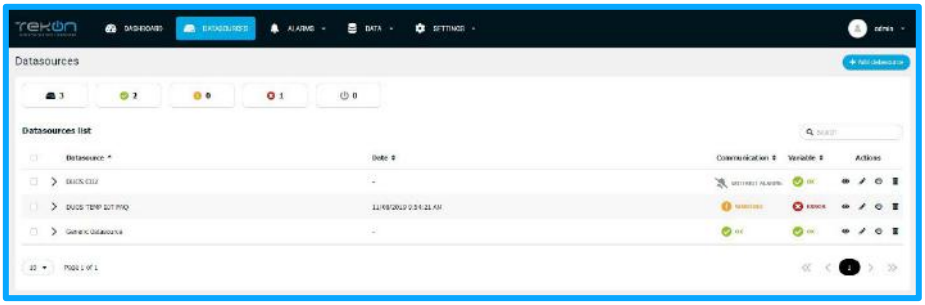
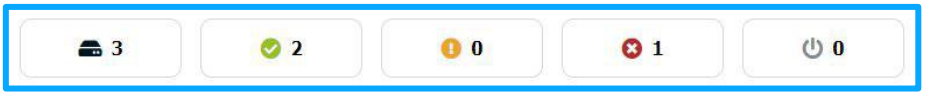


Figure 44 - Datasources page

In cases where the list of datasources is longer, you can use the “Search” field to search for datasources by name.

At the top of the list is a summary of the datasources present on the platform. This summary shows the number of datasources and their communication states and operating mode.



Total number of datasources	Datasources properly connected	Datasources with warning alarms	Datasources with error alarms	Datasources disabled

Figure 45 - Datasources overview

The listing of configured datasources on **Tekon IoT Platform** can be filtered by the options described above. The described states work as buttons and can be used to create filters for the presentation of datasources.

Figure 46 - Datasources filters

Datasources actions

In the elements that go with the datasource list, there are actions that can be uniquely applied to each of the elements listed.

Figure 47 - Datasources listing options

NOTE: when datasources are disabled, the options are modified so that they can be enabled again.

Figure 48 - Options with datasource listing activation

Let's describe the function of each of the action icons:

- See information about datasource properties and variables;
- Edit datasource configuration;
- Clone and create a new datasource based on the original parameters;
- Disable datasource;
  Stop the alarms associated with this datasource;
- Reactivate datasource;
  Reactivate the alarms associated with this datasource;
- Delete datasource and associated features (alarms, widgets,…)

Datasource status

The datasources presented on the platform are subject to user interaction and technical communication failures that may affect their operational state. To represent all of these states, the platform displays notifications about the condition of each datasource in real time.

The different state types are catalogued based on operating conditions:

- If datasources are active or inactive;
- If there are active alarms related to communication related events;
- If there are active alarms linked to events related to variable registers;

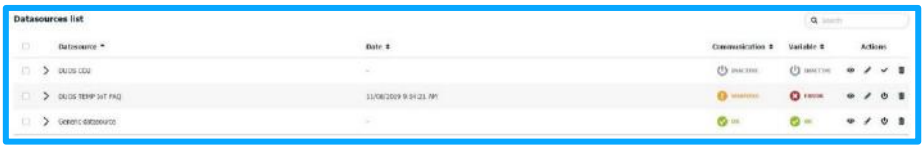


Figure 49 - Different datasources status

Possible status for user viewing transmits information of different patterns. In the upper image, you can see the examples that can define the states of datasources.

	Communication	Variable
WITHOUT ALARMS	The datasource is active and none of the associated inactivity alarms is ative.	The datasource is active and none of the associated value alarms is ative.
INACTIVE	The datasource is inactive and the associated alarms will not be processed.	The datasource is inactive and the associated alarms will not be processed.
WARNING	The datasource has a ***Warning*** category alarm***,*** of ***Inactivity*** type that is active.	The datasource has a ***Warning*** category alarm***,*** of ***Value*** type, that is active.
ERROR	The datasource has an ***Error*** category alarm, of ***Inactivity*** type, that is active.	The datasource has an ***Error*** category alarm, of ***Value*** type, that is active.
OK	Datasource communication has no problems	The values measured in the variables did not triggered any alarms.

Table 1 – Descriptive table of states and meanings

Datasource details

At **Tekon IoT Platform**, you can access detailed information from each datasource. This feature allows you to view the exact values of all variables defined in your configuration.

In the datasources list, obtained from the **DATASOURCES** main menu, click on the datasource row from which you want to access the details.

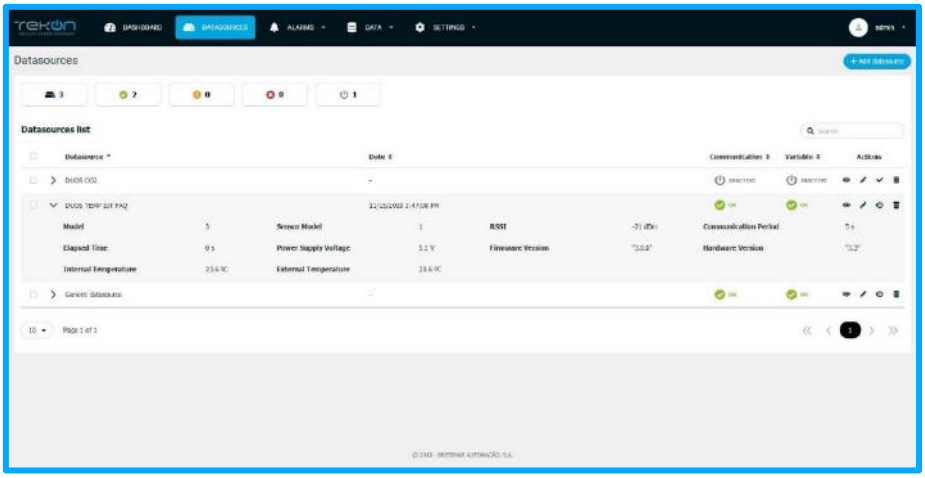


Figure 50 – Datasources detailed information

A box will show up containing the detailed information of the datasource, organized by variables.

Data types

The data collected and available for visualization on the platform have characteristic formats of the corresponding variables. When choosing or defining a variable type, it must be associated with a data type. Of the existing data formats, **Tekon IoT Platform** offers five types.

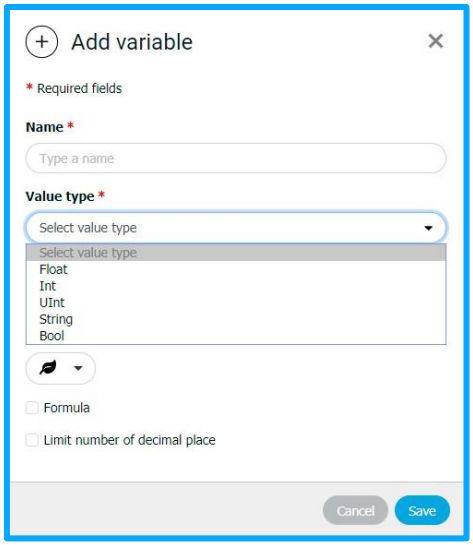


Figure 51 - Example of data type selection

Float

Float data types store real numbers, they refer to numeric values with decimal places. In this context, it is a decimal type with an accuracy of 28 or 29 digits.

Int

Int data types store integers, separated between negative and positive numbers. This type of data applies, for example, to record signal strength values in dBm, which is traditionally a negative integer value. In the lower data categories of this data type, the implemented one was the type ***Int32*** that presents a variation of -2,147,483,648 to 2,147,483,647.

UInt

UInt are datasets of numeric origin, but varying from 0 to 4,294,967,295, resulting only in positive numeric values. A common use of this type of data is in the communication time log, with a time unit of seconds.

String

String is the data type used when the value to be reached is alphanumeric strings. For example, the listing of the hardware and firmware version should occur using this data type.

Bool

Bool data type accepts logical values of “true” or “false” type. Its use may be appropriate for event detection, where verification focuses on whether the action happens or not.

WIDGETS

Widgets are tools designed to translate the information collected by sensors into a visual format. Widgets can be added at any time by any user through the menu at the top of the dashboard.

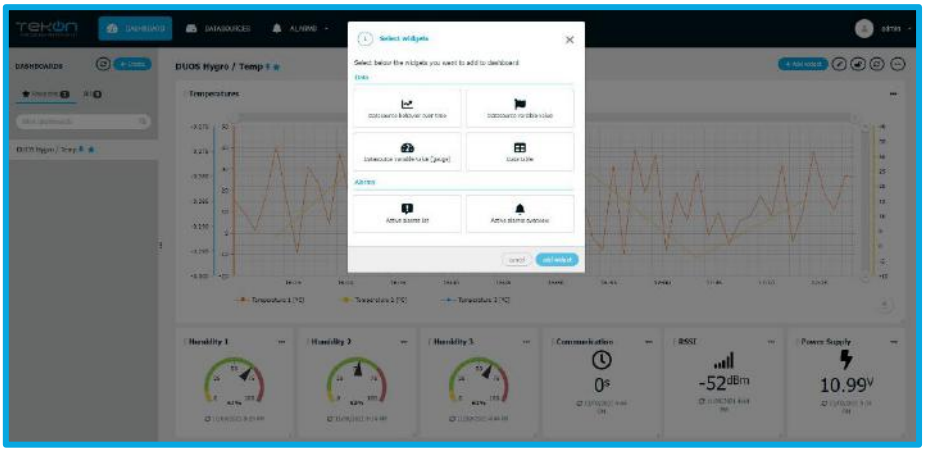


Figure 52 - Available widgets

The widgets available come in different formats and looks to better meet user's needs. Within the available formats, the user can configure widgets from the type:

Datasource behaviour over time

This widget allows you to have more than one variable represented on the same chart. To define the time interval of logged data you want to represent, a time interval can be set based on hours, days, weeks, months or years.

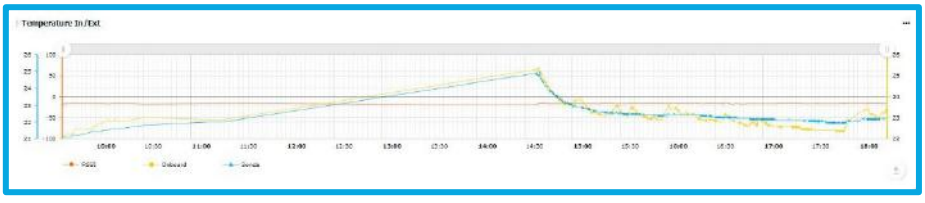


Figure 53 - Example of a timeline graph

After configuring the widget, you can interact with the chart, doing some actions:

- Hide and show each variable;
- Zoom-in and zoom-out directly on the timeline;

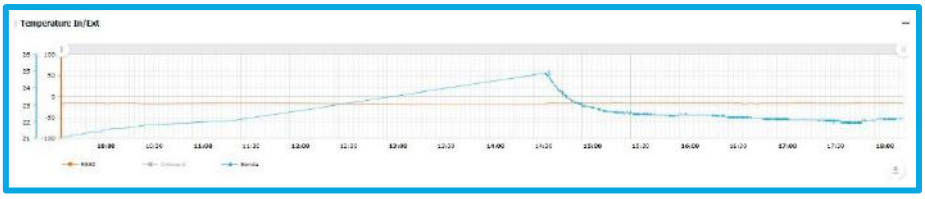


Figure 54 - Timeline chart with hidden variables

Configuration

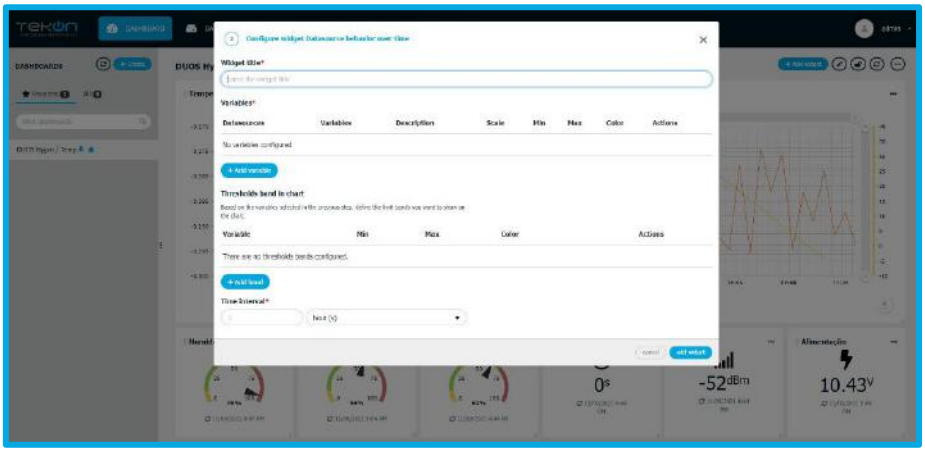


Figure 55 - Widget configuration

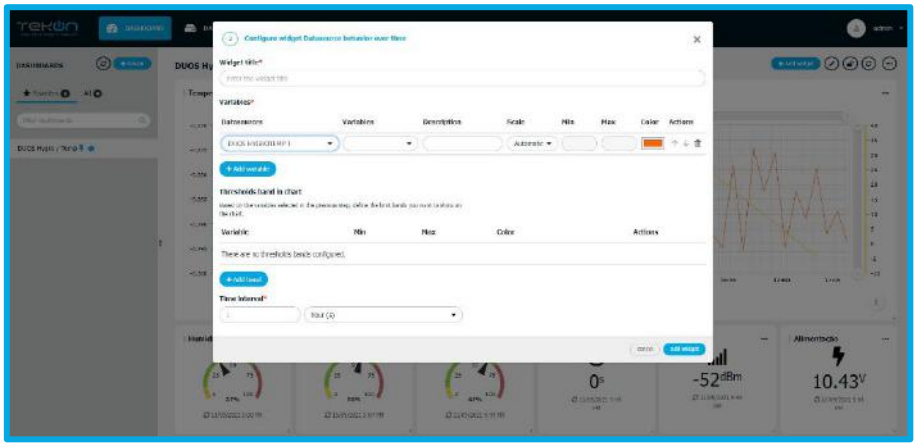


Figure 56 - Widget variables configuration

Configure chart widget

1. Define widget title.
2. Select a datasource and a variable.
3. If you want to customize the variable name, change the “Description” field.
4. If you want to customize the scale of the selected variable, in the “Scale” field, select “Manual” option and define minimum and maximum values of scales. By default, the scale is adjusted automatically, through the minimum and maximum values recorded in time interval that will be stipulated in the chart.
5. Select the color of the line that will represent the variable.
6. Click on to validate the variable configuration.
7. Repeat the previous steps to add more variables.
8. Optionally, you can add threshold bands associated with the configured variables. Click on “Add brand” to add more bands to the chart.
    a. Click on “Variable” list and select a variable.
    b. Set a minimum variable value.
    c. Set a maximum variable value.
    d. Select the band colour.
9. Define a time interval for the data that will be on the chart. It is possible to set an interval in hours, days, weeks, months or years.

NOTE: the longer the defined interval, the system will take more time to load data and update chart when there is new data.

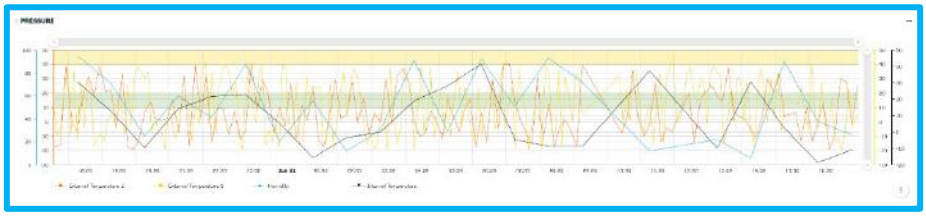


Figure 57 - Charts with threshold bands

Graphical data export plug-in

In this application, the export of data related to the graph and the information that is generating it can be done through a plug-in provided with the graph for this purpose.

You can choose to save only the graphic, as an image, in a file with .JPG, .SVG or .PDF formats.

NOTE: user can choose which graphic lines to show in the file to export.

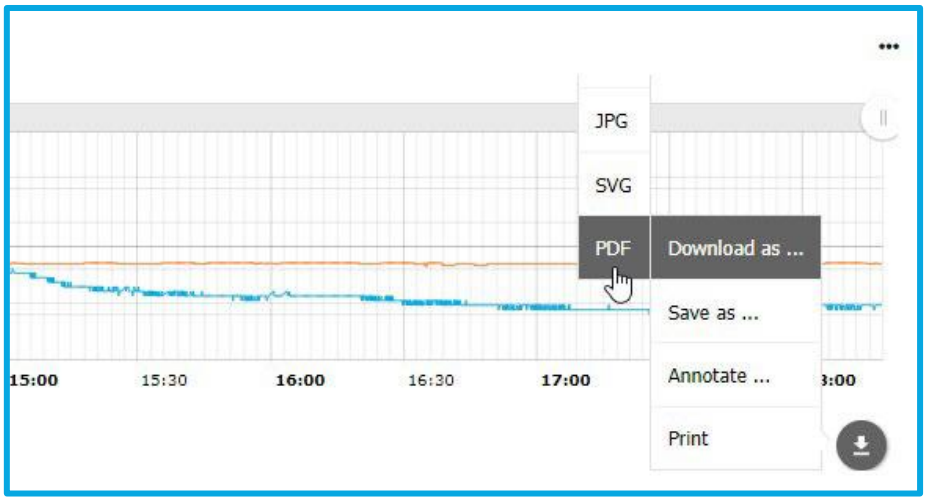


Figure 58 - Timeline graph plug-in

With this plug-in, the user has a chance to access the information that is originating the chart. The information will always be exported as a data list, separated by datasource, in a file with .CSV, .XLSX or .JSON formats.

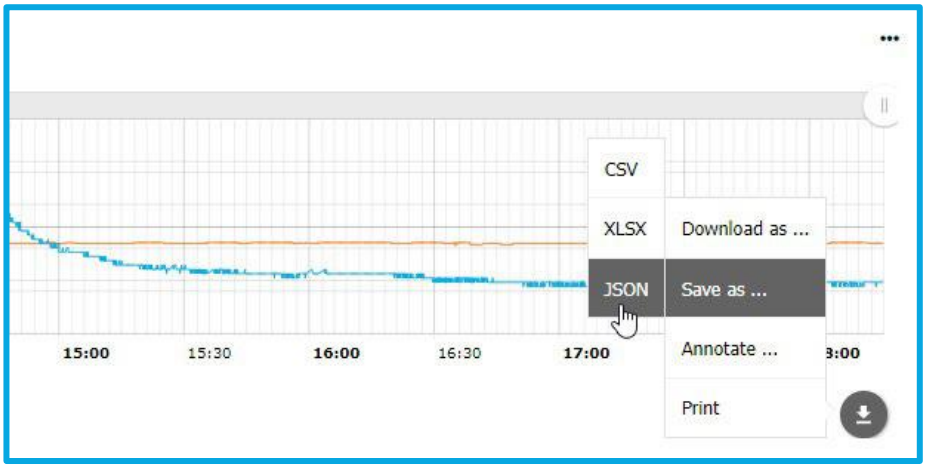


Figure 59 - Data export through plug-in

NOTE: no user has permissions to configure this type of export. The information is fully selected.

Datasource variable value

Defines a frame with the representation of only one variable chosen by the user through an icon associated with the variable context, name and the collected value.

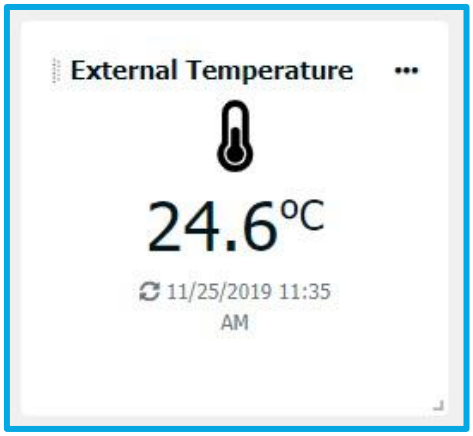


Figure 60 - Interface of single value widget

This widget lets the user to know the measured value as well as the date and time corresponding to the last record.

After defining the datasource that will serve as the basis for returning the desired value, a list with all the variables set for the chosen datasource is displayed. The user can now choose the desired variable, assign a name to the widget and choose the most appropriate representative icon.

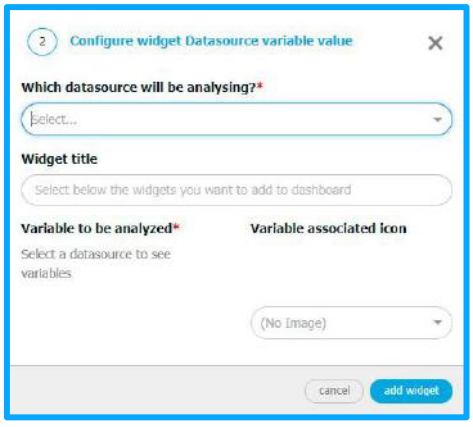


Figure 61 - Main window of widget configuration

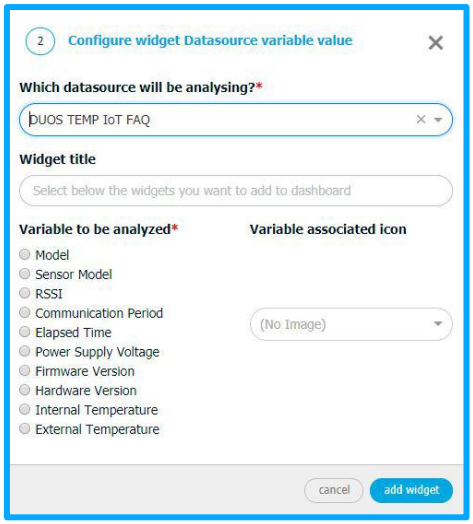


Figure 62 - Widget variable selection

Datasource variable value (gauge)

It defines a frame with the gauge representation of only one variable chosen by the user, where he can set safety intervals represented by customizable colours for each one.

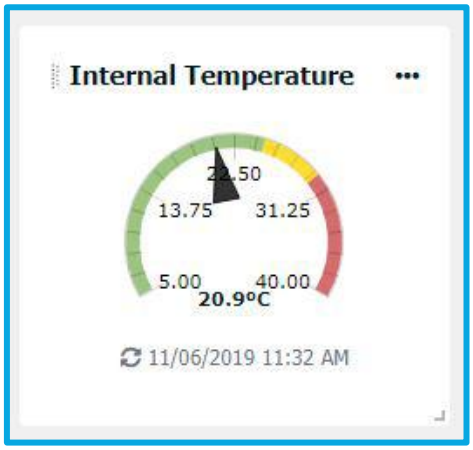


Figure 63 - Gauge widget interface

Like the **Datasource variable value** widget, in this frame you can also know the date and time of the last record.

Configuration

The parameters for the widget configuration are divided in four points:

- Widget name;
- Datasource selection that provides the variable;
- Represented variable;

- Representative value ranges;

The widget configuration form looks like the example below.

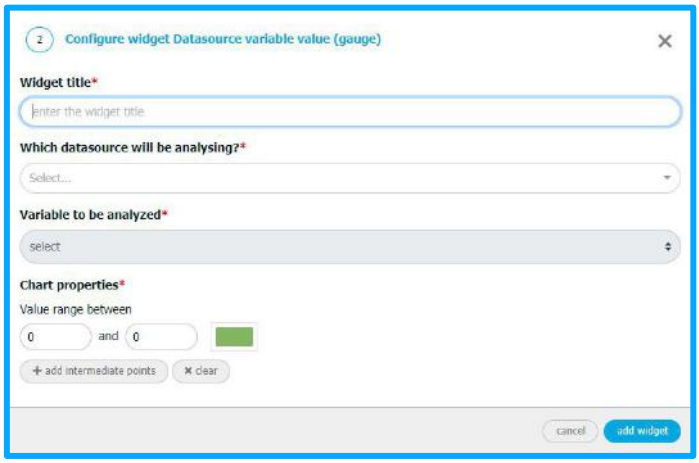


Figure 64 - Gauge widget configuration

The definition of the value ranges serves to set reference values for the chosen variable and customizable according to the process in which it is included. To enter more references values, click **Add intermediate points**. The representation of values ranges in this widget is limited by a maximum of five reference ranges.

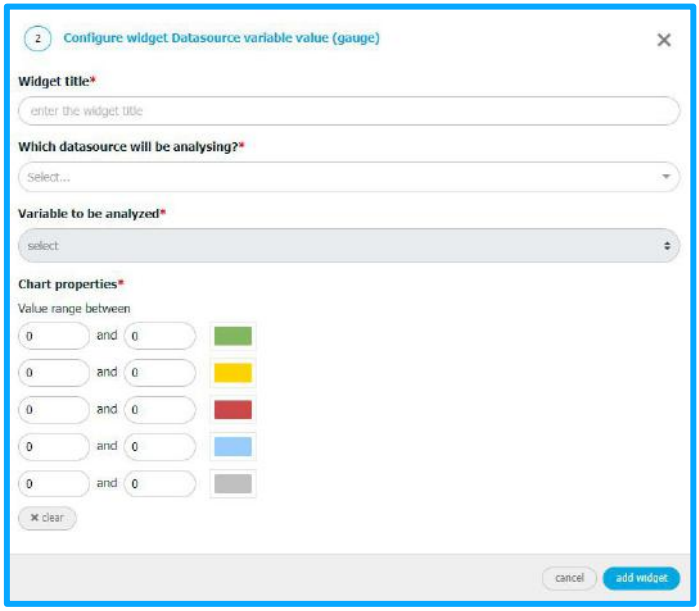


Figure 65 - Widget ranges

Each range has an associated colour that will be represented on the widget interface. This colour can be changed by the user, through a frame that allows the choice by several methods:

- Manual colour selection;

- RGB colour coding;
- Hexadecimal code;
- Default colours already defined;
- Degree of transparency for the selected colour;

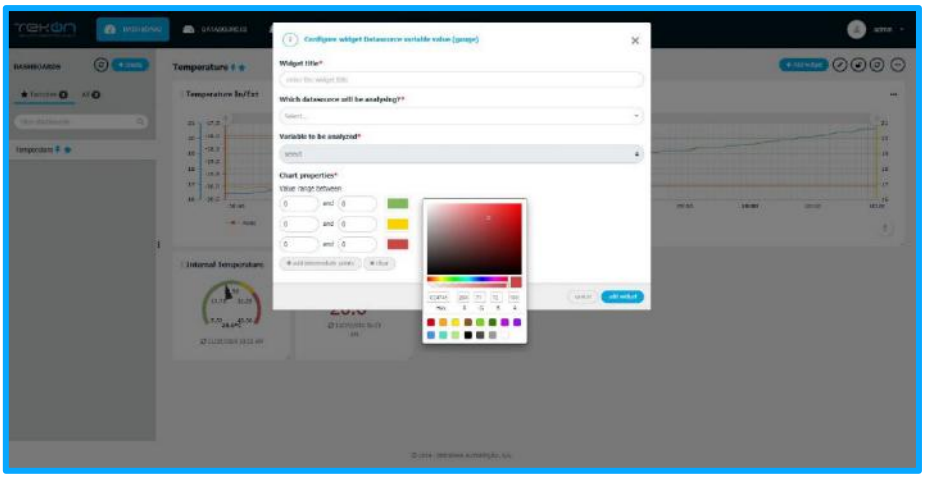


Figure 66 – Selection of range colours

NOTE: the set values of the ranges must follow a logical guideline. For this, the first value of a range must match the last value of a previously defined range. The upper range limit is unique, meaning this value is not within range. There can be no gap failures or gap overlaps.

Figure 67 - Example of a range configuration

If the setting range does not follow the value assignment logic, the fields will be marked with an error and a message that states a configuration problem that blocks the conclusion of the operation.

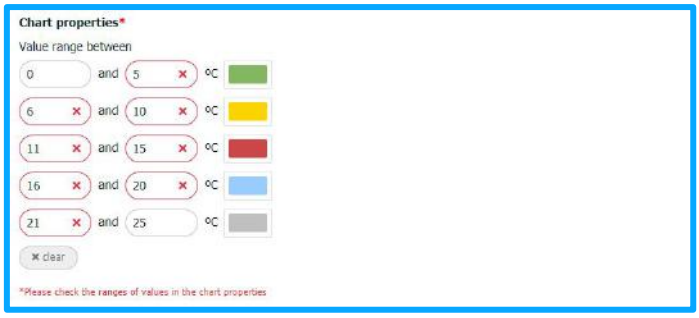


Figure 68 - Range configuration error

To reset the configuration, click on **Clear** and the default configuration is restored.

Active alarm list

The user can consult a list of alarms, referring to a datasource or dataset. It displays a log for each active alarm.

If an alarm is triggered, an item in the list is automatically created consisting of:

- Date and time of alarm;
- Alarm category (error or warning);
- Datasource providing alarm;
- The value that triggered the alarm;
- Alarm description (the variable and the factor set to trigger the alarm).

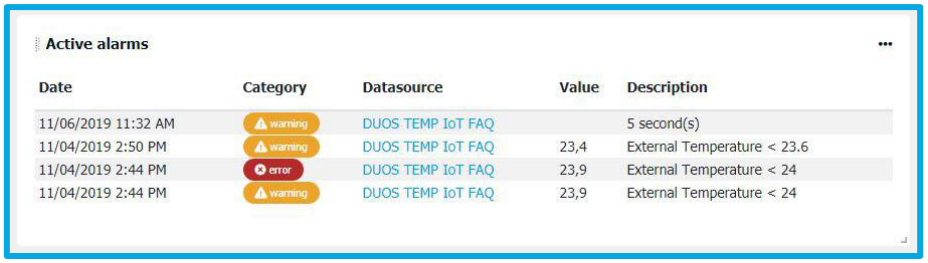


Figure 69 - Alarm list widget

NOTE: clicking on the name of the datasource that appears in the list redirects you to a list of alarms associated to the datasource.

In the configuration you can choose one or more datasources, the list/widget name and the maximum number of registers it will be listed.

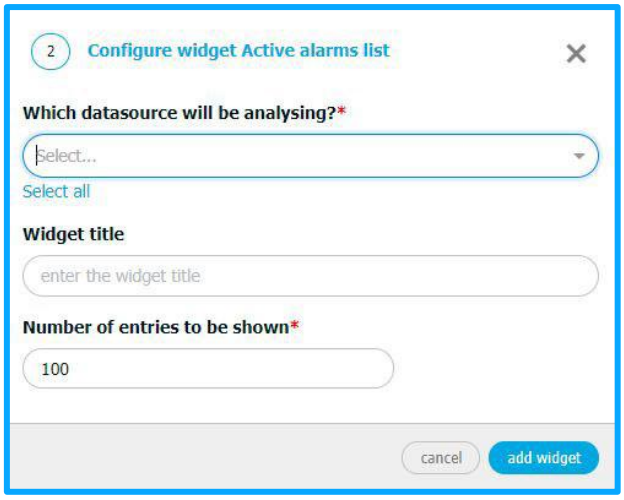


Figure 70 - Configuration of alarm list widget

Active alarms overview

You can configure this widget to present the number of alarms, when activated, for a datasource or dataset.

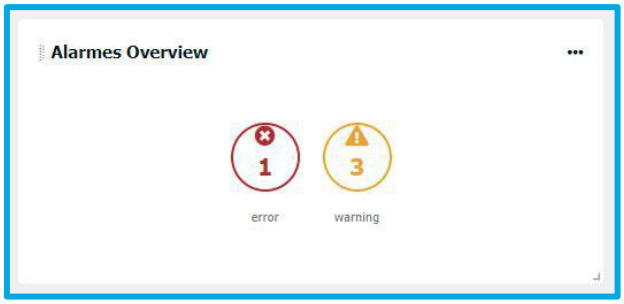


Figure 71 - Alarms overview widget

Alarm numbers are grouped by alarm category – **Error** or **Warning**.

Clicking on the alarm type icons will redirect you to an alarm history page built with the information. You can find more information about the alarm history feature on the **HISTORY** tab.

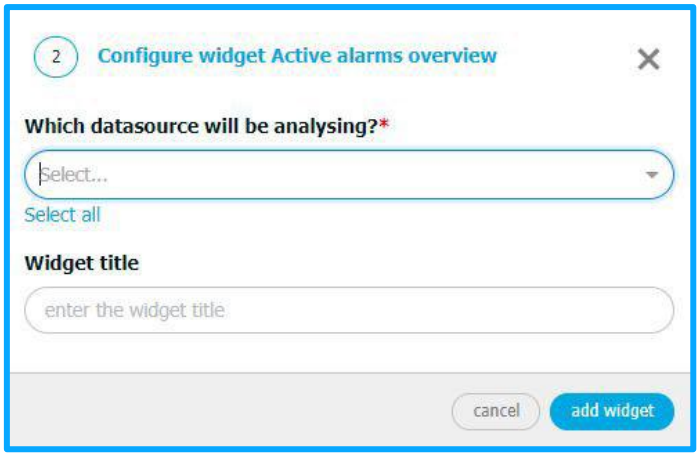


Figure 72 - Configuration of active alarms overview widget

Data table

In this widget, the user can consult real-time data in a table format.

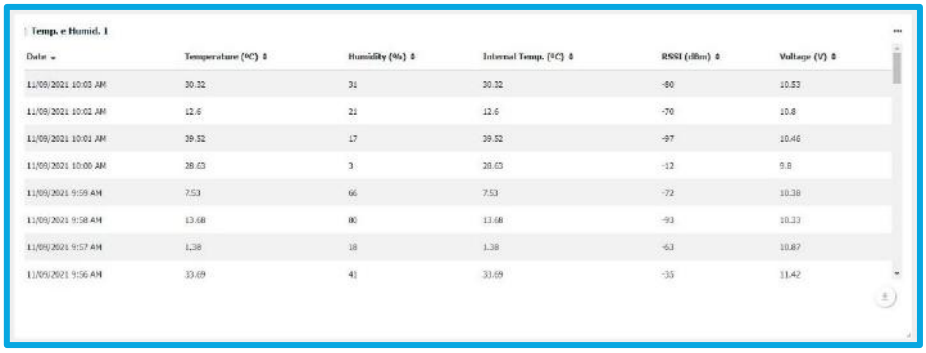


Figure 73 - Data Table widget

Configuration

The parameters for configuring the widget are divided into 6 points:

- Widget name
- Selection of the datasource that has the intended variable
- Variable that will be represented
- Aggregation type
- Aggregation interval
- Number of entries to display in the table
- Time intervals of displayed logs

The widget configuration window looks like the example below.

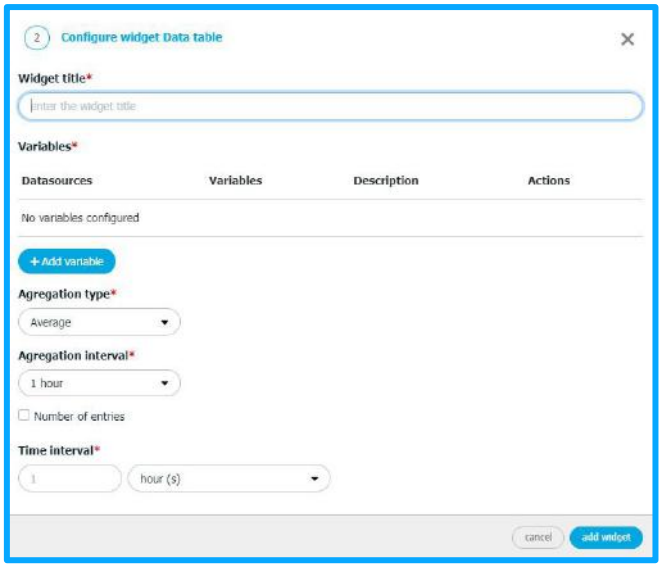


Figure 74 - Configuration of data table widget

Selecting variables will add columns to the widget table. Click on **Add variable** to select the datasource that has the variable you want to include in the data table. You can edit the description of the variable that will be used from the top of the column.

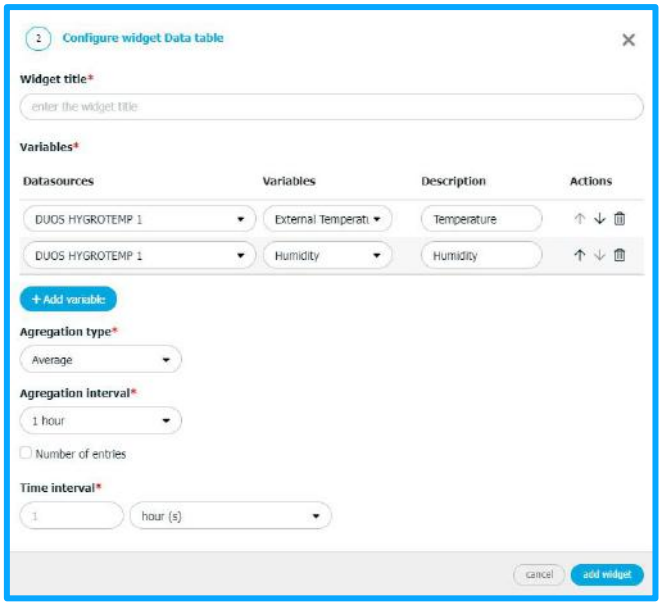


Figure 75 - Datasources for data table

The aggregation method allows to obtain various insights of process granularity. In the aggregation segment, you can configure the aggregation type – **Without aggregation, Average, Maximum, Minimum** and **Median** - and the aggregation interval – **30 seconds, 1 minute, 15 minutes, 30 minutes, 1 hour, 12 hours, 1 day, 1 week, 1 month** and **1 year** - to apply to data.

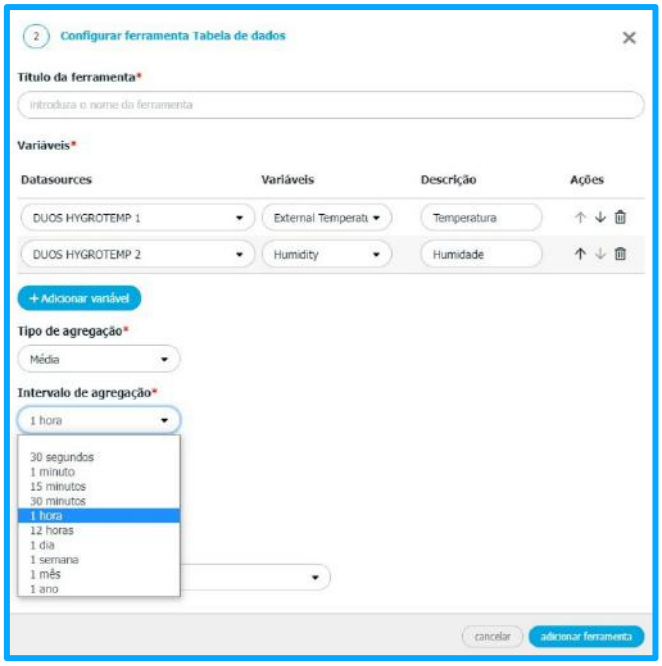


Figure 76 - Aggregation methods for data table widget

The number of entries will define the maximum number of records to be displayed in the widget. Whenever a new record is available, the oldest one is removed from the table. The time interval is the time span between the first and last record to be displayed in the table.

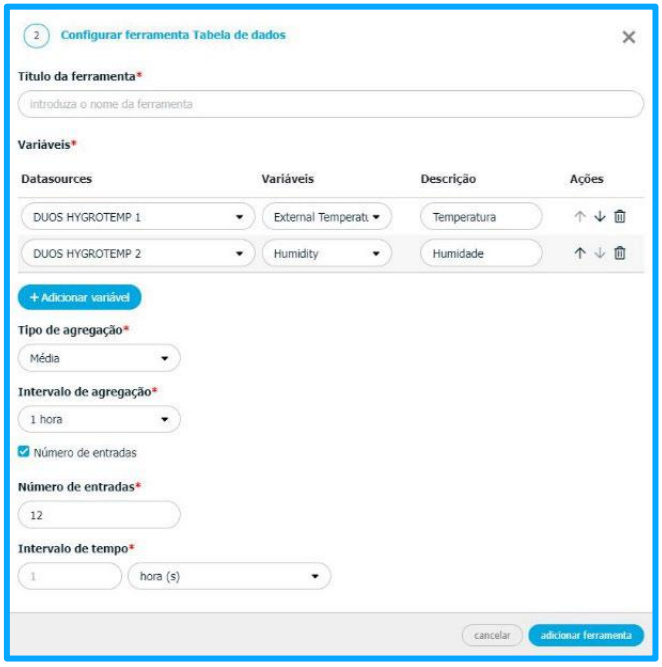


Figure 77 - Number of entries for data table widget

Widgets options

All widgets that are available on **Tekon IoT Platform**, once configured and deployed in dashboards, have options that allow user interaction.

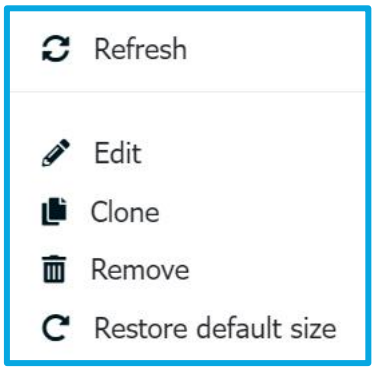


Figure 78 - Widgets options available at dashboards

- **Refresh** – update widget information;
- **Edit** – change widget configuration;
- **Clone** – clone all the widget configurations, except widget name;
- **Remove** – remove the widget from the dashboard;
- **Restore default size** – resize the widget frame to the original format and size;

Graphical environment customization

The dashboards graphic environment can be customizable through the arrangement of widgets. The scrolling of the various widgets is performed by *drag and drop* in the desired position. The size of widgets is adjustable to allow the users to create a balanced graphic environment or to simply highlight the desired information.

USER MANAGEMENT

Users are the main elements interacting with **Tekon IoT Platform**. The management of all processes of configuration, visualization and data export is up to you and should be regulated. The user management who may have access to the platform is divided into three control categories but related to each other.

To find the page where user management is done, go to *Settings* >> *Administration*.

Users permissions

Permissions define each user's degree of access to each area of the platform. Permission categories can be classified in two ways:

Access / Visualization

There are areas of the platform that have access and view permissions. These are divided into three parameters:

- **No Access** – access restricted. You will not have access to this area of the site and will be notified with a message informing you of the interdiction;

- **View** – access is limited, the use is only allowed to view the information;

- **Full control** – user has full access and control of all functionalities to the assigned area;

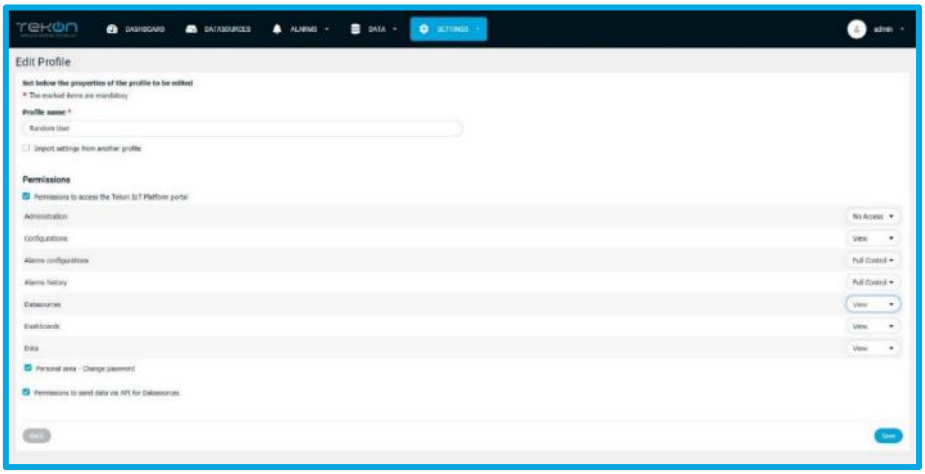


Figure 79 - Page of permissions management

Functionalities

Access to functionalities through validation boxes.

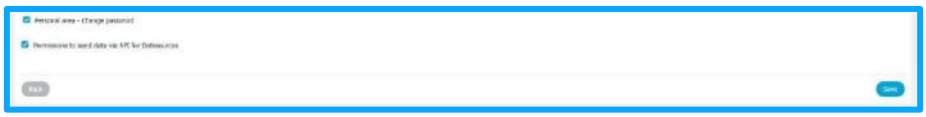


Figure 80 - Validation boxes of functionalities

User profile

The configuration of user profiles defines the interaction parameters of this type of user on the platform. Permissions management for users who were or will be created begins on this page and can always be edited later.

Based on the different demands and applications where the platform can be used, **Tekon IoT Platform** comes with pre-configured user profiles and assigned permissions.

Below there is a comparative map of the diverse profiles and permissions that describes them.

Áreas / Perfil	Access to Tekon IoT Platform	Administration	Configurations	Alams Configurations	Alarms History	Datasources	Dashboards	Data	Change Personal Password	Send data via API
Administrator	✓	Full Control	Full Control	Full Control	Full Control	Full Control	Full Control	Full Control	✓	✗
Advanced User	✓	No Access	No Access	Full Control	Full Control	Full Control	Full Control	Full Control	✓	✗
Gateway	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
Restricted User	✓	No Access	No Access	View	View	View	View	No Access	✓	✗
User	✓	No Access	No Access	View	Full Control	View	View	Full Control	✓	✗

Table 2 – Table of user's profile permissions

Profile parameters

The parameters of each profile identify it and must be different from the others to create a chain of authority and responsibility that promotes the management and use of **Tekon IoT Platform**.

- **Name –** set a name to the user profile.

- **Import configurations –** setting-up a user profile can be based on another existing profile. This option allows you to import the permissions configuration of another profile into what is currently being created.

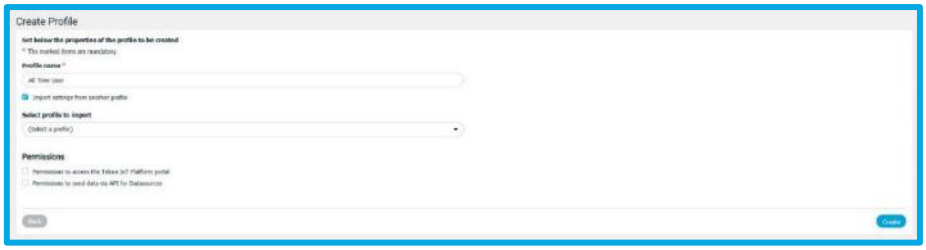


Figure 81 - Create a user profile

Permissions

The permissions of each profile define the hierarchy of access and customization of several areas of the platform as well as the ability to send data via API to datasources.

The access permissions are imposed in the three parameters covered in the **PERMISSIONS** menu and can be set for the following areas:

- Administration;
- Configurations;
- Alarms configurations;
- Alarms history;
- Datasources;
- Dashboards;
- Data;

In the user profile it is possible to define if the user to whom this profile will be assigned will be allowed to change their password to access the **Tekon IoT Platform**.

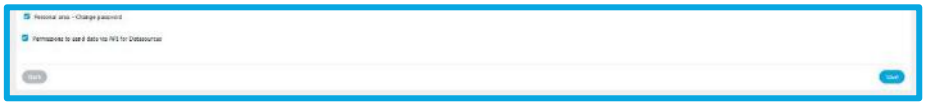


Figure 82 - Options to change password and send data

Permission to send data via API must be enabled if that user profile is associated with the user who provides the **API Key** to configure the connection to the **Tekon IoT Platform** and be able to send data to it.

NOTE: if you only want to create one user to access and use the Tekon IoT Platform, keep this option inactive. Tekon IoT Platform has a system user configured for this purpose only.

User profiles list

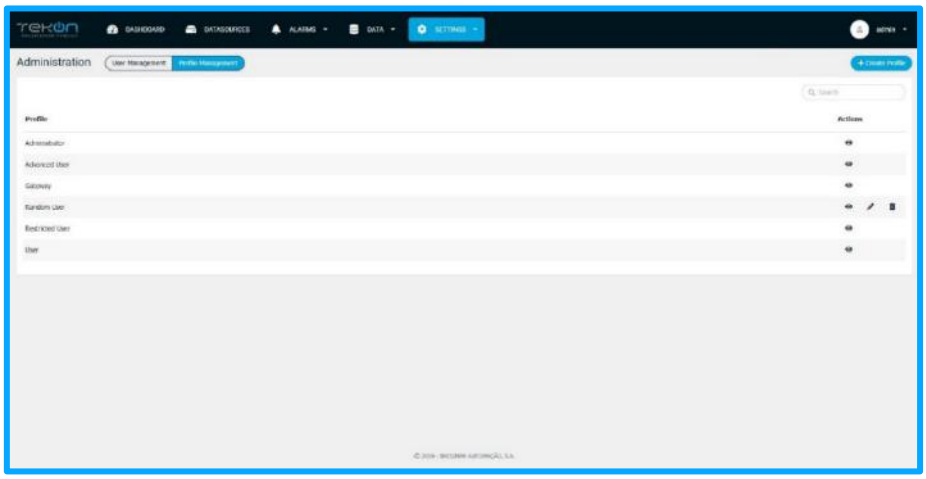


Figure 83 - Page of user profiles

In the *Settings* >> *Administration* >> *Profile Management* page, all currently configured user profiles are listed here.

The actions available for profiles originally predefined by **Tekon IoT Platform** are limited to only one – view ( ). User managers just can see the permissions setting for each of these elements.

Any profile created by the administrator or user with permissions for that task has more accessible manipulation options.

Figure 84 - User profile options

The first icon ( ) corresponds to the profile view. Permissions and other parameters can be queried but cannot be edited at all.

The second icon ( ) is about edition. Clicking on this option, all fields are shown with the current setting and can be changed by users with admin access permissions.

The third option ( ) enables you to permanently delete this user profile.

NOTE: you cannot delete an user profile that is assigned to at least one user. The platform issues an error that states that this profile is associated with an user.

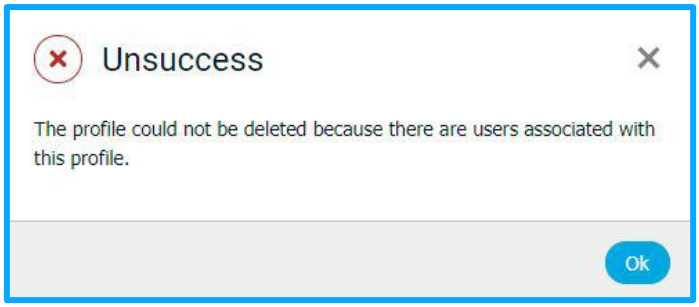


Figure 85 - Error message accessing pages without permission

EXTRA NOTE: the options available in user and profile management are subject to the application of permissions to the user using the platform.

Users

Users are the main managers of **Tekon IoT Platform**. The creation of user accounts is performed by the Administrator or another user with ***Full Control*** permissions to the administration areas.

To create a new user, click on **Create User**. All users have characteristic data of an identity.

- **Image** – image chosen by the user for identification;
- **Name*** – user complete name;
- **Username*** – username to access to the platform;
- **Profile*** – set an user profile with permissions already defined;
- **New password*** – set a password to access to the platform;
- **Confirm password*** – confirmation of the password set in the previous field;
- **Email** – user email address;
- **Cellphone** – user cellphone number;
- **Company** – user company name;

***** – **Required fields**

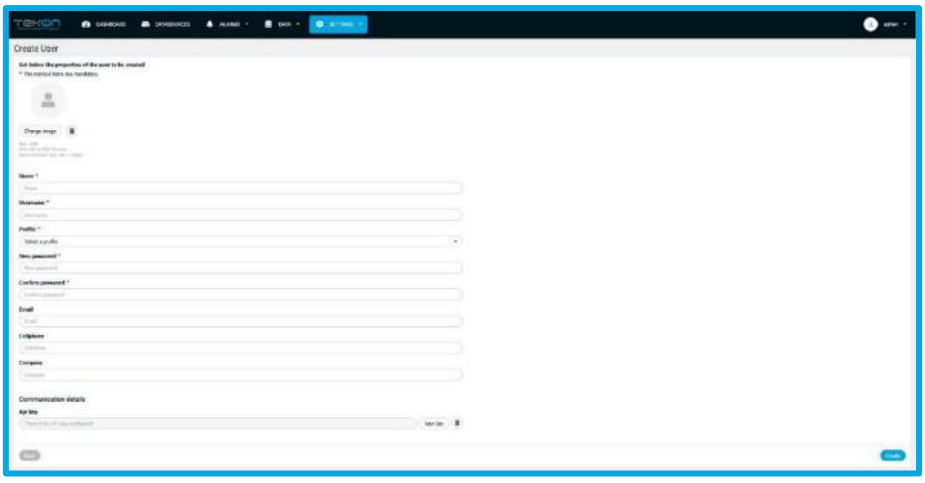


Figure 86 - Create User page

NOTE: the user account can be used to connect devices and the platform. When this intention is verified, you must click on "*New Key*" to automatically generate a new *API Key* to work as a communication bridge with the Tekon IoT Platform. The user profile concerned must have permissions that authorize this process.

Users list

In the *Settings* >> *Administration* >> *User Management* page, all configured users on the platform are listed.

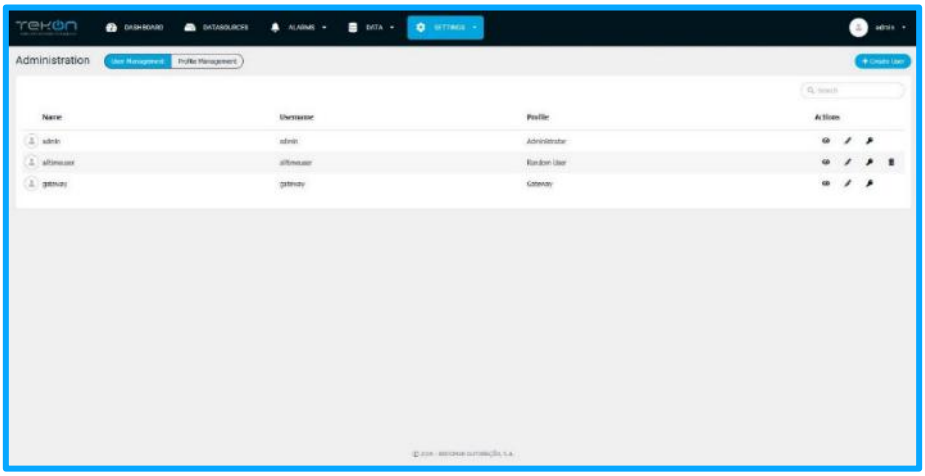


Figure 87 - Page of users on Tekon IoT Platform

The user management actions available to the users with full access to this area of the platform are divided into four options.

Figure 88 - Options available to each user register

The first icon ( ) enables to view the user information.

The second icon ( ) is about edition. Clicking on this option, all fields are shown with the current setting and can be changed.

The third icon ( ) it is possible to change the password to access to the platform.

The last option ( ) it is possible to delete this user from the platform.

Recover password

In case of forgetting the password, user can recover his password.

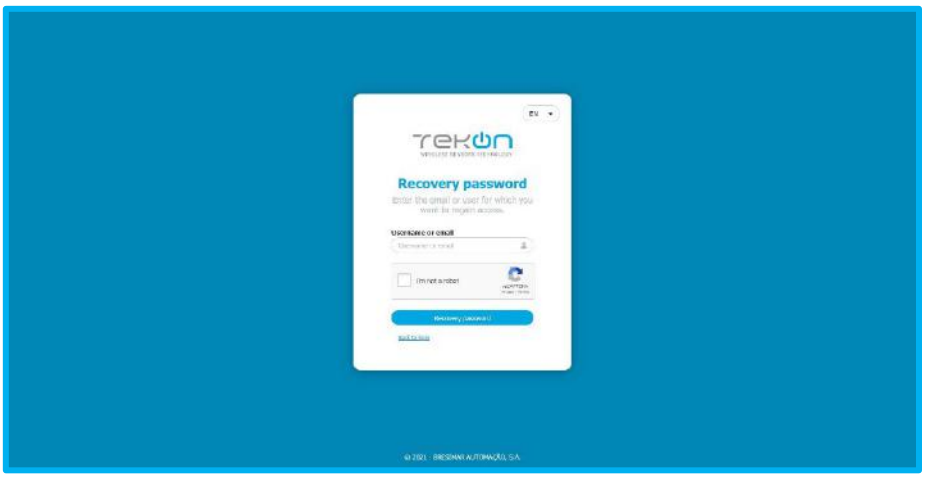


Figure 89 - Password recovery form

Enter **username** or **email**, to receive an email with password recovery instructions.

NOTE: If an error occurs in the password recovery process, a message will be displayed to the user reporting the failure.

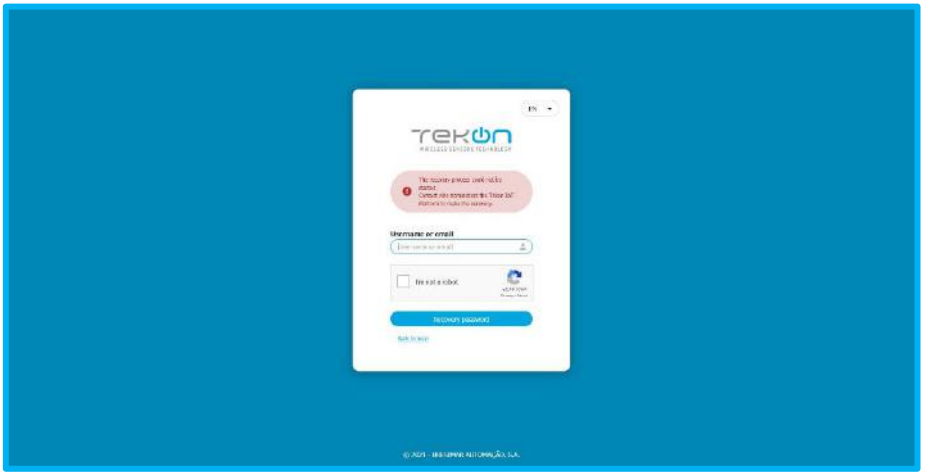


Figure 90 - Password recovery error

If the username / email is correct and there is an email server configured for password recovery, a success message will be displayed.

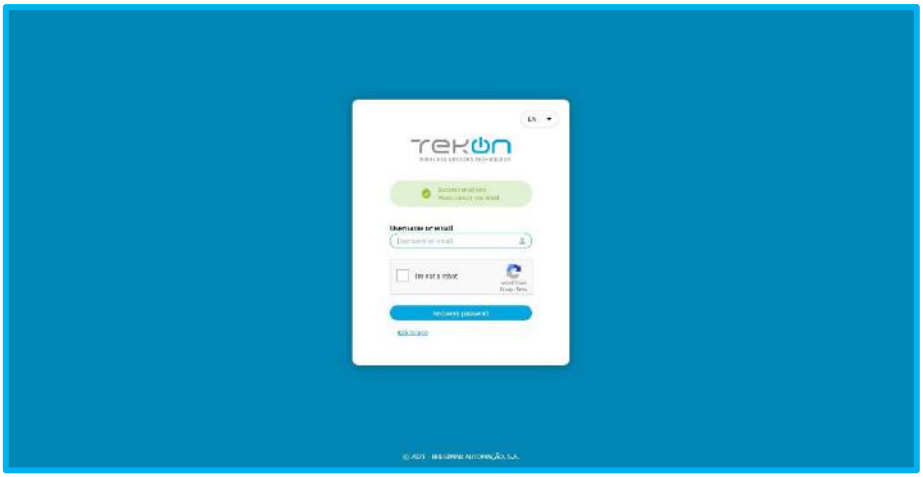


Figure 91 - Email for password recorevy has been sent

Go to your email inbox and click on **Recovery** to be redirected to the password recovery page.

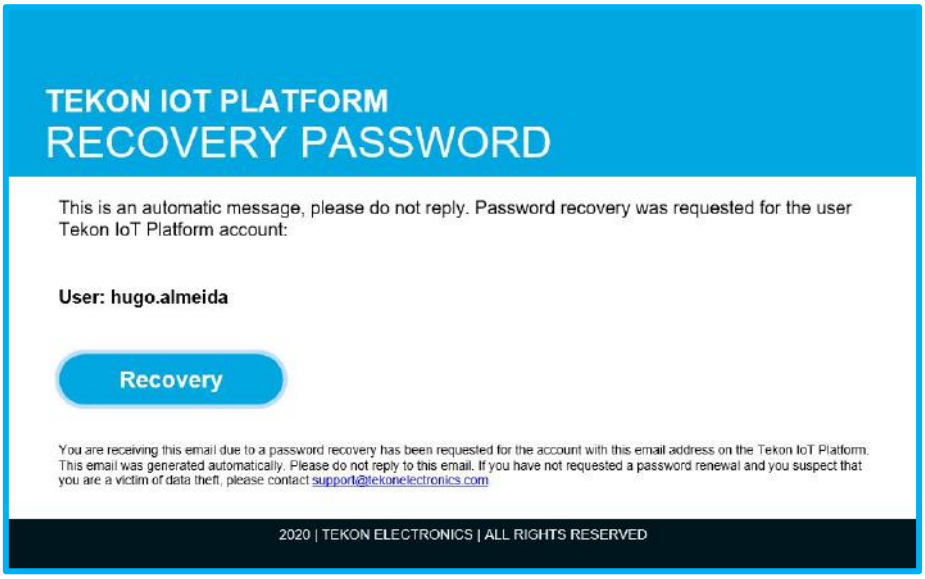


Figure 92 - Password recovery email

Fill in the new password definition form. After confirming the match between the two values, the password message successfully retrieved will be displayed.

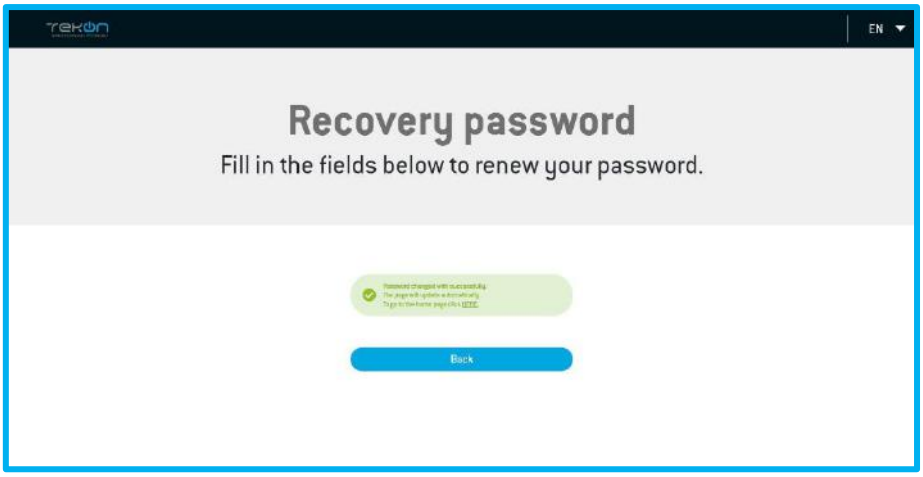


Figure 93 - New password assigned

ALARMS

Tekon IoT Platform enables users to configure alarms supplemented with notifications so that whenever an event away from the previously set parameters is triggered, the user can be notified of this state. Alarms can be configured to cause email, sms or visual notifications in dashboards. Alarms can be configured individually or in groups, generating an action that focuses in one or more datasources.

Alarm types

A configuração de alarmes na **Tekon IoT Platform** pode ser diferenciada por dois tipos – valores e inatividade.

Value

The configuration of parametrizable alarms with values allows to set which measured values serve as limit point for the alarm. In **Tekon IoT Platform**, value-based alarms have parameters that allow the user to create an alarm with more generic and more specific attributes appropriate for each application.

- **Datasources** – field to select the datasource(s) which we want to focus the alarm.

- **Variable** – field that defines the variable or variables on which the alarm will affect its parameterization. The options available to choose from will depend on the datasource(s) selected;

- **Number of occurrences** – the value of this field defines how many communications checking the alarm parameters will be made until an alarm is triggered;

- **Variable** – field that defines the variable on which the alarm will affect its parameterization. The options available to choose from will depend on the datasource where the alarm will act;

- **Comparation** – this field defines the alarm criterion set. Applying rules based on mathematical symbols, user can apply direct or range comparison rules to the defined variables;

- **Value** – reference value for the alarm. Depending on the criteria selected in the previous parameter, it may be necessary to define two reference values;

- **Category** – alarms can be set to be from the **Error** or **Warning** type. For more details about alarm categories, see the ALARMS CATEGORIES section.

Functional explanation of value alarm:

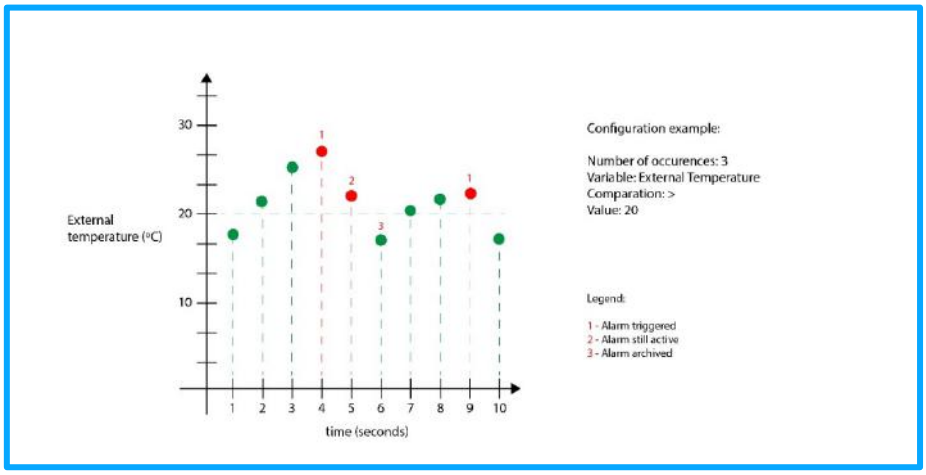


Figure 94 - Behaviour of value type alarms

Inactivity

Alarms can be set when there is no activity associated to one or more datasources, showing no dependence on the number of variables it is monitoring. **Tekon IoT Platform** allows the user to set two parameters for this type of alarm:

- **Datasources** – field to select datasource(s) which we want to focus the alarm.

- **Time** – elapsed time in seconds since the last communication until a new alarm is issued;

- **Category** – alarms can be set to be from the **Erro** or **Warning** type. For more details about alarm categories, see the **ALARMS CATEGORIES** section.

Functional explanation of inactivity alarm:

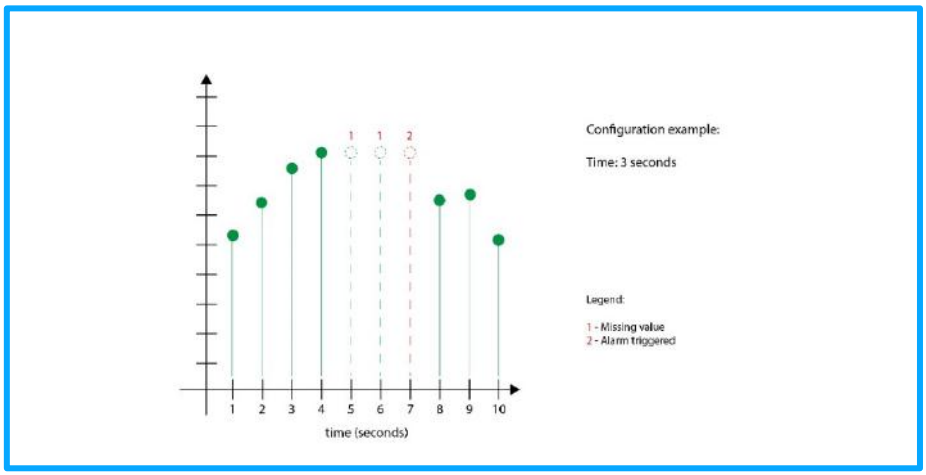


Figure 95 - Behaviour of inactivity type alarms

There are parameters that are common to all types of alarms – notifications and schedule.

Notifications

The notifications associated with alarms give you the ability to choose how you want to be notified when alarms are triggered. Notifications can be made by two different communication channels:

- **Email**

You can set on or more email addresses to receive notifications regarding this alarm.

Email address format must follow the traditional format (abcdef@abc.aaa). To enter more than one email in this field, you must divide the addresses with semicolons (“ ; ”);

Optionally, you can configure the message sent in the alarm email, to provide more details about the occurrence. The message has a maximum limit of 500 characters.

- **SMS**

You can set one or more mobile numbers to receive an SMS with notification regarding this alarm.

The format of mobile numbers must contain the country calling code of the contact (Portugal - +351987654321). To enter more than one contact in this field, you must divide the numbers with semicolons (“ ; ”);

Optionally, you can configure the message sent in the alarm SMS, to provide more details about the occurrence. The message has a maximum limit of 100 characters.

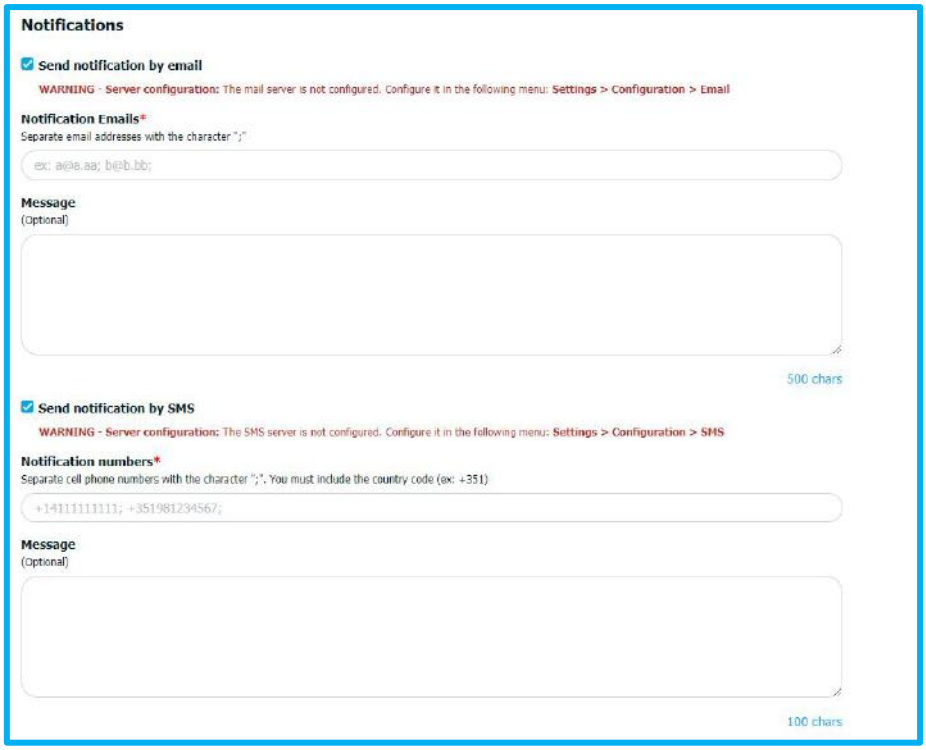


Figure 96 - Fields to enter the notifications contacts

NOTE: for these types of notifications to work, you must enable platform notifications and enter your email and sms services data. See the "*Notifications services*" topic to find more information to support the configuration.

EXTRA NOTE: the notification content is pre-set by the platform, with the variable, datasource and alarm reason unambiguously identified in the message.

Schedule

The schedule associated with alarms establishes the time frame in which their monitoring functions for a certain variable are active. Scheduling options center their parameterization on two topics with temporal relationship:

- **Days**: define days of the week when the alarm is active;
- **Time**: definition of daily time window in which the alarm is active;

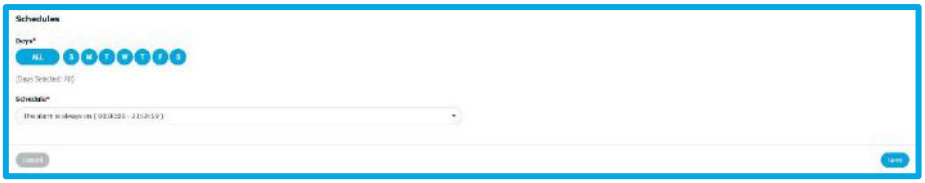


Figure 97 - Alarm schedule options

In the “Days” section, you can define the day(s) of the week when the alarm will be active. If you want the alarm to be active on all days, select the “All” option.

NOTE: By default, alarms are set to be operational every day, 24 hours a day.

In addition to the days the alarm can be active, you can define a different time window for each configured alarm.

Figure 98 - Days of the week when alarms are active

Available time intervals:

“The alarm is always active (00:00:00 – 23:59:59)” – the alarm is active all day**;**

“All days have the same interval” – is defined a time interval applied to days previously selected;

“Choose interval for each day” – for each day previously selected, you can define a different time interval in which the alarm will be active;

Figure 99 – Configuration of hours and days to the alarms

Alarms categories

The alarms configured on the **Tekon IoT Platform** can be distinguished into two types that allow the user to filter the relevance of the information that has triggered the alarm. The alarm category is divided into **Warning (** WARNING **)** and **Error (** ERROR **)** types. These two categories allow the user to assign a degree of priority to each alarm that is set.

History

The alarm history feature makes possible to export related to alarms generated on the platform. Users can set the parameters associated with alarms to filter the required information:

- **Datasources**: which datasources you want to get the alarm;
- **Start/End date of occurrence**: date and time interval of occurrences;
- **Type**: type of alarms. The user can choose both values or only "*Value*" or "*Inactivity*" type;
- **State**: the state of the alarms from which data will be collected. The user can choose to include all alarm status or only active (*Active*) or archived (*Archived*) alarms;
- **Category**: the user sets the category of alarms that will be included in the history. He can select both available categories, *Warning* or *Error*, or choose an individual selection.

The user can export the alarm history in three different formats: .CSV, .PDF or .XLSX.

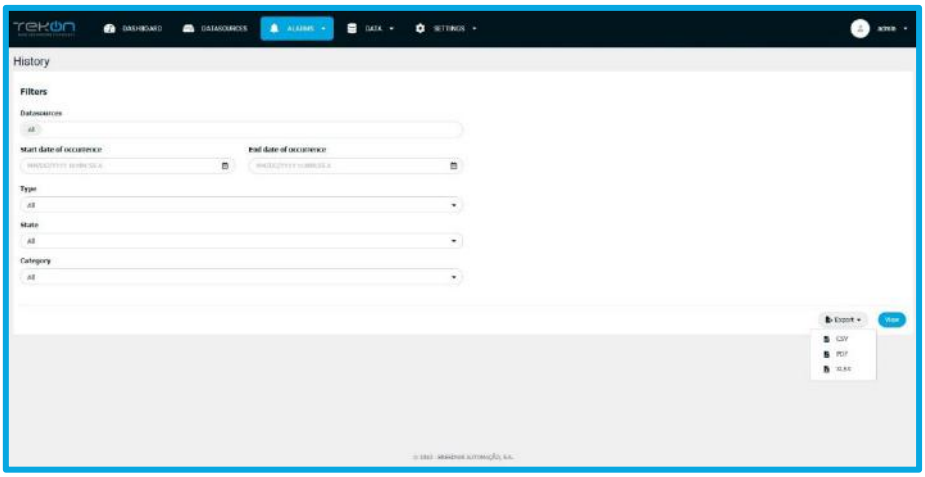


Figure 100 - Alarm history page

Alarms actions

In the elements that assist the alarm list, there are actions that can be applied in a unique way to each of the listed elements.

Figure 101 - Active alarms actions

Figure 102 - Deactive alarm actions

Let's describe the function of each action icons:

	View information about alarm configurations
	Edit alarm configuration
	Clone and create new datasource based on the original parameters
	Deactivate the alarm (option available when alarm configuration is activated)
	Activate the alarm (option available when alarm configuration is deactivated)
	Delete alarm

NOTE: when you deactivate an alarm, you will not receive any notification and the alarm will not be displayed on any alarm widget.

In the list of configured alarms, you can check the configuration and status of each alarm. Click on the icon before the datasource name and the information will be displayed. In alarms configured based on the inactivity of the datasource, the window will look like this.

Figure 103 - Inactivity alarm details

In alarms configured based on the value of a variable, the window will look like this.

Figure 104 - Value alarm details

Configure a “Value” type alarm

Follow the steps below to configure an alarm that focuses on the recorded values.

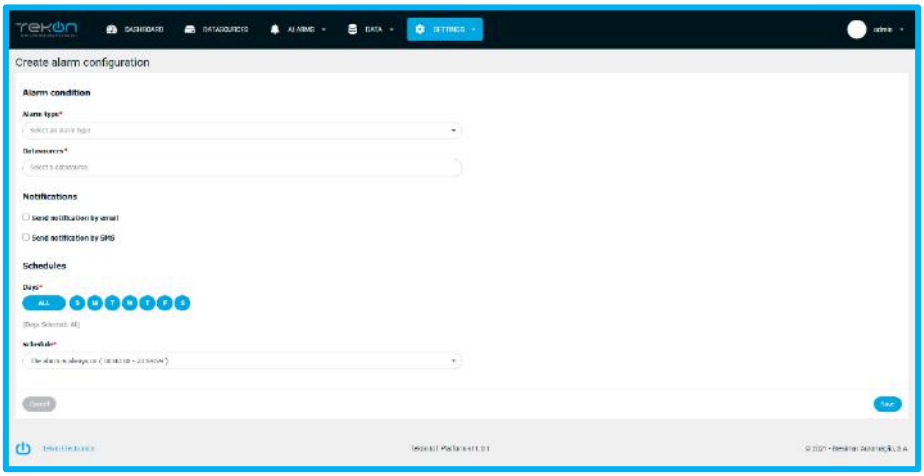


Figure 105 - Alarm configuration page

1. In the “Alarm type” field, select the option “Value”.
2. In the “Datasources” field, select the datasource(s) where the alarm will act.
3. From the list of displayed variables, select one or more matched variables where the alarm will act.

NOTE: Each variable is represented through a type of data (numeric – Uint, Int, Float; string – String; boolean – Bool). In each configured alarm where more than one variable will be used, you can only select variables of the same type.

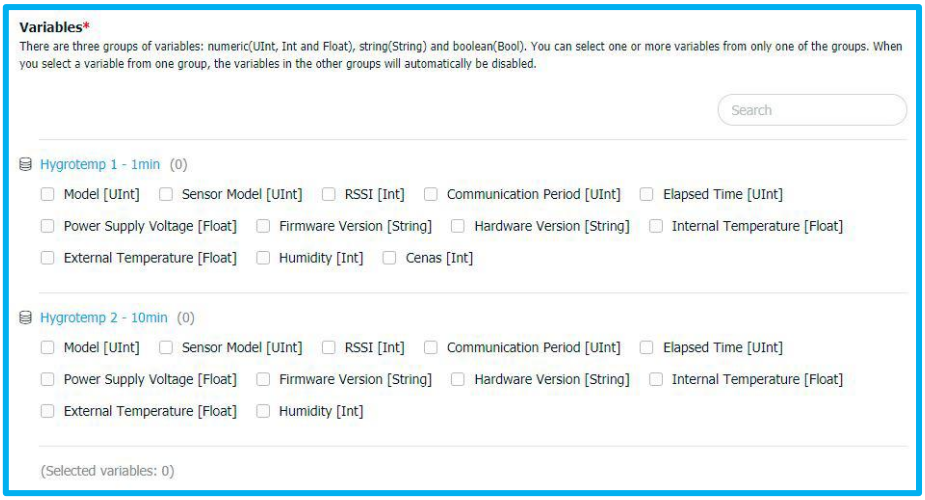


Figure 106 - Variables of selected datasources

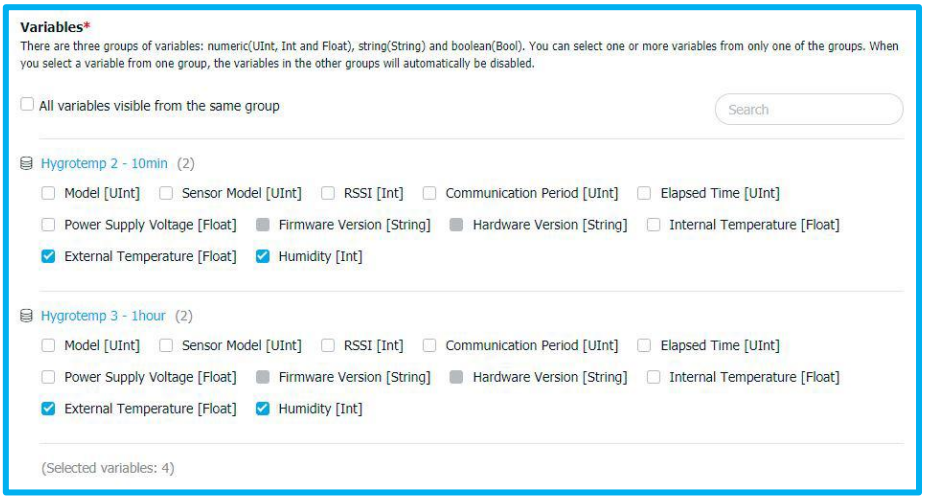


Figure 107 – Selected and blocked variables

4. To select multiple variables, you can do it in several ways:
    a. Manual selection of each variable;
    b. In the search bar, search the variable name e select “All variables visible from the same group” option.
5. Select a comparation method between the value configured on the alarm and the values registered by the datasource.
6. Insert a value of reference.
7. Configure the number of **consecutive** occurrences until the alarm be emitted.
8. Select the alarm category.
9. If you want notifications to be sent when the alarm is emitted, select the desired notification option:
    c. “Send notification by email” – insert email addresses to receive notifications;

d. “Send notification by SMS” – insert mobile numbers that will receive notifications by sms texts;

10. Select the days when the alarm will be active.
11. Define the time interval in which the alarm will be active, within the previously defined days.
12. Click on “Save” button to save the alarm configuration.

Configure an “Inactivity” type alarm

Follow the steps below to configure an alarm that focuses on the datasources communication status.

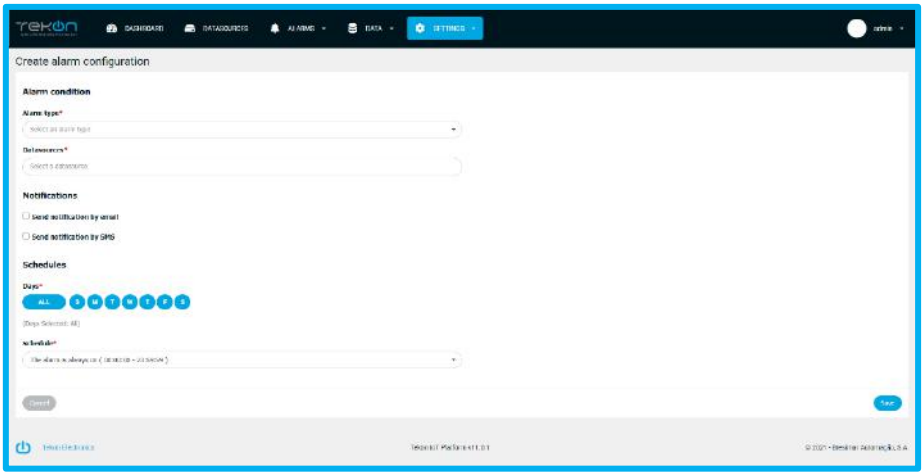


Figure 108 - Alarm configuration page

1. In the “Alarm type” field, select the option “Inactivity”.
2. In the “Datasources” field, select the datasource(s) where the alarm will act.
3. Configure the time, in seconds, since last communication until the alarm be emitted.
4. Select the alarm category.
5. If you want notifications to be sent when the alarm is emitted, select the desired notification option:
    a. “Send notification by email” – insert email addresses to receive notifications;
    b. “Send notification by SMS” – insert mobile numbers that will receive notifications by sms texts;
6. Select the days when the alarm will be active.
7. Define the time interval in which the alarm will be active, within the previously defined days.
8. Click on “Save” button to save the alarm configuration.

DATA EXPORT

Data export from **Tekon IoT Platform** allows the user to export data integrated in the platform.

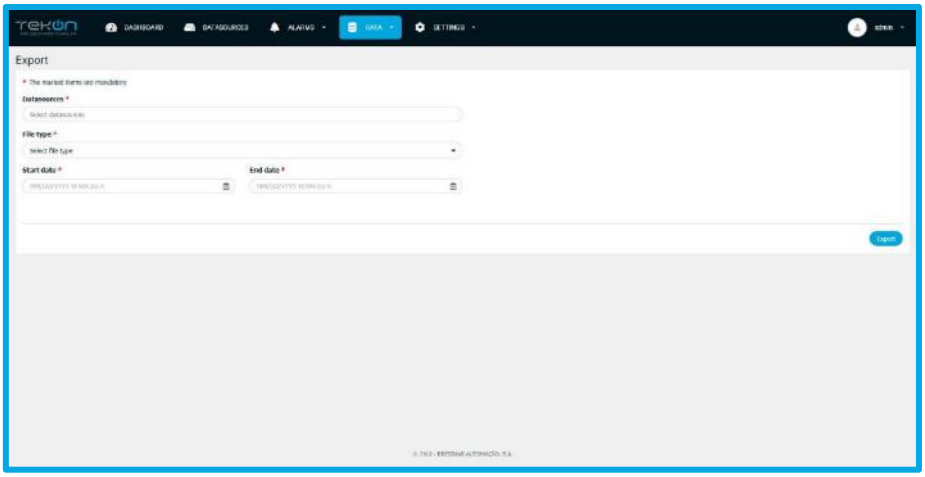


Figure 109 - Data export page

Data export formats

The data collected through the platform can be exported to a .PDF, .CSV and .XLSX file for further analysis.

The user can define:

- Datasources to gather data;
- File format to export;
- Time range of desired records;

DATA ANALYSIS

Data analysis allows the user, even within the Tekon IoT Platform, to show the behavior of the data already received, with the use of data aggregation filters, typical of this type of analysis. With the data export functionality, the user only has the possibility to download a file with the data received from one or more datasources and chosen time interval. In data analysis, it is possible to aggregate and correlate graphically, different variables from different datasources and download the data in a set of formats that adapt to what the user is looking for.

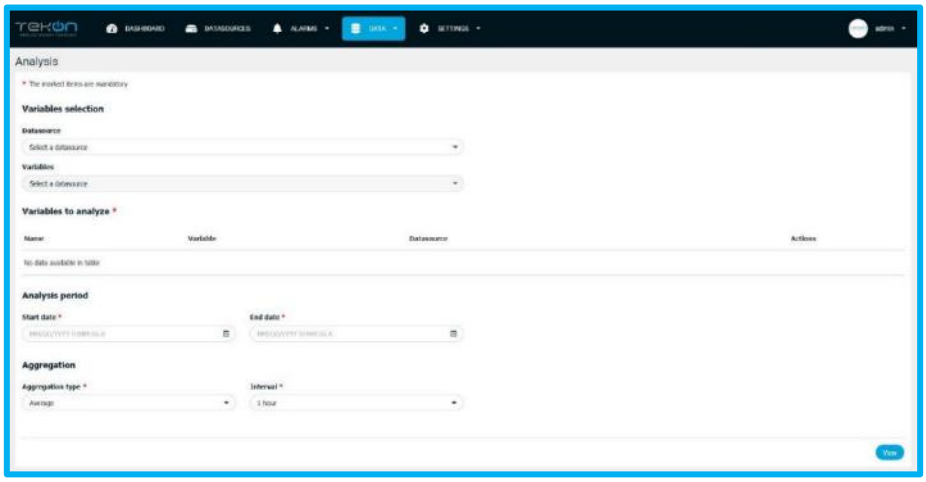


Figure 110 - Data analysis page

Variables selection

The selection of variables allows the user to indicate which variables he wants to include in the analysis. It is possible to select one or more variables from different datasources. There is no restriction on the selection of variables.

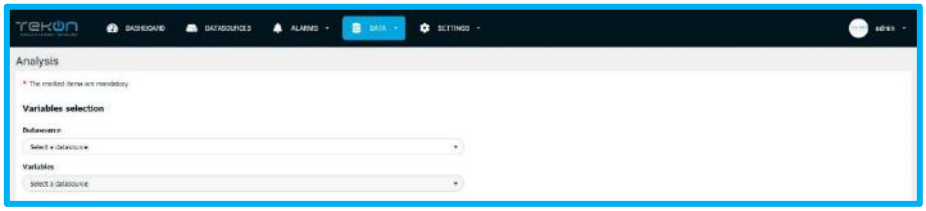


Figure 111 - Selection of variables

Choose a variable from a datasource:

- Click the checkbox below the “Datasource” parameter.
- Choose the datasource that has the variable you want to choose.
- Click the checkbox below the “Variables” parameter.

- Choose the variable you want to analyze.

Choose several variables from a datasource:

- Click the checkbox below the “Datasource” parameter.
- Choose the datasource that has the variable you want to choose.
- Click the checkbox below the “Variables” parameter.
- Choose the variables you want to analyze.

NOTE: each time the user selects a variable, it is removed from the list of variables available for selection and is placed in the list of variables to analyze.

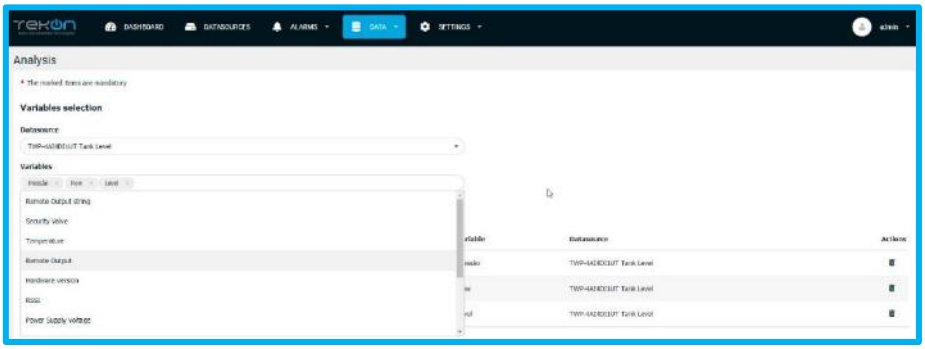


Figure 112 - Variables list

Variables to analyze

In the process of selecting variables for analysis, the user's choices are listed in order of selection. Each record in the list shows the following parameters:

- **Name**: name that the variable took on this list (original name + datasource);
- **Variable**: the variable that represents;
- **Datasource**: the datasource of which it is a part;
- **Actions**: possible actions on this list;

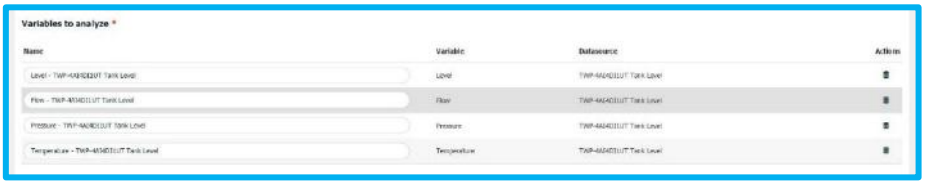


Figure 113 - List of variables for analysis

In this section, user can delete the variable from the analysis he wants to perform or modify the original name of the variable.

Delete variable

• Click the trash icon ( ) for the variable you want to delete.

Figure 114 - Action to delete variables

Change the variable name

• Click in the text box of the variable you want to modify and make the change.

• The change will be applied immediately.

Figure 115 - Change variables name

NOTE: the name change is valid only in the area of data analysis. It does not extend to other areas of the platform.

Analysis period

In this section, user defines the beginning and the end of the time interval of the records that will be used in the analysis.

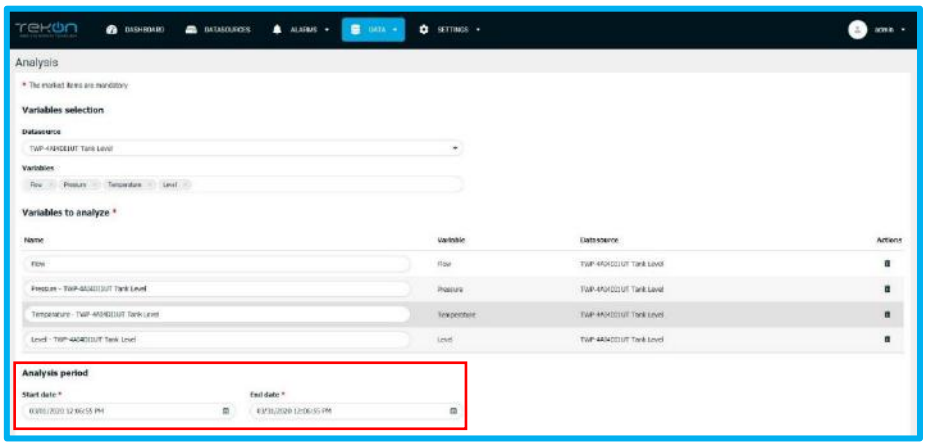


Figure 116 - Analysis period for configuration

NOTE: the longer the chosen interval, the more data will be used. The data load time may leave the page unavailable for some time.

Aggregation

Data aggregation is the process in which raw data is gathered and arranged in a summary format for statistical analysis. Each aggregation method must have a time interval in which the aggregation value is established.

Aggregation methods

- **Without aggregation**: no data aggregation method is applied in the analysis;
- **Average**: average of the aggregated values;
- **Maximum**: maximum value of aggregated data;
- **Minimum**: minimum value of aggregated data;
- **Median**: median value of the sample.

NOTE: in aggregation, the option "Without aggregation" downloads a large number of data from the server. This may take some time and make the page unavailable.

Interval

The "Interval" field allows user to define the time block in which aggregation is applied. The timeframe is counted from the start date of the data analysis.

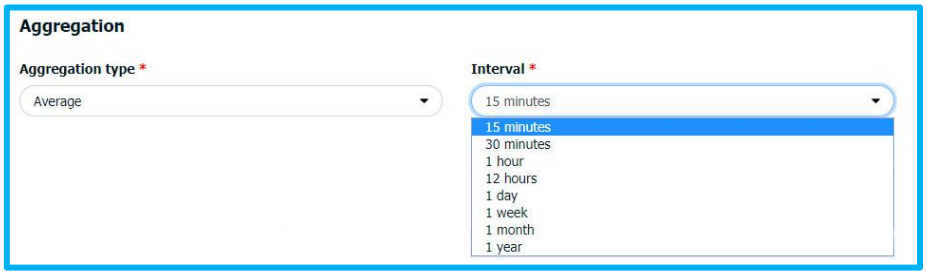


Figure 117 - Aggregation parameters - type and interval

The interval values cannot be set by the user. There are predefined values that can be applied. In this field, user can choose one of these values:

- **15 minutes**;
- **30 minutes**;
- **1 hour**;
- **12 hours**;
- **1 day**;

- **1 week**;
- **1 month**;
- **1 year**;

After setting all the previous fields, click on the button *View* to generate the data analysis.

NOTE: in aggregation, data from type *string* or *bool* will be left blank.

Data analysis

In this section of the data analysis page, the results of the combination of all parameters defined from the beginning of the page are displayed. The information generated for analysis is displayed in two different formats - graph and table.

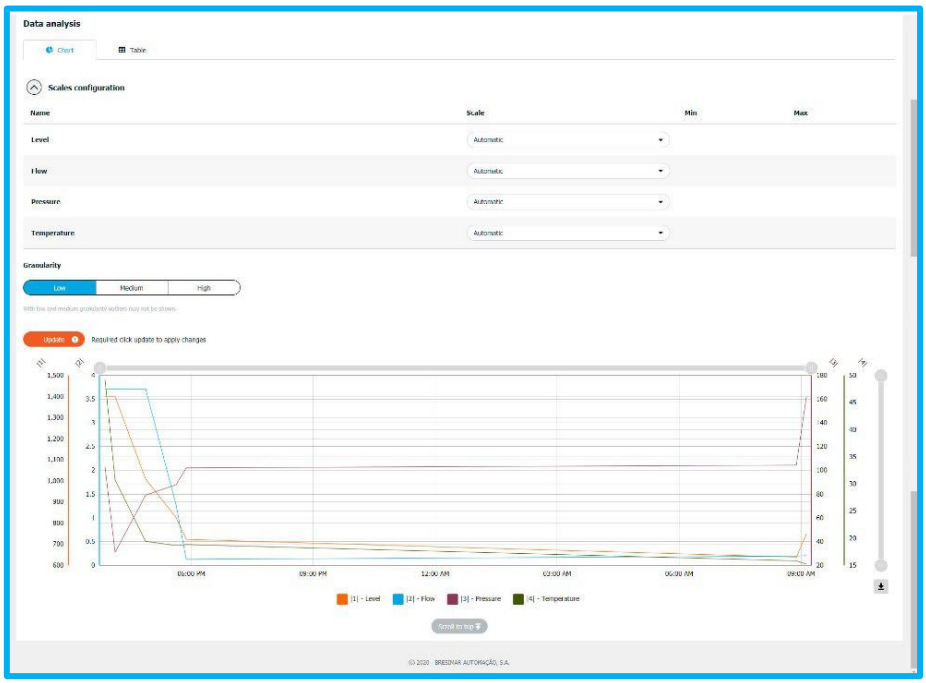


Figure 118 - Data analysis

Graphic

In this option, the projected data are displayed in a temporal graph, identical to the previous figure, with options that can be edited by the user, in order to specify their analysis. User can edit the following properties - Scale and Granularity.

Scales configuration

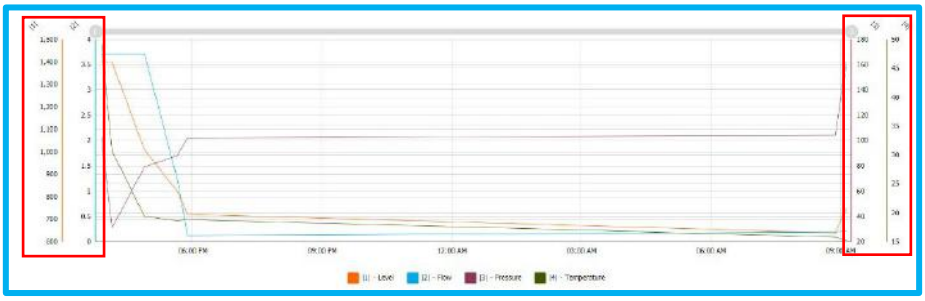


Figure 119 - Graph scales

A scale is assigned to each variable. The scale can be assigned in two ways:

- **Automatic**: the scale is defined based on the minimum or maximum value of the variable data in the defined time interval. This option appears selected by default.

- **Manual**: the scale is defined, through values entered manually, by the user. The user enters the minimum and maximum scale values

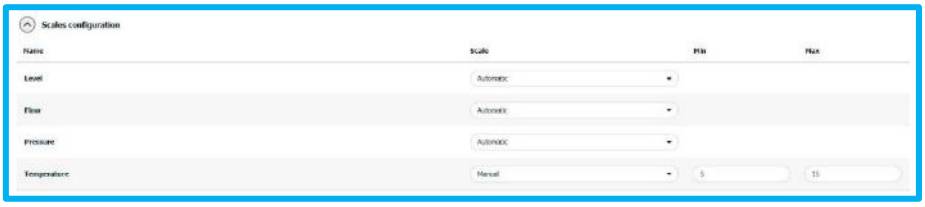


Figure 120 - Scales configuration

When scales are defined manually, the values are saved in the list of options for the scales. Thus, the scale values of one variable can be used in another, without the user having to repeat the entry of these values.

Figure 121 - Manual configuration of scales

Thresholds bands configuration

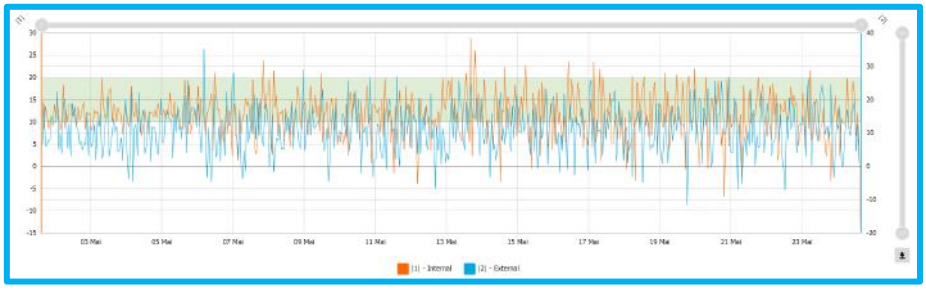


Figure 122 - Timeline chart with threshold bands

For each variable selected in the analysis, it is possible to define a graphic band that will be displayed in the generated graphic, as shown in the image above. The objective is to mark a range of values of a given variable and verify its behavior.

Figure 123 - Thresholds bands configuration

1. Click on “Add band” to add a new threshold band to the chart.
2. Click on “Variable” list and select the variable to associate the band.
3. Insert the minimum value.
4. Insert the maximum value.
5. Select the band colour.
6. Repeat the previous steps to configure a new band.
7. Click on “Update” to reload the configurations and view threshold bands.

Granularity

This parameter allows to define the level of detail of the data displayed in the graph. In the context of data analysis, this property is known as granularity. The higher the level of granularity, more detailed the information in the graph.

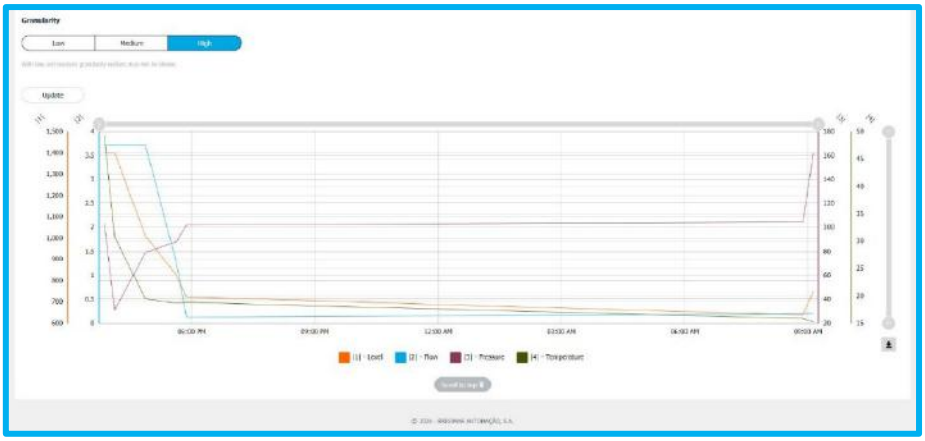


Figure 124 - Graph with granularity level

By default, the level of detail of the sample applied is "High". The user can change the level of detail at any time.

- Click on the level of detail you want to apply.
- Click the button Update to save the change and update the graph.

“Update” button

All changes that are made to the parameters, after the first configuration, are only implemented after the user clicks on the button Update, to update the data in the analysis table and graph.

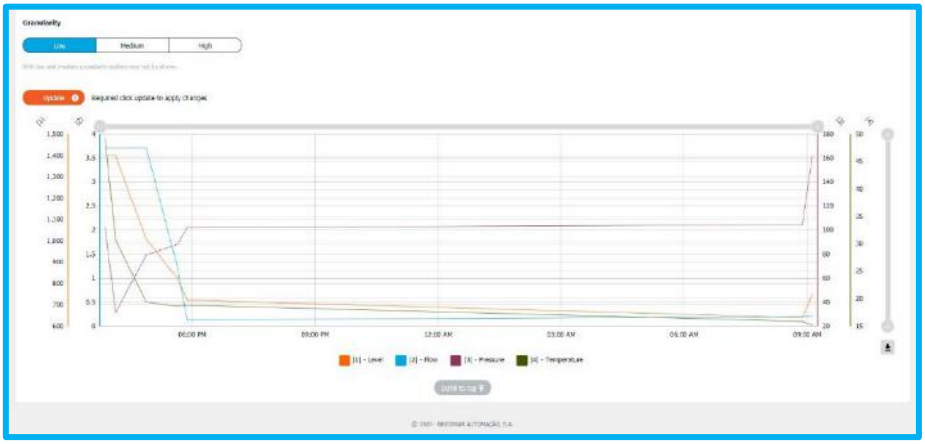


Figure 125 - Update button

Chart info

The graph generated for data analysis has a common visual model. In the following image, the characteristics of the graph are highlighted.

Figure 126 - Graph elements

1 – Variable scale

2 – Graph zoom bar

The user can increase and decrease the period. In a shorter period, it is possible to click on the bar and drag to the right and left to move the time back and forth, always maintaining the period.

3 – Data export button

4 – Variables caption

You can hide the variables from the graph by clicking on the name of the variable in the legend.

5 – Graph

Hovering the mouse will show more detailed information than the data being consulted: values and date. It is possible to select a zone of the graph (click and drag) to zoom in on that area.

NOTE: on devices with touchscreen navigation, the interaction with the graph is blocked. To activate the interaction with the graph, click on the graph. After three seconds of inactivity, the graph will be blocked again.

Data export

The data used to generate the graph in the data analysis of the Tekon IoT Platform, can be exported to a file or printed directly in physical format.

Type of export	Formats
Print	Window to configure the printing of the graph
Data	PDF, HTML, XLSX, CSV, JSON
Image	PDF, SVG, JPG, PNG

Figure 127 - Formats for data export

NOTE: invalid data for the chart, such as strings and booleans, are left blank on purpose. This prevents this data from appearing in the exported formats.

Table

The “Table” tab allows the user to list all the data found, within the parameters defined at the beginning of the page.

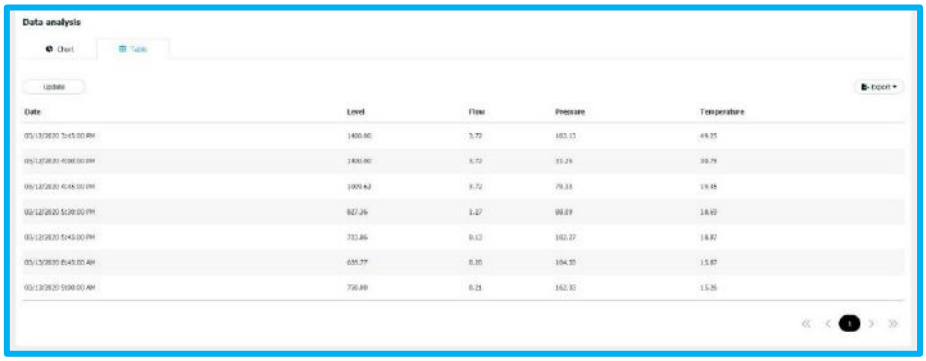


Figure 128 - Aggregated data in table

“Update” button

All changes that are made to the parameters, after the first configuration, are implemented only after the user clicks on the button

, to update the data in the table and graph of the data analysis.

Data export

The data that is listed in this tab can be exported to a file, which organizes the data in a list with the same format as the one visible on the platform. The possible formats for export are as follows:

- CSV;
- PDF;
- XLSX.

PERIODIC REPORTS

Tekon IoT Platform's periodic reporting functionality allows users to creat a document with a time frame that aggregates relevant data and information, promoting the temporal analysis of the process.

The configuration of the periodic report is divided into two parts - general information and data sections. In the general information, the user defines the most general aspects:

- **Name** - name assigned to the periodic report. When exporting, the .pdf file will also assume this name;
- **Email address of report recipients** - emails from the recipients who will receive the report. Emails must be separated by a semicolon (;);
- **Text to send in email** – email body where the report will be sent. Field limited to 500 characters;
- **Report title** - Title that will appear in the report header;
- **Report footer** - Information that will be at the bottom of the document. This field is not required;
- **Orientation of report pages** - Selection of the orientation of the report pages;
- **Reporting period** - time interval in which the report is generated;
- **Time from which the report can be generated** - time from which the system will gather information and generate the report. The defined time must take into account the time zone defined in the following field;
- **Timezone** - time zone for the creation of reports;
- **Language** - language of the periodic reports;
- **Logo** - logo of the company or organization to include in the report. Only files with JPEG or PNG formats can be used. This field is not required.;

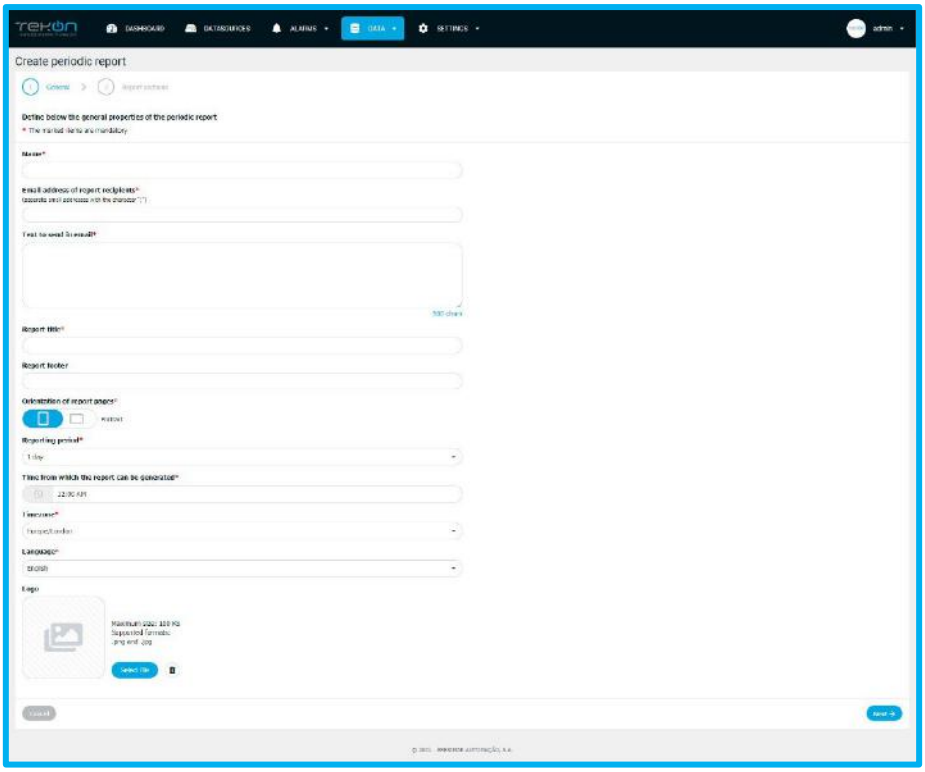


Figure 129 - General settings of periodic reports

The report sections are created to group data and the different types of analysis that can be configured. Each section has characteristic fields:

- **Title** - section title;
- **Description** - text describing the type of information that will be in that section or other relevant notes. This field is not required;
- **Datasources** - selection of the datasources that will provide the data for this section;
- **Variables** - List of variables available in the datasources chosen in the previous field;
- **Select the information that want to include in the report** - type of information organization that we want to use in this section (values in graph or table and alarms related to the variables);

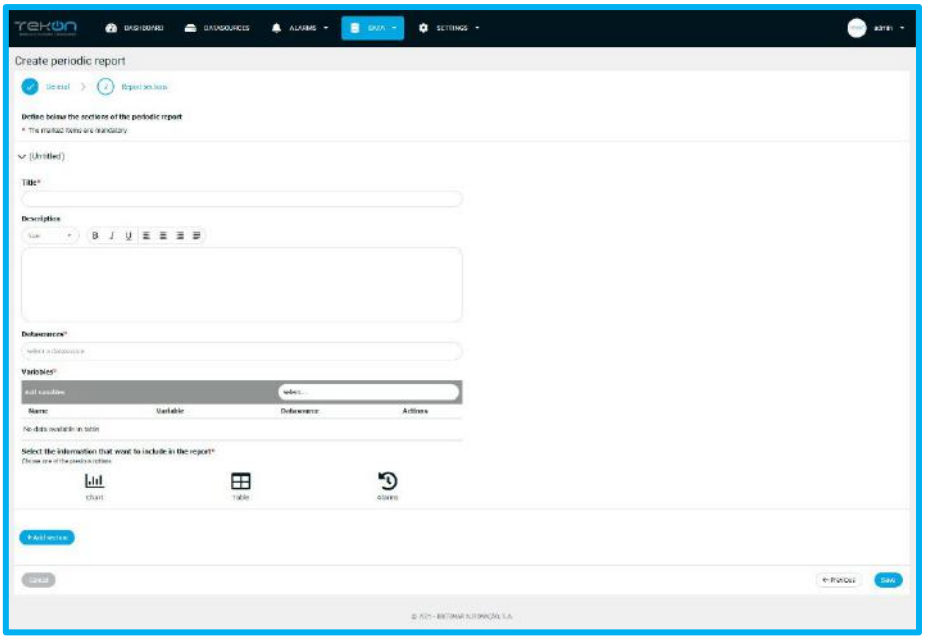


Figure 130 - Section configuration

Selection of datasources

Choose the datasources that will provide the data to produce this section of the report.

Figure 131 - Datasources selection

- Click in the box in the Datasources field;
- Select the datasource (s) from which the variables will be extracted to include in that section;

NOTE: the option to select all datasources from the list, will only be valid for the representation of alarms. The options for viewing the information in a graph or table will not be available.

Figure 132 - Selection of information to display in this section

Selection of variables

After determining the desired datasources, define which variables will be required for data processing. After defining the variables, they will be visible in a table.

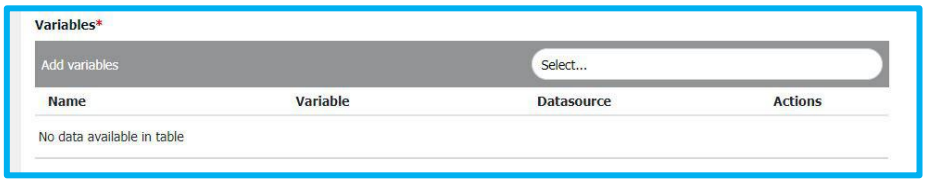


Figure 133 - Variables selection

- Click on the box **“Add variables”** to see the list of available variables;
- Click on checkbox of the variable that you want to select;

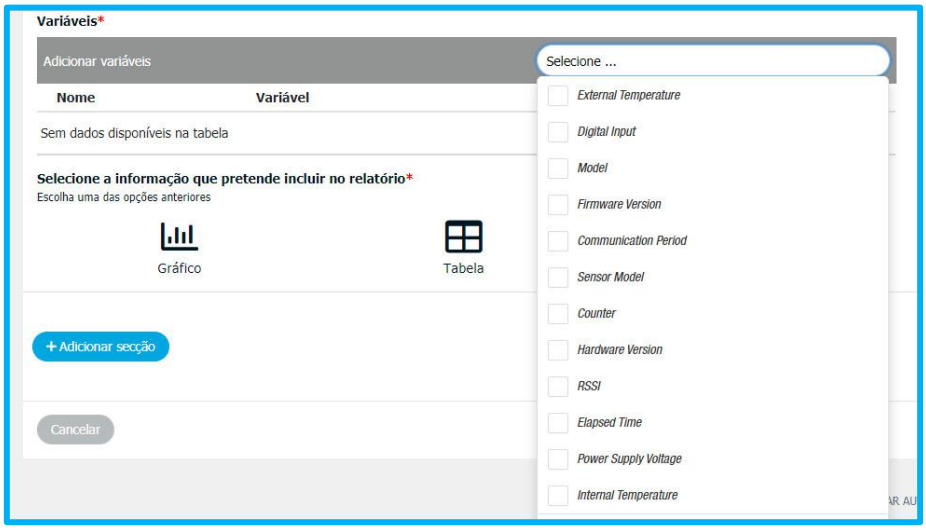


Figure 134 - List of available variables

If you want all the variables available, click on the checkbox of the option **"Select all".**

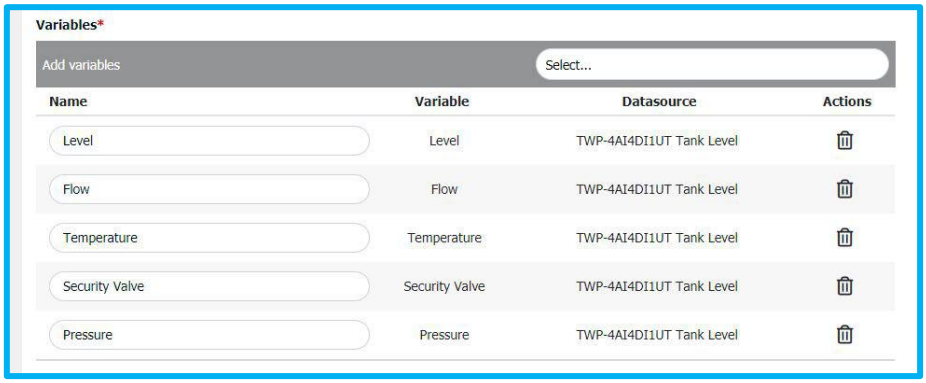


Figure 135 - List of chosen variables

It is possible to customize the name that the variable will have in the report, changing the "Name" field.

Selection of report information

In each section you can define the variables information that will be included. Users can choose from:

- include a chart with data for selected variables
- list registers in a table
- list all alarms that are associated with these variables that were triggered.

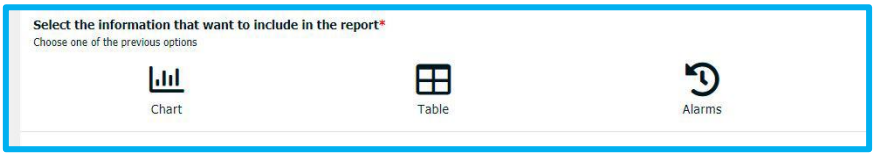


Figure 136 - Report information

If you choose the information in **Chart** or **Table**, you must define the aggregation parameters for this data analysis.

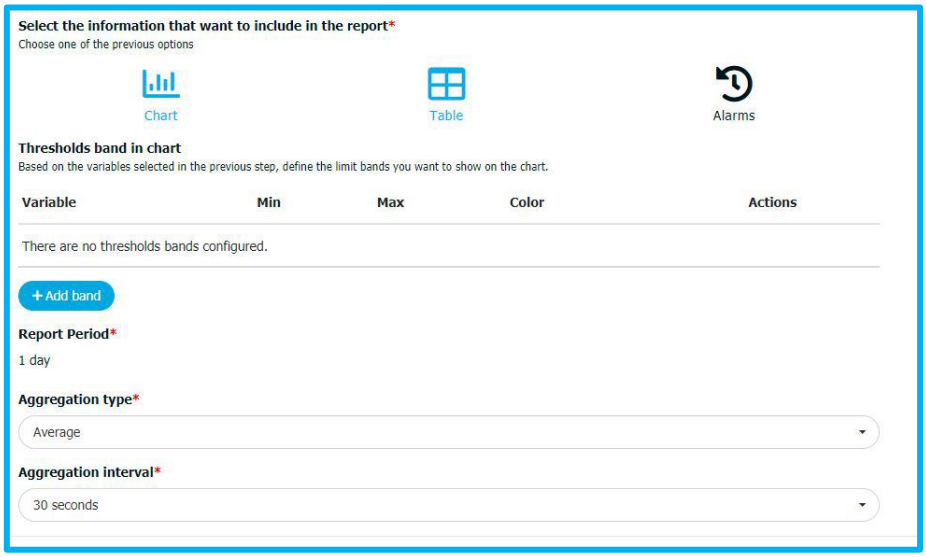


Figure 137 - Parameters of data aggregation

Thresholds bands

In the generated charts with the chosen variables, you can add data threshold bands.

1. Click on "Add band" to add a threshold band to the chart.
2. Click on the “Variable” list and select the variable to create the band.
3. Enter the minimum limit value for the variable.
4. Enter the maximum limit value for the variable.
5. Select the colour you want to assign to the band.
6. Repeat the previous steps for each band you want to add.

Aggregation type

Aggregation type allows you to define how the collected data will be aggregated and displayed. Among the options available, data can be aggregated in four ways:

- Average
- Maximum
- Minimum
- Median

Aggregation interval

Aggregation interval sets the time span under which the data will be aggregated. The data can be aggregated in three ways:

- 30 minutes
- 1 minute
- 1 hour

User can add new sections to the report at any time. To add new sections, click the ***Add section*** button.

After you have created the sections, you can organize them using the options in the section listing. You can also delete sections of your report at any time.

Figure 138 - Sections options

NOTE: if there is an error in the configuration of a section, it will be highlighted in red. One example could be the elimination of datasources from the platform, which would be used in periodic reports.

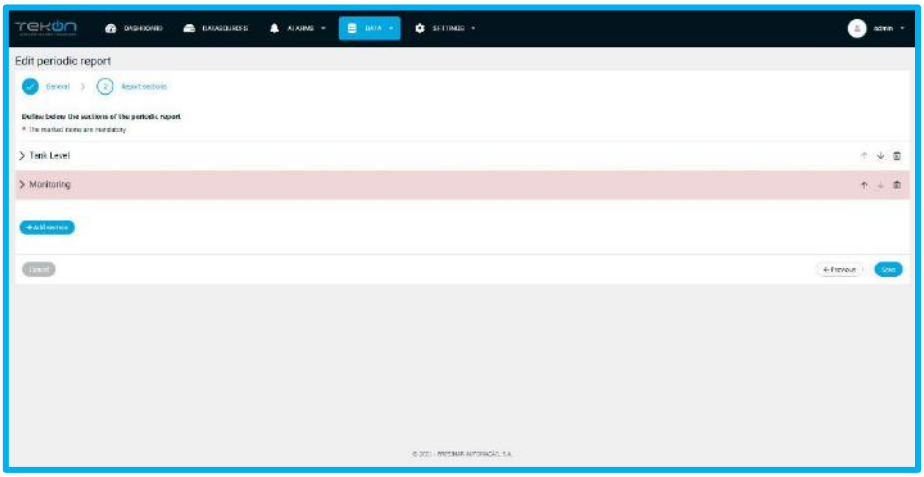


Figure 139 - Section error

Periodic reporting actions

After completing the configuration of the report (s), they are listed and with a set of options available.

Figure 140 - Periodic reports options

We will describe the function of each action icons:

	View report configurations.
	Edit report configurations.
	Clone this report.
	Active report sending (option only available when report sending is deactivated)
	Deactive report sending (option only available when report sending is activated)
	Test the submission of periodic

Preview report file.

Delete report.

NOTE: when periodic report is deactivated, report sending is suspended from that moment. User still be able to visualize the report.

NOTIFICATIONS SERVICES

Notifications are important tools that reinforce the significance of real-time data monitoring. **Tekon IoT Platform** currently offers a notification service oriented to two communication channels – email and sms.

Activate notifications

Using and setting the notification services is always an optional step for you and your organization. For a more effective experience and take advantage of all functionalities of **Tekon IoT Platform**, the notification service must be enabled.

On the *Settings* >> *Configuration* >> *Alarms Configuration* menu, click on **Edit** ( ). On the new page you can configure the language in which notifications will be sent and select which type of notification you want to be operational.

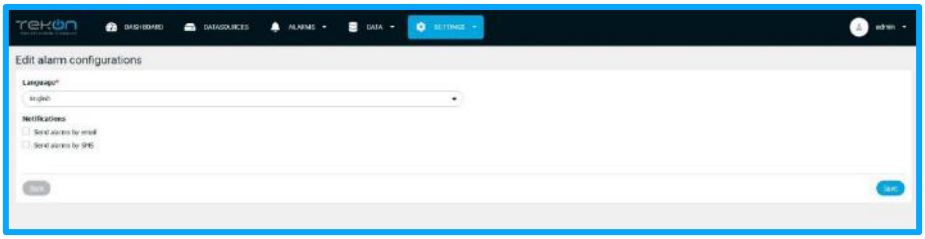


Figure 141 - Notifications service configuration page

NOTE: if you only enable one of the notification types, or if you do not enable any, email and sms services can be configured but not operational. If you pretend to activate the notifications, you must enable this option.

Limit notifications

Real-time monitoring can generate a high number of notifications. The context of monitoring may dictate the need to limit the number of notifications sent to users, and thus optimize the service, avoiding unnecessary expenses, with the costs of text messages.

By clicking on the validation boxes to activate notifications, options related to limiting the number of notifications will be displayed.

On a first scale, select whether or don't you want to limit the sending of notifications.

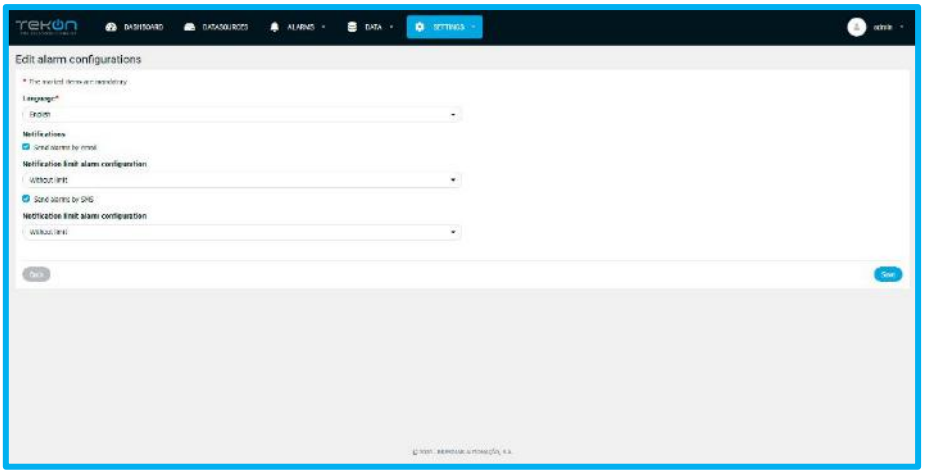


Figure 142 - Enabling notifications and limit options

Nota: por definição, as notificações são configuradas sem nenhum limite.

In the field **Notification limit alarm notification**, select **With limit** option.

It will be displayed the configuration fields to limit notifications:

- **Limitation period;**
- **Maximum number of notifications by period;**

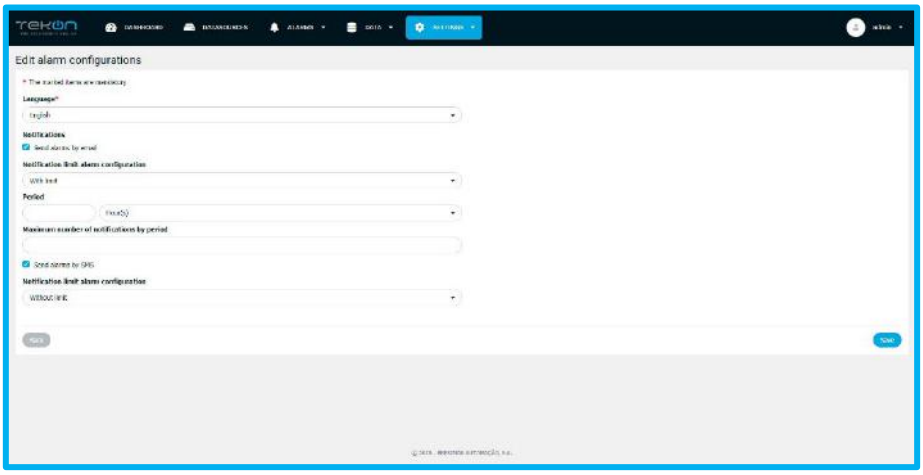


Figure 143 - Notification limits fields

In the field **Period**, select a time interval to the notification limit. Periods can be set by:

- **Hour(s);**
- **Day(s);**
- **Month(s);**

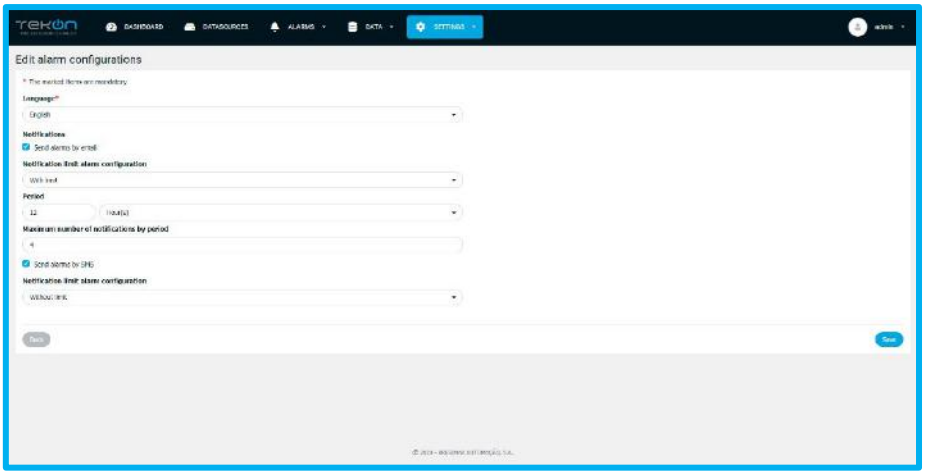


Figure 144 - Example of notifications limit

- Select the **type of period** and configure the **number of periods** intended.
- Define the **maximum number of notifications** by period.
- Click on *Save* to save the configurations.

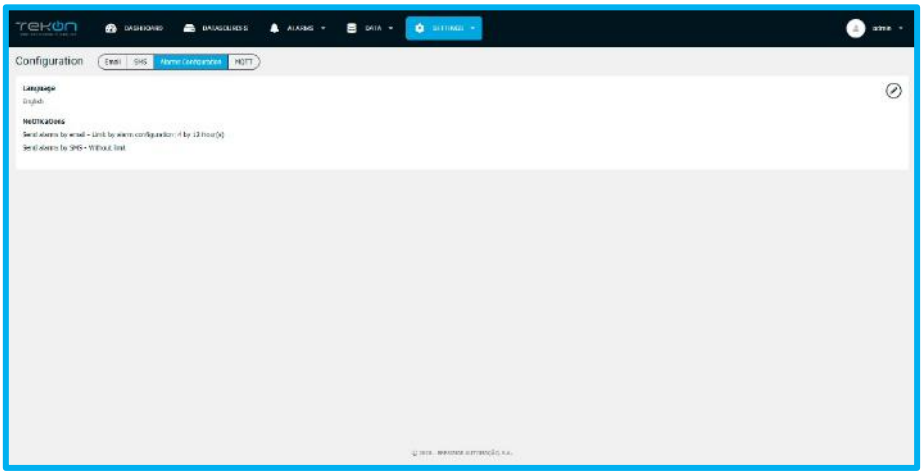


Figure 145 - Status and limit of notifications

NOTE: limits apply to each configured alarm. In this way, the user will be able to receive a higher number of notifications within the configured time interval but coming from several alarms.

Notifications services configuration

Notification services must be configured so that the defined recipients can receive them, either by email or sms.

Email

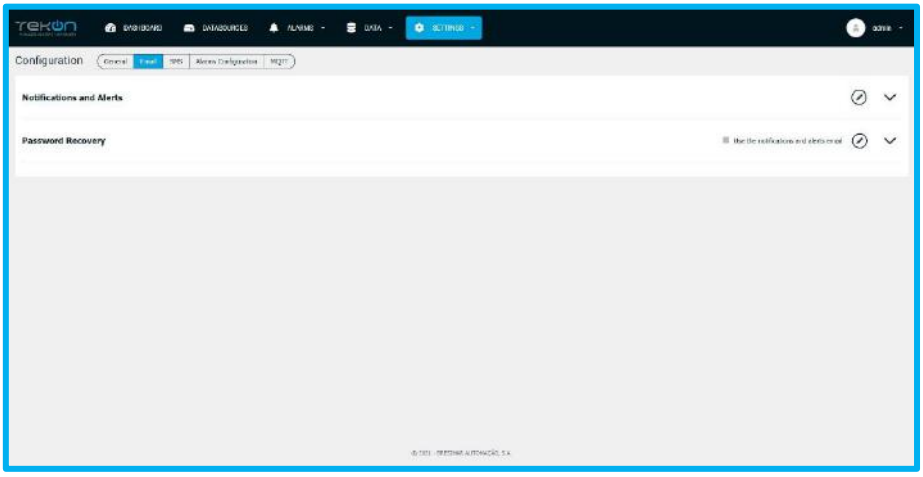


Figure 146 - Email services configuration

Go to the *Settings* >> *Configuration* >> *Email* menu.

Within email notifications, data can be entered for sending emails for two situations:

- Notifications and alerts – email sending to users with activation of alarms and periodic reports;
- Password recovery - users password recovery system;

“Notifications and Alerts”

- Cicki at Edit ( ) to insert the server configurations.
- Fill the form fields
    - **Server** – email sending server. Ex: smtp.gmail.com;
    - **Port** – email service port;
    - **Username** – email server username for access;
    - **Password** – email server password for access;
    - **Email** – email sender;
    - **Name to display on email** – name to show in email communications;

    As a practical example of configuration, we can use Google's email sending service, using the SMTP protocol. With this service, the configuration can look like the following.

- **Server**: smtp.gmail.com
- **Port**: 587
- **Username**: <google account username>
- **Email**: <google account email >
- **Name to display on email**: <defined by user>

- Click on the *Test configuration* button to validate the submission of emails through this server;
- Click on *Save* to save the configuration.

"Password recorevy"

Note: If you want to use the same server and configurations, used in the "Notifications and Alerts" section, select the option "Use the notifications and alerts email";

To configure a different email server, follow the next steps:

- Click on Edit ( ) to insert the server configurations.
- Fill the form fields
  - **Server** – email sending server. Ex: smtp.gmail.com;
  - **Port** – email service port;
  - **Username** – email server username for access
  - **Password** – email server password for access;;
  - **Email** – email sender;
  - **Name to display on email** – name to show in email communications;

- Click on the *Test configuration* button to validate the submission of emails through this server;
- Click on *Save* to save the configuration.

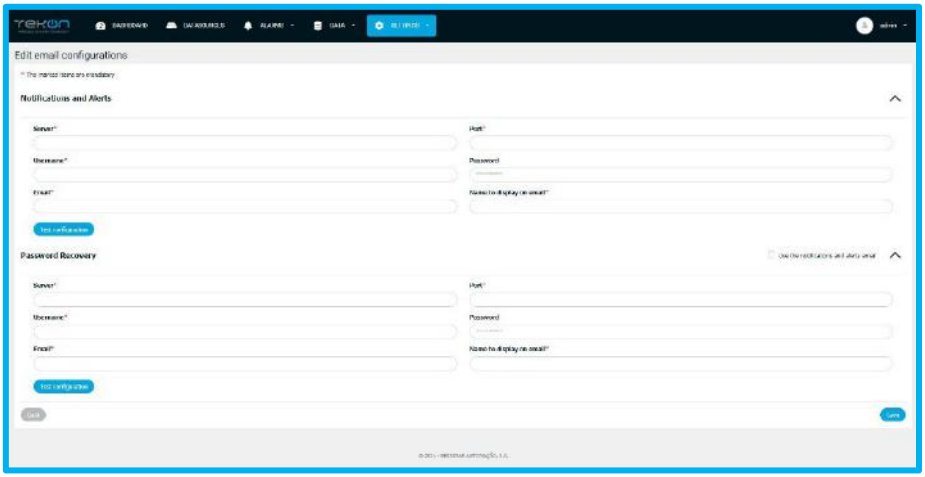


Figure 147 - Email service configuration form

SMS

Notifications configured via SMS are reliant on the subscription of an external service. The **Tekon IoT Platform** offers some SMS services for configuration. Each service is configured according to the supplier's needs. The services available belong to the providers **EZ4U** or **GatewayApi**.

EZ4U

The EZ4U SMS service offers two types of settings:

- **EZ4UPortugal**;
- **EZ4UInternacional**;

In each of the configurations, it is necessary to fill three fields:

- **Account**: provided by the EZ4U service;
- **Api Key**: provided by the EZ4U service;
- **Sender name**: name of the entity identified as the sender of the sms.

(Maximum of 11 characters);

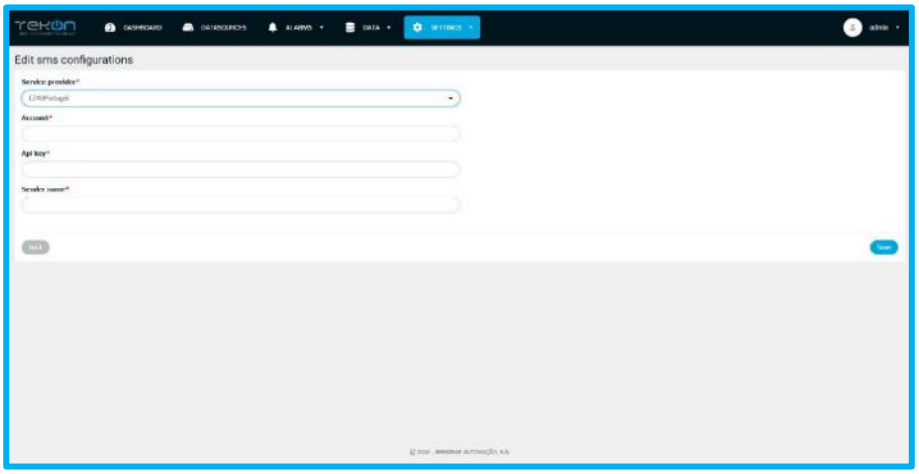


Figure 148 - SMS EZ4U service configuration

Note: the EZ4UPortugal service only works exclusively for numbers of communications operators in Portugal. If you subscribe to this service, but configure international numbers to receive notifications, the service will not send an SMS or may send it to a number in Portugal. This may happen because, due to the technical characteristics of the EZ4U service, the country extension is removed.

Copy EZ4U credentials to the Tekon IoT Platform

- Register as an user on the **GatewayAPI** platform website;
- Log in with the credentials used for registration;
- In the top menu, click on the user icon and click on *Developer*;

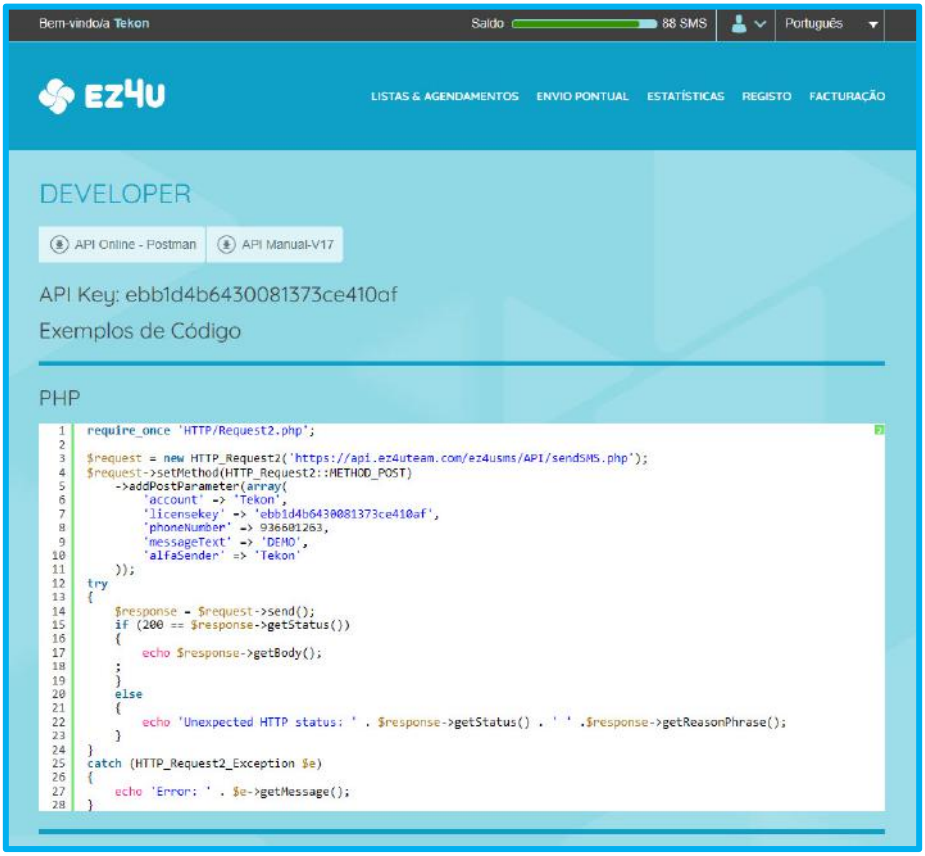


Figure 149 - EZ4U user access

- Copy the **Api Key** and paste it into the field with the same name, on the Tekon IoT Platform;
- In the **Account** field, enter your username;
- Fill in the **Sender Name** field;
- Click *Save* to save the settings.

GatewayApi

Learn more about the service in https://gatewayapi.com/

It is necessary to create a user account on the **GatewayApi** platform. See the topic **Create API Keys on the GatewayApi platform** steps to get the data you need. The user needs two unique parameters used in service configuration within **Tekon IoT Platform**:

- **API Key:** code provided by the service provider;
- **API Secret:** code provided by the service provider;
- **Sender name**: name of entity identified as sender of sms (maximum 11 characters);

This data is required to enable the service for **Tekon IoT Platform** notifications.

Go to *Settings* >> *Configuration* >> *SMS*, fill in the fields with the credentials provided by the sms service provider and set a name to the sms sender.

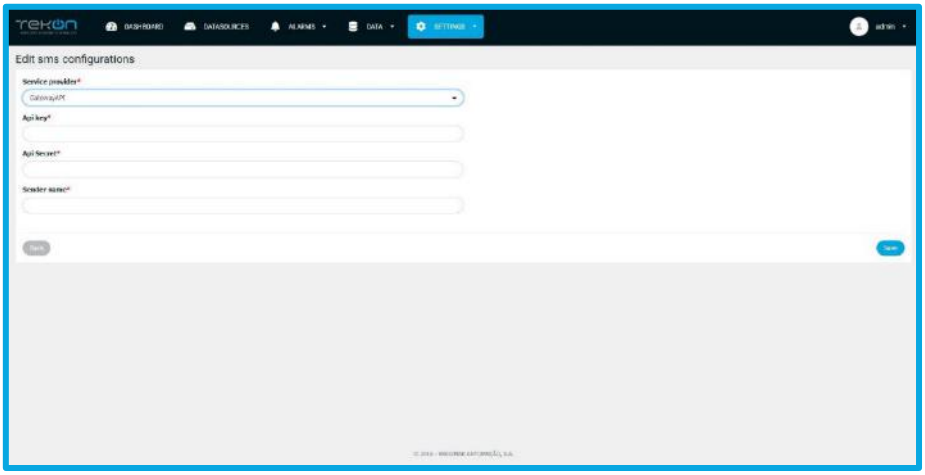


Figure 150 – SMS GatewayAPI service configuration

Create API Keys on the GatewayAPI platform

- Register as a user on the **GatewayAPI** platform website;
- Login with the credentials used for registration;
- On the side menu of your user page, click on *API* >> *API Keys*;

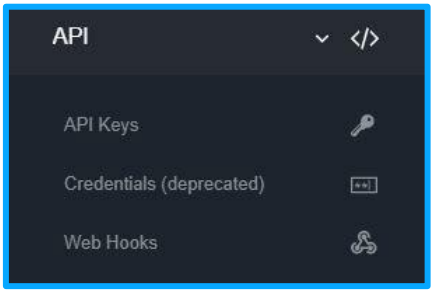


Figure 151 - GatewayApi site menu

You will be redirected to the API Keys creation page.

- Click on the **ADD API KEY** button.

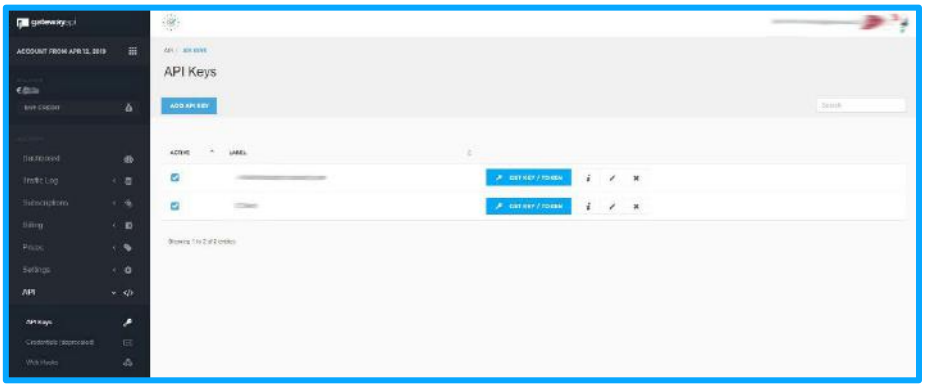


Figure 152 - GatewayApi platform API Keys page

- Set the API Key account ID. Each user can have multiple accounts for use on other platforms. Click **ADD** to save.

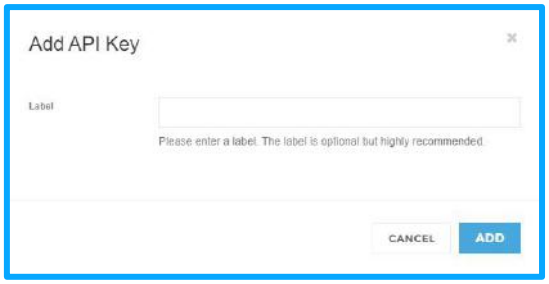


Figure 153 - API Key name label

- A window with the API Key information will show up.

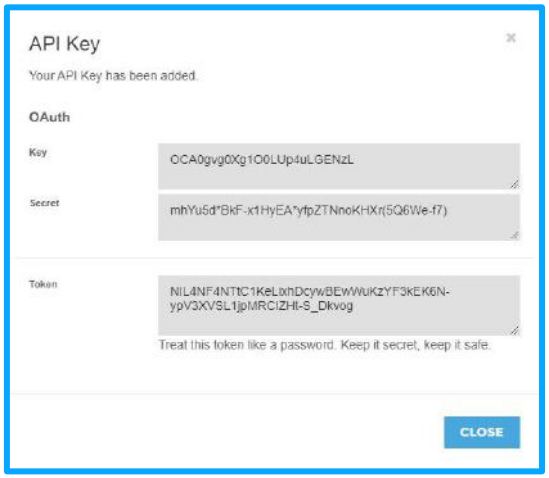


Figure 154 - API Key information on GatewayApi

To associate the service with **Tekon IoT Platform**, perform the following steps:

- Copy the key from the ***Key*** field and paste it into the ***API Key*** field of the platform sms service configuration page;
- Copy the ***Secret*** field key and paste it into the ***Secret API*** field of the platform sms service configuration page;

SMS credit

Users can check the balance of SMS notification services without leaving the Tekon IoT Platform.

Check account balance

1. In the “SMS” tab the configurations of SMS notification service it will be displayed as well as the account balance.
2. If you subscribe GatewayAPI service the account balace it will be displayed in numeric value. If the subscribed service is the EZ4U the number of SMS available it will be displayed.
3. Click on “Update” to reload the information about your SMS notification service.

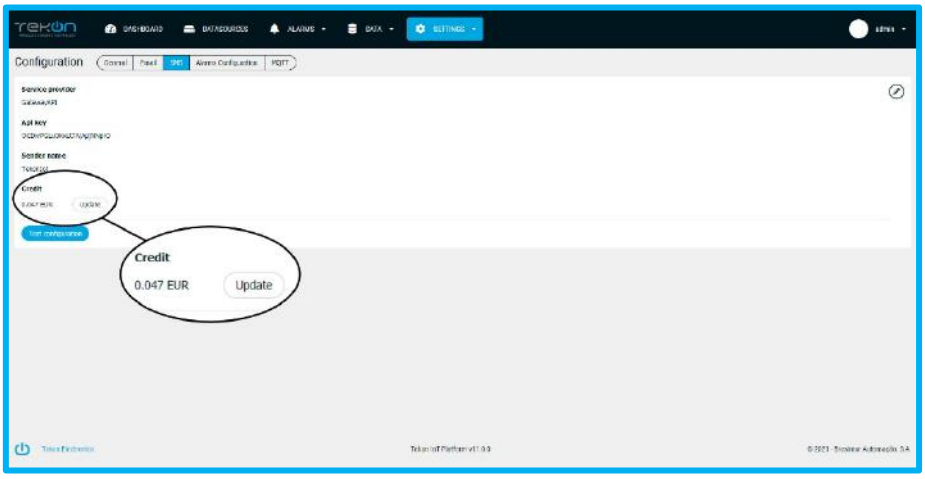


Figure 155 - Credit of SMS notification service

GENERAL SETTINGS

Customizable general information about the Tekon IoT Platform instance and your company.

Language

Tekon IoT Platform is available on four different languages. Users can change the language of the interface without lose any data.

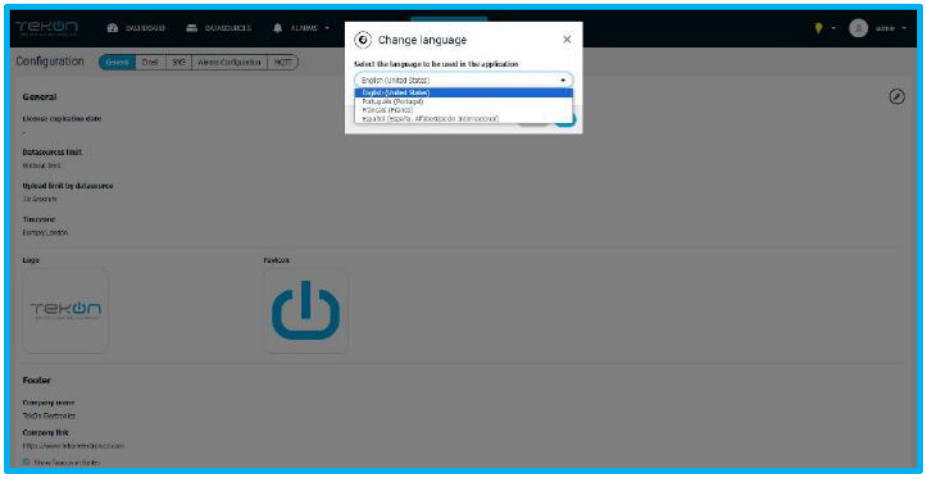


Figure 156 - Languages available

Click on “Language” tab and select an option – English, Português, Français or Español.

Datasource limit

Tekon IoT Platform instances have a datasource limit that sets a maximum number of devices supported for uploading data. This value is negotiated at the time of subscription.

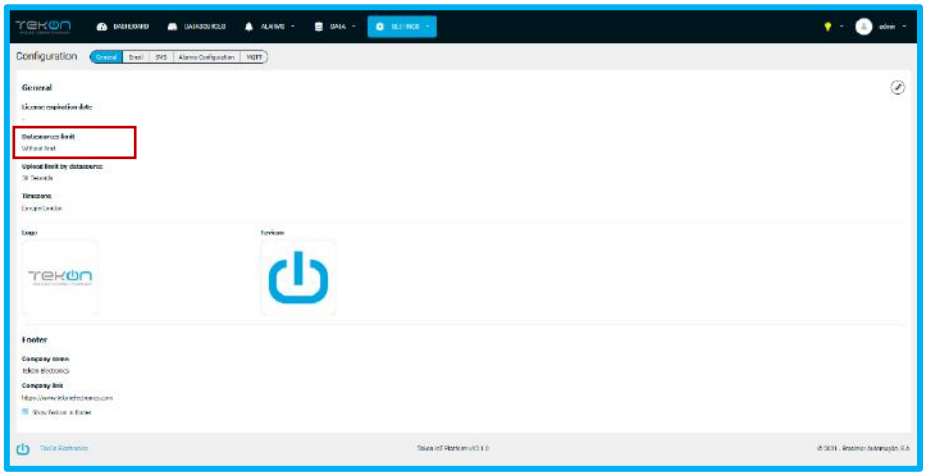


Figure 157 - Limit number of datasources

Upload limit by datasource

In each instance of Tekon IoT Platform, there is a minimum communication limit of data from datasources that are displayed on the platform. With this parameter, the minimum data logging period that is supported and logged by the instance is indicated.

By default, the set value is **5 minutes (300 seconds)**. If you want to change the value of this field, please contact Tekon Electronics's technical support or sales team.

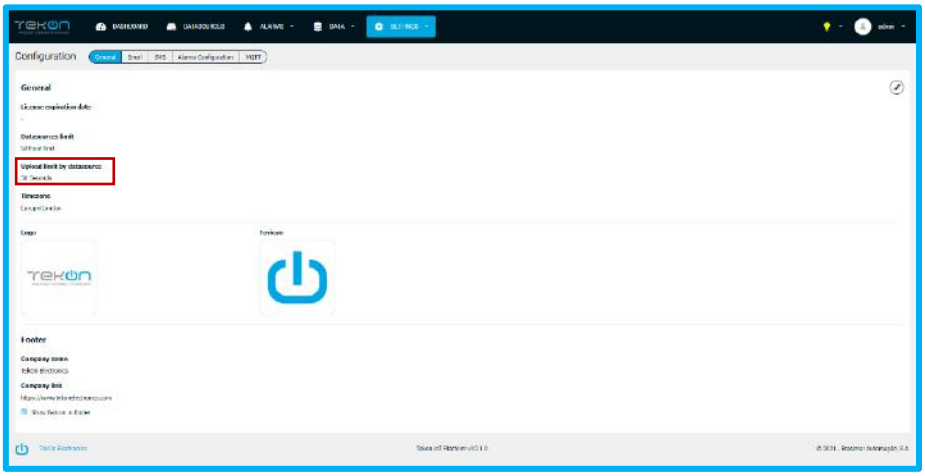


Figure 158 - Upload limit of Tekon IoT Platform

Customized image and information

The user with access permissions to configurations can customize the image and information of his company/business on Tekon IoT Platform. It is possible to configure your company logo and page identification favicon, as well as add company information in the platform footer. Defined images are also used in data export files.

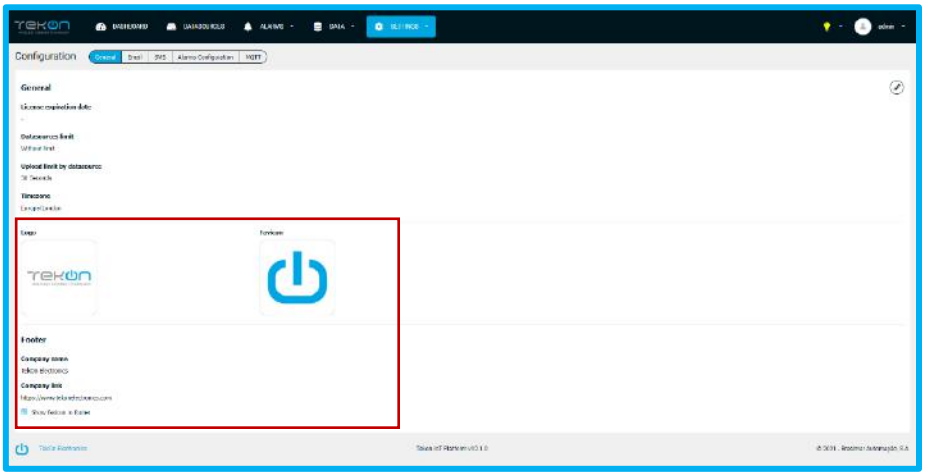


Figure 159 - Tekon IoT Platform customized info

Configure logo and favicon

1. Click on button to edit configurations.
2. Click on “Upload” button to choose an image to each field.
3. Please look to the information about sizes and formats on each image.

The images choosed on “Logo” and “Favicon” fields are available in several areas of Tekon IoT Platform.

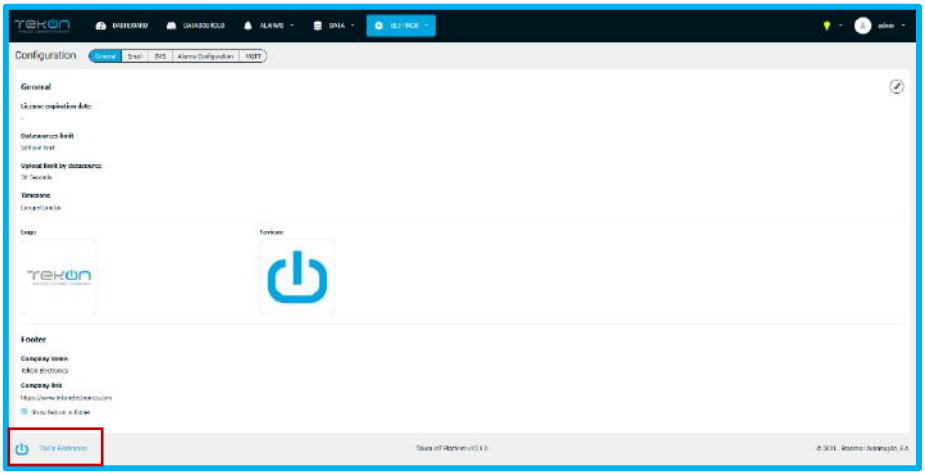


Figure 160 - Customized logo of Tekon IoT Platform

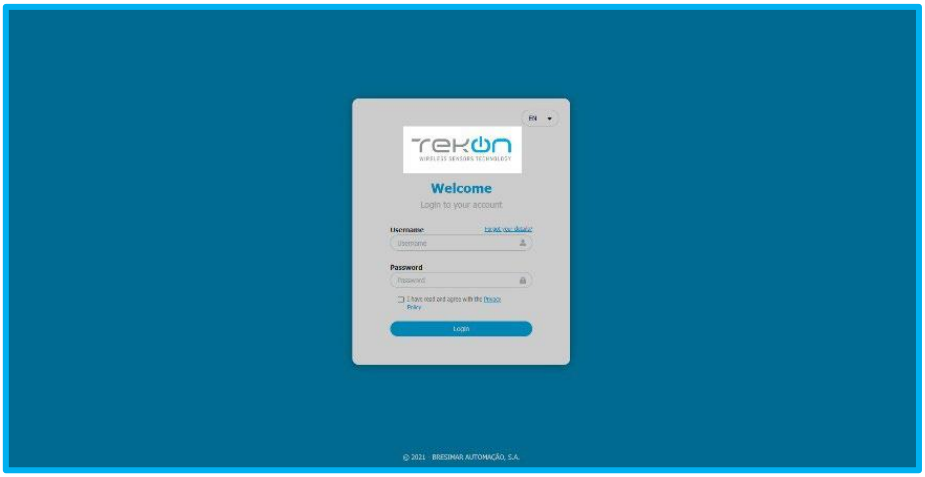


Figure 161 - Customized logo on login window

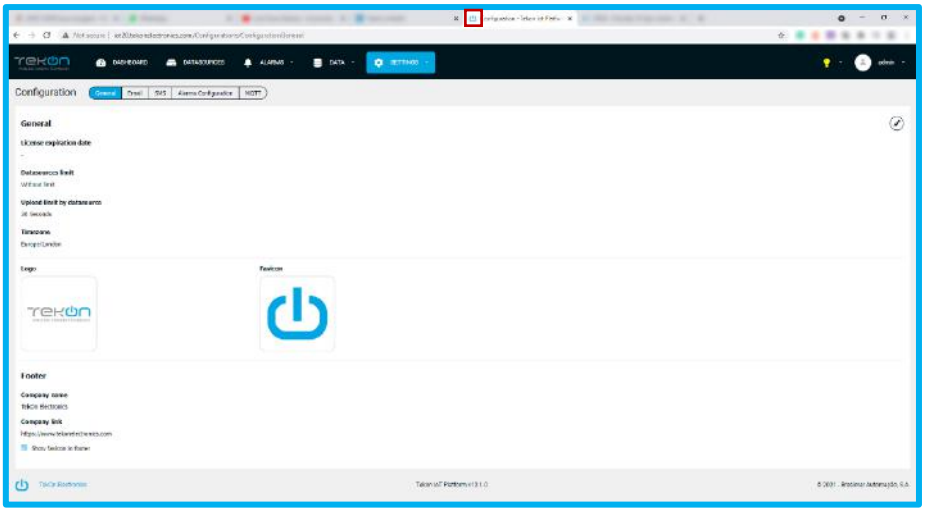


Figure 162 - Configured favicon

Delete logo and favicon

1. Click on button to delete image in use.

NOTE: If you delete the customized images, Tekon Electronics logo and favicon will be automatically applied.

Change logo and favicon

1. Click on “Upload” button to select a new image to each field.
2. Please look to the information about sizes and formats on each image.

Configure footer informations

Information about your company to be on Tekon IoT Platform footer.

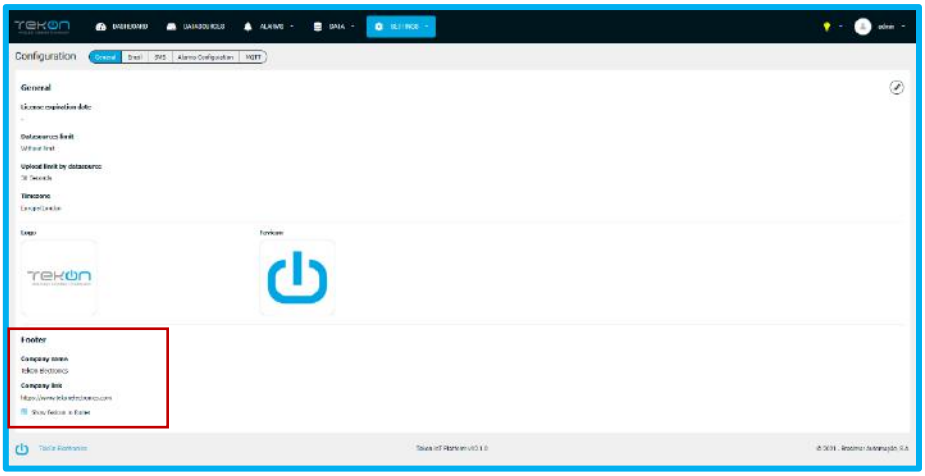


Figure 163 - Footer information

1. Click on button to edit configurations.
2. Insert the company name on “Company name” field.
3. Insert the website link on “Company link” field. By clicking on the link, user is redirected to this page.

NOTE: the link must be authentic and start with “https://” or “http://”

4. Click on “Show favicon in footer” checkbox if you want to use the favicon on the footer next to the link.

The fields in this section are not mandatory. The user can customize this section and define which elements will be displayed.

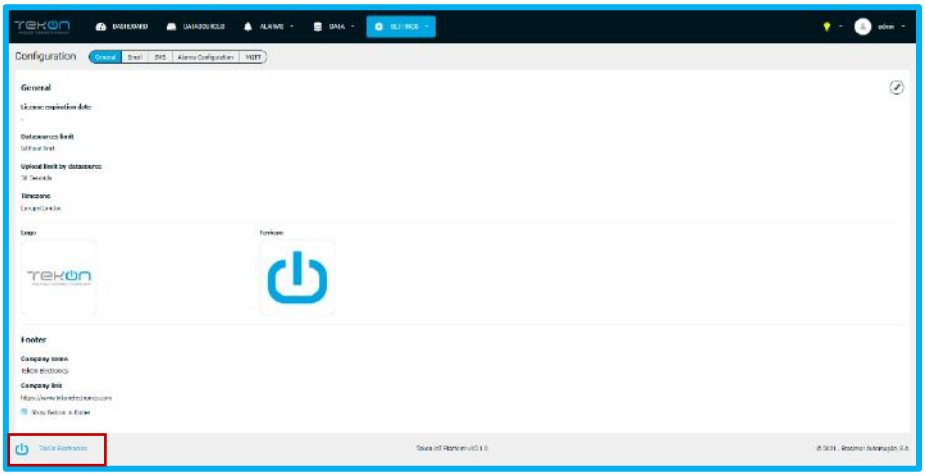


Figure 164 - Tekon IoT Platform footer

API KEYS

The communication between devices and **Tekon IoT Platform** is ensured by credentials, which ensure authentication and security of transacted data called API Keys. API Keys consists in individual 36-character codes automatically generated by **Tekon IoT Platform**.

API Keys are part of the profile of players responsible for communicating between sensors and the platform:

- **Datasources**: each datasource has a required API Key to distinguish the device when is transferring data with the datasource;

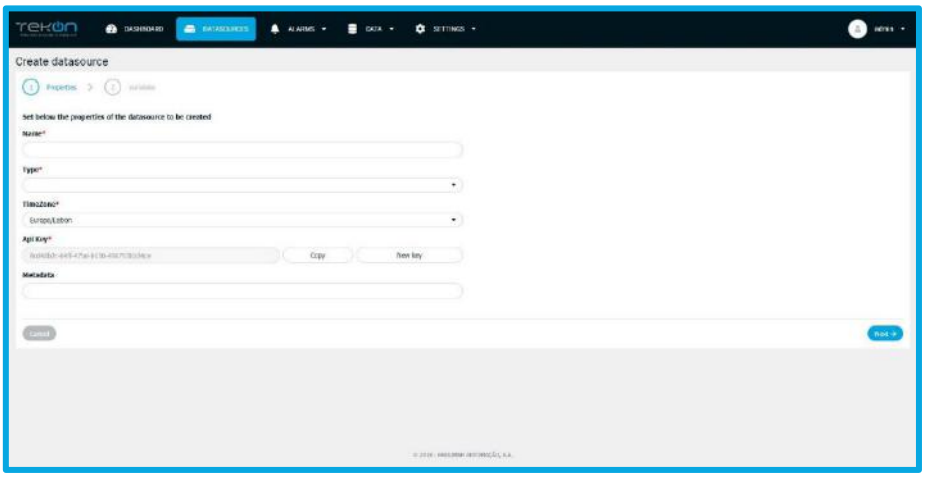


Figure 165 - Application of API Keys

- **User**: users can generate API Keys, on the personal information page, to use in the process of submitting data to the platform;

NOTE: a user who has a non-enabled profile with permissions to send data via API cannot be used to communicate between devices and platform, even if in their personal information has an API Key available for that purpose.

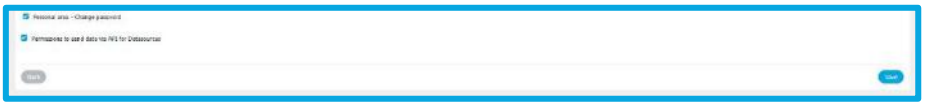


Figure 166 - Send data via API option

MQTT

The connectivity offered by the MQTT protocol, allows the integration of several devices. However, the data transmission must be authenticated by the MQTT broker. Credentials are required to validate the connection to the Tekon IoT Platform. These credentials are implemented in the connection process of the third device, which will act as the publisher, and serve as a key for data transmission.

Enable MQTT protocol

- In the *Settings* » *Configuration* » *MQTT* menu, click on the icon to access the tab options;
- Click on the *Use MQTT* checkbox;

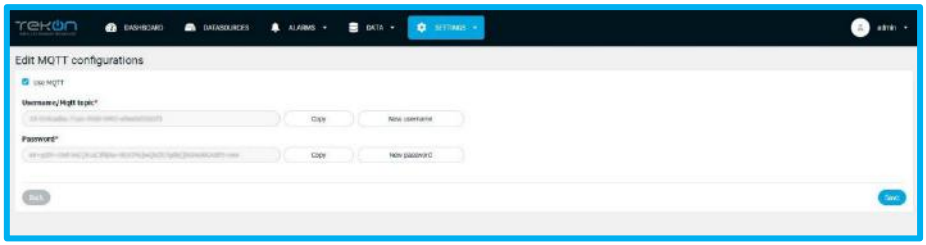


Figure 167 - MQTT credentials

The page will expand and show the fields already filled in with credentials. Credentials are automatically defined by the platform, so that they can respect the defined format. The credentials required to use the MQTT protocol are as follows:

- Username/MQTT topic;
- Password;

For each credential, there are two buttons with the same functionality, but applicable to each credential.

- "**Copy**" button - copy the credential text;
- "**New password**" / "**New username**" button - generate a new credential;

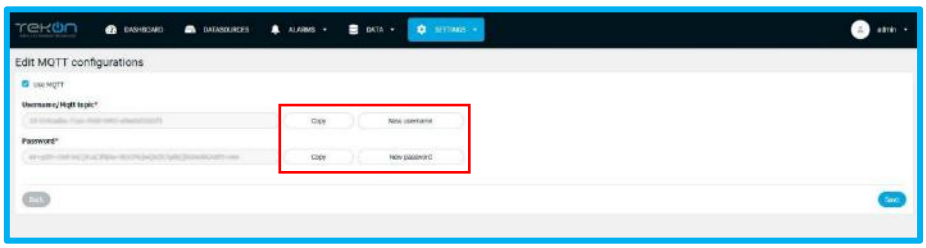


Figure 168 - Fields to copy the fields and generate new credentials

- Click on *Save* to save the changes.