KONTROLOG MINI

IOT PLC FOR REMOTE AND REAL-TIME CONTROL AND MONITORING

For LoRaWAN™, Sigfox, and Wi-Fi Networks

User's Manual

Version control

The following table contains the record of changes per manual version.

Version	Date	Description
1.0	20/09/2024	Creation of the User's Manual for the Kontrolog Mini device.

NOTICE

Read this manual before working with the product. For personal and system safety, and optimal product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

If you encounter a problem with your **Kontrolog Mini**, review the configuration information to verify that your selections are consistent with your application: input configurations; chosen limits; etc. If the problem persists after checking the above, you can have technical assistance at (+57) 3176478281, Monday through Friday, 7:00 a.m. to 5:00 p.m. Eastern Standard Time. You can also write to **solutions@omicroniot.com**, specialized personnel will discuss your application case.

Please have the following information available:

- All Configuration Information
- All Provided Manuals
- Device ID and the Parts List provided with the equipment.

Contact Information

To reach the **Kontrolog Mini** manufacturer for commercial information, refer to:

➔ Landline: +57 (604) 4087542
➔ Mobile: +57 (317)4365062
➔ **comercial@omicroning.co**

To reach the **Kontrolog Mini** manufacturer for technical information, refer to:

➔ Landline: +57 (604) 4087542
➔ Mobile: +57 (317)6478281
➔ **solutions@omicroniot.com**

Visit us at: **https://omicroniot.com/**

Warning notice standard

This manual contains notices that must be observed in order to ensure personal safety, prevent damage to properties, and guarantee proper installation, use and maintenance of the equipment. **The notices referring to personal safety or the integrity of the device are highlighted in the manual by an alert symbol**; notes regarding recommendations or complementary information to the topics covered in this manual have no safety alert symbol. The notices shown below are graded according to the previous definitions.

Refer to the safety messages indicated by this standard at the beginning of each section before interacting with the device or its components:

⚠WARNING

Indicates observations that, if not followed, could cause serious personal injuries, or damages to the device. The information in these tables indicates the risks related to each of the topics covered in this manual.

⚠CAUTION

Indications on the correct use of the equipment, useful to avoid improper operation.

NOTE:

Recommendations and clarifications to take into account in the different topics covered in the manual.

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⚠WARNING

Failure to follow safe installation guidelines could result in death or serious injuries.

- **Make sure the Kontrolog Mini is installed by qualified personnel** and in accordance with the applicable practice code.
- Use the device only as specified in this manual. Failure to do so may impair the protection provided by it.
- Inappropriate or incorrect use of the product may result in hazards and application-specific malfunctioning; such as damage to system components, due to incorrect mounting or adjustments.
- Do not perform any services besides those covered in this manual, unless you are qualified.
- Any substitution of non-authorized parts or repair, other than exchanging the sensors is prohibited.
- Unauthorized changes to the product are strictly prohibited as they may unintentionally and unpredictably alter the performance and safety.
- Unauthorized changes that interfere with the integrity of the enclosure or mounting holes, such as making additional perforations, compromise the product integrity and safety. **Equipment ratings and certifications are no longer valid on any products that have been damaged or modified without the prior written permission of Omicron IoT Solutions**. Any continued use of a product that has been damaged or modified without prior written authorization is at the customer's sole risk and expense.

Explosions could result in death or serious injuries.

- Verify that the operating environment of the device is consistent with its environmental specifications.
- **This device is not intended for use in flammable or combustible atmospheres.**

Section 1: Introduction

This reference manual provides detailed product-related information, installation instructions, configuration, and operation of the **Kontrolog Mini devices. The manual is designed for trained personnel. Read it thoroughly and carefully before unpacking and installing the products.**

⚠WARNING

The procedures and instructions in this manual may require special precautions to ensure the safety of the personnel performing the operations. The information that raises potential safety issues is indicated by a warning symbol. Refer to the safety messages listed at the beginning of each section before performing an operation preceded by this symbol.

1.1 Product Recycling / Disposal

Recycling of device components and packaging should be taken into consideration and disposed of in accordance with local and national legislation/regulations.

1.2 Storage and transport

The **Kontrolog Mini** is protected by a special packaging during transport and is guaranteed to handle normal loads during transport.

Section 2: General

The **Kontrolog Mini** device is a **programmable controller for IoT** (Internet of Things), with user-adapted functionalities: **No-Code, Low-Code and Full-Code**, thanks to its graphical and intuitive programming through the HMI interface for local configuration and its *open-source* code feature in C++ for user customization.

Designed for the **control and monitoring, remote and in real time, of different processes with high security and precision requirements,** the **Kontrolog Mini** easily adapts to the environment into which it is integrated, facilitating its use after assembly and guaranteeing efficient and safe operation in specialized applications.

It houses electronic components such as an ESP32 microcontroller with BLE and Wi-Fi antenna, and additional hardware elements such as: voltage sources, power outputs, and the necessary ports to connect the sensors and the Sigfox/LoRa dual communications module. The embedded software is contained in the microcontroller, which performs the tasks of: reading the sensors connected to its ports, capturing their information, creating the monitoring packets or frames, configuring and activating the communication module, sending data at intervals that can be variable depending on the programmed publication times, generating alerts and performing control tasks.

Customers are also offered memberships for the use of a **platform for remote monitoring and configuration**, supported by the manufacturer; More details about it can be found in **Section 7.**

2.1 Features.

Inputs and Outputs:

- Two (2) inputs for sensors, which can be configured as:
  - 4-20mA analog input.
  - Analog input 0-10 V.
  - Analog temperature input for NTC 10K – 3950 thermistor.
  - Digital input 1/0.
  - Input for analog ambient temperature and humidity sensor.
  - Digital pulse counter.
- 1 Input for a 12–24 VDC battery, and DC supply voltage measurement.
- A Modbus RTU (RS-485) input port that operates as a master in the network, with which up to 2 different external sensors can be read*.
- 4 GPIO pins available for user programming:
  - GPIO33
  - GPIO25
  - GPIO16
  - GPIO4
- One USB-C programming port or 5 VDC power supply.
- Two (2) 12A@120-240VAC relay control outputs, which can be configured as:
  - Control by remote commands sent from the platform.
  - *ON/OFF* Control with hysteresis for cooling or heating.
  - Timer.
  - Output follows associated input sensor.
  - Remote alarm.

    - Event counter.
    - PID Control.

Alarms:

- Alarms:
    - Built-in audible alarm.
    - Integration to a WEB IoT platform for sending remote alarms by SMS, voice message, email, Telegram messaging service, among others.

Wireless communication:

- Communications port, where a dual communications module with protocols for **LoRaWAN™/Sigfox** for US/EU/Latam/Australia areas can be installed.
- Built-in Wi-Fi communications module.
- Built-in Bluetooth LE.

HMI graphical interface for:

- Interactive graphic programming.
- Alarm configuration.
- Inputs and outputs configurations.
- Display of:
    - Status of the inputs.
    - Status of the outputs.
    - DC supply voltage.
    - Graphic records of the variables.

The **Kontrolog Mini** can be powered by a battery or DC 12V or 24V supply. According to the product philosophy, all the above-mentioned add-ons can be prescribed, and remote data transmission can be performed by different popular wireless technologies.

*** USE:**

The device can only read one Modbus slave per associated input, that is, up to two (2) different external sensors can be connected through the Modbus input port, and each of these will be associated with the memory register of the assigned input (S1- S2).
If the user wants to connect more Modbus sensors, they can connect up to 31, but they will have to assign registers for them in the microcontroller's memory space. You can do this by customizing the provided code (embedded firmware *open-source*). To do this, refer to the user programming tutorials provided by the manufacturer.

2.2 Device configuration

It is possible to configure the parameters of each sensor and the device, such as alarm levels and activation time, data publication time, among others. This can be done through the HMI interface on site, and/or through a remote configuration platform, for which the WEB IoT monitoring platform offered with the device already has this (Refer to **Section 7** for more details).

However, if you want to use your own remote monitoring and configuration platform, please refer to the **Communication Protocol Manual** to learn how to interpret the data frames sent by the Kontrolog Mini device and how to send remote configuration messages to it. To do this, the application software must have the ability to **send or store configuration messages, which must have the following fields:**

- ID of the device to which the message is directed.
- Identification of the sensor or control output.
- Parameter that you want to modify.
- Value or data.

The information that travels through the Internet is encrypted through secure and certified protocols to prevent it from being seen, manipulated or impersonated by third parties.

2.3 Synchronization of data frames lost due to network failures

The **Kontrolog Mini** devices also have a real time clock (RTC) system and the ability to synchronize this clock through communication with the software service, in such a way that it can store as a backup the last 140 messages sent, with a correct time stamp. Thanks to this, if there are data frames lost due to network failures, they can be automatically recovered when the connection is re-established through an encoded message type from the server.

Note: This feature only operates for devices with LoRaWAN™ and Wi-Fi modules.

Section 3: Sensors and Outputs Description

3.1 Description of Input Sensors

A sensor connected to the **Kontrolog Mini** measures a type of physical variable, analog or digital, that can be configured to read: temperature, humidity, voltage, current, etc. Each sensor has a register description given in the **Table 3-1.**

Table 3-1 Description of a child sensor in memory map

Address	Name	Record Type	Observation
0	Sensor Identity 1 to 8	R	Sensor's own identity 1 : Input sensor 1. 2 : Input sensor 2. 6 : Supply voltage 12-24VDC. For Modbus sensors: Address of sensor (Slave) to read: 1 to 247 (refer to **Section 4.1.7.2** for more information).
1	Current Value	R	Current sensor reading value
2	Sensor Type	R/W	Sensor Type, see **Table 3-2.**
3	Sensor reading resolution	R	0: Digital Sensors 1: Temperature (0.1°C) and Battery Voltage/DC Power Sensors 2: Current Sensor 4-20mA (0.01mA) 3: DC Voltage Sensor (0.001V or mV)
4	Enable/Disable Sensor	R/W	1: Sensor Enabled 0: Sensor Disabled
5	Reading Setting (*Offset*)	R/W	Read setting value (*Offset*) of the sensor: To adjust the reading value of a sensor, linear scaling can be used, in the form: *Adjusted V.= (Read V. + Offset)*Slope* (Refer to **Section 4.1.7.1** for more information).
6	Lower Alarm Limit	R/W	Lower alarm limit
7	Upper Alarm Limit	R/W	Upper alarm limit
8	Alarm Activation Time Delay in seconds	R/W	Time in seconds to delay alarm activation
9	Slope - (or scaling)	R/W	Sensor slope (scaling) value: To adjust the reading value of a sensor, linear scaling can be used, in the form: *Adjusted V.= (Read V. + Offset)*Slope* (Refer to **Section 4.1.7.1** for more information).

10	Read register address	R/W	Read start register for Modbus
11	No. of registers to read in Modbus	R/W	Number of registers to read in Modbus.
12	Data format	R/W	Modbus Register Format 0 : Whole 1: Integer with one (1) tenth (multiplied by 10) 2: Integer with two (2) tenths (multiplied by 100) 3 : Float (IEEE 754-2008) 4: Reverse Float (frame transmission begins with the least significant byte)

The R (Read) type registers are read-only, while the R/W (Read/Write) fields can be modified to change the sensor's operating parameters.

The **Table 3-2** describes the Types of Sensors (parameter No. 2) that are compatible with the devices **Kontrolog Mini** and its coding for subsequent interpretation in the application software, for example if a type of sensor is coded as Type 4, it is a Temperature Sensor and its reading is interpreted as 0.1 °C.

Table 3-2 Codification of Sensor Types connected to a Kontrolog Mini device

Sensor Type	Description	Resolution (in tenths)
1	Digital Sensor 0/1	0
2	Current Sensor 4 - 20mA	2
3	Voltage Sensor 0 - 10V	2
4	Temperature Sensor NTC 10K - 3950	1
5	Ambient Temperature Sensor	1
6	Ambient Humidity Sensor	1
7	Digital Pulse Counter 0/1	0
8	Remote value sent from platform	1
9	Modbus input	1

3.2 Description of Control Outputs

The programmable controller **Kontrolog Mini** has two (2) 12A@120-240VAC relay type outputs. These can be programmed to carry out different control tasks. The register description of each output can be seen in the **Table 3-3.**

Table 3-3 Description of Registers associated with a Control Output

Address	Name	Record Type	Observation
0	Output Identity	R	Output Identity 11: Output 1. 12: Output 2.
1	Current value	R	Current value or Port State 0: Relay Open 1: Relay Closed

2	Selected Control Function	R/W	Control Actuation Type for Output, see **Table 3-4.**
3	Assigned Control Signal	R/W	0 : No Control Signal 1 to 2: Sensor Inputs 1 to 2
4	Value of *Set-Point*	R/W	Desired value for control from -40.0 to 2047.0
5	Control Differential or Hysteresis	R/W	0.0 to 20.0, is the Control Range programmed around the *Set-Point*
6	Control type (Invert Output)	R/W	**For Control Function *On/Off*:** 0 : Normal Output (Cooling) 1 : Inverted Output (Heating) **For the Timer function:** 0 : The timer is activated when the Control Sign is less than the *Set-Point*. 1 : The timer is activated when the Control Sign is greater than the *Set-Point*. **For the Event Counter function:** 0: If # Pulses < *Set-Point* ==> Output = *OFF* If # Pulses >= *Set-Point* ==> Output = *ON* 1: If # Pulses < *Set-Point* ==> Output = *ON* If # Pulses >= *Set-Point* ==> Output = *OFF*
7	Cycle Time *ON* programmed for Timed Exit Cycle Time for PID Control	R/W	1 to 32767 seconds
8	Cycle Time *OFF* programmed for Timed Exit Time to perform Control Calculations for PID Control	R/W	0 to 32767 seconds
9	PID Control: Proportional Action	R/W	0 to 50%
10	PID Control: Integral Action	R/W	0 to 50
11	PID Control: Derivative Action	R/W	0 to 50
12	PID Control: Maximum Power to be applied to the Output	R/W	10 to 100%

The following figure shows the philosophy followed to activate the outputs.

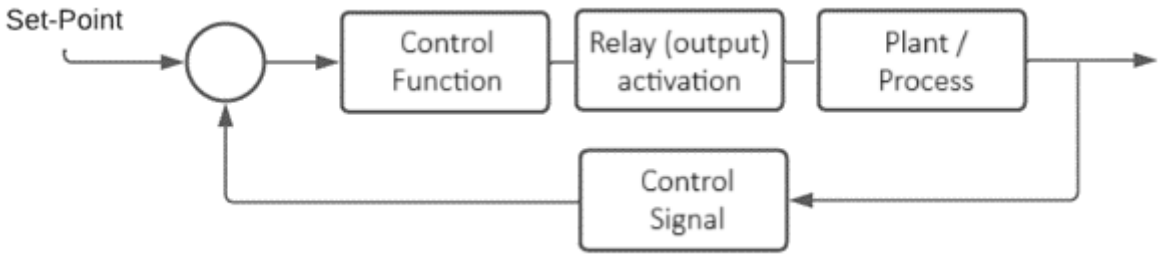


Figure 3-1 Closed loop control system

Control Signal: It is the associated Control Function Signal to activate the Control Function that affects the Output, this signal can be one of the two inputs (IN1 to IN2).

Control Function: It is a function assigned (According to Table 3-4) to control the output, this can be, for example, a Timer Function, a Control Function *On/Off* for heating or cooling, a PID Control, etc.

Output Activation: According to the state of the Control Signal and the logic applied by the Control Function, the activation/deactivation of the Output is carried out in a controlled manner.

Plant/Process: It is the system, plant or process that you want to control. It is external to the Kontrolog Mini device, and depends on the user's specific application.

Set-Point: It is a desired value to which you want to bring, or at which you want to maintain, the control variable (controlled by the Output). It is used in PID functions, *On/Off*, Timer and Event Counter.

Hysteresis: For the purposes of the present application, the hysteresis will be the value that will be added and subtracted from the *Set-Point* to determine the upper and lower range (respectively) of tolerance in which you want to keep the variable controlled by the system output. It is used in the Control function *On/Off*.

Table 3-4 Coding of Control Function types assigned to an output

Type	Description
0	Output Disabled.
1	Digital output controlled by remote commands sent from the platform (0/1).
2	Digital output follows associated Digital Sensor Input.
3	Control Function *On/Off*.
4	Timer function.
5	Remote Alarm Function (1: Alarm present in any of the 8 sensors, 0: No sensor is in Alarm State).
6	Event Counter.
7	PID Control.
32	This command allows resetting the output: clears timers and counters and resets the output to state *OFF* for 10 seconds, then apply the previously selected Control Function again.

3.2.1 Outputs controlled by remote commands

In this function, the output is activated or deactivated, according to a remote command sent from the platform. Status information is stored in the non-volatile memory of the **Kontrolog Mini**; In this way, in the event of a power failure, when the equipment is turned on again, the output is maintained in the same state that was assigned to it.

3.2.2 Output that follows the value of an associated input

In this case, the digital output follows the state of the associated input digital sensor, as long as it is selected as a digital sensor. If the input is not associated as a digital sensor, the output remains off.

3.2.3 Control Output Function *On/Off*

This type of function allows you to perform *On/Off* control with hysteresis for heating or cooling, the following parameters must be programmed at the output (**Table 3-5**) to correctly configure this control function.

Table 3-5 Parameters to configure for the Output Controlled by On/Off

No. Parameter	Parameter Name	Parameter Description	Allowable Value
2	Selected Control Function	Control Function Selection *On/Off*	3
3	Assigned Control Signal	Assign a Control Signal to the Equipment Inputs	1 to 2
4	Desired value or *Set-Point*	It is the desired control value, for example the temperature value that we want to achieve	-40.0 to 2047.0
5	Control differential or hysteresis	Delimits the Control Range for the variable that you want to control around the *Set-Point*	0.0 to 20.0
6	Control type (Invert Output)	0 : Cooling 1 : Heating	0 to 1

Examples of use:

Example No. 1:

We want to control the temperature in a telecommunications cabinet. When the temperature is higher than 35°C, a fan must be turned on until the temperature is below this value again.

1. **Output:** To activate the fan, select Output No. 1, which can handle up to 12A@120-240VAC.
2. **Control Function:** Control output function is chosen *On/Off* for output No. 1, and this is configured for cooling, with a *Set-Point* of 35°C, and a control differential (hysteresis) of 0.5°C.
3. **Control Signal:** A 10K NTC temperature sensor is installed at input No. 1, and assigned as a control signal to the control function.

Example No. 2:

If you want to activate a refrigerator in the range of 2 to 6 °C, configure:

1. Control Type = 0 → Cooling
2. Hysteresis = 2.0°C
3. *Set-Point* = 4.0 °C
4. When the temperature is less than or equal to 4.0-2.0 = 2.0°C, it turns off (*OFF*) the output.
5. When the temperature is greater than or equal to 4.0+2.0 = 6.0 °C, the output is (*ON*).

Example No. 3:

If you want to activate a water heater in the range of 30 to 32 °C, configure:

1. Control Type = 1 → Heating
2. Hysteresis = 1.0 °C
3. *Set-Point* = 31.0 °C
4. When the temperature is greater than or equal to 31.0 + 1.0 = 32.0°C, output is (*OFF*).
5. When the temperature is less than or equal to 31.0 - 1.0 = 30°C, output is (*ON*).

3.2.4 Timed Output Function

This type of function allows the output to be activated according to a timer, which can operate in three ways:

1. With a control signal associated with a single activation, in this case, Time is programmed *ON* > 0 and Time *OFF* = 0.
2. With a control signal associated cyclically, in this case, Time is programmed *ON* > 0 and Time *OFF* > 0.
3. Without an associated control signal, it operates as a timer cyclically, Time must be programmed *ON* > 0 and Time *OFF* > 0.

For the correct operation of a timer, the following parameters must be configured:

Table 3-6 Parameters to configure for Timed Output

No. Parameter	Parameter Name	Parameter Description	Allowable Value
2	Selected Control Function	Timer Function Selection	4
3	Assigned Control Signal	Assign a Control signal	0: For cyclic timer without control signal. 1 to 2: For single activation or cyclic timer with control signal.
4	Desired value or *Set-Point*	Desired value of the control signal to activate the timer	-40.0 to 2047.0
6	Control Type (Invert Output)	0: The timer is activated when the Control Signal is less than the *Set-Point*.	0 to 1

		1: The timer is activated when the Control Signal is greater than the *Set-Point*.	
7	Time *ON*	Indicates the time in which the output remains activated.	1 to 32767 Seconds
8	Time *OFF*	Indicates the time in which the output remains off.	0 to 32767 Seconds

Example No. 1:

You want to activate a fan for 60 minutes and turn it off for 15 minutes and keep this cyclic operation as long as the control signal temperature is above 37.0 °C.

1. *Set-Point* = 37.0 → From this point the timer is triggered.
2. Control Type = 1 → Timer activates when Control Signal is greater than 37.0°C
3. Cycle time *ON* = 3600 → The output is activated (*ON*) for 3600 Seconds.
4. Cycle time *OFF* = 900 → Output turns off (*OFF*) for 900 Seconds.

As long as the temperature is below 37.0°C, the output will remain off (*OFF*).

Example No. 2:

We want to activate an oxygenation pump for a tank for 60 minutes, once it is detected that the oxygen dissolved in the water falls below a minimum threshold. In this case, an oxygen sensor dissolved in water is being used that measures the concentration and delivers a proportional signal from 4 to 20mA. From knowledge of the process we know that the ideal oxygen level is 10 mg/L and occurs when the equivalent current signal is equal to 12mA.

A one-time activation timer is used because it is known that, for the given case, it will be enough to turn on the oxygenation pump just once for 60 minutes for the oxygen level to return to the desired range.

1. *Set-Point* = 12.0 → From this point the timer is triggered.
2. Control Type = 0 →The timer is activated when the Control Signal is less than 12.0 mA.
3. Cycle time *ON* = 3600 → The output is activated (*ON*) for 3600 Seconds.
4. Cycle time *OFF* = 0 → The output only triggers once for 60 minutes, then turns off.

As long as the current is above 12.0mA (Oxygen > 10 mg/l), the output will remain off (*OFF*).

3.2.5 Pulse Counter

For this type of function there are two ways of operating:

1. Input pulse counter less than *Set-Point*, output off.
   If # Pulses < *Set-Point* ==> Output = *OFF*
   If # Pulses >= *Set-Point* ==> Output = *ON*

2. Input pulse counter less than *Set-Point*, output on.
   In this case the output must be inverted
   If # Pulses < *Set-Point* ==> Output = *ON*
   If # Pulses >= *Set-Point* ==> Output = *OFF*

Use 1: To reset the pulse event counter, a command must be sent to reset the output or press the button on the HMI graphical interface. *RESET.*

Use 2: The maximum frequency for the pulse counter is limited to 0.1 Hz (i.e. one pulse every ten seconds).

Table 3-7 Parameters to configure in Output mode as Pulse Counter

No. Parameter	Parameter Name	Parameter Description	Allowable Value
2	Selected Control Function	Pulse Counter Function Selection	6
3	Assigned Control Signal	Assign an input signal for the Counter	1 to 2
4	*Set-Point*	Value to Count	0 to 2047
6	Control type (Invert Signal)	Assign 0: If # Pulses < *Set-Point* ==> Output = *OFF* If # Pulses >= *Set-Point* ==> Output = *ON* Assign 1: If # Pulses < *Set-Point* ==> Output = *ON* If # Pulses >= *Set-Point* ==> Output = *OFF*	0 to 1

Example of use:

Example No. 1:

A solenoid valve is intended to open once that more than 10 pulses emitted by a pressure switch are detected at the input.

1. **Output:** Output No. 2 is selected, which can handle up to 12A@120-240VAC.
2. **Control Function:** The counter function is chosen, control function = 6, a *Set-Point* = 10, the output = 0 is not inverted.
3. **Control Signal:** For example, input No. 1 is selected as digital and assigned as a control signal and the digital output of the pressure switch is connected to this input.

3.2.6 PID Control

3.2.6.1 Definition of PID control concepts

This type of function allows a PID control algorithm to be carried out at the output for systems with type control action *heating* (the actuator increases the value of the Control Variable, for example, temperature), given a *Set-Point* and a series of control parameters described below:

Process variable (Pv): It is the measured variable that you want to regulate or control, that is, one of the five assigned input variables, for example, Input 1: temperature.

Default value or *Set-Point* (Sp): It is a desired value to which you want to bring, or at which you want to maintain, the process variable (variable controlled by the system); It is programmed by the user.

Error (E): It is defined as the difference between the Process Variable and the *Set-Point,*

Error = Sp-Pv

Manipulated variable: Sometimes, the variable that actually changes to modify the Pv value may be different from the Pv, and is called the manipulated variable, being the one that is manipulated by the controller output. For example, in the control of the level of a tank, the process variable is the level of the tank, but the manipulated variable to change the level could be the flow rate of the tank outlet flow.

Cycle time (Tc): It is a cyclic time span, during which the activation of the output must be modulated, in order that such equipment receives a percentage of the power calculated by the PID control algorithm.

Control time: Sets a time in seconds in which the PID control algorithm is executed, usually taking the value of one or two seconds.

Proportional band (Bp): Corresponds to a band below the Sp along which the output power will vary proportionally to the Error, decreasing the closer the Pv is to the Sp. This is programmed in the control as a percentage of the Sp, as the proportional action (Pro). By itself, the proportional action fails to bring the system to the Sp value generating a stationary error.

Action or derivative constant (dEr): This parameter takes into account the rate of change over time of the measured variable (Pv). It allows to "advance" the control action of the output drive to obtain a more stable response. For example, if the process variable Pv is below Sp, but rises very quickly, then the control is advanced and decreases the output power.

Action or Integral constant (Int): Process that consists of introducing a small amount of power to the output, proportional to the sum of the measured error each time the control time elapses, thus generating the "adjustment" of the power required to maintain the equipment or system to be controlled at its Set-Point (Sp).

Maximum output power limit (Pot): This parameter is used to limit the maximum output power in the range of 10 to 100%. This power limit is not applied in the initial phase, but after the device has reached the PID control phase (this happens when the Error <75% of the Bp). With this parameter it is possible to prevent the variable from going out of control due to long disturbances to the system, for example, over-temperature peaks caused by a door being open in an oven for a long time and then being closed.

3.2.6.2 Calculation performed by the PID control algorithm

The Kontrolog performs a PID control algorithm to bring the process variable (Pv) to the desired value (Sp), expressed in the following formula for calculating the power to be supplied to the actuating elements:

$$\mathbf{Pot = [100\%(Error - Der/10*VEL + Int/1000 * \Sigma Error)/Bp]}$$

Where:

- **Bp (Proportional band)** = Sp* Prop /100%.
- **VEL** = Current Pv value - Previous Pv value
- **ΣError**: It is the summation of the error each time the control algorithm is executed.
- The power value is normalized in the range of 0 to 100%.

3.2.6.3 Selection of the PID control parameters

The key to success in the operation of PID controls in a given application is the proper selection of the parameters Pro, Der, Int, Tc, and Pot to be entered by the user. For this, the following behaviors and practical considerations should be taken into account in order to reach the optimum condition:

Unstable behavior: It is said that a system and its controller have an unstable behavior when after a reasonable time of operation and without external disturbances, the controlled variable (Pv) remains fluctuating around the Sp (Does not stabilize its value at the desired value). This is the case of an on/off type control or a system with a very small Bp.

Stable behavior: This is the behavior in which the controlled variable (Pv) remains at a constant value (at Sp) as long as no external disturbances occur. Within the stability conditions, there are 3 types of well-defined behaviors:

- **Overdamped system:** It has a slow response speed and after a disturbance occurs the system may take time to return to the Sp. The advantage is that it is very stable and does not acquire undesirable oscillatory behaviors. This condition occurs when the proportional band Bp is larger than necessary and when the derivative constant dEr is very large, since the derivative action tends to anticipate the response.
- **Underdamped system:** It has a very good response speed, but several oscillations of certain amplitude may occur (which, in practical terms, is power being lost in the system) before the process variable reaches a stable value. This condition occurs when Bp and dEr are small and the integration constant Int is large.
- **Critically damped system:** This condition corresponds to the optimum values of the parameters Bp, Der, and Int. In this case, the system is quite stable and the response speed is the best that can be achieved.

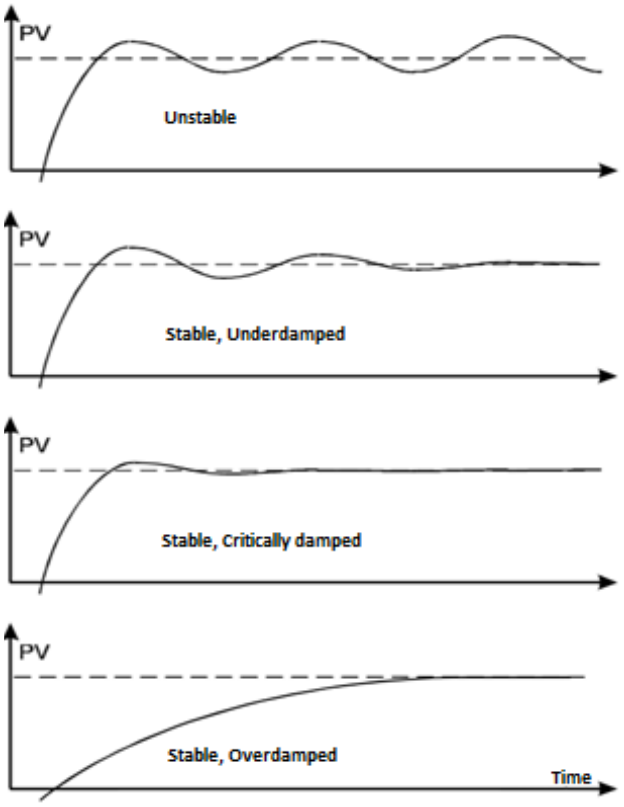


Figure 3-2 Behavior of PID control systems

3.2.6.4 Practical Considerations

In addition, it is important to be aware of some considerations such as:

- **A lower Proportional Band (Bp)** makes the system more oscillatory since the proportional control will behave more similar to the On/Off, i.e. it will tend to present oscillations around the Set-Point (Sp).
- **The longer the cycle time (Tc),** the less wear of the actuating elements (relays, contactors, resistors, etc.), but it must always be less than the time in which the system loses energy (e.g. heat, in the case of heating systems), called the characteristic time of the system. The recommended practice is to use a cycle time equal to half the system characteristic time.
- **Normally the Integral Constant (Int)** should be large only for fast-reacting systems and small for slow systems with a lot of inertia (e.g. furnaces and incubators).

Section 4: Graphical User Interface Guide

Kontrolog Mini devices can be configured through an HMI interface, which allows:

- Interactive graphic programming.
- Alarm configuration.
- Input and output configurations.
- Display of:
  - Status of the inputs.
  - Status of the outputs.
  - DC supply voltage.
  - Graphic records of the variables.

The Graphical Interface for device configuration was designed to make it easier for users to compose commands, according to the hierarchical coding supported by the devices.

It provides a great advantage in terms of ease of device configuration by technical personnel, because it simplifies complex control algorithms and does not require the use of any specific programming language.

Note:

The default password for the device to allow parameter changes is 333.

4.1 Description of input sensors

Figure 4-1 View of the sensor reading in the graphical interface

The screen in Figure 4-1 shows the respective information about each sensor.

There is a screen like this (Figure 4-1) for each of the 2 input sensors, and another for the Battery level or DC Supply Voltage sensor.

On the left side of this screen, under the word “Outputs” it is shown which outputs are enabled (green) and disabled (red). Two symbols related to the device's power are shown at

the bottom left. The first, a battery ( ), indicating whether the battery or 12-24V DC supply voltage is connected and its charge level or voltage, and the second, a connector ( ), which indicates whether the device is being powered by the USB-C connector. Additionally, with the arrows on the right side you can go forward or back to the other screens.

The symbols or letters that are indicated with numbering can be configured in a personalized way, as described below:

4.1.1 Device name setting (1)

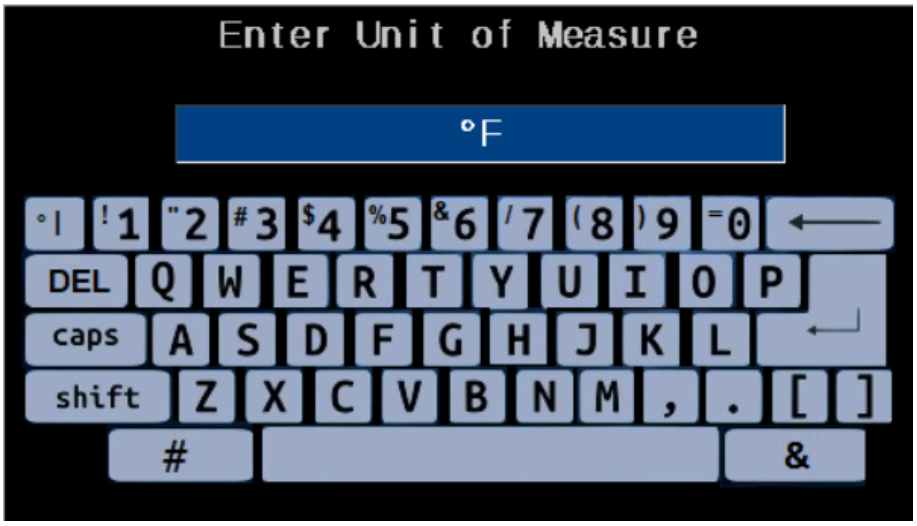
By clicking on the device name (in the case of the example given in Figure 4-1, KONTROLOG # 1), you can change the device name and personalize it.

4.1.2 Sensor name setting (2)

By clicking on the name of the sensor (in the case of the example given in Figure 4-1, SENSOR 1), it is possible to change the name of the sensor and customize it.

4.1.3 Configuration of measurement units (3)

By clicking on the units of measurement (in the case of the example given in Figure 4-1, ), it is possible to change these units of measurement according to those corresponding to the measurement displayed on the screen.

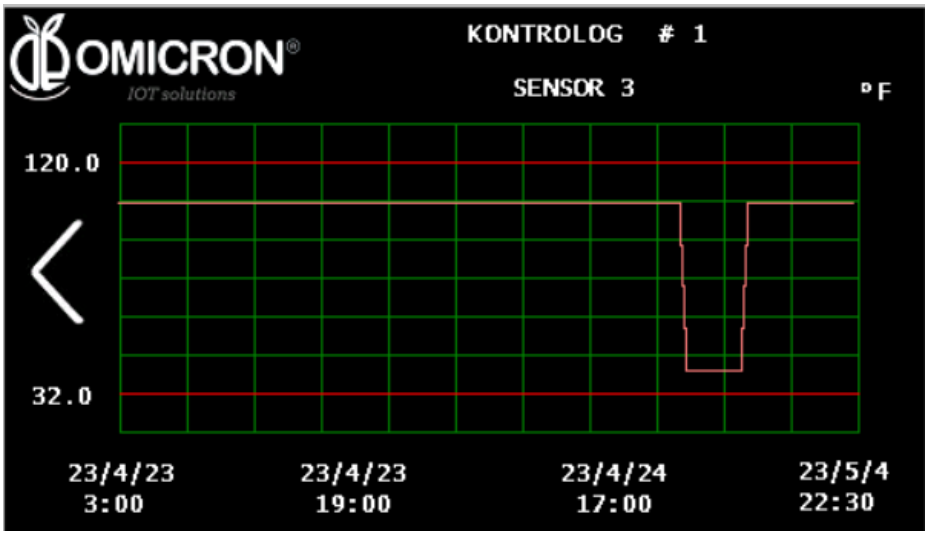


4.1.4 Graphic symbol configuration (4)

By clicking on the interactive graphic symbol, it is possible to choose another symbol among those that display the options, to interactively represent what the sensor measurement displayed on the screen corresponds to (for example, the doors symbol can be used for a door opening digital sensor).

4.1.5 Access to sensor reading graph (5)

By clicking on the graph symbol in the lower right corner (), it is possible to access a graphic record of the measurements of the corresponding sensor, where in turn you can see the recording dates of the measurements and the upper and lower alarm limits configured for said sensor.



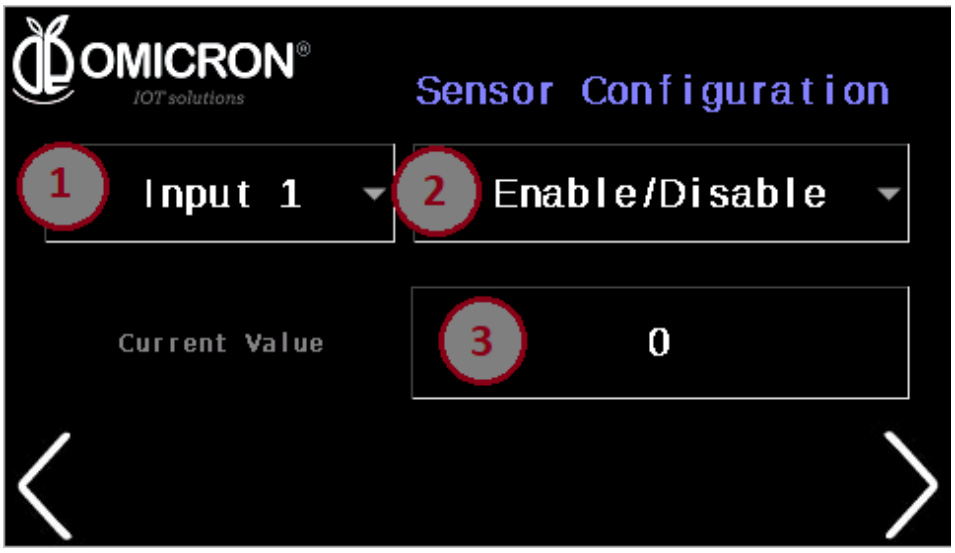
4.1.6 Time zone settings (6)

By clicking on the time shown on the screen (in the case of the example given in Figure 4-1, 17:57), you can change the current date and time according to the time zone where the device is installed.

4.1.7 Configuration of input sensors (7)

By clicking on the gear symbol ( ) it is possible to access the configuration of the input sensor parameters, as shown below:

4.1.7.1 Sensor configuration



1. Input Selection (1)

Here you can select the sensor you want to configure, from Input Ports 1 to 2, and the Battery Voltage Sensor or DC Supply Voltage.

2. Parameters to configure (2)

Pressing on (2) will display the options for configuration of the sensor selected in (1), these parameters are explained in the Table 3-1. The first parameter allows the input to be enabled or disabled by changing the current value in (3). The second parameter is the Sensor Type, go to the Table 3-2 to find all available sensor types and their corresponding number to be assigned in the current value (3). The next parameters to configure are the Read Adjustment (*Offset)*, the Lower Alarm Limit, the Upper Alarm Limit, the Alarm Activation Time Delay in seconds and the slope.

The Reading Setting (*Offset*) and the Slope (*Slope*), are constants used to adjust the value reading of a sensor, so that a linear scaling is carried out, using the formula:

*Adjusted V.= (Read V. + Offset)*Slope*

To better understand the linear scaling formula, two examples are explained below:

Example 1:

There is a sensor that delivers the temperature value in degrees Celsius, but it is required to read the temperature in Fahrenheit. It is known that:

°F=(°C*1.8) + 32

Then, it is configured:

Offset = 32/1.8 = 17.8

Slope = 1.8

Where: *°F=(°C + 32/1.8)*1.8*

Example 2:

A water Ph sensor provides the measurement in a range of 4 to 20 mA, where 4mA=0ph and 20mA=14ph.

Then, it is configured:

Offset = -4

Slope = 14pH/(20-4 mA) =

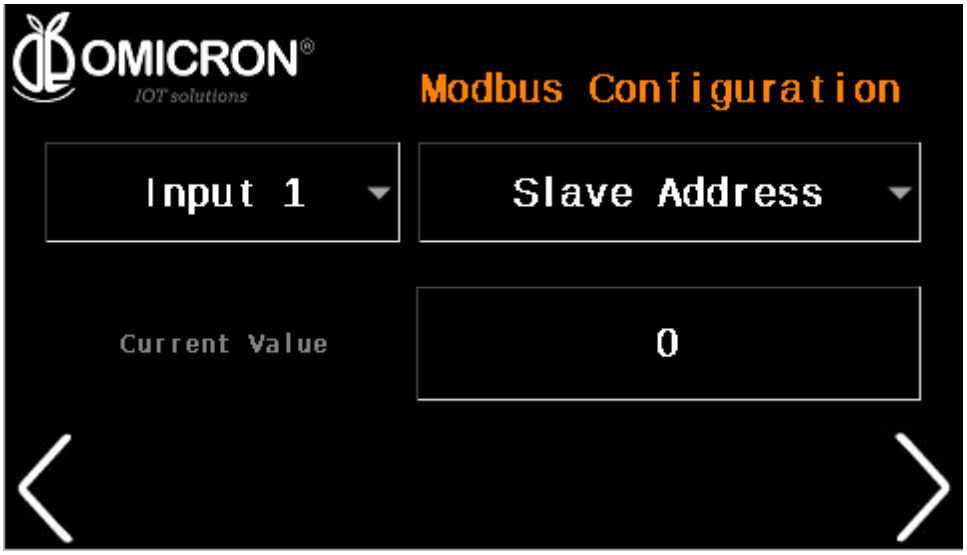
Following the formula: *Ph = (V. read [mA] - 4 [mA])*14/16 [ph/mA]*

3. Current value (3)

Space where the current value of the selected parameter will be displayed, and you can change it if you want to configure it differently.

4.1.7.2 Modbus sensor configuration

By pressing the arrow located at the bottom right of the screen of the **Section 4.1.7.1**, you will find the Modbus sensors configuration option. In case you have a sensor with the Modbus communication protocol, first make sure you have configured the Sensor Type correctly (refer to the **Section 4.1.7.1**).



In the same way as in the Sensor Configuration Screen, here you must choose the input you want to configure, and enter each of the four parameters requested (“*Slave Address, Start Address, Coils Number and Number Format*”).

1. *Slave Adress*: Modbus address of the sensor to be read (number between 1 and 247).
2. *Start Adress*: Initial register address that you want to read.
3. *Coils number*: Number of records to read.
4. *Number format*: It is the type of number format, and you can choose between: 0: Integer, 1: Integer x 10, 2: Integer x 100, 3: Direct Float 4 bytes, 4: Reverse Float 4 bytes.

Note:

The device can only read one Modbus slave per associated input, that is, up to two (2) different external sensors can be connected through the Modbus input port, and each of these will be associated with the memory register of the assigned input (S1- S2).

If the user wants to connect more Modbus sensors, they can connect up to 31, but they will have to assign registers for them in the microcontroller's memory space. You can do this by customizing the delivered code (embedded firmware *open-source*). To do this, refer to the **Kontrolog Mini Programming Guide.**

4.1.7.3 General settings

By pressing the arrow located at the bottom right of the screen of the **Section 4.1.7.2**, you will find the General Settings.

On this screen you can configure the following parameters:

1. Communication Module: The same must be chosen for all sensors. Depends on the type of device ordered (See Note at the end of the description). The values supported are: 0: Disabled, 1: Sigfox, 2: WiFi, 3: LoRaWAN™.
2. Publication time (in minutes): The time to publish data from the sensors to the remote monitoring platform.
3. Number of Uplink messages to make a Downlink: every how many upload messages it asks the platform if it has a download or configuration message.
4. RF Zone: The same must be chosen for all sensors. For communication module LoRaWAN™ and Sigfox, depends on the type of device ordered (See Note at the end of the description).
5. Normal Reboot *(Normal Reset)*: Allows you to restart the device. Assign 1 to reset.
6. Factory Reset *(Factory Reset)*: Allows you to perform a factory reset of the device, which places all its parameters at their factory default values. Assign 1 to reset.
7. Test mode (*Test Mode*): For RF testing. Assign 1 to enter *Test Mode*. To learn how to perform RF testing, consult the manufacturer for details. Please remember that you can find contact information at the beginning of this document.

Note:

Kontrolog Mini devices have a built-in WiFi communication module, and an internal communication port, where a dual communication module with protocols **LoRaWAN™/Sigfox** can be installed for US/EU/Latam/Australia areas.
Depending on your location, Sigfox Zone and LoRaWAN™ band coverage will change.

Kontrolog Mini USA
USA, Mexico, Brazil: Sigfox Zone 2 and LoRaWAN™ US915.
Latin America and Australia: Sigfox Zone 4 and LoRaWAN™ AU915.

Kontrolog Mini EU
Europe: Sigfox Zone 1 and LoRaWAN™ EU868.

4.2 Description of control outputs

To make a change to the parameters of some of the outputs, first, make sure you are on the output you want to configure, the current output is displayed at the top of the screen; To change the output, press the arrow located on the right edge of the screen. Click on the parameter you want to change. The parameters are listed in the **Table 3-3**.

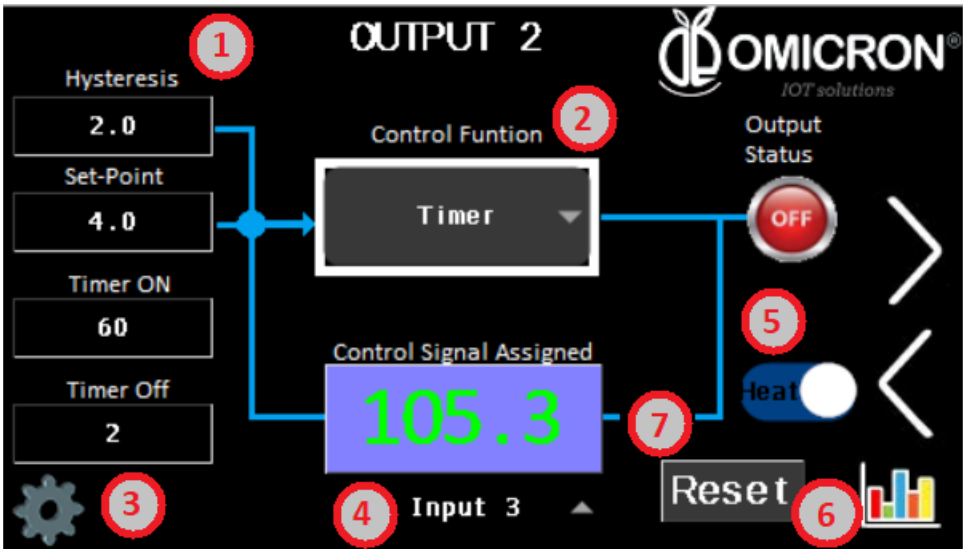


Figure 4-2 Output control configuration view in the graphical interface

4.2.1 Input parameters (1)

Hysteresis: From 0.0 to 20.0. For the purposes of the present application, the hysteresis will be the value that will be added and subtracted from the *Set-Point* to determine the upper and lower range (respectively) of tolerance in which you want to keep the variable controlled by the system output.

Set-Point: From -40.0 to 2047.0. It is a desired value to which you want to bring, or at which you want to maintain, the control variable (controlled by the Output).

Time of cycle *ON*: From 1 to 32767 seconds. It's Cycle Time *ON* programmed for Timed Output or Cycle Time for PID Control.

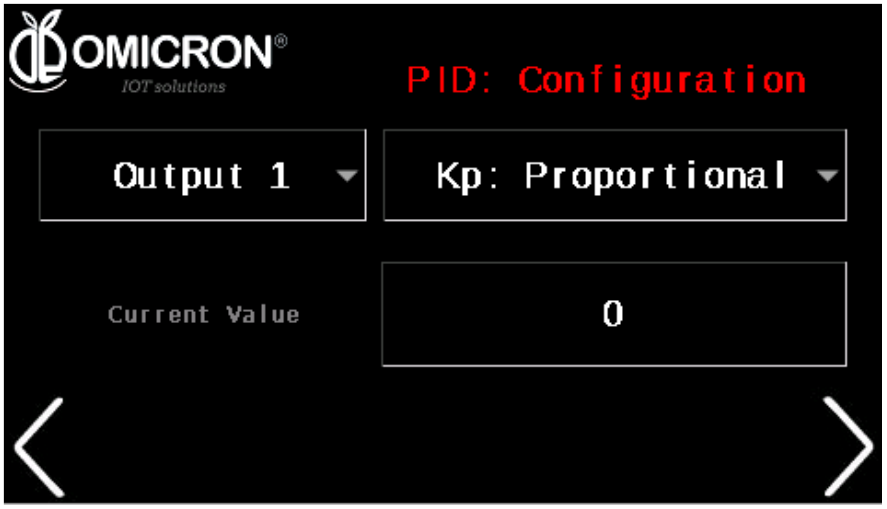
Cycle time *OFF*: From 0 to 32767 seconds. It's Cycle Time *OFF* programmed for Timed Output or Time to Perform Control Calculations for PID Control.

4.2.2 Control Function (2)

In the **Table 3-4** each of the control functions is listed, and in the **Sections 3.2.1** and below each of them are explained.

4.2.3 PID Control Parameters (3)

Press the setting gear ( ), to modify the parameters of the PID Control Function. In the **Section 3.2.6** you will find a detailed explanation of this type of Control Function and the parameters it receives.



4.2.4 Control Signal (4)

It is the associated Control Function Signal to activate the Control Function that affects the output, this signal can be one of the two inputs (IN1, IN2) of the **Kontrolog Mini**, or a remote command.

Note:

If the input associated with the output is not configured correctly according to the type of sensor you want to use, the output control will not work properly. For this reason, it is important that you first correctly configure the sensor that you will associate with the output (Refer to **Section 4.1.7**), and then configure the control loop.

4.2.5 Control type (Invert Output) (5)

Indicates the status of the Invert Output variable, and by pressing on it, you can activate or deactivate the Invert Output Function. This is:

For Control Function *On/Off*:
0 : Normal Output (Cooling)
1 : Inverted Output (Heating)

For the Timer function:
0 : The timer is activated when the Control Signal is lower than the *Set-Point*.
1 : The timer is activated when the Control Signal is greater than the *Set-Point*.

For the Event Counter function:
0:
If # Pulses < *Set-Point* ==> Output = *OFF*
If # Pulses >= *Set-Point* ==> Output = *ON*
1:
If # Pulses < *Set-Point* ==> Output = *ON*
If # Pulses >= *Set-Point* ==> Output = *OFF*

4.2.6 Access to sensor reading graph (6)

By clicking on the graph symbol in the lower right corner (), it is possible to access a graphic record of the measurements of the corresponding sensor associated with the output (assigned in parameter 4), where in turn you can see the recording dates of the measurements and the configured upper and lower alarm limits for said sensor.

4.2.7 Reset Button (7)

The Reset button, located at the bottom right of the screen, will reset the Timer and Pulse Counter. Please note that for 10 seconds it will turn off the output.

Section 5: Sigfox Backend Configuration

If you want the devices **Kontrolog Mini** to work with the Omicron IoT Solutions Monitoring Platform using the Sigfox telecommunications network, the user will be able to allow bidirectional communication with the platform by associating *Callbacks* to the messages of *Uplink y Downlink* of the devices in the **Sigfox backend.**

Note:

For correct operation, be sure to order the appropriate device depending on Sigfox Zone coverage.

Kontrolog Mini USA

USA, Mexico, Brazil: Sigfox Zona 2.
Latin America and Australia: Sigfox Zona 4.

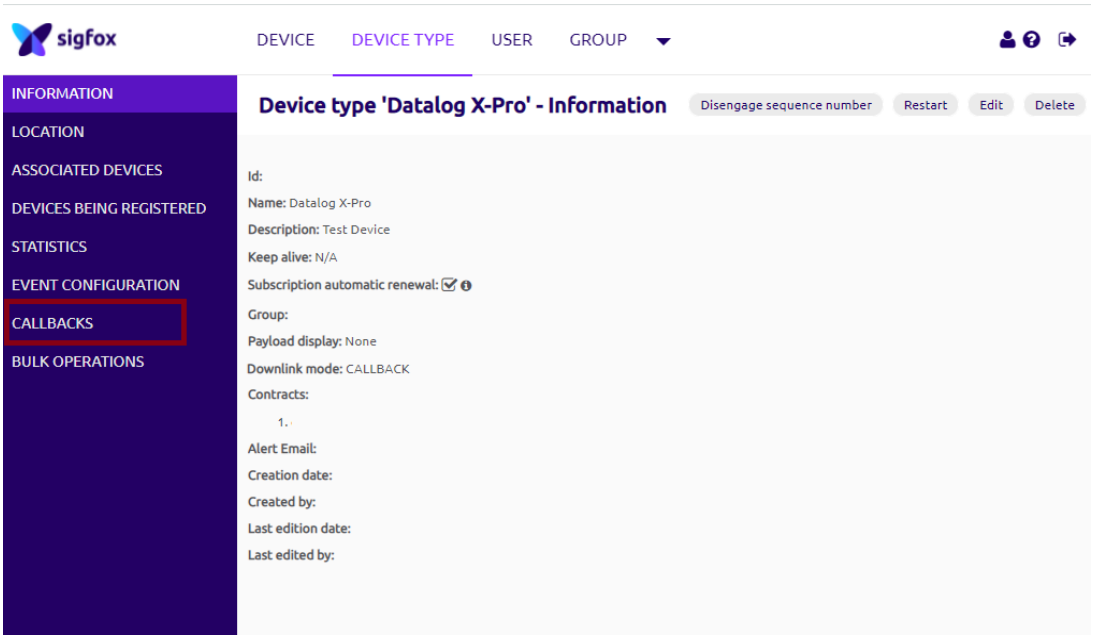
Kontrolog Mini EU

Europe: Sigfox Zona 1.

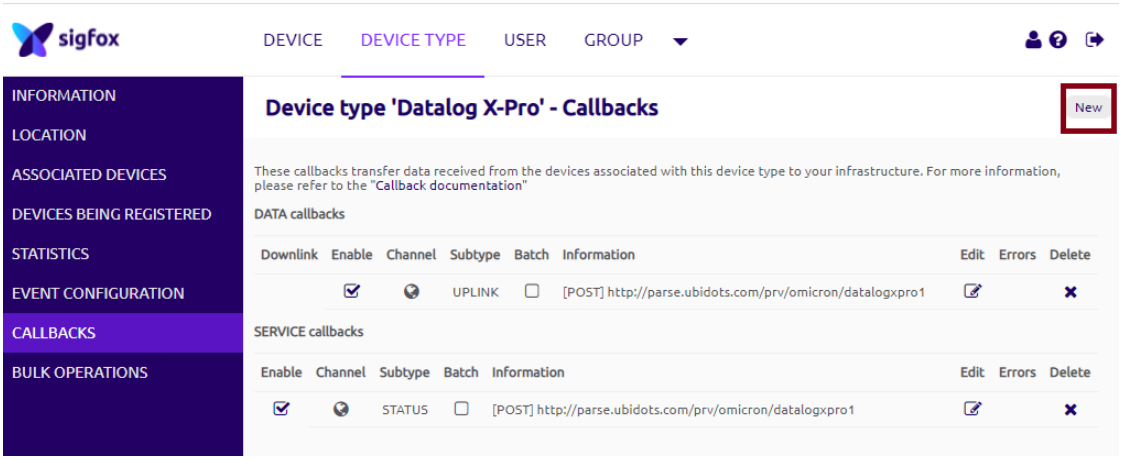
***Uplink-Downlink protocol* for third party platforms:**
If you want to use another monitoring platform, please do not hesitate to contact us and request the ***Communication Protocol Manual*** for the Kontrolog Mini.

5.1 Callback configuration for Uplink Messages on Sigfox

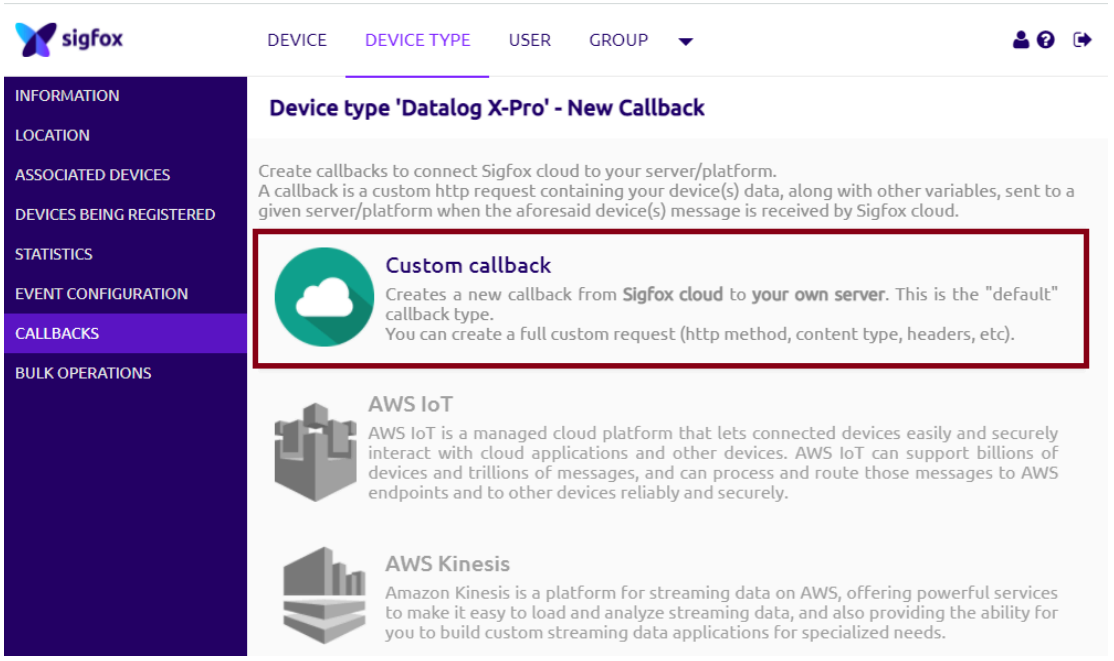
Follow the steps below:
1. In the Sigfox backend, enter the device type to which you have associated the Sigfox modules used by your **Kontrolog Mini** devices, and select “CALLBACKS” from the menu on the left.



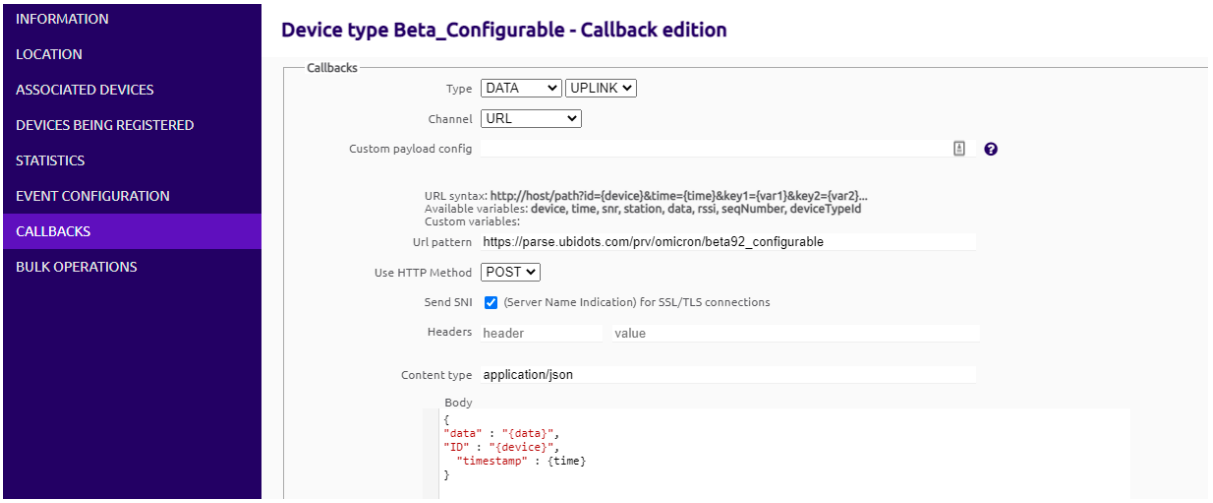
2. Create a new Callback by selecting the "New" option.



3. Select “Custom Callback”.



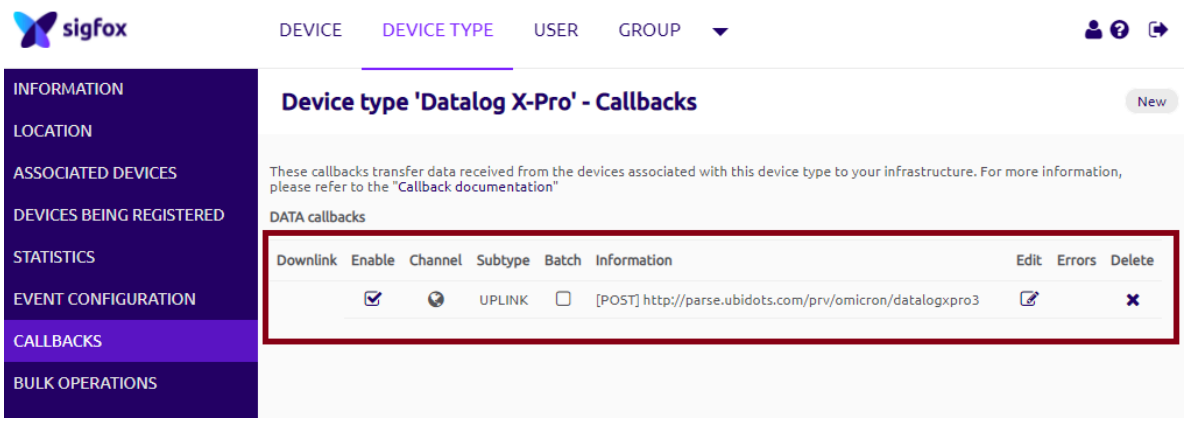
4. Configure the Callback as presented in the image below, and then press “OK”.



- Use the URL pattern: https://parse.ubidots.com/prv/omicron/kontrolog_configurable
- Use the body:

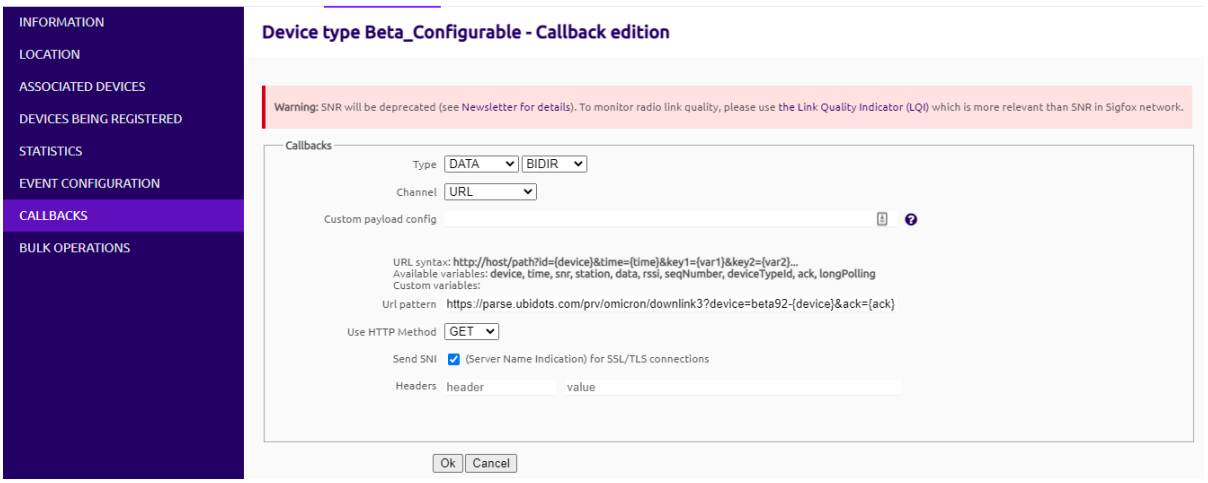
```
{
"data" : "{data}",
"ID" : "{device}",
"timestamp" : {time}
}
```

5. Next, in the section *Callbacks* of the edited device type, you will see a *Callback* like the following:



5.2 Configuration *Callbacks* for *Downlink* Messages *in Sigfox*

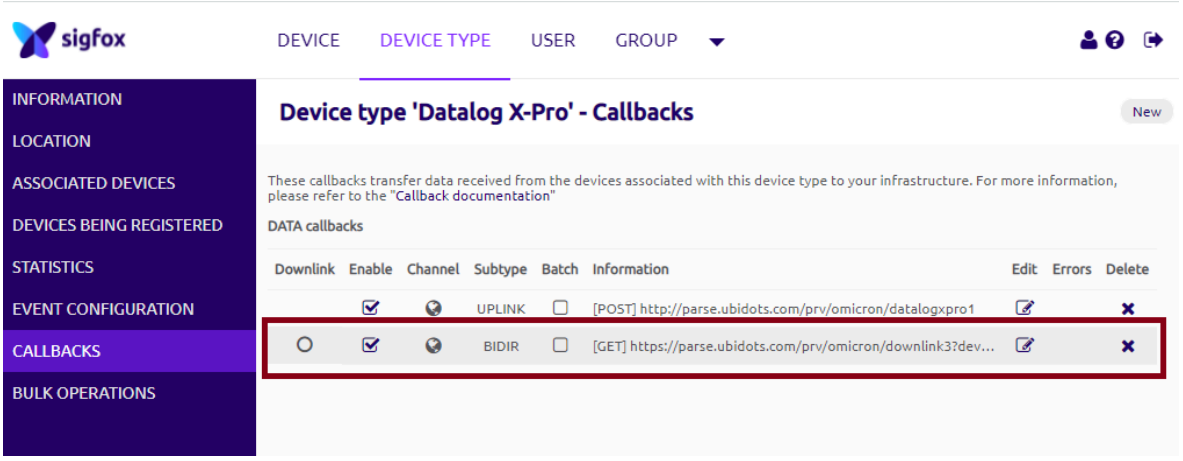
1. **Follow steps 1 to 3 in Section 5.1**, then set the new *Custom Callback* like the following, and then press "OK":



- DATA Type: BIDIR
- Canal: URL
- Using the HTTP method: GET

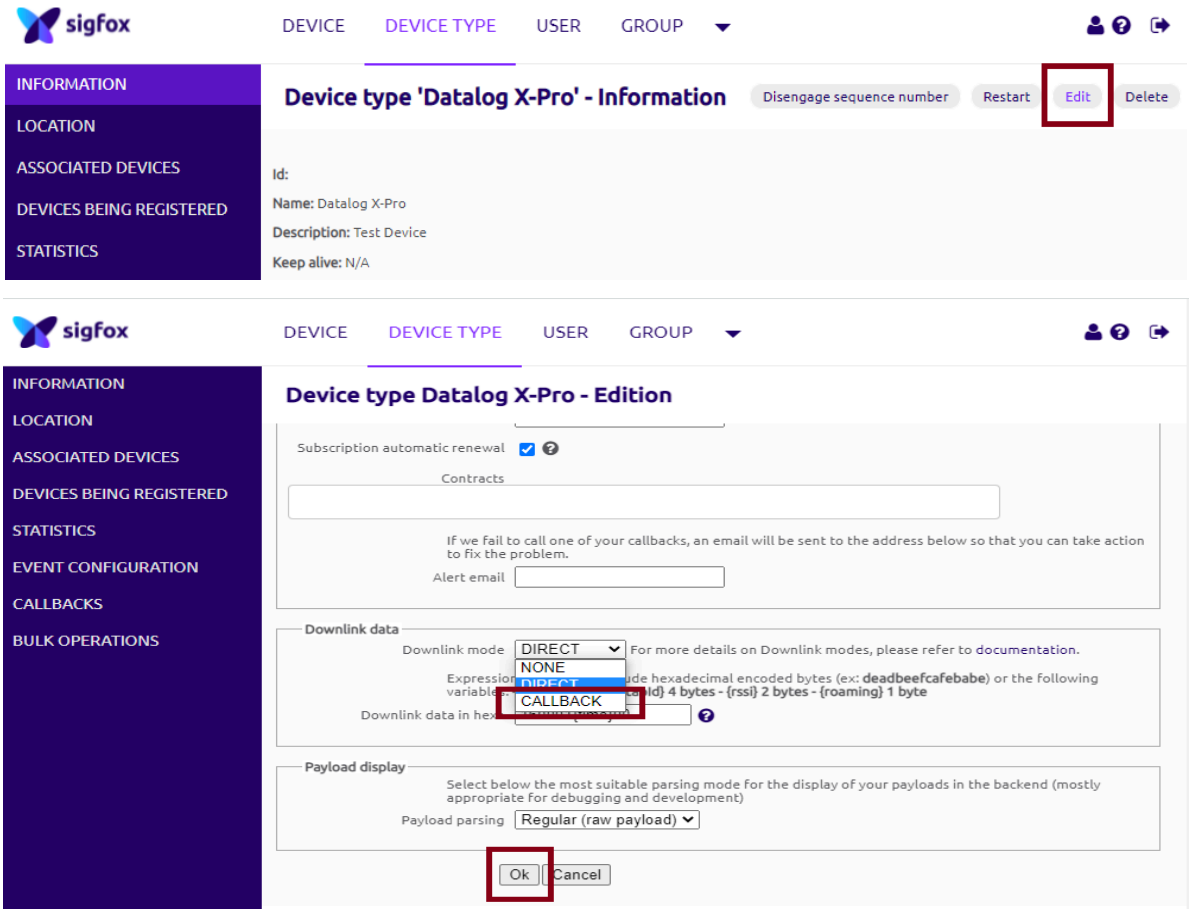
- Usage of URL pattern: https://parse.ubidots.com/prv/omicron/downlink3?device=kontrolog-{device}&ack={ack}

2. Then, in the Callbacks section of the edited device type, you will see a new Callback of type BIDIR like the following one:

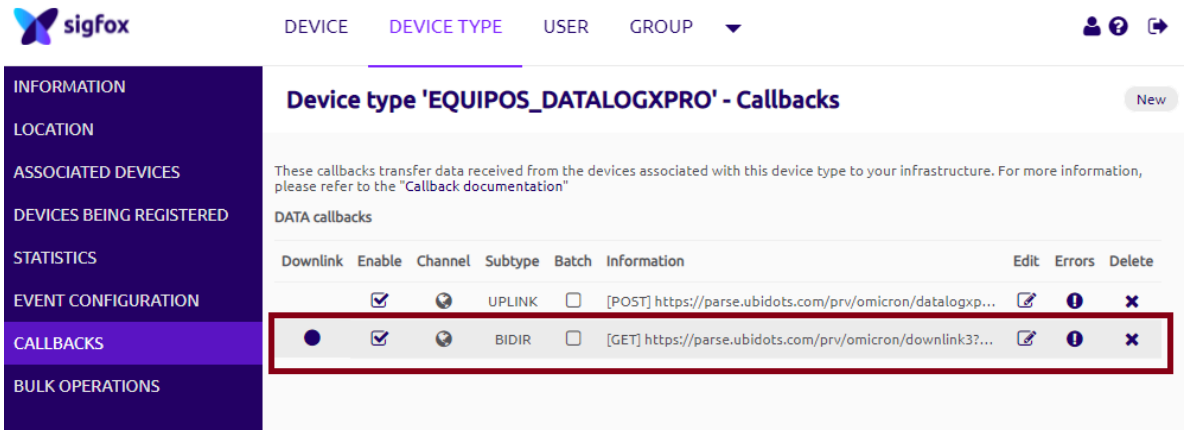


3. You will notice that this Callback is accompanied by an unfilled circle in its Downlink category. This means that the Callback has not been manually selected to handle Downlink messages of the device type. Before making this selection, check the following:

4. Go to the “INFORMATION” section of the device type and edit the “Downlink Data” option to assign it the value “CALLBACK”. Finally, press “OK”.



5. Now you can select the new BIDIR callback available as a Callback to handle Downlink messages in the “CALLBACKS” section of the edited device type, by clicking on the unfilled circle (after selecting it, the circle will be filled):



Section 6: Configuration on LoRaWAN™ TTN

If **Kontrolog Mini** devices are desired to work with the Omicron IoT Solutions Monitoring Platform using the LoRaWAN™ telecommunications network, the user can enable bidirectional communication with the platform by associating Callbacks to the devices' Uplink and Downlink messages on **The Things Network (TTN)** platform or other.

Note:

For correct operation, be sure to order the appropriate device depending on the Regional Band LoRaWAN™.

Kontrolog Mini USA

USA, Mexico, Brazil: Band US915.
Latin America and Australia: Band AU915.

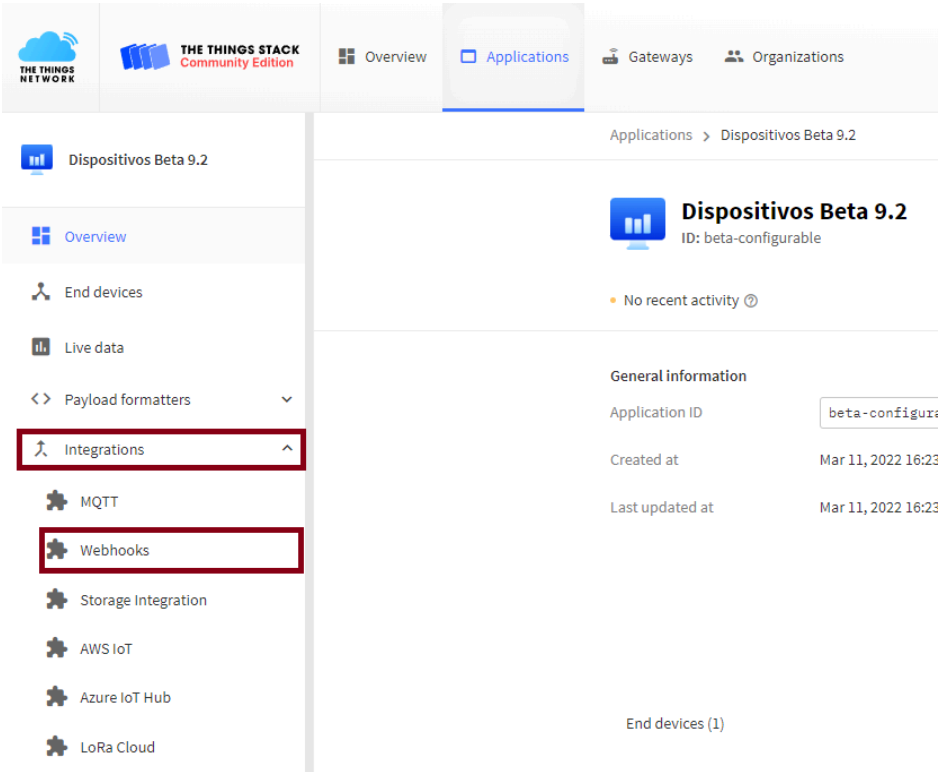
Kontrolog Mini EU

Europe: Band EU868.

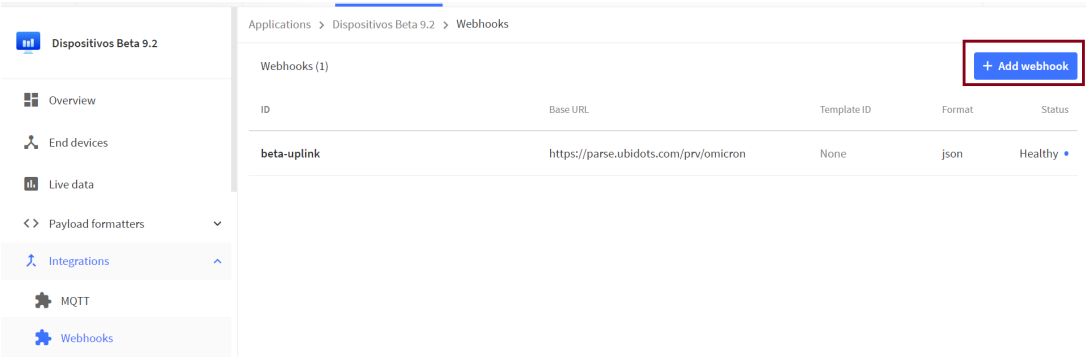
***Uplink-Downlink* protocol for third party platforms:**
If you want to use another monitoring platform, do not hesitate to contact us and request the ***Communication Protocol Manual*** for the Kontrolog Mini.

6.1 Callback configuration for LoRaWAN™ Uplink Messages

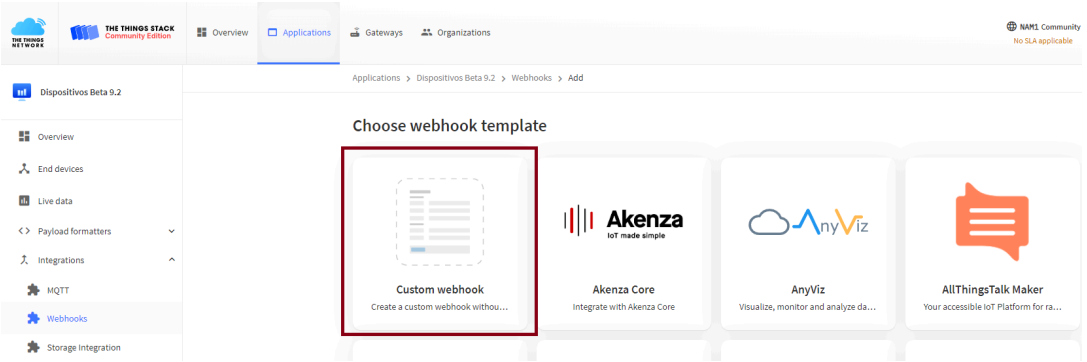
Follow the next steps:
1. In *The Things Network*, enter the application to which you have associated the LoRaWAN™ modules used by your **Kontrolog Mini** devices, and select "Webhooks", displaying the "Integrations" menu located on the left side.



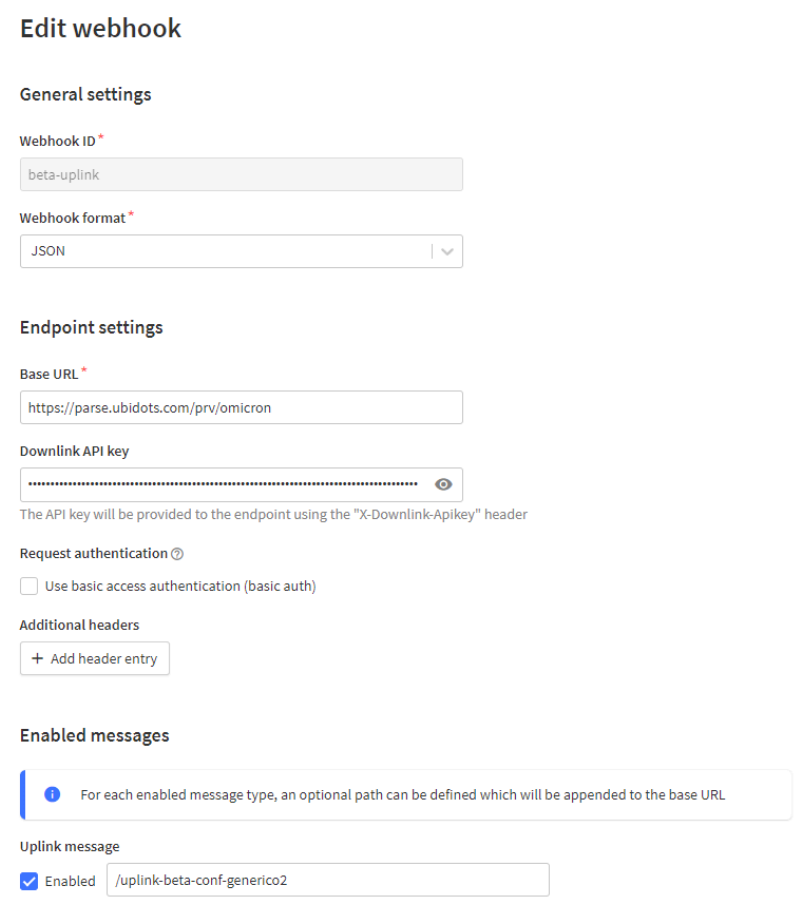
2. Create a new Webhook by selecting the "Add Webhooks" option.

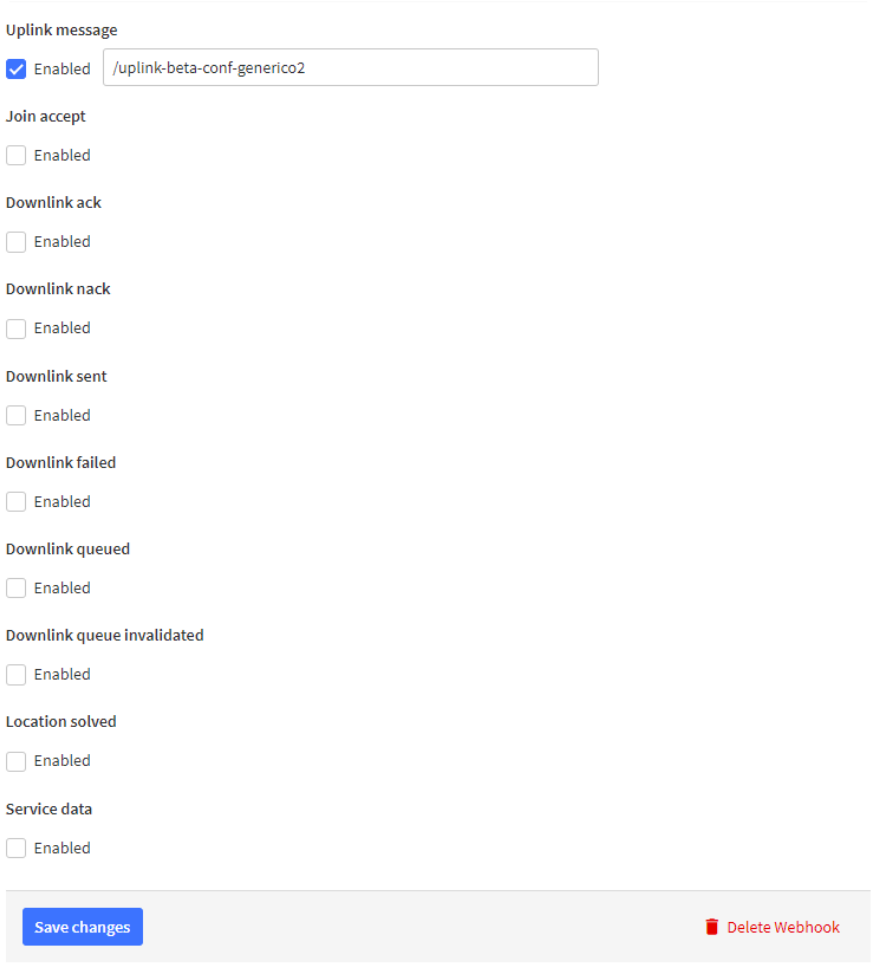


3. Then select “Custom Webhook”



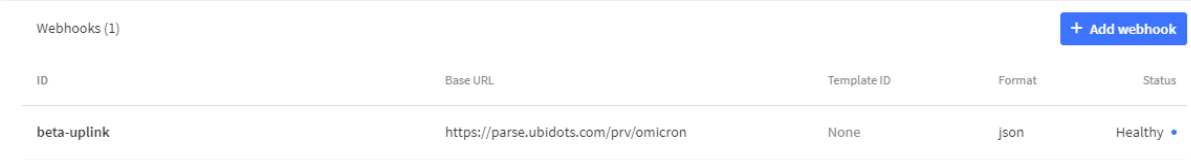
4. Configure the Webhook as presented in the following image, and then press “Save Changes”.





- **Webhook ID:** ID that the user wants to assign
- **Webhook format:** JSON
- **Base URL:** Base URL chosen by the user. In the case of the Omicron IoT Solutions monitoring platform: https://parse.ubidots.com/prv/omicron
- **Downlink API Key:** See section 6.1.1.
- **Uplink message:** Enable and add the path: /uplink-kontrolog-generico2

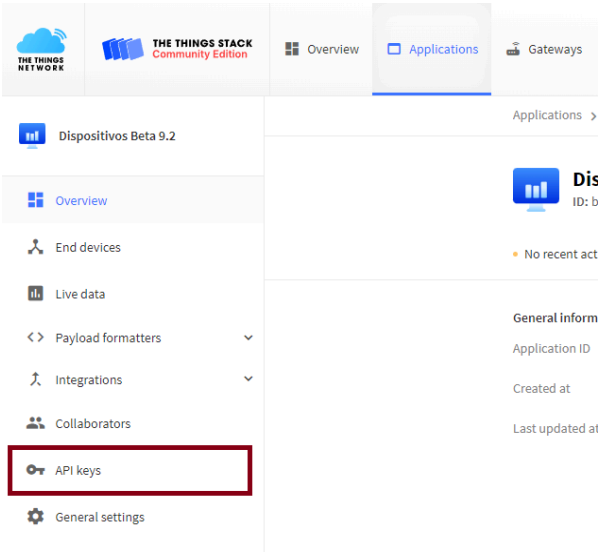
5. Then, in the “Webhooks” section, you will be able to see the following:



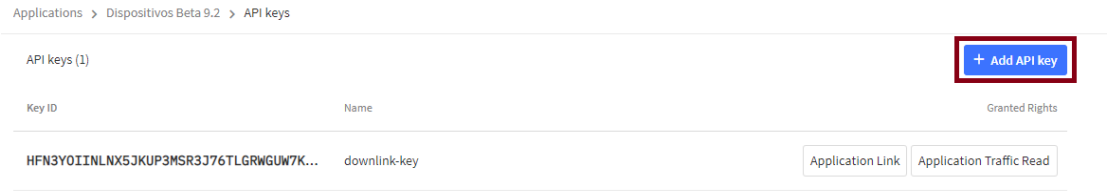
6.1.1 Downlink API Key

To obtain this parameter, follow the steps below.

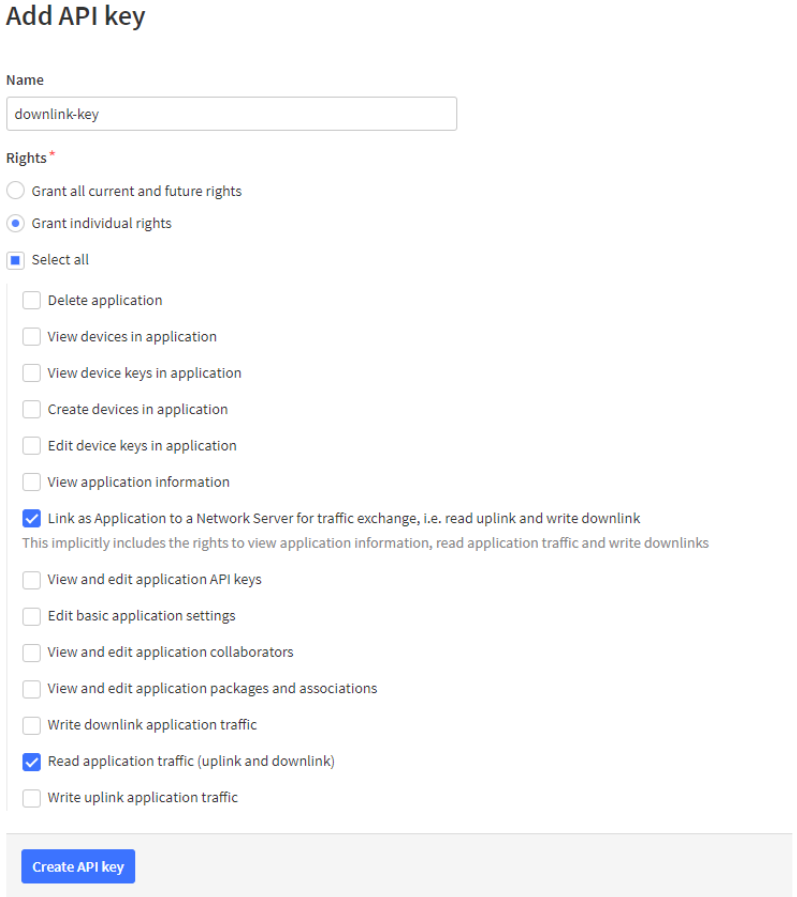
1. In TTN, go to the application to which you have associated the LoRaWAN™ modules used by your **Kontrolog Mini** devices and select “API Keys”.



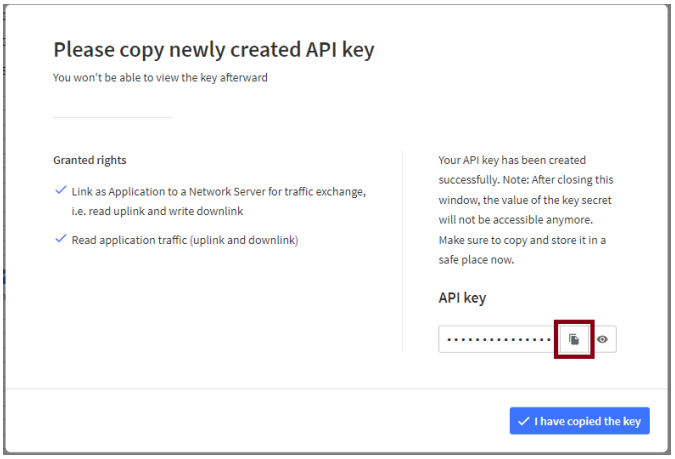
2. Select the option “Add API Key”.



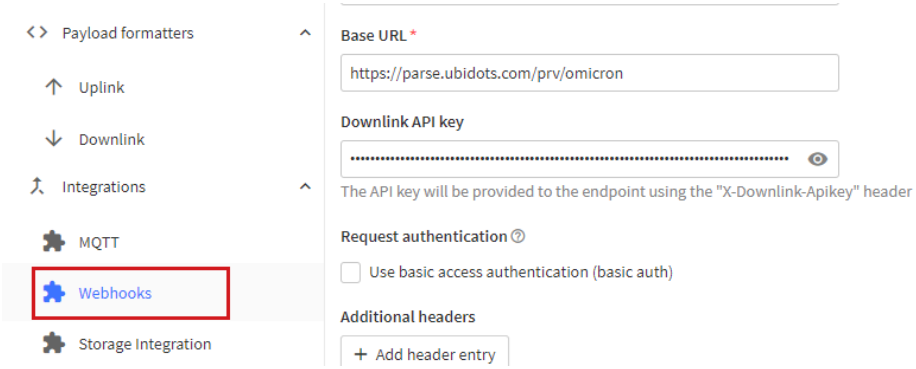
3. Configure the Webhook as presented in the following image and then press “Create API Key”.



4. The following window will appear, copy the API key because after closing, it will never be shown again, and press “I have copied the key”.

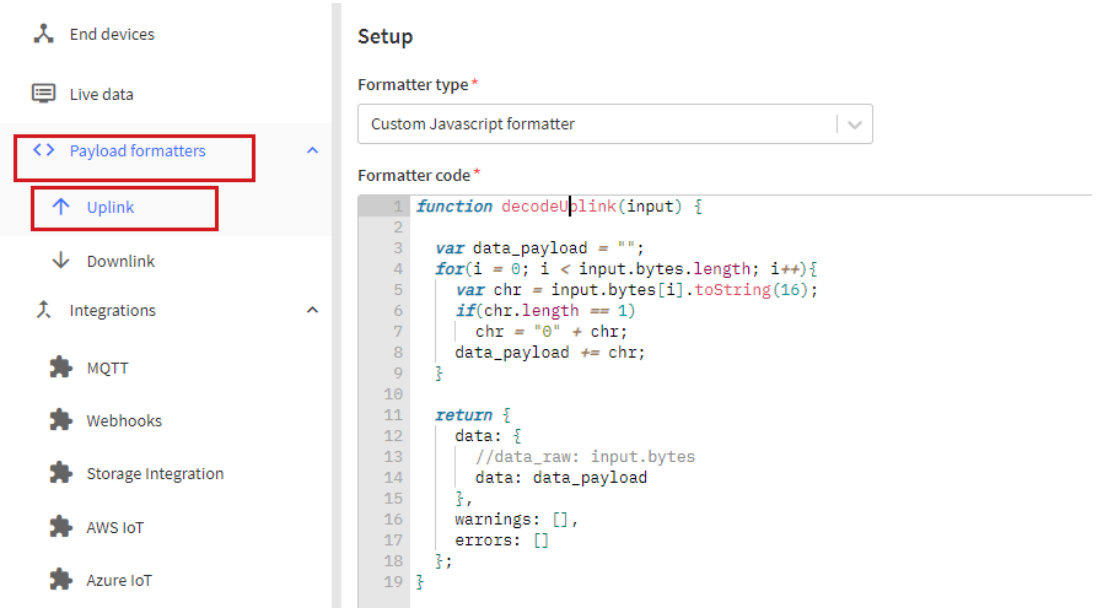


5. Then edit and copy this API key in your **Webhook: "Downlink API key".**



6.2 Format for Uplink payload

1. In The Things Network, enter the application to which you have associated the LoRaWAN™ modules used by your **Kontrolog** devices, and select “Uplink”, displaying the Payload Formatters menu located on the left side.



2. Then, enter the following information in the corresponding fields:

- **Formatter Type:** *Custom Javascript formatter*
- **Formatter code:** Copy and paste the following function code:

```
function decodeUplink(input) {

 var data_payload = "";
 for(i = 0; i < input.bytes.length; i++){
  var chr = input.bytes[i].toString(16);
  if(chr.length == 1)
    chr = "0" + chr;
  data_payload += chr;
 }

 return {
  data: {
    //data_raw: input.bytes
    data: data_payload
  },
  warnings: [],
  errors: []
 };
}
```

Section 7: IoT Remote Control and Monitoring Platform

The Kontrolog Mini works in conjunction with the Remote Monitoring WEB platform.

Users can access the Remote Monitoring Platform via WEB, to perform, among other things:

- Remote monitoring and visualization of historical data records, in graphs and data tables, for up to 2 years.
- Alarm management for variables out of range, battery levels, and main power supply failure.
- Add comments to alarm records.
- Set alarm limits, among other custom settings, like sensors' names.
- Configure alarm events, such as external notifications by email, SMS, voicemail, Telegram messaging service or via webhooks.

7.1 Access the Remote Monitoring Platform

Using the credentials provided by the manufacturer, the device's user can log in at iot.omicroning.co

Figure 7-1 Access to the Remote Monitoring Platform

NOTE:

If you don't have the login credentials, please contact the supplier or manufacturer of the device. **Remember that you can find the contact information at the beginning of this document.**

The platform uses some basic elements to organize the information it manages and facilitate interaction with users. These are: **Dashboards, Devices, and Events.**

An introduction to the use of each of them will be offered in this guide.

7.2 Reviewing Historical Data

Dashboards are interfaces where relevant data is presented to the users. The referred platform allows to edit or create custom Dashboards to integrate any information desired (if using an account with permission to do so); however, by default, it offers panels for remote monitoring of the data published by all the devices linked to the platform, and panels to display Alarms or Events that have recently occurred.

To review a Dashboard, initially follow what is indicated in Section 7.1 to access the platform.

Inside the platform, users can find a link to the section that includes all the Dashboards available to their accounts. There they can select the Dashboard of their interest:

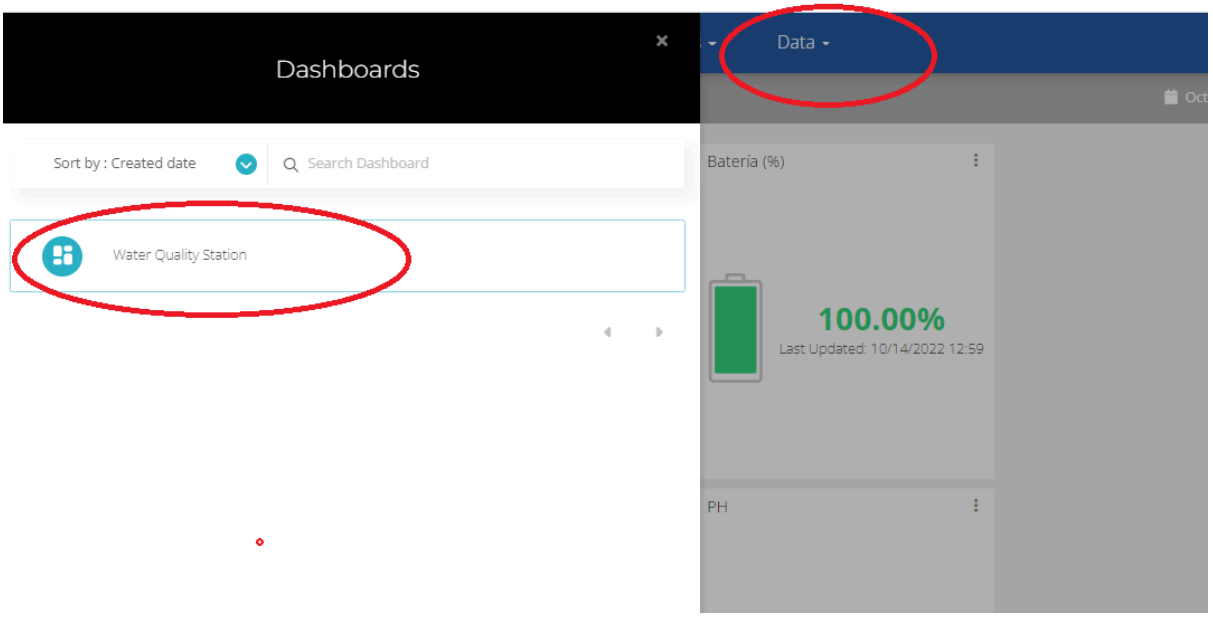


Figure 7-2 Dashboard selection

After selecting a particular Dashboard, users are able to see the information that corresponds to that panel in multiple graphs and visual elements:

Figure 7-3 Dashboard visualization example

To learn how to modify said elements and how to configure a Dashboard, **you can contact the manufacturer of the Kontrolog Mini.** Remember that the Contact Information is provided at the beginning of this document.

7.3 Reviewing Devices, their Variables, and Configuration

A Device is a virtual representation of a physical device that takes data from sensors and transmits them through a particular network to the platform. Thus, each Device visible to an account receives the data of the physical equipment acquired by the administrator of the account.

The data received by a device is stored and organized in multiple variables.

To review a specific Device, initially follow what is indicated in Section 7.1 to access the platform.

Inside the platform, users can find a link to the section that includes all the available Devices to their accounts and select the Device of their interest:

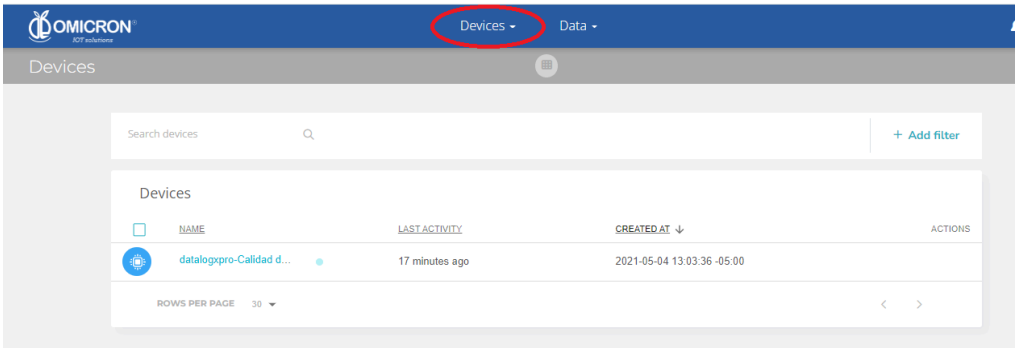


Figure 7-4 Device selection page

After selecting a particular Device, the user is able to see the information that corresponds to that Device in multiple panels and Variables.

Reviewing the Variables of a certain Device allows for checking the update status and the current measure of each Variable. If it is suspected that one variable is not being updated

properly, after entering the Device panel that should include it, its last activity period could be reviewed.

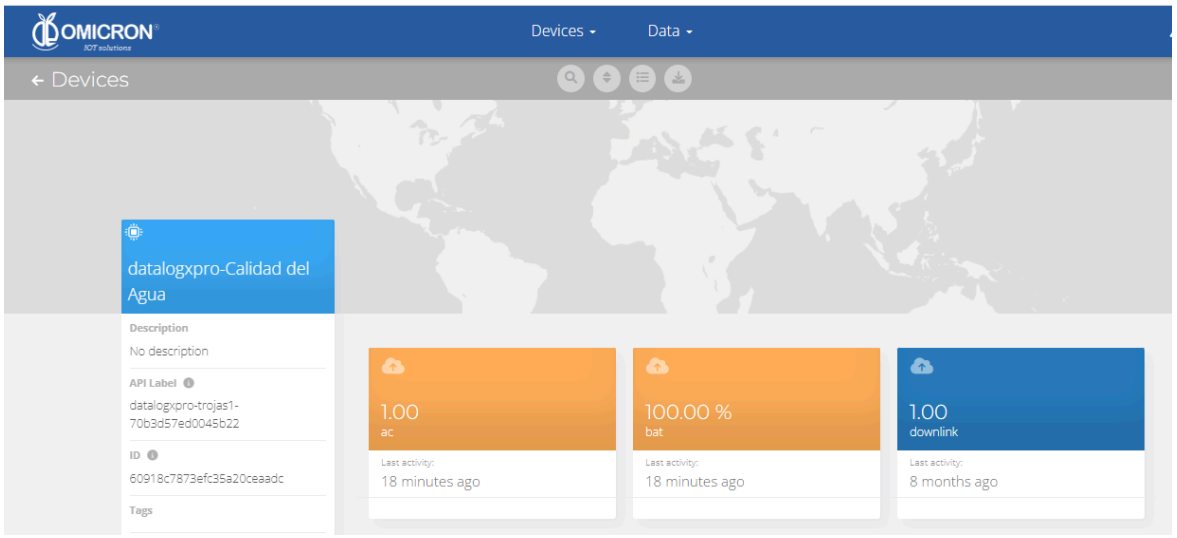


Figure 7-5 Reviewing the Variables of a Device

To review the historical data of a certain Variable, in a Device, select the Variable.

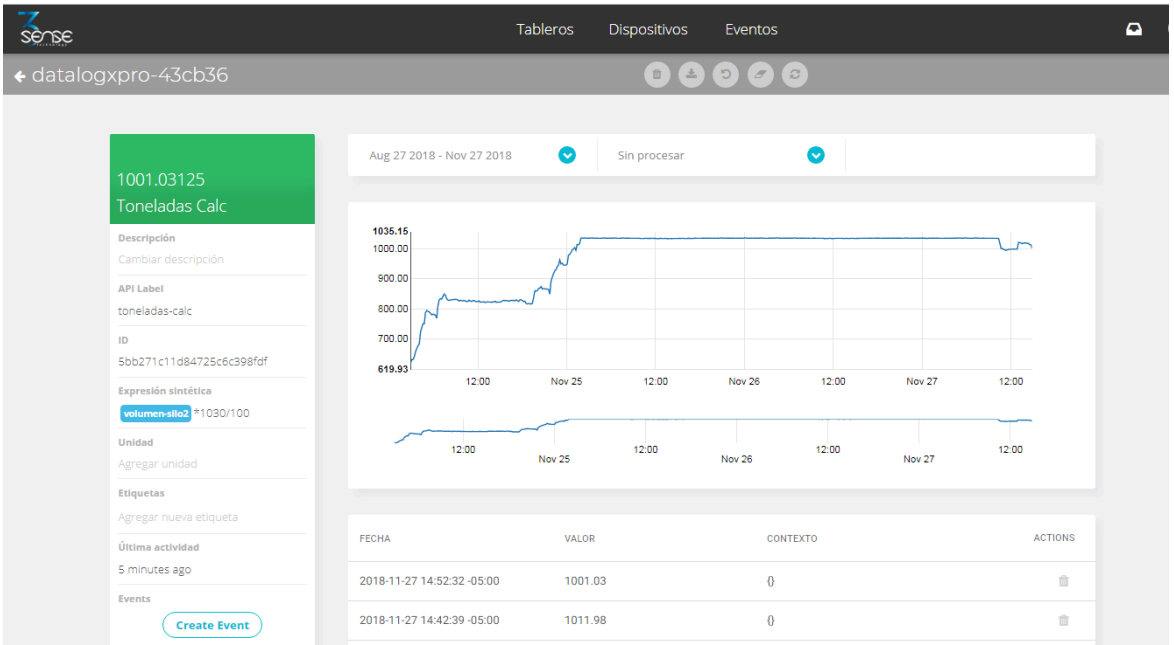


Figure 7-6 Variable Historical Data

7.4 Reviewing Alarms and Programmed Events

Events (or Incidents) are configurable conditions that activate the sending of alert messages via email, SMS, Telegram, or Webhooks. Violated conditions which may have been responsible for sending messages to users can be reviewed in a Dashboard associated with your account, in whose name the suffix -Alarms is included.

To review an Event, initially follow what is indicated in Section 7.1, to access the platform.

Inside the platform, users can find a link to the section that includes all the Events available to their accounts and locate the Event of their interest:

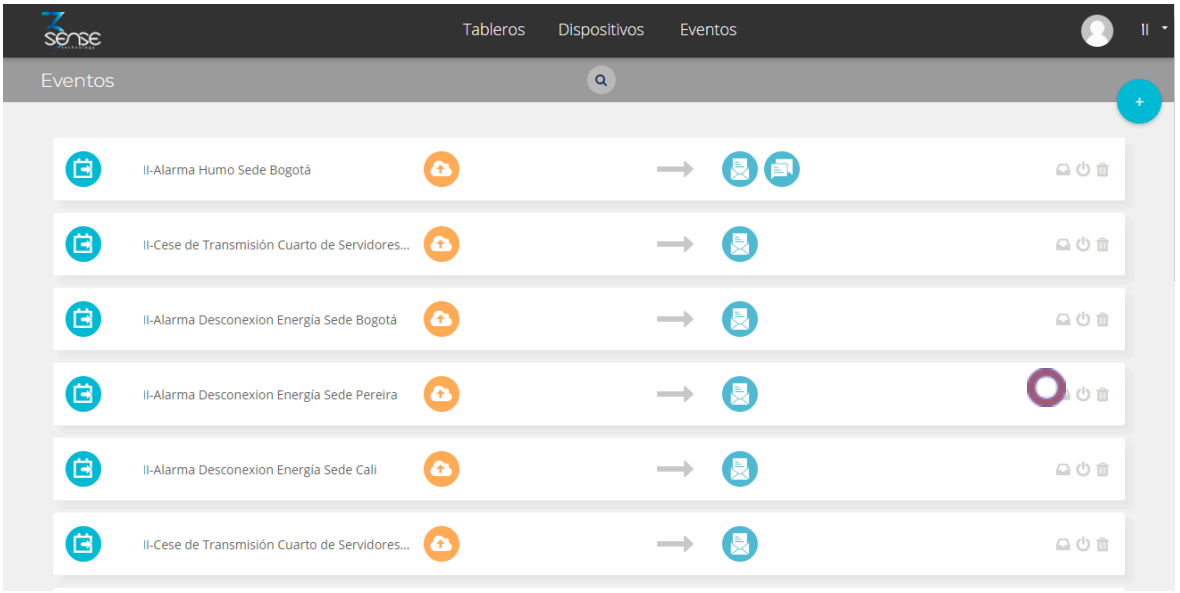


Figure 7-7 Events Configuration

To review the last activity of an Event (its log of updates, or the times in which one of its conditions where violated), the user can press the Log icon associated to any Event to see a table like the following one:

Figure 7-8 Events historical record

To review the Dashboard with the recently activated Alarms, refer to Section 7.2, and look for the Dashboard whose name contains the suffix -Alarms.

This Dashboard will contain a table like the following one:

Figure 7-9 Events Dashboard

To learn how to modify the configuration of an Event, **you can contact the manufacturer of the Kontrolog Mini**. Remember that the Contact Information is provided at the beginning of this document.

7.5 Remote Configurator

Platform users have access to a Dashboard that allows them to set commands to remotely configure their devices (to find it, login to the remote monitoring platform following the steps described in Section 7.1, and look for the Dashboard with the name "Remote Configurator", following the steps described in Section 7.2).

The "Remote Configurator" Dashboard presents to the users a summary of the configuration options available for each type of the Omicron IoT solutions devices, and only requires them to choose a parameter to configure, after indicating the device model, and the elements or general aspects of the device to be configured. The elements it contains are:

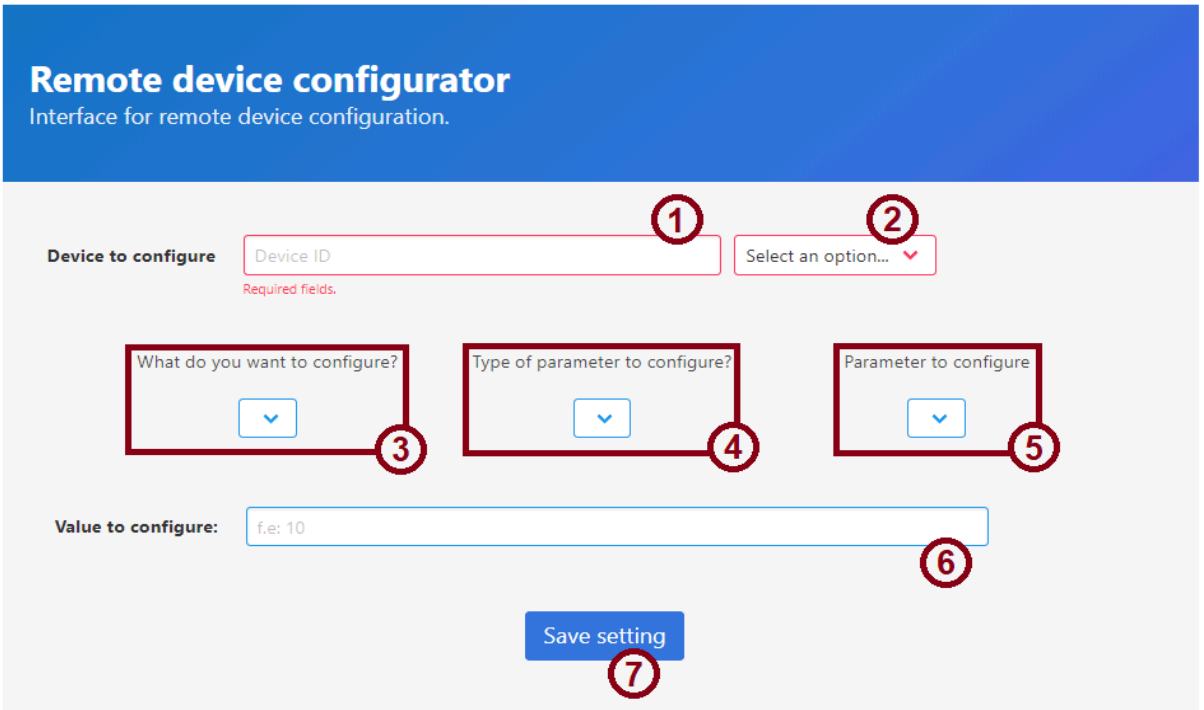


Figure 7-10 Elements of the Remote Configurator

7.5.1 Elements of the Remote Configurator

1. Field for the ID of the device to be configured

In this field, users must specify the UID (or MAC, if the communication is Wi-Fi) of the device they wish to configure remotely. This ID is printed on the labels of the devices; or it can be checked in the 'Device' information stored by the platform (to do this, refer to Section 8.5).

2. Device type selector to be configured

Allows you to select the model of the device to be configured.

3. General aspect selector to be configured

Here you must select the general aspect of the device to be configured.

4. Parameter type selector to be configured

This list allows you to specify the type of parameter to be configured for the general aspect of the device, chosen with selector 3.

5. Parameter to be configured selector

Finally, this list shows the parameters available for configuration, as chosen in lists 3 and 4.

6. Field for the value to be configured

In this field the user must specify the desired value for the parameter to be configured, following the indications that the interface presents as a text on this field when the cursor is placed there.

7. Save command button

Once the user has chosen the parameter to be configured, and has specified a configuration value, the user must save the command on the platform so that the device will download it once it is ready to do so.

7.5.2 Use of the interface for remote configuration

To configure a parameter using the Remote Configurator, follow the steps below:

1. Enter the identification information of the device to be configured in fields 1 and 2.
2. Select the parameter to be configured using selection lists 3, 4, and 5.
3. Enter the value you wish to assign to the configured parameter in field 6, **following the indications that the interface presents** as a text on this field when the cursor is placed there, after choosing the parameter to be configured.
4. Having selected the parameter to be configured, and having entered the value with which you wish to configure it, **press the 'Save Setting' button**. You will then be prompted to confirm the action on a pop-up window; and in the case that the configuration is successfully saved, the page will display a message indicating this below the button.

Pressing the button will not clear the entered or selected information, in order to facilitate configuring another device in the same way.

Based on the above, it can be concluded that in the case of selecting and entering in the Remote Configurator, for what is shown in the following image (as an example), the device with ID 44aeaa will configure Sensor 2 to operate as a digital input 0/1:

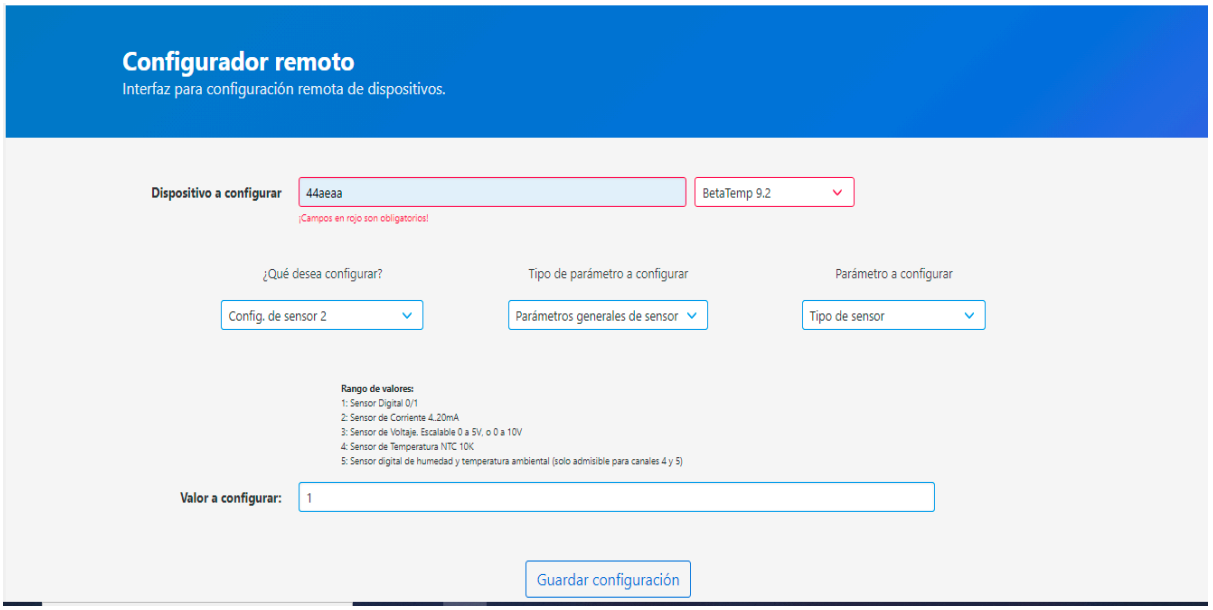


Figure 7-11 Example of the configuration made with the Remote Configurator

Section 8: Troubleshooting Guide

8.1 I cannot access the remote monitoring platform

To access the remote monitoring platform, **use the credentials given by the manufacturer exactly as they were delivered**; that is, if you were assigned a username or password with capitalized characters: you must enter them as assigned.

If you verify that the username or password provided by the manufacturer does not allow you to log in, ask the manufacturer to change them.

8.2 The device displays erroneous measurements on its screen or on the monitoring platform

Kontrolog Mini devices assign extreme values highlighted with a red background to measurements from enabled sensors that are not properly connected or are malfunctioning (as shown in Figure 8-1).

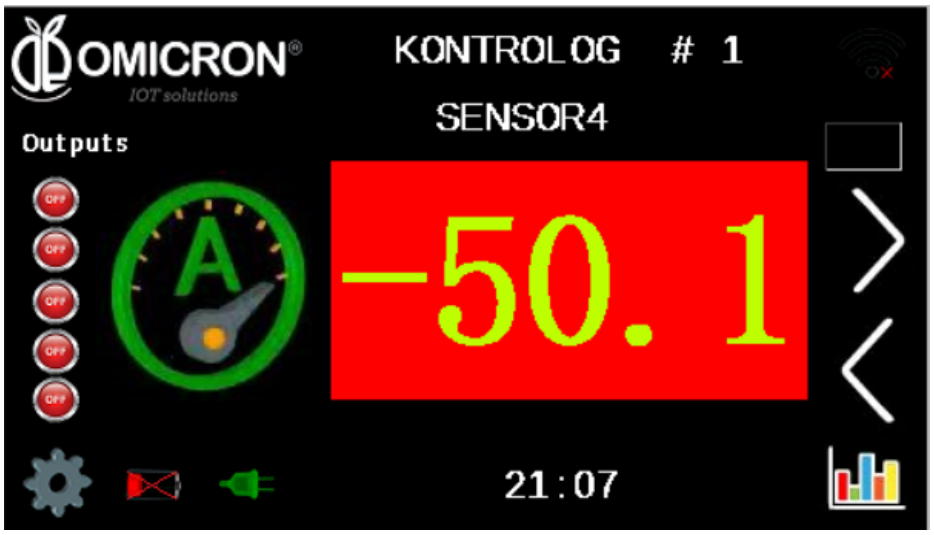


Figure 8-1 Outliers associated with sensors that are not properly connected

The following table summarizes some of the outliers that a **Kontrolog Mini** can associate with each sensor, and what each of them can indicate:

Table 8-1 Outliers associated with each sensor

Predefined Kontrolog Mini Abnormal Values	
Values	**Possible cause**
121.1	External temperature sensor (NTC) in short circuit.
-50.1	External temperature sensor (NTC) disconnected.
0 mA	4-20 mA sensor disconnected, but the load resistor is connected.

21.7 mA	4-20 mA sensor disconnected and the load resistor is disconnected.

If your device reports that any enabled external sensor is disconnected or damaged, try disconnecting and reconnecting it properly, carefully. Also, verify that the sensor cables are free of cuts, wear, corrosion, discontinuities, or physical hazards.

If you notice that the device is displaying values from a sensor that you do not wish to have connected, refer to **Section 4.1.7.1** to learn how to disable or enable the display of measurements from a specific sensor.

If you are unable to correct the abnormal measurements reported by the device through the reconnection of the sensors, if you do not identify physical damage to the sensors, if your device reports incorrect measurements that do not correspond to those listed in the table, or if it displays a specific value uninterruptedly, it is suggested that you contact the manufacturer; remember that you can find the contact information at the beginning of this document.

8.3 The device has stopped updating data on the monitoring platform.

If the monitoring platform does not record recent measurements from the device, perform the following to try to identify the problem:

1. Verify that the device is in its Normal Operating State:

The Normal Operating State of a **Kontrolog Mini** can be recognized when the device presents on its display the different correct measurements taken by its sensors, as long as they are properly connected.

NOTE:

In case the device presents on its display erroneous sensor measurements, refer to the recommendations given in **Section 8.2.**

2. Avoid obstructing the device's wireless signals:

It is essential to ensure that the device is within the coverage area of the wireless network it is using, therefore, try to locate it in a place that does not obstruct its wireless transmissions (away from metallic surfaces or objects, and sturdy objects such as walls or shelves; and preferably located in a high place).

3. If it transmits data via Wi-Fi, check the status of the Wi-Fi network to which it should be connected, and the device's connection to it:

Make sure that the configuration of the network to which the device is connected does not restrict access to the device (consult the personnel in charge of the network infrastructure in your organization); on the other hand, **verify that the network access credentials configured on the device correspond to those managed by the network** to which you wish to connect it; that is, that the SSID or password you have configured for the device match those of the Access Point of the network to which you intend to connect it. To ensure such a match, you can reconfigure the device with the correct credentials.

4. Contact the manufacturer:

If after verifying that the problem with your device cannot be corrected by following the recommendations given in the previous points, contact the manufacturer. Remember that contact information is provided at the beginning of this document.

8.4 When trying to save the configuration with the Remote Configurator, I see the message, "You do not have permission to perform this configuration. It is recommended to check the device ID entered, or the type of device selected."

The interface does not allow you to configure devices that do not exist, or to which you do not have access from your account; therefore, the message will appear if you enter the ID of a device not associated with your account, or if you select a device type that does not correspond to the one of the ID entered. It is recommended that you check the ID and type of the device you intend to configure before attempting to configure it. If you receive the message, even if you enter the correct device ID information, request assistance from Omicron IoT Solutions technical staff. Remember that contact information is provided at the beginning of this document.

8.5 I can't see the device ID on its label

Each device is delivered with a label on its back where you can find the ID, or MAC fields (these are different from the FCC ID, which you should ignore). However, if you are unable to locate the ID information on a device label, you can review the ID information of the devices associated with your account on the remote monitoring platform. To do this, after logging into the platform, in the 'Devices' tab, select the 'Devices' option (1, in Figure 8-2); then, in the list that appears, find and select the device for which you want to know the identification information (2, in Figure 8-2); and finally, locate the ID in the "API Label" field on the page with the device information (3, in Figure 8-2).

The API Label of each device is composed of its type, and its ID, separated by a hyphen (e.g. kontrologmini-123abc). Once you have identified the ID of interest, you can use it to specify the device to be configured with the Remote Configurator.

⚠CAUTION

Do not modify the "API Label" of a device associated with your account for any reason.

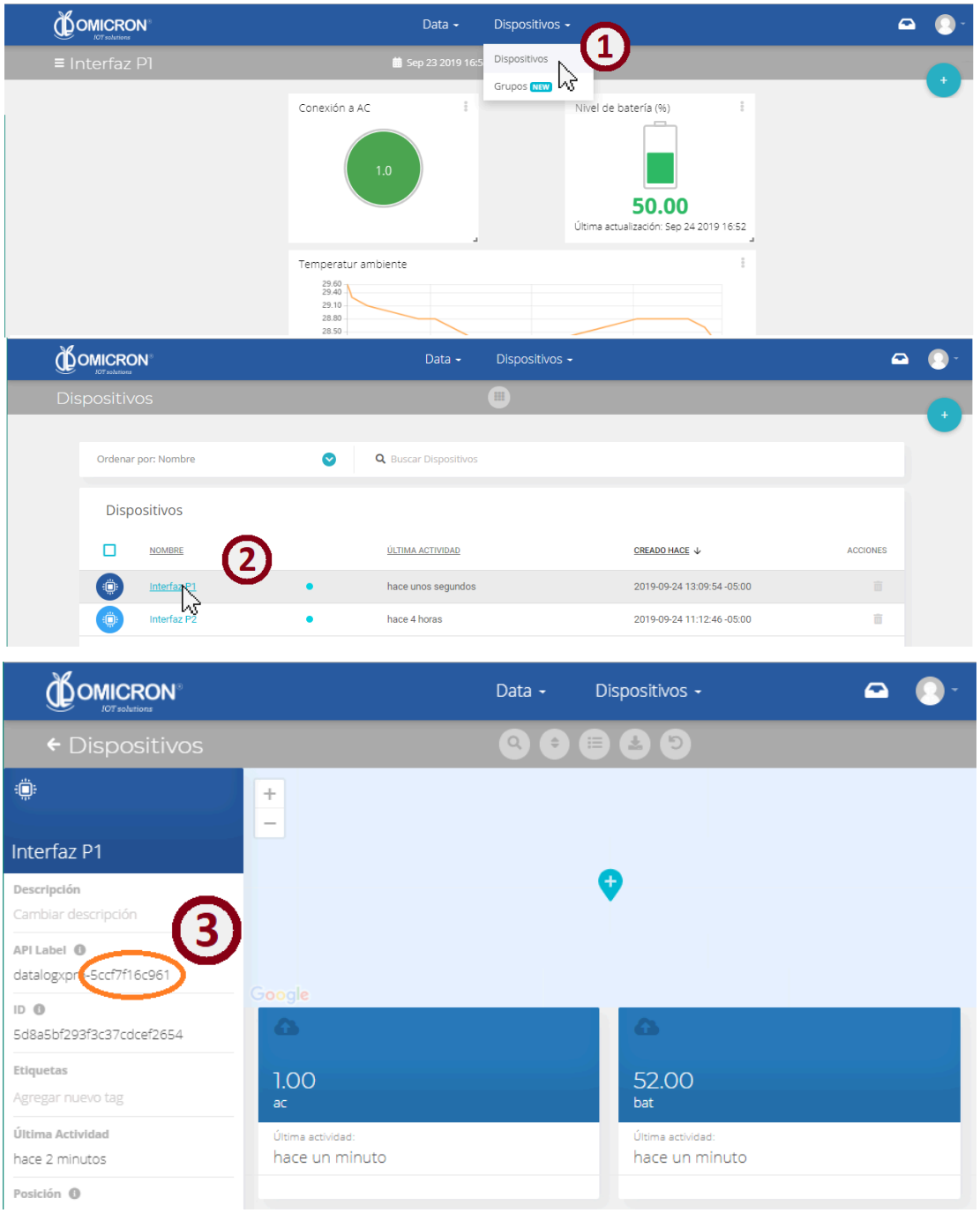


Figure 8-2 Device ID search on the remote monitoring platform

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