OMICRON®
IoT solutions

KONTROLOG

INTERNET OF THINGS SYSTEM FOR REMOTE AND REAL-TIME MONITORING AND CONTROL

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
1.3	15/03/2023	Format change. Extensive revision and correction of content. Technical background information update.
1.4	24/06/2023	Version control implemented. Device image changed.

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**, 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** manufacturer for commercial information, refer to:

➔ Landline: +57 (604) 2328381
➔ Mobile: +57 (317)4365062
➔ **comercial@omicroning.co**

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

➔ Landline: +57 (604) 2328381
➔ 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.

Contents

⚠ WARNING

Failure to follow safe installation guidelines could result in death or serious injuries.
- **Make sure the Kontrolog 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 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** is protected by a special packaging during transport and is guaranteed to handle normal loads during transport.

Section 2: Overview

The **Kontrolog** device is a programmable controller for IoT (Internet of Things), designed for **remote and real-time, control and monitoring of different processes with high security and precision requirements.** Adapted to your application, the device can be easily used after installation. It houses electronic components such as a microcontroller (CPU) and the memory, and other hardware elements such as: voltage sources, power outputs, and the ports needed to host the sensors and the IoT communication module. The microcontroller contains the embedded software, which performs the tasks of: reading the sensors connected to its ports, obtaining their information, creating the monitoring packets or frames, configuring and activating the communication module, and sending the data at intervals that can be variable depending on the programmed publication times, generating alerts, and performing control tasks.

2.1 Features

There are two models of the Kontrolog device, designated by the names Kontrolog 9.3 and Kontrolog 9.2. The main difference between them is that the Kontrolog 9.3 has one output (No. 5) which is analog (4-20mA), while for the Kontrolog 9.2, all of the outputs are relay type.

The main technical features of these two models of the **Kontrolog** device are listed below.

- Five (5) Inputs for sensors which can be configured as:
    - Analog input 4-20mA.
    - Analog input 0-10 V.
    - Analog temperature input for the NTC 10K – 3950 thermistor.
    - Digital input 1/0.
    - Input for analog ambient temperature and humidity sensors.
    - Digital pulse counter.
    - Frequency meter (Input 5 only, up to 20kHz).
- 1 Input for battery 6/12 VDC, also DC supply voltage is measured.
- Power Supply 110/220 VAC input, also AC supply voltage is measured.
- One (1) Input for the current transformer to measure AC current in the following ranges:
    - 0 to 30 A.
    - 0 to 50 A.
    - 0 to 100 A.
- One Modbus RTU (RS-485) input port operating as a master on the network, with which up to five different external sensors can be read.
- Alarms:
    - Built-in visual and audible alarms, as well as remotely visible alarms on the mobile or WEB application.
    - Integration to the platform for external alarms by SMS, voice message, email, and Telegram messaging service, etc.
- Five (5) Control Outputs:
    - For the **Kontrolog 9.2**: Up to 5 output relays, of which two can handle up to 12A@120VAC and three up to 3A@120VAC
    - For the **Kontrolog 9.3**: Up to 4 output relays, of which two can handle up to 12A@120VAC and two up to 3A@120VAC; and a fifth 4-20 mA analog output.
    To perform control tasks, such 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.
- ● HMI screen: (Human Machine Interface); 4.3" full-color LCD touch screen for programming and data visualization.
- ● Communication port, where a dual communication module with protocols for **LoRaWAN™/Sigfox** for the USA/EU/Latam/Australia zones or a **WiFi** communication module can be installed.

The **Kontrolog** is powered by a two-wire power cable, connecting its AC1 and AC2 inputs to the 110 - 220 VAC, 50/60 Hz lines. It can also be powered by a 6 or 12V battery. The system is delivered with the wireless communication modules ordered. According to the product philosophy, all the above-mentioned add-ons can be prescribed, and remote data transmission can be done by different popular wireless technologies. 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.**

2.2 Device configuration

It is possible to remotely 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 on-site HMI screen, and through a remote configuration platform, for which the WEB IoT monitoring platform offered with the device (Centriomega®) already includes this (Refer to **Section 7** for more details).

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

- ● ID of the device to which the message is addressed.
- ● Identification of the sensor or control output.
- ● Parameter to be modified.
- ● Value or data.

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

2.3 Synchronization of data frames lost due to network failures

The **Kontrolog** 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: Description of Sensors and Outputs

3.1 Description of Input Sensors

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

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

Address	Name	Record Type	Observation
0	Sensor Identity 1 to 8	R	Sensor self-identity 1 to 5 : For input ports 1 to 5. 6 : 12VDC Battery Voltage Sensor 7 : AC Voltage Sensor 8 : AC Current Sensor For Modbus sensors: Address of the sensor (Slave) to be read: 1 a 247 (refer to **Section 4.1.7.2** for more information).
1	Actual Value	R	Actual sensor reading value
2	Type of Sensor	R/W	Sensor Type, See **Table 3-2.**
3	Sensor reading resolution	R	0: Digital Sensors and AC Voltage Sensors 1: Temperature Sensors (0.1°C) and Battery Voltage 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 Adjustment (Offset)	R/W	Reading adjustment (Offset) of the sensor: To adjust the reading value of a sensor, a 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 the Alarm Activation
9	Reading Record Address	R/W	Modbus
10	No. of records to be read on Modbus	R/W	Modbus: Number of registers to be read. For the Current Sensor only: Load resistance:

	Load Resistance for the Current Sensor		60 ohms for 30A transformer 36 ohms for 50A transformer 18 ohms for 100A transformer
11	Data format	R/W	Modbus Register Format 0 : Integer 1 : Integer with one (1) tenth (multiplied by 10) 2 : Integer with two (2) tenths (multiplied by 100) 3 : Float (IEEE 754-2008) 4 : Inverse Float (starts the transmission of the frame from the least significant byte)
12	Slope (or scaling)	R/W	Slope value (scaling) of the sensor: To adjust the reading value of a sensor, a linear scaling can be used, in the form: *Adjusted V. = (Read V. + Offset)*Slope.* (Refer to **Section 4.1.7.1** for more information).

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

Table 3-2 describes the Types of Sensors (parameter No. 2) that are compatible with the **Kontrolog** devices and their coding for later interpretation in the application software, for example, if a sensor type 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 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 the platform	1
9	Modbus Input	1
10	Frequency Input (Input No. 5 only)	1

3.2 Description of the Control Outputs

The **Kontrolog 9.2** programmable controller has five (5) relay outputs and the **Kontrolog 9.3** programmable controller has four (4) relay outputs and one (1) 4 - 20 mA analog output.

These can be programmed to perform different control tasks. The register description of each output can be found in **Table 3-3.**

Table 3-3   Description of Records associated to a Control Output

Address	Name	Type of Record	Observation
0	Identity of the Output	R	Identity of the Output 11: Output 1. 12 to 15: Output 2 to Output 5
1	Actual value	R	Actual value or Port State 0: Relay Open 1: Relay Closed Actual value of the current in the 4-20 mA range for output No. 5 of the Kontrolog 9.3.
2	Selected Control Function	R/W	Type of Control Actuation for the Output, See **Tables 3-4.1 and 3-4.2.**
3	Assigned Control Signal	R/W	0 : No Control Signal 1 to 5 : Sensor Inputs 1 to 5
4	Set-Point Value	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 the Control Function:** 0 : Normal Output (Cooling) 1 : Inverted Output (Heating) **For the Timer function:** 0 : The timer is activated when the Control Signal is less than the Set-Point. 1 : The timer is activated when the Control Signal is greater than the Set-Point. **For the Event Counter:** 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 the Timed Output Cycle Time for the PID Control	R/W	1 to 32767 seconds
8	Cycle Time OFF programmed for the Timed Output	R/W	0 to 32767 seconds

	Time to make Control Calculations for the PID Control		
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 apply at the Output	R/W	10 to 100%

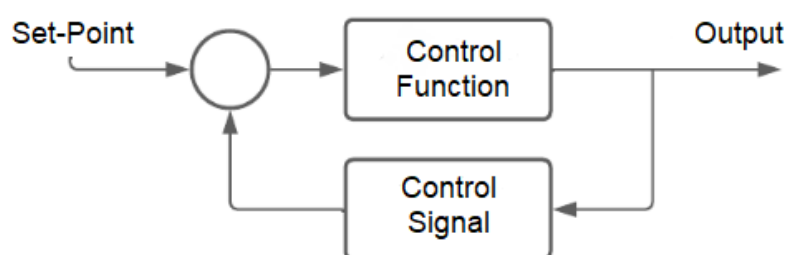The following figure shows the philosophy followed to activate the Outputs.

Figure 3-1   Closed Loop Control System

Control Signal: It is the Control Signal associated to activate the Control Function that affects the Output, this signal can be one of the five Inputs (IN1 to IN5).

Control Function: It is an assigned function (according to Tables 3-4.1 and 3-4.2) to control the Output, this can be, for example, a Timer Function, an On/Off Control Function 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, activation/deactivation of the Output is performed in a controlled manner.

Set-Point: It is a desired value to which the control variable (controlled by the Output) is to be taken, or at which it is desired to be maintained. It is used in the PID, On/Off, Timer and Event Counter functions.

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

Table 3-4.1   Control Function Types coding assigned to a Digital Output

Sensor Type	Description
0	Output Disabled
1	Digital Output controlled by remote commands sent from platform (0/1)
2	Digital Output follows associated Digital Sensor Input
3	On/Off Control Function
4	Timer Function

5	Remote Alarm Function (1: Alarm present on 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: it clears timers and counters and resets the output to OFF for 10 seconds, then reapplies the previously selected Control Function.

Table 3-4.2   Control Function Type coding assigned to the output No. 5 Analog (only applies to Kontrolog 9.3)

Sensor Type	Description
0	Output Disabled
1	Analog output value sent from the platform: Supported range 0 to 1000 0 = 0.0% = 4mA 1000 = 100.0% = 20mA.
2	Analog output (4-20mA) proportional to an associated analog input. 4mA: Input Value <= Input Lower Limit (Parameter 6 Table 3-1) . 20mA: Input Value >= Upper Input Limit (Parameter 7 Table 3-1).
7	PID Control Proportional output 4-20mA 0 % : 4mA 100 % : 20mA.
32	This command allows resetting the output: it clears timers and counters and resets the output to OFF: 4mA for 10 seconds, then reapplies the previously selected Control Function.

Note: Output resolution 0.1% or 0.016 mA

3.2.1 Output controlled by remote commands

In this function, the output is activated or deactivated (digital) or takes a value from 0.0% to 100.0% (analog - only for Kontrolog 9.3), according to a remote command sent from the platform. The status information is stored in the non-volatile memory of the **Kontrolog**, thus, in case of a power failure, when the device is turned on again, the output is kept in the same state it was assigned.

3.2.2 Output that follows the value of an associated input

In this case:

1. The digital output follows the state of the associated input digital sensor, as long as it is selected as a digital sensor. In case the input is not associated as digital sensor, the output remains off;
2. or the 4-20 mA analog output (only for **Kontrolog 9.3**) follows the state of the associated analog input sensor, for which it will take as the lower limit of the input the value that the user configures in Parameter 6 of Table 3-1, and as the upper limit of the input the value that the user configures in Parameter 7 of Table 3-1.

3.2.3 On/Off Control Output Function

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

Table 3-5   Parameters to be configured for the On/Off Controlled Output

Parameter No.	Parameter Name	Parameter Description	Admissible Value
2	Selected Control Function	Selection of On/Off Control Function	3
3	Assigned Control Signal	Assign a Control Signal from the Inputs of the device	1 to 5
4	Desired value or Set-Point	This is the desired control value, e.g. the temperature value to be reached.	-40.0 to 2047.0
5	Control Differential or Hysteresis	Delimits the Control Range for the variable to be controlled 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:

It is desired 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 back below this value.

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

Example No. 2:

It is desired to activate a refrigerator in the range of 2 to 6 °C, it is configured:

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, the output is turned OFF.
5. When the temperature is greater than or equal to 4.0+2.0 = 6.0°C, the output is turned ON.

Example No. 3:

It is desired to activate a water heater in the range of 30 to 32 °C, it is configured:

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 (OFF).
5. When the temperature is less than or equal to 31.0 - 1.0 = 30°C, output (ON).

3.2.4 Timed Output Function

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

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

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

Table 3-6 Parameters to be configured for the Timed Output

Parameter No.	Parameter Name	Parameter Description	Admissible Value
2	Selected Control Function	Selection of the Timer Function	4
3	Assigned Control Signal	Assign a Control Signal	0: For cyclic timer without a control signal. 1 to 5: For 1-trigger timer or cyclic timer with a control signal.
4	Desired value or Set-Point	Value of the Control Signal that activates the Timer	-40.0 to 2047.0
6	Control Type (Invert Output)	0: The Timer is triggered when the Control Signal is less than the Set-Point 1: The Timer is activated when the Control Signal is greater than the Set-Point.	0 to 1
7	Time ON	Indicates the time the output remains on.	1 to 32767 Seconds
8	Time OFF	Indicates the time the output remains off.	0 to 32767 Seconds

Example No. 1:

It is desired to turn a fan on for 60 minutes and off for 15 minutes and to maintain 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 → The timer is triggered when the Control Signal is greater than 37.0°C.
3. Cycle Time ON = 3600 → The output is turned (ON) for 3600 Seconds.
4. Cycle time OFF = 900 → The output is turned (OFF) for 900 seconds.

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

Example No. 2:

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

A single activation timer is used because it is known that, for the given case, it will be sufficient to turn on the oxygenation pump only once for 60 minutes for the oxygen level to return to the desired range.

1. Set-Point = 12.0 → At this point the timer is triggered.
2. Control Type = 0 →The timer is triggered when the Control Signal is less than 12.0 mA.
3. Cycle Time ON = 3600 → The output is turned (ON) for 3600 Seconds.
4. Cycle Time OFF = 0 → The output is only triggered once for 60 minutes and then turns OFF.

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

3.2.5 Pulse Counter

For this type of function there are two ways to operate:

1. Input Pulse Counter lower than the Set-Point, output OFF.
   If # Pulses < Set-Point ==> Output = OFF
   If # Pulses >= Set-Point ==> Output = ON

2. Input Pulse Counter lower than the Set-Point, output ON.
   In this case, the output must be inverted
   If # Pulses < Set-Point ==> Output = ON
   If # Pulses >= Set-Point ==> Output = OFF

Note 1: To reset the pulse event counter, a reset output command must be sent or the RESET button must be pressed on the display.

Note 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 be configured in the Output mode as a Pulse Counter

Parameter No.	Parameter Name	Parameter Description	Admissible Value
2	Selected Control Function	Selection of Function Pulse Counter	6

3	Assigned Control Signal	Assign an input signal for the Counter	1 to 5
4	Set-Point	Value to be counted	0 to 2047
6	Control Type (Invert Output)	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 to be opened when more than 10 pulses are detected at the input emitted by a pressure switch.

1. **Output:** To activate the valve, an output that is capable of handling the current is chosen. For example, output No. 3 is selected, which can handle up to 3A@120VAC.
2. **Control Function:** Counter function is chosen, control function = 6, Set-Point = 10 is selected, not inverted output = 0.
3. **Control Signal:** For example, input No. 1 is selected as digital and assigned as the 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 to realize a PID control algorithm at the output, for systems with heating type control action (the actuator increases the value of the Control Variable, e.g. temperature), given a Set-Point and a series of control parameters described below:

Process Variable (Pv): It is the measured variable to be regulated or controlled, i.e. one of the five assigned input variables, e.g. input 1: temperature.

Preset value or Set-Point (Sp): It is a desired value to which the process variable (variable controlled by the system) is to be brought, or at which it is desired to be maintained; 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:

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

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.
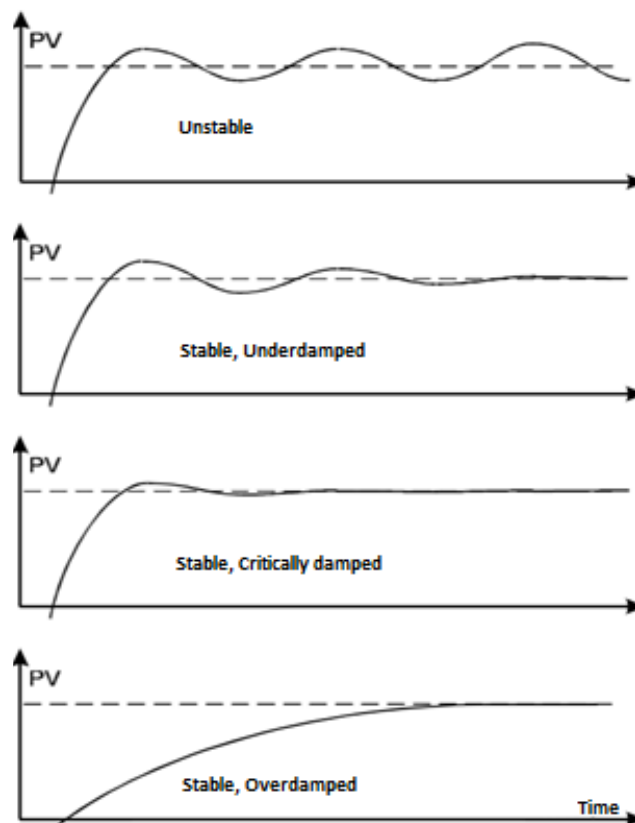
Figure 3-2   Behavior of PID control systems

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 HMI Screen Guide

The HMI (Human Machine Interface) screen for device configuration was designed to make it easier for the 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 the input sensors
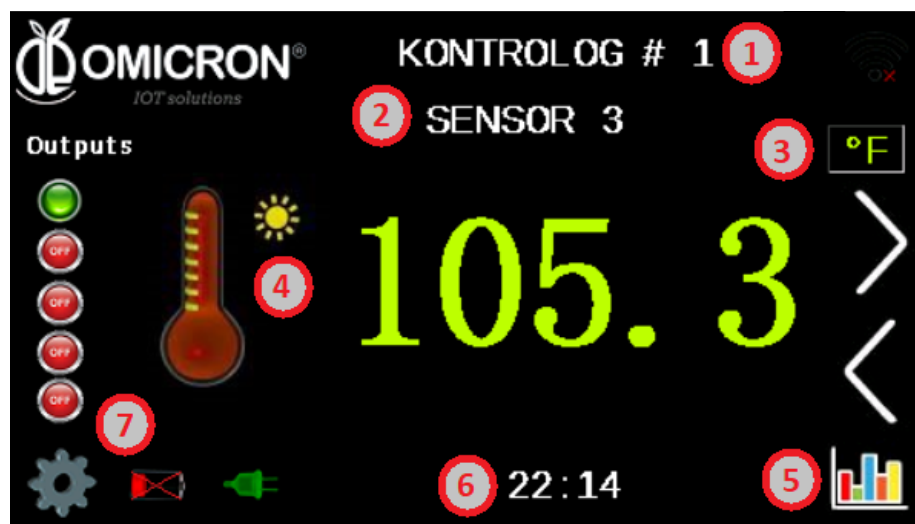
Figure 4-1   Sensor reading view on HMI screen

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

There is a screen like this one (Figure 4-1) for each of the 5 input sensors, one for the AC Voltage sensor, one for the AC Current reader, and one for the Battery level.

On the left side of this screen, under the word "Outputs" it is shown which outputs are enabled (green color) and disabled (red color). In the lower left part, two symbols are shown ( ), which indicate whether the battery is connected, and what level it is at; and if the device is connected to an AC power supply. In addition, the arrows on the right-hand side can be used to scroll forward or backward through the other screens.

The symbols or letters that are marked with numbers can be custom configured, as described below:

4.1.1 Device name configuration (1)

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

4.1.2 Sensor name configuration (2)

By clicking on the sensor name (in the case of the example given in Figure 4-1, **SENSOR 3**), it is possible to change the name of the device and customize it.
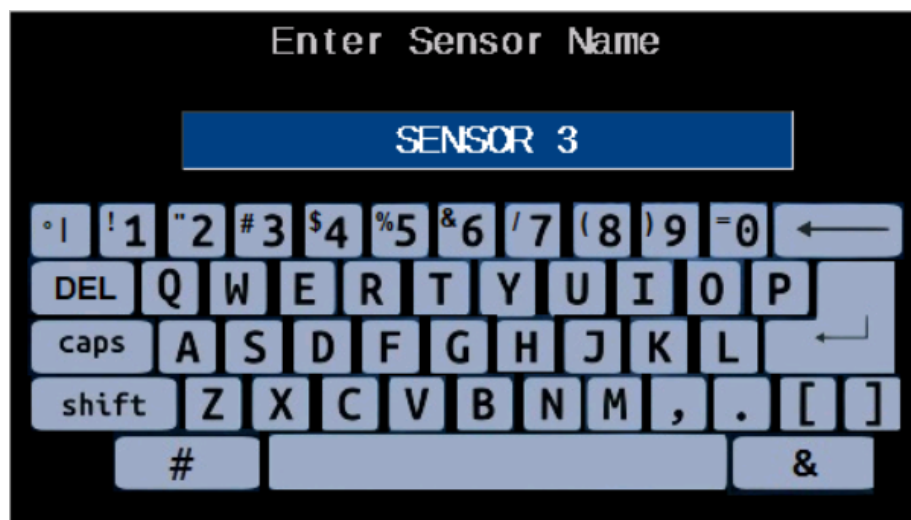
4.1.3 Configuration of measurement units (3)

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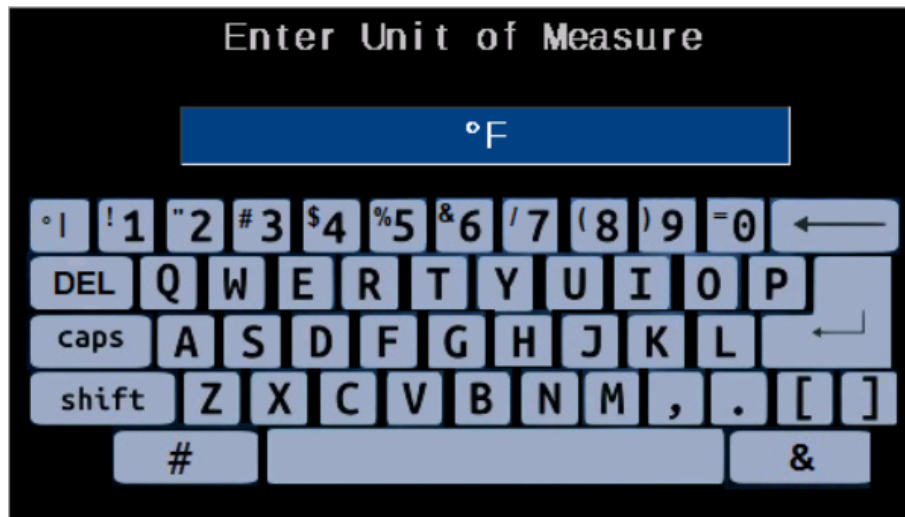
4.1.4 Graphic symbol configuration (4)

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

4.1.5 Access to sensor reading graph (5)

Click on the graph symbol in the lower right corner (), it is possible to access a graphical record of the measurements of the corresponding sensor, where it is also possible to see the measurement recording dates and the upper and lower alarm limits configured for that sensor.
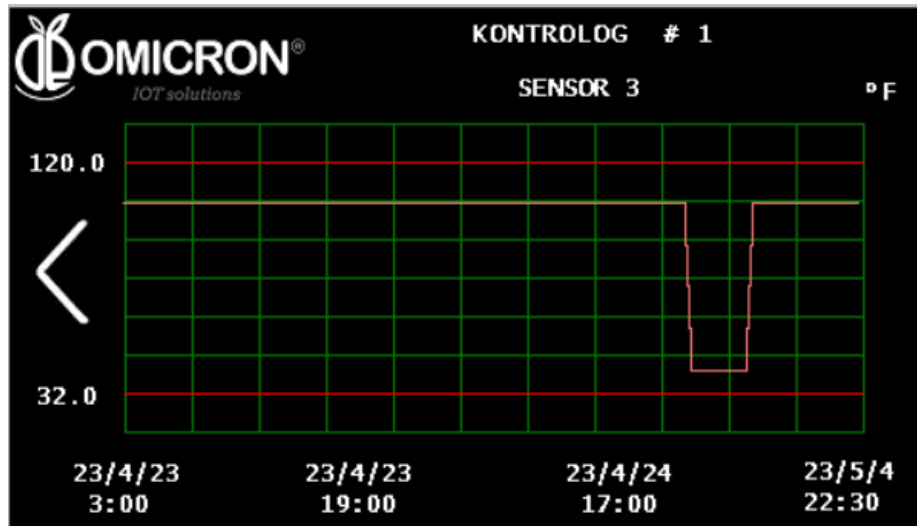
4.1.6 Time zone configuration (6)

By clicking on the time displayed on the screen (in the case of the example given in Figure 4-1, **22:14**), it is possible to change the current date and time according to the time zone where the device is installed.

4.1.7 Input sensor configuration (7)

By clicking on the gear symbol (⚙) it is possible to access the configuration of the input sensor parameters, as shown below:
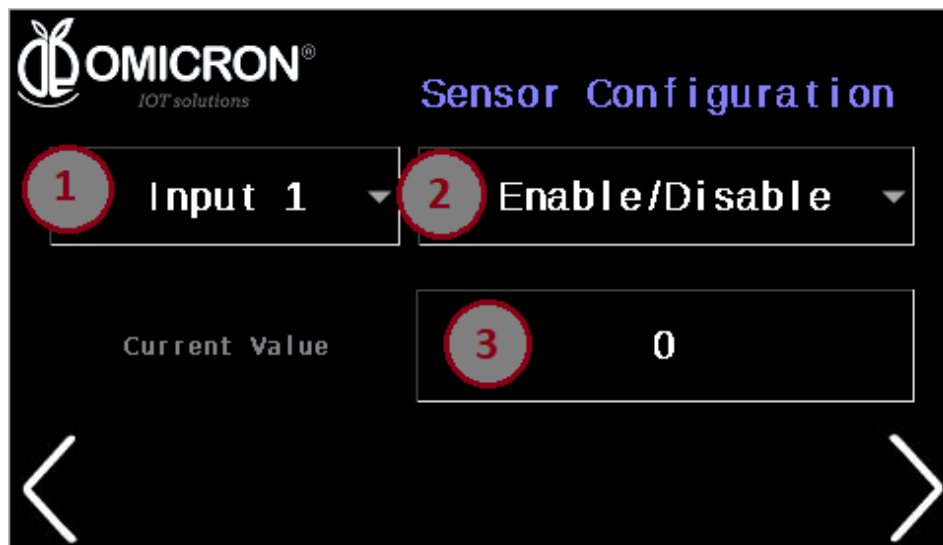
1. Input Selection (1)

Here you can select the sensor you want to configure, from Input Ports 1 to 5, the 12 VDC Battery Voltage Sensor, AC Voltage Sensor or AC Current Sensor.

2. Parameters to configure (2)

Pressing on (2) will display the options for configuring the sensor selected in (1), these parameters are explained in Table 3-1. The first parameter allows enabling or disabling the input by changing the current value in (3). The second parameter is the Sensor Type, refer to 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 Offset, the Alarm Lower Limit, the Alarm Upper Limit, the Alarm Activation Time Delay in seconds and the Slope.

The Offset and Slope are constants used to adjust the reading of a sensor value so that a linear scaling is performed, using the formula:

$$V. \ adjusted = (V. \ read + Offset)*Slope$$

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

Example 1:

You have a sensor that delivers the temperature value in degrees Celsius, but you need 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 delivers 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. Actual value (3)

The current value of the selected parameter will be displayed here, and you can change it if you want to set it differently.

4.1.7.2 Modbus sensor configuration

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

As in the Sensor Configuration Screen, here you must choose the input to be configured, 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*: Address of the initial register to be read.
3. *Coils number*: Number of registers to be 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.

4.1.7.3 General Settings

By clicking on the arrow at the bottom right of the screen in **Section 4.1.7.2**, you will find the General Settings.

In this screen you can configure the following parameters:

1. Communication Module: the same one must be chosen for all sensors. It 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. Publishing time (in minutes): The time to publish sensor data to the remote monitoring platform.
3. Number of Uplink messages to Downlink: Every how many Uplink messages it queries the platform if it has a Downlink or configuration message.
4. RF Zone: Must be chosen the same for all sensors. For LoRaWAN™ and Sigfox communications module, it depends on the type of device ordered (See Note at the end of the description).
5. Normal Reset: Allows to perform a reset of the device. Assign 1 to perform the Reset.
6. Factory Reset: Allows to perform a factory reset of the device, which sets all its parameters to their factory default values. Assign 1 to perform the Reset.
7. Boot mode: This is the mode for performing code updates. Assign 1 to enter Boot Mode.
8. Test mode: To perform RF tests. Assign 1 to enter Test Mode. For details on how to perform RF tests, please consult the manufacturer. Remember that contact information can be found at the beginning of this document.

There are different Kontrolog models (Kontrolog 9.2 and Kontrolog 9.3. Refer to **Section 2.1** for information on the features and differences between these models), which can be ordered with a WiFi communications module, or a dual Sigfox/LoRaWAN™ module. In turn, depending on your location, the Sigfox Zone and LoRaWAN™ Band coverage will change.

Kontrolog 9.2 / Kontrolog 9.3 Sigfox/LoRaWAN™ USA.
USA, Mexico, Brazil: Sigfox Zone 2 and LoRaWAN™ US915.
Latin America and Australia: Sigfox Zone 4 and LoRaWAN™ AU915.

Kontrolog 9.2 / Kontrolog 9.3 Sigfox/LoRaWAN™ EU.
Europe: Sigfox Zone 1 and LoRaWAN™ EU868.

Kontrolog 9.2 / Kontrolog 9.3 WiFi.

4.2 Description of the control outputs

Description of the control outputs
To make a change in the parameters of some of the outputs, first, make sure you are at the output you wish to configure, the current output is shown at the top of the screen; to change the output, press the arrow located on the right margin of the screen. Press on the parameter to be changed. The parameters are listed in **Table 3-3**.
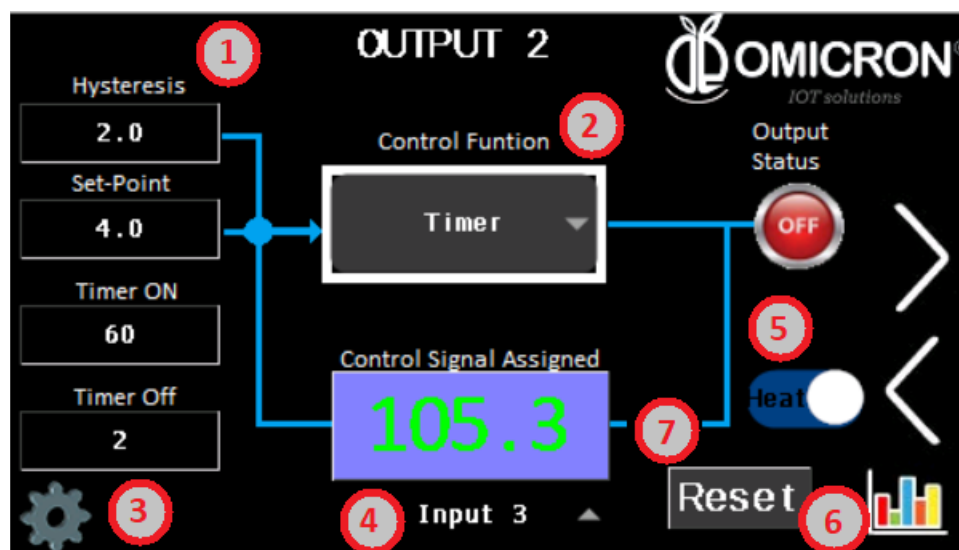
Figure 4-2   Output control configuration view on HMI screen

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 to be added to and subtracted from the Set-Point to determine the upper and lower range (respectively) of tolerance in which the variable controlled by the system output is to be maintained.

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

Tiempo de ciclo *ON*: From 1 to 32767 seconds. This is the ON Cycle Time programmed for the Timed Output or the Cycle Time for the PID Control.

Tiempo de ciclo *OFF*: From 0 to 32767 seconds. It is the OFF Cycle Time programmed for the Timed Output or the Time to perform Control Calculations for the PID Control.

4.2.2 Control Function (2)

Tables 3-4.1 and 3-4.2 list each of the control functions, and **Sections 3.2.1** onwards explain each of them.

4.2.3 PID Control Parameters (3)

Press the configuration gear (⚙),to modify the parameters of the PID Control Function. A detailed explanation of this type of Control Function and the parameters it receives is given in **Section 3.2.6**.
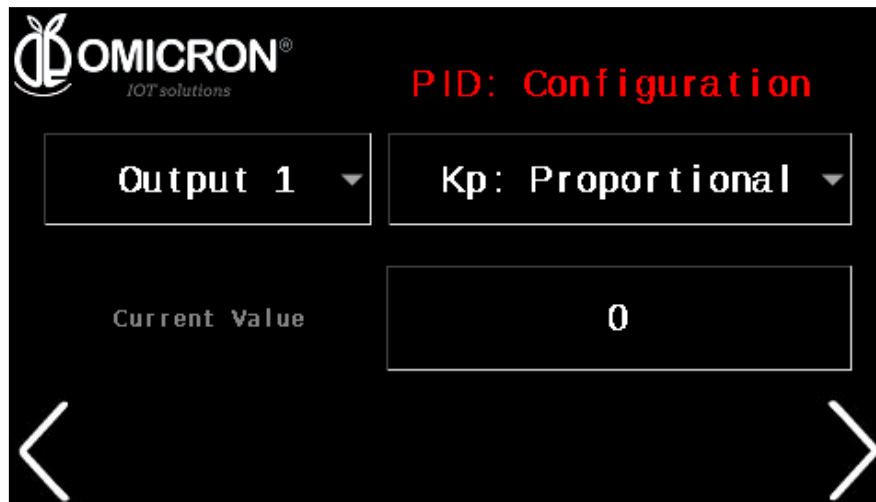
4.2.4 Control Signal (4)

This is the Control Signal associated to activate the Control Function that affects the output, this signal can be one of the five inputs (IN1 to IN5) of the **Kontrolog**, or a remote command.

NOTE:

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

4.2.5 Type of control (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 On/Off Control Function:
0 : Normal Output (Cooling)

1 : Inverted Output (Heating)

For Timer Function:
0 : Timer is activated when the Control Signal is less 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 the sensor reading graph (6)

By clicking on the graph symbol in the lower right corner (), it is possible to access a graphical record of the measurements of the corresponding sensor associated to the output (assigned in parameter 4), where the measurement recording dates and the upper and lower alarm limits configured for that sensor can be observed.

4.2.7 Reset button (7)

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

Section 5: Configuration on Sigfox Backend

If **Kontrolog** devices are desired to work with the Omicron IoT Solutions Monitoring Platform using the Sigfox Telecommunications Network, the user can enable bidirectional communication with the platform by associating Callbacks to the devices' Uplink and Downlink messages on the **Sigfox Backend.**

NOTE:

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

Kontrolog 9.2 SL50 USA / Kontrolog 9.3 SL41 USA
USA, Mexico, Brazil: Sigfox Zone 2.
Latin America and Australia: Sigfox Zone 4.

Kontrolog 9.2 SL50 EU / Kontrolog 9.3 SL41 EU
Europe: Sigfox Zone 1.
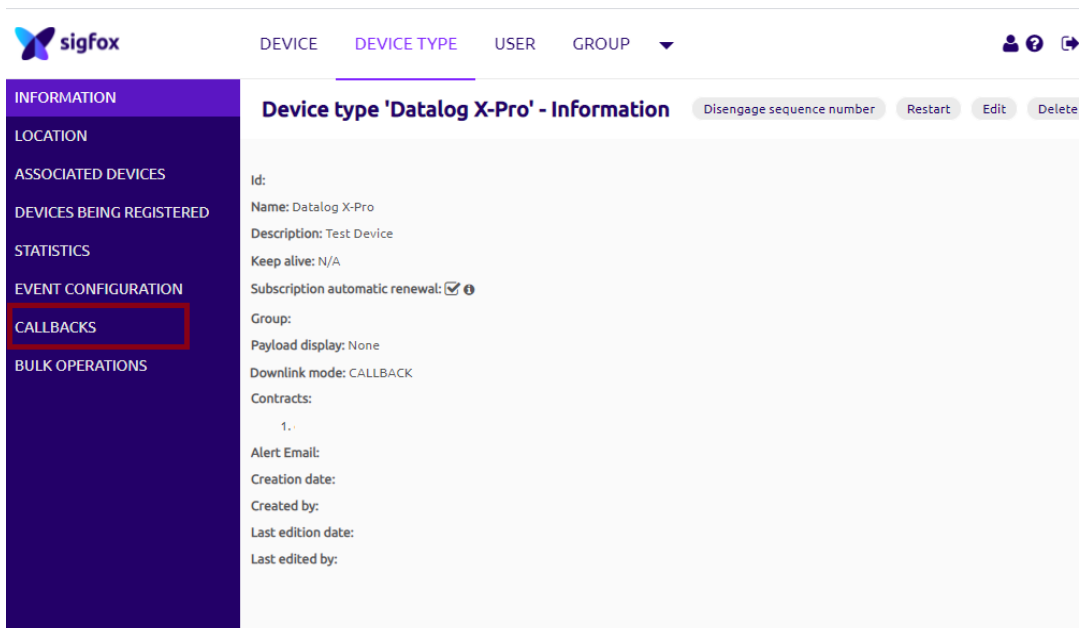
Uplink-Downlink protocol for third-party platforms:
If you want to use another monitoring platform, please don´t hesitate to contact us and ask for the *Communication Protocol Manual* for the Kontrolog.

5.1 Callback configuration for Uplink Messages on Sigfox
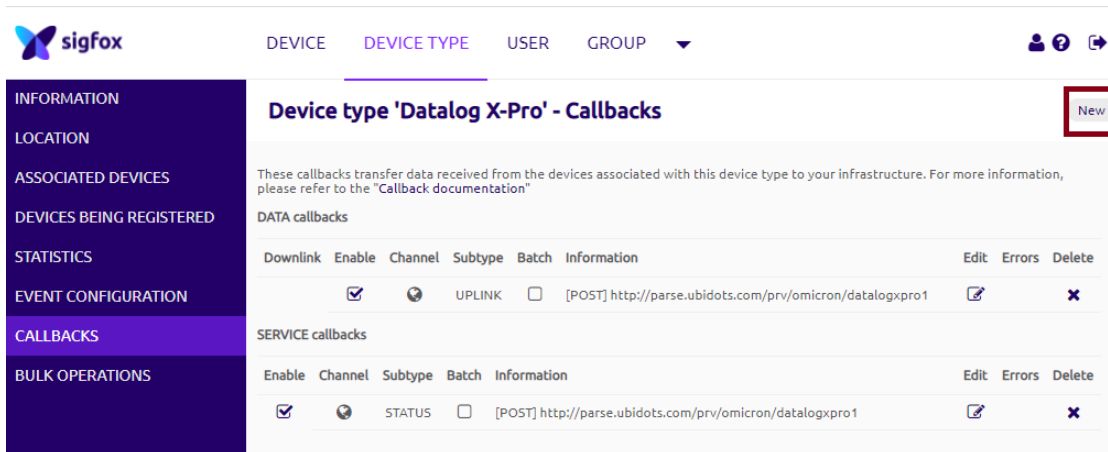
Follow the steps below:
1. In the Sigfox backend, enter the device type to which you have associated the Sigfox modules used by your **Kontrolog** devices, and select "CALLBACKS" from the menu on the left.
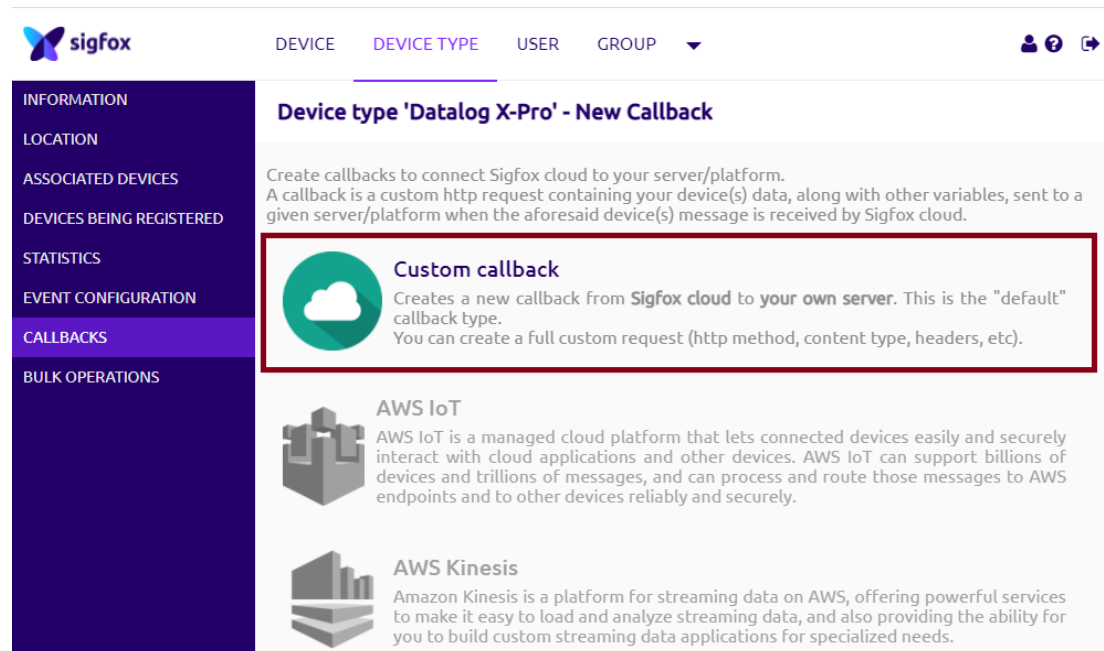
2. Create a new Callback by selecting the "New" option.

3. Select "Custom Callback".

4. Configure the Callback as presented in the image below, and then press "OK".
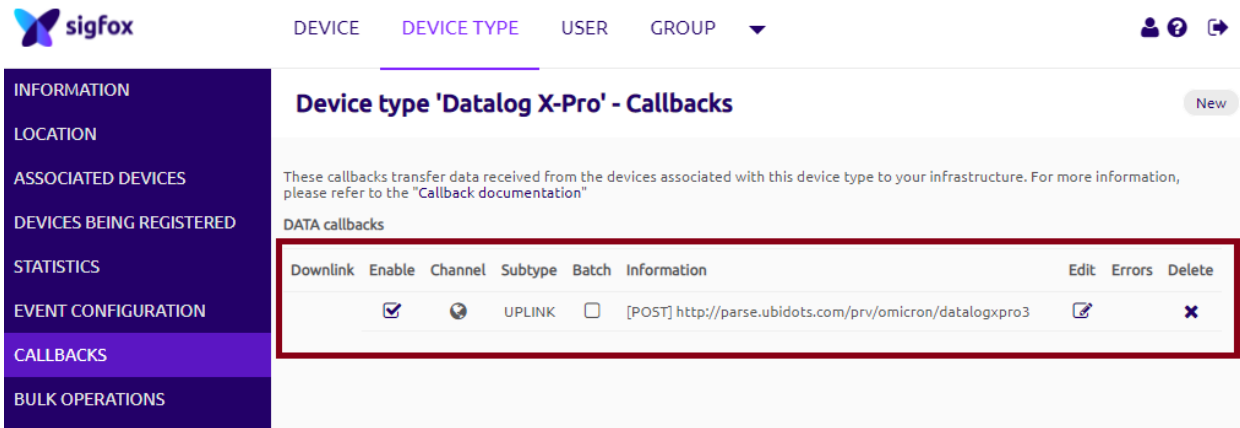
- Use the URL pattern: https://parse.ubidots.com/prv/omicron/beta92_configurable
- Use the body:

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

5. Then, in the "Callbacks" section of the edited device type, you will see a Callback like the following one:
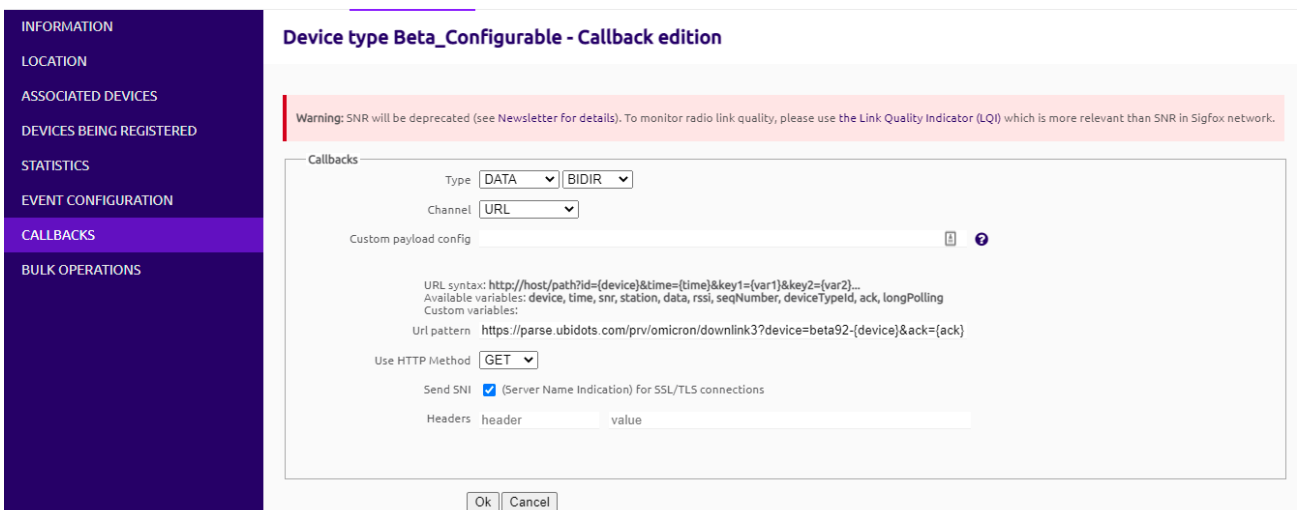
5.2 Callback configuration for Downlink Messages on Sigfox

1. **Follow steps 1 to 3 of section 5.1**, then, configure the new Custom Callback as the following one, and then press "OK":

- Type DATA: BIDIR

- Channel: URL

- Use HTTP Method: GET
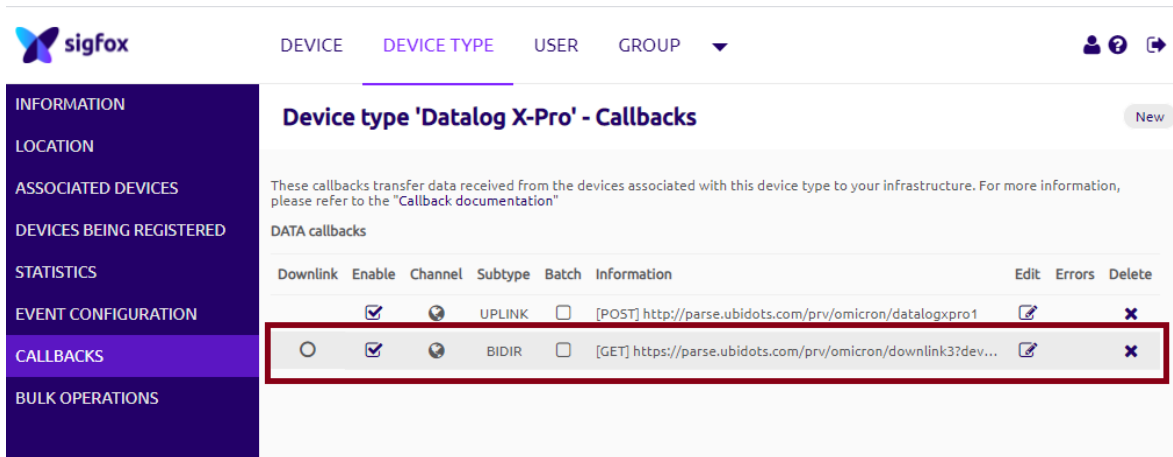
- Use the URL pattern:
  https://parse.ubidots.com/prv/omicron/downlink3?device=beta92-{device}&ack={ack}

2. Then, in the Callbacks section of the edited device type, you will see a new Callback of type BIDIR like the following one:
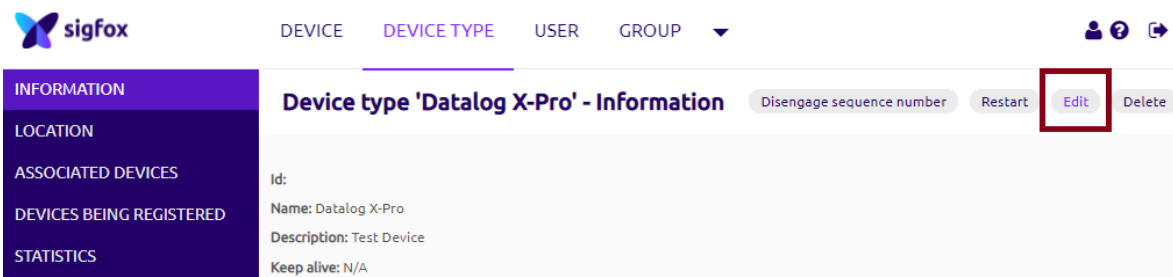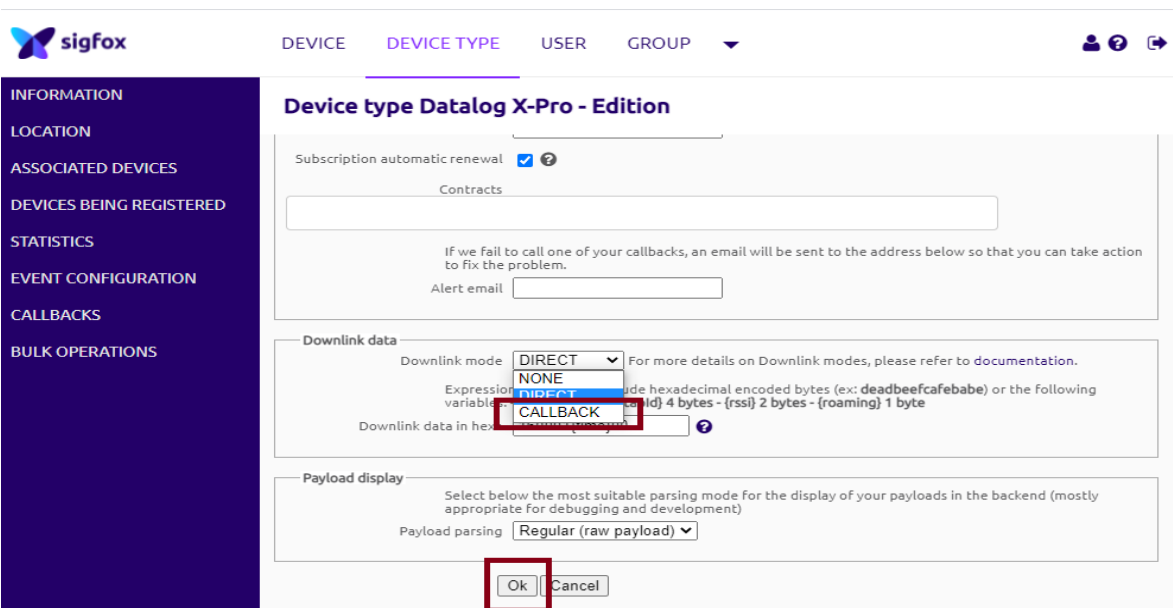
3. You will notice that this Callback is accompanied by an unfilled circle in its Downlink category. This means that the Callback has not been manually selected to handle Downlink messages of the device type. Before making this selection, check the following:

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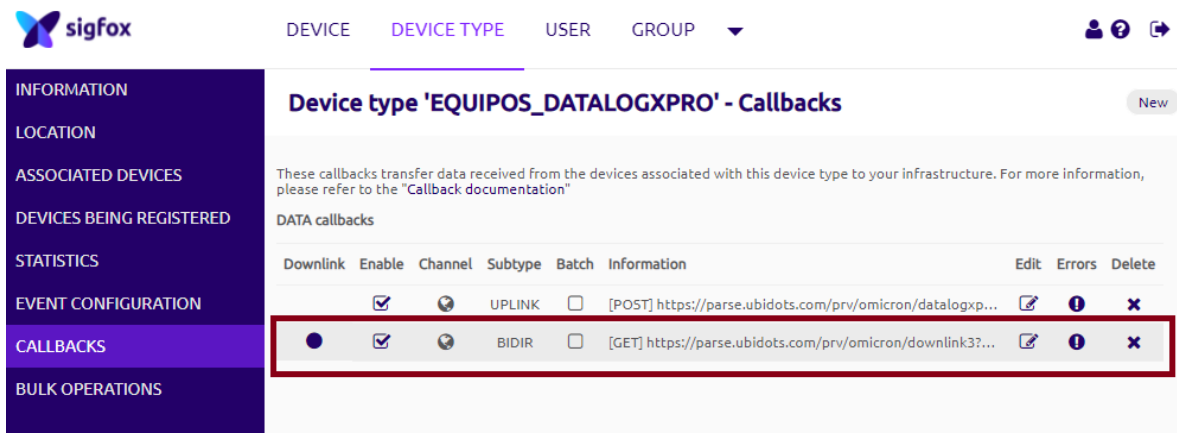
5. Now you can select the new BIDIR callback available as a Callback to handle Downlink messages in the "CALLBACKS" section of the edited device type, by clicking on the unfilled circle (after selecting it, the circle will be filled):

Section 6: Configuration on LoRaWAN™ TTN

If **Kontrolog** 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 proper operation, be sure to order the appropriate device depending on the LoRaWAN™ Regional Band.

Kontrolog 9.2 SL50 USA / Kontrolog 9.3 SL41 USA
USA, Mexico, Brazil: US915 Band.
Latin America and Australia: AU915 Band.

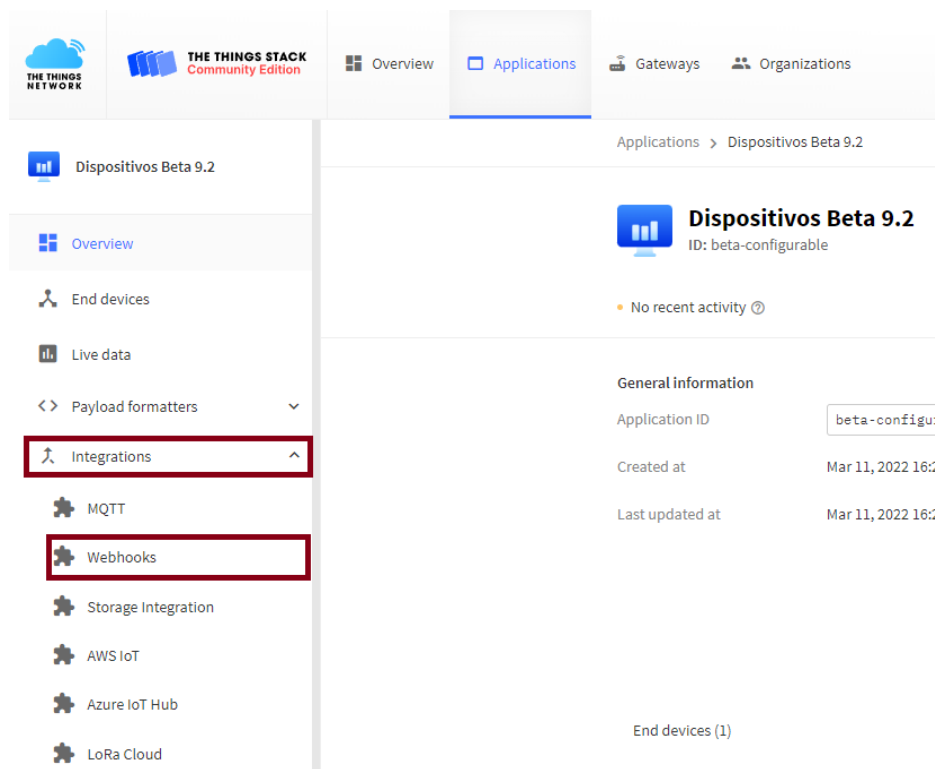**Kontrolog 9.2 SL50 EU / Kontrolog 9.3 SL41 EU**
Europe: EU868 Band.

Uplink-Downlink protocol for third party platforms:
If you want to use another monitoring platform, please don't hesitate to contact us and ask for the **Communication Protocol Manual** for the Kontrolog.

6.1 Callback configuration for LoRaWAN™ Uplink Messages
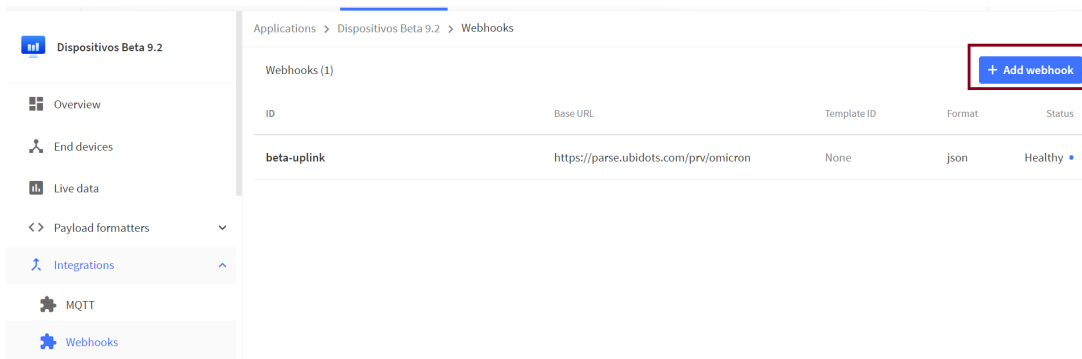
Follow the next steps:

1. In *The Things Network*, enter the application to which you have associated the LoRaWAN™ modules used by your **Kontrolog** devices, and select "Webhooks", displaying the "Integrations" menu located on the left side.
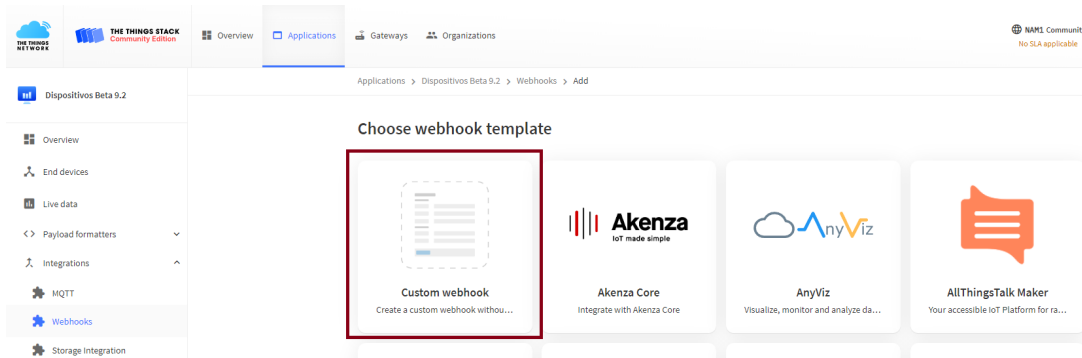
2. Create a new Webhook by selecting the "Add Webhooks" option.

3. Then select "Custom Webhook"

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

Uplink message

☑ Enabled   /uplink-beta-conf-generico2

Join accept

☐ Enabled

Downlink ack

☐ Enabled

Downlink nack

☐ Enabled

Downlink sent

☐ Enabled

Downlink failed

☐ Enabled

Downlink queued

☐ Enabled

Downlink queue invalidated

☐ Enabled

Location solved

☐ Enabled

Service data

☐ Enabled

Save changes   🗑 Delete Webhook

- **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-beta-conf-generico2

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

Webhooks (1)				+ Add webhook
ID	Base URL	Template ID	Format	Status
beta-uplink	https://parse.ubidots.com/prv/omicron	None	json	Healthy ●

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** devices and select "API Keys".
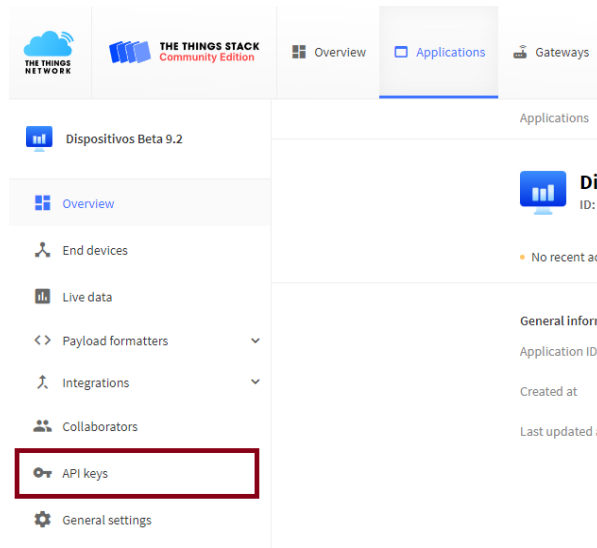
2. Select the option "Add API Key".

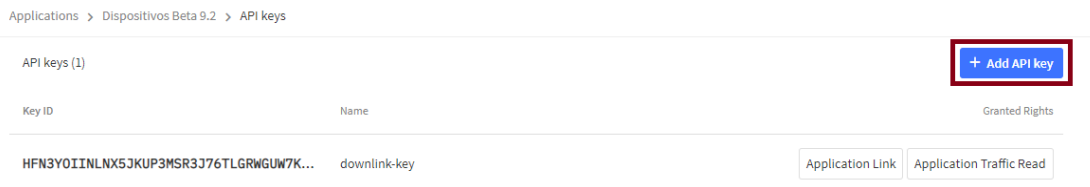## 3. Configure the Webhook as presented in the following image and then press "Create API Key".

Add API key

Name

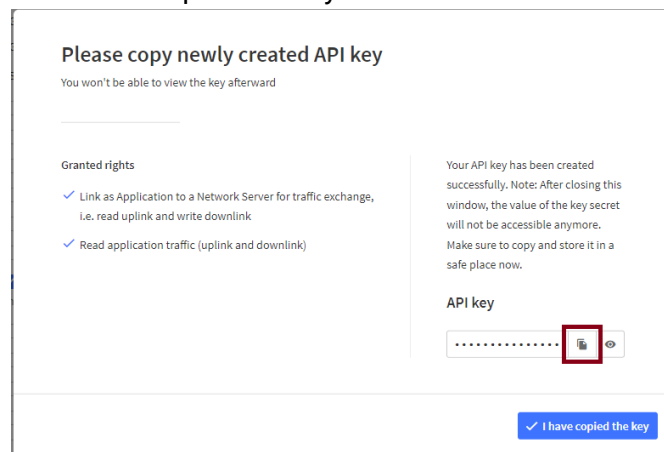downlink-key

Rights *

○ Grant all current and future rights

● Grant individual rights

☑ Select all

☐ Delete application

☐ View devices in application

☐ View device keys in application

☐ Create devices in application

☐ Edit device keys in application

☐ View application information

☑ Link as Application to a Network Server for traffic exchange, i.e. read uplink and write downlink
This implicitly includes the rights to view application information, read application traffic and write downlinks

☐ View and edit application API keys

☐ Edit basic application settings

☐ View and edit application collaborators

☐ View and edit application packages and associations

☐ Write downlink application traffic

☑ Read application traffic (uplink and downlink)

☐ Write uplink application traffic

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".
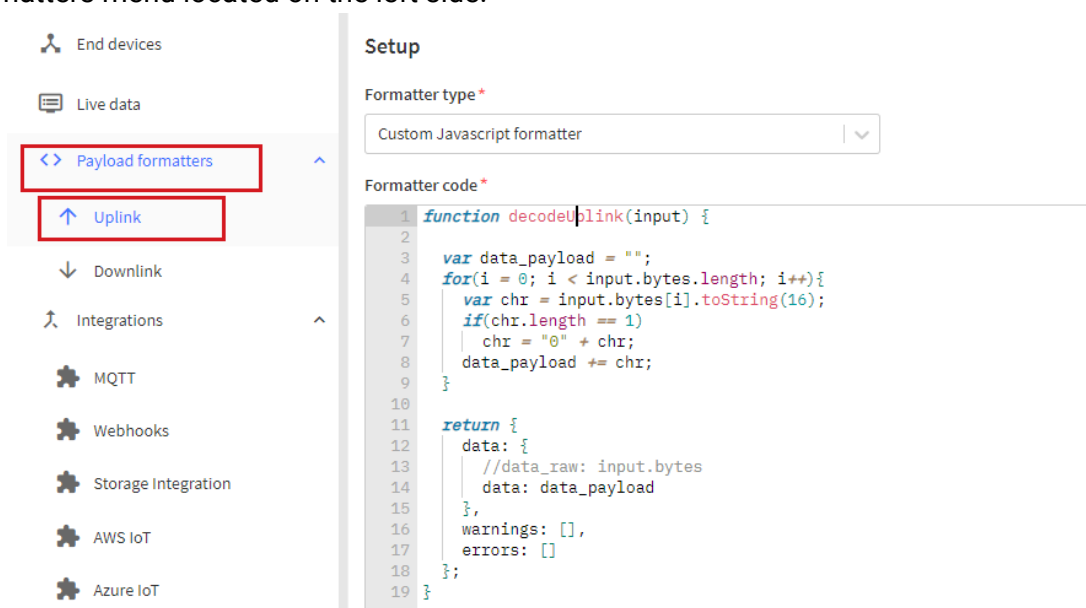

5. Then edit and copy this API key in your **Webhook: "Downlink API key".**
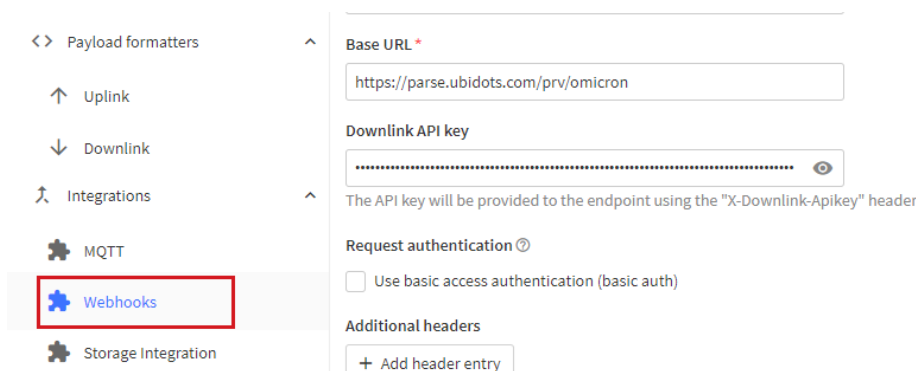
6.2 Format for Uplink payload

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 next function code:

```javascript
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: Centriomega® Remote Control and Monitoring Platform

The Kontrolog 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 Centriomega® Remote Monitoring Platform

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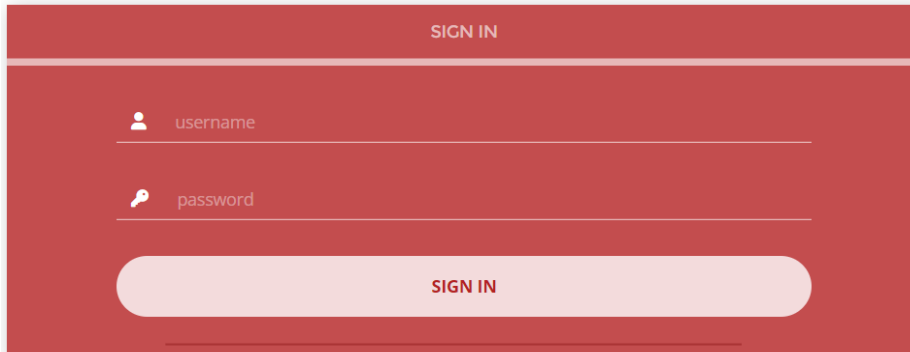

Figure 7-1   Access to the Remote Monitoring Platform

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:
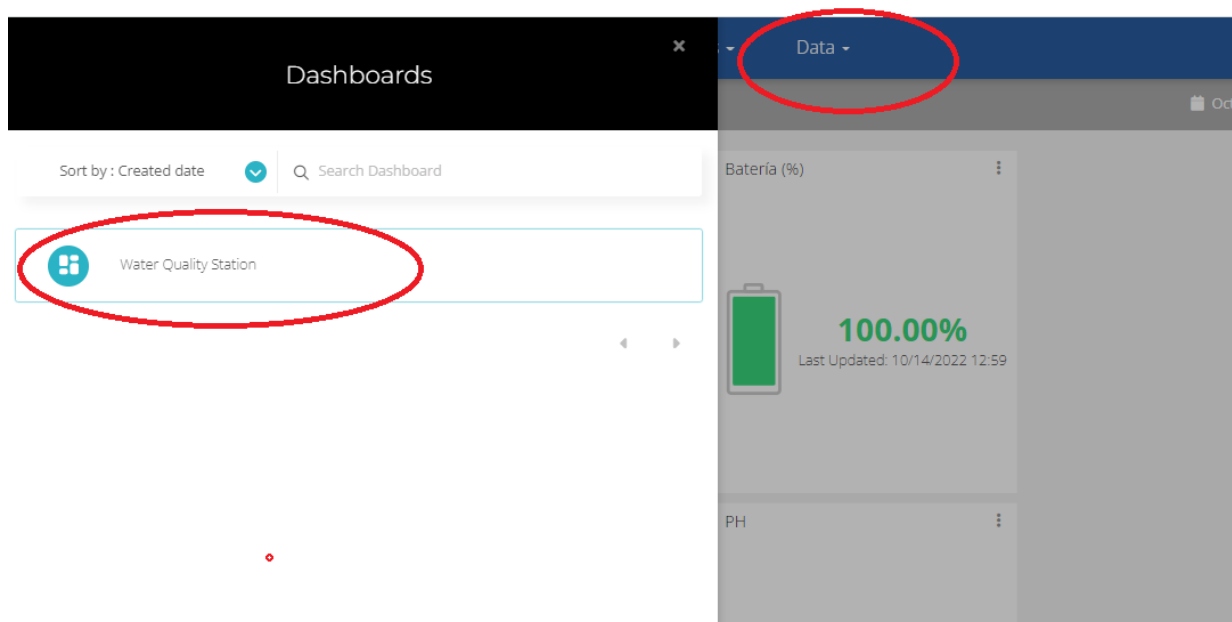

Figure 7-2   Dashboard selection

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.** 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:
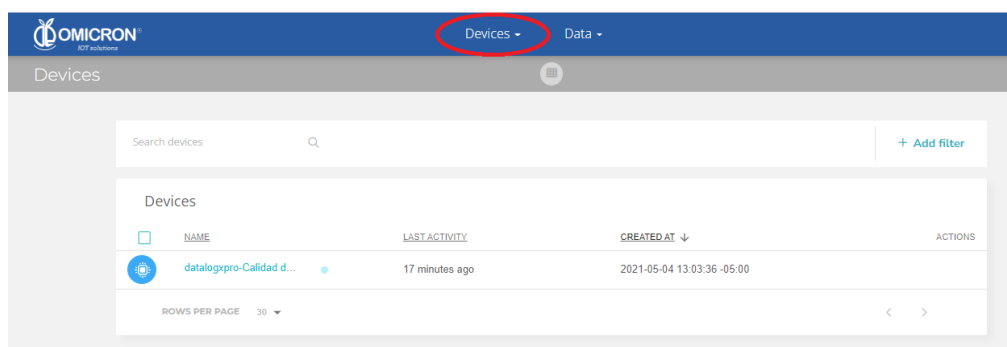

Figure 7-4   Device selection page

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

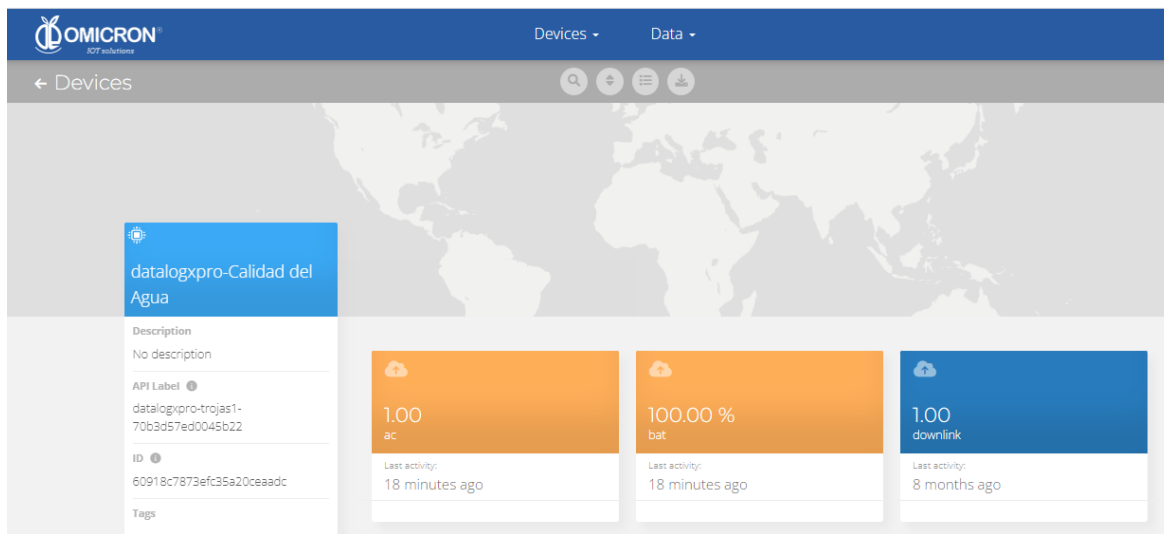properly, after entering the Device panel that should include it, its last activity period could be reviewed.

Figure 7-5   Reviewing the Variables of a Device

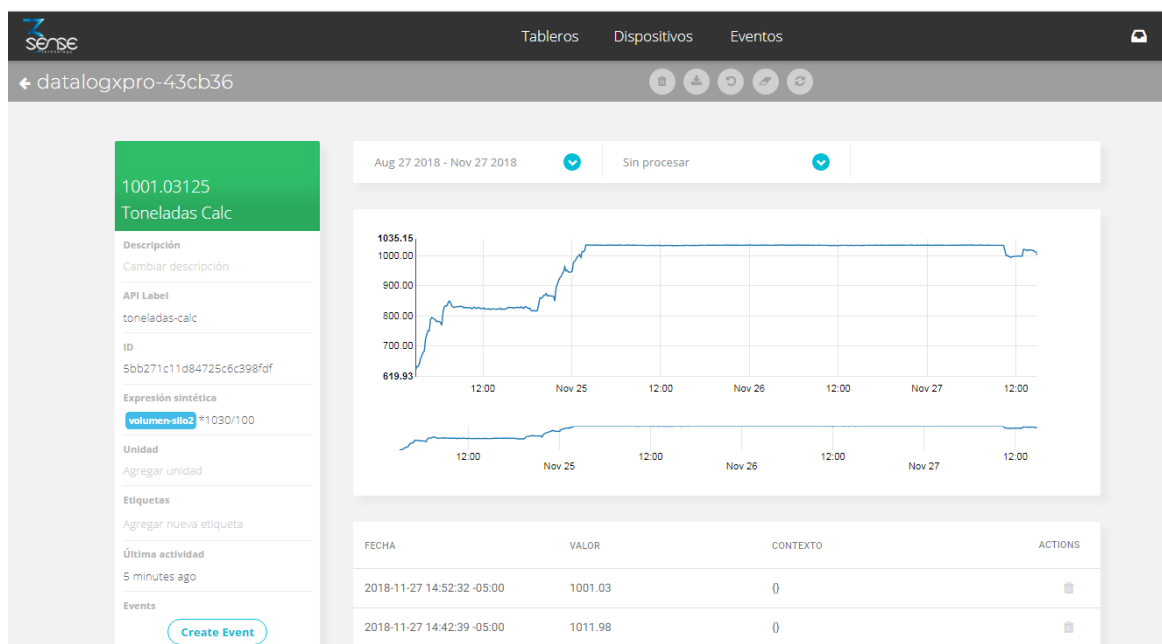To review the historical data of a certain Variable, in a Device, select the Variable.

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:
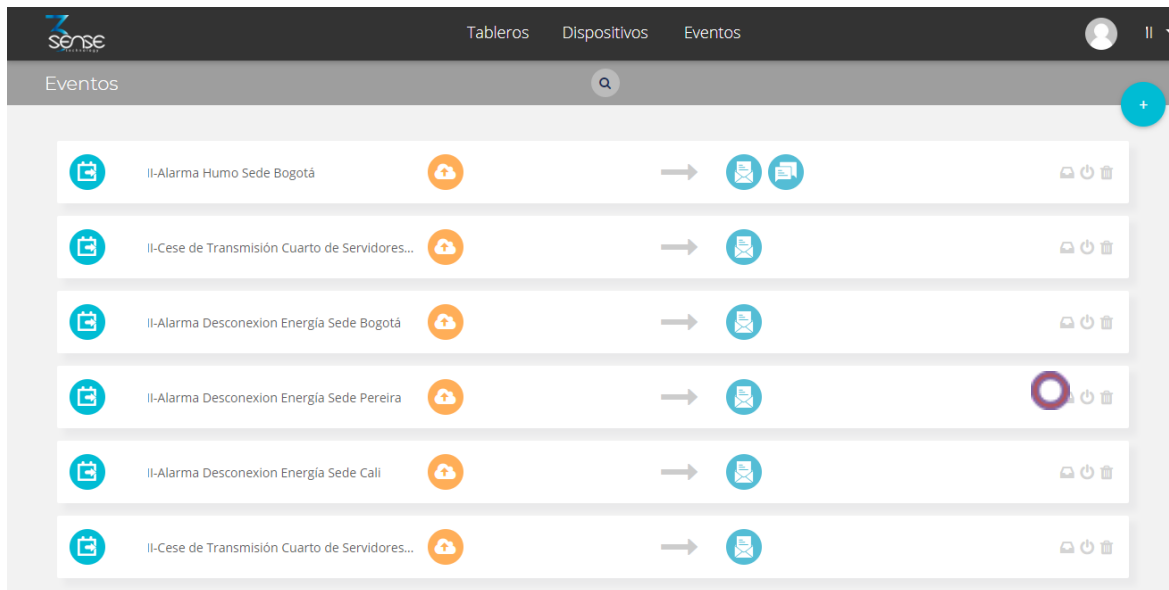

Figure 7-7   Events Configuration

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**. Remember that the Contact Information is provided at the beginning of this document.

7.5 Remote Configurator

Centriomega® 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.
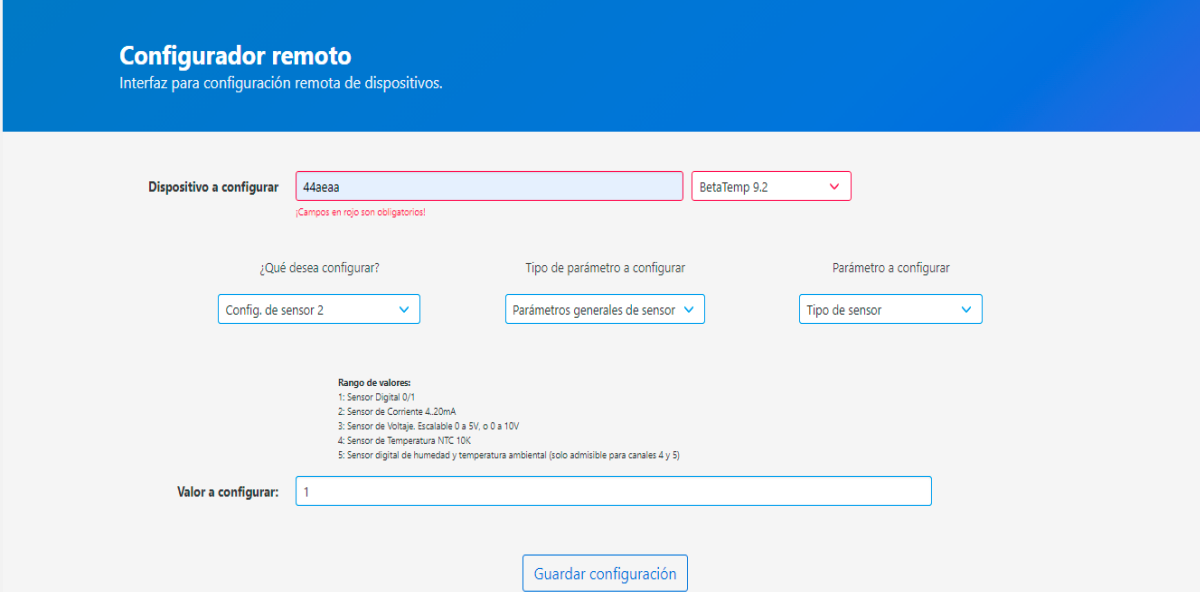
7.5.2 Use of the interface for remote configuration

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 Kontrolog 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 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** can associate with each sensor, and what each of them can indicate:

Table 8-1   Outliers associated with each sensor

Predefined Kontrolog 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** 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.

10.4 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.

10.5 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. kontrolog-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**
>
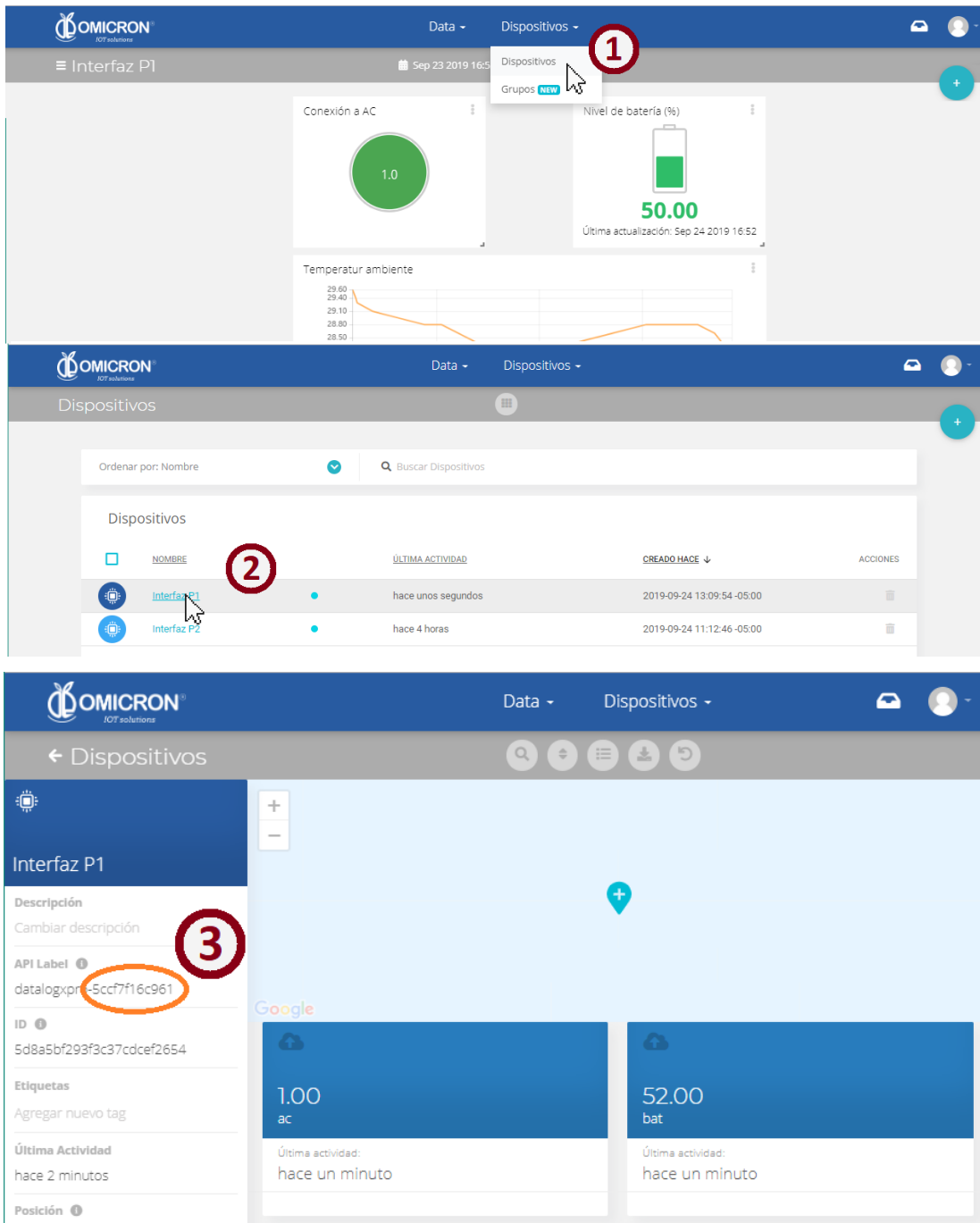> **Do not modify the "API Label" of a device associated with your account for any reason.**

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

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