



User manual

LESS X - Telemetry logger

Rev 01/2020

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LESS Industries S.A

Warranty and Assistance

The LESS X Telemetry logger is warranted by LESS INDUSTRIES S.A. to be free from defects in materials and workmanship under normal use and service for twelve (12) months from date of shipment unless specified otherwise. Batteries have no warranty.

LESS INDUSTRIES S.A.'s obligation under this warranty is limited to repairing or replacing (at LESS INDUSTRIES S.A.'s option) defective products. The customer shall assume all costs of removing, reinstalling, and shipping defective products to LESS INDUSTRIES S.A.

LESS INDUSTRIES S.A. will return such products by carrier paid by the receiver. This warranty shall not apply to any LESS INDUSTRIES S.A. products which have been subjected to modification, misuse, neglect, accidents of nature, or shipping damage. This warranty is in lieu of all other warranties, expressed or implied, including warranties of merchantability or fitness for a particular purpose. LESS INDUSTRIES S.A. is not liable for special, indirect, incidental, or consequential damages. Products may not be returned without prior authorization.

The following contact information is for International customers residing in countries served by LESS INDUSTRIES S.A. directly. Affiliate companies handle repairs for customers within their territories. Please visit www.lessindustries.com to determine which LESS company serves your country.

To obtain a Returned Materials Authorization (RMA), contact LESS INDUSTRIES S.A., by phone to +54 11 4923 1648 or by email to soporte@lessindustries.com. After an applications engineer determines the nature of the problem, an RMA number will be issued. Please write this number clearly on the outside of the shipping container.

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General and safety information

- Do not open the device.
- Do not let the electronic parts come into contact with any steel elements, to avoid injuries and burns.
- NEVER submerge the device in any liquid.
- Do not remove the battery.
- Check the product specifications section for the maximum allowed power voltage and amperage range and always use current transformers and batteries that work within that range. LESS will not be responsible for any malfunctions caused by using the device with any batteries, power supplies or chargers other than those supplied by LESS.
- Keep the device within the range of temperatures stated in the specifications section.
- Do not connect or power the device with damaged cables or batteries.
- Place the device in a location that can only be accessed by maintenance operatives (restricted area).
- In any case, keep children away from the device at all times.
- If there is an electrical failure, disconnect the main switch immediately and disconnect the battery or any other power supply that is being used.
- If using a car lighter as a power supply, be sure to respect the voltage and current levels specified in the "Power Supplies" section.
- When using a battery as the power supply, whether in combination with a solar panel or not, be sure to use the voltage and current levels specified in the "Power supplies" section.
- Check that the frequencies and power levels of the radio communication modules and the integrated antennas are appropriate for the location in which you intend to use the device.

Overview

LESS X data acquisition and logging instruments is a tool to measure and record a wide variety of quantities and values in the real world.

The data is sent to the cloud by a 2G/3G cellular connection, radio networks as LoRa or WiFi.

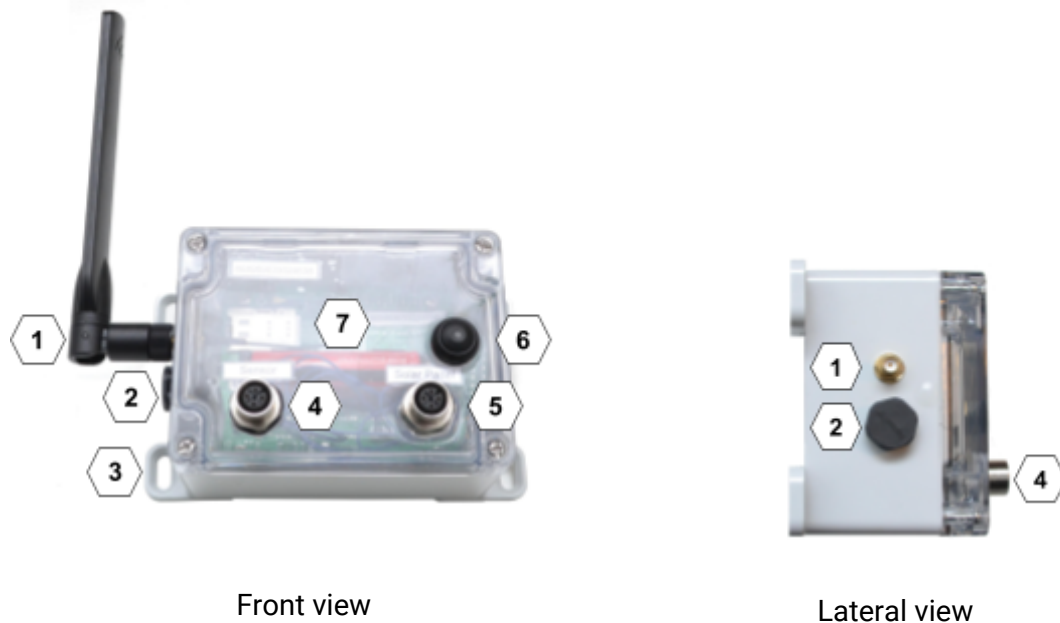
Logged data can then be downloaded using the web interface into files ready for import into spreadsheets and data analysis tools.

The LESS X is a ready-to-use out of the box, it does not require calibration, neither configuration. The system is ready to use.



Device description

In the following picture you will find a front and lateral view of the device.



Picture 1

The number indicated in the pictures, are references to:

1. Antenna / Antenna connector

The device is delivered with the antenna disconnected. [Please connect the antenna following the instructions below.](#)

Please do not replace the antenna. Do not use unauthorized antennas. Do not operate the device without an antenna.

2. Ventilation system

The device has a ventilation device for avoiding condensation.

Please do not remove the ventilation system. Please do not obstruct the ventilation system.

3. Device mounting point

The device has 4 (four) mounting points to attach it to a wall or pole.

4. Sensor connector

In this connector is where the sensor must be connected. Please be aware the connector only can be plugged in a specific position. Please connect the sensor following the instructions below.

5. Power connector

In this connector is where the external power supply must be connected. This can be a solar panel or any source of power according to the device power rating. Please be aware the connector only can be plugged in a specific position. Please connect the power source following the instructions below.

6. Power-ON button

This is a power on button. To turn on the device you have to push the button. To turn it OFF, you have to push it again. The power ON button is a mechanical switch which holds the status.

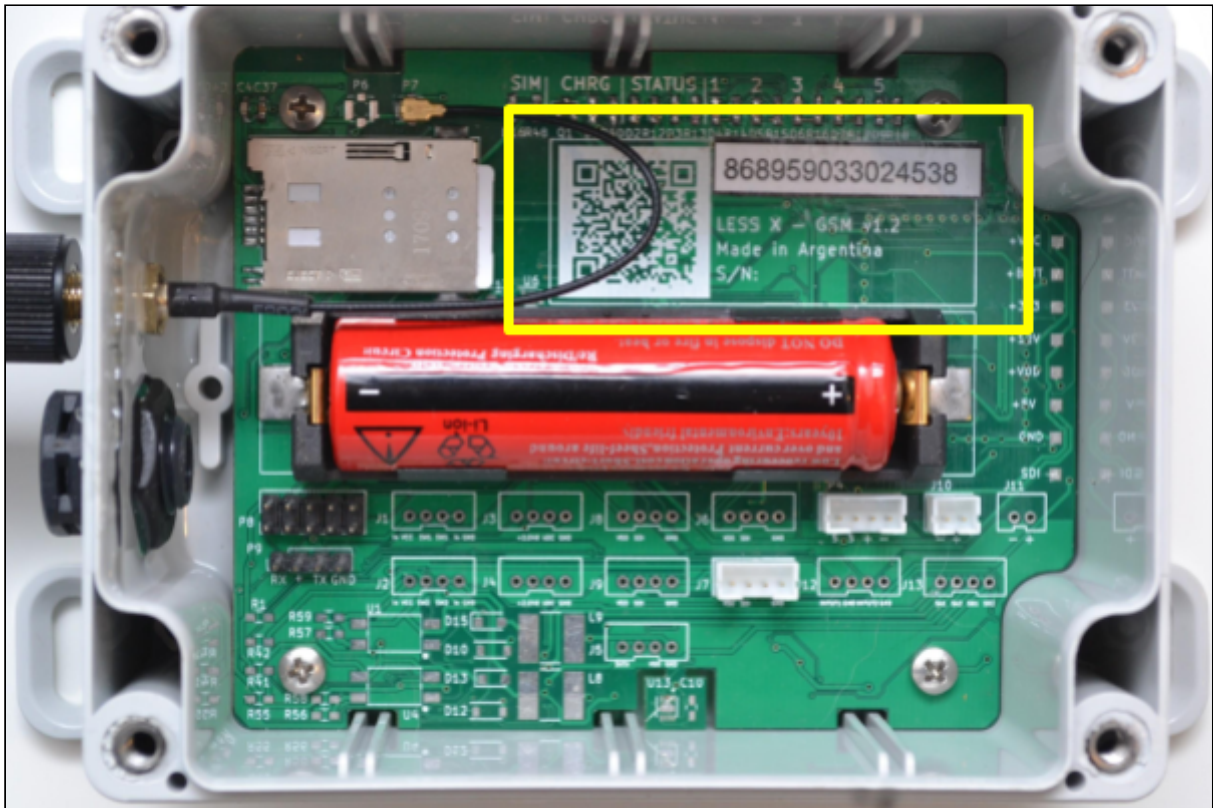
7. Built in battery

The device has a 18650 lithium-ion battery. Please:

- DO NOT change the battery.
- DO NOT remove the battery.
- DO NOT replace the battery.
- BE CAREFUL about the right way to connect the battery.

Identification

Each device has a label in the board's upper right side with a description of the brand, model and device ID.



Picture 2

In the previous picture it is indicated with a yellow rectangle the identification label.

The following image is a zoomed version of the previous picture, showing the identification label.



Picture 3

Where:

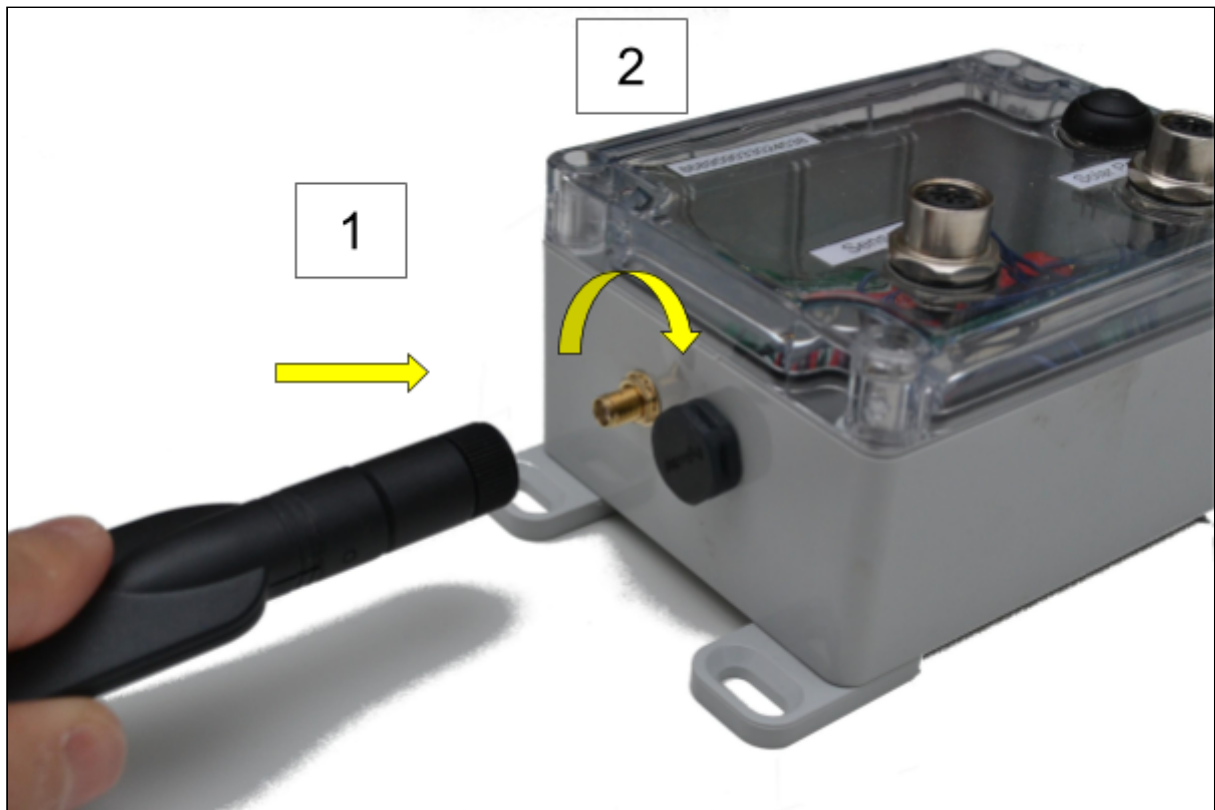
1. LESS ID: It is the unique number to identify each device
2. Device type: It is the device model. In this example, LESS X.
3. Telecommunication: It identifies how the device sends data. It could be GSM, LoRa or WiFi. In this case it is GSM.
4. Device version: It indicates which device model. In this example 1.2

In this picture, we can understand the device 868959033024538 is a LESS X which sends data through GSM network and it is the version number 1.2

Installation

Connecting the antenna

The device includes an antenna, which is needed to perform the communication with the cloud base app for downloading the data.



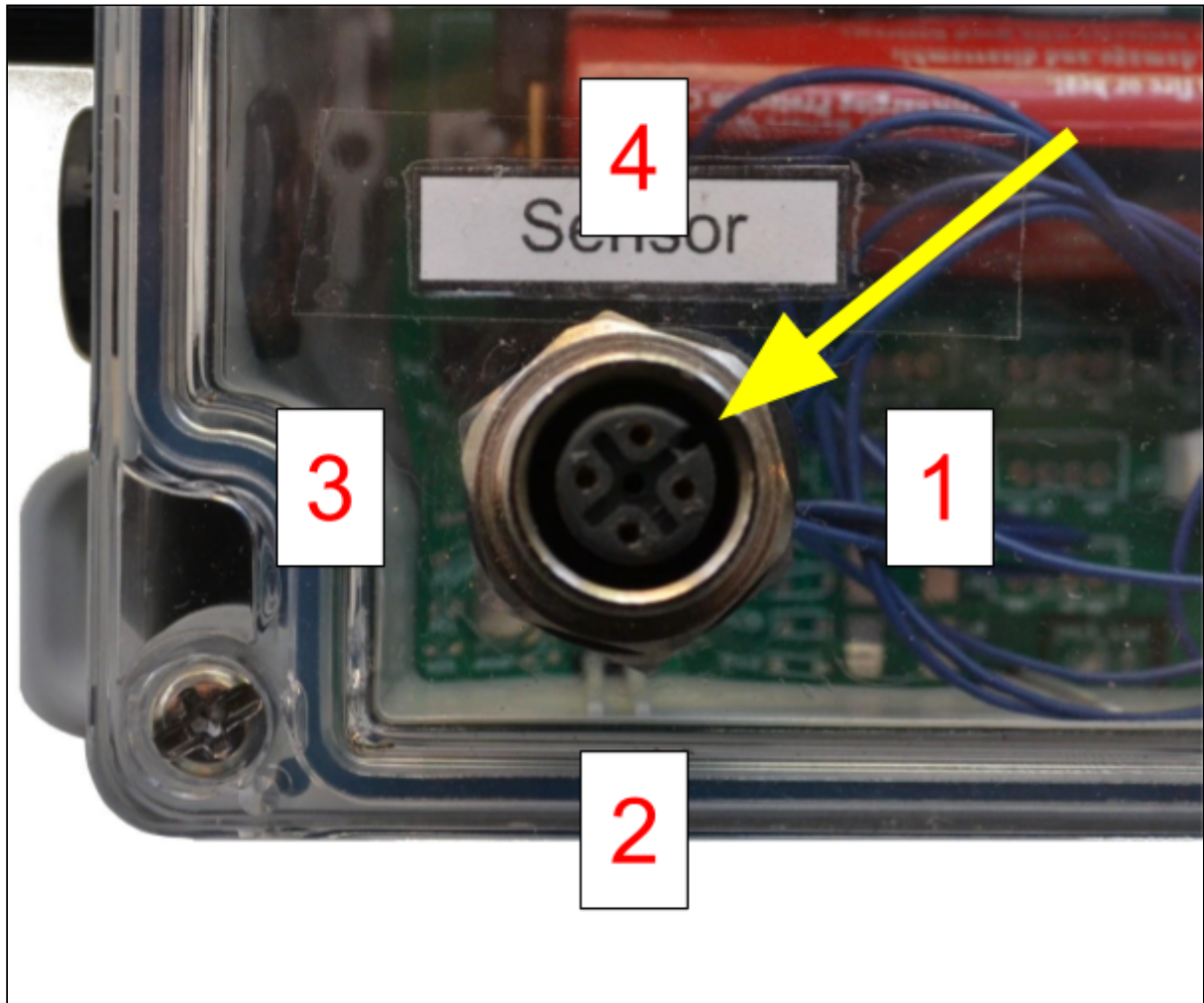
Picture 4

Step 1: place the antenna in the connector.

Step 2: turn the antenna clockwise.

Connecting sensors

Each device includes a connector in the front with the label "Sensor". This connector is used to connect a sensor to the telemetry module.



Picture 5



Water flow and water pressure sensors

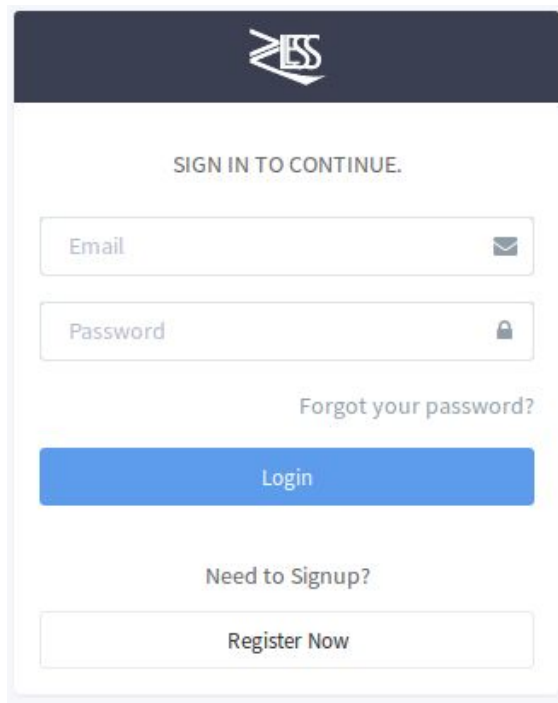
Dashboard

Website

1. URL

The URL website is <https://dashboard.lessindustries.com/>

2. Description

A screenshot of the LESS Industries dashboard login page. The page has a dark blue header with the LESS logo. Below the header, the text "SIGN IN TO CONTINUE." is centered. There are two input fields: "Email" with an envelope icon and "Password" with a lock icon. Below the password field is a link "Forgot your password?". A blue "Login" button is centered below the links. At the bottom, the text "Need to Signup?" is centered above a "Register Now" button.



SIGN IN TO CONTINUE.

Email 

Password 

[Forgot your password?](#)

Login

Need to Signup?

Register Now

Picture 6

The login page has four important areas:

1. Email box

In this space the user must write his username, it is his email.

2. Password box

In this space, the user must write his password.

3. "Forgot your password" button

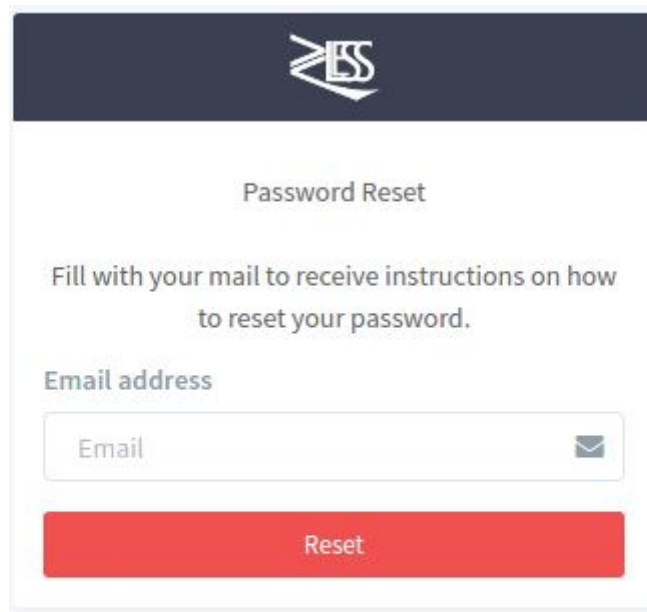
The user must click here if the password is forgotten.

4. "Login" button

Once the username and the password are written, this button must be clicked.

Reset password

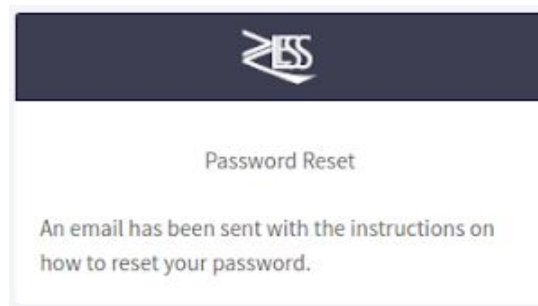
If a user forgets the password, this could be reseted by clicking on the button "Forgot your password"



The screenshot shows a web form for password reset. At the top is a dark blue header with a white logo that says "LESS". Below the header, the title "Password Reset" is centered. The instruction "Fill with your mail to receive instructions on how to reset your password." is centered. Below this is a label "Email address" followed by a text input field containing the placeholder "Email" and a small envelope icon on the right. At the bottom is a large red button with the text "Reset" in white.

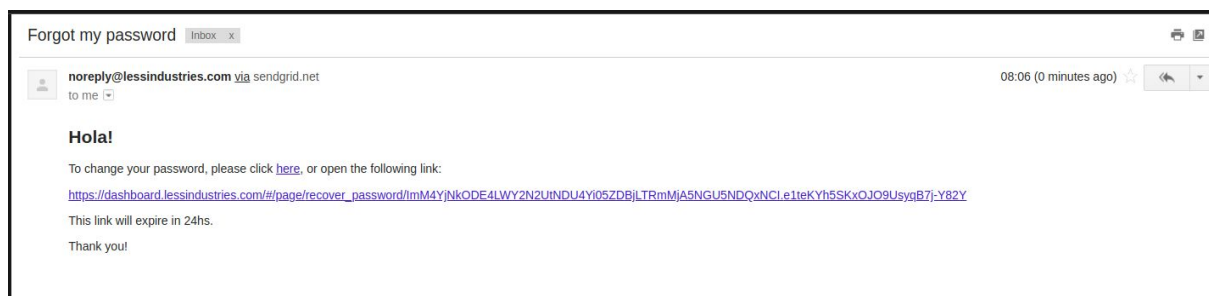
Picture 7

Adding the registered email address and clicking the "Reset" button the user will receive an email to restore the account password.



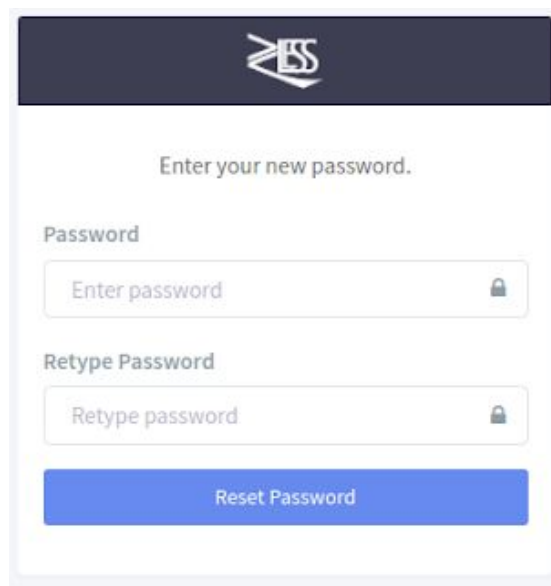
Picture 8

Once the "Reset" button is clicked, and email will be received with a link for restoring the password.



Picture 9

Clicking on the link will open a website where a new password must be entered

A screenshot of a web form for resetting a password. At the top is a dark blue header with the LESS Industries logo. Below the header, the text "Enter your new password." is centered. The form contains two input fields: "Password" and "Retype Password", each with a placeholder text "Enter password" and a lock icon. A blue button labeled "Reset Password" is positioned below the input fields.

Picture 10

Once the "Reset Password" button is clicked, the new password will replace the old one.

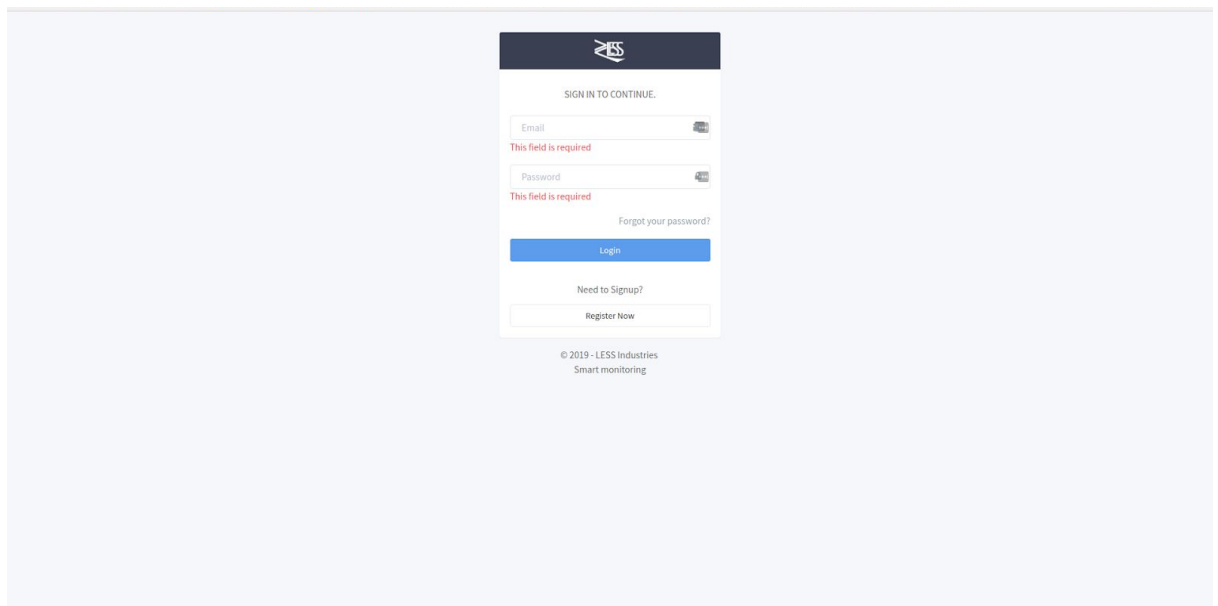
After resetting the password, users must log in again in order to access to the dashboard:

<https://dashboard.lessindustries.com>

Create a new user

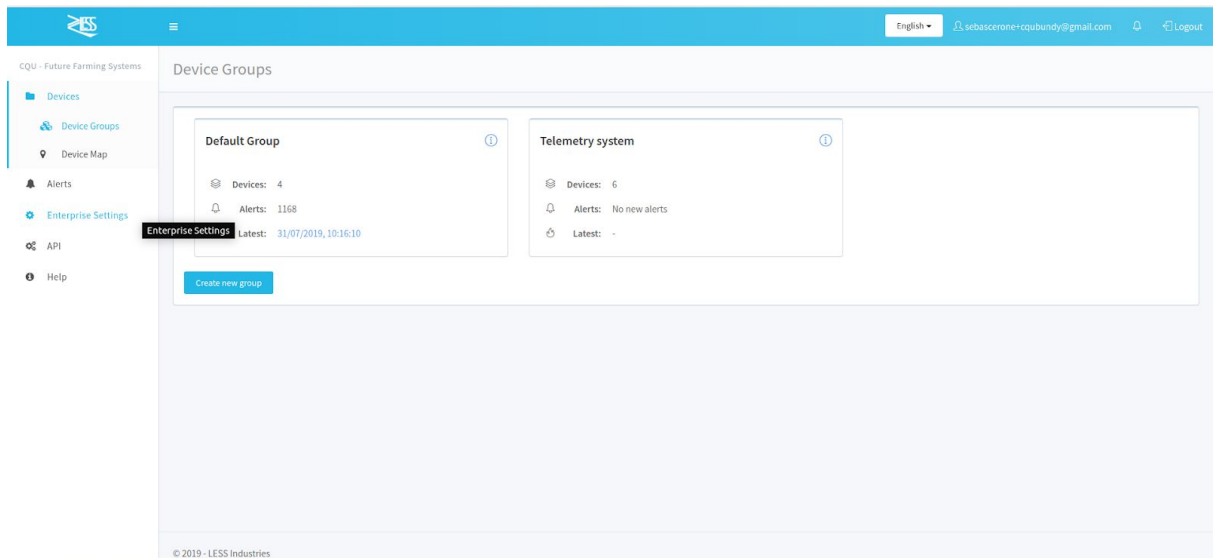
In order to create a new user who has access to the organization it has to be executed the following steps:

1. Log in in the platform: dashboard.lessindustries.com



Picture 11

2. Go to "Enterprise settings".

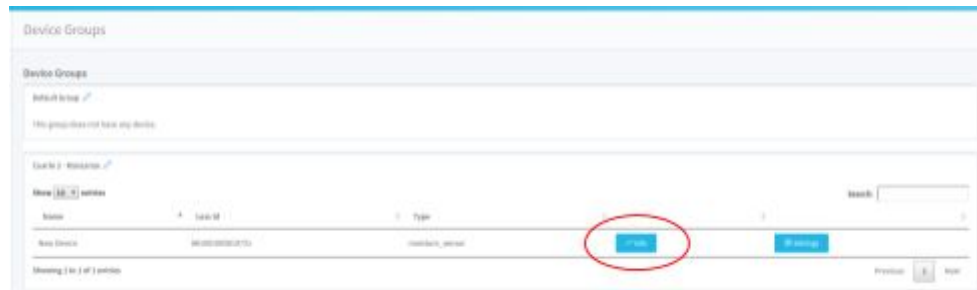


Picture 12

3. Click on "Create a new user".
4. Write the email for the new user.
5. Click on "Create a new user"

Add GPS position

1. Go to the dashboard: dashboard.lessindustries.com
2. Log in with your user and password.
3. Go to the device you want to add the GPS position



Picture 13

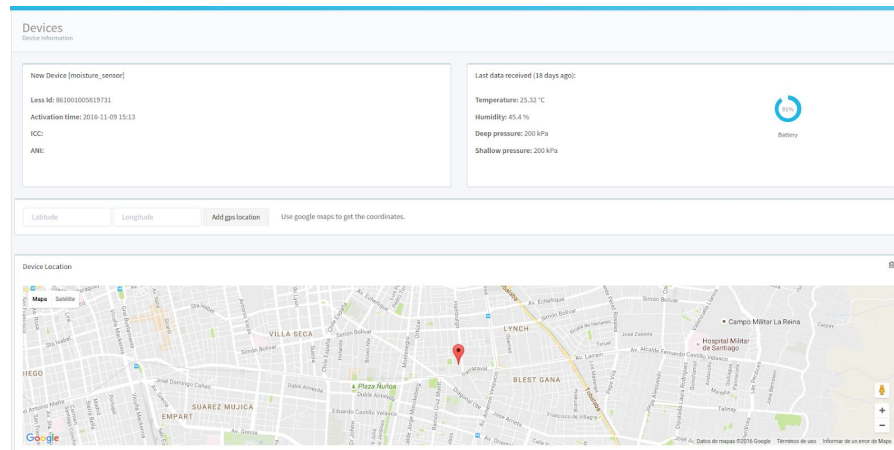
4. Fill the GPS position



Picture 14

5. Click the button "Add GPS Location".

6. If you succeed, the new position will appear at the dashboard.



Picture 15

Appendix 1

Identifying error types

After the device finishes the initialization process, it indicates if it was possible to connect to the server. In order to do it, its buzzer emits two beeps telling everything is ok, or three beeps indicating the presence of errors, the device will use the LEDs (D1 to D4) and the buzzer to indicate to the user the error number.

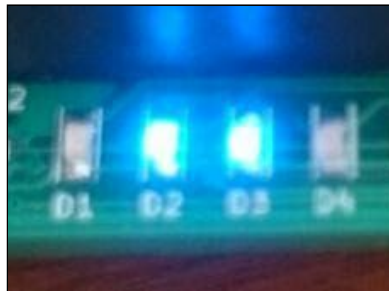
The error number will be represented with a code that can be interpreted in following table, and in turn the buzzer will emit as many beeps as the number of the error to represent.

This is the list of possible errors for a LESS device equipped with SDI-12 sensors:

Error Nr	Description
1	(It does not apply to this device)
2	Temperature / humidity sensor error
3	The cellular modem was unable to register to the network
4	(It does not apply to this device)
5	The device had a general failure and was internally reset
6	The device was unable to obtain the current date and time
7	Cellular modem failed to turn on (Usually due to low battery)
8	No SDI sensor detected

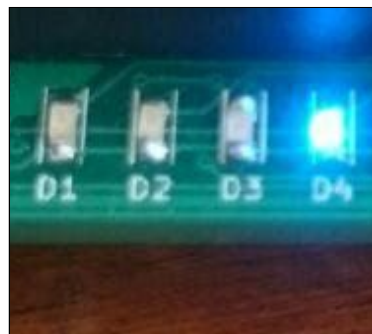
Error example

The following image shows D1 off, D2 and D3 on, and D4 off; which should be understood as error 6 (see Table 1). That is, the device was unable to obtain the current date.



Picture 16

In the following image you can see only D4 on, then the error is number 8, which means that the SDI-12 sensors are all disconnected, or there is a fault with them.



Picture 17

Binary to decimal chart translation

D1	D2	D3	D4	Error number
ON	OFF	OFF	OFF	1
OFF	ON	OFF	OFF	2
ON	ON	OFF	OFF	3
OFF	OFF	ON	OFF	4
ON	OFF	ON	OFF	5
OFF	ON	ON	OFF	6
ON	ON	ON	OFF	7
OFF	OFF	OFF	ON	8

Appendix 2

GSM signal level

When you turn on the power, this special function will automatically be activated. It aims to indicate to the user the best signal point for the device.

This function will be active for about a minute, if the user needs more time they can turn the device off and on again to reactivate this function.

It should be noted that the signal level is independent of the availability of the data connection. However this is a good indication of good or bad operation of the equipment. It is very likely that the equipment has difficulties to send data when the signal level is -113 dBm or less

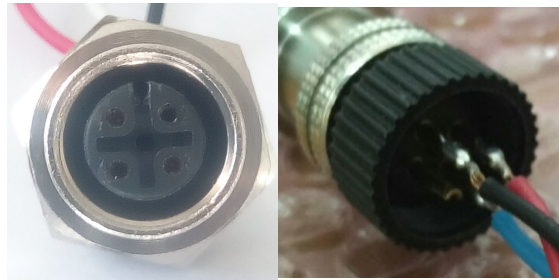
The signal level will be represented with the LEDs of figure 3, item 2, and the buzzer will be used to generate beeps. The better the signal, the more LEDs will light up and the more beeps the buzzer will emit (see table).

D1	D2	D3	D4	Beeps	Signal level
ON	OFF	OFF	OFF	1	Really bad: -113 dBm or less
ON	ON	OFF	OFF	2	Bad: -111 to -95 dBm
ON	ON	ON	OFF	3	Normal: -96 to -77 dBm
ON	ON	ON	ON	4	Good: -78 to -51 dBm
ON	ON	ON	ON	5	Excellent: -51 dBm or better

Appendix 3

SDI-12 connector assembly

- 1- Ground (cable negro)
- 2- Power (cable rojo)
- 3- Data (cable celeste)



Picture 18