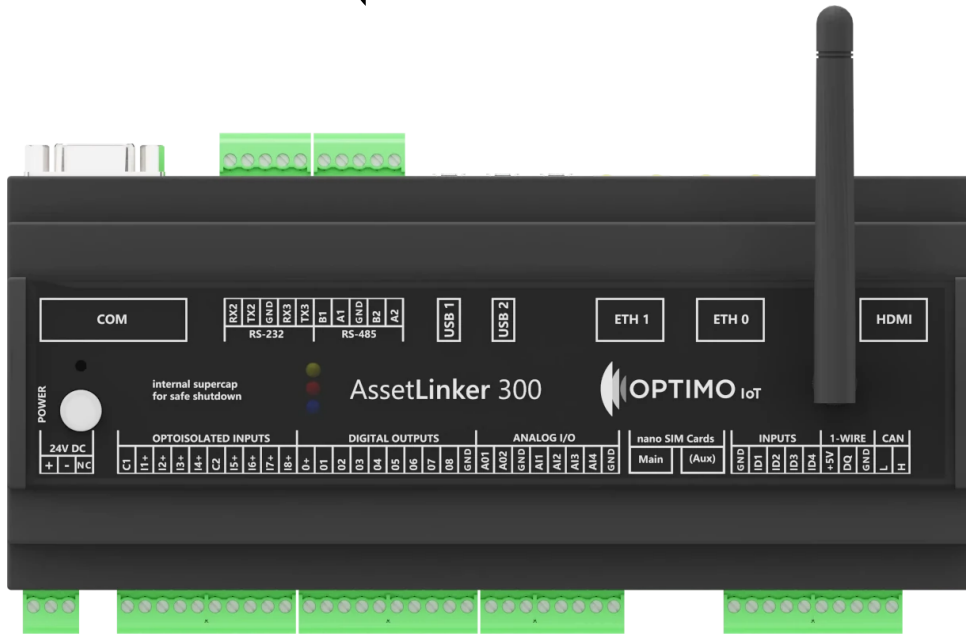




Comprehensive Guide to Setup and Configuration

Table of contents

1. Documentation Optimo IoT	13
2. Optimo IoT Resource types	14
2.1 Asset	14
2.2 Variables	14
2.3 AL300 Gateway configuration	15
2.4 Users	15
2.5 Dashboards	15
3. Gateway AL300	16
3.1 Quick start	16
3.1.1 Hardware installation	16
3.1.2 Access local web interface	16
3.1.2.1 Connection with network cable	17
3.1.2.2 Connection via WiFi	17
3.1.2.3 Connection with HDMI monitor, mouse and keyboard [DEPRECATED]	17
3.1.3 Configuration of network settings and data sources	17
3.2 Installation	18
3.2.1 AssetLinker300	18
3.2.1.1 Safety Instructions	18
3.2.1.1.1 Qualified Personnel	18
3.2.1.1.2 Device	18
3.2.1.1.3 Scope of Application	18
3.2.1.1.4 Assembly and Disassembly	18
3.2.1.2 Safety Information	19
3.2.1.2.1 Safety Standards	19
3.2.1.3 Decommissioning and Disposal	19
3.2.1.3.1 Device decommissioning	19
3.2.1.3.2 Device Disposal	20

3.2.2	AssetLinker300	22
3.2.2.1	Electrical connections	22
3.2.2.1.1	Cellular antenna	22
3.2.2.1.2	UPS	23
3.2.3	SIM card insertion	24
3.3	Device settings	30
3.3.1	Main view	30
3.3.1.1	Access	30
3.3.1.2	Status information	30
3.3.1.3	Network interfaces	31
3.3.1.4	RS485 serial interfaces	31
3.3.1.5	Data sources and destinations	31
3.3.1.5.1	Adding a new device	31
3.3.1.5.2	Status and modification of an already configured device	33
3.3.2	Network	34
3.3.2.1	Ethernet	35
3.3.2.1.1	Manual settings	39
3.3.2.1.2	NTP (date and time synchronization)	41
3.3.2.1.3	Proxy	41
3.3.2.2	WiFi	43
3.3.2.2.1	Available networks	43
3.3.2.2.2	Saved networks	43
3.3.2.2.3	WiFi Access Point	43
3.3.2.3	Modem LTE	45
3.3.2.3.1	Settings	45
3.3.2.4	Firewall	46
3.3.3	Sources	47
3.3.3.1	Intro	47
3.3.3.1.1	Introduction	47

3.3.3.1.2	Generic drivers	47
3.3.3.1.3	Plug&play drivers	48
3.3.3.2	Generic	52
3.3.3.2.1	Modbus RTU protocol	52
	Physical connection	52
	Configuration	52
3.3.3.2.2	Modbus TCP protocol	60
	Configuration	60
3.3.3.2.3	Siemens S7	67
	S7-300 and S7-400 CPUs	67
	S7-1200 and S7-1500 CPUs	68
	Configuration	70
	DB definition import	79
3.3.3.2.4	LoRaWAN	87
	Enabling LoRaWAN	87
	Opening ChirpStack	91
	Device Profiles	93
	Application and devices	94
	Configuring data sources	95
	ChirpStack guides	96
3.3.3.3	Node-RED	97
3.3.3.3.1	Adding the Node-RED source	97
3.3.3.3.2	Creating virtual variables	98
3.3.3.3.3	Opening the Node-RED editor	99
3.3.3.3.4	Available Optimo IoT nodes	101
3.3.3.3.5	Useful Node-RED links	103
	Device selection	104
	Configuration	105
	Variable selection	106

Source metadata	108
Saving	108
3.3.3.4 Plug & Play drivers	104
3.3.3.5 Common settings	109
3.3.3.5.1 Metadata	109
Edit metadata	109
Name and description	111
Additional parent groups	111
Unit of measure	111
Tags	111
Decimal places	111
Minimum and Maximum	111
Alarm	111
3.3.3.5.2 Scale	113
Value scaling	113
3.3.3.5.3 Save options	116
Data sinks	116
Save triggers	116
3.3.3.5.4 Bulk configuration	119
Edit with Excel/Spreadsheet	119
3.3.4 Sinks	123
3.3.4.1 Intro	123
3.3.4.1.1 Introduction	123
3.3.4.1.2 Supported sinks	123
3.3.5 License	124
3.3.5.1 Introduction	124
3.3.5.2 Adding a license token	125
3.4 Firmware upgrade	127
3.4.1 1. OTA update	127

3.4.2	2. Upload via local web interface	127
3.4.3	3. Upload through a USB mass storage	127
3.5	Factory reset	128
3.6	Buttons & leds	129
3.6.1	Power LED	129
3.6.2	Physical buttons	129
3.6.2.1	Power	129
3.6.2.2	Reset	129
3.7	Onboard I/O	130
3.7.1	I/O on board	130
3.7.2	Digital inputs and outputs	130
3.7.2.1	Optoisolated inputs	131
3.7.2.1.1	Example of connection to Siemens S7-1200 CPU (1214C)	131
3.7.2.2	Dry contact inputs	132
3.7.2.3	Digital outputs	132
3.7.3	Analog inputs and outputs	133
4.	Cloud	134
4.1	Dashboard cloud	134
4.1.1	Login	134
4.1.2	Navigation	134
4.1.3	Top bar	134
4.1.3.1	Data export	134
4.1.3.1.1	Aggregation	135
4.1.3.1.2	File type	135
4.1.3.1.3	Advanced settings	135
4.2	Periodic reports	136
4.2.1	Opening	136
4.2.2	Creating a new periodic report	136
4.2.3	Configuration	138

4.2.4	Report content	138
4.2.5	PDF preview	138
4.2.6	Saving	140
4.2.7	Modifying a report	140
4.3	Notifications	141
4.3.1	Configuration for single alarm variable	141
4.3.1.1	Recipients and sending limits	142
4.3.1.2	Single smart filters	142
4.3.2	Bulk configuration	144
4.3.2.1	Variable selection	145
4.3.2.2	Recipients	147
4.3.2.2.1	Adding new recipients	147
4.3.2.2.2	Modifying existing recipients	148
4.3.2.3	Multiple smart filters	149
4.3.2.3.1	Adding smart filters	149
4.3.2.3.2	Modifying existing smart filters	150
4.3.3	Smart filters	151
4.3.3.1	Example 1	152
4.3.3.2	Example 2	153
4.3.3.3	Example 3	153
4.4	Virtual Cloud Variables	154
4.4.1	Variables with values calculated periodically	155
4.4.1.1	Formula	156
4.4.1.1.1	Input variables	156
4.4.1.1.2	Expression	157
4.4.2	Variables with values calculated when queried	158
4.4.3	Variables with values entered via API	158
4.5	Settings	159
4.5.1	Access	159

4.5.2	Navigation	159
4.5.3	Tree	160
4.5.4	Explorer	160
4.5.4.1	Edit asset	160
4.5.4.2	Variable ID export	161
4.5.4.3	Gateway configuration	162
4.5.5	OTA updates	162
4.5.6	VPN Tunnel	162
4.5.7	Reporting	162
4.5.8	Dynamic UI	162
4.5.9	User management	163
4.5.9.1	User creation	163
4.6	Integration	166
4.6.1	API HTTP	166
4.6.2	Knime	167
4.6.2.1	What is KNIME	167
4.6.2.2	Installation	167
4.6.2.2.1	Adding the Optimo IoT repository	167
4.6.2.2.2	Installing the extension	168
4.6.2.3	Using the nodes	168
4.6.3	MCP Server	174
4.6.3.1	Adding the server to Claude	174
4.6.3.1.1	Claude.ai / Claude Desktop	174
4.6.3.1.2	Claude Code	174
4.6.3.2	Adding the server to ChatGPT	174
4.6.3.3	Adding the server to Mistral AI	175
4.7	Remote access VPN	176
4.7.1	Creation and download of certificate and VPN client (only for the first time)	177
4.7.2	Creation of VPN tunnel	180

4.7.3	Diagnostics and troubleshooting	183
4.8	AL300 Firmware Upgrade	188
4.8.1	Firmware version selection	189
4.8.2	Over The Air (OTA) update	190
4.8.3	Local - offline update	194
5.	Dashboard	196
5.1	Authentication	196
5.1.1	Credentials	196
5.1.2	User menu	196
5.1.2.1	Log out	197
5.1.2.2	Settings	197
5.1.2.2.1	Available settings	197
5.1.2.2.2	Multifactor authentication (MFA)	197
	MFA activation	197
5.1.2.3	Refresh	198
5.1.2.4	VPN connections	198
5.1.2.5	User information and version	198
5.2	Dashboard edit mode	199
5.2.1	Entering edit mode	199
5.2.2	Managing menu pages	200
5.2.2.1	Configuring a menu entry	201
5.2.3	Adding a widget	204
5.2.3.1	Configuring a time-series chart	206
5.2.4	Organizing pages	208
5.2.5	Editing and arranging widgets	209
5.2.5.1	Editing an existing widget	210
5.2.5.2	Moving a widget	211
5.2.5.3	Duplicating a widget	212
5.2.6	Finishing your changes	212

5.3	Data analysis	213
5.3.1	Access	213
5.3.2	Time interval	214
5.3.3	Variable selection	214
5.3.4	Graph	215
5.3.5	Statistics table	215
5.3.5.1	Series toggle	216
5.3.6	Sharing the analysis	216
5.4.0.1	Expression Syntax	217
5.4.0.1.1	Operator Precedence	217
5.4.0.1.2	Unary operators	217
5.4.0.1.3	Pre-defined functions	219
5.4.0.1.4	Array literals	219
5.4.0.1.5	Constants	219
5.4	Formula	217
5.5	Aggregation types	220
5.5.1	Point statistics	220
5.5.1.1	Average	220
5.5.1.2	Sum	220
5.5.1.3	Count	220
5.5.1.4	Maximum	220
5.5.1.5	Minimum	220
5.5.1.6	1st percentile	220
5.5.1.7	1st quartile	220
5.5.1.8	Median	220
5.5.1.9	3rd quartile	221
5.5.1.10	99th percentile	221
5.5.2	Variations	221
5.5.2.1	Count of rises	221

5.5.2.2	Count of falls	221
5.5.2.3	Incremental positive difference	221
5.5.3	Integrals and times	221
5.5.3.1	Integral	221
5.5.3.2	Weighted average	221
5.5.3.3	Time on	222
5.5.3.4	Count of alarm activations	222
5.5.3.5	Boolean weighted average	222
5.6	Alarms	223
5.6.1	Active Alarms	223
5.6.2	Events	224
5.6.3	Statistics	226
5.6.4	Notification Settings	226
6.	Security & Compliance	227
6.1	EU Cyber Resilience Act	227
6.1.1	1. Manufacturer identification	227
6.1.2	2. Reporting a security vulnerability	227
6.1.3	3. Product identification	227
6.1.4	4. Intended purpose and security properties	228
6.1.5	5. Known or foreseeable circumstances leading to cybersecurity risks	229
6.1.6	6. Software Bill of Materials (SBOM)	229
6.1.7	7. EU Declaration of Conformity	229
6.1.8	8. Security update support period	229
6.1.9	9. Instructions for secure use	230
6.1.9.1	Secure commissioning	230
6.1.9.2	Security update installation	230
6.1.9.3	Data security implications of configuration changes	230
6.1.9.4	Secure decommissioning	231

6.2 Coordinated Vulnerability Disclosure Policy	232
6.2.1 Scope	232
6.2.1.1 In scope	232
6.2.1.2 Out of scope	232
6.2.2 How to report	233
6.2.3 What you can expect from us	233
6.2.4 Coordinated disclosure	234
6.2.5 Safe harbor	234
6.2.6 Recognition	234
6.2.7 Changes to this policy	235

1. Documentation Optimo IoT

Optimo IoT offers a comprehensive platform for collecting, analyzing, and visualizing data from connected devices and sensors. The platform includes an IoT gateway (AL300) that handles local data acquisition using various industrial communication protocols (Modbus, OPC-UA, MQTT, etc). For more information about the AL300 gateway and the platform's features, visit the official website optimoiot.it or our online store store.optimoiot.it.

The platform is independently accessible through:

- integrated local web server in the AL300 gateway (http://<gateway_ip_address>/ or https://<gateway_ip_address>/ for secure access)
- Optimo IoT cloud platform (<https://cloud.optimoiot.it/>)

Both offer an intuitive web interface for configuring, managing, and visualizing the acquired data.

Once logged in, you can navigate between two main environments:

-  **Dashboard**: view and edit the pages where the acquired data is displayed.
-  **Configuration**: manage the gateway configuration, data sources, users, and other settings.

To switch between the two environments, use the icon in the top right bar.

What do you want to do?

- Install and connect the AL300 gateway
- Activate and configure the AL300 gateway
- Use and share cloud dashboards
- Learn about the logical structure of the platform

2. Optimo IoT Resource types

2.1 Asset

All resources (plants, dashboards, users, devices, variables, alarms, etc) managed by the Optimo IoT platform are organized in a tree structure called "Asset tree". This structure allows to represent in a hierarchical way the physical or logical organization of the resources, making it easier to navigate and manage them.

The `Asset tree` is composed of nodes (called assets). Each asset can have one or more child assets. Each asset can be of a different type. The available types are:

- **Company:** represents the main company or organization
- **Gateway:** represents an Optimo IoT gateway (AL300)
- **Device:** represents a connected device (e.g. PLC, sensor, etc)
- **Point:** represents a measurement point or a specific sensor connected to a device
- **Machine, Plant, Building, Site, Room, Process, Subprocess, Tenant, Group:** represent logical or physical groupings of assets, useful to organize and categorize resources based on the company structure or specific needs.

The branches of the `Asset tree` under each **Gateway** are part of the gateway configuration itself and are automatically synchronized with the **Gateway**.

2.2 Variables

`Variables` are quantities whose value changes over time. They are stored as time series whose values can be saved in the cloud or locally on the gateway, and then displayed in dashboards. Some variables are *alarm* variables: for these it is possible to set email or SMS notifications upon activation.

Each variable is associated with at least one asset in the `Asset tree`. It is usually automatically associated with the device that acquires it in the field, but it can be associated with other assets (e.g. departments, machines, etc)

2.3 AL300 Gateway configuration

The AL300 gateway configuration includes:

- the portion of the `Asset tree` under the **Gateway** itself
- network settings and communication interfaces
- configuration to communicate with data sources, read their variables (e.g. PLC, Modbus devices, OPC-UA, etc) and save the read values
- metadata associated with the acquired variables



Configure both locally and remotely

The configuration can be modified both locally, by accessing the gateway's web interface, and remotely through the Optimo IoT cloud platform.

In both cases, changes are **automatically synchronized** between the gateway and the cloud platform. In case of conflicts (e.g. changes made simultaneously while the gateway was offline), the configuration present on the gateway takes precedence over the one in the cloud.

2.4 Users

Each user is associated with an `Asset` in the `Asset tree`. Each user has access to all assets (and therefore variables) under the one they are associated with.

2.5 Dashboards

A dashboard is a set of pages organized in a hierarchical menu. Each page shows widgets of various types (charts, tables, indicators, maps, etc). Dashboards are fully customizable by users with `Administrator` access.

Cloud `Dashboards` are linked to an `Asset` in the `Asset tree`. The user is shown the dashboard associated with the asset they are linked to. If the asset does not have an associated dashboard, the dashboard is searched among the child assets. If no dashboard is found, the dashboard associated with the parent asset is shown, and so on up the tree until the root.

Locally, there is instead a single dashboard.

3. Gateway AL300

3.1 Quick start

3.1.1 Hardware installation

Power on the AssetLinker300 and optionally insert the data SIM, as described in the chapter Installation

3.1.2 Access local web interface

The following information is printed on the package:

- username and password for the local web interface
- factory configuration of the eth0 network port (10.10.10.10./24)
- factory configuration of the eth1 network port (auto)
- SSID and password with QR CODE for WiFi access

Note

By default, the LTE modem is active and, if a nanoSIM data with disabled PIN is inserted in the (Main) slot, the gateway will automatically connect to the Optimo IoT cloud, making the connection to the local web interface unnecessary

There are 3 ways to access the local configuration interface:

1. with ethernet cable
2. via WiFi
3. with HDMI screen, mouse and keyboard (deprecated, this possibility will be removed in the next releases)

3.1.2.1 Connection with network cable

1. configure the PC network port to be able to communicate with the gateway IP address (eg ip: 10.10.10.3 / subnet mask: 255.255.255.0):

- guide for Windows
- guide for Mac

1. connect to the gateway with an ethernet cable to the ETH 0 port
2. open the browser and visit <http://10.10.10.10/>
3. enter username and password

3.1.2.2 Connection via WiFi

The default settings keep active for the first 5 minutes of gateway power-on a WiFi network of the type `OptimoIotGw-XXXX`. To connect, you can scan the QRCODE with your smartphone/tablet or enter SSID and password on your PC.

Once connected, the gateway web interface will open automatically (<http://optimoiot.gw>). If for 5 minutes no device connects to the WiFi network, it will be deactivated

3.1.2.3 Connection with HDMI monitor, mouse and keyboard [DEPRECATED]

By connecting a monitor to the HDMI port and a mouse and keyboard to the two USB ports, you can access the web interface directly. The gateway also supports, with some limitations, HDMI+USB touchscreens

3.1.3 Configuration of network settings and data sources

Once you have logged in, you can access all the settings described in the chapter Device Settings

We recorded a video in which we quickly present:

- the configuration of a Modbus TCP data source
- the creation of a simple dashboard for a photovoltaic system



3.2 Installation

3.2.1 AssetLinker300

3.2.1.1 Safety Instructions

Warning

Failure to observe the essential precautions and safety guidelines outlined below can cause serious harm to people and property. For safe and trouble-free operation, it is crucial to adhere to all safety instructions and information contained in this manual.

Pay particular attention to the specific safety instructions provided in other sections of this manual as well.

3.2.1.1.1 QUALIFIED PERSONNEL

Only qualified and competent personnel are authorized to work with the AL300 (AssetLinker300). Such personnel must meet the following requirements:

- Be familiar with the installation, assembly, commissioning, and operation procedures of the AL300.
- Possess the appropriate qualifications for the tasks to be performed.
- Know and be able to apply all local regulations, directives, and laws related to accident prevention

3.2.1.1.2 DEVICE

The hardware and software of the AL300 must never be modified in ways not specifically described in the installation manual.

Note: Any unauthorized modification will result in the immediate nullification of all warranty claims and exclusion of liability by the supplier.

3.2.1.1.3 SCOPE OF APPLICATION

The AL300 is an electrical communication device. It is suitable exclusively for installation inside electrical cabinets or other closed and similar operating environments.

3.2.1.1.4 ASSEMBLY AND DISASSEMBLY

The AL300 must be handled according to these rules:

- Connect or disconnect all plug-in terminals only when the AL300 is turned off (not powered).
- Remove the AL300 from the installation only when the device is turned off.

3.2.1.2 Safety Information

The technical and regulatory documentation related to the AL300 is available in the dedicated product section. If any part of the documentation is missing, incomplete, or illegible, contact the AL300 manufacturer before performing any further operations on the product.

This chapter describes the basic safety rules to be observed during any operation involving the AL300. The intervention procedures described in the following chapters must be executed while respecting both the indicated methods and the general safety standards outlined in this chapter.

The safety regulations may vary from country to country. Therefore, in all cases where the manual's indications conflict with or are less restrictive than the industry or country regulations where the device is used, the latter will take precedence.

Warning

The manufacturer cannot be held liable, in any case, for accidental or consequential damages related to the connection, use, or maintenance, even partial, of the device, nor for damages resulting from the failure to observe the safety rules and intervention procedures indicated in the manual.

Failure to observe the operational rules and intervention methods, installation, configuration, use, and maintenance of the AL300 contained in this manual results in the expiration of warranty terms.

3.2.1.2.1 SAFETY STANDARDS

During the installation, connection, and use of the AL300, unforeseen malfunction situations may occur that are not described in the documentation. Such situations, completely abnormal, can be caused by environmental factors or unpredictable failures on the part of the manufacturer.

The manual must be kept by the user and/or the personnel responsible for the management, maintenance, and use of the AL300. In case of deterioration or loss, a certified copy can be requested from the manufacturer.

Warning

Since it is not possible to describe all operations to avoid or not allowed, all operations other than normal use and not explicitly described in the manual provided with the device must be considered not allowed.

3.2.1.3 Decommissioning and Disposal

3.2.1.3.1 DEVICE DECOMMISSIONING

The device is designed and built according to criteria of robustness, durability, and flexibility that allow its use for many years.

Upon reaching the end of its technical and operational life, the device must be decommissioned and placed in conditions such that it can no longer be used for the purposes for which it was designed and built, while at the same time making it possible to reuse the raw materials that compose it.

The same decommissioning procedure must be performed in the following cases:

- Decommissioning of the device and storage in the warehouse.
- Definitive disassembly of the product and subsequent disposal.

 Warning

The manufacturer assumes no responsibility for damage to people or things resulting from the reuse of individual parts of the device for functions or mounting configurations different from the original ones.

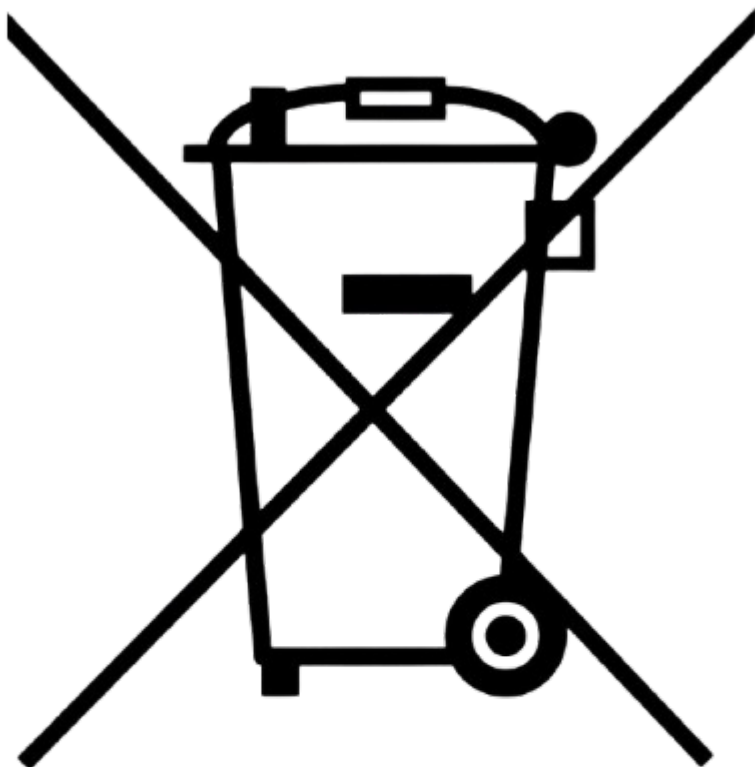
 Warning

The manufacturer disclaims any recognition, explicit or implicit, of suitability for specific purposes of the parts of the product reused after final decommissioning for disposal.

3.2.1.3.2 DEVICE DISPOSAL

The possibility of reusing some parts of the device is subject to the exclusive responsibility of the user.

On the device label, there is the symbol indicated by Legislative Decree 49 of March 14, 2014, which implements Directive 2012/19/EU and indicates the need to dispose of the product and its components through separate collection, particularly as waste from electrical and electronic equipment.



 Warning

The manufacturer has no responsibility for damage caused to the device if it is not used in its complete original version and for the purpose indicated in this manual. The manufacturer is not responsible for any damage to people or things resulting from the recovery of parts of the device used after its disposal.

3.2.2 AssetLinker300

3.2.2.1 Electrical connections

AL300 must be powered with 24V DC (min 20, max 32V). The only two terminals to connect are 24VDC+ and 24VDC-. The NC terminal should be left unconnected.



Once the connection to the power supply is made, AL300 takes about 2 minutes to charge the UPS (super capacitors). Only once this operation is completed does the system start up and in about a minute it becomes fully operational.

3.2.2.1.1 CELLULAR ANTENNA

AL300 has a single cellular antenna connector that serves the 4G modem. The antenna is included in the package and is suitable for most use cases. Antenna connector:

- AL300 with serial number up to 98-27-82-c0-06-b9: RP-SMA
- AL300 with serial number from 98-27-82-c0-06-ba: SMA

The WiFi antenna is integrated and does not require any connection.

3.2.2.1.2 UPS

The UPS can keep the device on for about 45 seconds during power outages. It is useful for:

- surviving voltage drops of less than a second
- shutting down the device in a controlled manner
- sending a power failure alarm (future firmware release)

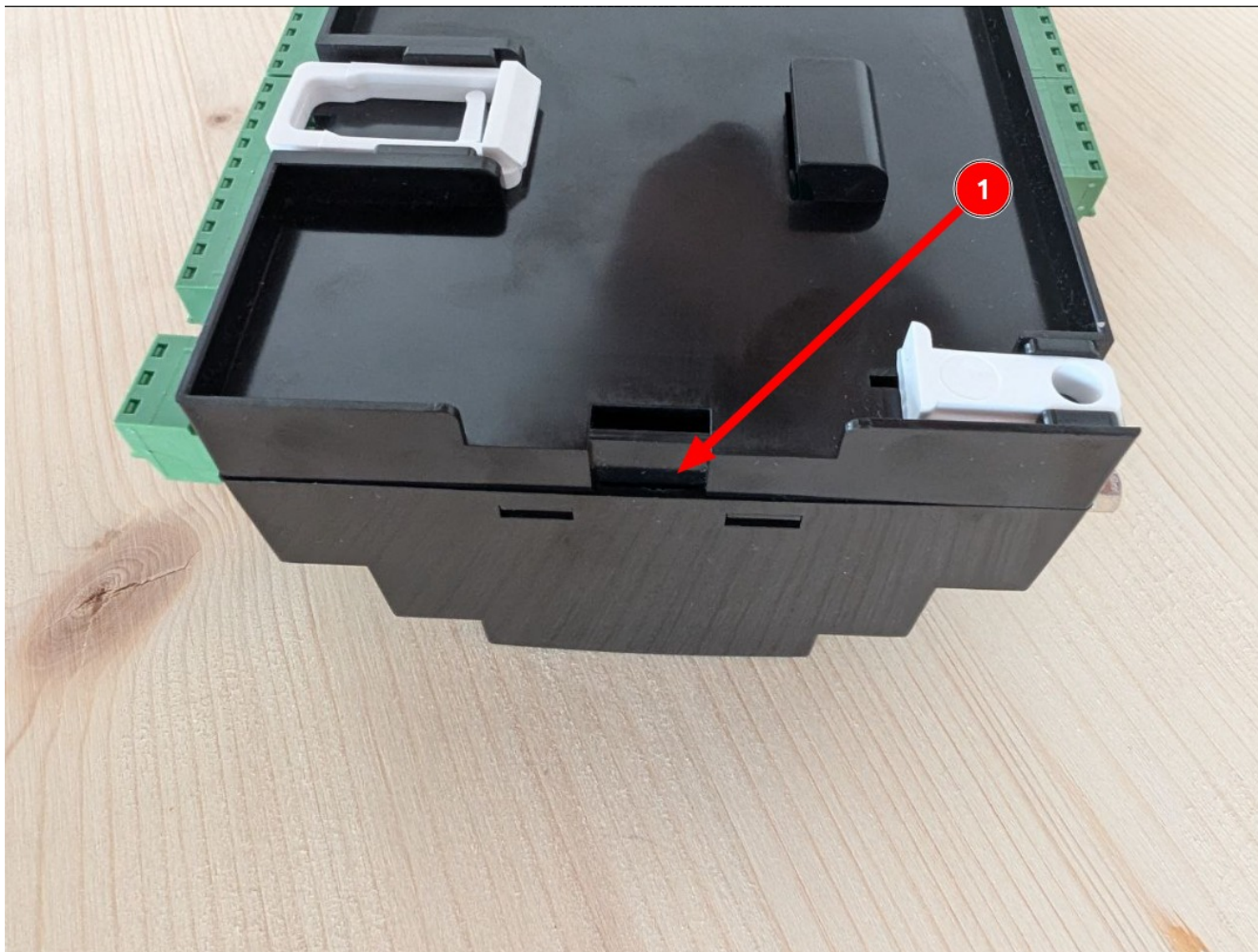
3.2.3 SIM card insertion

 Warning!

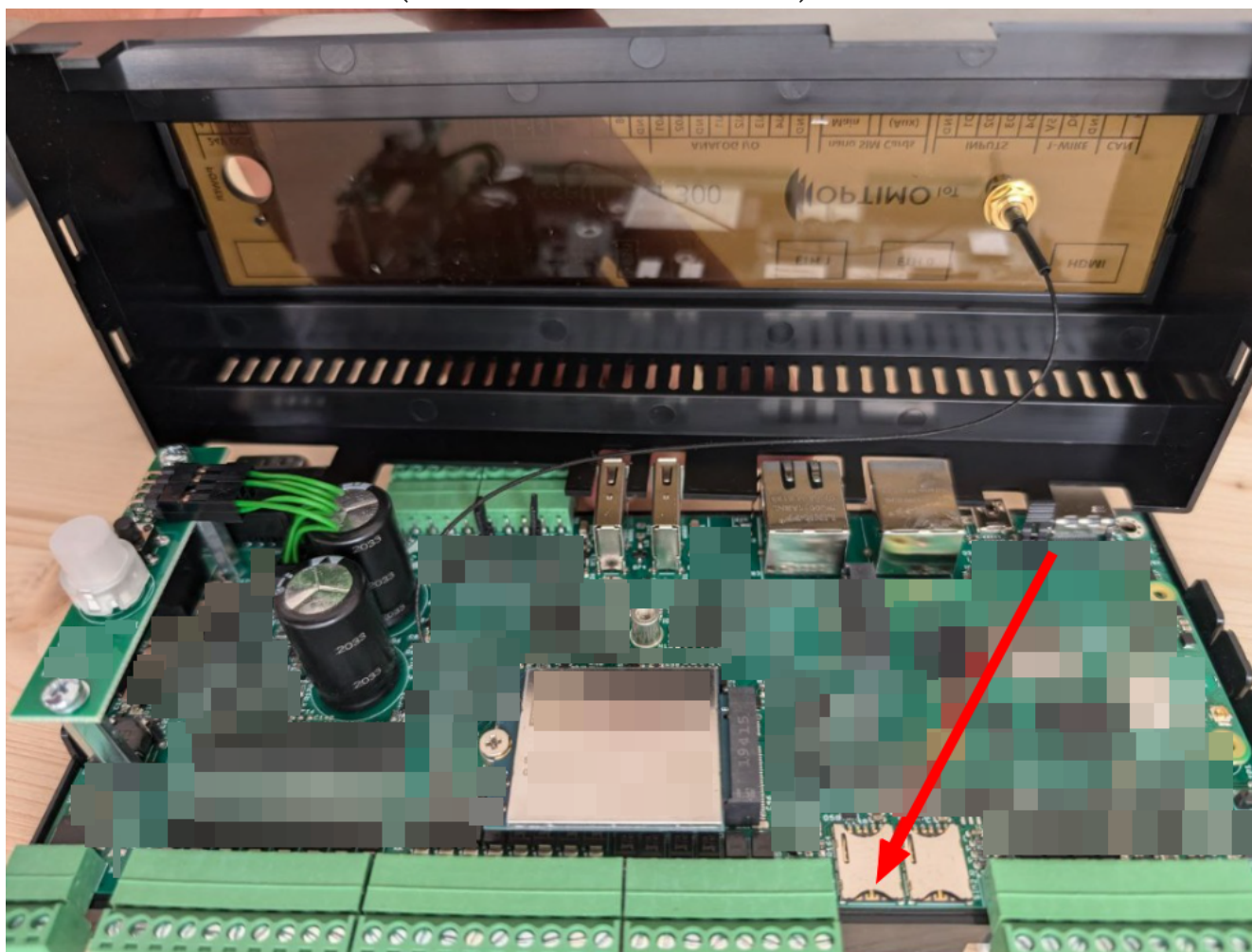
When opening the case, be very careful, as it is attached to the base by the 4G antenna cable. With sudden movements, the cable could come off and it would be very difficult to reattach it (slot M of the 4G module)

To insert a SIM card, you need a flathead screwdriver. The SIM must be in nano format and the PIN must be disabled.

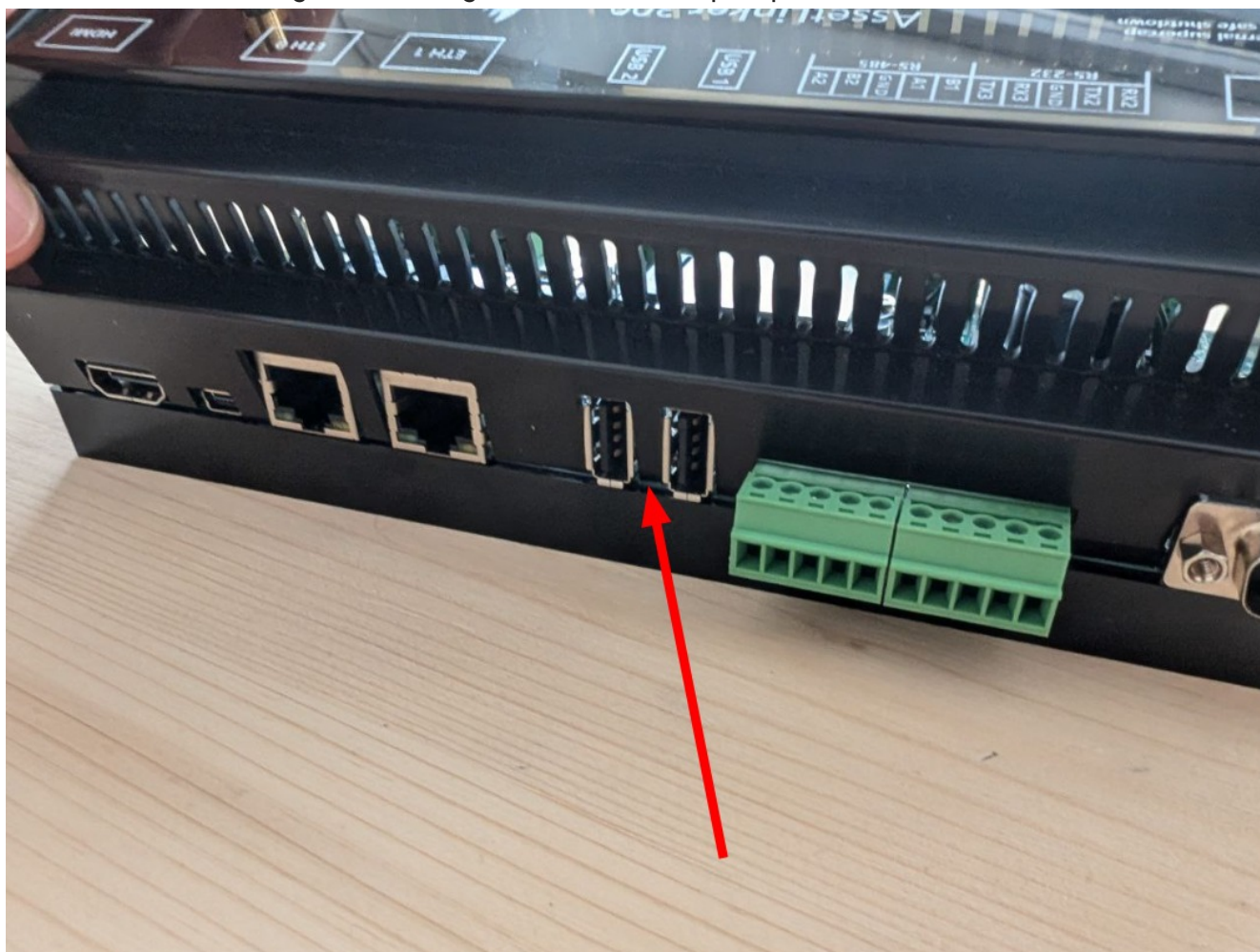
- open the case by inserting the screwdriver and levering, first on one side of the AL300, then on the other



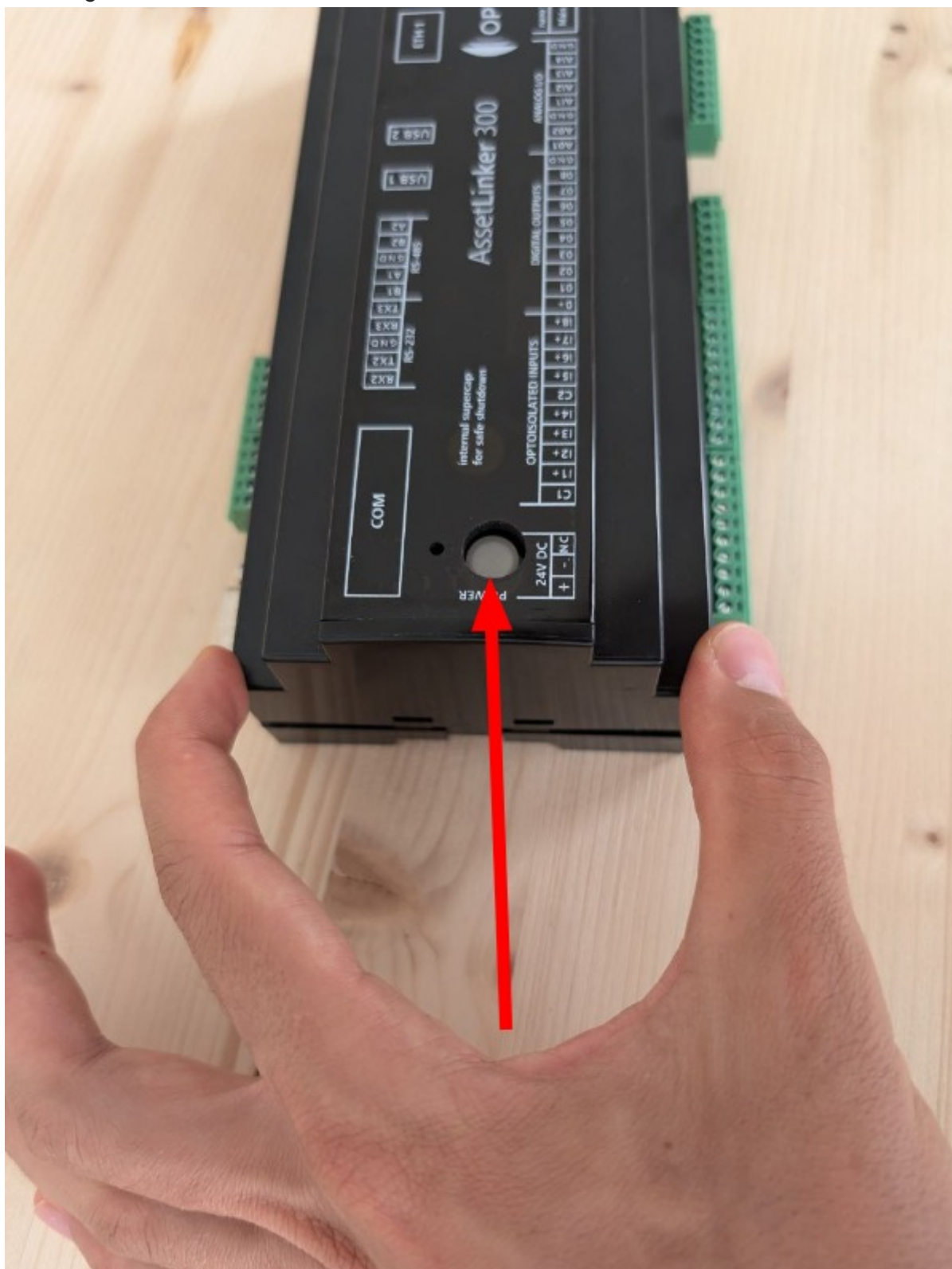
- insert the SIM into the left slot (indicated as Main on the cover)



- close the cover starting from the alignment of the USB port profile



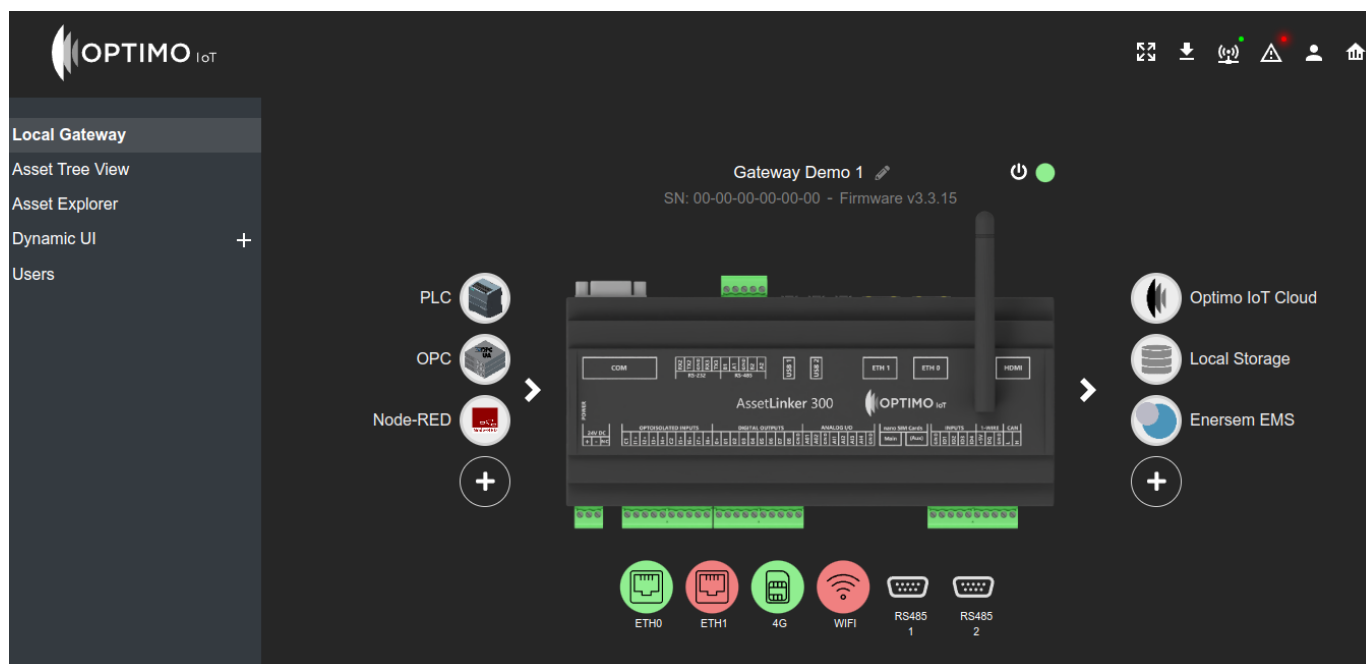
- then align the hole for the front button



- press evenly trying to keep the case parallel to the board

3.3 Device settings

3.3.1 Main view



3.3.1.1 Access

Once logged in, you can access the settings page by clicking on the **Settings** icon  at the top right. This page is only available for users with administrative permissions.

3.3.1.2 Status information

When the page loads, you can immediately see this information:

- serial number of the gateway
- installed firmware version
- status of the network interfaces

On desktop, you need to hover the mouse pointer over the gateway image to have all the information available

3.3.1.3 Network interfaces

Below the image of the AL300, the available network interfaces are listed. When you hover the mouse, for each one it indicates:

- the status:
 - green: configured and connected
 - red: configured but not connected
 - gray: disabled
- the IP address
- (only for WiFi) the name of the network it is connected to
- if the interface is used for the internet connection (**Default gateway**)

By clicking on each interface you can manage its settings. For more information, see the specific pages:

- Ethernet network ports
- WiFi card
- LTE modem

On this page the requirements that networks providing internet access must have for the gateway to connect correctly to the cloud are reported

3.3.1.4 RS485 serial interfaces

By clicking on the respective icons, you can configure the parameters of the two available serial ports (e.g. Baudrate, parity, etc). These settings are inherited by any configured RS485 devices.

3.3.1.5 Data sources and destinations

The icons on the sides of the gateway allow you to view, manage and add:

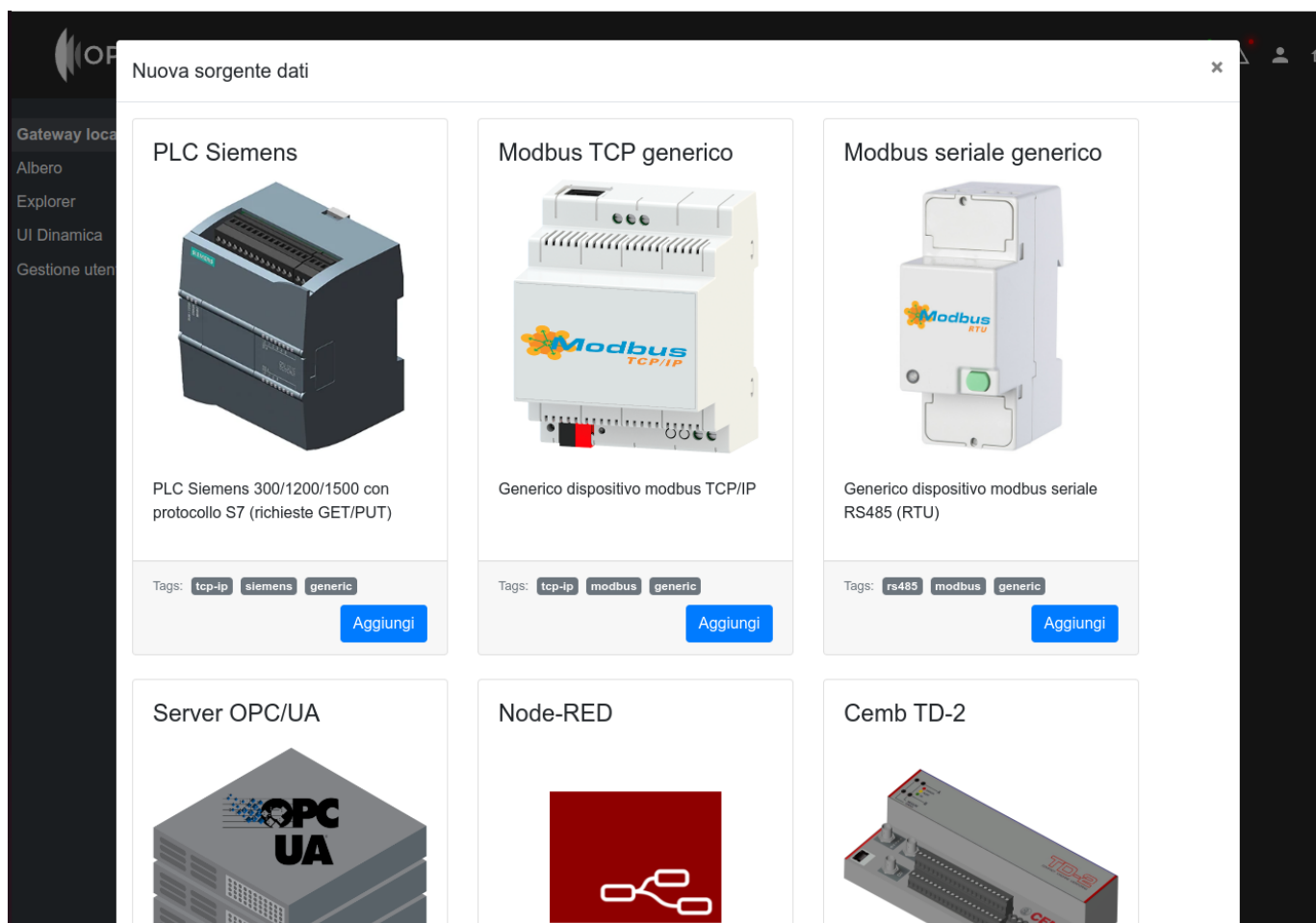
- data sources - on the left (e.g. PLC, modbus and OPC-UA devices, etc)
- data destinations - on the right (e.g. cloud platform, local storage)

3.3.1.5.1 ADDING A NEW DEVICE

You can add devices, compatible with the purchased license, by clicking on the **Add** button **+**



You can then select the type of data source to add and configure it through a guided procedure

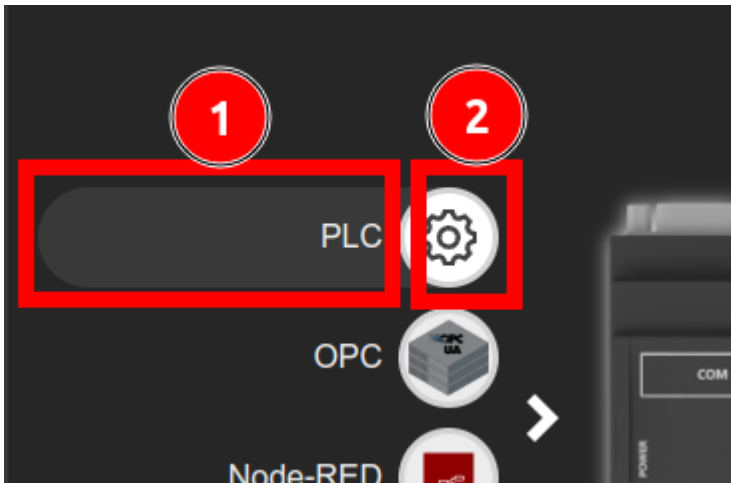


Subsequently, connection parameters will be requested (e.g. IP address), the choice of variables to acquire and how to store them.

Here are the currently supported devices and their configuration guides.

3.3.1.5.2 STATUS AND MODIFICATION OF AN ALREADY CONFIGURED DEVICE

You can view the status of the device and configure it or have diagnostic information by hovering the mouse cursor over the respective icon



1. Information on the current status (connection, variable values)
2. Modification of settings and advanced diagnostics

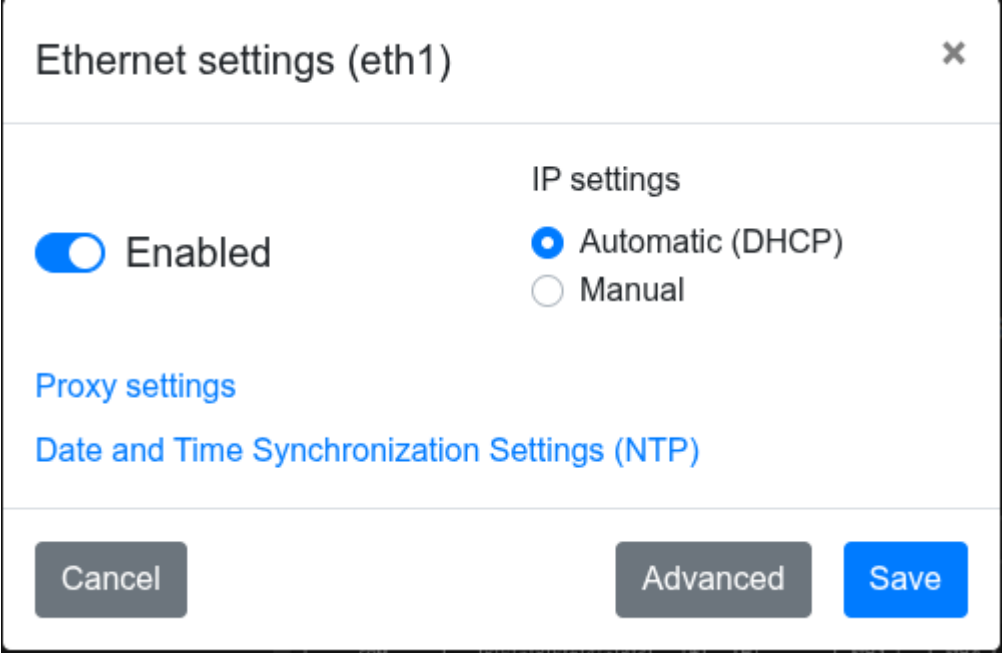
3.3.2 Network

3.3.2.1 Ethernet

Each interface can be:

- enabled or disabled

- if enabled, the type of IP settings can be configured:
 - automatic (with DHCP server)



Ethernet settings (eth1) ×

☒ **Enabled**

IP settings

☒ Automatic (DHCP)

☐ Manual

[Proxy settings](#)

[Date and Time Synchronization Settings \(NTP\)](#)

Cancel **Advanced** **Save**

• manual

Ethernet settings (eth0)

Enabled

IP settings

Automatic (DHCP)

Manual

IP address:

10.10.10.10

✓

Subnet mask:

255.255.255.0

✓

Add IP address

Use for internet connection

[Proxy settings](#)

[Date and Time Synchronization Settings \(NTP\)](#)

Cancel

Advanced

Save

3.3.2.1.1 MANUAL SETTINGS

In addition to IP address and subnet mask, it is possible to enable the interface for internet connectivity. In this case, it is necessary to specify the router address (Default Gateway) and optionally up to two DNS servers to use.

It is possible to assign more than one IP address to the same interface

Ethernet settings (eth0) ✕

☒ Enabled

IP settings

☐ Automatic (DHCP)
☒ Manual

IP address:

10.10.10.10 ✓

Subnet mask:

255.255.255.0 ✓

IP address (2):

192.168.88.3 ✓ ✕

Subnet mask (2):

255.255.255.0 ✓

Add IP address

☒ Use for internet connection

Router:

10.10.10.254 ✓

Router IP address (Default Gateway)

☒ Use custom DNS servers

DNS (1):

10.10.10.254 ✓

DNS server IP address

DNS (2):

e.g. 8.8.8.8

DNS server IP address

[Proxy settings](#)

[Date and Time Synchronization Settings \(NTP\)](#)

Cancel

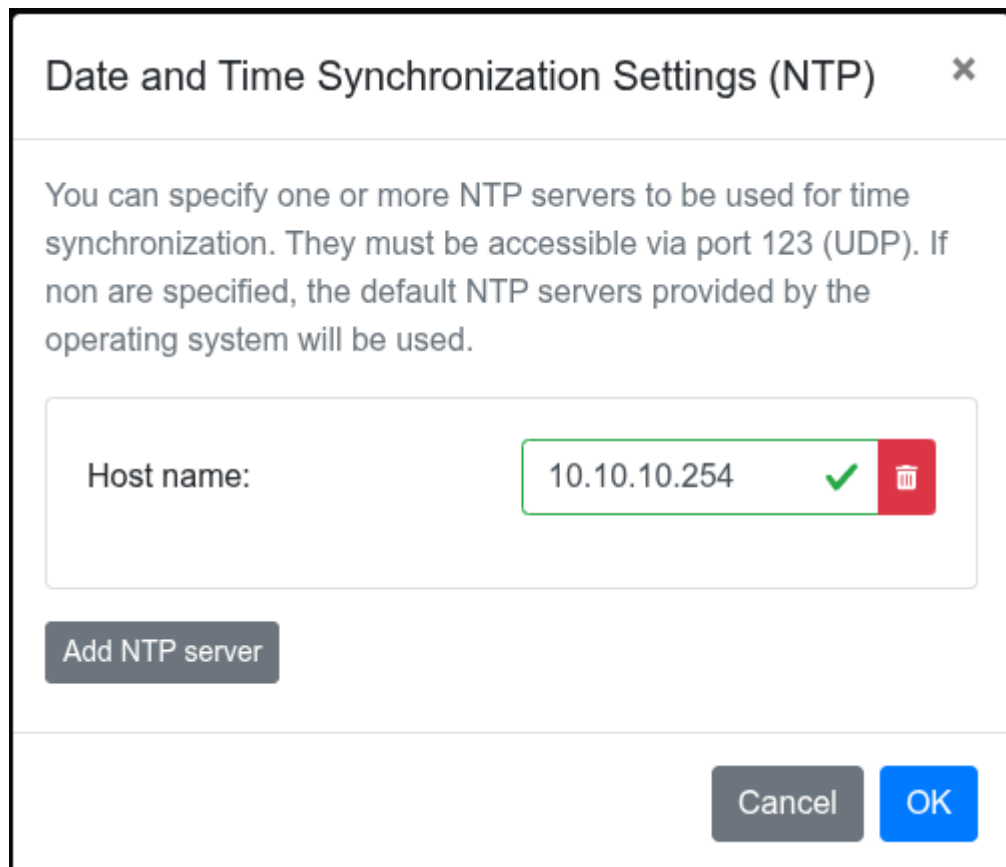
Advanced

Save

3.3.2.1.2 NTP (DATE AND TIME SYNCHRONIZATION)

(available from firmware version 3.8.6)

If the AL300 is not connected to the internet or a firewall blocks outgoing requests on the UDP port, it is possible to specify a custom NTP server. The server with the specified IP is used in addition to a list of predefined servers.



The dialog box is titled "Date and Time Synchronization Settings (NTP)" with a close button (X) in the top right corner. Below the title, there is a descriptive text: "You can specify one or more NTP servers to be used for time synchronization. They must be accessible via port 123 (UDP). If non are specified, the default NTP servers provided by the operating system will be used." Below this text, there is a form field for "Host name:" containing the IP address "10.10.10.254". To the right of the IP address, there is a green checkmark icon and a red trash can icon. Below the form field, there is a button labeled "Add NTP server". At the bottom right of the dialog box, there are two buttons: "Cancel" and "OK".

3.3.2.1.3 PROXY

It is possible to use a proxy server for the internet connection. It is possible to specify more than one server. If the first one fails, the next one will be used. If no proxy server is specified or all proxy servers fail, network requests will be made directly through the router.

Proxy settings ×

Every network requests that requires internet access will be tried with the following http or https proxy servers. If the first one fails, the next one will be tried. If no proxy server is specified or all proxy servers fail, the network requests will be made directly.

VPN connection supports http proxy only.

IP address:

10.10.10.54 ✓ ✕

TCP port:

8080 ✓

Add proxy server

Cancel

OK

 Note

The VPN connection only supports http type proxies

3.3.2.2 WiFi

Three tabs are available:

- Available networks
- Saved networks
- WiFi Access Point

3.3.2.2.1 AVAILABLE NETWORKS

When opening the page, the available WiFi networks are searched and listed. You can connect to WiFi networks that are:

- open (without password) or WPA (with password)
- the connection to the network must automatically provide access to the Internet: `captive portals` or other additional methods of authentication via browser are not supported



Note

Once the gateway has been connected to a network, remember to click the `Save` button, to avoid losing the connection at reboot

3.3.2.2.2 SAVED NETWORKS

Here the saved WiFi networks are listed. If you want to delete one, you must first disconnect from that WiFi network

3.3.2.2.3 WIFI ACCESS POINT

The WiFi Access Point functionality allows the gateway to create a WiFi network to which other devices (e.g. user's PC/tablet/phone) can connect to access the configuration interface.

By default, this functionality is active (with an SSID that includes the last 4 characters of the gateway's serial number and a randomly generated password) for the first 5 minutes after the gateway starts. After this time, in the absence of connected devices, the WiFi network is turned off.

You can disable this functionality, change the automatic deactivation time, change the SSID and password of the network.



Note

The gateway cannot be simultaneously connected to a WiFi network and keep the Access Point active for the connection of other devices! You can set which of the two modes has priority

3.3.2.3 Modem LTE

AL300 has an integrated modem that allows you to connect to the internet in the absence of other existing networks. To connect via LTE, you need to:

- have a data SIM (nanoSIM format)
- make sure you have disabled the SIM PIN
- (recommended) try the SIM on a phone and make sure there is credit available and that it allows you to browse the internet
- connect the antenna to the **RP-SMA** connector on the front cover of the gateway
- insert the SIM into the gateway following these instructions

According to the default settings, an APN is automatically selected and, in the absence of other internet connections via ethernet/WiFi, the modem is activated and the gateway connects to the cloud

3.3.2.3.1 SETTINGS

You can:

- manually specify an APN (useful for SIMs from some virtual operators). The APN is a configuration parameter specific to each mobile connectivity operator
- choose whether to keep the modem always on, always off, or to monitor other internet connections and activate it only if these are not present or not working properly
- choose whether to suspend the VPN service to reduce data consumption (useful if the cost per MB of traffic is high)
- enable the sending of configuration commands via SMS

3.3.2.4 Firewall

To connect to the Optimo IoT Cloud, the network to which the AL300 is connected must allow outgoing traffic to the internet on the ports listed below.

- TCP 443:
 - monitoring data
 - VPN service (optional)
- TCP 8883: if open for outgoing traffic, it is used for sending monitoring data instead of 443 (lower data consumption)
- UDP 53: DNS. Alternatively, it is possible to specify an internal DNS server for the company network
- UDP 123: NTP (date/time synchronization), in case the VPN service is not active. The gateway has an RTC with a battery. If the port is not open for outgoing traffic in the long term (years), there may be time drifts on the order of seconds. If in the very long term (more years) the RTC battery runs out and the gateway is restarted, the correct time may be lost

 Note

It is not necessary (in fact, it is not recommended) that the gateway has a public IP address or that it is reachable from outside the local network

If the company network has a firewall that needs to be configured to allow outgoing traffic to some specific FQDN, it is possible to request the list by sending an email to info@optimoiot.it

3.3.3 Sources

3.3.3.1 Intro

3.3.3.1.1 INTRODUCTION

We call data sources those devices (e.g. sensors, PLCs) that make available to AL300 some variables whose values can be read by AL300. Some data sources also support writing values (e.g. setpoints, thresholds, commands).

AL300 supports two modes of configuration of the communication with these devices:

1. **generic driver**: allows you to use a protocol freely, thus supporting any device from any manufacturer
2. **plug&play driver**: allows you to acquire specific devices with minimal configuration. AL300 already knows their characteristics and the available variables

3.3.3.1.2 GENERIC DRIVERS

The supported protocols are:

- Modbus RTU (on RS485)
- Modbus TCP
- S7 protocol (Siemens PLC)
- OPC UA
- LoRaWAN
- Ethernet IP (for Rockwell PLCs)
- Ethernet IP (generic)
- BACnet

3.3.3.1.3 PLUG&PLAY DRIVERS

We add several devices every month and this list is always growing. Among the currently supported devices we have:

- **Algodue UEM1P5 RS485** : Three-phase energy meter for the energy measurement in industrial and civilian application
- **Algodue UEM1P5 TCP** : Three-phase energy meter for the energy measurement in industrial and civilian application
- **Algodue UEM40 RS485** : Single phase energy meter for the energy measurement in industrial and civilian application
- **Algodue UEM80 RS485** : Three-phase energy meter for the energy measurement in industrial and civilian application
- **Algodue UEM80 TCP** : Three-phase energy meter for the energy measurement in industrial and civilian application
- **Algodue UPM209 RS485** : Power meter for measurement and recording of the electrical parameters
- **Algodue UPM209 TCP** : Power meter for measurement and recording of the electrical parameters
- **Algodue UPM309 RS485** : Three-phase network analyzer for measuring and storing electrical parameters
- **Algodue UPM309 TCP** : Three-phase network analyzer for measuring and storing electrical parameters
- **Ametek Baseline 9100** : Gas chromatograph for EtO | COV | BTEX. Uses TCP connection to read live data from 16 channels
- **Caleffi Conteca Easy** : Energy meater for HVAC
- **Cemb Cube** : Triaxial accelerometer
- **Cemb TD2-HFC** : Central unit for two accelerometers with Tacho for speed reading
- **Cemb TDSP&TD2** : Central unit for the monitoring of absolute and relative vibrations, compatible with accelerometers, velocimeters and proximity sensors, with optional tacho input for synchronous measurements
- **Comet TX** : Ambient temperature, humidity, precision, CO2 sensor
- **EnergyTeam X-Meter Serial** : Power meter for measurement and recording of the electrical parameters
- **EnergyTeam X-Meter TCP** : Power meter for measurement and recording of the electrical parameters
- **FRER NANO / QUBO** : Power meter for measurement and recording of the electrical parameters. Supported models: Q52...(NaNo) / Q72/96 (Qubo) / MCUP0H

- **Gavazzi EM24** : Power meter for measurement and recording of the electrical parameters
- **Local I/O** : Local I/O module for digital and analog inputs and outputs. It can be used to connect sensors and actuators to the device.
- **Milesight AM102 2-in-1 IAQ Sensor** : Provide real-time and basic temperature and humidity data in your indoor air quality (IAQ)
- **Milesight CT101 Current Transformer** : A LoRaWAN®-enabled device with an innovative, non-intrusive quick installation. It accurately estimates energy consumption with a sampling rate up to 3.3kHz and calculates cumulative ampere-hours every second
- **Milesight Em300 Temperature and Humidity Sensor** : EM300-TH is suitable for indoor and outdoor temperature and humidity monitoring
- **Milesight UC100 Controller IoT** : Read up to 32 Modbus RTU devices, serving as a converter from Modbus RS485 to LoRaWAN®. Designed for remote control and data acquisition.
- **Milesight WS101 Smart Button** : The Milesight WS101 is a compact, battery-powered LoRaWAN® smart button designed for wireless control, triggering actions, and sending alarms
- **NEON Temperature Sensor** : Atex LoRaWAN Temperature Sensor
- **NEON Temperature Transmitter** : Atex LoRaWAN Temperature Transmitter to transmit the signal for monitoring purposes by being connected to an industrial thermocouple or RTD.
- **Network ping** : Network diagnostics through ICMP ping
- **Overdigit EX04AI0** : 4 channels analog input/output module
- **Overdigit EX08AI** : 8 channels analog input module
- **Overdigit EX1608DD** : 16 digital inputs and 8 digital outputs module
- **RAK10701** : LoRaWAN field tester for collecting signal strength and quality data in the field
- **RAK7201 WisNode Button 4K** : The Button is suitable for a variety of Smart Home applications: Entertainment system control, Control of Lights, a Snooze Button for your Alarms, or a remote trigger. With long-range wireless connectivity, amazing battery life, and four programmable buttons, there are a ton of applications this device can fit into
- **Schneider iEM-3000** : Single or 3-phase DIN rail-mounted energy meters
- **Schneider MicroLogic** : MicroLogic trip unit for ComPact NSX, PowerPact H-,J-, and L-frame, ComPact NS, PowerPact P-, and R-frame or MasterPact NT/NW circuit breaker.
- **Schneider PM3250** : PM3250 energy meter for DIN rail mounting with backlit LCD display
- **Schneider PM5000** : Compact, versatile meters for energy cost and basic network management applications

- **Siemens SITRANS FMT020** : Flow meter for liquids and gases with Ethernet/IP connection
- **SMC Air Management** : Monitors machine standby conditions (when production stops) and automatically reduces pressure. Reduces unnecessary air consumption.
- **Solis Grid-tied PV Inverter** : Solis Grid-tied PV Inverter of all power ranges with Modbus RTU/RS485 connection
- **Telematica MB880-X** : External Modbus/RTU, Modbus/TCP converter for Iskra MT880 meters
- **Thytronic NA10** : NA10 general protection relay (software version 3.72)
- **Thytronic NA60** : NA60 general protection relay (software version 3.91)

3.3.3.2 Generic

3.3.3.2.1 MODBUS RTU PROTOCOL

Modbus RS485 (also commonly called Modbus RTU) is a widely used serial communication protocol in industrial settings, especially for interfacing with meters, inverters, energy counters, and other automation devices. The RS485 bus allows multiple devices (up to 32) to be connected on a single serial line, using a daisy-chain connection capable of covering long distances. It allows reading and writing variables (registers) on connected devices.

The AL300 Gateway can act as a Modbus master, querying slave devices connected to the RS485 bus.

Physical connection

AL300 has two independent RS485 ports, allowing it to behave as a Modbus master and query Modbus slave devices.



Port 1:

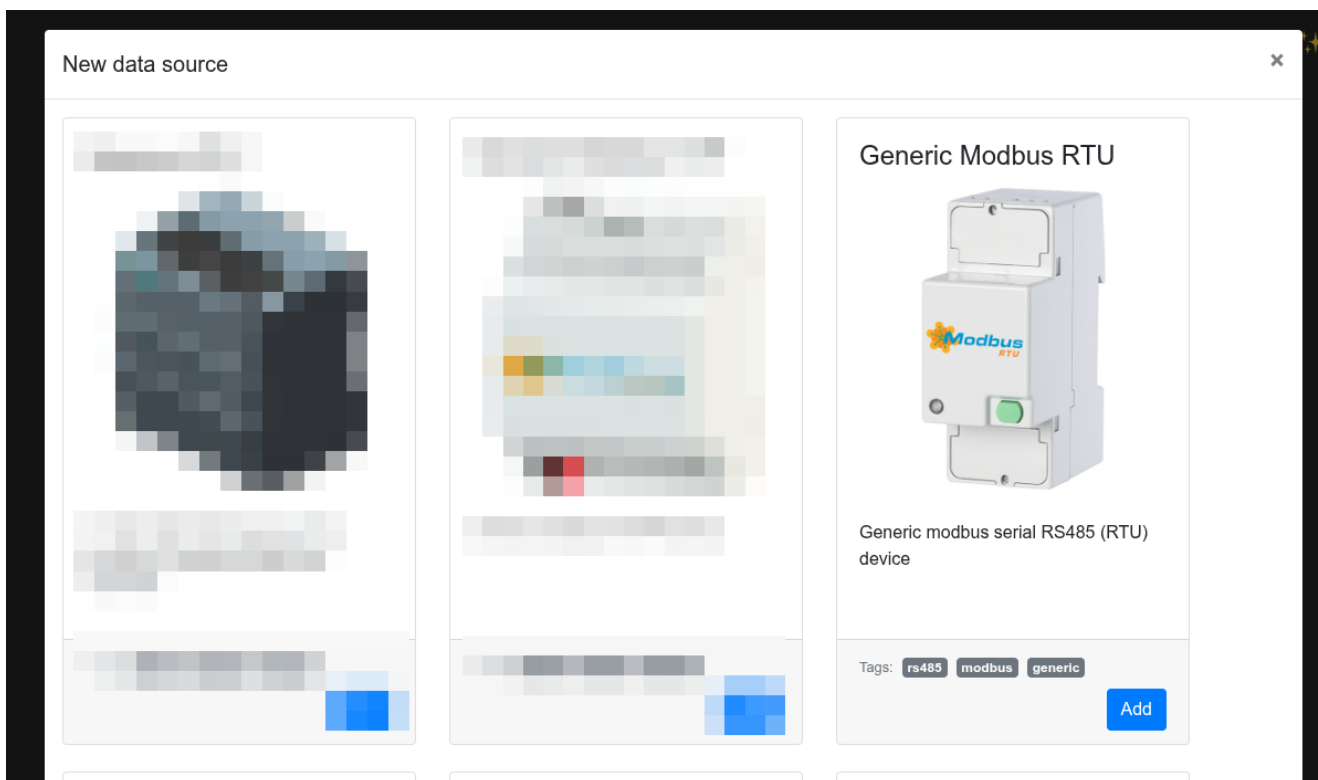
- A1
- B1
- GND

Port 2:

- A2
- B2
- GND

Configuration

1. Choose the data source `Generic Modbus RTU`



2. Select the serial port to use (1 or 2) and the id of the Modbus slave to query. To modify the serial port parameters (Baudrate, parity, stop bits) see here. To proceed, you need to have the documentation (register table) provided by the Modbus slave manufacturer.

The screenshot shows a 'New Modbus RS485 device' configuration window. It has three tabs: 'Connection', 'Modbus registers', and 'Metadata'. The 'Connection' tab is active. It contains two input fields: 'RS-485 Serial port:' with a dropdown menu and an information icon, and 'Modbus Slave ID (1-247)' with a text input field containing the number '1'. At the bottom, there are 'Cancel' and 'Next' buttons.

3. Choose whether to use register (1-based) or address (0-based) numbering and set the byte order and, if necessary, word order (in the documentation they are indicated as `big endian` / `little`

endian or LSB (least significant byte) / MSB (most significant byte)).

Modifica Dispositivo Modbus RS485 (ACS da PdC) ✕

Connessione

Registri modbus

Metadati

Addressing

Modbus address (0-based) ⌵

Byte order i

Big endian (MSB first, byte swap) ⌵

x

☐ Edit as JSON

4. Click on `Add variable` . To import or modify the table massively, see bulk configuration. For each variable of interest, you can set:

- Name and metadata (see here for more details)
- Topic. It can be:
 - Info: connection information (device disconnected variable and read error variable)
 - Holding registers: modbus functions 3 (read) and 6/16 (write)
 - Input registers: modbus function 4 (read)
 - Coils: modbus functions 1 (read) and 5/15 (write)
 - Discrete inputs: modbus function 2 (read)
- Address/Register: It can be expressed in decimal or hexadecimal and can be indicated as address (0-based) or register (1-based) depending on the `Addressing` setting above the table.

For each register, you need to set the correct encoding (data type). The available data types are:

- `8bit_uint` : unsigned integer of 8 bits
- `16bit_uint` : unsigned integer of 16 bits
- `32bit_uint` : unsigned integer of 32 bits
- `64bit_uint` : unsigned integer of 64 bits
- `8bit_int` : signed integer of 8 bits
- `16bit_int` : signed integer of 16 bits
- `32bit_int` : signed integer of 32 bits
- `64bit_int` : signed integer of 64 bits
- `8bit_bsint` : signed integer of 8 bits, most significant bit indicates the sign (0=positive, 1=negative)
- `16bit_bsint` : signed integer of 16 bits, most significant bit indicates the sign (0=positive, 1=negative)
- `32bit_bsint` : signed integer of 32 bits, most significant bit indicates the sign (0=positive, 1=negative)
- `64bit_bsint` : signed integer of 64 bits, most significant bit indicates the sign (0=positive, 1=negative)
- `16bit_float` : floating point number of 16 bits (half-precision)
- `32bit_float` : floating point number of 32 bits (single-precision)
- `64bit_float` : floating point number of 64 bits (double-precision)
- `string` : string of ASCII characters (you need to specify the length in characters)
- `bits` : array of bits (you need to specify the index from 0 to 15 of the bit within the register)
- Scale (see here for more details)
- Save to (see here for more details)

Edit Modbus RS485 device (ACS da PdC)

Connection Modbus registers Metadata

Addressing: Modbus address (0-based) Byte order: Big endian (MSB first, byte swap)

Edit as JSON

Name & metadata	Topic	Address	Hex	Scale	Save on	Read
Dispositivo disconnesso	Info	Disconnected			Cloud, Disk	
T ritorno ACS PdC [°C]	holding registers	17	16bit int	0.1	Cloud, Disk	

Add variable

Back Delete Next

5. Perform a read test of the variable just created by clicking on the **Read** button in the action column. If the reading is successful, the value read will be shown in the column.

Modifica Dispositivo Modbus RS485 (ACS da PdC)

Connessione Registri modbus Metadati

Addressing: Modbus address (0-based) Byte order: Big endian (MSB first, byte swap)

Edit as JSON

Nome e metadati	Area	Indirizzo	Hex	Scala	Salva su	Leggi
Dispositivo disconnesso	Info	Disconnesso			Cloud, Disk	
T ritorno ACS PdC [°C]	holding registers	17	16bit int	0.1	Cloud, Disk	40.300000000000004

Aggiungi variabile

Indietro Elimina Avanti

6. Repeat steps 4 and 5 for all variables of interest, then click on **Next** to go to the **Metadata** tab.
7. Here you can give a name and an optional description to the data source. You can also indicate where to insert the data source within the device hierarchy. In this way, you can organize devices into logical groups (e.g. departments, production lines, buildings, etc).

Modifica Dispositivo Modbus RS485 (ACS da PdC)

Connessione

Registri modbus

Metadati

Nome:

ACS da PdC

Nome della sorgente di dati

Descrizione:

Meter Caleffi 5704

Descrizione della sorgente di dati

Asset genitore: ⓘ

GW

✓

Aggiungi

Indietro

Elimina

Salva

8. Click on **Save** . Once the window is closed:

- if you are using the local web interface, the changes have been successfully applied
- if you are operating through the cloud, the configuration has been saved and placed in a sending queue. Until the configuration is applied, a ⚠ yellow triangle will be shown at the top of the AL300 configuration page.
 - if the AL300 is online, it is sent immediately to the AL300.
 - if the AL300 is offline, it will be sent when the connection is re-established.

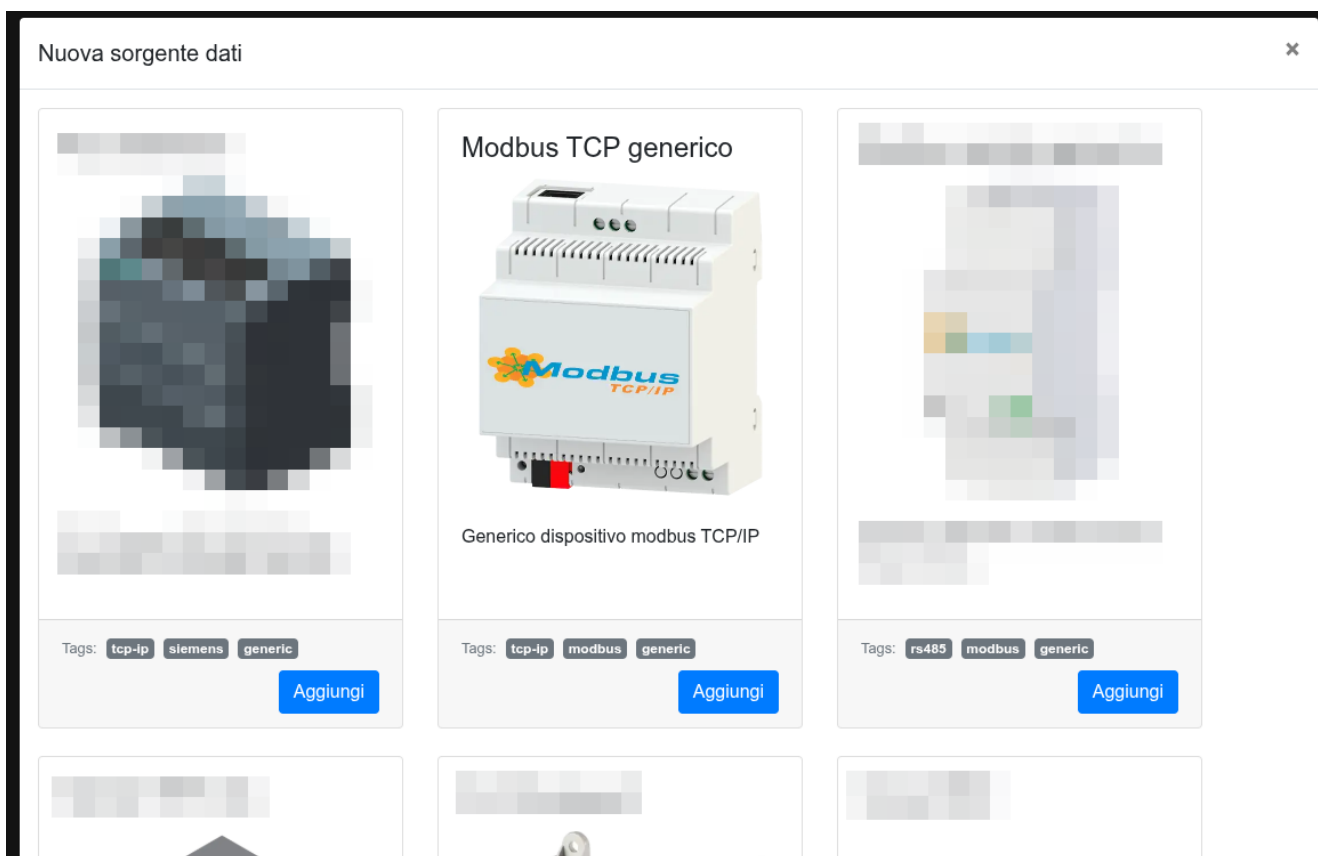
3.3.3.2.2 MODBUS TCP PROTOCOL

Modbus TCP is a variant of the Modbus protocol that uses the TCP/IP network (usually ethernet) for communication between devices. It is widely used in industrial settings for interfacing with meters, inverters, energy counters with RJ45 port. It allows reading and writing variables (registers) on connected devices.

The AL300 Gateway can act as a Modbus TCP master, querying slave devices connected to the Ethernet network.

Configuration

1. Choose the data source `Generic Modbus TCP`



2. Enter the IP address of the modbus slave. You can test the network connection by pinging the device (using the `Ping` button) and verify that the modbus slave is up and running (TCP port open) using the `TCP connect` button. To proceed, you need to have the documentation (register table) provided by the Modbus slave manufacturer.

The screenshot shows the 'Connessione' tab of the 'Modifica Dispositivo Modbus TCP (Meter 1)' dialog. It features input fields for 'Indirizzo IP' (10.10.0.155) and 'Porta TCP' (502). Below each field is a 'Ping' or 'TCP connect' button and a green status message indicating a successful connection with response times of 0.790ms and 1.226ms respectively. At the bottom are 'Annulla', 'Elimina', and 'Avanti' buttons.

3. Choose whether to use register (1-based) or address (0-based) numbering and set the byte order and, if necessary, word order (in the documentation they are indicated as `big endian / little endian` or `LSB (least significant byte) / MSB (most significant byte)`).

The screenshot shows the 'Registri modbus' tab of the 'Modifica Dispositivo Modbus TCP (Meter 1)' dialog. It displays three dropdown menus: 'Addressing' (set to 'Modbus address (0-based)'), 'Byte order' (set to 'Big endian (MSB first, byte swap)'), and 'Word order' (set to 'Big endian (word swap)'). An 'Edit as JSON' toggle is visible on the right. The 'Connessione' and 'Metadati' tabs are also visible at the top.

4. Click on `Add variable` . To import or modify the table massively, see bulk configuration. For each variable of interest, you can set:

- Name and metadata (see here for more details)
- Topic. It can be:
 - Info: connection information (device disconnected variable and read error variable)
 - Holding registers: modbus functions 3 (read) and 6/16 (write)
 - Input registers: modbus function 4 (read)
 - Coils: modbus functions 1 (read) and 5/15 (write)
 - Discrete inputs: modbus function 2 (read)
- Slave ID: identifier of the modbus slave to query. It is often ignored by TCP slaves, but in some cases (e.g. modbus TCP/Rs485 converters) it must be set correctly.
- Address/Register: It can be expressed in decimal or hexadecimal and can be indicated as address (0-based) or register (1-based) depending on the **Addressing** setting above the table.

For each register, you need to set the correct encoding (data type). The available data types are:

- `8bit_uint` : unsigned integer of 8 bits
- `16bit_uint` : unsigned integer of 16 bits
- `32bit_uint` : unsigned integer of 32 bits
- `64bit_uint` : unsigned integer of 64 bits
- `8bit_int` : signed integer of 8 bits
- `16bit_int` : signed integer of 16 bits
- `32bit_int` : signed integer of 32 bits
- `64bit_int` : signed integer of 64 bits
- `8bit_bsint` : signed integer of 8 bits, most significant bit indicates the sign (0=positive, 1=negative)
- `16bit_bsint` : signed integer of 16 bits, most significant bit indicates the sign (0=positive, 1=negative)
- `32bit_bsint` : signed integer of 32 bits, most significant bit indicates the sign (0=positive, 1=negative)
- `64bit_bsint` : signed integer of 64 bits, most significant bit indicates the sign (0=positive, 1=negative)
- `16bit_float` : floating point number of 16 bits (half-precision)
- `32bit_float` : floating point number of 32 bits (single-precision)
- `64bit_float` : floating point number of 64 bits (double-precision)
- `string` : string of ASCII characters (you need to specify the length in characters)
- `bits` : array of bits (you need to specify the index from 0 to 15 of the bit within the register)
- Scale (see here for more details)
- Save to (see here for more details)

Modifica Dispositivo Modbus TCP (Meter 1)

Connessione | Registri modbus | **Metadati**

Addressing: Modbus address (0-based) | Byte order: Big endian (MSB first, byte swap) | Word order: Big endian (word swap) | Edit as JSON

Nome e metadati	Area	Indirizzo	Scala	Salva su	Leggi
Dispositivo disconnesso	Info	Disconnesso		Cloud, Disk	
Energia prodotta [kWh]	holding registers	255 3203 64bit int	0.001	Cloud, Disk	

Aggiungi variabile

Indietro | Elimina | Avanti

5. Perform a read test of the variable just created by clicking on the **Read** button in the action column. If the reading is successful, the value read will be shown in the column.

Modifica Dispositivo Modbus TCP (Meter 1)

Connessione | Registri modbus | **Metadati**

Addressing: Modbus address (0-based) | Byte order: Big endian (MSB first, byte swap) | Word order: Big endian (word swap) | Edit as JSON

Nome e metadati	Area	Indirizzo	Scala	Salva su	Leggi
Dispositivo disconnesso	Info	Disconnesso		Cloud, Disk	
Energia prodotta [kWh]	holding registers	255 3203 64bit int	0.001	Cloud, Disk	208110.111

Aggiungi variabile

Indietro | Elimina | Avanti

6. Repeat steps 4 and 5 for all variables of interest, then click on **Next** to go to the **Metadata** tab.
7. Here you can give a name and an optional description to the data source. You can also indicate where to insert the data source within the device hierarchy. In this way, you can organize devices into logical groups (e.g. departments, production lines, buildings, etc).

8. Click on **Save** . Once the window is closed:

- if you are using the local web interface, the changes have been successfully applied
- if you are operating through the cloud, the configuration has been saved and placed in a sending queue. Until the configuration is applied, a ⚠ yellow triangle will be shown at the top of the AL300 configuration page.
 - if the AL300 is online, it is sent immediately to the AL300.
 - if the AL300 is offline, it will be sent when the connection is re-established.

3.3.3.2.3 SIEMENS S7

S7-300 and S7-400 CPUs

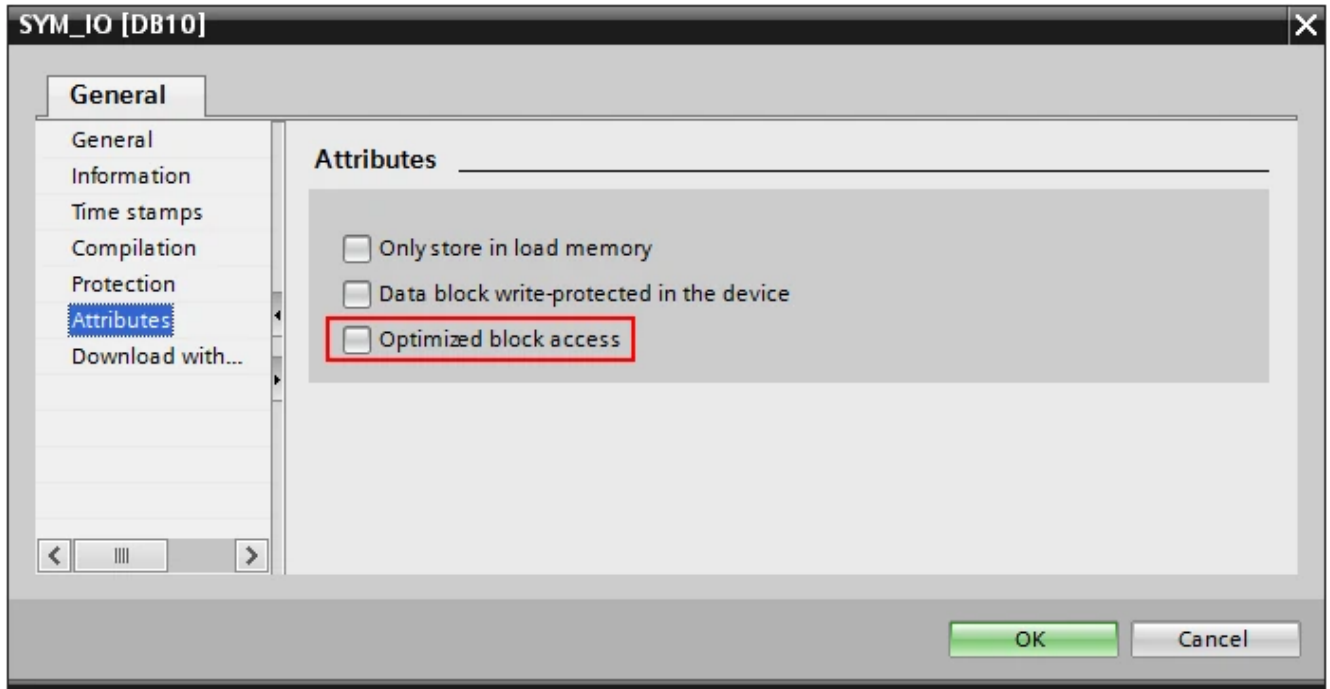
For S7-300 and S7-400 CPUs no particular configuration is required.

It has also been successfully tested with the Hilscher Netlink NL50 profibus converter.

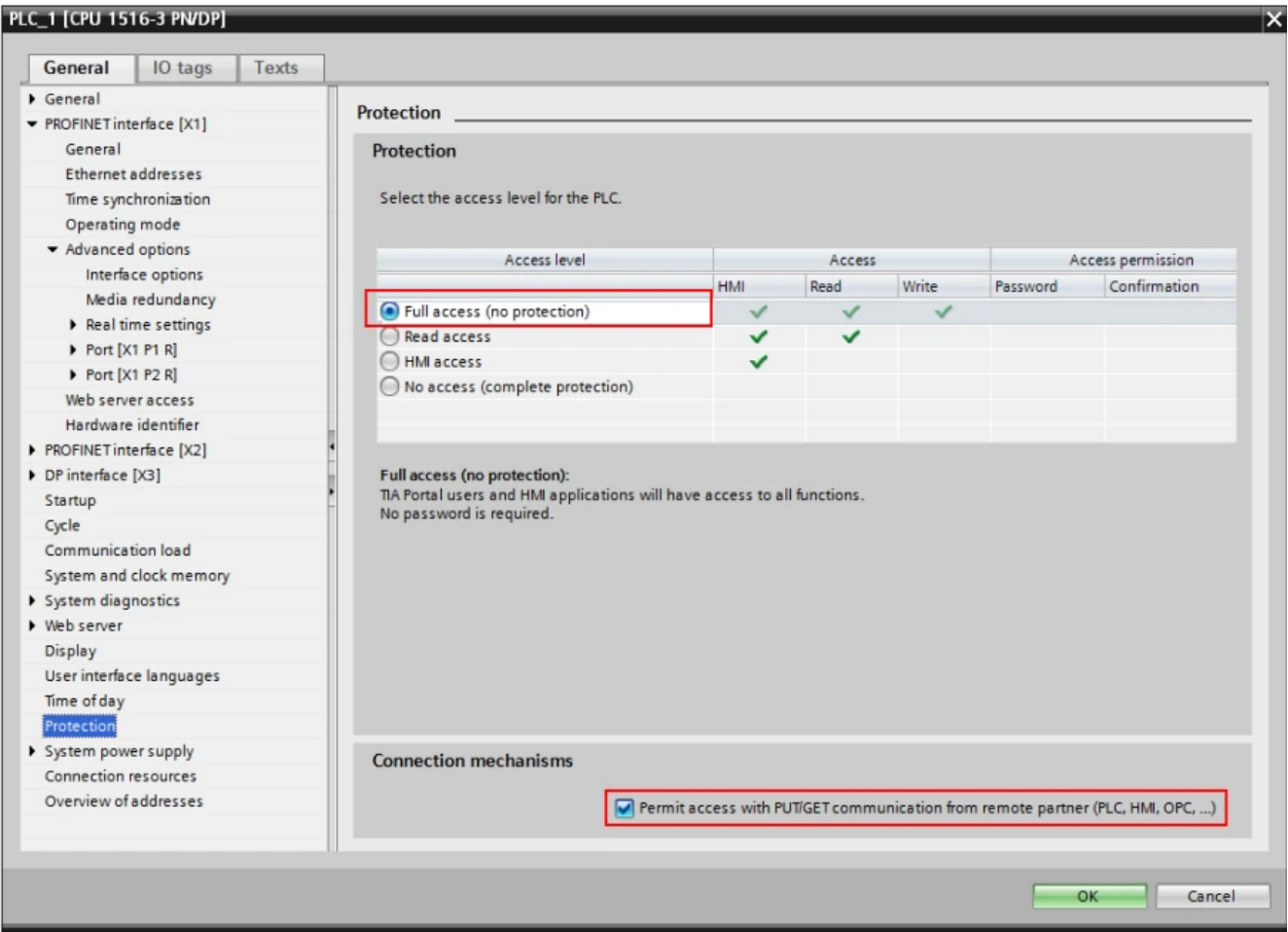
S7-1200 and S7-1500 CPUs

For S7-1200 and S7-1500 CPUs it is necessary to ensure these conditions:

- Optimized access to the blocks (DB) of interest must be disabled



- The access level must be 'full' and GET/PUT requests must be enabled:



Configuration

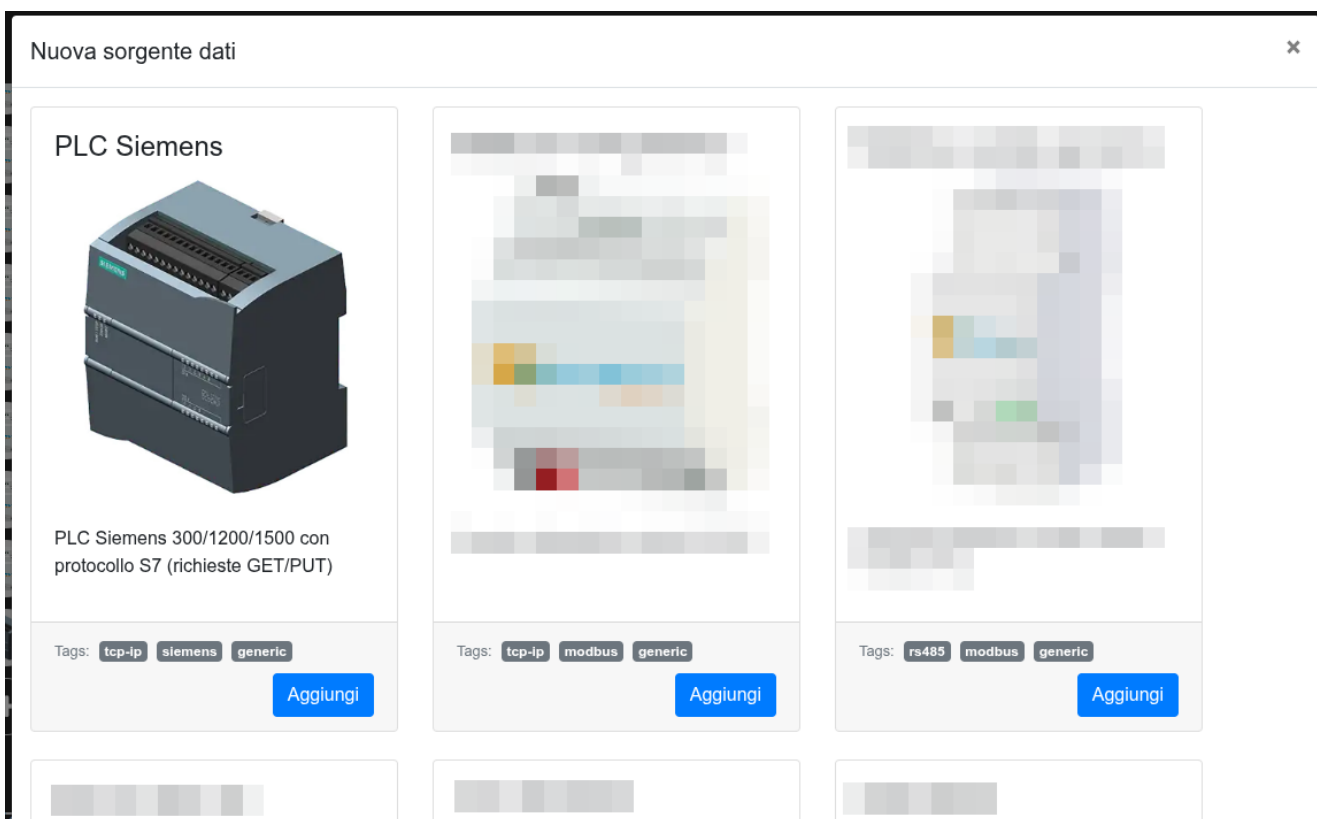
Siemens S7 Protocol

The S7 protocol (RFC 1006 info1, info2) is a proprietary communication protocol used by Siemens PLCs for data exchange with the CPUs of the S7-300, S7-400, S7-1200 and S7-1500 series. It allows reading and writing variables (bits, bytes, words, double words) on connected devices.

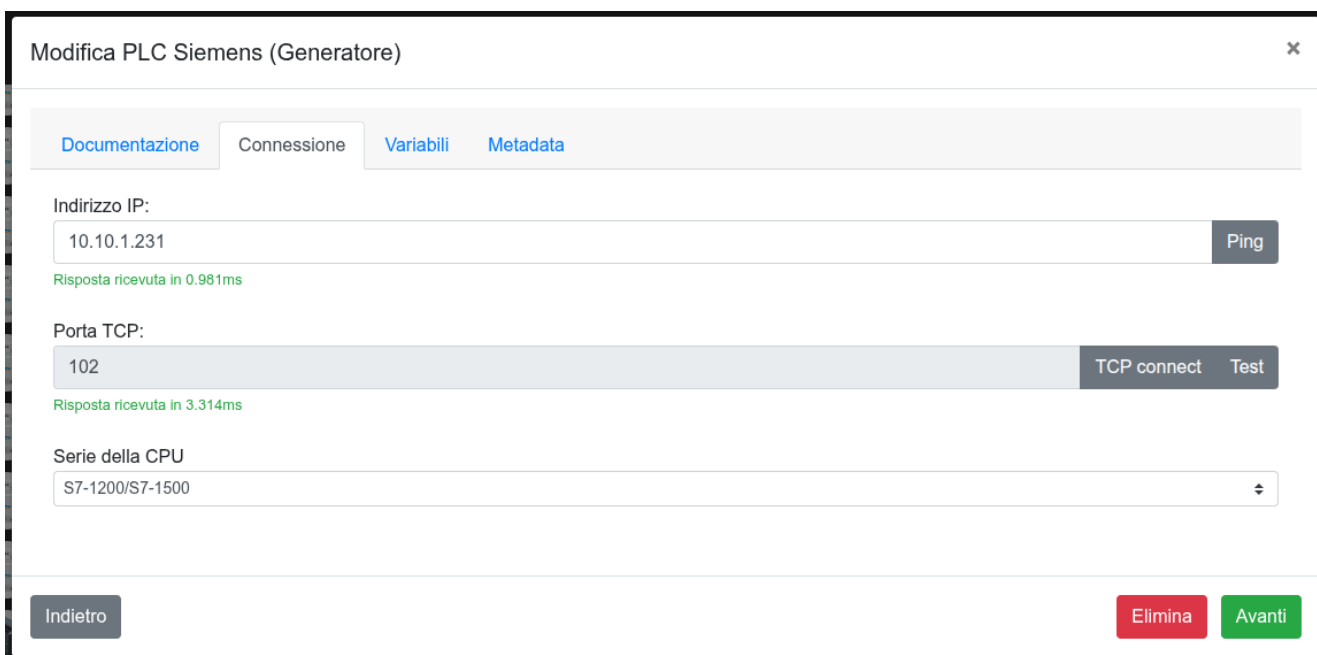
Requirements

Read this page to prepare the CPU for communication.

Configuration

1. Choose the **Siemens PLC** data source

2. Enter the IP address of the PLC. You can test the network connection by pinging the device (using the **Ping** button), check that the PLC accepts TCP connections on port 102 using the **TCP connect** button and verify the S7 connection using the **Test** button. Select the series of CPU to connect to (**200/400** or **1200/1500**).



3. Click on **Add PLC tag** . To import the variables of a DB from the TIA Portal project see DB definition import. To bulk import or edit the table, see bulk configuration. For each variable of interest you can set:

- Name and metadata (see here for more details)
- Topic. It can be:
 - Info: connection information (`Device disconnected` and `PLC not in RUN`)
 - DB: data contained in the Data Blocks (DB) of the PLC
- DB number. Visible in the TIA Portal project.

- S7 type. The available data types are:
 - REAL
 - INT
 - DINT
 - UINT
 - UDINT
 - BYTE
 - WORD
 - TIME_OF_DAY in milliseconds
 - DATE in unix timestamp
 - DTL in unix timestamp, assuming the PLC works in UTC
 - DTL_LOCAL in unix timestamp, assuming the PLC works in local time
 - DATE_AND_TIME in unix timestamp, assuming the PLC works in UTC
 - DATE_AND_TIME_LOCAL in unix timestamp, assuming the PLC works in local time
 - TIME in milliseconds
 - BOOL
 - STRING
 - FSTRING
 - WSTRING
 - CHAR
 - WEEKLY_STARTSTOP_SCHEDULE (custom schedule)
 - TIME_H_M_S in milliseconds, decoded from 3 `UINT` (hours, minutes, seconds)
 - TIME_H_S in milliseconds, decoded from 2 `UINT` (hours, seconds)
 - TIME_H_M in milliseconds, decoded from 2 `UINT` (hours, minutes)
 - TIME_M_S in milliseconds, decoded from 2 `UINT` (minutes, seconds)
- Byte: offset within the DB in bytes
- Bit: for `BOOL` types, 0-based index (0-7) of the bit within the byte
- Scale (see here for more details)
- Save to (see here for more details)

Modifica PLC Siemens (Generatore) ✕

[Documentazione](#) [Connessione](#) [Variabili](#) [Metadata](#)

 ☐ Edit as JSON

Nome e metadati

Area

Indirizzo

Scala

Salva su

Leggi

 PLC disconnesso	 Info ▾	Disconnesso ▾					Cloud, Disk		
Prelievo elettrico [kW] Positivo in prelievo	 DB ▾	95	REAL ▾	0	Nessuna 	Cloud, Disk			
		DB	Tipo S7	Byte					
Consumo termico [kW] Letto da Hawk	 DB ▾	95	REAL ▾	4	Nessuna 	Cloud, Disk			
		DB	Tipo S7	Byte					
Fattore di conversione termico-elettrico	 DB ▾	95	REAL ▾	8	Nessuna 	Cloud, Disk			
		DB	Tipo S7	Byte					
Consumo termico elettrico-equivalente [kW]	 DB ▾	95	REAL ▾	12	Nessuna 	Cloud, Disk			
		DB	Tipo S7	Byte					
Setpoint attuale CHP [kW]	 DB ▾	95	REAL ▾	16	Nessuna 	Cloud, Disk			
		DB	Tipo S7	Byte					
Setpoint inseguimento elettrico-termico [kW] Massimo tra consumo elettrico e termico	 DB ▾	95	REAL ▾	20	Nessuna 	Cloud, Disk			
		DB	Tipo S7	Byte					

Aggiungi tag PLC

Importa variabili da definizione DB...

Indietro

Elimina

Avanti

1. Perform a read test of the newly created variable by clicking on the **Read** button in the actions column. If the read is successful, the value read will be shown in the column.

Modifica PLC Siemens (Generatore) ✕

Documentazione Connessione Variabili **Metadata**

🔴 🟢 Edit as JSON

Nome e metadati **Area** **Indirizzo** **Scala** **Salva su** **Leggi** Risposta ricevuta in 0.038ms

PLC disconnesso	Info ▾	Disconnesso ▾			Cloud, Disk	false	
Prelievo elettrico [kW] Positivo in prelievo	DB ▾	95 REAL ▾ DB Tipo S7	0 Byte	Nessuna	Cloud, Disk	60	
Consumo termico [kW] Letto da Hawk	DB ▾	95 REAL ▾ DB Tipo S7	4 Byte	Nessuna	Cloud, Disk	1535.0999755859375	
Fattore di conversione termico-elettrico	DB ▾	95 REAL ▾ DB Tipo S7	8 Byte	Nessuna	Cloud, Disk	1.100000023841858	
Consumo termico elettrico-equivalente [kW]	DB ▾	95 REAL ▾ DB Tipo S7	12 Byte	Nessuna	Cloud, Disk	1688.6099853515625	
Setpoint attuale CHP [kW]	DB ▾	95 REAL ▾ DB Tipo S7	16 Byte	Nessuna	Cloud, Disk	2000	
Setpoint inseguimento elettrico-termico [kW] Massimo tra consumo elettrico e termico	DB ▾	95 REAL ▾ DB Tipo S7	20 Byte	Nessuna	Cloud, Disk	2000	

Aggiungi tag PLC **Importa variabili da definizione DB...**

2. Repeat steps 3 and 4 for all variables of interest, then click on **Next** to go to the **Metadata** tab.
3. Here you can give a name and an optional description to the data source. You can also indicate where to place the data source within the device hierarchy. This way you can organize devices into logical groups (e.g. departments, production lines, buildings, etc).

Modifica PLC Siemens (Generatore) ✕

Documentazione

Connessione

Variabili

Metadata

Nome:

Generatore ✓

Nome della sorgente di dati

Descrizione:

Descrizione della sorgente di dati

Asset genitore: ⓘ

Funzionamento in parallelo ✖ ✓

Aggiungi

Indietro

Elimina

Salva

4. Click on **Save** . Once the window is closed:

- if you are using the local web interface, the changes have been successfully applied
- if you are operating through the cloud the configuration has been saved and placed in a sending queue. Until the configuration is applied a  yellow triangle will be shown at the top of the AL300 configuration page.
 - if the AL300 is online then it is sent immediately to the AL300.
 - if the AL300 is offline it will be sent when the connection is re-established.

DB definition import

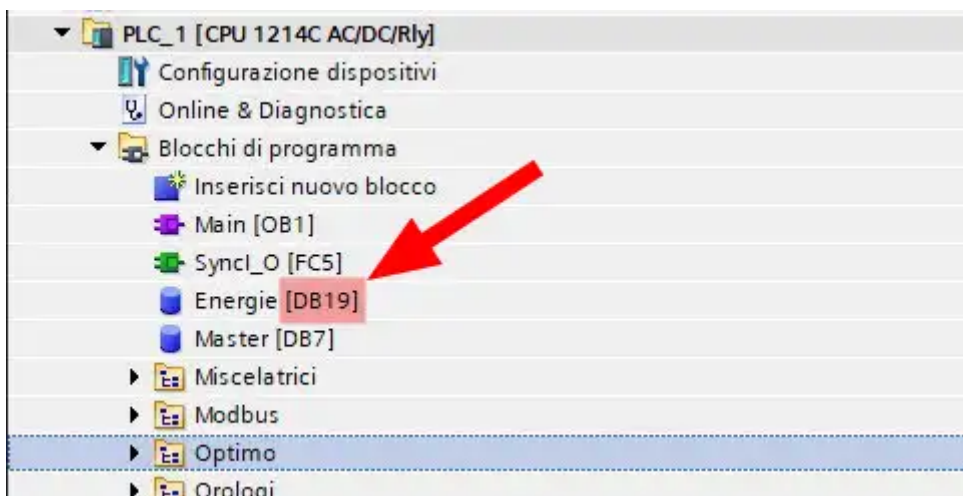
It is possible to import the definition of a DB if you have access to the TIA Portal project loaded on the Siemens PLC.

1. Click on **Import variables from DB definition**

The screenshot shows a configuration window for a variable named 'Setpoint inseguimento elettrico-termico [kW]'. The variable is of type 'DB' with a value of '95', data type 'REAL', and length '20'. The unit is 'Byte'. The storage location is 'Nessuna' (None). The variable is associated with 'Cloud, Disk' and has a value of '2000'. The dialog includes buttons for 'Aggiungi tag PLC', 'Importa variabili da definizione DB...', 'Indietro', 'Elimina', and 'Avanti'.

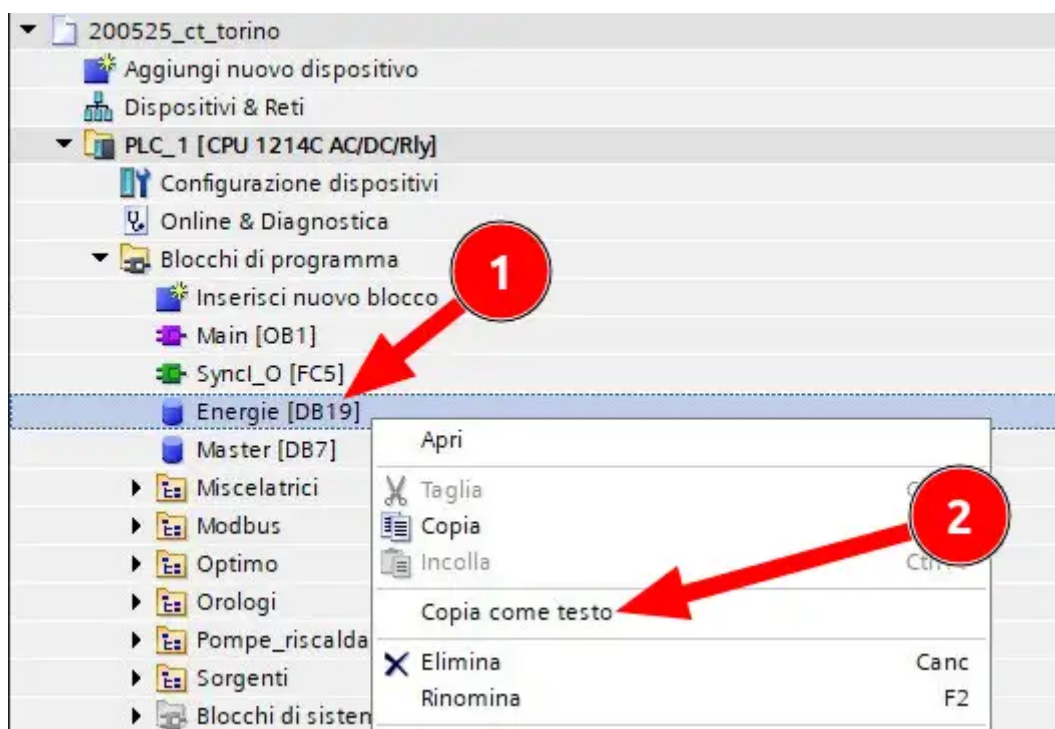
2. Open the PLC project with TIA Portal

3. Identify the DB of interest



4. Insert the DB number in the form

5. Right click on the DB (1) and select 'Copy as text' (2):



6. Paste the copied text into the form:

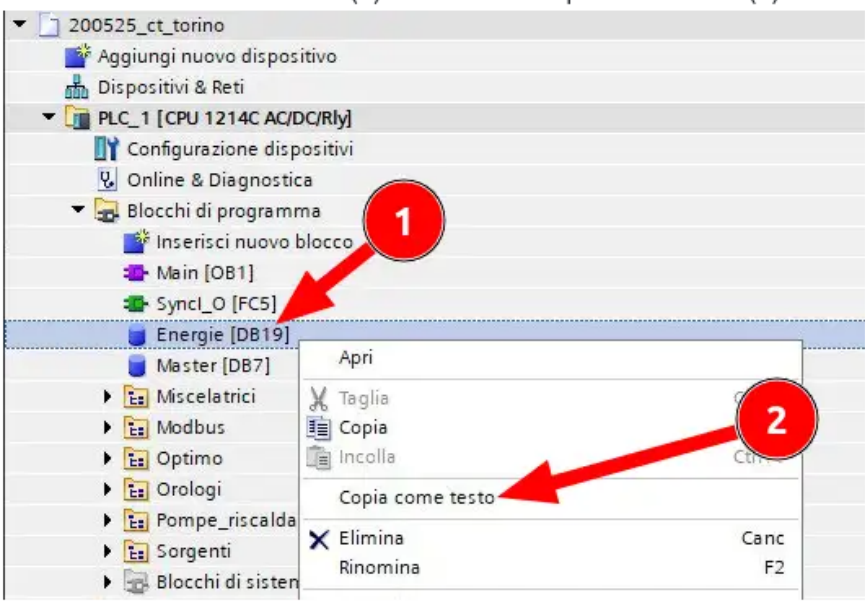
Importa DB ✕

Data Block (DB)
Tipi S7 personalizzati
Selezione variabili

1. Apri il progetto PLC con TIA Portal
2. Inserisci qui il numero del DB:



3. Clicca col tasto destro sul DB (1) e seleziona 'Copia come testo' (2):



Incolla qui il testo copiato:

4. Apri TIA Portal, clicca col tasto destro sul DB, seleziona 'Copia come testo', incolla qui !

7. If the DB contains only standard data types, then it is possible to do a read test, delete the variables that are not of interest and click on Add

Importa DB

[Data Block \(DB\)](#) [Tipi S7 personalizzati](#) [Selezione variabili](#)

Name	Type	Offset	Leggi	Actions
Date_start	DATE_AND_TIME	0		
Tipo S7		Byte		
Date_end	DATE_AND_TIME	8		
Tipo S7		Byte		
litri_start_meter_coll_12	REAL	140		
Tipo S7		Byte		
litri_end_meter_coll	REAL	144		
Tipo S7		Byte		

[Indietro](#) [Aggiungi](#)

8. If the DB contains some custom data types, you will be asked to provide the definition for each custom data type.

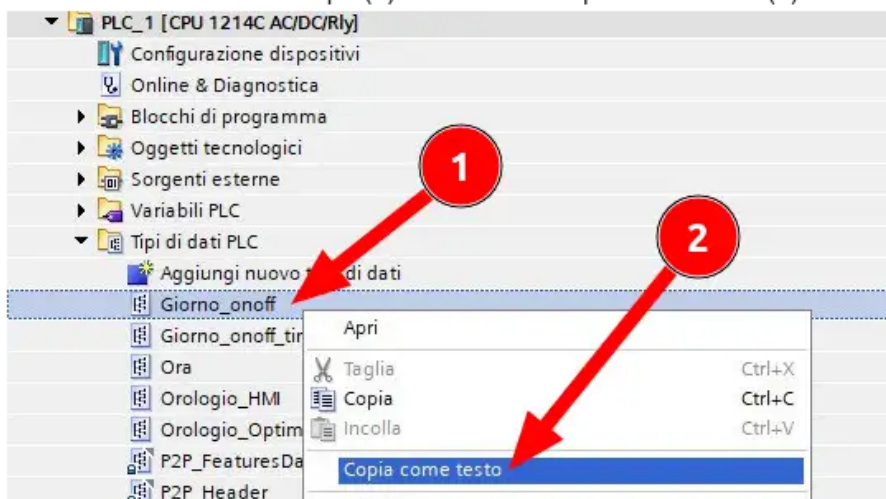
[Data Block \(DB\)](#)[Tipi S7 personalizzati](#)[Selezione variabili](#)

Nella definizione del DB sono presenti alcuni tipi S7 personalizzati. Puoi importarli o ignorarli.

- **POMPAT**

☒ Importa le variabili contenute in questo tipo S7

- Clicca col tasto destro sul tipo (1) e seleziona 'Copia come testo' (2):



Incolla qui il testo copiato:

- Apri TIA Portal, naviga su 'PLC Types' nel menu a sinistra, clicca col tasto destro sul tipo personalizzato, seleziona 'Copia come testo' e incolla qui

[Indietro](#)[Avanti](#)

If you are not interested in importing the variables of the custom data type you can proceed further. It is still required to insert the size in bytes of the custom type

Importa DB

[Data Block \(DB\)](#)[Tipi S7 personalizzati](#)[Selezione variabili](#)

Nella definizione del DB sono presenti alcuni tipi S7 personalizzati. Puoi importarli o ignorarli.

- **POMPAT**

☐ Importa le variabili contenute in questo tipo S7

Per continuare il processo di parsing del DB è necessaria la dimensione in byte del tipo. Come vuoi fornire la dimensione in byte?

- ☐ Copia la definizione del tipo per calcolare la dimensione
- ☒ Specifica la dimensione del tipo manualmente

Dimensione del tipo (byte):

0

[Indietro](#)[Avanti](#)

3.3.3.2.4 LORAWAN

The AL300 gateway can use LoRaWAN to receive and send data from LoRaWAN devices.

AL300 integrates a LoRaWAN Network Server based on ChirpStack, which allows you to manage LoRaWAN devices and receive data from them. The data received from LoRaWAN devices can be used to feed variables. AL300 is therefore independent of internet connectivity for the configuration and reception of data from LoRaWAN devices, as the Network Server is integrated directly into the gateway.



Requirements

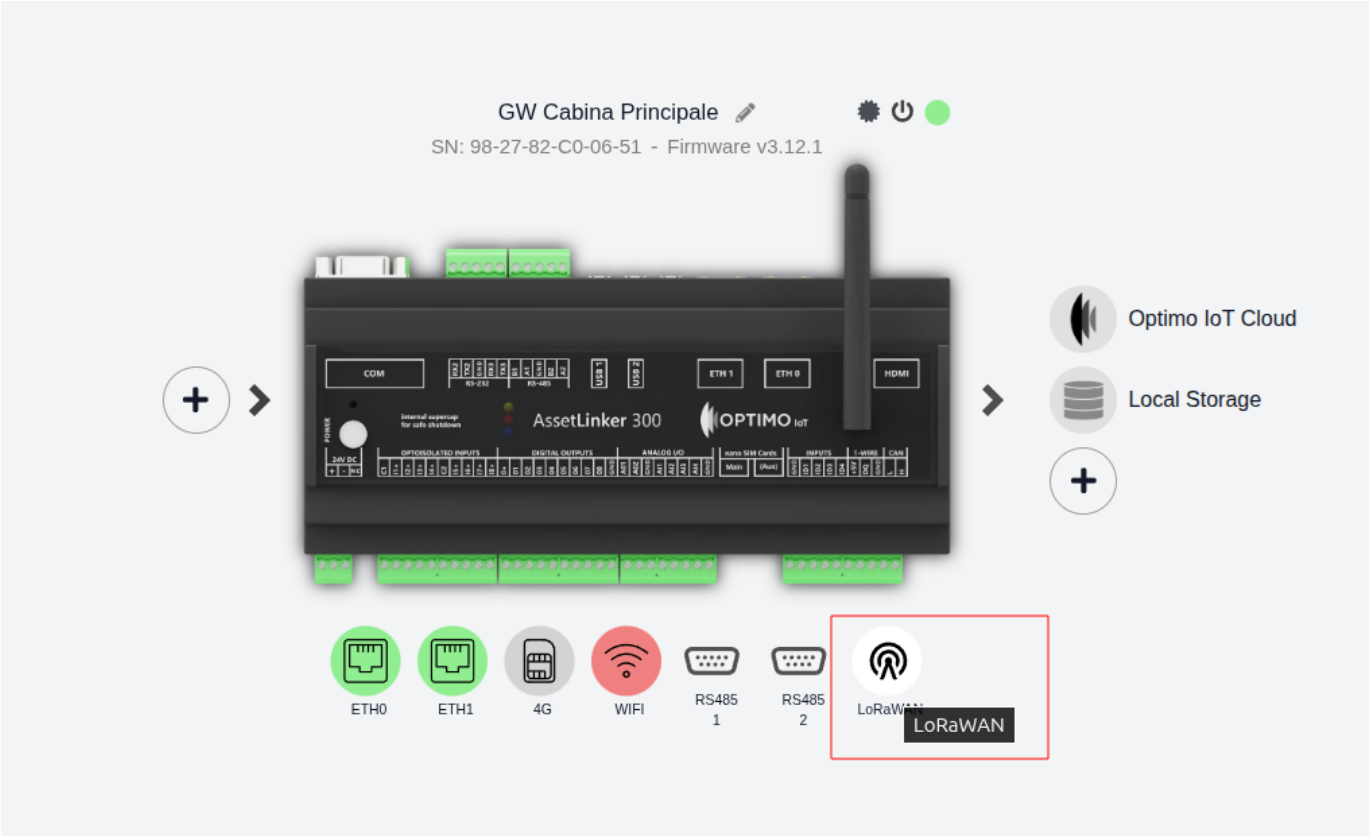
For this feature, you need to purchase the LoRaWAN antenna from Optimo IoT and connect it to one of the USB ports of the AL300 gateway.

The configuration of a generic LoRaWAN node is divided into three parts:

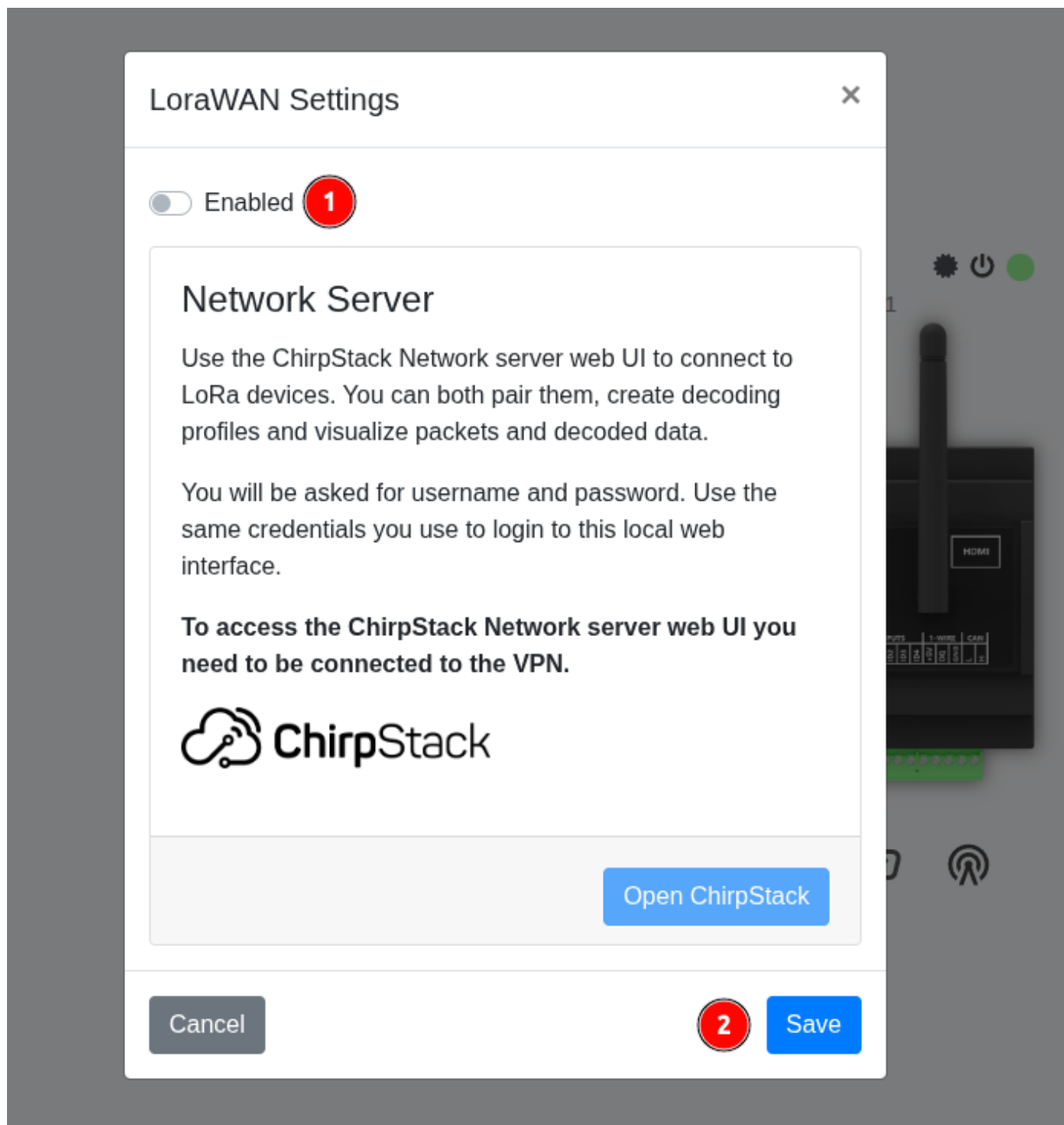
- enabling LoRaWAN on the AL300 gateway
- configuring and pairing devices in the ChirpStack Network Server integrated into the AL300
- configuring data sources in Optimo to use the data received from LoRaWAN devices

Enabling LoRaWAN

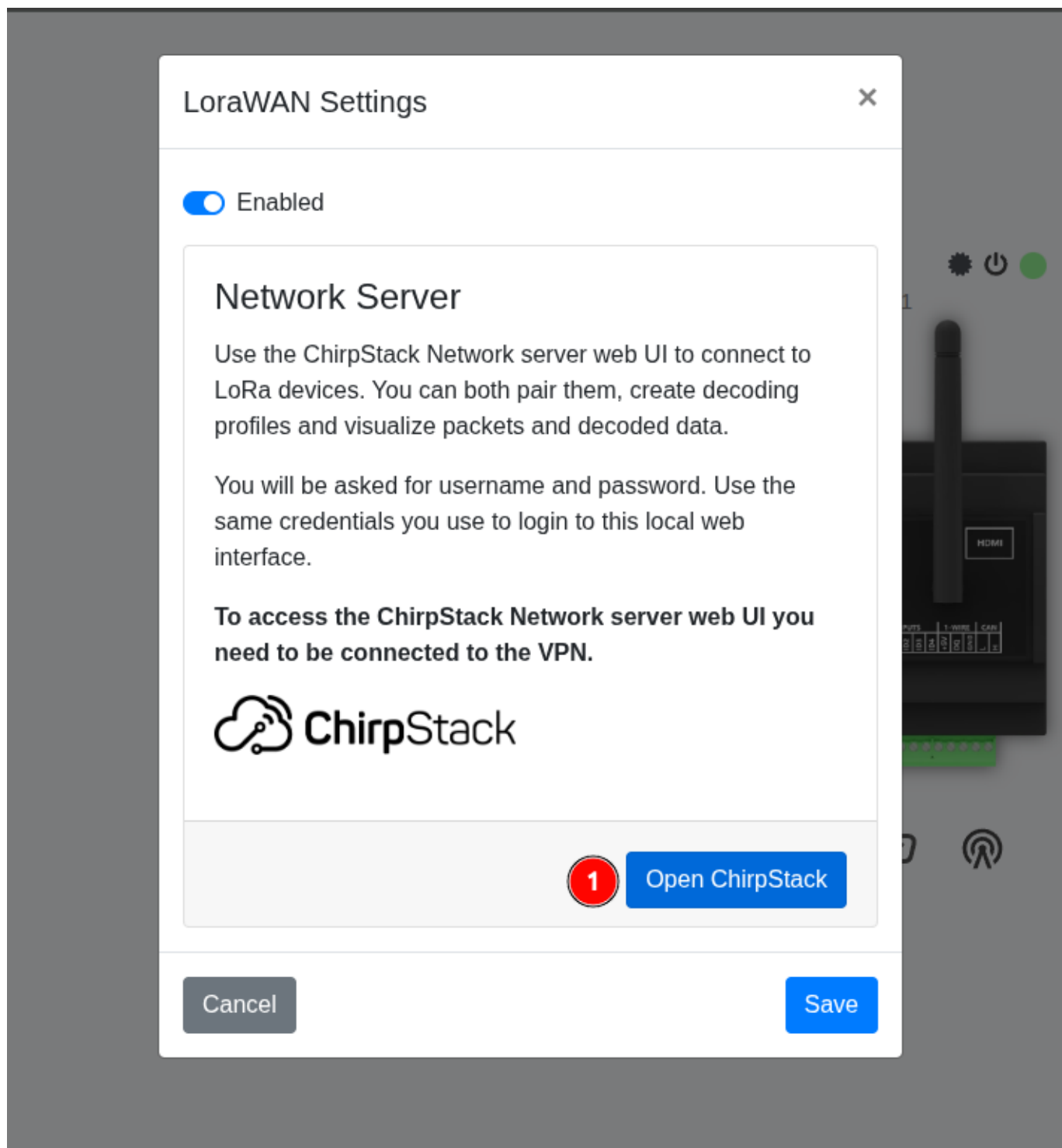
From the gateway configuration, click on the **LoRaWAN** icon.



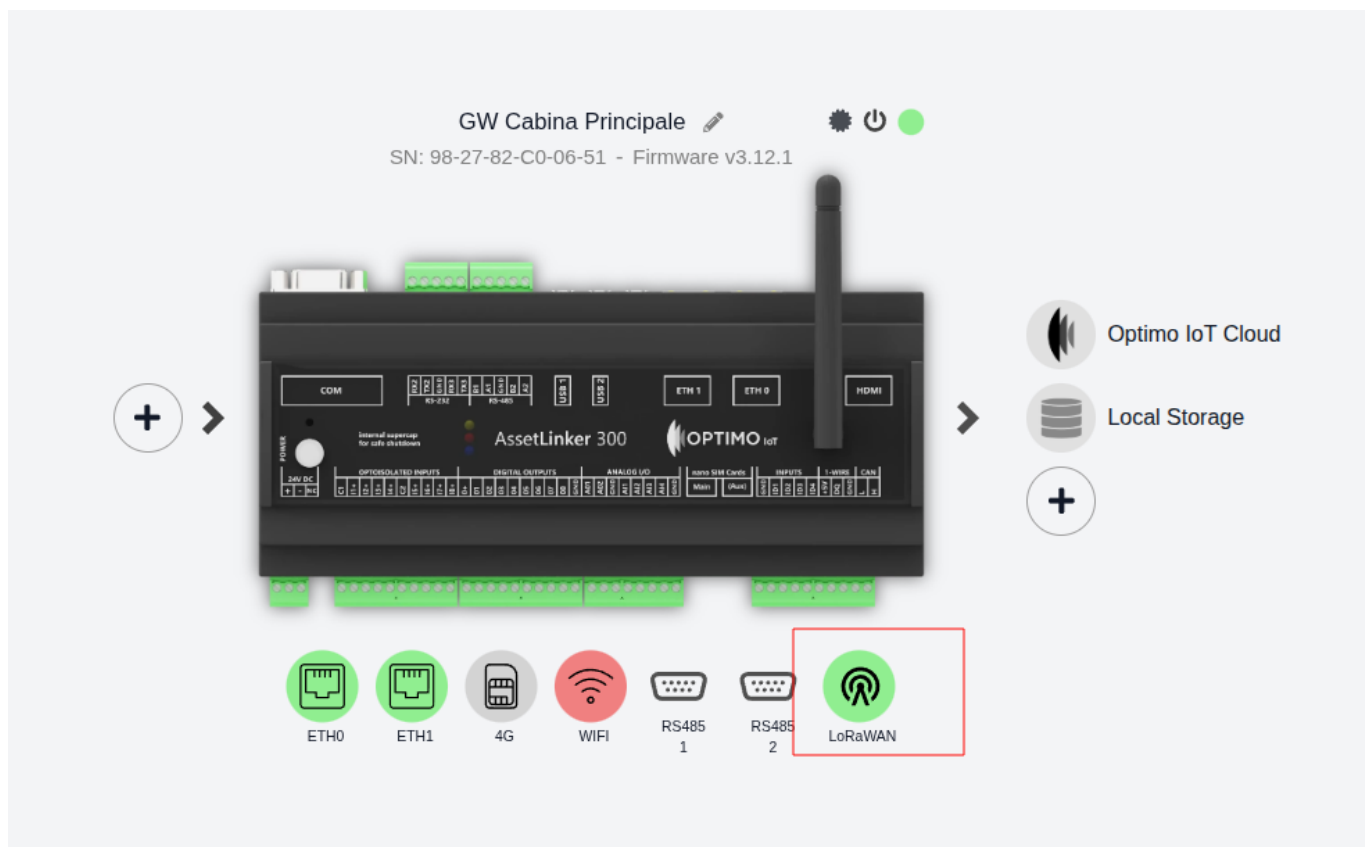
The LoRaWAN Settings window opens.



Activate `Enabled` and click on `Save`.

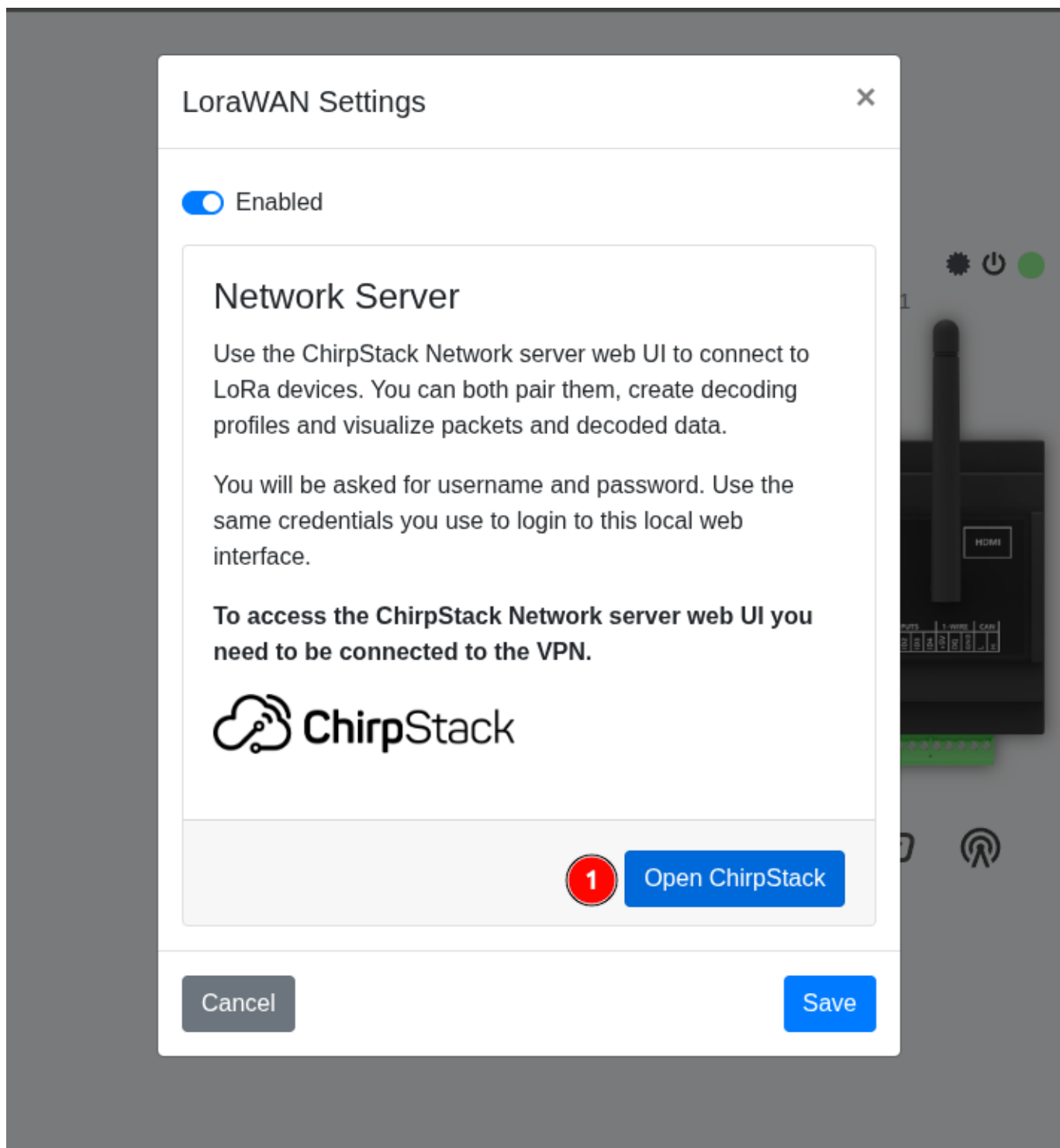


After saving, the LoRaWAN icon turns green when the service is active and the antenna is correctly connected. If the icon is red, check that the antenna is properly connected to a USB port of the AL300 gateway.



Opening ChirpStack

After enabling LoRaWAN, reopen the **LoRaWAN Settings** window and click on **Open ChirpStack**. You can access Chirpstack both locally and remotely through the cloud interface.



The ChirpStack login page is displayed.

ChirpStack login

* Username / email: **1**

* Password: **2**

Submit **3**

Use the local access credentials of the AL300 gateway to access ChirpStack. The cloud access credentials are not valid for access to ChirpStack.

Device Profiles

Device Profiles define the LoRaWAN characteristics of the device: radio region, LoRaWAN version, join mode, device class and payload decoding codec.

For plug and play devices already supported, the profiles are already present in **Tenant > Device Profiles**.

ChirpStack

Search... ? optimo

ChirpStack

Network Server

Regions

Tenant

Dashboard

Users

API Keys

Device Profiles

Gateways

Gateway Mesh

Applications

Tenants / ChirpStack / Device profiles

Device profiles Add device profile

Name	Region	MAC version	Revision	Supports OTAA	Supports Class-B	Supports Class-C
Milesight AM102	EU868	LoRaWAN 1.0.3	A	yes	no	no
Milesight CT101	EU868	LoRaWAN 1.0.3	A	yes	no	no
Milesight EM300-TH	EU868	LoRaWAN 1.0.3	A	yes	no	no
Milesight UC100	EU868	LoRaWAN 1.0.3	A	yes	no	no
Milesight WS101	EU868	LoRaWAN 1.0.3	A	yes	no	no
RAK 10701 Field Tester	EU868	LoRaWAN 1.0.3	RP002-1.0.3	yes	no	no
RAKwireless RAK7201	EU868	LoRaWAN 1.0.3	A	yes	no	no
TWTG Neon Temperature Sensor	EU868	LoRaWAN 1.0.2	A	yes	no	no
TWTG Neon Temperature Transmitter	EU868	LoRaWAN 1.0.2	A	yes	no	no

< 1 > 10 / page

Examples of plug and play devices that may be available, depending on the firmware version:

- Milesight AM102
- Milesight CT101
- Milesight EM300-TH
- Milesight UC100
- Milesight WS101
- RAKwireless RAK7201
- RAKwireless RAK10701
- TWTG NEON TS
- TWTG NEON TT

Plug and play devices

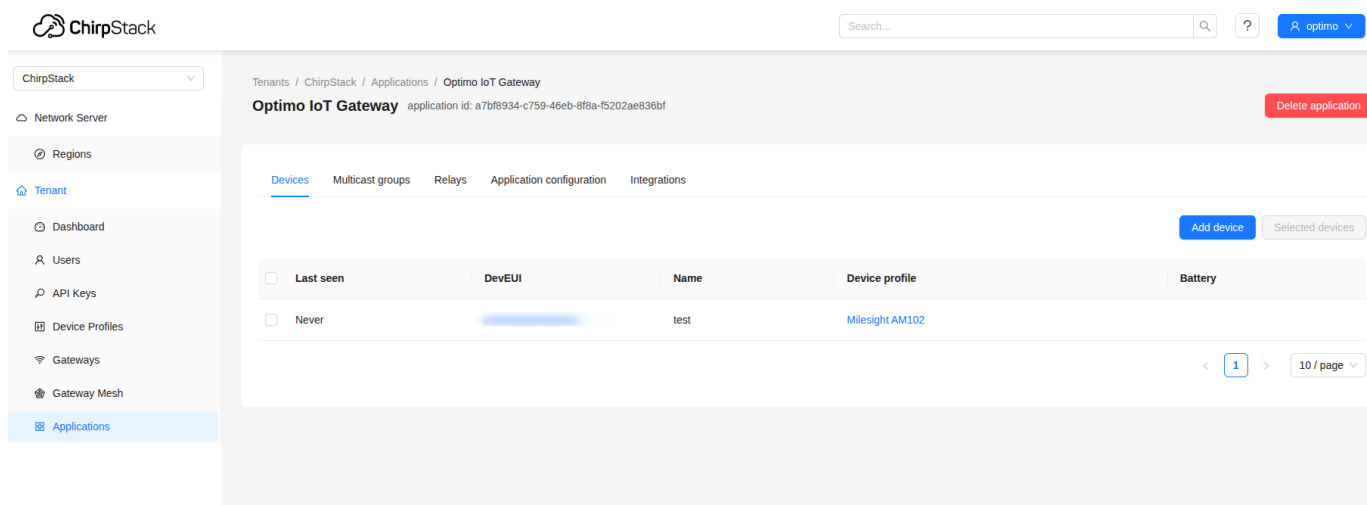
If the device is among those supported, do not create a new manual profile. Select the already present **Device Profile**, because it includes the parameters and decoder expected for that model.

For generic devices, it is necessary to create a new **Device Profile** with the correct parameters for the device and a custom decoder to decode the payload received from the device.

Application and devices

LoRaWAN devices are managed inside a ChirpStack **application**. The **Optimo IoT Gateway** application is already present in the AL300, and the devices must be configured within it.

Open **Applications**, select **Optimo IoT Gateway** and use the **Devices** tab.



ChirpStack

Tenants / ChirpStack / Applications / Optimo IoT Gateway

Optimo IoT Gateway application id: a7bf8934-c759-46eb-8f8a-f5202ae836bf Delete application

Devices Multicast groups Relays Application configuration Integrations

Add device Selected devices

☐ Last seen	DevEUI	Name	Device profile	Battery
☐ Never		test	Milesight AM102	

< 1 > 10 / page

To add a device:

1. click on `Add device`
2. insert the device name
3. indicate the `Device EUI`
4. select the `Device Profile` to use
5. save the device
6. configure the keys required by the device activation type

The activation type depends on the profile and the device:

- `OTAA` : usually requires `DevEUI` , `JoinEUI` and `AppKey`
- `ABP` : requires `DevAddr` and session keys

After activation, turn on the device or force an uplink. In ChirpStack you can verify the reception of messages by opening the `Device` page and checking the events or the LoRaWAN frames.

 Note

The required parameters (e.g. `DevEUI` , `JoinEUI` , `AppKey` , `DevAddr` and session keys) are provided by the manufacturer and are available in the device documentation. Such information may vary depending on the model and type of device.

Configuring data sources

After configuring the devices in ChirpStack, you can create data sources in Optimo to use the data received from LoRaWAN devices. The data source type to select is `LoRaWAN Device` .

For Plug and play devices:

1. add the corresponding data source
2. select the `Device EUI`
3. pick the variables of interest
4. complete the metadata and save

For a generic device:

1. add the `LoRaWAN Device` data source
2. select the `Device EUI`
3. indicate the `paths` of the JSON payload decoded by ChirpStack to save as variables. For example, if the payload decoded by ChirpStack has the structure `{ "temperature": 22.5, "humidity": 60 }`, to save the temperature and humidity as variables you need to indicate the `paths` `temperature` and `humidity`.
4. complete the metadata and save

An example of a decoded payload can be found in ChirpStack at the path:

`Tenant > Applications > Optimo IoT Gateway > [device name] > Events > Up`.

ChirpStack guides

For more information on configuring and using ChirpStack, refer to the official documentation and guides:

- ChirpStack documentation
- ChirpStack guide: Connecting a device
- ChirpStack documentation: Device profiles

3.3.3.3 Node-RED

The AL300 gateway integrates Node-RED to create local automations, process read values and/or record setpoints. Node-RED flows can easily interact with all the variables already configured on the AL300 (e.g. external devices, on-board I/Os, radio modules, etc).

The **Node-RED** source is useful when you want to:

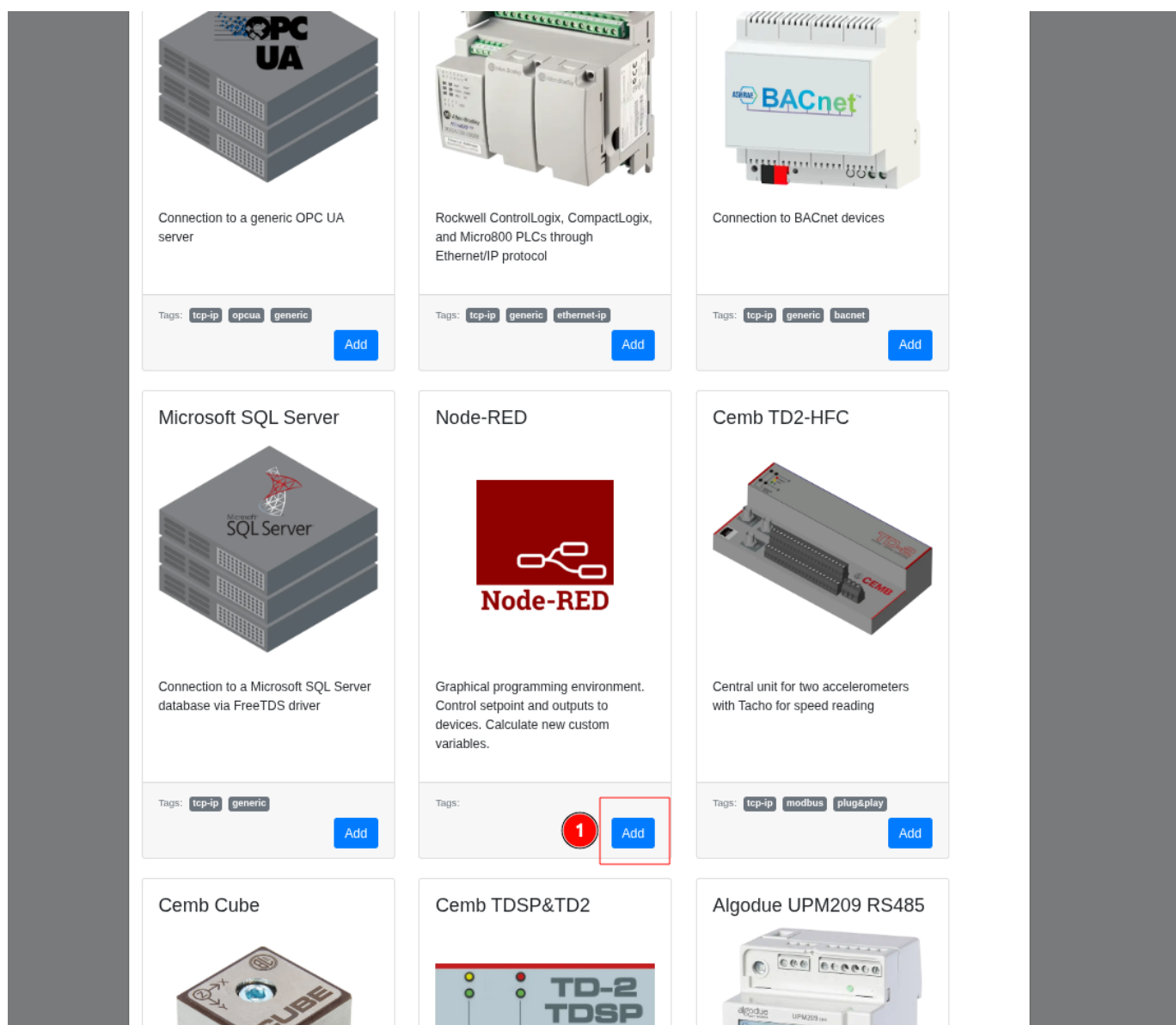
- create calculated variables from other acquired variables
- apply local automation logics
- write values to devices configured in the AL300

Local virtual variables

The virtual variables that can be created in **Node-RED** are local to the AL300 gateway. They are different from cloud virtual variables, which are instead calculated by the Optimo IoT platform. To create cloud virtual variables read the dedicated chapter.

3.3.3.3.1 ADDING THE NODE-RED SOURCE

From the data sources selection page, find the **Node-RED** tab and click on **Add**.

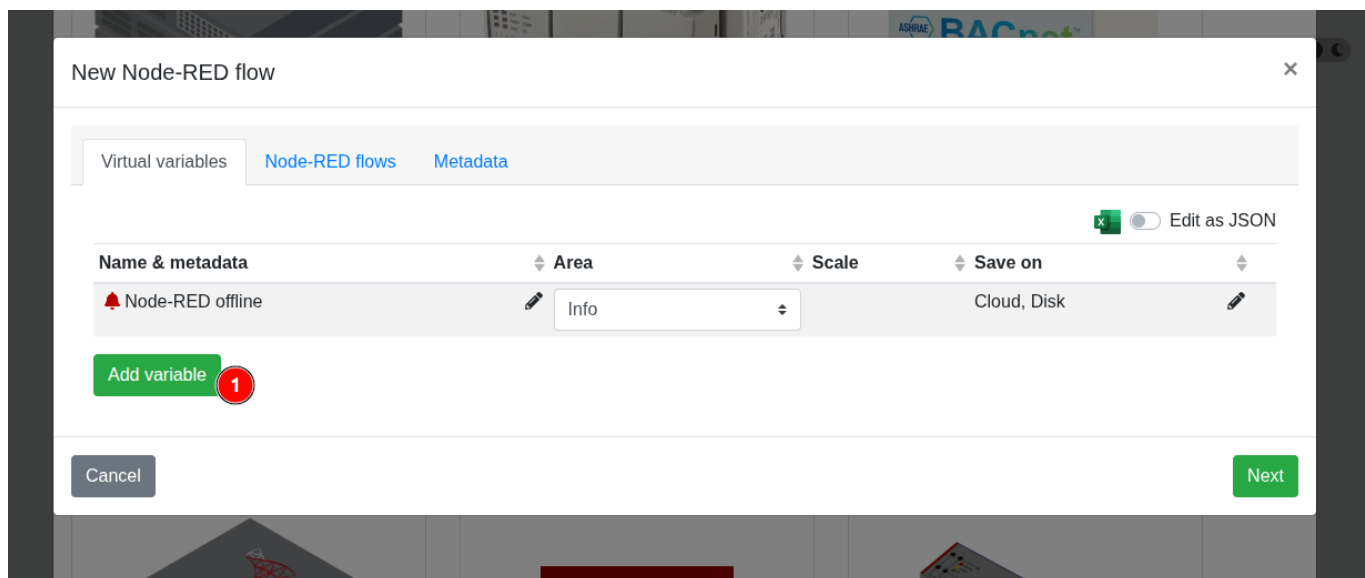


The window is divided into three sections:

- **Virtual variables** : list of virtual variables. They can be used to store setpoints to be used in automation or to create calculated variables from other acquired variables.
- **Node-RED flows** : access to the Node-RED flow development environment, where you can create and modify flows to process data, create automations and write values to devices configured in the AL300.
- **Metadata** : asset to associate with the source

3.3.3.3.2 CREATING VIRTUAL VARIABLES

Click on **Add variable** in the **Virtual variables** tab to add a new variable produced by the Node-RED flow.

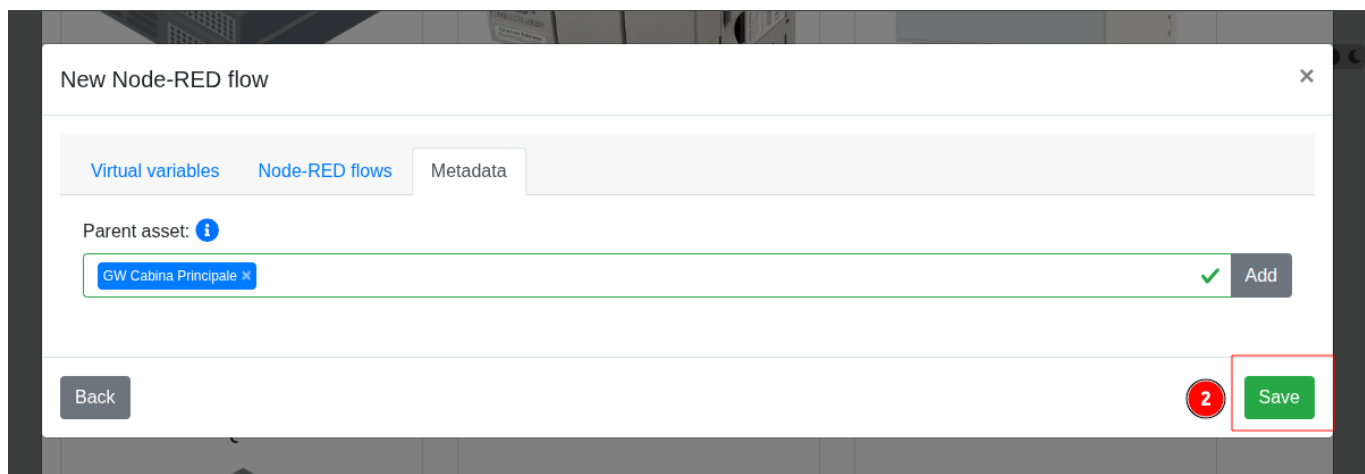


For each variable, you need to configure at least the name. You can also complete the metadata, as described here.

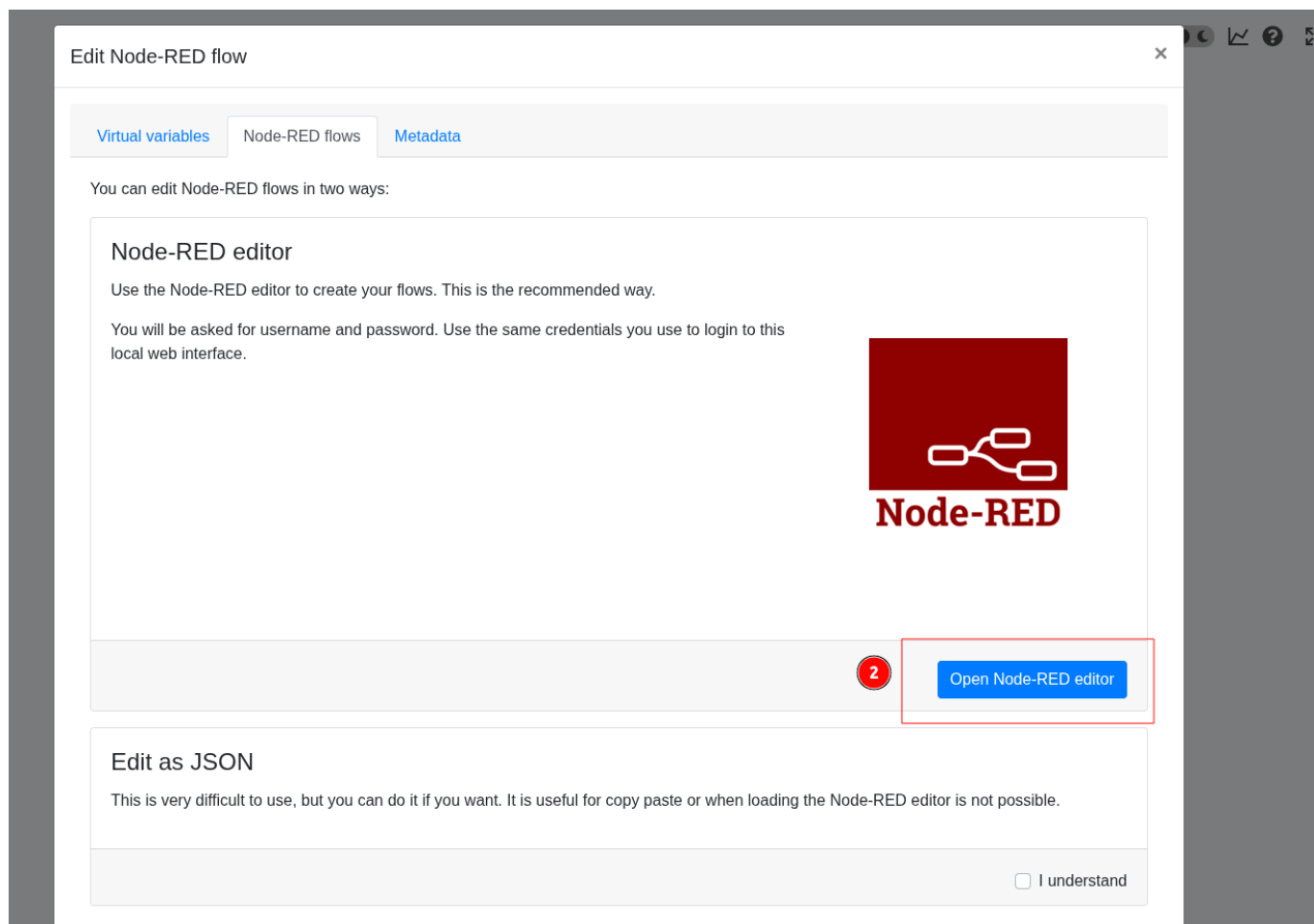
You can write values to the variables created in this section from the Node-RED flow using the `Write to virtual variable` node. At the startup of the AL300, the virtual variables created in this section have value `null`, unless they have been configured to be saved on the local memory of the gateway, as described here.

3.3.3.3.3 OPENING THE NODE-RED EDITOR

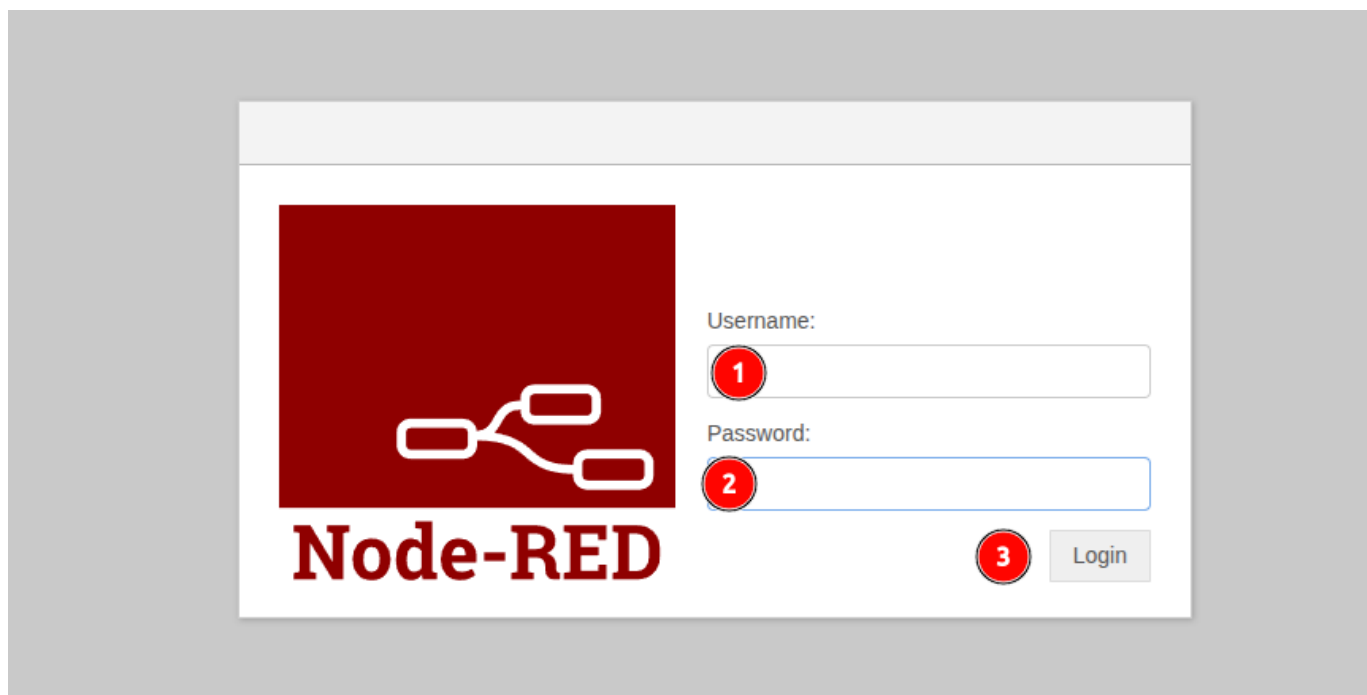
The Node-RED editor will be active after saving the data source. If the `Node-RED` source has not yet been saved, complete the next step, click on `Save` and then return to this section.



After saving, reopen the `Node-RED` source, open the `Node-RED flows` tab and click on `Open Node-RED editor`. You can access `Node-RED`, both locally and remotely through the cloud interface.



The Node-RED login page will then be displayed. Use the same credentials used to access the local interface of the AL300 gateway. The credentials used for the cloud web interface are not valid for access to Node-RED.



3.3.3.3.4 AVAILABLE OPTIMO IOT NODES

In the Node-RED editor, there are specific nodes available to interact with the AL300 gateway, in the **Variables** category. These nodes allow you to read variables configured in the gateway, write values to devices and update the virtual variables created in the **Node-RED** source.

The screenshot displays the Optimo IoT - Node-RED interface. On the left, the 'Variables' palette lists nodes: 'Read multiple variables' (1), 'Read single variable', 'Write to device', and 'Write to virtual variable'. Below this is the 'Manufacturing' section with 'common' nodes: 'inject', 'debug', 'complete', 'catch', 'status', and 'link in'. The central workspace, labeled 'Flow 1', contains a 'Read values' node (2). On the right, the 'help' panel (3) shows a search bar and a list of nodes under 'node-red-optimo-gw'. The 'Read multiple variables' node (4) is selected and highlighted. The 'Read multiple variables' (5) help panel provides a description: 'Read multiple variable from the Optimo IoT Gateway and outputs their values and timestamp in a structured payload defined by the user.' It also shows the 'Outputs' section with a 'payload' object containing an array of objects with properties: 'value' (various), 'timestamp' (number), and 'variable_id' (string).

In the side palette, the available Optimo nodes that can be used in the flows are:

- **Read multiple variables**: reads multiple variables configured in the gateway and returns values, timestamps and identifiers in a structured payload.
- **Read single variable**: reads a single variable configured in the gateway.
- **Write to device**: writes a value to a device or a variable compatible with writing.
- **Write to virtual variable**: updates a virtual variable created in the **Node-RED** source.

To add a node to the flow, drag it from the side palette to the workspace. By selecting a node, the **Help** panel shows the description of the node, the required inputs, the produced outputs and the structure of the payload.

To build the flows, you can also use the standard Node-RED nodes, such as input, processing, logic and debug nodes.

 Deploy and saving

After changes to the flow, you need to use `Deploy` inside Node-RED.

3.3.3.3.5 USEFUL NODE-RED LINKS

To learn more about using Node-RED:

- [Official Node-RED website](#)
- [Official Node-RED documentation](#)

3.3.3.4 Plug & Play drivers

Plug & Play drivers allow you to configure devices supported by the AL300 with a simplified procedure. For these devices, the gateway already knows the model, communication protocol, and list of available variables.

Compared to a generic driver, it is not necessary to manually enter registers, addresses, data types, or conversion formulas: simply select the device, configure the connection parameters, and choose which variables to acquire.

Supported devices

The list of available plug & play devices may vary depending on the firmware version and the license installed on the gateway.

Device selection

From the data sources page, locate the device to configure and click **Add**.



Plug & play devices are identified by the `plug&play` tag. Devices with different protocols may be available, such as `Modbus TCP`, `Modbus RTU`, `LoRaWAN`, or other protocols supported by the gateway.

Configuration

After selecting the device, the configuration window for the new source opens.

The configuration may include different tabs depending on the type of device, for example:

- **Documentation** : information and notes about the selected device
- **Connection** : communication parameters
- **Variables** : variables to acquire
- **Metadata** : name, description, and position of the source in the asset tree

In the **Connection** tab, enter the parameters required by the device, such as IP address, port, RS485 serial, Modbus ID, LoRaWAN EUI, or other data necessary for communication.

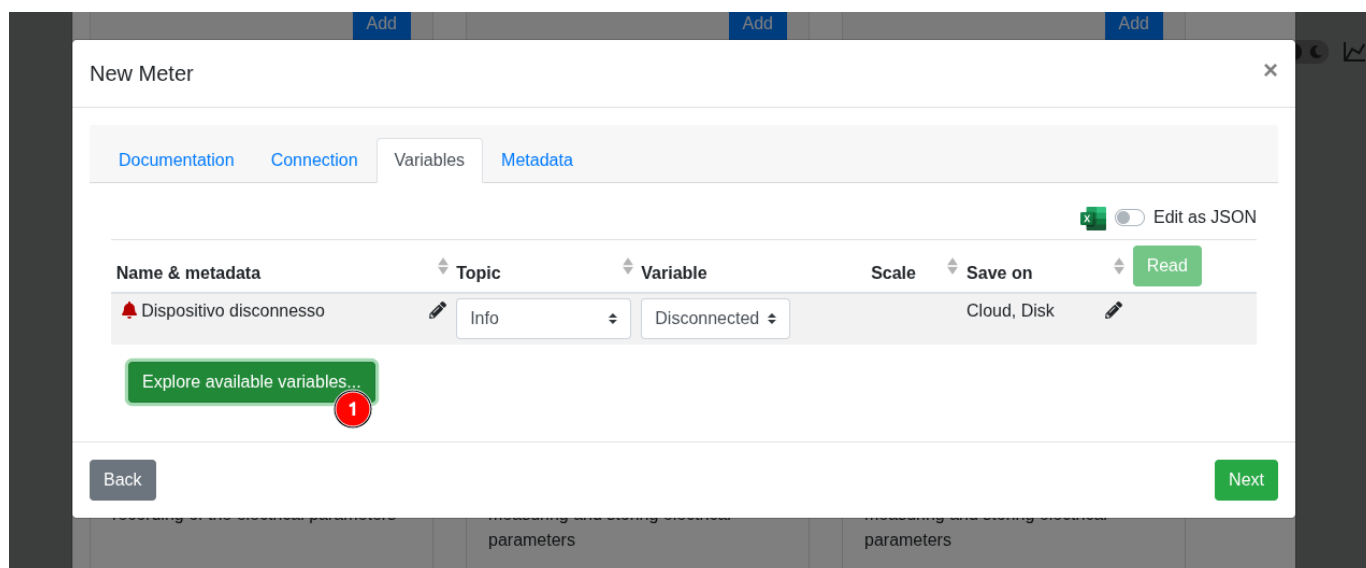
Connection parameters

The required parameters depend on the device model and the protocol used. Use the values indicated in the manufacturer's documentation or in the plant's network configuration.

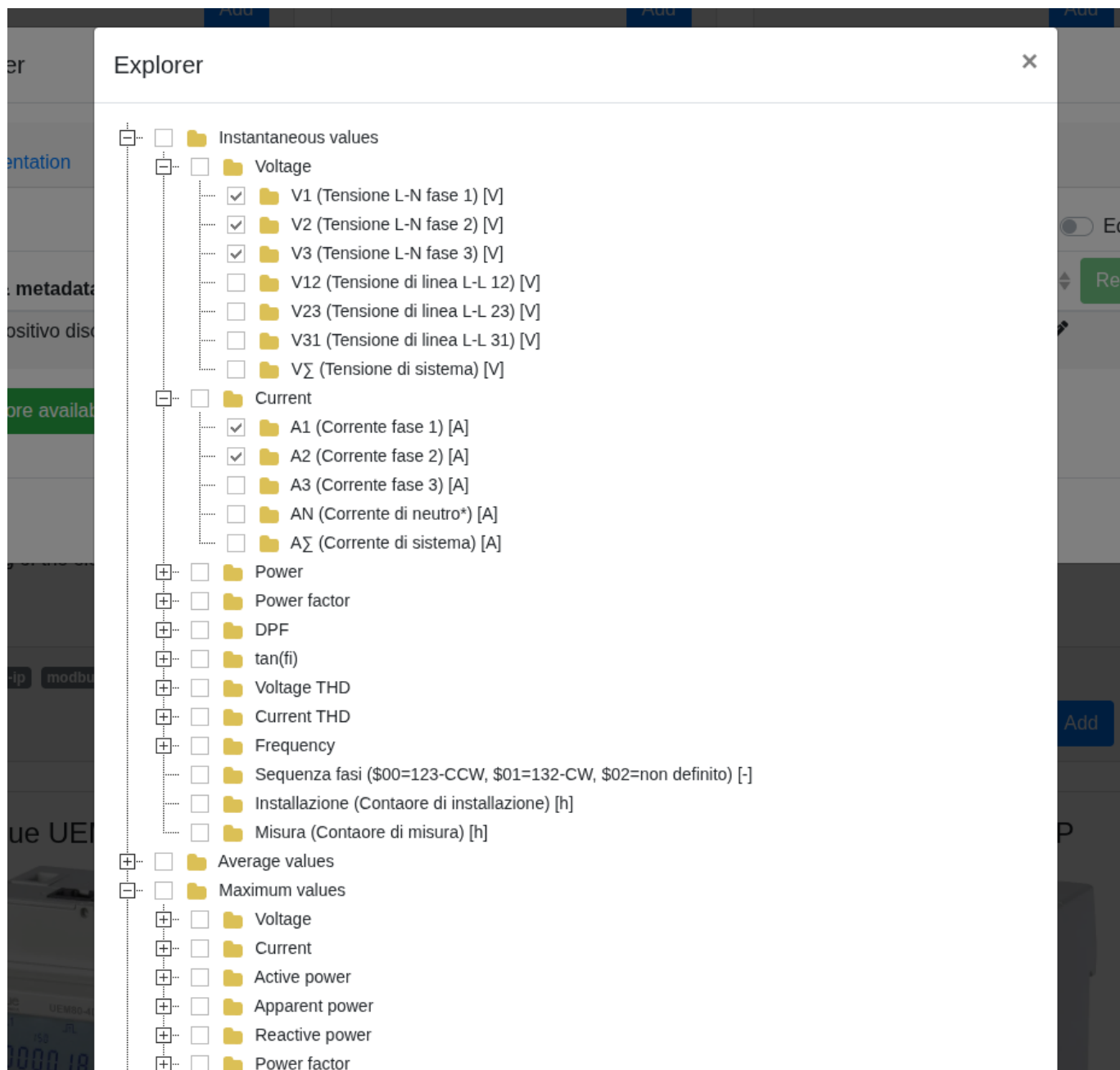
Variable selection

In the **Variables** tab, the **Device disconnected** status variable is already present, useful for monitoring the connection with the device. This variable cannot be deleted.

To add the variables supported by the driver, click on **Explore available variables...**



The **Explorer** opens with the tree of all available variables for that device, organized into logical groups.



Select the variables to acquire and confirm the selection. The chosen variables will be added to the source table.

For each variable, it is possible to complete or modify:

- Metadata
- Scale
- topic or category: within the variables made available by the device, the variable used
- Save options

Source metadata

Here you can give a name and an optional description to the data source. You can also indicate where to insert the data source within the device hierarchy. In this way, you can organize devices into logical groups (e.g. departments, production lines, buildings, etc).

Saving

Click on **Save** . Once the window is closed:

- if you are using the local web interface, the changes have been successfully applied
- if you are operating through the cloud, the configuration has been saved and placed in a sending queue. Until the configuration is applied, a  yellow triangle will be shown at the top of the AL300 configuration page.
 - if the AL300 is online, it is sent immediately to the AL300.
 - if the AL300 is offline, it will be sent when the connection is re-established.

3.3.3.5 Common settings

3.3.3.5.1 METADATA

Edit metadata

For each variable it is possible to specify additional metadata, which describes it in more detail. This metadata is optional and is useful to better characterize the variables and improve the creation and use of dashboards and data export. The available fields are explained below.

Metadati

Name *:

T ritorno ACS PdC

Description:

Additional parent groups:

✓

Select

Unit of measure:

°C

Variable type tag (comma separated):

return

Decimal places:

1

Minimum value:

Maximum value:

☐ Alarm variable

Cancel

OK

Name and description

The name is shown in the graphs and lists of variables. The description is optional and is shown as a tooltip when hovering over the variable name. Both can be up to 45 characters long.

Additional parent groups

Optional, for advanced users. It is possible to specify one or more additional parent `assets` for the variable. By default each variable is a child of the `asset` data source it belongs to. By specifying additional parent `assets`, the variable will also be associated with them. This allows you to organize the variables more flexibly and group related variables in one place even if they are acquired through different physical devices.

Unit of measure

Optional. Specify the unit of measure (without spaces). It is shown in the graphs and tables next to the variable value.

Tags

Optional, for advanced users. Used in the generation of dynamic templates to classify variables.

Decimal places

Optional. Specifies the number of decimal places to show in graphs and tables. If not specified, all decimal places are shown.

Minimum and Maximum

Optional. Specifies the start and end of the variable scale. Used in some graphical widgets to define the range of values shown.

Alarm

Specifies whether the variable is an alarm variable. For alarm variables, it is possible to configure the reception of notifications upon activation.

You can specify:

- **Name** . Usually it is the same as the variable name. In case the logic of the variable is reversed, it is possible to specify a different name for the alarm (e.g. variable name: "Operation OK", alarm name: "Operation NOT OK"). This name will be shown in notifications.
- **Description** . Optional, as for **Name**
- **Level** : allows you to indicate the severity level of the alarm. The available levels are 1 (not severe) and 2 (severe). The level determines the graphical rendering of the alarm in dashboards and notifications.
- **Alarm logic** : allows you to specify whether the alarm is considered active if the variable value is **truthy** (1, true, numbers > 0, etc) or **falsy** (0, false).
- **Acknowledgeable** : if enabled, the alarm can be manually acknowledged by the user, to keep track of already examined alarms.

☒ Alarm variable

Name:

Bassa T ai rubinetti

☒ Same as variable

Description:

☒ Same as variable

Level:

1

☒ Alarm is active when variable value is different from 0

☒ Acknowledgeable

Cancel

OK

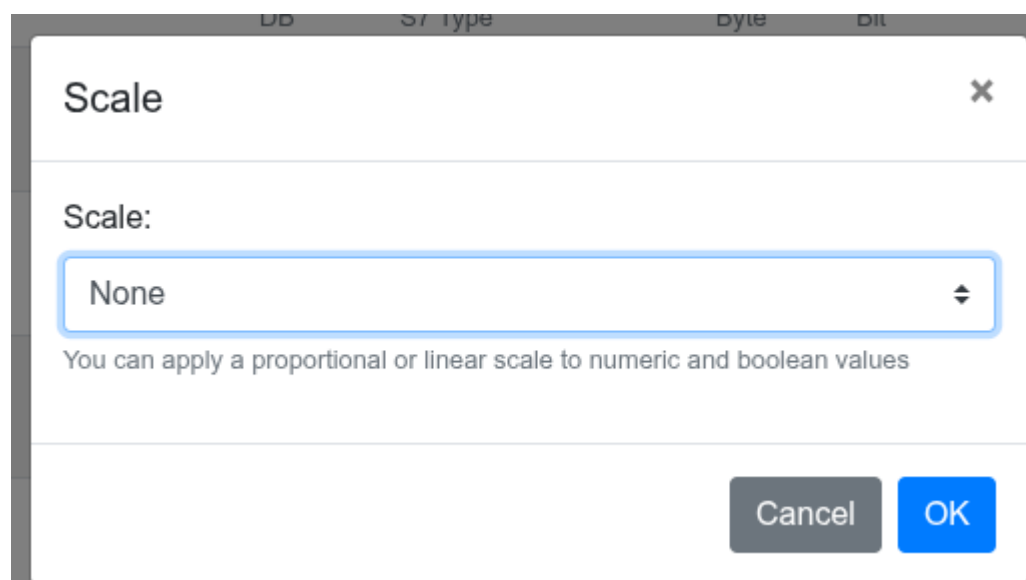
3.3.3.5.2 SCALE

Value scaling

It is possible to specify a linear transformation of the value acquired from the variable. The following options are available:

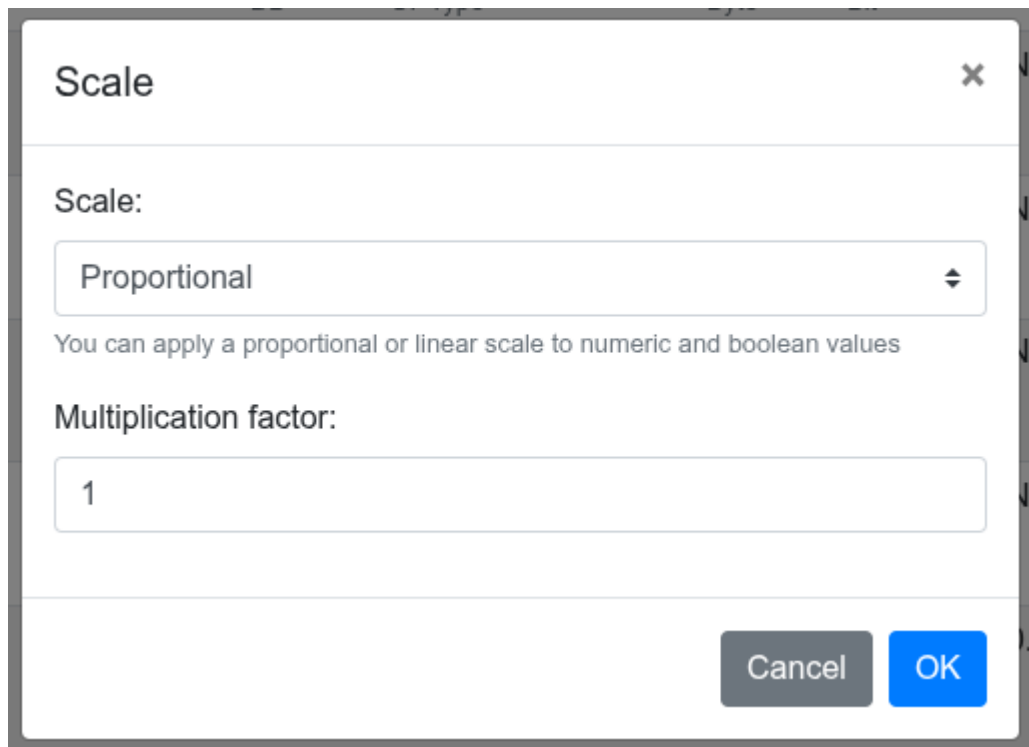
- None: the acquired value is used as is
- Proportional: the acquired value is multiplied by a scale factor
- Linear interpolation: the acquired value is transformed through a linear interpolation function defined by multiple points

None



The screenshot shows a dialog box titled "Scale" with a close button (X) in the top right corner. Below the title, there is a label "Scale:" followed by a dropdown menu. The dropdown menu is open, showing the option "None" selected. Below the dropdown, there is a hint text: "You can apply a proportional or linear scale to numeric and boolean values". At the bottom right of the dialog, there are two buttons: "Cancel" and "OK".

Proportional



The image shows a 'Scale' dialog box with a close button (X) in the top right corner. It contains a 'Scale:' label followed by a dropdown menu currently set to 'Proportional'. Below this is a text instruction: 'You can apply a proportional or linear scale to numeric and boolean values'. Then, there is a 'Multiplication factor:' label followed by a text input field containing the number '1'. At the bottom right, there are two buttons: 'Cancel' and 'OK'.

Scale ✕

Scale:

Proportional ⬆️⬆️

You can apply a proportional or linear scale to numeric and boolean values

Multiplication factor:

1

Cancel OK

Linear interpolation

Scale [Close]

Scale:

Linear [Dropdown]

You can apply a proportional or linear scale to numeric and boolean values

Interpolation points:

Input	Output	
0	5	[Remove]
1	10	[Remove]

[Add point]

Out of range values:

Pick the nearest point value [Dropdown]

[Cancel] [OK]

For each variable value (column **Input**), it is possible to specify the corresponding value after scaling (column **Output**). It is possible to add and remove points (at least two are necessary).

It is possible to specify what to do for values outside the specified range:

- **Clamp** : values outside the range are brought to the specified minimum or maximum value
- **Extrapolate** : values outside the range are calculated through the equation of the line defined by the two closest points
- **Ignore** : values outside the range are considered null

3.3.3.5.3 SAVE OPTIONS

Data sinks

For each data sink it is possible to specify one or more save triggers. The always available data sinks are:

- Local: data is saved in the internal memory of AL300
- Optimo Cloud: data is sent to the Optimo cloud

Save triggers

To add a trigger, click on `Add trigger`.

Save/send values ✕

Optimo Cloud **Local disk**

Trigger list

All of these triggers cause the value to be saved/sent

Add some triggers to save/send values to this data destination

Add trigger

Cancel **OK**

Each trigger can be activated by different conditions, can have a rate limiter and can be subject to particular conditions.

- Trigger name: arbitrary, used only in this configuration page.
- On change: the trigger is activated when the value of a variable changes. The variable can be the same variable associated with the trigger or one or more arbitrary variables. Useful for booleans and setpoints.
- On positive change: the trigger is activated when the value of a variable changes from a `falsey` value (e.g. `0`, `false`, etc) to a `truthy` value (e.g. `1`, `true`, numbers > 0 , etc). The variable can be the same variable associated with the trigger or one or more arbitrary variables. Useful to save on activation of one or more alarms
- On delta: the trigger is activated when the value of a variable changes by more than a threshold compared to the last saved value. The threshold can be specified as a percentage of the absolute value or as a percentage of the variable scale range
- Periodically: the trigger is activated at regular time intervals (e.g. every 5 minutes) expressed in seconds. If you use numbers that are divisors of the minute / hour / day (e.g. 60, 300, 900, 3600, 86400) the trigger will be aligned to standard time intervals (e.g. every exact hour, every day at midnight, etc)
- Skip null values: if enabled, the trigger will not be activated if the variable value is `null`
- Log trigger reason: for advanced users. If enabled, every time the trigger is activated, in addition to the variable value, the reason for the trigger activation is also saved (e.g. "change", "delta", etc).
- Rate limiter: for advanced users. Allows you to limit the maximum frequency of trigger activation. Useful to avoid too frequent saves in case of very "noisy" variables. For example, you can limit the trigger to 3 activations per hour.
- Condition: for advanced users. Allows you to specify a condition on the value of another variable that must be true for the trigger to be activated. Supported conditions are: equal to, not equal to, greater than or equal to. Useful to save data only when a particular event is active (e.g. an alarm).

Save/send values

Optimo Cloud

Local disk

Trigger list

All of these triggers cause the value to be saved/sent

- trigger1

Trigger name

 - ☒ On value change
 - Trigger when

this variable

 changes
 - ☐ On positive value change
 - ☐ When, since the last save/send, the variable
 - ☐ At time interval

☐ Skip null values

Log trigger reason: No

Rate limiters: +

☐ Condition

Add trigger

Cancel

OK

3.3.3.5.4 BULK CONFIGURATION

To modify the list of variables of a configured data source, you can use:

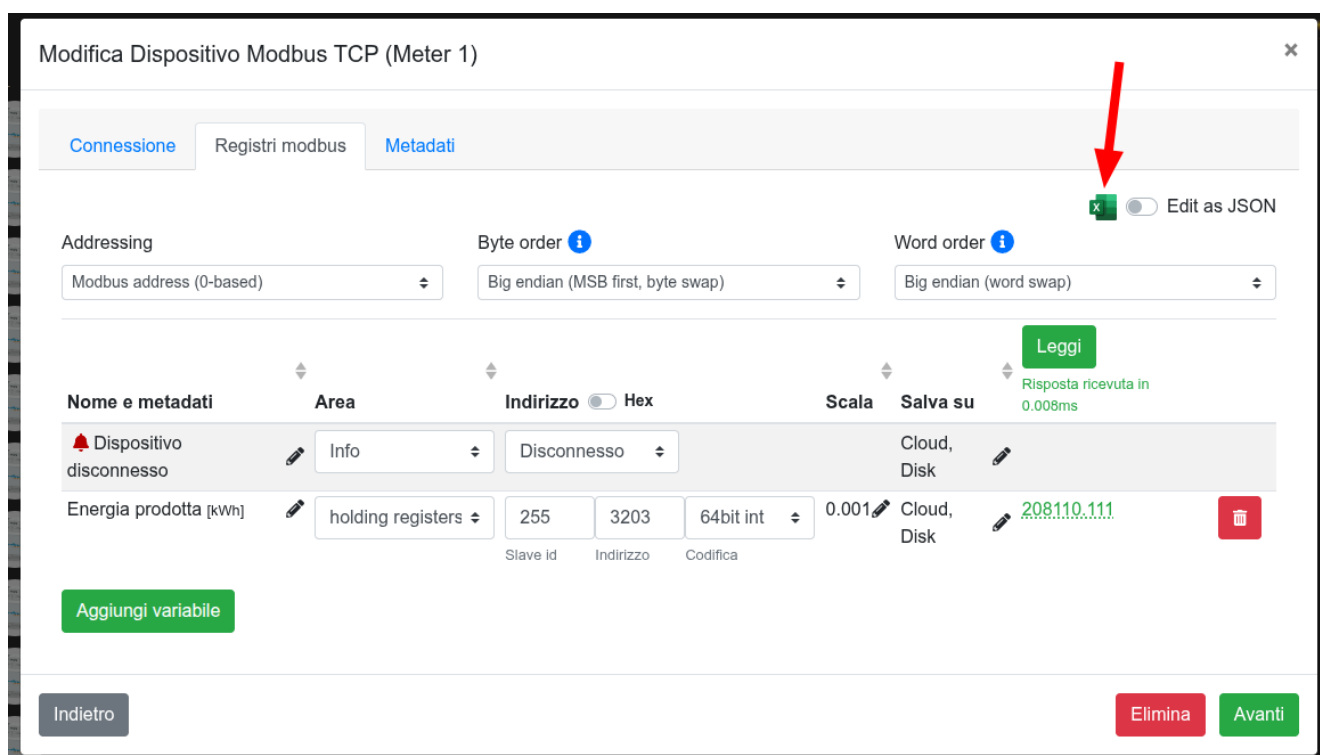
- Excel/Spreadsheet: copy the table of variables into a spreadsheet, modify it and paste it back into the web interface
- JSON: directly modify the configuration structure in JSON format

Note

This is useful for advanced users or when working with many variables. We always recommend entering two or three variables manually before proceeding with bulk modification, in order to have reference examples to start from.

Edit with Excel/Spreadsheet

1. Click on the  Edit with Excel icon



2. Click on  Copy to clipboard to copy the table of variables

Modifica con Excel

Consiglio: aggiungi un po' di variabili con l'interfaccia grafica e usa Excel solo per modifiche massicce o per replicare variabili simili

1. Clicca qui per copiare la tabella: 
2. Incolla su un foglio Excel vuoto
3. Modifica le variabili su Excel. Ecco alcune cose da tenere in considerazione:
 - Non modificare le intestazioni delle colonne
 - Le colonne senza nome (metadata/name) verranno ignorate
 - Non modificare il contenuto della colonna variable_id. L'ID della variabile deve essere univoco. Quando aggiungi nuove variabili lascia il campo vuoto: verrà generato automaticamente un nuovo ID
4. Copia la tabella modificata da Excel
5. Incolla la tabella qui:

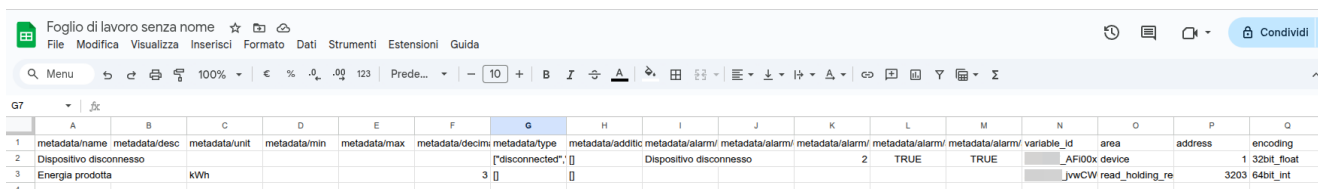
Incolla qui

Cancel

OK

3. Paste the table into a spreadsheet (Excel, LibreOffice Calc, Google Sheets, etc) and modify it according to your needs. Some things to keep in mind:

- Do not modify the column headers
- Rows without a name (metadata/name) will be ignored
- Do not modify the content of the variable_id column. The variable ID must be unique. When adding new variables, leave the field empty: a new ID will be generated automatically



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	metadata/name	metadata/desc	metadata/unit	metadata/min	metadata/max	metadata/decim	metadata/type	metadata/additc	metadata/alarm/	metadata/alarm/	metadata/alarm/	metadata/alarm/	metadata/alarm/	variable_id	area	address	encoding
2	Dispositivo disconnesso						["disconnected"; []		Dispositivo disconnesso		2	TRUE	TRUE		_AFI00x device		1 32bit_float
3	Energia prodotta	kWh				3									_jvwCW read_holding_re	3203	64bit_int
4																	

4. Copy the modified table from the spreadsheet (select the entire sheet and press **CTRL+C**) and paste it into the indicated space

Modifica con Excel

Consiglio: aggiungi un po' di variabili con l'interfaccia grafica e usa Excel solo per modifiche massicce o per replicare variabili simili

1. Clicca qui per copiare la tabella: 
2. Incolla su un foglio Excel vuoto
3. Modifica le variabili su Excel. Ecco alcune cose da tenere in considerazione:
 - Non modificare le intestazioni delle colonne
 - Le colonne senza nome (metadata/name) verranno ignorate
 - Non modificare il contenuto della colonna variable_id. L'ID della variabile deve essere univoco. Quando aggiungi nuove variabili lascia il campo vuoto: verrà generato automaticamente un nuovo ID
4. Copia la tabella modificata da Excel
5. Incolla la tabella qui

Incolla qui

CancelOK

5. Review the new variables listed, resolve any errors and confirm.

Modifica con Excel

Nome	Tipo	Errori
Dispositivo disconnesso	Esistente	
Energia prodotta	Esistente	
Energia esportata	Nuovo	

Cancella e incolla di nuovo

CancelOK

6. The inserted/modified variables will now be visible in the variable table of the data source.

Modifica Dispositivo Modbus TCP (Meter 1)

Connessione

Registri modbus

Metadati

Addressing

Modbus address (0-based)

Byte order

Big endian (MSB first, byte swap)

Word order

Big endian (word swap)

Nome e metadati

Area

Indirizzo

Scala

Salva su

Dispositivo disconnesso

Info

Disconnesso

Cloud, Disk

Energia prodotta [kWh]

holding registers

255320364bit int

0.001

Cloud, Disk

Energia esportata [kWh]

holding registers

255320764bit int

0.001

Cloud, Disk

Aggiungi variabile

Indietro

Elimina

Avanti

 **Tip**

If you are configuring several data sources from which you always acquire the same variables (e.g. multiple Modbus meters with the same registers), you can create an Excel/Spreadsheet file with the variable table starting from the first one configured. Remember to delete the content of the `variable_id` column cells. For each additional source, you just need to paste the same Excel file. This way you save time and reduce the risk of configuration errors.

3.3.4 Sinks

3.3.4.1 Intro

3.3.4.1.1 INTRODUCTION

We call data sinks the final destinations of the data acquired by AL300.

3.3.4.1.2 SUPPORTED SINKS

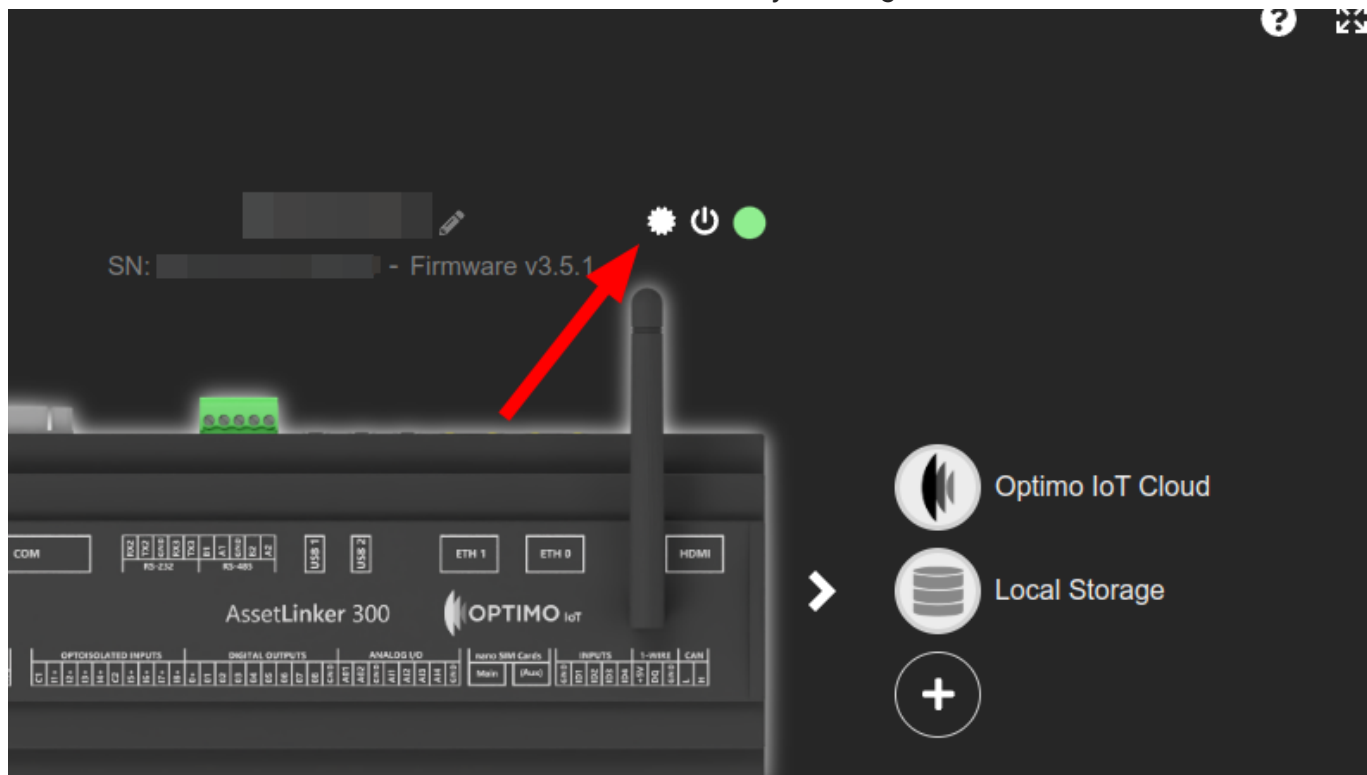
AL300 supports the following data sinks:

- **Optimo IoT Cloud:** sends data to the Optimo IoT cloud
- **Local storage:** saves data in the internal memory of the AL300. This data can be:
 - exported or viewed locally
 - queried through SQL clients
- **OPC UA Server:** expose data through an integrated OPC UA server
- **Modbus TCP Server:** expose data through as Modbus TCP server

3.3.5 License

3.3.5.1 Introduction

Starting from firmware version v3.5.0, a licensing system has been introduced for the use of data sources. You can check the status of the licenses used by clicking on the button:



A summary is shown that represents the current situation:

License

Summary

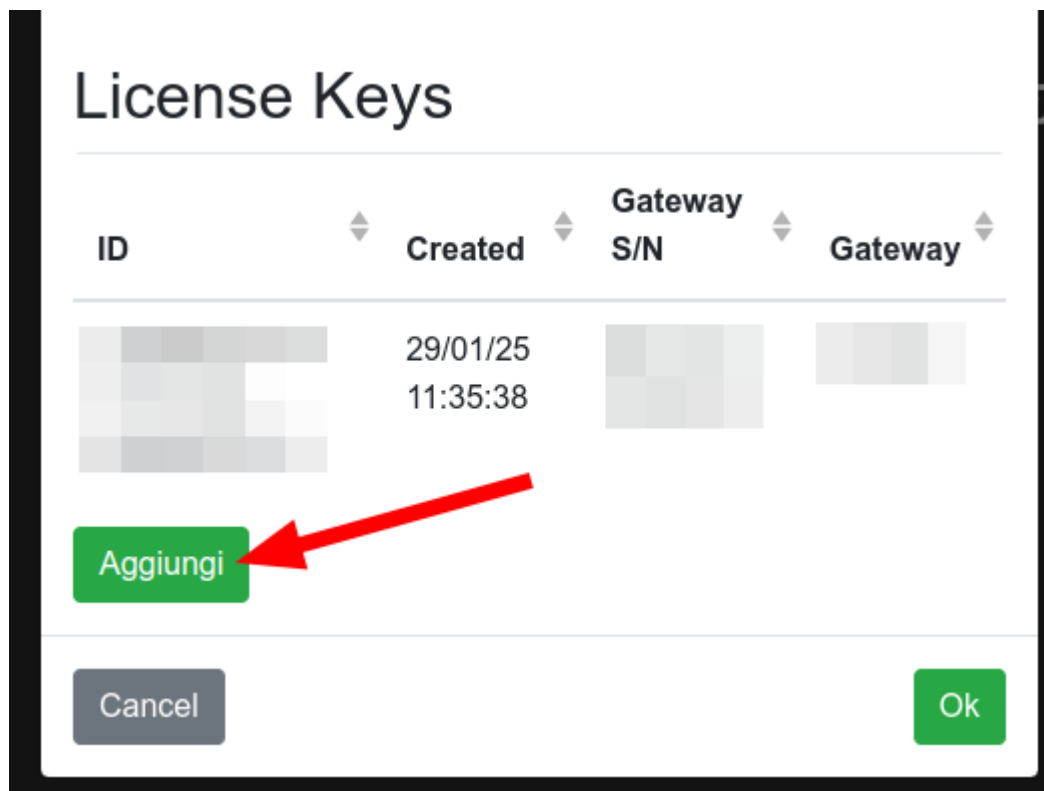
Name	Used	Available
Additional generic devices 10 variables blocks	11	13
Additional plug'n'play devices	0	3
Node-RED	0	0
	0	0
	0	0
LoRaWAN	0	0

License Keys

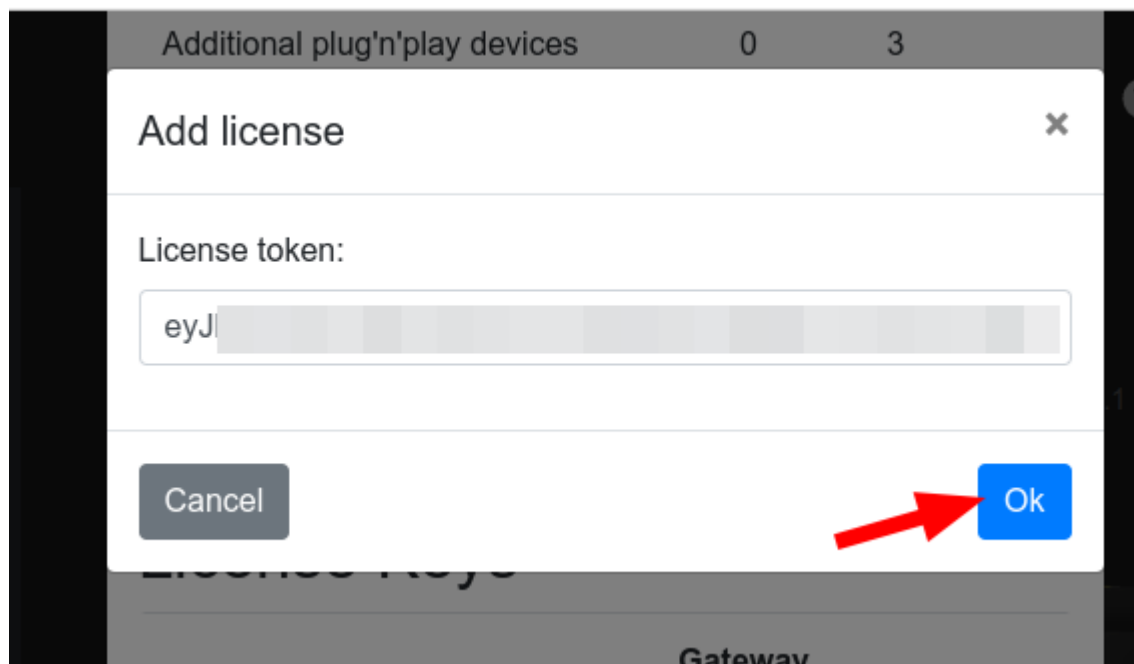
To meet the required requirements (column **Used**), you can add one or more license tokens. License tokens are provided by Optimo IoT. To request a new token, write to info@optimoiot.it.

3.3.5.2 Adding a license token

You can add a token provided by Optimo IoT both in the cloud and locally by clicking on **Add** :



Paste the token provided by Optimo IoT, click **Ok** and then **Save** :



3.4 Firmware upgrade

It is possible to update the gateway firmware in 3 ways:

1. remotely (OTA) through the Optimo cloud platform
2. connecting through the local network to the gateway
3. physically accessing the gateway and inserting a USB stick

To use methods 2 and 3, you need to download the update package from the cloud platform, as described in the dedicated section.

3.4.1 1. OTA update

Follow the procedure described in the Cloud section

3.4.2 2. Upload via local web interface

- connect to the local network of the gateway (WiFi or ethernet)
- visit the page `http://<<gateway IP address>>:8085/` (e.g. `http://10.10.10.10:8085/`)
- click on the white box and select the update package

3.4.3 3. Upload through a USB mass storage

- copy the update package to a USB mass storage (N.B.: it is important that the file is in the main folder of the storage device, and **not** in a subfolder)
- insert the mass storage into any of the two USB ports of the gateway
- wait 5 minutes
- remove the mass storage from the USB port

3.5 Factory reset

Starting from firmware version 3.4.1 it is possible to reset the device to factory settings.

 Warning!

This procedure resets all settings (network, devices, credentials) to factory settings and irreversibly deletes all acquired data (time series, alarms, etc)

1. create, in the root folder (not in a subfolder) of a USB stick an empty file called `DANGER_factory_reset_START.txt`
2. power off the AL300 (alternatively, turn it off with the Power button)
3. insert the USB stick into one of the two USB ports of the AL300
4. power on the AL300 (alternatively, turn it on with the Power button)
5. AL300 will detect the configuration file, perform a reset and reboot. At the end of the procedure you can access the Web UI again using the IPs and credentials contained in the original package

3.6 Buttons & leds

3.6.1 Power LED

In this table the meaning of the LED incorporated in the front button is reported: | Power LED | UPS status | System status | | ----- |

----- -----			
250 ms off, 250 ms on	The UPS is charging	OFF	Always on
The UPS is charged	ON	250 ms off, 100 ms on	External power failure detected. After 0.5 seconds in the absence of external power, the controlled shutdown of the system begins
ON	900 ms off, 100 ms on	Shutdown in progress. The UPS is discharging	ON
Always off	Charging or discharging. Not in use	OFF	

3.6.2 Physical buttons

3.6.2.1 Power

The front button is not generally useful. If pressed for two seconds, it turns off the Gateway in a controlled manner without the need to turn it off. When the Gateway is turned off in this way to start it later **it will be necessary to press the front button again** (turning it off and on again will not start it)

3.6.2.2 Reset

The reset button is not generally useful. It can be pressed with a needle through the small hole in the case and is only used to immediately remove power from the system (bypassing the UPS and instantly shutting down the system **in an uncontrolled way**)

3.7 Onboard I/O

3.7.1 I/O on board

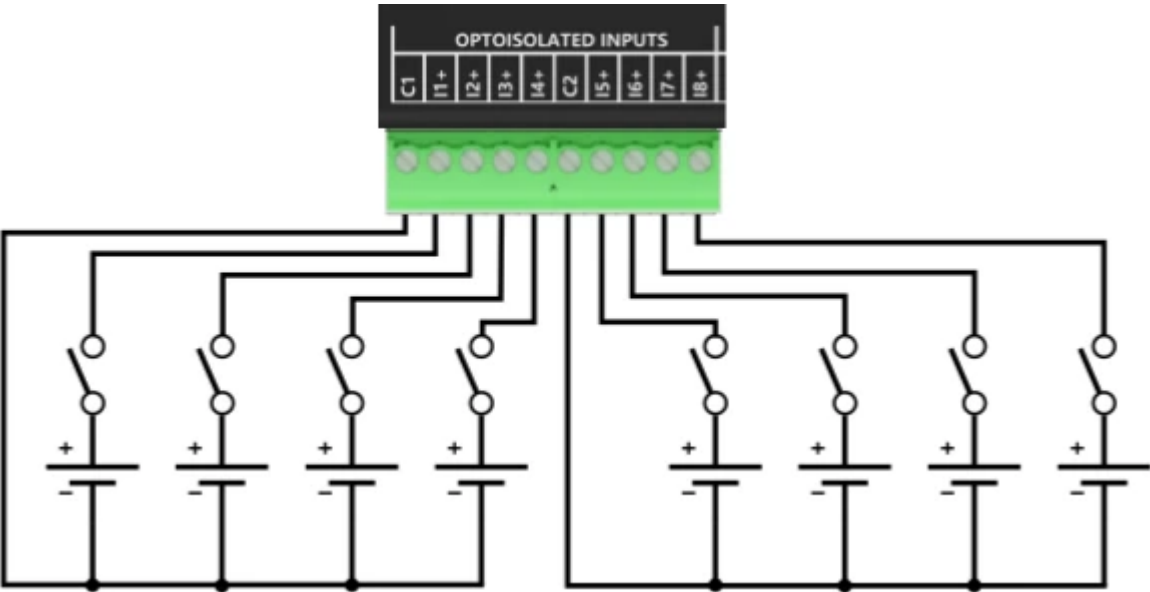
AL300 provides:

- Digital I/O:
 - 8 optoisolated digital inputs
 - 4 dry contact digital inputs
 - 8 digital outputs
- Analog I/O:
 - 4 0-10V analog inputs
 - 2 0-10V analog outputs

3.7.2 Digital inputs and outputs

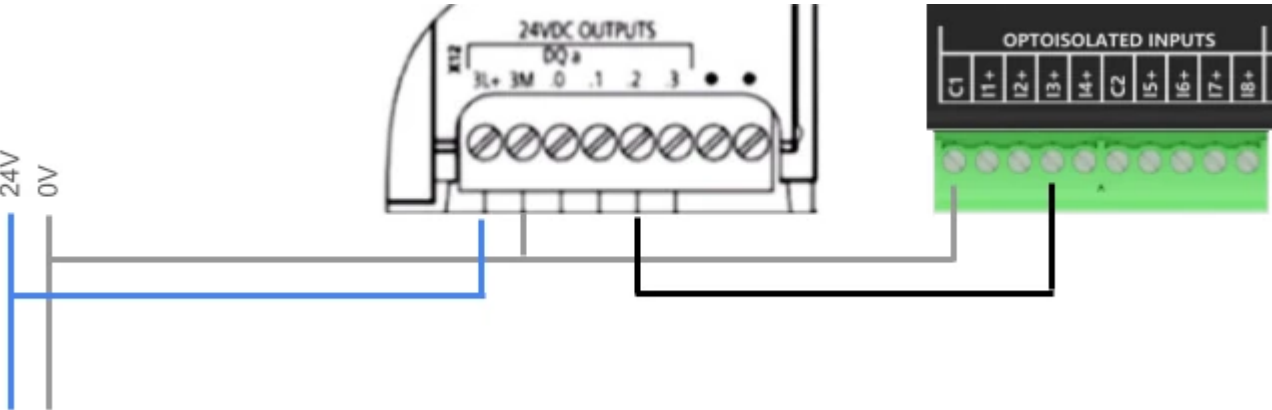
Digital inputs can be used as pulse counters. The minimum pulse duration and the minimum period between one pulse and the next are 10-50 milliseconds, depending on the number of monitored inputs and the overall load of the AL300.

3.7.2.1 Optoisolated inputs

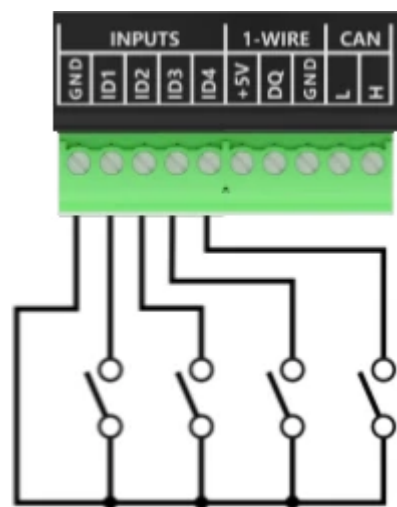


Parameter	Value
Quantity of inputs	8
Low-level input voltage	0 - +5 V DC
High-level input voltage	+10 ... +28 V DC
Isolation voltage	5 kV RMS
Input resistance	>=10kOhm

3.7.2.1.1 EXAMPLE OF CONNECTION TO SIEMENS S7-1200 CPU (1214C)

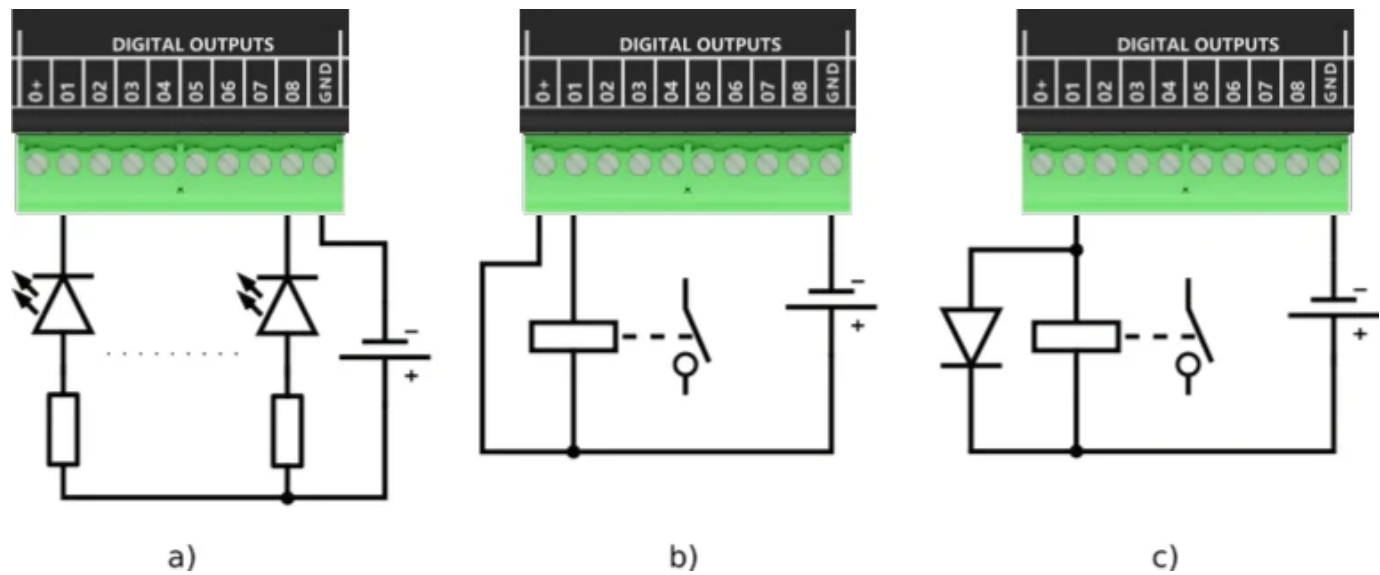


3.7.2.2 Dry contact inputs



3.7.2.3 Digital outputs

AL300 has 8 open-collector digital outputs. This figure shows the recommended connection of LEDs (a) and relays (b,c) to the open-collector outputs. The internal diodes protect the output transistors from transient voltage spikes (b). In the case of long cables to the relay, the connection with an external diode is recommended (c).



Parameter	Value
Quantity of outputs	8
Maximum current	500 mA
Maximum voltage	28 V DC

3.7.3 Analog inputs and outputs

AL300 has 4 0-10V analog inputs and 2 0-10V analog outputs.

4. Cloud

4.1 Dashboard cloud

4.1.1 Login

After an administrator user has created your account, open cloud.optimoiot.it to log in for the first time.

If you have not logged in yet or if you have forgotten your password, you can click on the *Forgot password* button to recover it. You will be asked to enter the email address with which the administrator registered you, on which you will then receive a confirmation code.

4.1.2 Navigation

You can navigate using the left menu, expanding the tree of pages

4.1.3 Top bar

Through the top bar, you can access several additional features: (image)

4.1.3.1 Data export



You can export the recorded data in raw or aggregated form, with different formats. By clicking on the button shown, the following steps are proposed:

1. select the devices for which to export the data in the tree
2. filter the variables by unit of measure
3. choose the variables to export among those previously filtered
4. set the type of aggregation and the output format

4.1.3.1.1 AGGREGATION

The raw data can be acquired at variable frequencies (e.g. every minute, every quarter of an hour or on change). You can export the raw data, as they are in the database, by selecting "None" as the type of aggregation.

On the other hand, it can be useful to export some elaborations made on this data, aggregated by a defined time step (e.g. hour, day, week, month).

The types of aggregation are various and selectable from the drop-down menu. By selecting one, a brief description is shown that explains how it works.

4.1.3.1.2 FILE TYPE

You can choose between:

- Simple: a single csv file, recommended for most exports
- Structured: a compressed zip file that contains several csv files. Recommended for massive exports of many variables over extended time intervals (e.g. years, especially if not aggregated)

4.1.3.1.3 ADVANCED SETTINGS

You can choose different options, including the date and time format (and time zone), the decimal separator (comma or point) and the type of csv file

4.2 Periodic reports

The **Optimo IoT** platform allows you to create periodic reports in PDF format and automatically send them via email. Each report is associated with an asset, a periodicity, and a content configuration composed of widgets.

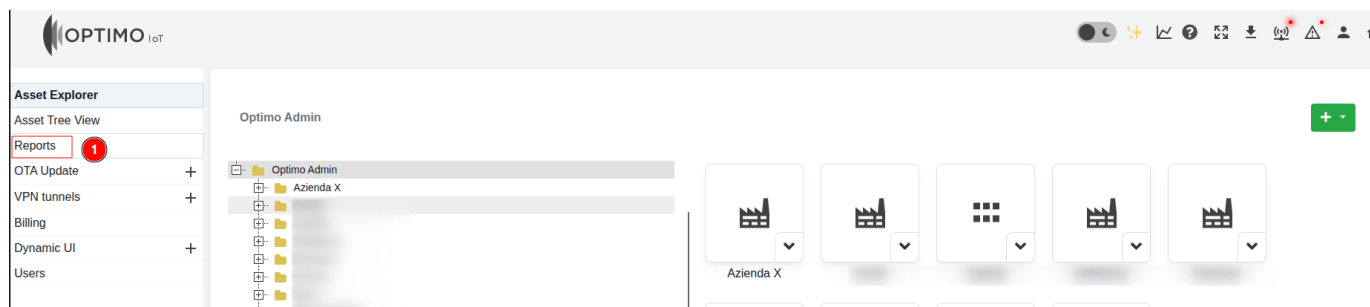
This function is useful for receiving recurring summaries, such as weekly or monthly reports with charts, indicators, and synthetic data related to a plant, a building, or a production line.

Availability

The **Reports** function is only available in the cloud web interface. It is not available in the local gateway interface.

4.2.1 Opening

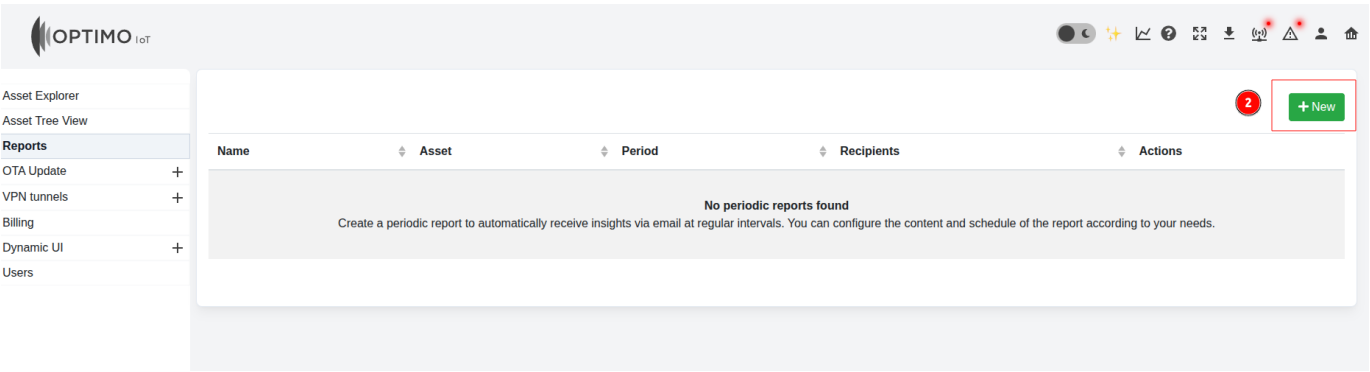
To open the reports page, enter the configuration environment and select the **Report** item from the side menu.



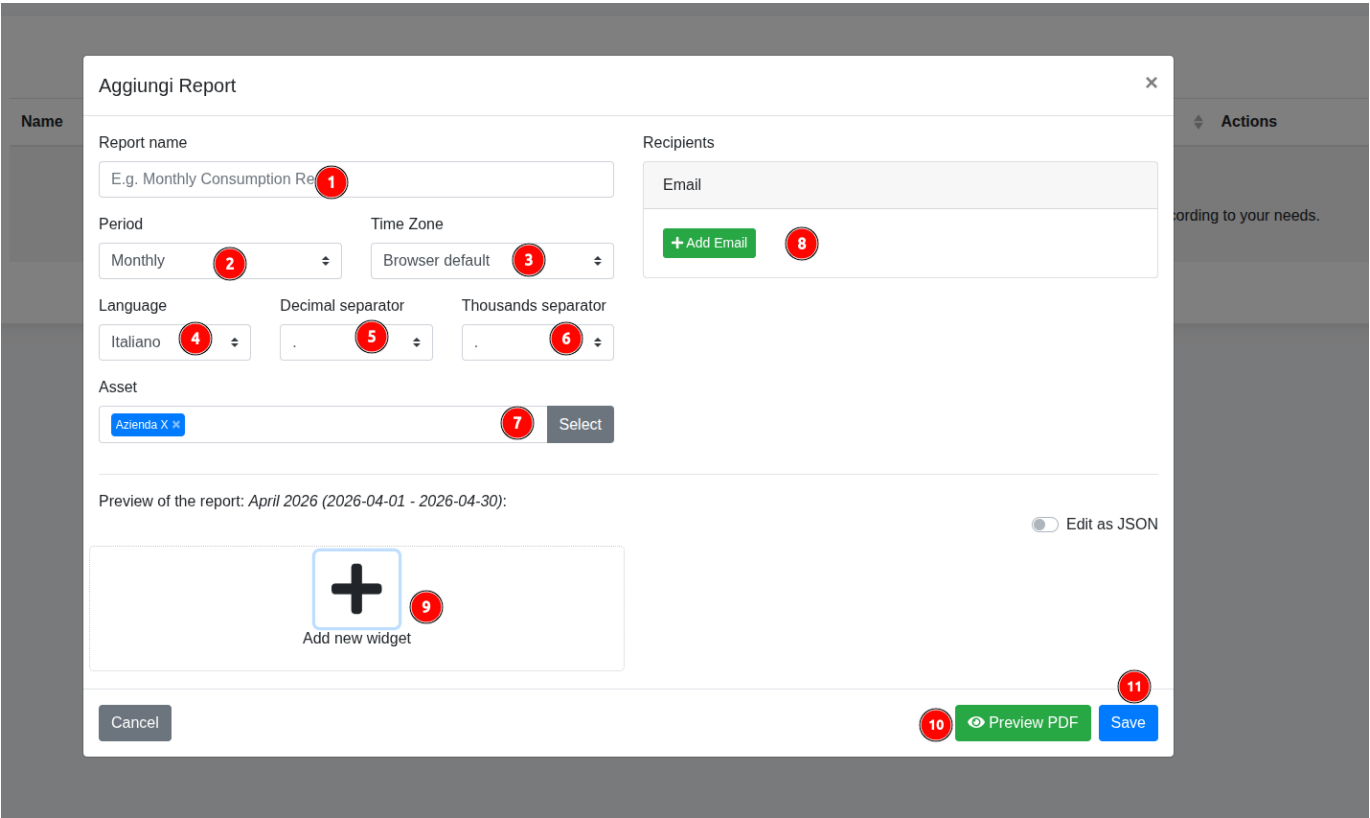
4.2.2 Creating a new periodic report

The page shows the list of already configured periodic reports. If there are no reports, an informative message is displayed.

To create a new report, click on **New**.



The **Add Report** window opens, where you can configure the main settings of the report.



4.2.3 Configuration

The main fields are:

- **Report name** : name of the report, used to identify it in the list and as a header of the generated PDF.
- **Period** : frequency of report generation.



Report time interval

The selected period determines how often the report is generated and sent. The content of the PDF refers to the time interval corresponding to the chosen periodicity. For example, the report generated on February 1st with **Monthly** periodicity will contain data from January.

- **Time Zone** : time zone used to determine the report period and to show dates in widgets.
- **Language** : language used in the generated PDF.
- **Decimal separator** : decimal separator of numeric values.
- **Thousands separator** : thousands separator.
- **Asset** : asset to which the report is associated. It determines the data that the report can access and the users who can modify it.
- **Recipients** : email addresses that will receive the report. Click on **Add Email** to add one or more recipients.

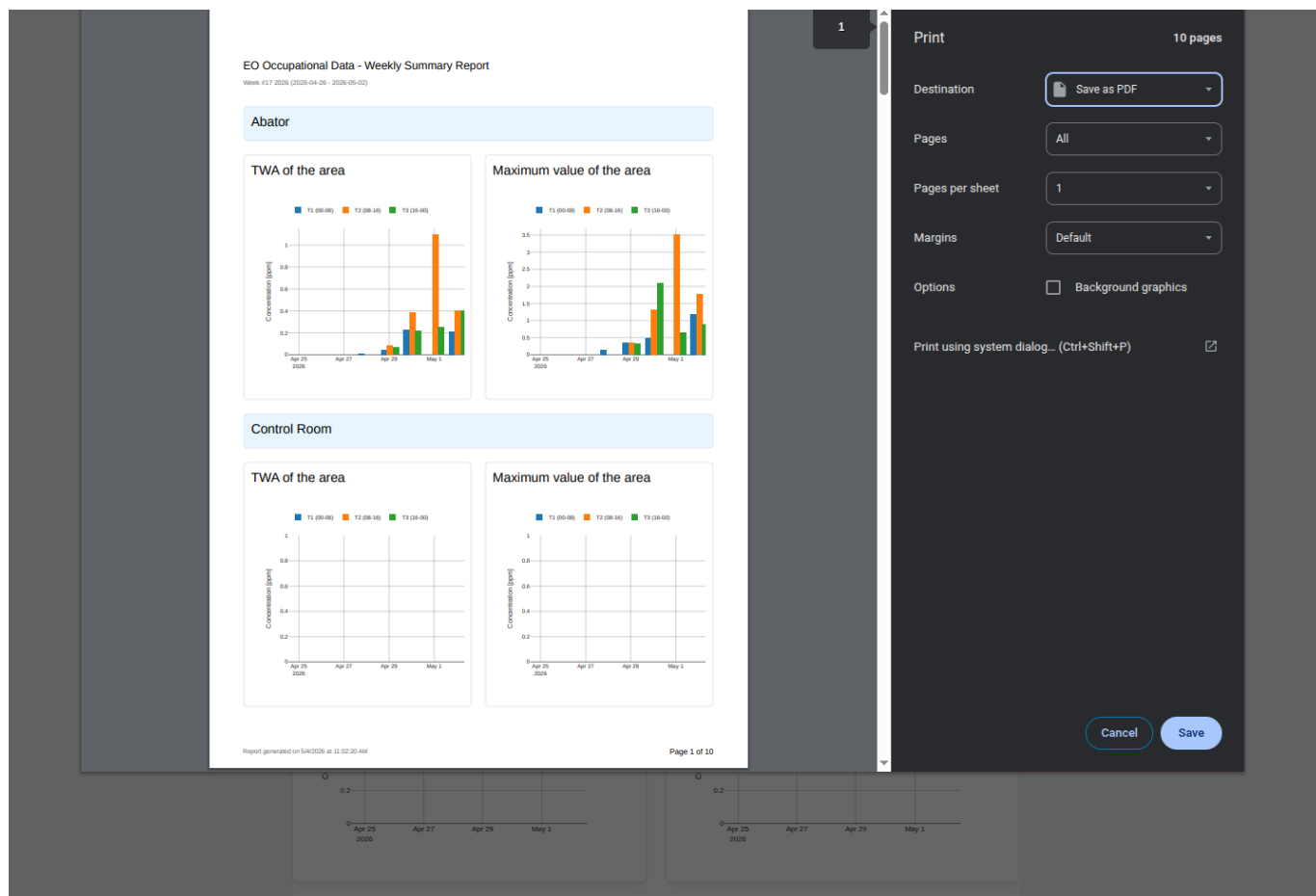
4.2.4 Report content

At the bottom of the window, the preview of the report structure is shown. To add content, click on **Add new widget**.

The widgets allow you to define what will be included in the PDF, such as charts, values, or summaries. The configuration of the widgets follows the same logic as the components available in the dashboards.

4.2.5 PDF preview

Before saving the report, you can click on **Preview PDF** to generate a preview.



The preview allows you to check:

- report layout
- title and period shown in the PDF
- insertion of widgets and their configuration
- correct display of charts, values, and summaries
- number of pages generated

If the preview is not correct, close the preview, modify the report or widget configuration, and generate the PDF again.



Preview limitations

In the preview, the language, time zone, decimal separator, and thousands separator are not applied. To verify that these parameters are correct, you need to save the report and wait for the PDF generation according to the configured periodicity, or temporarily change the periodicity to generate a test PDF immediately.

4.2.6 Saving

When the configuration is complete, click on **Save**.

After saving, the report is added to the list of periodic reports and will be generated automatically according to the configured frequency.

4.2.7 Modifying a report

From the list of reports, you can manage the already created reports through the available actions in the table.

From here you can open an existing report, modify its configuration, update recipients and content, or delete it if it is no longer needed.

4.3 Notifications

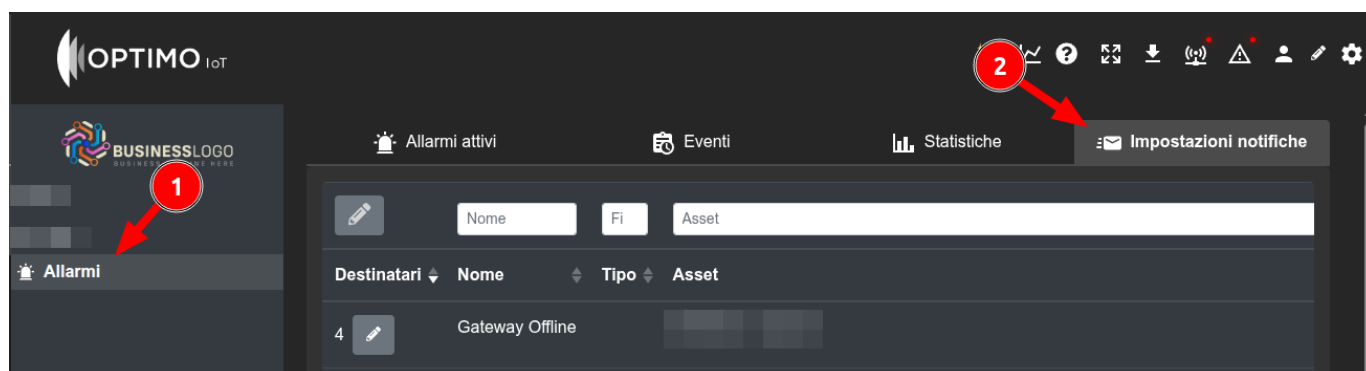
Optimo IoT can send email or SMS notifications when alarm variables are triggered.

Alarm variables can be:

- connection status variables (e.g. Gateway connected to cloud, Modbus device connected to gateway, etc)
- status variables acquired from sensors and devices (e.g. heat pump alarm) (see Configuration of alarm variables)
- virtual variables processed periodically by the cloud platform (e.g. daily average temperature above a threshold)

To modify the notification settings, you need to be a user with administrator privileges.

Access the alarm page from the left menu of the dashboard:



4.3.1 Configuration for single alarm variable

Choose the row in the table corresponding to the alarm variable of interest and click on the pencil icon to open the edit window.

Impostazioni notifiche per Gateway Online

Email

Nessuna notifica via email configurata

[+ Aggiungi indirizzo email](#)

I messaggi email sono limitati per destinatario [i](#)

SMS

Nessuna notifica via SMS configurata

[+ Aggiungi numero di telefono](#)

Gli SMS sono limitati per destinatario [i](#)

Annulla

Salva

4.3.1.1 Recipients and sending limits

Add the email addresses or phone numbers to which to send the notifications.

To prevent an incorrect configuration of an intermittent alarm from filling the recipient with too many messages, the following sending limits are applied per recipient:

Period	SMS limit	Email limit
Hour	2	10
Day	4	20
Week	5	50
Month	15	100

The last message will explain to the recipient that their limit has been reached. Only for email notifications, a link is also sent to reset the count and continue receiving notifications.

4.3.1.2 Single smart filters

If occasional false alarms occur, you can configure a strategy to reduce unnecessary notifications related to the specific variable.

Impostazioni notifiche per Gateway Online ✕

Email

- test@mail.com 

+ Aggiungi indirizzo email

I messaggi email sono limitati per destinatario 

SMS

Nessuna notifica via SMS configurata

+ Aggiungi numero di telefono

Gli SMS sono limitati per destinatario 

Filtro smart

Se sono previsti falsi allarmi occasionali, è possibile configurare una strategia per ridurre le notifiche non necessarie relative a questa variabile.

Quando l'allarme si attiva:

☐ invia subito una notifica

☒ aspetta prima di inviare una notifica

Una volta che l'allarme è attivo, invia una notifica quando, nell'arco degli ultimi minuti:

☒ l'allarme è stato attivo in totale per almeno minuti 

☒ l'allarme si è attivato almeno volte

[Applica il preset per connessione internet via cavo !\[\]\(e298d6cf836ff3287dd906354e473a99_img.jpg\)](#)

[Applica il preset per connessione internet mobile !\[\]\(a86c877738bf7ac20e73c200684da061_img.jpg\)](#)

[Applica il preset per connessione di dispositivi in campo !\[\]\(65d90377bfd5b4d5d5bc50c363df1d44_img.jpg\)](#)

Annulla

Salva

By default, notifications are sent immediately when the alarm is triggered.

It is possible to delay the sending of the notification.

In the example above, once the alarm condition is detected, the system will continuously check every minute the situation of the previous 4 hours. The notification is sent if one of these conditions is verified:

- if in that period the alarm was active for at least 5 minutes (in total, possibly considering multiple activations cumulatively)
- if in that period the alarm was triggered at least 3 times (regardless of the duration of each activation)

More information on smart filters is available in the Smart filters section later in this page.

4.3.2 Bulk configuration

Click on the pencil icon in the table header to open the massive edit window.

4.3.2.1 Variable selection

It is possible to filter the alarm variables to be modified in bulk based on various criteria:

- belonging asset
- type of alarm
- fine selection (alarm by alarm)

1. Select one or more assets to which the variables to be modified belong

Modifica massiva delle notifiche di allarme

Asset Tipi Variabili Destinari Filtro smart

Seleziona le variabili di allarme per le quali vuoi configurare le notifiche

- ☐ Cre
- ☐ GW Cre
 - ☐ CT Deumidificatore
 - ☐ CT PdC
 - ☐ Field Tester
 - ☐ IO Re
 - ☐ Local I/O

2. Select one or more types of alarm to modify

Modifica massiva delle notifiche di allarme

Asset Tipi Variabili Destinari Filtro smart

Seleziona le variabili di allarme per le quali vuoi configurare le notifiche

- ☐ Tutte
 - ☐ Generiche
 - ☐ Dispositivo
 - ☐ Errore di connessione
 - ☐ Gateway
 - ☐ Gateway online

Indietro Avanti

Allarme T soglia mandata caldaia Residenza Cremascoli / Node

3. Select the alarm variables to be modified among those filtered in the previous steps

Modifica massiva delle notifiche di allarme

Asset

Tipi

Variabili

Destinatari

Filtro smart

Seleziona le variabili di allarme per le quali vuoi configurare le notifiche

Nome

Descrizione

Asset

Nome	Descrizione	Asset
☐ Dispositivo disconnesso	-	GW Cre /Sonda Esterna
☐ Dispositivo disconnesso	-	GW Cre /Sonda Pi
☐ Dispositivo disconnesso	-	GW Cre /Sonde Re
☐ Dispositivo disconnesso	-	GW Cre /CT Deumidificatore
☐ Gateway Online	-	GW Cre
☐ Node-RED offline	-	GW Cre /Node-RED

<

1

2

3

>

26 variabili disponibili [Seleziona tutte](#)

0 variabili selezionate: selezionane qualcuna per continuare

Indietro

Avanti

4.3.2.2 Recipients

4.3.2.2.1 ADDING NEW RECIPIENTS

If no recipients were configured for the notifications of the selected alarm variables, the recipient table will be empty:

Modifica massiva delle notifiche di allarme

Asset

Tipi

Variabili

Destinatari

Filtro smart

Hai selezionato 26 variabili di allarme

Ora puoi aggiungere o rimuovere messaggi di notifica per le variabili di allarme selezionate

Destinatario

Invio notifiche per

Per queste variabili non è stata configurata alcuna notifica. Clicca qui sotto per aggiungere un destinatario.

+ Aggiungi email

+ Aggiungi numero di telefono

Indietro

Avanti

You can add them by clicking on `Add email` or `Add phone number`.

Modifica massiva delle notifiche di allarme

Asset

Tipi

Variabili

Destinatari

Filtro smart

Hai selezionato 26 variabili di allarme

Ora puoi aggiungere o rimuovere messaggi di notifica per le variabili di allarme selezionate

Destinatario

Invio notifiche per

test@mail.com

Tutte e 26

Nessuna

+39 3

Tutte e 26

Nessuna

+ Aggiungi email

+ Aggiungi numero di telefono

Indietro

Avanti

4.3.2.2.2 MODIFYING EXISTING RECIPIENTS

If instead recipients were already configured for the notifications of the selected alarm variables, the table will show the recipients configured for at least one of the selected variables:

Modifica massiva delle notifiche di allarme

Asset

Tipi

Variabili

Destinatari

Filtro smart

Hai selezionato 26 variabili di allarme

Ora puoi aggiungere o rimuovere messaggi di notifica per le variabili di allarme selezionate

Destinatario	Invio notifiche per
test@mail.com	Tutte e 26 26 su 26 Nessuna
+39 311 111 1111	Tutte e 26 26 su 26 Nessuna

+ Aggiungi email

+ Aggiungi numero di telefono

Indietro

Avanti

For each existing recipient, you can extend the notifications to all selected variables by clicking on **All 26** or remove the recipient from the selected variables by clicking on **None**.

4.3.2.3 Multiple smart filters

In the next step, you can configure the smart filters for the selected alarm variables

4.3.2.3.1 ADDING SMART FILTERS

If no smart filters were configured for the selected alarm variables, the filter section will be empty:

Modifica massiva delle notifiche di allarme

Asset
Tipi
Variabili
Destinatari
Filtro smart

Hai selezionato 26 variabili di allarme

Se sono previsti falsi allarmi occasionali, è possibile configurare una strategia per ridurre le notifiche non necessarie relative a queste variabili

Numero di variabili	Filtro esistente	Nuovo filtro
		Tutte le notifiche di allarme verranno inviate immediatamente quando l'allarme si attiva

+ Nuovo filtro

+ Nuovo filtro

Indietro
Salva

You can add one by clicking on **New filter**. The smart filter configuration window will open. For more info on how smart filters work, please refer to the Smart filters section above.

Modifica massiva delle notifiche di allarme

Asset
Tipi
Variabili
Destinatari
Filtro smart

Hai selezionato 26 variabili di allarme

Se sono previsti falsi allarmi occasionali, è possibile configurare una strategia per ridurre le notifiche non necessarie relative a queste variabili

Numero di variabili	Filtro esistente	Nuovo filtro
26	Nessuno: invia la notifica immediatamente	Ignora i primi 10 minuti di tempo di attivazione cumulativo e 5 attivazioni in una finestra temporale di 120 minuti

+ Nuovo filtro

Indietro
Salva

The created filter will be applied to all selected alarm variables.

4.3.2.3.2 MODIFYING EXISTING SMART FILTERS

If instead smart filters were already configured for the selected alarm variables, the table will show the filters configured for at least one of the selected variables:

Modifica massiva delle notifiche di allarme

Asset
Tipi
Variabili
Destinatari
Filtro smart

Hai selezionato 26 variabili di allarme

Se sono previsti falsi allarmi occasionali, è possibile configurare una strategia per ridurre le notifiche non necessarie relative a queste variabili

Numero di variabili	Filtro esistente	Nuovo filtro
26	Ignora i primi 10 minuti di tempo di attivazione cumulativo e 5 attivazioni in una finestra temporale di 120 minuti	(non modificato)

+ Nuovo filtro

Indietro
Salva

For each existing filter, you can leave it unchanged or modify it by choosing from the drop-down menu a filter to apply. To add a new filter, click on **New filter**.

4.3.3 Smart filters

Some examples of smart filter configurations and their effect are shown.

The parameters in the first three columns are those settable by the user, namely:

- W (`window [min]`): the time window that the system considers to evaluate whether to send the notification, in minutes
- D (`duration [min]`): after this cumulative time of alarm activation in the W window is exceeded, the notification is sent
- C (`count`): after this number of alarm activations in the W window is exceeded, the notification is sent

Filtro smart

Se sono previsti falsi allarmi occasionali, è possibile configurare una strategia per ridurre le notifiche non necessarie relative a questa variabile.

Quando l'allarme si attiva:

- ☐ invia subito una notifica
☒ aspetta prima di inviare una notifica

Una volta che l'allarme è attivo, invia una notifica quando, nell'arco degli ultimi minuti:

☒ l'allarme è stato attivo in totale per almeno minuti 

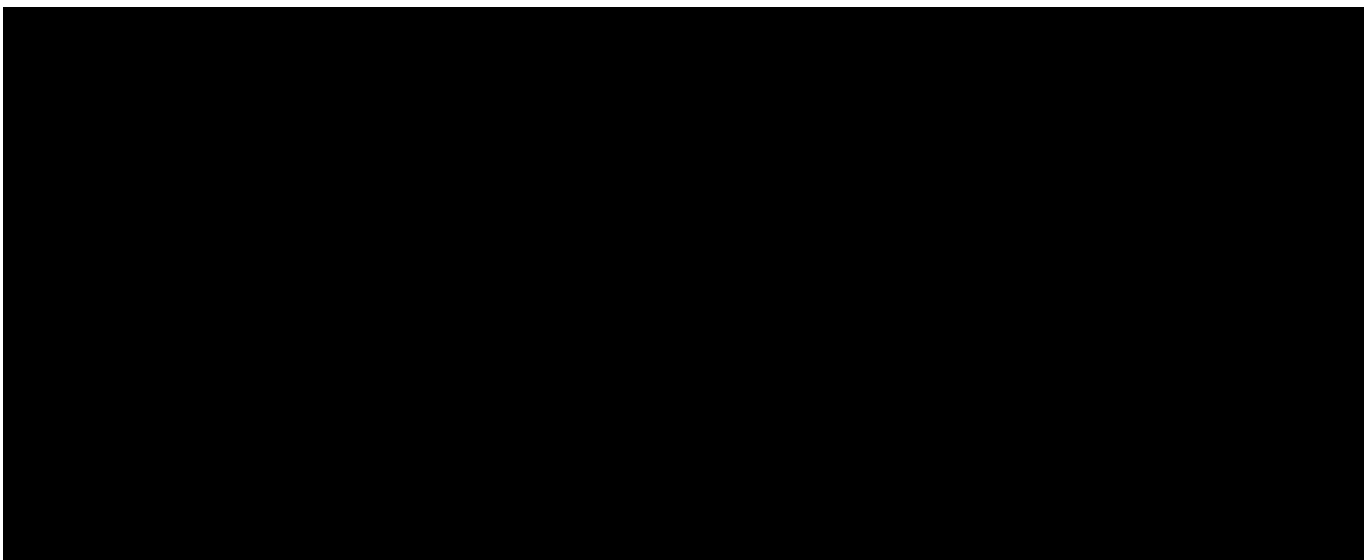
☒ l'allarme si è attivato almeno volte

W

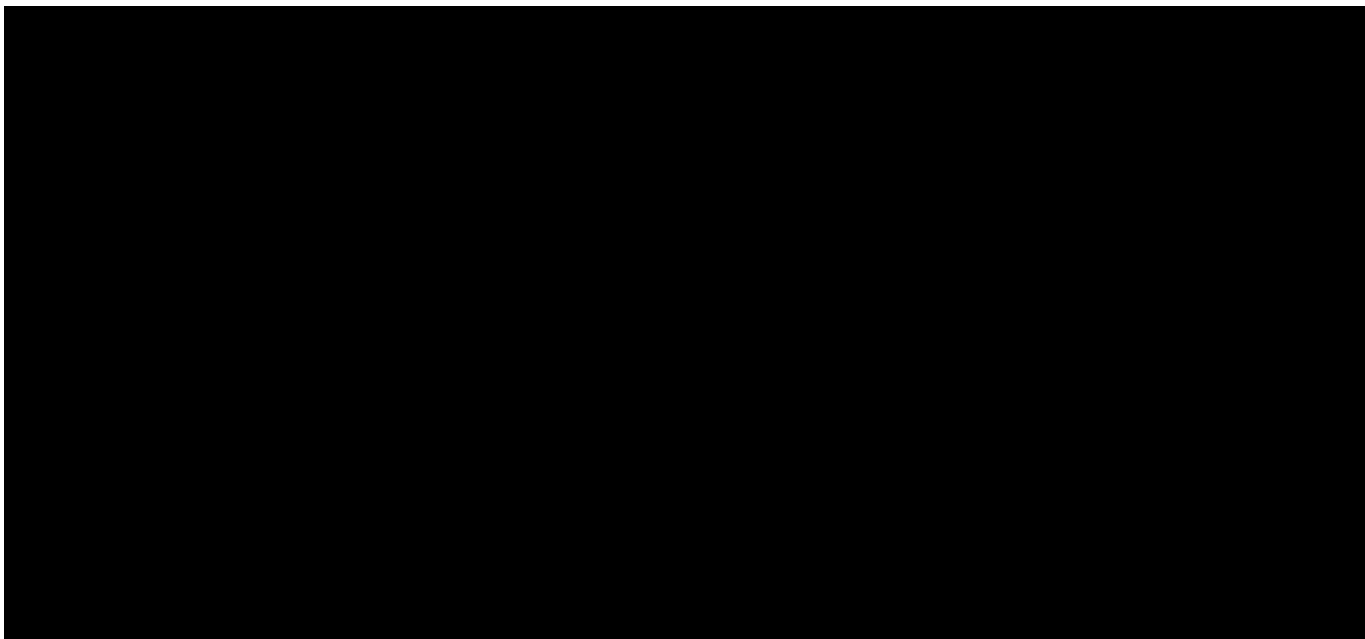
D

C

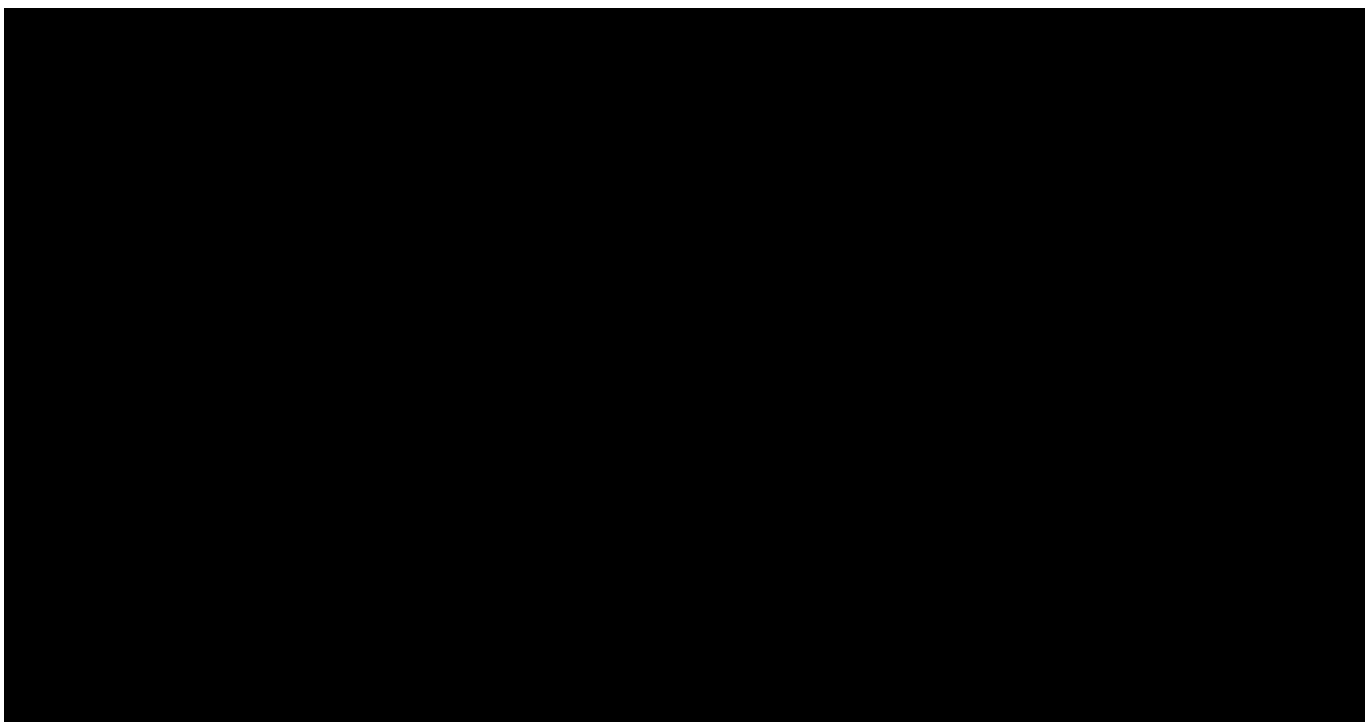
4.3.3.1 Example 1



4.3.3.2 Example 2



4.3.3.3 Example 3



4.4 Virtual Cloud Variables

We call virtual variables those variables that are not acquired directly from a sensor or device connected to an Optimo IoT AL300 Gateway.

Variables calculated in dashboard widgets

Most of the widgets that can be used to form dashboards internally support the display of data calculated based on one or more variables through arbitrary formulas. For this use, it is not necessary to create virtual variables as described in this chapter

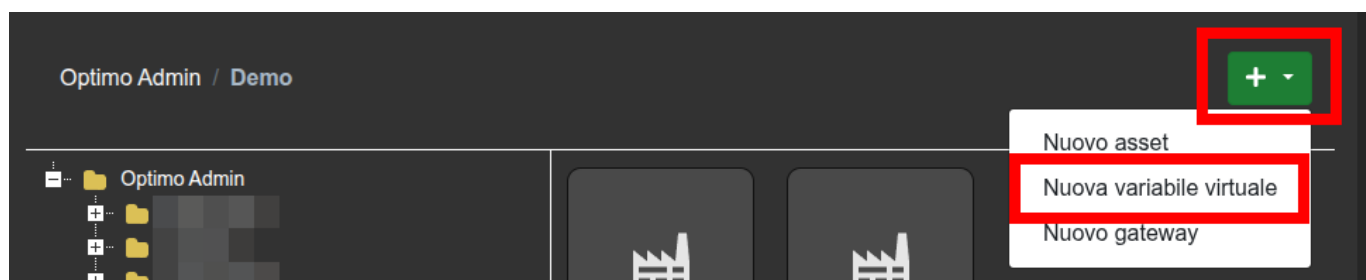
Virtual variables calculated within the AL300

Within the AL300 Gateways, it is possible to use Node-RED to create local virtual variables managed solely by the AL300. The virtual variables described on this page are instead created and processed by the Optimo IoT cloud platform.

There are three types of virtual variables, based on how their values are populated:

1. **Variables with values calculated periodically by the cloud platform**, based on mathematical or logical formulas involving other variables (e.g. daily average temperature, alarm status based on multiple sensors, etc.)
2. **Variables with values calculated when queried**, based on mathematical or logical formulas involving other variables (e.g. difference between two temperatures, alarm status based on multiple sensors, etc.)
3. **Variables with values entered via API** (e.g. market prices, weather conditions, status of an external device, etc.) that can be used to create more complete dashboards

Virtual variables can be created from the Asset Explorer:



Nuova variabile virtuale

Le variabili virtuali sono variabili che non sono associate a un Gateway Optimo IoT fisico, ma possono essere utilizzate per calcoli, aggregazioni o essere scritte tramite API da applicazioni di terze parti.

☐ Edit as JSON

Valori

Metadati

Tipo

☒ I valori sono calcolati periodicamente

☐ I valori sono calcolati quando interrogati

☐ I valori sono inseriti via API

Formula:

Periodo:

Giorno

I valori vengono inseriti a partire dall'8o minuto successivo all'ora/giorno/settimana esatti. Nel caso le variabili di input ricevano nuovi valori (es.: coda da un gateway che è stato offline) la formula non verrà ricalcolata

Annulla

Salva

Since they cannot be associated with a specific AL300, this possibility is given only for assets that are not part of the hierarchy of an AL300 Gateway.

4.4.1 Variables with values calculated periodically

With the specified frequency, the Optimo IoT Cloud executes the formula specified by the user and saves the result as the value of the variable.

The possible frequencies are:

- hourly
- daily
- weekly

Within the formula, it is possible to use as input variables statistics (e.g. average, minimum, maximum, sum, count, etc.) calculated on other variables in a time interval defined relative to the moment of execution of the formula (e.g. last hour, last day, last week, last month, etc.).

Here are some examples of what can be the value of a variable:

- the maximum value of the temperature detected by a set of sensors in the last hour
- `0` if the temperature of a set of sensors in the last 12 hours has always been below a threshold, `1` otherwise (useful for creating an alarm)
- calculate the sum of the energy consumed by the general meters of different establishments in the last day

4.4.1.1 Formula

Click on the pencil icon to open the formula editor. To define the formula, you must first specify the input variables and then write the mathematical or logical expression that involves them.

4.4.1.1.1 INPUT VARIABLES

Each input variable is the result of a statistic calculated on a variable acquired by the cloud platform in a time interval defined relative to the moment of execution of the formula.

Click on "Add input variable":

Specify:

1. the name to use in the formula to refer to it
2. the variable on which to calculate the statistic (it can be any variable acquired by the cloud platform)
3. The type of statistic to calculate (e.g. average, minimum, maximum, sum, count, etc.). Here is the complete list.
4. the time interval on which to calculate the statistic (e.g. last 3 hours)

It is also possible to specify a value to use in case there are no values of the variable on which to calculate the statistic (e.g. no data acquired in the specified time interval).

4.4.1.1.2 EXPRESSION

Once the variables are defined, you can write the expression.

Editor variabili calcolate

Variabili di input

Formula

Nome	Valore	Valore di prova
t	6.3000000000000001	

Formula:

Puoi usare le variabili riferendoti al loro nome definito sopra. Puoi usare la sintassi descritta [qui](#).

(6.3000000000000001 > 30) = false

Indietro

Ok

You can view in real time the values of the input variables and the final result obtained. You can simulate arbitrary input values to check the functioning of the formula.

The syntax of the expression is described here.

4.4.2 Variables with values calculated when queried

The use of this type of virtual variable is not made publicly available to all customers

4.4.3 Variables with values entered via API

Once the variable is created, it is possible to insert historical or real-time values using the `/inject` endpoint described in the HTTP API documentation.

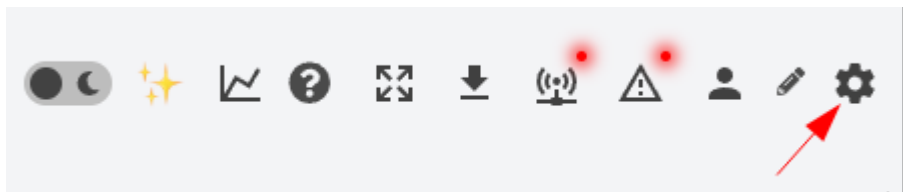
If the virtual variable is configured as an alarm variable, the values entered via API can also cause the sending of alarm notifications

4.5 Settings

4.5.1 Access

Navigate to cloud.optimo.it. For more details read the Login chapter.

Click on the button



If the button is not visible, it means that you do not have administrator permissions. Contact the person who created your account to ask for information and possibly modify the settings.

4.5.2 Navigation

Depending on the user's level, they can see all or only some of the following menus:

	
Explorer	
Albero	
Report	
Aggiornamenti OTA	+
Tunnel VPN	+
Rendicontazione	
UI Dinamica	+
Gestione utenti	

4.5.3 Tree

A graphical representation of the hierarchical structure of the assets is shown. By clicking on each asset, it is opened in the Asset explorer

4.5.4 Explorer

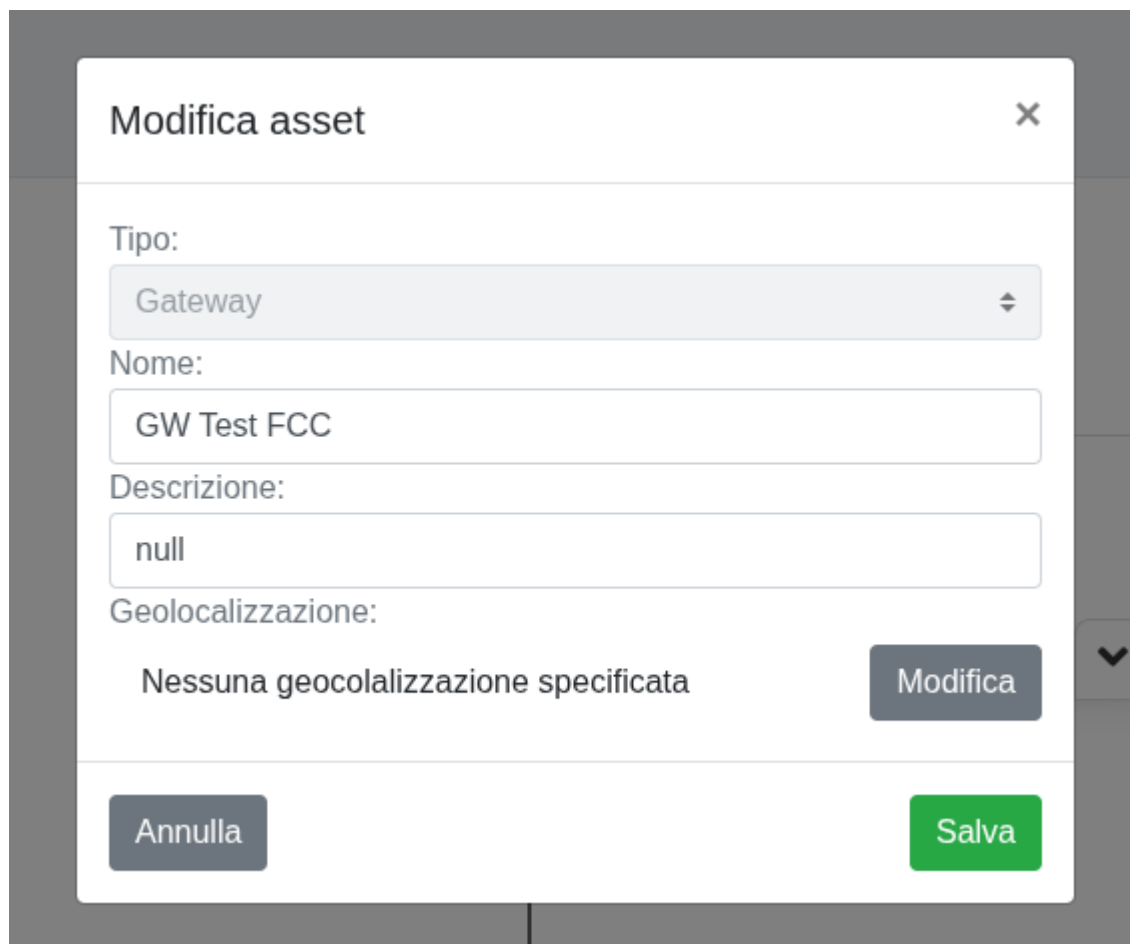
From this interface it is possible to navigate between the assets. The interface is similar to a file explorer (e.g. Windows Explorer). It is possible to modify the name, description, type and geolocation of each asset.

To open the action menu, select the asset and click the arrow button.



4.5.4.1 Edit asset

By clicking *Edit*, you can update the main asset information, such as name, description, and geolocation.



Modifica asset ✕

Tipo:
Gateway

Nome:
GW Test FCC

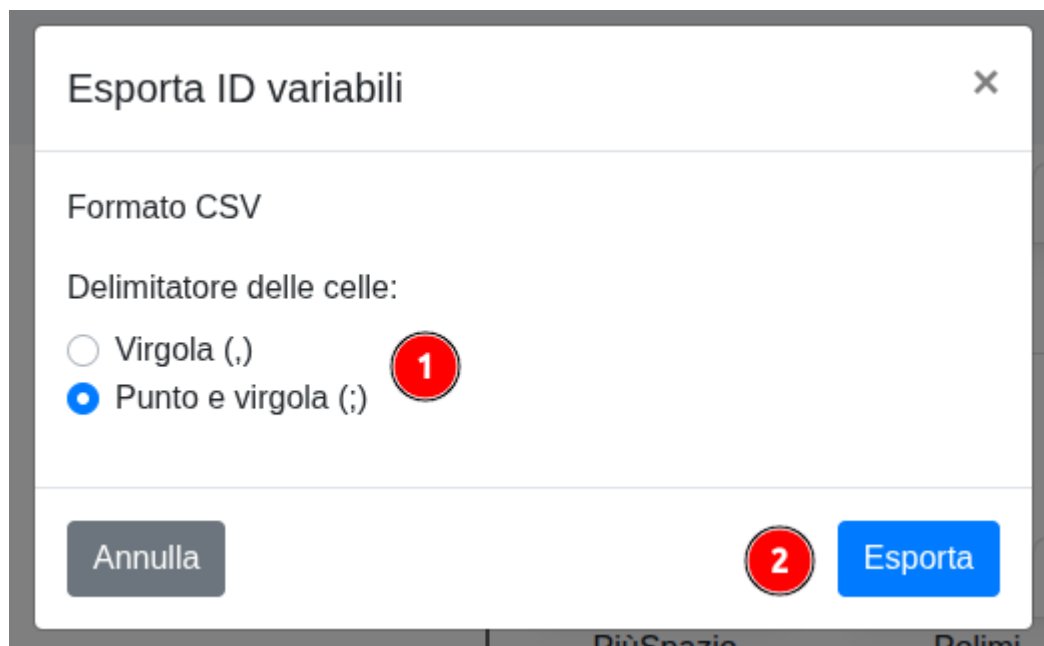
Descrizione:
null

Geolocalizzazione:
Nessuna geocolalizzazione specificata

Annulla Modifica Salva

4.5.4.2 Variable ID export

By clicking *Export variable IDs*, you can generate a CSV file containing the IDs of the variables associated with the selected asset. Before exporting, choose the cell delimiter: *Comma* or *Semicolon*. Then click *Export* to download the file.



Esporta ID variabili

Formato CSV

Delimitatore delle celle:

☐ Virgola (,)

☒ Punto e virgola (;)

Annulla

Esporta

4.5.4.3 Gateway configuration

For Gateway type assets, it is possible to access the configuration page by clicking *Configure*.

4.5.5 OTA updates

It is possible to view the history of firmware for Optimo IoT Gateways released, view the versions in use in the gateways and start the update remotely (OTA) or locally. For more information and instructions consult the specific page

4.5.6 VPN Tunnel

It is possible to view the active VPN tunnels on all Gateways and consult the history of activated tunnels. For more information and instructions consult the specific page

4.5.7 Reporting

For some companies it is possible to view the renewal status of cloud subscriptions

4.5.8 Dynamic UI

Through this interface it is possible to modify in real time the dashboards seen by users

4.5.9 User management

It is possible to modify, disable and delete users.

4.5.9.1 User creation

It is possible to create infinite users with permissions equal to or lower than their own, by clicking on the "New" button

Nuovo utente ✕

Generale

Preferenze utente

☒ Abilitato

Nome *

Email *

Non sarà possibile modificare l'email in futuro

Asset * i
n/d

Seleziona

Permessi * i
☒ Visualizza ☐ Modifica ☐ Amministra

Annulla

Salva

For each user it is essential to specify:

- name (first and last name)
- email address (all lowercase): it will be necessary for login and is the only way through which the user can recover their password
- asset: it is the asset that determines which variables and assets the user has access to. **Only for some assets is a dashboard specified!** associate users only to these assets, unless there are superior assets able to generate dashboards for the child assets.
- permissions:
 - Viewer: can access to variable values (e.g. measurements, alarms, etc)
 - Editor: `Viewer` permissions + can edit setpoints of variables of connected devices
 - Administrator: `Editor` permissions + can edit the configuration of the gateway and the dashboard, and manage users and assets

It is also possible to specify the preferences that the user himself can then modify:

Nuovo utente ✕

Generale | Preferenze utente

Lingua:

Unità di misura della velocità di rotazione:

Separatore decimale:

Separatore delle migliaia:

Annulla **Salva**

Once created, the user can recover the password independently as specified in Login

This is a draft message to send to newly created users:

Hello XXXXX,

you can access the Optimo IoT cloud platform for the XXXX plant by opening the site cloud.optimoiot.it and using the following login credentials:

- Email: the email address to which you receive this message, written all lowercase
- Password: click on *Forgot password* to recover it. During the procedure a verification code will be sent to the email address above

4.6 Integration

4.6.1 API HTTP

Optimo IoT provides an HTTP API that can be used to interact with the platform data programmatically, for example in machine learning pipelines, external reporting systems or integrations with other software.

The HTTP API supports these operations:

- reading historical data in full or in aggregated form
- sending commands and setpoints in the field through the AL300 IoT Gateways
- inserting external data into the system, to be displayed in the dashboards (Cloud only)

The API is made available both by the cloud platform and by the AL300 IoT Gateways.

The complete documentation of the HTTP API is available at the following link: [HTTP API Documentation](#).

To read historical data through the API, you need the variable IDs. The procedure to retrieve them is described in the Variable ID export section.

 Note

In the cloud version, requests are limited to 2400 requests per day per user

4.6.2 Knime

4.6.2.1 What is KNIME

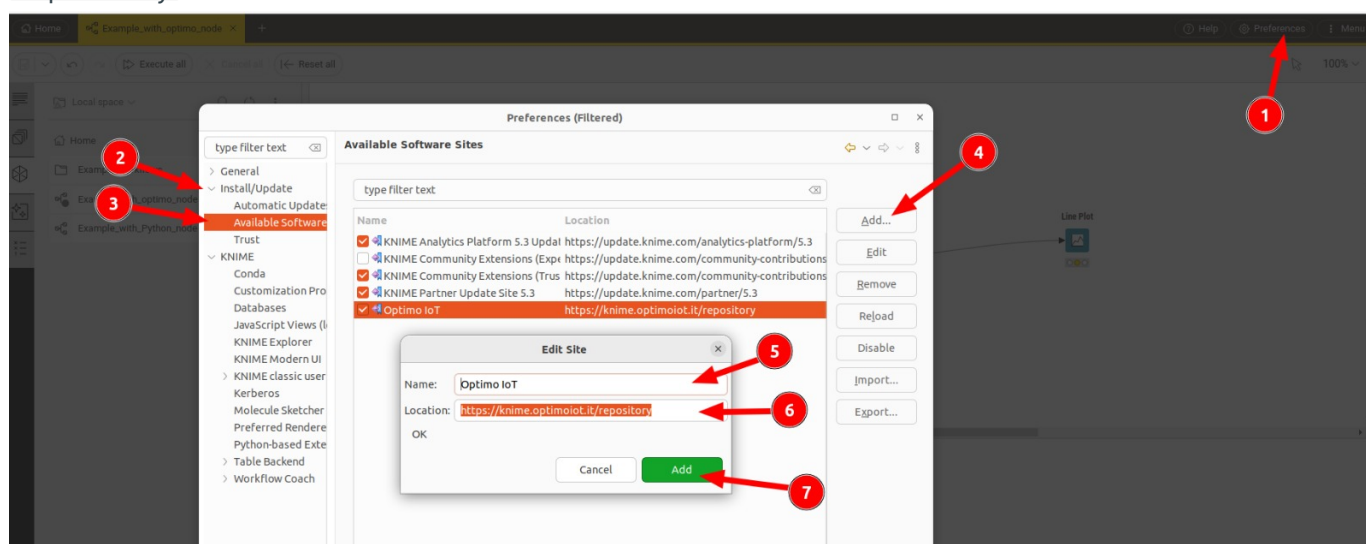
KNIME Analytics Platform is a free and open source low-code/no-code software that allows anyone, regardless of experience level, to make sense of data.

Optimo IoT has developed an extension to access the data of the Optimo IoT Cloud platform directly in KNIME flows.

4.6.2.2 Installation

4.6.2.2.1 ADDING THE OPTIMO IOT REPOSITORY

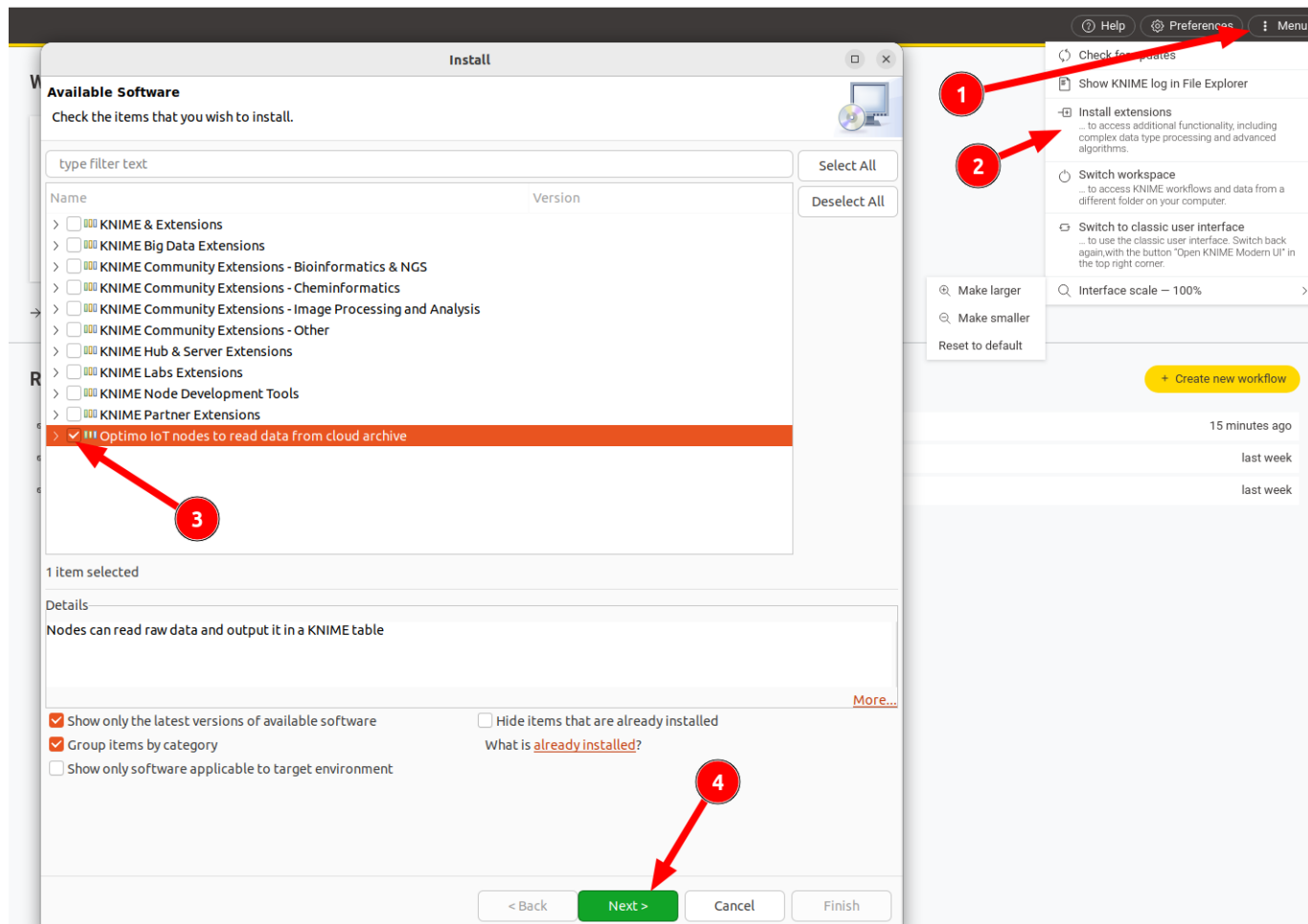
Follow the steps shown in the image to add the repository `https://knime.optimoiot.it/repository`



1. Click on "Settings"
2. Open the "Install/Update" menu
3. Open the "Install Software Repositories" submenu
4. Click on Add
5. Enter the name of the repository (Optimo IoT , or any name you like)
6. Enter the repository url: `https://knime.optimoiot.it/repository`
7. Click on Add

4.6.2.2.2 INSTALLING THE EXTENSION

Follow the steps shown in the image to install the extension



1. Click on "Menu"
2. Click on "Install extensions"
3. Check "Optimo IoT nodes"
4. Click on Next
5. Follow the rest of the guided procedure:
 - a. Click on Finish
 - b. Select the repository as trusted
 - c. Restart KNIME

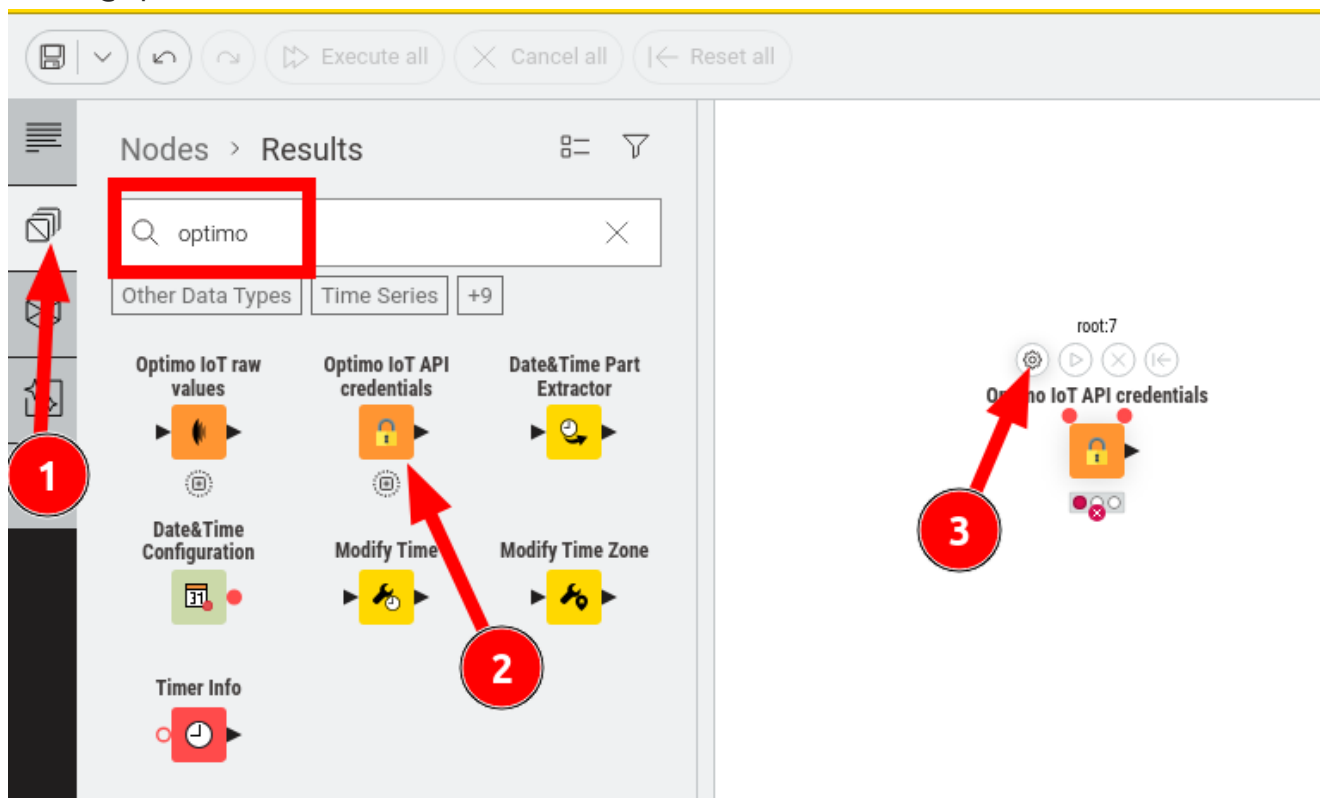
4.6.2.3 Using the nodes

For a working example, download a sample project from [here](#).

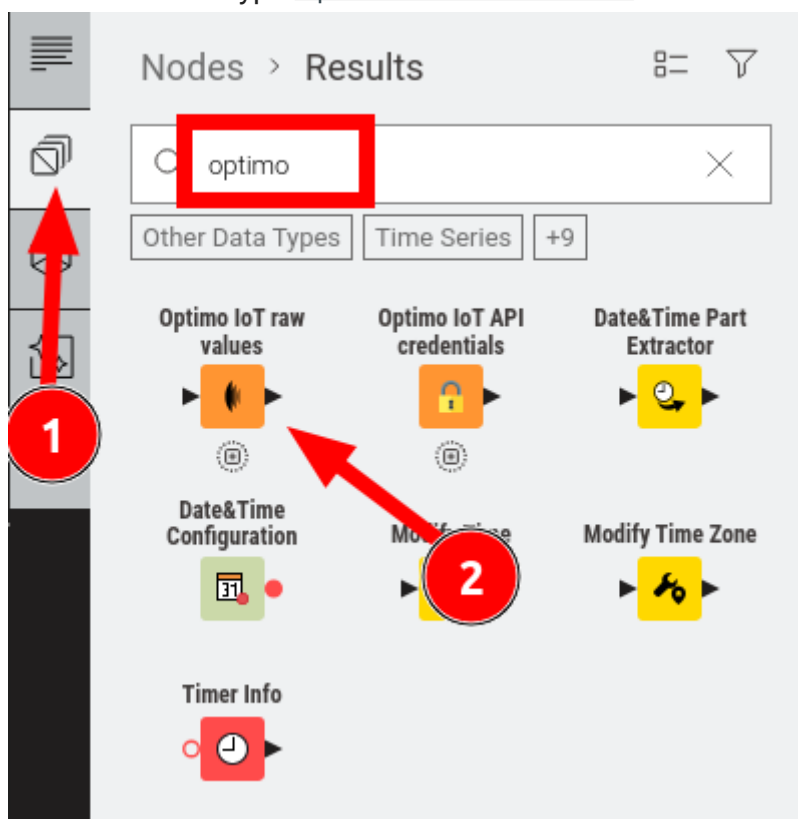
 **Warning!**

When sharing Knime flows with other users, the credentials to access cloud.optimoiot.it must be shared. Delete or empty the `Optimo IoT API credentials` node before sharing a flow.

1. Insert a node of type `Optimo IoT API credentials`, and enter the API keys. To obtain them, write to `info@optimoiot.it`



2. Insert a node of type `Optimo IoT raw values`

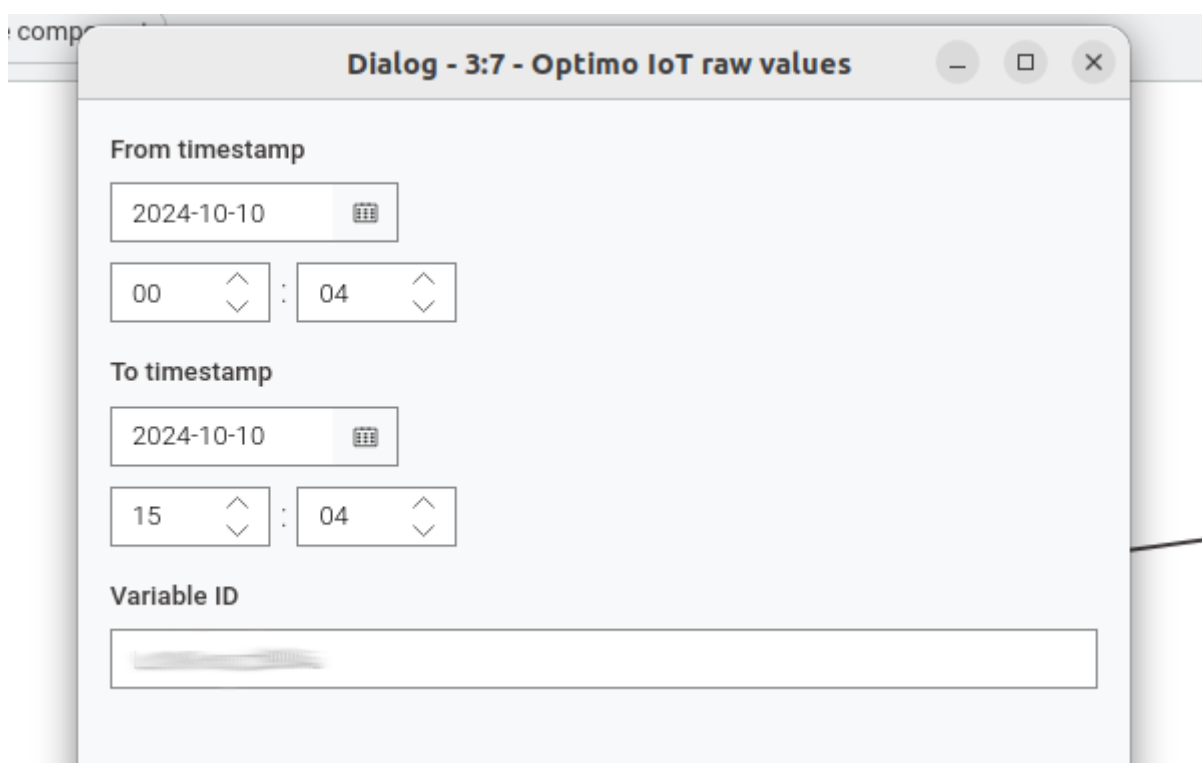


3. Copy the variable id from cloud.optimoiot.it

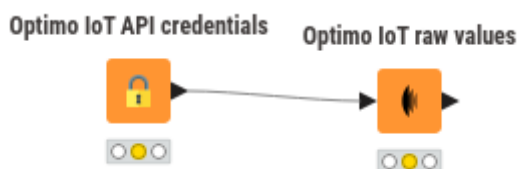


To retrieve multiple variable IDs in bulk, use the Variable ID export procedure.

4. Configure the node, entering the time range and pasting the variable id copied at point 4



5. Connect the two nodes



6. Execute the nodes. A table with the columns `timestamp` and `value` will be emitted

Optimo IoT API credentials → Optimo IoT raw values

Add comment

► 1: Raw values Flow Variables

Rows: 288 | Columns: 2

#	RowID	timestamp Local Date Time	value Number (double)
1	Row0	2025-03-09T14:35	7.536
2	Row1	2025-03-09T14:30	6.251
3	Row2	2025-03-09T14:25	7.037
4	Row3	2025-03-09T14:20	8.732
5	Row4	2025-03-09T14:15	9.697
6	Row5	2025-03-09T14:10	11.254

7. Add, connect and execute a Line Plot node to get a chart

1. Add 'Line Plot' node from the palette.

2. Connect 'Optimo IoT raw values' node to 'Line Plot' node.

3. Execute the workflow.

Line Plot

Open in new window

timestamp

value

The chart displays a line plot of 'value' (y-axis, 0 to 30) against 'timestamp' (x-axis, 16:00 to 12:00). The plot shows a sharp peak around 12:00, reaching a value of approximately 28.

4.6.3 MCP Server

Optimo IoT provides a remote MCP (Model Context Protocol) server that gives AI assistants, such as Claude, ChatGPT or Mistral AI, read access to the platform data:

- asset and variable metadata (asset tree, variable list, units, ...)
- timeseries data, both raw and aggregated
- AIMS asset logs

MCP server URL:

```
https://mcp.cloud.optimoiot.it/mcp
```

Note

The MCP server only provides read access to the platform data. It cannot be used to change the configuration or write data.

4.6.3.1 Adding the server to Claude

4.6.3.1.1 CLAUDE.AI / CLAUDE DESKTOP

1. Open **Settings** → **Connectors**
2. Click **Add custom connector**
3. Enter a name (e.g. **Optimo IoT**) and the URL **https://mcp.cloud.optimoiot.it/mcp**
4. Click **Add**
5. cloud.optimoiot.it login page opens for you to authorize access
6. Once authorized, the connector is available for use in conversations

4.6.3.1.2 CLAUDE CODE

Run the following command:

```
claude mcp add --transport http optimo-iot https://mcp.cloud.optimoiot.it/mcp
```

On first use, Claude Code opens the cloud.optimoiot.it login page for you to authorize access.

4.6.3.2 Adding the server to ChatGPT

1. Open **Settings** → **Connectors**

2. If custom connectors are not visible, enable them first from `Settings` → `Connectors` → `Advanced settings` → `Developer mode`
3. Click `Create` (top right of the Connectors page)
4. Enter a name (e.g. `Optimo IoT`) and the URL `https://mcp.cloud.optimoiot.it/mcp`, then select `OAuth` as the authentication method
5. Click `Create`
6. `cloud.optimoiot.it` login page opens for you to authorize access
7. Once authorized, enable the `Optimo IoT` connector in the chat composer (`+` → `More` → your connector) to use it in a conversation

4.6.3.3 Adding the server to Mistral AI

1. Open Vibe and go to `Context` → `Connectors`
2. Click `Add Connector` and open the tab `Custom MCP connector`
3. Enter a name (e.g. `Optimo IoT`) and the URL `https://mcp.cloud.optimoiot.it/mcp`
4. Confirm the addition
5. `cloud.optimoiot.it` login page opens for you to authorize access
6. Once authorized, enable the `Optimo IoT` connector from the tools menu of the conversation to use it

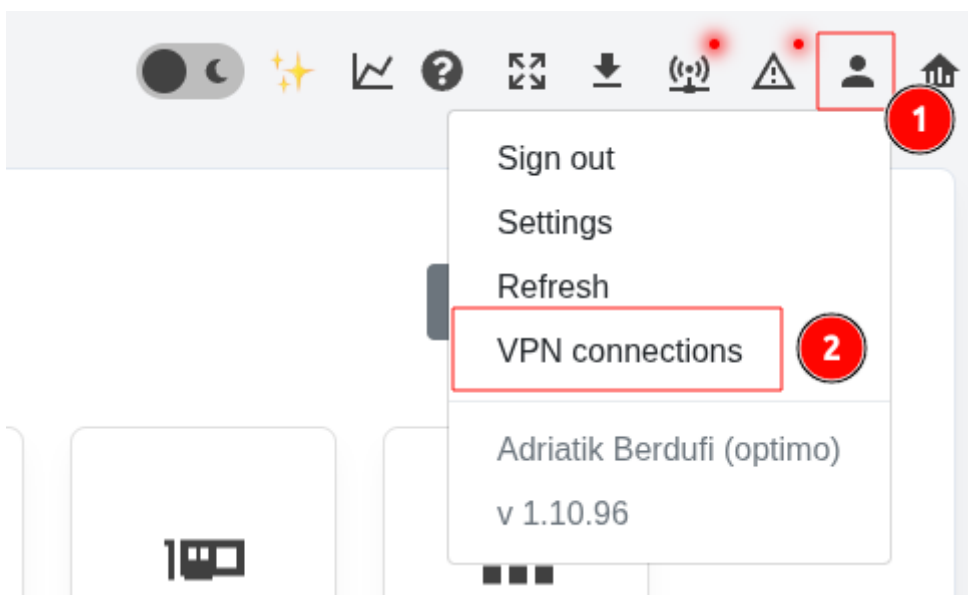
4.7 Remote access VPN

If enabled, the AL300 Gateway allows users to create a secure remote access VPN connection to the devices connected to the Gateway itself. This is useful, for example, to connect and modify the program of a PLC remotely.

4.7.1 Creation and download of certificate and VPN client (only for the first time)

To access this functionality, you need to have administrator permissions.

1. open the VPN menu



2. if it has never been done, you need to create your certificate for VPN access



3. download your certificate and install the VPN client following the instructions provided

VPN connections

VPN tunnel configuration

Download your certificate

Download

3

Download and install a VPN client

Instructions

4

Click on the three dots of an item of type Device in the [Asset Explorer](#) to create a temporary tunnel

Active tunnels

Gateway

Device

Virtual IP

Local IP

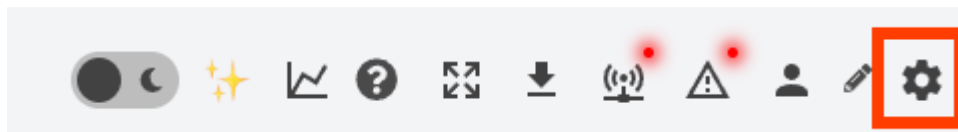
Created date

4.7.2 Creation of VPN tunnel

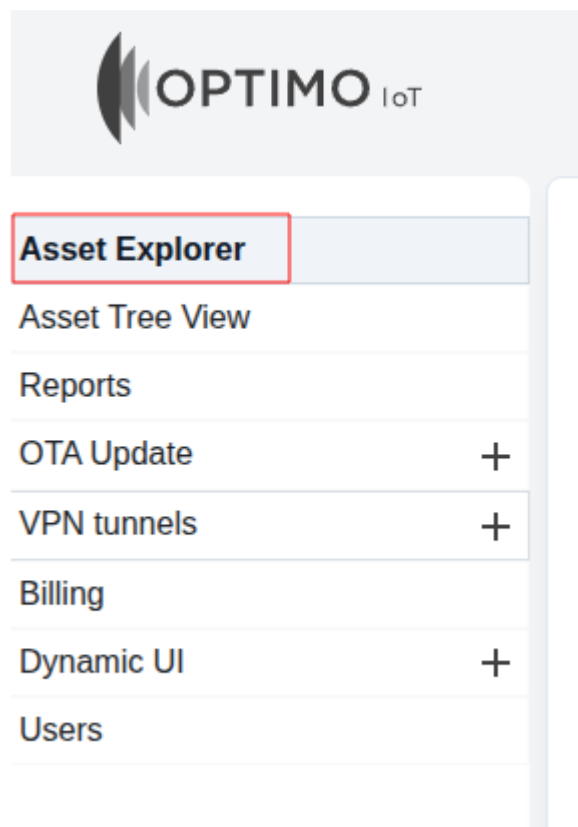
VPN access does not give access to any device. For each device you want to connect to, you need to create a *VPN tunnel*. Each VPN tunnel is automatically deleted after 10 minutes of inactivity:

1. Open the *Asset Explorer*:

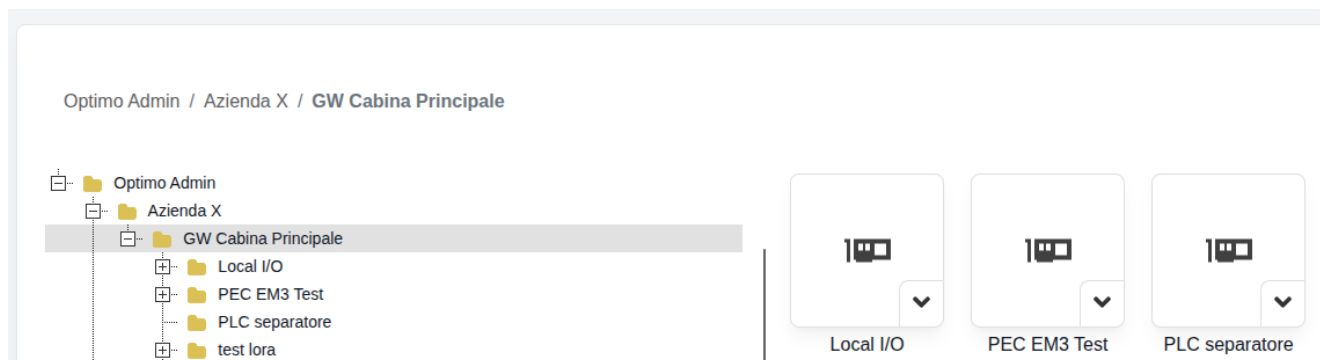
- a. Go to the configuration interface



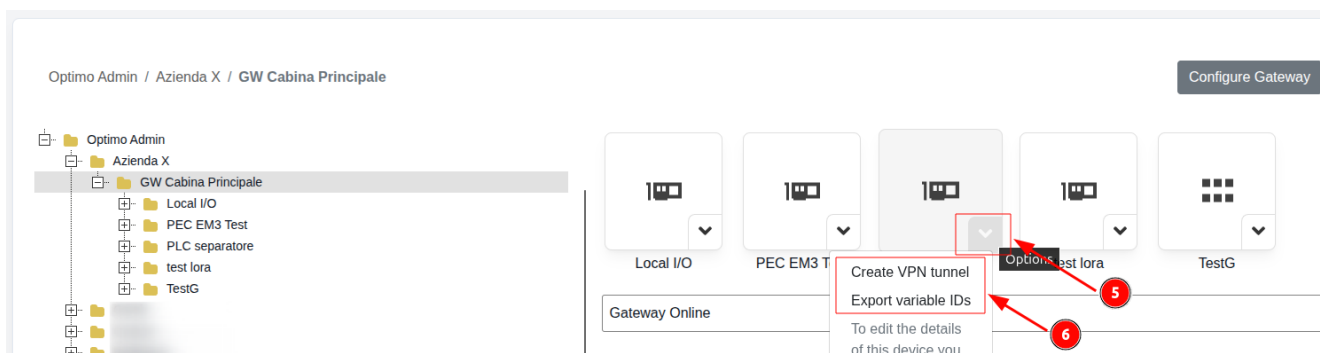
- b. Open the *Explorer* menu



2. Navigate to the AL300 Gateway of interest, until you see the device you want to connect to (e.g. PLC)



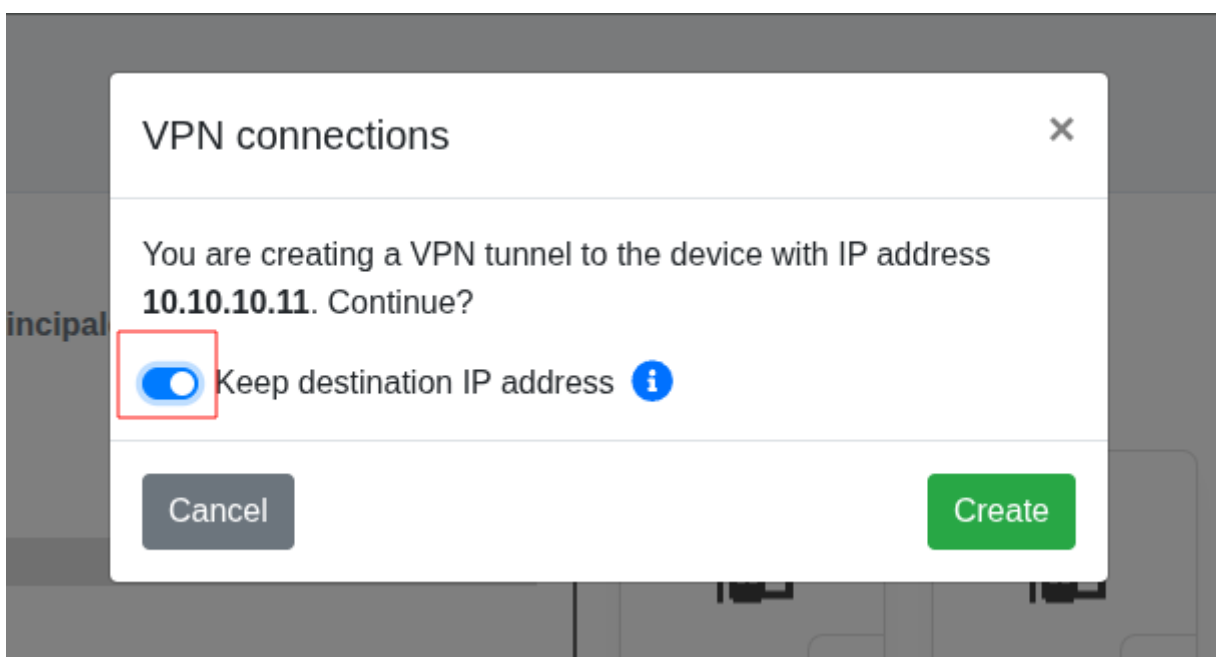
3. Click on the 3 dots of the device



4. Click on *Create VPN tunnel*

5. Confirm the creation of the VPN tunnel. You can choose whether to query the device with the destination IP address (local IP of the device), or whether to use a virtual IP

- **Keep destination IP address:** useful for TIA Portal. It requires a subsequent disconnection and reconnection of the PC to the VPN because the tunnel is received by the user's PC
- **Virtual IP:** useful for web interfaces of devices in the field, or when you need to connect to different devices with the same IP connected to Gateways in separate local networks



6. If you chose to *Keep the destination IP address*, disconnect and reconnect your PC to the VPN

7. You can now ping or reach the web interface of the device. For use with TIA Portal choose the TAP adapter network interface

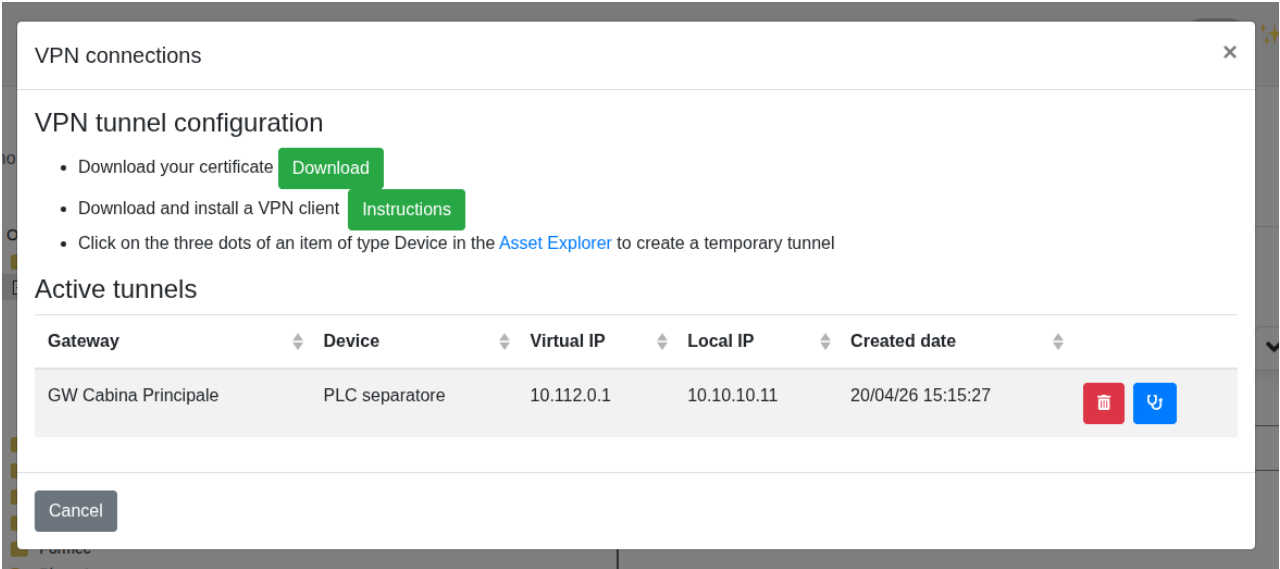
4.7.3 Diagnostics and troubleshooting

In case of problems, you can analyze the operating status of the *VPN tunnel*.

1. check that the device responds to pings (instructions). If it responds to pings, the VPN is working correctly. Check the application parameters (e.g. IP in the browser)
2. check that your PC is connected to the VPN. The procedure is different depending on your VPN client

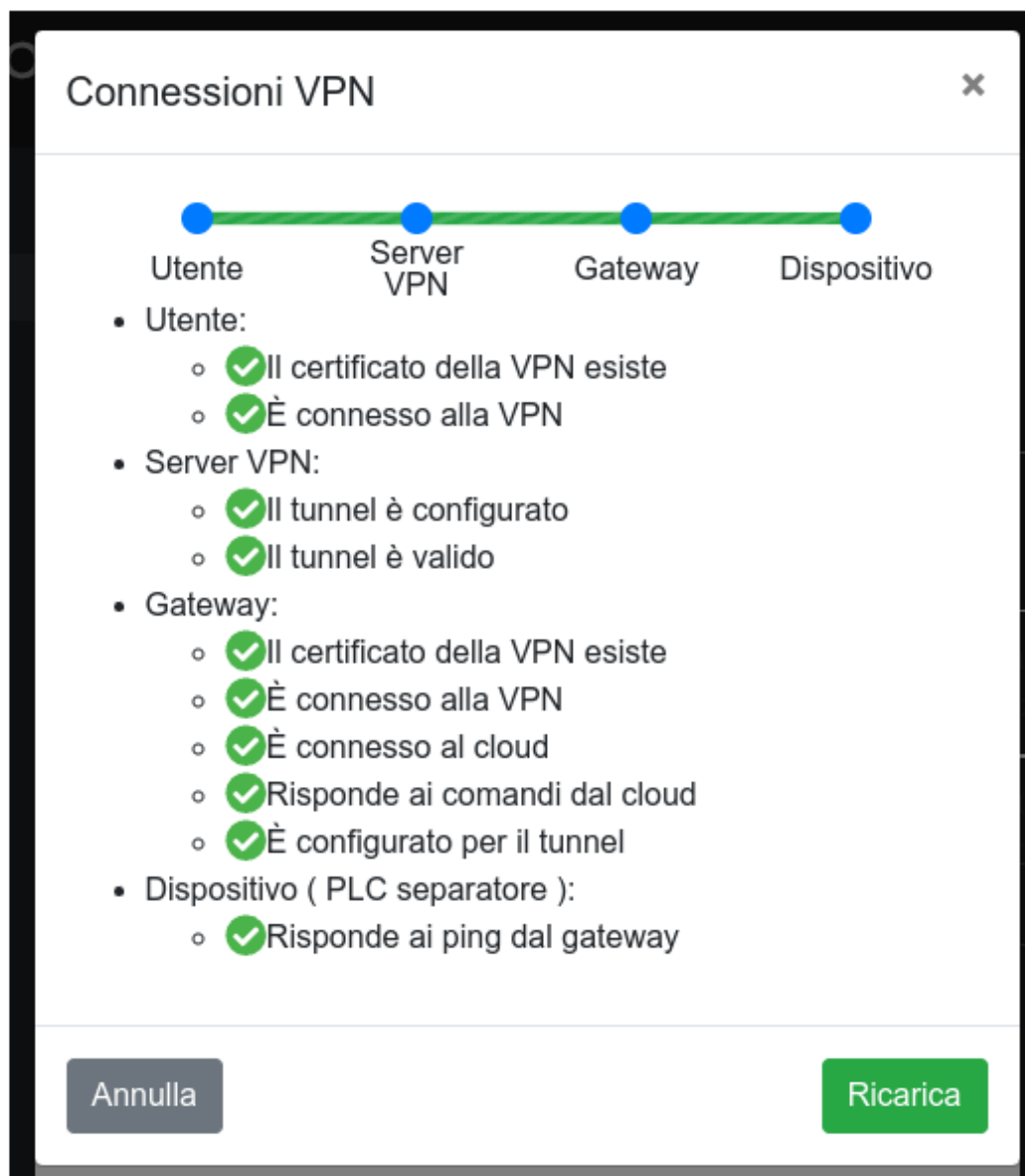
3. check the status of the VPN tunnel in the *VPN menu*:

a. open the list of active tunnels



b. click on the diagnostics icon  for the tunnel to be tested

- c. check that all checks have been successful. To solve some problems, it may be necessary to delete and recreate the tunnel



4.8 AL300 Firmware Upgrade

It is possible to upgrade the AL300 Gateway firmware directly from the cloud interface (Over The Air update). If the AL300 is offline or with a data plan for which the download of 300MB is too expensive, it is possible to download the update file and upload it manually.

During the update phase, the Gateway remains fully operational. At the end of the update phase, the gateway is automatically restarted. The downtime caused by a firmware update is therefore around 60 seconds.



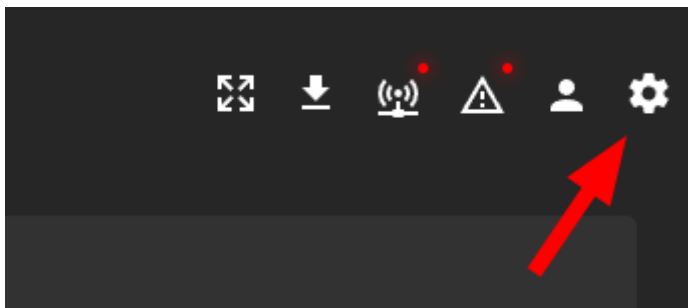
Internet connection or power supply not guaranteed? No problem

The AL300 operating system is stored in two twin A-B partitions. While one is running (A), the update is installed on the other (B). Only at the end and verification of the update of the second partition (B) the Gateway is automatically restarted and will run the second partition (B). In case of interruption of installation (lack of internet, lack of power, etc.) the gateway continues to operate with the partition in use (A).

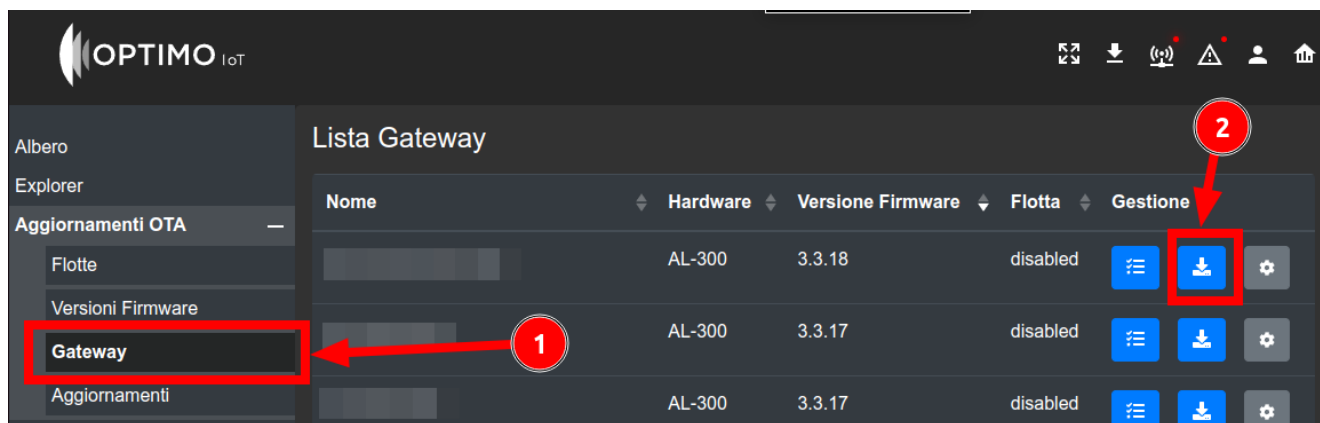
4.8.1 Firmware version selection

To access this feature you need to have administrator permissions.

1. open the settings homepage



2. open the `Ota Update` menu and click on the corresponding AL300 Gateway icon



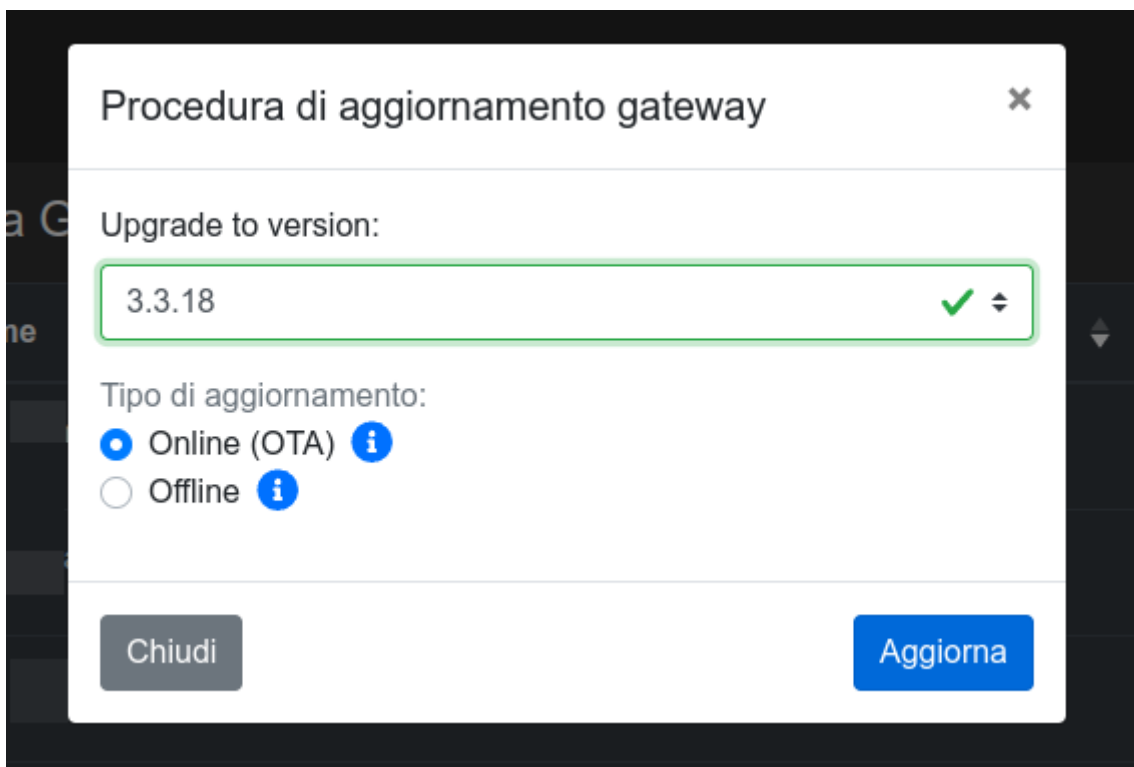
3. select the new version from those available

4.8.2 Over The Air (OTA) update

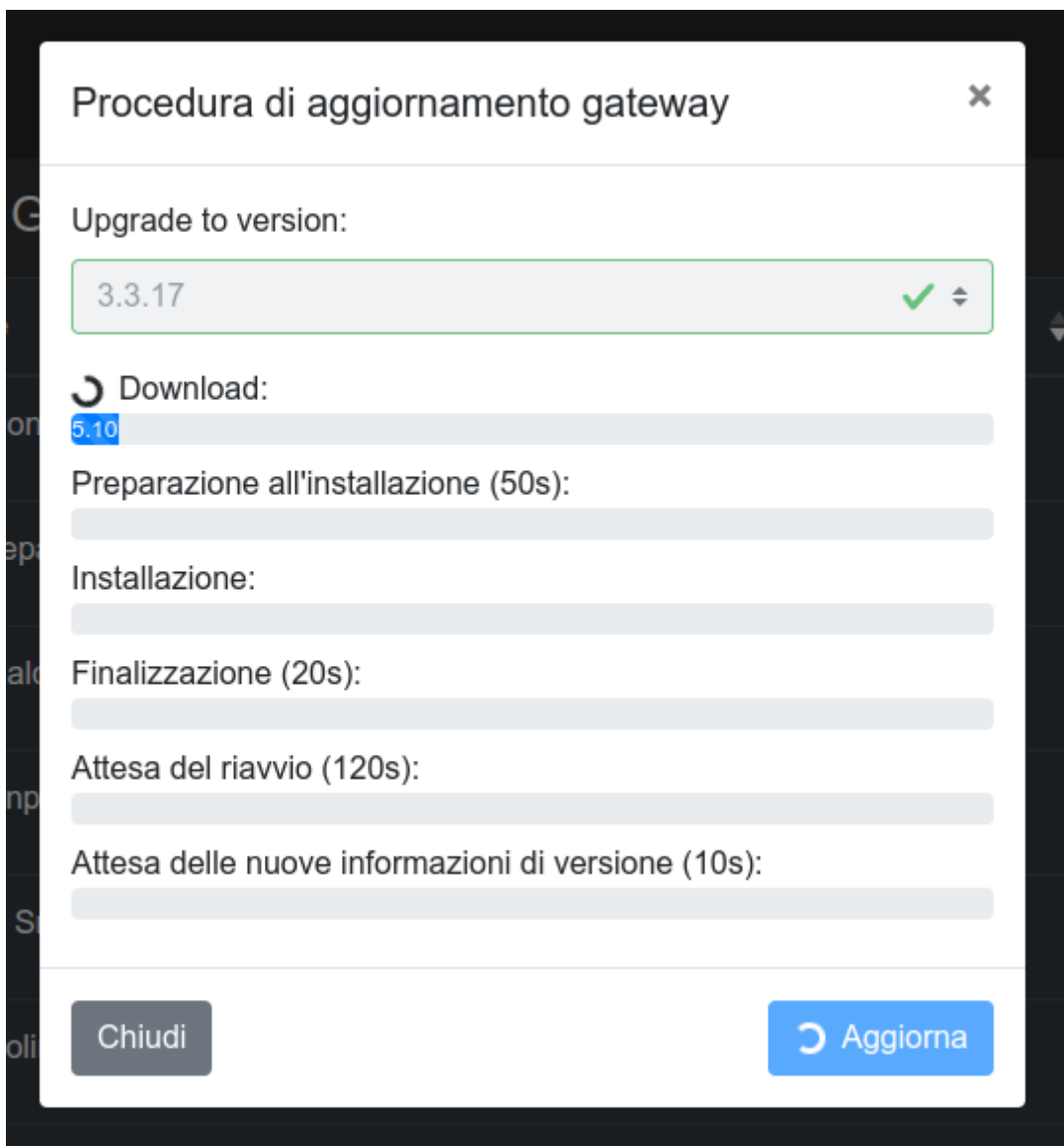
Note

This procedure causes the download of about 300-350MB of data from the Gateway's internet connection. If it is connected to the internet via a SIM data with limited traffic, make sure that there is a sufficient traffic volume in the active plan, and that any auto-recharge automations are not too slow to keep up with the download process. If mobile data traffic is too expensive, it is recommended to update the Gateway through the procedure described in the next chapter.

1. if the Gateway is connected to the cloud it is possible to select the **Online (OTA)** update type, then click on **Update**



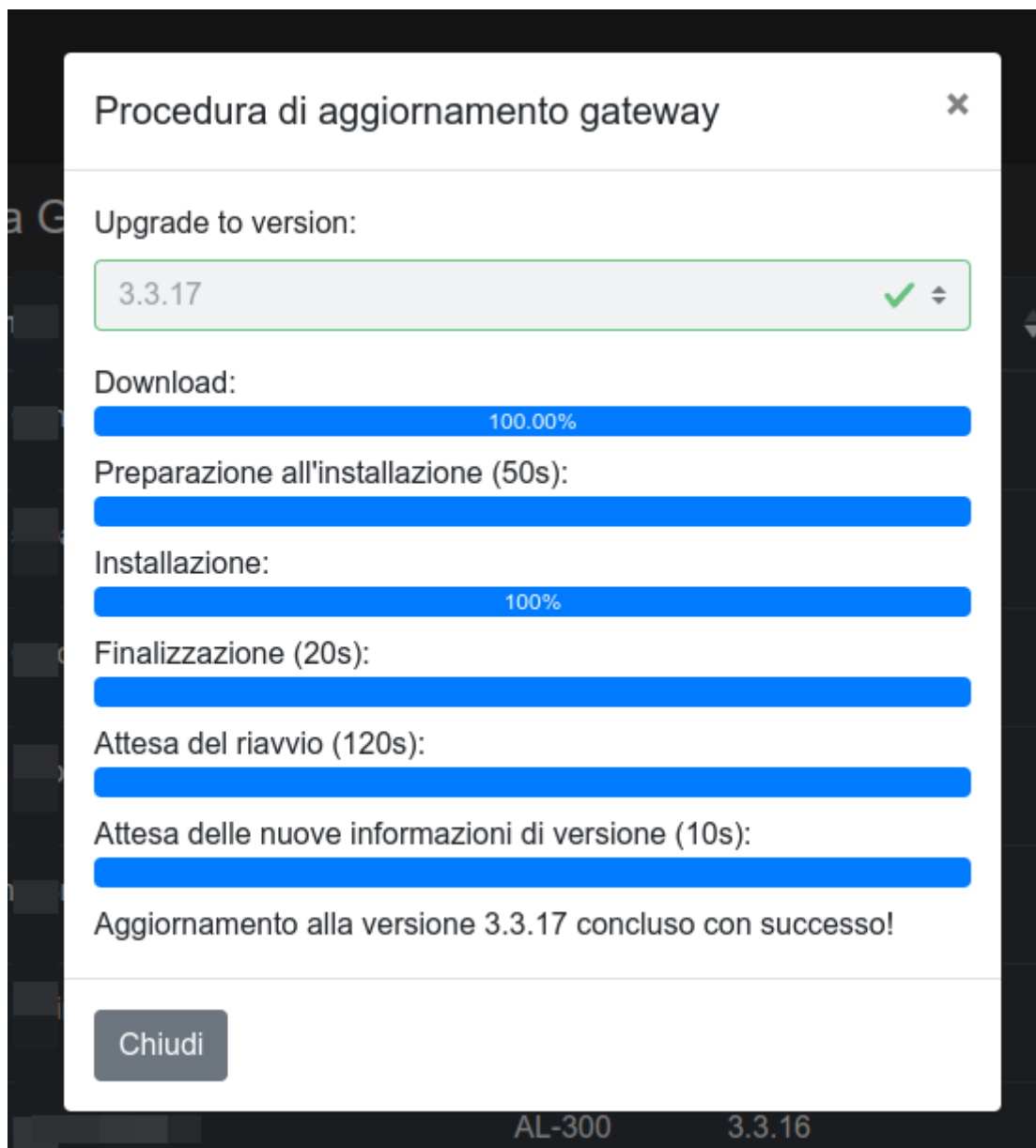
2. Wait for the update download



3. Wait for the Gateway reboot



4. Update completed



4.8.3 Local - offline update

1. if the Gateway is not connected to the cloud or the connection to the cloud is too limited in download volume, it is possible to select **Offline** and download the update package.



2. upload the update file to the AL300 through one of the methods described in the dedicated chapter

5. Dashboard

5.1 Authentication

5.1.1 Credentials

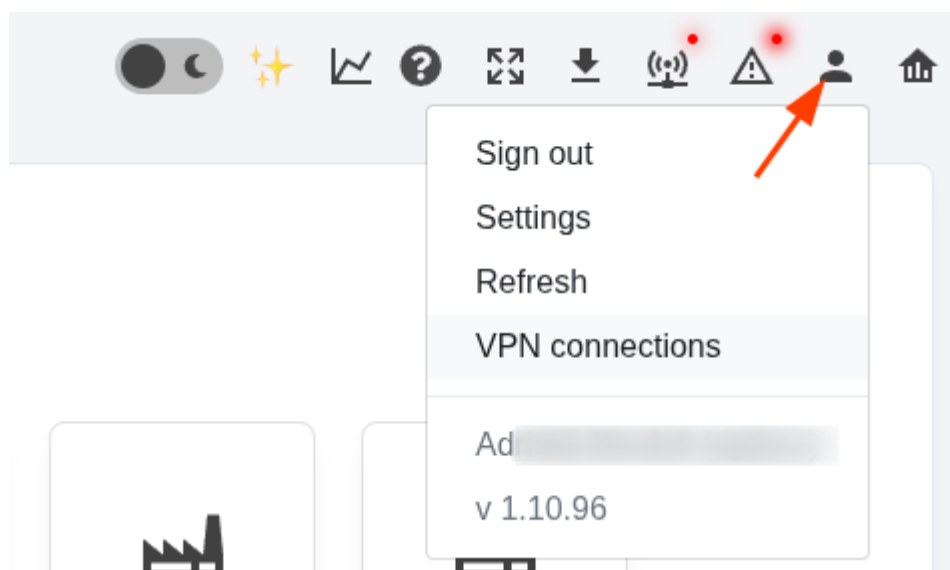
The platform can be used in two distinct environments, with separate authentication:

- **Local access:** direct access to the gateway web interface in the local network (e.g. `http://10.10.10.10/`). The initial credentials are printed on the labels provided inside the AL300 package, as explained here
- **Cloud access:** access to the cloud platform from the internet via `cloud.optimoiot.it`. The credentials are linked to an email address that can be used to recover the password in case of loss. More details are available here.

The cloud and local access credentials are therefore completely independent and do not need to be the same. For security reasons, it is recommended to change the local access credentials at the first login.

5.1.2 User menu

To open the user menu, click on the profile icon in the upper right corner of the top bar.



5.1.2.1 Log out

Closes the current user's session and logs out of the environment in use (local or cloud).

5.1.2.2 Settings

These options change the behavior of the interface for the single user and do not modify the configuration of gateway, data sources or assets.

Graphical user interface settings for user a.berdufi@optimoiot.it

Language:	Browser default
Popups Alarm:	Disabled
Rotational speed unit:	CPM (cycles per minute)
Decimal separator:	.
Thousands separator:	.
Multifactor authentication:	MFA disabled Enable MFA

5.1.2.2.1 AVAILABLE SETTINGS

- **Language** : sets the interface language. With **Browser default** the browser language is used.
- **Popups Alarm** : enables or disables the notification popups when alarms arrive. The popups appear in the lower right corner of the screen and show in real-time the activation or deactivation of an alarm.
- **Decimal separator** : defines the decimal separator shown in numeric values (**.** or **,**).
- **Thousands separator** : defines the thousands separator to improve the readability of numbers.

5.1.2.2.2 MULTIFACTOR AUTHENTICATION (MFA)

MFA adds a second authentication factor in addition to the password, significantly increasing account security.

MFA activation

1. click on **Enable MFA**
2. follow the guided procedure shown on the screen to associate an authentication app (OTP codes)

3. enter the temporary code generated by the app to confirm activation
4. from the next login, after the password, the MFA code will also be required

5.1.2.3 Refresh

Clears the metadata cache. Useful to force the update of the displayed data, for example after modifying the gateway or data source configuration. It is generally not necessary to use this option, as the data is updated automatically, but it can be useful in case of frequent changes to the configuration or to resolve any display issues.

5.1.2.4 VPN connections

Opens the section dedicated to VPN tunnels, where you can view active connections and the history of tunnels used by your account.

For more details, see the VPN page.

5.1.2.5 User information and version

At the bottom of the menu are shown:

- user name and associated asset
- current version of the web application

5.2 Dashboard edit mode

Edit mode lets you customize the dashboard structure and content. From this mode, you can create and organize menu pages, add widgets, configure their data, and change their layout.

5.2.1 Entering edit mode

Open the user menu in the top bar (1) and select **Edit UI** (2). If you manage multiple dashboards, first check the dashboard selected in the **Dashboard** field.



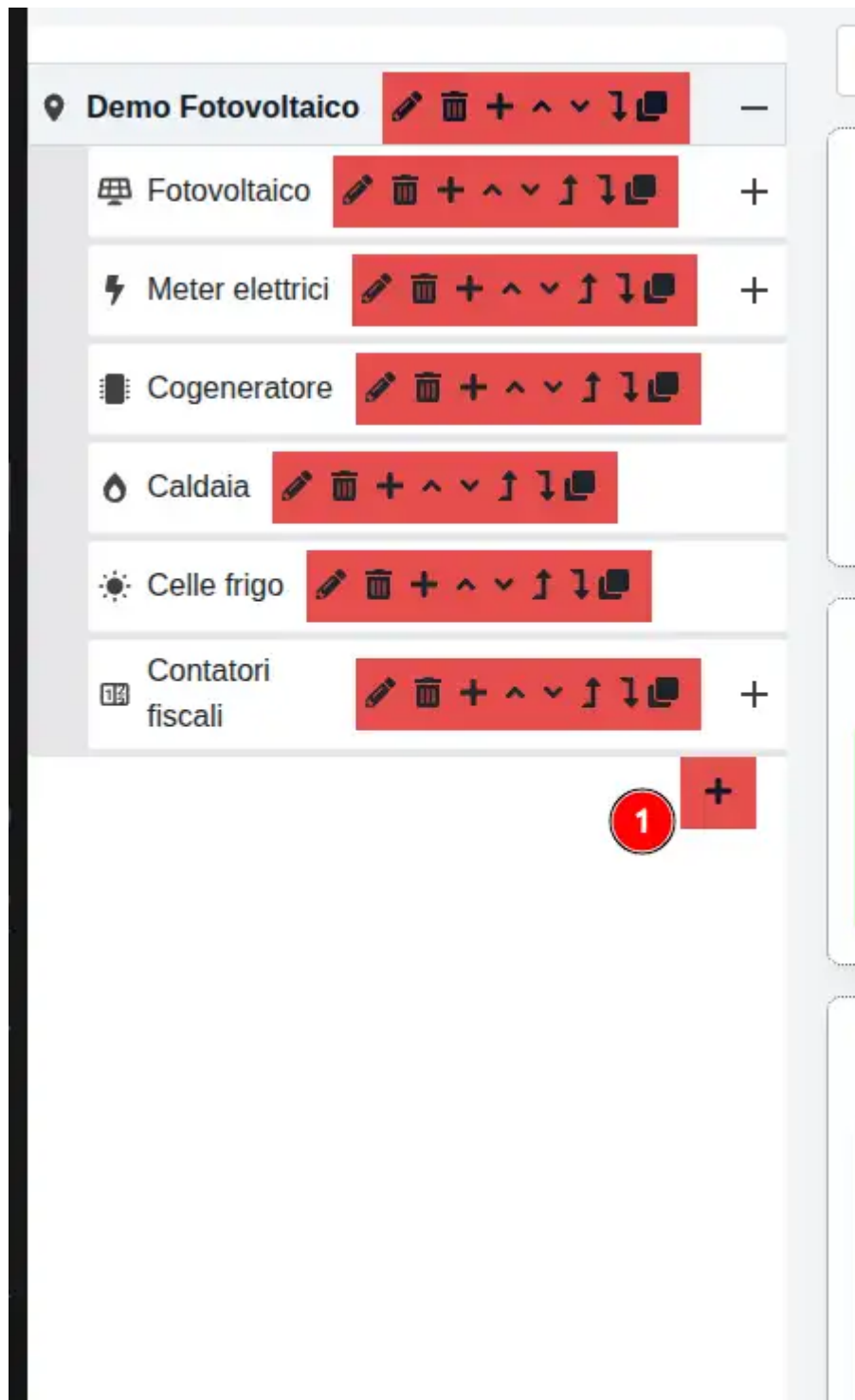
In edit mode, the interface displays:

- management controls beside the entries in the side menu;
- editing controls in each widget header;
- + buttons for adding pages and widgets;
- a green check mark for confirming changes and a red X for cancelling them.



5.2.2 Managing menu pages

The side menu represents the hierarchy of the dashboard pages. The **+** button at the bottom of the menu (1) creates a new top-level entry.



The new page is added to the menu and initially contains no widgets. Use the pencil beside the new entry (1) to configure it.



5.2.2.1 Configuring a menu entry

In the **Edit menu item** window, you can set:

1. **Name:** the text displayed in the menu;
2. **Icon:** the symbol displayed next to the name;
3. **Description:** a short description of the page;
4. **Show icon only:** hides the name and displays only the icon in the menu.

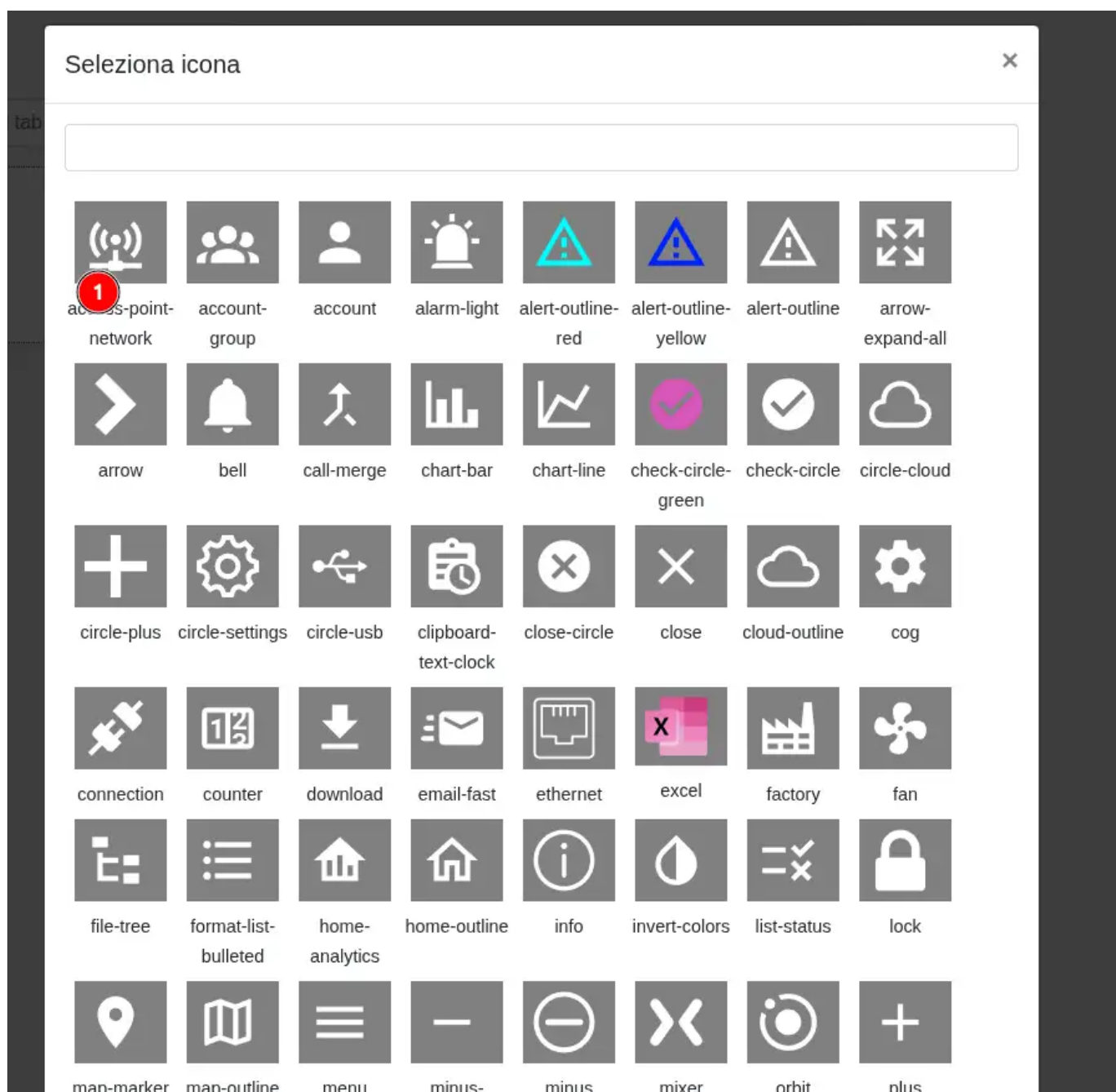
The **Page type** field defines the content associated with the entry. To create a page containing widgets, select **Dashboard**. **Text in the address bar** defines the readable part of the page address.

The screenshot shows a 'Modifica voce menu' (Edit menu item) dialog box. It contains the following fields and controls:

- Nome ***: A text input field containing 'Item 2'. A red circle with the number '1' is next to it.
- Icona:**: A label followed by 'n/d' and a 'Select' button. A red circle with the number '2' is next to the 'Select' button.
- Descrizione:**: A text input field. A red circle with the number '3' is next to it.
- Tipo di pagina**: A dropdown menu showing 'Dashboard'.
- Testo nella barra degli indirizzi**: A text input field containing 'item-2'. A blue information icon is to its right.
- Mostra solo icona**: A checkbox that is currently unchecked. A blue information icon is to its right. A red circle with the number '4' is next to the checkbox.

At the bottom right of the dialog are 'Cancel' and 'OK' buttons.

To choose an icon, click **Select**, then select (1) one of the available symbols. The field at the top lets you search for an icon by name.



Complete the fields, enable **Show icon only** (1) only if required, and click **OK** (2) to save the entry.

Modifica voce menu ✕

Nome *: ✓

Icona:  

Descrizione: ✓

Tipo di pagina ▾

Testo nella barra degli indirizzi ⓘ ✓

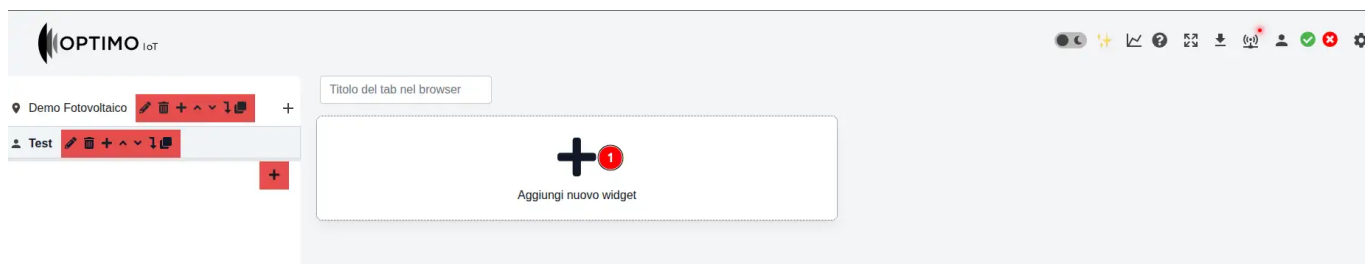
☒ Mostra solo icona ⓘ

Se selezionato, l'elemento di menu verrà visualizzato solo come icona

1 **2**

5.2.3 Adding a widget

Open the required page and click **Add new widget** (1).



In the **New Widget** window, you can:

- describe the desired result in natural language and use **Create** to obtain an automatically proposed configuration; this feature is marked as beta;
- manually choose the widget type and click **Add (1)**.

Each card includes a preview, a short description, and tags identifying the widget's purpose.

Nuovo Widget

BETA: Scrivi ciò che vorresti ✎

L'LLM ti proporrà un widget già configurato. Potrai poi affinare la tua richiesta o modificare manualmente il risultato ⓘ

Es: crea un grafico che mostri l'andamento della temperatura della caldaia negli ultimi 7 giorni

Crea

Qualche esempio:

- Mostra in un gauge la portata di vapore, che può avere 1300 come valore massimo
- Mostra in un grafico a barre la produzione giornaliera dell'impianto fotovoltaico nell'ultimo mese
- Crea un box che mostri l'energia prodotta dall'impianto fotovoltaico a partire da oggi. Fallo verde scuro e con un'icona di un albero

Oppure

Scegli il tipo di widget e configuralo manualmente

Grafico valori real-time

Portata istantanea

Un grafico per dati in serie temporale. Le serie plottate possono essere calcolate a partire da altre variabili

Tags: real-time timeseries

1 Aggiungi

Gauge

Potenza elettrica CHP

Un widget a indicatore. L'ago si muove in tempo reale, in base al valore della variabile e al valore della scala

Tags: real-time graphics

Aggiungi

Grafico valori aggregati

Consumi elettrici - storico

Grafico a barre/punti per analizzare e confrontare valori con diversi tipi di funzioni statistiche e di aggregazione

Tags: analisis

Aggiungi

- 205/235 -

Copyright © Optimo IoT 2025

5.2.3.1 Configuring a time-series chart

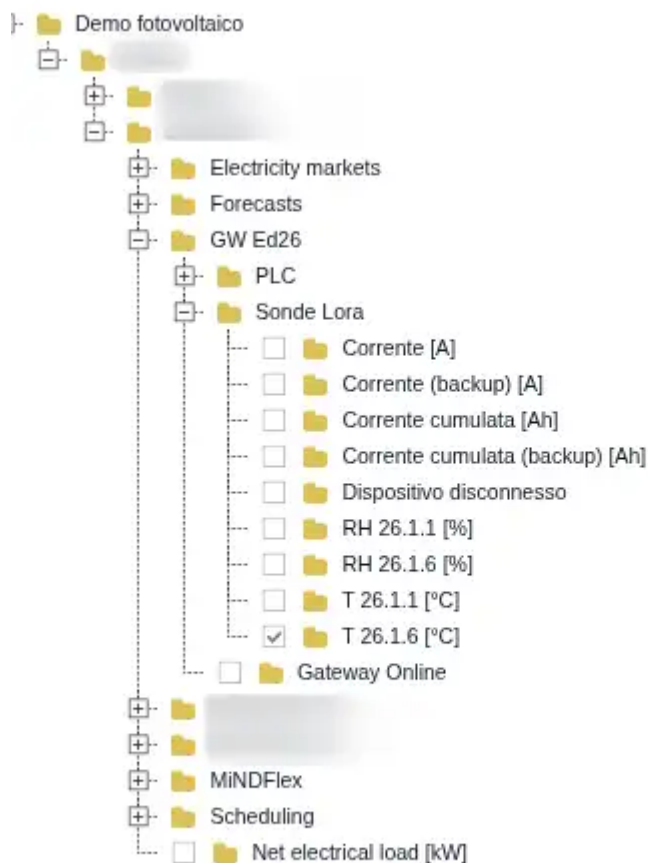
In the **Widget editor**, enter a title and configure the data. In the time-series chart example:

1. **Select** opens the resource tree and lets you choose one or more variables;
2. the pencil beside **Interval from** configures the start of the time range;
3. the pencil beside **Interval to** configures the end of the time range.

The other tabs let you configure calculated variables, line options, vertical axes, and events. The available options vary according to the selected widget type. Click **OK** to add the widget to the page.

The screenshot shows the 'Widget editor' window for a 'Timeseries Chart'. The chart area is empty with a grid. The y-axis ranges from 0 to 30, and the x-axis ranges from -1 to 6. Below the chart, there is a 'Titolo:' field containing 'Timeseries Chart'. A tabbed interface shows 'Dati' as the active tab, with other tabs being 'Variabili calcolate', 'Opzioni per linea', 'Assi verticali', and 'Eventi'. Under 'Variabili:', a search bar contains 'Sonde Lora / T 26.1.6' and a 'Seleziona' button. The 'Intervallo temporale' section has two items: 'Intervallo da:' with a value 'da ora attuale sottrai 3 giorni, poi vai all'inizio del/della giorno' and 'Intervallo a:' with a value 'Ora attuale (default)'. Red numbered circles 1, 2, and 3 highlight the 'Seleziona' button, the 'Intervallo da:' field, and the 'Intervallo a:' field respectively. At the bottom right are 'Cancel' and 'OK' buttons.

In the resource tree, expand folders and devices until you reach the variables. Select the checkboxes for the variables to display in the widget, then confirm your selection.

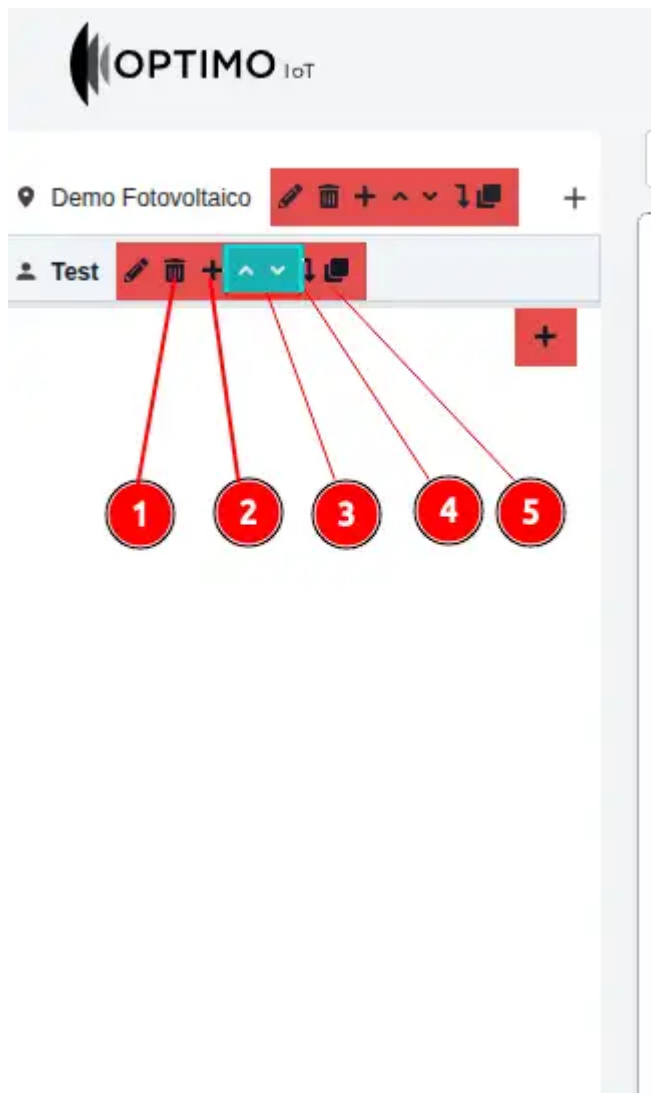


5.2.4 Organizing pages

The controls beside each menu entry let you:

1. delete the entry;
2. add a child entry;
3. move the entry up or down in the menu order;
4. change the entry's hierarchy level;
5. duplicate it.

The pencil, shown before the bin, lets you edit the entry. The available controls depend on the entry's position in the hierarchy.



5.2.5 Editing and arranging widgets

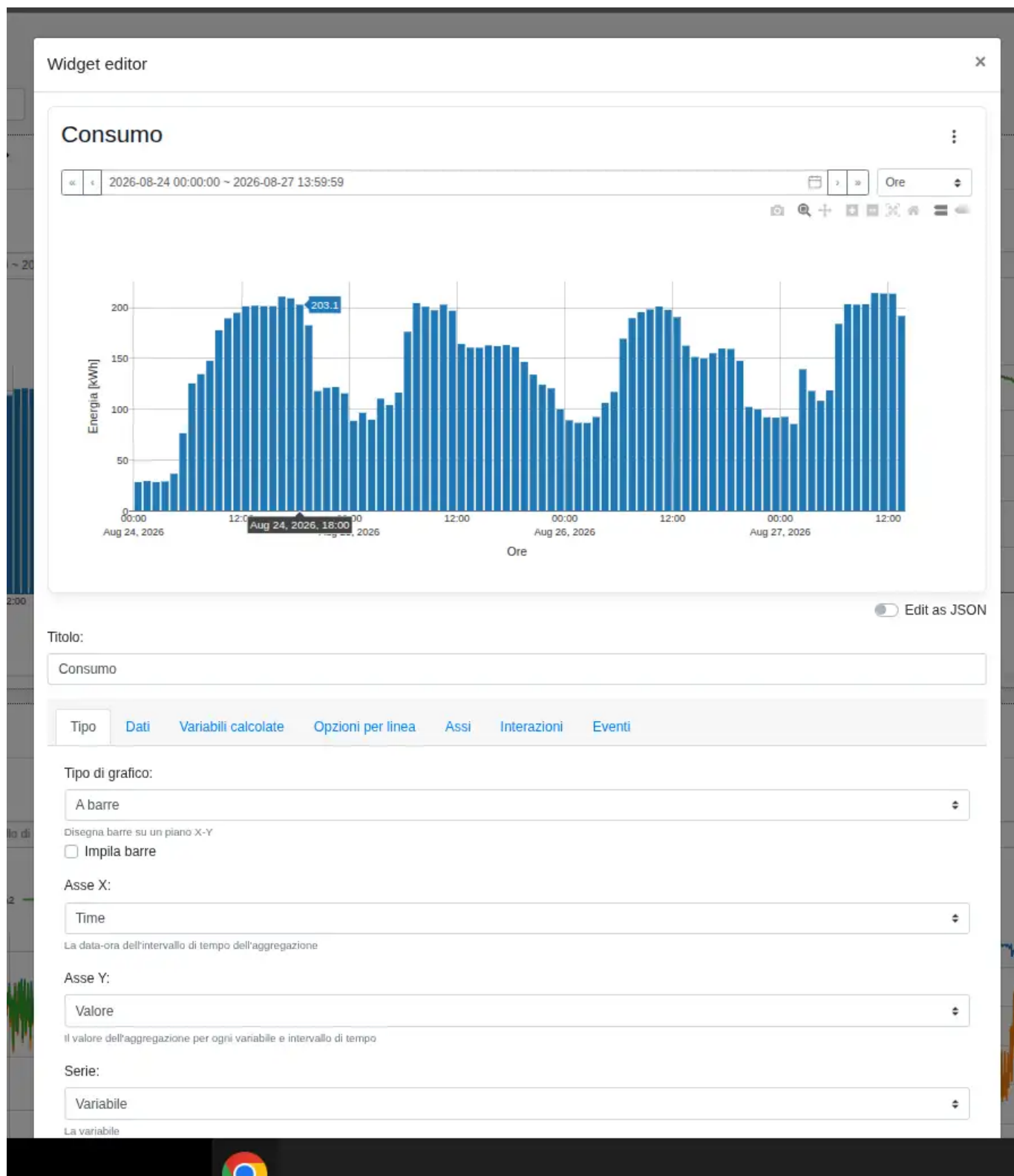
Each widget has controls in its header:

1. the pencil beside the widget type opens its configuration;
2. the dotted handle lets you drag the widget;
3. the overlapping-squares icon duplicates the widget;
4. the ruler changes its width;
5. the vertical arrows move the widget up or down;
6. the bin deletes the widget.



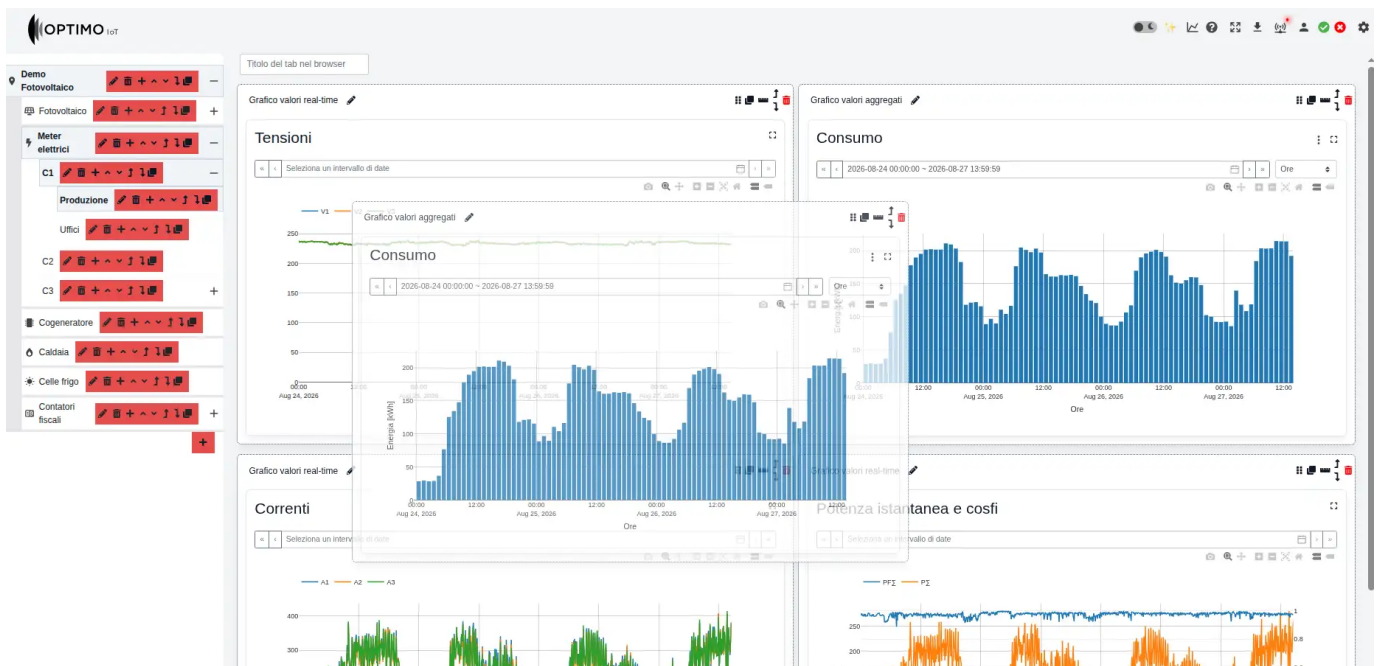
5.2.5.1 Editing an existing widget

Click the pencil to reopen the **Widget editor**. You can change the title, chart type, variables, axes, interactions, and events. The tabs and fields vary according to the widget. When finished, click **OK**.



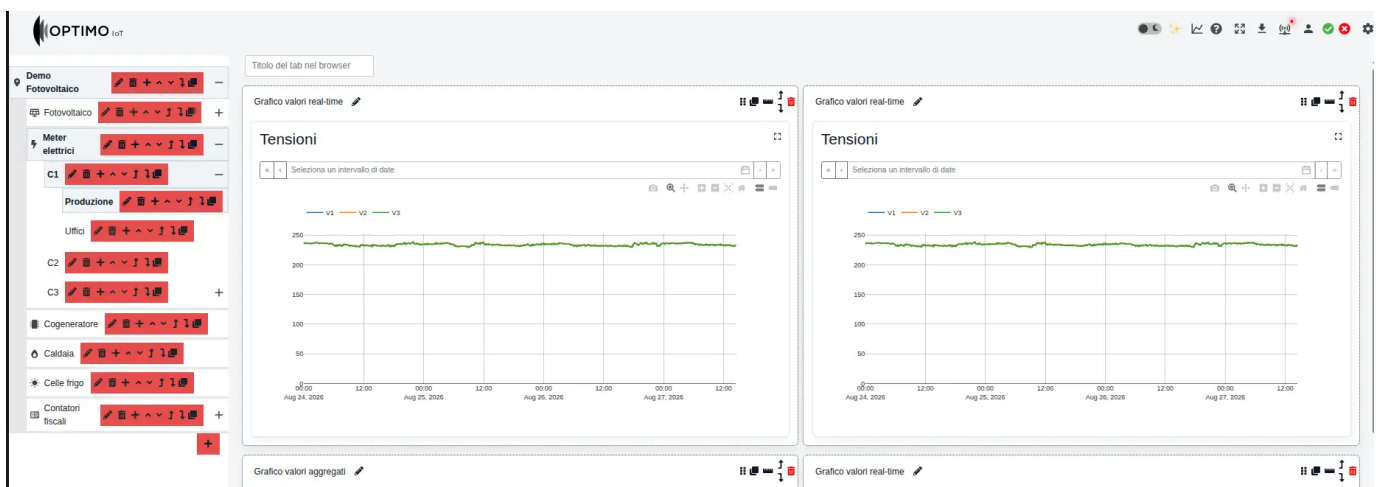
5.2.5.2 Moving a widget

Drag the widget by its dotted handle and drop it in the required position. While dragging, the translucent preview shows its new location.



5.2.5.3 Duplicating a widget

Click the overlapping-squares icon to create a copy of the widget on the same page. The copy keeps the original configuration and can then be edited independently.



5.2.6 Finishing your changes

When the dashboard is ready, use the green check mark in the top bar to confirm the changes. Use the red X to leave edit mode and cancel unconfirmed changes.

5.3 Data analysis

The **Analysis** page allows you to quickly consult the historical values of the variables, even when they come from different sources or sites. From this view, you can select a time interval, choose one or more variables from the asset tree and compare their trend on the graph. Below the graph, a summary table is shown with the main statistics calculated over the entire selected period.

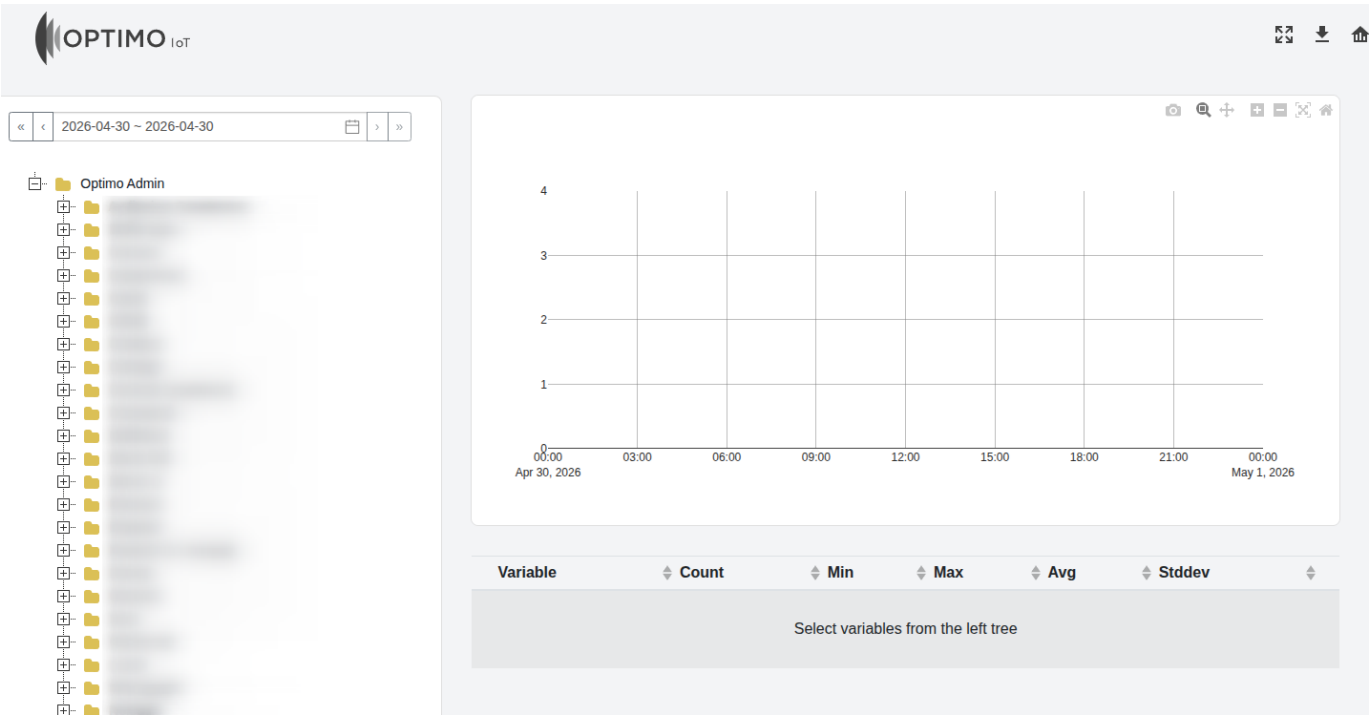
5.3.1 Access

To open the analysis tool, click on the graph icon in the top bar of the dashboard.



The analysis view is made up of:

- time interval selector
- asset and variable tree
- graph area
- statistics table



5.3.2 Time interval

The selector in the upper left defines the period to analyze. By default, the current day is proposed, from 00:00:00 to 23:59:59 . You can modify the period using the calendar or the navigation buttons next to the date field.

When the interval is modified, the graph and table are updated based on the selected variables.

 **Note**

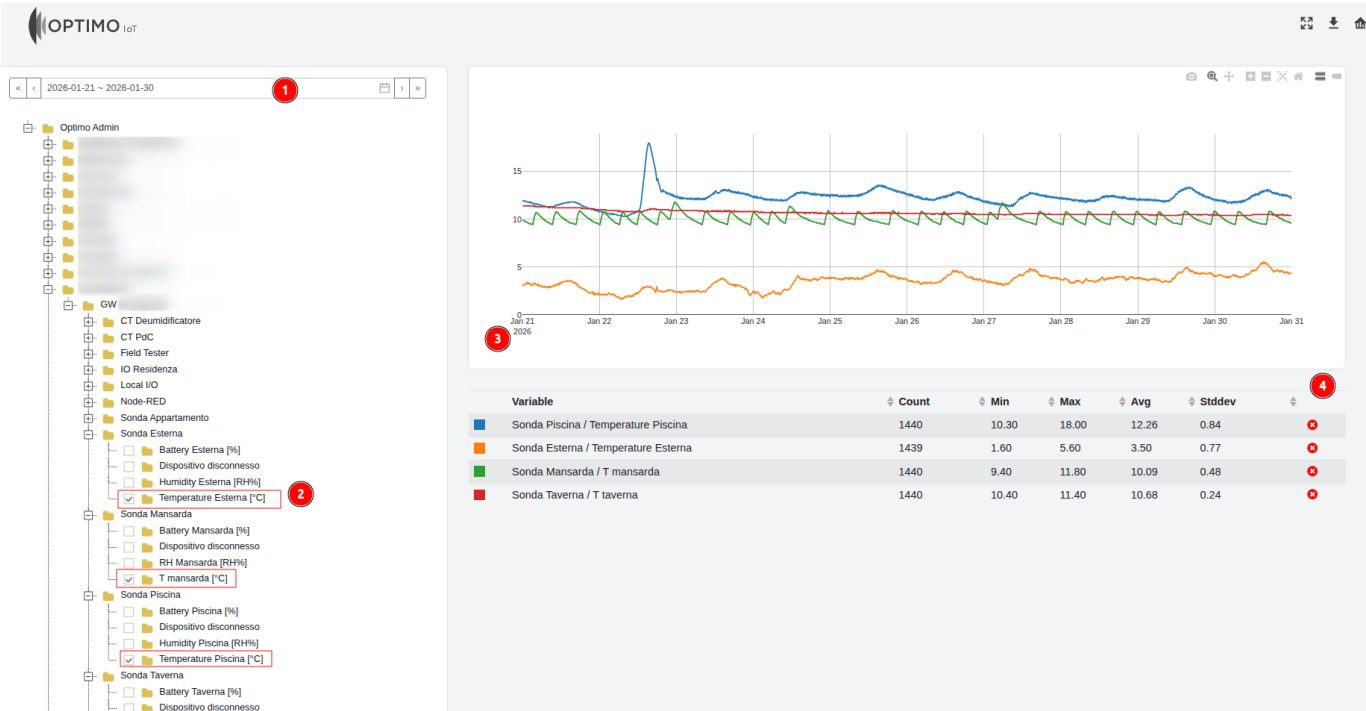
Very long intervals or a large number of variables may require more time to load the data.

5.3.3 Variable selection

The tree on the left shows the hierarchy of the configured assets. Expand the folders with the + button until you reach the desired variables.

You can select multiple variables at the same time. Each selected variable is added:

- to the graph, as a time series
- to the table, as a summary statistics row



In the example:

- 1 : time interval used to query historical data
- 2 : variables selected from the asset tree
- 3 : graph with the time series of the selected variables
- 4 : summary table with statistics and remove button

To remove a variable from the analysis, use the remove icon in the corresponding row of the table.

5.3.4 Graph

The graph shows the trend of the values in the selected period.

Each variable is represented with a different color. By hovering the mouse over the points of the graph, the value, unit of measurement and time reference are shown.

The buttons available in the upper right corner of the graph allow you to use the interactive tools of the graph, for example zoom, pan, view movement, autoscale and save image, based on the functions available in the interface.

5.3.5 Statistics table

The table below the graph provides a summary for each selected variable.

The available columns are:

- **Variable** : variable name, with reference to the asset hierarchy
- **Min** : minimum value in the selected period
- **Max** : maximum value in the selected period
- **Count** : number of samples available in the selected period
- **Mean** : average value in the selected period
- **Std Dev** : standard deviation of the values in the selected period

Stats are calculated on the values available in the selected period, so if there are missing data the statistics are calculated only on the available samples.

5.3.5.1 Series toggle

The square icon next to the variable name in the table allows you to toggle the visibility of the corresponding series in the graph.

With a single click the series is activated or hidden. With a double click you can quickly isolate a series with respect to the others; if all series are hidden, a new double click makes them visible again.

5.3.6 Sharing the analysis

The URL of the page is continuously updated and contains within it the selected time interval and variables. This allows you to copy the URL to save or share with other users the set analysis view. The user who opens the link must have access to an account with permissions to view the contained variables.

5.4 Formula

Many widgets available to the user to build their dashboard support custom formula defined by the user.

Here is the full documentation of the supported syntax.

5.4.0.1 Expression Syntax

The parser accepts a pretty basic grammar. It's similar to normal JavaScript expressions, but is more math-oriented. For example, the `^` operator is exponentiation, not xor.

5.4.0.1.1 OPERATOR PRECEDENCE

Operator	Associativity	Description
(...)	None	Grouping
f(), x.y, a[i]	Left	Function call, property access, array indexing
!	Left	Factorial
^	Right	Exponentiation
+, -, not, sqrt, etc.	Right	Unary prefix operators (see below for the full list)
*, /, %	Left	Multiplication, division, remainder
+, -,	Left	Addition, subtraction, array/list concatenation
==, !=, >=, <=, >, <, in	Left	Equals, not equals, etc. "in" means "is the left operand included in the right array operand?"
and	Left	Logical AND
or	Left	Logical OR
x ? y : z	Right	Ternary conditional (if x then y else z)
;	Left	Expression separator

5.4.0.1.2 UNARY OPERATORS

The parser has several built-in "functions" that are actually unary operators. The primary difference between these and functions are that they can only accept exactly one argument, and parentheses are optional. With parentheses, they have the same precedence as function calls, but without parentheses, they keep their normal precedence (just below `^`). For example, `sin(x)^2` is equivalent to `(sin x)^2`, and `sin x^2` is equivalent to `sin(x^2)`.

The unary **+** and **-** operators are an exception, and always have their normal precedence.

Operator	Description
-x	Negation
+x	Unary plus. This converts it's operand to a number, but has no other effect.
x!	Factorial ($x \cdot (x-1) \cdot (x-2) \cdot \dots \cdot 2 \cdot 1$). $\text{gamma}(x + 1)$ for non-integers.
abs x	Absolute value (magnitude) of x
acos x	Arc cosine of x (in radians)
acosh x	Hyperbolic arc cosine of x (in radians)
asin x	Arc sine of x (in radians)
asinh x	Hyperbolic arc sine of x (in radians)
atan x	Arc tangent of x (in radians)
atanh x	Hyperbolic arc tangent of x (in radians)
cbrt x	Cube root of x
ceil x	Ceiling of x — the smallest integer that's $\geq x$
cos x	Cosine of x (x is in radians)
cosh x	Hyperbolic cosine of x (x is in radians)
exp x	e^x (exponential/antilogarithm function with base e)
expm1 x	$e^x - 1$
floor x	Floor of x — the largest integer that's $\leq x$
length x	String or array length of x
ln x	Natural logarithm of x
log x	Natural logarithm of x (synonym for ln, not base-10)
log10 x	Base-10 logarithm of x
log2 x	Base-2 logarithm of x
log1p x	Natural logarithm of (1 + x)
not x	Logical NOT operator
round x	X, rounded to the nearest integer, using "grade-school rounding"
sign x	Sign of x (-1, 0, or 1 for negative, zero, or positive respectively)
sin x	Sine of x (x is in radians)
sinh x	Hyperbolic sine of x (x is in radians)
sqrt x	Square root of x. Result is NaN (Not a Number) if x is negative.
tan x	Tangent of x (x is in radians)
tanh x	Hyperbolic tangent of x (x is in radians)
trunc x	Integral part of a X, looks like floor(x) unless for negative number

5.4.0.1.3 PRE-DEFINED FUNCTIONS

Besides the "operator" functions, there are several other functions.

Function	Description
random(n)	Get a random number in the range [0, n). If n is zero, or not provided, it defaults to 1.
fac(n)	n! (factorial of n: "n _ (n-1) _ (n-2) _ ... _ 2 * 1") Deprecated. Use the ! operator instead.
min(a,b,...)	Get the smallest (minimum) number in the list.
max(a,b,...)	Get the largest (maximum) number in the list.
hypot(a,b)	Hypotenuse, i.e. the square root of the sum of squares of its arguments.
pyt(a, b)	Alias for hypot.
pow(x, y)	Equivalent to x^y . For consistency with JavaScript's Math object.
atan2(y, x)	Arc tangent of x/y. i.e. the angle between (0, 0) and (x, y) in radians.
roundTo(x, n)	Rounds x to n places after the decimal point.
map(f, a)	Array map: Pass each element of <code>a</code> the function <code>f</code> , and return an array of the results.
fold(f, y, a)	Array fold: Fold/reduce array <code>a</code> into a single value, <code>y</code> by setting <code>y = f(y, x, index)</code> for each element <code>x</code> of the array.
filter(f, a)	Array filter: Return an array containing only the values from <code>a</code> where <code>f(x, index)</code> is <code>true</code> .
indexOf(x, a)	Return the first index of string or array <code>a</code> matching the value <code>x</code> , or <code>-1</code> if not found.
join(sep, a)	Concatenate the elements of <code>a</code> , separated by <code>sep</code> .
if(c, a, b)	Function form of <code>c ? a : b</code> . Note: This always evaluates both <code>a</code> and <code>b</code> , regardless of whether <code>c</code> is <code>true</code> or not. Use <code>c ? a : b</code> instead if there are side effects, or if evaluating the branches could be expensive.

5.4.0.1.4 ARRAY LITERALS

Arrays can be created by including the elements inside square `[]` brackets, separated by commas. For example:

```
[ 1, 2, 3, 2+2, 10/2, 3! ]
```

5.4.0.1.5 CONSTANTS

The parser also includes a number of pre-defined constants that can be used in expressions. These are shown in the table below:

Constant	Description
E	Euler's number
PI	PI (π)
true	Logical <code>true</code> value
false	Logical <code>false</code> value

5.5 Aggregation types

In different elements of the Optimo IoT system it is possible to calculate statistics on the values of a variable (dashboard widgets, calculated variables, http API).

In this page the available functions are listed.

5.5.1 Point statistics

5.5.1.1 Average

Arithmetic mean of the values of the variable present in the time interval

5.5.1.2 Sum

Sum of the values of the variable present in the time interval

5.5.1.3 Count

Count of the number of values of the variable present in the time interval

5.5.1.4 Maximum

Maximum value of the variable present in the time interval

5.5.1.5 Minimum

Minimum value of the variable present in the time interval

5.5.1.6 1st percentile

Value below which 1% of the values of the variable present in the time interval are located

5.5.1.7 1st quartile

Value below which 25% of the values of the variable present in the time interval are located

5.5.1.8 Median

Value below which 50% of the values of the variable present in the time interval are located

5.5.1.9 3rd quartile

Value below which 75% of the values of the variable present in the time interval are located

5.5.1.10 99th percentile

Value below which 99% of the values of the variable present in the time interval are located

5.5.2 Variations

5.5.2.1 Count of rises

Count of the number of times the value of the variable present in the interval was higher than the previous recorded value (if not present in the interval, the first value prior to the interval is considered)

5.5.2.2 Count of falls

Count of the number of times the value of the variable present in the interval was lower than the previous recorded value (if not present in the interval, the first value prior to the interval is considered)

5.5.2.3 Incremental positive difference

Sum of the positive values of the difference between the value of the variable present in the interval and the previous recorded value (if not present in the interval, the first value prior to the interval is considered). Useful for variables in kWh, m3, L of incremental meters (eg electricity, gas, water) for which you want to know the variation in the interval

5.5.3 Integrals and times

5.5.3.1 Integral

Integral of the variable over time in the interval. The continuous function to be integrated is constructed by considering at each instant of the interval the last valid value (if not present in the interval, the first value prior to the interval is considered)

5.5.3.2 Weighted average

Weighted average over time of the interval of the values of the variable. The continuous function to be integrated is constructed by considering at each instant of the interval the last valid value (if not present in the interval, the first value prior to the interval is considered)

5.5.3.3 Time on

Time in which the variable was ON (value greater than zero) in the interval. The last valid value is considered at each instant of the interval (if not present in the interval, the first value prior to the interval is considered). Boolean values are considered as 0 or 1

5.5.3.4 Count of alarm activations

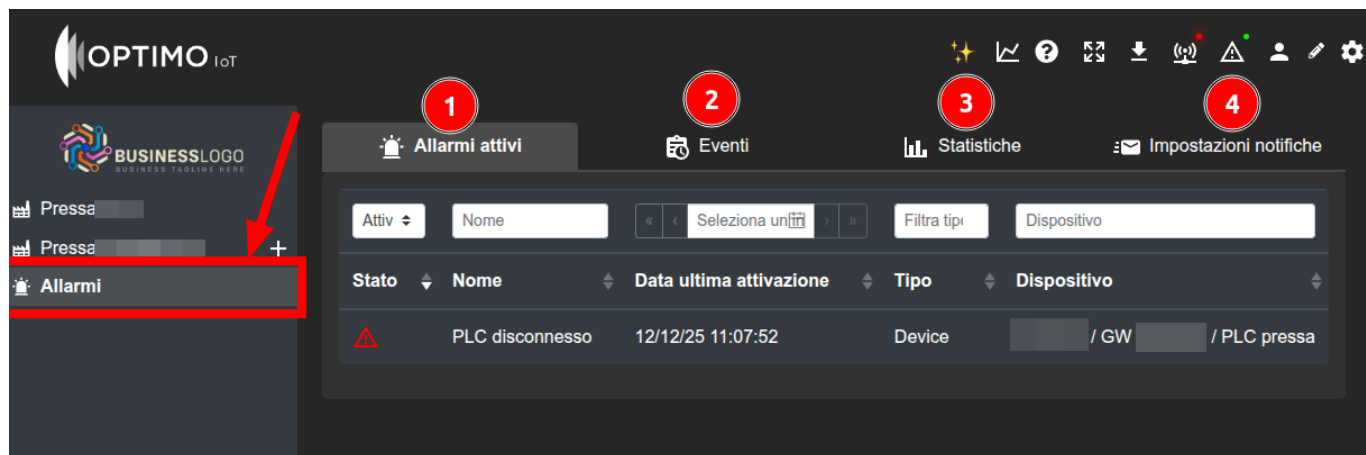
Only for alarm variables. Count of the number of alarm activations in the interval

5.5.3.5 Boolean weighted average

Weighted average over time of the interval of the ON state (value greater than zero) compared to OFF (value equal to zero) of the variable. The continuous function to be integrated is constructed by considering at each instant of the interval the last valid value (if not present in the interval, the first value prior to the interval is considered). Boolean values are considered as 0 or 1

5.6 Alarms

In the dashboards, there is a dedicated page for viewing the status of alarms, their history, and managing notifications.



The page is divided into 4 tabs:

1. **Active Alarms:** shows the list of currently active alarms
2. **Events:** shows the history of alarms (activations, deactivations, management)
3. **Statistics:** shows statistics on alarms (number of activations per day) in a bar chart
4. **Notification Settings:** allows you to configure email and SMS notifications when specific alarms are activated

5.6.1 Active Alarms

The tab shows the list of active alarms, with the following information:

- current status (active or inactive). By default, the filter for this column shows only active alarms, but it can be modified to also display inactive alarms
- name of the alarm
- date of last activation
- type of alarm (lost connection to device or specific device alarm)
- device associated with the alarm (e.g., machine, plant, etc.)

You can filter and sort the table based on all available columns.

5.6.2 Events

Allarmi attivi

Eventi

Statistiche

Impostazioni notifiche

-	« < 2025-11-14 > »	Nome	Utente		
Stato	Gestione	Ultima attivazione	Allarme	Asset	Utente
		14/12/25 09:31:41	Diagnostic Present: Critical	/ GW	
		14/12/25 09:18:25	Diagnostic Present: Critical	/ GW	
		14/12/25 09:15:52	CHP in allarme non bloccante	/ GW	
		14/12/25 09:03:57	Diagnostic Present: Critical	/ GW	
		14/12/25 08:59:42	Diagnostic Present: Critical	/ GW	

The tab shows the history of alarm activations, with the following information:

- **Status:** current status (active or inactive)
- **Management:** status of the management of the alarm activation. It can be:
 - Not taken in charge
 - Taken in charge
 - Resolved
- **Activation Date:** activation date
- **Alarm:** name of the alarm
- **Asset:** device associated with the alarm (e.g., machine, plant, etc.)

By clicking on each row of the table, you can view further details about the event:

Attivazione allarme Dispositivo disconnesso del 14/12/25 07:36:56

Attivazione14/12/25 07:36:56

Presa in caricon/d

Risoluzionen/d

Disattivazione14/12/25 07:37:19

Chiudi

Gestisci

By clicking on **Manage**, you can update the management status of the event and enter notes to keep track of the actions taken:

Attivazione allarme Dispositivo disconnesso del 14/12/25 07:36:56

Stato

Presa in carico

Attivazione

Note

È successo quando ho chiuso la

Presa in carico

Note

Sto indagando

Disattivazione

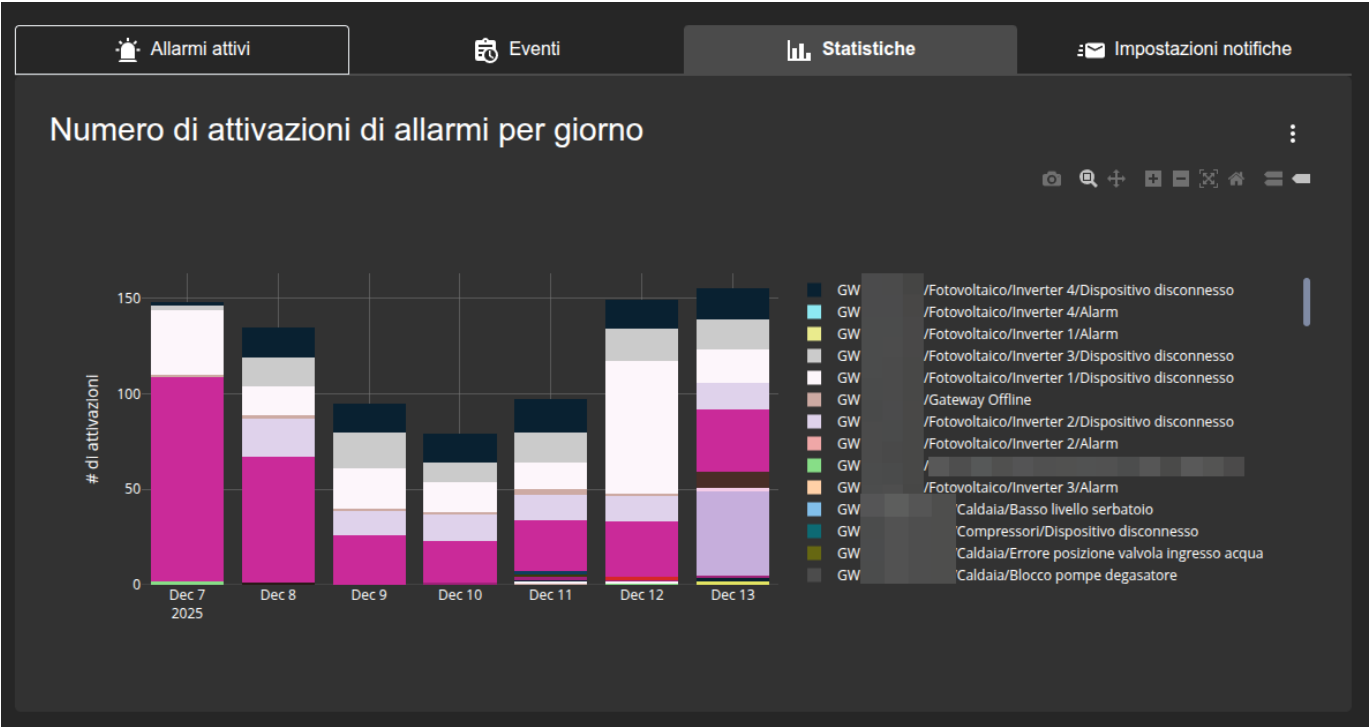
Note

Si è risolto da solo

Annulla

Salva

5.6.3 Statistics



The tab shows a bar chart with the number of alarm activations per day. You can view the number of activations for each individual alarm by selecting it from the legend on the right side of the chart.

5.6.4 Notification Settings

See chapter Notifications.

6. Security & Compliance

6.1 EU Cyber Resilience Act

This page collects the information and instructions required by **Annex II** ("Information and instructions to the user") of Regulation (EU) 2024/2847, the Cyber Resilience Act (CRA), for the products with digital elements covered by this documentation: the **AL300 (AssetLinker300) gateway** and the **Optimo IoT cloud platform**.

6.1.1 1. Manufacturer identification

- **Legal name:** Optimo IoT s.r.l.
- **Registered office:** Via Francesco Restelli, 3 – 20124 Milano (MI), Italy – P.IVA 03834900130
- **Operational office:** Via Sant'Anna, 16 – 23875 Osnago (LC), Italy
- **Email:** info@optimoiot.it
- **Phone:** +39 039 596 9780
- **Website:** optimoiot.it

6.1.2 2. Reporting a security vulnerability

Cybersecurity vulnerabilities affecting the AL300 gateway or the Optimo IoT cloud platform can be reported to the manufacturer's dedicated point of contact:

- **Email:** security@optimoiot.it

See the Coordinated Vulnerability Disclosure Policy for what to include in a report, expected response times, and the disclosure timeline.

6.1.3 3. Product identification

- **Gateway:** AL300 (AssetLinker300). Model, hardware revision and serial number are printed on the label affixed to the device enclosure and on the label included in the product packaging.
- **Firmware version:** shown in the local/cloud web interface user menu, at the bottom of the panel described in Authentication → User information and version.

- **Cloud platform:** Optimo IoT Cloud, reachable at cloud.optimoiot.it; being a continuously-updated SaaS service, it does not have a fixed version number, but the current version is shown in the user menu of the web interface, at the bottom of the panel described in Authentication → User information and version.

6.1.4 4. Intended purpose and security properties

The AL300 gateway is an industrial IoT device intended for installation inside electrical cabinets or other closed operating environments (see Safety instructions). It acquires data from field devices over industrial protocols (Modbus RTU/TCP, Siemens S7, LoRaWAN, OPC-UA, etc.) and forwards it to the Optimo IoT cloud platform, or exposes it locally, for monitoring, alarming and analysis.

Security-relevant functionalities provided by the platform include:

- unique per-device credentials for the local web interface, generated at manufacturing time and printed on the device/package labels (see Quick start), with a recommendation to change them on first login
- role and asset-based access control, so a user only sees the assets and variables associated with them (see Resources → Users)
- optional multi-factor authentication (MFA) for cloud accounts (see Authentication → MFA)
- outbound-only connectivity to the cloud platform: the gateway does not need to be reachable from the internet (see Firewall)
- an optional encrypted remote-access VPN for reaching field devices, in place of exposing them directly on the network (see Remote access VPN)
- signed firmware update packages, installable over-the-air or locally (see Firmware upgrade and OTA update)

6.1.5 5. Known or foreseeable circumstances leading to cybersecurity risks

The following circumstances, if present during use of the AL300 gateway or the cloud platform, are known to increase cybersecurity risk:

- leaving the local web interface credentials at their factory-assigned values instead of changing them at first login
- installing the gateway outside a closed electrical cabinet or otherwise granting physical access to unauthorized personnel (see Safety instructions)
- exposing the gateway's local web interface or connected field devices directly to the public internet (e.g. via port forwarding) instead of using the remote access VPN
- opening firewall ports beyond those documented in Firewall
- running firmware versions for which security updates are no longer provided (see §8)
- disabling multi-factor authentication on accounts with administrative privileges

6.1.6 6. Software Bill of Materials (SBOM)

Optimo IoT maintains an internal software bill of materials covering the top-level components and dependencies of the AL300 firmware and the Optimo IoT cloud platform, as required by Article 13(24) of the Cyber Resilience Act.

The SBOM is not published publicly. It is made available to market surveillance authorities upon reasoned request.

6.1.7 7. EU Declaration of Conformity

The EU Declaration of Conformity for the AL300 is available [here](#).

6.1.8 8. Security update support period

Optimo IoT provides **security updates** for the AL300 gateway free of charge to all customers for **5 years from the date of purchase** from Optimo IoT.

Feature updates (new functionality, non-security improvements) are provided to customers with an active Optimo IoT Cloud subscription.

Firmware updates, including security updates, can be installed through any of the methods described in Firmware upgrade: over-the-air (OTA) from the cloud platform, via the local web interface, or via USB stick.

6.1.9 9. Instructions for secure use

6.1.9.1 Secure commissioning

1. Install the gateway as described in Installation, respecting the safety instructions.
2. Access the local web interface using the unique credentials printed on the device/package labels, as described in Quick start.
3. Change the local web interface credentials at first login.
4. Enable multi-factor authentication on accounts with administrative privileges.
5. Prefer the remote access VPN over exposing field devices or the local web interface directly on a routable network.
6. Review and restrict firewall rules to only the ports required for the deployment.

6.1.9.2 Security update installation

Apply firmware updates as described in Firmware upgrade and OTA update. OTA updates via the cloud platform are the recommended method, as they do not require physical access to the gateway.

6.1.9.3 Data security implications of configuration changes

Changes to network settings, data source configuration or user permissions can affect which data is collected, where it is sent, and who can access it. Configuration is synchronized between the gateway and the cloud platform (see Resources → AL300 Gateway configuration); review changes made by any collaborator with configuration access, and restrict that access using the role/asset model described in §4.

6.1.9.4 Secure decommissioning

Before removing the gateway from service, disposing of it, or transferring it to a third party:

1. Perform a factory reset to irreversibly wipe all configuration, credentials and locally-stored acquired data from the device.
2. Remove any inserted SIM card.
3. Dispose of the device following the Decommissioning and disposal instructions, including separate collection under WEEE regulations.

6.2 Coordinated Vulnerability Disclosure Policy

Optimo IoT values the work of independent security researchers in helping us keep the AL300 gateway and the Optimo IoT cloud platform secure. This policy describes how to report a suspected security vulnerability to us, what you can expect from us in return, and the rules under which we authorize good-faith security research.

6.2.1 Scope

6.2.1.1 In scope

- AL300 (AssetLinker300) gateway: firmware, hardware, local web interface and local APIs
- Optimo IoT cloud platform, including cloud.optimoiot.it, its web dashboard, and its public APIs (HTTP API, MCP server)
- the OTA firmware update mechanism and update packages distributed by Optimo IoT
- the VPN remote-access service provided through the platform

6.2.1.2 Out of scope

- third-party field devices connected downstream of the gateway (PLCs, sensors, meters, etc.) that are not manufactured by Optimo IoT
- the customer's own network, IT infrastructure, or physical premises
- vulnerabilities that require physical possession of a specific customer's device, or that require credentials already known to an attacker (e.g. through the customer's own negligence), unless the finding demonstrates a way to obtain those credentials or that access without authorization
- denial-of-service (DoS/DDoS) testing, load/stress testing, or any action that could degrade the service for other users
- social engineering, phishing, or physical attacks against Optimo IoT staff, contractors or customers
- automated vulnerability scanning of production systems performed without prior written coordination with security@optimoiot.it
- reports based purely on best-practice recommendations, missing security headers, or software version disclosure without a demonstrated, concrete impact
- issues already known to us or already publicly disclosed at the time of the report

If you are unsure whether something is in scope, report it anyway — we would rather review a borderline report than miss a real issue.

6.2.2 How to report

Send a report to **security@optimoiot.it**.

To help us triage and reproduce the issue quickly, please include:

- the product/component affected (e.g. "AL300 local web interface", "Optimo IoT Cloud HTTP API") and, if known, the firmware or platform version
- a description of the vulnerability and its potential impact
- step-by-step instructions to reproduce it, including any proof-of-concept code, request/response samples, or screenshots
- whether you believe the vulnerability is already being exploited or has been disclosed elsewhere
- how you would like to be credited (or that you'd prefer to remain anonymous)
- your contact details for follow-up questions

Please submit reports in English or Italian.

6.2.3 What you can expect from us

Step	Target time
Acknowledgement of receipt	within 3 business days
Initial triage and validation	within 10 business days of acknowledgement
Status updates while the issue is open	at least every 15 calendar days
Notification once a fix or mitigation is available	as soon as it is released

Once validated, we assess severity using CVSS and target the following remediation timeframes, counted from validation:

Severity	Target remediation time
Critical	30 days
High	60 days
Medium	90 days
Low	120 days, or at the next scheduled release

These are internal targets, not guarantees; complex issues (e.g. requiring a hardware revision) may take longer, in which case we will explain why and keep you updated.

6.2.4 Coordinated disclosure

We ask that you keep any vulnerability you report confidential, and do not disclose it publicly or to third parties, until:

- we confirm a fix or mitigation has been made available to affected users, and
- 90 days have passed since your initial report,

whichever comes first, unless we mutually agree in writing to a different disclosure date. If a vulnerability is already being actively exploited, we may need to ask for expedited public disclosure (e.g. a security advisory) before a full fix is available, together with interim mitigation guidance.

6.2.5 Safe harbor

Optimo IoT will not pursue legal action against, and will not report to law enforcement, researchers who:

- make a good-faith effort to comply with this policy
- only interact with accounts, devices and data they own or are explicitly authorized to test
- do not access, modify, or exfiltrate data belonging to other customers beyond what is strictly necessary to demonstrate the vulnerability, and delete/report any such data immediately
- do not disrupt production systems or degrade service availability for others
- report the vulnerability to us promptly, and give us a reasonable opportunity to investigate and remediate before any public disclosure, as described above

This authorization does not extend to third-party systems, products or infrastructure not owned by Optimo IoT, even if reachable through our products; such findings should be reported directly to the relevant third party.

6.2.6 Recognition

With your consent, we will credit you by name (or handle) in the release notes or security advisory associated with the fix.

6.2.7 Changes to this policy

This policy may be updated from time to time; the version published on this page applies to reports submitted after the date of the latest change.