

USER MANUAL

DLG I/O MODULES

UNIVERSAL DIGITAL/ANALOG MODULES



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PROPERTIES AND CONDITIONS

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1. General description

DLG is a family of devices that aims at digital and analog galvanic data acquisition and digital transformation, making them available via the ModBus RTU or ModBus TCP communication protocol.

It is configured via a web interface by connecting it to a PC or mobile device.

The configuration of the device has the following characteristics:

- Doesn't require knowledge of any programming language
- Changes are made through the web interface

The models of the DLG family

- **DLG-A4:** 4 analog inputs and 4 analog outputs, the analog inputs are configurable in Voltage [0-24V], Current [0-200mA] and NTC [°C]
- **DLG-D16:** 16 digital inputs or outputs configurable in groups of 4
- **DLG-M2:** 2 analog inputs, 2 digital inputs or digital outputs with all the features listed above

2. Specifications

CPU	I/O
32b Arm® Cortex-M7®	Signal LED
2MBytes Flash ROM	No. 1 Ethernet port 10/100 Mb/s
1MByte RAM	No. 1 galvanically isolated RS485 serial port (on terminals)
Internal RTC with buffer	
MECHANICAL	ENVIRONMENTAL
IP21 plastic enclosure for DIN rail	Operating Temperature: -20°C ÷ 60°C
Connector for inserting the SD card	Relative humidity: 0 to 80% non-condensing
NUTRITION AND CONSUMPTION	
Power supply: 10-24VDC	
Average power consumption: < 2 W	
DLG-A4	
No. 4 Analog Inputs/Outputs	
Dimensions: 90 x 105 x 60 mm, 6 DIN module	
DLG-D16	
No. 16 Digital Inputs/Outputs	
Dimensions: 90 x 105 x 60 mm, 6 DIN module	
DLG-M2	
No. 2 Analog Inputs	
No. 2 Digital Inputs	
Dimensions: 70 x 90 x 60 mm, 4 DIN module	

SAFETY INFORMATION

- Do not install DLG modules near medical devices such as pacemakers or hearing aids.
- DLG modules must not be used on board aircraft.
- Do not install DLG modules near oil stations, fuel depots, chemical plants, or flammable sites.
- DLG modules may cause interference when used near televisions, radios, or personal computers.

3. Quick Start Guide

3.1. Connection and Wiring

This guide briefly explains how to make electrical connections and settings for initial access.

3.2. SD Card

In the DLG-A4 the slot is located on the top (see fig.1/A)



Fig. 1/A Top and terminals of the DLG-A4

On the DLG-D16 and DLG-M2 the slot is located on the bottom (see fig.1/B and fig.1/C)



Fig. 1/b DLG-D16 Bottom and Clamps



Fig. 2/c DLG-M2 bottom and clamps

The micro-SD card connector is a push-push type: to insert the card, press until you hear a click. To remove the SD card, press lightly; Clicking will lift the tab a bit and you can pull it out. We always recommend the use of industrial-grade SD cards.

NOTE: It is very important to insert and remove the SD card only when the DLG is not powered.

3.3. Serial Port

If you are using the serial port to read data from ModBus RTU devices, connect the RS485 wires as indicated in Fig. 2.



Fig. 2/A Bottom and terminals of DLG-A4



Fig. 2/B Bottom and terminals of DLG-D16



Fig. 2/C Top and terminals of DLG-M2

3.4. Ethernet

If you are using an Ethernet connection to read data from ModBus TCP devices, insert the Ethernet cable jack into the appropriate RJ connector, as shown in Fig.3.



Fig. 3/a Top of DLG-A4



Fig. 3/b Top of DLG-D16



Fig. 3/c Bottom of DLG-M2

3.5. Feeding

Connect the DLG to a 10-32 Vdc power supply with the word "POWER" respecting the poles as in Fig. 2/A, Fig. 2/B and Fig. 2/C.

NOTE: Make sure that the polarity of the power supply is respected. The DLG is however protected against any reversals.

4. Access and configuration

DLGs have a built-in WEB server, so you can configure it using a standard browser. To access the configuration pages, enter the IP address of the DLG from the browser of your PC, tablet or smartphone.

The device from which you are connecting must be on the same network as the DLG (Par. 2.1).

4.1. Network IP address

The default IP address of the DLG is 192.168.1.100.

If the network is of the same IP class: 192.168.1 ..., skip to paragraph 4.2

To identify the IP class of the network, run the IPCONFIG command from the command prompt.

In Fig. 5, the IP address of the PC is 192.168.1.5. It belongs to the same class/network as the DLG, as the first three numbers (192, 168, and 1) are the same. You can then reach the DLG from your PC's browser.

If the network does NOT fall into class 192.168.1, there are two ways to proceed:

1. Set the DLG to work in DHCP (see manual);
2. Set a valid IP on the DLG.

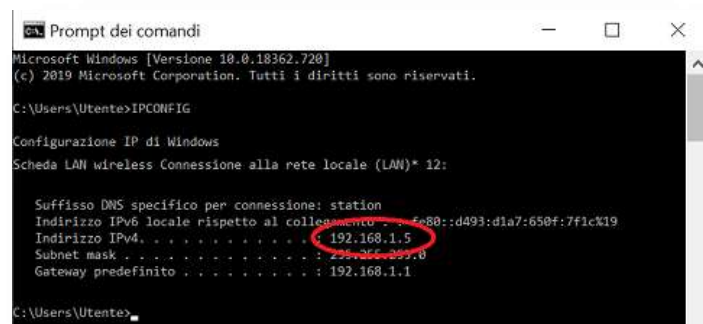


Fig. 3 Checking the IP address on the PC

4.2. Login and authentication

Once you have defined the IP address, type it into your browser. This will take you to the DLG configuration pages.

The first screen (Fig. 4) is the authentication page with username and password.tag.

The default values are:

User name: Admin

Password: Admin

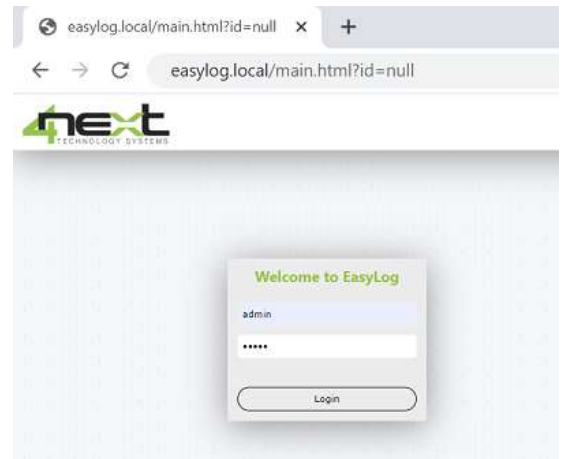


Fig. 4 Login

5. IP Settings

Assignment of a defined IP address to the DLG.

1. Connect the DLG to your PC using an Ethernet cable.
2. From the Windows menu, select Settings (Fig. 5)
3. Choose Network and Internet (Fig.6).

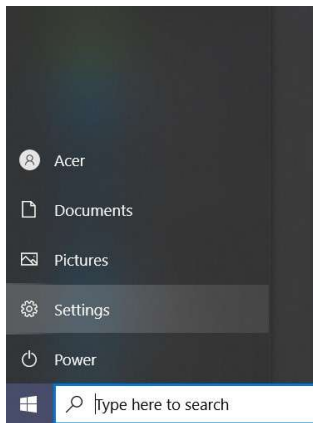


Fig. 5

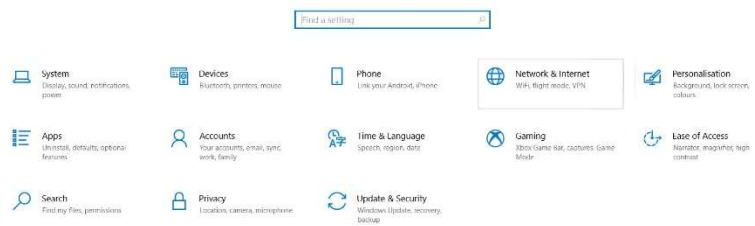


Fig. 6

4. Choose Ethernet again (Fig. 7) and the menu will open.
5. Click "Edit Adapter Options." A tab will appear with all the network resources (Fig. 9).

Fig. 5

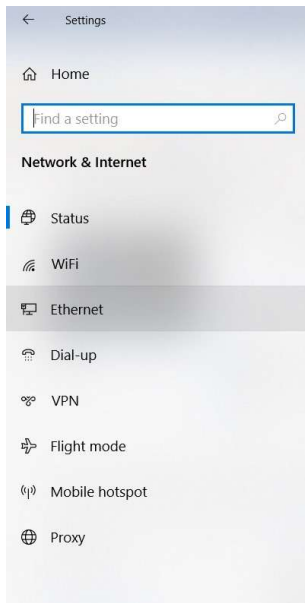


Fig. 7

Ethernet



- Related settings
- [Change adapter options](#)
- [Change advanced sharing options](#)
- [Network and Sharing Centre](#)
- [Windows Firewall](#)
- Help from the web
- [Troubleshooting network connection issues](#)
- [Get help](#)
- [Give feedback](#)

Fig. 8

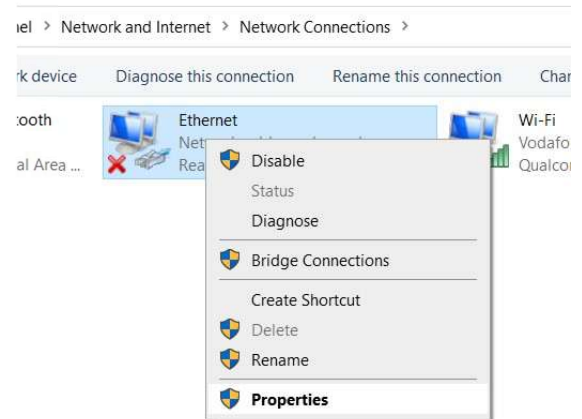


Fig. 9

6. Place your mouse over Ethernet, press the right button and choose "Properties".
7. From the Ethernet properties menu (Fig. 10), select "Internet Protocol Version 4 (TCP/IPv4)" and press the properties button. The following screen will open (Fig. 11).

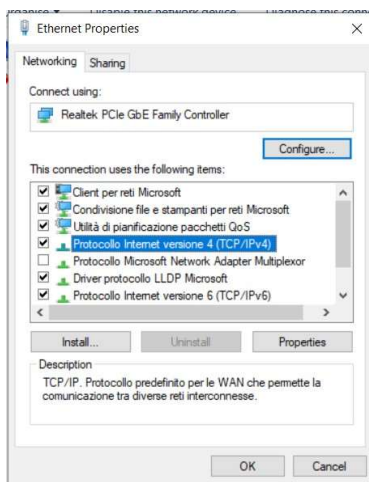


Fig. 10

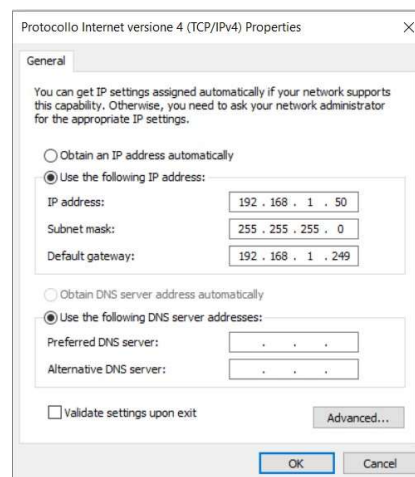


Fig. 11

8. Make a note of any existing settings that will be used later for recovery.
9. Set the IP address to 192.168.1.1.
10. Set the subnet mask to 255.255.255.0 and confirm with OK.
11. You can now open your web browser and type 192.158.1.103 to configure the DLG.
12. Log in with your username and password.
The default values are **Username:** admin **Password:** admin (Fig. 4)
13. Select "Network" from the Configurations menu to set the DLG's network parameters to match those of the Ethernet network.

For example, if the IP address in the original screenshot in Fig. 7 was 192.168.10.1, set the DLG to 192.168.10.103 (example in Fig. 12).

14. Save the new DLG configuration.
15. Reset the values on your PC.
16. The DLG is ready to be used on the same network as your PC.



The screenshot shows a configuration window titled "Network." with the following fields:

- DHCP: Disabled (dropdown menu)
- IP address: 192.168.10.100
- IP network mask: 255.255.255.0
- IP gateway: 192.168.1.1
- HTTP server port: 80

Fig. 12

6. Configuration

6.1. Main menu

After logging in, the DLG publishes the variable view page which is the default page or home page. If the DLG has never been configured, the page displayed will be one of the following for the respective templates:

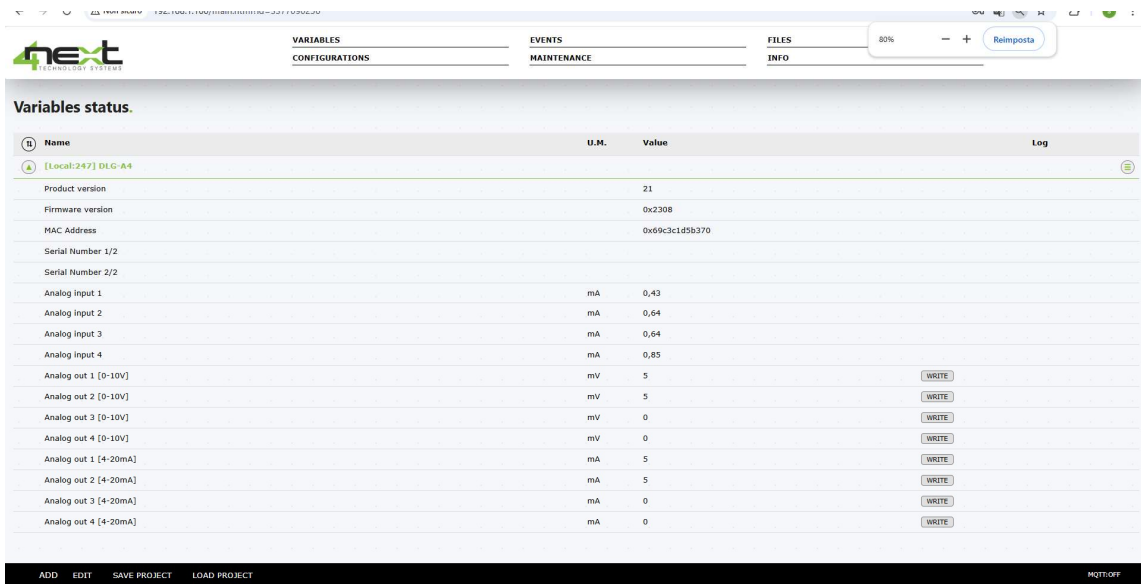


Fig. 6.1.A DLG-A4

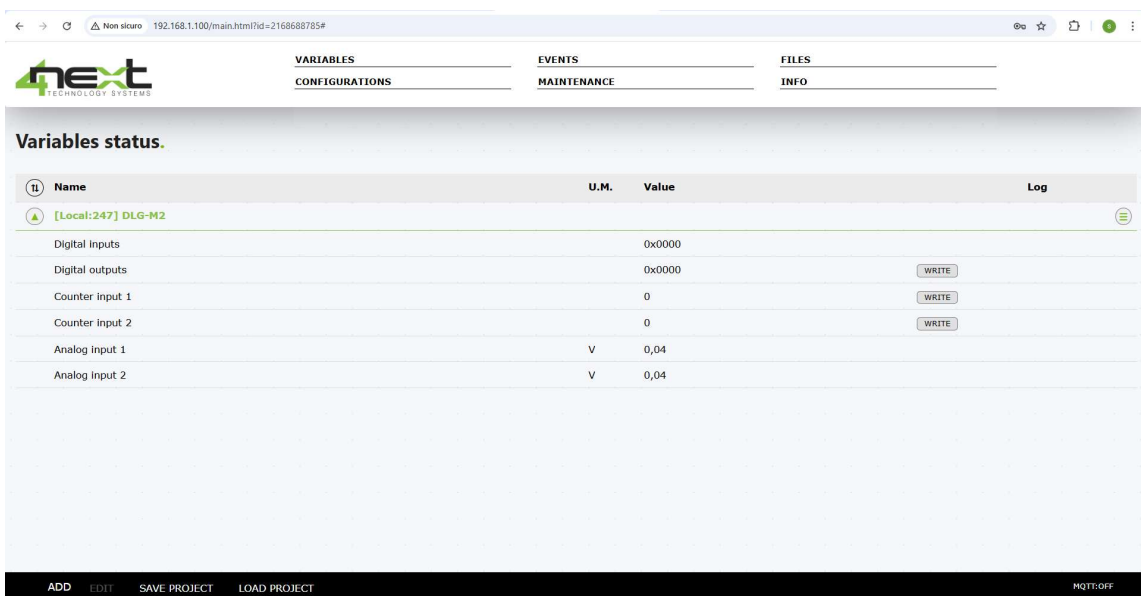


Fig. 6.1.B DLG-M2

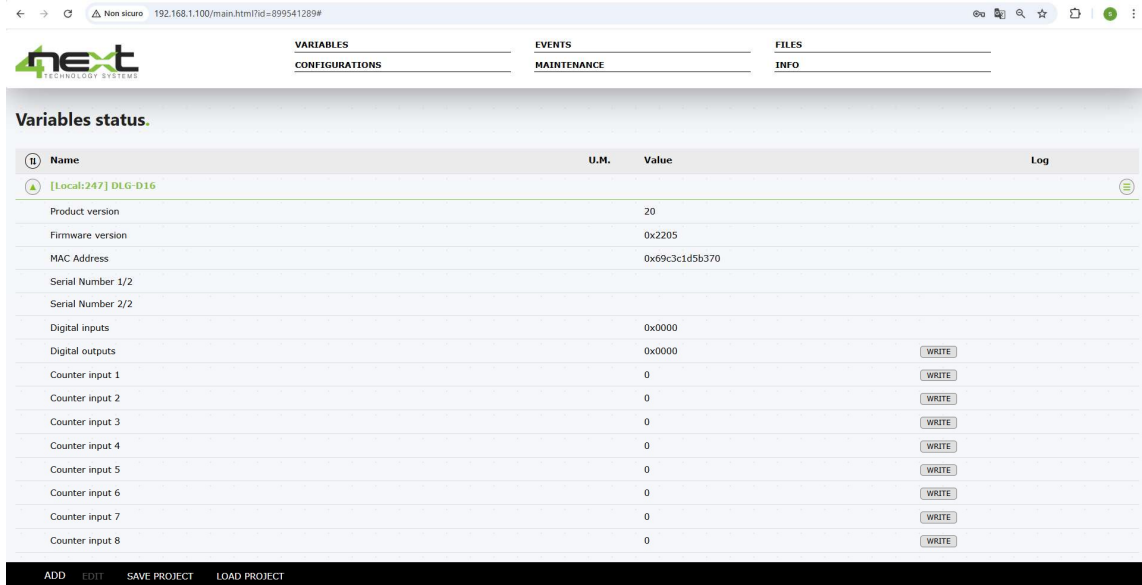


Fig. 6.1.C DLG-D16

On all pages of the application, the menu bar will be visible at the top, which includes:

- Variables: For displaying and configuring the variables read by ModBus devices.
- Events**: Setting for tracking user-set events.
- Files ("**Files**"): The list of files created on SD containing the logged data.
- Configurations: For setting all system parameters.
- Maintenance: For maintenance operations such as firmware updates, factory resets...
- Information ("**Info**"): Displays the version of Firmware, serial number, bootloader and MAC address.

At the bottom is a menu bar whose "buttons" have the following features. In order from left to right, the possible operations are:

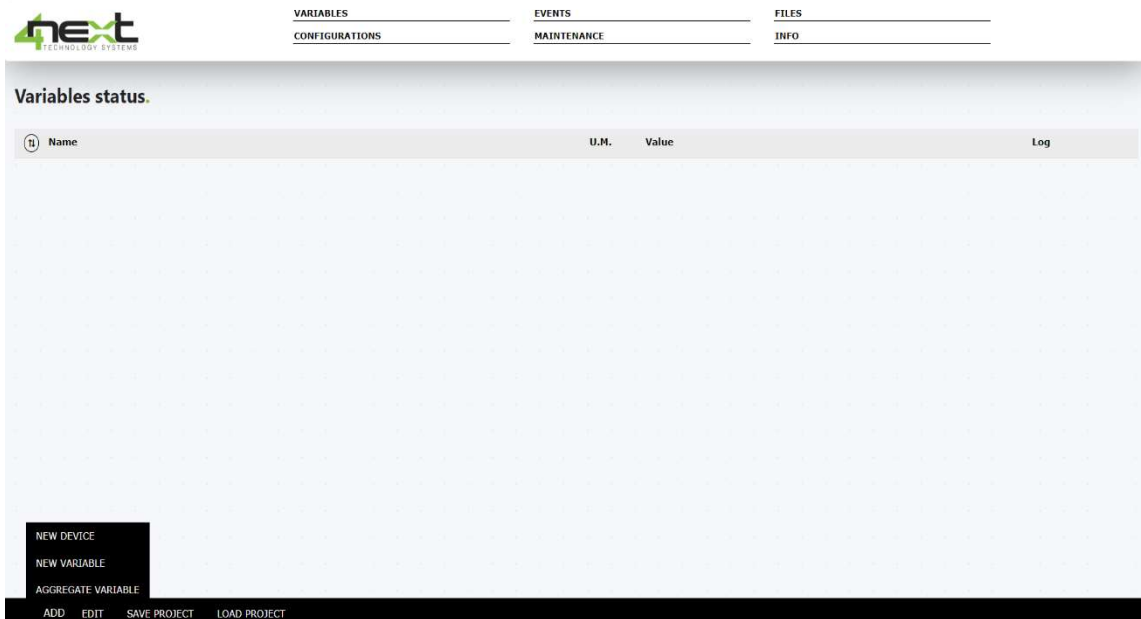
-Add: Creating new devices and variables with choices:

- New device ("**NEW DEVICE**"): Creates a new device (ModBus Slave) ModBus RTU or ModBus TCP. If you already have the ModBus libraries for the Slave in use, you can import the variables with a few clicks and save a lot of time in configuration.
- NEW **VARIABLE**: Allows you to add a new variable to a particular device.
- Aggregate **variable**: Allows you to add a new type of aggregate variable to the main variable with mean, minimum, and maximum mathematical function.

-Edit Device/Variable ("**EDIT**"): This function allows you to edit a variable or a device depending on whether the cursor is positioned over one of the two elements.

-SAVE **PROJECT**: This function saves the entire configuration of the DLG (System Variables and Settings) to a JSON file.

-LOAD **PROJECT**: Allows you to program the DLG from a previously saved configuration file.



Inserting a new device

By pressing the function key ("**NEW DEVICE**"): you can add a new device. The following screen is used to enter the information related to the new device

- **Device name**: name of the device
- **Read variables period**: read interval of all device variables

Communication:

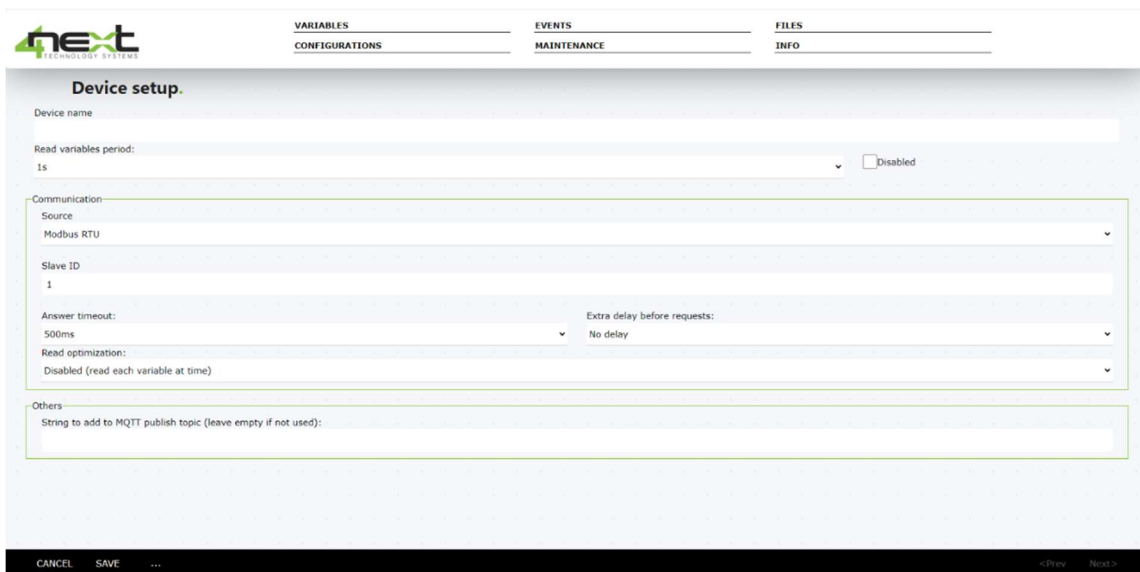
- **Source**: for choosing ModBus RTU or ModBus TCP
- **Modbus Parameters**: the Modbus parameters at the device level (slave) If the device is **ModBus RTU** the parameters are:
 - the **Slave ID** ("Slave Address"): address of the slave device (1 ÷ 255)
 - **Answer timeout**: The timeout for the master to wait for the answer (DLG)
 - **Extra Delay between request**: the time to wait between one request and the next

In the case of **ModBus TCP**:

- In addition to Slave ID, Answer timeout and Extra delay between request, the IP address and port of the Slave device are also added
- **Read optimization**: optimized reading of variables in a single request (up to a maximum of 64 variables)
 - **Consecutive addresses** (standard): consecutive reading without discontinuity.
 - **Allow discontinuity of maximum 2 registers**: consecutive reading allowing discontinuity of maximum 2 registers.
 - **Allow discontinuity of maximum 10 registers**: consecutive reading allowing discontinuity of maximum 10 registers.
 - **Disabled (read each variable at time)** [*Default*]: by default it is disabled at the creation of the device, it makes one request at a time for each existing variable.

The last parameter (others) is **MQTT publish topic**: it is the identifier (digital signature) of the device for sending via MQTT protocol. It is used to differentiate the MQTT topics of publication for each device. The "Separate publish for each device" parameter must be active in the *Configuration -> IoT service -> MQTT publish config section*.

In this way, the topic on which the device will publish its log data will be given by the concatenation of the publish topic (configuration parameter) and the string defined here.



At the bottom left you will find the following items:

- **Cancel:** To cancel the setting made
- **Save:** To save the setting
- **"...":** this opens a new configuration entry which are:
 - o **Delete:** Erasing the device
 - o **Import variables:** Import variables from a file .json given by an export from another data logger. (These are called **Library**)
 - o **Export variables:** Export variables and reload them into other data loggers or the same data logger for slave devices with the same log mapping.

6.2. Configuring variables

From the "ADD" screen, press the "NEW VARIABLE" button at the bottom left. Your browser displays the following page:

GENERAL INFORMATION

- Device: The device referenced by the variable.
- Variable **name**: Enter the name of the variable.
*The name you choose is also used as a label on the display page.
- **Measure unit**: The unit of measurement of the variable.

MODBUS PARAMETERS

Section that is used to set the identification data to access the variable, and in particular:

- **Register address**: the address of the variable identifiable by the register mapping provided by the constructor.
- **Register Type**: The type of register: Coil, Digital Input, Input register, Holding Register.
- **MSW first**: literally "Most Significant Word first", it is used for variables of type Int, Long or Float that can have a Big-Endian or Little Endian format. The constructor specifies the format used.
- **Little Endian**: For 4-byte variables, represent the Big-Endian or Little Endian order in each WORD.

N.B. The manual of the ModBus device indicates whether or not to select the latter parameters.

DATA TYPE ("**VALUE TYPE**")

- Variable Type ("**Type**"): The data type of the variable. A combo box allows you to easily select from all supported data types without the possibility of making mistakes.
- Decimal **digits**: The number of decimal places that are displayed and stored on a file.
- **Access Mode**: Indicates the mode of the variable at memory access, whether it is read or write only according to the parameters of the datasheet provided by the constructor.
- The format of the print of the value on the screen ("**Print format**"): indicates the format of the number measured in decimal or hexadecimal value.

Depending on the type of value, we have two types of conversion:

- o Bit **conversion**: Function that allows the choice of the reading on the position of the word of our choice.
- o Linear **conversion**: the function performs a linear conversion, transforming a scale of measurement into another desired one by mathematically proportioning 4 values.
- Multiplication factor(**m**): the factor by which the raw data is multiplied to obtain the correctly engineered variable. Many devices export information in a non-standard format, such as temperature in tenths of a degree. To display it in degrees, you will have to set this value to 0.1.
- **Offset(q)**: Allow you to add a fixed value to the value of the read variable.
- **Incremental**: it is a checkbox that activates the incremental function that calculates the variation of the variable between two samples, subtracting the previous value from the current one. It then updates the previous value for the next sampling.

DATA STORAGE ("DATA LOG")

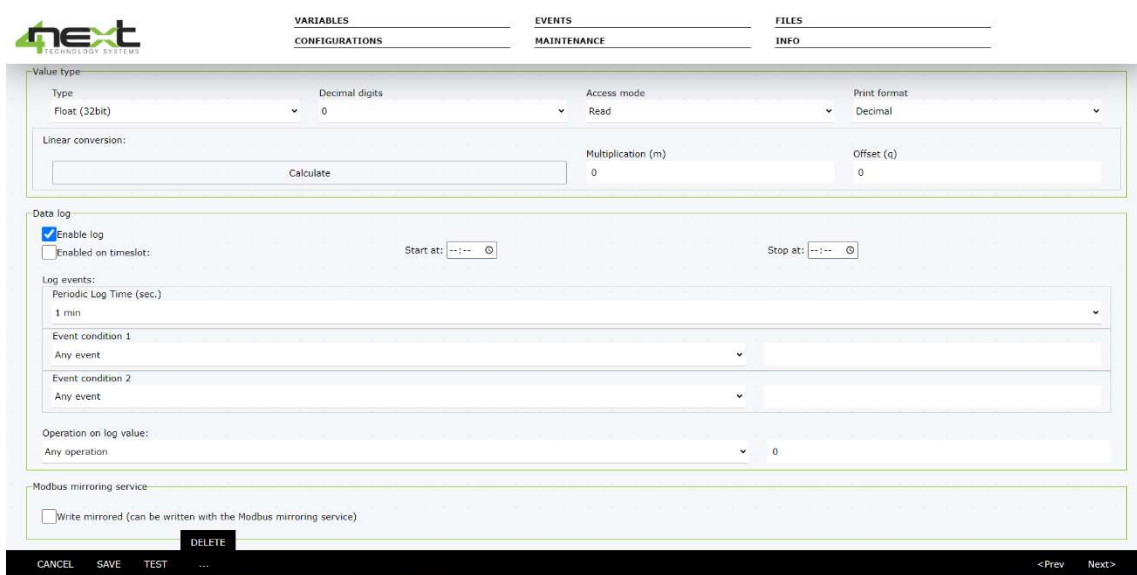
- Enable **log**: This checkbox enables writing to files or not. NOTE: It **absolutely must** be selected to store files on the SD card.
- **Enabled only on timeslot**: If selected, it allows you to define the time interval within which the data is stored. It is used to limit the sending of unnecessary data. E.g. from 8:00 to 20:00.
- Periodic **log time**: Sampling time of the variable, defines how often the ModBus network master (X) reads the variable from the Slave and saves it to file if the log option is enabled.
- **Log on event**: X allows you to store data when a given event occurs, which can be:
 - **Any event**: Any event.
 - **Value changed**: The value of the variable changes.
 - **Value changed at least of**: The variable changes by a minimum value specified in the field next to it.
 - **Value changed at least of %**: The variable changes by a minimum value in percentage specified in the field next to it.
 - **Value lower of**: The variable is less than a value specified in the field next to it.
 - **Value lower or equal of**: The variable is less than or equal to a value specified in the field next to it.
 - **Value higher of**: The variable is greater than a value specified in the field next to it.
 - **Value higher or equal of**: The variable is greater than or equal to a value specified in the field next to it.
- **Operation on log value**: Performs an operation on the read data:
 - **Any operation**: The read data is stored under any conditions.
 - **Cut-off**: ("**Value cut-off to 0 if lower than**"): If the value read is less than the set threshold, it is not considered and will be considered as 0.
 - **Filter**: ("**Discard value that differs from last one more than %**:") does not store the data if it differs from the previous value by x% reported in the field.

The menu at the bottom of the page allows you to do the following:

- **Cancel:** Cancels the operation of modifying or inserting the variable.
- **Save:** Stores the variable you entered or the changes you made.
- **Test:** Sends the test ModBus command by tracing the various packets.
- **Delete:** Deletes the variable.

N.B. Once the variable deletion operation has been carried out, it will not be possible to annul the operation and the variable will be permanently deleted.

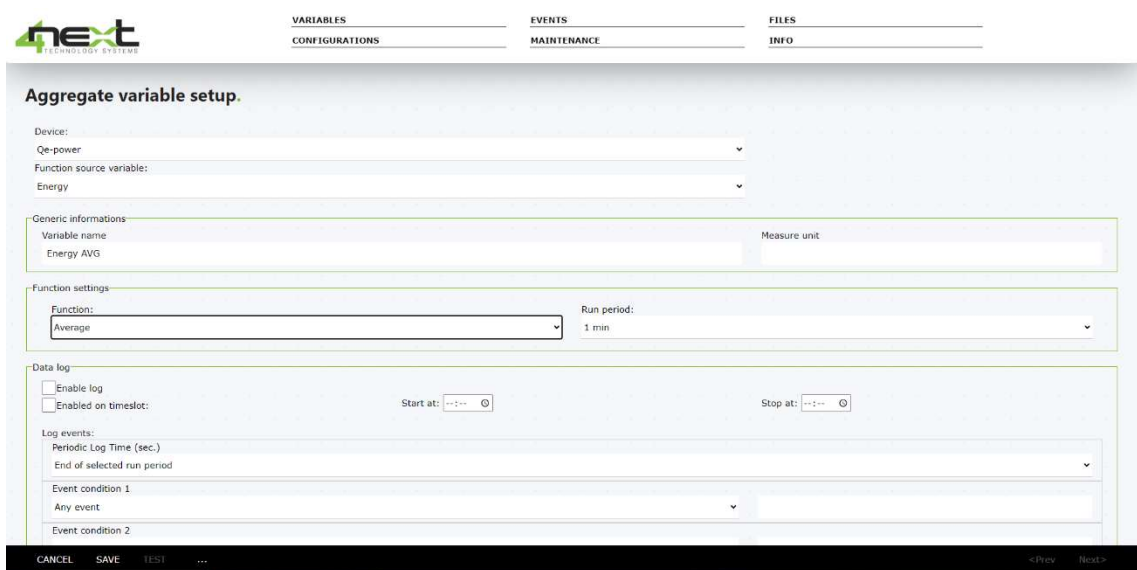
<Prev/Next>: Navigating through variables.



Aggregate variable setup

Aggregate variables are variables that collect data from the variable, process it according to the previously set functions which are average, maximum, and minimum.

By selecting a variable and clicking on the **"ADD"** item at the bottom left **"AGGREGATE VARIABLE"** you add an aggregate variable and this screen will appear.



The difference between variable and aggregate variable is the addition of two new sections:

FUNCTION SOURCE VARIABLE

- In this box, you select the available variables to aggregate to add the average, minimum, and maximum functions.
If you have previously selected a variable after clicking **"AGGREGATE VARIABLE"**, this box automatically shows the selected variable.

FUNCTION SETTINGS

- Functions: in this box you can select the items:
 - Average (**"Average"**): Returns the average of the values over the variable's execution period.
 - Minimum: Returns the minimum measured over the variable's execution period.
 - Maximum: Returns the maximum measured over the variable's execution period.
- Run **period**: In this box, you can set the regularity of the execution of the function by choosing between: 1 min, 2 min, 3 min, 4 min, 5 min, 10 min, 15

min, 20 min, 30 min, 1 hour, 2 hours, 4 hours, 6 hours, 12 hours, a day, a week and a month.

N.B. The aggregate variable does not support the ModBus mirroring service.

6.3. File System

the DLG stores the files on the internal SD Card. You can view the list of files via the Files menu. This page allows you to see the files that have been stored and possibly sent and download them locally from the connected PC. The files are stored in the `elog_AAAAMMGG_ORA` format with the prefix "elog" that can be changed to "CONFIGURATIONS" and are contained in archives defined by a date with the format `YYYYMMDDG`, with the order from the most recent to the oldest, from top to bottom so the first file is the most recent.

The screenshot shows the 'Log files' interface with the following table:

Time	Name	Size	Status	Operations
Operations in progress				
	20221108/elog98_20230328_1743.csv		LOGGING	
	20221108/elog98_20230328_1600.csv	130	SENDING	
Stored files				
Invalid Date	/elog98.csv	26	TO SEND	⬇️ ⓘ
27/2/2023, 11:07:00	[mdb-w]		ARCHIVE	
8/11/2022, 16:27:52	[20221108]		ARCHIVE	
21/10/2022, 11:14:34	[20221021]		ARCHIVE	
22/9/2022, 11:50:22	[20220922]		ARCHIVE	
29/8/2022, 16:31:34	[20220829]		ARCHIVE	
26/7/2022, 10:42:34	[20220726]		ARCHIVE	
17/6/2022, 12:58:00	[20220617]		ARCHIVE	
28/4/2022, 16:24:22	[20220428]		ARCHIVE	
19/11/2021, 20:59:58	[20211119]		ARCHIVE	

At the bottom of the interface, there is a 'RELOAD' button on the left and a 'Log send period countdown: 21 sec' indicator on the right.

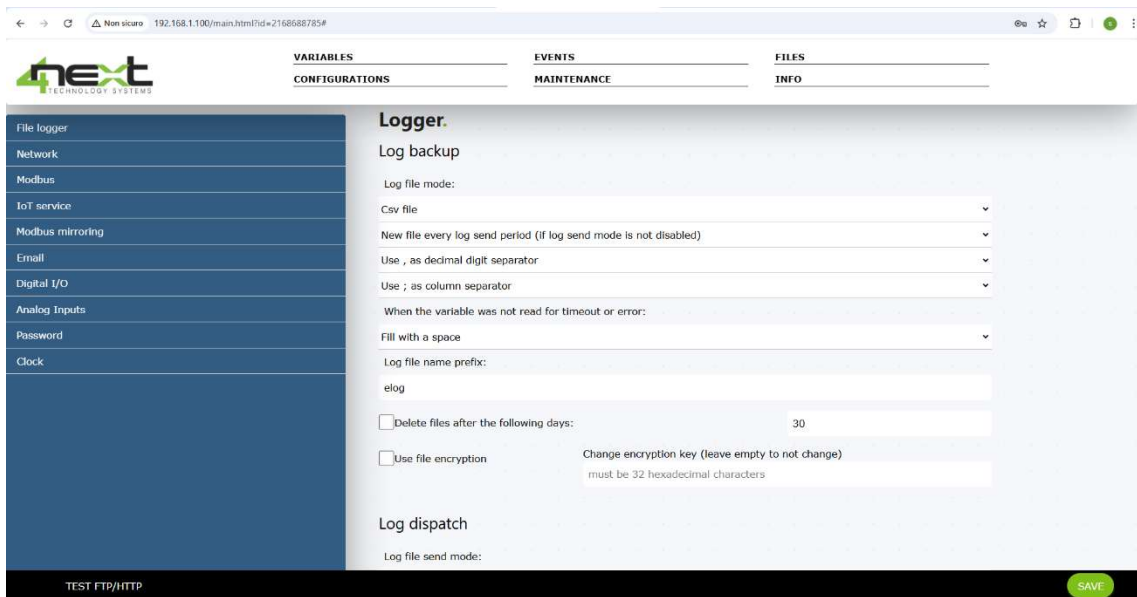
To download them, click on the underlined text and a list of .csv stored files appears with the prefix, date and time of the data logging. Finally, by clicking on the download symbol "⬇️" on the right, the selected file is downloaded and saved in csv format (by default).

6.4. System Configuration

File Logger

The File logger menu allows you to choose how files will be saved on the SD, in particular:

- **Log File Mode:**
 - File type: None, CSV file, JSON file
 - How often to create a new file: every hour, every day, or write to the same file over and over again
 - Decimal separator: , (comma), or . (period)
 - Separator between fields: ; (semicolon), | (Pipe), # (sharp or sharp)
 - **Log file name prefix:** the prefix of the file name in the SD card
 - **Delete files after the following days:** represents the maximum time of days that the file remains on the SD card. Setting 0 never deletes files. Otherwise they are deleted after n. days from their creation (by default it is 30). Ex. 8 keeps files from the last 8 days
 - **Use file encryption:** check box for enabling file encryption and using a different encryption key to be entered in the field next to max 32 hexadecimal characters or leave it blank so as not to change the encryption
 - **Log Dispatch:** Used to define how often and how to send the file remotely
 - **Log Send Mode:** the sending mode that can be:
 - Disabled / Disabilitato
 - FTP
 - HTTP
 - E-Mail (Option in development)
 - http REST (Option under development)
 - **Log Send Period:** Indicates how often to send the file
 - **Delete file after sent:** If selected the file is deleted after sending



In the menu at the bottom we find from left to right:

- Date and time;
- **FTP/HTTP test:** allows you to perform a connection test with the credentials entered;
- **SAVE:** Save settings.

**If the FTP/HTTP Test does not work and the message "Unable to resolve IP address" appears, you need to enable DHCP (Dynamic Host Configuration Protocol) to resolve the error. Later, you can disable DHCP if you want to set a fixed IP address. If the problem persists, contact the company for further technical assistance.*

Network

In the "Configurations" menu we have a list of items. **Network** allows you to enter the parameters of the Ethernet network to which the DLG is connected in order to make it communicate with the servers for sending data. These are the parameters to be configured in detail:

- **DHCP:** Allows you to determine whether you should use the network DHCP server to assign the IP address or not;
- **IP address:** The static IP address assigned to DLG.
- **IP network mask:** The **subnet mask or netmask allows you to establish the range of IP addresses within a subnet;**
- **Gateway IP:** IP address of the referring gateway;
- **DNS IP 1:** the DNS of the IP address, by default is 8.8.8.8;
- **DNS IP 2:** the DNS of the IP address alternatively, by default is 0.0.0.0;
- **HTTP server port:** Port of the http server when different from the standard 80 or 8080.



VARIABLES	EVENTS	FILES
CONFIGURATIONS	MAINTENANCE	INFO

- File logger
- Network
- Modbus
- IoT service
- Modbus mirroring
- Email
- Password
- Clock

Network.

DHCP
Enabled

IP address
192.168.1.105

IP network mask
255.255.255.0

IP gateway
192.168.1.1

IP DNS 1
8.8.8.8

IP DNS 2
0.0.0.0

HTTP server

HTTP server port (empty=default)

Enable HTTPS

[CA certificate \(to add to the trusted Root Certification Authority list\)](#)

09/08/2024, 12:08:41
SAVE

ModBus

In this section you define the configuration parameters of the RS485 serial channel for ModBus communication with Slaves:

ModBus RTU (Remote Terminal Unit):

With this configuration, the data logger is connected directly to the slave via an electrical cable and the following settings define:

- **ModBus RTU speed:** Communication speed;
- **ModBus RTU mode:** Number of bits, stop bits, and parity of serial communication.

ModBus TCP (Transmission Control Protocol):

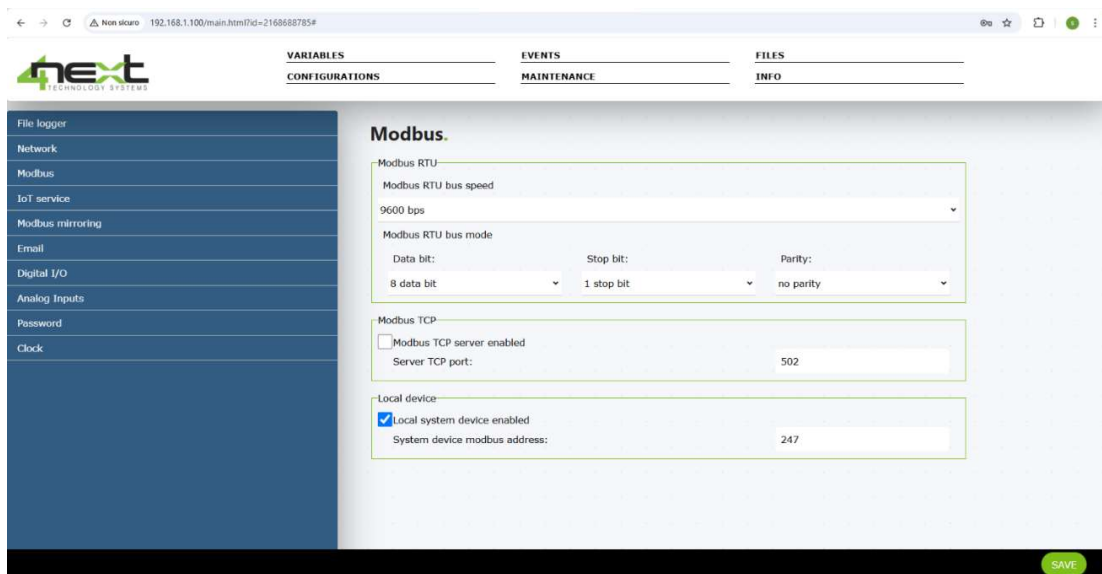
With this configuration it is possible to choose whether to make slaves connected to other masters accessible or to query them directly through TCP/IP requests, transforming DLG into an effective ModBus server:

- **Server mode:** ModBus server mode choice;
 - o **Disabled :** [default] disabled
 - o **Modbus TCP slave :** availability to be queried by another master in ModBus TCP
 - o **Modbus TCP to RTU bridge:** direct communication with devices connected to the X
- **TCP server port:** the serial port of the TCP server is used to identify a connection endpoint or direct data to the service (by default it is 502 for the application of ModBus devices).

Local device:

This function allows the data logger to make its I/O modules available for reading and writing to the user:

- **Local system device enabled:** check box for enabling for local system;
- **System device modbus address:** the serial port of the local system (by default it is 247).



** This function creates in "Variables" a new device called "Local" containing the parameters and information of the device, if it is equipped with I/O modules it is detected*

IoT Service – MQTT

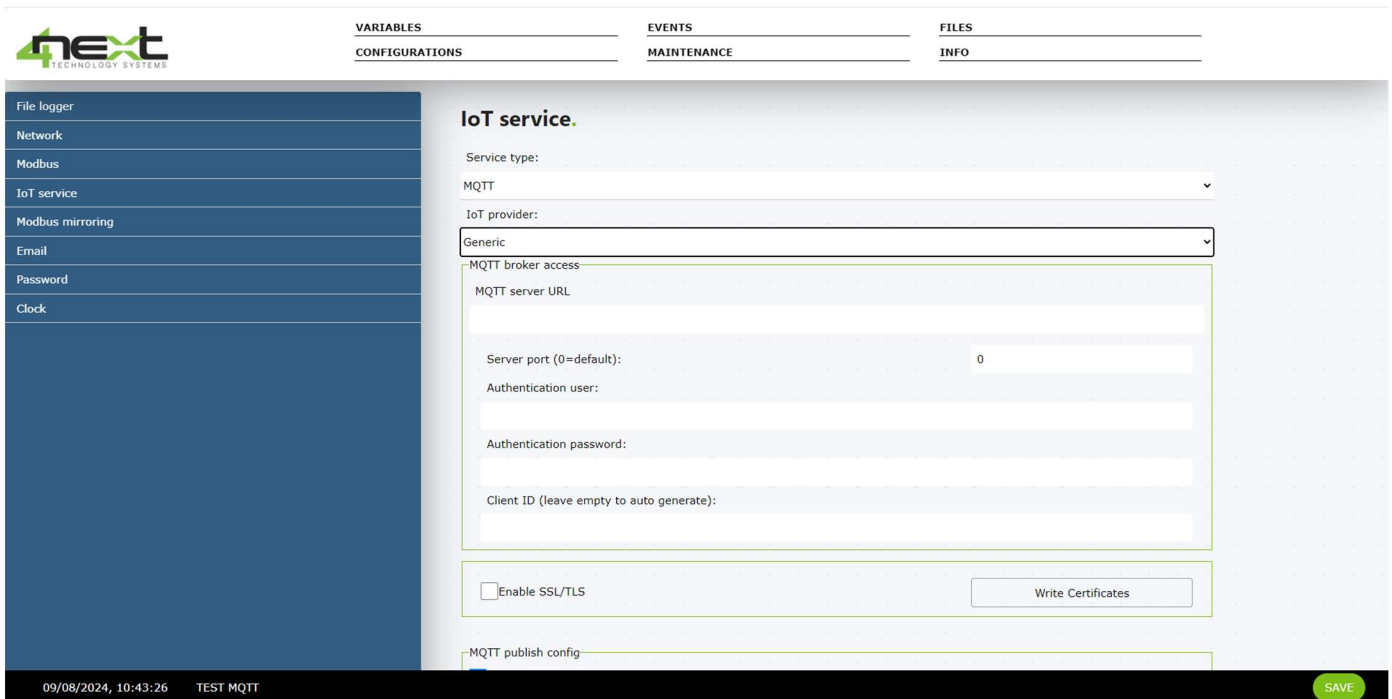
This configuration menu is used to set the parameters for sending data via the MQTT protocol.

- **Service type:** Enable or disable sending in MQTT
- **MQTT Provider:** This is the type of MQTT broker available by default. Currently, the DLG provides for connection to a generic MQTT broker or to the following providers
 - o Generic
 - o Rilheva
 - o ConnHex (available from FW version 2.3.7 onwards)

With Generic Provider you have the following configurations to set:

- **MQTT server URL:** The address (URL) of the server
- **Authentication user:** Username for accessing the server
- **Authentication password:** Server access password
- **Client ID:** This is the identifier of the DLG client that connects to the MQTT broker. It is a unique ID for a particular broker. The broker uses this to identify the client and the current status of the client.
- **Enable SSL/TLS (server port 8883):** Enable if the remote broker uses SSL/TLS encryption for data transfer
- **Publish topic:** The topic of the MQTT broker on which to send the log data publications. This is a string that represents a path in the broker, such as "DLG/location1"
- **Separate publish for each device:** Indicates whether you want to use a different topic in the broker for each device configured in DLG. In this case, the topic on which a device will publish its log data will be given by the concatenation of the publish topic (previous parameter) and the topic defined on the configuration of each individual device.
- **Publish QoS:**
Defined by the MQTT standard, it indicates the level of assurance that a message will actually be received by the broker:
QoS 0 (At most once) = the guarantee is delegated to the TCP protocol
QoS 1 (At least once) = The collateral is managed by an acknowledgment by the broker. The risk is duplication of a publication
QoS 2 (Exactly once) = The warranty is managed by a double acknowledgment between device and broker. There is no risk of duplication but there are 2 more posts per post. The choice should be made based on how much traffic is allowed for publications.

- **Retain:** Activate if a possible subscriber to the topic used by DLG for publication wants to receive the latest published data as soon as the connection is made.



In the MQTT section you can enable the "subscribe config" function to edit the messages of the topic and read them:

- **Enable:** Enables the subscription service. It can be used to manage message read and write configurations.
- **Subscribe topic:** The topic to subscribe to. After subscribing, the device can receive any message posted by other clients on that topic.
- **Qos:** MQTT Service Quality.

MQTT has three levels of QoS:

- QoS 0 (At most once) = the guarantee is delegated to the TCP protocol
- QoS 1 (At least once) = The collateral is managed by an acknowledgment by the broker. The risk is duplication of a publication
- QoS 2 (Exactly once) = The warranty is managed by a double acknowledgment between device and broker.

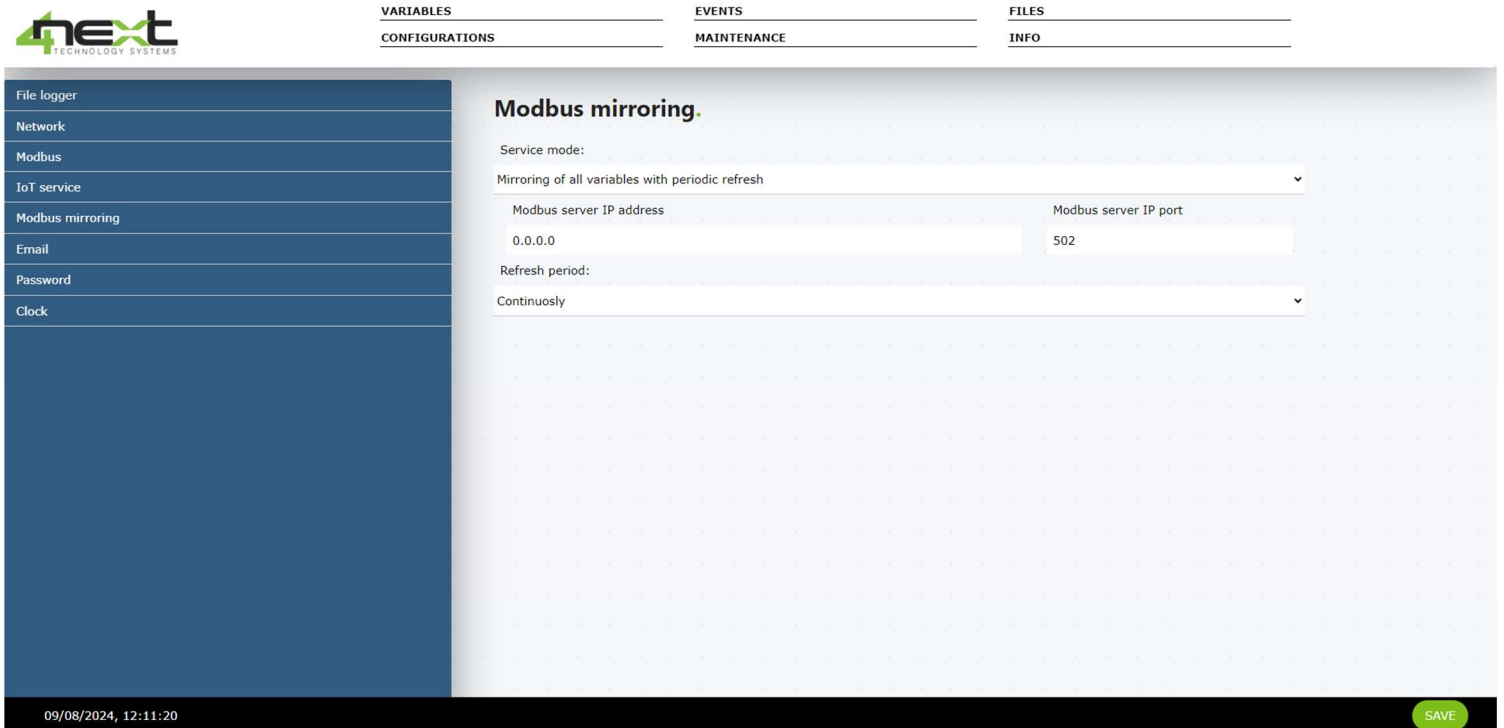
At the bottom left we have the button:

- **MQTT test:** used to verify the connection to the server you want to connect which will send a test message

**If the FTP/HTTP Test does not work and the message "Unable to resolve IP address" appears, you need to enable DHCP (Dynamic Host Configuration Protocol) to resolve the error. You can later disable DHCP if you want to set a fixed IP address. If the problem persists, contact the company for further technical assistance*

Modbus Mirroring

This function allows you to bridge the slave devices on the RS485 and a ModBus TCP Master (Client). The variables read and logged by RS485 are written to the respective Modbus TCP addresses.



The Service Mode combo allows you to:

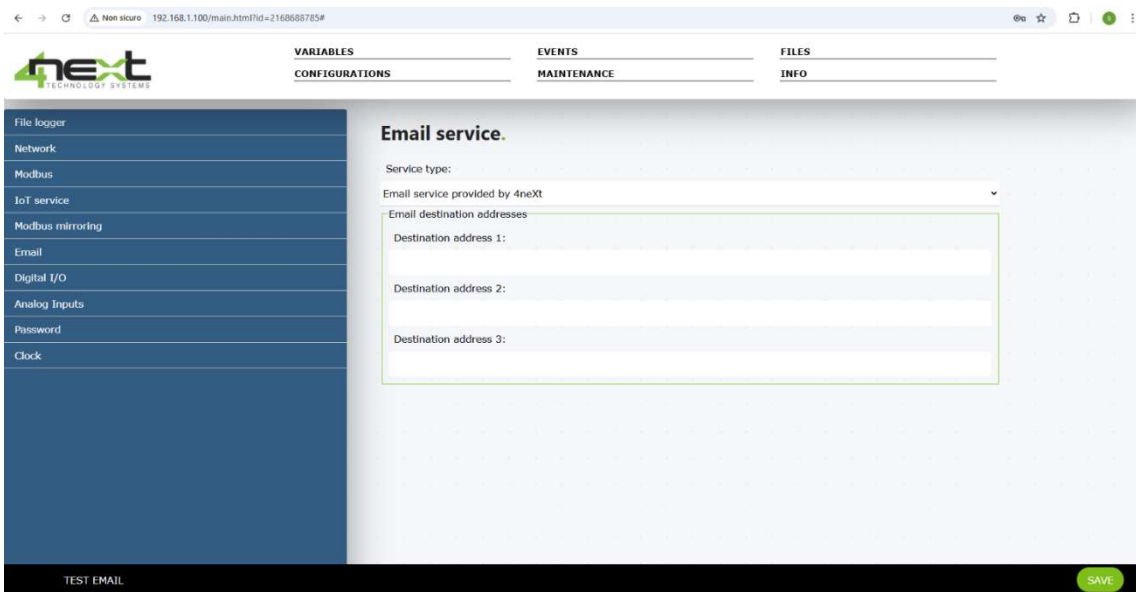
- **Disabled:** Disable the service
- **Mirroring of logged variables on log event:** Copying logged variables to an event
- **Mirroring of all variables with periodic refresh:** Copy all variables at defined intervals

The Modbus Server IP address and Modbus server IP port parameters are used to address the Modbus TCP client. "Refresh period" is the time it takes for variables to be updated on the Modbus TCP client.

E-mail Service

This feature allows you to receive emails in case of set events. Here are the possible options to enable:

- **Disabled:** disabled (by default)
- **E-mail service provided by 4next:** the e-mail service offered by our company
- **SMTP server:** Setting up addressing servers with SMTP protocol.



Once the Test Email **has been run**, a test email will be sent

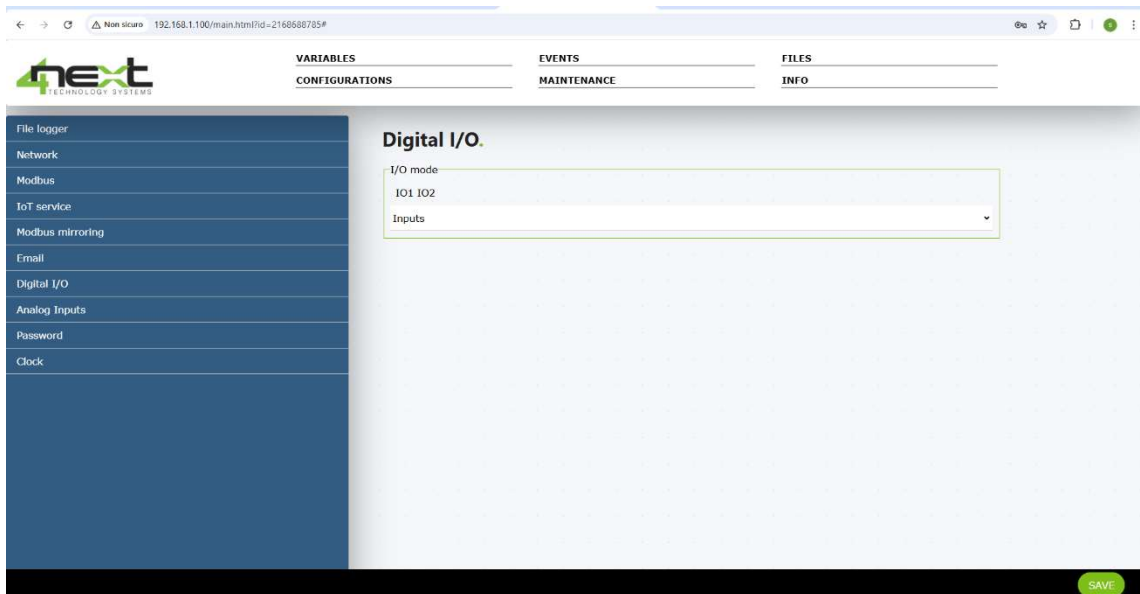


Above is the default message that arrives after setting up the destination email using the email service.

Digital I/O (available in D16 and M2)

In this section you can set the digital inputs/outputs and set its modes in:

- **Inputs:** Digital Inputs
- **Outputs:** Digital outputs



**For physical connections see section 8.2 and 9.2 for DLG-D16 and DLG-M2 respectively.*

Analog inputs (available in DLG-A4 and DLG-M2)

This is the configuration of the analog inputs with the following modes:

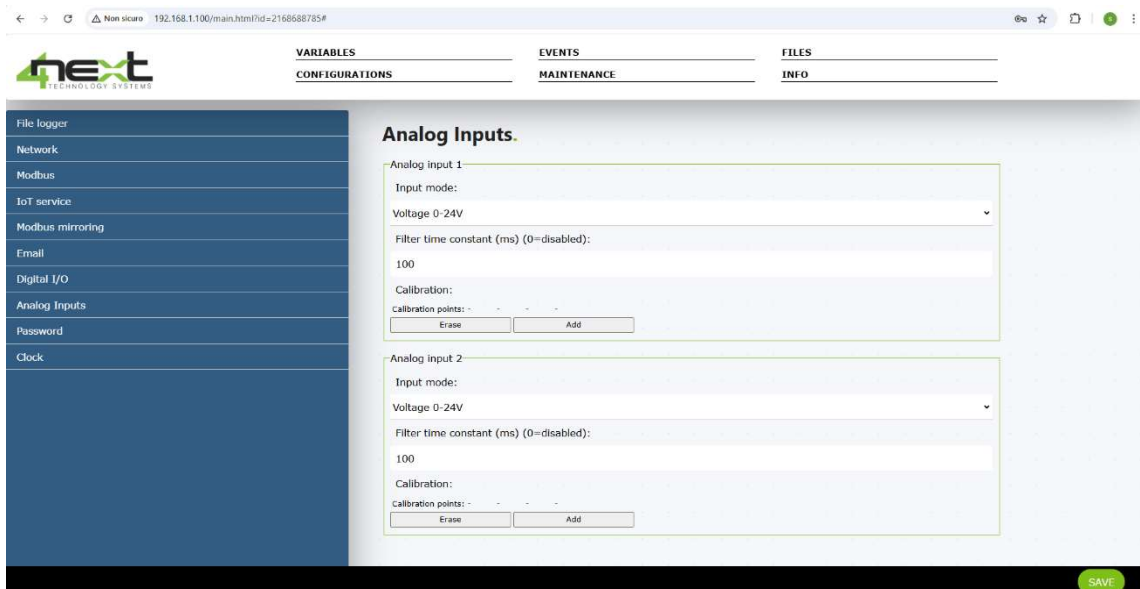
- Voltage [0-24 V]
- Current [0-200 mA]
- NTC-generic [°C]

And they have the following entries:

- **Input mode:** the type of input you want to measure
- **Filter time constant (ms):** the period of time for which it measures
- **Calibration:** Calibration uses the linear math function to calibrate the measurement for any measurement errors.

To configure the RTC it is necessary to know the following parameters of the instrument:

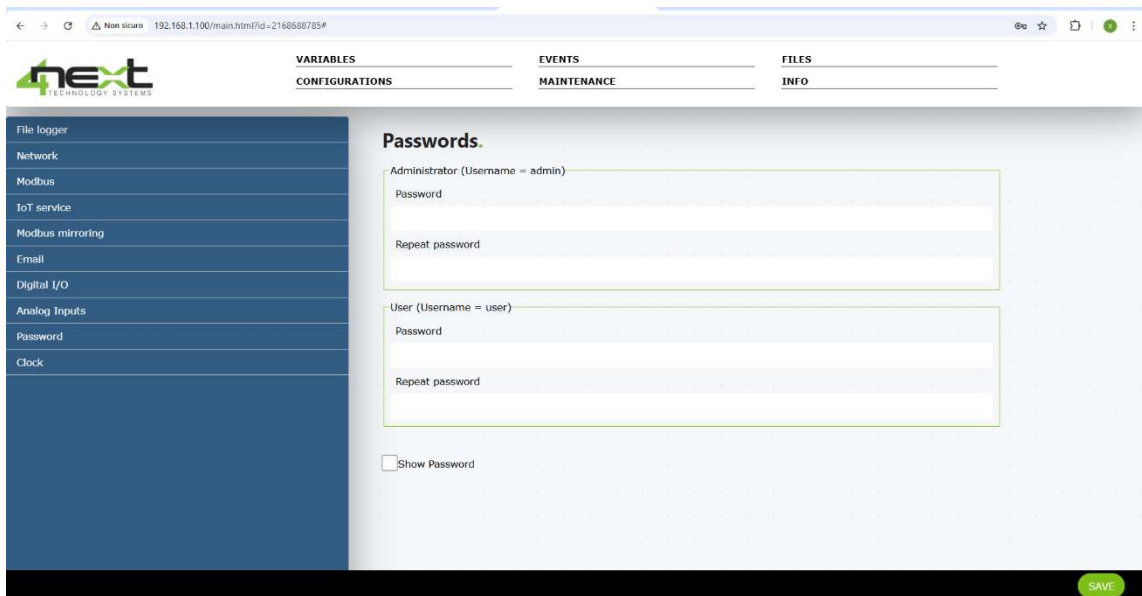
- the resistance at 25°C in Ohms (Ω)
- Best Beta Coefficient (β)



**For connections, please follow section 7.2 and 9.2, for DLG-A4 and DLG-M2 respectively.*

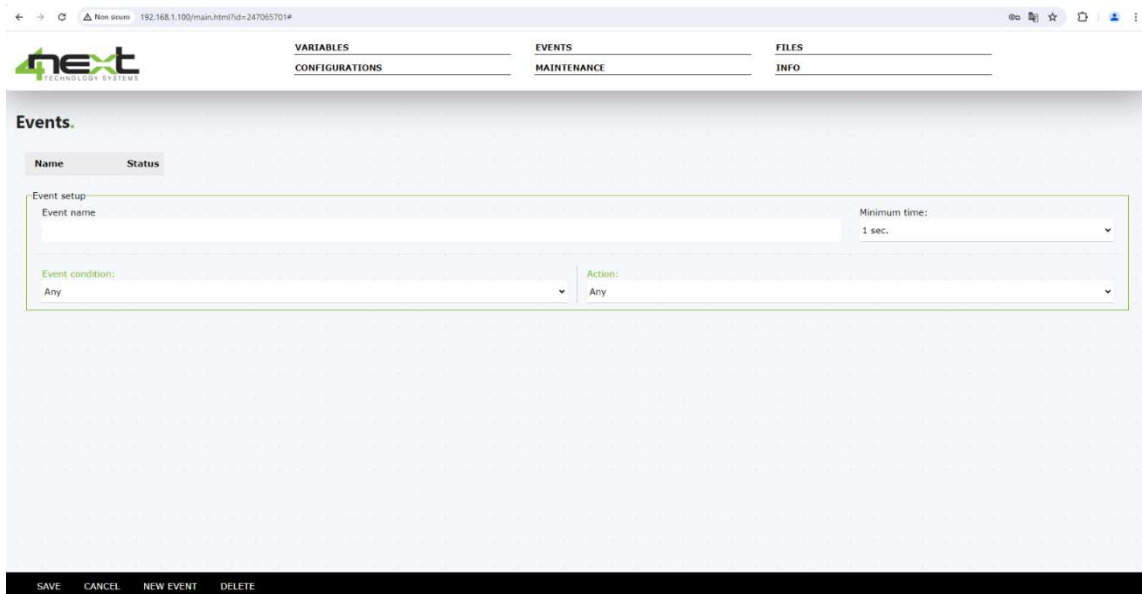
Password

Set passwords for accessing the DLG configuration page.



6.5. Events

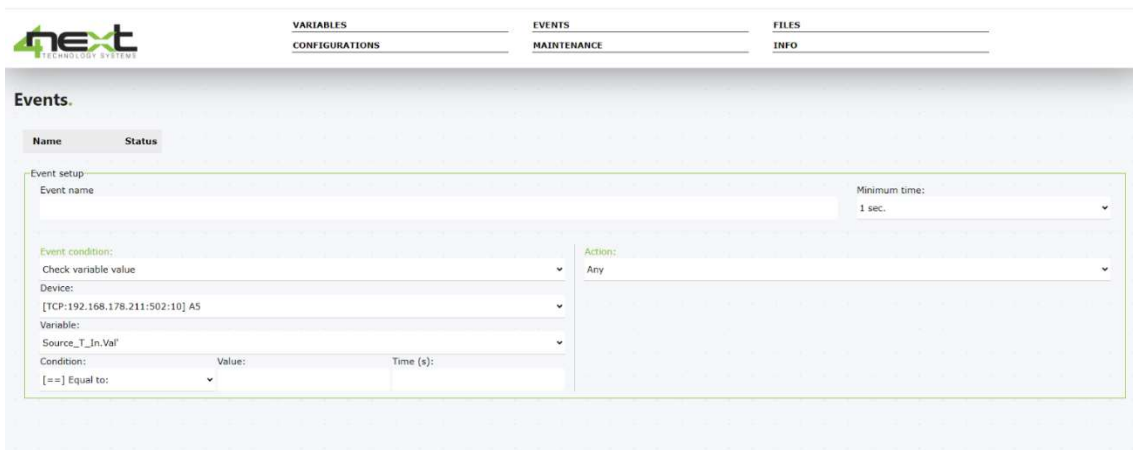
In this section you can set up events to manage and intervene autonomously, for example the sending of the e-mail from the data logger to our e-mail mail at the start or the variation of a variable configured according to preset conditions.



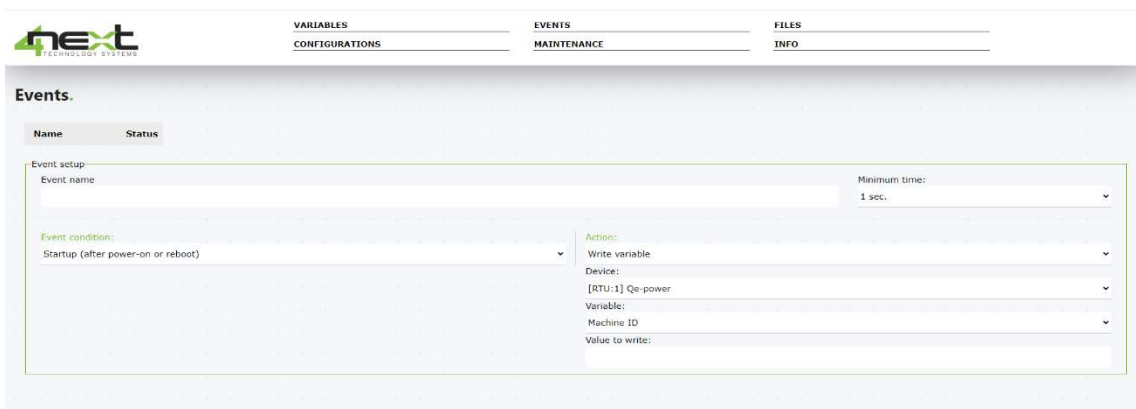
The items are:

- **Event name:** name of the event
- **Minimum time:** minimum execution time
- **Event condition:** Event condition with the following options
 - **Any:** Any;
 - **Check variable value :** Check a value of the selected variable;
 - **Device:** Reference device
 - **Variable:** variable on which you want to apply the condition
 - **Condition:** Applicable conditions are equal to, not equal to, less than, less than equal to, greater than, and greater than
 - **Value:** Trigger threshold

- **Time(s):** execution time.



- **Startup (after power-on or reboot)** : condition of boot or restart of the device;
- **Action** : Operations
 - **Any** : None;
 - **Write variable**: Write on the variable;
 - **Device**: Source device
 - **Variable**: Target variable
 - **Value to write**: value to be attributed

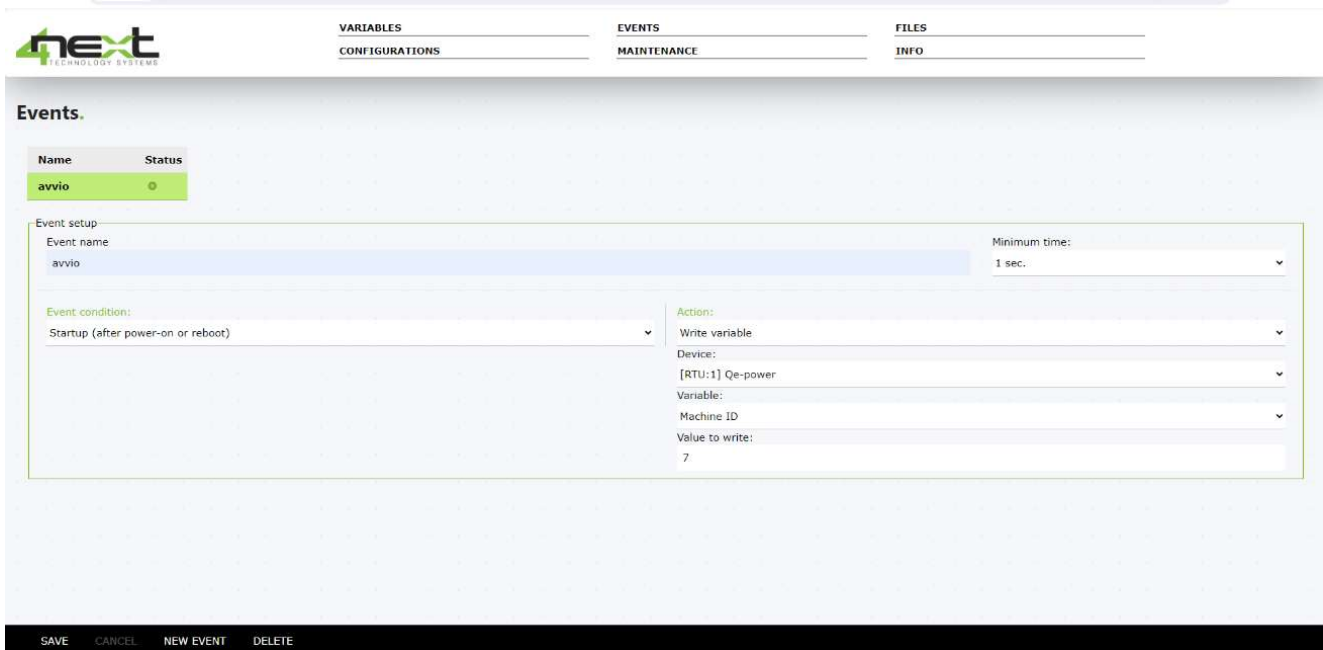


- **Send email**: sending recipient email (you can select a maximum of 3 emails by activating them via checkbox);
**To use the Email function, you need to enter and enable email in Configurations -> Email service. (For Notice or Notification purposes only).*

At the bottom left there are features and they are:

- **Save**: Rescue
- **Cancel**: cancel
- **New event**: creating a new event

- **Delete:** Delete event



This is the screenshot of a successful event save.

6.6. Maintenance

The maintenance menu is used to update the device's firmware and enable debugging for technical support. Clicking on "**Update firmware**" performs the update by selecting the latest firmware version.

To enable the debugging feature, choose from the following modes:

- **Disabled:** Disabled by default
- **Basic messages[Lv1]:** Logs basic clock renewal request and network operations
- **Application debug[Lv2]:** Records all operations that the device performs at the application layer
- **Application and network debug[Lv3]:** Records all the operations listed above and also records network operations in detail allowing accurate error analysis.

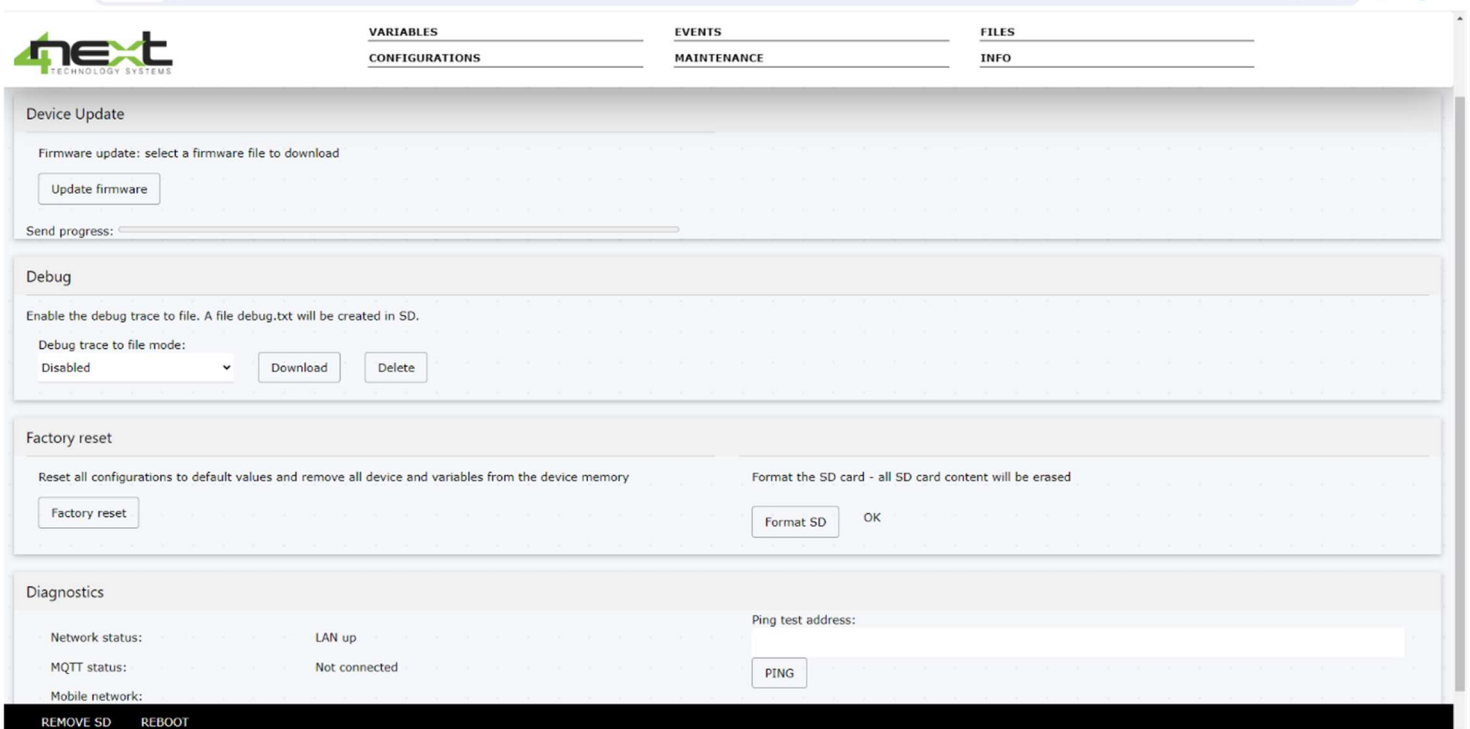
You can store data on the SD card. You can download the data or delete it with "**Download/Delete**". With the "**Fabric reset**" button, each configuration is reset to factory defaults and all devices and variables are removed from the device's memory. Next to it there is the "**Format SD**" button with the function of formatting and erasing all the contents of the inserted SD card.

In addition, a "Diagnostics" diagnostic section, which allows you to monitor the current connection of the device to the network with the following items:

- **Network status**
- **MQTT status**
- **Mobile network**

(exclusive function of the X and Easynet for the GSM module)

With the wording "**Ping test address**" it is possible to test the communication on the network by entering an IP address and clicking the "**PING**" button, a log window appears where the connection is verified.



6.7. Info

The info menu displays the Hardware and Software information for the device. Always check on the website www.4next.eu on the device page if the firmware is updated to the latest version.



7. DLG-A4

7.1. Terminals

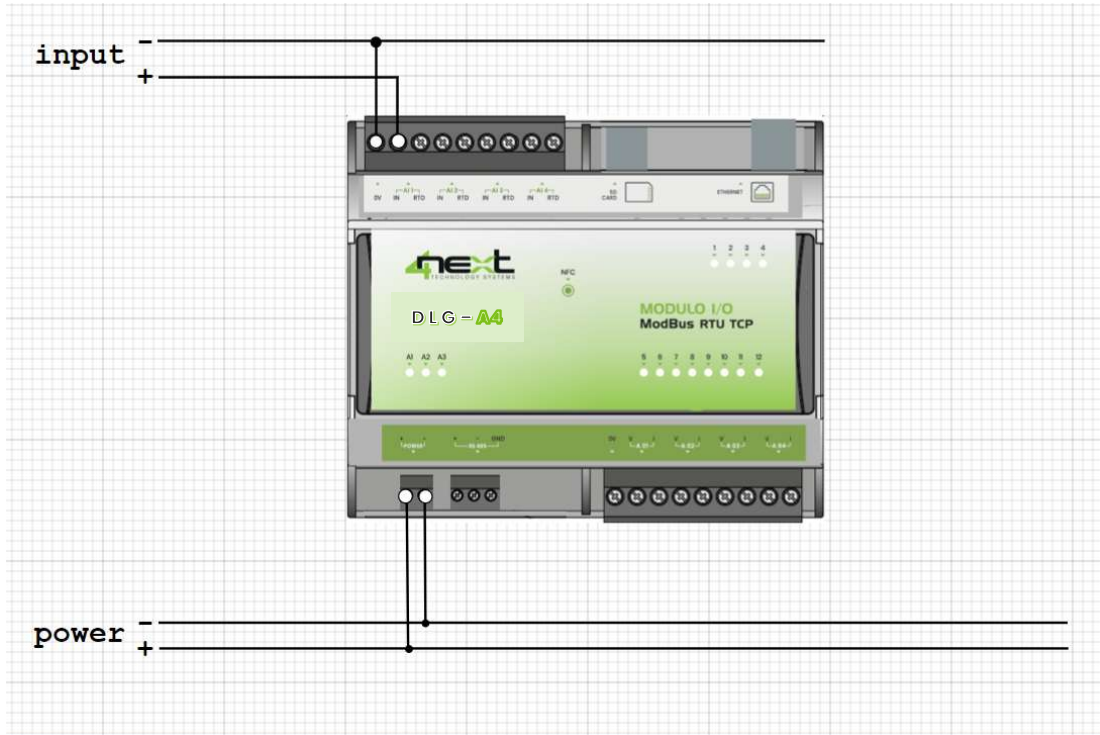
Number of terminals:

15 16 17 18 19 20 21 22 23

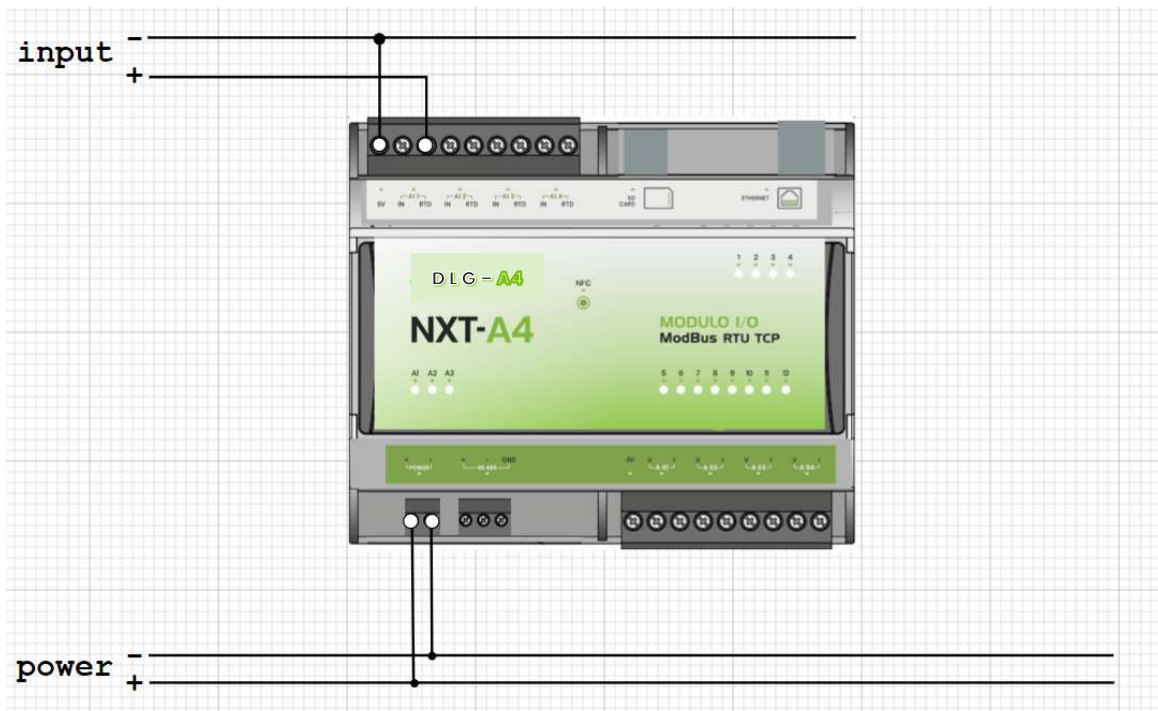


7.2. Links

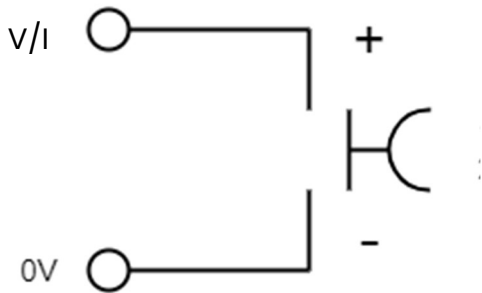
To read the voltage and current we can use one of the 4 analog inputs, connecting to a common - (pin 15) and connecting the + to one of the pins 16, 18, 20 and 22 indicated by the word "IN".



On the other hand, for the reading of the temperature configured in NTC-generic, the + must be connected to pins 17, 19, 21 and 23 indicated by the word "RTD".



To use the analog output, after entering the value to be delivered (voltage or current) in the web interface, connect the cables as follows:



7.3. Configuration

The "Analog input" menu in Configurations allows you to configure the type of analog input you want:

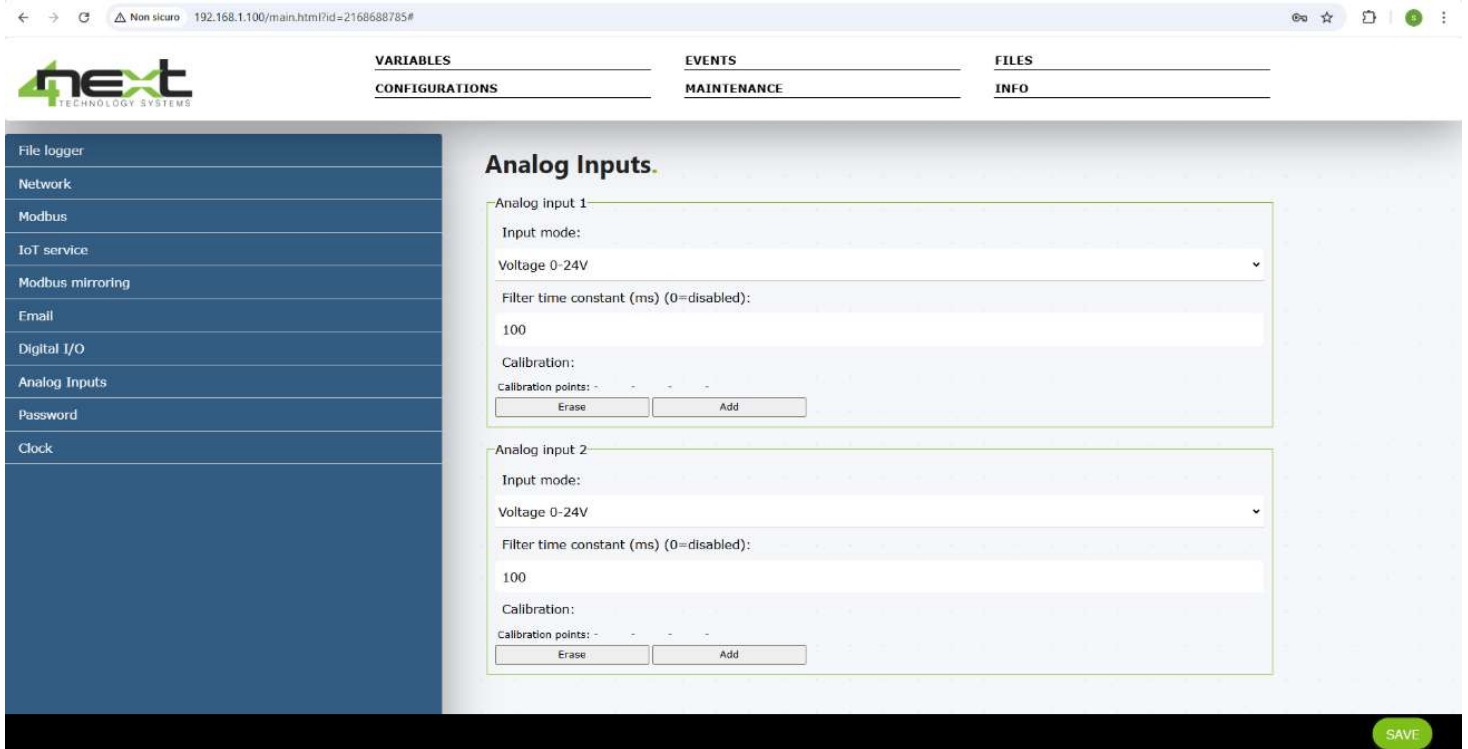
- Voltage [0-24 V]
- Current [0-200 mA]
- NTC-generic [°C]

Each selected mode has the following parameters:

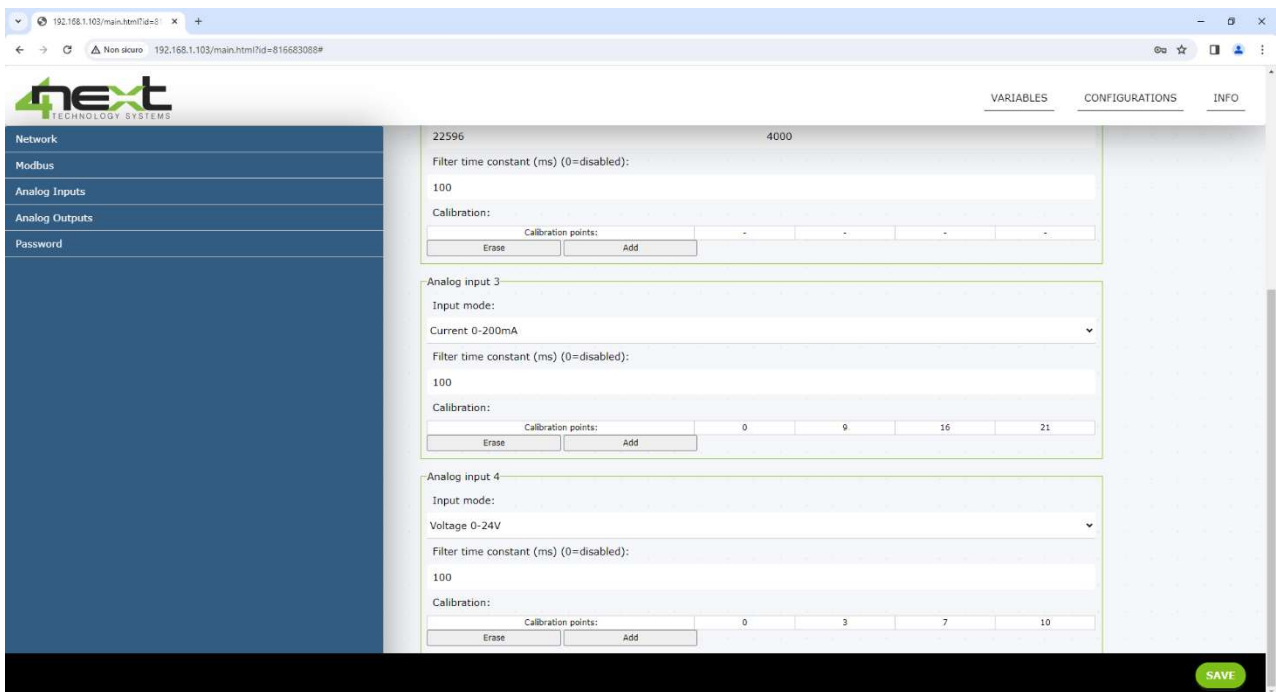
- **Input mode:** the type of input you want to measure
- **Filter time constant (ms):** the period of time for which it measures
- **Calibration:** **Calibration** uses the linear mathematical function to calibrate any measurement errors.

The only mode that requires you to enter parameters is the *NTC – generic of the instrument*. It is necessary to know:

- resistance at 25°C in Ohms (Ω)
- the best beta coefficient (β).



For the calibration operation, scalar values must be added in order to calibrate the measurement error up to 4 values. Below is an example of calibration for the current reading.



7.4. MODBUS register mapping

Parameters	Description	Supported Modbus read functions	Supported Modbus write functions	Address	Data size/type
HW TYPE	Board model identifier: 8 = DLG-D16, 9 = DLG-A4, 10 = DLG-M2	HOLDING REGISTER 0x03 INPUT REGISTER 0x04		0	1 register UINT16
FW VERSION	Firmware version. The version is stored as major.minor.build where: major=bits 12-15, minor=bits 8-11, build=bits 0-7	HOLDING REGISTER 0x03 INPUT REGISTER 0x04		1	1 register UINT16
SLAVE ADDRESS	Current modbus slave address	HOLDING REGISTER 0x03 INPUT REGISTER 0x04		5	1 register UINT16
ANALOG INPUT 1	Analog value readed from the analog input 1. The value is in: [V] for the voltage input, [mA] for the current input, [°C] for the NTC input.	HOLDING REGISTER 0x03 INPUT REGISTER 0x04		200	2 register - LSW first float32
ANALOG INPUT 2	Analog value readed from the analog input 2. The value is in: [V] for the voltage input, [mA] for the current input, [°C] for the NTC input.	HOLDING REGISTER 0x03 INPUT REGISTER 0x04		202	2 register - LSW first float32
ANALOG INPUT 3	Analog value readed from the analog input 3. The value is in: [V] for the voltage input, [mA] for the current input, [°C] for the NTC input.	HOLDING REGISTER 0x03 INPUT REGISTER 0x04		204	2 register - LSW first float32
ANALOG INPUT 4	Analog value readed from the analog input 4. The value is in: [V] for the voltage input, [mA] for the current input, [°C] for the NTC input.	HOLDING REGISTER 0x03 INPUT REGISTER 0x04		206	2 register - LSW first float32
ANALOG OUTPUT 1 [V]	Voltage analog output 1, 0-10V. The value is in mV (0 - 10000)	HOLDING REGISTER 0x03 INPUT REGISTER 0x04	HOLDING REGISTER 0x06 HOLDING REGISTER 0x10	210	1 register UINT16
ANALOG OUTPUT 2 [V]	Volatge analog output 2, 0-10V. The value is in mV (0 - 10000)	HOLDING REGISTER 0x03 INPUT REGISTER 0x04	HOLDING REGISTER 0x06 HOLDING REGISTER 0x10	211	1 register UINT16
ANALOG OUTPUT 3 [V]	Voltage analog output 3, 0-10V. The value is in mV (0 - 10000)	HOLDING REGISTER 0x03 INPUT REGISTER 0x04	HOLDING REGISTER 0x06 HOLDING REGISTER 0x10	212	1 register UINT16
ANALOG OUTPUT 4 [V]	Voltage analog output 4, 0-10V. The value is in mV (0 - 10000)	HOLDING REGISTER 0x03 INPUT REGISTER 0x04	HOLDING REGISTER 0x06 HOLDING REGISTER 0x10	213	1 register UINT16
ANALOG OUTPUT 1 [I]	Current analog output 1, 4-20mA. The value is in mAx100 (ex.400 = 4mA)	HOLDING REGISTER 0x03 INPUT REGISTER 0x04	HOLDING REGISTER 0x06 HOLDING REGISTER 0x10	214	1 register UINT16
ANALOG OUTPUT 2 [I]	Current analog output 2, 4-20mA. The value is in mAx100 (ex.400 = 4mA)	HOLDING REGISTER 0x03 INPUT REGISTER 0x04	HOLDING REGISTER 0x06 HOLDING REGISTER 0x10	215	1 register UINT16
ANALOG OUTPUT 3 [I]	Current analog output 3, 4-20mA. The value is in mAx100 (ex.400 = 4mA)	HOLDING REGISTER 0x03 INPUT REGISTER 0x04	HOLDING REGISTER 0x06 HOLDING REGISTER 0x10	216	1 register UINT16
ANALOG OUTPUT 4 [I]	Current analog output 4, 4-20mA. The value is in mAx100 (ex.400 = 4mA)	HOLDING REGISTER 0x03 INPUT REGISTER 0x04	HOLDING REGISTER 0x06 HOLDING REGISTER 0x10	217	1 register UINT16

8. DLG-D16

8.1. Terminals

DLG-D16 Device Pin Mapping

19 20 21 22 23 24 25 26 27 28 29 30 31



1 2

3 4 5

6 7 8 9 10 11 12 13 14 15 16 17 18

8.2. Links

The inputs and outputs can be configured in groups of 4:

IO1 IO2 IO3 IO4 IO5 IO6 IO7 IO8 IO9 IO10 IO11 IO12 IO13 IO14 IO15 IO16

DIGITAL INPUTS

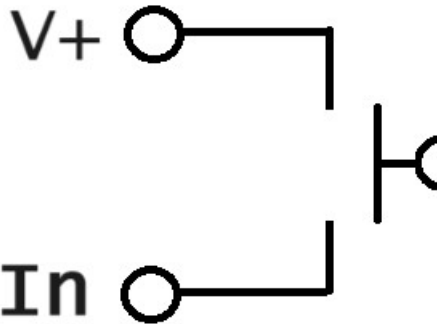
There are two possible ways to connect the Digital Inputs:

8.2.1 Model: Dry Contact

Contact must be made between the V+ terminal and the desired input:

Example:

16, 21



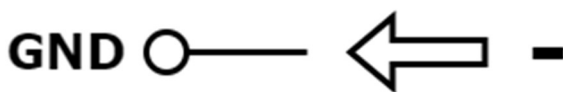
6-14

23-31

8.2.2 Mode2: Voltage Input

The voltage input must be connected as follows:

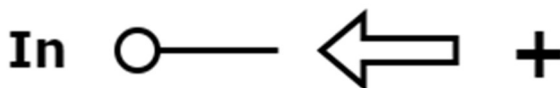
17-20



Tensione esterna
3 ÷ 12 V

6-14

23-31



The Gnd is equivalent to pins 17/18 and 19/20 which have the symbol (-)

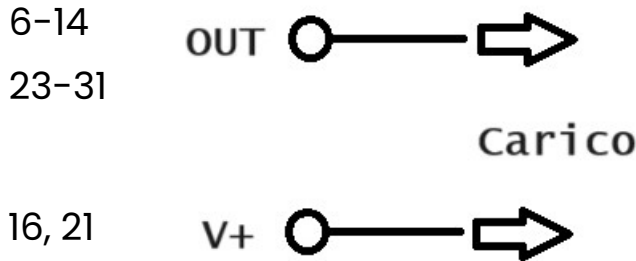
8.2.3 Counter Input

There are 8 counter inputs and They are located on inputs 1 to 8.

DIGITAL OUTPUTS

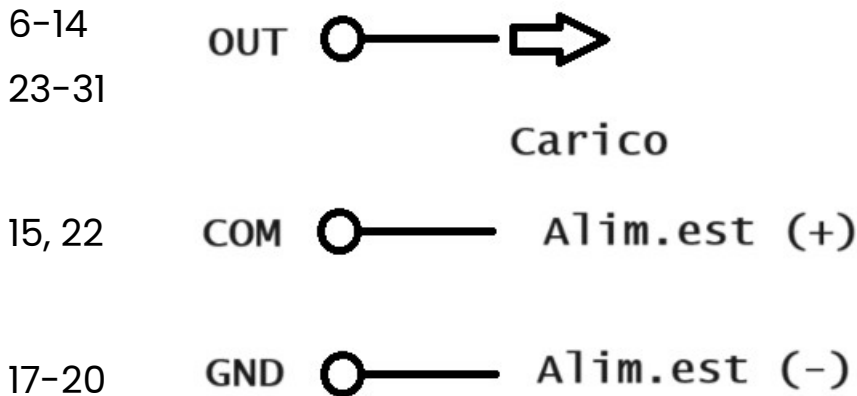
For the configuration of the digital outputs there are two types of situations, with internal power supply or external power supply.

8.2.4 Internal Power Supply



The load is powered by the DLG-D16 module and the current that can be delivered is a maximum of 80mA for all outputs.

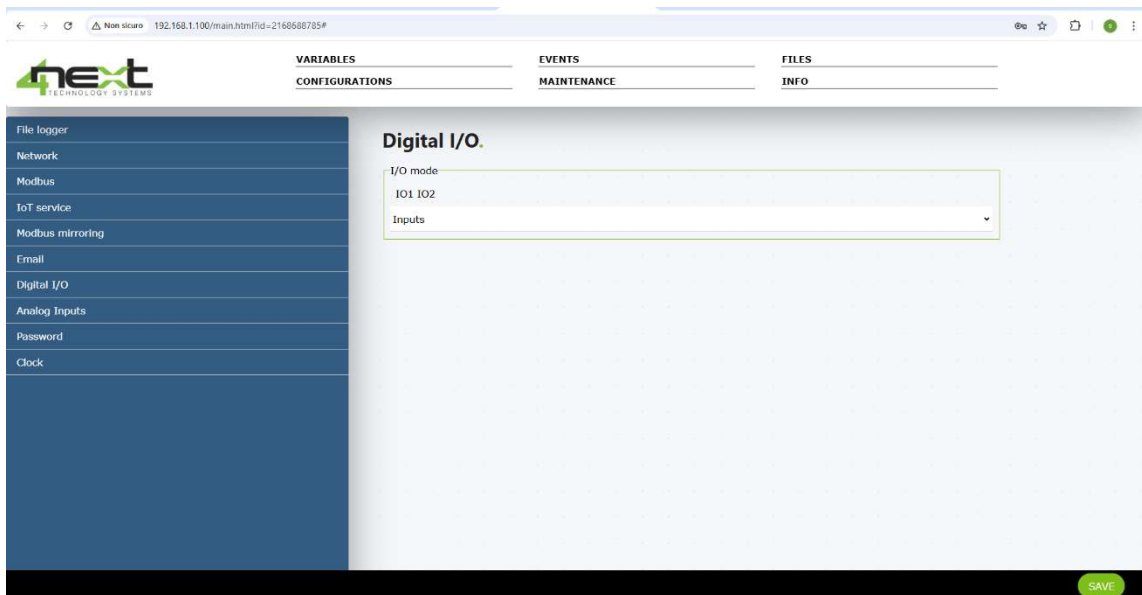
8.2.5 External Power Supply



Between the GND(-) and COM(D) connector there is an external power supply (3 ÷ 48Vdc) which will be used to power a load of up to 500mA.

8.3. Configurations

Under "Configurations", under "Digital I/O" you can change the group of INPUTS and OUTPUTS.



8.4. MODBUS register mapping

HW TYPE	Description	R/W	Address	Data size/type
FW VERSION	Board model identifier: 8 = DLG-D16, 9 = DLG-A4, 10 = DLG-M2		0	1 registerUINT16
SLAVE ADDRESS	Firmware version. The version is stored as major.minor.build where: major=bits 12-15, minor=bits 8-11, build=bits 0-7		1	1 registerUINT16
DIGITAL INPUTS	Current modbus slave address		5	1 registerUINT16
DIGITAL OUTPUTS	Digital input state: bit0=input1, bit1=input2, ... bit15=input16	R/W	100	1 registerUINT16
COUNTER INPUT 1	Digital outputs state: bit0=out1, bit1=out2, ... bit15=out16	R/W	101	1 registerUINT16
COUNTER INPUT 2	Counter of the input 1. It is incremented every time the input switches from inactive to active state	R/W	102	2 registerUINT32
COUNTER INPUT 3	Counter of the input 2. It is incremented every time the input switches from inactive to active state	R/W	104	2 registerUINT32
COUNTER INPUT 4	Counter of the input 3. It is incremented every time the input switches from inactive to active state	R/W	106	2 registerUINT32
COUNTER INPUT 5	Counter of the input 4. It is incremented every time the input switches from inactive to active state	R/W	108	2 registerUINT32
COUNTER INPUT 6	Counter of the input 5. It is incremented every time the input switches from inactive to active state	R/W	110	2 registerUINT32
COUNTER INPUT 7	Counter of the input 6. It is incremented every time the input switches from inactive to active state	R/W	112	2 registerUINT32
COUNTER INPUT 8	Counter of the input 7. It is incremented every time the input switches from inactive to active state	R/W	114	2 registerUINT32

9. DLG-M2

9.1. Terminals

1 2 3 4 5 6 7 8 9 10 11



12 13 14

9.2. Links

ANALOG INPUTS

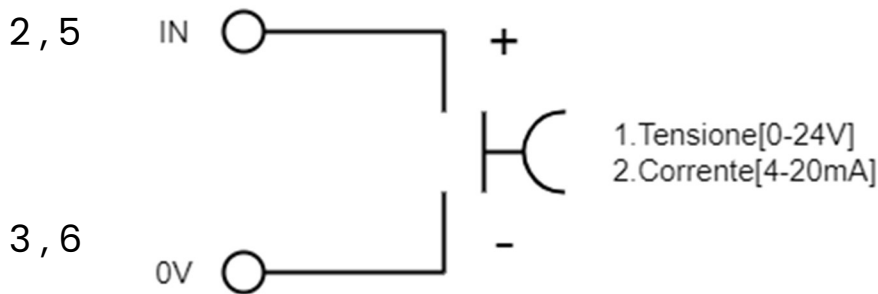
There are 2 analog inputs available with the following modes:

- voltage/current measurement
- NTC for temperature measurement

And for the following connection modes are:

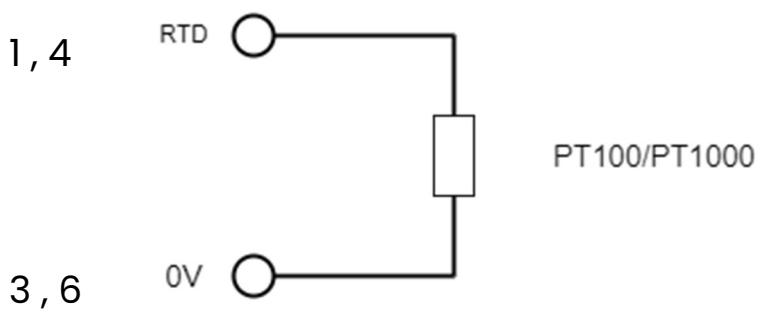
Voltage and current

For voltage or current measurement, you must first select the mode from "configurations" per input. Then the following connection is made:



Temperature

For temperature measurement, the NTC configuration is selected before connection and then connected as follows:



* Before connecting, check the temperature probe values in the configuration: they must coincide with those actually used. By default, the following values are entered for the NTC10K probe: $R_{25} = 10000$ $\beta = 4000$

The digital inputs/outputs can be configured in pairs:

IO1 IO2

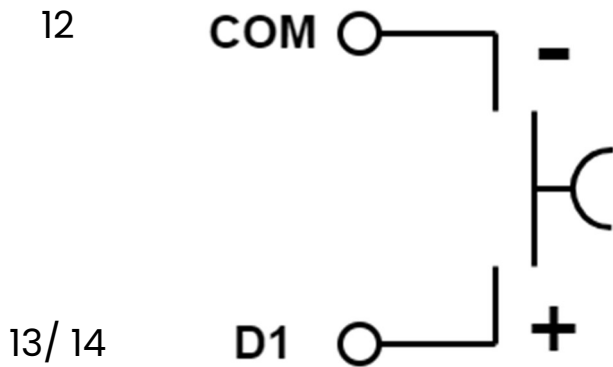
DIGITAL INPUTS

In the configuration as Digital Input it is possible to connect it to:

Dry contact

Contact must be made between the COM terminal and the desired input whether it is D1 or D2.

Example:



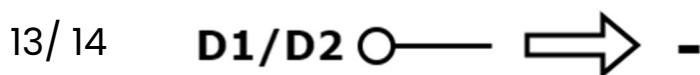
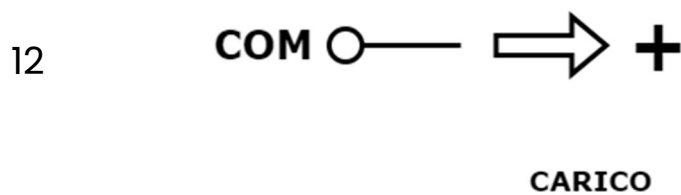
Counter Input

There are 2 counter inputs, they are available on the inputs and are integrated into the digital inputs.

DIGITAL OUTPUTS

Configured as digital outputs, the mode is as follows:

Internal power supply

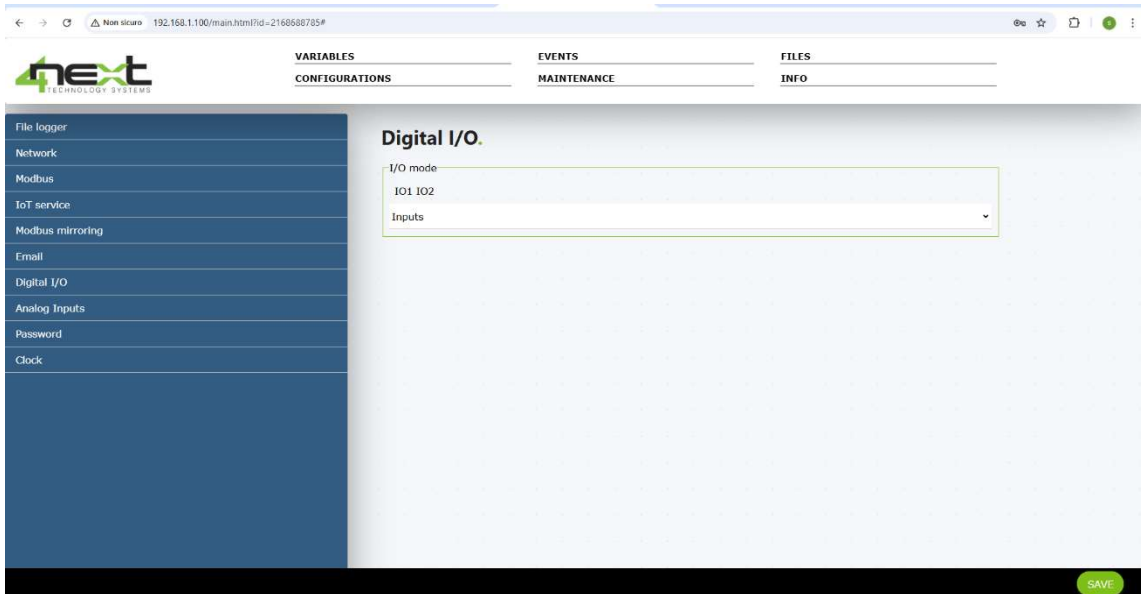


The load is powered by the DLG-M2 module and the current that can be delivered is a maximum of 80mA for all outputs.

9.3. Configurations

Digital I/O

The M2 module has two configurations. The first is the setting of digital inputs with the possibility of setting them as inputs or outputs. The screen below can be found in "Configurations", in the "Digital I/O" menu.



Analog inputs

The second setting is the configuration of the analog inputs under "Analog inputs" in the following ways:

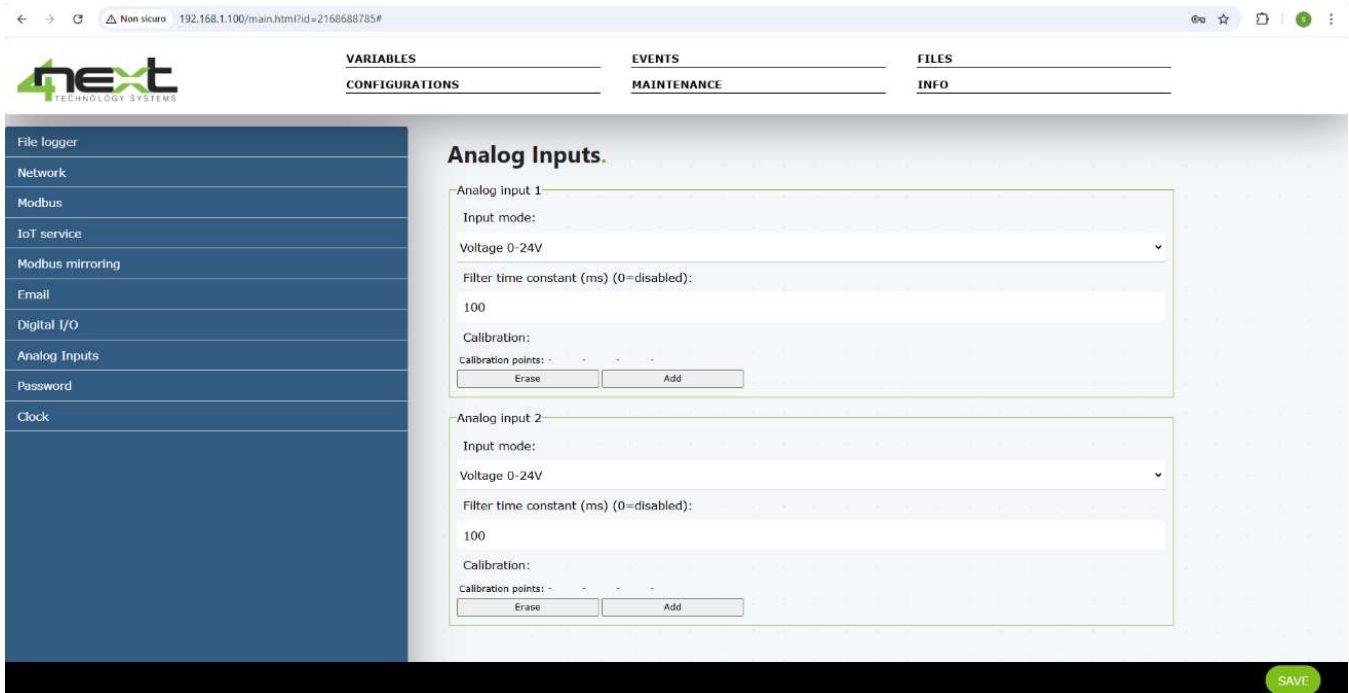
- Voltage [0-24 V]
- Current [0-200 mA]
- NTC-generic [°C]

With the following items:

- **Input mode:** the type of input you want to measure
- **Filter time constant (ms):** the period of time for which it measures
- **Calibration:** Calibration uses the linear mathematical function to calibrate the measurement of any measurement errors.

To configure the RTC it is necessary to know the following parameters of the instrument:

- the resistance at 25°C in Ohms (Ω)
- Best Beta Coefficient(β)



9.4. MODBUS register mapping

Parameters	Description	Supported Modbus read functions	Supported Modbus write functions	Address	Data size/type
HW TYPE	Board model identifier: 8 = DLG-D16, 9 = DLG-A4, 10 = DLG-M2	HOLDING REGISTER 0x03 INPUT REGISTER 0x04		0	1 register UINT16
FW VERSION	Firmware version. The version is stored as major.minor.build where: major=bits 12-15, minor=bits 8-11, build=bits 0-7	HOLDING REGISTER 0x03 INPUT REGISTER 0x04		1	1 register UINT16
SLAVE ADDRESS	Current modbus slave address	HOLDING REGISTER 0x03 INPUT REGISTER 0x04		5	1 register UINT16
DIGITAL INPUTS	Digital input state: bit0=input1, bit1=input2	HOLDING REGISTER 0x03 INPUT REGISTER 0x04		100	1 register UINT16
DIGITAL OUTPUTS	Digital outputs state: bit0=out1, bit1=out2	HOLDING REGISTER 0x03 INPUT REGISTER 0x04	HOLDING REGISTER 0x06 0x10	101	1 register UINT16
COUNTER INPUT 1	Counter of the input 1. It is incremented every time the input switches from inactive to active state	HOLDING REGISTER 0x03 INPUT REGISTER 0x04	HOLDING REGISTER 0x06 0x10	102	2 register - LSW first UINT32
COUNTER INPUT 2	Counter of the input 2. It is incremented every time the input switches from inactive to active state	HOLDING REGISTER 0x03 INPUT REGISTER 0x04	HOLDING REGISTER 0x06 0x10	104	2 register - LSW first UINT32
ANALOG INPUT 1	Analog value readed from the analog input 1. The value is in: [V] for the voltage input, [mA] for the current input, [°C] for the NTC input.	HOLDING REGISTER 0x03 INPUT REGISTER 0x04		200	2 register - LSW first float32
ANALOG INPUT 2	Analog value readed from the analog input 2. The value is in: [V] for the voltage input, [mA] for the current input, [°C] for the NTC input.	HOLDING REGISTER 0x03 INPUT REGISTER 0x04		202	2 register - LSW first float32

10. Return and repair

Return for repair or replacement must be authorized in advance by requesting an RMA number.

Then email 4neXt (support@4next.eu) or your dealer/dealer with the following information:

- Company name and customer details (address, phone, fax, e-mail)
- Contact person
- Point of purchase
- P/N and S/N product details on the back of each product or on the original box
- Detailed description of the fault or anomaly detected.

4neXt will send the RMA number with which the customer can send the material for repair. Products must be shipped freight prepaid.

If the material arrives without the factory seals, it will automatically be considered "out of warranty".

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