ePowerLog

Datalogger

User Manual

Product installation instructions

ePowerLog Serie (DL 500, DL 1000, DL 3000 & DL 10 000).

Index

1. General information

1.1. About this manual

This manual provides users with all the essential information needed to **install, configure, and operate** the **ePowerLog DataLogger** by **Elum Energy**. It covers **product details, safety precautions, installation steps, and configuration guidelines.**

For information on other models such as **ePowerControl ZE, ePowerControl SD, ePowerControl HFS**, and **ePowerControl EV** please refer to their respective user manuals. For **ePowerControl MC** and **ePowerControl PPC**, please contact the **Elum team** for assistance.

Intended audience:

- EPC contractors involved in new hybrid PV/Genset or PV/Battery power systems.
- EPC contractors working on PV/Battery integration into existing genset-based power systems.
- Professionals responsible for the design, installation, and maintenance of hybrid power systems.

To improve readability and emphasize critical information, this manual uses the following symbols:

Warning
Indicates a potentially hazardous situation that could lead to serious injury or death. This symbol is used to highlight precautionary measures and safety guidelines that must be followed.

Notes
Provides **general information** or useful tips to help the user during installation, configuration, or operation.

Before installing the **ePowerLog**, carefully read this manual to **prevent personal injury and avoid equipment damage**.

1.2. Glossary

APN address	A gateway that connects a GSM, GPRS, 3G, or 4G mobile network to another computer network.
AWG (12 wires)	American wire gauge : A standard unit for measuring the diameter of electrical wires.
CT	Current Transducers: A device that detects electric current in a wire and generates a proportional signal.
DHCP mode	Dynamic Host Configuration Protocol : A network protocol that automatically assigns IP addresses to devices.
DIN rail	A standardized metal rail used for mounting industrial control equipment inside enclosures or racks.
EMS	Energy Management System A system designed to monitor and/or control, and optimize energy usage in industrial and commercial environments.
EPC	Engineering, Procurement & Commissioning : A company responsible for the design, procurement, and installation of power systems.
I/O module	Input/Output module : A device that manages input and output signals between control systems and external devices.
ICMP	Internet Control Message Protocol : A network protocol used for diagnostic and error reporting in IP networks (e.g., Ping command).
LAN ports	Local Area Network : Physical connections for networking devices within a local network.
Local NEC rules	National Electrical Code : A standard for the safe installation of electrical wiring in various regions.
Modbus RTU	Communication protocol to connect a supervisory computer with a remote terminal unit (RTU)
Modbus TCP	Communication protocol to connect a supervisory computer with a remote terminal unit through Ethernet with a transmission control protocol (TCP)
OCPP	Open Charge Point Protocol for communication between electric vehicle charging stations and a central management system
RS-485	Standard electrical characteristics of drivers and receivers in serial communications systems
SCADA	Supervisory control and data acquisition
SNMP	Simple Network Management Protocol (SNMP) is an Internet Standard protocol for collecting and organizing information about managed devices on IP networks and for modifying that information to change device behavior.
UDP ports	Ports for User Datagram Protocol
UPS	Uninterruptible Power Supply : A backup power system used to ensure continuous operation of the datalogger, preventing data loss or system shutdowns during power outages.

1.3. Legal information

Elum SAS, headquartered at 9 rue d'Enghien - 75010 Paris, is registered with the Paris Trade and Companies Registry under number 817 860 083. The company specializes in the integration and distribution of monitoring and control panels for photovoltaic and hybrid energy systems, marketed under the brands "ePowerLog" and "ePowerControl".

Elum ensures that its controllers and dataloggers comply with French quality standards, are designed and assembled in France, and meet all necessary technical and quality requirements.

Elum reserves the right to modify the content of this document as needed. In the event of any discrepancy between translated versions, the English version shall take precedence.

1.4. Safety warnings

The ePowerLog products are electrical devices and should only be installed and operated by qualified personnel who are aware of the associated safety risks.

Installation of meters
Voltage-carrying parts. Risk of heart attack, burns and other injuries. Disconnect the power supply and charge the device before installing the analyzer. Protect the terminals with covers. The energy analyser must be installed by qualified/approved personnel.

Dangerous voltage
Do not touch the terminals for voltage and current measurement. Always connect grounding terminals. Do not disconnect the datalogger CT terminals. Be careful to protect the unit from electrostatic discharges during the installation.

Internet access
A **stable internet connection** is required for the proper **commissioning and operation** of the **ePowerLog**.

Monitoring and control features
Elum can only guarantee the monitoring and control of the site according to its product features once all of the equipment to be monitored have correctly been configured and connected to the datalogger.

1.5. Scope of supply

1.5.1. The ePowerLog datalogger

The ePowerLog datalogger is a ready-to-use solution that consists of a Central Computing Unit (CCU) and one or more satellites. The central unit is dedicated to data acquisition and enabling remote communication with the Elum cloud via the Internet. Any additional options purchased by the client will already be integrated into the base station, ensuring seamless operation upon installation.

For detailed specifications and technical information regarding the **Central Computing Unit**, please refer to the **ePowerLog datasheet**.

1.5.2. Additional equipment

Additional external equipment, such as weather sensors, I/O modules, and power meters, included in the purchase order will be delivered under the same terms as the datalogger. Some of these components may already be pre-installed within the ePowerLog cabinet, while others will require installation by the client.
For further details on optional accessories and configurations, please refer to the Options section of this manual.

1.5.3. Monitoring platform - ePowerMonitor

Upon purchase of a subscription to the ePowerMonitor platform, and once all hardware components are installed, the internet connection is configured, and the commissioning tests are completed, Elum will provide the client with access credentials for the ePowerMonitor online platform. This access includes a User ID and Password, enabling remote monitoring and control of the commissioned plant.

1.6. Commissioning overview

1.6.1. Before proceeding to the commissioning

Before initiating the commissioning process, Elum will provide the following essential documents:

- User Manual
- Datasheet
- Software delivery note

The ePowerLog datalogger is delivered with pre-installed Elum firmware, ensuring that it is ready for installation. The installation team must follow the step-by-step instructions provided in this manual to complete the autonomous commissioning of the datalogger.
The entire system configuration can be performed on-site, and all necessary setup details are included within this document.

Equipment first integration by Elum
For the integration of new equipment by Elum, the Operations team must be notified at least 15 days prior to deployment. Failure to do so may result in limited availability of Elum engineers for assistance, and their full support cannot be guaranteed.

PV injection precaution
During the deployment process, PV injection must remain shut down. Elum cannot be held responsible for any damage caused by uncontrolled PV injection during the commissioning process. It is the responsibility of the installation team to ensure that proper precautions are taken before proceeding.

1.6.2. Deployment steps

Step 1	Read the User Manual
Step 2	Plan the communication architecture
Step 3	Wire the slave devices
Step 4	Connect and configure all non-Elum equipment: - PV inverters - Generator controller (*with a protection relay if necessary*) - Power meters - Other equipment (sensors, Electric Vehicle Charging Stations, etc.)
Step 5	Wire and install the ePowerLog
Step 6	Configure the ePowerLog online with Elum Configuration: - ePowerLog password and Internet access - Communication ports and devices according to your Communication Architecture Plan (test and correct)
Step 7	Start the Data acquisition
Step 8	(Optional) access to ePowerMonitor

2. Step 2: Communication Architecture Plan

2.1. Objectives

Before commissioning, a clear communication plan must be established to prevent any network-related issues. The design of the network should take into account wiring limitations, communication protocol compatibility, and the configuration requirements of each device to ensure seamless integration.

2.2. RS485 Constraints: Configuring Slave ID Addresses

To ensure stable communication via RS485 (Modbus RTU), the following rules must be followed:

Each **device** must have a **unique Slave ID** to avoid address conflicts.

All devices connected to the **same serial port** must use the **same communication protocol** and have matching parameters, including **baud rate, parity, byte size, and stop bits**.

The **Modbus RTU protocol** allows up to **32 devices** to be connected to a single serial communication port.

Limits
The **maximum cable length** for RS485 communication must not exceed **1000 meters** to ensure signal integrity.

2.3. Ethernet Constraints: Configuring IP Addresses

For proper Ethernet communication, the following guidelines must be observed:

- Each **device** must have a **unique IP address** within the network.
- All devices must be **within the same subnet** as the **Elum Explorer** to allow seamless data exchange.
- The **subnet range 192.168.4.XX** is **reserved** for LAN port **2 for DL 500 and DL 1000 and** LAN port 4 **for DL 3000 and DL 1000°** and **must not be used** for other devices.

All devices should be configured with the **Subnet Mask: 255.255.255.0** to maintain proper network segmentation and communication stability.

Limits
The **maximum Ethernet cable length** must not exceed **100 meters** to prevent signal degradation and ensure reliable communication

2.4. Example

Table 1: Communication Architecture Plan Example

Device	Slave Reference	Protocol	Slave IP address	Slave ID	Baud rate	Byte Size	Parity	Stop Bit
Inverter n°1	*SMA STP 25000 TL*	*Modbus TCP*	*192.168.3. 200*	-	-	-	-	-
Inverter n°2	*SMA STP 25000 TL*	*Modbus TCP*	*192.168.3. 201*	-	-	-	-	-
Inverter n°3	*SMA STP 25000 TL*	*Modbus TCP*	*192.168.3. 202*	-	-	-	-	-
Inverter n°3	*SMA STP 25000 TL*	*Modbus TCP*	*192.168.3. 203*	-	-	-	-	-
Grid Meter	*EM330-DIN. AV5.3.H.S1.X, Carlo Gavazzi*	*Modbus RTU*	-	*2*	*9600*	*8*	*No*	*1*
Load Meter	*EM330-DIN. AV5.3.H.S1.X, Carlo Gavazzi*	*Modbus RTU*	-	*1*	*9600*	*8*	*No*	*1*

3. Step 3: Wire the slave devices

3.1. Connecting RS485 Devices

To enable the ePowerLog to monitor external devices via RS485, a physical connection must be established. The ePowerLog functions as the master of the communication bus, while all connected equipment act as slaves. Each slave device must be properly configured to ensure seamless communication using the Modbus RTU/TCP protocol.

3.1.1. Central Computing Unit serial ports

a) DL 500 & DL 1000

RS485-compatible devices can be connected to Serial Port 1 or Serial Port 2 on the DL 500 and DL 1000 Central Computing Unit using shielded twisted pair connectors. If an RS485 Extension Module is provided by Elum, its serial ports 1 or 2 can also be used for device connections.

For specific wiring and configuration details related to third-party hardware, please refer to the manufacturer's documentation to ensure compatibility and correct setup.

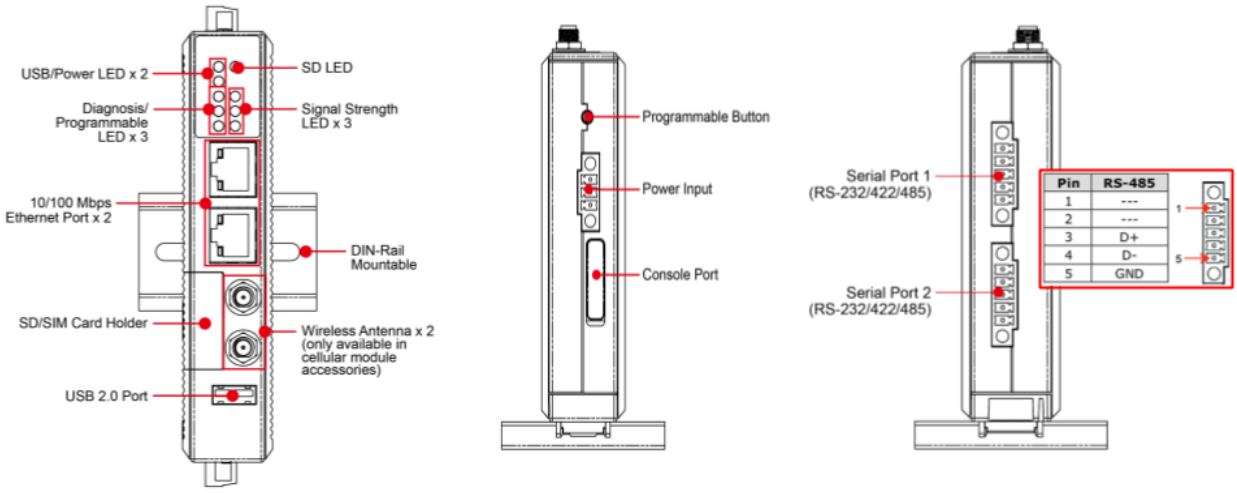


Fig. 1: Front, Top, and Bottom Views of the Central Computing Unit

The table below provides the pin configuration for the UC-8100 (DL 500 & DL 1000) communication ports, used to connect RS485-compatible devices to the ePowerLog Central Computing Unit. Proper wiring and adherence to these pin assignments are crucial to ensure stable data transmission and device monitoring

Pin	RS-485
1	---
2	---
3	D+
4	D-
5	GND

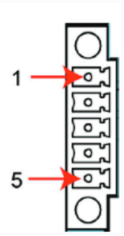
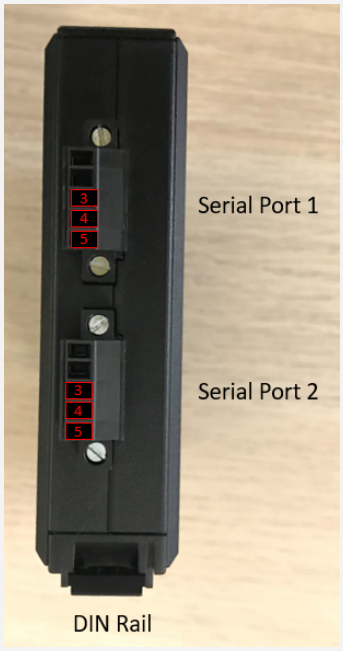
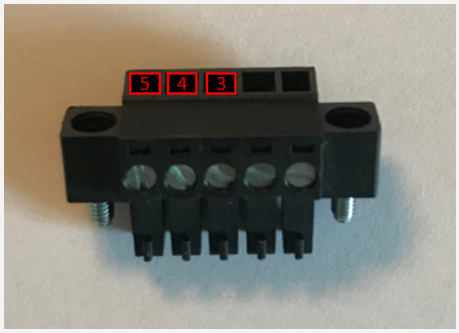


Fig. 2: Pin association of the central computing unit serial ports for RS485 wiring

For correct RS485 wiring, ensure that Pin 3 (Data B+) and Pin 4 (Data A-) are connected using a shielded twisted pair cable to prevent interference. Pin 5 (GND) should also be connected to maintain signal integrity.





If additional RS485 expansion modules are used, follow the same pin configuration for serial communication. For third-party devices, refer to their respective technical documentation to verify compatibility with the UC-8100 (DL 500 & DL 1000) communication ports.

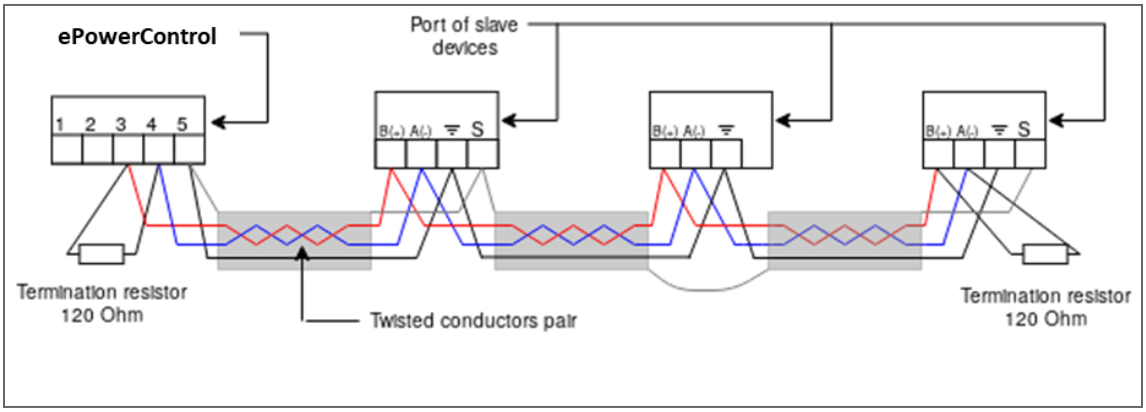


Fig. 3: Daisy-chain wiring for RS-485 serial communication

b) DL 3000 & DL 10 000

Compatible RS485 devices can be connected to any of the four serial ports available on the DL 3000 and DL 10000 Central Computing Unit. This connection must be made using two shielded twisted pair connectors to ensure proper data transmission and minimize electromagnetic interference.
If an RS485 Extension has been provided by Elum, any available serial port on the extension can also be used for connecting RS485 devices.
For detailed configuration and installation guidelines specific to third-party hardware, please refer to the manufacturer's documentation.

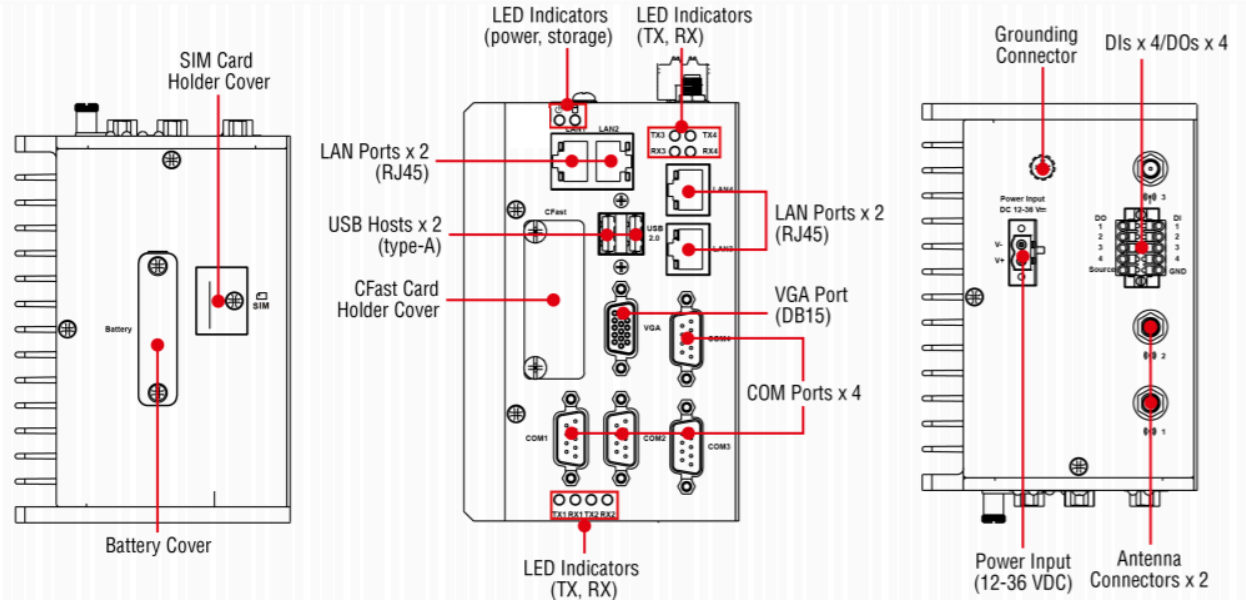
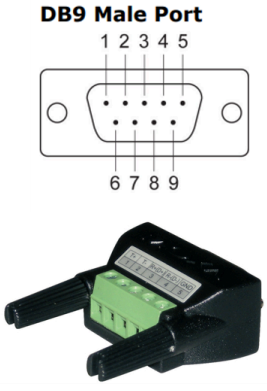


Fig. 4: Front, top and bottom views of the Central Computing Unit

Table 2 provides the pin assignments for COM ports.

Table 2: Pin of the Central Computing Unit serial ports association forRS485 wiring



Pin	RS-485 (4-wire)	RS-485 (2-wire)
1	TxDA(-)	–
2	TxDB(+)	–
3	RxDB(+)	DataB(+)
4	RxDA(-)	DataA(-)
5	GND	GND
6	–	–
7	–	–
8	–	–

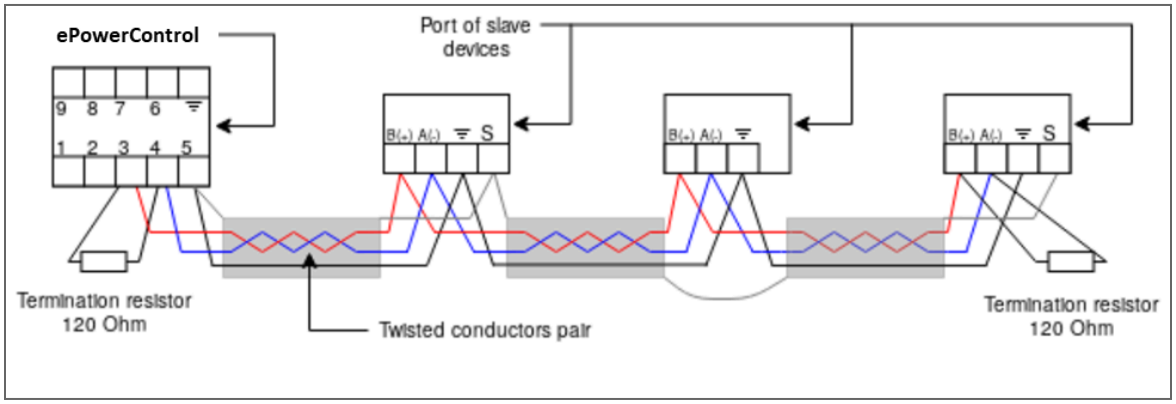


Fig. 5: Daisy-chain for RS-485 serial communication

3.1.2. RS-485 Wiring Guidelines

Proper wiring of the RS-485 serial line is essential for ensuring reliable data transmission between the ePowerLog and connected devices. Follow these guidelines to minimize interference and maintain stable communication:

- **Daisy chaining connections**

1. Pin 3 (DataB +) of the serial port should be connected in a daisy-chain with all DataB (+) ports of the connected devices

2. Pin 4 (DataA -) of the serial port should be connected in a daisy-chain with all DataA (-) ports of the connected devices.

3. Pin 5 (GND) should be connected in a daisy-chain with all GND ports of the connected devices.

- **Cable selection & Organization**

1. Use twisted-pair cables for DataB (+) and DataA (-) to reduce electromagnetic interference

2. To simplify wiring and avoid errors, maintain a consistent color scheme (e.g., red for DataB (+), blue for DataA (-), and black for GND).

3.1.3. Termination of data wires

To prevent signal reflections and data errors, termination resistors must be installed:

- A 120 Ohm resistor should be placed at each end of the RS-485 communication line, connecting DataB (+) and DataA (-).
- The resistance value must be compatible with the impedance of the communication cable used.

3.1.4. Shielding

- It is recommended to use shielded RS-485 cables to protect against external electrical noise.
- The shielding should be continuous along the entire RS-485 communication line and must be connected to the GND (Pin 5) at the datalogger.
- To prevent ground loops, the shield should only be connected at a single point, preferably at the datalogger side.

3.1.5. RS-485 connection limitations

- The total cable length between the datalogger and the farthest external device must not exceed 1 km for proper signal integrity.
- The use of unshielded cables should be minimized to prevent communication interference.

Failure to adhere to the **RS-485 wiring guidelines**, including the use of **termination resistors**, **proper grounding**, and **adequate shielding** can lead to **unstable communication**, **reduced performance**, and even **potential equipment damage**.

To maintain signal integrity, **shield continuity must be ensured** throughout the entire communication line. This requires **dedicated third-party hardware** for shield connections, with the shield being **grounded at a single point** to **prevent ground loops**

For **RS-485 lines exceeding 100 meters**, the installation of a **120 Ohm termination resistor** is strongly recommended. This resistor should be placed **between pin 3 and pin 4** on the **RS-485 port of the Central Computing Unit**, ensuring stable data transmission over long distances.

3.2. Connecting Ethernet Devices

To enable the ePowerLog to monitor Ethernet-based equipment, a physical Ethernet connection must be established. The ePowerLog acts as the master of the communication network, while all connected devices function as slaves. The datalogger communicates via Modbus TCP/IP..

3.2.1. Central Computing Unit LAN ports

To connect power units, sensors, or other Ethernet-compatible devices, use an Ethernet-male to Ethernet-male cable and connect it to the LAN ports on the ePowerLog module.

- If an Ethernet switch is not used, devices communicating via Modbus TCP should be directly connected to LAN port 1 on the DL 500 and DL 1000 (see Figure 4) or on LAN port 1, 2, 3 on the DL 3000 and DL 10000 (see Figure 5).

- If an Ethernet switch is used, all Modbus TCP devices should be connected to any of the available ports on the switch. One of the Ethernet switch ports must then be connected to the ePowerLog datalogger, ensuring seamless data transmission

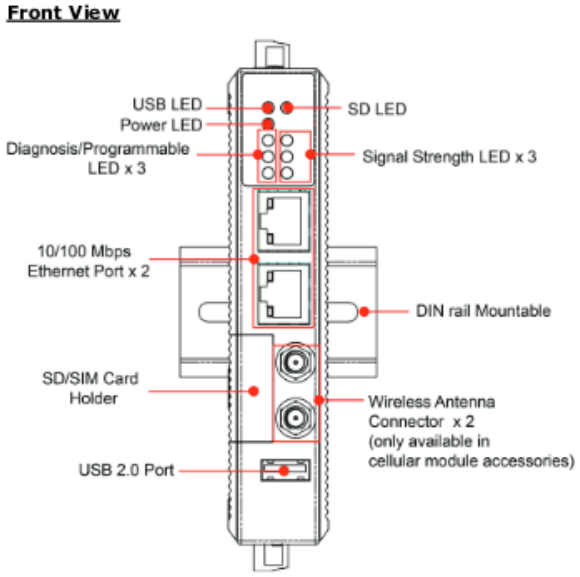


Fig. 4: Front view of the Central Computing Unit

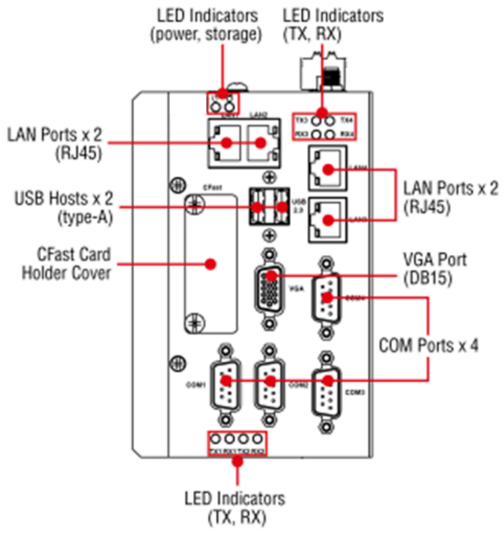


Fig. 5: Front view of the Central Computing Unit

The two 10/100 Mbps Ethernet ports of the Central Computing Unit and the switches provided by Elum use RJ45 connectors.

Pin	Signal
1	ETx+
2	ETx-
3	ERx+
6	ERx-

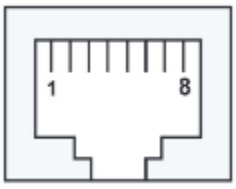


Fig. 5: Pin description of the LAN ports of the Central Computing Unit

3.2.2. Wiring

The wiring of the Ethernet line should be done by connecting each of the Slaves to the ePowerLog using an RJ45 cable

3.3. Wiring an AC Meter | 5A provided by Elum

3.3.1. Materials required

The installation and wiring of an AC Meter | 5A provided by Elum require the following components:

- **Circuit protection:** For each phase, use the smallest available breakers or rated fuse taps according to local NEC regulations. Typically, a 15A circuit breaker or a single multipole breaker is used, depending on the number of phases.
- **Wiring:** Use black, red, and white stranded AWG 12 wire, ensuring a thermal resistance of at least 75°C. The wire length should be determined based on the installation location. For three-phase installations, an additional blue wire is required. The insulation rating of the wire must be greater than the maximum voltage inside the panel.
- **Other materials:**
    - Electrical tape for insulation.
    - Conduit and couplings as needed.
    - Mounting and wire organization hardware to ensure a neat and secure installation.
    - Outdoor-rated enclosure (if the meter is installed outside) to protect against environmental conditions.

3.3.2. Safety warnings

To ensure a **safe and proper installation**, always follow the **wiring diagrams** and **CT selection guidelines** provided in this manual.

To **reduce the risk of electric shock** and prevent damage to the equipment:

- **Do not connect** the device to a circuit that operates at **more than 277 Vrms to neutral**.
- **Always disconnect** circuits from the **building's power distribution system** before installing or servicing the **power meter or attached current transformers (CTs)**.
- **Only use authorized 5A CTs** with this device to maintain accurate measurement and ensure safe operation.

3.3.3. Installation location

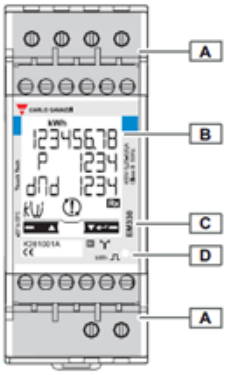
The power meter should be installed near the low-voltage distribution panel, ensuring easy access to connections for the grid, load, and genset (refer to the application overview for guidance). A 10A circuit breaker must be installed for each phase, positioned close to the meter and within easy reach of the operator. These breakers must be clearly labeled as the disconnecting devices for the power meter to allow quick identification and access.

Since the power meter is a listed device, it must be housed inside a suitable enclosure that meets the environmental requirements of the installation site:

- For indoor installations, a standard electrical cabinet is sufficient.
- For outdoor installations, a weatherproof, outdoor-rated enclosure is required to protect against moisture, dust, and direct sunlight.

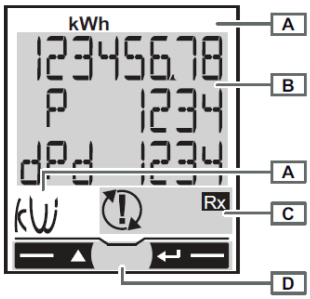
When selecting the installation location, ensure that the power meter is not exposed to direct sunlight or extreme environmental conditions.

3.3.4. Device overview



Area	Description
A	Current and communication connection terminals
B	Backlit LCD display with sensitive touch screen areas
C	Model, feature summary and serial number
D	LED: • blinking red: pulse weight proportionate to the TA and TV ratio result, • orange on: total active power negative. Control only run if the imported and exported energies are measured separately (**Measure** = b).

Fig. 6: View of the EM330-DIN.AV5.3.H.S1.X, Carlo Gavazzi



Area	Description
A	Unit of measure area
B	Specific section information area
C	Signal area: • : incorrect voltage connections • : incorrect current connections • Rx: version S1 only. Modbus command correctly received. • Tx: version S1 only. Modbus command correctly sent to master.
D	Command area

Fig. 7: View of the EM330-DIN.AV5.3.H.S1.X, Carlo Gavazzi LCD screen

3.3.5. Installation steps

1. Place the required breaker(s) in the power distribution panel, ensuring access to all phases of the system.
2. Open the breakers to ensure there is no power on the breaker contacts before proceeding with the installation.
3. Securely mount the power meter inside a suitable enclosure near the power distribution panel.
4. Ensure the enclosure is appropriate for the installation environment (e.g., outdoor-rated enclosures for external installations).
5. Wiring the Power Meter and CTs :
    a. Follow the wiring diagram corresponding to the site's system layout to properly connect the power meter.
    b. For a three-phase system with a 4-wire unbalanced load, connect the three current transformers (CTs) as specified in the installation diagram.
    c. Ensure the stickers on the CTs are correctly oriented toward the measured current flow direction to avoid incorrect readings.
    d. If the CT wires need to be adjusted in length, ensure they are securely connected without compromising signal integrity.

The main voltage must not exceed 400V, and the CTs must always have 5A secondary current.

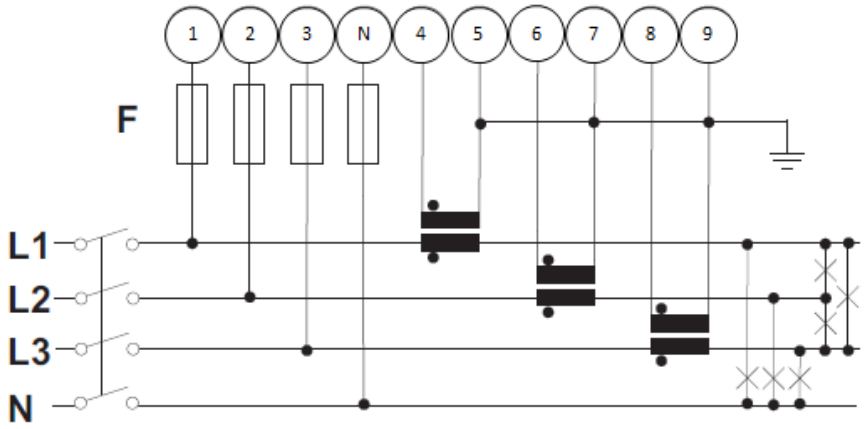


Fig. 8: Example of the EM330-DIN.AV5.3.H.S1.X, Carlo Gavazzi connection diagram for a three-phase system of the system, 4 wires, unbalanced load and three current transformers (CT) and three voltage transformers (VT)

6. Wire the power supply of the power meter as per the installation diagram provided.

*The power supply should be **65-400V AC, 50Hz**.*

*The **auxiliary power supply** on the meter ensures it remains powered **regardless of whether the plant is running on the grid or gensets**. Power meters responsible for **monitoring the grid, load, or gensets** should **never be turned off**, as this could trigger a **fail-safe mode in the ePowerLog**, leading to **curtailed PV production**.*

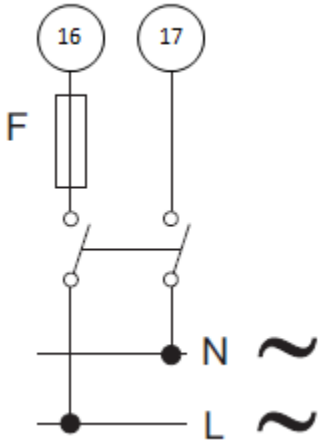


Fig. 9: Connecting the power supply to the EM330-DIN.AV5.3.H.S1.X, Carlo Gavazzi

7. Close the newly installed breakers to energize the power meter. Within a few seconds, the screen should illuminate, displaying the measurement page to confirm proper operation.
8. Once the power meter is successfully powered on, you can continue with the configuration and parameter setup to align with the system's operational requirements.

*After powering up the **EM330-DIN.AV5.3.H.S1.X** power meter, it is essential to **configure its parameters** correctly to ensure **accurate measurements** and proper system integration. Below are the **critical settings** that must be adjusted:*

***SYStEM**, System type : To be set according to the site design*

***Ct rAtIo**, Current transformer ratio : To be set according to the CTs used with the power meter. You can obtain this ratio by dividing the primary*

current by the secondary current. As an example, when using 200 A to 5 A CTs, the ratio should be set to 40.

***Vt rAtIo**, Voltage transformer ratio : To be set according to the VTs used with the power meter. You can obtain this ratio by dividing the primary voltage by the secondary voltage. As an example, when the power meter when using no VTs, the ratio should be set to 1.*

***MEASurE**, Measurement type : To be set to "b"*

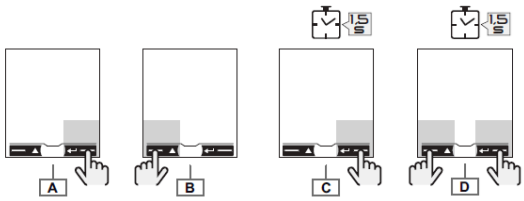
***AddrESS**, Modbus address : To be set according to your ID plan*

The result of the ratio between the current and voltage transformers must be under 1054.

It is critical that the measurement type was correctly set up to "b" for the zero export control feature. If the power meter was not correctly set up, Elum cannot guarantee any reliability on the zero export feature and will not be taken responsible if some energy is exported to the grid.

Instructions to use the power meter and navigate through the different menus.

Measurement pages displayed by default when turned on. Pages are characterized by the reference unit of measure. The initial measurement page set is displayed after 120 s of disuse.



Commands

Navigation

Operation	Command
View the next page	A
View the previous page	B
Open the programming section	C
Exit the programming section	C (page End)
Open the information section	D
Exit the information section	D

Parameter settings

Operation	Command
Increase a parameter value	A
View the next value option	A
Decrease a parameter value	B
View the previous value option	B
Confirm a value	C
Open the parameter settings page	C

Parameters description

Page	Code	Description	Values
PASS	**P1**	Enter current password	Current password. 0000 default password.
nPASS	**P2**	Change password	Four digits (0000–9999)
SYStEM	**P3**	System type	**3Pn**: three phase system, 4-wire/ **3P**: three-phase system, 3-wire/ **2P**: two-phase system, 3-wire
Ct rAtIo	**P4**	Current transformer ratio (TA)	1–1000 *
Vt rAtIo	**P5**	Voltage transformer ratio (TV)	1–1000 *
		*NOTE *: the result of the ratio between the current and voltage transformers must be under 1054 for **AV5** analyzers and under 3148 for **AV6**.*	
MEASurE	**P6**	Measurement type	**A** : *easy connection* , measures total energy without considering the direction/ **b** : separately measures imported and exported energy
InStALL	**P7**	Connection check	**On**: enabled/ **Off**: disabled
P int	**P8**	Average power calculation interval (minutes)	1–30
MOdE	**P9**	Display mode	**Full** : complete mode/ **Easy** : reduced mode. Measurements not displayed are still sent via serial port.
tArIFF	**P10**	Tariff management	**On**: enabled/ **Off**: disabled
HoME	**P11**	Measurement page displayed when turned on and after 120 seconds of disuse	For full display mode (**Mode** = Full): 0–19 For reduced display mode (**Mode** = Easy): 0–3, 6, 7, 10/11, 18 To learn the page code *see "**Measurement (Fig. 16)**" on page 7.*
rESET	**P17**	Enable energy tariff, maximum requested power and partial active and reactive energy reset (the latter only sent via serial port)	**No**: cancel reset/ **Yes**: enable reset
End	**P18**	Return to the initial measurement page	–

AddrESS	**P14**	Modbus address	1–247
bAUd	**P15**	Baud rate (kbps)	**9.6/ 19.2/ 38.4/ 57.6/ 115.2**
PArITY	**P16**	Parity	**Even/ No**
STOP bit	**P16–2**	Only if no parity. Stop bit.	**1/ 2**

9. Proceed to the communication wiring of the power meter as described below. Connect the power meter to one of the serial ports of the Central Computing Unit using a shielded twisted-pair RS485 connector and a Cat 5 cable.

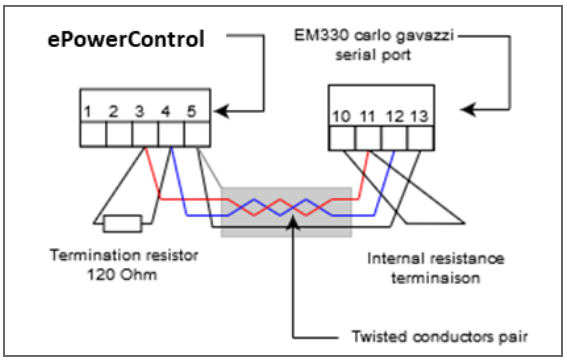


Fig. 10: RS 485 Wiring diagram for connecting a single EM330-DIN.AV5.3.H.S1.X, Carlo Gavazzi to the ePowerLog

Additional RS485 power meters should be connected in parallel, with the serial output terminated only on the last device by connecting terminals B+ and T.

For connections over 1000 meters or networks with more than 160 devices, a signal repeater must be used.

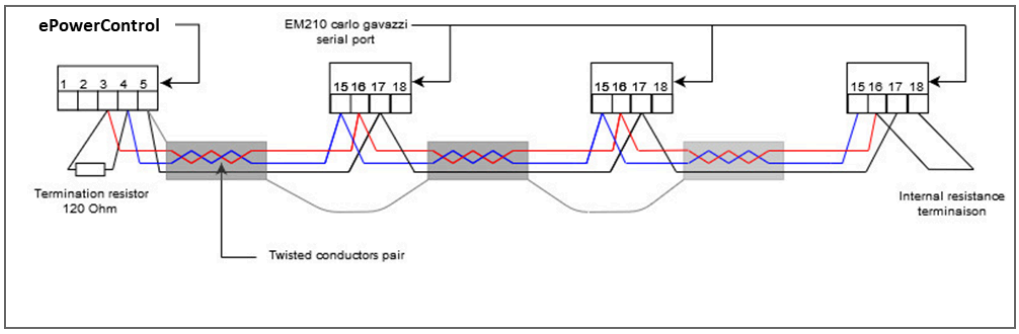


Fig. 11: RS485 wiring diagram for connecting multiple EM330-DIN.AV5.3.H.S1.X, Carlo Gavazzi in parallel

The continuity of the shielding must be ensured throughout the communication cable, and the ground must be connected at a single point. The total length of the cable must not exceed 1000m.

10. Label the newly installed breakers as "Power Meter Disconnect" so they can be easily identified if the device needs to be power-cycled or turned off.

3.4. Wiring an AC Meter | 333mV provided by Elum

3.4.1. Materials required

- **Circuit protection:** For each phase, use the smallest available breakers or rated fuse taps according to local NEC regulations. Typically, a 15A circuit breaker or a single multipole breaker is used, depending on the number of phases.

- **Wiring:** Use black, red, and white stranded AWG 12 wire, ensuring a thermal resistance of at least 75°C. The wire length should be determined based on the installation location. For three-phase installations, an additional blue wire is required. The insulation rating of the wire must be greater than the maximum voltage inside the panel.
- **Other materials:**
    - Electrical tape for insulation.
    - Conduit and couplings as needed.
    - Mounting and wire organization hardware to ensure a neat and secure installation.
    - Outdoor-rated enclosure (if the meter is installed outside) to protect against environmental conditions.

3.4.2. Safety Warnings

To ensure a **safe and proper installation**, always follow the **wiring diagrams** and **CT selection guidelines** provided in this manual.

To **reduce the risk of electric shock** and prevent damage to the equipment:

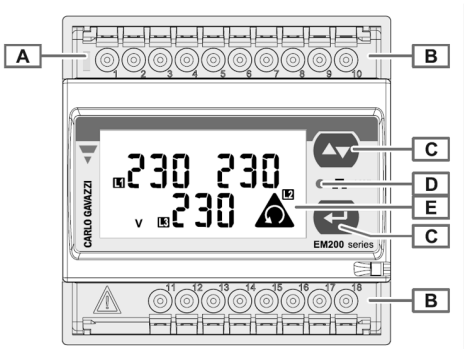
- **Do not connect** the device to a circuit that operates at **more than 277 Vrms to neutral**.
- **Always disconnect** circuits from the **building's power distribution system** before installing or servicing the **power meter or attached current transformers (CTs)**.
- **Only use authorized 5A CTs** with this device to maintain accurate measurement and ensure safe operation.

3.4.3. Installation location

The power meter should be installed near the low-voltage distribution to ensure easy access to the grid, load, and genset connections (see application overview). A 10A circuit breaker per phase must be installed close to the device and within easy reach of the operator. These breakers must be clearly labeled as the disconnecting device for the power meter.

As a listed device, the power meter must be housed in a suitable enclosure rated for its installation environment. For outdoor installations, a weather-resistant, outdoor-rated enclosure is required to protect against environmental conditions. The installation location should be shielded from direct sunlight and harsh elements to ensure long-term reliability and accuracy.

3.4.4. Device overview



Product

Area	Description
A	Green LED: • steadily on: instrument powered. • blinking: instrument powered and serial communication under way.
B	Terminals for current, voltage and communication connections
C	Control buttons
D	Red LED: • blinking: pulses proportional to the measured energy (pulse weight: see *Features*).
E	Non-backlit LCD display

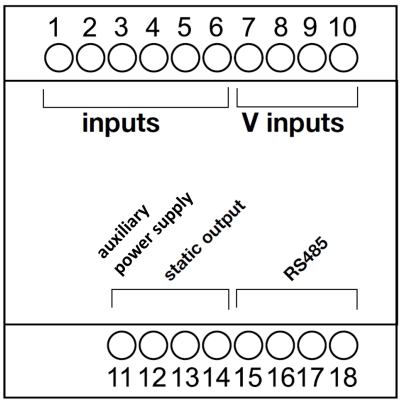
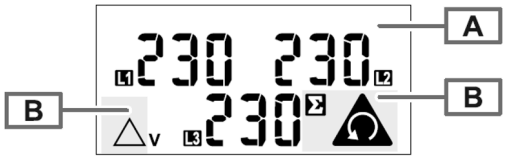


Fig. 12: View of the EM210-72D.MV5.3.X.OS.X, Carlo Gavazzi



Display

Area	Description
A	Measuring unit area
B	Indication area:
	Incorrect phase sequence.
	Displayed line voltages .
	Displayed system values.

Fig. 13: View of the EM210-72D.MV5.3.X.OS.X, Carlo Gavazzi LCD screen

3.4.5. Installation steps

1. First, install the breaker(s) in the power distribution panel, ensuring they provide access to all phases.
2. Before proceeding, open the breakers to ensure no power is present on the breaker contacts.

3. Next, mount the power meter inside a suitable enclosure near the power distribution panel, ensuring easy access for wiring and maintenance.
4. Proceed with the wiring of the power meter and CTs, following the wiring diagram corresponding to the site system layout. For a three-phase system with a 4-wire unbalanced load, connect the three current transformers (CTs) as specified. Ensure that the CT stickers are correctly oriented toward the measured current flow. If CT wires need to be shortened or extended, make sure they are properly connected to maintain signal integrity.

*The **main voltage** must not exceed **400V**, and the **CTs** must always have a 333mV output.*

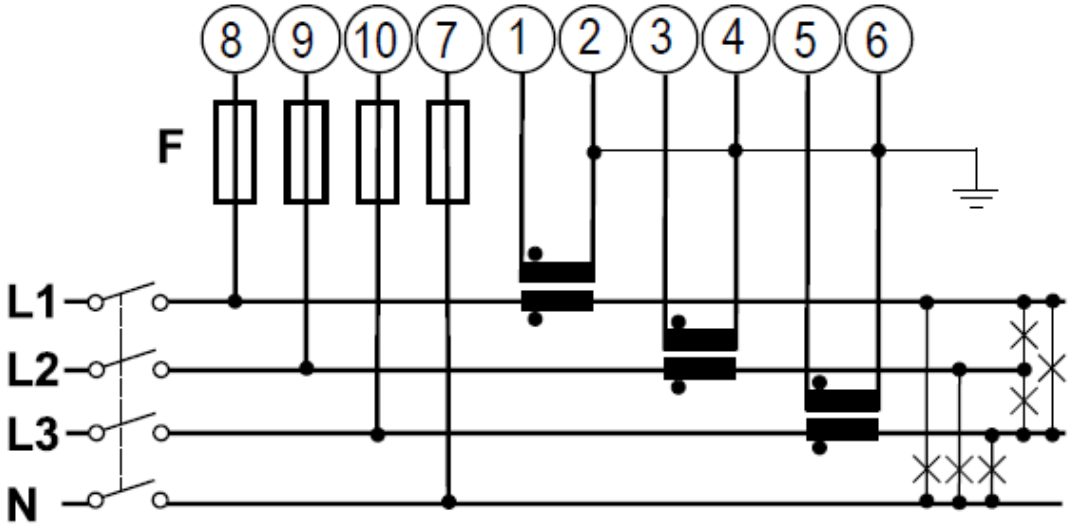


Fig. 14: Example of the EM210-72D.MV5.3.X.OS.X, Carlo Gavazzi connection diagram for a three-phase system of the system, 4 wires, unbalanced load and three current transformers (CT) and three voltage transformers (VT)

5. Proceed with the power supply wiring of the power meter as specified. The power supply should be 65-400V AC, 50Hz.

The power supply should be 65-400 V AC, 50 Hz

*The **auxiliary power supply** ensures that the meter remains powered, whether the plant is running on the **grid or gensets**. Power meters monitoring the **grid, load, or gensets** must always remain powered. If*

*any of these meters **turns off unexpectedly**, the **ePowerControl** will enter **fail-safe mode**, causing a **curtailment of PV production**.*

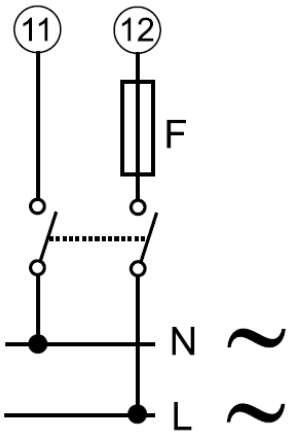


Fig. 15: Connecting the power supply to the EM210-72D.MV5.3.X.OS.X, Carlo Gavazzi

6. Once the wiring is complete, close the newly installed breakers. Within a few seconds, the power meter should turn on, and its screen will display the measurement page.

7. At this point, you can proceed with the parameter setup of the power meter.

When installing a EM210-72D.MV5.3.X.OS.X, Carlo Gavazzi the critical parameters to be set are listed below:

***SYStEM**, System type: To be set according to the site design.*

***SEnSOr** , CT type: To be set according to the CTs used with the power meter. As an example, when installing the power meter with Rogowski coil CTs, the type should be set to roG*

***Ct Prin**, Current transformer maximum current input: To be set according to the CTs used with the power meter. As an example, when installing the power meter with Rogowski coil 4000A, the type should be set to 4,00k.*

***Vt rAtIo**, Voltage transformer ratio: To be set according to the VTs used with the power meter. You can obtain this ratio by dividing the primary voltage by the secondary voltage. As an example, when installing the power meter using no VTs, the ratio should be set to 1.*

***APPLiC**, Measurement application: To be set to "E".*

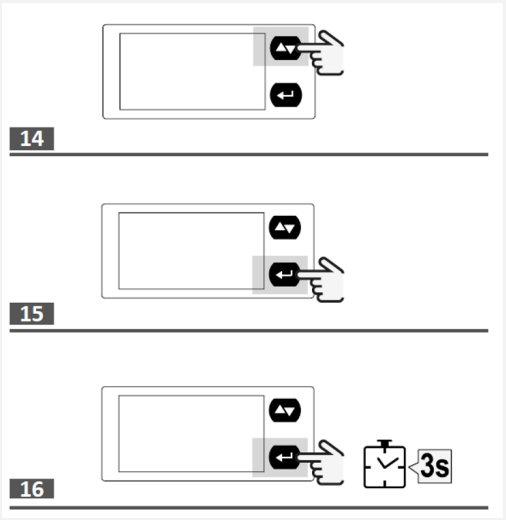
***AddrESS**, Modbus address: To be set according to your ID plan.*

*The **combined ratio of the current and voltage transformers must not exceed 1054**.*

*It is essential to set the **measurement application** to **"E"** for the **zero export control** feature. If this setting is incorrect, **Elum cannot guarantee the reliability of zero export control** and will not be responsible for any unintended energy export to the grid.*

*For instructions on **using the power meter** and **navigating through its menus**, refer to the manufacturer's guidelines.*

*When powered on, the **default measurement pages** will be displayed, each showing a **reference unit of measure**. If no interaction occurs, the **initial measurement page** will automatically reappear after **120 seconds of inactivity**.*



Controls (Fig. 14 – Fig. 16)

Navigation

Operation	Control
Display the next measurements page	**Fig. 14**
Open the Information menu	**Fig. 15**
Display the next information page	**Fig. 15**
Exit the information menu	**Fig. 14**
Enter the parameters menu	**Fig. 16**
Exit the parameters menu (the information menu will be displayed)	**Fig. 16** (page **End**)

Parameter setting

Operation	Control
Access the page to set a parameter	**Fig. 15**
Switch from increase mode (**C** icon) to decrease mode (**-C** icon)	**Fig. 15**
Increase the value of a parameter/display the next option (**C** icon)	**Fig. 14**
Decrease the value of a parameter/display the previous option (**-C** icon)	**Fig. 14**
Confirm a value	**Fig. 16**

NOTE: hold it pressed for at least 2.5 s.

8. To establish communication, connect the power meter to one of the serial ports of the Central Computing Unit (CCU) using a shielded twisted-pair RS485 connector and a Cat 5 cable.

Fig. 16: RS485 wiring diagram for connecting a single EM210-72D.MV5.3.X.OS.X, Carlo Gavazzi

Additional RS485 power meters must be connected in parallel (daisy-chained). The serial output should only be terminated on the last device in the network by connecting terminals B+ and T.

The total cable length must not exceed 1000 meters to ensure reliable communication.

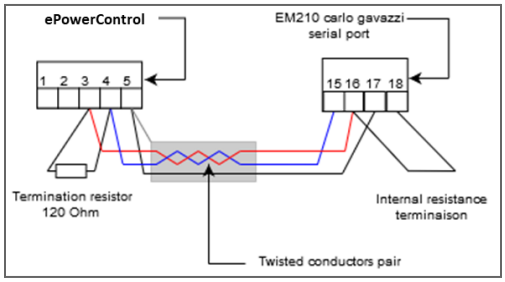


Fig. 17: RS485 wiring diagram for connecting multiple EM210-72D.MV5.3.X.OS.X, Carlo Gavazzi in parallel

*The **shielding continuity** must be maintained throughout the entire **communication cable**, with the **ground connected at a single point** to prevent interference.*

To facilitate maintenance, label the newly installed breakers as "power meter Disconnect" so you can easily locate them if the device needs to be power-cycled or turned off.

4. Step 4: Configuring non-Elum equipment

4.1. Configuring Solar Inverters

Some solar inverters may require RS485 control features to be activated. To configure a specific inverter, please refer to the manufacturer's instructions.

The Elum ePowerLog must communicate with solar inverters to collect data for monitoring purposes. To achieve this, the datalogger interacts with the inverters to:

- Collect active power output measurements
- Communicate maximum power output setpoints
- Retrieve additional measurement data useful for monitoring operations

Table 3 lists all the accessed variables.

Table 3: Solar inverter variable accessed

Elum Name	Description	Max Access
W	Total active power	Read Only
WphA	Active power phase A	Read Only
WphB	Active power phase B	Read Only
WphC	Active power phase C	Read Only
VAR	Total reactive power	Read Only
VARphA	Reactive power phase A	Read Only
VARphB	Reactive power phase B	Read Only
VARphC	Reactive power phase C	Read Only
VA	Total apparent power	Read Only
VAphA	Apparent power phase A	Read Only
VAphB	Apparent power phase B	Read Only
VAphC	Apparent power phase C	Read Only
Hz	Frequency	Read Only
AphA	Current phase A	Read Only
AphB	Current phase B	Read Only
AphC	Current phase C	Read Only

PhVphA	Line voltage phase A	Read Only
PhVphB	Line voltage phase B	Read Only
PhVphC	Line voltage phase C	Read Only
Status	Solar inverter status	Read Only
Operating Mode	Solar inverter operating modes	Read Only
Alarm	Solar inverter alarms	Read Only
WSet	Solar inverter maximum active power setpoint	Read / Write

Table 4: Requirement for solar inverter

RS1	Each inverter must allow Modbus RTU or TCP communication

4.2. Configuring Genset Controllers

To enable remote communication or activate reverse power protection on a genset controller, follow the manufacturer's instructions.

Elum ePowerLog must communicate with the genset or its controller to ensure safe operation and collect monitoring data. To perform this task, the datalogger gathers:

- Active power output measurements
- Additional accessible data needed for site monitoring

Table 5 lists all the accessed variable.

Table 5: Genset or genset controller variable accessed

Elum Name	Description	Max Access
W	Total active power	Read Only
WphA	Active power phase A	Read Only
WphB	Active power phase B	Read Only
WphC	Active power phase C	Read Only
VAR	Total reactive power	Read Only
VARphA	Reactive power phase A	Read Only

VARphB	Reactive power phase B	Read Only
VARphC	Reactive power phase C	Read Only
VA	Total apparent power	Read Only
VAphA	Apparent power phase A	Read Only
VAphB	Apparent power phase B	Read Only
VAphC	Apparent power phase C	Read Only
Hz	Frequency	Read Only
AphA	Current phase A	Read Only
AphB	Current phase B	Read Only
AphC	Current phase C	Read Only
PhVphA	Line voltage phase A	Read Only
PhVphB	Line voltage phase B	Read Only
PhVphC	Line voltage phase C	Read Only
Status	Genset status	Read Only
Operating Mode	Genset operating modes	Read Only
Alarm	Genset alarms	Read Only

Table 6: Requirement for genset or genset controller

RS1	The genset or the controller must allow Modbus RTU or TCP communication

4.3. Configuring Grid and Load Sensors

Elum ePowerLog must gather information from the Point of Connection (POC) between the site and the external power grid, as well as from the load. This data is collected using sensors that measure all required electrical parameters.

The datalogger communicates with the installed sensor to collect:

- Active power measurements
- Additional data for operational monitoring

By default, the power meters provided by Elum meet all these requirements and will be used unless specified otherwise.

Table 7 lists all the accessed variables.

Table 7: Grid sensor variable accessed

Elum Name	Description	Max Access
W	Total active power	Read Only
WphA	Active power phase A	Read Only
WphB	Active power phase B	Read Only
WphC	Active power phase C	Read Only
VAR	Total reactive power	Read Only
VARphA	Reactive power phase A	Read Only
VARphB	Reactive power phase B	Read Only
VARphC	Reactive power phase C	Read Only
VA	Total apparent power	Read Only
VAphA	Apparent power phase A	Read Only
VAphB	Apparent power phase B	Read Only
VAphC	Apparent power phase C	Read Only
Hz	Frequency	Read Only
AphA	Current phase A	Read Only
AphB	Current phase B	Read Only
AphC	Current phase C	Read Only
PhVphA	Line voltage phase A	Read Only
PhVphB	Line voltage phase B	Read Only
PhVphC	Line voltage phase C	Read Only

Table 8: Requirement for grid sensor

RS1	The sensor must allow Modbus RTU or TCP communication

5. Step 5: Installing the ePowerLog

5.1. Installation

Installation location
*The **ePowerLog** is designed for **indoor installations**. If an **outdoor installation** is required, a **special housing** must be specified when placing the order.*

Internet access
*A **stable internet connection** is required for the **autonomous deployment** of the **ePowerLog** and for **maintenance interventions** by **Elum engineers**. The enclosure should be installed in a location with **at least edge-level reception** if using a **wireless connection**, or with a **stable local network connection** if using a **wired connection**.*

5.1.1. Instructions for installing the ePowerLog when in casing

To wall mount the ePowerLog enclosure, follow these steps:

1. Remove the mounting plate by unscrewing the four nuts securing it inside the enclosure.
2. Mount the Base Station to the wall using the appropriate screws and wall plugs.
3. Reattach the mounting plate inside the enclosure.

5.1.2. Instructions for installing the ePowerLog when in kit

If delivered as a kit, all ePowerLog components must be installed on a DIN rail. To prevent the Central Computing Unit from overheating, ensure a 15 cm cooling space on each side of the unit.

5.2. Power Supply

To power the electrical enclosure, use the screw terminal block. The allowed voltage range is 100 to 240V AC, with a maximum current draw of 1.30A.

Power source

*The **power source** supplying the **controller** must be taken from the **load side** to ensure it remains powered in both **"On-grid" (Grid-connected mode)** and*

	"Off-grid" (Genset-connected mode)" *operations.* *If a* ***UPS*** *is used, its* ***power source*** *must also follow this same rule to guarantee continuous operation of the* ***controller*** *under all conditions.*

5.2.1. Instructions for connecting the power supply to ePowerLog when in Elum casing

1. The power connectors are pre-wired to a single screw terminal block on the left side of the DIN rail.

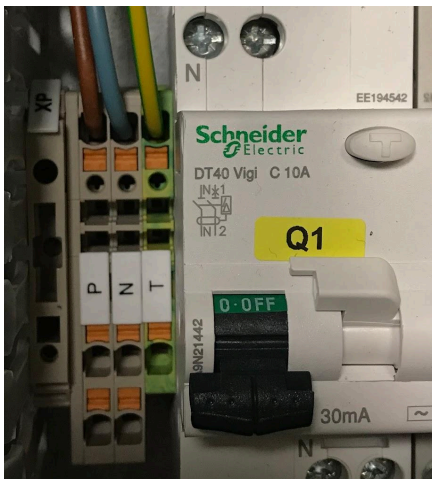


Fig. 18: Terminal block and circuit breaker overview

2. Connect the phase wire to the red/brown wire.
3. Connect the neutral wire to the blue wire.
4. Connect the ground wire to the green/yellow wire.
5. If a UPS is included with the ePowerLog, connect the battery red/black wire to the transformer.
6. Engage the circuit breaker to supply power.
7. Verify that the Power LED on the Central Computing Unit is on, confirming proper power connection.

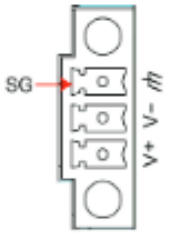
5.2.2. Instructions for connecting the power supply to ePowerLog when in kit

a) DL 500 and DL 1000

Table 2: ePowerLog Power Supply Parameters

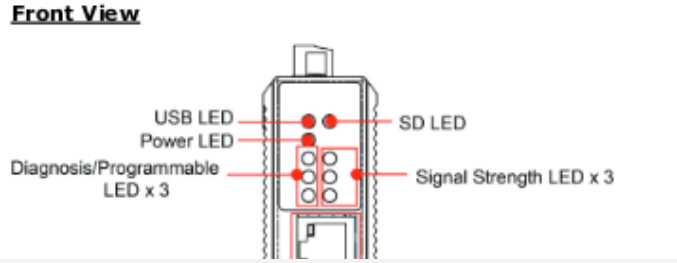
Input Voltage	12 to 24 VDC
Input Current	480 mA @ 12 VDC 225 mA @24 VDC
Power Consumption	5,4 W

1. To power the Central Computing Unit (CCU), connect the "terminal block to power jack converter" (included in the package) to the DC terminal block located on the top panel of the unit. Then, connect the power adapter. The system will take approximately 30 seconds to boot up.



2. Proper grounding and wire routing help reduce electromagnetic interference (EMI) and ensure stable operation. The shielded ground contact (also known as protected ground) is the top contact of the 3-pin power terminal block connector. Connect the shielded ground wire to a properly grounded metal surface to enhance protection and minimize interference.

*When the **ePowerLog** is turned on, **all LEDs** will illuminate for **1 second**, then turn **off for 60 seconds** while the **Internet connection and system services** initialize.*



On the left side, LEDs for diagnosis:

- ***Green light (independent from orange and red lights):***
- ***ON:** The **local data retrieval system** is functioning properly.*
- ***OFF:** The retrieval system and/or local database are **inactive**.*

- ***Orange light ON, Red light OFF:***
- *The **connection to the Elum server** is **active**.*

- ***Red light ON, Orange light OFF:***
- *The **connection to the Elum server** is **inactive**.*

- ***Red light BLINKING:***
- *The **local data retrieval system is functioning**, but the **connection to the Elum server** is **not active**.*

On the right side, LEDs for network :

- ***Red light BLINKING:***
- ***No internet connection detected**.*

- ***Green light ON, Other Lights OFF:***
- ***Internet access via Ethernet** : Connection **OK**.*

- ***Red light ON, Other Lights OFF:***
- ***Internet access via 3G, 4G, or GSM** with **poor reception (< 25%)**.*

- ***Red and Orange lights ON, Green OFF:***
- ***Internet access via 3G, 4G, or GSM** with **moderate reception (25-50%)**.*

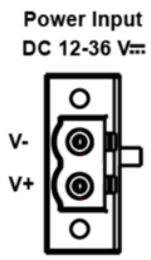
- ***Red, Orange, and Green lights ON:***
- ***Internet access via 3G, 4G, or GSM** with **good reception (> 50%)**.*

b) DL 3000 and DL 10 000

Table 9: ePowerControl Power Supply Parameters

Input voltage	12 to 24 VDC
Input Current	480 mA @ 12 VDC 225 mA @24 VDC
Power Consumption	5,4 W

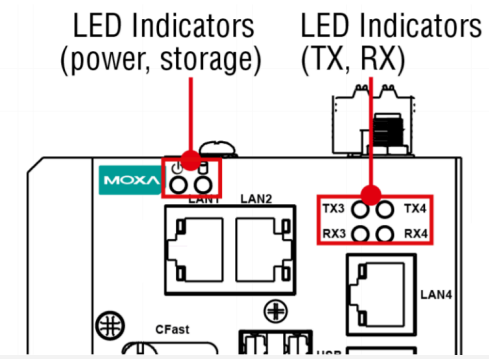
1. To power the Central Computing Unit (CCU), connect the “terminal block to power jack converter” (included in the package) to the DC
terminal block located on the top panel of the unit.



Then, connect the power adapter. The system will take approximately 30 seconds to boot up.

2. Proper grounding and wire routing help reduce electromagnetic interference (EMI) and ensure stable operation. The shielded ground contact (also known as protected ground) is the top contact of the 3-pin power terminal block connector. Connect the shielded ground wire to a properly grounded metal surface to enhance protection and minimize interference.

*When the **ePowerControl** is turned on, **all LEDs** will illuminate for **1 second**, then turn **off for 60 seconds** while the **Internet connection and system services** initialize.*



The central processing unit within the ePowerControl controller is equipped with multiple LED indicators that offer a quick overview of the system's status. Their meanings are detailed in the table below.

LED Name	Status	Function
Power	Green	Power is on and computer is function normally.
	Off	Power is off.
Storage 1 (CFast)	Yellow	Blinking: Data is being transmitted.
	Off	No data transmission.
Storage 2 (SD) (MC-1111 and MC-1121 Series only)	Yellow	Blinking: Data is being transmitted.
	Off	No data transmission.
LAN 1/2/3/4 (LAN 3/4 is available only on the MC-1121 and MC-1122 Series)	Green	100 Mbps Ethernet link. Blinking: Data is being transmitted.
	Yellow	1000 Mbps Ethernet link. Blinking: Data is being transmitted.
	Off	10 Mbps Ethernet link or LAN is not connected.
Tx 1/2/3/4	Green	Blinking: Data is being transmitted.
	Off	Not connected.
Rx 1/2/3/4	Yellow	Blinking: Data is being transmitted.
	Off	Not connected.

6. Step 6: Configuring the ePowerLog on eConf

6.1. Before proceeding to the commissioning

6.1.1. Required Materials

To configure internet access, you will need:

- A **computer** with an **Ethernet port**
- An **Ethernet cable**
- If your computer **does not have a LAN port**, use a **USB-to-Ethernet** or **Type-C-to-Ethernet adapter**.

6.1.2. Prerequisite

Before commissioning your system, Elum may require a firmware update to ensure access to the latest version of eConf with the most recent communication drivers. Keeping the drivers updated is essential for reliable communication tests and for conducting wiring reviews and ePowerLog configuration autonomously.

6.2. Accessing eConf

1. To access eConf interface, connect your laptop to LAN2 (for DL 500 and DL 1000) or LAN4 (for DL 3000 and DL 10 000) of the Central Computing Unit (CCU).

Ensure that the CCU is powered on (check the Power LED).

2. Then, open a web browser and enter 192.168.4.127 in the URL bar to access the configuration settings.

*To access **eConf** local web page, ensure that your computer's **Ethernet port is configured in DHCP mode**.*

6.3. Configuring your password

On the login page, set an access password, which will be required each time you connect to the ePowerLog and access the configuration platform "eConf". Once the password is set, click "Begin Setup" to proceed.

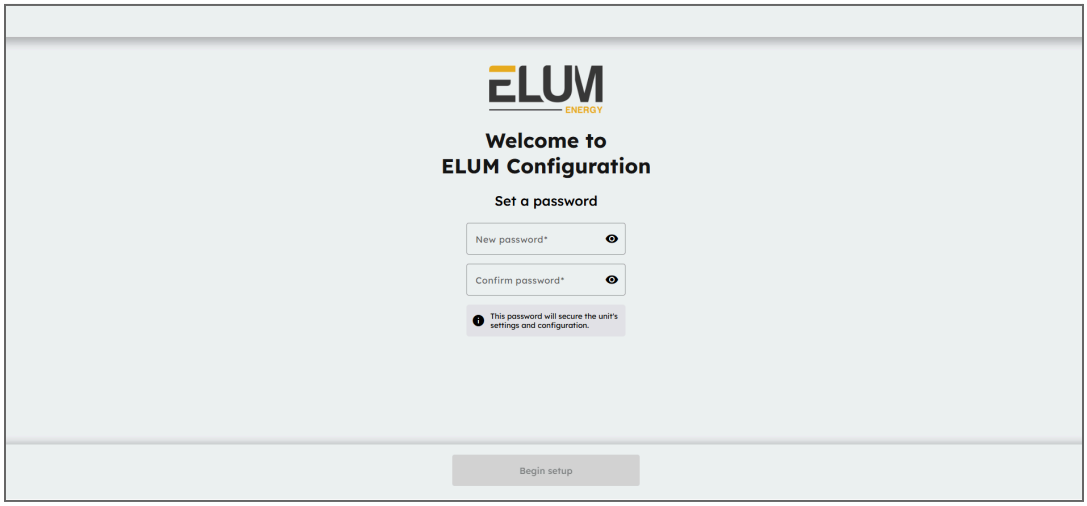


Fig. 19: eConf password panel

6.4. Checking and installing Software Updates

After setting up the password, the system will automatically check for available software updates and display them. However, you can also manually check for updates by clicking on "Check for updates".

If an update is available, it will appear in the "Available updates" section. To proceed with the update, click the "Install" button. The update process will then begin, ensuring your system runs the most recent version of ExplorerOS.

It is recommended to install the latest available update to ensure optimal performance and compatibility.

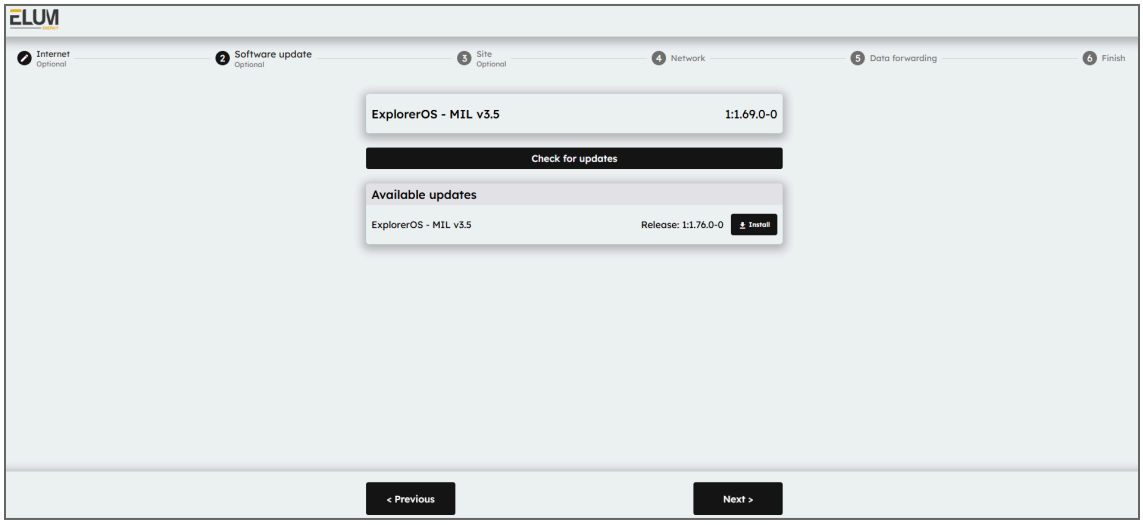


Fig. 20: Software Update panel

6.5. Configuring site settings (optional)

Enter the name and GPS coordinates of the site associated with the ePowerLog data logger.

*The information provided in this panel will be used to **configure the ePowerMonitor dashboard**. Access to **ePowerMonitor** requires a **subscription** to the platform.*

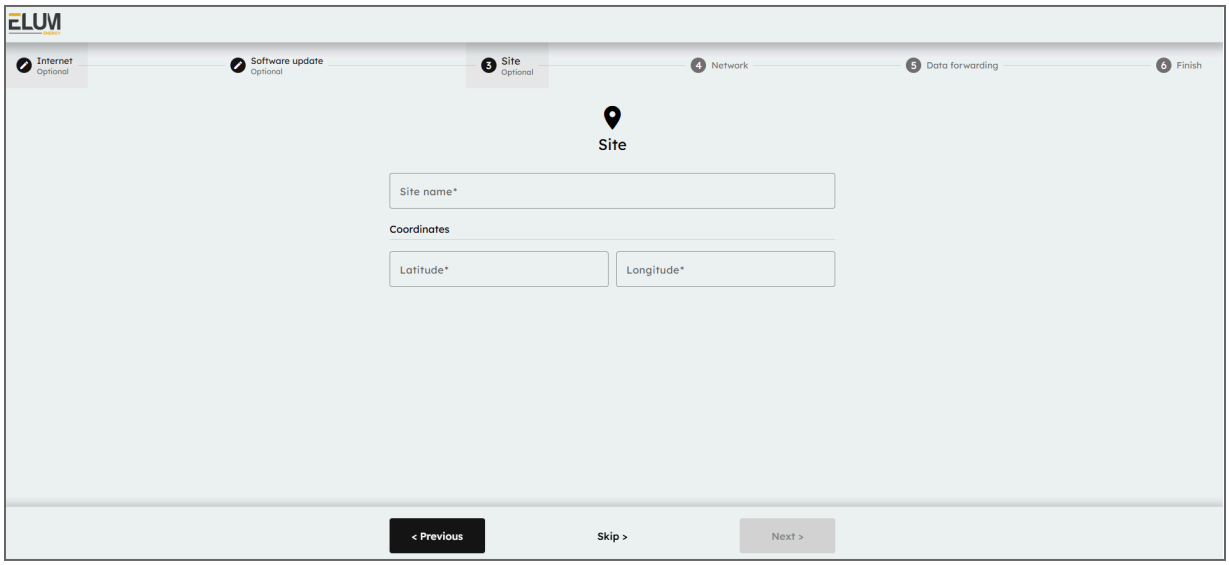


Fig. 21: eConf Site setting panel

6.6. Configuring internet access (optional)

After setting up the site settings, you will need to configure the network settings for internet access and device communication.

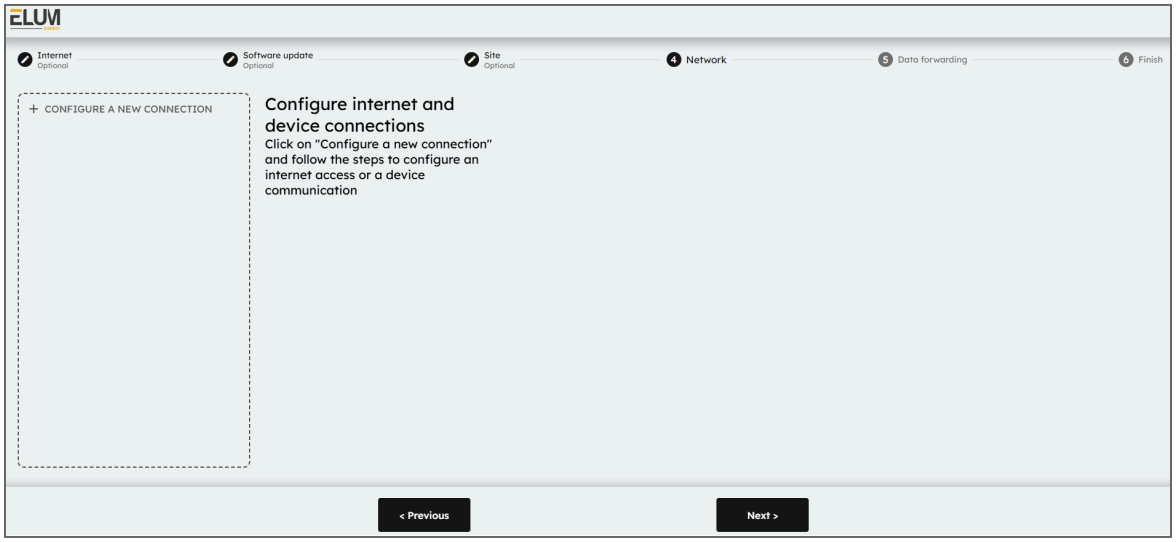


Fig. 22: eConf Network panel

6.6.1. Configuring a wired internet connection

*The **LAN connection** that allows the **ePowerLog** to access the internet via a **wired connection** must always be made through **LAN port 1 for DL 500 and DL 1000 or LAN port 1, 2 or 3 for DL 3000 and DL 10000** of the **Central Computing Unit (CCU)**. If additional **LAN ports** are needed, a **network switch** can be connected to the **LAN port.***

*To properly configure the **internet connection**, coordination with the **IT team** is essential. The following **outgoing IPv4 network accesses** must be allowed for the datalogger to communicate with the **Elum backend servers**:*

- ***ICMP (Ping Protocol)***
- ***TCP Ports:** 53, 80, 443, 4505, 4506*
- ***UDP Ports:** 53, 123, 1195*

*Additionally, before installation, request the **network configuration details** that should be applied to the **ePowerLog** to ensure proper connectivity.*

No optional module is required to establish a wired internet connection between the ePowerLog and the internet.

1. Click on "+ Configure a new connection" and select "Internet access", then choose "Wired Access - LAN1".

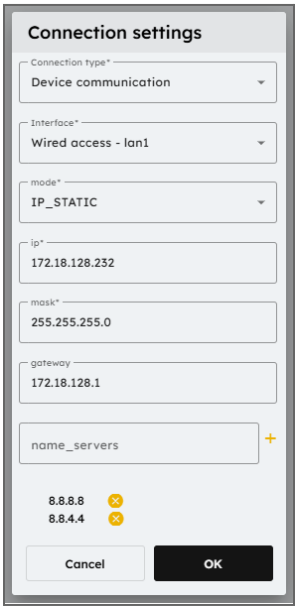


Fig. 23: Internet access configuration through wired connection configuration

2. Enter the appropriate connection parameters based on your network settings and press OK.
3. Click the "Test" button to verify the connection. 

6.6.2. Configuring a cellular internet connection

*The **GSM/3G module** is **pre-installed** in the **Central Computing Unit (CCU)**. However, you will need a **SIM card** with a valid **data subscription** to enable connectivity*

*The **ePowerLog must be turned off** before **inserting or removing** the SIM card.*
*If you need to **change the SIM card**, an **empty start** (powering on without a SIM card before inserting the new one) must be performed.*

a) DL 500 and DL 1000

For these steps, the Central Computing Unit must NOT be powered on.

1. Connect the two wireless antennas to the dedicated connectors on the front panel of the CCU.

The antenna connectors are located on the front

Panel of the Central Computing Unit

2. Insert the SIM card into the SIM card slot, located next to ports W1 and W2 for antennas.

To access the SIM card slot, use a screwdriver to open the cover.

*Insert the SIM card directly into the slot **until you hear a "click"**, indicating it is securely in place.*

3. Power ON the Central Computing Unit (CCU).

*Upon startup, **all LEDs will turn ON for 1 second, then turn OFF for 60 seconds** while the system initializes.*

4. Wait approximately 1 minute for the startup process to complete.

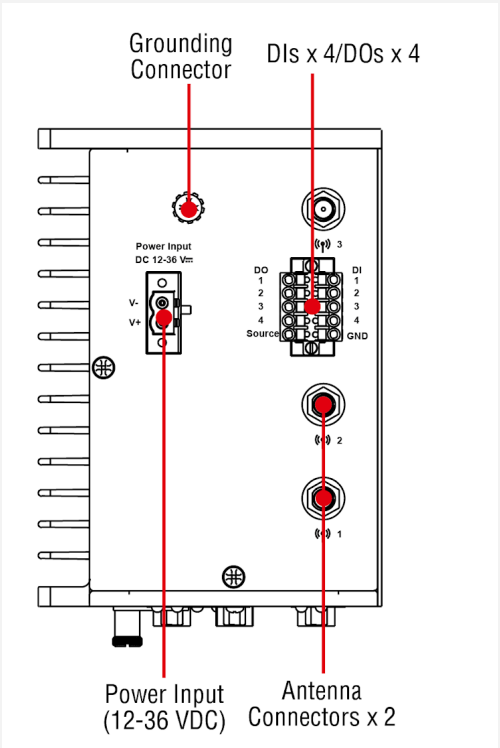
5. In the Network Configuration Panel, click "+ Configure a new connection" and select "Internet access", then choose "3G Access - Built-in".

6. Enter the appropriate connection parameters for your network and press OK.
7. Test the connection by clicking the “Test” button. 

b) DL 3000 and DL 10000

1. Connect the two wireless antennas to the dedicated connectors on the front panel of the CCU.

The antenna connectors are located on the front Panel of the Central Computing Unit



2. Insert the SIM card into the SIM card slot.

To access the SIM card slot, use a screwdriver to open the cover.

*Insert the SIM card directly into the slot **until you hear a “click”**, indicating it is securely in place.*

3. Power ON the Central Computing Unit (CCU).

Upon startup, ***all LEDs will turn ON for 1 second, then turn OFF for 60 seconds*** *while the system initializes.*

4. Wait approximately 1 minute for the startup process to complete.

5. In the Network Configuration Panel, click “+ Configure a new connection” and select “Internet access”, then choose “3G Access - Built-in”.
6. Enter the appropriate connection parameters for your network and press OK.
7. Test the connection by clicking the “Test” button.

Fig. 24: Internet access configuration through 3G access

To obtain your **SIM card PIN number**, **APN address**, and **required credentials**, please refer to the **documentation provided by your service provider**. These details are necessary to configure the **GSM/3G connection** on the **ePowerLog**.

6.7. Configuring ports and devices

Once the wiring and internet configuration is complete, you can proceed with setting up communication between the ePowerLog and connected devices.

From eConf you have to configure each connection corresponding to each of the ports of the Central Computing Unit which are used.

1. Click “+ Configure a new connection” and select “Device communication”, then choose the appropriate interface.

Fig. 30: Connection settings when adding a device (1/2)

Only **unused interfaces** will be available in the **drop-down list**. If a port has already been configured, you can **edit its settings** directly.

2. Apply the correct connection settings based on the device requirements.

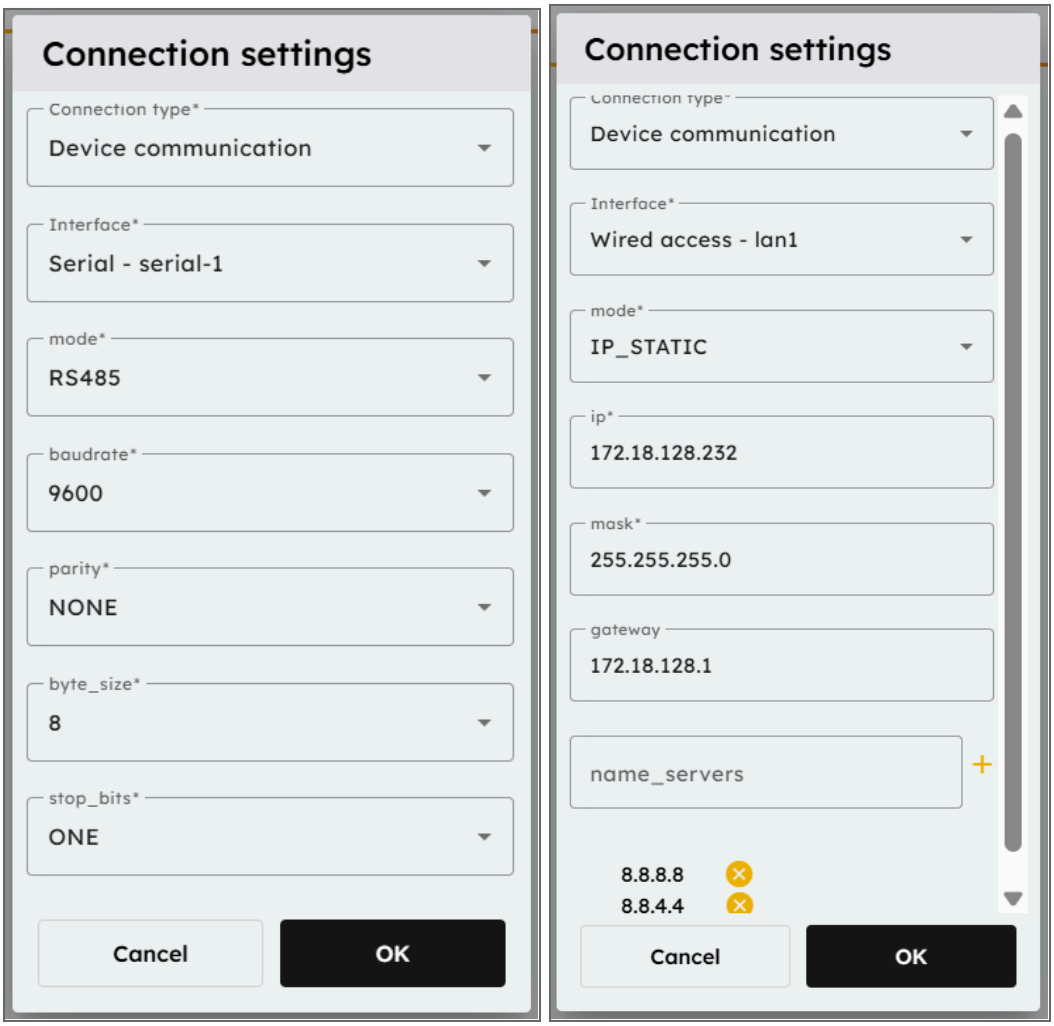


Fig. 31: Connection settings when adding a device (2/2)

3. Once the connection is configured, add each device one by one by clicking "+ Add device".
4. Apply the correct parameters for each device to ensure proper communication.

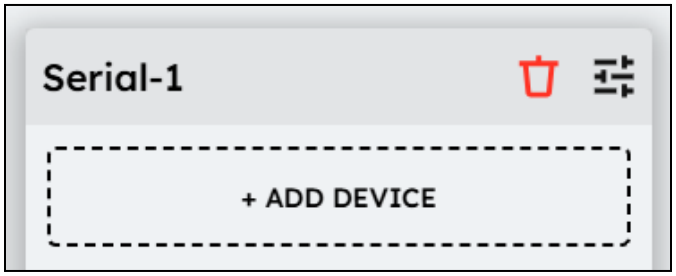


Fig. 32: Associating a device to a communication port (1/2)

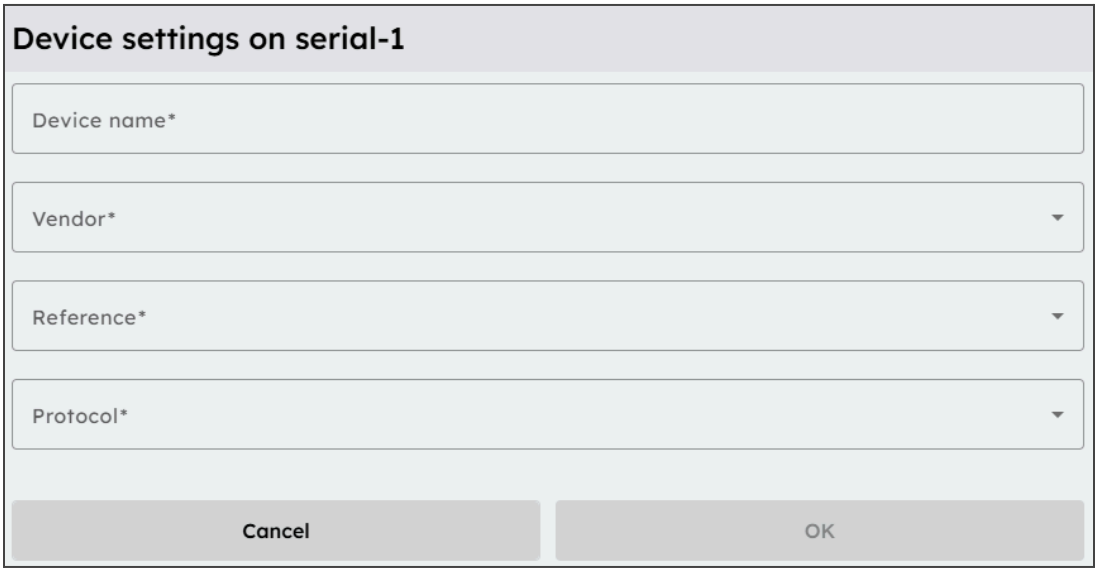


Fig. 33: Associating a device to a communication port (2/2)

Communication parameters

Modbus RTU:

- **Slave ID** : Unique identifier for the device.
- **Response Timeout** (default: **0.5s**) : Maximum waiting time before receiving the **first byte** of the response.
- **Byte Timeout** (default: **0.1s**) : Maximum waiting time between subsequent bytes in the response.

Modbus TCP:

- **IP Address** : The device's network address.
- **Port** (default: **502**) : The communication port used for Modbus TCP.
- **Slave ID** : Unique identifier for the device.
- **Response Timeout** (default: **0.5s**) : Maximum waiting time before receiving the **first byte** of the response.
- **Byte Timeout** (default: **0.1s**) : Maximum waiting time between subsequent bytes in the response

SNMP:

- **IP Address** : The device's network address.
- **Community** : The SNMP community string for authentication.
- **Port** (default: **161**) : The communication port for SNMP.
- **Transport** (default: **UDP**) : The protocol used for SNMP communication.
- **Timeout** (default: **0.5s**) : Maximum waiting time before receiving a response.

5. To test all devices linked to a specific connection port on the Central Computing Unit (CCU), click on "Test" in the connection settings. 

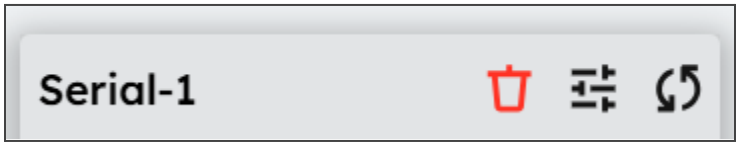


Fig. 34: Testing the connection with all the devices associated to a communication port

To test a single device independently, click on the three dots next to the device name, then select “Test”.

Fig. 35: Testing the connection with a single device associated to a communication port.

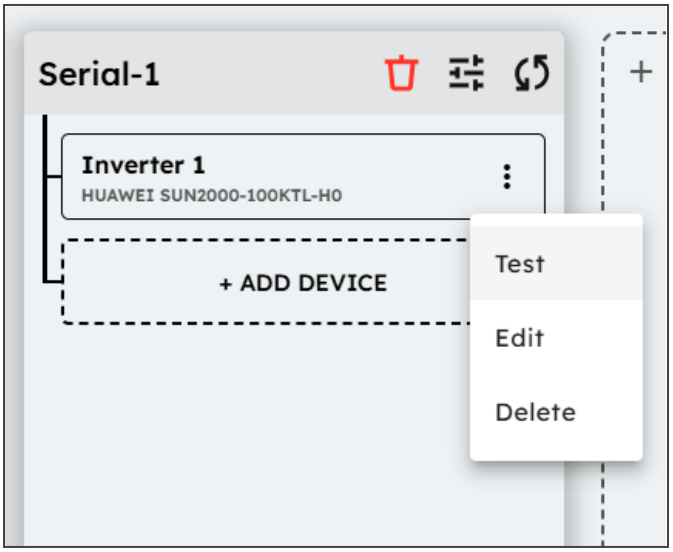


Fig. 36: Testing the connection with a specific device (1/2)

Fig. 37: Testing the connection with a specific device (2/2)

When you run a connection test from eConf interface, the ePowerLog sends a read request to the connected equipment.

- If the test is successful, the device status will be displayed as “Connected”.
- If the test fails, the device status will be shown as “Disconnected”.

Driver error
If the test returns a **“Driver error”**, it means the device is **“Connected”**, but the driver needs to be **updated remotely** by **Elum**. In this case, please notify the **Elum Deployment Team** for assistance.

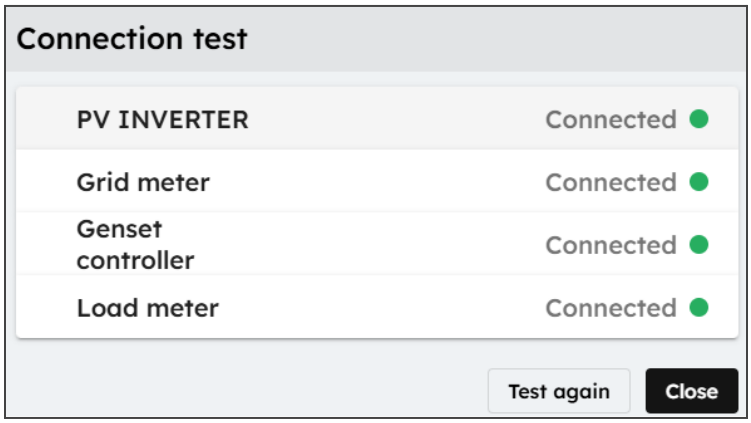


Fig. 38: Testing devices

6. Once all ports and devices have been correctly configured and all connection tests have been successful, click “Continue” to proceed.

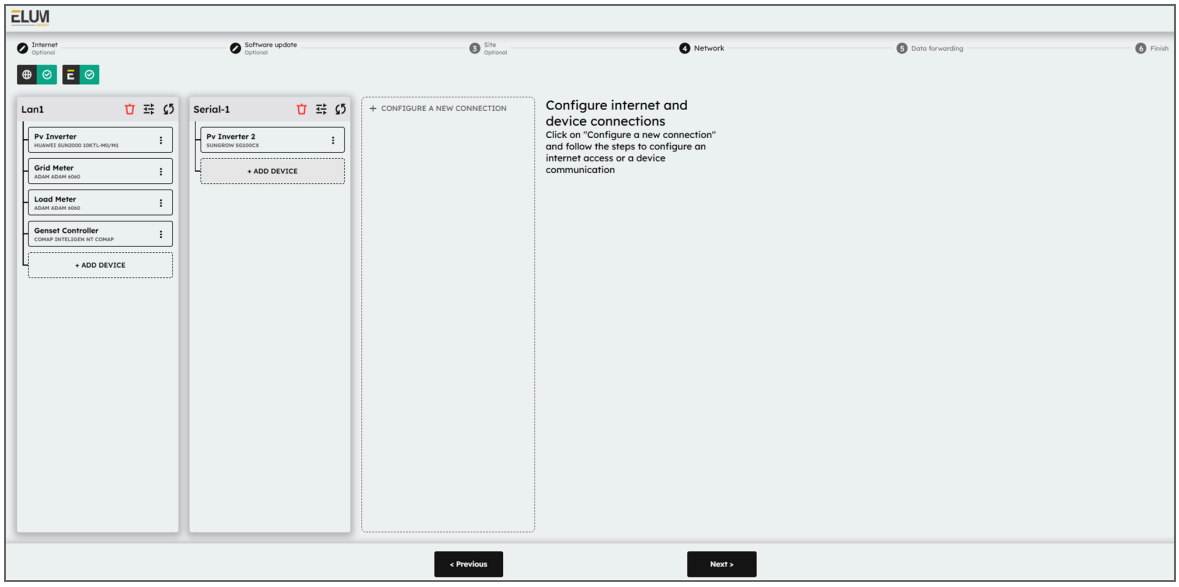


Fig. 39: Network panel

6.8. Configuring data forwarding (optional)

Elum Energy offers an optional data export feature, allowing data to be forwarded to third-party platforms or USB devices. If you do not need to export data to any platform other than ePowerMonitor or to a USB device, click “Skip” to move to the next configuration section.

Available Data Export options:

- **FTP Push to Energysoft :** Exports data to the Energysoft monitoring platform using the S4E PowerAPI data format.
- **FTP Push to Other Servers :** Sends data to any internal or external server supporting the FTP protocol, using the Elum Energy data format.
- **Meteocontrol Export :** Enables data export to the Meteocontrol platform. The serial number of the datalogger must be registered on the Meteocontrol interface for data export to be enabled. Users can configure:
- **USB Export :** Saves data directly to a USB device for local storage.

For more details about the Elum Data Export feature and supported data formats, contact Elum support at support@elum-energy.com.

*If needed, all **export methods** can be **activated simultaneously**.*

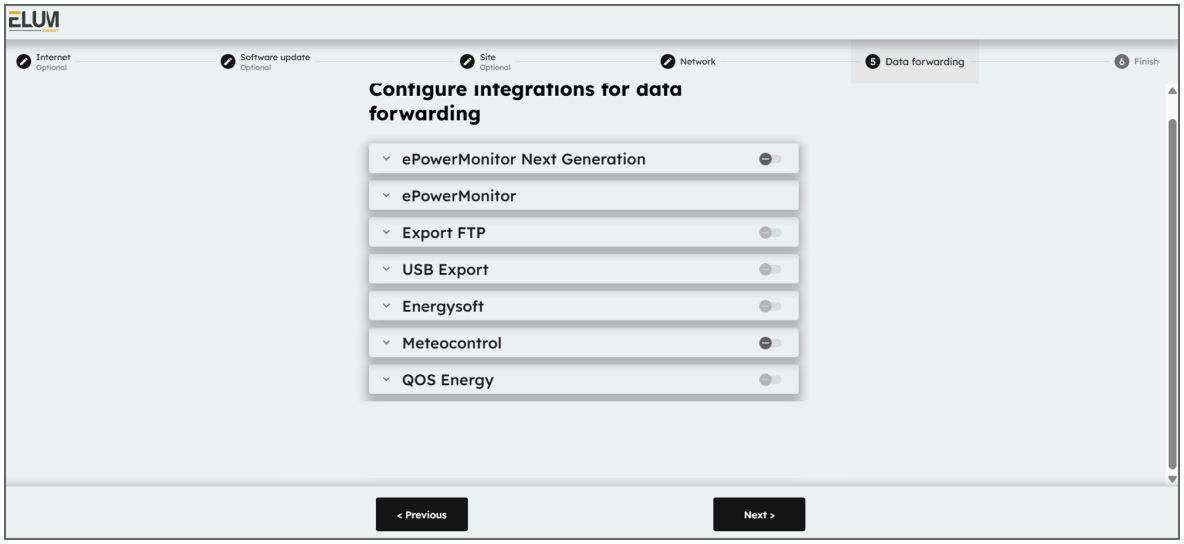


Fig 25: Data forwarding configuration panel

Start by selecting an export method from the available options. Once chosen, you will be prompted to enter additional details required to configure the data forwarding settings.

6.8.1. Export FTP

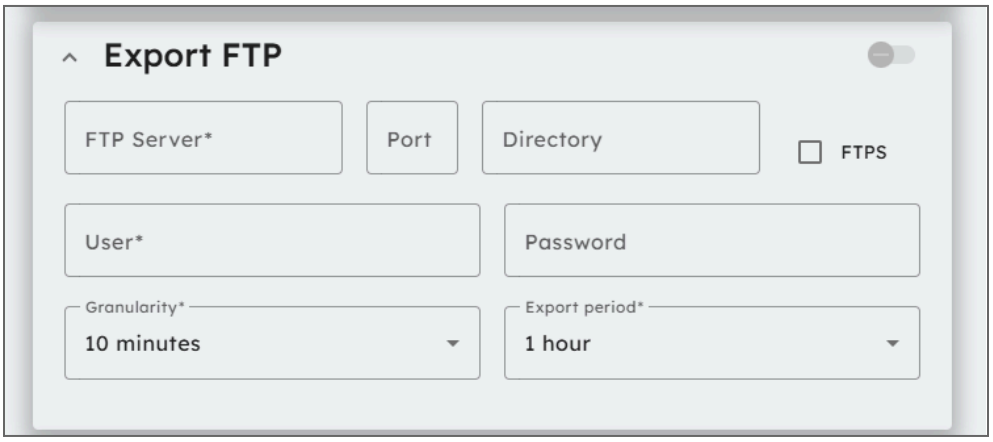


Fig. 26: FTP export configuration

- Enter the FTP server details, including the server address, port, and directory, where you want to forward your data.
- Provide your user credentials (Username and Password) to authenticate access to the specified FTP server.
- Set the data granularity, which determines how frequently data points are recorded before being forwarded. This can range from 5 minutes to 1 day.
- Specify the export period, which defines how often the collected data is sent to the FTP server. This setting is independent of granularity and can range from 10 minutes to 1 day.
- Enable FTPS (via the checkbox) if you require a secure connection using FTP over SSL/TLS to enhance data encryption and security during transmission.

6.8.2. EnergySoft

The Energysoft export method operates using the FTP protocol, similar to Elum's standard FTP push service, with the only difference being the export file format. Therefore, the same FTP forwarding settings apply to both methods.

For further information see previous section Export FTP.

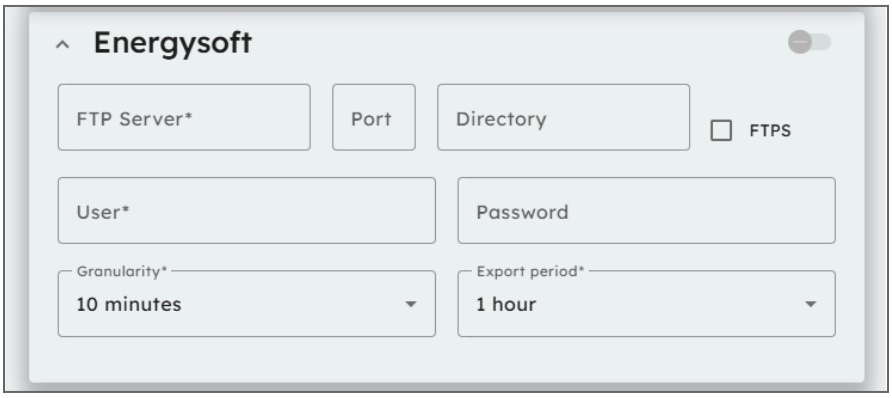


Fig. 27: Energysoft export configuration

6.8.3. Meteocontrol Export

The Meteocontrol export option enables the ePowerLog to forward data to the Meteocontrol platform for monitoring and analysis. To activate this feature, the serial number displayed on the eConf platform must be registered on the Meteocontrol interface.

Configuration parameters :

- **Serial number:** The unique identifier generated by eConf, which must be registered in the Meteocontrol platform to activate data export.
- **Granularity:** Defines how often data is collected before being forwarded. This can be set between 5 minutes and 1 hour.
- **Export period:** Determines how often the collected data is sent to Meteocontrol, with options ranging from 10 minutes to 1 day.

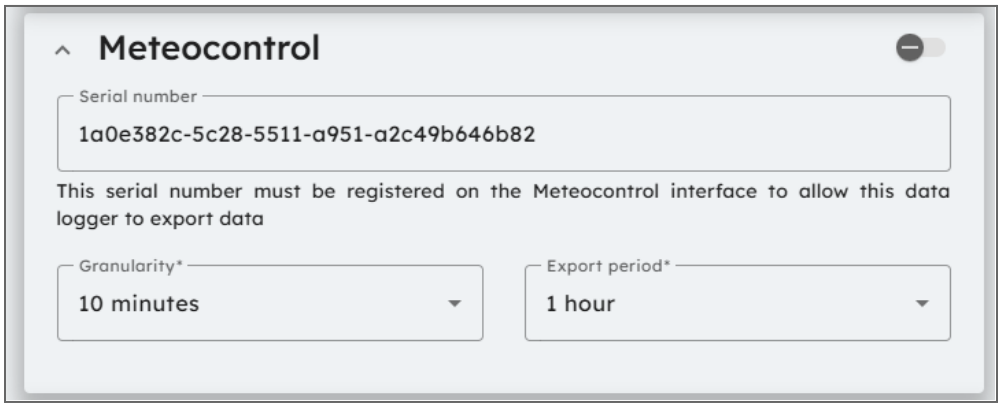


Fig. 28: Meteocontrol export configuration

6.8.4. USB Export

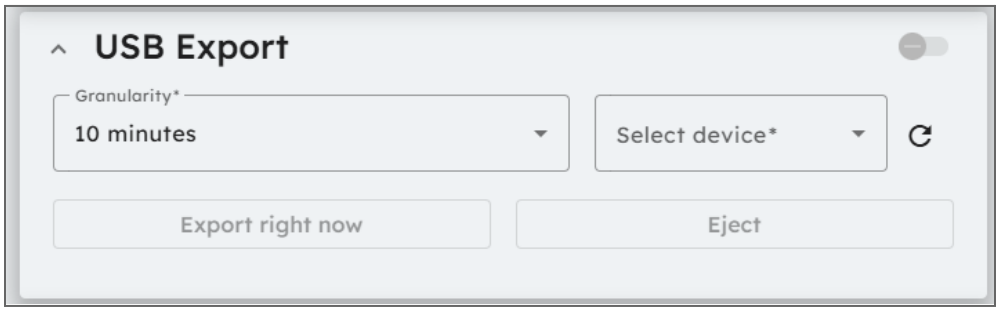


Fig. 29: USB export configuration

When a USB device is plugged into the Elum Explorer USB port, it will appear in the device selection list within the USB export configuration panel. Select the USB device where you want to forward your data.

Configuration parameters :

- Granularity: Defines how often data is collected before being saved to the USB device..
- Export Period: The export period is fixed at 24 hours, with all data being exported once per day at 00:00 UTC.

Manual data export & Ejecting USB device

- By clicking “Export right now”, the data from the current export period will be immediately saved to the USB device.
- It is highly recommended to use “Export right now” just before ejecting your USB device to ensure all collected data is saved.
- To safely remove your USB device, click “Eject” before physically unplugging it.
- Failure to eject the USB device properly may result in data loss or permanent damage to the USB storage.

*To prevent **damage to your USB device** and **avoid irreversible data loss**, always **eject the USB device** before physically removing it from the **Elum Explorer USB port**.*

6.9. Starting the EMS

1. Confirm that you want to complete the setup by clicking on "Finish Setup".

The data entered during the setup process can be modified later through eConf platform.

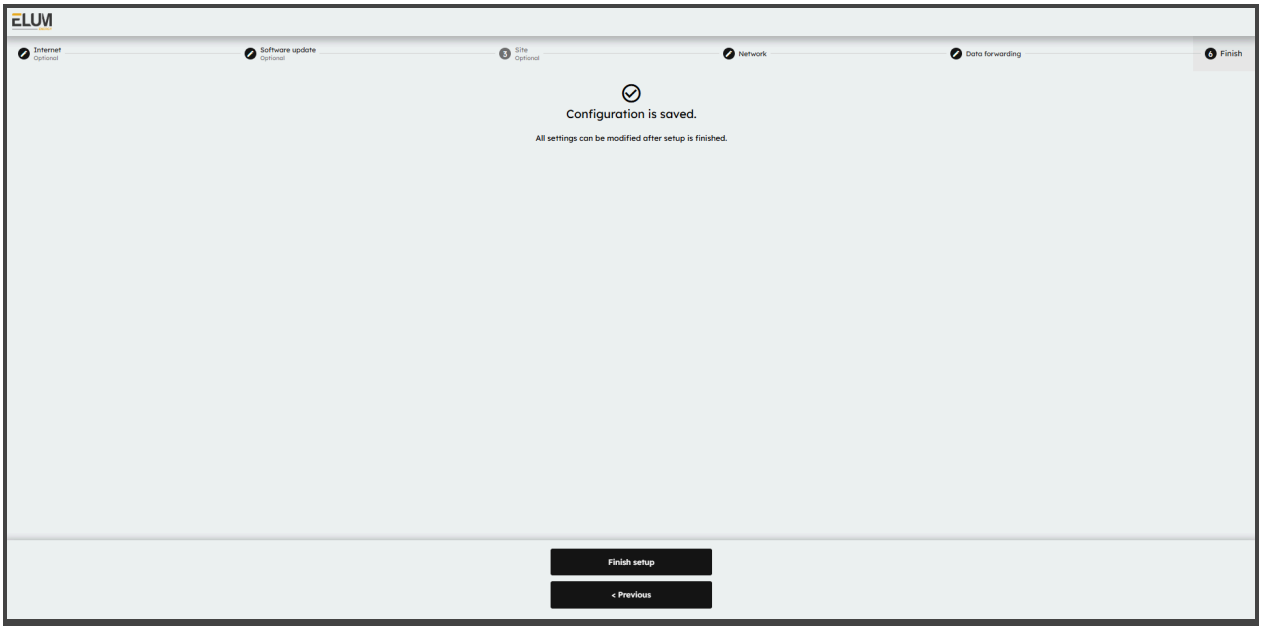


Fig. 40: Finish setup and access the homepage of eConf

2. Once you click on the "Finish Setup" button, you will be redirected to the Overview page of eConf platform for ePowerLog.

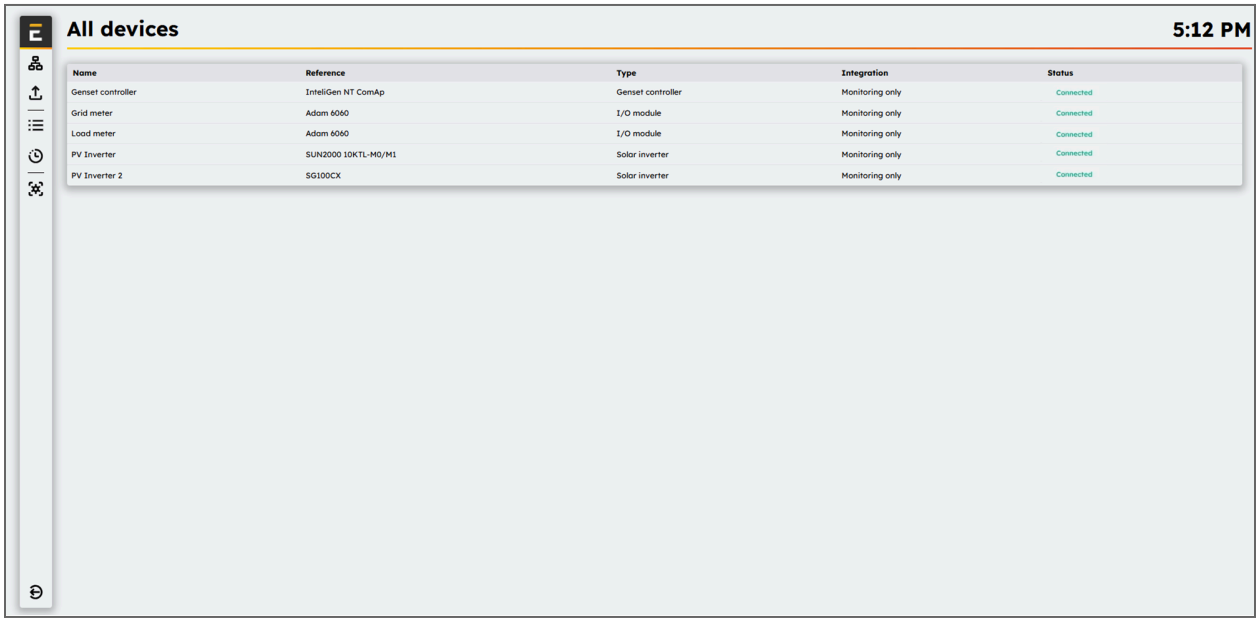


Fig. 41: Overview tab of eConf

7. eConf navigation after the commissioning

7.1. Accessing eConf

After deploying the ePowerLog, the eConf interface remains accessible at any time for further adjustments or diagnostics.

To access the interface:

1. Connect your laptop to LAN2 (for DL 500 and DL 1000) or LAN4 (for DL 3000 and DL 10000) of the Central Computing Unit (CCU).
2. Open a web browser and enter 192.168.4.127 in the URL bar.

7.2. User interface : eConf

7.2.1. General information

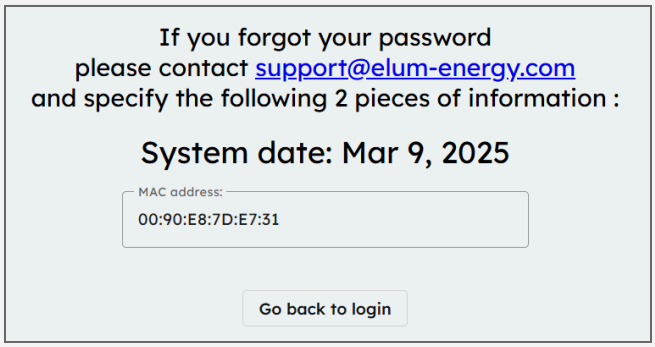
The main purposes of eConf are:

- To configure the site : Set up network parameters, connected devices, and system settings.
- To define the control rules : Establish operational rules for managing site behavior.
- To monitor the logs : Track system logs, events, setpoints, and errors.
- To monitor the behavior of the site : Observe real-time data and performance of all connected devices

Forgot password?

If the User password is forgotten, Elum can generate a backup password upon request.

This backup password will be valid for 24 hours and can be used to log in and set a new password from the Password panel in eConf.



7.2.2. Supported language

eConf interface supports the following languages:

- English
- French

The language selection is automatically determined by the browser's language settings.

In solutions that include a screen, it may not always be possible to change the browser's language. If this issue occurs, please **contact Elum Support** for guidance and assistance.

7.2.3. Overview

The Overview panel is the main interface for ePowerLog operators, providing a real-time summary of the plant's status. It includes:

- Power Monitoring : Shows the active and reactive power of each connected unit.
- Maintenance status : Displays the number of devices currently under maintenance.

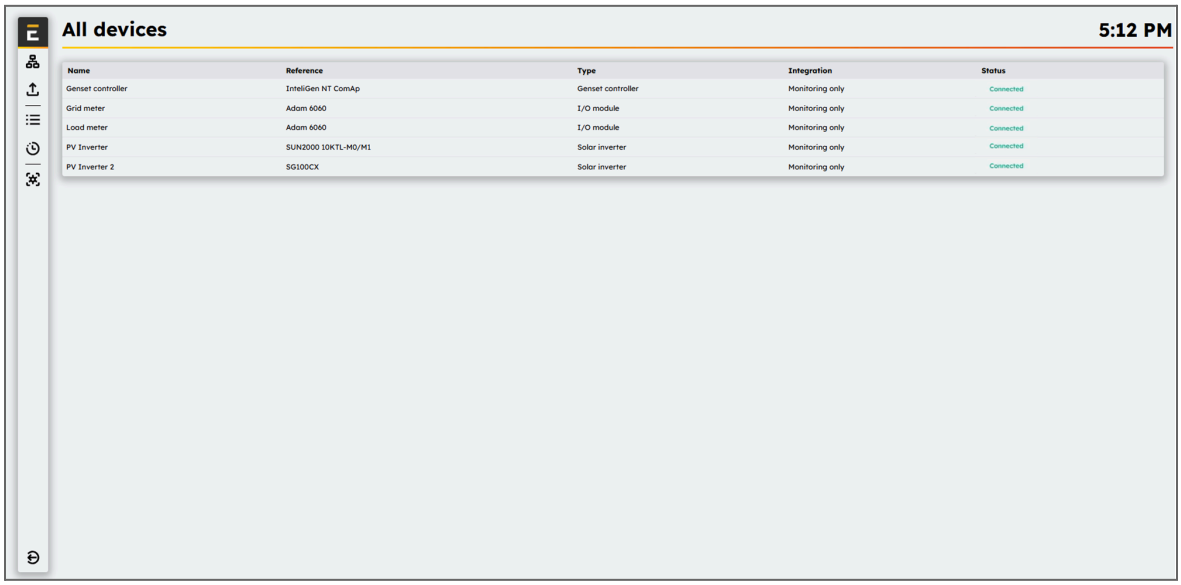


Fig. 42: Overview tab of eConf

You can navigate through eConf interface using the left-side menu, which provides access to different configuration and monitoring panels.

Available panels in the Left-Side Menu:

- **Elum Logo :** Clicking on the logo will return you to the homepage of the interface.
- **“Network” panel** : Used to configure LAN connections, serial connections for devices, and internet connectivity.
- **“Data Forwarding” panel** : Provides access to data export options, enabling configuration for exporting data to third-party platforms or USB storage.
- **“All Devices” panel** : Displays the status of all devices connected to the ePowerLog and provides access to individual device data acquisition.
- **“Logs History” panel** : Allows access to the history of logs, setpoints, and errors for system diagnostics and analysis.
- **“System Settings” panel** : Enables modification of various system settings and parameters, allowing customization of the ePowerLog configuration

A User can log out at any time by clicking on the logout button located in the bottom left corner of the eConf.

7.3. Network panel

The **"Network"** panel provides access to network settings, allowing users to configure and manage network interfaces.

Within the network menu, users can:

- Create or configure network interfaces (Serial or LAN)
- Add devices to a configured interface

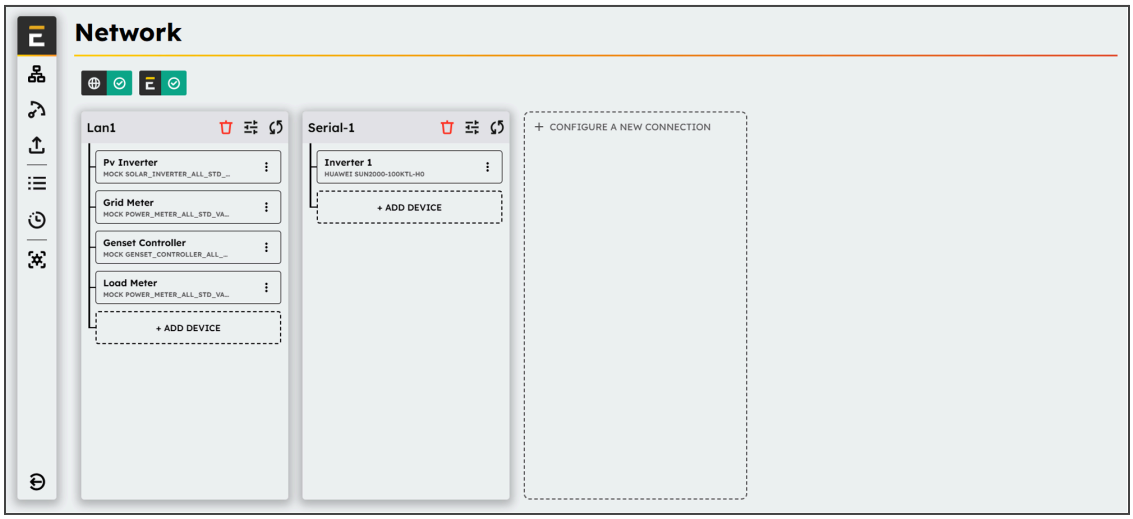


Fig. 43: eConf Network panel

7.4. Data Forwarding

Data forwarding manages all specific data exchange methods between the EMS and third-party solutions that do not use the Modbus gateway for data transfer. The Data Forwarding panel allows you to modify the data forwarding settings that were initially configured during commissioning.

Available data forwarding interfaces

- ePowerMonitor
- ePowerMonitor Next Gen
- Export FTP
- Export USB
- Energysoft
- QOS Energy
- Meteocontrol

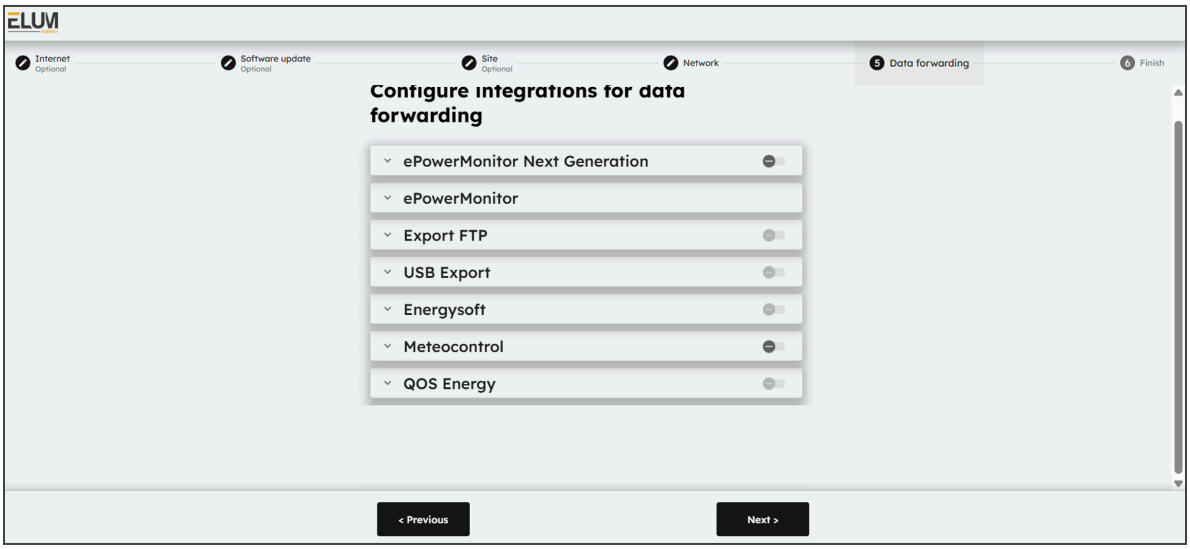


Fig. 44: eConf Data forwarding panel

In eConf, the Data Forwarding page allows you to configure connections with different interfaces. All mandatory settings are displayed, and once they are completed, data forwarding can be activated. Some advanced parameters can be modified in a configuration file.

Interface	Description
ePowerMonitor	Sends all data from the Elum Data Model to the Elum asset management platform: ePowerMonitor. *Activated upon subscription to ePowerMonitor.*

FTP	Allows sending data from the EMS to an FTP server. All data from the Elum Data Model is transferred.
USB	Enables exporting data from the EMS to a local USB key. All data from the Elum Data Model is transferred.
Energysoft	Sends available data from the Elum Data Model to the Energysoft platform.
QOS Energy	Sends available data from the Elum Data Model to the QOS Energy platform.
Meteocontrol	Sends available data from the Elum Data Model to the Meteocontrol platform.

7.5. Devices

The Devices panel displays a list of all equipment connected to the ePowerLog, along with their current connection status.

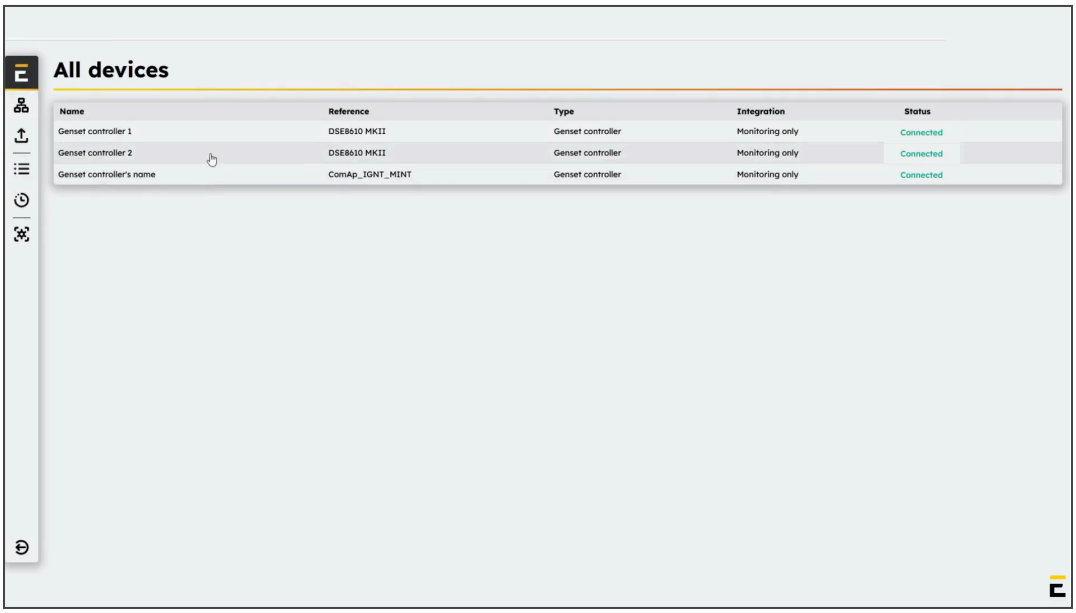


Fig. 45: eConf Devices panel

By selecting a device in the “All Devices” panel, you can view its detailed live data to monitor its real-time performance and status.

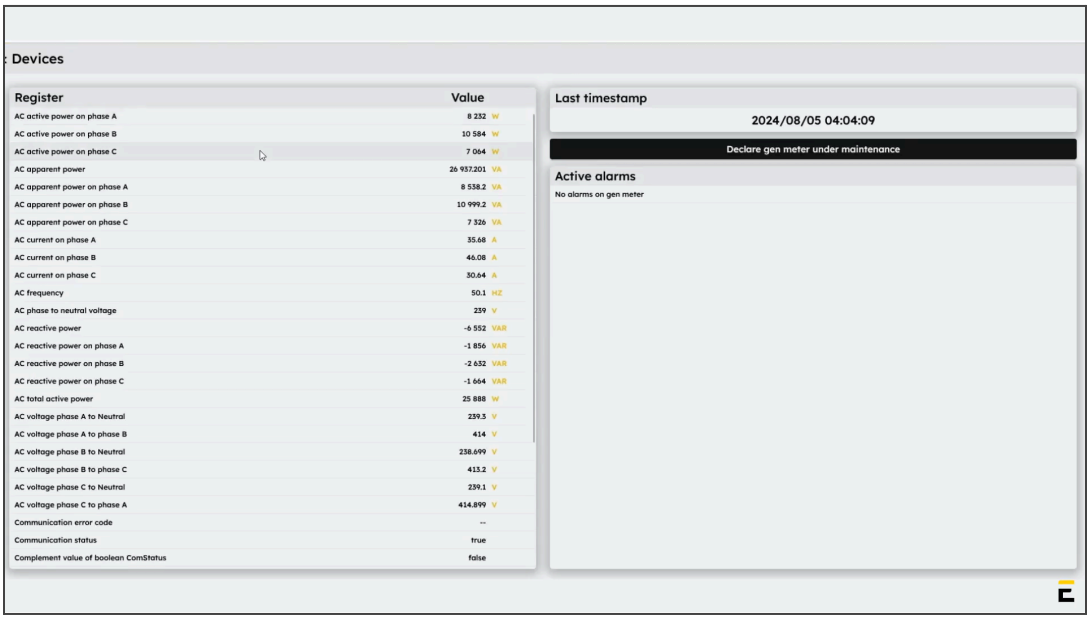


Fig. 46:eConf Device registers panel

The live data panel displays all accessible read and write registers for the selected device.
Some registers can be edited by clicking on the edit icon. When modifying a register, you will be prompted to enter a new value for the specific device and confirm your choice.

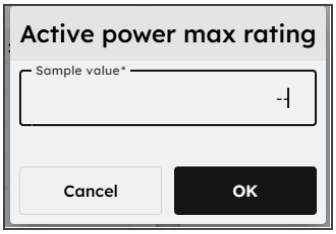


Fig. 47: Register edition from Device panel

7.6. Logs

The Logs History panel provides access to timestamped logs of EMS events, enabling system diagnostics and analysis.

Available Log categories :

- Communication Errors : View a list of communication failures between devices.
- Device Errors : Check any device-related malfunctions detected by the system.
- Setpoints : Monitor the setpoints sent by the EMS to the plant for control operations.

Filtering and exporting Logs :

You can:

- Select a start and stop date to filter logs for a specific time range.
- Export the log data in CSV format for further analysis.

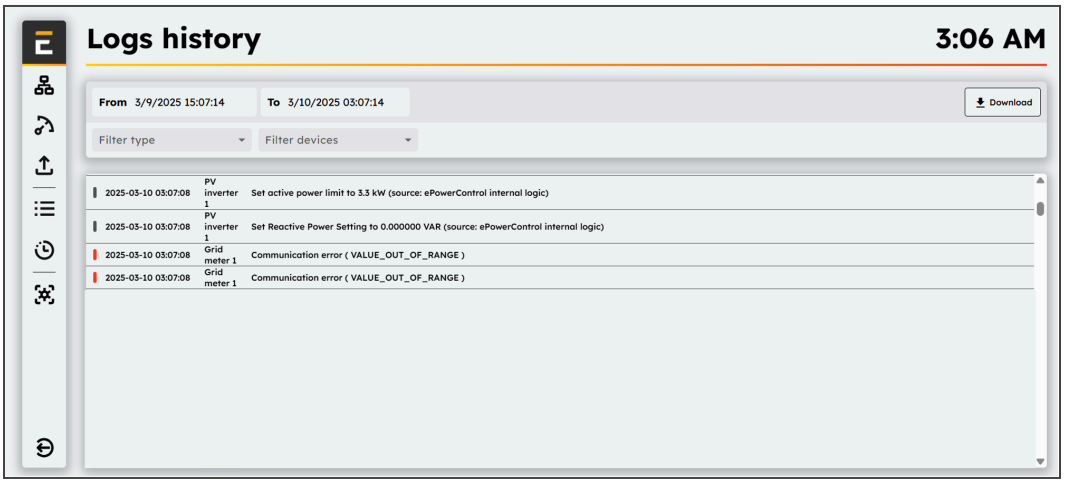


Fig. 48: Log history tab

7.7. System settings

The System Settings panel allows you to access and configure essential system parameters.

Available settings:

1. **Site :** Enter the site name and its location details.
2. **Date and Time :** Define and adjust the date, time, and time zone settings.
3. **Firmware:** Check the installed firmware version and update if necessary.
4. **Password :**Change the login password for accessing eConf.
5. **Advanced settings:** Access additional system configurations, including logging options and factory reset.

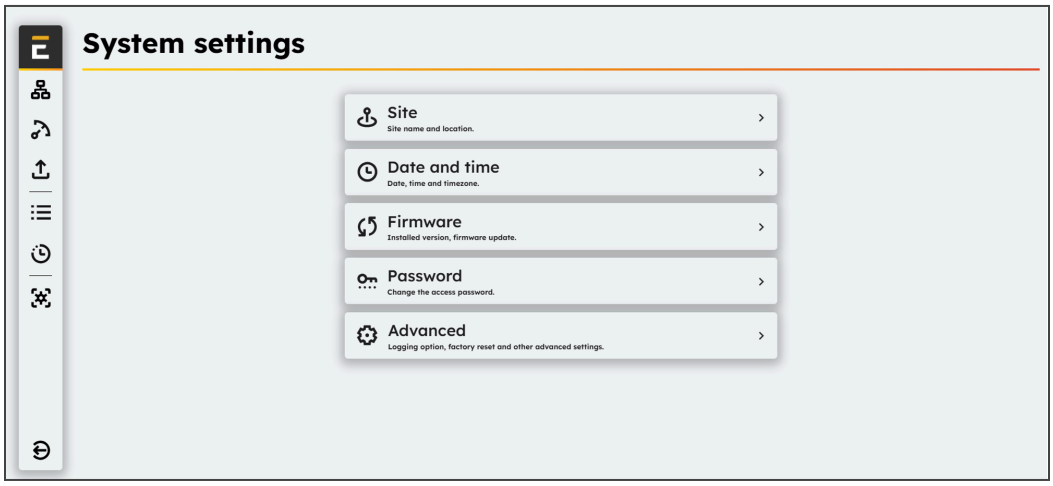


Fig. 49: System setting tab

7.7.1. Version

The “Firmware” panel shows the version of the Elum firmware packages installed on your ePowerLog.

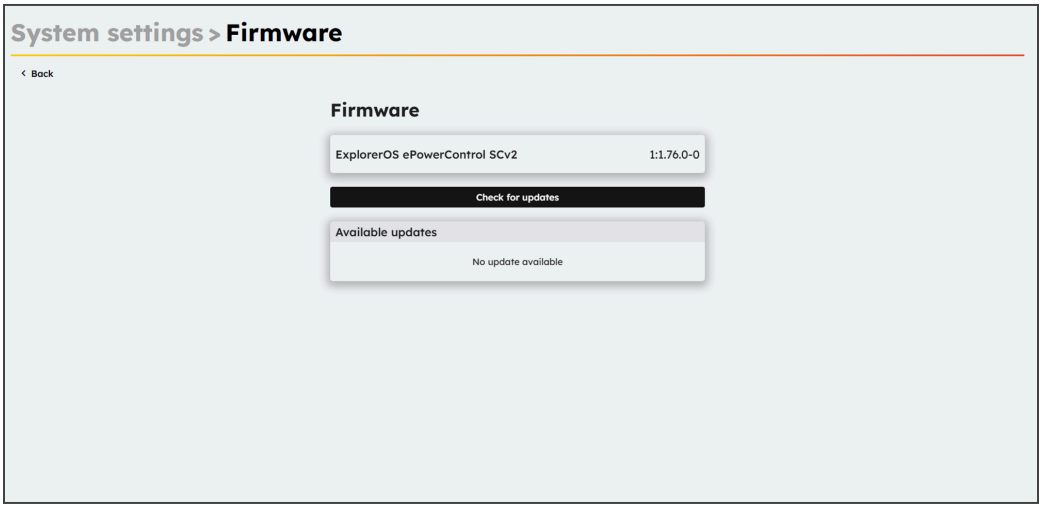


Fig. 50: eConf firmware tab

7.7.2. Date

The “System settings” panel provides access to configure the Date & Time, including the Timezone.

By default, if the Explorer is connected to the internet, it will automatically synchronize its clock with Elum platforms. Alternatively, it can be configured to sync with a custom NTP server.

In the absence of an internet connection, the date and time must be set manually via the interface.

Proper configuration of date and time is essential to ensure accurate timestamping of all monitored values.

Timestamps are recorded in UTC, meaning the time zone setting does not affect them. The timestamp assigned to the data corresponds to the midpoint of the reading operation. For example, if the reading starts at 12:35:30 and takes 3 seconds to complete, all variables will be assigned the timestamp 12:35:31.5.

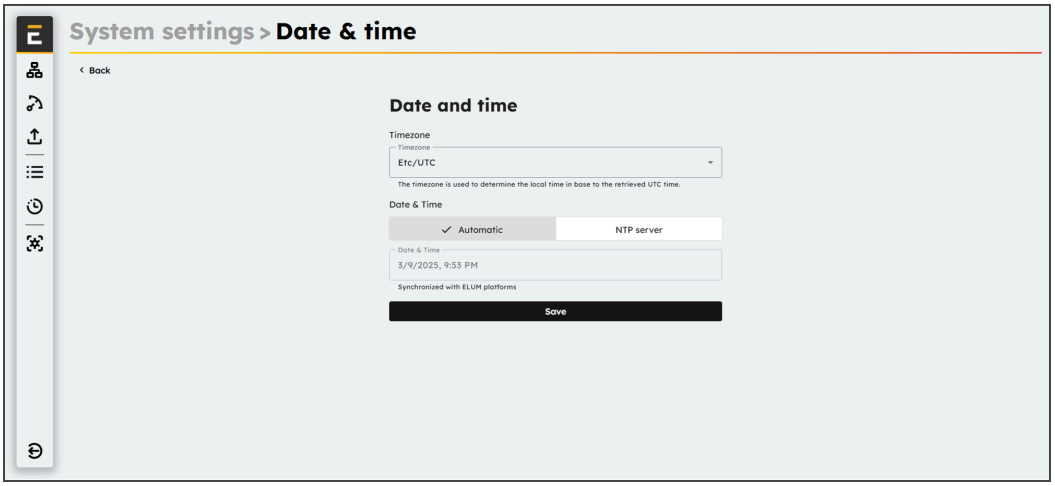


Fig. 51: eConf Date & time tab

7.7.3. Password

The Password panel allows you to set a new password for accessing the system.

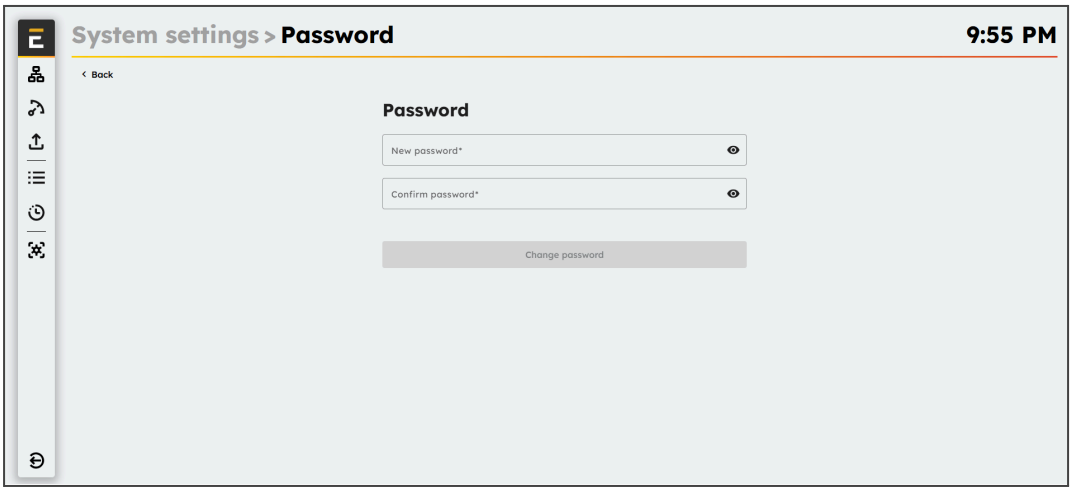


Fig. 52: eConf password modification tab

7.7.4. Site

The Site panel allows you to modify the site settings, with new settings overwriting the previous ones.

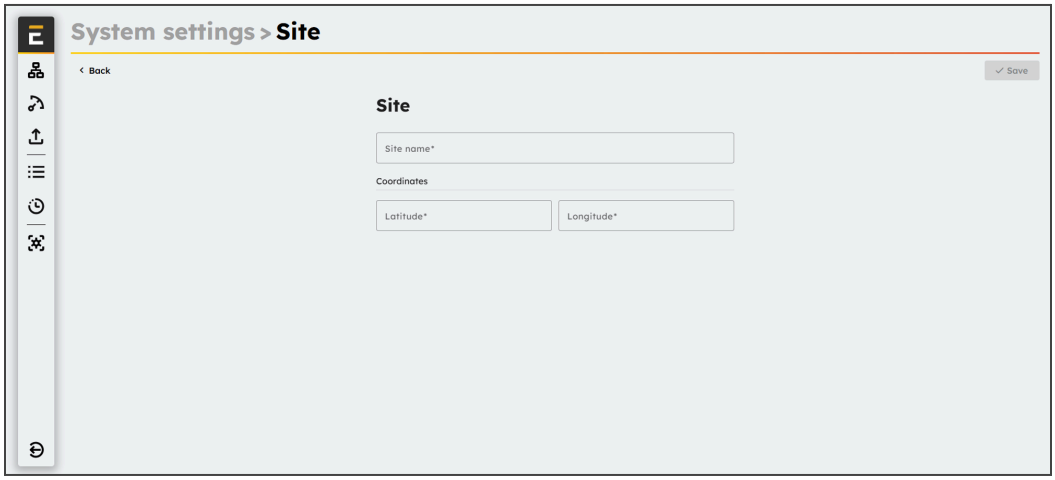


Fig. 53: Site panel information and coordinate tab

7.7.5. Advanced

The Advanced panel allows an Advanced User to reset the ePowerLog configuration to factory settings.

> *This action will **permanently delete all personal data**, and **restoration will not be possible**.*

The Advanced panel also provides access to the Modbus Gateway interface of the Elum Controller. To access it, click on "Elum Technician Tools", then select "Modbus Gateway".

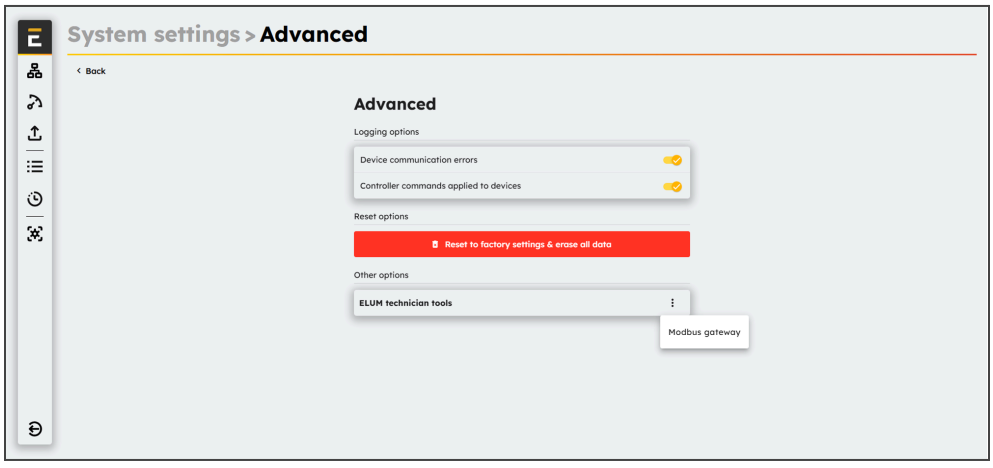


Fig. 54: Advanced setting tab

From this menu, you can select the LAN port of the Elum Explorer to be exposed for external Modbus masters to send queries. Additionally, you can configure the slave ID for each device connected to the Elum Explorer.

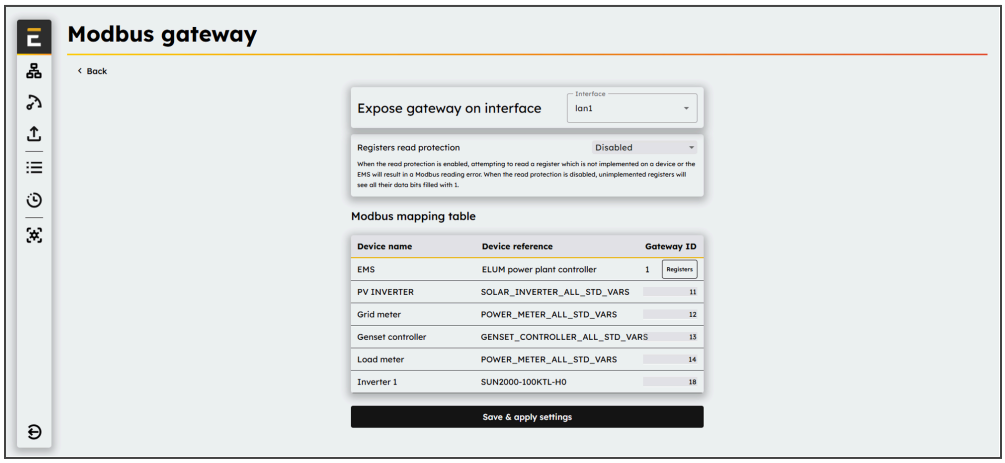


Fig. 55: Advanced settings - modbus gateway tab.

For more details about the Elum Modbus Gateway interface, please refer to Appendix D: Modbus Gateway.

Please note that this option is only available when ordering your Elum Explorer. If you wish to subscribe to this additional feature after purchase, please contact the Elum sales team at sales@elum-energy.com .

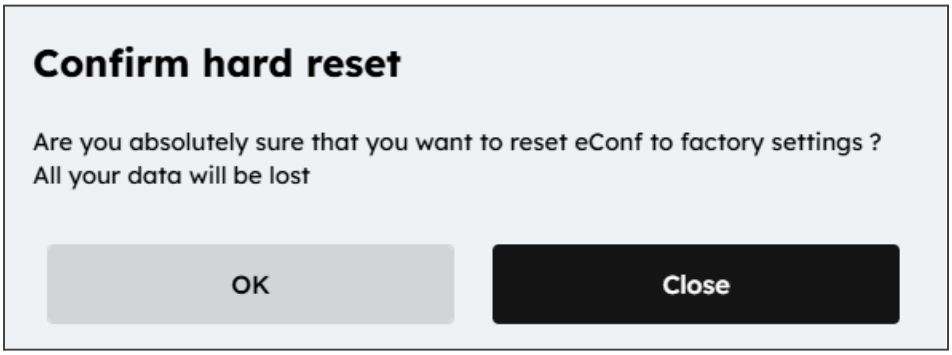


Fig. 56: Hard reset confirmation tab.

8. Options and accessories

8.1. Cabinets

	**Metal Casing | S** IP50 Casing	- Dimension : 300*300*150 - Weight : 10,5 kg - Wireways - Power supply 24V
	**Metal Casing | M** IP50 Casing	- Dimension : 500*400*250 - Weight : 12,5 kg - Wireways - Power supply 24V
	**Metal Casing | L** IP50 Casing	- Dimension : 600*600*300 - Weight : 28 kg - Wireways - Power supply 24V - Screen mounting option
	**ePowerMonitor | SCADA** HMI supervision screen 115-AP01, Arcdis	- 15-inch industrial grade touchscreen - Fully autonomous - no internet required

8.2. Antennas

	**Cellular kit | No casing** Antennas + modem 4G/LTE Antenna VT4GLTE-R-1, Techship	- Pair of plastic 4G/LTE Antennas - SMA connector - Modem for 3G/4G connection access - Does not include the 3G card
	**Cellular kit | Casing** Antennas + modem CELLULAR/LTE MIMO 2J602 4Ba, Techship	- Single plastic 4G/LTE Antennas - SMA connector - Modem for 3G/4G connection access - Does not include the 3G card
	**Cellular kit | Container** IP65 antennas + modem 3G/4G LTE Multiband Antennas LP70x, Techship	- Pair of plastic 4G/LTE Antennas IP65 - Operating conditions -40°C to 85°C - SMA connector - Modem for 3G/4G connection access - Does not include the 3G card

8.3. Meters

	**AC Meter | 5A** EM330-DIN.AV5.3.H.S1.X, Carlo Gavazzi	- AC power measurements - Active/Reactive power, cos phi, current, voltage - Frequency - RS485 | Modbus RTU communication - Compatible with 5A CTs
	**AC Meter | 333mV** EM210-72D.MV5.3.X.OS.X, Carlo Gavazzi	- AC power measurements - Active/Reactive power, cos phi, current, voltage - Frequency - RS485 | Modbus RTU communication - Compatible with 333 mV CTs
	**AC Meter | 5A | LV & MV** WM20.AV5.3.H, Carlo Gavazzi	- Advanced modular AC power analyzer - Active/Reactive power, cos phi, current, voltage - Frequency - RS485 | Modbus RTU communication - Compatible with 5A CTs + LV/MV Applications
	**CT | 200 A** Current transformer CTD-6S.200.5A.XXX	- Input current up to 200 A - 5A output - Split core
	**CT | 1000 A** Current transformer CTD-6S.1000.5A.XXX	- Input current up to 1000 A - 5A output - Split core
	**CT | 4000 A** Current transformer ROG4K1002M4003X02, Carlo Gavazzi	- Input current up to 4000 A - 333 mV output - Split core rope

8.4. UPS

	**UPS | S** SPUBC24120 with SPUBAT241A2, Carlo Gavazzi	- Output voltage 24 V - Nominal current 5A - 1.2 Ah battery
	**UPS | M** SPUBC24120 with SPUBAT243A2, Carlo Gavazzi	- Output voltage 24 V - Nominal current 5A - 3.2 Ah battery
	**UPS | L** SPUBC24120 with SPUBAT2412A, Carlo Gavazzi	- Output voltage 24 V - Nominal current 5A - 12 Ah battery

8.5. Connectivity

	**I/O Module | Analog** 6017, ADAM	- 8 channel differential Analog input - Ethernet | Modbus TCP/IP communication
	**RS485 Extension** Nport 5230A, Moxa	- 1 Ethernet port - 2 RS485 ports
	**Switch** EDS 205, Moxa	- 5 Ethernet ports

8.6. Weather Sensors

	**Pyranometer** SMP 10, Kipp & Zonen	- Pyranometer < 1 % (-20 ...50 °C) otherwise < 2 % (-40 ... 70 °C) - Ambient temperature +/- 0.1 °C - Operating range -40 to 80 °C - RS485 | Modbus RTU communication
	**Irradiance sensor** Si-RS485TC-T-Tm-MB, INGENIEURBÜRO	- Irradiance sensor +/- 5% - Module temperature +/- 1 °C - Operating range -20°C to 70 °C - RS485 | Modbus RTU communication
	**Temperature sensor** Ta-ext-RS485-MB, INGENIEURBÜRO	- Ambient temperature sensor +/- 1 °C - Operating range -40°C to 90 °C - RS485 | Modbus RTU communication

Accessories & options description - Sensors

	**Weather station** WS500, Lufft	- Temperature ±0.2 °C (-20...50 °C) otherwise ±0.5 °C (>-30 °C) - Operating range -50 to 60 °C - Relative humidity ±2 % RH Operating range 0 to 100 % RH - Air pressure ±0.5 hPa (0...40 °C) Operating range 300 to 1200 hPa - Wind direction < 3° Operating range 0 to 359.9 ° - Wind speed ±0.3 m/s Operating range 0 to 75 m/s - RS485 | Modbus RTU communication
	**Remote temperature sensor** WT1, Lufft	- Additional module for the weather station - Module temperature sensor +/- 0.1 °C - Operating range -40°C to 125 °C - Communication through weather station WS500

9. Appendix A : Modbus gateway

9.1. About the feature

The Modbus Gateway feature, also known as the Modbus TCP Slave Interface, is a standard feature available in all Elum ePowerLog and ePowerControl series products. Modbus TCP is an industry-standard protocol that allows SCADA systems and third-party equipment to interface with Elum products.

With the Modbus TCP interface, users can:

- Read standard data from devices connected to the Elum Explorer.
- Read and/or write custom data from the EMS to the ePowerControl PPCs.

This manual provides all the necessary information to configure and operate the Elum Explorer's Modbus TCP Slave Interface.

The following symbol will help guide the reader through the document by highlighting important information:

Notes
Notes provide **background information** for the reader to **keep in mind** while configuring and operating the system.

9.2. Glossary

Modbus TCP	Gateway between a GSM, GPRS, 3G or 4G mobile network and another computer network
SCADA	Supervisory Control And Data Acquisition system
PPC	Power Plant Controller
IP address	Identification number of each device connected to a network
LAN	Local Area Network, a LAN is a group of connected computers or devices
EMS	Energy Management System (EMS)
RESEARCH AND DEVELOPMENT	Research and development
Explore	Generic term for the central unit of Elum's monitoring and control solutions

9.3. Configuration of the Modbus TCP slave interface of the ePowerControl PPC

9.3.1. Procedure

Step 1	**Plan the communication architecture and connect the Modbus master**	
Step 2	**LAN network settings**	
	Path	Settings/Network/LAN/Edit
	Parameters	- LAN port - IP address - Subnet mask
Step 3	**Activation of the slave interface**	
	Path	Settings/Advanced/Other options/ELUM technician/.../Modbus Gateway
	Parameters	- LAN port
Step 4	**Setting the slave interface**	
	Path	Settings/Advanced/Other options/ELUM technician/.../Modbus Gateway
	Parameters	- Gateway_id - Port: 502 (required)

9.3.2. LAN network settings

Configure the LAN port to which the Modbus master is connected by navigating to Settings > Network > LAN > Edit. The network settings of the LAN port must be compatible with those of the Modbus master, as the IP address assigned to the LAN port will be used to address Modbus requests.

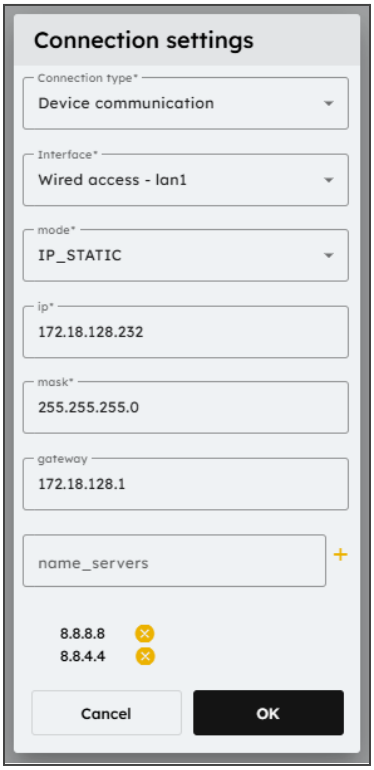


Fig. 57: LAN settings

9.3.3. Activation of the slave interface

By default, the Modbus TCP Slave Interface is disabled. To enable it, navigate to Settings > Advanced > Other Options > ELUM Technician > ... > Modbus Gateway.

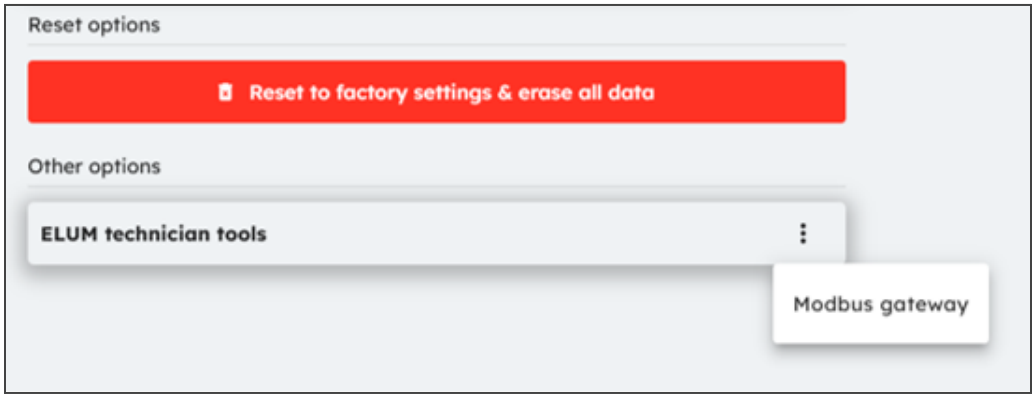


Fig. 56: Modbus TCP slave interface

Then, select the Explorer LAN port to be used for the Modbus TCP Slave Interface. Choose the Explorer LAN port that is connected to the Modbus master to ensure proper communication.

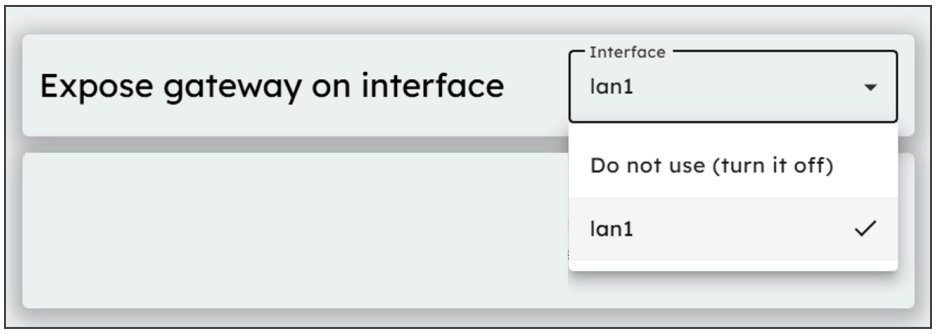


Fig. 58: Modbus TCP slave interface

9.3.4. Setting the slave interface

The Modbus TCP protocol requires specific parameters for addressing requests:

- IP Address: This is the IP address of the LAN port where the Explorer 538/538i's Modbus TCP Slave Interface has been activated. You can view and edit this address from Settings > Network > LAN > Edit.
- Port: The Modbus TCP communication port is always 502.
- Gateway ID: Also referred to as unit_id or slave_id in some SCADA software, this identifier is used to specify which device the Elum Explorer should read from or write to. The list of devices and their assigned slave IDs can be viewed and edited from Settings > Advanced > Other Options > ELUM Technician > ... > Modbus Gateway.

The **slave_id** of each device can be configured within the range of **11 to 254**.

For **ePowerControl PPC Explorers**, the **slave_id** is also used to select the **EMS** and its possible **control sub-blocks**, which are defined by the **Elum R&D team**. **Slave IDs 1 to 10** are **reserved** for this purpose.

In **Modbus TCP**, the **slave_id** does not have a predefined function, so **application developers** can use it as needed. The **internal addressing system** is freely configurable in this section.

It is important to note that the **slave_id assigned here** will likely **differ** from the **slave ID used to identify devices in the Settings/Network menu**.

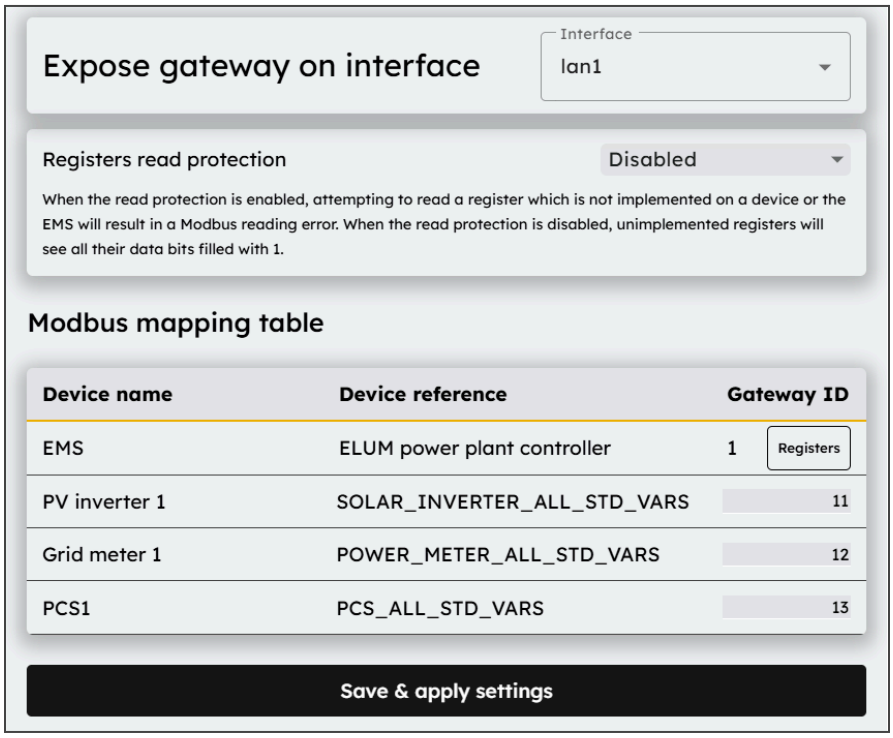


Fig. 59: Modbus mapping table

9.4. Modbus addressing table

9.4.1. Accessible data according to Elum's product

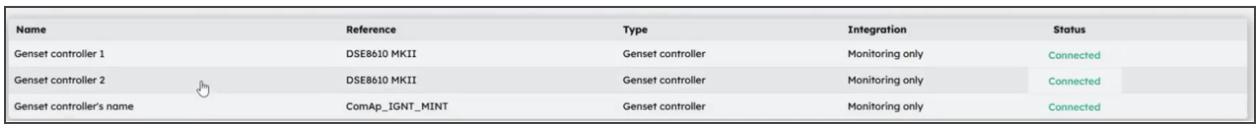
Elum product	Accessible data	Access level
ePowerLog	- Standard data table	Read only
ePowerControl ZE/SD/HFS/MC	- Standard data table	Read only
ePowerControl PPC	- Standard data table	Read only
	- Customized data table PPC	Read and/or write according to specifications

9.4.2. Read access to standard data

A SCADA system or any third-party device connected to the Modbus TCP Slave Interface of an Elum Explorer can read all standard data from devices linked to the Elum Explorer, using their assigned slave_id for identification.

Device data is read-only.

A standard addressing table is defined for each device type based on the Elum Data Model. These standard addressing tables specify how data is structured and accessed for different types of devices. The device type can be viewed in the Devices menu within eConf..



Name	Reference	Type	Integration	Status
Genset controller 1	DSE8610 MKII	Genset controller	Monitoring only	Connected
Genset controller 2	DSE8610 MKII	Genset controller	Monitoring only	Connected
Genset controller's name	ComAp_IGNT_MINT	Genset controller	Monitoring only	Connected

Fig. 60: Modbus mapping table

Two devices of the same type will share the **same addressing table**, but they will always have **different slave IDs**.

All registers in the **standard address table** will be available for each device, provided that the corresponding registers **actually exist** on the specific device being read. The **available data** may vary between **different manufacturers**, depending on the device's supported registers.

9.4.3. Read and/or write access to EMS custom data (on ePowerControl PPC only)

A SCADA system or any third-party equipment connected to the Modbus TCP Slave Interface of an Elum ePowerControl PPC can read and/or write to the custom EMS data defined by Elum's R&D team.

The EMS Addressing Table (Appendix C - Addressing Table) was provided to the client at the end of the design and development phase of the project.

This EMS addressing table can also be accessed directly from eConf by navigating to: Parameters > Advanced > Other Options > ELUM Technician > ... > Modbus Gateway, then clicking on Registers in the line associated with the EMS.

Variable	Description	Unit	Value Type	Value Range	Aggregation Method	Channel Type	Applicable Device Types	Modbus Gateway Register Number	Modbus Gateway Read Function Address	Modbus Gateway Read Function Code	Modbus Gateway Table	Modbus Gateway Data Type
A	AC current	A	float32	[-1.0e+07, 1.0e+07]	avg	timeseries	Power Meter, EVCS, PCS, Genset Controller, Solar Inverter	40001		3	HOLDING	float32
AC_DISCONNECT	AC disconnect open		bool		or	persistent	Solar Inverter	1		1	COIL	bool
AC_OVER_VOLT	AC Voltage above limit		bool		or	persistent	Solar Inverter, Power Meter	2	1	1	COIL	bool
AC_OVER_VOLT_A	AC Voltage above limit on phase A		bool		or	persistent	Solar Inverter, Power Meter	3	2	1	COIL	bool
AC_OVER_VOLT_B	AC Voltage above limit on phase B		bool		or	persistent	Solar Inverter, Power Meter	4	3	1	COIL	bool
AC_OVER_VOLT_C	AC Voltage above limit on phase C		bool		or	persistent	Solar Inverter, Power Meter	5	4	1	COIL	bool
AC_UNDER_VOLT	AC Voltage under limit		bool		or	persistent	Solar Inverter, Power Meter	6	5	1	COIL	bool
	AC Voltage											

Fig. 61: EMS register table

EMS data can have different access levels: **read-only, read-write, or write-only**. The **Register Access parameter** defines the level of access for each register.

9.4.4. Parameters

Each register is defined by the following parameters:

- Register number: Specifies the address of the register.
- Function code: Defines the Modbus function code used for register access.
- Size: Indicates whether the register should be read in one or two words.
- Data type: Specifies the type of data according to Modbus standards.

The **data is already scaled**, so no additional **scaling factor** is require

9.5. Error codes and troubleshooting

9.5.1. Common errors

The most common cause of error is an incorrect association between the gateway_id and the register definition.

To verify and correct this:

- Check the gateway_id definition in Settings > Advanced > Other Options > ELUM Technician > ... > Modbus Gateway.
- Refer to the Elum documentation for the correct register definitions.

9.5.2. Error codes

- **Gateway path unavailable**

If the Modbus master sends a request using a gateway_id that is not assigned to a device or the EMS, it will receive Modbus error code 10 (Gateway path unavailable).

- **Illegal function**

If the Modbus master sends a request to the EMS using an unsupported function code (other than 1 (Read Coils), 3 (Read Holding Registers), 5 (Write Single Coil), 15 (Write Multiple Coils), or 16 (Write Multiple Registers)), it will receive Modbus error 1 (Illegal function).

If the Modbus master sends a request to a device using an unsupported function code (other than 1 (Read Coils) or 3 (Read Holding Registers)), it will receive Modbus error 1 (Illegal function).

- **Illegal data address**

If the Modbus master sends a request to an assigned gateway_id (EMS or device) with a valid function code, but the address does not map to any data, it will receive Modbus error code 2 (Illegal data address).

- **Device slave failure**

If the Modbus master sends a request to an assigned gateway_id (EMS or device) using a valid function code and a mapped address, but the data is invalid for some reason, it will receive Modbus error code 4 (Device slave failure).