



RI-ENERGYSET-3P-ESS-125-261 RI-ENERGYSET-3P-ESS-125-261-S Commissioning Manual

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Note: this document is intended to provide a simplified overview of the RI-ENERGYSET-3P-ESS-125-261(-S) system and Services Operation Procedures. For more detailed installation procedures, commissioning, maintenance, and advanced configuration, always refer to the Rayleigh Instruments User Manuals.

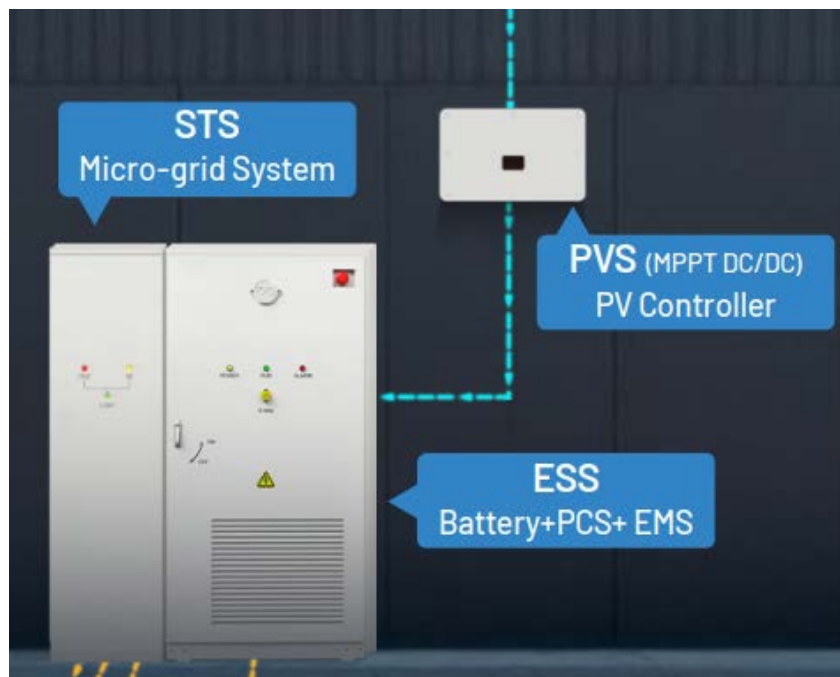
RI-ENERGYSET-3P-ESS-125-261 Solution

The Rayleigh Instruments RI-ENERGYSET-3P-ESS-125-261 is a fully integrated Commercial and Industrial Battery Energy Storage System (BESS) designed for energy storage, peak shaving, backup power, self-consumption optimization, and energy management.

The system combines battery storage, power conversion, intelligent energy management, safety protection, and liquid cooling into a single outdoor cabinet, providing a compact and reliable solution for commercial and industrial applications.

The complete RI-ENERGYSET-3P-ESS-125-261 system can be composed of the following components:

- ESS-125-261 – Battery Energy Storage System (BESS)
- STS-400 – Static Transfer Switch for automatic On-Grid/Off-Grid switching
- PVS – Photovoltaic Power Conversion System (PV generation interface).



ESS-125-261

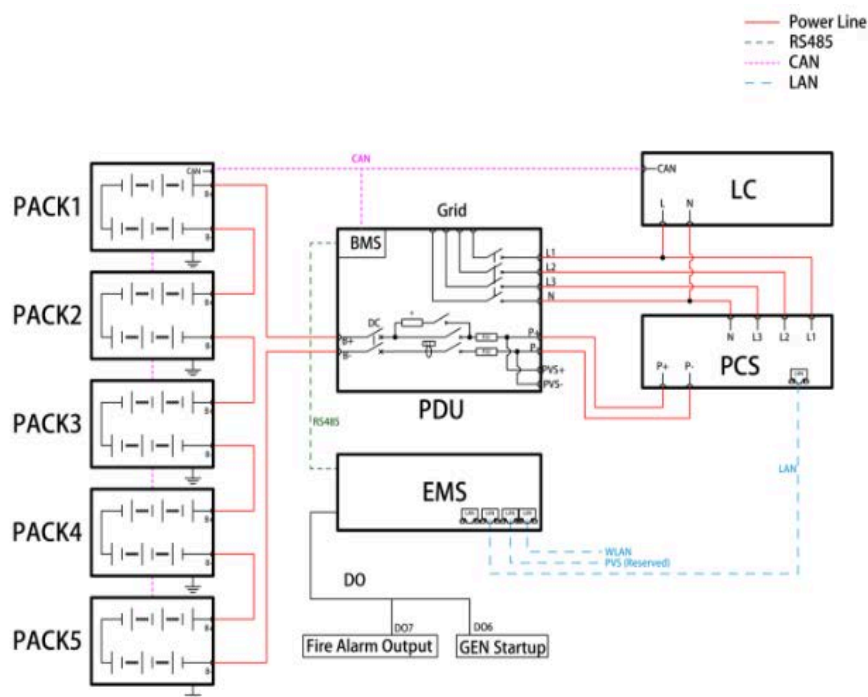
Model	ESS-125-261
System Parameters	
Rate Power [kW]	125
Nominal Energy [kWh]	261
Battery Technology	LFP(LiFePO ₄)
IP Protection	IP54 (Battery IP55)
Warranty	5 Years Product warranty ,10 Years Battery Performance warranty
Battery Parameters	
Nominal Energy of Module [kWh]	52.25
Module Configuration	1P52S
Number of Modules	5
Rated Voltage [V]	832
Voltage Range [V]	650 ~ 949
Max. Charging / Discharging Current [A]	200



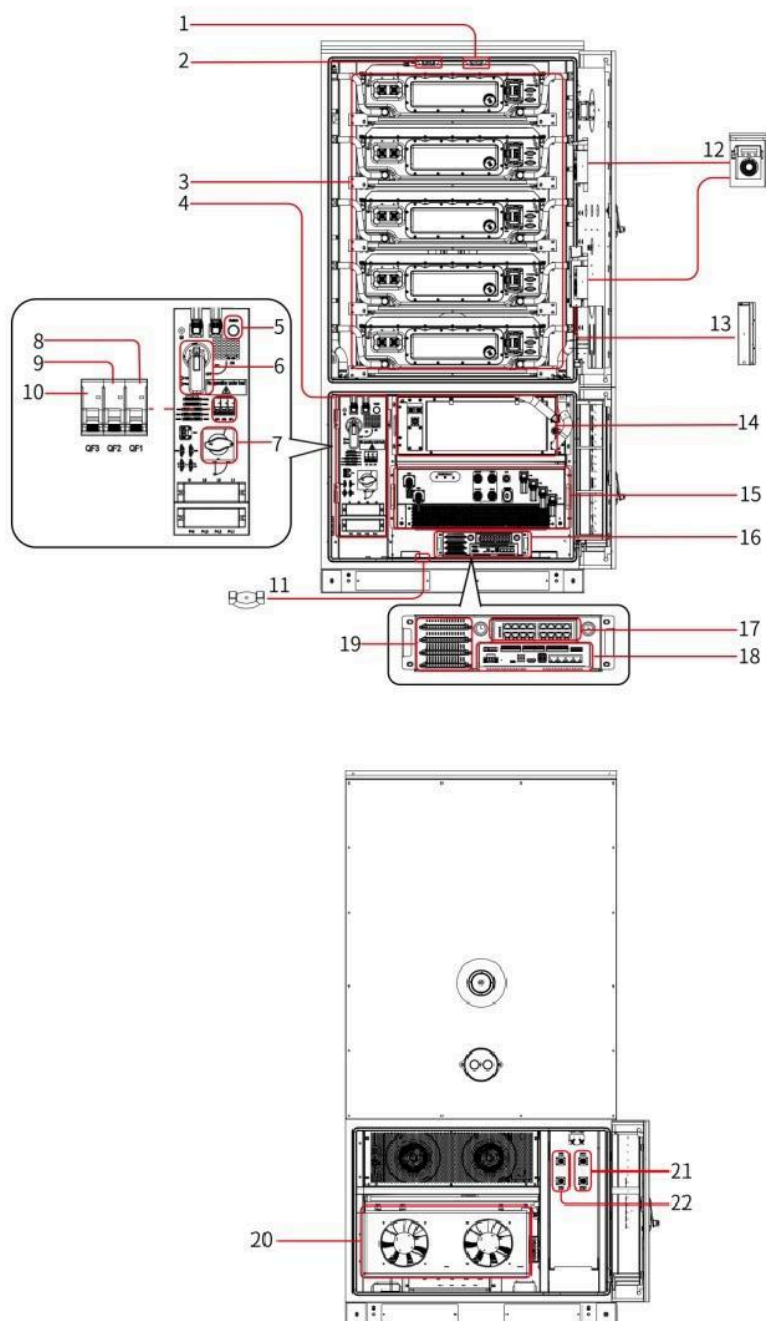
The ESS-125-261 provides 261kWh of energy storage capacity and integrates all major components required for a Commercial & Industrial Battery Energy Storage System (BESS) into a single outdoor cabinet.

The system consists of:

- Five (5) Battery packs for energy storage;
- A Power Conversion System (**PCS**) responsible for bidirectional DC/AC power conversion;
- An Energy Management System (**EMS**) that monitors, controls, and optimizes energy flow while providing strategic energy management, fault detection, and system diagnostics;
- A Power Distribution Unit (**PDU**) responsible for power distribution, switching, protection, and system control. The Battery Management System (**BMS**) is integrated within the PDU and continuously monitors battery operation;
- An integrated Liquid Cooling (**LC**) system to maintain optimal battery operating temperature.



ESS-125-261 Layout Components



COMPONENTS AND FUNCTIONS			
No.	Component	Description	Qty.
1	Temperature sensor	Monitors the temperature inside the cabinet	1
2	Smoke sensor	Detects smoke or fire inside the cabinet	1
3	Battery pack	Stores and releases power. Each battery has an energy capacity of 52.2 kWh.	5
4	PDU	Controls battery charging/discharging, processes information and communicates with EMS and liquid cooling	1
5	Switch	Starts the system when the external grid power is lost	1
6	DC switch	Controls DC power	1
7	AC switch	Controls AC power	1
8	QF1	Controls the liquid-cooled unit	1
9	QF2	Controls the fans	1
10	QF3	Controls the smart dehumidification system	1
11	Water sensor	Detects risk of water accumulation inside the cabinet	1
12	Dehumidifier	Dehumidifies inside the equipment	1
13	Fire-fighting system	Suppresses fire in emergencies. Aerosol system activates automatically at 170°C.	1
14	Liquid cooler	Maintains stable battery system temperature	1
15	PCS	Core energy conversion component. Enables bidirectional DC/AC conversion (125 kW)	1
16	EMS control box	Intelligent terminal device for data acquisition, processing, control and communication	1
17	Switching Hub	Communication expansion switch	1
18	EMS	Energy management, strategic control and fault monitoring	1
19	Communication Ports	Connects communication cables	1
20	Cooling fan	Machine heat dissipation	1
21	PCS connector	Connects to PCS	1
22	PVS connector	Connects to PV system	1

ESS-125-261-S

The ESS-125-261-S is a compact all-in-one commercial and industrial (C&I) battery energy storage system that integrates the battery, PCS, EMS, liquid cooling system, and a built-in 175kW Static Transfer Switch (STS) into a single enclosure. It supports both on-grid and off-grid operation, enables seamless automatic transfer between grid-connected and backup modes, and is designed for standalone applications requiring reliable and uninterrupted power.

Feature	ESS-2125-61-S	ESS-125-261 (Conventional)
STS	Integrated 175kW STS	External STS-400 required (if transfer function is needed)
Installation	Faster and simpler, fewer external components	More flexible, but requires additional equipment and wiring
System Size	Compact all-in-one solution	Modular solution
Scalability	Single unit only	Supports parallel connection of multiple ESS units
Application	Small and medium C&I installations	Medium and large C&I or microgrid projects
Expansion	Not expandable	Expandable up to multiple ESS cabinets
Diesel Generator Integration	Available with ATS version	Available using STS-400-G/D

Recommendation:

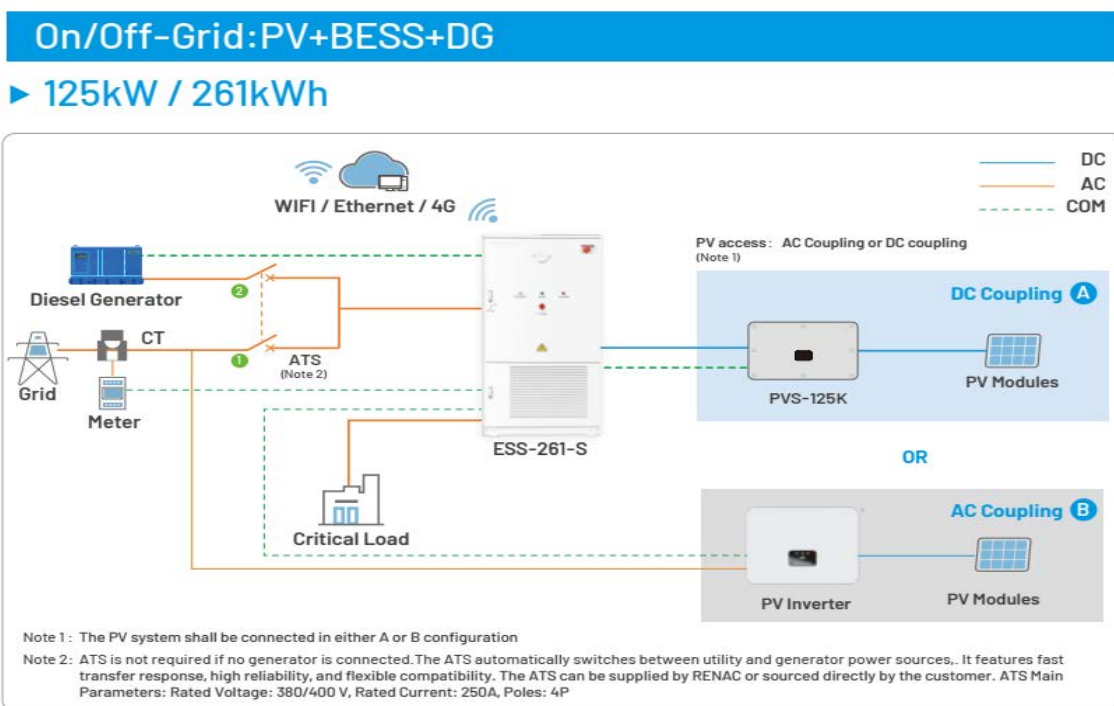
- **ESS-125-261-S:** Best choice for projects that prioritize simplicity, compactness, and quick deployment.
- **ESS-125-261:** Best choice for projects requiring higher capacity, scalability, and maximum flexibility for future expansion.

Advantages of ESS-125-261-S

- Compact all-in-one design.
- Faster installation and commissioning.
- Lower installation complexity.
- Reduced Size.
- Fewer external cables and accessories.
- Lower engineering and installation costs.
- Built-in STS for seamless grid/off-grid transfer (<20 ms).

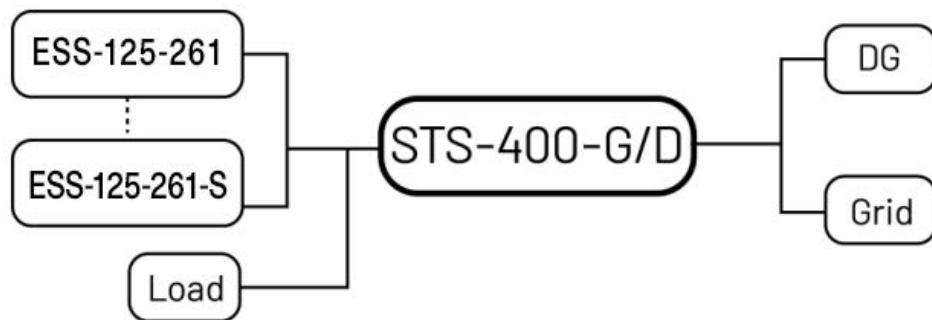
Limitations Compared to the ESS-125-261

- No support for parallel operation.
- No support for Diesel Generator.
- Limited system expansion.
- Lower flexibility for customized system architectures.



STS-400 and STS-400-GD Static Transfer Switch

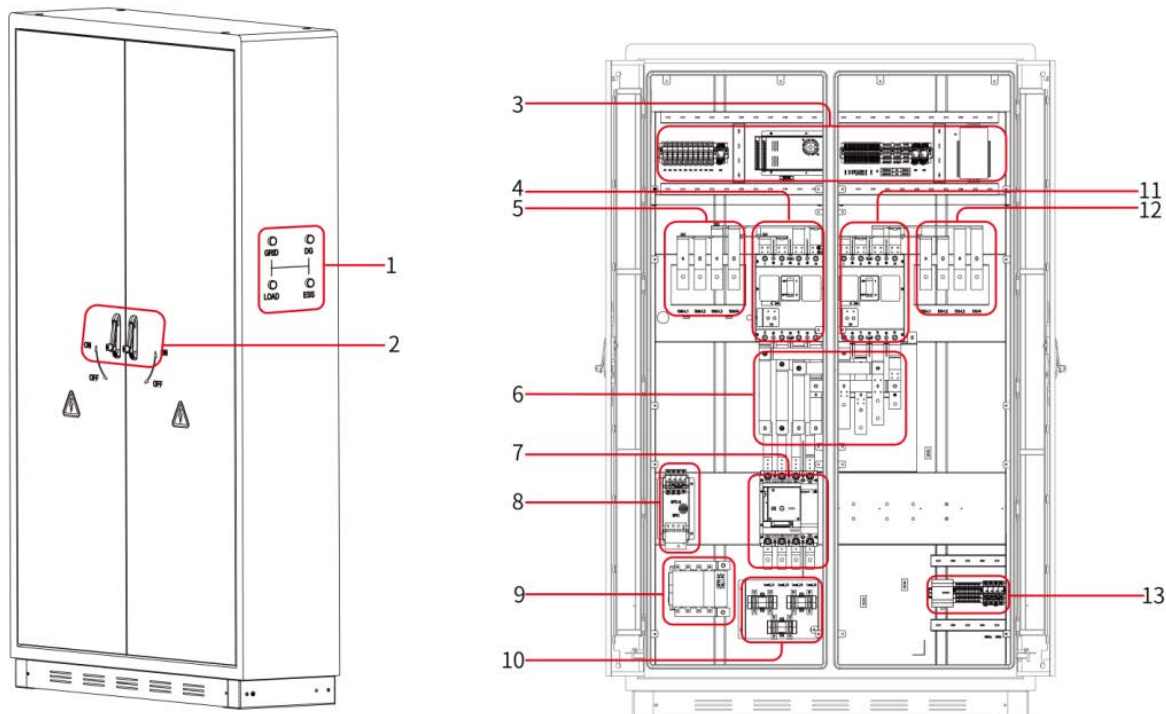
- The STS-400 is a micro-grid control system designed to operate together with the ESS-125-261 Energy Storage System.
- During normal operation, the utility grid supplies the loads while the ESS performs energy management functions. If the utility grid fails, the STS automatically isolates the installation from the grid and transfers the critical loads to the ESS.
- When the battery State of Charge (SOC) becomes insufficient, the EMS can automatically start the diesel generator to maintain the power supply and recharge the batteries.
- Each STS-400 supports up to three ESS-125-261 battery storage systems connected in parallel, providing a maximum ESS capacity of 783kWh and a rated load power of 375kW.



		STS-400-G/D	STS-400-G
Grid	AC Voltage Range [V]	400±10%	400±10%
	Rated Current [A]	630	630
	Max. Input Power [kW]	400	400
	Automatic Switch Time [ms]	< 20	< 20
DG	AC Voltage Range [V]	400±10%	-
	Rated Current [A]	630	-
	Max. Input Power [kW]	400	-
	Automatic Switch Time [ms]	< 20 ^[1]	-
ESS	Rated AC Power [kW]	250	250
	Nominal Energy [kWh]	522	522
	Rated AC Voltage [V]	380/400, 3L+N+PE	380/400, 3L+N+PE
	Rated AC Current [A]	360	360
	Rated Charging / Discharging Power [kW]	250 ^[2]	250 ^[2]
	PV access (optional) [kW]	≤250	≤250
Load	Rated AC Power [kW]	250	250
	Rated AC Voltage [V]	380/400, 3L+N+PE	380/400, 3L+N+PE
	Rated AC Current [A]	360	360
	Electrical Durability	20000	20000
General Data of STS	Mechanical Durability	20000	20000
	Application Type	Interlock	Single
	Isolated Break Point	Yes	Yes
	AC Surge Protection	Type II	Type II
	Auxiliary power supply	Grid & ESS Dual Path, 24Vdc	
	Communication protocol	Modbus, RS485	
	Control Method	Dry Contact	Dry Contact



STS-400 Layout Components



No.	Name	Description
1	Indicator lights	Used for indicating operating status.
2	Handles	Used for opening and closing doors.
3	Secondary Distribution Room	Used for secondary power distribution
4	KSIC 1	Used for ensuring seamless switching between on-grid and off-grid modes.
5	Grid Ports	Used for connecting to the grid
6	ESS-125-261 Ports	Used for connecting to the ESS-125-261
7	Load CB	Load Circuit Breaker. Used for connecting the load
8	Surge Protection Switch	Used for protecting electrical equipment from voltage spikes and lightning strikes.
9	NPE Contactor	Used for automatically connecting or disconnecting the generator neutral point from the ground to prevent circulating currents during parallel operation with the mains or other generators.
10	CT	Used for measuring alternating current by producing a reduced current proportional to the current in the circuit.
11	KSIC 2	Used for seamless on/off-grid switching of diesel generator sets.
12	DG Ports	Used for connecting devices to the diesel generator for power input.
13	External Terminal Block	Used for providing external connection points for electrical circuits to facilitate wiring and maintenance.

PVS

PVS (Photovoltaic System) is a DC-coupled photovoltaic interface that connects the PV array directly to the ESS, enabling efficient solar energy harvesting, optimized battery charging, and improved overall system performance by reducing conversion losses.

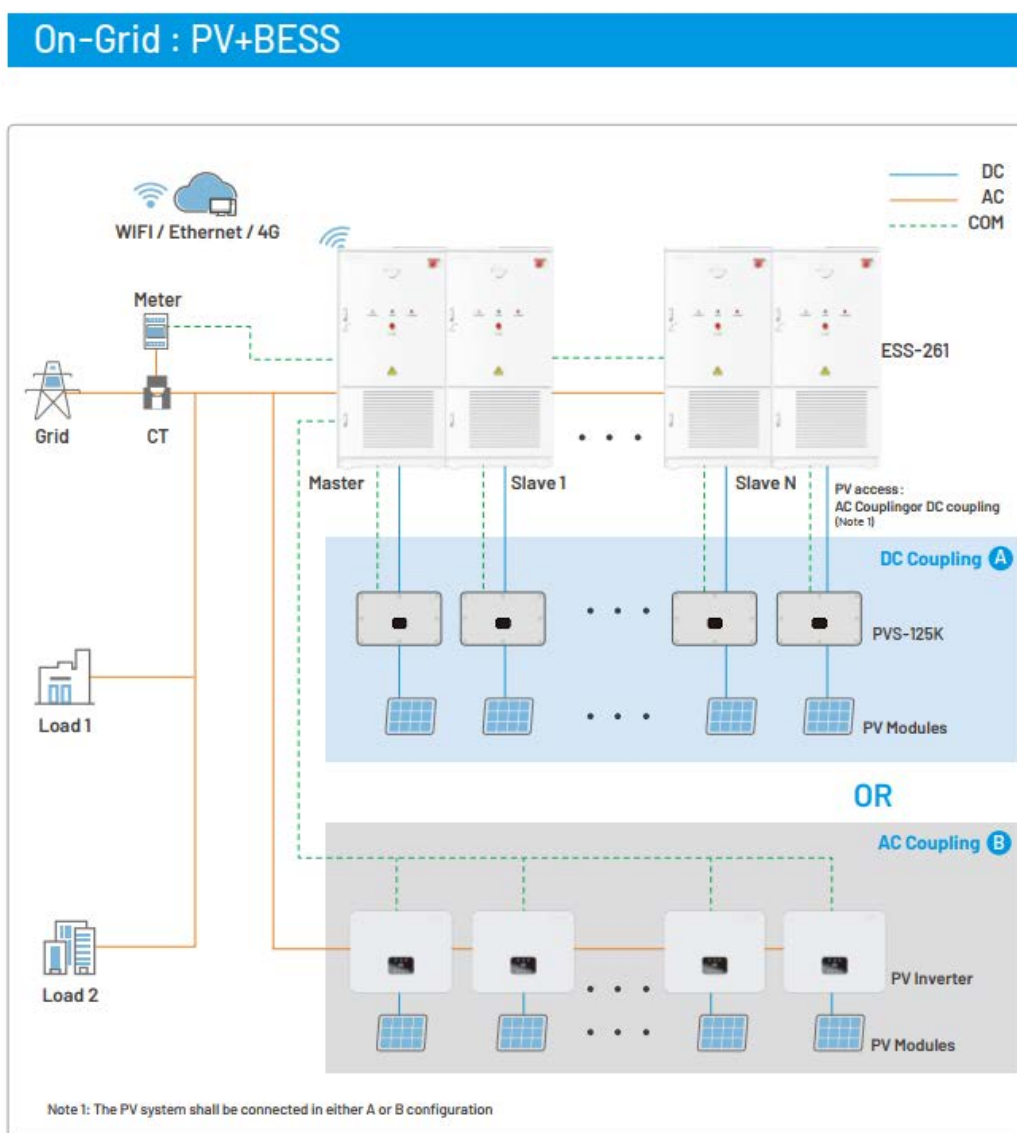
Model	PVS-125K
Input	
Max. Recommended PV Power [kWp]	187.5
Max. PV Input Voltage [V]	730
MPPT Voltage Range [V]	180~600
Rated PV Input Voltage [V]	550
Start-up Voltage [V]	200
No. of MPP Trackers	10
No. of Input Strings per Tracker	2
Max. PV Input Current [A]	40
Max. Short-circuit Current [A]	50
Output	
Rated DC Output Voltage [V]	832
Output Voltage Range [V]	650~949
Rated DC Output Power [kW]	125
Max. DC Output Power [kW]	125
Max. DC Output Current [A]	183



Scenarios

Exclusive on-Grid System

In an On-Grid configuration, the ESS-125-261 Battery Energy Storage System (BESS) is connected directly to the utility grid, supplying power to the same distribution network that serves the facility loads.



This configuration supports the parallel connection of many ESS-125-261 units, allowing the total energy storage capacity and output power to be expanded according to the project requirements.

Since this configuration does not include a Static Transfer Switch (STS), the system cannot provide backup power during a utility grid outage. In the event of a grid failure, the ESS-125-261 automatically ceases operation in compliance with grid protection requirements.

For proper energy management, the system must be installed together with a smart energy meter, which continuously measures the facility's power flow and communicates with the Energy Management System (EMS). This information enables the BESS to monitor energy consumption and execute the configured operating strategy.

The ESS-125-261 can also be integrated with a photovoltaic (PV) system using one of the following configurations:

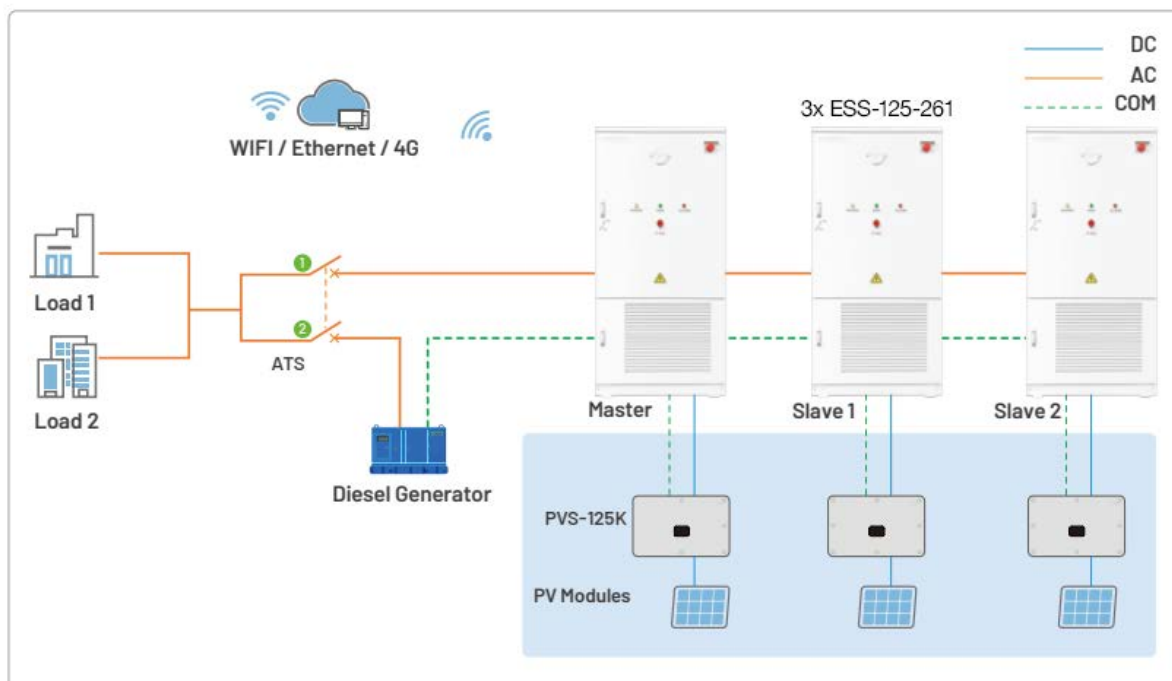
- DC-Coupled – PV modules are connected through the PVS, allowing direct DC integration with the battery energy storage system.
- AC-Coupled – The PV system is connected through conventional grid-tied PV inverters, while the ESS-125-261 is connected independently to the AC distribution network.

Exclusive Off-grid System

In an Off-Grid configuration, the ESS-125-261 operates as the primary power source for the connected loads, providing a stable AC supply independently of the utility grid. The battery system can be charged by the PV system through the PVS or by an external DG when available.

Off-Grid:PV+BESS+DG

► (125 -375)kW / (261-783)kWh



For applications requiring extended backup capability, the system can be integrated with a diesel generator using an Automatic Transfer Switch (ATS). The ATS automatically starts and connects the generator whenever the battery State of Charge (SOC) reaches the configured threshold or additional power is required, ensuring continuous operation of the loads.

When the battery is sufficiently recharged or PV generation becomes available again, the ATS automatically disconnects the generator and returns the system to normal battery operation.

When a diesel generator is used as the backup power source, the generator AC output must be connected to the AC input of the ESS-125-261. In addition, a communication cable must be installed between the generator controller and the EMS of the ESS-125-261 to enable automatic generator control. This communication allows the EMS to start and stop the generator based on the configured operating conditions, such as the battery State of Charge (SOC), load demand, or other programmable parameters. Proper power and communication wiring are essential to ensure reliable operation of the ATS and seamless transitions between battery and generator power.

On/Off-Grid switching System

The On/Off-Grid Switching configuration enables the ESS-125-261 to operate in both grid-connected and off-grid modes. This configuration requires the STS-400, which automatically transfers the loads between the utility grid and the ESS during grid outages and restoration.

Under normal conditions, the utility grid supplies the loads while the ESS performs energy management functions. During a utility outage, the STS isolates the installation from the grid and transfers the critical loads to the ESS, ensuring uninterrupted power.

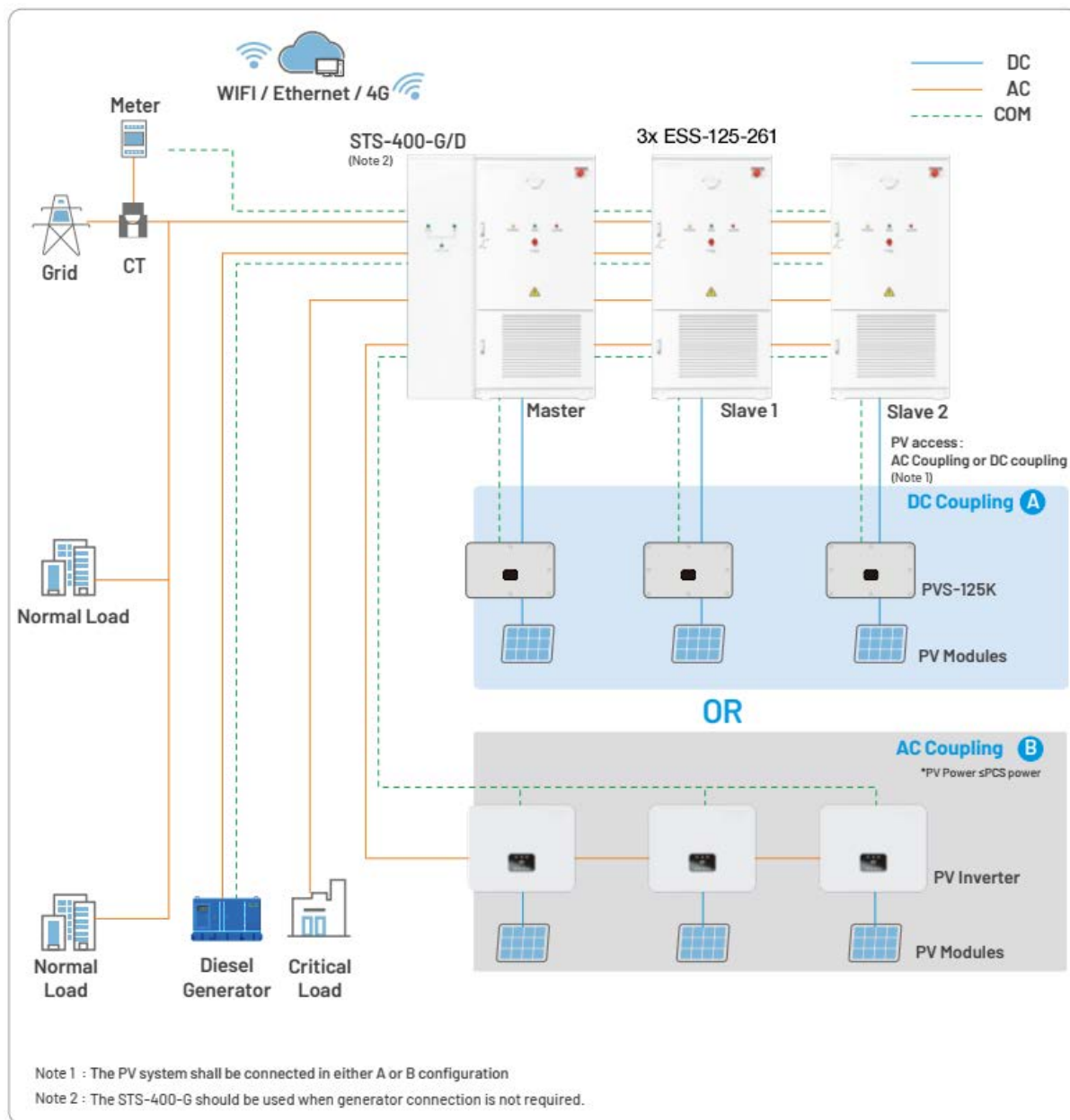
The photovoltaic system can be integrated using one of the following methods:

- DC-Coupled: PV modules are connected to the ESS through the PVS-125K, providing direct DC charging of the battery system.
- AC-Coupled: PV modules remain connected to an existing on-grid PV inverter, which communicates with the ESS for coordinated energy management.

An optional diesel generator (DG) can be connected to the STS-400-G/D to provide extended backup operation and recharge the batteries during prolonged grid outages.

On/Off-Grid: PV+BESS+DG

► (250 -375)kW / (522-783)kWh

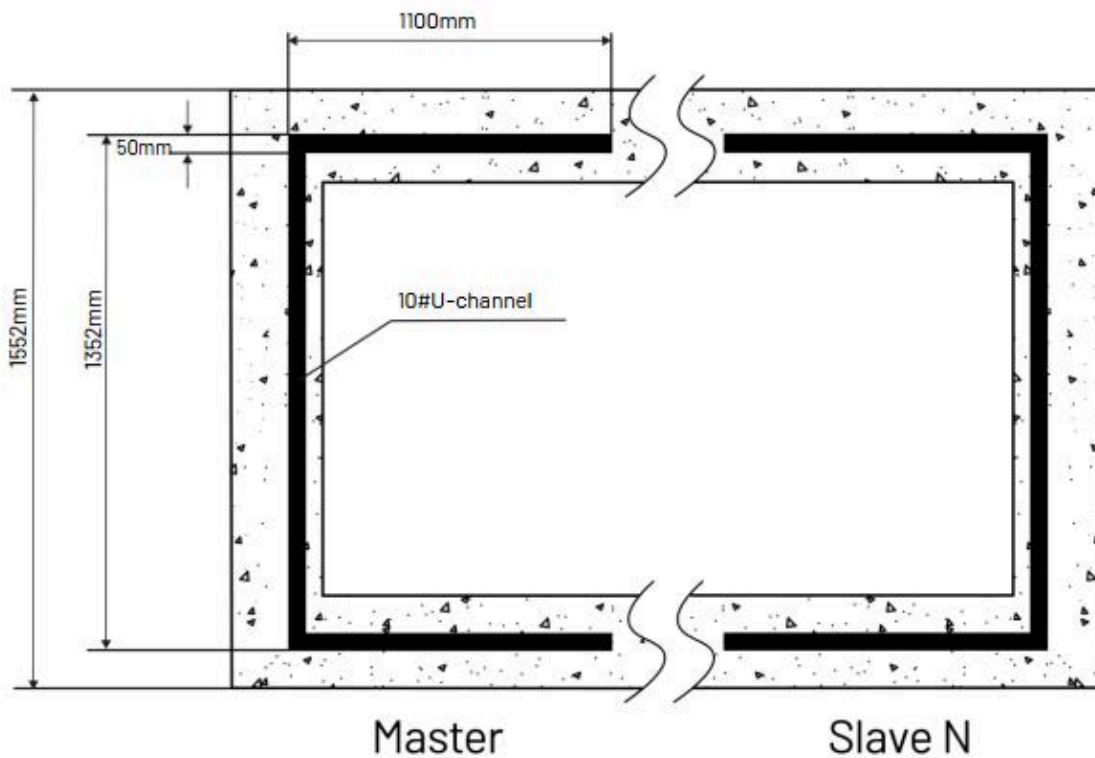
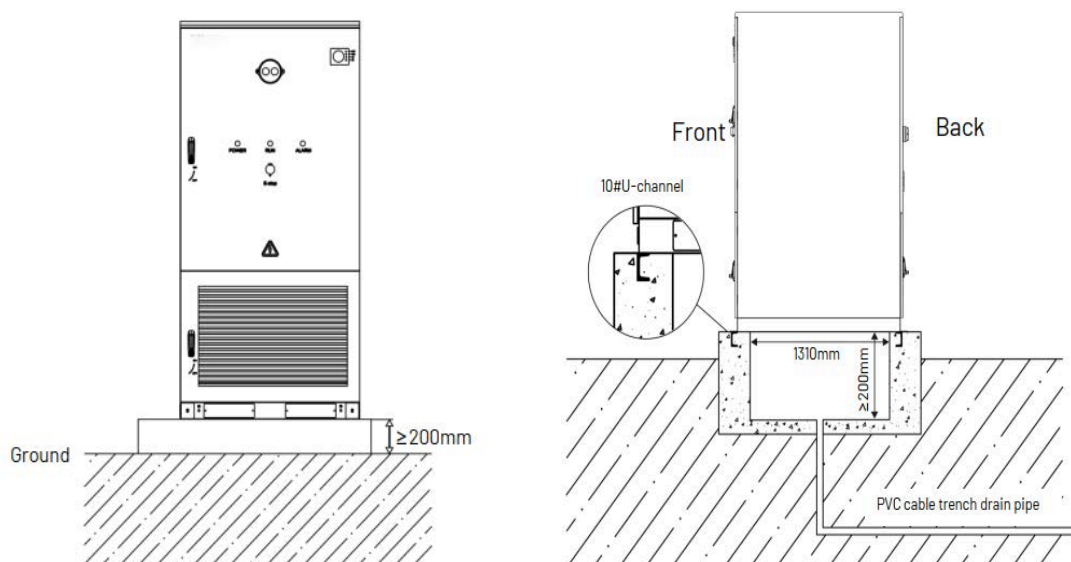


Available Systems for Different Application Scenarios

SCENARIOS	SYSTEM
- On-grid (Single or many units parallel connection ESS-125-261 battery storage systems) - Off-grid	 ESS-125-261
- On-grid (Single or max 3 units parallel connection ESS-125-261 battery storage systems) - Off-grid - On/Off-Grid switching	 ESS-125-261 +  STS-400
- On-grid (Single or max 3 units parallel connection ESS-125-261 battery storage systems) - Off-grid - On/Off-Grid switching - Integration with DG <400 kW	 ESS-125-261 +  STS-400-G/D
- On-grid (Single ESS-125-261-S, parallel operation not supported) - Off-grid - On/Off-Grid switching	 ESS-125-261-S
- On-grid (Only single ESS-125-261-S supported) - Off-grid - On/Off-Grid switching - Single ESS-261-S only - Integration with DG <400 kW	 ESS-125-261-S +  External ATS

ESS-125-261 System Startup (One ESS-125-261)

Prepare the Foundation

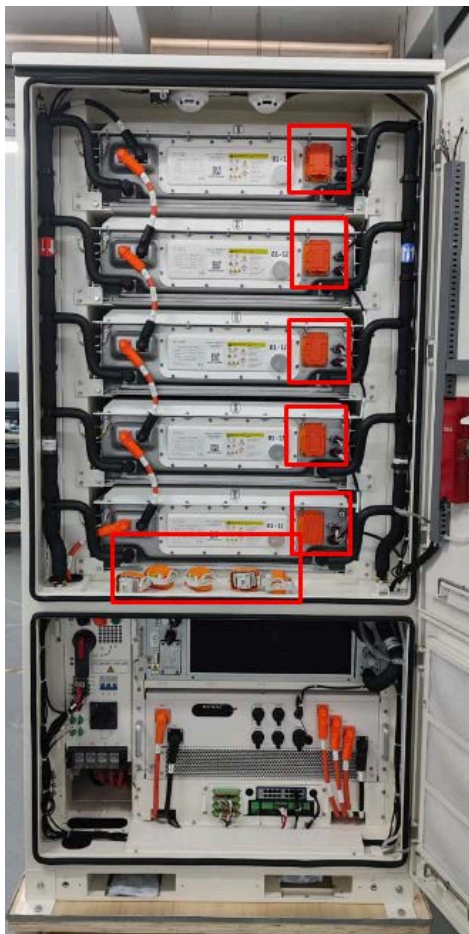


Installing the MSD Fuses

Follow the procedure below to install the **Manual Service Disconnect (MSD)** fuses on the five battery modules of the ESS-125-261.

1 – Open the accessory box and verify that all **five MSD fuses** are included and free from any signs of damage before installation.

2 – Remove the protective covers from all five battery modules to access the MSD fuse compartments. Store the covers in a safe place for re-installation after the procedure is completed.



3 – Before inserting each MSD fuse, ensure that it is correctly oriented and aligned with the battery connector.

Important: Never force the MSD into the connector. If resistance is encountered, remove the MSD and verify its orientation before attempting installation again.

4 – Insert one MSD fuse into each battery module until it is fully seated and securely locked in position.

Repeat this procedure for all **five battery modules**.

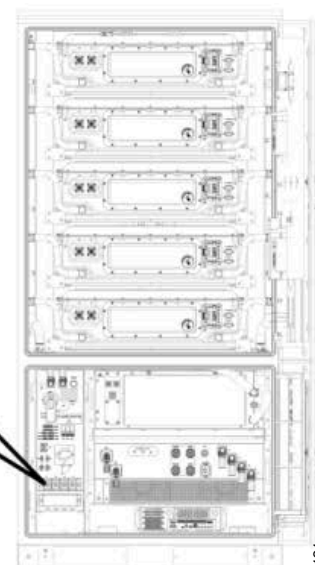
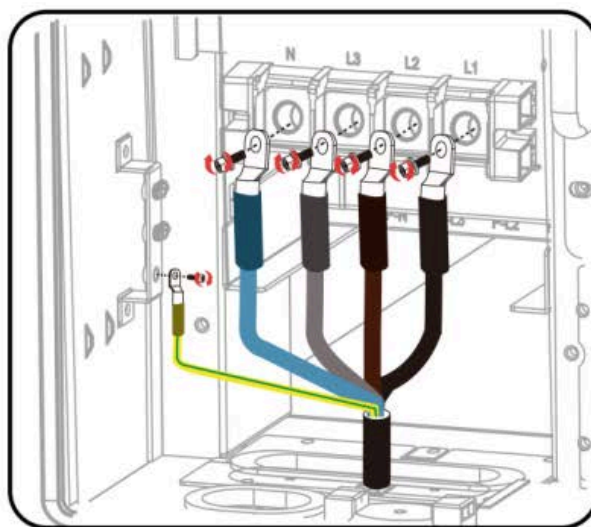


Cable Wiring on ESS-125-261

The utility grid connection must be made through the AC input terminals of the PDU (Power Distribution Unit), as shown in the installation diagram.

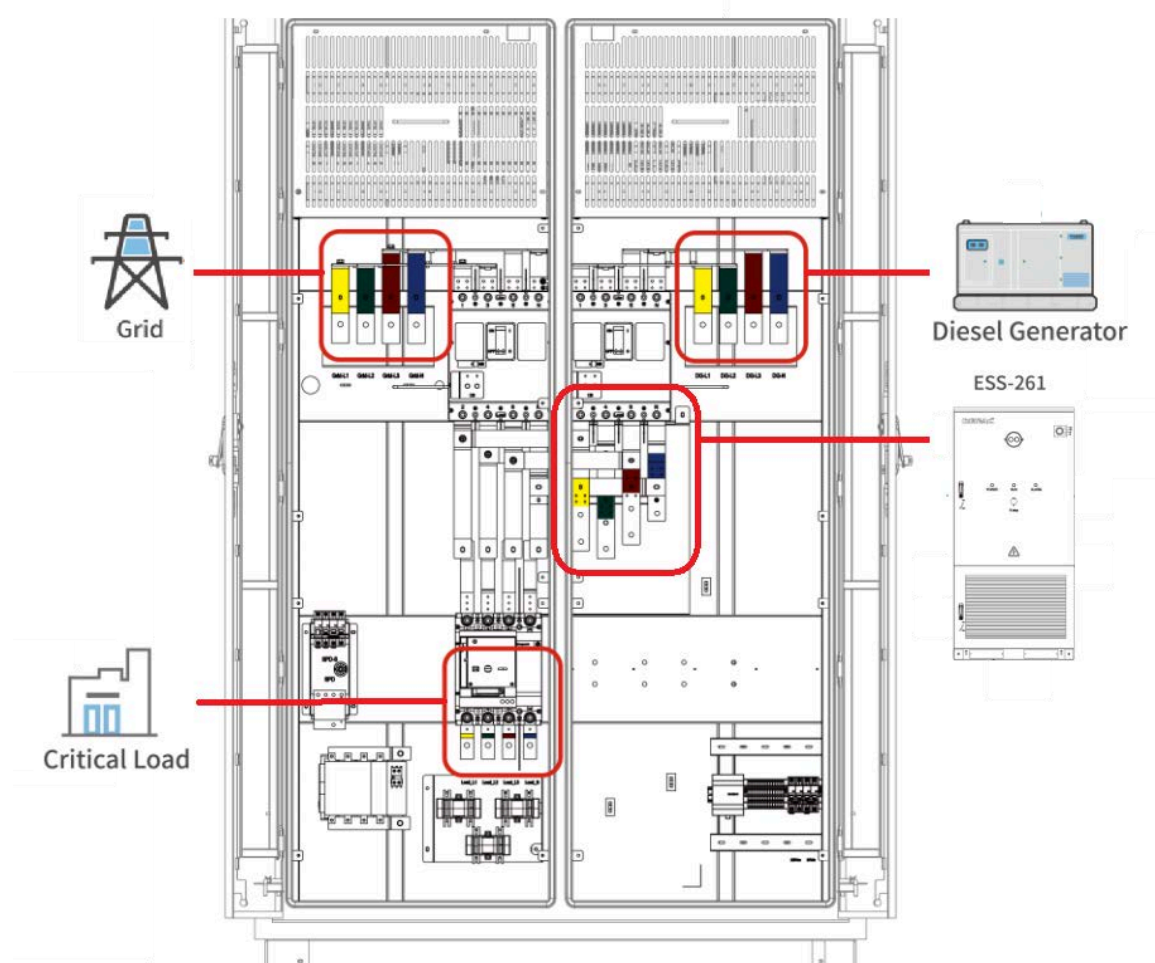
Before energizing the system, verify that the phase sequence (L1, L2, and L3) is correct and consistent throughout the entire installation. The phase sequence connected to the PDU must exactly match the sequence configured for the Smart Meter and all other interconnected equipment.

An incorrect phase sequence may result in inaccurate power measurements, communication issues, improper system operation, or synchronization faults. Therefore, always verify the phase rotation before commissioning the system.



Cable Wiring on STS400

The figure below shows the location of the main power connection terminals for the Grid, ESS-125-261, Diesel Generator (DG), and Critical Load. Verify that all power cables are connected according to the system wiring diagram before energizing the equipment. Follow the diagram:



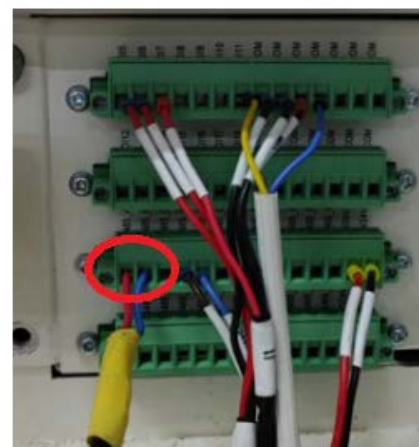
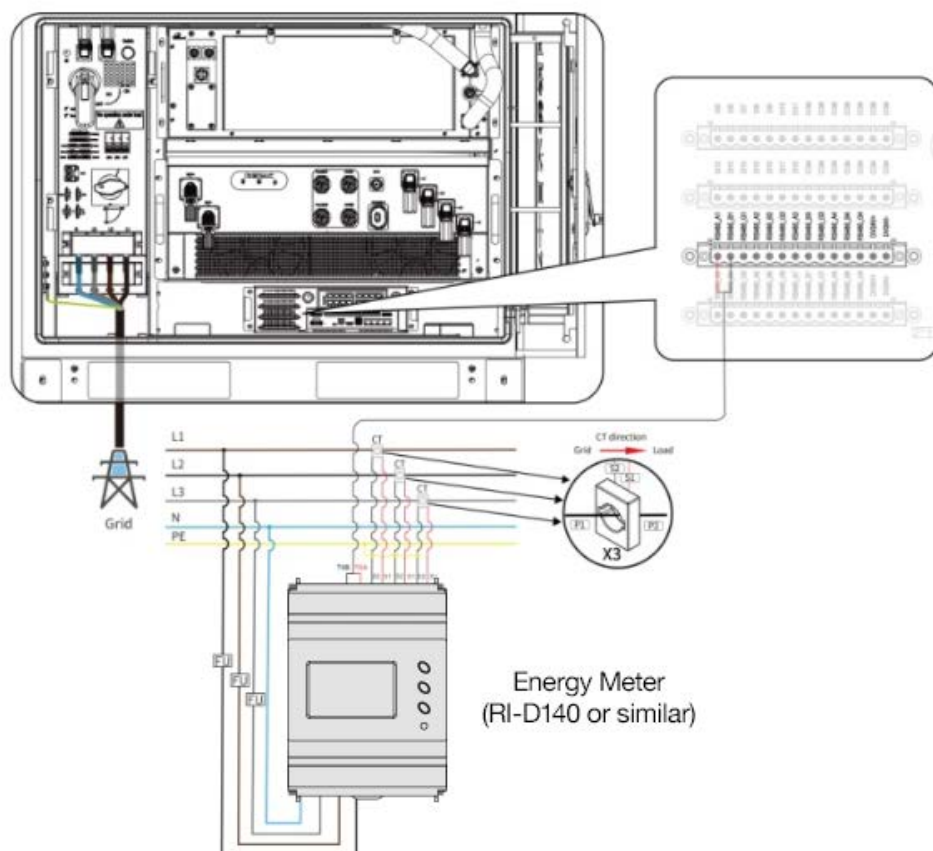
Note: Some STS-400-G/D versions are supplied without dedicated Grid and Diesel Generator (DG) busbars. In these versions, the Grid and DG power cables must be connected directly to the corresponding terminals of the Static Transfer Switch (STS).

Meter Installation - Wiring and CTs

The ESS-125-261 On-Grid configuration requires the installation of a Smart Meter to monitor the facility's power flow and enable the Energy Management System (EMS) to execute the configured operating strategy.

The Smart Meter continuously measures the power imported from and exported to the utility grid, providing real-time electrical data to the BESS. Based on this information, the EMS controls battery charging and discharging according to the selected operating mode, such as self-consumption optimization, peak shaving, or time-of-use (TOU) management.

The Smart Meter must be installed and wired as shown in the following diagram. Use the ports RS485_A1 and RS485_B1 to connect the communication of the meter with ESS-261.



The Current Transformers (CTs) must be installed with the arrow (current flow direction) pointing toward the load, as illustrated in the installation diagram. Incorrect CT orientation may result in inaccurate power measurements and improper BESS operation.

The CT is not supplied as a standard component with the ESS-125-261 and must be provided by the customer.

After selecting and installing the appropriate CT, configure the Smart Meter according to the selected CT ratio. The CT primary current and transformation ratio must be set to match the installed CT.

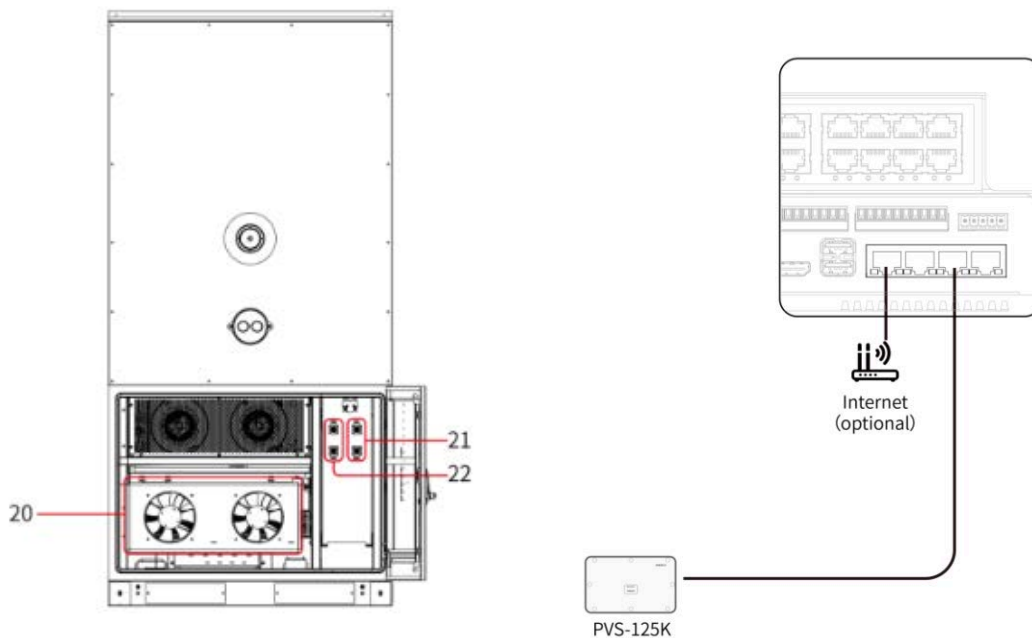
Incorrect CT selection or Smart Meter configuration may lead to inaccurate energy measurements, affecting the performance of functions such as self-consumption, peak shaving, and battery charge/discharge control.

PVS Cables Wiring (DC Coupling)

The PVS (PV String Combiner) enables the ESS-125-261 to integrate directly with a photovoltaic (PV) system through DC coupling, allowing the BESS to charge directly from the PV array.

The DC output of the PVS must be connected to DC Input number 22 of the ESS-125-261, while the PVS communication cable must be connected to EMS Communication Port 3, as shown in the wiring diagram below.

Once the installation is complete, configure the PVS parameters through the ESS-125-261 Supervisory Control Interface and confirm that PV generation and communication are operating correctly before placing the system into normal operation.



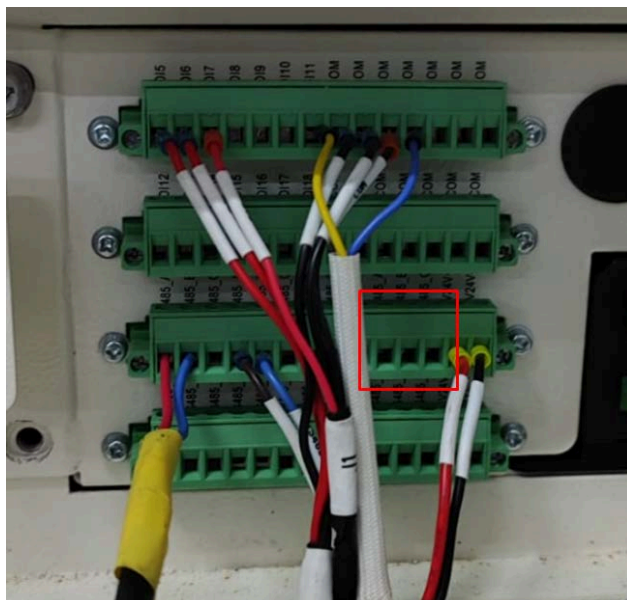
On-grid Inverter Communication Wiring (AC Coupling)

If the installation already includes an existing On-Grid PV inverter, a different connection method must be used.

Single PV Inverter

In this configuration, the On-Grid inverter must be connected directly to the utility grid rather than to the ESS-125-261. Additionally, a communication cable must be connected between the On-Grid inverter and the EMS of the ESS-125-261, as illustrated in the figure below on J3 Pin 10, 11 and 12 (RS485_A4, RS485_B4 and RS485_G4)

This communication link enables the EMS to monitor the inverter, coordinate energy management, and optimize battery charging and discharging according to the system operating strategy.

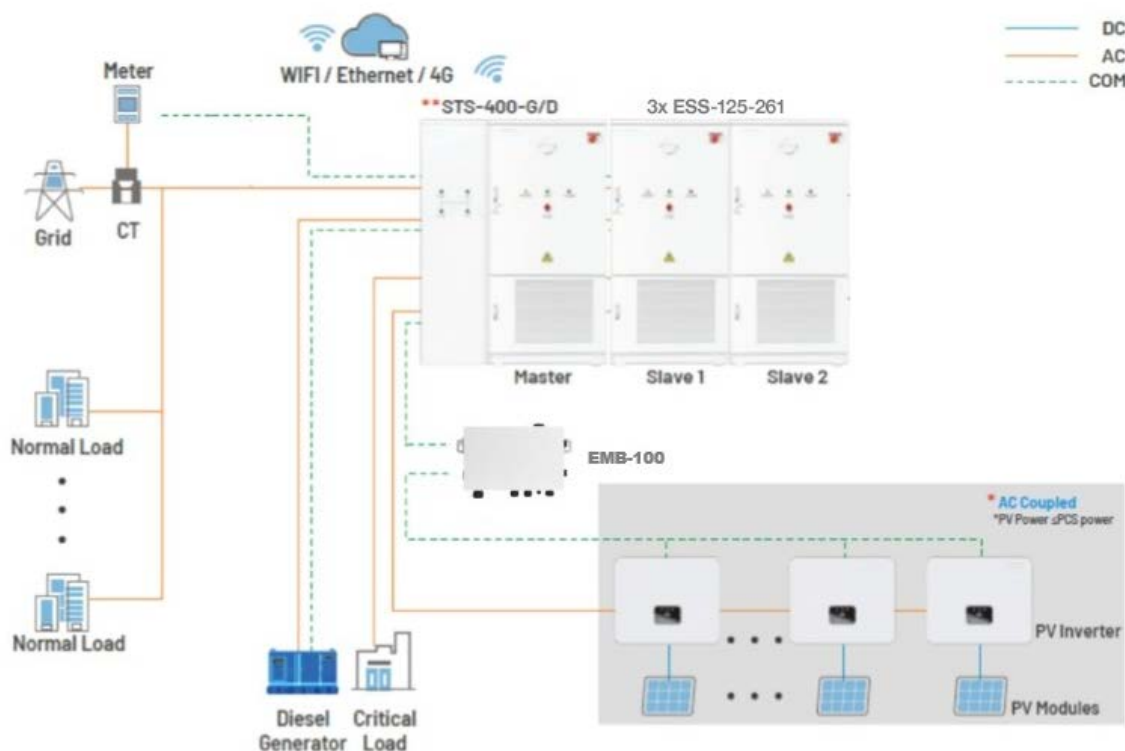


Multiple PV Inverters

When the system includes multiple on-grid PV inverters, an external EMB-100 (Energy Management Box) is required. The communication cables from all PV inverters are connected to the EMB, which collects and manages the communication data. A single TCP/IP communication cable is then connected between the EMB and the ESS EMS, providing centralized communication for all connected PV inverters.

Important:

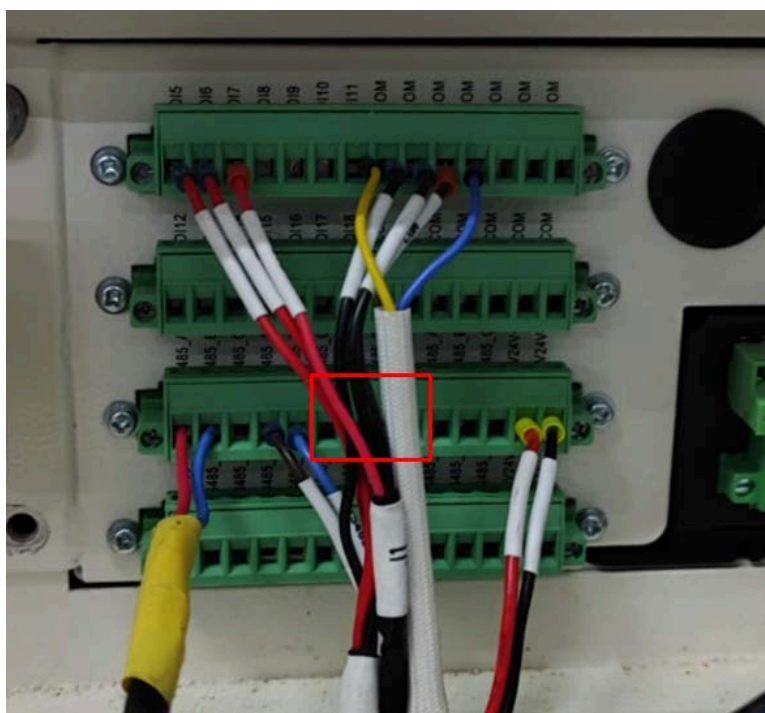
The EMB-100 is required whenever more than one on-grid PV inverter is integrated into the ESS-125-261 system. This architecture simplifies the communication network and enables centralized monitoring and control of all PV inverters by the EMS.



Diesel Generator Communication Wiring

The diesel generator (DG) communication with the EMS is established through a dry contact interface. The EMS uses this dry contact to automatically send start and stop commands to the generator according to the configured operating conditions, such as battery State of Charge (SOC) or system load demand. The figure below illustrates the correct wiring of the dry contact between the EMS and the diesel generator controller.

Connect the cable to connector **J3**, using **Pin 8 (RS485_A3)**, **Pin 9 (RS485_B3)**, and **Pin 10 (RS485_G3)**.



Supervisory Access Page

The Supervisory Control Interface provides real-time access to the operating status of the ESS-125-261 system. Through this interface, users can monitor battery status, power flow, charging and discharging data, system alarms, historical records, and all operating parameters.

It also allows users to perform the necessary system configuration, including communication settings, network parameters, and Wi-Fi configuration for remote monitoring and data transmission to the **rayleighconnect™** platform.

The Supervisory Control Interface can be accessed using the following methods:

- Ethernet cable connection
- Wi-Fi network connection

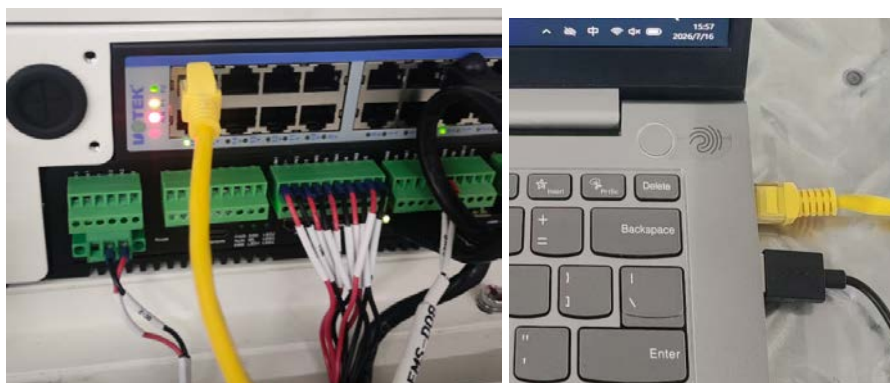
Accessing the Supervisory Control Interface via Ethernet

Required Materials

- Computer with an Ethernet communication interface (or a USB-to-RS485 adapter)
- Ethernet communication cable

Procedure:

1- Connect the Ethernet communication cable to the EMS RS485 communication port of the ESS-125-261, as shown in the figure below. Connect the other end of the cable to the RS485 interface (or Ethernet adapter) on your computer.



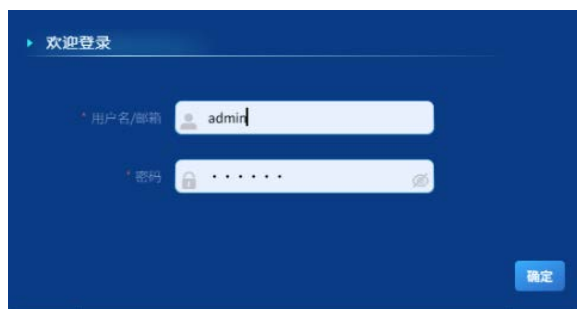
2- Open a web browser and enter the default IP address 192.168.1.100 in the address bar, then press Enter to access the ESS-125-261 Supervisory Control Interface.



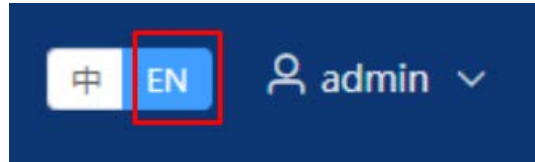
3- A login page will be displayed. Enter the default administrator credentials below and click Login to access the ESS-125-261 Supervisory Control Interface.

Username: admin

Password: 123123



4- The interface language can be changed by selecting EN in the upper-right corner of the page.



5- You now have access to the ESS-125-261 Supervisory Control Interface.

From this interface, you can monitor the system's operating status, view battery and energy data, review alarms and historical records, and configure the ESS-125-261 operating parameters.

The Supervisory Control Interface also allows you to configure the Wi-Fi connection, enabling communication with and remote monitoring of the ESS through a web browser-based platform.



Accessing the Supervisory Control Interface via Wi-Fi

Required Materials

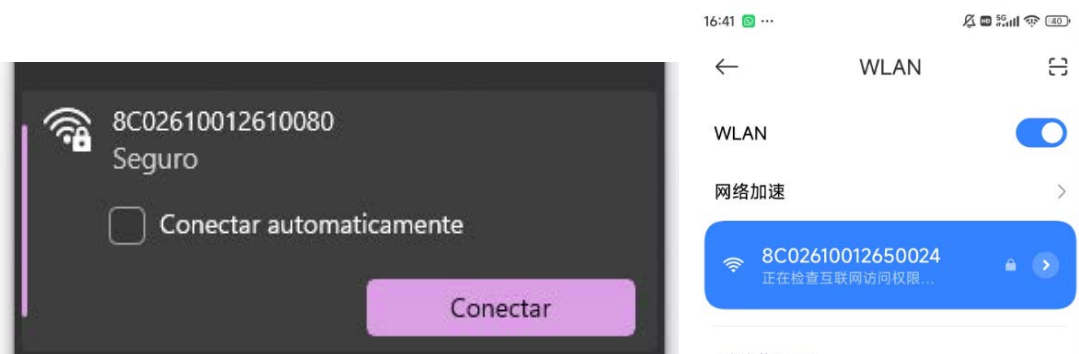
- Computer, smartphone, or tablet with Wi-Fi connectivity
- Wifi Antenna installed on ESS-125-261 port

Procedure:

1 - Power on the ESS-125-261 and wait for the EMS to complete its start-up sequence.

Once the start-up is complete, the EMS will automatically create a Wi-Fi network (Access Point). The default SSID is the ESS-125-261 serial number (S/N), and the network is protected by the factory default Wi-Fi password.

Connect your computer or mobile device to this Wi-Fi network before proceeding to the next step.



SSID: “EMS Serial Number (BESS) ”

Password: 12345678

2- Open a web browser and enter the default IP address 192.168.1.100 in the address bar, then press Enter.



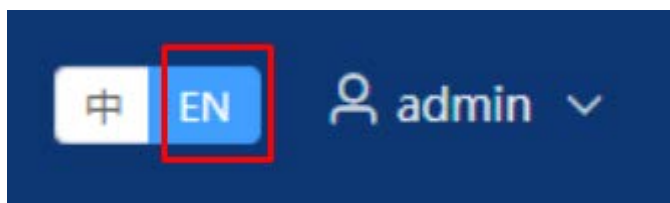
3- A login page will be displayed. Enter the default administrator credentials below and click Login.



Username: admin

Password: 123123

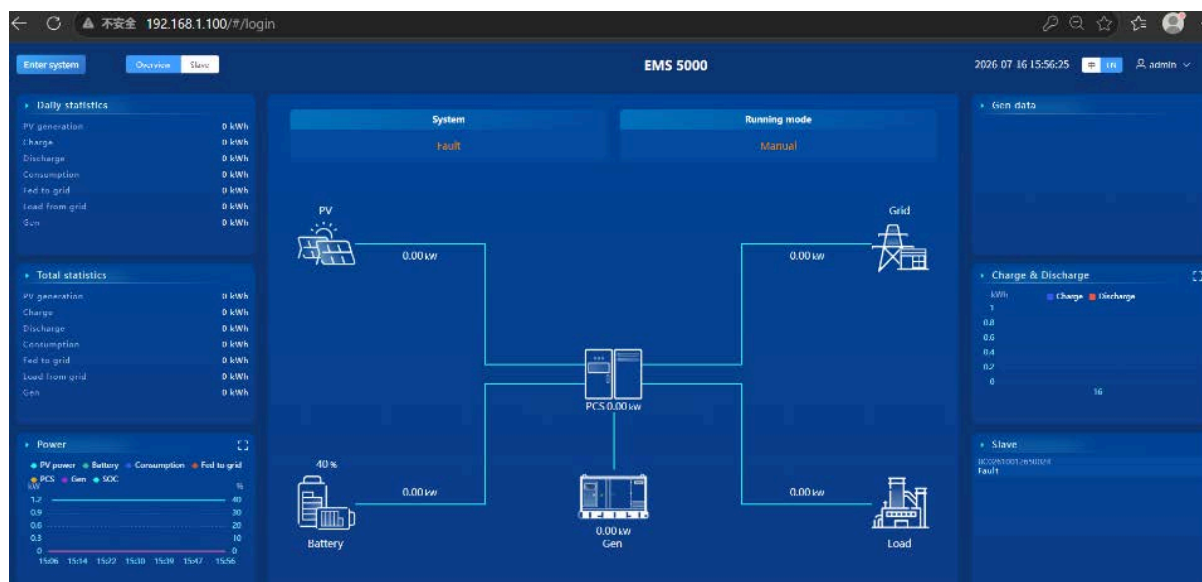
4- The interface language can be changed at any time by selecting EN in the upper-right corner of the page.



5- You now have full access to the ESS-125-261 Supervisory Control Interface.

From this interface, you can monitor the operating status of the BESS, view real-time system information, review alarms and historical records, and configure system parameters and user settings.

The Supervisory Control Interface also allows you to configure the Wi-Fi connection, enabling communication with and remote monitoring through the **rayleighconnect™** platform.

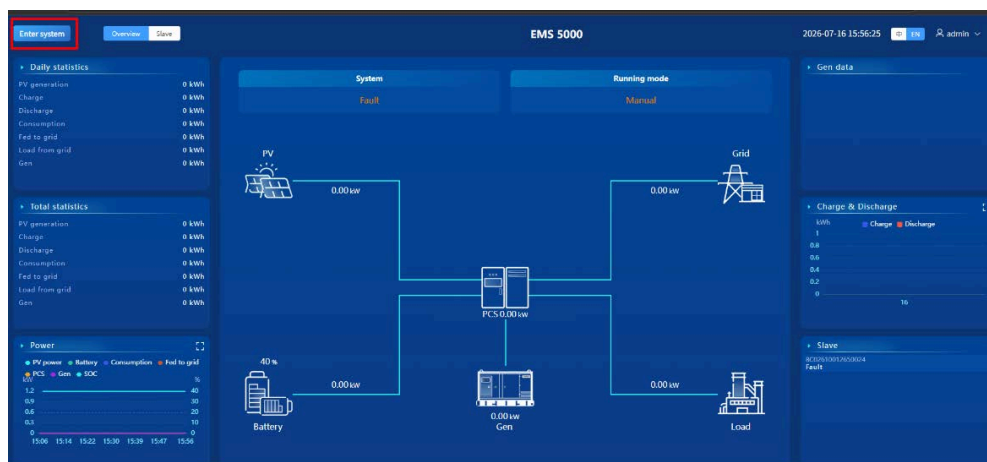


Add PVS on Supervisory System(DC couple)

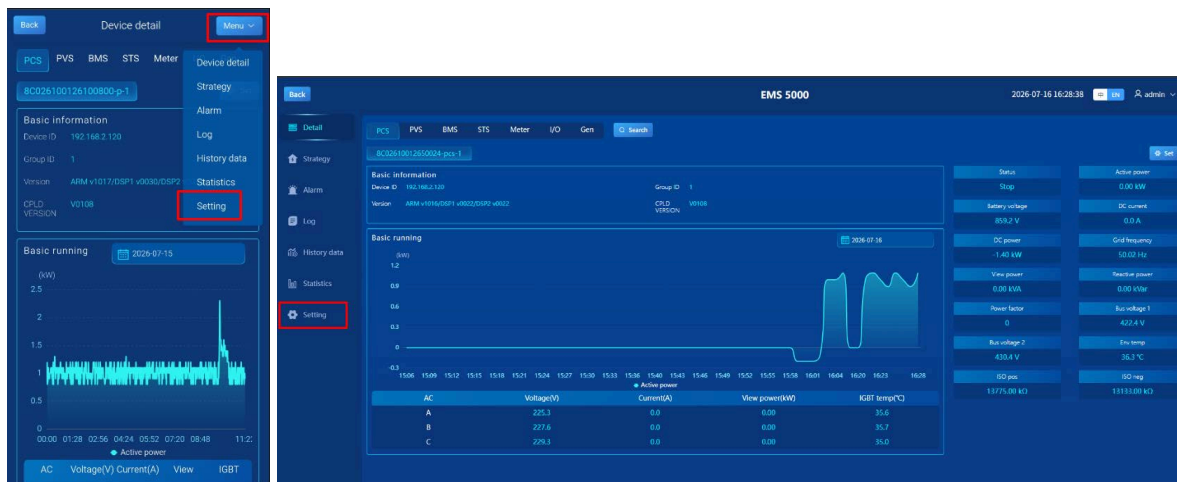
The PVS (PV String Combiner) is not pre-configured in the ESS-125-261 Supervisory Control Interface. After the electrical installation and communication wiring have been completed, the PVS must be manually added to the supervisory system before it can be monitored and managed.

Follow the steps below to add a new PVS to the Supervisory Control Interface and enable PV monitoring.

1- Select the Enter System button on the home page, as shown in the figure below.



2- Select the Menu button, then navigate to Settings, as shown in the figure below.



3- Select Device and +Add and enter the device information as shown below:

- **ID:** 192.168.3.120
- **SN:** PVS Serial Number
- **Device type:** PVS
- **Group ID:** 1

Add device

* Device ID

Device SN

* Device type

* Group ID

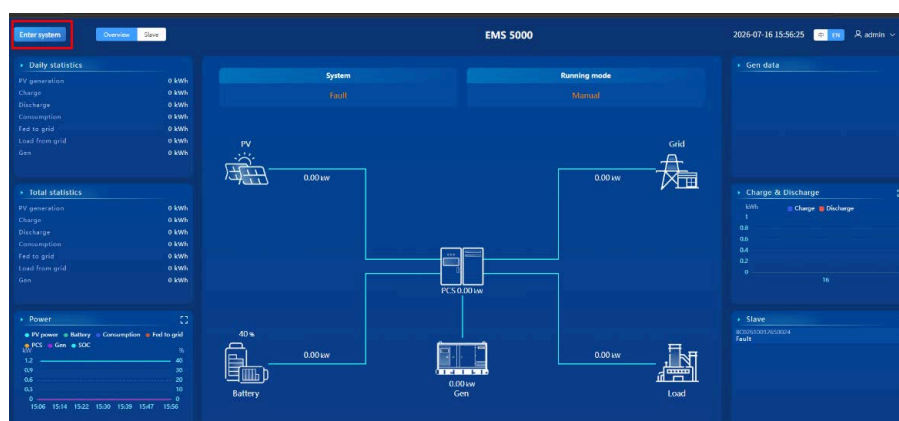
After entering the required information, verify that all values are correct and click Ok to register the PVS in the Supervisory Control Interface.

Add Meter On Supervisory System

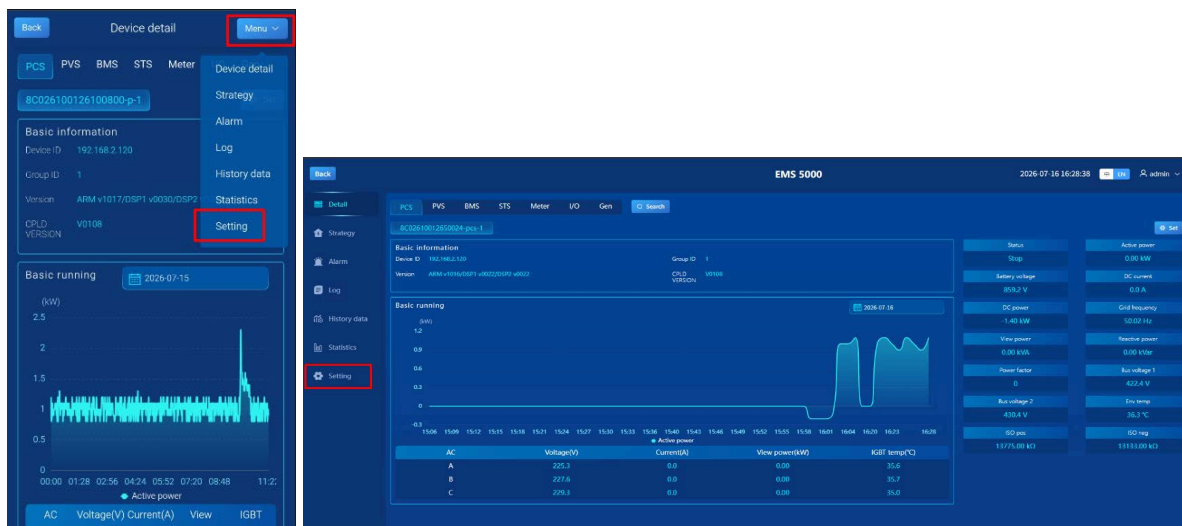
The grid meter is not pre-configured in the ESS-125-261 Supervisory Control Interface. After the electrical installation and communication wiring have been completed, the meter must be manually added to the supervisory system before it can be monitored and managed.

Follow the steps below to add a new meter to the Supervisory Control Interface and enable grid monitoring.

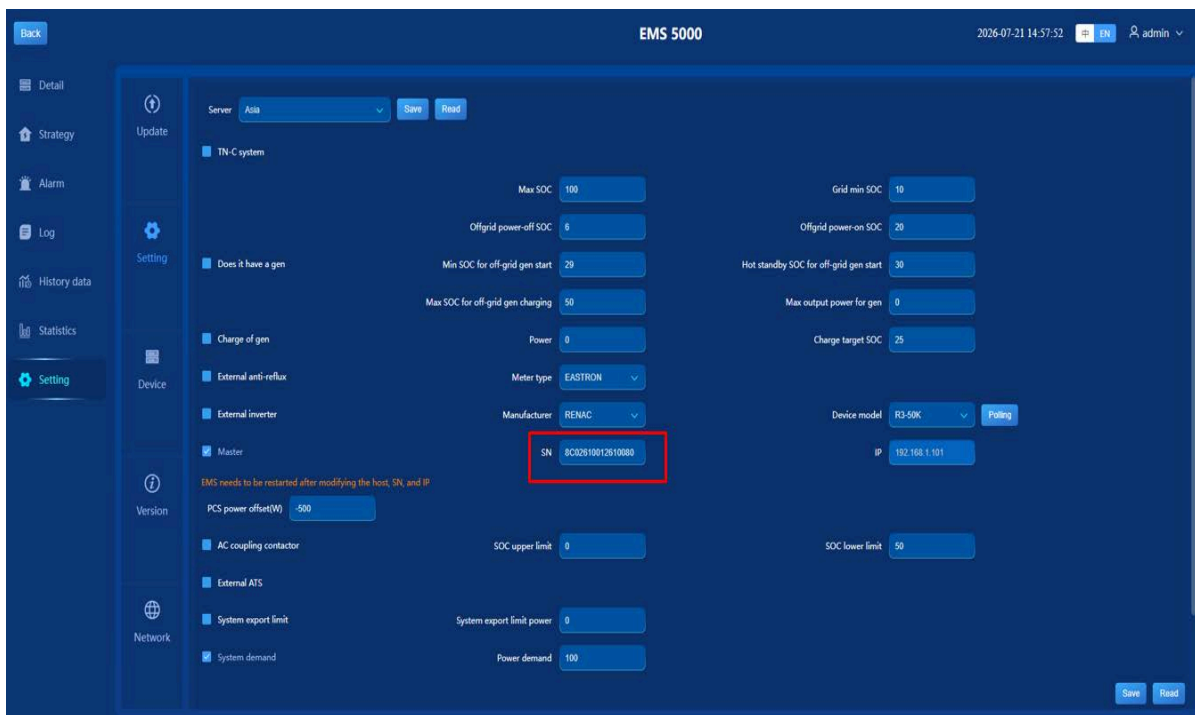
1- Select the Enter System button on the home page, as shown in the figure below.



2- Select the Menu button, then navigate to Settings, as shown in the figure below.

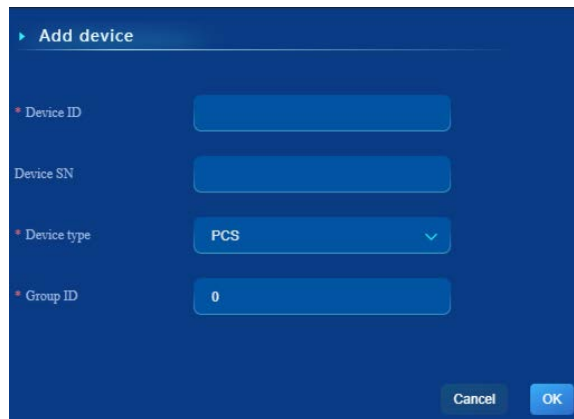


3- From the Settings menu, locate and copy the ESS Serial Number, as shown in the figure below. This serial number will be required when registering the meter in the Supervisory Control Interface.



4- Select Add a Device and enter the device information as shown below:

- **ID:** RS485-1
- **SN:** ESS Serial Number(step 3)
- **Device Type:** Meter
- **GROUP:**1



▶ Add device

* Device ID

Device SN

* Device type

* Group ID

Cancel OK

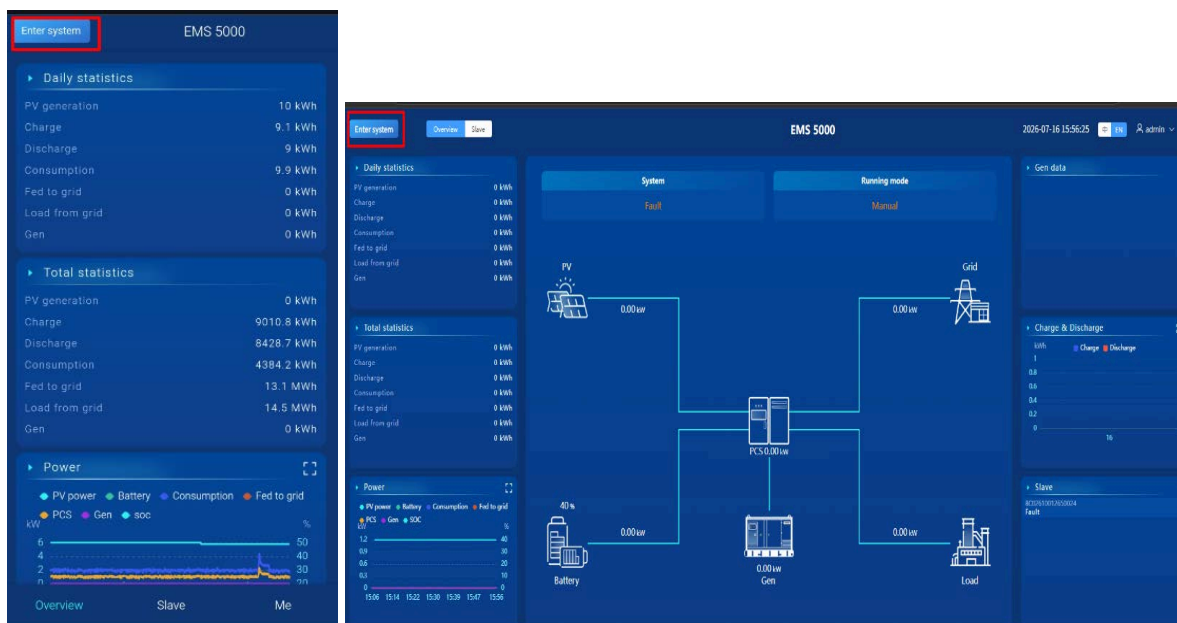
After entering the required information, verify that all values are correct and click Save to register the Meter in the Supervisory Control Interface.

Connecting the ESS-125-261 to the Site Wi-Fi Network for Remote Monitoring

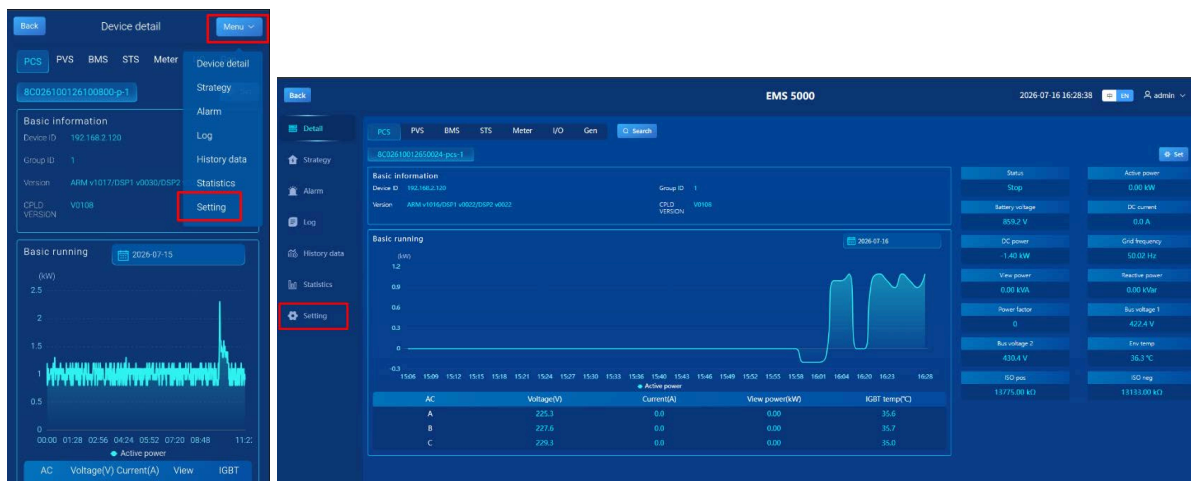
First, verify if the antenna is installed as in the picture.



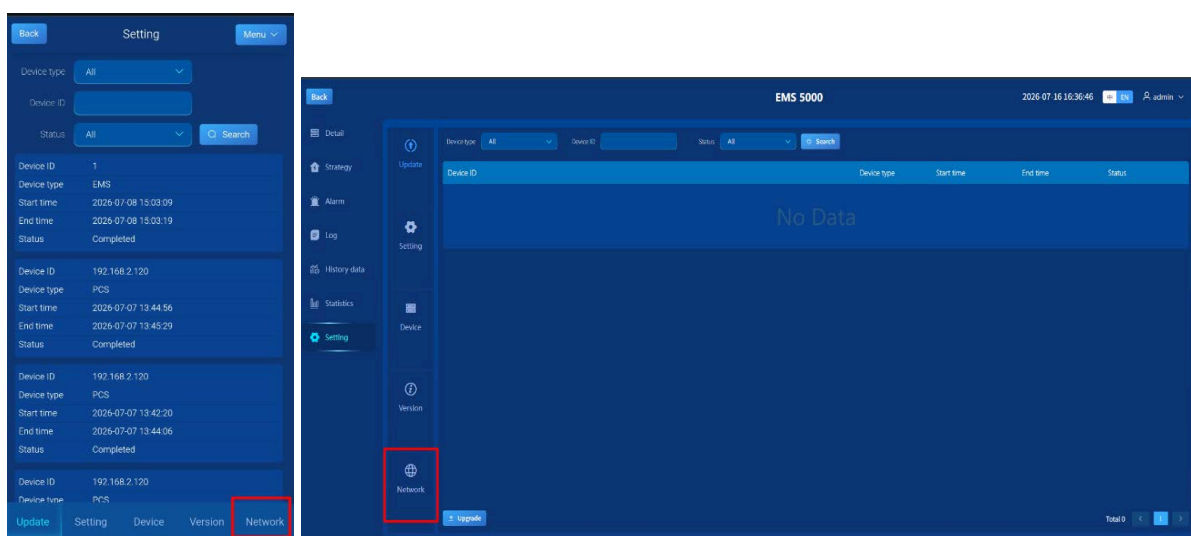
1- To connect the ESS-125-261 to the site's Wi-Fi network and enable remote monitoring through the **rayleighconnect™** platform, select the Enter System button on the home page, as shown in the figure below.



2- Select the Menu button, then navigate to Settings, as shown in the figure below.



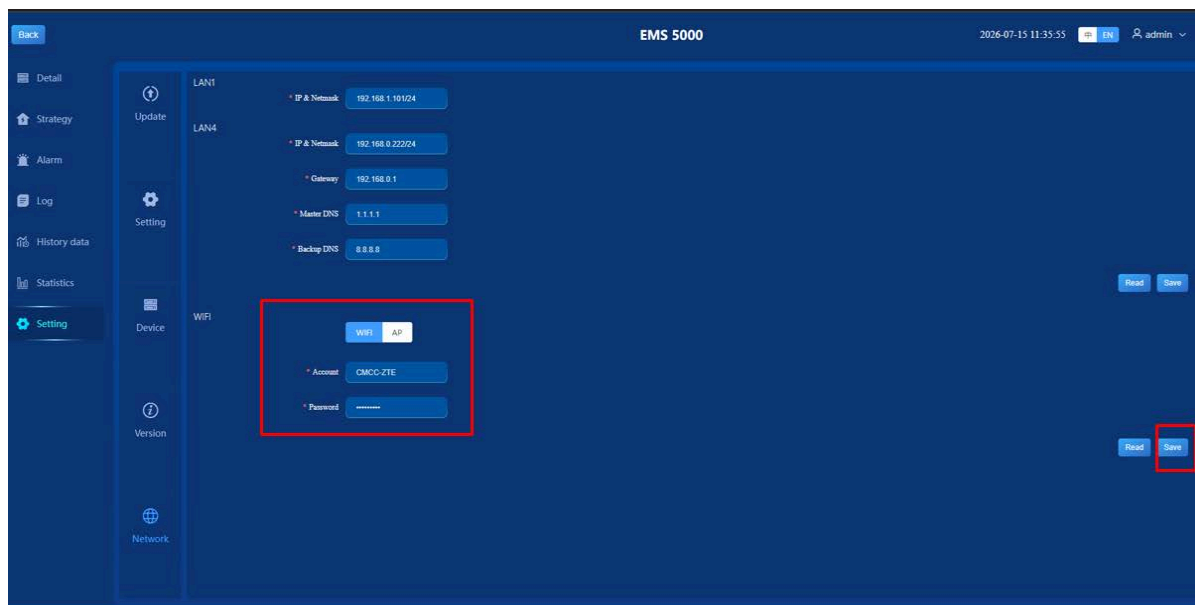
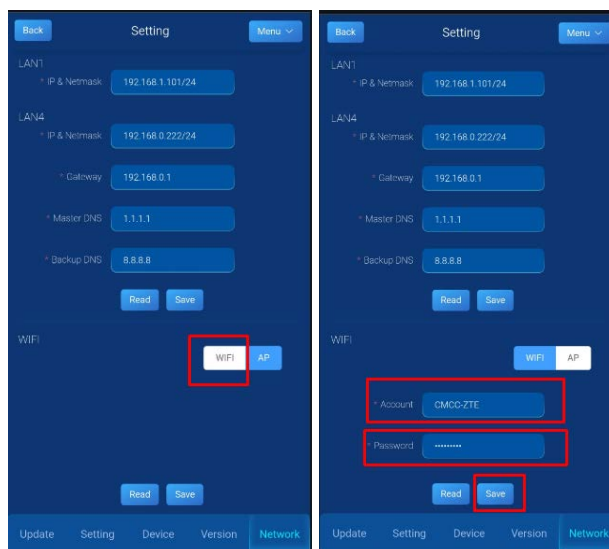
3- In the Settings menu, select Network, as shown in the figure below.



4- Select the Wi-Fi tab and enter the credentials for the site's wireless network.

Note: Only 2.4 GHz Wi-Fi networks are supported.

After entering the network information, verify that the SSID and Password are correct, then click Save to apply the settings.

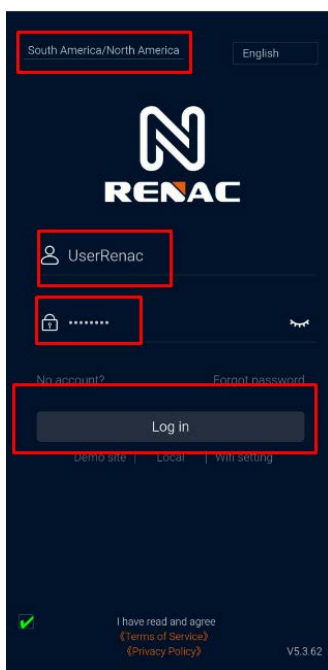


5- Once the Wi-Fi configuration has been saved successfully, the ESS-125-261 will automatically connect to the selected Wi-Fi network.

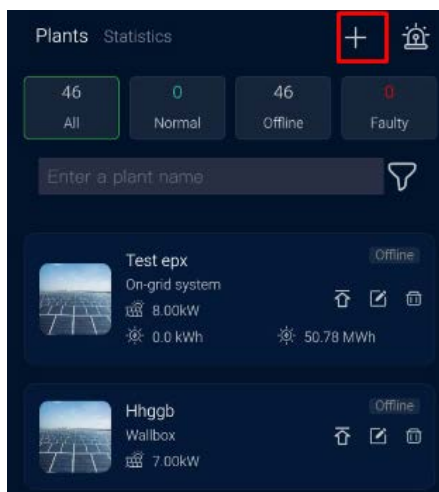
The BESS is now ready to be added to a **rayleighconnect™** monitoring plant for remote monitoring and system management.

Creating a BESS Monitoring Plant in the RENACSEC App

1 – Open the RENACSEC App. Select the appropriate Data Center for your region, enter your username and password, then tap Log in.



2 – After logging in, the **Plants** page will be displayed. Tap the "+" (Add) icon located in the upper-right corner of the screen.



3 – Enter the Plant Information and complete the required fields as shown below and tap **Submit** to create the monitoring plant.

- **Plant Name** – Enter the project name.
- **Installer** – Select the installer account.
- **End User** – Enter the customer name.
- **System Size (kW)** – Enter the rated system power.
- **Installation Date** – Select the installation date.
- **Plant Type** – Select **C&I ESS**.
- **EMS SN** – Enter the serial number printed on the EMS label.
- **Energy Rate** – Enter the local electricity tariff.
- **Time Zone** – Select the correct time zone.
- **Longitude / Latitude** – Enter the installation location or use the location icon to obtain the GPS coordinates automatically.
- **Plant Photos (Optional)** – Upload a photo of the installation site if required.

The image displays two side-by-side screenshots of a mobile application's 'Add station' form. The left screenshot shows the form with all fields filled out: Plant name (Name of the plant for BESS), Installer (Renac Installer), End user (Antonelli), System size (kW) (125), Installation date (2026-07-23), Plant type (C&I ESS), EMS SN (LABEL SERIAL NUMBER), Energy rate (1 \$), Time Zone (Brasilia (-3.00)), and Longitude (-180~180). The right screenshot shows the same form with the 'Submit' button highlighted by a red rectangle.

Start Up Parallel ESS-125-261 Configuration (more than one ESS-125-261)

When multiple ESS-125-261 units are connected in parallel, additional configuration steps are required to ensure proper communication and coordinated system operation.

The first step is to designate one ESS-125-261 unit as the Master. The Master unit is responsible for managing all parallel-connected battery storage systems and serving as the primary communication gateway for the entire BESS installation.

The Master ESS-125-261 performs the following functions:

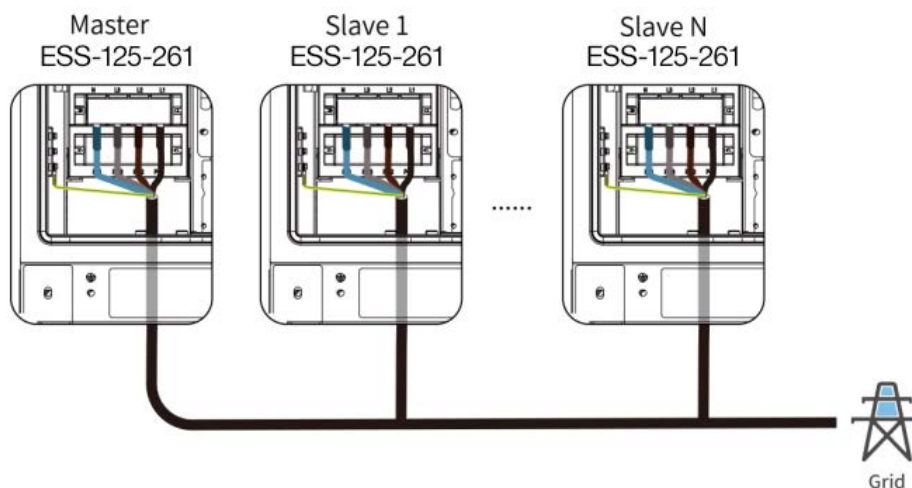
- Controls and coordinates the operation of all parallel ESS-125-261 units.
- Collects operational data from all Slave units.
- Communicates with the Smart Meter to monitor the facility's power flow.
- Communicates with the Energy Management System (EMS) and executes the selected operating strategy.

All remaining ESS-125-261 units must be configured as Slave units. These units communicate exclusively with the Master and do not connect directly to the Smart Meter or the monitoring platform.

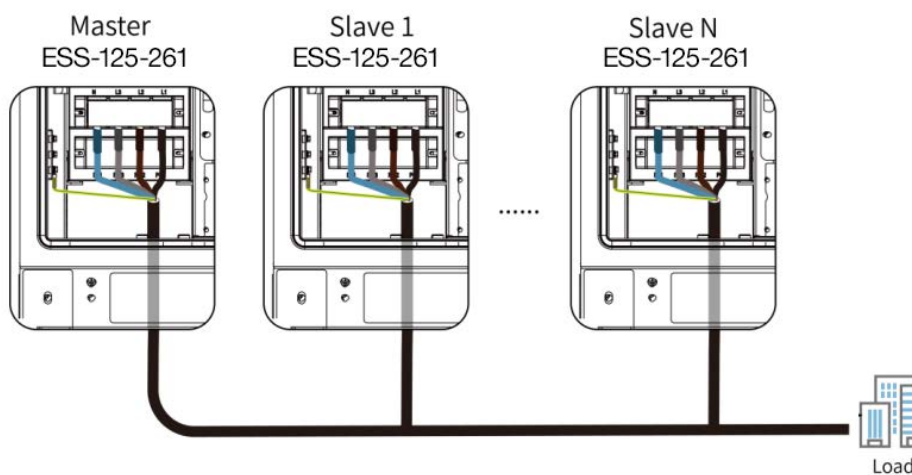
Therefore, the Smart Meter communication cable and the communication network connecting the parallel ESS-125-261 units must always be connected to the Master unit, as illustrated in the following wiring diagram. This configuration ensures synchronized operation and reliable communication across the entire energy storage system.

Cable Wiring For Parallel ESS-125-261

units: For Exclusive Ongrid :

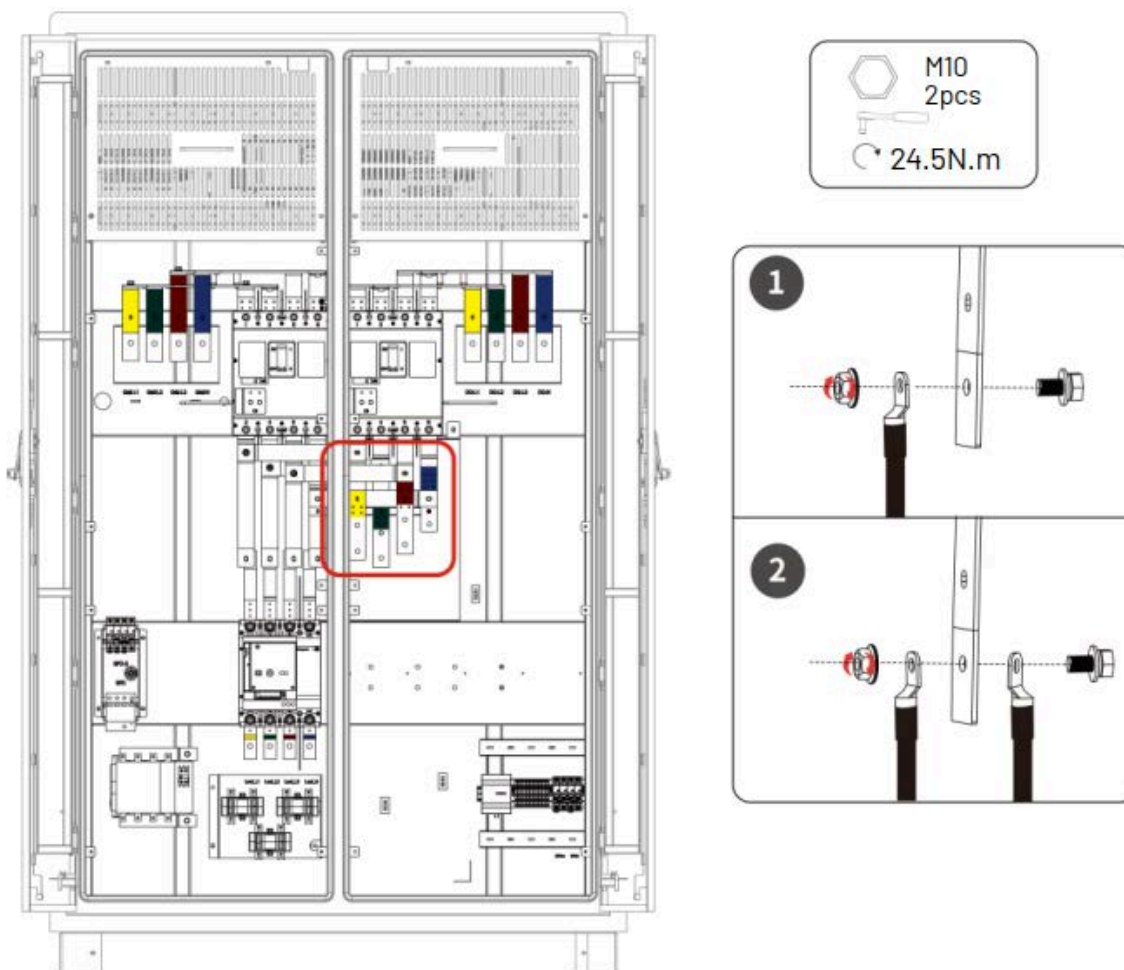


For Exclusive Offgrid System :



For On/Off-Grid switching System :

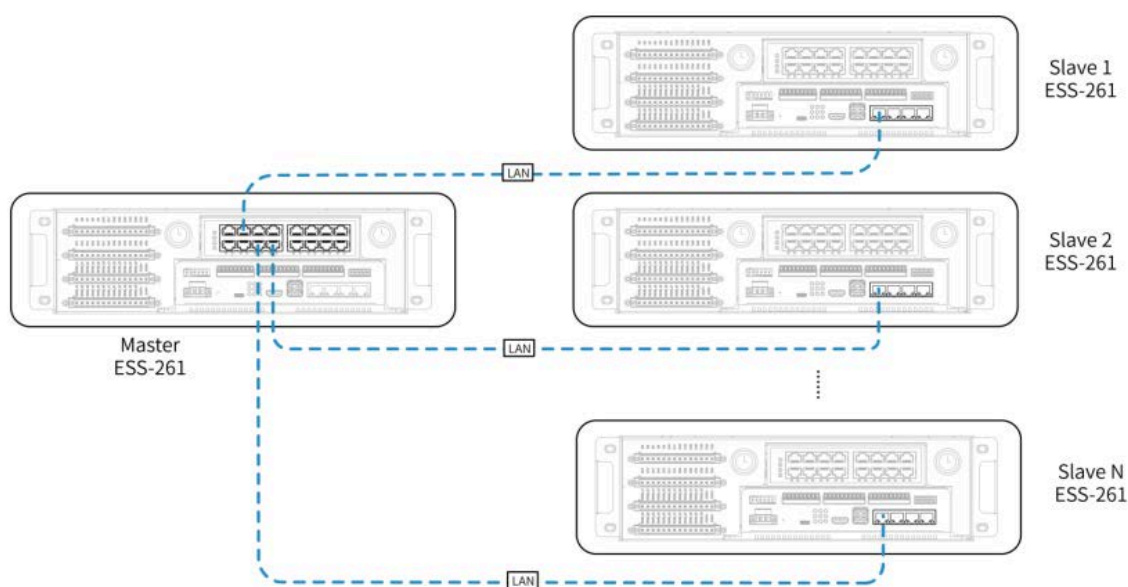
Connect the prepared cables to the ESS-125-261 PDU Grid Ports. If one STS-400 connects to one ESS-125-261, use Method 1. If one STS-400 connects to three ESS-125-261 units, use Method 2.



Communication Cable Wiring for Parallel ESS-125-261 Systems:

For Exclusive Ongrid or Offgrid System

The EMS communication cable must be connected between the EMS controllers of all battery systems, as illustrated in the figure below. This communication network allows the Master EMS to coordinate system operation, synchronize the battery banks, and manage the parallel operation of all connected ESS units.



For On/Off-Grid Switching System :

The EMS communication network described above is also required. In addition, a parallel communication cable must be connected between the PCS units of all ESS-125-261 systems, as shown in the corresponding wiring diagram. The PCS communication is essential to synchronize inverter operation during grid-forming and grid-following modes, ensuring stable transitions between On-Grid and Off-Grid operation and reliable power sharing among all parallel battery systems.



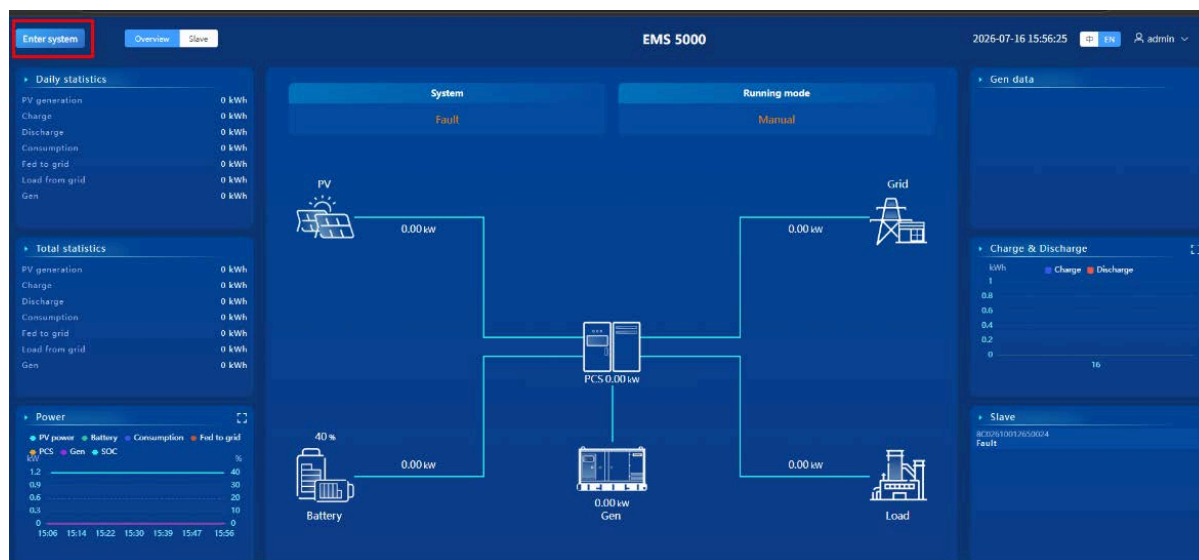
Set Supervisory Control Access for Parallel ESS-125-261 Systems

When multiple ESS-125-261 units are installed in parallel, each unit must be assigned a unique IP address before the supervisory control system can be used. This ensures reliable communication between all ESS-125-261 units and allows the Master unit to manage the complete BESS installation correctly.

To configure the IP address of each ESS-125-261 unit, follow the procedure below.

IP Address Configuration Procedure

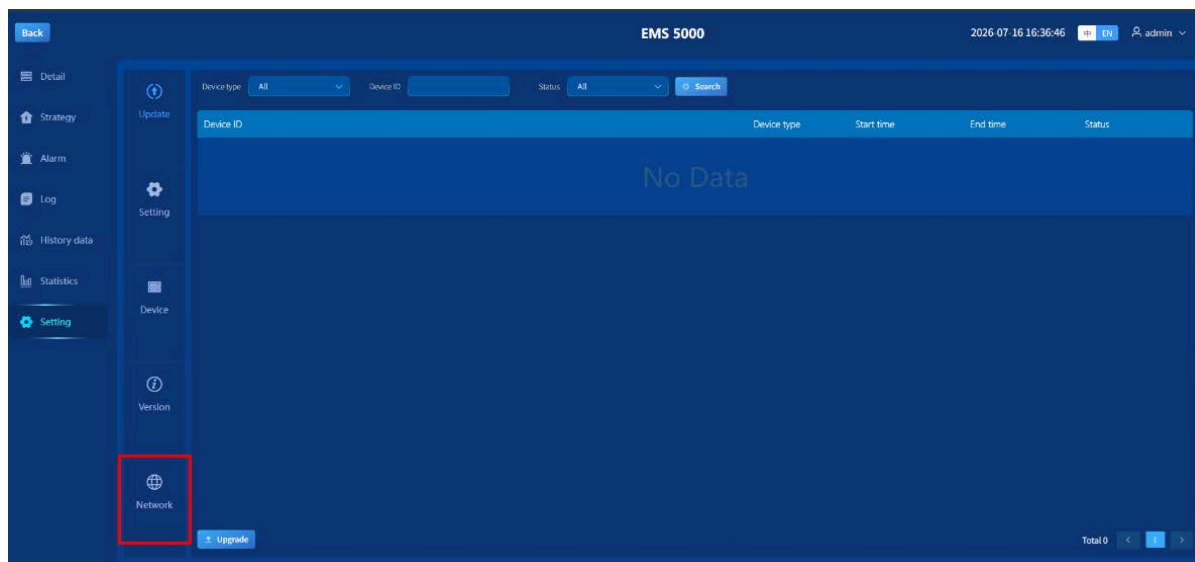
- 1- Power on only one ESS-125-261 unit. Ensure that all other battery storage units remain powered off during the configuration process.
- 2- Access the Supervisory Control Interface..
- 3- On the main screen, select **Enter System**.



4- Select **Settings**. If prompted for a password, enter **123123** to access the configuration menu.

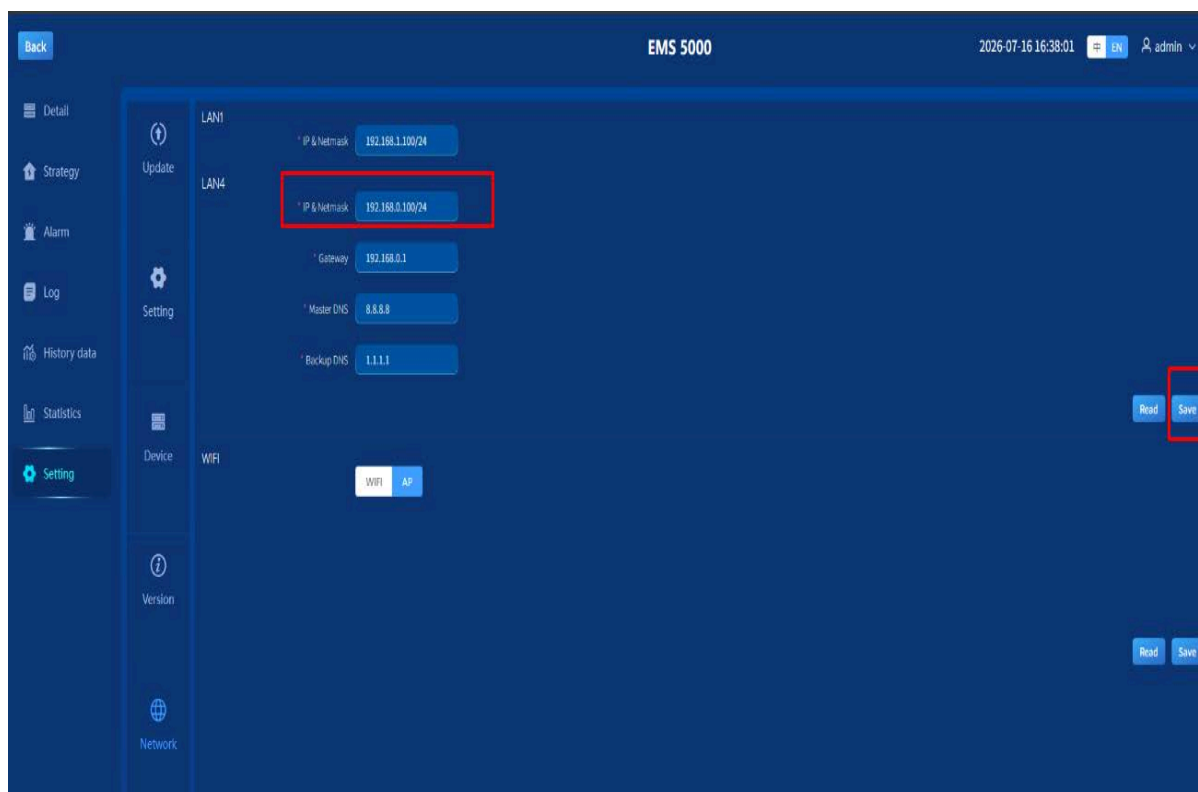


5- Select **Network** menu to access the communication and network configuration settings.



6- Within the Network menu, **assign a unique IP address to each ESS-125-261** unit. Every battery storage system connected in parallel must have a different IP address to ensure proper communication and reliable operation of the supervisory control system.

Note: Record the IP address assigned to each ESS-125-261 unit for future maintenance and troubleshooting. Avoid assigning duplicate IP addresses, as this may cause communication failures or system malfunctions.



7- **Modify the LAN4 IP** Address and Netmask so that each ESS-125-261 unit has a unique IP address for communication and supervisory control access.

For example:

ESS-125-261 Unit	LAN4 IP Address / Netmask
ESS-261#1 (Master)	192.168.0.111/24
ESS-261 #2	192.168.0.112/24
ESS-261 #3	192.168.0.113/24
ESS-261 #4	192.168.0.114/24

After entering the new IP address and Netmask, click **Save** to apply the changes.

Important: Ensure that each ESS-125-261 unit is assigned a unique IP address within the same subnet. Duplicate IP addresses will cause communication conflicts and may prevent the parallel system from operating correctly.

8- Power off the first ESS-125-261 unit and power on the second unit. **Repeat** the IP configuration procedure described in the previous steps to assign a unique LAN4 IP Address/Netmask. For example:

ESS-261 #2

LAN4 IP Address / Netmask: 192.168.0.112/24

After entering the new IP address and Netmask, click **Save** to apply the changes.

Important: Configure only one ESS-125-261 unit at a time during the IP assignment process. This prevents IP address conflicts and ensures that each unit can be identified correctly by the supervisory control system.

9- After assigning a unique IP address to each ESS-125-261 unit, the Supervisory Control Interface can be accessed through a web browser using the newly configured IP address of the desired battery storage system.

Record the IP address assigned to each ESS-125-261 unit and keep this information in a safe location for future maintenance and troubleshooting. Proper documentation of the network configuration will simplify future access to the supervisory control interface and help prevent communication issues.

10- The next step is to **set on EMS** which ESS-125-261 unit will operate as the **Master**.

Only one ESS-125-261 unit can be configured as the Master. All other units in the parallel system must be configured as Slave units and communicate exclusively with the Master

Set Master ESS-125-261 on Supervisory Control Access

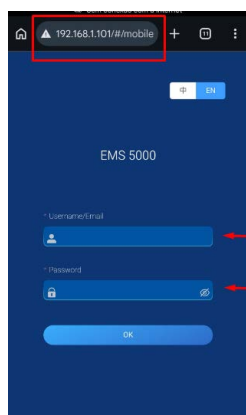
The following procedure describes how to configure the Master ESS-125-261 unit when multiple battery storage systems are installed in parallel.

1- **Open a web** browser and access the Supervisory Control Interface of the ESS-261 unit that will be configured as the Master using the IP address assigned.

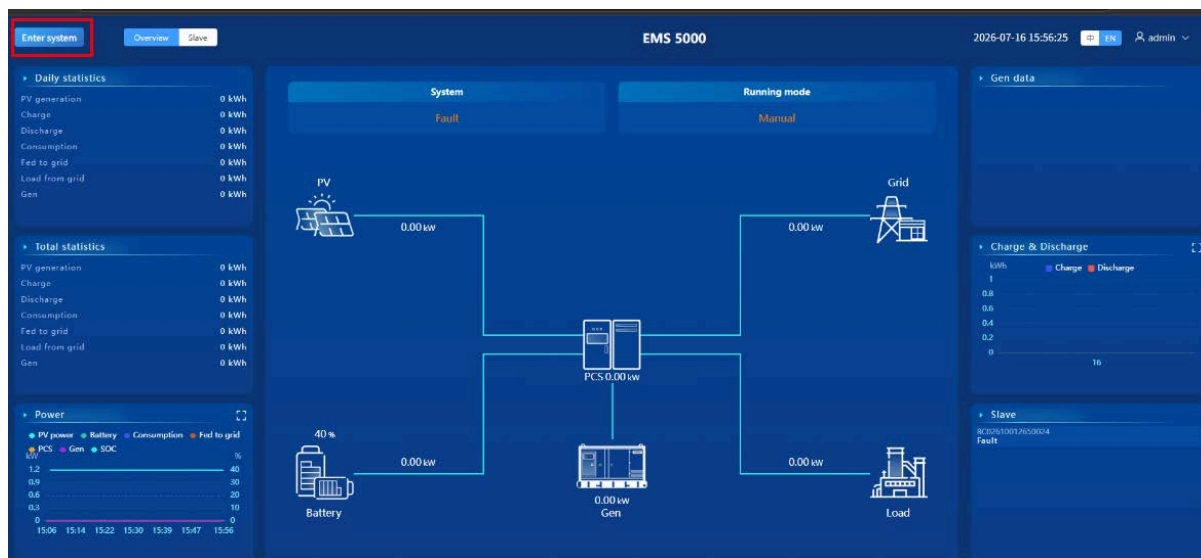
2- **Log in** to the Supervisory Control Interface using the default administrator credentials:

Username: admin

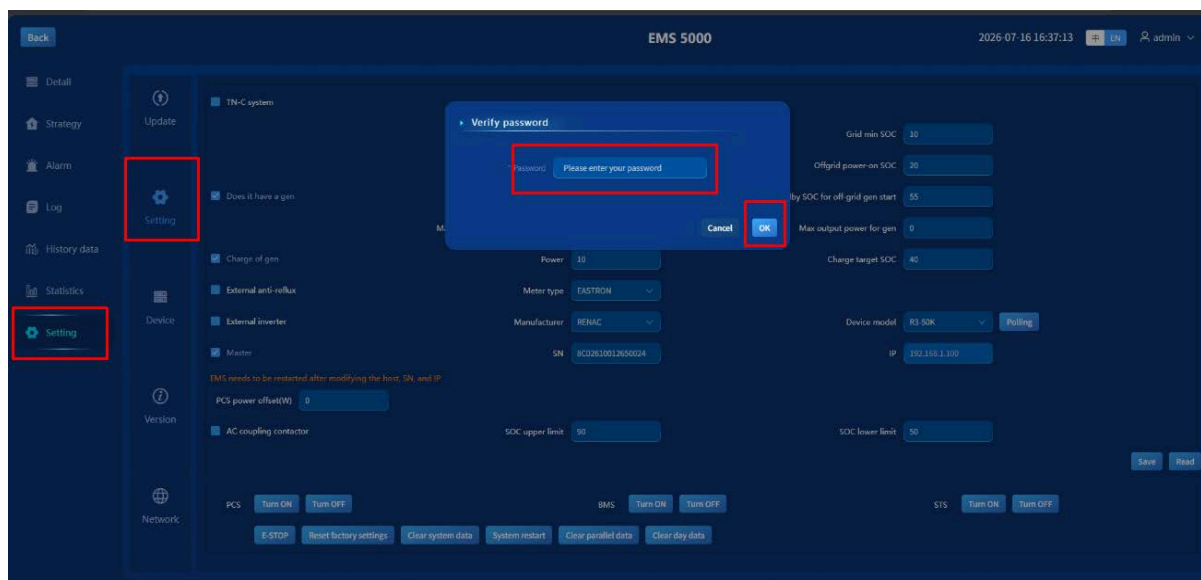
Password: 123123



3- On the main screen, select **Enter System**



4- Select **Settings**, enter the configuration password 123123, and then click OK to access the advanced system settings.



5- **Enable the Master option** by selecting the Master checkbox, then click Save to apply the configuration.

Important:

- Only one ESS-125-261 unit in the parallel system must be configured as the Master.
- Ensure that the Master check-box is disabled on all other ESS-125-261 units, which must operate as Slave units.
- Access the Supervisory Control Interface of each ESS-125-261 unit using its assigned IP address to verify that only the designated Master has the Master option enabled. Incorrect Master/Slave configuration may result in communication failures and improper operation of the parallel ESS system.

The screenshot displays the 'Setting' page for an EMS 5000 system. The left sidebar contains navigation options: Back, Detail, Strategy, Alarm, Log, History data, Statistics, Setting (highlighted), Device, Version, and Network. The main content area is titled 'Update' and lists various configuration parameters. The 'Master' checkbox under the 'Device' section is highlighted with a red box. Other parameters include Min SOC (100), Offgrid power off SOC (6), Min SOC for off-grid gen start (50), Max SOC for off-grid gen charging (80), Power (10), Meter type (EASTRON), Manufacturer (RENAC), SN (8C02610012600024), Grid min SOC (10), Offgrid power on SOC (20), Hot standby SOC for off-grid gen start (55), Max output power for gen (0), Charge target SOC (40), Device model (R3-50K), IP (192.168.1.100), PCS power offset(W) (0), SOC upper limit (90), and SOC lower limit (50). At the bottom right, the 'Save' button is highlighted with a red box. The top right corner shows the date and time (2026-07-16 16:37:40) and the user (admin).

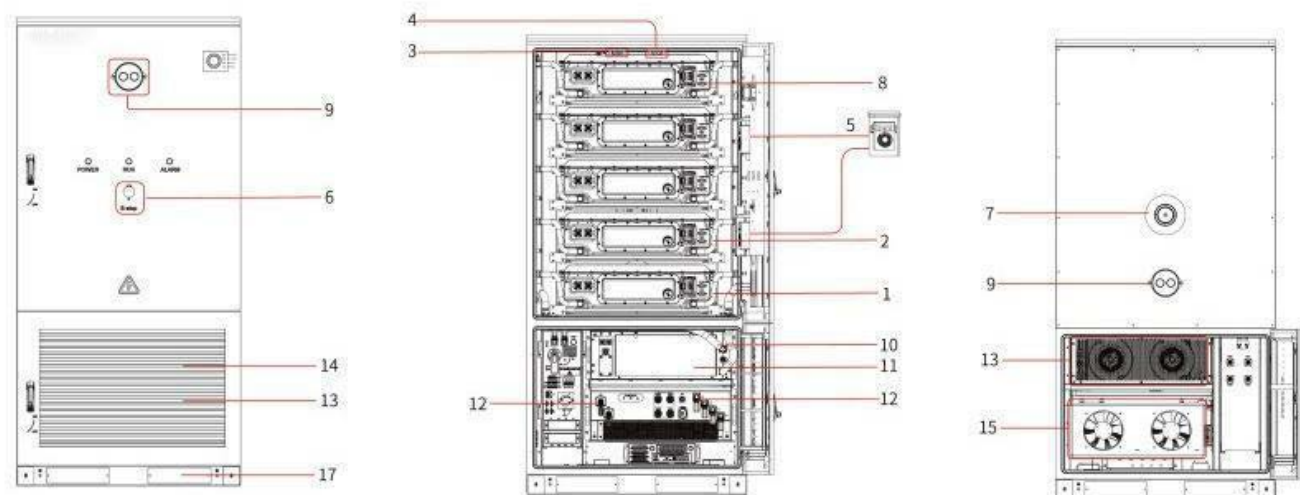
Periodic Maintenance and Commissioning

The table below summarizes the recommended periodic inspection, maintenance, and commissioning procedures for the ESS-125-261 system. Performing these inspections at the recommended intervals is essential to ensure safe operation, optimal performance, and long-term system reliability.

Special attention should be given to the recommended inspection intervals indicated in the table. Following the prescribed maintenance schedule helps identify potential issues before they affect system performance or safety.

It is strongly recommended that all maintenance and commissioning procedures be performed only by qualified and authorized personnel who are trained to work with high-voltage Battery Energy Storage Systems (BESS) and are familiar with the applicable local electrical codes and safety regulations.

Routine maintenance is an essential part of the full life-cycle management of energy storage cabinets. Please carry out the following maintenance tasks:



Figure— Maintenance area

Inspection Area	Item	Maintenance Task	Maintenance Interval			Inspection / Maintenance Method
			Monthly	6 Months	5-Year	
Battery Compartment	1	Inspect for signs of coolant or liquid leakage.	√			Visual inspection
	2	Check for abnormal odor inside compartment	√			Check for abnormal odors indicating overheating or insulation degradation.
	3	Verify proper operation of the smoke detection system.		√		Test using an integrated smoke and temperature simulator
	4	Verify the accuracy and functionality of the temperature sensors.		√		Test using an integrated smoke and temperature simulator
	5	Verify humidity controller operation and recorded values.		√		Check controller display
	6	Test the Emergency Stop (E-Stop) button to confirm correct functionality.		√		Functional test

	7	Inspect the water intrusion detection system and verify there is no evidence of moisture ingress.		√		Visual inspection
	8	Measure the temperature of electrical power connections to identify abnormal heating	√			Infrared thermography
	9	Inspect the explosion relief valve for mechanical integrity and proper operation.		√		Manual functional inspection
Control Compartment	10	Verify Liquid cooling unit pressure (bar)	√	Refil to 2 bar	Replace coolant	Read from EMS monitoring
	11	Inspect the compartment for coolant or liquid leakage.	√			Visual inspection
	12	Measure electrical connection temperatures.	√			Infrared thermometer

	13	Inspect air filters for dust accumulation.	√	Filter Cleaning		Visual inspection
	14	Verify that ventilation openings are unobstructed and free of foreign objects.	√			Visual inspection
	15	Check cooling fan operation for abnormal noise or vibration. Clean accumulated dust when necessary.	√	Clean Fan Dust		Auditory check
Others	16	Ensure no combustible or flammable materials are stored near the equipment.	√			Visual inspection
	17	Verify the integrity of enclosure and cable entry seals.	√			Visual inspection

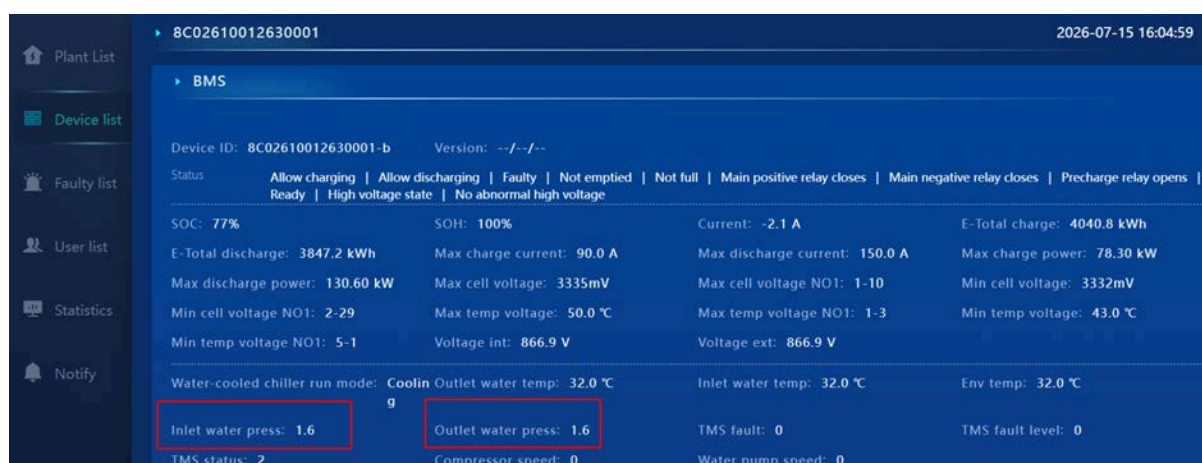
Water Cooling System Maintenance

The coolant pressure of the water cooling system must be inspected every six (6) months to ensure proper cooling performance and reliable operation of the ESS-125-261.

During the inspection, verify that the coolant pressure is greater than 1 bar.

- Normal Condition: Coolant pressure > 1 bar
- Maintenance Required: Coolant pressure < 1 bar

If the measured pressure is below 1 MPa, coolant must be added to the water cooling system until the pressure returns to the specified operating range.



The coolant specification is provided below:

Indicator	Parameter	Unit
Appearance (Color)	Blue transparent liquid	/
Odor	No irritating odor	/
pH	≥7	/
Conductivity	2000–4000	μS/cm
Reserve Alkalinity	>2	mL
Turbidity	<5	NTU
Total Bacteria Count	<100	CFU/mL
Copper (Cu)	<5	mg/L
Silicon (Si)	<5	mg/L
Aluminum (Al)	<5	mg/L
Iron (Fe)	<5	mg/L
Chloride (Cl ⁻)	<20	mg/L
Sulfate (SO ₄ ²⁻)	<50	mg/L
Total Hardness (as CaCO ₃)	<20	mg/L

A manual or automatic filling pump may be used to add coolant to the water cooling system when the coolant pressure falls below the recommended operating value.

The figure below shows an example of a manual filling pump commonly used to refill the cooling circuit during the maintenance procedure.



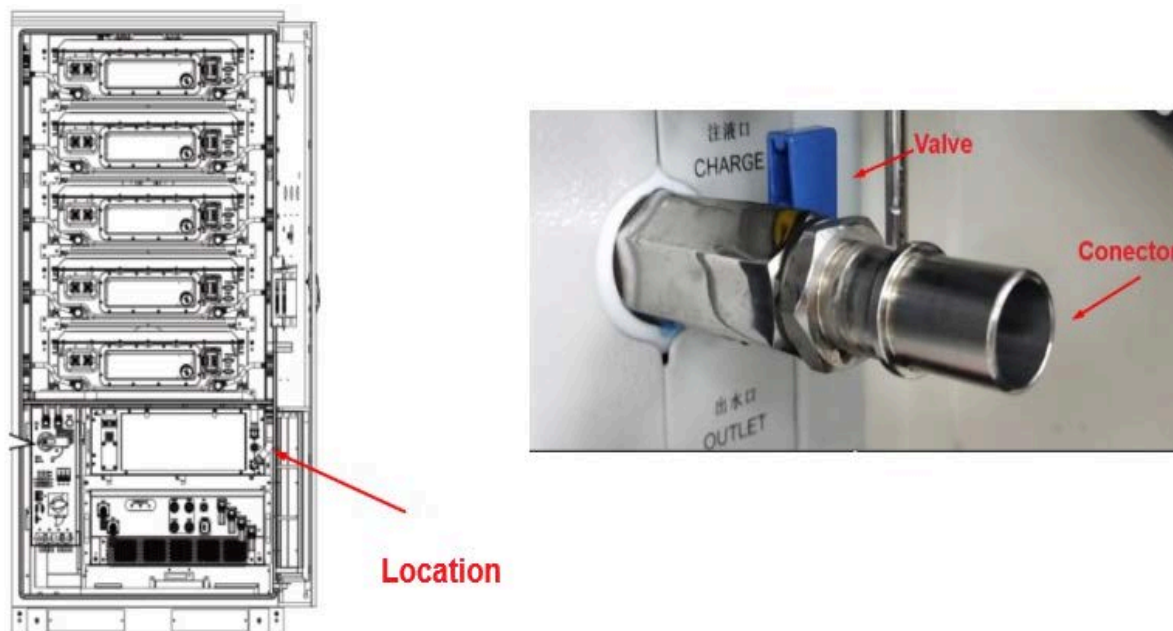
Follow the steps below to safely refill the ESS-125-261 liquid cooling system.

1 – Prepare the Filling Pump

Fill the storage of the manual or automatic filling pump with the approved coolant. Ensure that the reservoir cap is securely tightened to prevent air from entering the system during the filling process.

2 – Connect the Filling Hose

Connect the filling hose to the Water Cooler filling port as shown in the figure below. Before starting the refill procedure, verify that the valve remains in the closed position.



3- With the valve in the closed position, begin operating the filling pump until the pressure inside the pump reservoir reaches 2 bar.

Monitor the pressure gauge continuously during this process to ensure that the target pressure is reached without exceeding the recommended value.



4 – Open the Water Cooler Valve

Once the pressure gauge indicates 2 bar, slowly open the Water Cooler valve to allow the coolant to flow into the cooling circuit.

5 – Restore the Filling Pressure

After opening the valve, the pressure indicated on the filling pump gauge will decrease as coolant enters the system.

Continue operating the pump until the pressure gauge returns to 2 bar.

Note: Maintaining the filling pressure at 2 bar ensures that the coolant is properly introduced into the cooling circuit.

6 – Complete the Refill Procedure

Once the pressure gauge has stabilized again at 2 bar, close the Water Cooler valve.

After the valve has been fully closed, disconnect the filling hose from the Water Cooler filling port.

Important:

- Always close the valve before disconnecting the hose to prevent coolant leakage or air from entering the cooling system.
- After disconnecting the hose, inspect the filling port and surrounding connections for any signs of leakage.