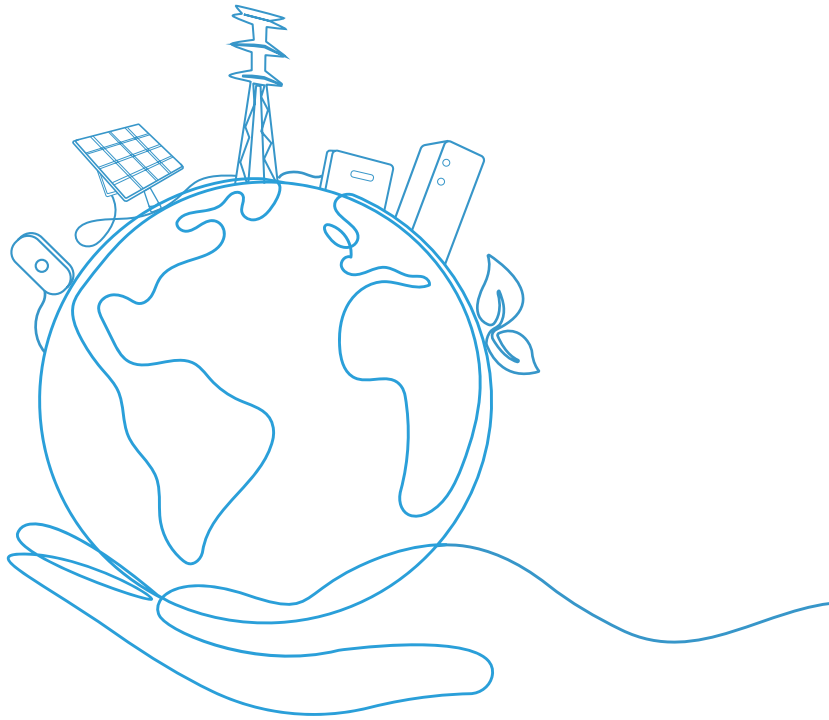
User Manual

IEMS

HXEM100

v1.0 2025-09



LIVOLTEK

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About the Manual

Validity

This manual is valid for the following products:

- HXEM100

Target Group

This document is intended for qualified persons and operators. Only qualified persons are allowed to perform the activities marked in this document with a warning symbol and the caption "Qualified person". Tasks that do not require any particular qualification are not marked and can also be performed by operators. Qualified persons must have the following skills:

- Have basic knowledge and installation skills of the product.
- Training to deal with risks associated with installing, repairing, and using electrical devices, PCS, and batteries.
- Training in the installation and commissioning of electrical devices and installations.
- Knowledge of all applicable laws, regulations, standards, and directives.
- Knowledge of and compliance with this document and all safety information.
- Successful participation in a training course on commissioning the device with the Livoltek manufacturer.

Levels of Warning Messages

The following levels of warning messages may occur when handling the product.

DANGER	
	Indicates risk of Electric Shock which will result in death or serious injury if not avoided.
WARNING	
	Indicates a situation of moderate potential hazard that could result in death or serious injury if not avoided.
CAUTION	
	Indicates a low level of potential hazard that, if not avoided, could result in moderate or minor injury to personnel.
NOTE	
	Emphasis and additions to the content may also provide tips for optimizing the use of the product.

Release Note

Version	Version Update Record	Date
1.0	Initial release.	2025-09-05

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1 Safety

1.1 General Safety

The IEMS has been carefully designed and tested to comply with relevant national and international safety standards. Safety precautions must be taken to ensure a safe installation and to minimize the risk of personal injury.

Before installing the equipment, please read, fully understand and strictly observe the detailed instructions in the user manual and other relevant safety regulations. The safety instructions in this document are intended only as a supplement to the safety precautions.

The Company shall not be liable for any consequences resulting from violation of the storage, transportation, installation, and operation regulations set forth in this manual. Such consequences include, but are not limited to:

- Damage to the equipment caused by force majeure such as earthquakes, floods, lightning strikes, fires, volcanic eruptions and overvoltages;
- Damage to the equipment caused by man;
- Failure to follow the operating instructions and safety warnings in the product and documentation;
- Improper installation or use in unsuitable environmental or electrical conditions.

1.2 Personal Safety

DANGER

The installation process is strictly prohibited to operate with electricity. It is prohibited to install or remove the cable with electricity, the moment the cable core touches the conductor, it will generate electric arc or electric spark, which can lead to fire or personal injury.

DANGER

When equipment is energized, unregulated and incorrect operation may produce fire, electric shock, or explosion, resulting in injury, death, or property damage.

DANGER

It is strictly prohibited to wear watches, bracelets, bangles, rings, necklaces and other easily conductive objects during operation to avoid being burned by electric shock.

DANGER

Special insulated tools must be used during operation to avoid electric shock injury or short-circuit failure, and the insulation voltage withstand level must meet the requirements of local laws and regulations, standards and codes.

NOTE

- Do not deactivate equipment protection devices and ignore warnings, cautions and precautions in manuals and on equipment.
- During operation of the equipment, if a malfunction is detected that could result in personal injury or equipment damage, immediately terminate the operation, report it to the person in charge, and take effective protective measures.
- Do not energize the equipment before installation is completed or without confirmation from a qualified person.
- In case of fire, evacuate the building or equipment area and press the fire alarm or call the fire alarm. Under no circumstances should you re-enter a burning building or equipment area.

NOTE

- Personnel responsible for installing and maintaining the equipment must first be rigorously trained in the proper methods of operation, and be aware of the various safety precautions and relevant standards of the country/region in which they are working.
- Only qualified professionals or trained personnel are allowed to install, operate and maintain the equipment.
- Only qualified professionals are allowed to dismantle safety facilities and service equipment.
- Personnel for special scenarios such as electrical operation, work at heights, and operation of special equipment must have special operation qualifications required by the local country/region.
- Replacement of equipment or parts (including software) must be done by authorized professionals.
- Do not approach the equipment except for the personnel who will operate the equipment.

1.3 Electrical Safety

DANGER

Unregulated and incorrect operation may cause accidents such as fire or electric shock.

DANGER

Prevent foreign objects from entering the equipment during operation, as this may result in short-circuit failure or damage to the equipment, derating or loss of power to the load, and personal injury.

WARNING

When installing equipment that requires grounding, the protective ground wire must be installed first; when removing equipment, the protective ground wire must be removed last.

1.3.1 General Requirements

- Installation, operation and maintenance must be carried out in accordance with the step-by-step sequence in the manual. Do not modify, add or change the equipment without authorization, do not change the installation sequence without authorization, etc.
- Obtain permission from the power authority of the country or region where you are located before connecting to the grid.
- Before installing or removing the power cables, disconnect the equipment itself and the front and rear switches.
- If liquid is found inside the equipment, turn off the power immediately and do not continue to use it.
- Before operating the equipment, carefully check that the tools used are in compliance with the requirements and register them; retrieve them by number after operation to prevent them from being left inside the equipment.
- Before installing power cables, make sure that the cable labels are correctly labeled and that the cable terminals are properly insulated.
- When installing the equipment, use a torque tool with the appropriate range to tighten the screws. When tightening with a wrench, make sure that the wrench is not skewed and that the tolerance of the torque value does not exceed 10% of the specified value.
- If the equipment has multiple inputs, disconnect all inputs to the equipment and wait until the equipment is completely powered down before operating the equipment.
- Check the device connection terminal screws periodically to make sure that they

are tightened and not loose.

- If the cable is damaged, it must be replaced by a professional to avoid risks.
- It is strictly prohibited to artificially alter, damage, or cover up the markings and nameplates on the equipment, and promptly replace markings that have become unclear due to prolonged use.
- It is prohibited to clean the electrical parts inside and outside the equipment with water, alcohol or oil or other solvents.

1.3.2 Cabling Requirements

- Equipment grounding impedance should meet local electrical standards.
- The equipment should be permanently connected to a protective earth. Before operating the equipment, check the electrical connections of the equipment to ensure that it is securely grounded.
- Do not operate the equipment without a grounding conductor.
- Do not tamper with the grounding conductor.
- For equipment using a three-pronged socket, make sure that the grounding terminal in the three-pronged socket is connected to the protective earth.
- In the case of equipment with a large contact current, the protective earth terminal of the equipment case must be grounded before connecting the input power to prevent electric shocks to the human body from the contact current of the equipment.

1.3.3 Grounding Requirements

- Equipment grounding impedance should meet local electrical standards.
- The equipment should be permanently connected to a protective earth. Before operating the equipment, check the electrical connections of the equipment to ensure that it is securely grounded.
- Do not operate the equipment without a grounding conductor.
- Do not tamper with the grounding conductor.
- For equipment using a three-pronged socket, make sure that the grounding terminal in the three-pronged socket is connected to the protective earth.
- In the case of equipment with a large contact current, the protective earth terminal of the equipment case must be grounded before connecting the input power to prevent electric shocks to the human body from the contact current of the equipment.

1.4 Mechanical Safety

DANGER

Work at height must wear a helmet, safety belt or waist rope, tied to a solid and sturdy structural components, is strictly prohibited to hang on the moving not solid objects or have sharp edges of the metal, to prevent the hook slipped off the fall accidents.

WARNING

Tools need to be prepared and qualified by professional organizations, prohibit the use of scarred and unqualified or beyond the inspection of the validity of the tool, to ensure that the tool is solid, not overloaded.

WARNING

Drilling holes in the equipment is strictly prohibited. Drilling holes will damage the sealing, electromagnetic shielding performance, internal devices and cables of the equipment, and the metal shavings generated by drilling holes into the equipment will lead to a short circuit of the circuit board..

- It is prohibited to perform arc welding, cutting, etc. on the equipment without an evaluation by our company.
- It is prohibited to install other equipment on top of the equipment without our assessment.
- Use the correct tools and know how to use them properly.
- When carrying heavy objects, be prepared to bear the weight to avoid being crushed or sprained by the heavy objects.
- When more than one person is handling heavy objects at the same time, consider height and other conditions, and make reasonable personnel matching and division of labor to ensure balanced weight distribution.
- When two or more people are handling heavy objects together, one person should direct the lifting and lowering of the equipment at the same time to ensure a uniform pace.
- When handling equipment by hand, wear protective gloves, shoes, and other safety gear to avoid injury.
- When lifting equipment by hand, approach the object, crouch down, and lift the object slowly and smoothly with the strength of straightened legs, not with the strength of the backbone; sudden jerking or twisting of the torso is strictly prohibited.
- When moving or lifting the equipment, hold the handles of the equipment or support the bottom edge of the equipment, not the handles of the installed modules in the equipment.
- Do not quickly lift a heavy object above waist height. Place the heavy object on a half-waist-high workbench or a suitable place and adjust the position of your

hands before lifting it.

- Lifting heavy objects must be done with balanced and smooth force; moving at an even, low speed; and positioning at a smooth, slow speed to avoid any impact or fall that could scratch the surface of the equipment or damage its components and cables.
- When carrying heavy loads, be especially careful of workstations, slopes, stairs and places that are prone to slipping. When carrying heavy loads over thresholds, make sure that the width of the door is wide enough to allow the equipment to pass through in order to prevent bumping or bruising of fingers.
- When transferring heavy objects, move your feet instead of twisting at the waist. When lifting and transferring heavy objects at the same time, point your feet in the direction you want to move them before lifting.

1.5 Symbols on the Label

Item	Description
	Follow the instruction in this manual for service and replacement.
	RoHS Mark.
	CE Mark.
	**Warning:** General warning sign
	**Caution:** Risk of Electric Shock Disconnect all incoming power and turn off the product before working on it.
	**WEEE Mark.** All electrical and electronic products should be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or the local authorities. The correct disposal of your old appliance will help prevent potential negative consequences for the environment and human health. For more detailed information about disposal of your old appliance, please contact your city office, waste disposal service or the shop where you purchased the product.

2 Product Overview

IEMS is suitable for industrial and commercial power plants, large ground power plants, inverter and battery data acquisition, energy control, intelligent operation and maintenance. Its small size, low power consumption, high interface integration and other features provide customers with a better choice of products. It supports data acquisition, protocol conversion and edge computing for inverters, energy storage systems, environmental monitoring and other devices.

2.1 Performance and Features

- Supports RS485, Ethernet, 4G and other communication methods.
- Supports up to 10 inverters/storage cabinets, remote setup and maintenance.
- Support master-slave management, IEMS master can manage 10 slaves.
- Built-in WEB page supports local monitoring and remote access.
- Automatic search of energy storage cabinets
- IEMS Automatic Slave Setting
- Remote setting of inverter parameters, system active and reactive power adjustment.
- Built-in metering function, no need to communicate with the meter to obtain metering data, backflow prevention, feeder control is more efficient.
- Supports continuous transmission over the Internet without data loss
- Industrial-grade application with high reliability

2.2 Appearance

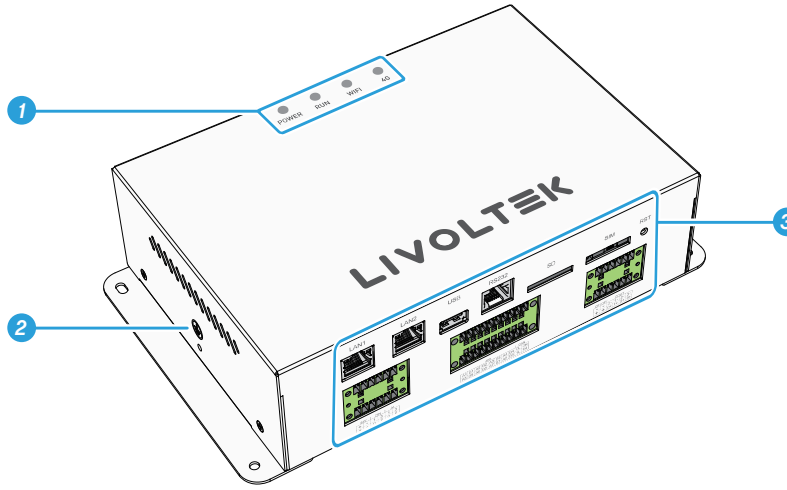


Figure 2-1 Appearance

No.	Item	Description
1	**Indicators**	Simultaneously emits sound and light alarm signals.
2	**PE**	For grounding connection.
3	**Connection Area**	To display status information of all processess running on the system.

2.3 Product Sizes

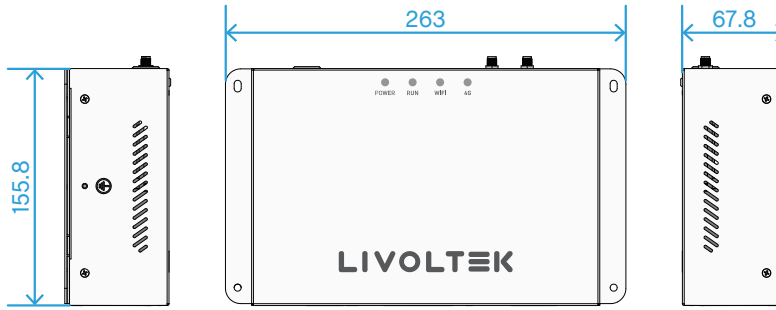


Figure 2-2 Product Size (Dimensions in mm)

2.4 Connection Area

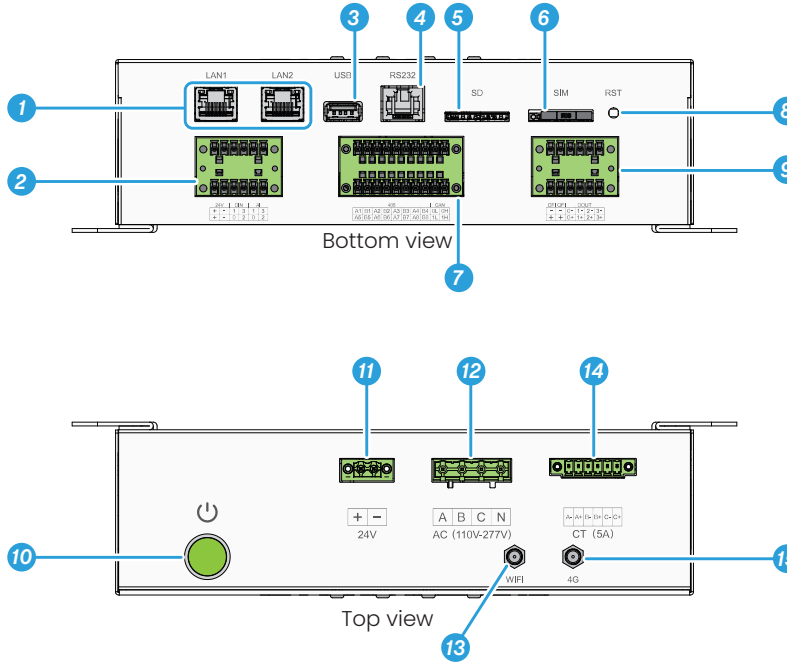


Figure 2-3 Terminals

No.	Item	Description
1	**Ethernet port**	NET1: Connection to lower-level IEMS. NET2: Connection to upper level IEMS.
2	**Power output**	External output 24 Vdc source.
	DI port	1-4: Support 4-way passive dry contact signal access.
	AI analogue input	1-4: AI signal access, support voltage input from 0 to 10 V.
3	**USB port**	For equipment maintenance upgrades.
4	**RS232**	Prepared debugging interface.
5	**SD card slot**	For expanding device storage.
6	**Nano-SIM slot**	SIM card mounting interface.

No.	Item	Description
7	RS485 port	1-2: Connection to grid-connected inverters, meters or other devices. 3: Temperature and humidity sensors specially designed for connection to switching cabinets. 4-7: Connection to the grid inverter, meter or other equipment. 8: Dedicated to the connection of grid-connected point meters.
	CAN port	2 CAN-FD ports.
8	Reset button (RESET)	Long press (>30 s) for restarting the data collector and restoring factory settings. Short press (<3 s) function reserved.
9	Electrical Pulse Port	1 active energy pulse output; 1 reactive energy pulse output.
	DO port	1: Relay output interface.
10	Power switch	Device power supply power switch, press to switch on the device power.
11	DC 24V port	24 Vdc.
12	AC voltage interface	AC three-phase, four-wire voltage interface (110 Vac ~ 277 Vac) for powering and metering IEMS.
13	WIFI antenna port	For extended 4G signalling.
14	Power CT Interface	3-way power CT interface (0 ~ 5 A) for current sampling.
15	4G antenna port	For extended 4G signalling.

2.5 Indicator Definition

Indicator	Status		Description
Power indicator		Always On	Equipment is properly powered up.
		Off	Equipment power failure.
RUN indicator		Blink (1 Hz)	During startup.
		Always On	The system is functioning normally.
		Blink (1 Hz)	External equipment failure.
		Blink (5 Hz)	Malfunction.
		Off	Equipment not in operation.
WIFI indicator		Always On	WIFI connection successful.
		Blink	Data communication in progress.
		Off	No data communication.
4G (network status) indicator		Always On	4G connection successful.
		Blink	Data communication in progress.
		Off	No data communication.

2.6 Networking

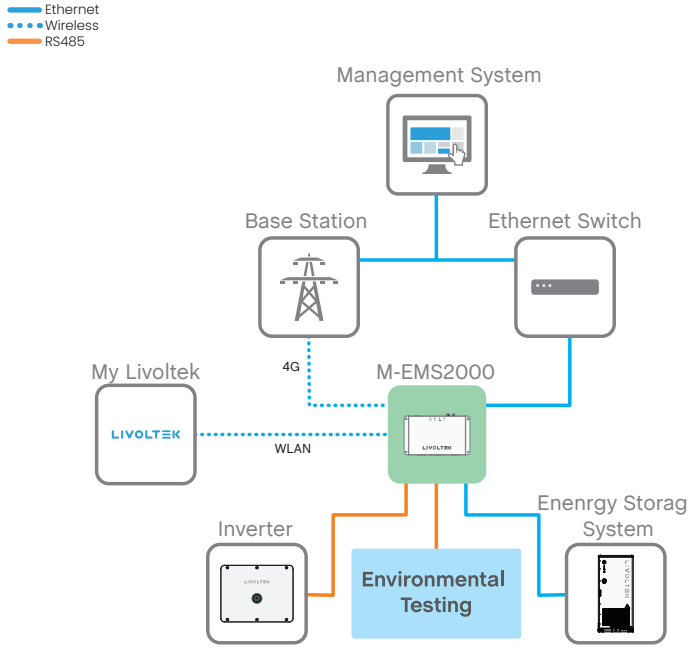


Figure 2-4 Networking

2.7 Application Scenarios

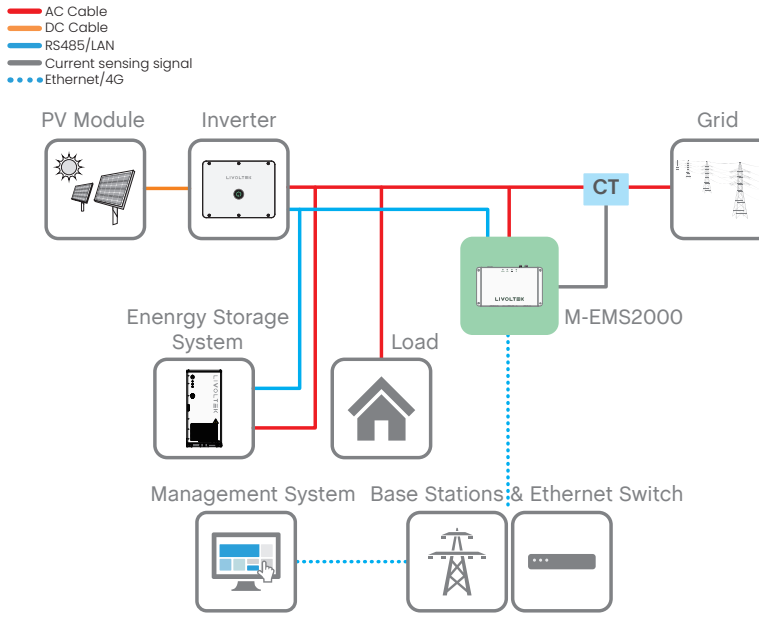


Figure 2-5 Single Cabinet

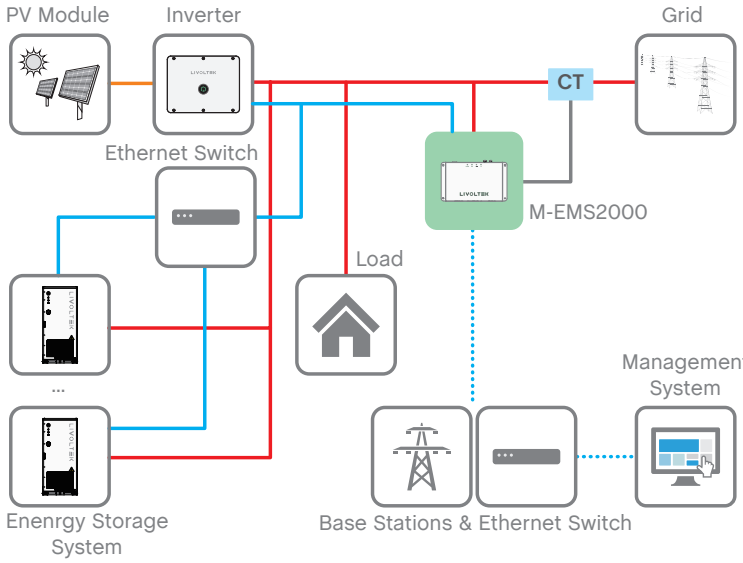


Figure 2-6 Paralleling Multiple Cabinets in a Distribution Area

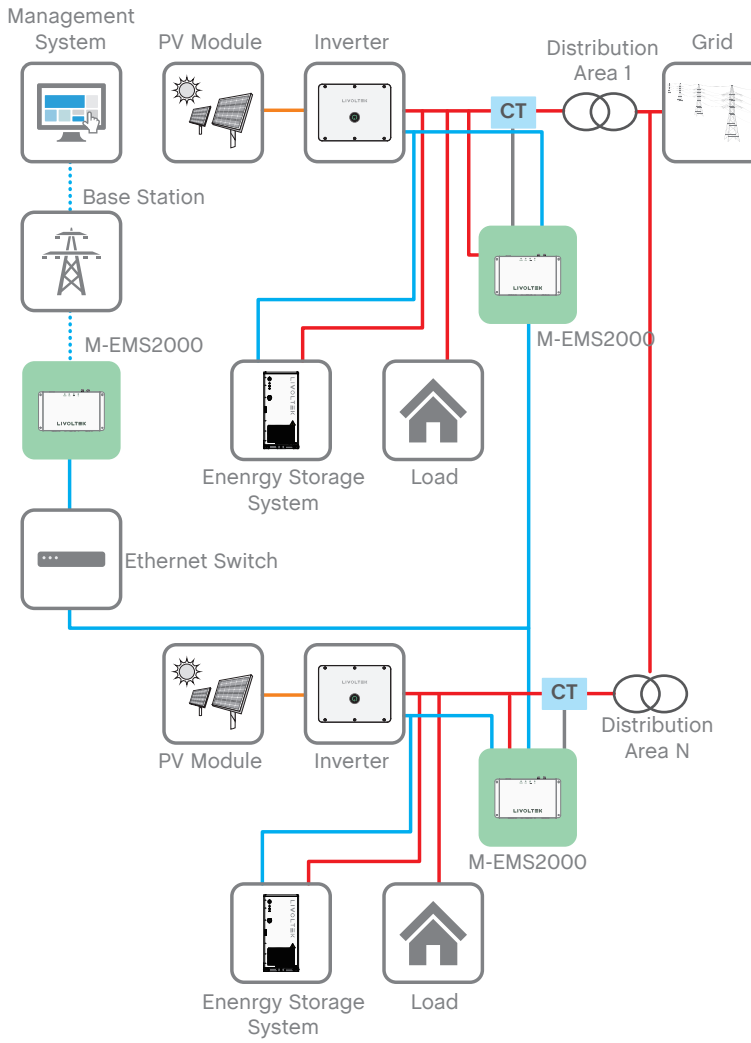


Figure 2-7 Paralleling Multiple Cabinets in Multiple Distribution Areas

3 Installation Preparations

3.1 Installation Site Condition

3.1.1 Environment

DANGER

It is strictly prohibited to place the equipment in an environment where flammable or explosive gases or fumes are present, and it is forbidden to carry out any operation in such an environment.

DANGER

It is strictly prohibited to place the equipment close to sources of heat or fire, such as fireworks, candles, heaters, or other heat generating devices, as heat exposure to the equipment may result in damage to the equipment or cause a fire.

WARNING

The equipment should be installed in the area away from the liquid, it is strictly prohibited to be installed under the water pipe, air outlet and other locations that are prone to condensation; it is strictly prohibited to be installed under the air conditioning outlets, ventilating outlets, machine room outlet windows and other locations that are prone to water leakage to prevent the liquid from entering the interior of the equipment and causing the equipment to malfunction or short-circuit.

- The temperature and humidity environment in which the equipment is stored should be appropriate, stored in a clean, dry, well-ventilated area, and protected from dust and condensation.
- It is strictly prohibited to install and operate the equipment beyond the range specified in the technical specifications, otherwise the performance and safety of the equipment will be affected.
- It is strictly prohibited to install, use, and operate the outdoor equipment and cables (including but not limited to handling the equipment, operating the equipment and cables, plugging and unplugging signal interfaces connected to the outdoor area, working at height, outdoor installation, and opening the door, etc.) in inclement weather, such as thunder and lightning, rain, snow, and winds of six or more degrees.
- It is strictly prohibited to install the equipment in an environment with direct sunlight, dust, fumes, volatile gases, corrosive gases, infrared or other radiation, organic solvents, or excessive salt content.
- It is strictly prohibited to install the equipment in an environment with metallic

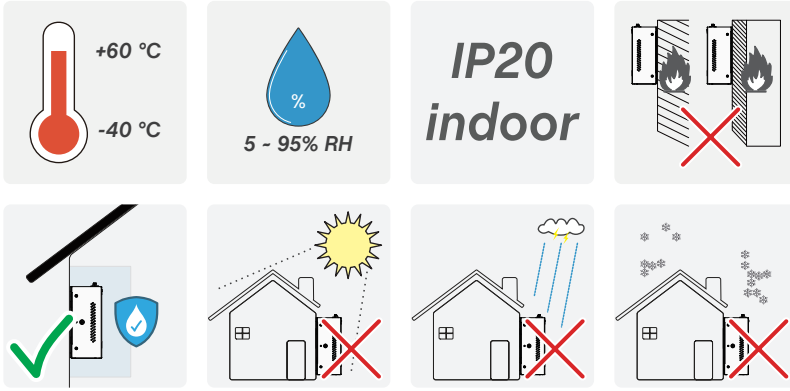
conductive dust or conductive magnetic dust.

- It is strictly prohibited to install the equipment in an area where microorganisms such as fungus and mold can easily grow.
- Do not install the equipment in an area where there is strong vibration, strong noise sources, or strong electromagnetic field interference.
- After installing the equipment, remove empty packing materials, such as cartons, foam, plastic, cable ties, etc., from the equipment area.

3.1.2 Location Requirements

Make sure that the installation environment meets the following conditions:

- Ambient Temperature: -40 °C ~ +60 °C
- Relative Humidity: 5 ~ 95%
- Avoid rain and snow.
- Keep away from areas with flammable, explosive and corrosive substances.
- Keep away from signal interference.
- The mounting carrier must be made of non-combustible material and the equipment must be waterproofed using a waterproof box or other waterproofing measures.



3.1.3 Space Requirements

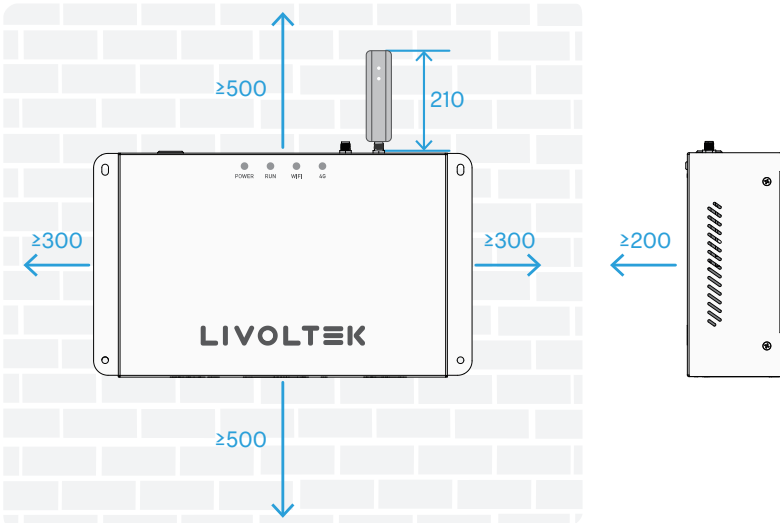


Figure 3-8 Space Requirements (Dimensions in mm)

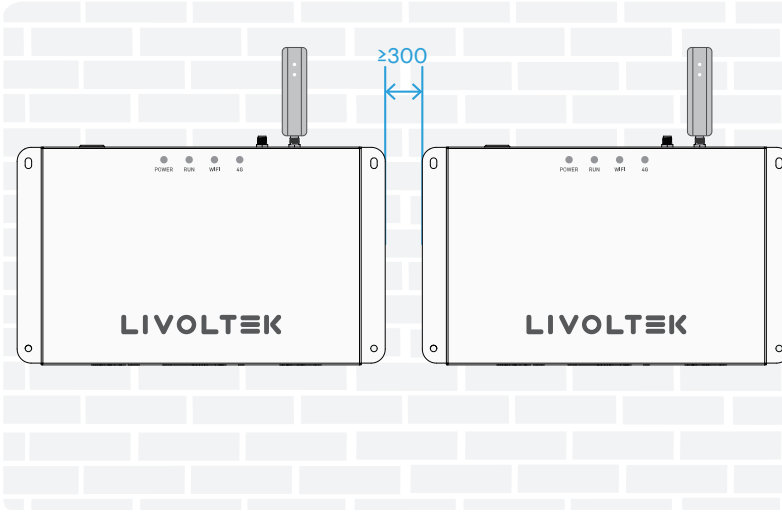


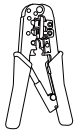
Figure 3-9 Multiple Devices Space Requirements (Dimensions in mm)

NOTE

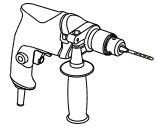
- Antennas are available in a variety of models with different sizes for different models.

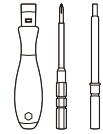
3.2 Tools Preparations

3.2.1 Tools Requirements


Wire crimper


Diagonal pilers


Pneumatic drill


Cross screwdriver
Straight screwdriver

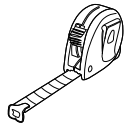

Torque wrench

Level

Pencil


Knife


Multimeter


Tape measure


Insulated gloves


Safety goggle


Safety shoes

3.2.2 Additional Required Materials

Cables are not included in IEMS shipments. Please prepare cables and materials in advance according to the following requirements.

Table 3-1 Cable Size Comparison Table

Item	Type	Cross-sectional Area [mm² (AWG)]
3P4W Power Cable	4 or more core cables	0.2 ~ 2.5 (24 ~ 14)
CT Cable	2 or more core cables	1.3 ~ 3.3 (16 ~ 12)
RS485 Cable	2 or more core cables	0.2 ~ 2.5 (24 ~ 14)
CAN Cable	2 or more core cables	0.2 ~ 2.5 (24 ~ 14)
DO Cable	2 or more core cables	0.2 ~ 1.5 (24 ~ 16)
DI Cable	2 or more core cables	0.2 ~ 1.5 (24 ~ 16)
AI Cable	2 or more core cables	0.2 ~ 1.5 (24 ~ 16)
24V OUT Cable	2 or more core cables	0.2 ~ 1.5 (24 ~ 16)
Network Cable	CAT 5E	/
RJ45 Terminal	Standard RJ45 Terminal	/

NOTE

- The above cables are not included in the scope of delivery and should be prepared separately.
- Failing to follow the relevant installation requirements in this manual may result in equipment or system failure, and the damage caused therefrom will not be covered by warranty.

4 Unpacking and Inspection

4.1 Unpacking

Unpacking the package and make sure the device is intact during transportation. If there are some visible damages, such as cracks, or missing, please contact your dealer immediately.

4.2 Scope of Delivery

- Before installing the product, please inspect it for any signs of damage. If you detect any evidence of damage, retain the evidence and promptly contact Hangzhou Livoltek Power Co., Ltd.
- If you confirm that the product is in good condition, please proceed to check against the delivery list to verify the completeness of all components.

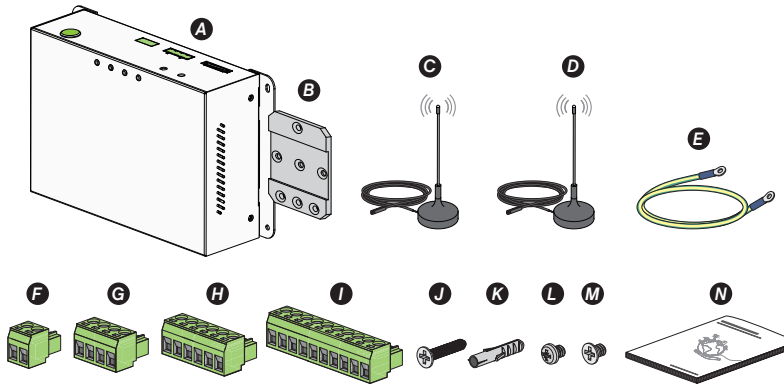


Figure 4-10 Scope of Delivery

Table 4-1 Components Included in Scope of Delivery

Item	Description	Quantity
A	IEMS	1 pc
B	DIN Rail Bracket	1 pc
C	WIFI Suction Cup Antenna 1.5 m	1 pc
D	4G Suction Cup Antenna 1.5 m	1 pc
E	PE Cable	1 pc
F	2-pin Terminal Block	1 pc
G	4-pin Terminal Block	1 pc
H	6-pin Terminal Block	5 pcs

Item	Description	Quantity
I	10-pin Terminal Block	2 pcs
J	ST4.2 × L30 Self-tapping Screw	4 pcs
K	Expansion sleeve	4 pcs
L	M4 × L8 Screw	4 pcs
M	M4 × L8 Countersunk Head Screw	3 pcs
N	User Manual	1 pc

5 Mechanical Mounting

⚠ *QUALIFIED PERSON*

5.1 DIN Rail Mounting

Step 1: Align the four holes of the DIN rail bracket **B** with the mounting holes on the rear of the IEMS **A** and secure with seven M4 × L8 screws **M**.

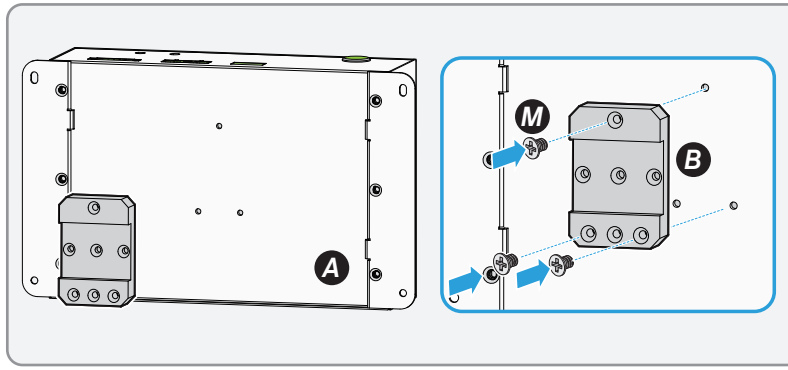


Figure 5-1 Securing Screws

Step 2: Snap the assembled rail bracket onto the rail from top to bottom.

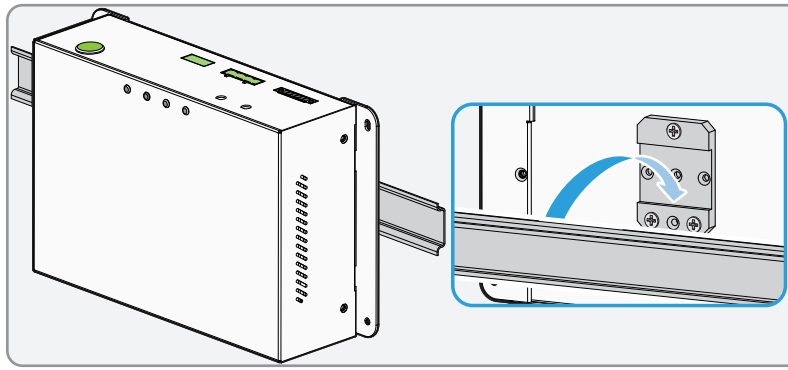


Figure 5-2 Snapping the Rail Bracket

5.2 Wall Mounting

NOTE

When using this type of installation, make sure the unit is waterproofed.

Step 1: Place the IEMS on a wall at a suitable height above the floor, level the unit with a spirit level and mark the hole positions.

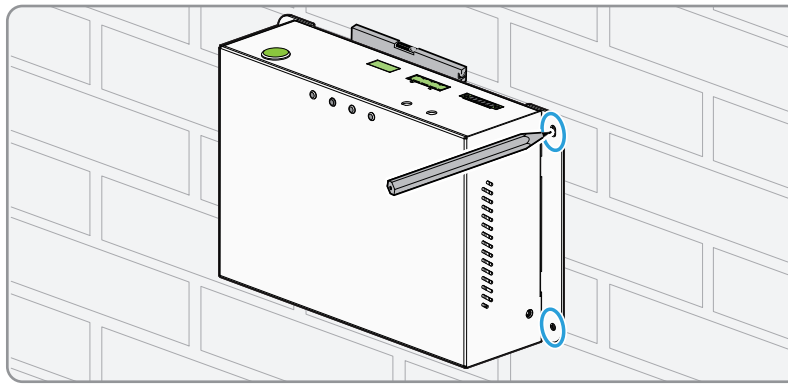


Figure 5-3 Locating

Step 2: Drill holes in the wall according to the hole markings.

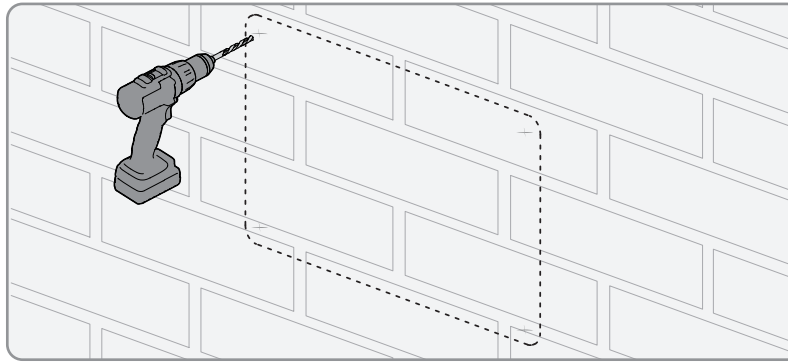


Figure 5-4 Drilling Holes

Step 3: Insert the expansion sleeve K into the hole, then hammer it in with a rubber mallet to ensure that the expansion sleeve is all the way into the wall.

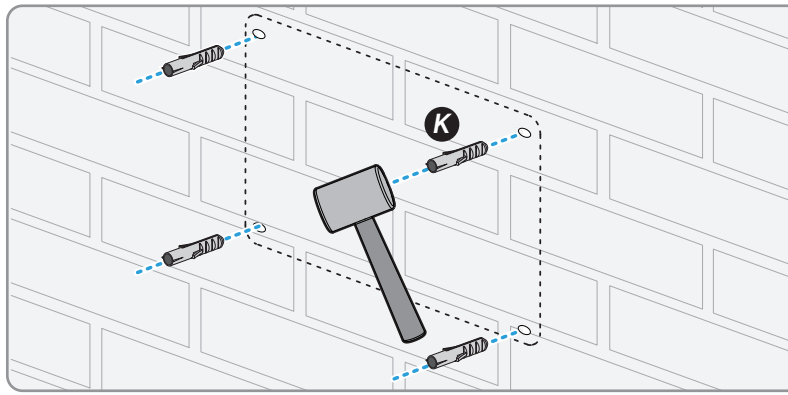


Figure 5-5 Inserting the Expansion Bolts

Step 4: Secure the unit to the wall with four ST4.2 × L30 self-tapping screws J.

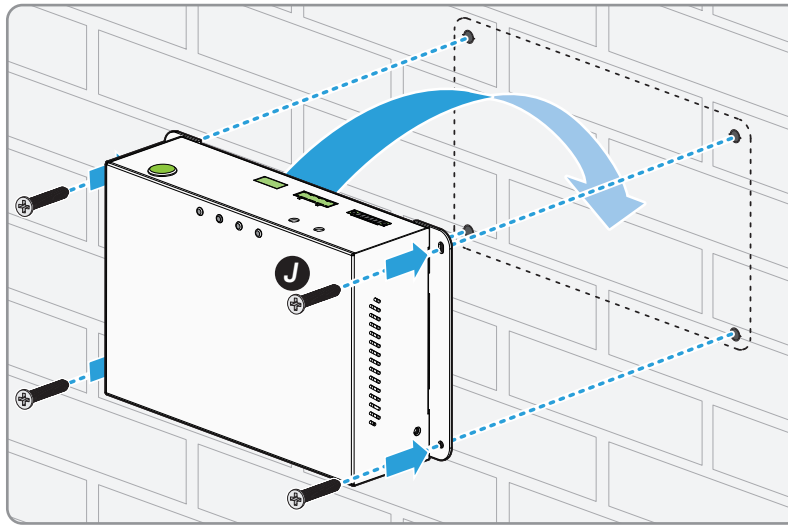


Figure 5-6 Securing the Device

6 Electrical Connection

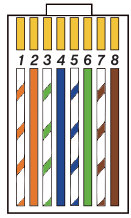
⚠ QUALIFIED PERSON

6.1 Network Connection

Step 1: Strip the appropriate length (15 mm) of insulation from the surface of the mesh cable.

Step 2: Insert the signal cable into the male RJ45 connector and crimp it tightly using RJ45 crimping pliers.

Table 6-1 RJ45 Pin Definition

RJ45 Pin Definition		
	1	Orange/white
	2	Orange
	3	Green/white
	4	Blue
	5	Blue/white
	6	Green
	7	Brown/white
	8	Brown

Step 3: Plug the assembled cable into the appropriate network port.

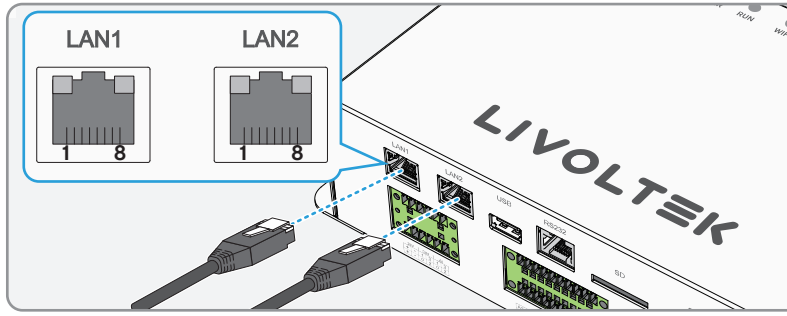


Figure 6-1 Network Connection

6.2 4G SIM Card Installation

Step 1: 4G SIM card is not included in the shipment. Please prepare the 4G SIM card in advance.

Step 2: After installing the SIM card into the SIM drawer, insert the card chip side down into the device card slot.

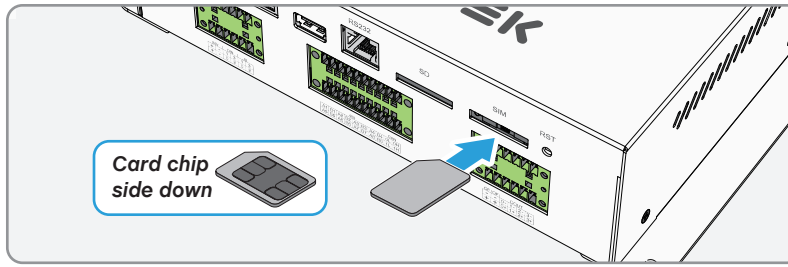


Figure 6-2 SIM Card Installation

6.3 RS485 Port Wiring

NOTE

Please insulate the unconnected cables appropriately.

Step 1: Strip the appropriate length (8~10 mm) of insulation from the surface of the cable.

Step 2: Insert the RS485A, RS485B, and ground wires into the 10-pin terminal block ❶ in that order, then lock the cables with a screwdriver.

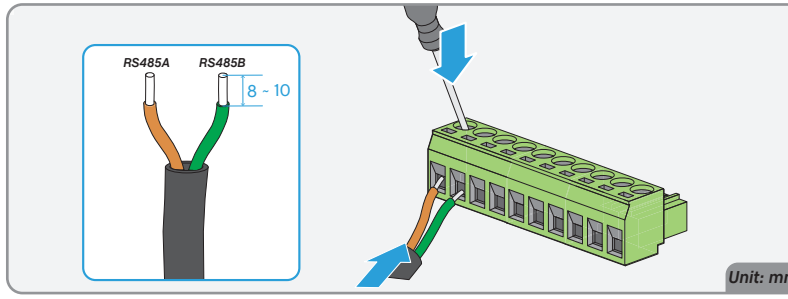


Figure 6-3 Cutting RS485 Cable

Step 3: Insert the terminal block into the RS485 interface according to the device identification.

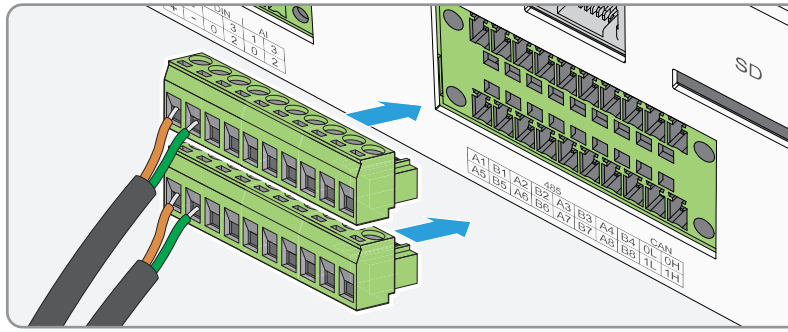


Figure 6-4 Inserting RS485 Terminal

6.4 DO Port Wiring

Step 1: Strip the appropriate length (8~10 mm) of insulation from the surface of the cable.

Step 2: Insert the DO cable and ground wire into the 6-pin terminal block H in sequence, then lock the cable with a screwdriver.

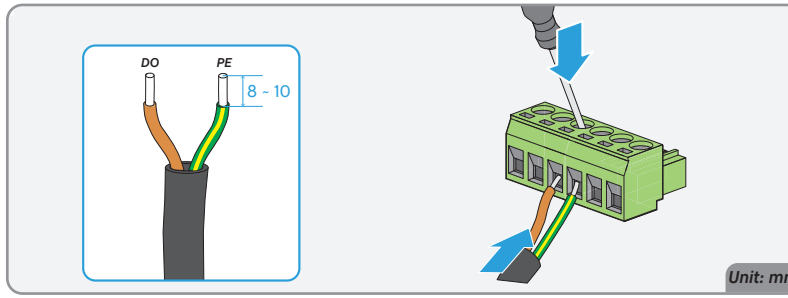


Figure 6-5 Cutting DO Cable

Step 3: Insert the terminal block into the DO port according to the device identification.

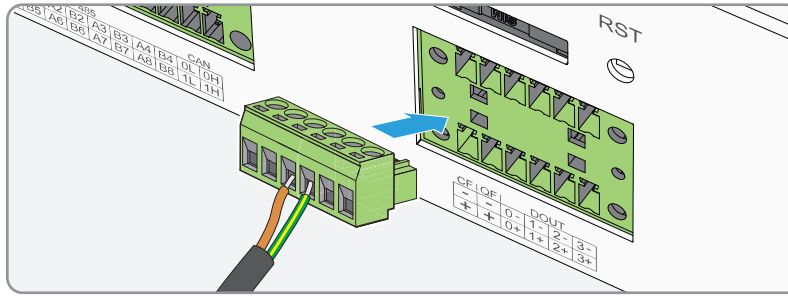


Figure 6-6 Inserting DO Terminal

6.5 DI Port Wiring

Step 1: Strip the appropriate length (8~10 mm) of insulation from the surface of the cable.

Step 2: Insert the DI cable and ground wire into the 6-pin terminal block H in sequence, then lock the cable with a screwdriver.

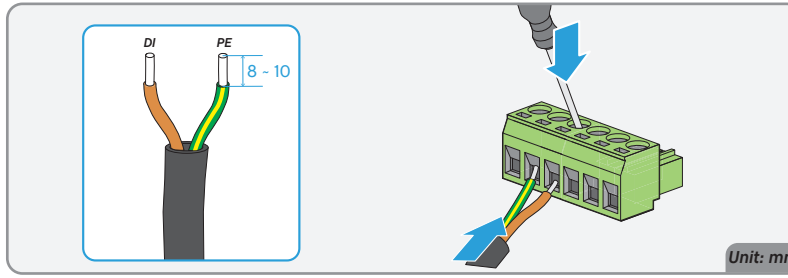


Figure 6-7 Cutting DI Cable

Step 3: Insert the terminal block into the DI port according to the device identification.

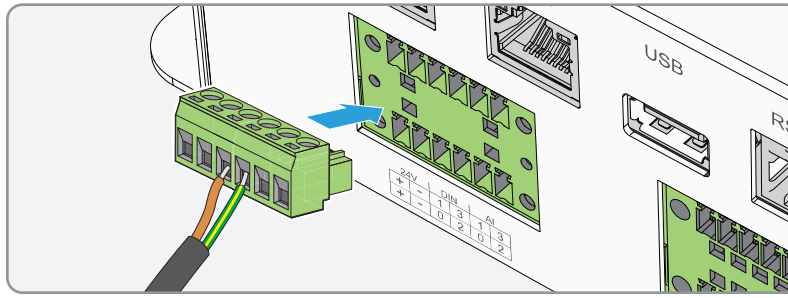


Figure 6-8 Inserting DI Terminal

6.6 AI Port Wiring

Step 1: Strip the appropriate length (8~10 mm) of insulation from the surface of the cable.

Step 2: Insert the AI cable and ground wire into the 6-pin terminal block H in sequence, then lock the cable with a screwdriver.

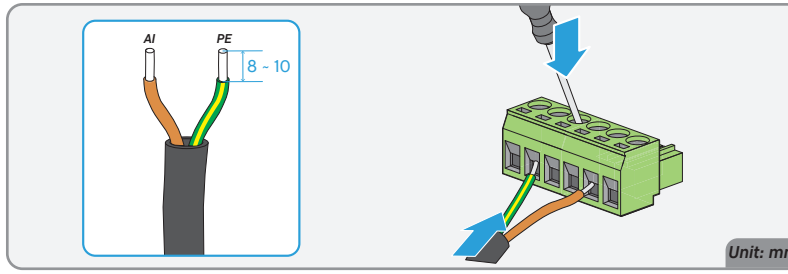


Figure 6-9 Cutting AI Cable

Step 3: Insert the terminal block into the AI port according to the device identification.

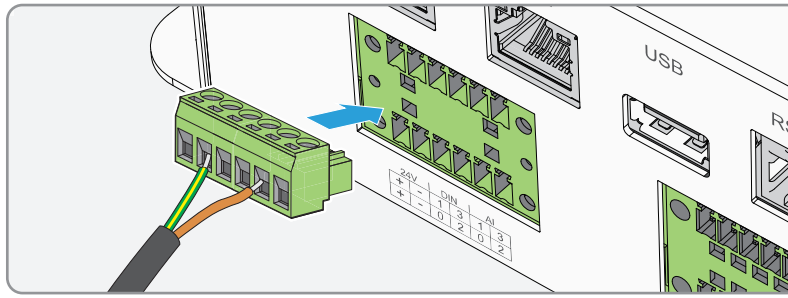


Figure 6-10 Inserting AI Termina

6.7 Antenna Connection

- Suction cup antenna connects directly to SMA antenna connector.

Step 1: Insert the WIFI antenna C and 4G antenna D and rotate clockwise to secure.

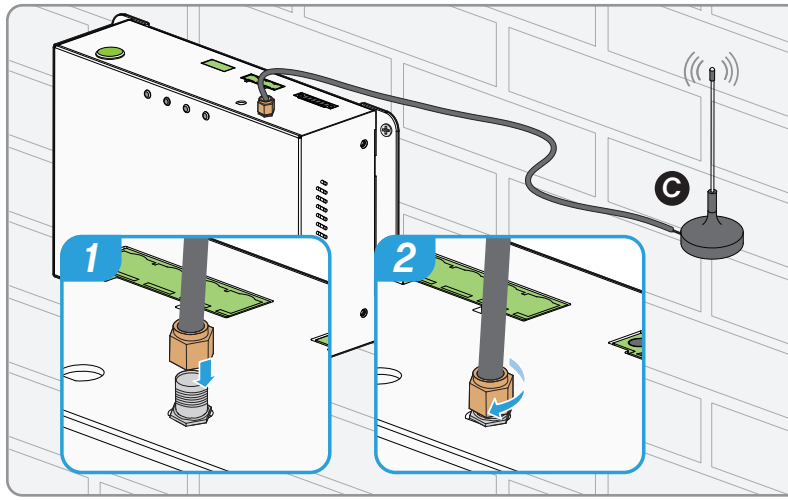


Figure 6-11 Antenna Connection

7 Operation on Web

Through the IEMS web page users or operation and maintenance personnel can successfully complete the establishment of the station, device configuration, operation and control, operation and maintenance monitoring and policy configuration and other key tasks.

> **NOTE**
>
> This section uses screenshots of the V0.2 version of the software as an example, and the actual page information may differ.

7.1 Login

> **NOTE**
>
> IE is not currently supported, we recommend using Chrome to log in.

Step 1: Use a network cable to connect your computer to the NET1 port of the IEMS and then access the system through the specified IP address. Network cable access: **192.168.10.15**.

Step 2: Log in to the administrator account (if you do not know the password, ask an internal staff member) to operate the system.

Please do not disclose the administrator account password directly to an outside party.

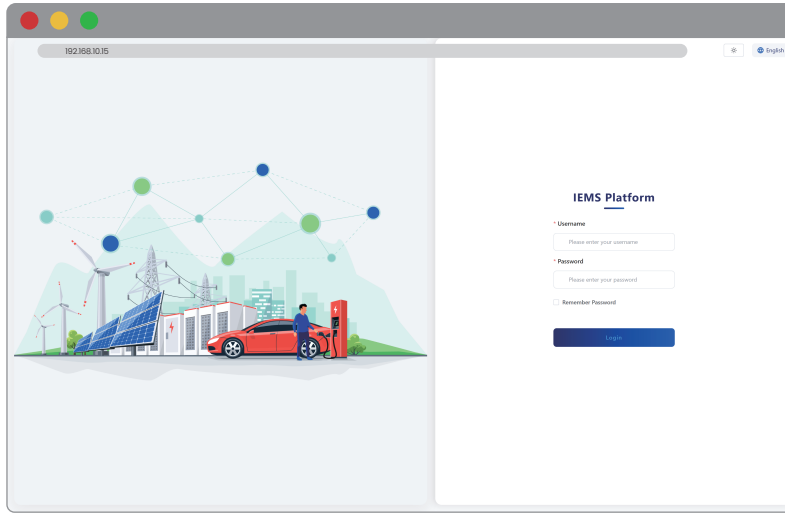


Figure 7-1 Login Page

7.2 Page Layout

The IEMS web pages are rich in functional modules, which are logically divided into several sections, including the navigation bar, the content area, and the quick action area.

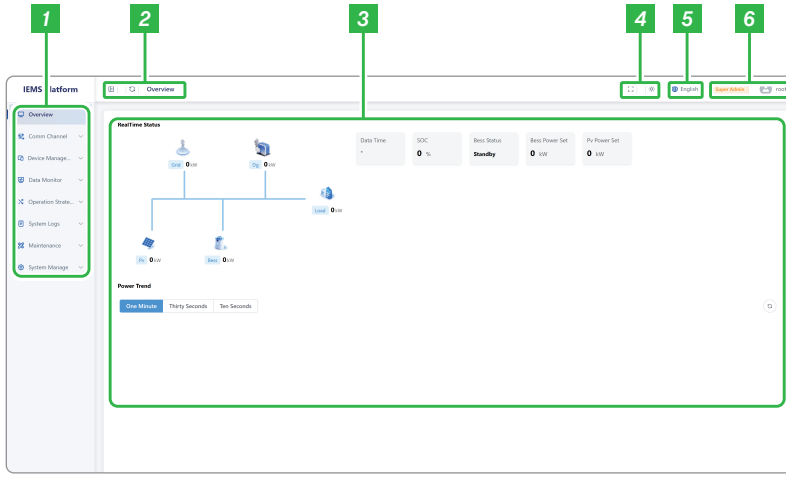


Figure 7-2 Page Layout

Table 7-1 Web Page Layout

Item	Name	Description
1	Navigation bar	List of functions offered by the device.
2	Page path	Current page, click the refresh icon to refresh the data of the current page.
3	Content area	Displays detailed information about the selected function.
4	Full screen and Mode	Click on the left icon to go full screen and the right icon to switch to night mode.
5	Language	Click on the icon to switch the system language without logging out.
6	User	Currently logged in account. Click on the icon to change your password or log out.

7.3 Change Password

It is recommended that you change your password immediately after logging in to the website for the first time.

Step 1: Click the user icon at the top right corner of the page and select **Change Password**.

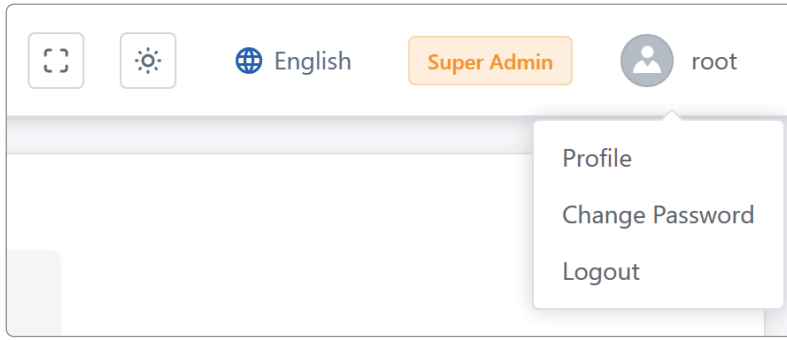


Figure 7-3 Change Password

Step 2: In the Change Password pop-up window, enter the current password, enter the new password and confirm the new password, then click **Confirm**.

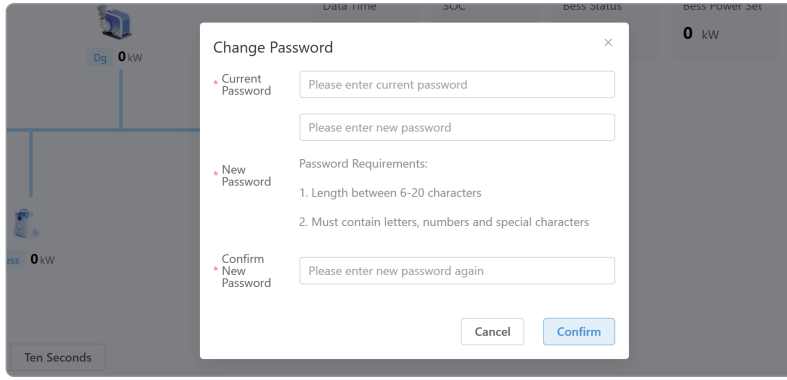


Figure 7-4 Confirm New Password

NOTE

If you forget your password, you need to reset it through your administrator account or contact technical support to restore the system default password.

7.4 Overview

After logging into the webpage, the overview page is displayed by default. In this page, you can view real-time and historical equipment operation information for the entire plant, including real-time power data and status as well as historical power discount graphs.

7.4.1 Energy Statistics

View data time and critical power data.

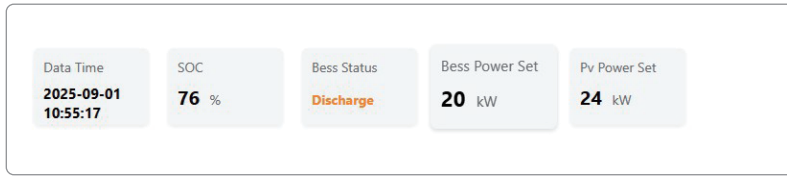


Figure 7-5 Power Data

Table 7-2 Description of Power Data Parameters

Item	Description
Data Time	Current time zone time.
SOC	Current energy storage capacity.
Bess Status	Energy storage status (standby, discharge, charge).
Bess Power Set	Current storage-controlled downstream power.
PV Power Set	Current PV controlled downstream power.

7.4.2 Running Line Graphs

View the operating data of generator power, PV power, load power, battery charging/ discharging power and grid-connected meter power in the form of a line graph, which is convenient to understand the trend of the operating power of each device.

Click the icon below to select the data you want to view, or hover your mouse over the line graph to view the detailed data at a specific point in time.

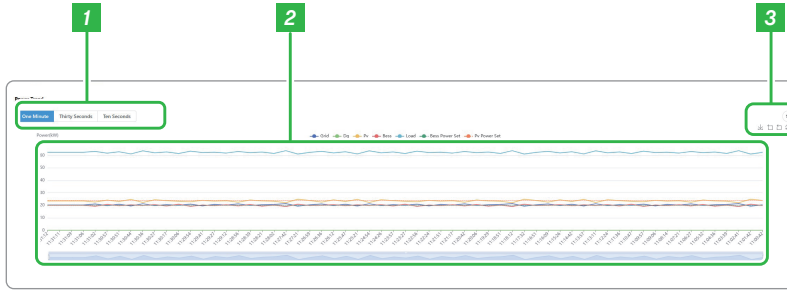


Figure 7-6 Line Graph

Table 7-3 Description of Power Data Parameters

Item	Description
1	Data display interval, selectable from one minute, 30 seconds, 10 seconds.
2	Line graph data presentation (Unit in kW).
3	Refresh line graph data, download data.

7.4.3 Real Time Status

View current site grid-side and equipment real-time power conditions and operational status.

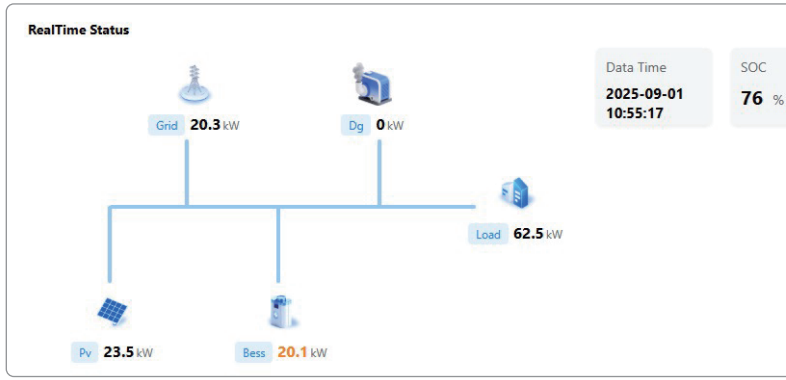


Figure 7-7 Real Time Status

Table 7-4 Description of Power Flow Diagram

Item	Parameter [kW]	Description
PV	PV Power	Real-time output power of photovoltaic modules.
Bess	Battery charging and discharging power	Current charging/discharging power of the battery.
Grid	Grid Input/Output Power	Real-time power that the system draws from the grid or feeds into the grid.
Load	Load power	Real-time power consumption of system loads.
Dg (Diesel generator)	Generator power	Cogeneration power.

7.5 Basic Configuration

7.5.1 Create Network Cards

Step 1: Click **Comm Channel > Network Cards** in the navigation bar to enter the configuration page.

Step 2: Configure the IP address, subnet mask and other information of the physical network port of EMS.

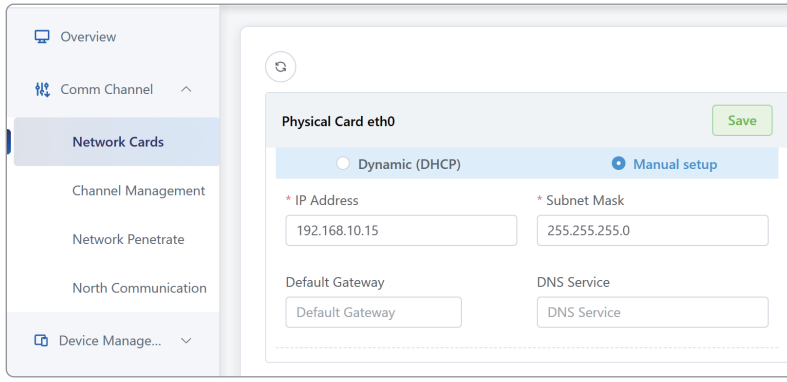


Figure 7-8 Network Card

Table 7-5 Description of Adding Network Card Parameters

Item	Parameter	Description
IP Obtain Method	Static IP	Adding a network card manually can only set a static IP.
IP Address	IP Address	Configuring the IP address of the EMS physical network port.
Subnet Mask	IP Address	Configure the subnet mask of the EMS physical network interface.
DNS Service	/	Optional.

Step 3: Meanwhile, click **+ Add Virtual Card** button to add virtual Network card information.

7.5.2 Channel Management

Step 1: Click **Comm Channel > Channel Management** in the navigation bar to enter the configuration page.

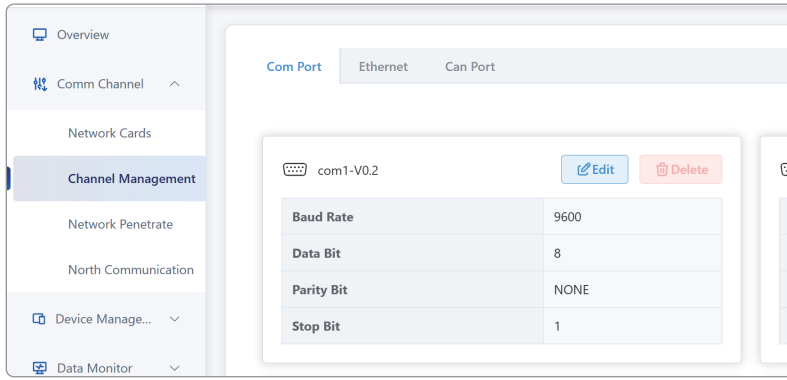


Figure 7-9 Channel Management

Step 2: The label shows the Com port information by default, the Com port is acquired by the system scanning, you can reset the baud rate, data bits and other information according to the requirements of device connection.

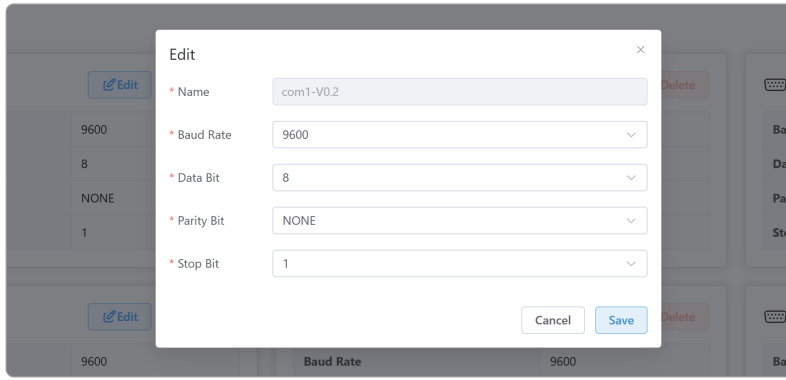


Figure 7-10 Edit Channel

Table 7-6 Description of Channel Parameters

Item	Description
Baud Rate	Baud rate selectable 300, 600, 1200, 2400, 4800, 9600, 17200, 38400.
Data Bit	Data bits selectable 5, 6, 7, 8.
Parity Bit	Parity bits selectable NONE, ODD, EVEN.
Stop Bit	Stop bit selectable 1, 1.5, 2.

7.5.3 Ethernet Configuration

Step 1: Select the **Ethernet** label, and click **+ Addition** to configure the network port information.

Step 2: Configure addresses for different network segments to meet the connectivity needs of the device, then click **Save**.

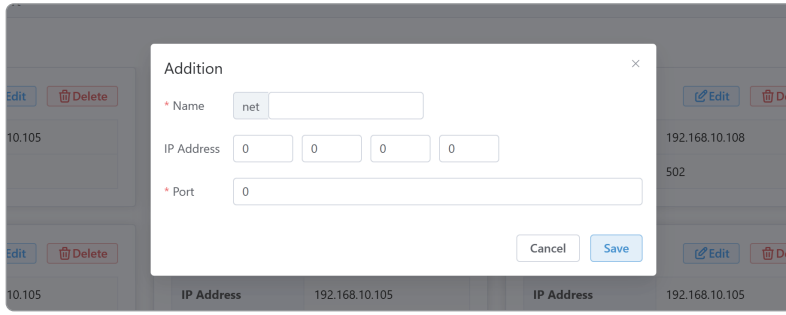


Figure 7-11 Ethernet Addition

Table 7-7 Description of Ethernet Addition

Item	Description
Name	Setting the Ethernet Name.
IP Address	Setting the IP address.
Port	Do not duplicate port settings.

7.5.4 Network Penetrate

Step 1: Click **Comm Channel > Network Penetrate** in the navigation bar to enter the configuration page.

Step 2: Configure FRP network penetration for remote access to internal network devices.

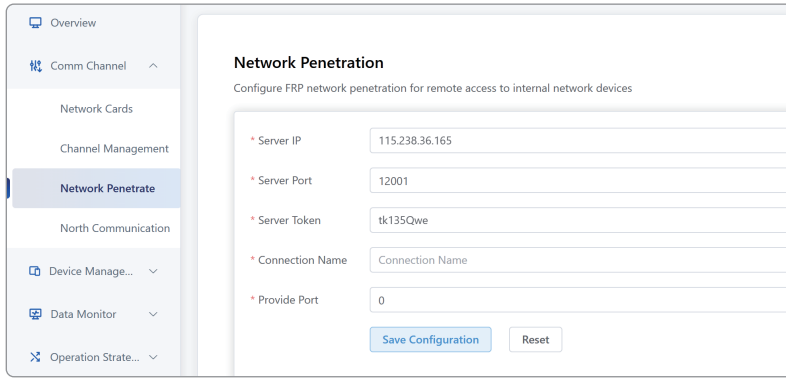


Figure 7-12 Network Penetration

Table 7-8 Description of Network Penetration

Item	Description
Server IP	IP address of the FRP server.
Server Port	Port for FRP service, default bit 7000.
Server Token	Authentication Token for FRP server.
Connetion Name	A customized connection name for identification.
Provide Port	The port on which the FRP server provides access to the outside world.

7.5.5 North Communication

Step 1: Click **Comm Channel > North Communication** in the navigation bar to enter the configuration page.

Step 2: Configure the northbound communication channel parameters to report data to the cloud platform.

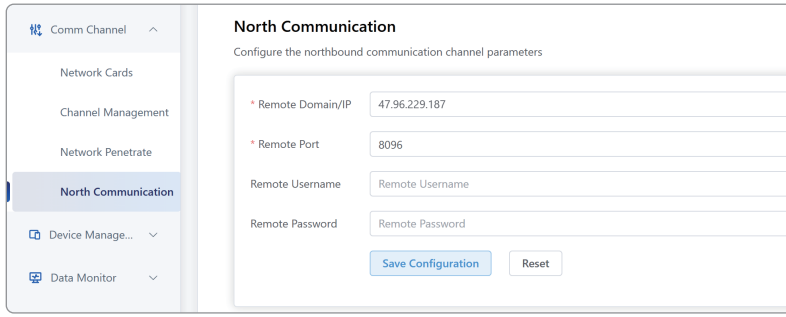


Figure 7-13 North Communication

Table 7-9 Description of North Communication

Item	Description
Remote Domain/IP	Domain name or IP address of the remote server.
Remote Port	Port number of the remote server.
Remote Username	User name for remote server authentication (optional).
Remote Password	Password for remote server authentication (optional).

7.6 Device Management

In an EMS system, device creation is the first step in realizing device management, monitoring and control by creating entity devices. Creating entity devices such as PV Meter, PCS (Power Storage Converter), etc.

7.6.1 Entity Device

Step 1: Click **Device Management** > **Device Config** in the navigation bar to enter the configuration page.

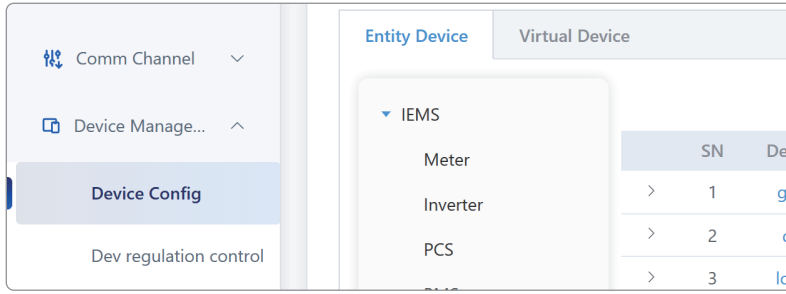


Figure 7-14 Device Config Page

Step 2: Select **Entity Device** label, and click **+ Addition** to add an new entity device.

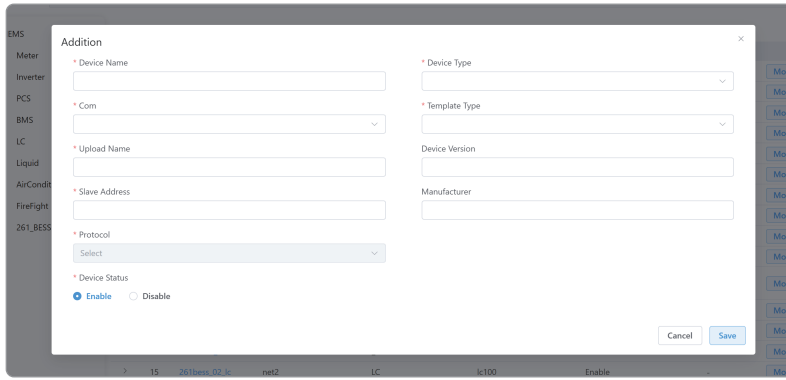


Figure 7-15 Entity Device Addition

Table 7-10 Description of Entity Device Addition

Item	Description
Device Name	The name of the device, its function, and how it differs from other devices of the same type (e.g., pv_meter_01).
Com	Communication ports (e.g., com port, network port, etc.).
Upload Name	This field is used when uploading to the cloud platform.
Slave Address	Modbus communication master-slave address.
Protocol	TCP or RTU communication.
Device Type	Select a type of your device.
Template Type	After selecting the device type and then selecting the corresponding template type.

7.6.2 Virtual Device

NOTE

Virtual devices are created automatically when the device type is PCS and the template type is LC100.

Step 1: Click the **Virtual Device** label in the table to view its corresponding virtual device information, virtual devices can not be modified or deleted.



Figure 7-16 Virtual Device

7.6.3 Add a Sub-device

In the IEMS system, when there is a hierarchical relationship between devices, such as a total distribution cabinet containing multiple devices, such as PCS, liquid cooling, fire protection, etc., then you can bind to the parent device by creating a child device. The creation and binding relationship of sub-devices need to be based on the situation of the specific type of entity device type.

Step 1: Find your device and select **Bind Sub-dev** in the table of **Entity Device**.

Step 2: In the window of **Sub-device Config**, select your certain sub-device and click **Add**. Then this sub-device will show on the **Sub-device List**.

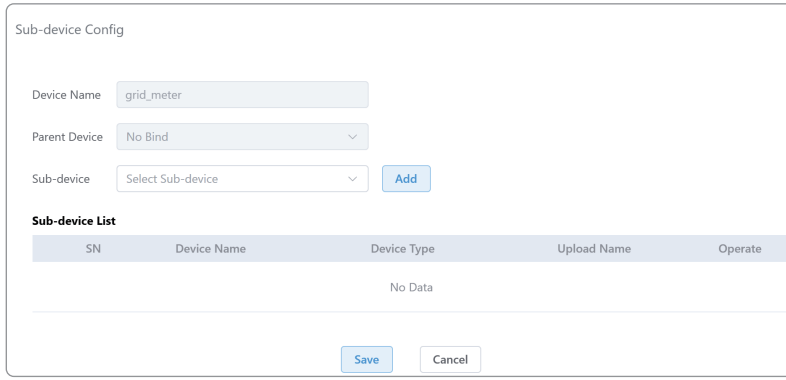


Figure 7-17 Sub-device Config

Table 7-11 Description of Sub-device Configuration

Item	Description
Device Name	Device name auto-generation.
Parent Device	Parent device auto-binding.
Sub-device	Drop down to select the type of sub-device you want to bind to.

Step 3: Click **Save** to finish binding.

7.6.4 Device Regulation Control

Step 1: When the real-time data to view the device communication and EMS is normal, you can click the navigation bar **Device Management > Dev regulation control** to enter, select the device type corresponding to the device debugging equipment.

Step 2: Remotely issue commands to see if the operation can be executed correctly, set the CT multiplier of the meter, debug the equipment, and check whether the equipment operates normally and whether the upstream and downstream data are normal.

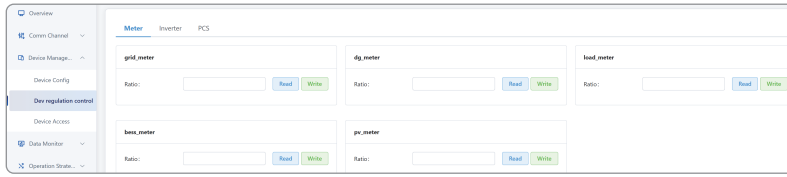


Figure 7-18 Device Regulation Control

7.6.5 Device Access

Before selecting the template operation, you need to make sure that you have completed the device creation work, the device communication is normal, and you have a clear understanding of the topology of the actual scene of the project, and make clear the position and connection relationship of each device in the topology.

At the same time, check whether there is a compliant template in the system, whether the grid topology of the compliant template is accurate, and if there are missing equipment nodes or errors, you can contact the R&D staff to make adjustments.

Step 1: Click **Device Management > Device Access** in the navigation bar to enter the configuration page.

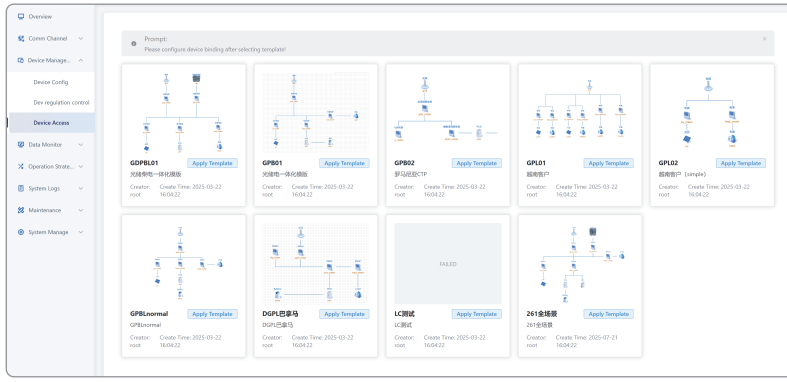


Figure 7-19 Device Access

Step 2: Click on the image to view the topology diagram and click on the button to select the template.

Step 3: Click **Save Template** to submit the binding information.

If you find that the selected template is wrong, you can re-select it by clicking the **Switch Template**.

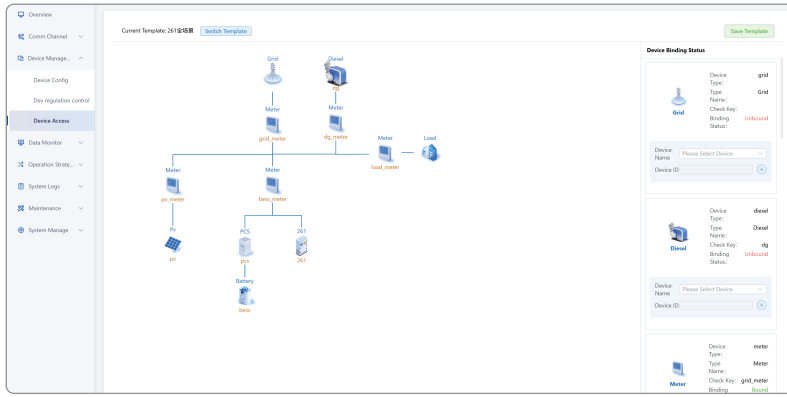


Figure 7-20 Templates Page

7.7 Data Monitor

Step 1: Click **Data Monitor > Device Monitor** in the navigation bar to enter the configuration page.

Step 2: Select the device type, select the corresponding device to view the real-time operation information and telecommunication telemetry data, observe whether the data has a value and whether the value is accurate, and ensure that the connection of the device is normal as expected.

- **Meter**

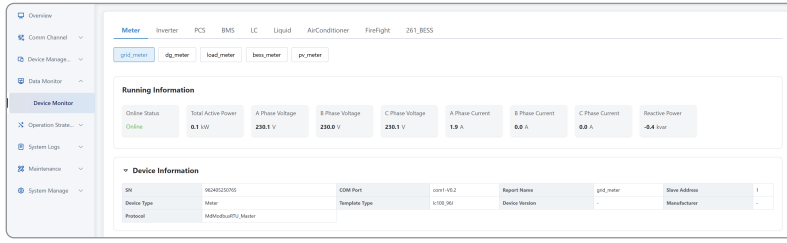


Figure 7-21 Meter Page

Table 7-12 Description of Meter Data

Item	Description
Total Active Power	Total active power of the meter.
A Phase Voltage	Meter A Phase Voltage.
B Phase Voltage	Meter B Phase Voltage.
C Phase Voltage	Meter C Phase Voltage.

Item	Description
A Phase Current	Meter A Phase Current.
B Phase Current	Meter B Phase Current.
C Phase Current	Meter C Phase Current.
Reactive Power	Reactive power of the meter.
SN	Serial number of the meter.
COM Port	The com port that the meter is connected to.
Report Name	Name of the current meter reported data.
Slave Address	Address for reading meter data.
Device Type	Types of equipment for meters.
Template Type	Types of templates.
Device Version	Current meter version number.
Manufacturer	Manufacturer of meters.
Protocol	Communication protocols supported by the meter.

- **PCS**

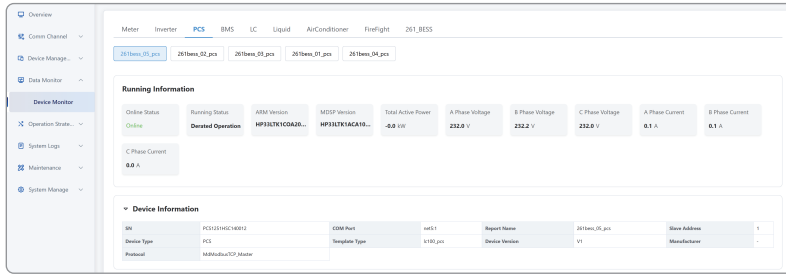


Figure 7-22 PCS Page

Table 7-13 Description of PCS Data

Item	Description
ARM Version	ARM program version number.
MDSP Version	Version number of the DSP program.
Total Active Power	Total active power of PCS.
A Phase Voltage	PCS A Phase Voltage.
B Phase Voltage	PCS B Phase Voltage.
C Phase Voltage	PCS C Phase Voltage.

Item	Description
A Phase Current	PCS A Phase Current.
B Phase Current	PCS B Phase Current.
C Phase Current	PCS C Phase Current.
COM Port	The com port that the PCS is connected to.
Report Name	Name of the current PCS reported data.
Slave Address	Address for reading PCS data.
Device Type	Types of equipment for PCS.
Template Type	Types of templates.
Device Version	Current PCS version number.
Manufacturer	Manufacturer of PCS.
Protocol	Communication protocols supported by PCS.

- **BMS**

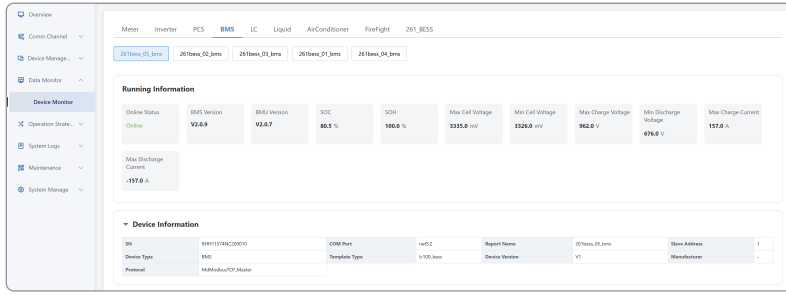


Figure 7-23 BMS Page

Table 7-14 Description of BMS Data

Item	Description
BMS Version	Version number of the BMS program.
BMU Version	Version number of the BMU program.
SOC	Current battery SOC.
SOH	SOH of the battery.
Max. Cell Voltage	Maximum Cell Voltage.
Min. Cell Voltage	Minimum Cell Voltage.
Max. Charge Voltage	Maximum charging voltage.

Item	Description
Min. Discharge Voltage	Minimum discharging voltage.
Max. Charge Current	Maximum charging current.
Max. Discharge Current	Maximum discharging current.

7.8 Operation Strategy

Configuring Strategy parameters is the key link to realize efficient energy management, ensure stable system operation and meet specific customer needs. The setting of strategy parameters will directly affect the system's scheduling and control logic for various types of energy equipment. The setting of each strategy parameter should be accurate, safe and reliable.

Step 1: Click **Operation Strategy > Strategy Plan** in the navigation bar to enter the configuration page.

Step 2: Click the **Strategy Running** to view the Strategy operation status, Strategy Activation Status, Strategy Items, and Grid and Off Grid status of current site.

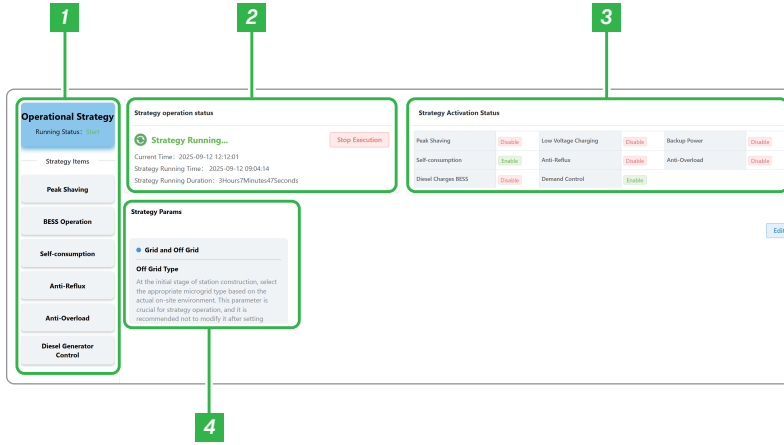


Figure 7-24 Strategy Operation Page

Table 7-15 Strategy Plan

Item	Name	Description
1	Strategy List	Optionally configure and enable those strategies.
2	Strategy operation status	Strategy running duration, Strategy Running Time.
3	Strategy Activation Status	/
4	Strategy Params	/

7.8.1 Peak Shaving

Peak shaving configures the charging and discharging of the energy storage throughout the day according to the time period.

Step 1: Click on the **Peak Shaving** block you can view the currently set configuration parameters.

Step 2: Click on **Edit** opens a pop-up window to configure the Peak Shaving operating parameter information.

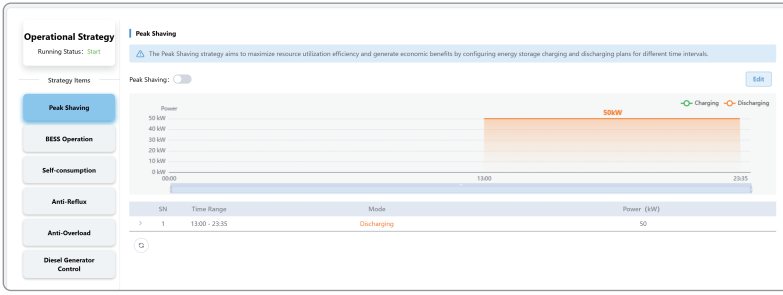


Figure 7-25 Peak Shaving Page

7.8.2 Secondary Protection

The energy storage secondary protection page contains energy storage related setup parameters, low voltage charging strategy, and energy storage backup power strategy.

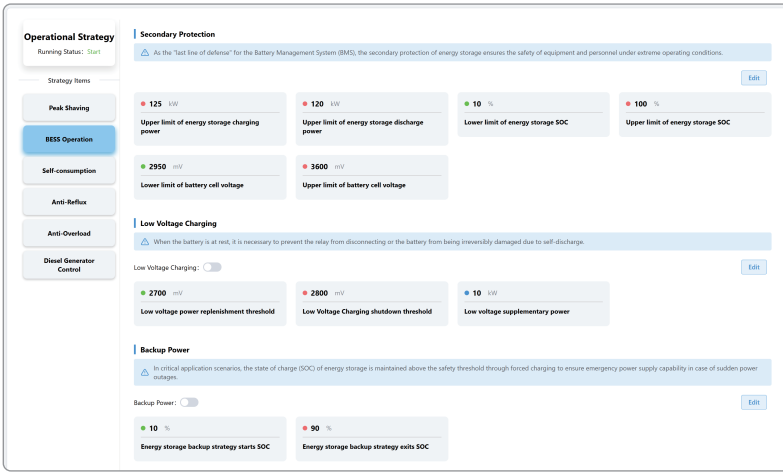


Figure 7-26 Secondary Protection Page

7.8.3 Self-consumption

The Self-consumption strategy is responsible for controlling the use of excess photovoltaic power to charge energy storage.

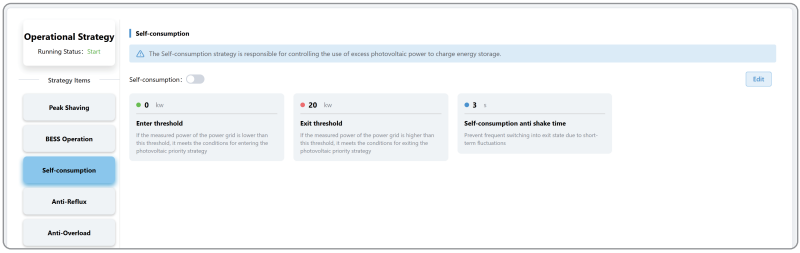


Figure 7-27 Self-consumption Page

Table 7-16 Description of Self-consumption

Item	Description
Self-consumption button	Turn on the Self-consumption button to start the strategy
Enter threshold	Grid-measured power below a low threshold is satisfied to enter the Self-consumption strategy.
Exit threshold	Grid-measured power above this threshold satisfies the exit Self-consumption strategy.
Self-consumption anti shake time	Prevents frequent switching into an exit state due to transient fluctuations.

7.8.4 Anti-Reflux

The anti backflow strategy prevents reverse flow into the upper level power grid or main system, avoiding impact on power grid frequency and voltage, or measurement confusion and equipment damage caused by backflow.

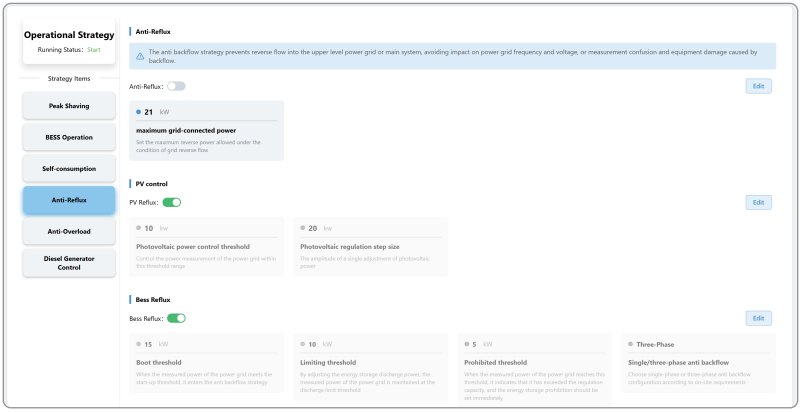


Figure 7-28 Anti-Reflux Page

Table 7-17 Description of Anti-Reflux

Item	Description
Anti-Reflux button	Turn on the Anti-Reflux switch to activate the Anti-Reflux strategy.
Maximum grid-connected power	Setting the maximum backflow power in case of permissible grid backflow.
PV Reflux button	Open to allow PV reverse flow, PV can sell power to the grid.
Photovoltaic power control threshold	Keeps the grid measured power in this threshold range.
Photovoltaic regulation step size	Magnitude of single adjustment of PV power.
Bess Reflux button	Allow excess electricity from storage to be sold to the grid.
Boot threshold	Grid-measured power meets the startup threshold then enters flow.
Limiting threshold	Maintaining the grid measured power at the discharge limit threshold by regulating the energy storage discharge power.
Prohibited threshold	The grid power measurement reaches this threshold indicating that the regulation capacity has been exceeded and the storage ban needs to be set immediately.
Single/three-phase anti backflow	Select single-phase or three-phase backflow prevention according to the configuration of site requirements.

7.8.5 Anti-Overload

Overload prevention strategies prevent reverse flow into the upper-level grid or main system, avoiding impacts on grid frequency and voltage stability, or issues such as measurement inaccuracies and equipment damage due to backflow.

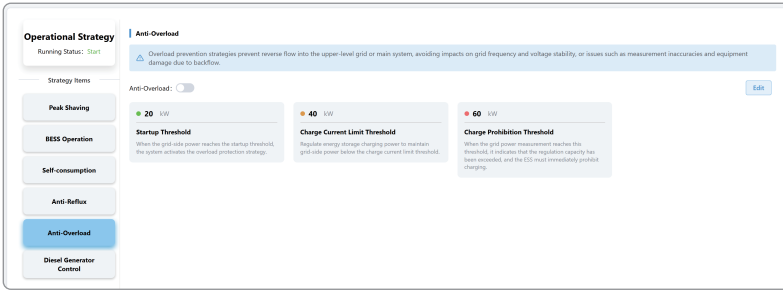


Figure 7-29 Anti-Overload Page

Table 7-18 Description of Anti-Overload

Item	Description
Anti-Overload button	Turn on the anti-overload switch to prevent excess load from flowing to the higher grid or main system.
Startup Threshold	Grid-measured power meets startup threshold then enters anti-overload strategy.
Charge Current Limit Threshold	Maintaining the grid measured power at the charging limit threshold by regulating the energy storage charging power.
Charge Prohibition Threshold	The measured power of the grid reaches a threshold value indicating that the regulation capacity has been exceeded, i.e., the energy storage is immediately set to prohibit charging.

7.8.6 Diesel Generator Control

The Diesel Generator Control page allows you to set the Diesel start and stop condition parameters as well as the Diesel operation information parameters.

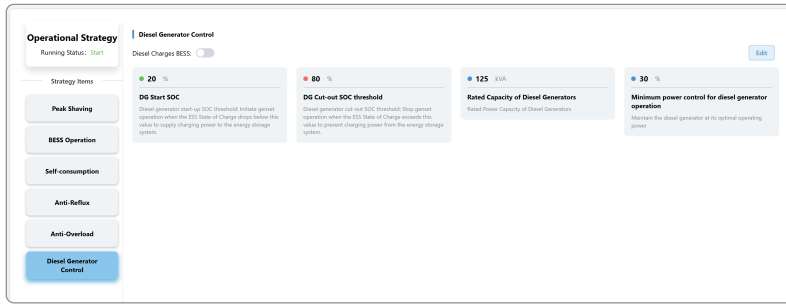


Figure 7-30 Diesel Generator Control Page

Table 7-19 Description of Diesel Generator Control

Item	Description
DG Start SOC	Diesel start SOC, when the energy storage SOC is lower than this value, the diesel start to charge the energy storage.
DG Cut-out SOC threshold	Stop diesel-fired energy storage charging when the storage SOC is higher than this value.
Rated Capacity of Diesel Generators	Rated power of diesel generators.
Minimum power control for diesel generator operation	Maintain the diesel generator at its optimal operating power.

7.9 Maintenance

7.9.1 Check Time Time Zone

Accurate time zone setting and time synchronization is the basis for ensuring the accuracy of information such as equipment data logs and operation log timestamps, which contributes to the stable operation of the system and precise analysis of data.

Step 1: Click **Maintenance > Check Time Zone** in the navigation bar to enter the configuration page.

Step 2: At the top of the page, you can set the time manually and systematically, and at the bottom, you can set the time zone by selecting the continent and then the region.

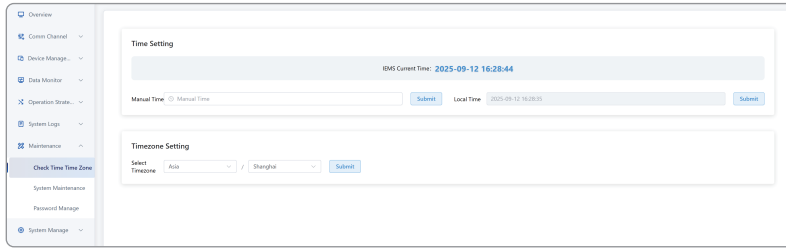


Figure 7-31 Time Zone Page

Table 7-20 Description of Time Zone Settings

Item	Description
Manual Time	System time can be set manually.
Local Time	Automatic time acquisition after calibrating the system time.
Select Timezone	Issue system time zones with automatic system time calibration.

7.9.2 System Maintenance

Step 1: Click **Maintenance > System Maintenance** in the navigation bar to enter the configuration page.

System restart module provides the entry point for system restart operation, through which system resources can be released, temporary faults can be solved or configuration changes can be made effective to ensure the smoothness of system operation.

Restore Factory Settings module is used to perform the operation of restoring the factory settings of the system, which can restore the system to the initial state (including the default configuration, data clearing, etc.), and it is suitable for the repair of system faults or resetting of personalised configuration scenarios.

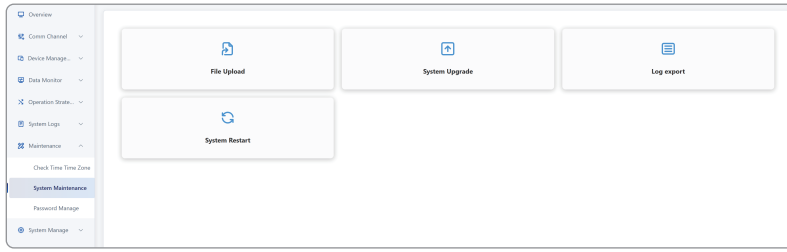


Figure 7-32 System Maintenance Page

- ## File Upload

The file upload module is used to realise the upload operation of the upgrade package, which can upload the required upgrade package to the system for the upgrade module to select the file for upgrading.

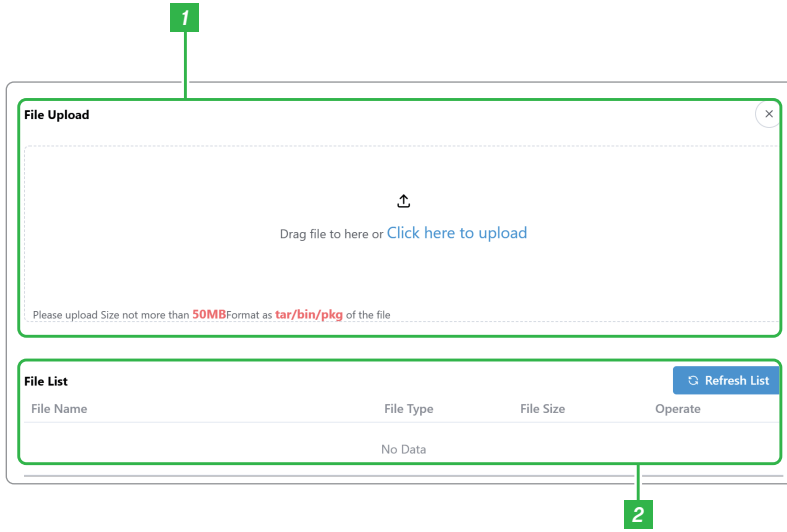


Figure 7-33 File Upload Page

Table 7-21 Description of Uploading Files

Item	Name	Description
1	File Upload Area	You can choose local file or drag and drop to upload the upgrade package, click close to close the file upload pop-up window.
2	File List Area	The uploaded files are visible in the list, refresh the list to get the latest file list, click delete to delete the uploaded files.

NOTE

Uploading the same file and filename will overwrite the previous file and keep only the latest uploaded file.

- ## System Upgrade

Responsible for the update and iteration of the system version, through which the module can obtain the latest features, fix the vulnerabilities or optimise the performance to ensure the stability and advancement of the system operation.

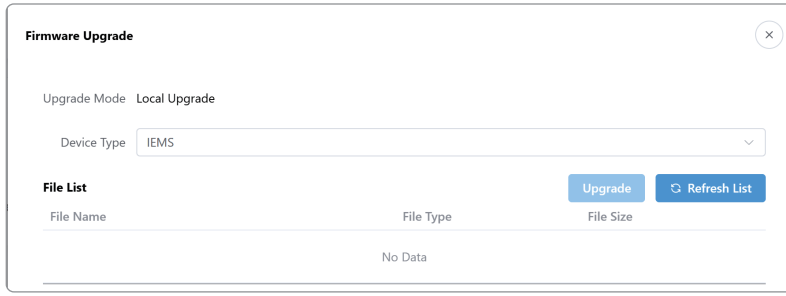


Figure 7-34 Upgrade Page

Table 7-22 Description of Upgrading

Item	Description
Firmware Upgrade	Upgrade Mode
	Device Type
File List	Upgrade package file management, after selecting the upgrade package to be upgraded, the upgrade button will light up automatically, and you can upgrade the corresponding device by clicking the upgrade button.

- ## Log Export

Log export module, support for system log export function, can be the system running records, operation logs and other data exported to the local, easy to follow up the analysis, archiving or troubleshooting.



Figure 7-35 Log Export Page

8 Troubleshooting and Maintenance

8.1 Troubleshooting

When an abnormality occurs, please refer to the following troubleshooting list for possible causes and solutions to the problem. If the problem cannot be solved or is not listed, please contact technical support and provide the device serial number (SN) and a description of the problem.

Table 8-1 Troubleshooting List

Fault/Alarm	Cause and Solutions
IEMS cannot be turned on.	***Cause:*** • Incorrectly connected power cord (e.g., reversed positive and negative terminals) • Power supply terminals not plugged in or not connected to the Power supply terminal not plugged in or loose connection to IEMS main body • Cabinet in which IEMS is located is not energized. • IEMS internal failure. ***Solution:*** ***1*** Check power terminal wiring, tighten screws. ***2*** Apply power to the cabinet. ***3*** Contact installer or technical support.
Connected device not recognized	***Cause:*** • Communication cables are wired in the wrong order • The communication cable is not connected to the IEMS terminal correctly. • RS485 communication parameters on the web page do not match the actual configuration (e.g., baud rate, parity bit, stop bit). ***Solution:*** ***1*** Check the status of the communication cable connections and rewire if necessary. ***2*** Verify RS485 communication parameters (baud rate, check bits, stop bits) ***3*** Verify RS485 communication parameters (baud rate, check bit, stop bit) Ensure that addresses are not duplicated when multiple devices are connected via RS485.

Fault/Alarm	Cause and Solutions
IEMS connected devices show offline on the web page	***Cause:*** • The communication cable between the IEMS and the device is not properly connected. • Power failure or abnormal operation of the device. • Device communication parameters have been modified • The device has been changed. ***Solution:*** ***1*** Check communication cable connections and reconnect if necessary. ***2*** Check whether the device has been disconnected or malfunctioned, and then re-power it up again after troubleshooting. ***3*** Verify the RS485 communication parameters of the device to ensure compatibility with the IEMS. ***4*** Check the RS485 communication parameters of the device to ensure compatibility with the IEMS If the device has been replaced, search for it again or add it to the IEMS manually.
IEMS fails to communicate with the Cloud Platform.	***Cause:*** • IEMS Failed to bind station on Cloud platform. • 4G communication failure. • Local Area Network (LAN) communication failure. ***Solution:*** ***1*** Create a new station and bind the IEMS to it, or bind the IEMS directly to an existing station. ***2*** See solution for 4G communication failure. ***3*** See Solution for LAN Communication Failure.
4G communication failure	***Cause:*** • SIM card is not inserted, damaged or in arrears. • 4G communication parameters are set incorrectly. • 4G signal strength is weak. ***Solution:*** ***1*** Check the SIM card slot to ensure that the SIM card is intact and properly inserted. ***2*** Contact your mobile operator or technical support to recharge ***3*** Check 4G communication parameters and make sure they are configured correctly. ***4*** Tighten or replace the antenna to improve signal reception. ***5*** Log in to the IEMS webpage to check the real-time 4G signal strength.

Fault/Alarm	Cause and Solutions
Local Area Network (LAN) Communication failure	***Cause:*** • The network cable of the IEMS is connected to the wrong NET terminal. • Field network abnormality. • Network firewall blocks communication. • Incorrectly set LAN communication parameters. ***Solution:*** ***1*** Check and ensure that the network cable is connected to the NET3 port of the IEMS. ***2*** Verify that the local network is available from your computer/mobile phone. ***3*** Check local network firewall settings and release. ***4*** Check the local network firewall settings and release the domain name and port required for the IEMS to communicate with the Cloud platform. ***5*** Select the IP acquisition method supported by the local network. For static IP, enter the IP address, subnet mask, DNS and gateway correctly.
Device pairing failure	***Cause:*** Abnormal wiring between cabinet and equipment. ***Solution:*** Check wiring, reconnect cables and retry.

8.2 Equipment Maintenance

⚠ *QUALIFIED PERSON*

Please maintain the IEMS regularly to ensure its long-term stable operation.

Table 8-2 Maintenance List

No.	Maintenance Items	Maintenance Cycle
1	Check and update IEMS software	Depending on the official release date of the new version.
2	Change your passwords regularly and keep them highly secure.	Flexibility to adjust to system maintenance requirements.
3	Check IEMS hardware status, including terminals, LEDs, etc.	
4	Check cable connections and wiring	

9 Technical Specifications

Item	HXEM100
Power Supply	DC 24 V
CPU	Cortex-A55 4-core 1.6 GHz
Memory	DDR4-1GB
Stockpile [GB]	Standard: 8, Expandable to 128
DI	4 channels
DO (4 channels)	Breaking Capacity: 5 A/250 Vac
AI (4 channels)	0 ~ 10 Vdc
RS485 (8 channels)	Single channel supports 32 slave devices
CAN	2 channels
USB (1 channel)	USB 2.0
Max. DC Output Current (DC24V) [mA]	200
Ethernet (2 channels)	Is1000/100/10 M Ethernet (adaptive)
Dimensions (W × H × D) [mm]	155.8 × 67.8 × 263
Weight [kg]	1.6
Maximum Power Consumption [W]	≤20
Electricity Metering	3P4W, AC3X100V~3X300 V, 5(6) A Active: 0.5S Reactive: 2.0
Operating Temperature Range [°C]	-40 ~ +60
Ingress Protection	IP30 (Optional Waterproof Casing: IP65)
SIM Card	Support
SD Card	Support, Max to 128 G

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