BF100

USER MANUAL

EnerCore
Outdoor Air-cooling
Battery Cabinet

File version-20250730-V1.1-EN Information might be subject to change without notice during product improving.

Content

Statement of Law

This product complies with the design requirements for environmental protection and personal safety. The storage, use and disposal of the product shall be in accordance with the product manual, relevant contract or relevant laws and regulations.
When products or technologies are updated, customers can check the information on the website of Dyness.
Website: http://www.dyness.com/
Please note that products can be modified without prior notice.

Revised History

Revised Version	Revision Date	Revision Reason
1.0	2024.09.13	First publication
1.1	2025.07.30	Freeze 71kWh model and C5 version; add BDU port definition; modify external port definitions, cable specifications, and accessory list, etc.

1. Guideline

CAUTION: Read this manual carefully before installing or operating this product. Keep this manual in a safe place for future reference.

1.1. Use of Manuals

- Manual content: this manual mainly introduces the safety precautions, functions and specifications, delivery and storage, installation and wiring, power on/off process, HMI operation, maintenance and quality assurance of this ESS product.
- Applicable population: this manual is suitable for professional technicians who install and maintain the ESS product, as well as users who carry out daily operation. Readers should have certain electrical knowledge.

1.2. Symbol and Abbreviation

This manual may contain the following symbols to emphasize important information, to ensure the safety of the user's personal and property when installing this product, or to facilitate the efficient operation, please read it carefully.

Table 1-1 Symbol Mark

	Indicate that there is high voltage inside the ESS cabinet, so beware of electrocution resulting in personal safety issues
	Indicate an electrical hazard, all external power connections must be disconnected before maintenance and operation
	Anti-temperature mark
	Ventilation mark
	Indicate that there is protective earthing (PE) terminal, which is used to prevent electric shock in the event of a fault, and needs to be firmly earthed to ensure operator safety
	Recycle mark
	Hazardous waste, need professional recycling, can not be put into the trash can
	Instruction (User manual) mark

References to the following products in this manual are replaced by abbreviations for ease of presentation.

Table 1-2 Abbreviation Definition

Abbreviation	Full name
ESS	Energy Storage System
EMS	Energy Management System
BMS	Battery Management System
PACK	Battery Module
BDU	Battery Distribution Unit
SPD	Surge Protection Device
SOC	State of Charge
SOH	State of Health
DC	Direct Current
AC	Alternating Current
RCD	Residual Current Device
CT	Current Transformer
PE	Protective Earthing

2. Safety Instructions

2.1. Safety Principle

Related safety precautions need to be strictly followed during installation, operation and maintenance. This product is a combined high-voltage DC and three-phase AC system and should only be operated by Dyness authorized personnel.

DANGER

- Deadly high voltages are present inside the product, please observe and comply with the warning labels on the product;
- Do not touch the power grid or the contacts connected to it inside the product to prevent the risk of fatal electric shock!
- Damage to the battery may result in electrolyte leakage. If the electrolyte leaks, do not touch the leaking electrolyte or volatile gases and contact the after-sales service team immediately for assistance.

WARNING

- Transportation, installation, maintenance must comply with local regulations and this user manual;
- Installation work must be assigned to a specialized full-time operator.

PROHIBITION

- Risk of damage to the battery system or personal injury or behavior is prohibited;
- Replacement of the modules by the user is prohibited and the company will not be responsible for any damages caused.

2.2. Operator Qualifications

Only qualified electricians or professional personnel can operate the product, the operator should meet the following requirements.

- Shall be familiar with local standards and relevant electricity safety regulations;
- The operator shall have received professional training related to the installation and commissioning of electrical equipment, and should have the ability to respond to emergencies or unexpected situations that may occur during installation or trial operation.
- The operator shall have certain specialized knowledge of electronics, electrical wiring and machinery, and be familiar with electrical and mechanical schematic diagrams;
- The Operator should be fully familiar with equipment protection and standard maintenance, and operations should comply with established safety

standards.

2.3. Environmental Safety Requirements

- Do not install and use the product in environments with temperature below -20°C or above 50°C;
- Do not install and use the product near any heat sources or combustible materials;
- Do not install and use the product in areas with frequent movement of personnel;
- Do not expose the product to corrosive gases or liquids;
- Keep the product installation and use away from children and animals;
- The maximum installation altitude for the product should not exceed 3000m, and it should be derated when above 2000m;
- Sufficient space should be reserved for product installation to ensure adequate ventilation;
- Isolation barriers must be set up during installation to prevent any unrelated personnel from entering the site.

2.4. Electrical Safety Requirements

The operator must ensure that: all basic information and step-by-step instructions are understood before commissioning and switching off the disconnecting circuit-breaker.

DANGER

Battery Protection Safety

Please ensure that during installation, maintenance of the equipment:

- The battery is completely disconnected;
- Have a visible warning sign at the break point to ensure no accidental reconnections.

Ground Fault Protective Safety

- When a ground fault occurs, the original non-electrified part may carry high voltage, and accidental electric shock can lead to personal safety! Ensure that there is no ground fault and take necessary protective measures before operation.

Safety Of Live Line Measurements

- Given the presence of high voltages in this equipment, protective measures (e.g., wear insulated gloves, etc.) must be taken during live line measurements, and the operator must be accompanied by a person to ensure personal safety.

Arc Protection Safety

- Avoid arc, fire and explosion hazards caused by improper operation;
- Prohibit touching uninsulated cables that may be energized;
- When a loose connection occurs in the power cable, or a screw or other component falls out accidentally, do not operate it without authorization, and it must be handled by a qualified professional to avoid causing a larger

malfunction.

2.5. Transportation and Installation Safety Requirements

WARNING

Personnel Operation Regulations

- Forklifts, cranes and other construction machinery must be operated by qualified operators if required on site;
- The operator must wear insulated protective equipment that complies with safety regulations during installation;
- When connecting the power on-site, a professional guardian must be assigned to protect the switches that need to be turned off;
- Ensure that it has no electrical connections before installation;
- Each completed project must be checked at least once and cross-checked during the installation process;
- The equipment must be installed in sequence without skipping any steps.

Wiring regulations

- Appropriate measuring devices must be used, appropriate standards and directives must be followed;
- The operating manual of the measuring device must be known before any measurement is carried out;
- Only use equipment specified by Dyness. Failure to use equipment specified by Dyness may result in impaired protection as well as injury to personnel.

Test run after installation

- Only after confirmation by professionals and obtaining permission from local electrical authorities can the equipment be put into operation;
- Before operation, please switch off all distribution circuit breakers, and it is strictly prohibited to disconnect them during product running.

DANGER

- Do not change fuse size or rating value during installation;
- It is not allowed for two or more operators to connect a single wire simultaneously during the wiring process.

2.6. Daily Operation and Maintenance

All operations of the product should follow the instructions in the User Manual. Damage to the equipment caused by violation of these instructions will void the associated liability and warranty. If necessary, contact Dyness Customer Service for repairs.

WARNING

- The software, shell and components of the product may not be changed without Dyness authorization. If changed, the corresponding liability and warranty shall be void;
- Do not remove or alter the nameplate;
- Do not open the cabinet doors in inclement weather such as rain or strong winds.

2.7. Product Obsolescence

When the product as a whole or individual internal components become aged or damaged and need to be discarded, they cannot be disposed as regular waste. Some components inside the product can be recycled and reused. Improper disposal of certain components may cause environmental pollution. Please contact qualified local professional recycling organization for proper disposal of the product and internal components.

3. Product Description

3.1. Product Overview

The product is an outdoor battery cabinet, including PACK, BDU (integrated BMS and EMS), Security & fire protection system, Air conditioner system and so on. With the hybrid inverter converted to AC output, it can be widely used in charging stations, commercial buildings, manufacturing and other small-scale industrial and commercial scenarios.

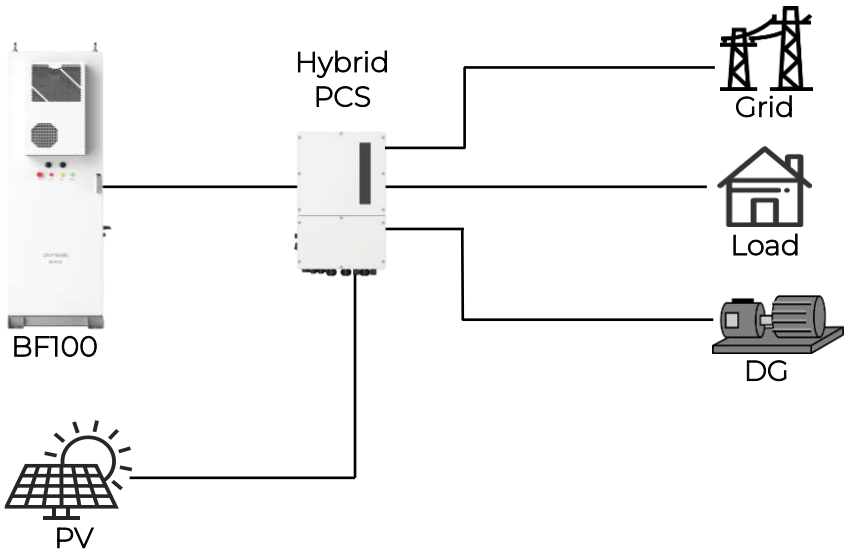


Figure 3-1 System Application Principle

3.2. Product Model

This manual applies to outdoor battery cabinet products (BF100) of EnerCore series. The definition are explained as below:

- EnerCore: Product series name
- B: Battery, Dyness battery series product
- F: Fan/air-cooling system
- 100: Battery capacity of standard model
- C: Indicate system capacity, the number after “C” means the initial system capacity of different model, unit: kWh

Table 3-1 Product Model

No.	Model	Description
1	BF100-C80	Battery cabinet, Nominal capacity: 86kWh
2	BF100-C100	Battery cabinet, Nominal capacity: 100kWh

3.3. Product Configuration

The product adopts a modular design, which is easy to install, operate, and maintain. Its configuration list is as follows:

Table 3-2 Product Configuration List

Module	Function	Qty.	Config.
PACK	Used for energy storage, providing stable and continuous power output to the system	6/7	Standard
BDU	System energy management and comprehensive control, battery control unit, and high-voltage power supply	1	Standard
Security & Fire protection systems	Provide intrusion protection, fire prevention, and effective fire extinguishing for equipment.	1	Standard
Air conditioner system	Adjust battery working temperature to ensure it works under optimal temperature	1	Standard

3.4. System Parameters

The parameter may vary without notice during product upgrade:

Table 3-3 BF100 Parameter

Model	BF100-C80	BF100-C100
Battery		
Battery Type	LFP ($LiFePO_4$)	
Battery Capacity	280Ah	
Rated Current	140A	
Max. Current	160A	
PACK Configuration	1P16S*6	1P16S*7
Voltage Range	278.4~345.6Vdc	324.8~403.2Vdc
Nominal Capacity	86kWh	100kWh
System		
Weight	1200±100kg	1300±100kg
Dimension (W*D*H)	725*1200*2260mm	
Max. Efficiency	94%	
Air Conditioner Power	2kW (Cooling), 1kW (Heating)	
Operating Temperature	-20~50℃ (Derating above 45℃)	
Operating Humidity	0~95%RH (Non-condensing)	
Ingress Protection	IP55	
Anti-corrosion Grade	C3	
Cooling Method	Air-cooling	
Noise	≤65dB	
Elevation	3000m (Derating above 2000m)	

Display	Touch screen
Fire Protection	Aerosol, Multi-sensor/Water ingress, Explosion-proof ventilation
Communication	Ethernet/4G/RS485
Certification	CE, LVD, UN38.3
Depth of Discharge	95%
Cycle Life*	≥8000 cycles

*Operating conditions: 0.2C Charging & Discharging, @25°C, 95% DOD

3.5. Appearance Design

- Dimension(W*D*H): 725*1200*2260mm (Rings not included)
- Net weight: Approx 1300kg (Model BF100-C100 as reference)
- Ingress protection grade: IP55
- Anti-corrosion level: C3

Figure 3-2 Product Appearance

The front panel of the product is equipped with 1 emergency stop button, 3 indicator lights showing the main operating status of the product, and 2 antennas:

Antennas from left to right: 4G, GPS;
Indicator lights from left to right: emergency stop button “EPO”, alarm indicator “FAULT”, running indicator “RUN” and power indicator “POWER”.

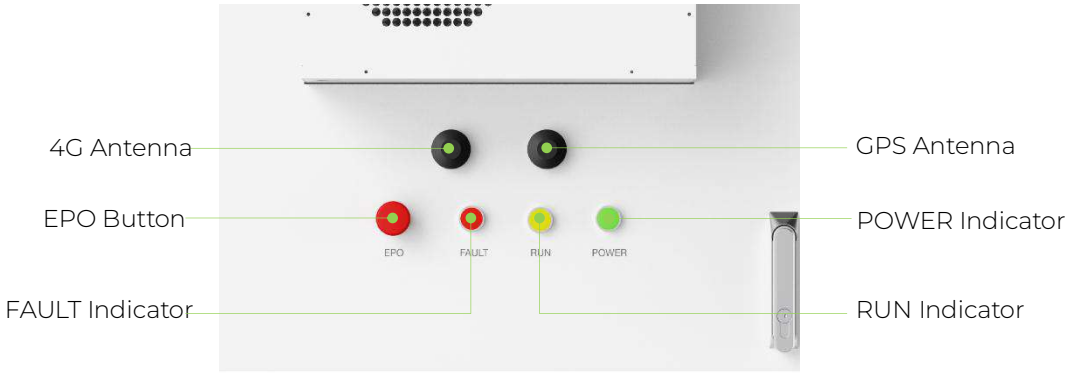


Figure 3-3 Product Indicators

Table 3-4 Indicator Name and Function

NO.	Color	Name	Function
1	●	EPO	The system stops when the button is pressed
2	●	FAULT	Light stay on indicates a system malfunction
3	●	RUN	Light stay on indicates normal system operation, off indicates standby
4	●	POWER	Light stay on indicates power is applied and ready for operation
5	●	4G	Receive and send 4G signals
6	●	GPS	Receive location signals

* CAUTION: Do not operate the emergency stop button in a non-emergency situation.

3.6. Internal Design

The product is an outdoor battery cabinet, including PACK, BDU, Security & fire protection system, air conditioner system, HMI screen.

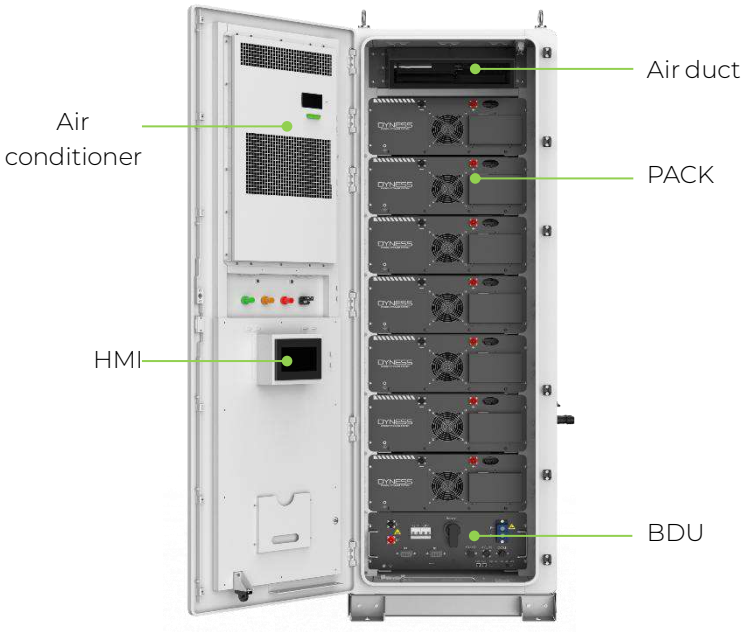


Figure 3-4 Internal Structure

3.7. Main Modules

3.7.1. PACK

DANGER

- Do not touch any batteries while the BESS is running;
- Only authorized operators should handle the batteries;
- End of life (should be decommissioned, disassembled and disposed of in accordance with the recycling program provided).

This system's PACK uses LFP batteries with 280Ah cells, arranged in a 1P16S configuration. The PACK has a rated capacity of 14.33kWh and a rated voltage of 51.2V. Each battery PACK is equipped with one Level 1 BIC module (slave controller) for collecting voltage and temperature parameters of the PACK, and it also has functions such as state of charge balancing and thermal management. The PACK module adopts air-cooled heat dissipation, with an IP20 protection rating, high structural reliability, and low maintenance costs.

Figure 3-5 PACK Diagram

Table 3-5 PACK Configuration

Model Number	HV51280F
String Form	1P16S
Battery Energy (kWh)	14.33
Nominal Voltage (Vdc)	51.2
Nominal Capacity (Ah)	280
Standard Charging/Discharging current (A)	140
Dimension(W*D*H)	568*764*231mm
IP Grade	IP20
Operating Temperature	Charging 0°C~+60°C
	Discharging -20°C~+60°C
Operating Humidity	0%~95% RH (Non-condensing)
Storage Temperature	1 Month -20~45°C
	1 Year 0~35°C

WARNING

- When battery leakage occurs, or there is abnormal smell from the battery, if it is difficult to determine whether the electrolyte leaks, please stop using it immediately and contact Dyness or professionals;
- Please do not touch the electrolyte directly, if skin contact accidentally, please flush with plenty of water;
- When handling leaking batteries, make sure that the power supply connected to the battery is off to prevent fire and sparks, and keep the environment well ventilated;
- Wear rubber gloves (insulation voltage>10kV) when handling leaking batteries;
- Please use gauze (ordinary medical gauze) or other liquid absorbent solids to clean the battery leakage;
- The treated battery should be placed in isolation and should not be used again;
- The above operations shall be completed by personnel designated by Dyness or qualified professionals.

3.7.2. BDU

The BDU is equipped with a built-in EMS (Energy Management System), BMS (Battery Management System), high-voltage contactors, high-voltage fuses, circuit breakers, and other control and protection devices, integrating control, protection, and monitoring functions into a single unit. This reduces the need for external cables and independent components, enhancing system compactness. Through efficient power distribution, multiple layers of protection, and intelligent management, the system ensures stable operation while providing data support and operational convenience for maintenance and operations.

Figure 3-6 BDU Diagram

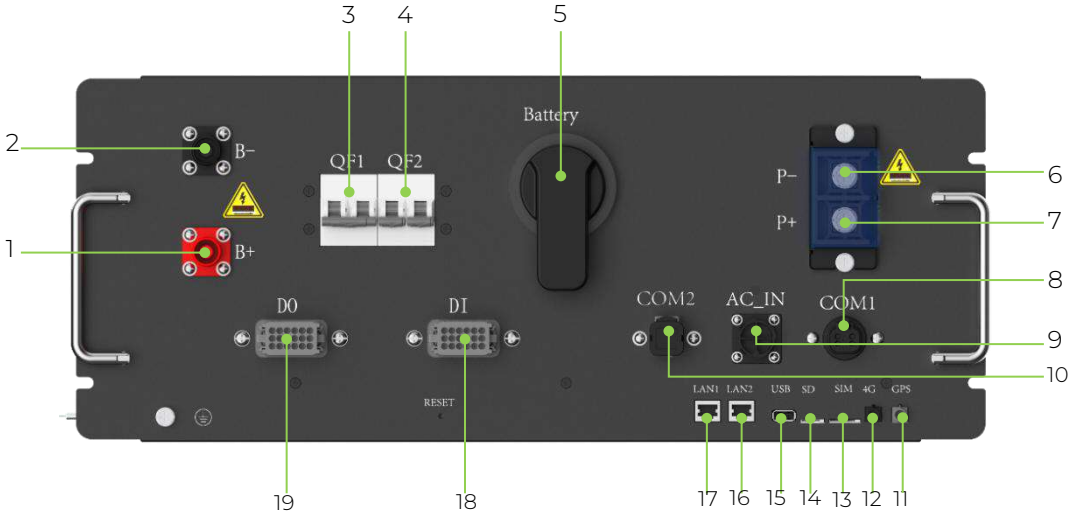


Figure 3-7 BDU Port Diagram

Table 3-6 BDU Port Definition

No.	Label	Definition
1	B+	Battery cluster positive terminal input
2	B-	Battery cluster negative terminal input
3	QF1	Air conditioner& AC/DC switch
4	QF2	DC/DC switch
5	Battery	Battery main circuit breaker
6	P-	Battery cluster negative terminal output
7	P+	Battery cluster positive terminal output
8	COM1	PACK power supply/communication

9	AC_IN	Air conditioner & AC/DC AC auxiliary power input
10	COM2	PCS communication/host computer port
11	GPS	GPS antenna port
12	4G	4G antenna port
13	SIM	SIM card port
14	SD	SD card port for local data storage
15	USB	USB port for EMS local program upgrade
16	LAN2	Cloud platform cloud port
17	LAN1	Ethernet backup port
18	DI	Control/communication
19	DO	Control/communication

3.7.3. Security & Fire Protection System

The system is equipped with efficient and reliable security and fire protection systems, providing intrusion protection, fire prevention, and effective fire suppression for equipment.

Security System

- GPS: Locate where the system is installed to reduce the risk of theft.
- Limit switch: Installed at the top of the battery compartment to detect whether the door is tightly closed, preventing rainwater ingress.
- Water detector: Installed at the bottom of the battery compartment. In the event of an anomaly detected by the water detector, the system will report the anomaly and also stop operating.

Fire Protection System

- Composite detector: This system installs composite detectors in the battery compartment, which can detect smoke, temperature, CO gas, VOC, etc., and transmit data to the EMS in real time.
- Aerosol: Aerosol has two activation methods: temperature-sensitive activation and electric activation. Temperature-sensitive activation is triggered when the temperature in the battery compartment rapidly rises to around 185°C or when an open flame is detected. At this point, the thermosensitive wire ignites, triggering the aerosol spray. Electric activation is triggered when the composite detector in the protected area detects a fire. The EMS immediately triggers the electric activation signal for the aerosol, providing a 24V power supply for electric activation.

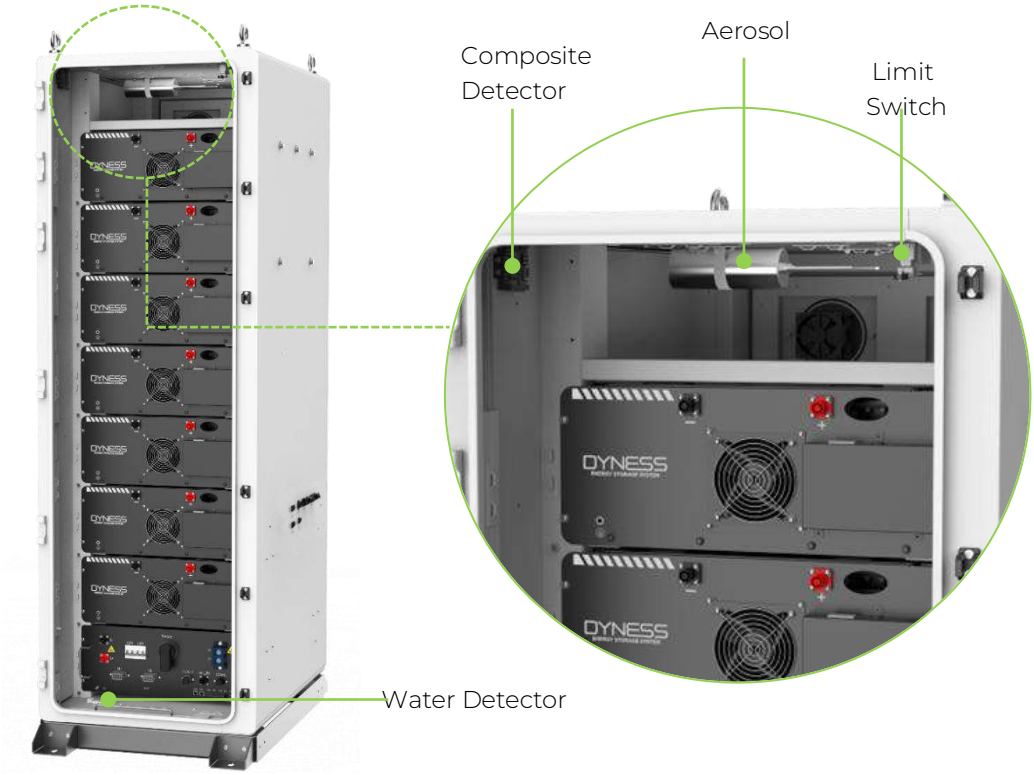


Figure 3-8 Security & Fire Protection System Diagram

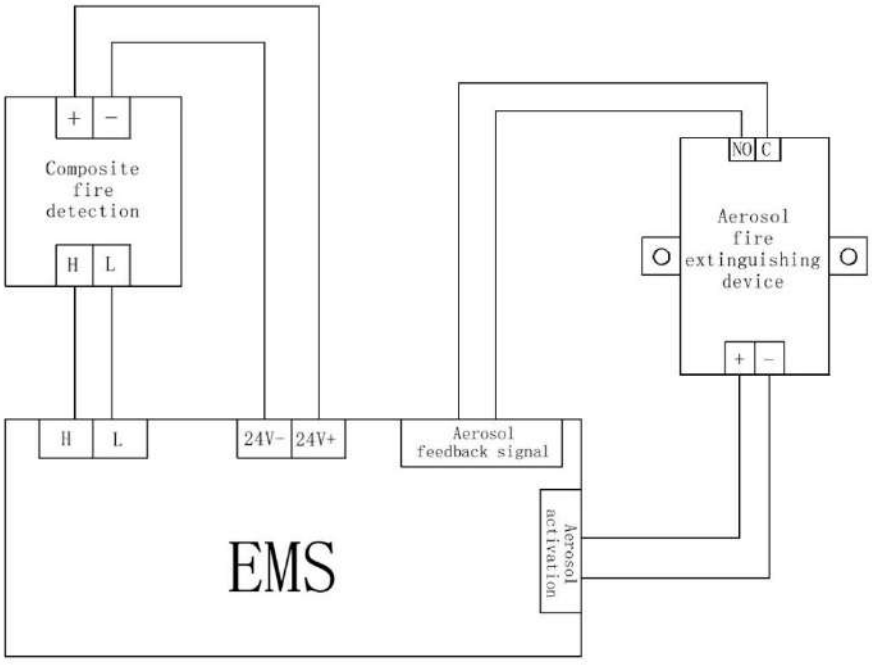


Figure 3-9 Fire Protection Principle Diagram

- The maintenance of the fire protection system should comply with the fire regulations of the country/region where the project is located.
- Fire protection equipment should be inspected and maintained regularly to ensure that all functional indicators are normal.

3.7.4. Air Conditioner System

The system is an air-cooled system equipped with one industrial air conditioner with a cooling capacity of 2 kW and a heating capacity of 1 kW.

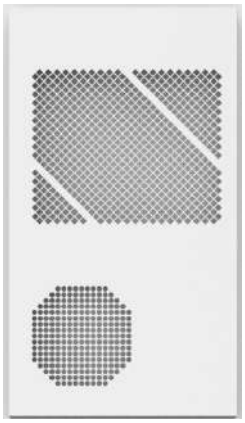


Figure 3-10 Air Conditioner Diagram

4. Transportation and Storage

Caution: Failure to transport and store in accordance with the requirements of this manual may void the warranty.

4.1. Unpacking and Checking

- After receiving the product, please check whether all the delivered components are complete against the “supply list”;
- Please check whether the actual received cabinet and the received product mode is the same as the ordered model;
- Carefully check whether the product is in good condition, the transportation process may lead to damage due to transportation collision, if any problem is found, please contact Dyness or the transportation company in time.

Shipping Requirement

- All necessary equipment in the product have been installed and fixed in the cabinet before leaving the factory, and the product can be transported as a whole during transportation;
- Please confirm that the cabinet doors of the equipment are tightly locked before transportation;
- The transportation of a single ESS cabinet requires wooden box packaging, reserve buffer between the wooden box and ESS cabinet;
- Be sure to set up warning signs or caution tape to prevent unauthorized personnel from entering the lifting and transportation area to avoid accidents;
- Remove any existing or potential obstacles during the moving process, such as trees, cables, etc;
- Whenever possible, choose favorable weather conditions for transporting the equipment.

Requirements For Equipment Transportation Mobility

- Select a suitable crane or lifting tool according to the site conditions. The selected tool must have sufficient load-bearing capacity, arm length, and rotation radius;
- If movement on slopes or similar conditions is required, additional traction devices may be necessary;
- When carrying out ground transportation, be sure to use ropes to secure the top lifting ring of the equipment to the transport vehicle to prevent excessive tilting during transportation.

4.2. Lifting Transportation

This product is equipped with a lifting ring at the top for lifting, and can be transported by lifting. The following requirements must be met when lifting the products:

- Ensure site safety when lifting;
- When lifting and installing, professional personnel should be in charge of the whole process;
- The strength of the slings should be able to withstand the weight of the equipment;

- Ensure that all sling connections are safe and reliable, and ensure that each section of the sling connected to the corner piece is of equal length;
- The length of the slings can be adjusted appropriately according to the actual requirements of the site;
- Make sure that the equipment remains stable and does not tilt during lifting process;
- The equipment shall be suspended after being lifted from the ground by 300mm, and check that the lifting device is firmly connected before lifting;
- Take all necessary auxiliary measures to ensure safety.

Caution: The hanging rings need to be installed on site, please ensure that the hanging ring bolts are tightened before lifting.

Figure 4-1 Lifting Transportation

4.3. Forklift Transportation

The bottom of this product is equipped with fork holes specially designed for forklift transportation. The product can be moved through the bottom fork holes on the left and right. If the installation site is flat, the product can be moved using a forklift. Forklift transportation methods should meet the following requirements:

- The forklift should be equipped with sufficient load capacity;

- The length of the pins should meet the requirements of the equipment;
- The pins should be inserted into the fork holes at the bottom of the workstation;
- Moving and lowering should be slow and steady during forklift transportation;
- Products should only be placed on stable surfaces. The area should be well-drained, free of any obstacles or protrusions;
- Under no circumstances should the unit be moved by inserting the pins into a position other than the fork holes.

Correct Shipping Method:

False Shipping Method:

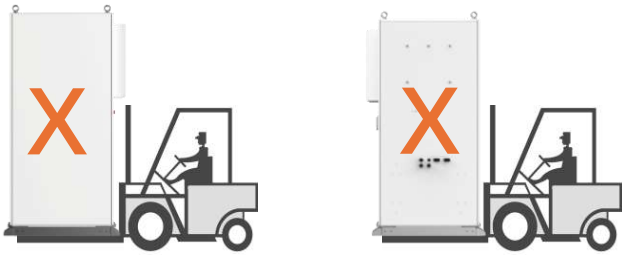


Figure 4-2 Forklift Transportation

4.4. Storage Requirement

Storage Environment Requirements

- The product should be stored on dry, flat (flatness should be no more than 5mm), solid ground with sufficient load-bearing capacity and without any vegetation cover;
- To prevent condensation inside the product or soaking of the bottom of the product during the rainy season, the product should be stored on higher ground;
- The basement must be raised, and the specific elevation height should be determined according to the site geology, meteorological conditions and other conditions;
- Storage environment temperature: 0~+35℃, Humidity: 0~95%(Non-condensation);
- Pay attention to cope with the harsh environment around, such as sudden cold, sudden heat, collision, etc., so as not to cause damage to the PACK.

Storage Operating Requirements

- Packing boxes should not be tilted or inverted;
- Make sure that the cabinet doors are securely locked before storage;
- Effectively protect the product's air inlet/outlet to prevent rainwater, sand, and dust from entering the interior of the cabinet;
- Due to the capacity decay that occurs during long-term storage, it is not recommended to store batteries exceeding six months;

- For products stored for a long period (more than six months), inspecting visually before installation to ensure there is no condensation and verify if the equipment is intact. Additionally, checking after powering on;
- Perform regular inspections, more inspection programs please refer to chapter 9.

NOTE

Starting from the date of delivery, perform one charge and discharge cycle for the PACK every 6 months, to maintain the system SOC of 25~40%.

5. Installation

Only a qualified electrical engineer can operate related electrical connection. Please comply with the requirements given in "Safety Instructions" in this manual and we shall not be liable for casualties or property loss caused by neglect of safety instructions.

DANGER

- Do not touch the live parts!
- Ensure both AC and DC sides are not energized before installation. All electrical connections must be operated under de-energized condition;
- Check the polarity of all input cables to ensure that each input polarity is correct before wiring;
- Do not place the equipment on surfaces that are flammable.

WARNING

- The ingress of sand and moisture may damage the electrical equipment inside the ESS cabinet or affect the performance of the equipment!
- During sandstorm seasons or when the relative environmental humidity exceeds 95%, electrical connection work should be avoided;
- Wait until there are no sandstorms and the weather is clear and dry before starting any connection work;
- Avoid pulling or tugging on cables or wires forcefully to prevent damage to their insulation performance during electrical installation.

CAUTION

- All cables and wires should be ensured to have a certain amount of bending space;
- Necessary auxiliary measures should be taken to reduce the stress on cables or wires;
- After completing each step of the wiring operation, careful inspection is required to ensure correct and secure connections;
- All electrical connections must be strictly in accordance with the wiring diagram.

5.1. Installation Environmental Requirements

Site Requirements

- When selecting the installation site, full consideration should be given to the surrounding environment (climate and geological conditions, such as stress wave emission, underground water level, no high cables in the vertical upper part of the installation site, no pipelines or other underground facilities in the lower part of the installation site, and a certain safety distance should be

maintained between the equipment and buildings and people, the length of the distance should be subject to the fire safety regulations of the project);
- The surrounding environment should be dry and well ventilated;
- Please ensure that there are no trees around the installation location to prevent branches or leaves from blocking the doors or air inlets of the energy storage integrated system during strong winds;
- The installation location should be away from toxic and harmful gas and flammable, explosive, corrosive, and dust-intensive materials;
- The installation location should be away from residential areas to avoid noise.

Foundation Requirements

- The foundation should provide sufficient load-bearing support for the equipment;
- The height of the foundation should be higher than the historical highest flood level;
- The basic bearing capacity > 3t/㎡, the basic service life > 50 years, and the basic level < 3mm/㎡;
- The ESS cabinet should be raised to against the rain. The recommended mounting height of the base is about 300mm-500mm higher than the ground;
- Drainage measures should be constructed according to local geological conditions.

Wiring Requirements

- According to the positions and dimensions of the cable inlets/outlets, sufficient space should be reserved for the AC side cable trough and the cable guide should be inserted in advance during foundation construction;
- The specifications and quantity of perforated pipes are based on the cable model and quantity of the cable;
- Both ends of all embedded pipes are temporarily sealed to avoid impurities from entering. Otherwise, later wiring is inconvenient;
- After connecting all the cables, inlets, outlets and connectors of the cable should be sealed with refractory clay or other suitable material to avoid entry of rodents.

5.2. Installation Spatial Requirements

The product adopts front-rear ventilation. Make sure that the equipment has enough space for better cooling and maintenance, it is advised to reserve enough space around the cabinet installation position:

- The space reservation distance at the front of the product is not less than 800mm;
- The space reservation distance at the rear of the product is not less than 600mm;
- The space reservation distance of the left of the product is not less than 500mm;

- The space reservation distance of the right of the product is not less than 1000mm.

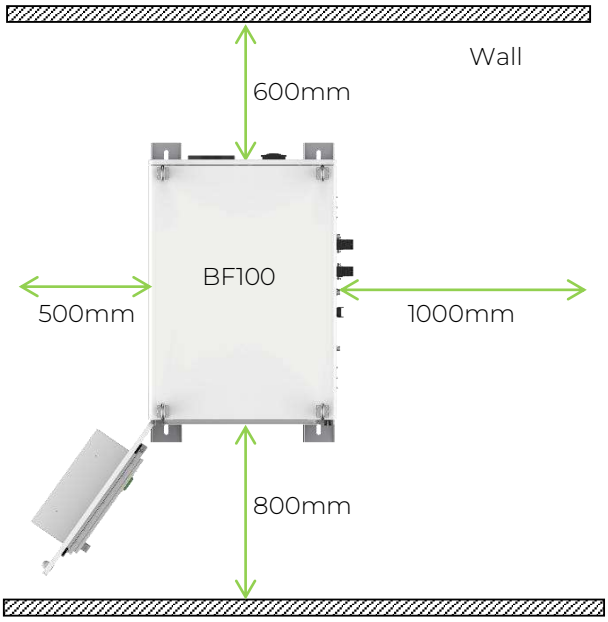
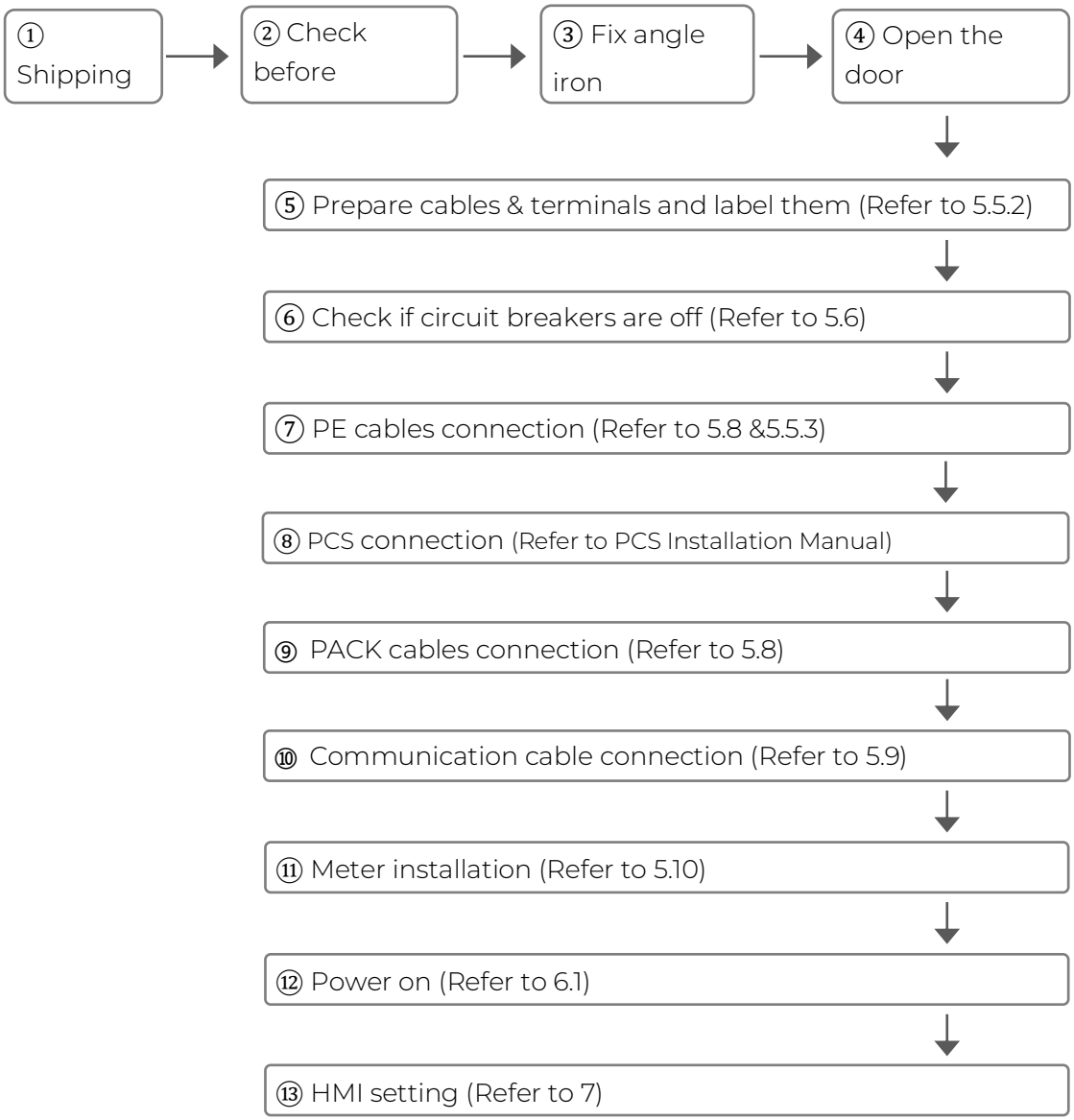


Figure 5-1 Space for Single Product Installation

5.3. Installation Procedure

Product installation please follow the below steps, The specific operation process is detailed in this chapter:



5.4. Fixed Installation

Check Before Installation

WARNING

Please comply with local safety regulations and operational rules during installation. Only complete and undamaged equipment can be installed! Please ensure that before installation:

- The product cabinet itself should be complete and intact;
- All equipment in the cabinet should be complete and intact.

Install Angle Iron Brackets & Expansion Bolts

The product adopts right side cable outlet, concrete column is not necessary. After shipping the product to the installation site, it shall be fixed. Four L-shaped angle iron brackets are pre-reserved at the front/back of the product base, as shown in the below diagram.

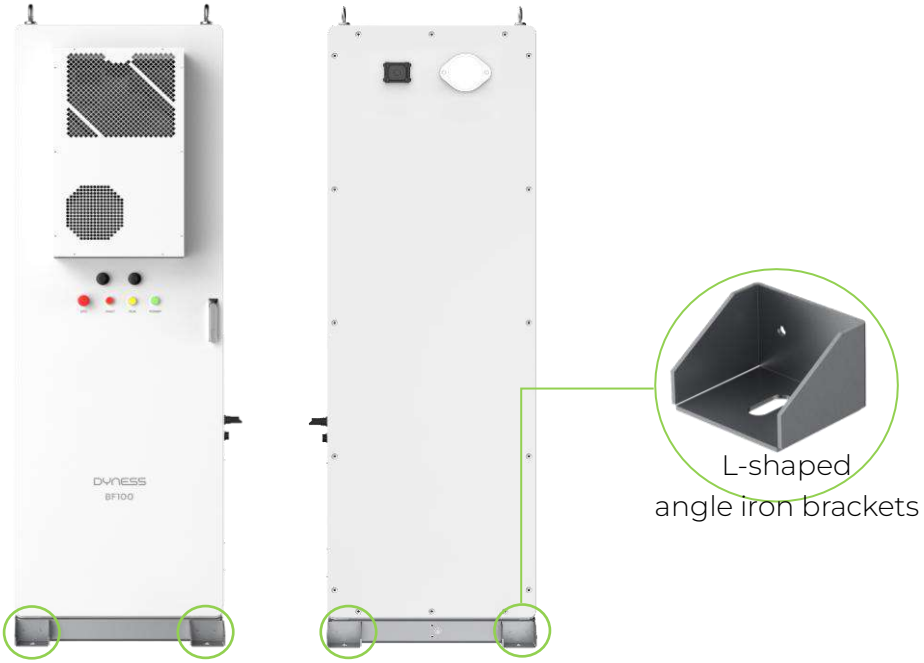


Figure 5-2 Angle Iron Brackets

Note: L-shaped angle steel fixed brackets can also be installed on the side of the product.

The following tools may be needed for installing the brackets: marker pen, electric drill, angle iron, M12 expansion bolts. These tools are not included in the supply list and need to be provided by the customer.

L-shaped Angle Iron Brackets Installation Steps

① Use a marker pen to mark the drilling positions;
② Choose an electric drill with a diameter matching the bolt's outer diameter,

drill holes according to the bolt's length (hole depth slightly greater than the bolt length) until reaching the desired depth for installation;
③ Insert the bolt and expansion sleeve into the hole, tighten the nut to the end of the bolt, and use a wrench to tighten it.

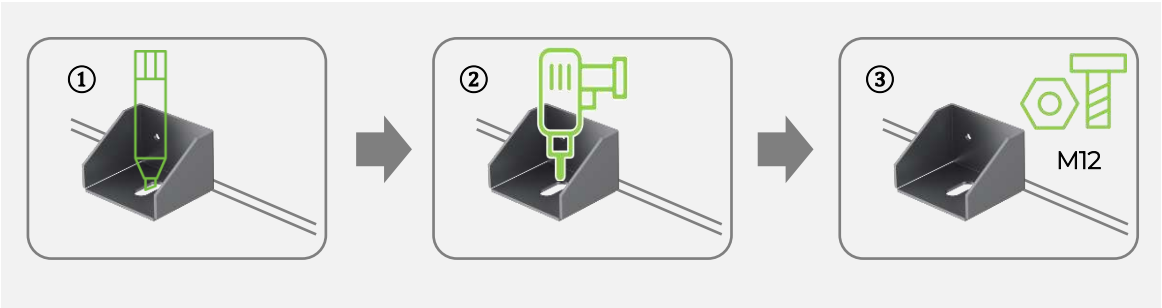


Figure 5-3 Angle Iron Brackets Installation Steps

Door Open Steps

① Make sure that the equipment is under lock state;
② Moving the lid up above the locking hole;
③ Plug in the key in the door and revolve it clockwise;
④ Rotating the handle clockwise to the position shown in the figure to open the door.

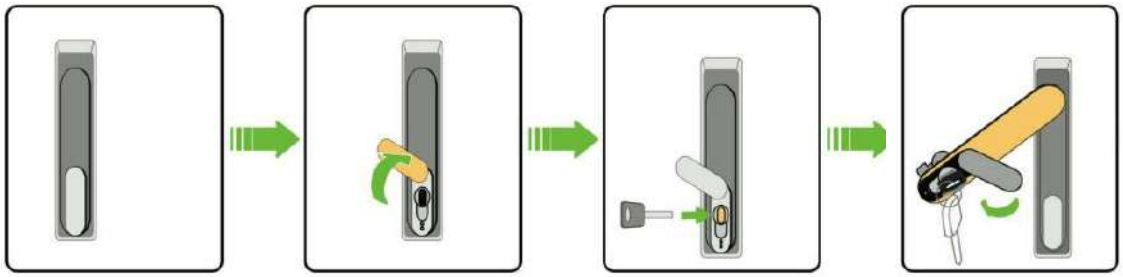


Figure 5-4 Door Open Steps

5.5. Preparation Before Installation

5.5.1. Wiring Tools

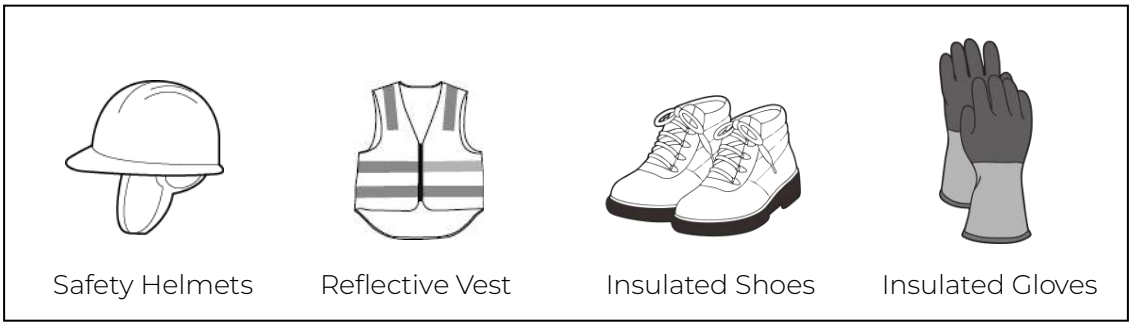


Figure 5-5 Safety Gear

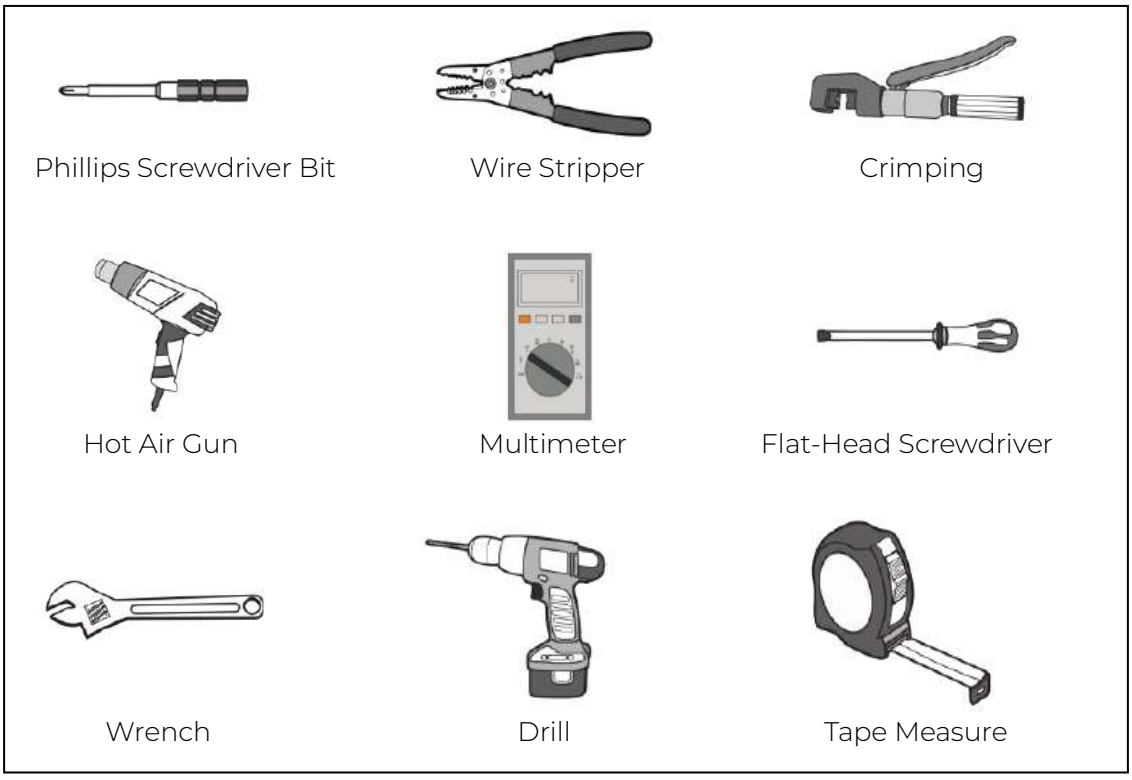


Figure 5-6 Tools

5.5.2. Wiring Accessories List

- The conductor must have sufficient current-carrying capacity, which includes but is not limited to: environmental conditions, conductor insulation material type, cable laying method, cable material, and cross-sectional area.
- The cable diameter must be selected according to the maximum current-carrying capacity, and the length must allow for a margin.
- The specifications and materials of three-phase AC output cables must be consistent.
- Flame-retardant cables must be selected.
- The cables used must comply with local laws and regulations.

Notice:**Observe the specified torque during installation.** The following accessories are provided by Dyness: Power cable, PCS grounding cable, Auxiliary power cable, Communication cable. The cabinet grounding cable is to be provided by the customer.

Table 5-1 Wiring Accessories by Dyness

No.	Type	Specifications	Length	Terminal Mode	Torque
1	Power cable	Outdoor single-core copper cable 2*4AWG	450mm	SC 25-8	12N.m
2	PCS grounding cable	Outdoor single-core copper cable/yellow-green dual color 8AWG	250mm	SC 10-6	5N.m
3	Auxiliary power cable	Sheathed cable 4*14AWG	850mm	RV2-6 RV2-8	5N.m 12N.m
4	RS485/CAN communication cable	Two-core twisted pair shielded cable 24AWG	800mm	RJ45	/

Table 5-2 Wiring Accessories by Customer

No.	Type	Specifications	Length	Terminal Mode	Torque
1	Cabinet grounding cable	Outdoor single-core copper cable/yellow-green dual color 4AWG	On demand	SC 25-6	5N.m

5.5.3. Terminal Wiring Method

OT/DT/SC terminals connection step:

(1) Peel off the insulation skin from the cable terminal, and the length of which should be the depth of the wire hole on the copper terminal, plus an additional 2-3mm;

(2) Install the heat-shrink sleeve at the cable terminal and insert the exposed

copper core part of the stripped wire into the wire hole of the copper terminal (OT/DT/SC terminal);

(3) Use hydraulic pliers to firmly crimp the copper terminally;

(4) Slide the heat-shrink tube onto the copper terminal (OT/DT/SC terminal) to fully cover the wire hole. Use a heat gun to tighten the heat-shrink tube.

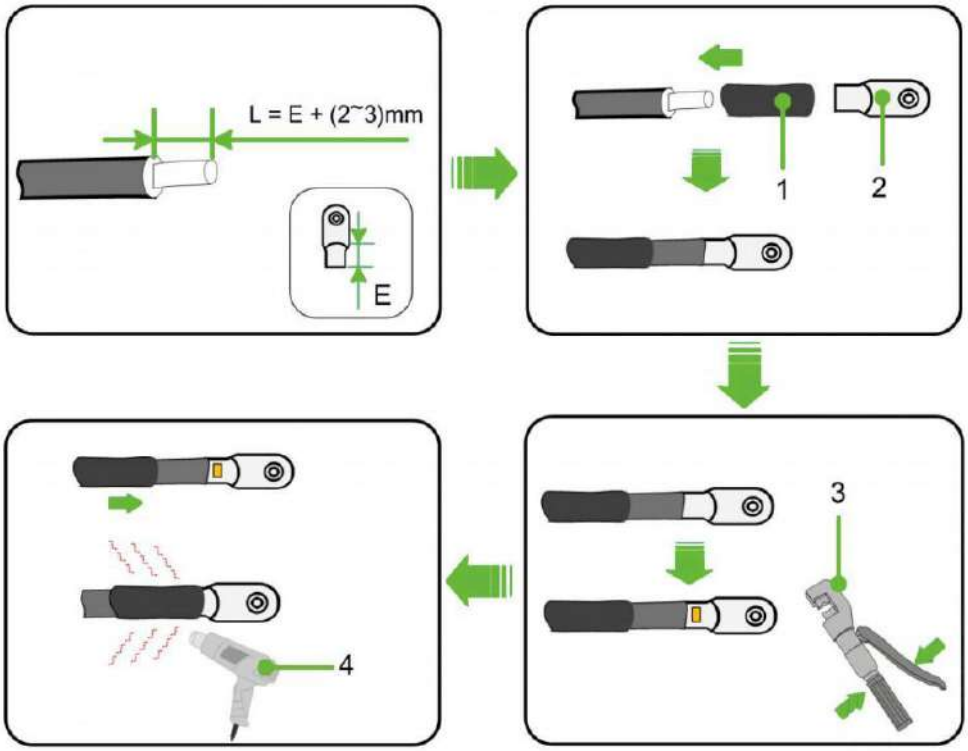


Figure 5-7 The Connection Sequence of Wiring Components

1: Heat-shrink tube

2: OT/DT/SC terminal

3: Crimping Pliers

4: Hot air gun

5.6. Checking Before Wiring

1) Checking Breakers

Check whether the next following circuit breakers is in the disconnected position:

- Air switch “QF1” “QF2” on the front panel (As shown in position 1);
- Battery breaker (“Battery”) on the front panel (As shown in position 2).

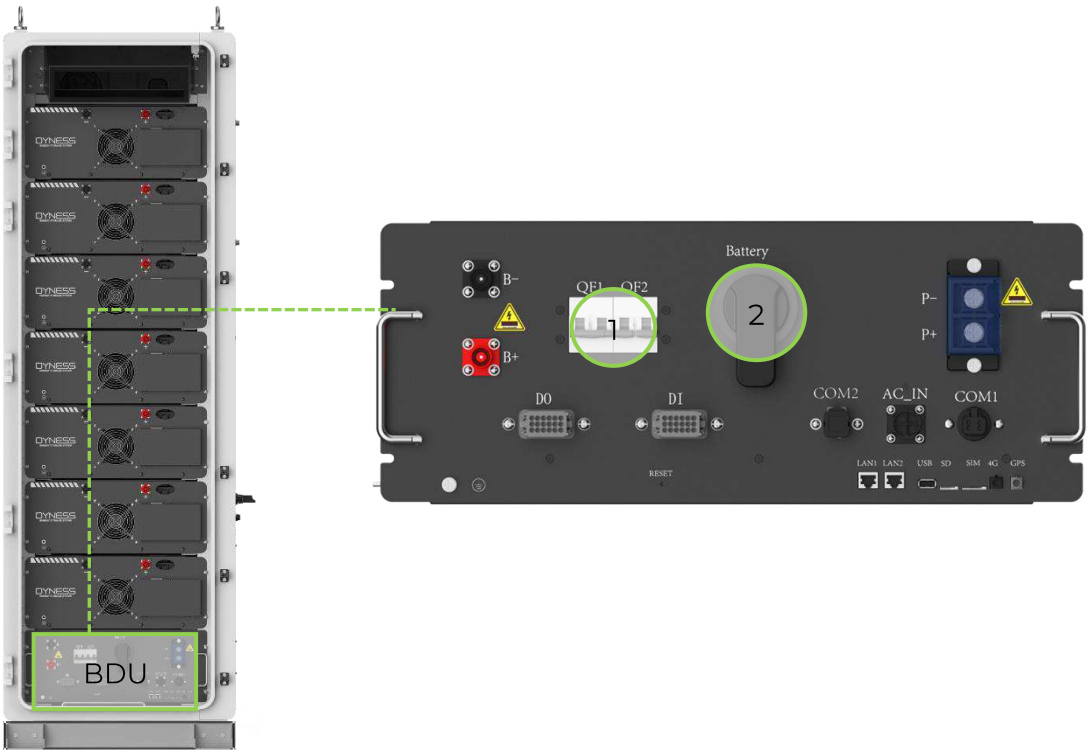


Figure 5-8 Breakers Location

2) Checking Before Wiring

Table 5-3 Checking List Before Wiring

No.	Checklist	Confirm
1	The cables and terminals used should meet the requirements of wire diameter and shielding;	☐
2	The cable are labeled correctly;	☐
3	The related wiring accessories are ready;	☐
4	The wiring operator have worn protective devices;	☐
5	Checking if all the breakers are in disconnected position.	☐

5.7. PE Wiring

The grounding connection must comply with local laws and regulation. Please consider the actual situation at project site and follow the instructions of the power station staff during the process of ground connection, the grounding connection is shown as follows:

(1) Reserve grounding point, which can be grounded by cable/flat steel;

(2) Use 8AWG grounding cable, grounding cables and terminal requirements should refer to 5.5.2.

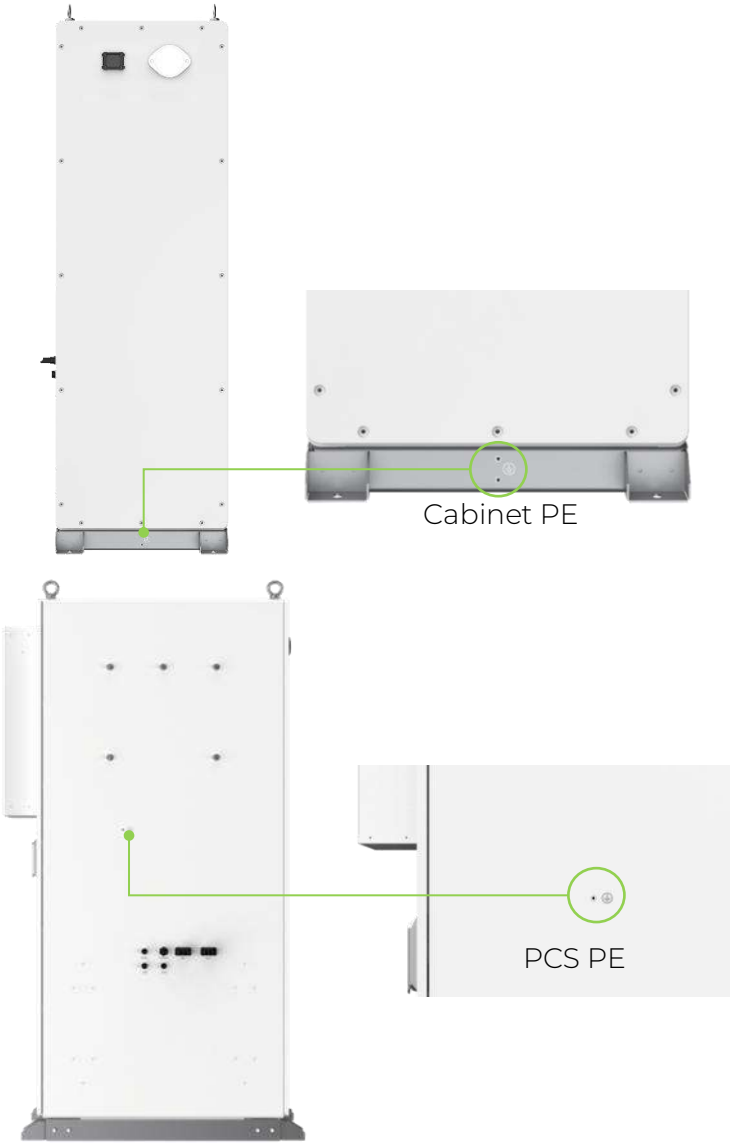


Figure 5-9 Battery Cabinet Grounding

After the grounding connection, the grounding resistance must be measured, and the specific grounding resistance value must comply with relevant region/local standards and regulations.

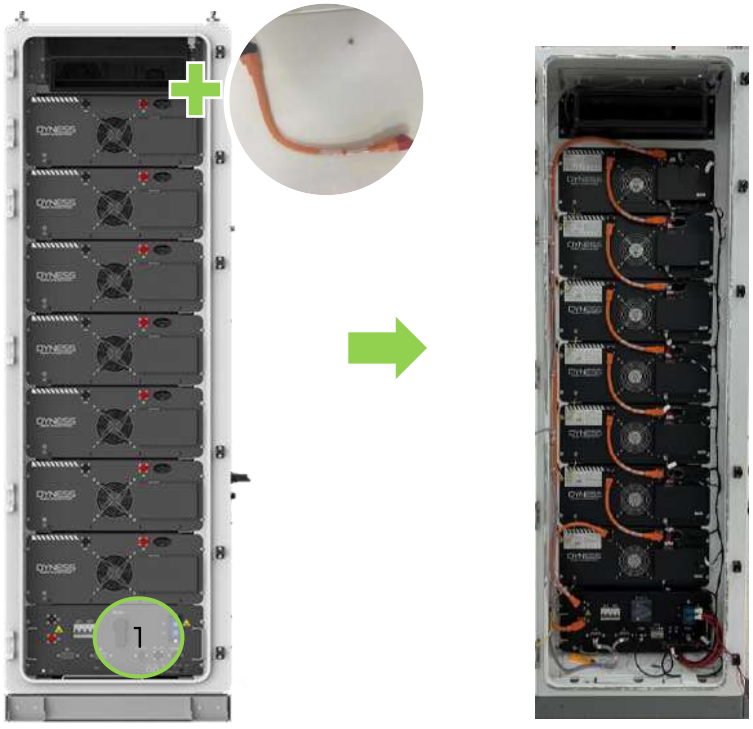
5.8. Electrical Wiring (Internal/External)

Step 1	Internal Wiring
To ensure the safety of the product, the PACK power cables for the batteries are shipped with the product and need to be installed on-site as follows: (1) Please reconfirm the battery switch is off (As shown in position 1); (2) PACK cables connections: connect the PACK in series with cables, where the negative terminal of the upper PACK is connected to the positive terminal of the lower PACK, please ensure the connection sequence is	

correct;

(3) PACK and BDU connection: the positive terminal of PACK is connected to the positive terminal of BDU, the negative terminal of PACK is connected to the negative terminal of BDU.

Notice : The color of PACK and BDU terminals: red represents positive, black represent negative.



Before Wiring After Wiring

Figure 5-10 PACK Cables Connections

Step 2 External Wiring

The product supports external connection to PCS, and the following external interfaces are defined:

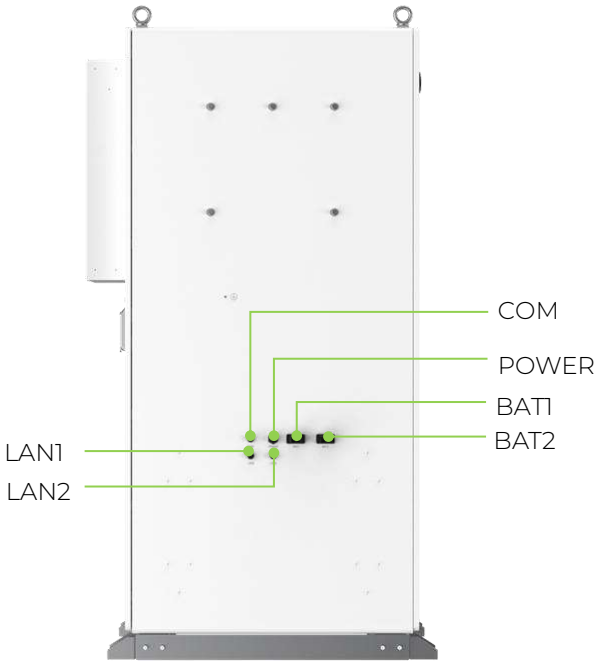


Figure 5-11 External Port Diagram

Table 5-4 External Port Definition

No.	Label	Definition
1	COM	PCS communication port
2	POWER	AC230V External power input
3	BAT1	Battery port 1
4	BAT2	Battery port 2
5	LAN1	Local cloud platform port
6	LAN2	Host computer & DC parallel machine communication

5.9. Communication Wiring

The EMS of this product is integrated in the BDU, and the external communication port as shown in the below diagram:

Figure 5-12 Communication Port

Table 5-5 Communication Port Definition

No.	Label	Definition
1	LAN1	Ethernet backup port
2	LAN2	Cloud platform cloud port
3	USB	USB port, for EMS local program upgrade
4	SD	SD card port, for local data storage
5	SIM	SIM card port
6	4G	4G antenna port
7	GPS	GPS antenna port

5.10. Checking After Wiring

Please check the following checklist after wiring to avoid equipment damage.

Table 5-6 Checklist Before Wiring

NO.	Checklist	Confirm
1	Please disconnect the user's grid-side switch and the DC-side switch of the battery cabinet, please ensure the AC side and DC side of PCS not energized;	☐
2	Please check if the negative and positive connection of battery, the AC phase of PCS are connected correct. Measure the resistance between the three phase, which should be in the MΩ level, if it is in kΩ level or smaller, please check the circuit;	☐
3	Check if External cables, PE cables and communication cables are well connected.	☐
4	The PE cable resistance should be less than 0.1Ω, the cable is intact and has no damage or cracks;	☐

5	Clean the installation area and ensure that there are no tools or other irrelevant objects left inside the ESS cabinet;	☐
6	Use fireproof and waterproof materials to tightly seal the openings and gaps around the ESS cabinet's entry and exit holes.	☐

6. Power On and Power Off

6.1. Power On Process

Precautions

- The product can only be put into operation after being confirmed by professionals and approved by the local power department.
- For products with a long shutdown time, before powering on, a comprehensive and detailed inspection must be carried out on the equipment to ensure that all indicators meet the requirements before powering on.

Check before power on

Table 6-1 Checklist Before Power On

NO.	Checklist	Confirm
1	Check if the wiring is correct;	☐
2	Check if the emergency stop button is released;	☐
3	Check PE cable connection to make sure there are no ground faults;	☐
4	Check if the AC and DC voltages meet the start-up conditions and there is no risk of over-voltage with multimeter;	☐
5	Check to make sure no tools or parts are left inside the device;	☐
6	Check if there is condensation, if so, must open the ESS cabinet for ventilation until condensation disappears;	☐
7	Check if there are no wire ends, metal shavings and other objects that may cause short circuits in signal or power cables.	☐

Power on step

- Step 1: Close “Battery” breaker on the BDU;
- Step 2: Close “QF1”, “QF2” breakers on the BDU in sequence.

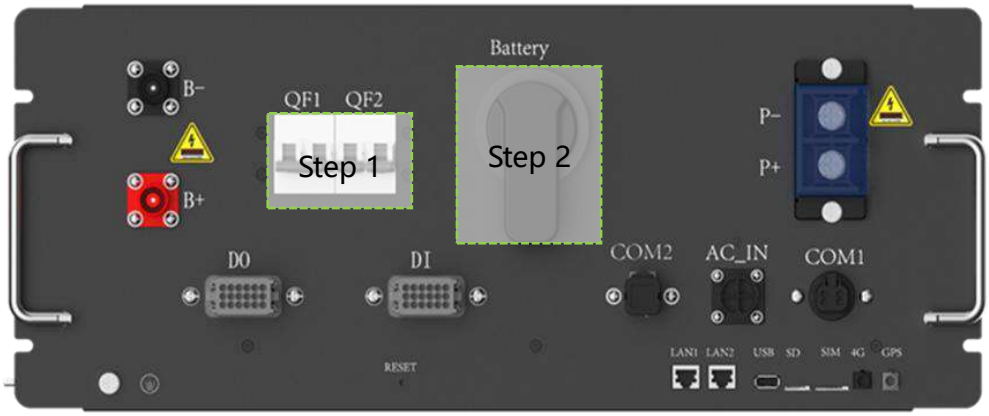


Figure 6-1 BDU Operation

After operating the steps one by one, check whether the indicator light of the product is on and whether the screen is displayed. If the product status is normal, the “POWER” and “RUN” indicator light are on, and “FAULT” indicator is off. The

screen starts to display the system running status and parameters.

6.2. Power Off Process

Operation process could refer to the above image

- Step 1: Disconnect “QF1”, “QF2” breakers on the BDU in sequence;
- Step 2: Disconnect “Battery” breaker on the BDU.

WARNING

After operating step by step, the system will stop running, and the product indicators and screen will go out. After the inspection is completed, wait for five minutes to perform maintenance and inspection operations.

6.3. Emergency Stop

Press the “EPO” red button on the front door when there is an emergency.

Figure 6-2 EPO Location

WARNING

Under normal circumstances, please use the normal shutdown procedure to power off the product! In emergency situations, it is necessary to use EPO to ensure quick response and protect personal and equipment safety!

7. HMI Operation

7.1. Operation System Overview

The product is equipped with 7-inch screen, on where the users could check the system information ad set system parameters.

Table 7-1 HMI Interface Overview

Main Window	Main Menu	Level 1	Main Window	Main Menu
Main interface	Dashboard	Grid		
		PCS		
		Battery		
		Load		
		PV-DC		
		Gen		
	Data	EMS	Status	
			Parallel	
			INV/CHG data	
			S-P-F-V data	
		BMS data	Basic	
			Volt	
			Temp	
			Alarm	
		PCS data	Basic	
			Alarm	
		Sys Data	Meter	
			Air-Cond	
			L-cooling	
		Alarm Info	Alarm	
			History	
		Version Info		
	Setting	EMS	RunSet	Auto
				Remote
			DataSet	SysParam
			SysSet	Basic Set
	Login	Permission		
		Modify		

Please notice: the HMI interface may vary with version update, the images in this chapter is only for reference.

HMI Main Interface

- Dashboard: Display the details of system access device;
- Data: Query the detailed data, alarm information, version information of each sub-module of the system;

- Setting: Setting the related system parameters (please notice the user could only change the EMS parameters);
- Login: The permission for login the system.

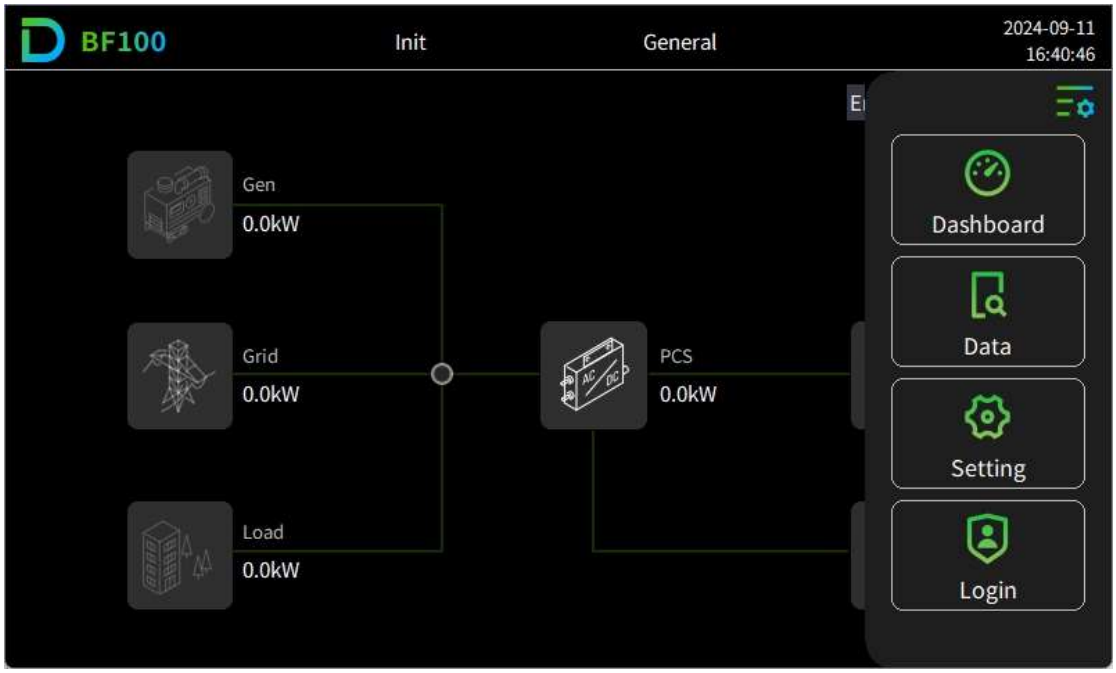


Figure 7-1 HMI Main Interface

7.2. User Login

Table 7-2 Login Permission Description

Permission	Description
Not login	When not log in, the user could only read the system running data, cannot set the device.
General user	The user could check the system running data and set related system parameters. This permission is only open to on-site installation personnel, the original password is 1111.
Advanced user	Only open to the manufacturer staff.

Login step

- Step 1: Click main menu icon  on the upper right corner of the main interface;
- Step 2: Click "Login" to enter the user interface under the main menu bar;
- Step 3: Select "General", input password (1111), click "Login";
- Step 4: Click "Confirm" in the prompt popup.

——END

Figure 7-2 General User Login Step

Change password

- Step 1: Click "Modify" at the upper left of navigation bar;
- Step 2: Input old password and new password, complete the setting, then click "Confirm modification".

——END

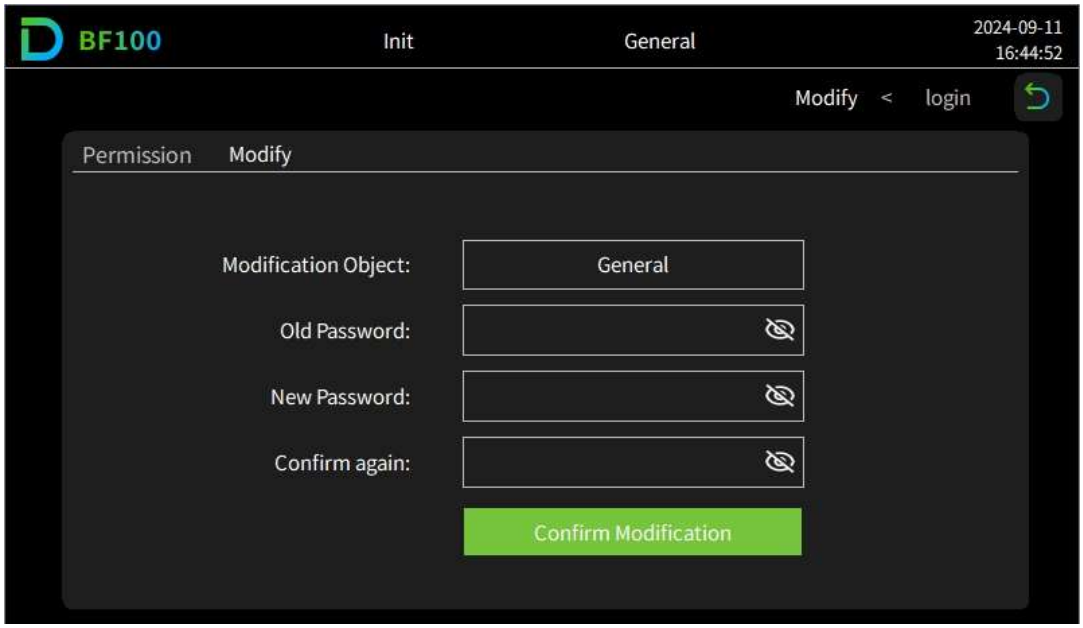


Figure 7-3 Change Password Diagram

7.3. Running Information

Method 1

Click corresponding icons on the main interface and directly enter corresponding module data interface.

- Click Gen icon  , enter Gen interface;
- Click Grid icon  , enter Grid interface;
- Click load icon  , enter Load interface;
- Click PCS icon  , enter PCS interface;
- Click battery icon  , enter Battery interface;
- Click PV-DC icon  , enter PV-DC interface.

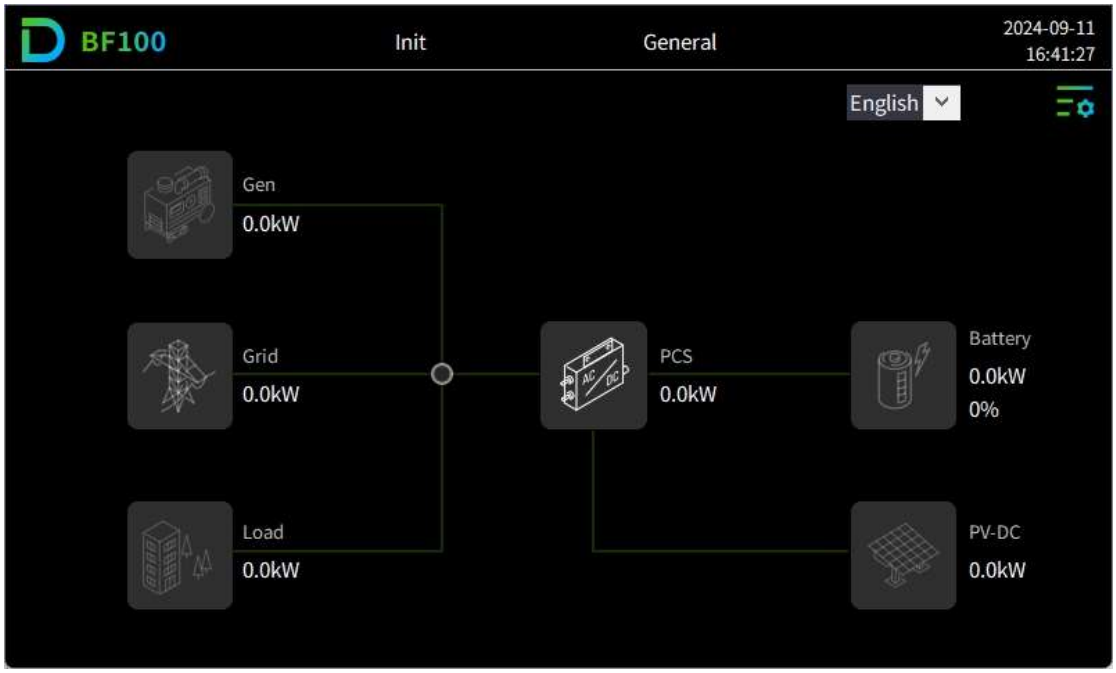


Figure 7-4 Main Interface Module Diagram

Method 2

- Step 1: Click main menu icon  on the upper right corner of the main interface;
- Step 2: Click "Dashboard" under main menu bar;
- Step 3: Select corresponding sub-menu (Grid/ PCS / Battery / Load/ PV-DC/ Gen) as needed.

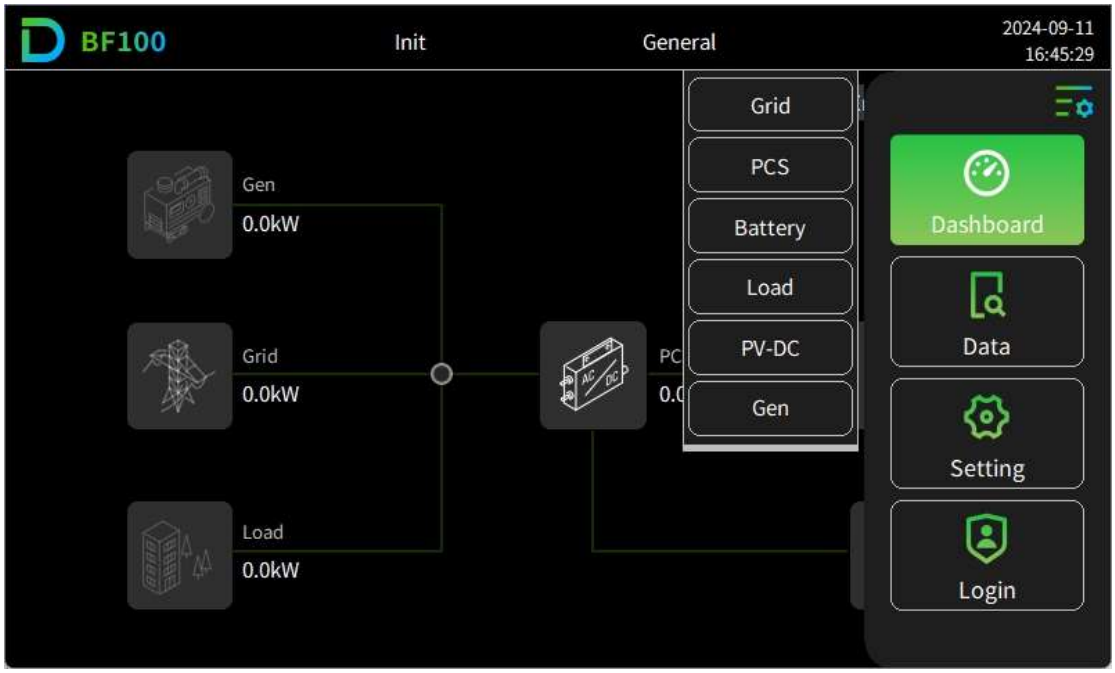


Figure 7-5 System Running Information Overview

7.4. Query Data

- Step 1: Click main menu icon on the upper right corner of the main interface;
- Step 2: Click "Data" under main menu bar;
- Step 3: Select corresponding sub-menu (EMS/ BMS data/ PCS data/ Sys data/ Alarm Info / Version Info) as needed.

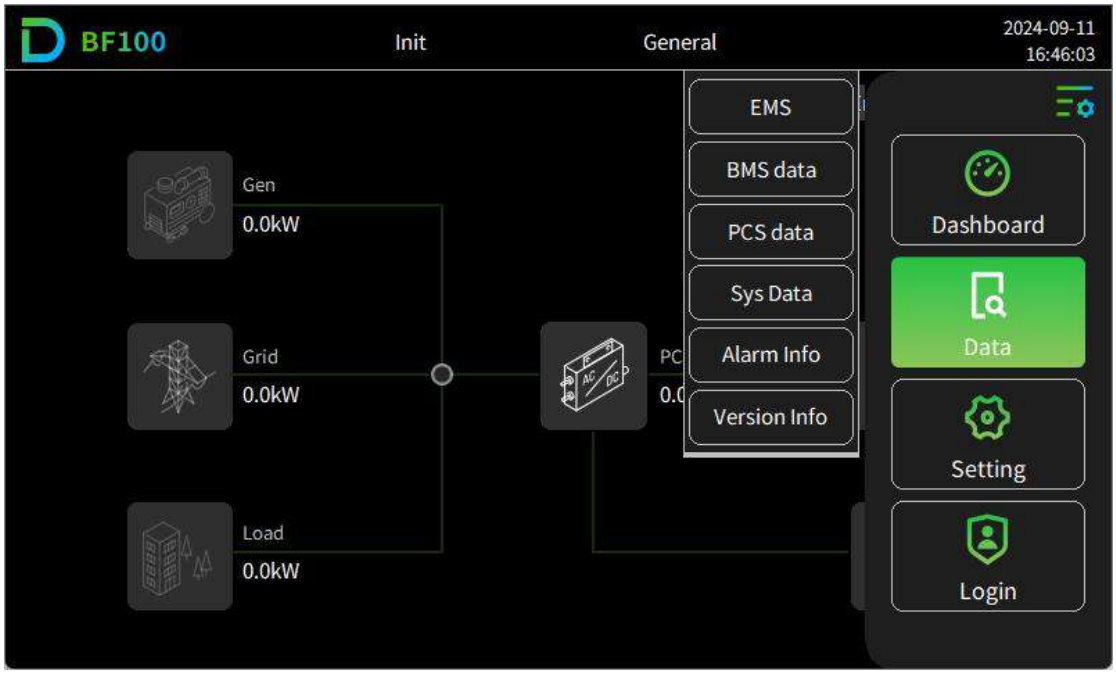


Figure 7-6 Query Data Diagram

7.5. EMS Setting

7.5.1. Run Setting

The operation setting interface is for setting “Auto power on”, “Set Mode”, “Manual Switch”.

- Step 1: Click main menu icon on the upper right corner of the main interface;
- Step 2: Click “Setting” under main menu bar;
- Step 3: Click “EMS” under sub-menu bar;
- Step 4: Click “RunSet” at the upper left of navigation bar.

——END

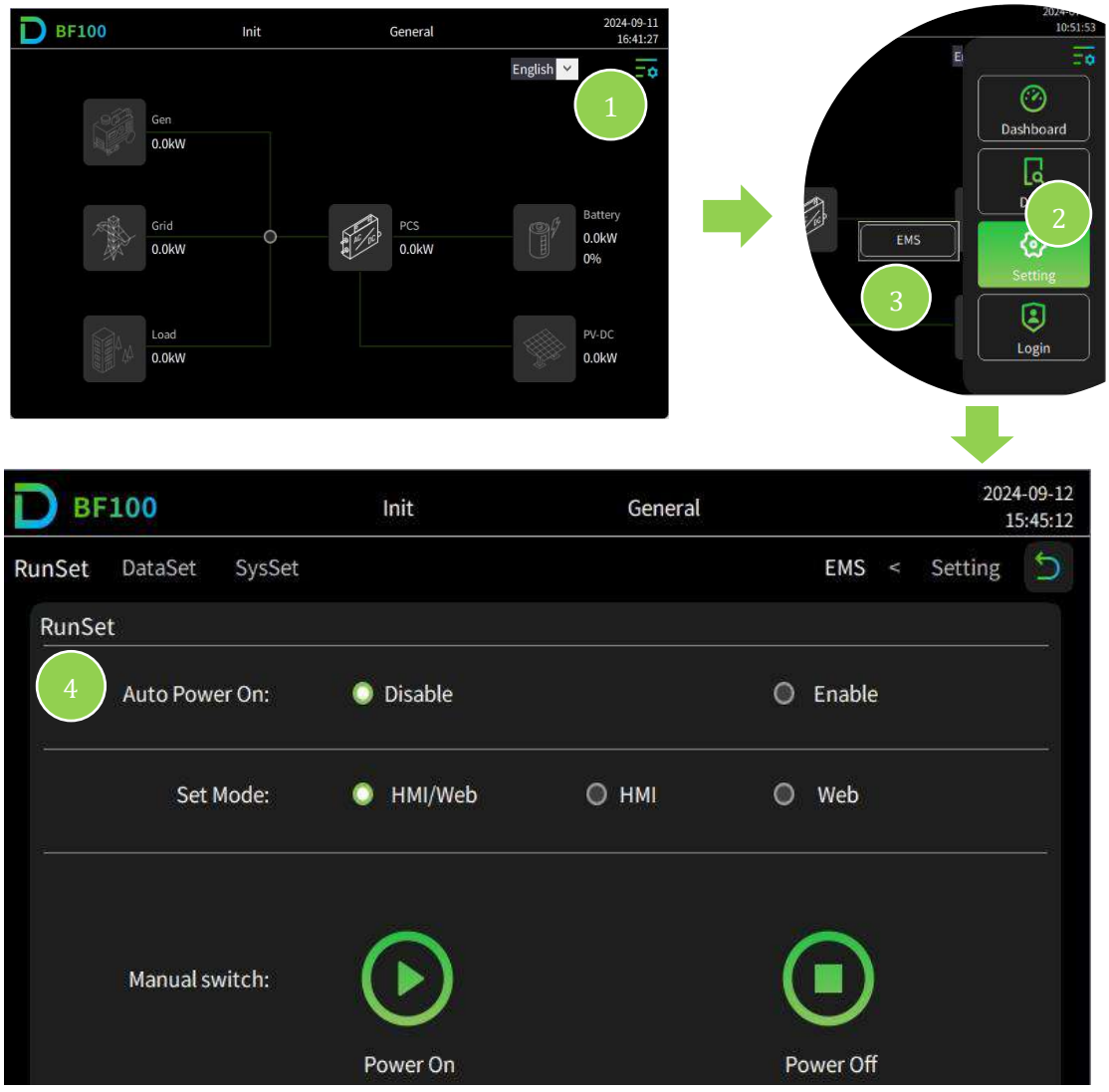


Figure 7-7 Running Setting Step

7.5.2. Parameter Setting

Parameter setting interface for “Fault Reset”, “System Restart”, “Restore Factory Set”.

- Step 1: Click main menu icon on the upper right corner of the main interface;
- Step 2: Click “Setting” under main menu bar;
- Step 3: Click “EMS” under sub-menu bar;
- Step 4: Click “DataSet” at the upper left of navigation bar.

——END

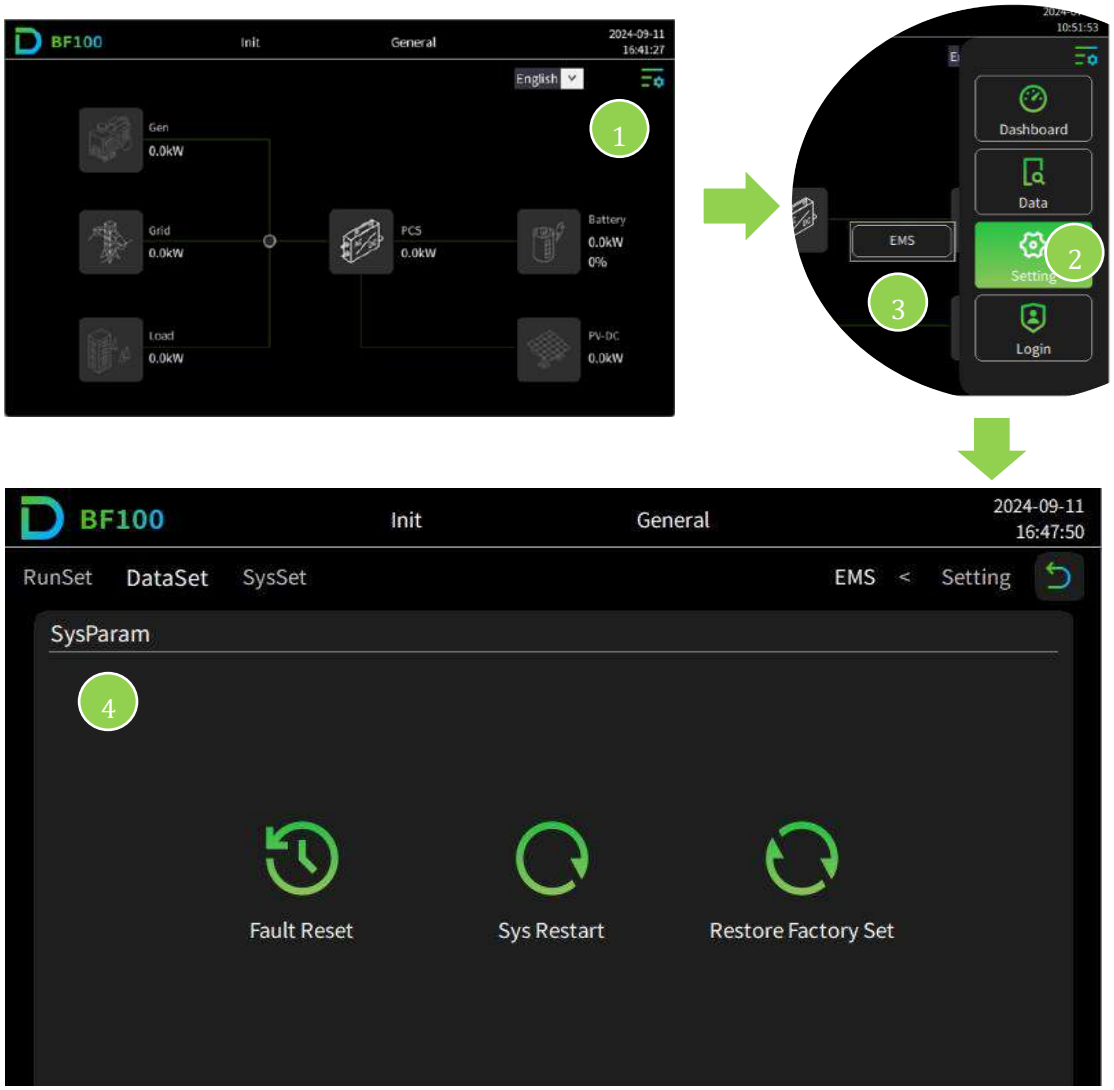


Figure 7-8 Parameter Setting Step

Table 7-3 System Control Description

Item	Description
Fault Reset	Reset for the system faults.
Sys Restart	Restart EMS (Notice: this operation is not possible when the system is running.

Restore factory Set	Safety regulation parameter, correction coefficient, power generation, no clear.

7.5.3. System Setting

Setting the relevant basic parameters of the ESS on system setting interface.

- Step 1: Click main menu icon on the upper right corner of the main interface;
- Step 2: Click "Setting" under main menu bar;
- Step 3: Click "EMS" under sub-menu bar;
- Step 4: Click "SysSet" at the upper navigation bar and input relevant parameters.

——END

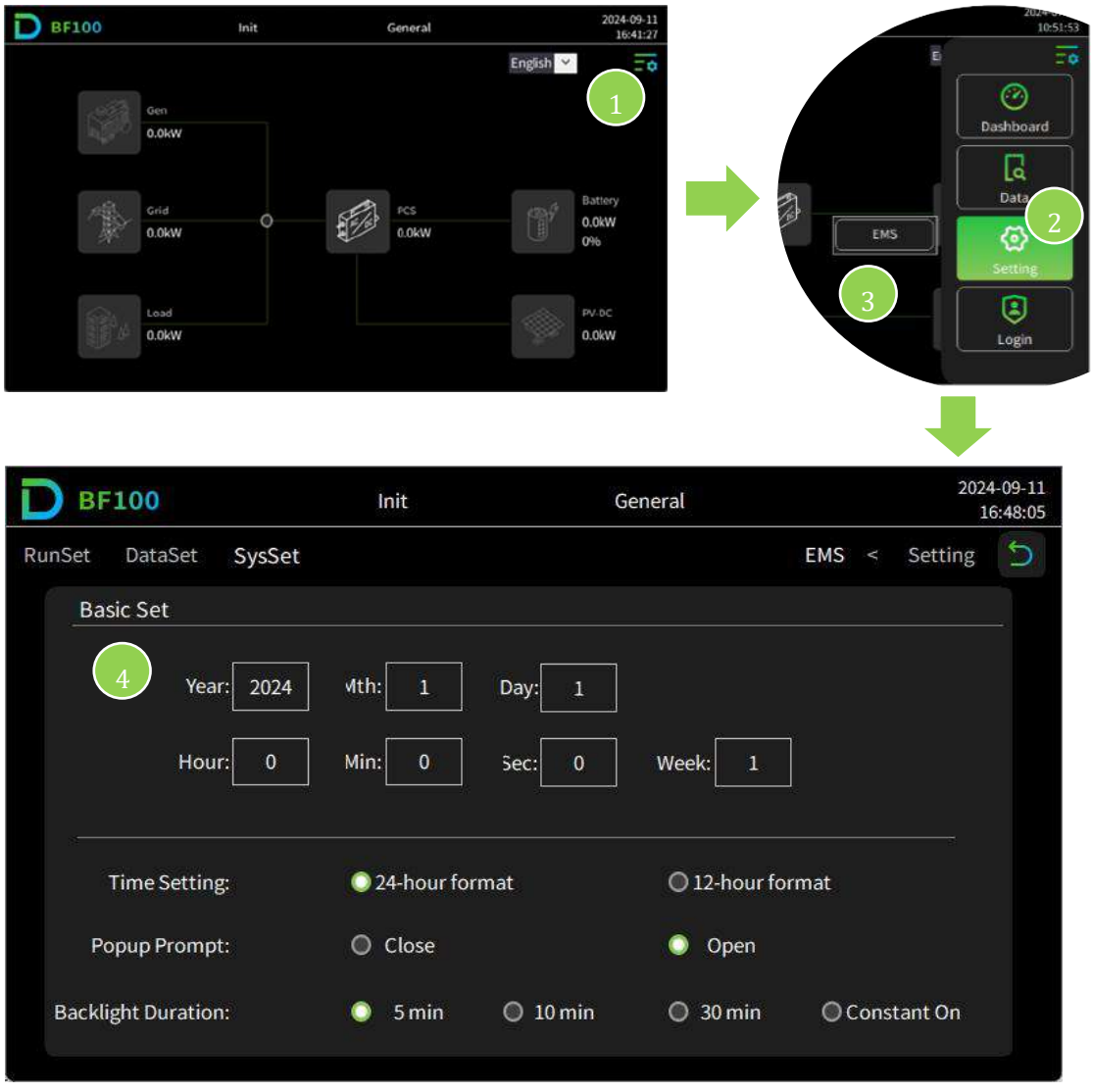


Figure 7-9 System Setting Step

Table 7-4 System Setting Description

Item	Description
HMI time	Set HMI display time.
Time Setting	Set HMI display time system, 12-hour and 24-hour available.
Popup Prompt	Set HMI popup remind function, set to “open”, reminder will popup when setting important parameters.
Backlight Duration	Set HMI backlight time.

8. Fault Description

If the solution provided below still doe not solve the problem, please contact Dyness.

Table 8-1 Fault Description and Solution

Fault Phenomenon	Solution
Power light off	• Check that each circuit breaker is closed.
Running light off	• Check if EMS is in running state.
Alarm light on	• Check whether there is any alarm through the screen or the web, whether it is caused by improper operation, if not, please contact Dyness.
Show access alarm	• Check if the door is closed.
Show flood alarm	• Check whether the system is flooded, or whether the water sensor line is disconnected or damaged.
Show emergency stop Alarm	• Check whether the emergency stop switch is in the released state.
Show SPD alarm	• Check whether the surge protector is damaged and whether the fault light is on. If damaged, contact the supplier for replacement.
Show gas detector alarm	• Stop using immediately and contact the supplier.
Show temperature detector alarm	• Stop using immediately and contact the supplier.
Show smoke detector alarm	• Stop using immediately and contact the supplier.
Show other alarm	• Need to contact the manufacturer for supplier.
Abnormal anti-backflow	• Check whether the anti-backflow meter is set correctly and whether the meter is correctly installed; • Check whether the PE cable of the EMS is grounded; • If the fault information still exists, please contact the supplier.
Abnormal communication between EMS and BMS	• Shutdown to check if the communication cable is firmly connected and correct; • Restart the EMS and check if it functions normally; • If the error message still exists, please contact the supplier.
Abnormal communication between EMS and fire protection module	• Shutdown to check if the communication cable is firmly connected and correct; • Restart the EMS and check if it functions normally; • If the error message still exists, please contact the supplier.
Abnormal communication between EMS and PCS	• Shutdown to check if the communication cable is firmly connected and correct; • Restart the EMS and check if it functions normally; • If the error message still exists, please contact the

	supplier.
Abnormal communication between EMS and DCDC	• Shutdown to check if the communication cable is firmly connected and correct; • Restart the EMS and check if it functions normally; • If the error message still exists, please contact the supplier.
Abnormal communication between EMS and meter	• Shutdown to check if the communication cable is firmly connected and correct; • Restart the EMS and check if it functions normally; • If the error message still exists, please contact the supplier.
Abnormal communication between EMS and air conditioner	• Shutdown to check if the communication cable is firmly connected and correct; • Restart the EMS and check if it functions normally; • If the error message still exists, please contact the supplier.
Abnormal communication between EMS and HMI	• Check the meter cables after shutdown; • If the error message still exists, please contact the supplier.
SD card detect abnormality	• Check if the SD card is normal, if not please replace the SD card; • If the error message still exists, please contact the supplier.
Network abnormality - (default blocked)	• Check the 4G/WIFI/LAN antenna; • If the error message still exists, please contact the supplier.
EMS power loss saving abnormality	• If the error message still exists, please contact the supplier.
EMS external Flash abnormality	• If the error message still exists, please contact the supplier.
System version inconsistency abnormality	• Restart PCS and check if it is normal; • If the error message still exists, please contact the supplier.
Parallel communication loss	• Restart PCS and check if it is normal; • If the error message still exists, please contact the supplier.
Parallel host loss	• Restart PCS and check if it is normal; • If the error message still exists, please contact the supplier.
Parallel gird input inconsistency	• If the error message still exists, please contact the supplier.
Parallel input phase sequence error	• If the error message still exists, please contact the supplier.
Parallel output phase	• If the error message still exists, please contact the

deficiency	supplier.
Incompatible software versions prevent parallel operation	• If the error message still exists, please contact the supplier.
Inconsistent capacities prevent parallel operation	• If the error message still exists, please contact the supplier.

9. System Maintenance

WARNING

- Operation and maintenance work must comply with the laws and regulations of your region and the precautions in this manual;
- Maintenance of the system must be carried out by qualified operators with knowledge of power and electricity;
- Start inspecting only after the internal equipment of the ESS cabinet is completely powered off during system maintenance! During the inspection, if non-conformance are found, please correct them immediately.

The system needs to be checked regularly. Here are some things to check and how often to do it. For more details, check out the *Operating and Maintenance Manual*.

Table 9-1 System Maintenance Checklist

Items	Checklist	Frequency
Cabinet exterior	Check if there are any flammable materials on the ESS cabinet;	Once/year
	Check if the ESS cabinet and expansion bolts are secure and free from rust;	
	Check if there are any damage, peeling paint, and oxidation on the ESS cabinet casing;	
	Check if the cabinet door locks can open smoothly;	
	Check if the sealing strips are securely fixed.	
System status	Check if the ESS cabinet and internal equipment are damaged or deformed;	Once/year
	Check if the warning signs and labels are clear and visible. Replace them if necessary;	
	Check if there are any loose or missing screws inside the ESS cabinet;	
	Check if the cable shielding layer is in good contact with the insulation sleeve; Check if the grounding copper bar is securely fixed in place.	
	Check if there are any oxidation or rust inside the ESS cabinet;	
	Check if the ESS cabinet and internal equipment are damaged or deformed.	
Wiring and	Check if all the inlet/outlet of the ESS cabinet are sealed	Once/year

cable arrangement	properly; Check if there are any water leakage inside the ESS cabinet; Check if the power cables are loose, tighten them according to previously specified torque; Check if there are any damage for power cables and control cables, especially check for cuts on the insulation where they contact metal surfaces; Check if the insulation wrapping of cable terminals are falling off; Check if the PE cable connection is correct, the grounding resistance value should not exceed 1Ω; Check if the equipotential connections inside the ESS cabinet are correct.	
System cleanliness	Check if the inlet/outlet of ESS cabinet are blocked. Please clean them if needed; Check if the humidity inside is ESS cabinet is within the normal range, Please clean them if needed; check if there are foreign objects, dust, dirt and condensation inside the ESS cabinet; Check if there are condensation inside the ESS cabinet regularly: Once a year for areas with low relative humidity; One half year for areas with medium relative humidity; Once every one to three months for areas with high relative humidity.	Once/ half year
System function	Check if there are abnormal noise inside the ESS cabinet during operation; Check if the temperature is too high inside the ESS cabinet; Check if the system operates normal for startup and shutdown.	Once/ two years
Fan	Check the operation status of fan; Check if the fan is blocked; Check if there are abnormal noise during fan operation.	Once/year
Air conditioner	Check the operation status of air conditioner; Check if the air conditioner is blocked;	Once/year

	Check if there are abnormal noise during air conditioner operation.	
Safety function	Check the stop function of EPO and screen, and simulate shutdown for test;	Once/half year ~ year
	Check the warning signs and other labels, please replace them if there are any damage or blur.	
Device maintenance	Perform a regular inspection for rust condition of all metal components (once every half year);	Once/half year ~ year
	Annual inspection of the contactor (auxiliary switch and micro-switch) to ensure that the product runs well;	
	Check the operating parameters (especially voltage and insulation parameter).	

10. Quality Assurance

Warranty period please refer to “Technical Agreement”and “ Warranty Agreement”

Service within warranty period: For Dyness ESS products that fail within warranty period, we will be responsible for handling and providing proper replacement or repair solution, offering free services or replacement of failure products. We will require valid invoices and receipts of purchase for warranty. Meanwhile, the Dyness trademark should be visible to ensure the validity of assurance.

We reserve the right not to provide warranty in the following situations:

- The ESS products exceed the free warranty period;
- Improper installation, modification or usage;
- Operation under harsh environments beyond those specified in this document or “Warranty Agreement” or “Technical Agreement”, or damage caused by abnormal natural environmental factors;
- Damage or failure caused by installation, modification and disassembly from unauthorized agencies or individuals;
- Damage or failure caused by the use of non-standard products or unauthorized components and software.

For failures caused by the above situations, Dyness could provide paid maintenance services if customer require.

If you have any problems about this product, please contact us. In order to solve your problem more quickly, please provide the following information:

- Original purchase receipt or invoice;
- Contact information, including name, phone number, email address and shipping address;

Product information, including product model, product serial number, installation date and location, fault date and fault description, etc.

11. Appendix

In order to better serve users, please check if the following checklist have been completed before product runs.

Table 11-1 Checklist Before Operation

Items	Checklist	Confirm
1	Check if the appearance is damaged and if the internal equipment is intact;	☐
2	Check if the assembly is firm;	☐
3	Check if the logo and labels of ESS cabinet and components are clear or damaged;	☐
4	Check if the communication cable connection is completed;	☐
5	Check if there are any faults of PE cable;	☐
6	Check if the liquid cooling pipes are well connected and check if there are any leakage;	☐
7	Check if the meter reads correctly;	☐
8	Check if all the connection points are correct and have good contact;	☐
9	Check if there are no abnormal situation of manual components;	☐
10	Check if the circuit breakers functioning normally;	☐
11	Check if all the buttons and related indicators are functioning normally;	☐
12	Check if the power indicator is normal;	☐
13	Check if the running indicator is normal;	☐
14	Check if fan and air conditioner is running well and no abnormal sound;	☐
15	Check if the HMI screen is normal and there are no error messages;	☐
16	Check if there are any tools or components left inside the ESS cabinet;	☐
17	Check if the air conditioner drain pipe is smooth and free of kinks (the end of the pipe should not touch the ground).	☐

DISCOVER YOUR NATURE

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