

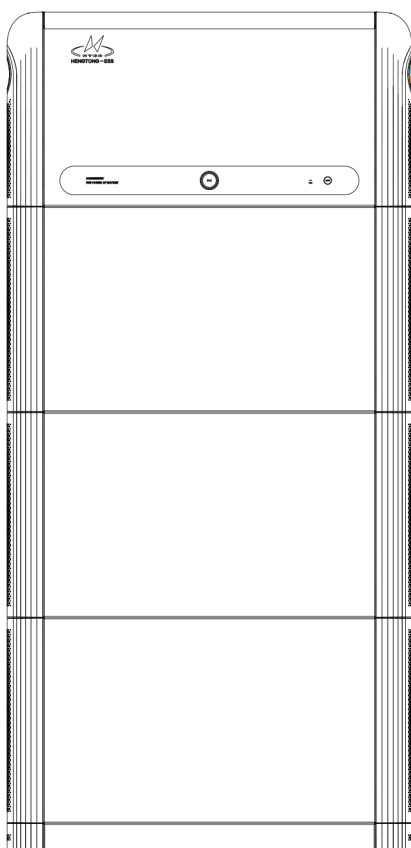


SAGITTARIUS
HTESS-7.68K/11.52K/15.36K

Product User Manual

Hengtong Household Energy Storage System (High Voltage Version)

Version Number: 20240108-V0



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PREFACE

- The copyright of the information covered in this document belongs to Jiangsu Hengtong Energy Storage Technology Co., Ltd. Any part of this document may not be commercially reproduced in any form.
- This document primarily introduces the transportation and packaging, product information and parameters, installation wiring, configuration debugging, troubleshooting, and maintenance of the Hengtong Household Energy Storage System (High Voltage Version). Before installing or using this product, please read this manual carefully to understand the product's safety information and familiarize yourself with its features and characteristics.
- Jiangsu Hengtong Energy Storage Technology Co., Ltd strictly complies with local laws and regulations.
- Specifications in this document are subject to change without prior notice. We have made every effort to ensure that this document is complete, accurate, and up-to-date. However, in some cases, improvements may be necessary, and no further notice will be given. The company is not responsible for any losses incurred due to this document, including but not limited to omissions, printing errors, arithmetic errors, or listed inaccuracies.

VERSION HISTORY

The latest version in the revision history includes updates from all previous document versions.

20240108-V0 JANUARY 08, 2024 INITIAL RELEASE

GENERAL INSTRUCTIONS

Symbol Definitions

This manual aims to ensure the personal and property safety of users during the installation of this product and to enhance the optimal use of the product. Relevant information is outlined in this manual, and industry-standard symbols are used for emphasis. Please carefully read the following symbols used in this product for a better understanding and use of this manual.



Danger

Danger: Indicates that failure to avoid it may result in personal injury, severe accidents, or harm
Indicates a high-risk level of injury



Warning

Warning: Indicates that failure to avoid it may result in personal injury, severe accidents, or harm
Indicates a moderate-risk level of injury



Caution

Caution: Indicates that failure to avoid it may result in minor or moderate personal injury
Indicates a low-risk level of injury

ABBREVIATION DEFINITIONS

Full Name	Abbreviation
Flexible printed circuit	FPC
Battery management system	BMS
Battery management unit	BMU
Begin of life	BOL
Current connection between cells	Bus-bar
Controller area network	CAN
State Of Charge	SOC
Battery Module	BM
Power Conversion System	PCS
End of life	EOL
Open circuit voltage	OCV
Switch Gear	S/G

TABLE OF CONTENTS

01. Safety Instruction

01

02. Overview

2.1 Introduction 02

2.2 Energy Storage
Capacity Explanation 02

2.3 Networking Applications 03

03. Packaging for shipping And storage

3.1 Items in the Packaging Box 03

3.2 Transport Requirements 05

3.3 Storage Requirements 05

04. Product description

4.1 Symbol Definitions 05

4.2 ICOM Description 05

4.3 Household Energy Storage
System Appearance 06

4.4 Light Logic Explanation 06

4.5 Button Instructions 10

4.6 Product Specifications 10

05. Installation

5.1 Installation Precautions 11

5.2 Tools To Prepare 12

5.3 Safety Protective Equipment 12

5.4 Operational Safety
Requirements 135.5 The Machine Installation
Process 13

06. Maintenance Guide

6.1 Maintenance Cautions 21

6.2 Periodic Maintenance 21

6.3 Diagnosis of Common
Abnormalities 22

6.4 Battery Protection 23

07. After-sales

24

1. SAFETY INSTRUCTION

Danger

- Only professionals who are familiar with local laws, regulations, standards, and electrical systems, and have received specialized training and possess knowledge related to this product, are allowed to operate the battery system.
- Operations such as live installation, wiring, maintenance, and replacement of components are strictly prohibited. Contact between the power cable and conductors can generate arcs or sparks, leading to fires or personal injuries.
- This battery system is classified as a high-voltage system. Installation, usage, and operation of the battery system are strictly prohibited in adverse weather conditions such as thunderstorms, rain or snow, and wind speeds of seven or above.
- Translation: If any obvious defects, damages, or missing components are found in the electrical cabinet or battery box, please do not use them, and contact professional after-sales personnel.
- Do not place the battery near high temperatures, high-pressure, or heat-generating equipment.
- Battery damage may lead to electrolyte leakage. If electrolyte leakage occurs, do not touch the leaked electrolyte and evaporating gases. Take necessary precautions and immediately contact the after-sales service center for assistance.
- Without official authorization from the product, do not disassemble or modify any part of the battery box or electrical cabinet.
- In the event of a flood, do not use batteries that have been submerged in water. Please contact a local battery recycling service for proper disposal.
- In the event of a fire, turn off the power to the equipment if it can be done safely.

Warning

- If inhaling leaked substances, evacuate from the contaminated area and seek medical assistance immediately.
- If in contact with eyes, rinse with clean water for at least 15 minutes/If in contact with skin, thoroughly wash the affected area with soap and water/In case of ingestion, induce vomiting immediately and seek medical assistance promptly.
- For battery replacement or addition, please contact the after-sales service center. Do not disassemble the mobile battery system without authorization.
- Approval from relevant authorities in the country is required before connecting to the grid.
- Prohibited activities include compiling or decompiling the device or engaging in other derivative works, as well as stealing the device's intellectual property.
- When installing grounding equipment, connect the wires first and disconnect the ground wire last when removing the equipment.
- Dispose of old batteries properly; do not treat them as general waste to avoid environmental pollution.
- Contact a battery recycling company for proper disposal, adhering to local laws and regulations.

Caution

- Store and transport the battery system as required to ensure it remains undamaged during transportation and storage.
- Exercise caution and consider the weight when lifting the battery or electrical cabinet.
- Wear gloves when handling batteries during transport.
- Do not impact, pull, drag, or step on the equipment, and do not place unrelated items in any part of the battery module.
- Transportation must be carried out by trained professionals, and operations during the process must be documented.
- Ensure the equipment is placed securely and not tilted, as tilting may lead to equipment damage or personal injury.
- Make sure there are liquid carbon dioxide, Novac1230, or FM-200 fire extinguishers near the equipment.
- When extinguishing fires, use extinguishers with recommended materials; do not use water or ABC dry powder fire extinguishers. Firefighters should wear protective clothing and self-contained breathing apparatus.
- There is a risk of explosion when the ambient temperature exceeds 150°C.
- Use appropriate tools and protective measures when installing and maintaining heavy equipment to prevent cabinet scratches. If scratches occur, repair them promptly to prevent rust.
- Use specialized insulation tools for high-voltage operations.
- Wiring may deteriorate and break down if used in high temperature environments for a long time. The distance between the wiring and the periphery of the heat generating device or heat source area should be at least 30mm.
- Bundle cables of the same type together and keep cables of different types at least 30mm apart, avoiding intertwining or crossing.

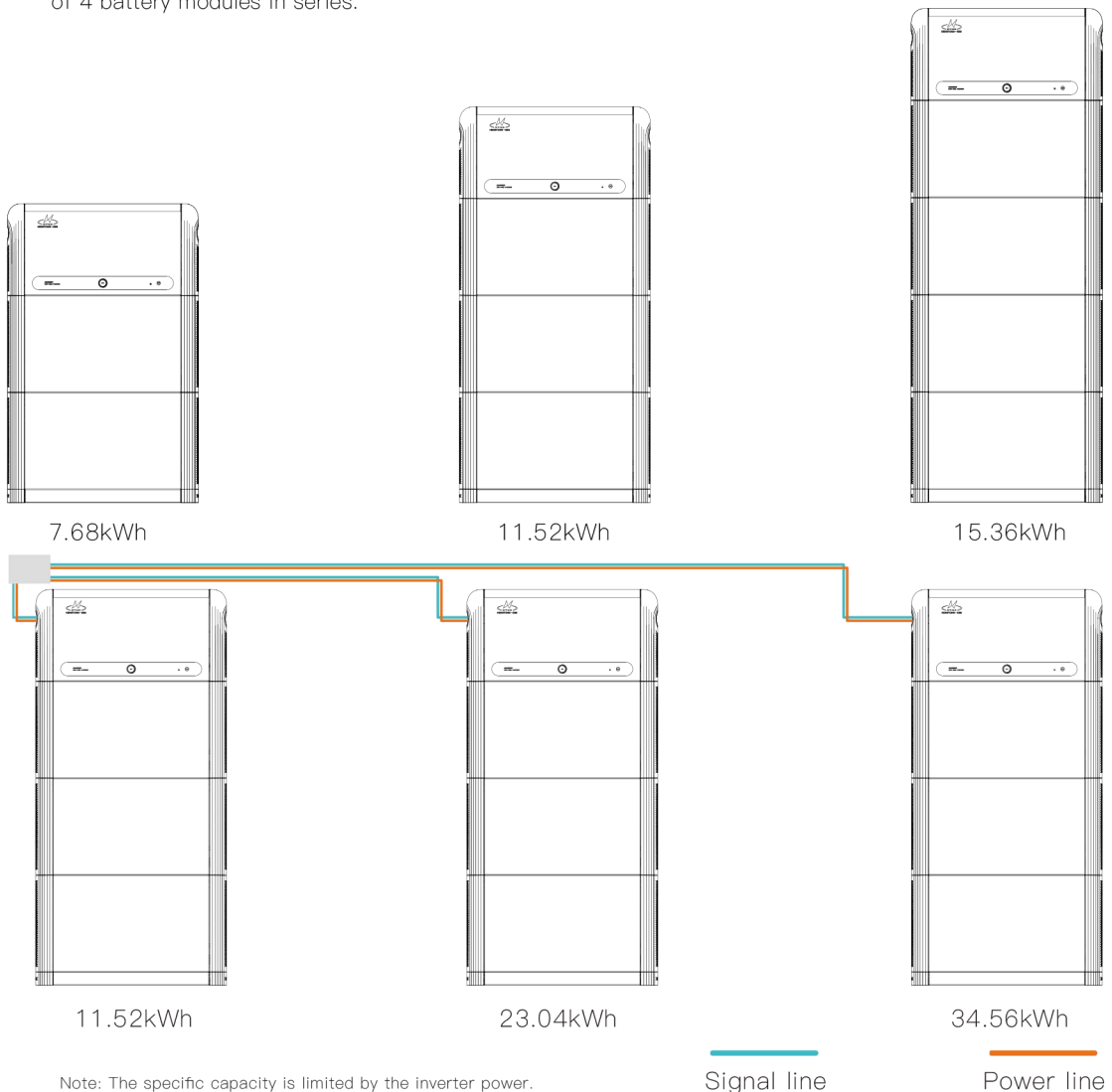
2. OVERVIEW

2.1 Introduction

Jiangsu Hengtong Energy Storage Technology Co., Ltd is a wholly-owned subsidiary of Hengtong Group, established in 2019. The company is committed to providing customers with the service objectives of "more efficient energy," "cleaner energy," and "less carbon emissions." It focuses on renewable energy and energy storage business, dedicated to the utilization of green energy and efficient energy management. The company offers energy system solutions, including industrial and commercial energy storage, residential energy storage, multi-energy complementary microgrids, integrated solar and energy storage solutions, regional energy projects, and smart energy management. It aims to contribute to the sustainable development of global green energy.

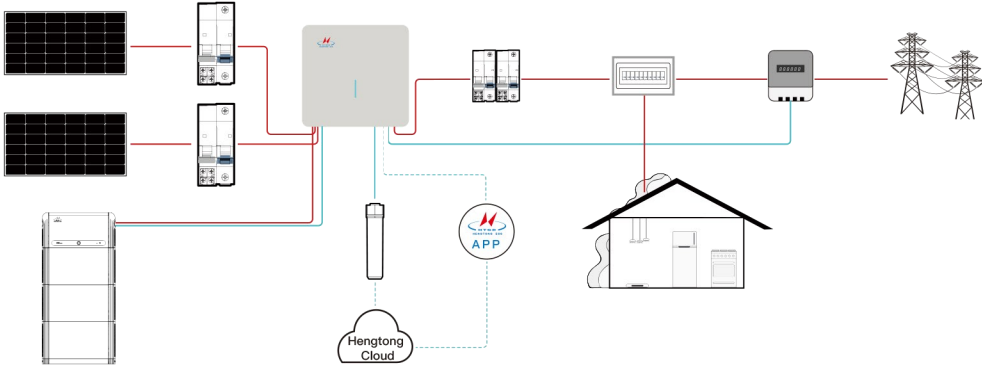
2.2 Energy Storage Capacity Explanation

The energy storage system supports multi-unit capacity expansion, with each unit supporting a maximum of 4 battery modules in series.



2.3 Networking Applications

The HTESS-11.5K230C energy storage system is suitable for household photovoltaic power station systems, which are generally composed of string inverters.



3. PACKAGING FOR SHIPPING AND STORAGE

3.1 Items in the Packaging Box

The battery system has undergone rigorous testing and inspection by our company. However, damage may still occur during transportation, so please inspect it carefully.

If you discover any transport damage or missing parts, please report it immediately to the shipping company and your local dealer. The packing list for the battery system is provided in Table 1, Table 2, and Table 3.

Packing List-7.68kWh						
Electrical boxX1	Electrical boxX2	Electrical box decorative coverX2	Electrical box decorative coverX4	Base decorative coverX2	BaseX1	Mounting bracketX4
Power line terminals (P-) X1	Power line terminals (P-) X1	Communication harnessX2	Power harnessX3	Terminal resistorX1		
Linking piecesX6	Connect PCS communication harnessX1	Connect PCS power harnessX2	M6*60expansion screwsX4	M5*10screwsX24		
M6*12screwsX4	M4*10screwsX6	Instruction manualX1	Certificate of conformityX1	Warranty cardX1	Grounding wireX1	

Table 1

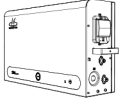
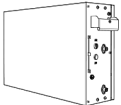








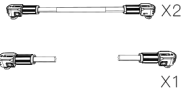












Packing List-11.52kWh						
						
Electrical boxX1	Electrical boxX3	Electrical box decorative coverX2	Electrical box decorative coverX6	Base decorative coverX2	BaseX1	Mounting bracketX6
						
Power line terminals (P-) X1	Power line terminals (P-) X1	Communication harnessX3	Power harnessX4	Terminal resistorX1		
						
Linking piecesX8	Connect PCS communication harnessX1	Connect PCS power harnessX2	M6*60expansion screwsX6	M5*10screwsX32		
						
M6*12screwsX6	M4*10screwsX8	Instruction manualX1	Certificate of conformityX1	Warranty cardX1	Grounding wireX1	

Table 2

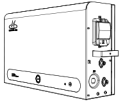
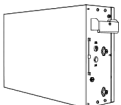








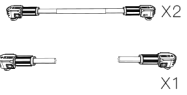












Packing List-15.36kWh						
						
Electrical boxX1	Electrical boxX4	Electrical box decorative coverX2	Electrical box decorative coverX8	Base decorative coverX2	BaseX1	Mounting bracketX8
						
Power line terminals (P-) X1	Power line terminals (P-) X1	Communication harnessX4	Power harnessX5	Terminal resistorX1		
						
Linking piecesX10	Connect PCS communication harnessX1	Connect PCS power harnessX2	M6*60expansion screwsX8	M5*10screwsX40		
						
M6*12screwsX8	M4*10screwsX10	Instruction manualX1	Certificate of conformityX1	Warranty cardX1	Grounding wireX1	

Table 3

3.2 Transport Requirements

- a. During transportation, it should be strictly placed according to the direction indicated on the packaging box to avoid damage from strong vibrations, shocks, and heavy pressure during transportation.
- b. During long-distance transportation, it is not allowed to be loaded on open vehicles or cabins. Mixing with flammable and explosive items is not permitted.
- c. During handling, it should be handled with care and strictly follow the warning signs on the packaging box.
- d. It should not be stored outdoors during mid-transit, and exposure to rain, snow, or other liquid substances, prolonged exposure to sunlight, and mechanical damage should be avoided during transportation.

3.3 Storage Requirements














If the equipment is not immediately installed for use, please ensure that the storage environment meets the following conditions:

- a. The equipment should be packaged in the packaging box, and the packaging box should be sealed after placing a desiccant inside.
- b. If the equipment is not installed within 3 days after unpacking, it is recommended to store the equipment in the packaging box.
- c.Storage SOC: 25%-60% SOC, one charge and discharge cycle is required every 3 months of storage.
- d.Storage temperature range: Do not store for more than 3 months under conditions of -20°C~45°C; Do not store for more than 1 year under conditions of 0~35°C.
- e.Humidity range: 0~95% non-condensing. Do not install if there is moisture condensation on the battery terminals.
- f.The equipment should be stored in a cool place, avoiding direct sunlight. It should be protected from rain and stored away from flammable, explosive, and corrosive materials.

4.PRODUCT DESCRIPTION

This document primarily introduces the product overview, application scenarios, installation, debugging, maintenance, and technical specifications of the High Voltage Series Energy Storage Battery System (hereinafter referred to as the "Battery System").

4.1 Symbol Definitions

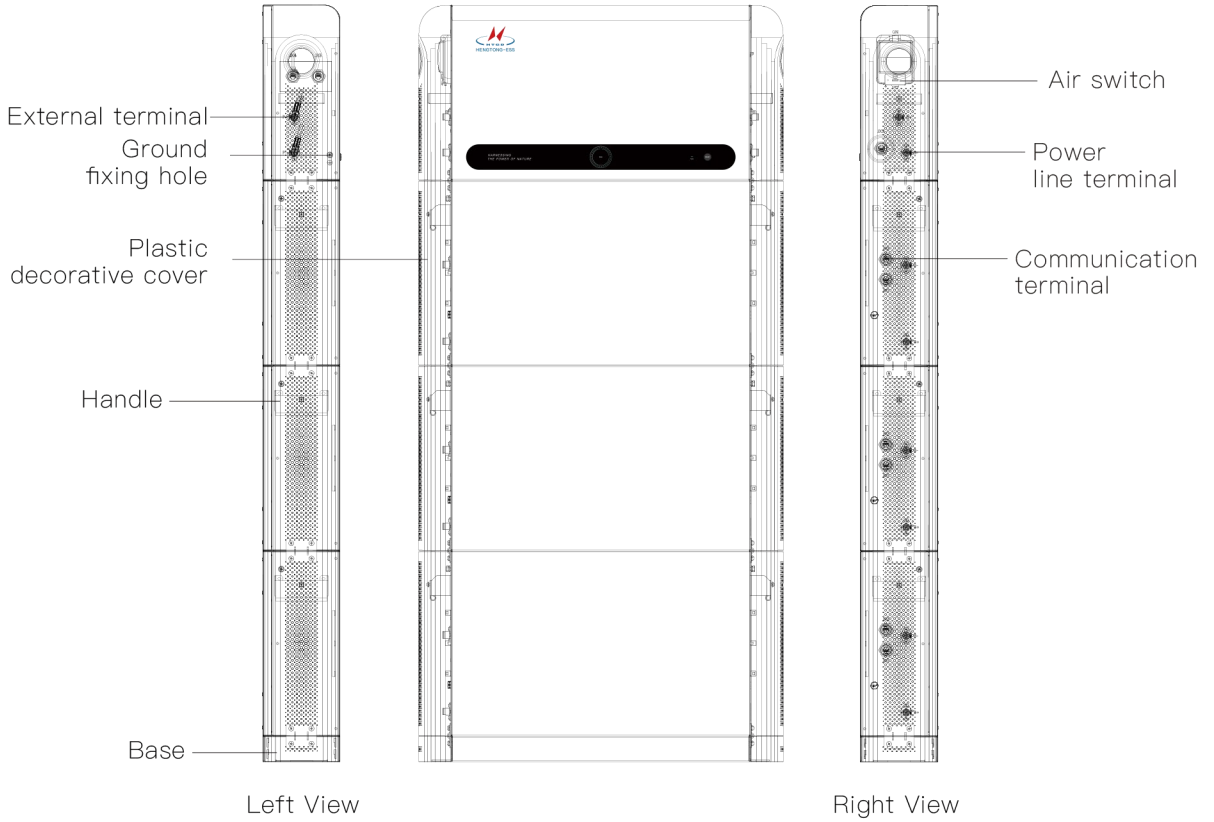
	After power-off, there is a delay in the discharge of components. Please wait for 5 minutes until the device is completely discharged.		
	High surface temperature		Do not short-circuit the battery
	Caution, risk of electric shock		Do not disconnect or dismantle by non-professionals
	Be cautious about safety		Install the product in a place inaccessible to children
	Beware of fire hazards		Recyclable
	Before installation and use, please read the instruction manual carefully.		Do not dispose of this product with household waste.
	Prohibit placing near flammable materials		CE Certification

4.2 ICOM Description

P- / External negative interface
 P+ / External positive interface
 B- / Battery negative interface
 B+ / Battery positive interface
 ON **OFF**

JX1、 JX2、 JX3、 JX4、 JX5 / Communication Interface
 Reset / Reboot

4.3 Household Energy Storage System Appearance



4.4 Light Logic Explanation



The color of the green indicator light



The color of the red indicator light



The color of the yellow indicator light

Table 1 LED Color Description

Indicator Status Description: Power-on self-test



During startup self-test - The RUN green light blinks rapidly with an interval of 0.3s. At the same time, the SOC circular window light (green light, yellow light alternating) runs clockwise in a loop until the self-test is completed. After the self-test is completed, the letters "SOC" immediately show breathing effect. Before this, the "SOC" letters were black on the screen, blinking at an interval of 1s.

Indicator Status Description: working

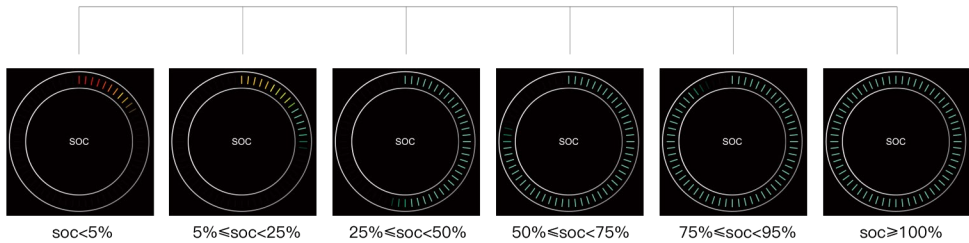


RUN green light is always on, the letters "SOC" breathing effect, Flashing interval: 1s; SOC displays power effect

Indicator Status Description: Charging



The letters "SOC" blink with a green light, blinking at intervals of 1s, indicating that it is charging.



Indicator Status Description: Overvoltage of the battery



The first light (5 windows) of RUN and SOC synchronously blink with a red light, with an interval of 0.5s.

Indicator Status Description: Battery under-voltage



The first light (5 windows) of RUN and SOC synchronously blink with a yellow light, with an interval of 0.5s.

Indicator Status Description: Overcurrent during charging



RUN lights up red, and the first and fourth lights (5 windows in total) of SOC light up green, synchronously blinking with an interval of 0.5s.

Indicator Status Description: Overcurrent during discharge



RUN and SOC, the first and fourth lights (5 windows in total), synchronously blink with a red light, with an interval of 0.5s.

Indicator Status Description: Battery temperature too high



RUN and SOC, the fourth light (out of 5 windows), synchronously blinks with a yellow light, with an interval of 0.5s.

Indicator Status Description: Battery temperature too low



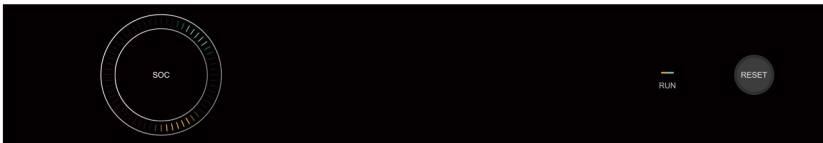
RUN and SOC, the fourth light (out of 5 windows), synchronously blinks with a green light, with an interval of 0.5s.

Indicator Status Description: Insulation anomaly



RUN and SOC, the sixth light (out of 5 windows), blink synchronously with a yellow light, with an interval of 0.5 seconds.

Indicator Status Description: Excessive temperature difference



The RUN light alternates between yellow and green, while the second light of SOC is green, and the sixth light is yellow, blinking synchronously with an interval of 0.5 seconds.

Indicator Status Description: Excessive pressure difference



The RUN light alternates between yellow and red, while the second light of SOC is red, and the sixth light is yellow, blinking synchronously with an interval of 0.5 seconds.

Indicator Status Description: Communication abnormality



The RUN light alternates between yellow and green, while the third and ninth lights of SOC blink synchronously with green along with the RUN light, with an interval of 0.5 seconds.

Indicator Status Description: Pre-charge fault



RUN light green, the first and twelve SOC lights green flash synchronously with RUN, with an interval of 0.5s.

Indicator Status Description: Relay malfunction



The RUN light and the seventh light of SOC blink red with an interval of 0.5s.

Indicator Status Description: NTC fault



The RUN light and the seventh light of SOC alternately blink with red and yellow colors, with an interval of 0.5s.

Indicator Status Description: Current sampling fault



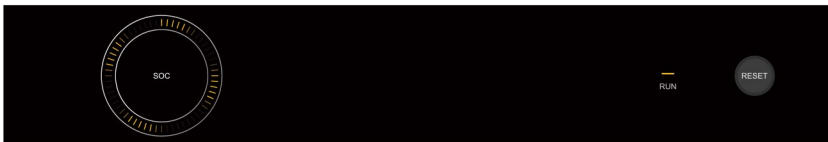
RUN light red, SOC The sixth and seventh lights flash red synchronously with RUN, with an interval of 0.5s.

Indicator Status Description: Voltage sampling fault



RUN light red, SOC The seventh and twelfth light flash synchronously with RUN, with an interval of 0.5s.

Indicator Status Description: Other faults



RUN light and SOC light up every two lights, red and yellow alternately rotate clockwise with an interval of 0.5s.



4.5 Button Instructions

Press the "RESET" button switch for 1–2s (and release), the pack powers on.
In emergency situations, press the "RESET" button switch for more than 5s (without releasing), the pack powers off.

4.6 Product Specifications

Product performance	values		
Product model	HTESS-7.6K153C	HTESS-11.5K230C	HTESS-15.3K307C
Cell type	Rechargeable Li-ion Battery		
Standard pack – series and parallel count	24S1P		
Standard pack – rated voltage	76.8V		
Standard pack – nominal capacity	50Ah		
Standard pack – nominal energy	3.84kWh		
Standard pack – weight	40±1kg		
Standard pack – dimensions	718±2*365±2*152±2mm		
Standard pack – protection rating	IP54		
Number of standard packs	2	3	4
System rated voltage	153.6V	230.4V	307.2V
System operating voltage range	134.4~172.8V	201.6~259.2V	268.8~345.6V
System nominal energy	7.68kWh	11.52kWh	15.36kWh
Rated charging and discharging currents	25A	25A	25A
Maximum charging and discharging currents	30A	30A	30A
Communication method	CAN/RS485	CAN/RS485	CAN/RS485
System dimensions (length * width * height)	718±2*1125±2*152±2mm	718±2*1490±2*152±2mm	718±2*1855±2*152±2mm
System weight	≤105±1kg	≤148±1kg	≤190±1kg
System protection rating	IP54	IP54	IP54
Cooling method	Natural cooling	Natural cooling	Natural cooling
Operating temperature	charging: 3°C~55°C/discharging: -20°C~55°C		
Relative humidity range	5~95%	5~95%	5~95%
Installation method	Landing	Landing	Landing
Maximum operating altitude	2000	2000	2000

Note:

- 1、 All data of new batteries are measured at 100% depth of discharge (DoD) and +25°C, under a charging and discharging rate of 0.2C; Available power may vary depending on the inverter used.
- 2、 Rated charging and discharging currents and power are affected by temperature and SOC status.

5. INSTALLATION

5.1 Installation Precautions

The energy storage battery system is a high-voltage energy storage device, and improper operation or usage by non-professionals may lead to serious consequences such as electric shock, combustion, and explosion of the battery system.

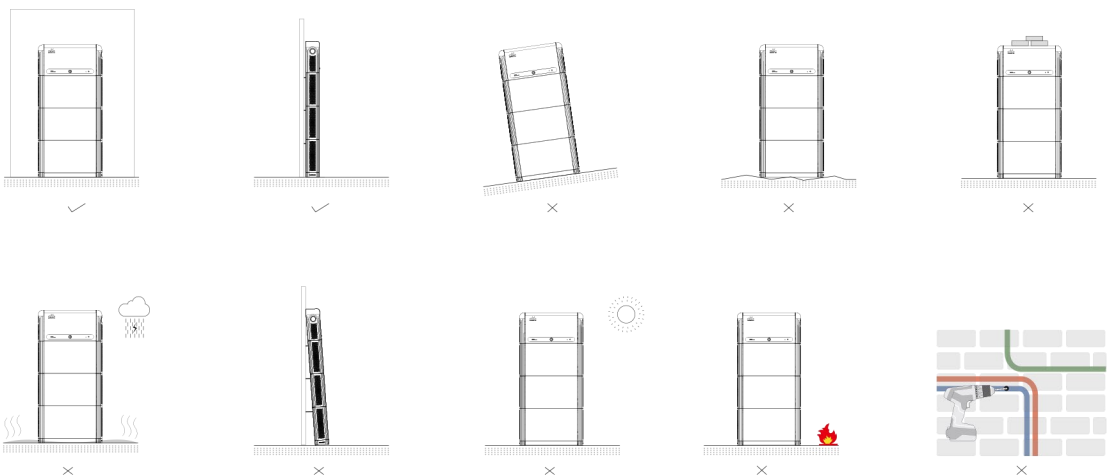
The installation and maintenance of the battery cabinet must be performed by professional technicians, and strict compliance with relevant safety regulations is required during use. Non-professionals are strictly prohibited from installing, repairing, and using the battery cabinet beyond its specified scope.

01. When installing the battery cabinet, check in advance whether the connection box, main control box, and related circuits are unobstructed, including the good contact of each connection point, to avoid introducing open or short circuit faults.

02. When installing the battery cabinet, ensure that the grounding equipment is effective.


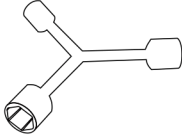


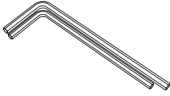
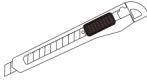





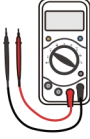
03. Battery system installation requirements:

- The battery system should be installed on a ground with sufficient bearing capacity and flatness. If the ground lacks adequate support and flatness, it needs to be ensured through other means (such as foundation construction, adding load-bearing plates, etc.).
- The battery system should be installed on a wall with sufficient bearing capacity and flatness. If the wall lacks adequate support and flatness, it needs to be ensured through other means (such as building a cement wall, brick wall, etc.).
- The battery system needs to be installed against the wall (with a reserved 50mm assembly space).
- Do not place any items above the control cabinet.
- Do not place the system in areas with corrosive gases or liquids.
- Do not place flammable, explosive, or corrosive items around the equipment.
- Avoid installing in environments near high-temperature heat sources or low-temperature cold sources (ideal environment: $-20\sim 40^{\circ}\text{C}$).
- Avoid placing it in areas exposed to direct sunlight, rain, or humidity.







- Avoid installing in environments with strong interference.
- Avoid installing in areas prone to water accumulation.
- Do not install in areas accessible to children.

5.2 Tools To Prepare

			
Crosshead screwdriver	Socket Wrench	Heat Gun	Drill
			
Hex Key Wrench	Utility Knife	Marker Pen	Spirit Level
			
Heat shrink tubing	Mobile phone OR other internet-connected device	Vacuum cleaner	Multimeter

5.3 Safety Protective Equipment

			
Anti-static gloves	Eye shield	Dust mask	Safety shoes

5.4 Operational Safety Requirements

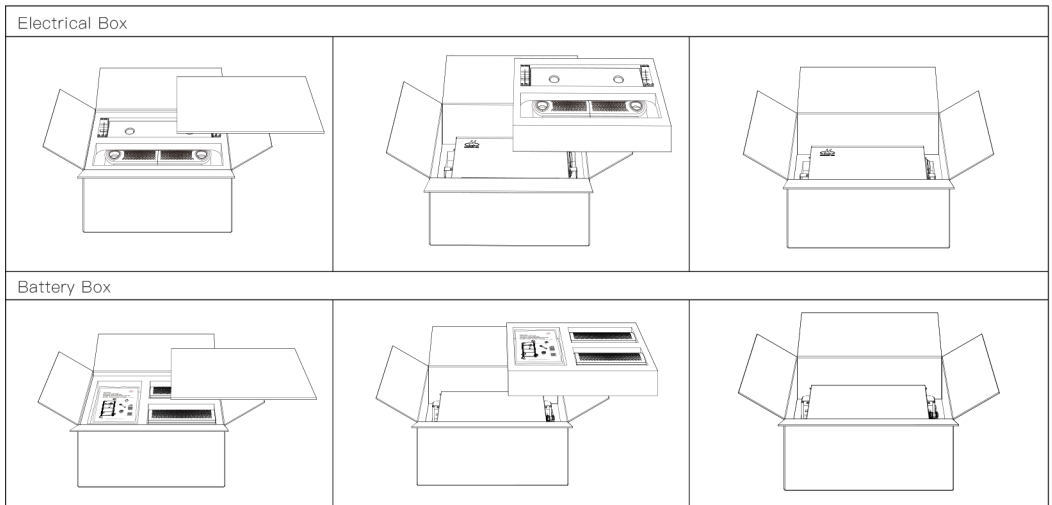
For the installation of the system to be safe and effective, installation personnel must be familiar with the content of this document and all warnings, and they must undergo professional training and qualification before taking up their positions.

- (1) This product is a high-voltage device. When operating and maintaining this product, please take personal protective measures and follow the operation regulations specified in the high-voltage standards. If direct handling of the battery is necessary, wear insulated rubber gloves.
- (2) For the safety of children, please place it out of reach of children.
- (3) When touching the battery system, please avoid contact with exposed metal parts.
- (4) To prevent static electricity buildup, maintenance personnel should discharge static electricity from their bodies before operating the battery.
- (5) Do not place tools or metal parts on top of the control cabinet.
- (6) At all times, do not touch all terminals with hands or other metal objects to prevent electric shock or short circuit.
- (7) Do not step on or sit on the battery system.
- (8) Do not directly short-circuit the positive and negative terminals of the battery; otherwise, it may cause battery leakage, heating, and rupture.
- (9) It is strictly prohibited to alter the battery without authorization; for safety reasons, a protection system is installed in the battery. If the protection system is damaged, it may result in a loss of control over charging and discharging, and the current during charging or discharging may exceed the set limits, leading to battery leakage, heating, and rupture.
- (10) It is strictly prohibited to cover the battery system during charging and discharging processes. Otherwise, accumulated heat may result, causing a decline in battery performance and liquid leakage.

5.5 The Machine Installation Process

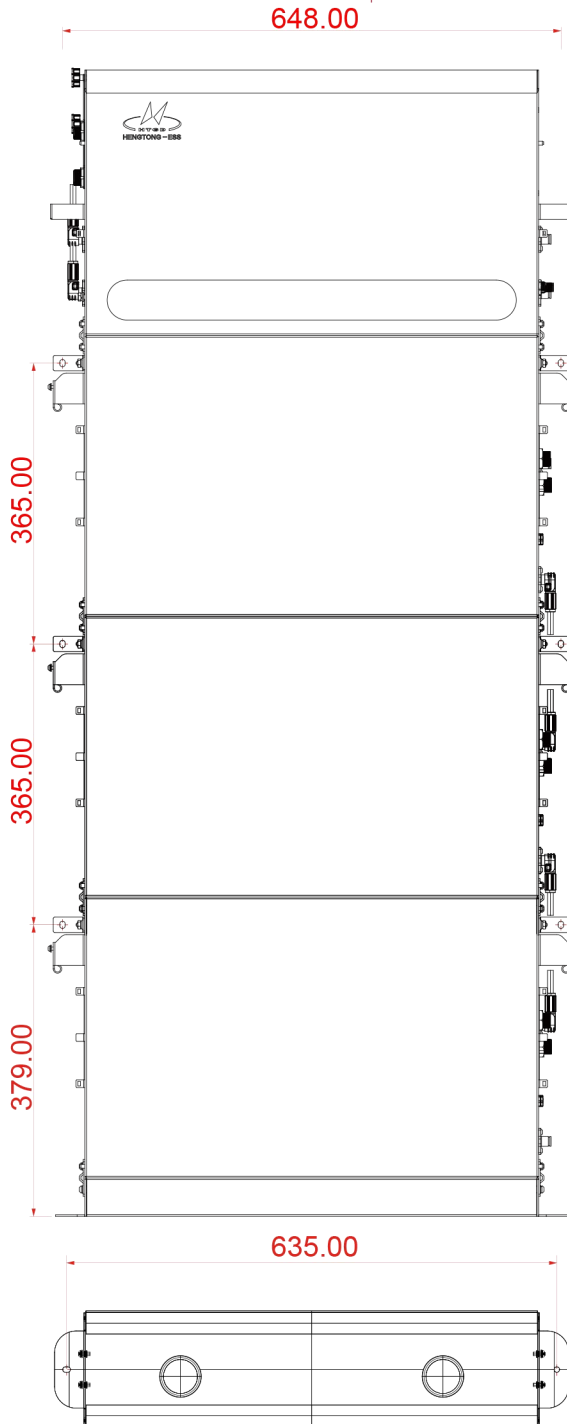
5.5.1 Unboxing

- ① Take out the product one by one, verify and read the instruction manual, and check the products.

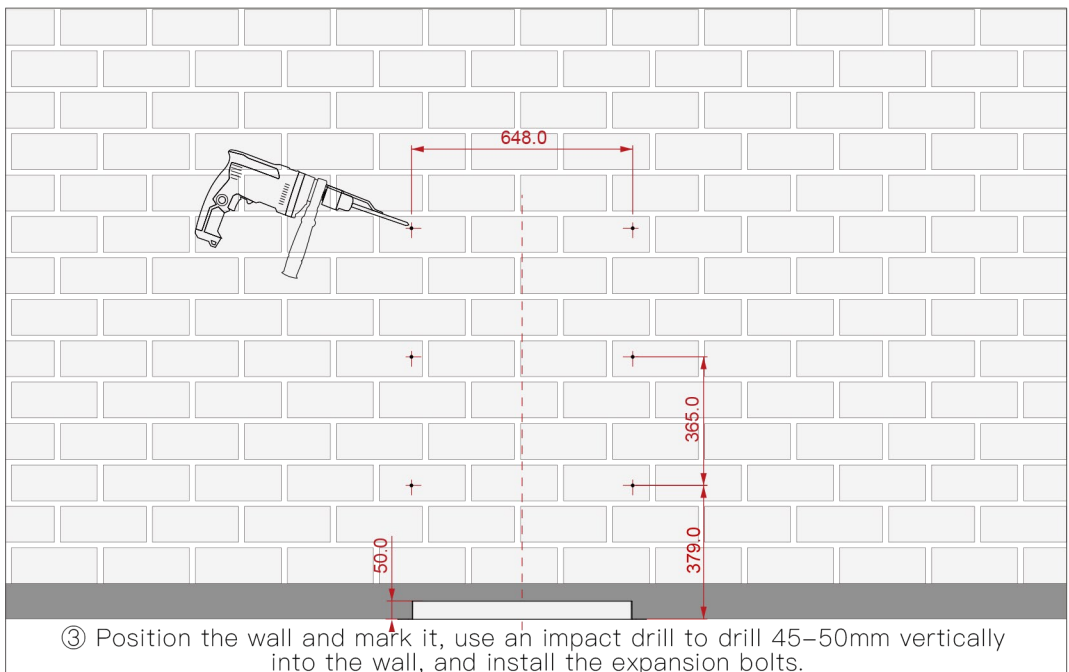
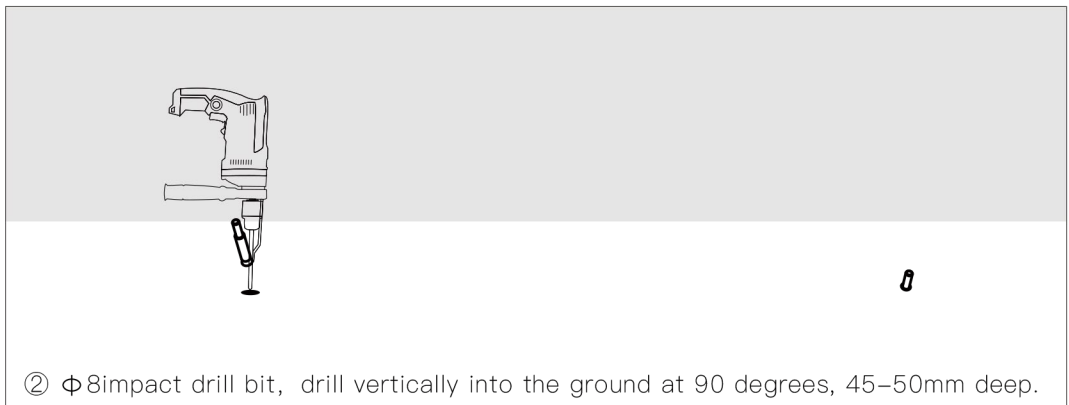
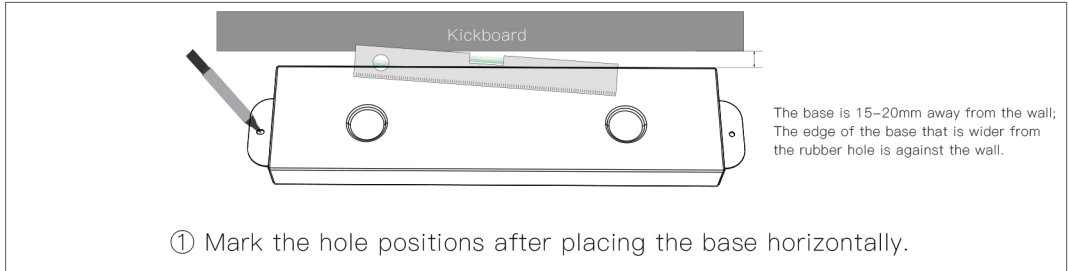


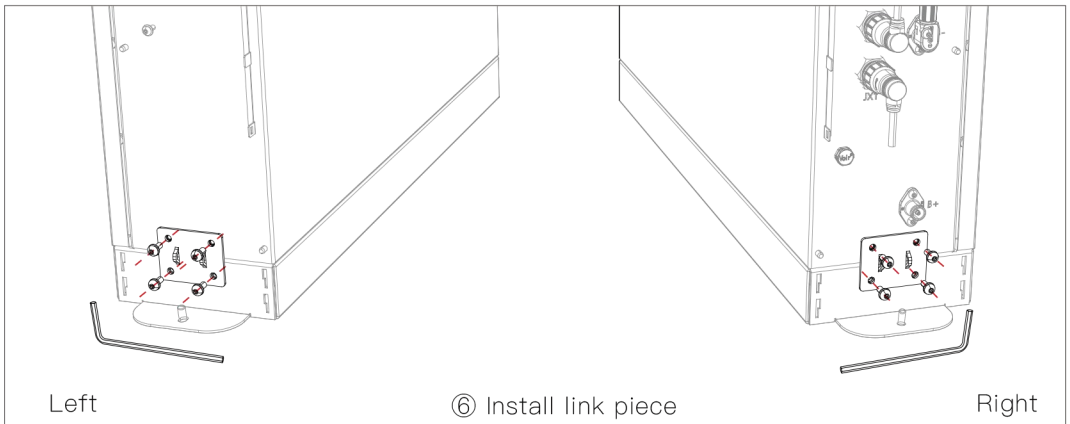
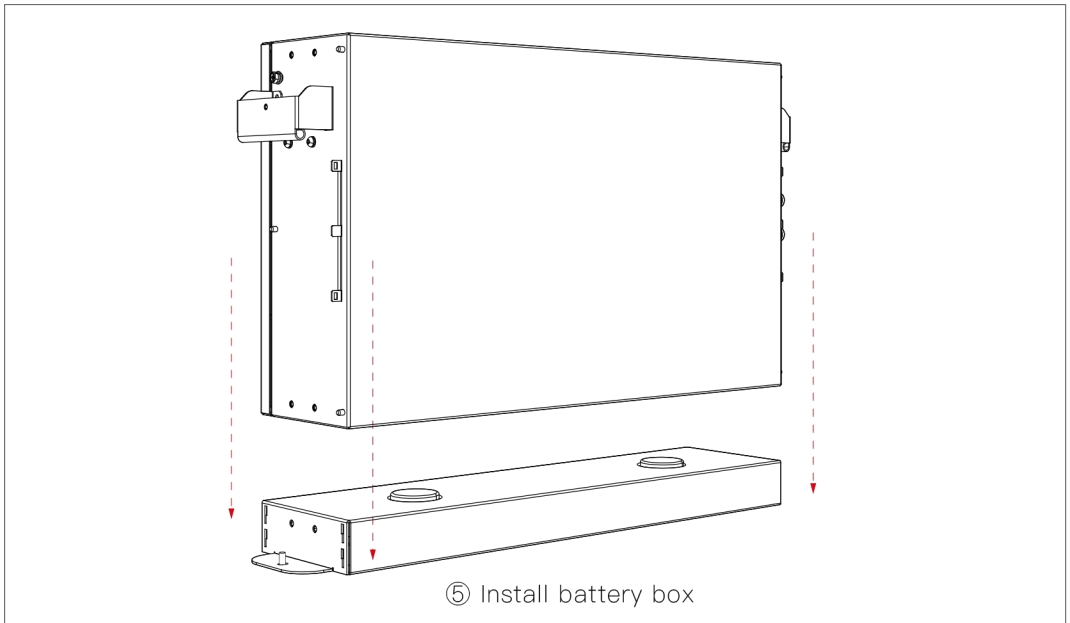
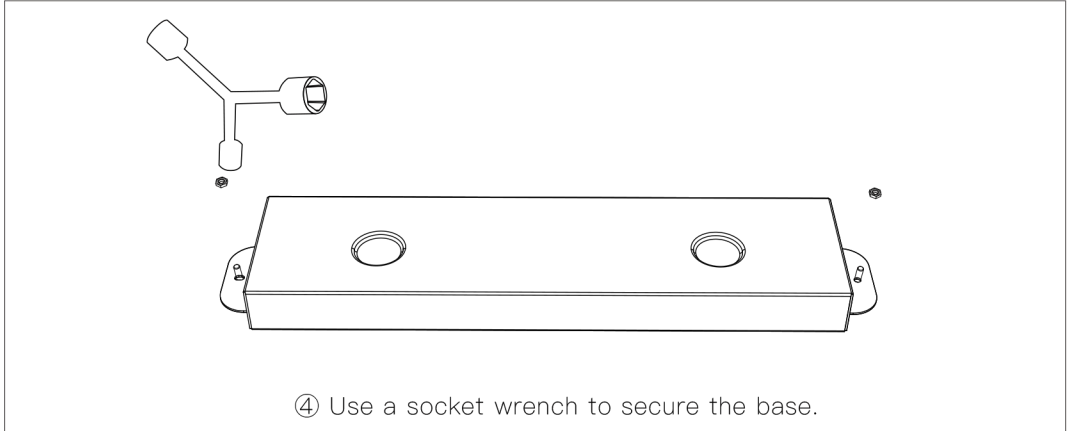
5.5.1 Installation Fixing Hole Diagram

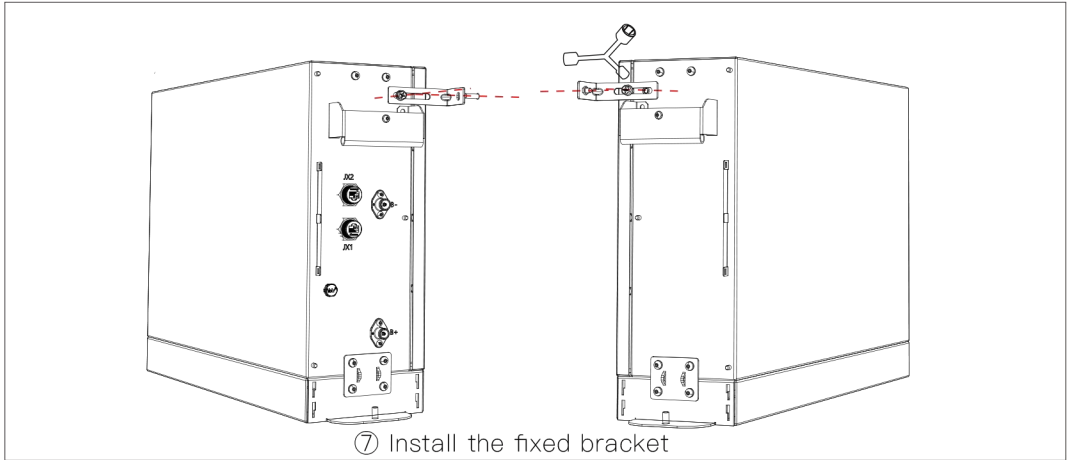
⚠ Danger Installation stacking order before installation, ensure that the circuit breaker in the electrical box is in the off position.



5.5.2 Battery System Installation

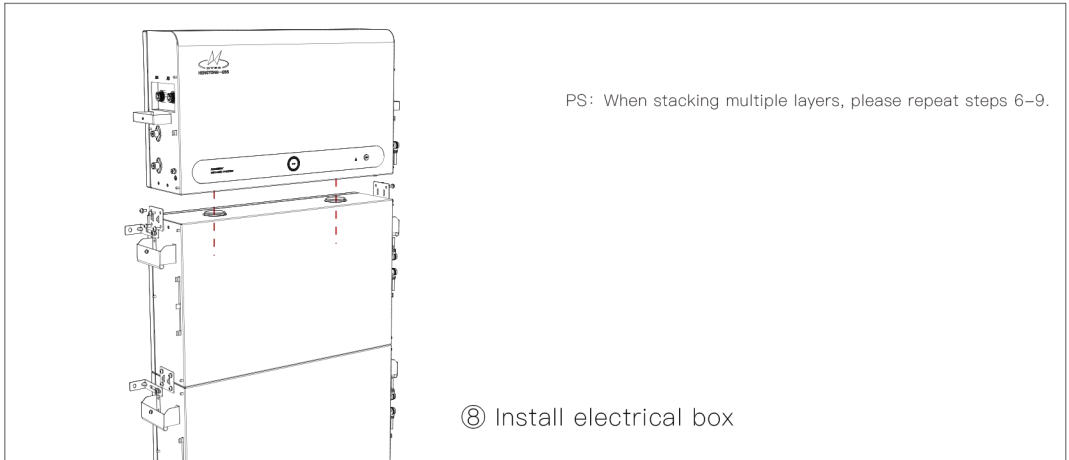






⑦ Install the fixed bracket

• • • • •



PS: When stacking multiple layers, please repeat steps 6–9.

⑧ Install electrical box

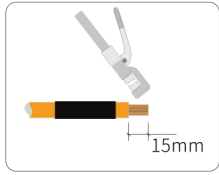
5.5.3 Electrical component installation

5.5.3.1 Wire harness assembly

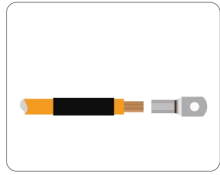
⚠ Caution

Different versions have slight differences in the provided connecting wires. Some connecting wires are shipped as finished products and do not require on-site customization; they can be used directly. Please prepare the protective ground wire yourself. The cross-sectional area of the protective ground wire conductor should be 6mm^2 , and the wire should comply with outdoor use standards. The pull-out force after crimping should be greater than 400N.

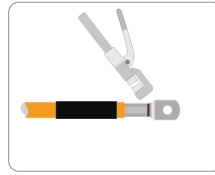
Power cord assembly



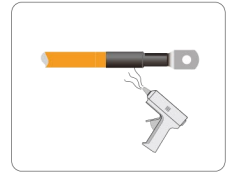
1
Strip a certain length of conductor and insert it into the heat shrink tube.



2
Insert terminal block

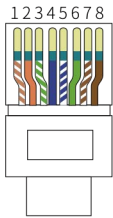


3
Use crimping pliers to crimp the terminal tightly.



4
Use a hot air gun to heat the heat-shrink tube.

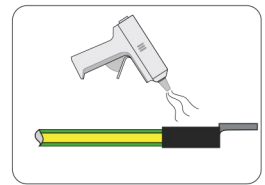
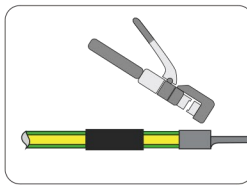
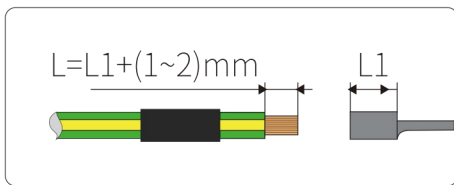
Communication line assembly



Parallel/PCS communication interface

PIN	JX4	JX5
1	485_1A(Reserved)	485_1A(Reserved)
2	485_1B(Reserved)	485_1B(Reserved)
3	CAN1_G	CAN2_G(PCScommunication)
4	CAN1_H	CAN2_H(PCScommunication)
5	CAN1_L	CAN2_L(PCScommunication)
6	CAN3_G(Commissioning)	CAN3_G(Commissioning)
7	CAN3_H(Commissioning)	CAN3_H(Commissioning)
8	CAN3_L(Commissioning)	CAN3_L(Commissioning)

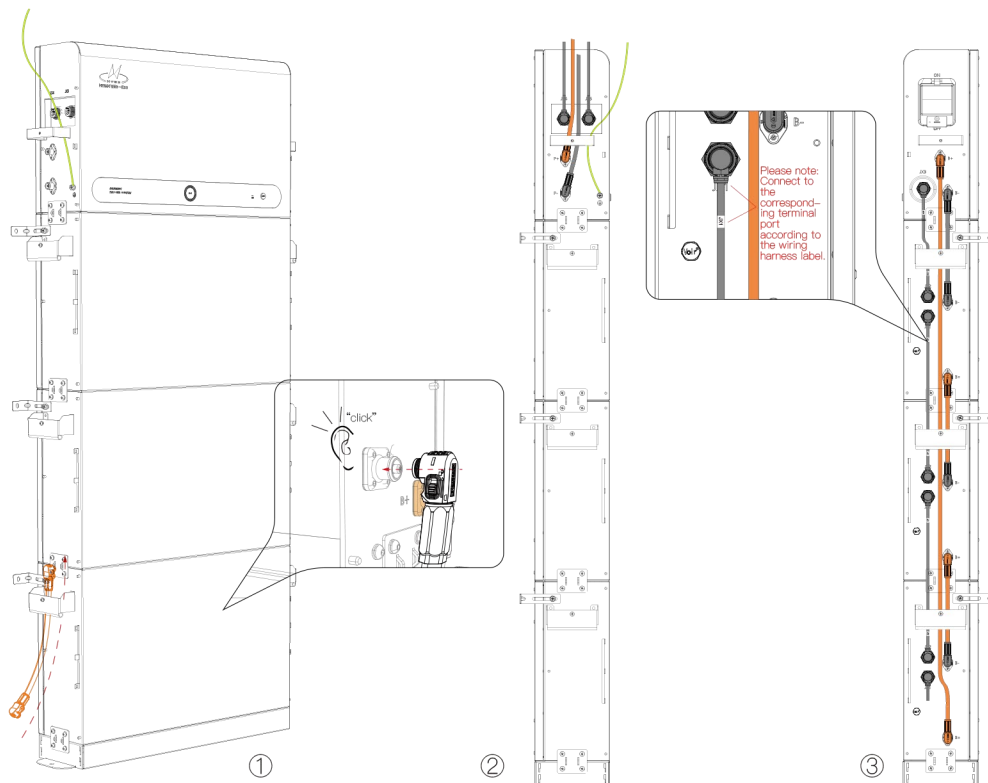
Ground wire assembly



5.5.3.2 Harness Connection

⚠ Caution

Installation sequence of connecting wires: Ground wire assembly → Communication line assembly → Assemble the orange (positive) power line → Assemble the black (negative) power line. When installing the equipment, the protective ground wire must be installed first; when removing the equipment, the protective ground wire must be the last to be removed.

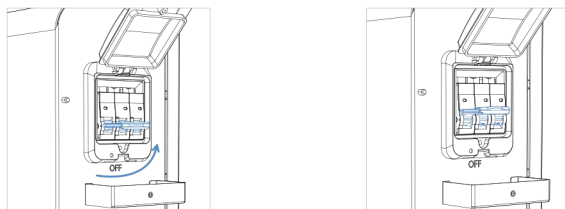


- ① First, connect the ground wire.
- ② Thread the communication harness from the bottom of the handle, and follow the diagram for connection. Repeat this step accordingly.
- ③ Assemble the power cord in the order of orange (positive) first and then black (negative)

5.5.3.3 System startup

After all wiring harnesses are connected (including at the inverter end), power on all battery packs.

- ① Close the air switch on the right side of the electrical box, and the BMS starts to power on;



- ② After the BMS is powered on, the RUN light starts blinking with an interval of 1 second.



- ② Press and hold the "RESET" button for no more than 2 seconds and release it. The surface-mounted indicator light will turn on, and the BMS will enter the self-inspection process. If the self-inspection is normal, the high voltage will be turned on.

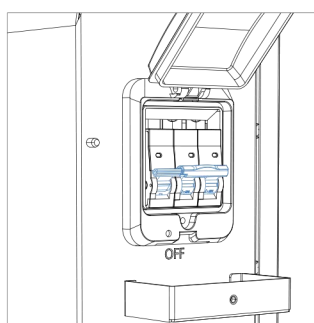
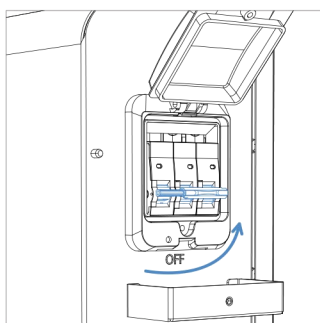


- ③ The device is started up and can be used

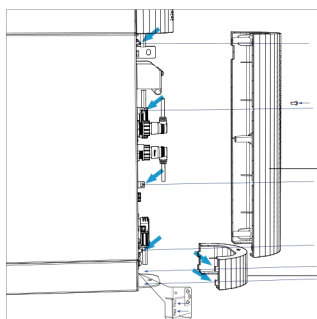


5.5.3.4 Installation of decorative cover plates

- ① Close the air switch on the right side of the electrical box.

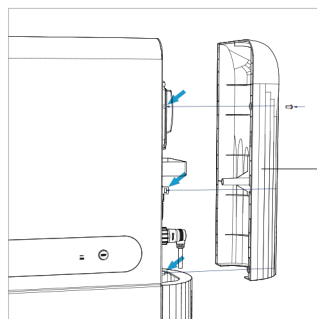


- ② Installation of decorative cover



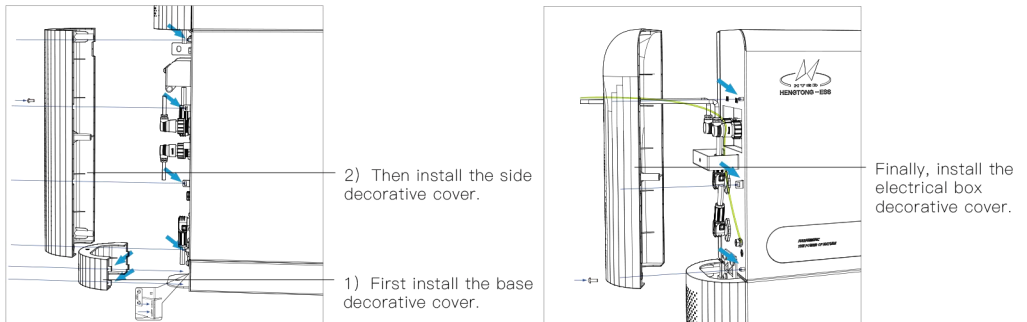
2) Then install the side decorative cover.

1) First install the base decorative cover.



Finally, install the electrical box decorative cover.

Installation of communication-side decorative cover



Installation of the power cord side decorative cover

5.5.3.5 System shutdown

When shutting down the battery system, follow these steps in order to prevent damage to the system:

Press and hold the "RESET" button for about 5 seconds until you hear two clicks, manually turn off the air switch, and the indicator lights will turn off.

6. MAINTENANCE GUIDE

6.1 Maintenance Cautions

- (1) In order to perform system maintenance and upkeep safely and effectively, maintenance personnel must undergo professional training and be qualified for the job. When carrying out maintenance work, it is crucial to adhere to relevant safety precautions, use necessary tools, and wear protective equipment.
- (2) Do not wear gold, silver jewelry, watches, and other metal accessories when operating and maintaining the system.
- (3) Use insulated tools, wear insulated gloves, and insulated shoes during maintenance.
- (4) After completing maintenance tasks, promptly clean up tools and materials. Do not place metal items and tool parts inside or on top of the equipment.
- (5) When connecting or disconnecting system cables, ensure that all switches are in the off position, and pay attention to positive and negative pole protection.
- (6) If system operators or maintenance personnel have any doubts about the operation and maintenance of the equipment, they should stop the operation and contact the manufacturer for consultation. Unauthorized operation is strictly prohibited.

⚠ Always remember that even when the battery cabinet is not operational, there is still a potentially dangerous voltage inside. After turning off all battery box air switches, ensure that the inverter and all DC and AC power sources are completely isolated for at least 5 minutes before using a voltmeter to check. Make sure all power sources are disconnected and in a safe state before performing maintenance work.

6.2 Periodic Maintenance

To maintain the efficiency and reliability of the energy storage system operation, please perform the following operations regularly:

- (1) Maintain environmental cleanliness to prevent dust or chemical contamination on the battery cabinet.
- (2) Regular (every 6 months) dust removal: Clean the system regularly. Before dust removal, the power must be disconnected, and washing with water is strictly prohibited.
- (3) Regularly (every 6 months) inspect the wiring terminals of input and output cables. Carefully check for any looseness or foreign objects, examine if the terminal surfaces exhibit severe rust or oxidation, and measure the quality of the contacts.

- (4) Regularly (every 6 months) inspect cables for aging, damage, and ensure insulation integrity.
- (5) Regularly (every 6 months) inspect the operational status of the battery cabinet.
- (6) Waterproof board: Check if waterproof boards of components are replaced annually.

6.3 Diagnosis of Common Abnormalities

After activating the battery cabinet, if it cannot function properly, refrain from immediately determining it as a cabinet malfunction. Refer to Table 6–1 to identify potential causes. Also, check whether external environmental factors such as temperature, humidity, or load overload may be contributing to the issue.

If troubleshooting using the methods in Table 6–1 does not resolve the problem, seek assistance from professionals for repairs.

This chapter includes only some basic fault diagnosis procedures. If the diagnosis is unclear or the information obtained is insufficient to solve the problem, please contact Hengtong energy storage’s after-sales support for assistance.

NO	Fault Or Alarm Symptoms	Possible Causes Of The Fault	Troubleshooting Solutions
01	Wi-fi faults	a.Data stick damage	Replace the data stick
		b.Poor wire harness contact	Re-plug or replace
02	Battery, and pcs communication faults	a.Abnormal wire harness connection	Check wire harness connections
		b.BMS failure	Replace bms
		c.Damaged RJ45	Replace rj45
		d.PCS anomaly	
03	Overcurrent protection during charging	Excessive current discharge in the current system	Reduce power
04	Overcurrent protection during discharge	Excessive current charge in the current system	Reduce power
05	High-temperature protection during discharge	a.Excessively high environmental temperature	Disallow discharge, lower environmental temperature
		b.Abnormal temperature in a single cell	Abnormal temperature in a single cell
		c.Excessive charge/discharge current	Stop discharge
06	Low-temperature protection during discharge	Excessively low environmental temperature	Disallow discharge
07	High-temperature protection during charging	a.Excessively high environmental temperature	Disallow charging, decrease in environmental temperature.
		b.Abnormal temperature in a single cell	Stop charging
		c.Excessive charge/discharge current	Reduce charging current
08	Low-temperature protection during charging	Excessively low environmental temperature	Not allowed to charge
09	Total pressure low voltage protection	Excessively high total voltage	Stop charging
10	Overvoltage protection	Over-discharge of the battery	Stop discharge, charge immediately
11	High voltage protection for individual cells	Excessively high individual cell voltage	Stop charging
12	Low voltage protection for individual cells	Over-discharge of the battery	Stop discharge, charge immediately
13	Relay sticking	Relay damage	Replace the relay
14	Ntc abnormality	Damaged NTC	Replace NTC
15	Insulation monitoring	Battery pack leakage.	After tripping the circuit breaker, contact customer service.
16	Internal communication abnormality in bms	a.Abnormal wire harness connection	Check the wire harness connection
		b.BMS failure	Replace BMS
		c.Damaged RJ45	ReplaceRJ45

6.4 Battery Protection

Under the following conditions, the battery will limit the charge/discharge current for protective purposes:

- (1) Battery SOC is below 1–DOD (Depth of Discharge).
- (2) Battery overheating protection.
- (3) Lithium battery BMS restrictions.
- (4) Battery voltage is below the discharge voltage.
- (5) Communication abnormalities in the lithium battery.

When charge/discharge current limiting protection occurs:

- (1) In grid–connected mode, battery charge/discharge operations may be abnormal.
- (2) In off–grid mode, the off–grid power supply will be shut down.

Caution

- (1) In off–grid mode, if the off–grid power supply is shut down due to low battery, battery SOC, or voltage, the energy generated by the photovoltaic side will be entirely used to charge the battery until the battery SOC reaches $40\% + (1 - \text{DOD})/2$, activating the off–grid power supply.
- (2) In both grid–connected and off–grid modes, the battery is protected against over–discharge based on DOD and discharge voltage.
- (3) Setting the battery DOD prevents the inverter from releasing the battery’s backup power. Once the DOD set value is reached, the load will be powered only by the photovoltaic side or the grid. If the battery receives little or no charge for several consecutive days, the battery may continue to self–consume energy to maintain communication with the inverter. If the battery SOC reaches a certain level, the inverter will prompt an increase in SOC. This protective mechanism prevents the battery SOC from dropping to 0%.

6.5 Accident Handling

In the event of abnormalities or incidents in the system, timely and correct measures should be taken to address them, eliminating further damage and minimizing losses:

- (1) Overheating:

When the temperature of the battery pack exceeds the safe operating limit, the management system will issue a warning and require immediate cessation of use. In this case, usage should be stopped immediately, and relevant technical personnel should be notified for a comprehensive inspection. Only after troubleshooting can the system be used again.

- (2) Leakage:

If a leakage is detected during system operation, personnel should be evacuated immediately. Notify relevant technical personnel to handle the situation, and usage can only continue after the fault is rectified. It is strictly forbidden to operate the system with faults or force it to continue.

- (3) Short Circuit:

In the event of a short circuit caused by various reasons, relevant personnel must be evacuated immediately. Cut off relevant power sources and electrical equipment (if possible), disconnect the battery from the system immediately, and notify technical personnel for on–site repairs. Devices and components severely affected by the short circuit must undergo comprehensive testing by the manufacturer before deciding whether they can continue to be used.

- (4) Collision:

If equipment is impacted, deformed, or pierced by foreign objects for any reason, disconnect the power connection line of the system immediately. Notify professional technicians to handle the situation. If the situation is special, personnel wearing necessary protective equipment can handle it on–site before dismantling work can proceed.

- (5) Other Incidents:

When the system needs repair or removal of equipment or devices due to other accidents, the battery circuit should be disconnected first to ensure personnel safety from electric shock. Disassembly should be carried out under conditions where short circuits are prevented, ensuring that there are no secondary damages such as collisions, falls, or inversion during the process.

 **Danger**

- (1) If you identify any issues that may affect the battery or energy storage inverter system, please contact the after-sales personnel. Unauthorized disassembly is strictly prohibited.
- (2) If you discover exposed copper wires inside a conductive cable, do not touch it as it poses a high voltage risk. Contact after-sales personnel immediately and refrain from unauthorized disassembly.
- (3) In the event of other emergencies, promptly contact after-sales personnel. Follow their guidance for operation or wait for on-site assistance from the after-sales team.

7. AFTER-SALES

Jiangsu Hengtong Energy Storage Co., Ltd. provides comprehensive technical support and after-sales service to its customers.

The free warranty service period is in accordance with the terms specified in the contract.

The following situations are not covered by our company's free warranty service:

- (1) System damage or faults caused by not following the operation instructions in the user manual.
- (2) Damage or faults caused by improper wiring, power supply according to relevant electrical safety specifications, or adverse on-site environmental conditions.
- (3) System damage or faults caused by unauthorized modifications by the user.
- (4) System damage or faults caused by irresistible natural factors such as typhoons, earthquakes, floods, fires, or harsh environmental conditions (high temperature, low temperature, high humidity, acid rain, etc.).
- (5) If the user fails to maintain the initial fault condition, does not promptly notify the manufacturer after a fault occurs, and handles the issue independently, making it impossible to provide a practical fault diagnosis.



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