

LITHIUM-ION BATTERY PRODUCT MANUAL

HEC2-MP69r1

HEC2-SP69r1



Copyright Statement

Please keep the manual properly and operate in strict accordance with all safety and operating instructions in this manual. Please do not operate the system before reading through the manual.

Copyright Statement Contact the nearest hazardous waste disposal station when the products or components are discarded.

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1–Safety

1.1 Mark Instructions

This section explains the dangerous and warning marks related to user’s energy storage system, as shown in table below:

Symbol	Explanation
	The inverter conforms to the requirements of applicable CE guidance
	The inverter conforms to the requirements of applicable UKCA guidance
	The inverter conforms to the requirements of applicable UKNI guidance
	TUV mark of IEC62619
	The battery should be recycled environmentally and safely in proper facilities.
	Do not dispose the battery along with household wastes. Refer to the attached document for disposal information.
	Pay attention to the attached documents.
	Keep the battery away from open fire or fire source.
	Keep the battery inaccessible to children.
	Danger! High voltage! The high voltage of battery may lead to life risks!
	Danger! Electric shock!
	The battery pack may explode.

1.2 Operation Requirements of Manual

- Please read the Manual carefully prior to operation, in order to master the contents of the Product’s assembly, installation, debugging, maintenance and faults.
- This Manual is prepared for eligible electricians, who are responsible for electrical connection and installation described in the Manual only.
- Installation personnel should master all contents and warning in the Manual to keep safety.
- The Product should be installed by electricians having passed training and installation personnel who could:
 - Understand the functions, principles and operation conditions of power–grid system
 - Understand the dangers, risks and acceptable migration methods related to installation and use of electrical equipment
 - Basic knowledge about installation of electrical equipment
 - Understand and follow all safety prevention methods and the best practices in the Manual

1.3 Precautions

1.3.1 Safety Principle

Please comply with the following basic principles to install and use the Product safely:

- Avoid strong collision, heavy pressing or piercing of battery
- Keep the battery away from heat source or high–temperature places, such as fire sources
- Place the battery in dry and ventilated places
- Keep the battery inaccessible to children and animals to avoid electric shock
- Keep the battery away from electric conductors to avoid electric shock
- Keep the battery away from public places
- Do not touch the battery with wet hands
- Keep a safety distance between battery and ground
- Make sure to arrange Type D foam, water–based insulation fire extinguisher, ABC or carbon dioxide extinguisher.

1.3.2 Emergency Treatment

- Avoid direct contact with the leaked liquid or gas of battery, for the electrolyte is corrosive; otherwise, skin irritation or chemical burn may occur. For any contact with leaked substances, please take the following measures:
 - Accidental inhalation of hazardous substances: Take away the person from polluted area and seek for medical assistance immediately.
 - Eye contact: Wash the eyes with flowing water for 15min and seek for medical assistance immediately.
 - Skin contact: Wash the contaminated skin with soap and water thoroughly and seek for medical assistance immediately.
- When battery is wet or soaked in water, do not touch it, but contact the professional personnel for judgment and treatment.
- When battery is expected to be damaged, please contact the professional personnel for judgment and treatment.

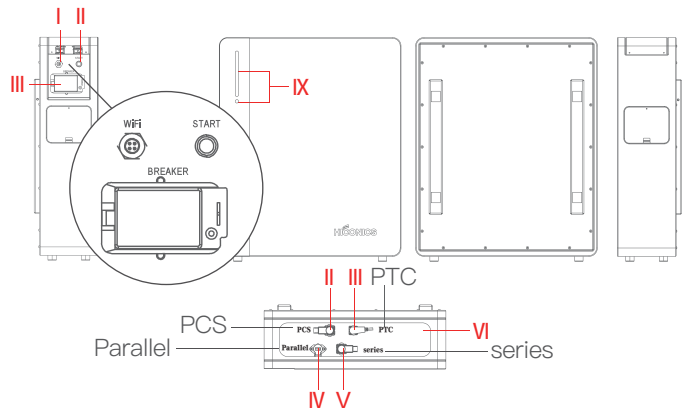
2–Product Introduction

2.1 Introduction

Composed of power control module and battery cascading module, the battery pack can store and release electric energy based on the requirements of inverter management system.

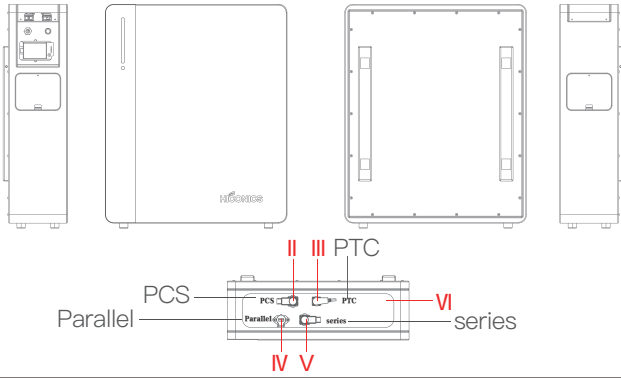
The battery pack, which is wall–mounted, consists of master control battery pack (HEC2–MP69r1) and slave control battery pack (HEC2–SP69r1). The master battery pack and slave battery pack are of the same size, but the former is fitted with LED status indicator to show the current electric quantity, running status and fault information.

Interfaces and functions of master battery pack:



S/N	Mark	Description
I	WIFI	wifi connector
II	START	Battery switch
III	BREAKER	Battery circuit breaker
IV	PCS	Inverter connector
V	PTC	Battery pack heating connector
VI	parallel	Parallel expansion connector of battery pack
VII	series	Series extension connector of battery pack
VIII	PE	Grounding point
IX	/	Indicator

Interfaces and functions of battery pack interface:



S/N	Mark	Description
I	/	Grounding point
II	PTC-input	Heating input connector of battery pack
III	PTC-output	Heating output connector of battery pack
IV	Series-input	Series extension input connector of battery pack
V	Series-output	Series extension output connector of battery pack
VI	/	Grounding point

2.2 Basic Functions

Composed of master battery pack and slave battery pack, the battery is under the systematic management and control by the master battery pack. The system's advanced technique has been fully accepted by the market.

- High cost performance
- Grade IP65 protection;
- High reliability and safety;
- Adapted to -20°C – 60°C charge/discharge environment
- Self-heating function
- Battery cycle life $\geq 6,000$ times
- Class of hazardous material: Class9
- Easy installation and flexible
- BMS has passed automotive-level function safety analysis

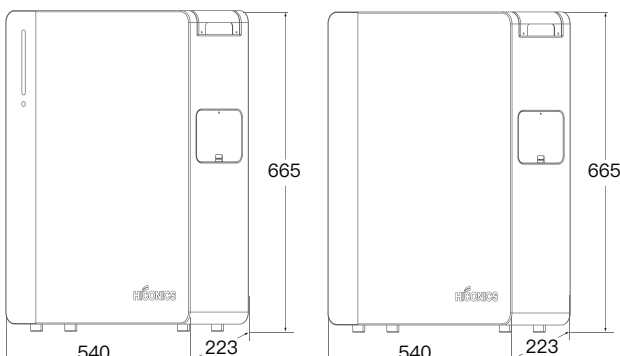
2.3 Authentication Introduction

- The system conforms to TÜV (IEC62619), EU, CB and CE authentication
- Authentication standards: IEC 62619, EMC IEC 61000, IEC 60529, IEC 63056 and VDE-AR-E 2510

2.4 Dimensions & Weight

The battery consists of master battery pack and slave battery pack. The detailed dimensions and weight are as follows:

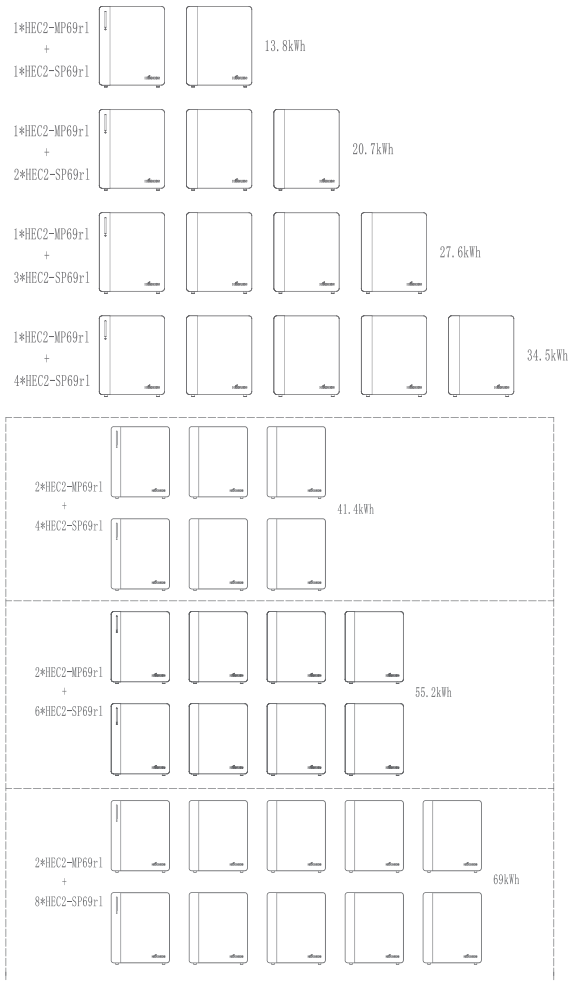
	Master battery pack: HEC2-MP69r1	Slave battery pack: HEC2-SP69r1
Width	540mm	540mm
Height	665mm	665mm
Depth	223mm	223mm
Weight	76.5KG	74KG



2.5 Product Configuration

The battery can be installed as demanded by user and configured as follows:

- Single master battery pack can have series connection with 4 slave packs maximally.
- The number of slave battery packs connected by dual master battery packs must be the same; the dual master battery packs should be in parallel connection;



2.6 Product Performance

Item	Description
Model	HEC2-MP69r1 HEC2-SP69r1
Nominal Voltage [V]	96
Operating Voltage [V]	76.5–106.5
Battery Type	LFP (Li-ion)
Nominal Capacity [kWh]	6.9
Usable Capacity [kWh]	6.2
Faradic Charge Efficiency [%]	99
Battery Roundtrip Efficiency [%]	95
Max Power [kW]	4.8
Recommend Charge Discharge Current [A]	36
Max Charge Discharge Current [A]	50
Cycle Life [90% DOD]	>6000 Cycles
Warranty [year]	5

3-Installation Instructions

3.1 Installation Preparation

Please install the Product in strict accordance with steps in the Manual; otherwise, Hiconics does not bear any legal liability due to improper assembly and operation.

3.1.1 Environmental Conditions

Make sure the installation position meets the following conditions:

- The installation place should be free from direct sunlight and rainfall. The battery may encounter accelerated aging and reduced service life in severe assembly environment, even if the battery is designed based on Grade IP65 protection!
- The installation position should be away from water sources such as faucet, sewer line and sprinkler head to avoid water penetration.
- The installation position should be away from the sea to avoid sweater or humid air.
- The mounting wall must be firm and smooth.
- The installation environment should be free from corrosive gas such as ammonia.

3.1.2 Personal Protection

Installation & maintenance personnel must follow the local regulations, industrial laws and regulations.

Installation personnel should wear protective devices to avoid short circuit and personal injuries, for the battery belongs to high-voltage system.

Recommended PPEs:



Insulated gloves



goggles



dust mask



safety shoes

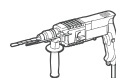
3.1.3 Unpack

The equipment needs to be handled by several workers according to the regional regulations.

- Please check the integrity of outer package before unpacking, to make sure the battery is not damaged during transport and storage. For any damage, please contact your dealer immediately.
- The battery is surrounded with cushion foam protection. After unpacking, check if battery pack shell has faults such as deformation and crack; if so, stop installation immediately and contact the after-sales personnel for treatment.
- Make sure the battery is intact during transport. For any visible damage, such as crack, please contact your dealer.
- After unpacking, check if battery pack and accessories are intact. For details of pack list, please refer to Section 3.1.5 of the Manual. For any missing part, please contact the dealer immediately.

3.1.4 Tool Preparation

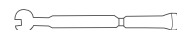
The following can be used for installing the battery pack. The tools below are for reference only. Tools which can reach the same effects shall prevail.



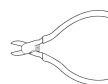
Percussion drill (12mm)



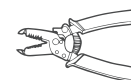
Torque socket wrench



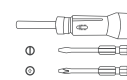
Torque wrench



Diagonal pliers



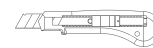
Wire stripper



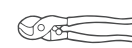
Torque screwdriver



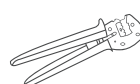
Rubber hammer



Utility knife



Cable cutter



Crimping tool

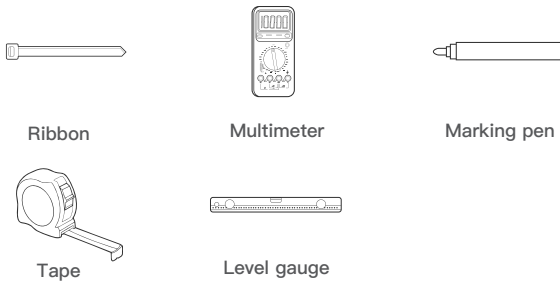


Cold pressing terminal clamp



Open-end wrench

Charging Temperature[°C]	-20 to 60
Discharging Temperature[°C]	-20 to 60
Storage Temperature[°C]	-20 to 60
Humidity [%]	0 to 95
Altitude [m]	Below 2000
Nominal Voltage [V]	76.5-106.5
Protection	IP65
System to Inverter	CAN2.0 Note: This parameter is not included in slave battery pack
Battery to Battery/BMS	CAN2.0
Program Update Port	RS485
Master Control Working Mode Indicator	1 LED Note: This parameter is not included in slave battery pack
Master Control Capacity Indicator	6 LED (10%, 25%, 40%, 60%, 80%,100%) Note: This parameter is not included in slave battery pack
Switch ON/OFF	Button*1 + Breaker*1 Note: This parameter is not included in slave battery pack
Safety	CE, TUV(IEC62619), ROHS, REACH
UN Number	UN3840
Hazardous Materials Classification	Class 9
Transport Testing Requirement	UN38.3
Dimension(L*W*H) [mm]	665*540*223
Weight [kg]	Master battery pack: 76.5, slave battery pack: 74



3.1.5 Check Accessories

Once the Product is unpacked, check if the attached product list is consistent with the table below:

a. List of accessories of master battery pack

S/N	Photos	Description/Specification	Qty
A		Master battery pack	1
B		Rack	1
C		#1 installation positioning board Note: Applies to positioning between racks of master battery pack and inverter rack. Applies to positioning between master battery pack and its rack (parallel operation)	1
D		#2 installation positioning board Note: Applies to positioning between racks of master battery pack and slave battery pack.	1
E		#3 installation positioning board Note: Applies to positioning rack when battery pack is installed on ground.	1
F		BAT short-circuit plug	1
G		PTC short-circuit plug	1
H		Ground wire, with OT terminals at both ends	1
I		WIFI communication cable	1
G		Cross recessed screws M4*8	12
K		Expansion screws M8*60	8

b. List of accessories of slave battery pack

S/N	Photos	Description/Specification	Qty
A1		Slave battery pack	1
B1		Rack	1
C1		PTC series connection harness of slave battery pack	1
D1		Electrode series connection harness of slave battery pack	1
E1		Ground wire	1
F1		Cross recessed screws M4*8	2
G1		Expansion screw M8*60	8

c. Optional accessory 1 – Inverter connection harness

This harness is used for power connection and communication (CAN) between battery pack and inverter. The harness is a standard product, or it can be separately prepared by harness technicians as demanded by user if it is improper.



- P2 and P4 are respectively connected to positive and negative anode of inverter battery interface. Please check the positive/negative anode mark on harness carefully during installation
- P3 is connected to CAN communication interface of inverter. The definition of harness interface is as follows:

1	NC
2	NC
3	NC
4	CAN-H
5	CAN-L
6	NC
7	NC
8	NC

d. Optional accessory 2 – parallel connection harness

This harness is used for parallel connection of two master battery packs. The following accessory should be selected when user's battery contains two master battery packs and several auxiliary battery packs. The harness is a standard product, or it can be separately prepared by harness technicians as demanded by user if it is improper.



! Note:

Users should contact the dealer to confirm the specification and quantity of optional accessories before choosing the Product.

3.2 Steps of Installation

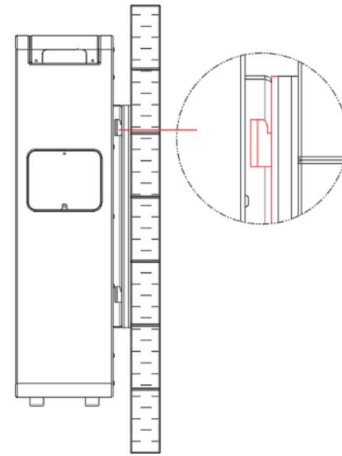
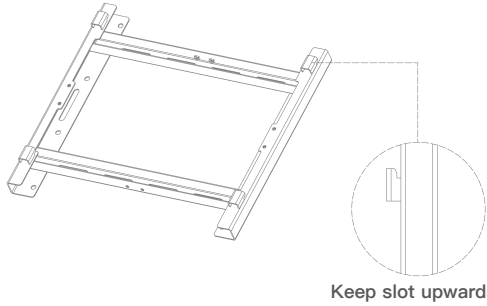
3.2.1 Structure Installation

The positioning rack attached in battery pack can be used for simple positioning. Please use it along with the level gauge, in order to correct the horizontal error. Once all racks are installed, the positioning board can be removed.

The ground clearance of battery pack should conform to the local laws and regulations. When attached positioning board has conflict with the laws and regulations, the laws and regulations shall prevail.

! Note:

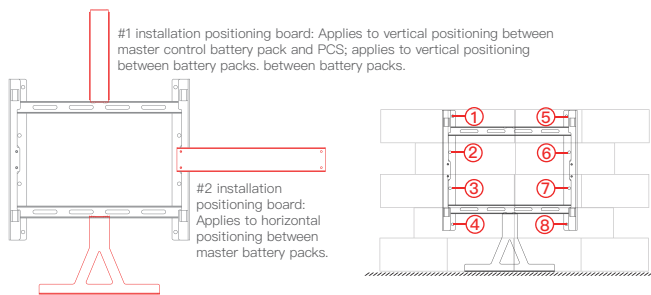
Make sure the slot faces upwards when installing the rack.



a. Install rack of master battery pack

- Connect the rack B, positioning board C, D and E according to the picture below. Determine the ground clearance of battery pack, the drilling position for fixed bolts of 8 racks, and mark the drilling position with marking pen.

Positioning board C: Determine the inverter position. Positioning board D: Determine the rack position of battery pack.



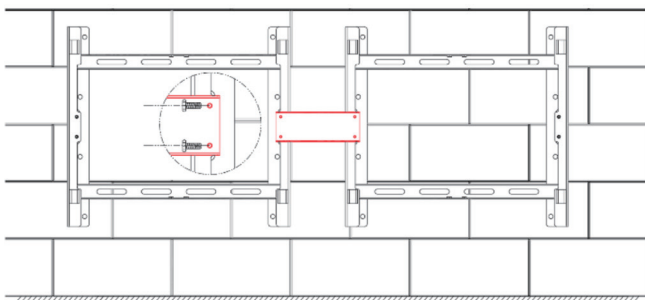
#3 installation positioning board: Applies to positioning between rack and ground during installation on ground.

- Conduct drilling (hole depth $\geq 50\text{mm}$) at the marked position by using the $\phi 12\text{mm}$ percussion drill and remove the positioning board E. Fix and fasten the rack E by using M8*60 expansion screws. Not less than 2 expansion screws should be used per column (4-point fixing).

b. Install rack of master battery pack

Determine the rack position of the second battery pack according to the picture below. Mark the drilling position with marking pen. Repeat the steps in 1.2 to fix the rack of battery pack.

Please repeat this step to install multiple racks of battery pack.

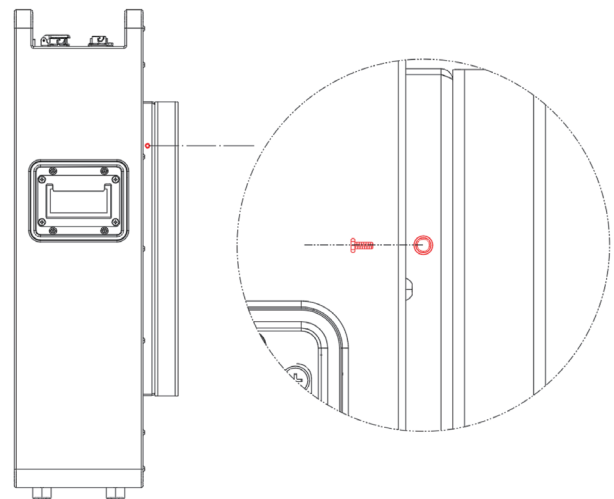


3.2.2 Installation battery pack

- Insert the rear matching holes of battery pack to the rack hook as shown in picture below. Move the battery pack to the matching holes gradually to finish the installation.

b. Install thrust bolts of battery pack

As shown in picture below, the lock hole is arranged at the back of rack to avoid accidental falling of battery pack. Please determine whether secondary lock is required according to the accidental risks at site.

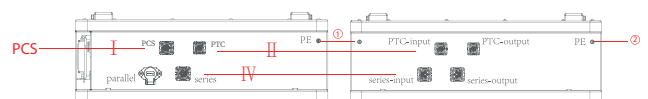


3.2.3 Install Harness

Once harness is installed, protect the unconnected communication ports of battery pack with waterproof cap, cover and reset the top. The PTC-OUTPUT and series-OUTPUT interface of the final slave battery pack per cluster should be short-circuited by using F, G short-circuit piece.

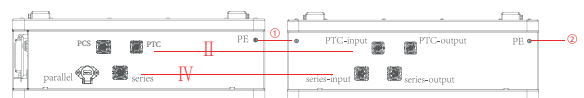
a. Installation of harness between master battery pack and slave battery pack

Use harness H, C1, D1, E1 for connection, as shown in picture below:



b. Connection of master battery pack and slave battery pack

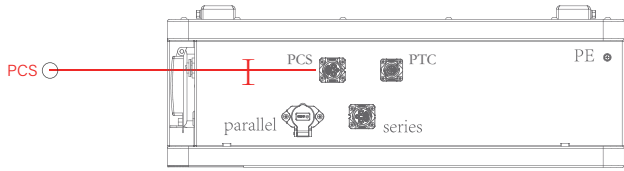
- Use harness C1, D1 and E1 for connection, as shown in picture below. Please repeat this step is 1 master battery pack is fitted with 4 slave battery packs (maximally).



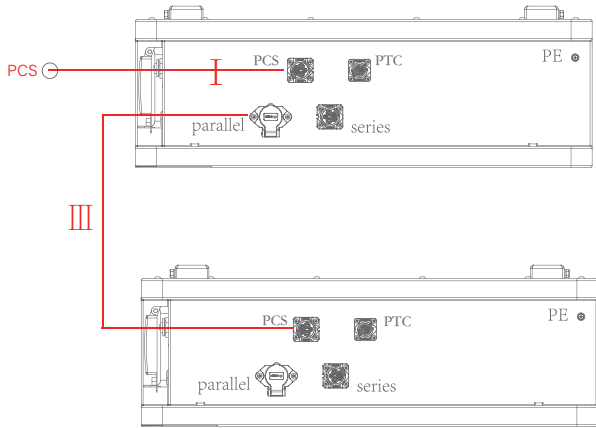
- The PTC-OUTPUT and series-OUTPUT interface of the final slave battery pack should be short-circuited by using F, G short-circuit piece, in order to form complete circuit of this electrical interface.

c. Installation of parallel harness and inverter connecting wire

- When 1 cluster of master battery pack system is used in the battery system selected by user, the optional accessory 1 should be purchased, and the inverter harness should be connected according to picture below:

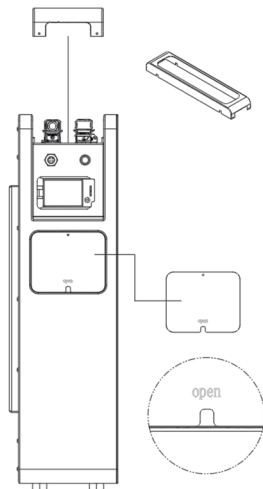


• When 2 clusters of master battery packs are used in battery system selected by user, the optional accessory 1 and 2 should be purchased; the parallel harness of two master battery packs and inverter connection harness should be connected according to the picture below:



3.2.4 Install covering piece

Covering pieces are arranged at top and both sides of battery pack. Choose whether cover them after installation (covering is recommended).



Overall installation

The effect picture for product with the max. battery pack system and completed installation is shown below: The top covering piece of battery pack will be provided with semi-transparent treatment, in order to display the installation effects of harness.



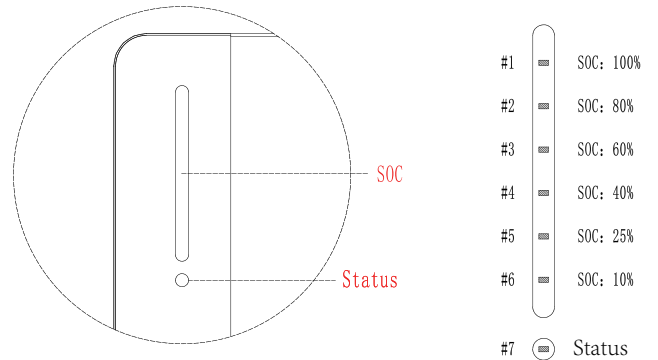
4-Product Debugging

4.1 Hardware Setting

The machine can be started immediately after system installation, for the battery pack has been configured before leaving factory.

4.2 Status Introduction

Once the battery pack is powered on, its status will be displayed and judged by LED of master battery pack.



A total of 7 LED lamp beads are arranged at the upper left corner of master battery pack panel

#1-#6 lamp: Current electric quantity; in which, #6 lamp: Red/blue lamp, others are single-color lamps in blue.

#7 lamp: Current battery status; red/yellow lamp.

4.2.1 Power Level Indicator of Battery Pack

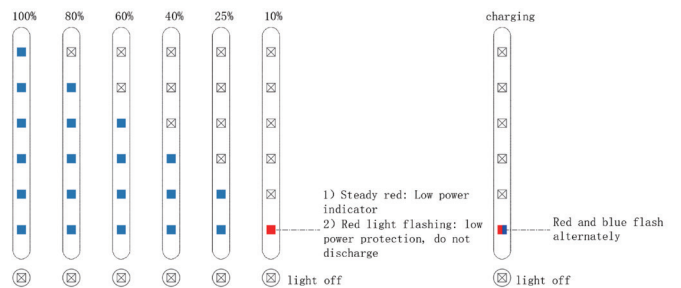
• #1-5# lamp bead: The corresponding lamp beads will flicker during battery charging, or they will be off progressively during discharging.

• #6 lamp bead:

Steady red: Battery pack is discharged to low battery level (25%SOC>current electric quantity≥10%SOC), charge/discharge is allowed;

Red light flashing: Low battery protection of battery pack, discharging is disabled, please charge as soon as possible;

Red and blue flash alternately: Charging at low battery (25%SOC>current electric quantity≥10%SOC);



4.2.2 Running Status Indicator of Battery Pack

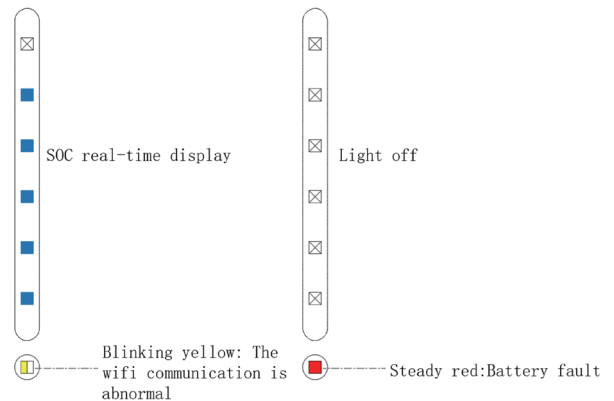
• #7 lamp bead:

Off: Battery is running normally;

Steady red: Battery fault, charge/discharge prohibited

Blinking yellow: WIFI communication error, charge/discharge allowed

Note: When status indicator is steady red, the power status indicator will become off completely!



4.2.3. Faults & Troubleshooting

The faults and troubleshooting of battery system are shown in table below. Please contact the dealer if you don't have qualified operator.

S/N	Description	Troubleshooting
1	Power status indicator of battery pack is off	Check if cable is connected properly and battery is powered on
2	Running status indicator of power battery is normally on in red	Check if PCS communication cable is connected properly
3	Running status indicator of battery pack flickers in yellow	Check if WiFi is connected successfully

4.3 System Startup

Make sure all cables are connected properly prior to startup. Open the protective cover of circuit breaker, and pull the circuit breaker to ON position. Press the startup button (auto-reset) for 2~3s, then SOC power indicator will be on, which means battery pack is powered on normally. Wait for 1min after startup is done (SOC indicator will flicker progressively during self-check of system).

4.4 System Shutdown

Make sure the battery is not charged or discharged prior to shutdown! Pull the circuit breaker to OFF position and finish battery shutdown. Do not remove the power cable until the battery pack system is shut down completely; otherwise, arc discharge may occur, which may lead to severe injury. It is suggested to touch the battery pack and cable 30s after system is shut down.

5-Troubleshooting

S/N	Fault Description	Troubleshooting
1	Battery startup failure	Check if cables are connected properly
2	Battery operation failure	Check if PCS cable is connected properly and PCS has alarm of battery communication error

6-Maintenance

The battery should be opened, repaired or dismantled by workers or personnel authorized by manufacturer only. For any consequences or liabilities due to violation against the safety operation, design, production and equipment safety standard, we do not bear any legal responsibilities.

Inspection Contents	Inspection Method	Maintenance Period
System running and environment	1.Visually inspect whether the device has damage or deformation. 2.Check if there's abnormal sound while device is running. 3.Inspect the humidity and dust in the ambient environment of device; check if air inlet filters are normal. 4.The battery should be charged to at least SOC 50 % each time before battery is idled for over 9 months. 5.Please contact the dealer and carry out reasonable evaluation before expanding the capacity of battery system.	1 times/year

Electric connection	1.Check if cable and terminal block are loose and have the trace of arc discharge and rust. 2.Check if cable has damage, especially whether the surface that contacts metal surface has the trace of scratch. 2.Check if cable has damage, especially whether the surface that contacts metal surface has the trace of scratch. 3.Check if the insulation wrapping of cable terminal block is falling. 4.Check if cable distribution is normal.	1 times/half a year
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Note: The table above is the recommended period for routine maintenance of products. The actual maintenance period should be determined based on the Product's installation environment. Make sure to shorten the maintenance period and increase maintenance frequency in case of dirty environment!

7-Product Outage

Move the inverter switch to the off position. Turn off the master battery pack switch and disconnect the master battery pack breaker.

Disconnect the cable between battery pack and inverter, then disconnect the short-circuit plug and cable on the last battery pack.

Please pack the BMS and battery module with original package. If package is unavailable, please use the equivalent carton that conforms to the following requirements.

- Applies to load above 80kg
- With handle
- The product can be wrapped completely

8-Disclaimer

Hiconics will offer quality guarantee services within the warranty period if the Product is installed and used by the Manual.

The warranty will expire immediately if the Product's installation or operation violates against the Manual

For any direct or indirect losses and damages due to the followings, we shall not offer quality warranty services, nor undertake the direct or indirect liabilities.

- Force Majeure (earthquake, tsunami, fire hazard, etc.)
- Misuse or non-compliance with regulations
- Improper installation, debugging, startup or operation (violate against the detailed guidance principle in installation manual)
- The cooling and natural airflow are minimized due to insufficient ventilation and circulation
- Installed in corrosive environment
- Damage during transport
- Unauthorized maintenance
- Poor maintenance of device. The device can be inspected by qualified technicians at site after continuous use for 60 months. When the device is used for over 60 months, the warranty request may be refused, unless the device is proved to be fully maintained.
- External factors, including abnormal physical or electrical pressure (blackout surge, surge current, etc.)
- Incompatible frequency converter or device
- Connected to other brands of inverters without permission by Hiconics



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