

LFP Storage System

HV5120 User Manual

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Contents






| | |
|---|-----------|
| HV5120 USER MANUAL | 1 |
| 1. SCOPE AND SIGN | 3 |
| 2. PRODUCT COMPONENTS | 6 |
| 2.1.1 PRODUCT MAIN COMPONENTS | 6 |
| 2.1.2 BATTERY SYSTEM PORT | 7 |
| 2.1.3 SYSTEM DIAGRAM | 7 |
| 2.1.4.ANNOUNCEMENTS OF PARALLEL CONNECTION BEFORE START-UP | 9 |
| 2.2 DEFINITION OF COMMUNICATION PIN SOCKETS | 10 |
| 2.3 PACKAGE | 11 |
| 3. PRODUCT ELECTRICAL CHARACTER | 12 |
| 3.1 MODULE SPECIFICATION | 12 |
| 4. MANAGEMENT SYSTEM (BMS) FUNCTION | 13 |
| 5. PRODUCT EXTERIOR REQUIREMENT | 13 |
| 6. DATA STORAGE REQUIREMENT | 13 |
| 7. PACKING, TRANSPORTATION, STORAGE REQUIREMENTS | 13 |
| 7.1 PRODUCT PACKAGE PACKING REQUIREMENTS | 13 |
| 7.2 PRODUCT TRANSPORTATION REQUIREMENTS | 13 |
| 7.3 PRODUCT STORAGE REQUIREMENT | 13 |
| 8. REGULAR MAINTENANCE | 14 |
| 8.1 SOC CHECK | 14 |
| 8.2 CABLE CHECK | 14 |
| 8.3 BALANCE | 14 |
| 8.4 OUTPUT RELAY CHECK | 14 |
| 8.5 HISTORY CHECK | 14 |
| 8.6 MAINTENANCE | 14 |









1. Scope and Sign

1.1 This User Manual is to describe the technical indexes of HV5120 Battery Module produced by Shanghai Sermatec Energy & Technology Co.,Ltd.And would be used as the basis of product inspection by Sermatec Quality Department and Client.

1.2 This manual includes important description given below: The installation and usage of HV5120 storage product must follow this manual. The design of the product and the tests are based on the global safety requirements. But same for all the electricals, you must follow some prevention strategies during installation and operation. To decrease the risk of human injury and make sure that the product is installed and operated safely, you must read and follow all the descriptions, announcements and warnings carefully.

1.3 Signs

| | | |
|---|--------------------------|--|
|  | <p>Danger</p> | <p>Fatal Voltage! Battery module would generate DC voltage, and would cause fatal voltage and electric shock. Only trained person can do the installation of the battery module.</p> |
|  | <p>Warning</p> | <p>Damaged battery system may lead to risk of human injury. Don't draw the connector when the system is working! Cut off on several power source, and make sure that there is no voltage left.</p> |
|  | <p>Alarm</p> | <p>Decrease the possibility of battery module system error or risk on life-cycle.</p> |
|  | <p>Read Signs</p> | <p>Please firstly read the User Manual and Datasheet before starting using the battery!</p> |
|  | <p>Sign</p> | <p>Danger! Careful!</p> |

| | | |
|---|----------------------|--|
|  | <p>Sign I</p> | <p>Be Careful of Electric Shock!</p> |
|  | <p>Sign</p> | <p>Don't put the system beside inflammables.</p> |
|  | <p>Sign</p> | <p>Don't connect +/- reversely.</p> |
|  | <p>Sign</p> | <p>Don't put the system beside fire.</p> |
|  | <p>Sign</p> | <p>Isolate the system from children and pets.</p> |
|  | <p>Sign</p> | <p>Recycle Sign</p> |
|  | <p>Sign</p> | <p>Waste Electrical and Electronic Equipment (WEEE) Command (2012/19/EU)</p> |
|  | <p>Sign</p> | <p>EMC Certificate Sign</p> |

| | | |
|---|--------------------|--|
|  <p>TÜVRheinland® Precisely Right.</p> | <p>Sign</p> | <p>TÜV Rheinland Safety Certificate Sign</p> |
|---|--------------------|--|



Danger: Battery provides electricity. When battery is short-circuit or wrongly installed, may lead to danger of burn or fire.

Danger: Fatal voltage exists in battery port and cables. Touch cables or ports could lead to serious human injury or death.



Warning: Please don't open or change the appearance of the battery module;

Warning: When operate on the batteries, please wear proper Personal Protective Equipment (PPE), e.g. rubber gloves, rubber boots, goggles.

Warning: LV5324 system working temperature range: 0°C~50°C; Proper temperature: 18°C~ 28°C. If it exceeds the range, the battery life-cycle might be decreased or even cause battery system over/low temperature warning or protection. And may influence warranty.

Warning: On the battery installation, installers shall follow the local installation standards.



Attention: Improper setting or service may permanently destroy the battery.

Attention: Wrong inverter parameters may lead to battery early aging.



Alarm

1) During installation or operation, please carefully read the user manual (in the attachment), this is very important and necessary. If you don't follow the instruction or warnings in this document, it could lead to electric shock, serious damage, or death, or destroy the battery and impossible to control the battery.

2) During Long period of storage, it is necessary to charge every half a year, SOC should be higher than 90%;

3) Battery need to be charged before 12 hours after fully charged.

4) Cables need to be sufficiently insulated.

5) During maintenance, all the battery ports must be disconnected.

6) If you find any error, please directly contact manufacturer in 24 hours.

7) Please don't use cleanser to wash the battery.

8) Please don't expose the battery to inflammables or pungent chemicals or steam;

9) Please don't paint any part of the battery, including inside or outside components.

10) Please don't directly connect battery and PV panels.

11) Except authorized Sermatec staffs, don't open, repair or disassembly batteries. Our company doesn't take responsibility for any results due to disobeying safety operation or design, production and device safety standards.

12) Direct or indirect damage due to above items, is not included in Sermatec warranty.

13) It is not allowed to insert foreign matter to any part of the battery.



1.2 Before connection

- 1) Please firstly check the product and pack list after opening the case. If there is any damage or missing, please contact local dealer.
- 2) Before installation, please make sure that grid power is cut off, and make sure that the battery is at 'Off' condition.
- 3) Connection must be correct, don't connect battery +/- reversely, and make sure that the battery is not short-circuited.
- 4) Don't connect battery directly with AC power.
- 5) Battery inner BMS is 51.2VDC, please don't connect the battery in series.
- 6) The battery system shall be grounded sufficiently, and the resistance shall be smaller than 100mΩ.
- 7) Make sure that the battery system electrical parameters is compatible to related devices.
- 8) Make the battery far from water and fire.



1.3 Usage

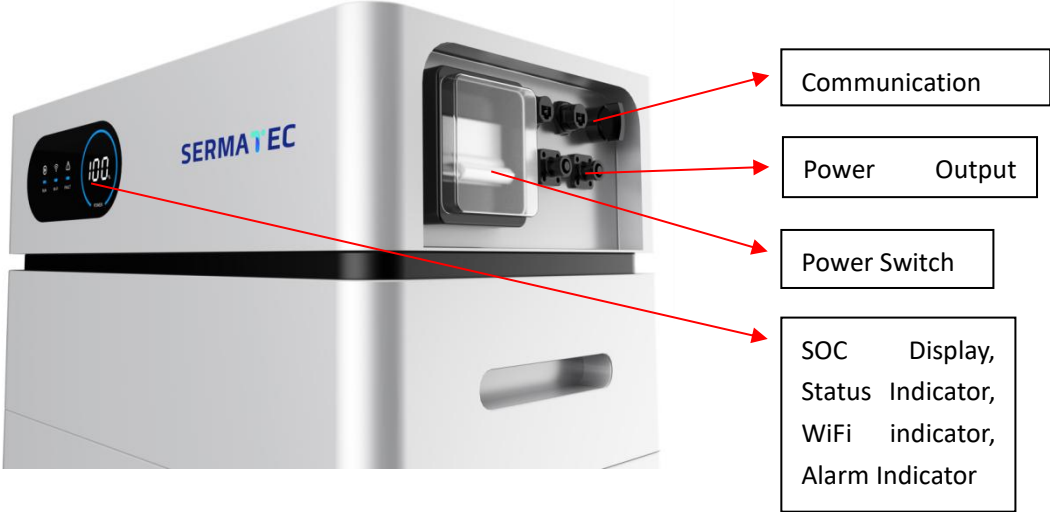
- 1) If you need to move or repair battery system, you must cut off the power, and totally shut down the battery.
- 2) Don't connect the battery with different types of batteries
- 3) Don't connect the battery with malfunctioning or incompatible inverters.
- 4) Don't disassembly the battery (When the QC label is teared or destroyed).
- 5) When fire occurs, please use dry powder extinguisher, don't use liquid extinguisher.

2. Product Components

2.1.1 Product main components

| Component | Specification | Figure |
|---------------------|--|--------|
| Battery Box | 100Ah 1P16S | |
| Low Voltage BMS | Maximum Current 50A | |
| Pedestal | Width 363mm Depth 590mm Height 72.5mm, 50A | |
| Power Cables | Orange and Black 1xAWG3, Surlok Connector | |
| Communication Cable | CAN, RS485 communication cable | |
| Battery Output | Surlok Port | |

2.1.2 Battery System Port



2.1.3 System Diagram



| Model Type | HV5120 | | | | | | |
|------------------------------------|-------------|--|-------------------|------------------|--------------------|------------------|--------------------|
| Battery Cell | LFP | | | | | | |
| Battery Energy(kWh) | | | 20.48 | 25.60 | 30.72 | 35.48 | 40.96 |
| Battery Voltage(Vdc) | 204.8-409.6 | | | | | | |
| Battery Capacity(AH) | | | 400 | 500 | 600 | 700 | 800 |
| Module Number(pcs) | | | 4 | 5 | 6 | 7 | 8 |
| Module Energy(kWh) | 5.12 | | | | | | |
| Module Voltage(Vdc) | 51.2 | | | | | | |
| Module Capacity(AH) | 100 | | | | | | |
| Cell Number(pcs) | 16 | | | | | | |
| Charging Voltage(Vdc) | | | 228 | 285 | 342 | 399 | 456 |
| Nominal Charging Current(A) | 20 | | | | | | |
| Suggested Charging Current(A) | 50 | | | | | | |
| Charging Current(A, Max.@15S) | 55 | | | | | | |
| Cut-off Discharging Voltage(Vdc) | | | 189.6 | 237 | 284.4 | 331.8 | 379.2 |
| Nominal Discharging Current(A) | 20 | | | | | | |
| Suggested Discharging Current(A) | 50 | | | | | | |
| Maximum Discharging Current(A) | 55 | | | | | | |
| Efficiency(%, \leq 0.5C-rate) | 96 | | | | | | |
| Depth of Discharge(%) | 90 | | | | | | |
| Dimension(W*D*H, mm) | | | 590*363 *985.5 | 590*363 *1168 | 590*363 *1350.5 | 590*363 *1533 | 590*363 *1715.5 |
| Communication | RS485\CAN | | | | | | |
| Protection Level | IP55 | | | | | | |
| Life Cycle(Years) | 15+ | | | | | | |
| Working Temperature($^{\circ}$ C) | 0~50 | | | | | | |
| Storage Temperature($^{\circ}$ C) | -20~60 | | | | | | |
| Altitude(M) | <2,000 | | | | | | |
| Product Certificate | IEC62619 CE | | | | | | |
| Transport Certificate | UN38.3 | | | | | | |

| | |
|--|---------------|
| 1) Controller Dimension (W*D*H, mm) | 570*352*183 |
| 2) Module Dimension (W*D*H, mm) | 570*352*182.5 |
| 3) Pedestal Dimension (W*D*H, mm) | 590*363*72.5 |

2.1.4 Announcements of parallel connection before start-up

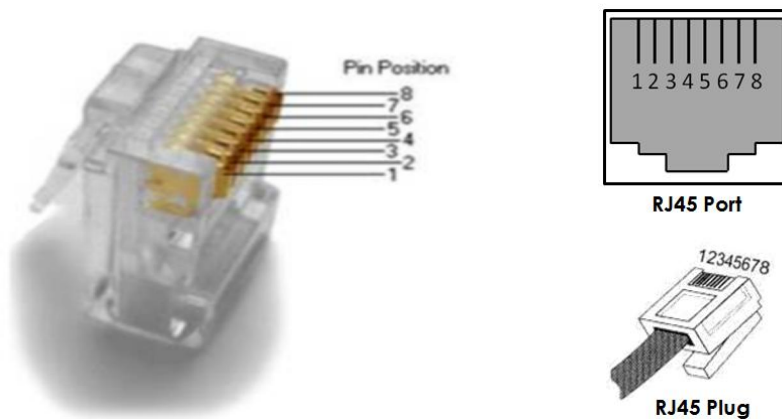


1. Install and pile the batteries correctly, and then turn the switch to 'ON' position, start up the batteries. When the batteries are installed wrongly, it would lead to startup error. After starting up the system normally, the batteries would distribute the address automatically. The main control box at the top would judge through the data sent from the below batteries. If the data sent from the batteries are judged to be normal, the batteries would be started up successfully, otherwise startup would fail.
2. Shut down. When the battery is not charged or discharged, then you can shut down the battery. The switch can be used to cut-off the circuit when the battery is powering the loads. But to protect outer devices, we suggest to firstly shutdown the loads and stop charging/discharging and then turn the switch to 'Off', and make sure that the indicators are OFF, so that the battery is shut down.

2.2 Definition of communication pin sockets

| | CAN | RS485 |
|------------------|--------------------|---------------|
| Baud Rate | 500K Default | 19200 Default |
| No. | Description | |
| 1 | CANH | RS485A |
| 2 | CANL | RS485B |
| 3 | GND | GND |
| 4 | | |
| 5 | | |
| 6 | -- | |
| 7 | -- | |
| 8 | -- | |


CAN: Communication Terminal:(RJ45 port) Follow CAN Protocol, used for



communication between battery and inverter.

RS485: Communication Terminal:(RJ45 port) Follow RS485 Protocol , used for communication between battery and inverter

LV3584 LFP Battery Interface Description

| No. | Name | Label | Function Description |
|-----|---------------------|---|---|
| 1 | Grounding Port |  | Used for Battery Grounding |
| 2 | Switch | | Power Switch, while at 'ON' status, system started up; While at 'Off' status, the system cannot be started up, cannot output power. |
| 3 | RUN Indicator | RUN | When switch is at 'ON', the RUN indicator would be 'ON'. |
| 4 | SOC indicator | POWER | When the switch is at 'ON' status, the control box would display SOC based on the battery data. |
| 5 | WIFI and FAULT | WIFI/FAULT | Status indicator, Fault Indicator, WiFi indicator |
| 6 | CAN Port | CAN | Used for communication |
| 7 | RS485 Port | RS485 | Used for communication |
| 8 | - Input/Output Port | “ - “ | Battery Input/Output - Port |
| 9 | + Input/Output Port | “ + “ | Battery Input/Output + Port |

2.3 Package

LV3584 Box, Inner Dimension: 650mm*430mm*260mm; Outer Dimension: 670mm*445mm*280mm

LV3584 Accessory Box, Outer Dimension: 600mm*100mm*40mm

Battery Dimension: 570mm*352mm*182.5mm

Accessory List

| Accessory Name | Specification | Figure | |
|------------------|--|--------|--|
| Grounding Cable | Yellow-Green/1 Meter/10AWG/Two side TL6-6 Circle Connector | | |
| nut, screw, bolt | Full Set | | |

Outer Accessory List

| Accessory Name | Specification | Figure |
|-------------------------------|--|--------|
| + Outer Power Cable | Orange/3m/4AWG/SURLOK Connector/25-8 Connector | |
| - Outer Power Cable | Black/3m/4AWG/SURLOK Connector/25-8 Connector | |
| Outer CAN Communication Cable | Black/3.0m/STP/Two-Side RJ45 Connector | |

3. Product Electrical Character
3.1 Module Specification

| Parameter | Specification | Remark |
|--|---|---|
| 3.1.1Nominal Voltage | 51.2V | |
| 3.1.2Nominal Capacity | Typical: 104Ah | Charge normally and lay 0.5-1h, 0.1C discharge to 47.2V or discharge until BMS protect. |
| | Minimum: 103Ah | |
| 3.1.3Nominal Charge Method | 0.2C Constant Current Constant Voltage (57V) charge until discharge current 0.01C | |
| 3.1.4Nominal Discharge Current | 20A | |
| 3.1.5Discharging Protect Current | 55A | 15s delay protection. 1 minute after protection resume or directly resume when there is charge current |
| 3.1.6Nominal Charging Current | 50A | |
| 3.1.7 Charging Protect Current | 55A | 15s delay protection. 1 minute after protection resume or directly resume when there is discharge current |
| 3.1.8Battery Inner Resistance (BMS Excluded) | Inner Resistance<20m Ω | |
| 3.1.9Upper Value of Charging Voltage | 57.6±0.1V | Suggested Charging Voltage 57±0.5V |
| 3.1.10Lower Value of Discharging Voltage | 47.2±0.1V | |
| 3.1.11Working Temperature | Charging | -10~60℃ |
| | Discharging | -10~60℃ |
| 3.1.12 Working Humidity | 5%~95% | No condensation, system can work normally |
| 3.1.13Storage Temperature | -25℃~65℃ | |

4. Management System (BMS) Function

BMS has following function: Over-charging protection, over-discharging protection, high-voltage protection, low-voltage protection, charging over-current protection, over-temperature protection, low-temperature protection, short-circuit protection, battery cell balance function.

5. Product exterior Requirement

Battery exterior keeps clean, and installer need to firstly clean dusts and scrap iron before installation and power on. And installer shall keep the area clean.

6. Data Storage Requirement

The battery test data must be stored in the database. So that the data can be checked with SN number.

7. Packing, Transportation, Storage Requirements

7.1 Product Package Packing Requirements

Battery module precharge to 60%~70% SOC or deliver according to customer requirement. The battery remaining SOC after going on boat depends on the storage time and storage condition.

1. Battery Module meets UN38.3 Certificate Standard.
2. Especially, the package must follow Revised Special Rule of Road Cargo Transportation and Existing Dangerous Goods Act.

7.2 Product Transportation Requirements

Battery must be prevented from strong shaking, impact, extrusion, and must be prevented from sunlight and rain. The battery can be transported through car, train, boat, air etc. for transportation. The battery shall be lightly moved during assembly and disassembly, and cannot be dropped, rolled and pressed hardly.

7.3 Product Storage Requirement

Battery shall avoid exposure to corrosive matters, and shall be away from fire and heat source.

Suggestion for storage:

a) Long-time Storage (more than 3 months), battery shall be stored under 5~45°C, relative humidity 65%, without corrosive air. Battery module shall be stored under 5~45°C, dry, clean, with good ventilation. Battery shall be charge to 50~55% SOC. And it is suggested to do a chemical active charging and discharging every 3 months. The maximum time interval cannot be longer than 6 months.

Note: If the battery is not long-time stored in the correct way mentioned above, the battery life cycle would be decreased greatly.

8. 【Regular Maintenance】 Check the Battery Voltage through Monitoring. Check whether the system voltage is normal or not. For example: Cell voltage is abnormally high/low.

8.1 SOC Check:

Use Monitoring system to check Battery System SOC status, and check the battery SOC is normal or not.

8.2 Cable Check:

Check all the cables with eyes. Check whether there is breakage, aging, loosing.

8.3 Balance:

Long-time of not fully charged would lead to battery module unbalance. Solution: Do balance maintenance every three months (Charge to 100% SOC). Generally speaking, this process can be achieved automatically through communication between system and outer devices.

8.4 Output Relay Check:

When load is small (low current), control the switch of output relay, to hear the sound from the relay, so that you will know that the relay is working normally.

8.5 History Check:

Analyze history records, check whether there is accident (warning, protection), and analyze on the reasons.

8.6 Maintenance:

For the functions that needs maintenance during restarting, it is suggested to do maintenance every 6 months. need recycle,
Destroyed batteries could have electrolyte leakage or generate combustible gas. If there is fire, please call local Fire Alarm Number. If the destroyed batteriesthe recycling process shall follow the local rules to achieve the recycle of related items.

If there is any further question, please contact us.

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