SIMOPO 5000

Service Manual_V1.0

ZYC ENERGY

ZERO YOUR CARBON

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Contents

1. Introduction

This manual is aimed at helping users to troubleshoot SIMPO 5000 system. Please read it carefully.

Please try to solve the problems by following fault analysis and steps. If there is problem remains, contact our technical support team ASAP.

Note: This manual is subject to technical revisions, please make sure to always use the latest version of this service manual.

1.1. Safety

SIMPO 5000 is a product with high voltage and weight, the power cables and plugs also have high voltage. Any improper handling may cause danger.

All operations should be performed strictly in accordance with the installation manual and must be carried out by professional and qualified personnel.

1.2. General Steps

Please follow the steps for an initial check of the SIMPO 5000 system .

No.	Inspection Items	Steps
1	Inverter Setting Guide	Make sure that the voltage range of battery system satisfies the recommended voltage range of the inverter. Please refer to the 'SIMPO 5000 Inverter Compatibility List', available at: 'https://www.zyc.energy/download'.
2	First Installation	If this is the first installation, please ensure that you are installing according to the 'SIMPO 5000 Quick Start Guide', available at: 'https://www.zyc.energy/download'.
3	External Connections	 1. Please refer to the illustration to check if the wiring is correct. 2. Check whether the cable is loose or damaged. 3. Check for proper connection of multiple modules in parallel. Refer to 'SIMPO 5000 Quick Start Guide', available at: 'http://www.zyc.energy/download'. 4. Ensure that the 'OUT' port of last module is inserted with a terminal resistor.

4	Latest Firmware	Make sure the firmware is updated to the latest version
5	Restart	Please follow the sequence carefully 1. Shut down the inverter. 2. Turn off the DC breaker between battery and inverter (if any). 3. Hold 'ON/OFF' button for 3s on Master battery to shut it down. 4. Make sure the LEDs on all batteries are off, and wait for at least 3 minutes. 5. Turn on the DC breaker between battery and inverter (if any). 6. Press 'ON/OFF' button of Master battery for 1s to power on the system. 7. Active the inverter after the system on. **Note: When multiple batteries are paralleled. Make sure the 'IN' port of current battery connects to the 'OUT' port of next battery.**
6	Checking the Correct Operation	The system runs properly if: - Inverter displays battery SOC correctly - System is charges/discharges normally Note: If you cannot complete the commissioning, then turn off the battery and unplug all wires before you leave the site and make sure all LEDs are off. After that, contact our technical support team.

2. Fault Analysis

When faults occur, please connect your battery system to ZYC Assist or ZYC Assist Pro to check the fault details. Please read 2.1 if there are event codes shown, and read 2.2 if they are not available.

2.1. Event Code

After the battery system is switched on, if any faults exist and there are event codes appears on ZYC Assist or ZYC Assist Pro, please refer to Appendix 1.

2.2. No Event Code

2.2.1. SIMPO Wi-Fi Dongle

No.	Issues Description	Inspection Steps
1	No Wi-Fi Dongle Signal	1) Make sure the Wi-Fi Dongle is connected to '**IN**' port of Master battery. 2) Check with the indicator state ・ Solid OFF: Non-Connection. ・ Solid ON: Local Communication (AP). ・ Flash Slowly: Connecting Internet (STA). ・ Flash Quickly: Data in transit. 3) If the Wi-Fi LED doesn't light up, or it does light up and there is still no signal. Then the Wi-Fi should be replaced.
2	There's a Wi-Fi signal, but it can't be connected/It's connected but can't read any data	Try another battery module.
3	The system is connected to battery Wi-Fi, but the firmware upgrade process was interrupted	Disconnect communication with the inverter and upgrade system firmware separately.
4	Unable to connect to the internet via Wi-Fi	1) Check if local Wi-Fi information has been configured, make sure the name and password are correct. 2) Make sure the Wi-Fi hotspot is 2.4G network only. 3) Make sure the mobile device is disconnected from BMS Wi-Fi.

2.2.2. Battery Issues

No.	Issues Description	Inspection Steps
1	The system cannot be turned on	1) Please make sure the correct way to restart the system, refer to above chapter 1.2 'General Steps – No.5 Restart'. 2) Power up the system. Use multi-meter to check if the voltage between positive and negative of the battery module is greater than 40V. - If the voltage greater than 40V and the restart is in right way, then it is BMS problem. - If the voltage less than 40V, then check the voltage of each module specific steps follow '4.1 Module voltage measurement'. If the voltage is correct, it may be a connection problem between modules. If the module voltage is not correct, then it is module's problem.
2	Battery cannot be charged and discharged	1) Check the voltage of each module. 2) Check for proper communication between modules and inverter. 3) Check the event code.
3	The MCB trips immediately after system being turned on	Disconnect all the cables and restart system again, if MCB still trips immediately, then it is BMS problem.
4	The MCB automatic tripping after a period of operation.	If MCB trips after a period of operation, please check if there are large power loads, then download and report the running logs.
5	Over discharge	Check whether the lowest cell voltage is less than 1.55V. If not, then the voltage can be restored by charging. If the lowest cell voltage is less than 1.55V, then this battery needs to be replaced. Minimum Cell Voltage < 1.55V

2.2.3. Communication Issues

| No.	Issues Description	Inspection Steps
1	Communication problem with inverter	1) Make sure inverter only has communication with master battery. 2) Check whether the communication cable is loose or damaged.
2	Communication problem between batteries	1) Check whether cables between batteries are loose or damaged. 2) Make sure the '**IN**' port of current battery connects to the '**OUT**' port of next battery. 3) Make sure that the '**OUT**' port of last module is inserted with a terminal resistor. 4) Change another communication cable and try to communicate again.

2.3. Firmware Version

Please make sure to always download and use the latest version of firmware.

You can update the firmware version of battery system by ZYC Assist and ZYC Assist Pro.

3. ZYC Tools and Methods
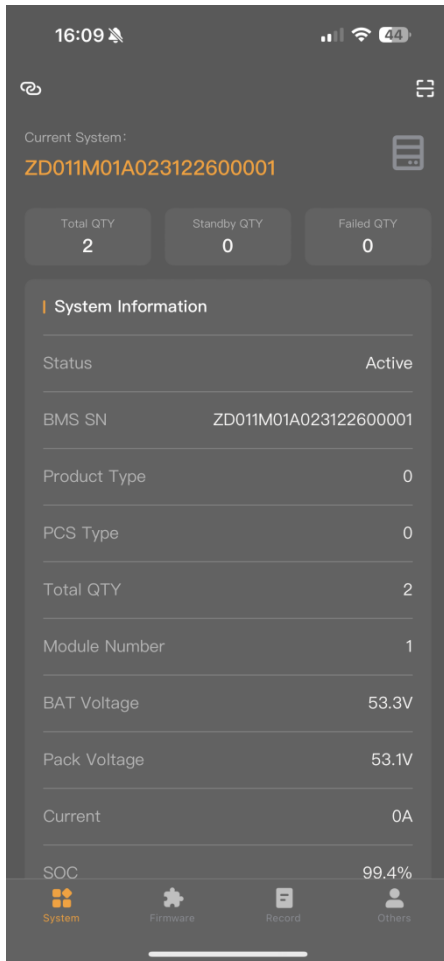
3.1. ZYC Portal
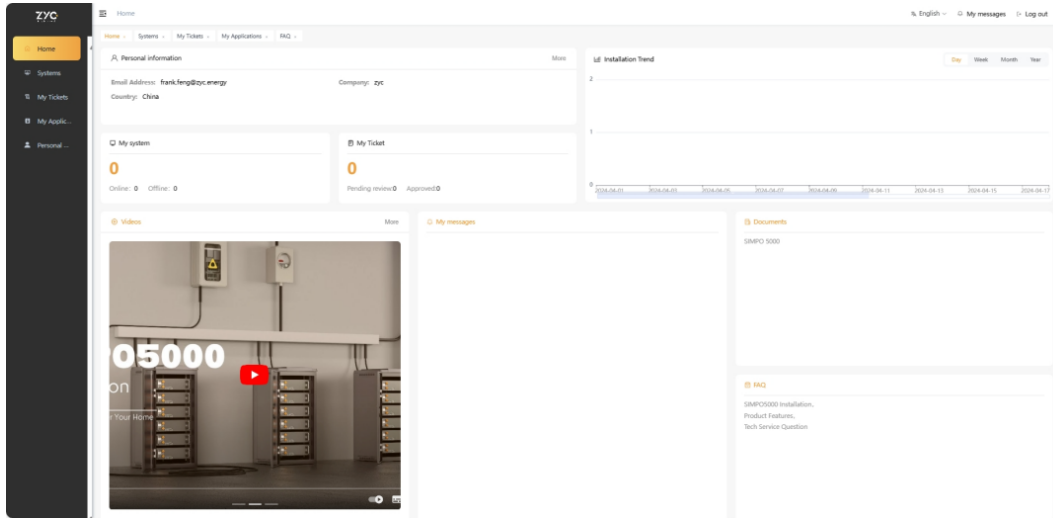
With ZYC Portal, you can:

- Manage your battery system

- Customize your own portal.

- Perform remote monitoring of the ZYC ESS in real-time.

- Get ZYC products manuals and videos.

- Submit tickets to report faulty system.

- Getting helps quickly to manage your account and battery system.

Note: The 'User Manual of ZYC Portal' is available at: https://www.zyc.energy/download.

3.2. ZYC Assist

ZYC Assist is a mobile device APP, with ZYC Assist you can:

● Read the battery information.

● Update firmware.

● Query and export system operation logs and fault details.

● Upload operation logs and fault details to ZYC Portal to ask for technical support.

● Configure local Wi-Fi hotspot to connect the battery system to the Internet.

ZYC Assist is constantly being improved and updated. Make sure you are using the latest APP version.

You can download the latest version of ZYC Assist on Google Play or APP Store.

For the service analysis, please download the data / logs, and then upload in the records.

Note: The 'User Manual of ZYC Assist' is available at: https://www.zyc.energy/download.

3.3. ZYC Assist Pro

ZYC Assist Pro is a PC tool, with ZYC Assist Pro you can:

● Read the battery information.

● Update firmware.

● Query and download system operation logs and fault details.

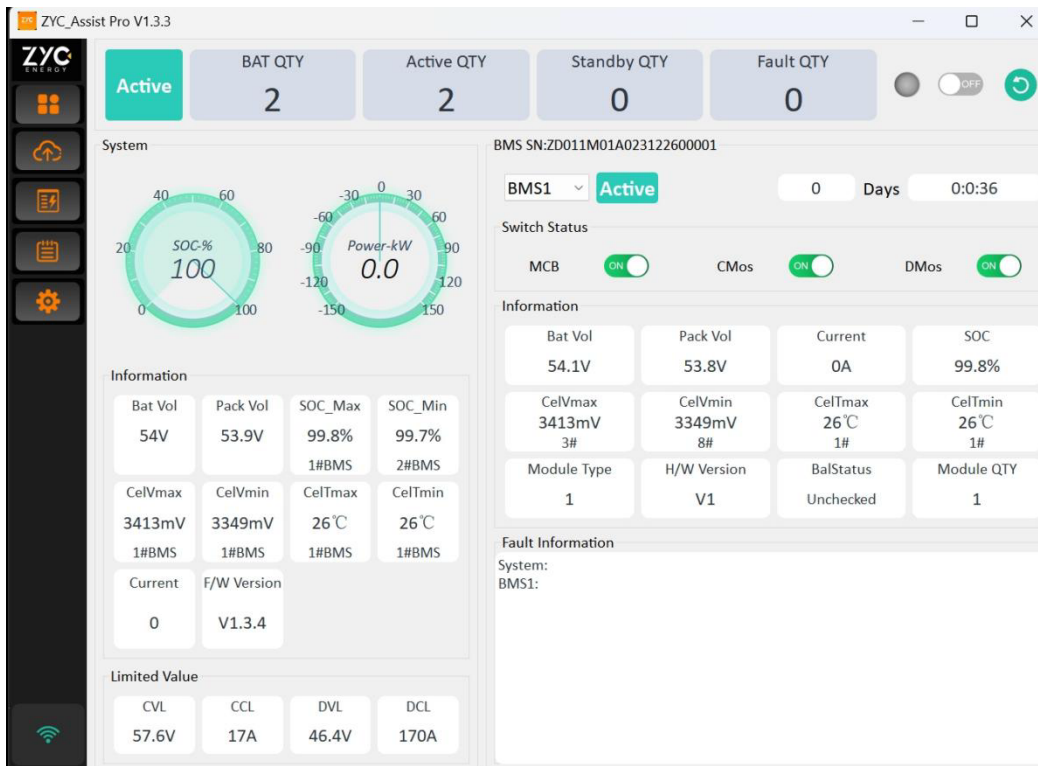● Configure local Wi-Fi hotspot to connect the battery system to the Internet.

ZYC Assist Pro is constantly being improved and updated. Make sure you are using the latest version.

You can download the latest version of ZYC Assist Pro on 'https://zyc.energy/assisttool'.

For the service analysis, please download and provide the data / logs as described in the user manual.

Note: You need a computer with Windows system that can be connected to the battery Wi-Fi.

Note: The 'ZYC Assist Pro Manual' is available at: https://www.zyc.energy/download.

4. Replacement and Measurement Guidance

4.1. Module Voltage Measurement

Attention: SIMPO 5000 is a high voltage product, incorrect operation may lead to injury or death of the operator or third parties. Please take the voltage measurements by qualified personnel and wear insulated gloves.

Please follow the figures and steps below for voltage measurements:

Figure 4.2

Figure 4.1

Figure 4.3

Step 1: As figure 4.1 shown, adjust the multi-meter to the DC voltage position, and then use the positive and negative probe for zero calibration.

Step 2: Power on the SIMPO 5000 to be tested individually.

Step 3: According to figure 4.3. Use the multi-meter to measure the voltage across the positive and negative terminals of the plug connector.

Step 4: If the voltage of this battery module is less than 45V, then there is an over-discharge, and the module needs to be replaced.

4.2. Module Replacement

1) When the new battery is added, you can use the battery system with the remaining stacks and a correspondingly reduced capacity.

2) SIMPO 5000 has no SOC balancing issues and new module can be added with any SOC at any time.

3) In standby mode, if the voltage difference is greater than or equal to 1.5V, the high voltage module

will charge the low voltage module through DC-DC to achieve voltage equalization.

4.3. Charging Instruction after Over-Discharge

When the SOC of battery module is equal to **0%** and the voltage is less than **40V**, it means that an over discharge has occurred. Please follow below methods to charge the battery for protection.

1) If the inverter is working, please charging the battery with the inverter directly.

2) If there is a battery module with a higher voltage, the two modules can be connected in parallel. Then the module with a higher voltage will automatically charge the module with a lower voltage, the battery modules can be automatically balanced.

3) If cannot charge the battery via inverter, please charge with a **48V** adjustable constant current charger for 30 minutes, and the parameter of charger is setting as **54V and less than 10A**.

Note: When the battery module with a prolonged period of not charging, resulting in automatic battery shutdown, please charge the battery within **10 Days** to restore the SOC to a healthy state.

5. Claim and Contact

Please ensure that the above instructions have been completed by qualified personnel and confirm that there is an irreparable part failure that needs to be resolved by replacement.

The contact information for the service team is as follows:

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Appendix 1 Event Code

Event Code	Description	Operation
EC01	Over Voltage	
EC02	Under Voltage	
EC03	Over Voltage (Cells)	
EC04	Under Voltage (Cells)	1. If no other faults occur, please ignore the event.
EC05	Charging Temperature High (Cells)	2. If other faults occur at the same time, please refer to other troubleshooting solutions to solve the problem.
EC06	Charging Temperature Low (Cells)	
EC07	Discharging Temperature High (Cells)	
EC08	Discharging Temperature Low (Cells)	
EC09	Over Current (Charging)	1. Restart the system and charge normally, observe whether the fault will occur again.
EC10	Over Current (Discharging)	2. If the fault occurs again, use the current clamp to measure the actual current and compare it with the current value read by ZYC Assist Pro, if the deviation is too large, then the current sensor is identified as faulty. 3. Read the fault records and logs, and upload them to 'My Tickets' on ZYC Portal to apply for BMS replacement.

Event Code	Description	Operation
EC11	Severe Imbalance (Cells)	1. Use ZYC Assist Pro to read the voltage of cells, and observe which cell's voltage is abnormal. 2. If there is any cell voltage lower than 1.5V, replace the module. 3. If there is no situation as point 2, then restart the battery and perform a full charge to allow the battery to be balanced. 4. Provide a screenshot of ZYC Assist Pro of the cells' voltage data, and fault records. Then upload it to 'My Tickets' on ZYC Portal to request a replacement of battery module.
EC12	Mosfet Over-Temperature	1. If no other faults occur, please ignore the event. 2. If other faults occur at the same time, please refer to other troubleshooting solutions to solve the problem.
EC14	Ambient Over-Temperature	1. Confirm whether the ambient temperature is higher than 55℃, if it is higher than 55℃, the system will recover automatically when the temperature drops. 2. If it is much lower than 55℃, try to reboot the system and observe whether it can work normally. If the fault still exists after restarting, use the ZYC Assist Pro to read the fault records and logs. Then upload them to 'My Tickets' on ZYC Portal to seek a solution from the manufacturer.
EC17	Voltage Sensor Failure	1. Restart the system and observe whether it can work normally. 2. If not, use the voltage of a single cell to confirm whether there is a case of abnormal voltage in more than one cell. 3. If the above situation exists, provide a screenshot of ZYC Assist Pro of the cells' voltage data, and fault records. Then upload it to 'My Tickets' on ZYC Portal to request a replacement of battery module.

Event Code	Description	Operation
EC18	Temperature Sensor Failure	1. Restart the system and observe whether it can restore normal. 2. If not, use the temperature of a single cell to confirm whether more than half cells have abnormal temperatures. 3. If the above situation exists, provide a screenshot of ZYC Assist Pro of the cells' temperature data, and fault records. Then upload it to 'My Tickets' on ZYC Portal to request a replacement of battery module.
EC19	BIC Communication Fault	Please provide a screenshot of ZYC Assist Pro of the cells' voltage data, and fault records. Then upload it to My Tickets by ZYC Portal to request a replacement of battery module.
EC20	Total Voltage Sensor Failure	1. Confirm that there are no other faults, such as BIC communication faults. If so, please refer to that fault processing first. 2. If there are no other faults at the same time, try to restart the system and observe whether it can be restored. 3. If not, please upload the fault records and operation logs to 'My Tickets' on ZYC Portal to request a replacement of BMS.
EC21	Current Sensor Failure	1. Restart the system, observe for a few minutes, if there is no such fault, start charging and discharging. 2. If the fault is still not detected, observe the system for a few more days. 3. If it occurs irregularly, please upload the fault records and operation logs to 'My Tickets' on ZYC Portal to ask for technical support. 4. If the fault is still reported after step 1. Please upload the fault records and operation logs to 'My Tickets' on ZYC Portal to ask for the replacement of BMS.

Event Code	Description	Operation
EC22	Discharging Mosfet Failure	Please provide a screenshot of ZYC Assist Pro of the fault records and operating logs. Then upload it to 'My Tickets' on ZYC Portal to request a replacement of BMS.
EC23	Charging Mosfet Failure	
EC24	Pre-Charged Circuit Failure	1. Firstly, disconnect the main circuit connected to the inverter. 2. Restart the system, if it can't be recovered then replace the BMS.
EC28	Air Switch Open	If there is no other fault message, it is considered that the air switch is faulty, please try to restart the system to confirm whether the air switch can be closed normally. If there are other fault messages at the same time, then refer to other troubleshooting methods.
EC35	Short Circuit/Reverse Connection Warning	Scenario 1: The fault is reported shortly after power on the system: 1. Please check whether the wiring is reversed. 2. Try to disconnect the power cable between batteries and then restart the system to see if the fault still exists. 3. If the fault does not exist, it means there is a short circuit in the power cables. 4. If the fault still exists, it means that there is a short circuit inside the BMS and the BMS needs to be replaced; Scenario 2: This fault occurs during the system operation: 1. Please check whether there is an inductive load starting during system working. 2. If not, restart the battery; if the failure still exists, please replace the BMS. 3. If this fault occurs irregularly, please provide fault records, and operation logs, and submit them on 'My Tickets' on ZYC Portal to the manufacturer for technical support.

Event Code	Description	Operation
EC36	Loading Parameters Error	1. Please upgrade the firmware to the latest version. 2. After successful upgrade, reboot the system and check if the fault disappears. 3. If the fault still exists, please provide a screenshot of ZYC Assist Pro of the module serial number and fault records. Then upload it to 'My Tickets' on ZYC Portal to request technical support.
EC37	Abnormal Module Type	Please provide a screenshot of ZYC Assist Pro of the module serial number and fault records. Then upload it to 'My Tickets' on ZYC Portal to request technical support.
EC39	Internal CAN Communication Fault	1. Inspect the communication cable between modules. 2. When this fault occurs, whether there is a module has been automatically shut down. 3. If there is a situation as step 2, please reboot the system. If it still exists, try again after excluding the module that has shut down automatically.
EC40	SOH Low/Cell Failure	1. Verify that there are no other faults, such as failure of the cell voltage sensor. 2. If above fault exists, please refer to that troubleshooting. 3. If there is no other fault, please record the battery cells voltage and confirm whether the voltage of certain cell is lower than 1.55 V. If there is, please replace the corresponding battery module.
EC41	Functional Safety Alarm	1. Restart the system and monitor the working status. 2. Normal work, logs are needed to be uploaded to 'My Tickets' on ZYC portal to get analyzed. 3. If the system cannot work normally, it means that there are faults, and BMS needs to be replaced.

Event Code	Description	Operation
EC45	Node ID Allocation Failure	1. Make sure that the OUT port of last module is plugged with Terminal Resistor. 2. Make sure that the communication cable between modules is properly connected. The OUT port from previous battery is connected to the IN port of the next battery. 3. Confirm that power up the system from master module. 4. If the above three steps are correct, please replace the communication cable between modules. 5. If the fault still exists after replacing the communication cable, confirm from which module the system cannot be switched on, then remove it and reboot again. 6. If the fault still exists at the same location, it means that the fault occurs in the last tower started. 7. Test the removed module individually (remember the OUT port must be inserted into the terminal resistor), if there is no problem, then incorporate the module into the system for testing; if there is still a problem after incorporation, then request to replace the module.
EC46	Storage Failure	Try to read the logs, if it is not readable, then the SD card is faulty and the BMS needs to be replaced.
EC48	Air Switch Cannot be Switched Off	1. Check what is the fault that causes the tripping of air switch. Then deal with it according to the corresponding troubleshooting. 2. Pull down the air switch manually, if no air switch disconnect fault appears on ZYC Assist Pro, then the air switch is faulty and the BMS needs to be replaced.