

# IS005 Battery Energy Storage System

## Setup and Usage Guide

Version 0.1



## **Catalog**

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## 1. Introduction Battery Energy Storage System (IS005)

IS005 is a Battery Energy Storage System suitable for small and medium-sized industrial or commercial businesses. It supports higher voltage by series by connecting 4 to 15 batteries in series as a module. And parallel the modules up to higher energy battery storage system.

It included levels of the management system to monitor and collect voltage, current, and temperature of each cell and module in real time.

Equipment includes:

- Server rack batteries modules HVB50156
- High voltage control box (HVCB-03-200) and BAU

And accessories

- Positive and Negative color coded power cables
- Inter-battery communication cables

To achieve remote battery health monitoring and diagnostic check, it is recommended to connect to a router for internet access.

Here are the introductions of every part:

### 1.1 Server Rack Battery module (HVB50156):

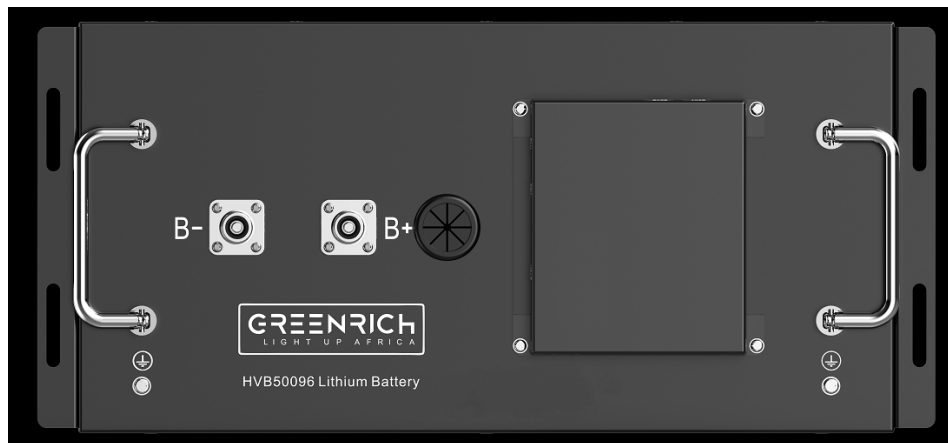


Fig1. HVB50156 images

The Server rack battery HVB50156, rated voltage 51.2V, rated capacity 156.4Ah. Basic parameters are shown in Table 1.

Battery Pack

Item	Parameters
Cell Type	LiFePO4
Nominal Voltage	51.2V
Nominal Capacity	156400mAh/8007Wh
Working Voltage Range	46.4V~56.8V
Working Temperature	Charging: 0~55℃
	Discharging: -20~60℃
Temperature Sensor Type	B Value 3435 (10K@25℃), 4ways
Dimension	438mm*536mm*221mm
Weight	About 50kg
Communication Type	CAN bus

Table1. Parameters of HVB

Table 2. Description of the battery module panel functions:

No.	Item	Description
1	Cable Outlet	Voltage and Temperature sensors collecting cable outlet
2	Positive terminal	Positive battery connection
3	Negative terminal	Negative battery connection
4	Ground	Ground cable connection
5	CAN-2	Communication port of the BSU
6	CAN-1	Communication port of the BSU



Fig2. Server rack battery HVB50156 images

## 1.2 High voltage control box (HVCB):

High voltage control box is the terminal of voltage and data collects from a series of Battery modules.

The system parallels battery units that work with HVCB-03-200 and BAU.

### a) HVCB-03-200 with BAU

It is for systems with a structure of more than one series of battery units to achieve higher energy storage. Each series of the batteries is connected to its HVCB-03-200, and then connects and communicates with BAU as a whole communication unit.

HVCB-03-200 equipped with control devices, fuses and relays. It has the functions of fault alarm, fault protection and safety protection lamp to ensure the safety of the battery. At the same time, it has the function of emergency stop and step by step disconnect the system during maintenance. The technical parameters are shown in Table 3.

BAU is the central information hub of the battery control system, it obtains information from all HVCB-03-200 including voltage, current, temperature, insulation impedance, SOC, relay status and fault status information through the internal CAN bus. BAU has option to communicate with EMS (energy management system) and PCS through Ethernet, to deploy request based on EMS control strategy, and realize energy scheduling, system thermal management and fault handling.

The HVCB-03-200 needs to bundle BAU or there will be no function and the device will not even start up.

Here are the parameters of HVCB-03-200 and BAU:

HVCB-03-200	
Operating voltage range	150V~900Vdc
Rated Current	100A(125A at max)
Operating temperature range	-40°C~85°C
Communication port	2 ways of CAN@ 3 ways RJ45 physical interface

Analog Signal port	5 ways of dry contact@ 2ways in 3 ways out
Temperature Detection	2ways @NTC10Q B3950
Dimension	478mm*434mm*133mm (W*L*H)
Weight	20.5kg
Installation mode	Screw fixation
Protection	Short protection
	Over current protection
	Over Voltage protection
	Under Voltage Protection
	Temperature Protection
	Breaker Monitor
	Remote Control

Table5. Parameters of HVCB-03-200

Table6. Parameters of BAU

BAU	
Operating voltage	24Vdc
Operating temperature	-30°C~75°C
Working humidity	5%~95%
485 Communication	5 ways @ Modbus
Ethernet Communication	3 ways @ TCP/IP
CAN Communication	2 ways @ CAN 2.0B
Dry Contact	9 ways @ 5ways output, 4 ways input
Temperature Detection Range	-40°C~120°C
Temperature detection accuracy	≤±1°C
Operating Power Consumption	<3.8W
Sleep Power Consumption	<0.03mW
SD Card Storage	64G TF Card
PCS Communication	485 or CAN
EMS Communication	TCP/IP
Dimension	348mm*150mm*48mm (W*L*H)

The image of the HVCB-03-200 is as follows:

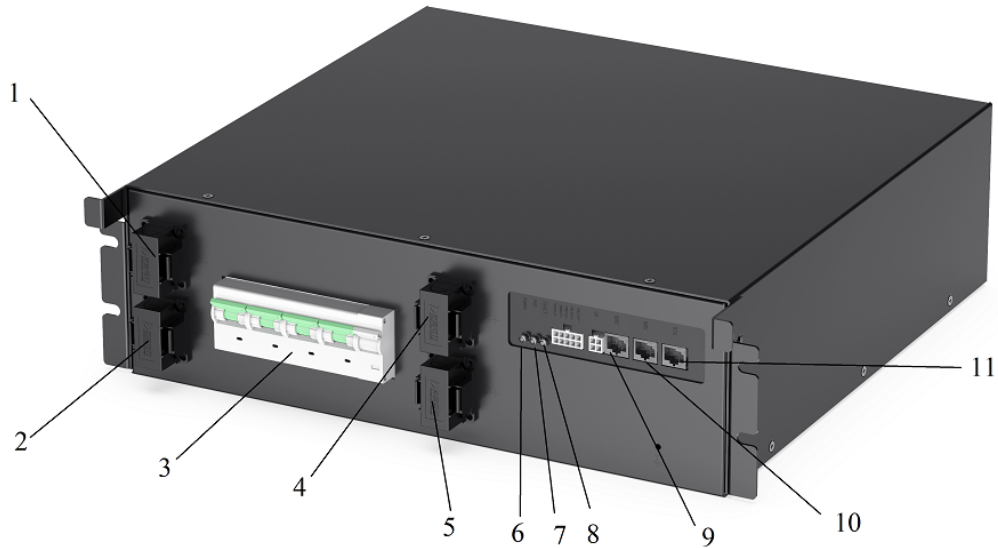


Fig 5. HVCB-03-200 images

1. Battery system negative input B-;
2. Battery system negative output P-;
3. Circuit breaker;
4. Battery system positive input B+;
5. Battery system positive output P+;
6. Battery system energy input indicator;
7. Battery system running indicator;
8. Battery system fault indicator light;
9. BMU, Cluster Parallel or communicate with BAU;
10. BMU, Cluster Parallel or communicate with BAU;
11. BSU, Communicate with Slave Unit.

The electrical drawing of HVCB-03-200 is as follows:

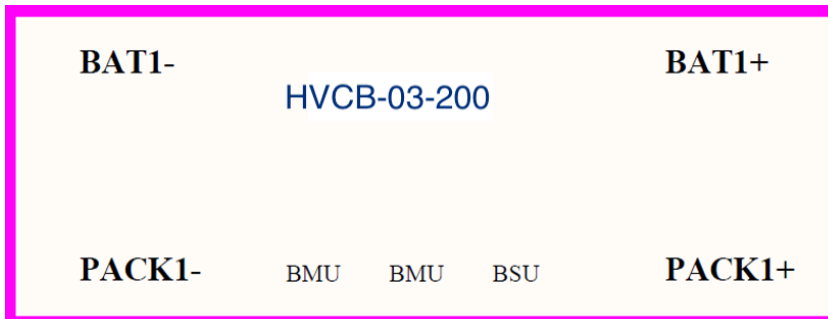


Fig 6. HVCB-03-200 images-Electrical drawing



Fig 7. BAU images

1. TOBAT Communication Port;
2. Communication Port;
3. DEBUG Communication Port;
4. PCS Communication Port;
5. Power indicator light;
6. Run indicator light;
7. Fault indicator light;
8. Dry Contact Port;
9. ON/OFF Power;

The electrical drawing of BAU is as follows:



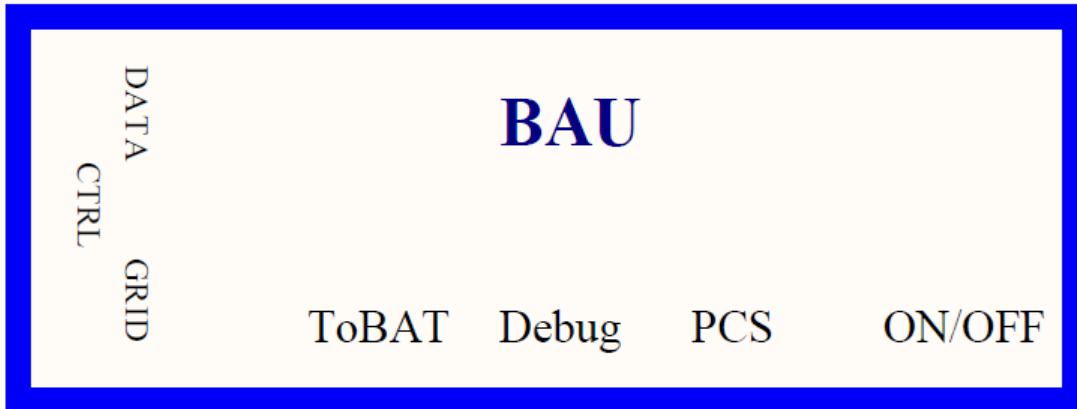
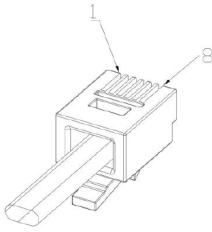


Fig 8. BAU images-Electrical drawing

As BAU need to communicate with the PCS, so here are the order definition of PCS port:

Table7. Definition of PCS Port

Item	PIN	Cable color	Net definition	Remarks
RJ45 Type B connection 	1	Orange & White	A1	485 Communication
	2	Orange	B1	
	3	Green & White	/	
	4	Blue	CAN_H	CAN Communication
	5	Blue & White	CAN_L	
	6	Green	/	
	7	Brown & White	/	
	8	Brown	/	

### 1.3 BR3000 – Remote energy management system

The EMS is energy management on top of battery modules and/or PCS (Power control system). It used to remotely collect information of the all batteries and PCS, configure and deploy energy management strategy and logic.

Basically, we can get all the cell voltage, temperature, current and fault status information from the EMS as well as PCS. Connect the EMS to the internet, we can get all the information remotely.

We offered BR3000 EMS and Router, specifications as shown in the attachment. Please contact us if you want to use your own brand.



## 2. Hardware Wiring and Configuration

### 2.1 Hardware Wiring and configuration for HVCB-03-200 and BAU

Each HVCB-03-200 connected to one series of HVB50156 batteries. Batteries are connected in series to achieve the expected voltage.

And connect all HVCB-03-200 in parallel to obtain the accumulated capacity.

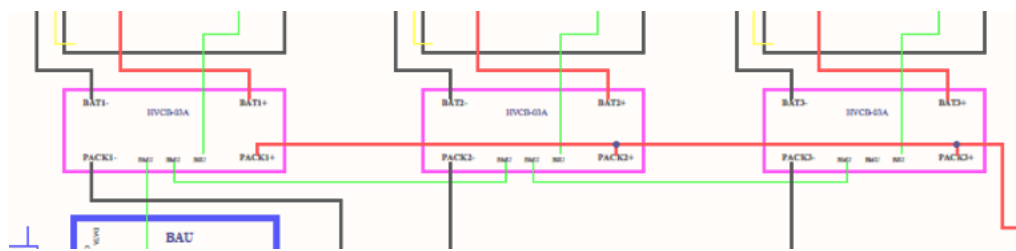


Fig16. All HVCB-03-200 in parallel

### How to connect Cables to the Battery Terminal

1. Identify the positive B+ and negative B- terminals on your battery using the Power cable (color in orange). Terminals are labeled.
2. Verify you have all hardware to attach the cable properly. Check to ensure the bolt insert for the terminal fully seats and can be tightened to the proper torque.
3. Connect the cables to your battery terminals by removing the terminal bolts, inserting them through the eyelet of the proper cable, and reseating the bolt into the terminal block to the correct torque.
4. DO NOT finger-tighten the terminal bolts. They require a specific torque (60 in-lb/7nm) to ensure they do not loosen during operation. Failure to properly tighten the terminal bolts can result in serious damage and will void your warranty.

### Power cable connection

1. Connect the positive terminal B+ to the negative terminal B- of the next battery, one after the other within the same series of battery.
2. Within the series of battery, connect one end of battery B+ terminal to HVCB B+ terminal. And connect the other end of the battery B- terminal to HVCB B- terminal.

3. Connect in parallel the PACK+ and PACK- of all HVCB-03-200 and to the PCS

### **Data (communication) cable connection**

1. Connect HVCB BSU port to the CAN port of the first series connected battery.
2. Follow the connection sequence of power cable. Connect CAN port of battery to CAN port of next battery within the series. the last blank CAN port in the series should insert a CAN plug to match communications.

All battery information will be uploaded to HVCB through the BSU communication port.

3. Connect BMU to BMU port in series between HVCB-03-200

All information will be collected to BAU.

4. Connect BMU of one end of HVBC-03A to BAU “To BAT” port.
5. Connect the CTRL port to router to access the internet to achieve remote data management.

Application program is needed to install to configure the HVCB internet access.

### **Grounding**

Connect the grounding screw with ground cables provided and then connect to the grounding conductor.

Warning – DO NOT ground rack/cabinet or door to negative or positive terminal in the battery.

The electrical drawing of HVCB-03-200 system are shown as below example:

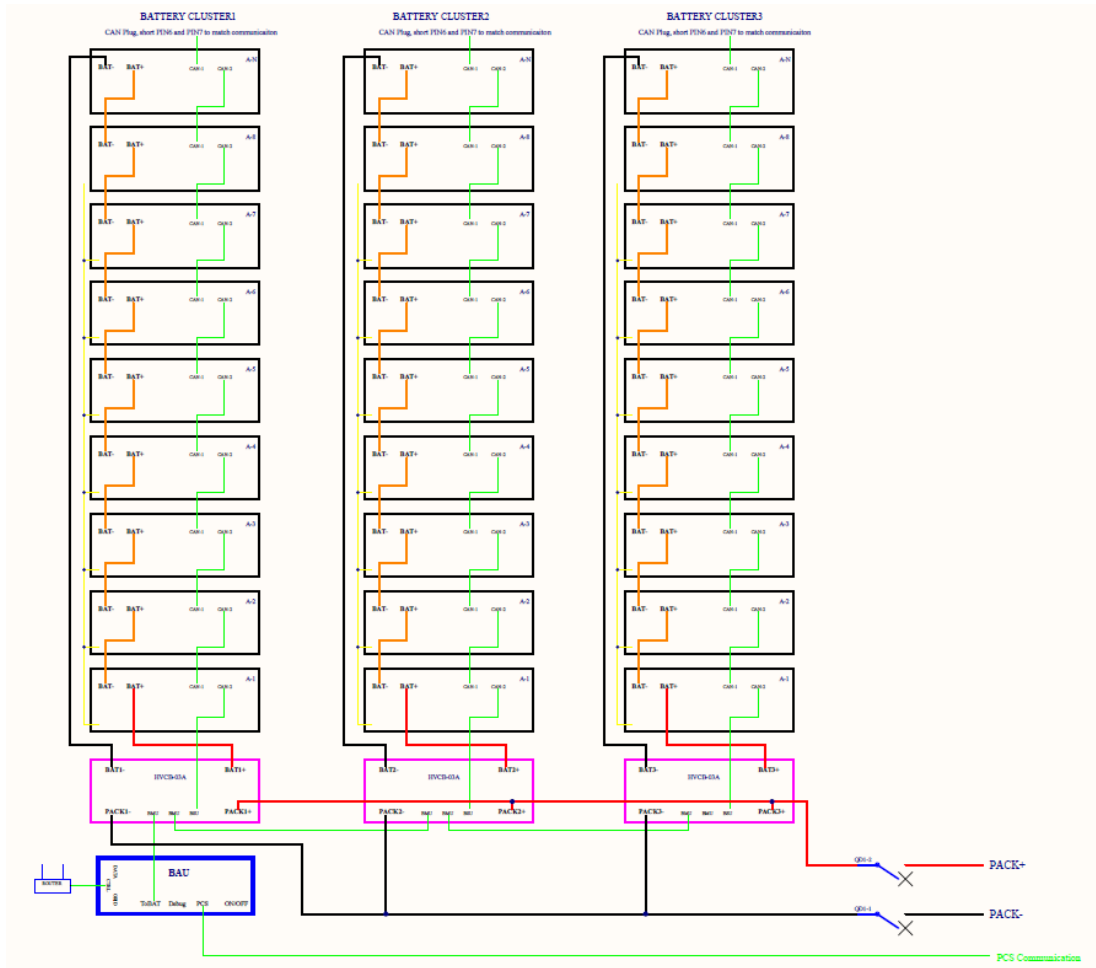


Fig17. Three Cluster Battery Module Connection Example

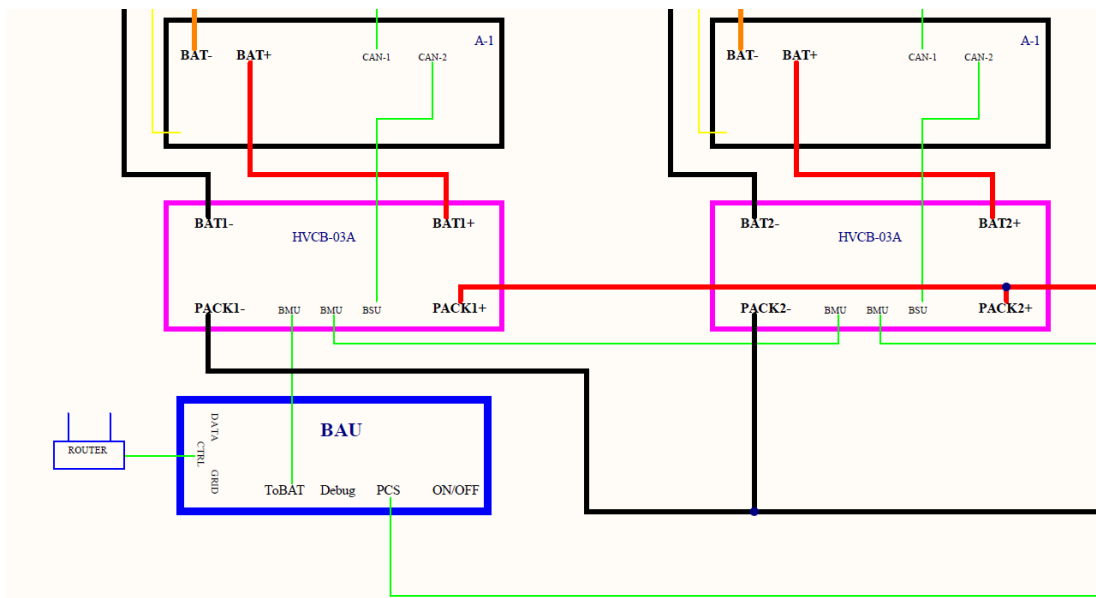


Fig18. Electrical drawing of HVCB-03-200 system

After all the cable connected well, start the system (start the breaker and then press the ON/OFF button on the BAU) and operate as below:

### 1) Network settings on PC(Automatically)

HVCB-03-200 and PC automatically get the IP address from the router (DHCP). Windows default network settings shown as below.

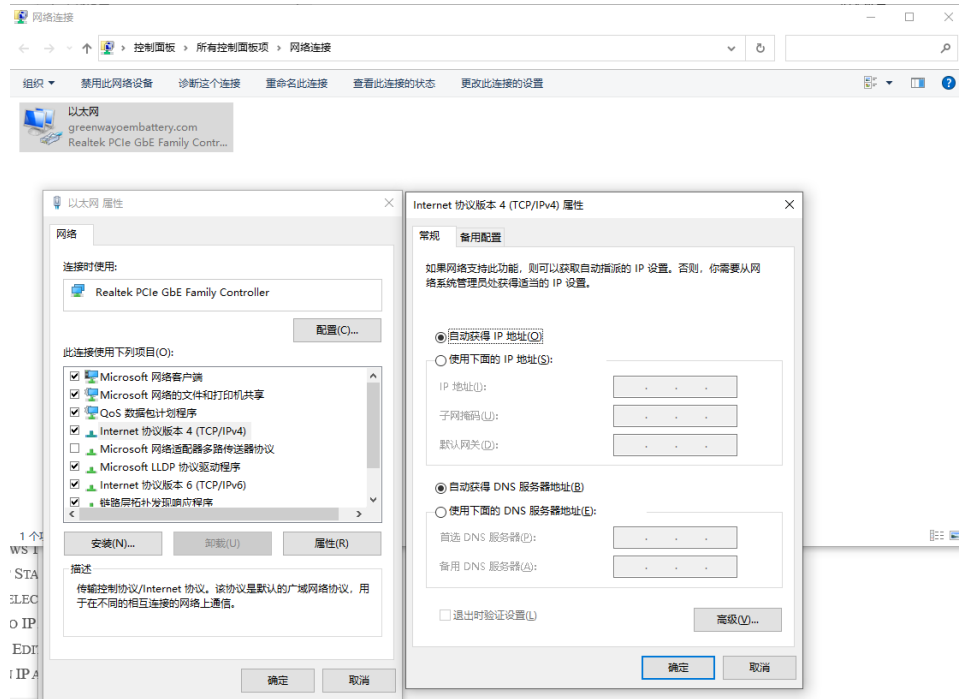


Fig19. Network Setting: automatically get IP address

### 2) Application HV\_System configures on Windows OS

Note: Application is supported on Windows OS only

a. Start HV\_System application in PC

Open the folder and double click this icon: HV\_System.exe to start the Application program.

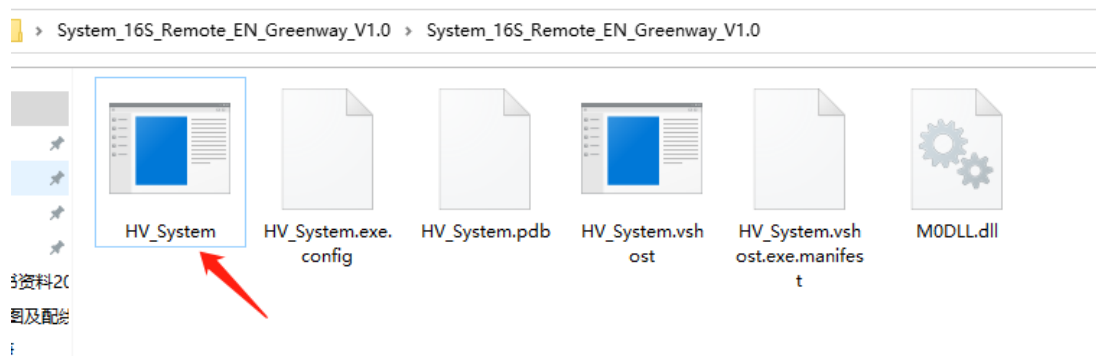


Fig20. Open HV\_Master application

b. Login to Admin mode

In “Key Info” tab -> “Admin Mode” box, enter “jsyh5678” in “Admin password” and then click “Login”

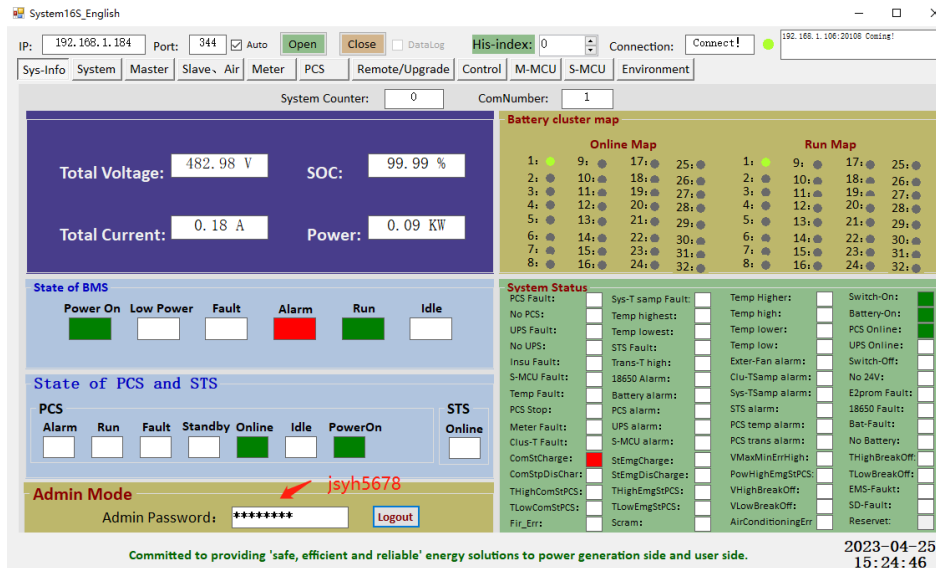


Fig21. Admin Password: jsyh5678

c. Detect local and setting

i) Go to “Upgrade/Remote” tab;

ii) Click “Search”, output Message will show the detected IP address of PC, and then click “LAN”, and then click “Connect”, the “Com\_State” light will turn green after the battery system get connect with the application program;

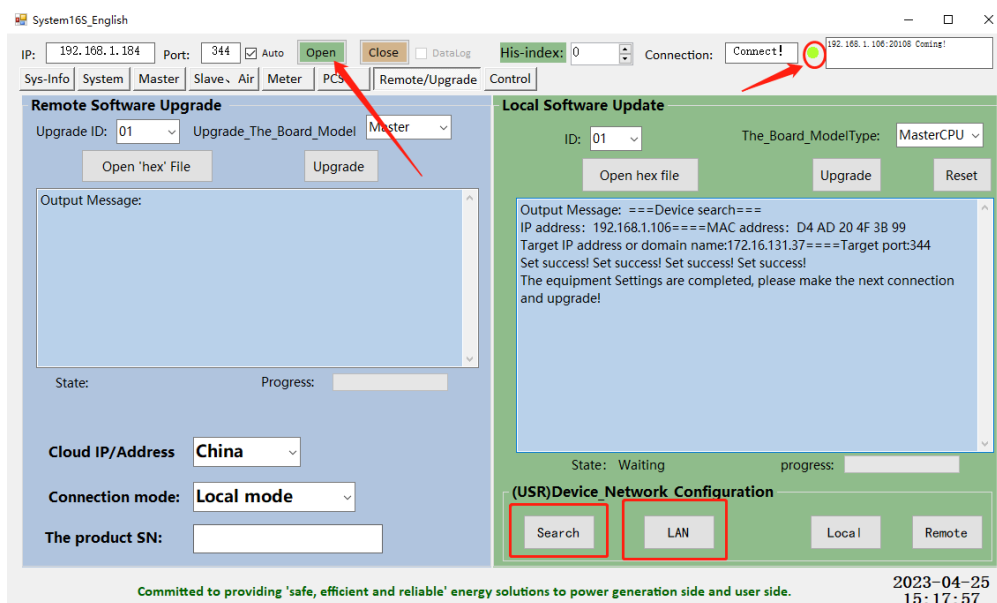


Fig22. Search-LAN-Open, the connection light will turn green if connected

iii) Go to “Environment” tab Setting PCS parameter to match different brand of PCS, shown in Fig. Here are the settings of different brand of PCS:

PCS Brand	PCS type	PCS Factor	Comm -Type	Baudrate -485	Baudrate -CAN	PCS Comm Cycle	PCS addr	STS adr
Sinexcel 100kw	0	2	1CAN	19200	250	1	1	0
Goodwe	0	6	1CAN	9600	250	1	1	0
Sinexcel	0	7	1CAN	9600	250	1	1	0
Deye/PYLON	0	9	1CAN	19200	500	1	1	0
ATESS	0	10	1CAN	19200	250	1	1	0
MEGAREVO	0	11	1CAN	9600	500	1	1	0

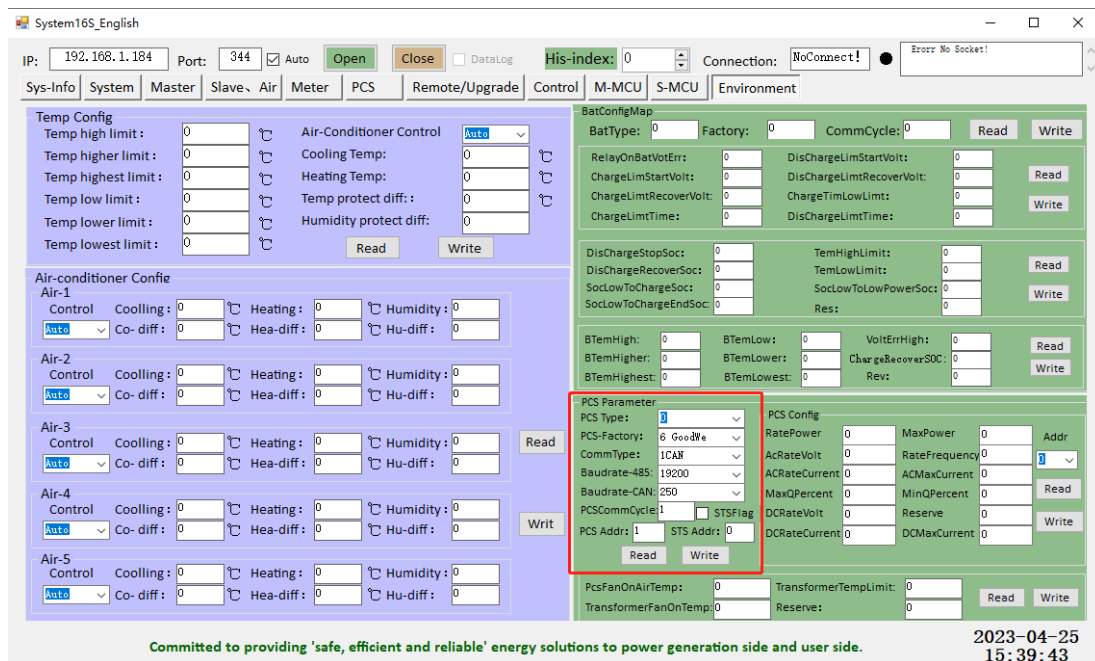


Fig23. PCS Parameter Settings

d. Number of high voltage control box setting

Setting the number of high voltage control box in “PCS” tab -> “Master Map” box, for example, choose “0” if there is only one HVCB-03-200, choose “1” if there are two HVCB-03-200, and so on, in total, we can set 32 HVCB-03 boxes in the system.



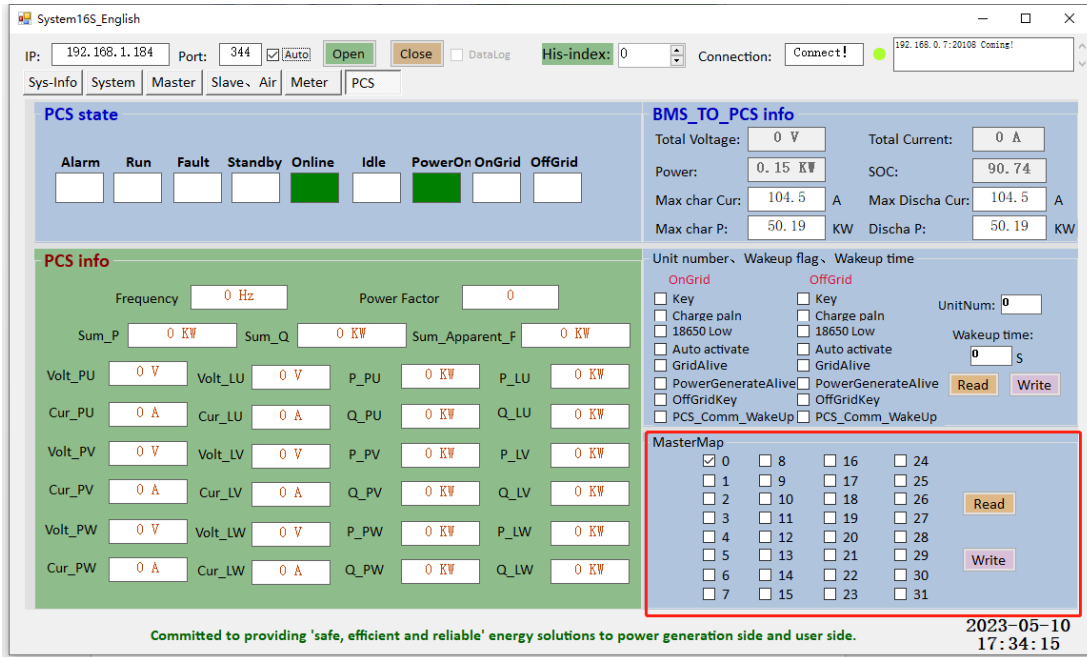


Fig24. Number of HVCB-03-200 box setting

e) Trail Run:

After all the parameters are set, start the PCS to Trail run and see if there are any alarm.

If there is an alarm, please check the connections and setting, if there are still problems, please feel free to contact us.

And record the SN number of the BAU as below

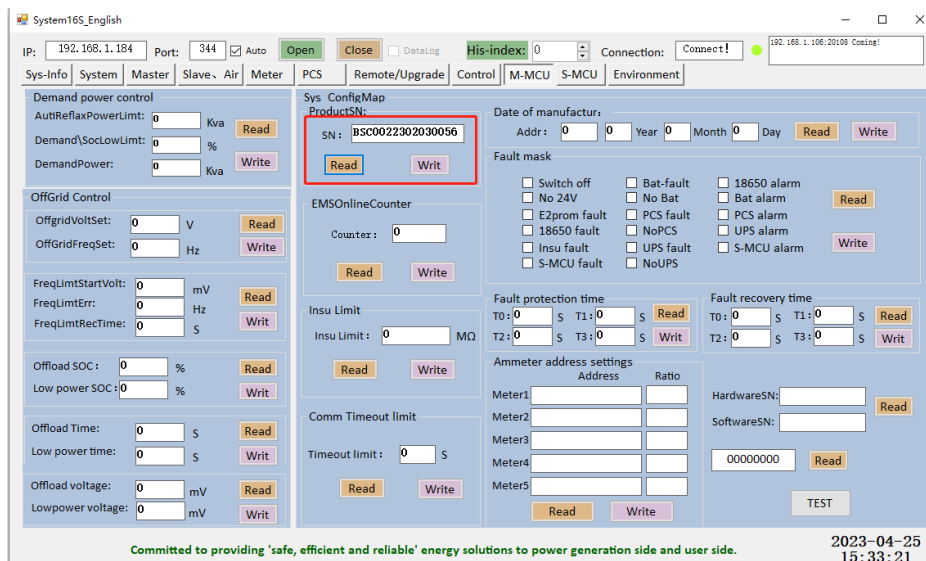


Fig25. PCS Parameter Settings

f) go to remote mode:

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After the PCS run well, go to “Upgrade/Remote” tab, click “Search” and “Remote”, then the battery system can be monitored remotely online.

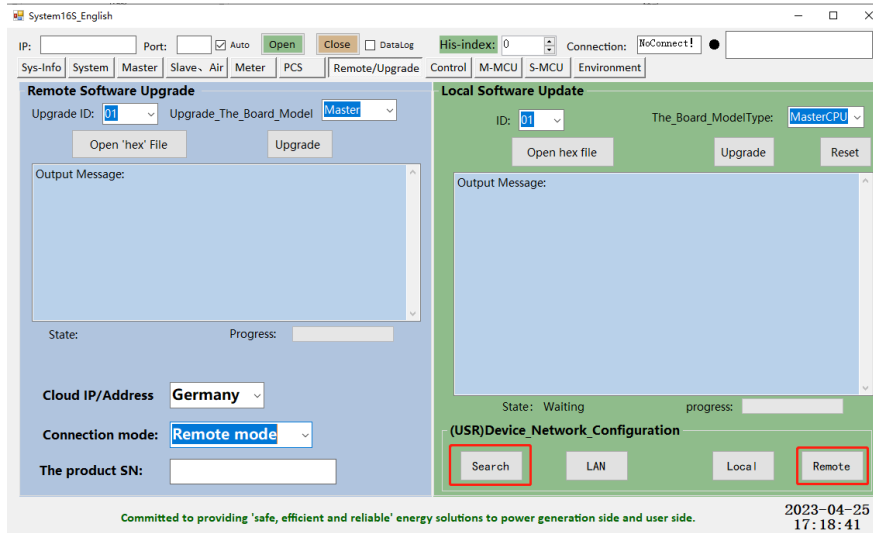


Fig26. Search-Remote

### 3. APP download and application

#### 3.1 App download and register



Fig27. Batterich App download

Use the QR code to download app and register with your own e-mail

## Batterich Battery

Login Register

Please enter the email

Please enter password

→

Fig28. Register with E-mail account

### 3.2 App application

- a) **Bind your own device, there are three ways to bind, as below**

Bonded device

Bind the device >

Bind device S/N >

WIFI module setting >

Fig29. Bind your device

- b) **After the device is bonded, the information of the whole system can be checked on your mobile phone.**

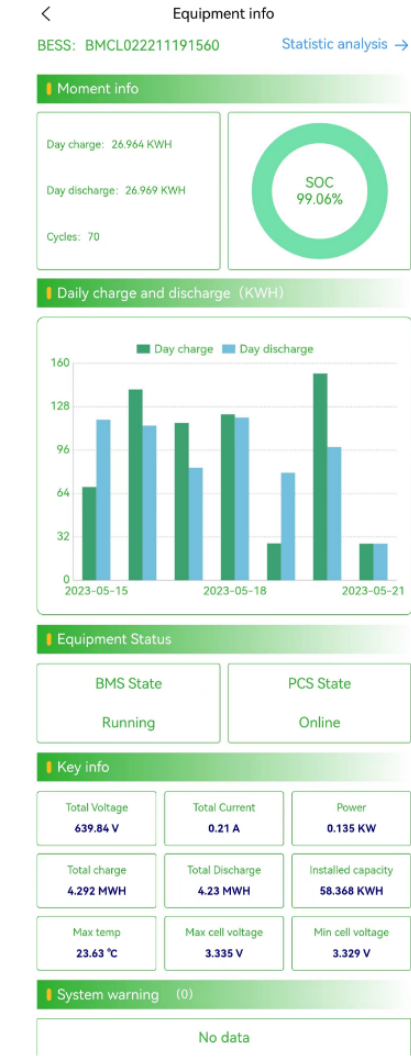


Fig30. Information Interface