Product Specification Document

SPECIFICATION

Product Name: Energy Storage High-Voltage Box

Product model: HV-BC250

product code：

Version: VER1.0

fabrication：

examine and verify：

ratify：

Revise Resume Form

Revision Date	Edition	Description of the revision content	Revision Author	Confirm Approval
2025-12.26	VER1.0	Editio princeps	Chen Zhiwen	

Catalogue

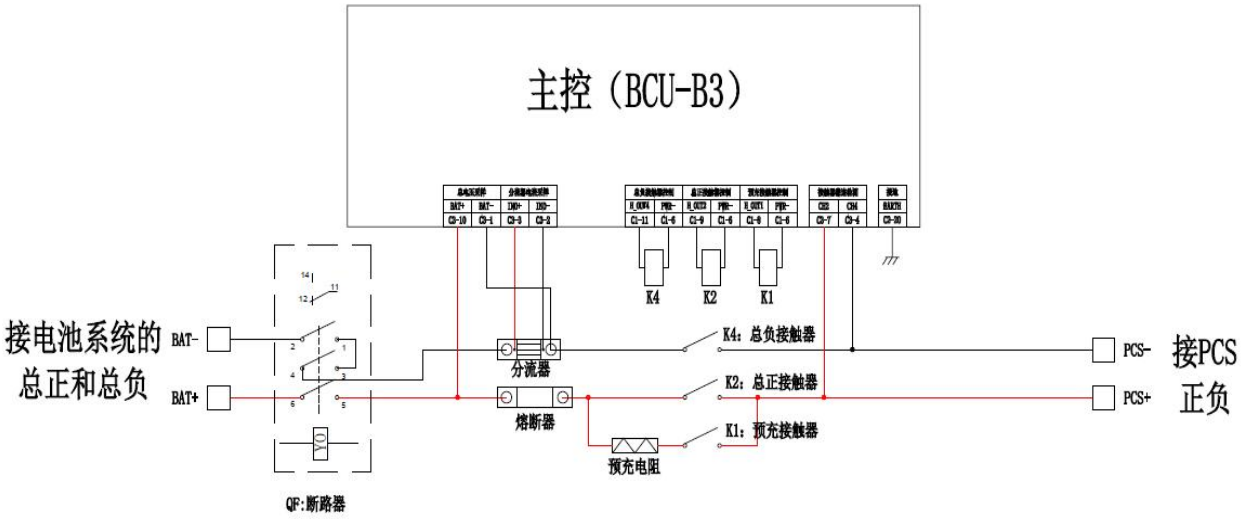
1. Product Overview

The HV-BC250 is a high-voltage power circuit management unit independently developed by our company, serving as an intermediate component between the battery cluster and the Power Conversion System (PCS). This high-voltage control box enables voltage and current acquisition from the battery cluster, along with contactor control and protection functions for its circuits. It integrates essential components such as circuit breakers, contactors, fuses, pre-charging control circuits, current sensors, the Battery Cluster Control Unit (BCU), and switching power supplies. During its design, the box comprehensively considers the electrical characteristics, thermal management, safety features, and operational maintainability of all components, featuring a rational spatial layout, compact structure, flexible configuration, and reliable performance. The built-in BCU supports CAN,菊花-chain, and RS-485 communication interfaces, facilitating seamless communication between the high-voltage control box, energy storage battery management modules, the main unit of the battery management system, and the PCS—enabling comprehensive control, protection, and data exchange capabilities for the battery cluster.

2. Feature

- The product features a standard operating voltage of AC 220V and is compatible with 24V or battery pack outputs (80VDC−1000 VDC), meeting the requirements of various energy storage applications.
- The product supports series connection of 32 to 273 battery cells.
- The product supports CAN or菊花-chain communication functions between the control module and the master control module for battery management in energy storage systems, enabling centralized aggregation and management of battery cluster information.
- The product supports manual or electric tripping control functions for DC circuit breakers.
- The product features precise detection of battery cluster terminal voltage, cluster terminal current, and battery cluster insulation status.
- The product panel features operational status indicators that visually display the current operating condition.
- The product features high-reliability components and employs multiple redundant protection measures, thoroughly addressing the harsh electromagnetic environments as well as high temperatures and vibrations inherent in energy storage systems. It boasts exceptional reliability, stability, and anti-interference performance.
- The system is applicable to various energy storage applications, including centralized power station storage and cascaded utilization storage.

3. Electrical Circuit Diagram



4. Key Component Parameter Table

Order number	Name	Parameter	Quantity	Functional description	Remarks
1	Moulded case circuit breaker	200A	1	Manual connection and disconnection of the battery pack circuit	Standard configuration
2	DC contactor	250A	1	Automatic connection and disconnection of the battery pack cathode circuit	Standard configuration
3	DC contactor	250A	1	Automatic connection and disconnection of the battery pack anode circuit	Standard configuration
4	Pre-charged contactor	40A	1	Automatic opening and closing of the precharge and circulation circuit	Standard configuration
5	Pre-charging resistor	50 Europe	1	Precharge and current limiting in the circulation circuit	Standard configuration
6	Current diverter	200A±0.2%	1	Electric current measurement	Standard configuration
7	Fuse	250A	1	Protect the main circuit from overcurrent	Standard configuration
8	Control unit	Master control BCU	1	Battery Cluster Control and Management Unit	Standard configuration
9	Power connector	250A	4	High-voltage circuit input/output	Standard configuration
10	Pilot lamp	Green LED	1	Work Status Indicator	Standard configuration
11	Pilot lamp	Orange LED	1	Fault Status Indicator	Standard configuration
12	Power/Communication Socket	5 Core	1	24V input/output, reserved for CAN communication	Standard configuration
13	Communication socket	4 Core	1	Cabinet indicator light signal	Standard configuration
14	Communication socket	Internet access	5	CAN/485, Debugging, Display, etc.	Standard configuration
15	Character-shaped socket	220VAC，10A	1	AC input	Standard configuration
16	ACDC switching power supply	150W	1	Low-voltage power supply	Standard configuration
17	DC DC Switching Power Supply	150W	1	Low-voltage power supply	Standard configuration

5. Schematic Diagram of the External Dimensions of the High-Voltage Box

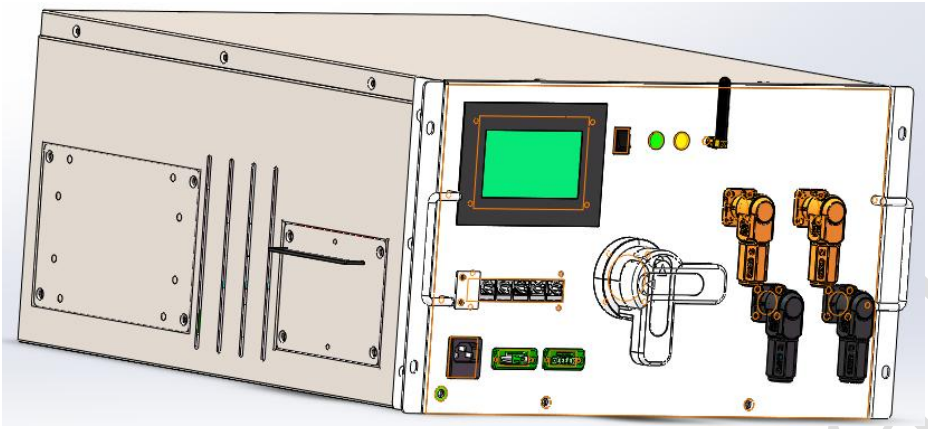


Figure 1. External View

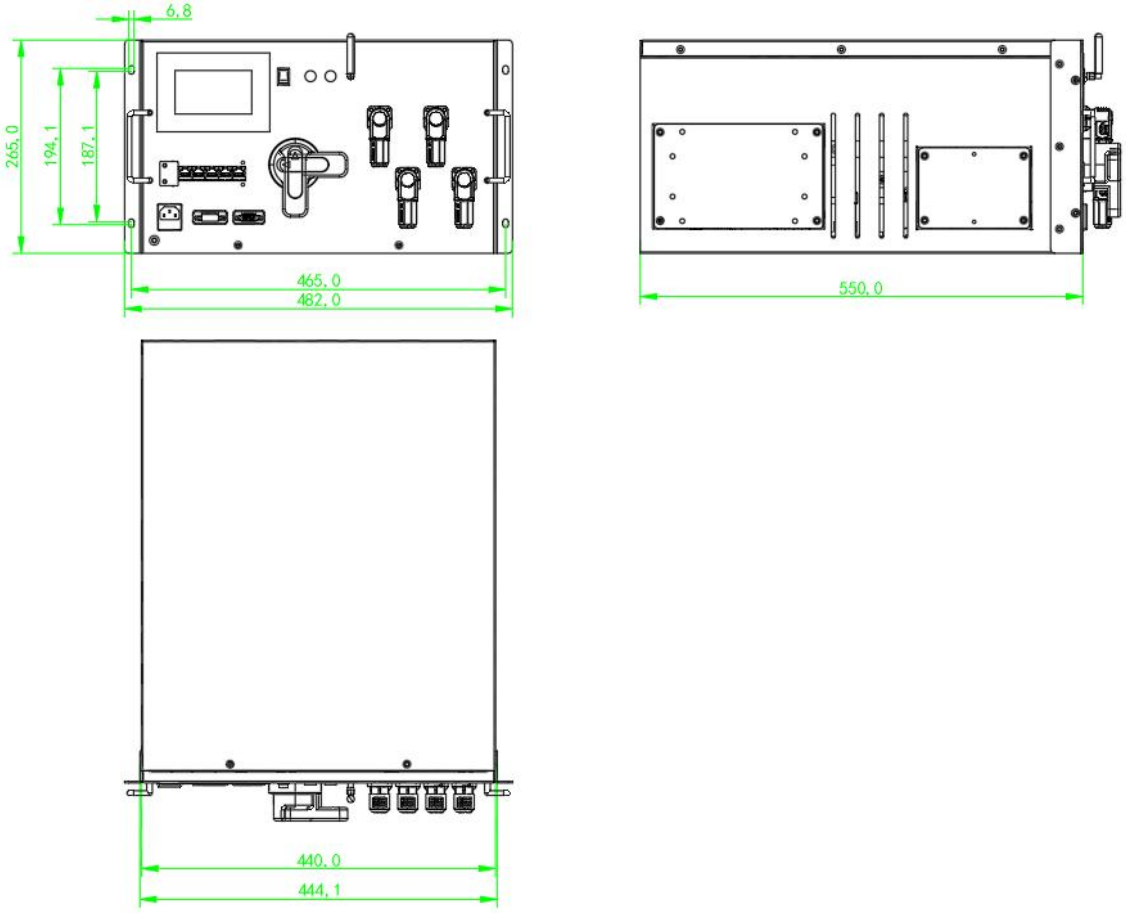


Figure 2. External Dimensions Diagram

6. High-Voltage Box Installation Instructions

- The product installation dimensions are shown in Figure 1 (length * width * height): 482*550*265 mm (including the mounting bracket).
- The product color defaults to spray-painted RAL9003 Signal White with orange patterns.
- The default fixed hole dimensions for the high-voltage cabinet are as follows: a left-right spacing of 465 mm and an up-down spacing ranging from 187.1 to 194.1 mm. The mounting ear holes are circular holes with a diameter of Φ6.8.

7. High-Voltage Power Input/output Interface Definition

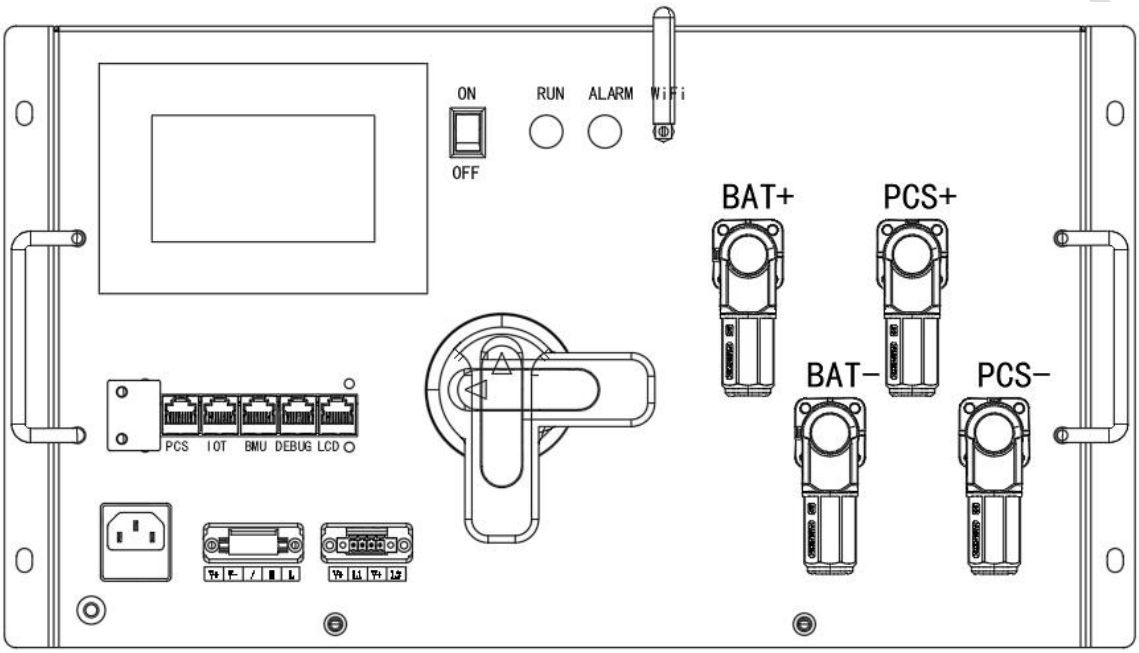
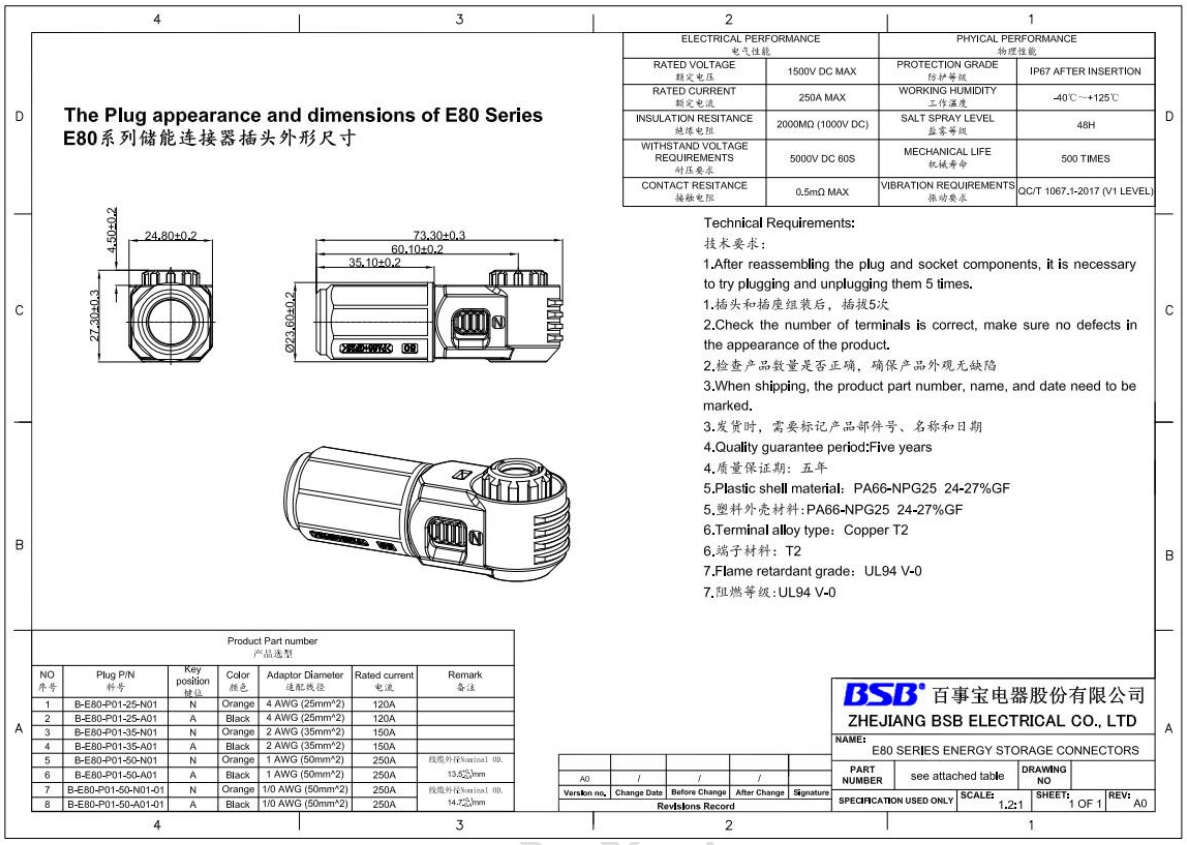


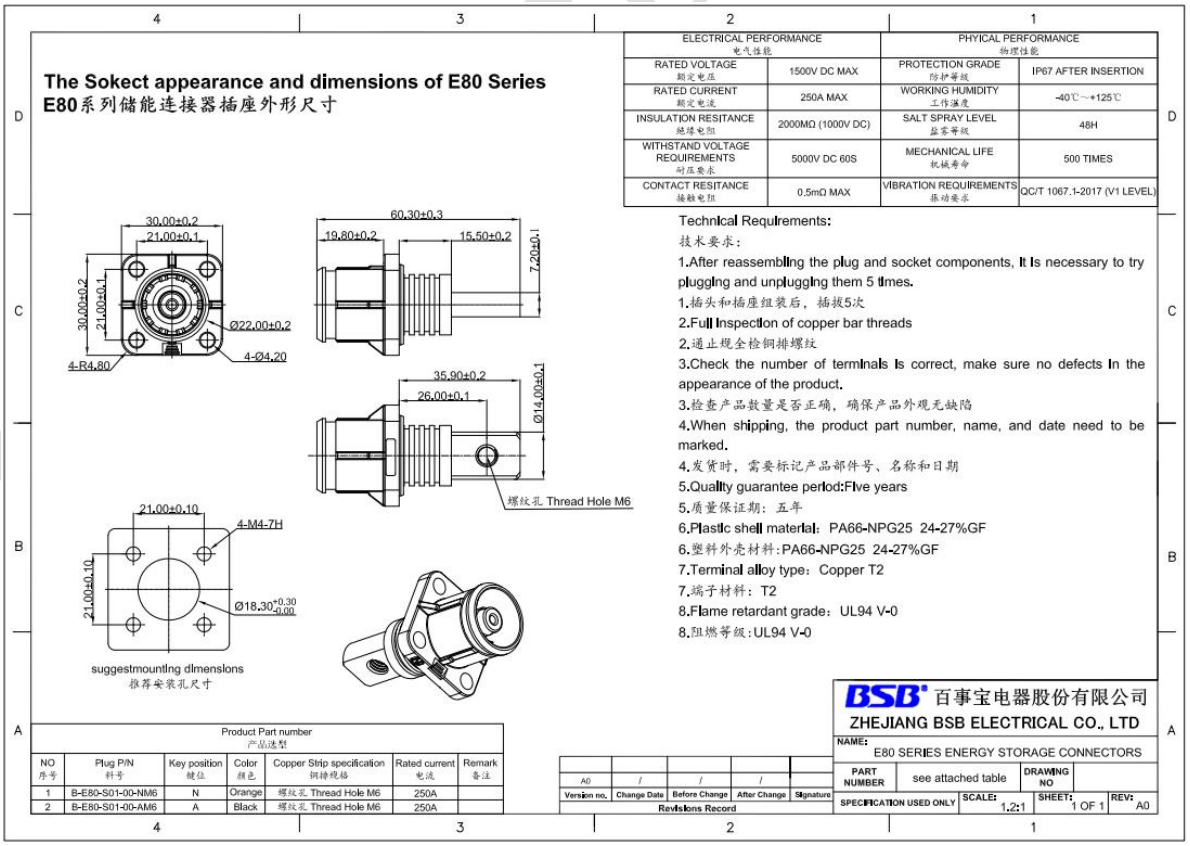
Figure 1. Panel Screen Printing Pattern

Interface Definition	Function declaration	Remarks
BAT+	Positive terminal of the battery pack input	Connect to the positive terminal of the battery pack. Interface socket: B-E80-S01-00-NM6; matching plug: B-E80-P01-50-N01
BAT-	Negative terminal of the battery pack input	Connect to the negative terminal of the battery pack; socket interface: B-E80-S01-00-AM6; matching plug: B-E80-P01-50-A01
PCS+	PCS input positive terminal	Connect to the positive terminal of PCS; interface socket: B-E80-S01-00-NM6; matching plug: B-E80-P01-50-N01
PCS-	PCS input negative terminal	Connect to the PCS negative terminal; interface socket: B-E 80-S01-00-AM6; matching plug: B-E80-P01-50-A01
QF	Battery cluster switch	Manually control the high-voltage output of the battery pack (DC circuit breaker)

remarks：

The power socket uses a PepsiCo-style socket, with the following specifications:





8. Power Supply and Communication Input/output Interface Definition

① Reserved interface for power/CAN communication

Port name	Order number	Definition	Functional description	Remarks	
24V power supply/CAN	1	V+	DC24V+ input/ output	Interface socket: 15 EDGKPM-3.81-5P; 配套 plug: 15EDGKM-3.81 mm-5P	
	2	V-			
	3	/	/		
	4	H	CAN communication reserved		
	5	L			

② Indication light interface

Port name	Order number	Definition	Functional description	Remarks	
Pilot lamp	1	V+	Operation indicator light	Interface socket: 15 EDGKPM-3.81-4P; 配套 plug: 15EDGKM-3.81 mm-4P	
	2	L1			
	3	V+	Fault indicating lamp		
	4	L2			

③ Standard RJ45 network port

Port name	Order number	Definition	Functional description	Remarks
PCS	1	/		Connect to the Central Control/EMS/PCS
	2	/		
	3	/		
	4	BCU:CAN_2H	CAN2 Communication	
	5	BCU:CAN_2L		
	6	/		
	7	/		
	8	/		
IOT	1	BCU:CAN_2H	CAN2 Communication	Connect to the 4G gateway
	2	BCU:CAN_2L		
	3	PWR+	DC24V output	
	4	PWR+		
	5	PWR-		

	6	PWR-		
	7	BCU:485_A2	RS485-2 Communication	
	8	BCU:485_B2		
BMU	1	BCU:IPO	Chrysanthemum Chain Communication	Connect from Control
	2	BCU:IMO		
	3	/		
	4	/		
	5	/		
	6	/		
	7	/		
	8	/		
DEBUG	1	/		Communication Debugging
	2	/		
	3	/		
	4	BCU:CAN_1H	CAN1 Communication	
	5	BCU:CAN_1L		
	6	/		
	7	BCU:485_A1	RS485-1 Communication	
	8	BCU:485_B1		
LCD	1	BCU:485_B1	RS485-1 Communication	Connect Display
	2	BCU:485_A1		
	3	PWR+	DC24V output	
	4	PWR+		
	5	PWR-		
	6	PWR-		
	7	BCU:485_A1	RS485-1 Communication	
	8	BCU:485_B1		

④ Fault diagnosis switch

Port name	Open and close positions	Definition	Functional description	Remarks	
/	ON	Open	Low-voltage power switch	The boat-shaped switch is set to ON by default and to OFF during maintenance.	
	OFF	Close			

⑤ : Star-shaped plug, AC 220V input

Port name	Functional description	Remarks	
220VAC power supply	For powering the AC side of the equipment	With a 10A fuse and a square-shaped socket	

9. Powering on and Wiring of the High-Voltage Cabinet

① Wiring instructions:

Step 1: The high-voltage box components include two sets of power connection plugs. Strip and secure the corresponding 50mm² power cables onto the power connection plugs. In the high-voltage box panel, connect the BAT terminals (positive and negative) to the corresponding terminals on both ends of the battery cluster's battery box—one terminal to the battery box's negative terminal and the other to its positive terminal. Connect the PCS terminals (positive and negative) to the corresponding DC input ports of the PCS unit.

Step 2: Connect the high-voltage box's RJ45 network port (PCS) to the PCS using the accessory cable harness to establish CAN communication.

Step 3: Connect the high-voltage box's RJ45 network port (BMU) to the 1# battery box control module within the cluster using the accessory cable harness, enabling daisy-chain communication.

Step 4: Connect the high-voltage box's "24V Power/Fan Communication" interface to the cluster's 1# battery box master control module using the accessory cable harness. This connection powers the master control module and enables CAN communication with the battery box fan.

Step 5: Supply AC220V power to the "220VAC Power Supply" interface using the accessory cable harness.

② Power Supply Explanation

Step 1: Normal external 220V alternating current supply;

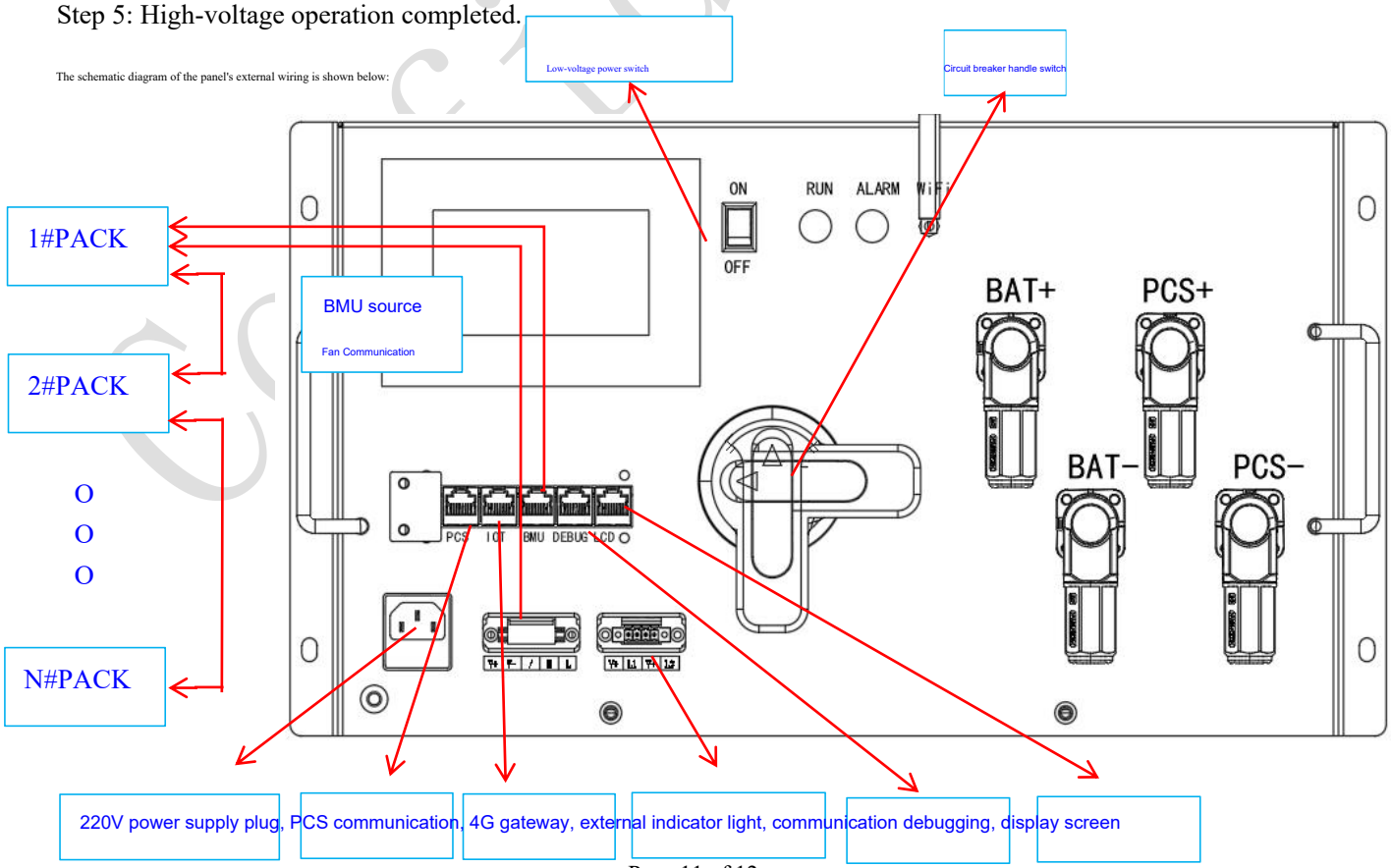
Step 2: Set the circuit breaker handle to the "ON" position;

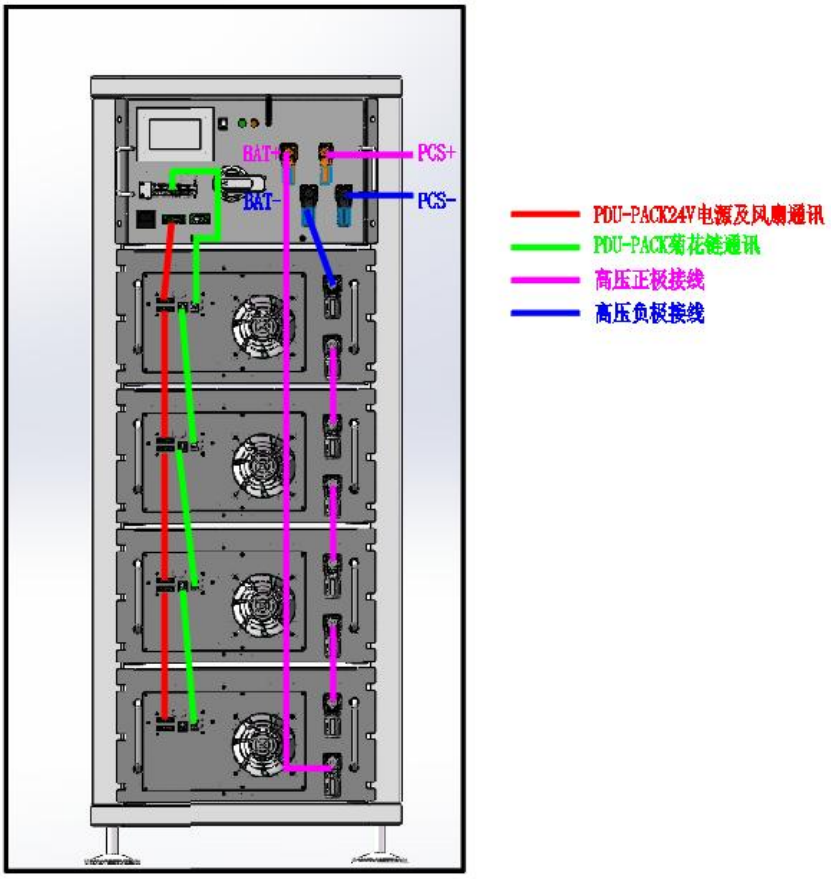
Step 3: Turn on the low-voltage power switch (the switch positioned higher indicates "ON" for power supply, while the one lower down indicates "OFF" for power cut-off).

The high-voltage box is powered on, and the power indicator light flashes slowly (the indicator light begins flashing immediately after the low-voltage power switch is activated); Step 4: Wait until the main positive and negative contactors inside the high-voltage box close, at which point a total voltage output appears at the "P+" and "P-" terminals.

Step 5: High-voltage operation completed.

The schematic diagram of the panel's external wiring is shown below:





10. Technical Support and Services

1. For packaging information, refer to "Product Shipping Packaging Information".
2. If the product operates under loads exceeding those specified in this manual, its performance cannot be guaranteed to meet all performance specifications outlined herein.
3. Unless otherwise specified, all data in this paper were measured at Ta = 25°C, humidity <75%, with the input nominal voltage and output rated load.
4. The above are all the product performance specifications listed in this manual.
5. Our company supports product customization.

For any questions regarding product usage or technical matters, please feel free to contact us. We will respond promptly upon receiving your inquiry and look forward to communicating with you!