

All-in-one Liquid-cooled Battery Cabinet ESS-E261LP User Manual



Content

1. Application Scope	1
2. Normative References	1
3. Product Introduction	2
4. Technical Parameters of System	3
5. Product Introduction	4
5.1 PACK.....	4
5.2 DC High-voltage Box	6
5.4 Chiller Unit	8
5.5 PCS(Power Control System)	8
6. Packaging, Transportation and Storage.	9
6.1 Packaging of Product	9
6.2 Transportation of Product.....	10
6.3 Storage of Product	10
7. Warranty Statement.....	10
8. Safety Usage Guidelines.....	11

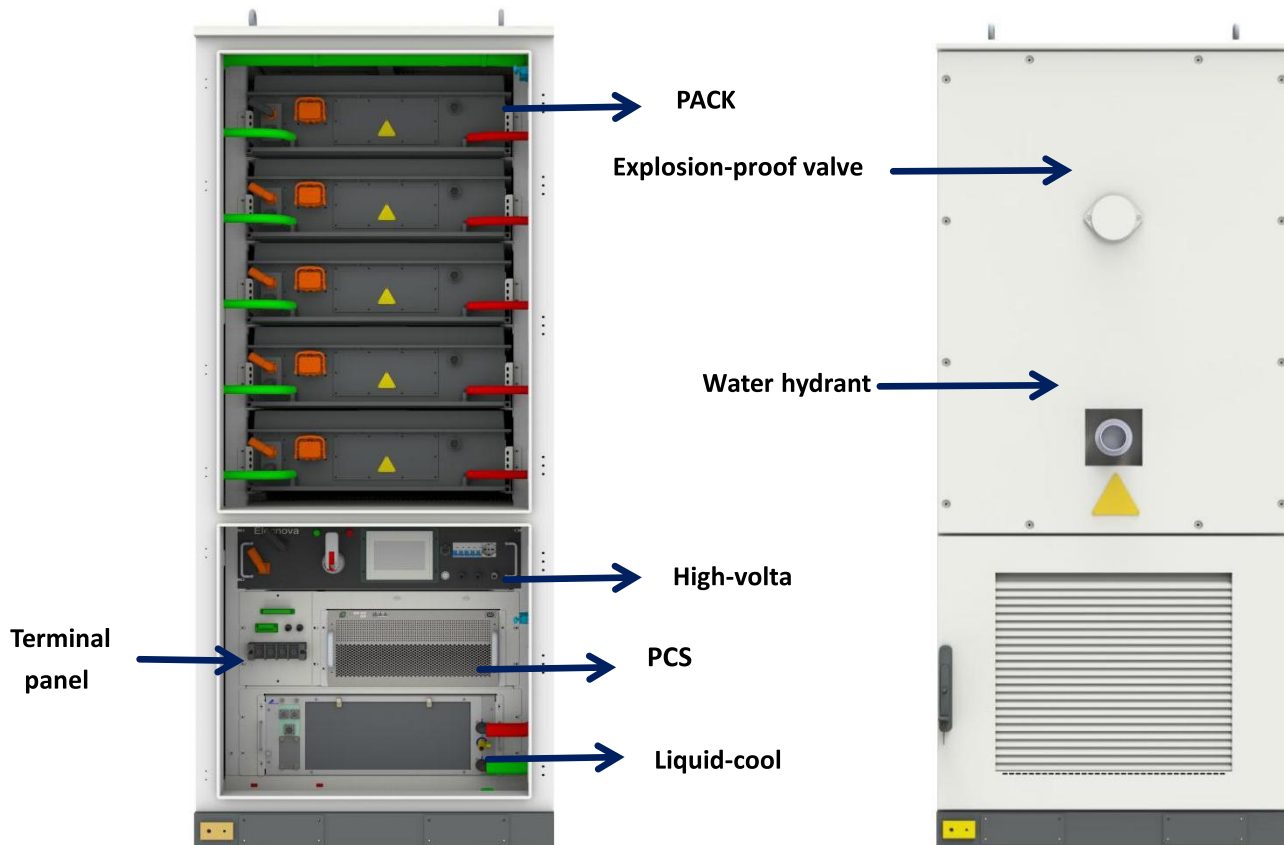
1. Application Scope

The Specification sets forth the performance indicators, transportation and storage requirements, usage conditions, precautions, and risk warnings of the all-in-one liquid-cooled ESS Cabinet produced by Sunpal Power Co., Ltd. (hereafter referred to as "Sunpal") for energy storage scenarios.

2. Normative References

- | | |
|-------------------|--|
| IEC 63056-2020 | Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries for use in electrical energy storage systems. |
| IEC 62477-1 | Safety requirements for power electronic converter systems and equipment - Part 1 General |
| GB/T 36276-2023 | Lithium ion battery for electrical energy storage |
| GB/T 34131-2023 | Battery management system for electrical energy storage |
| GB/T 34120-2017 | Technical requirements for power conversion system of electrochemical energy storage system |
| GB/T 36547-2018 | Technical rule for electrochemical energy storage system connected to power grid |
| GB 4208-2008 | Degrees of protection provided by enclosure (IP code) |
| GB/T 17626 | Electromagnetic compatibility - Testing and measurement techniques |
| GB/T 14048.1-2006 | Low-voltage switchgear and control-gear Part 1: General rules |
| IEC 60068-2-6 | Environmental testing - Part 2-6: Tests Fc: Vibration (sinusoidal) |

3. Product Introduction



ESS-E261LP Energy Storage Cabinet Layout Diagram

No.	Part	Quantity	Remarks
1	PCS (inverter)	1	125kW
2	High-voltage box	1	/
3	Fire protection unit	1	Smoke sensor, temperature sensor, aerosol, explosion-proof valve and water hydrant adapter
4	PACK	5	Grouping mode is 1P52S
5	Liquid-cooling unit	1	5kW (W18/L35)
6	Cabinet body	1	1050(W)*1350(D)*2400(H)(mm)

4. Technical Parameters of System



Physical Image of ESS-E261LP

Item	Specifications	Remarks
DC Side Parameters		
Cell type	LFP 314Ah	
Grouping method	1P260S	
Rated energy	261.248kWh	100%DOD, (25±2) °C, 0.5P
Rated capacity	314Ah	
Rated voltage	832V	
Recommended voltage range	DC 728-936V	Cell lower limit voltage 2.8V Cell upper limit voltage 3.6V
AC Side Parameters		
Maximum output power	125kW	
Grid voltage	400V ac/3P+N+PE	
Grid frequency	50Hz/60Hz	
THDi	≤3%	
DC component	<0.5%I _{pn}	
Power factor range	-1 to 1	
System Parameters		
Energy conversion efficiency	≥89%	Including auxiliary power consumption
Charging/discharging rate	≤0.5P	
Discharge depth	95%DOD	
Cycle life	≥8000 times (25±2°C)	Rated operating conditions:

		25±2℃, 0.5P and 95%DOD, 70%SOC,2c/day
Protection level	IP55	
Cooling method	Active liquid cooling	
Operating temperature	-25 to 55℃	
Relative humidity	0-95%RH	
Working Altitude	≤2000m	Derated above 2,000m, maximum application altitude ≤ 4000m
Dimensions (W*D*H)	1050*1350*2400mm	
Total weight	Approximately 2,670kg	
Fire protection system	PACK-level aerosol + Cube-level aerosol fire extinguishing	
Communication	Ethernet/RS485	
Standards complied with	UN38.3, IEC62619, IEC62477, IEC63056 and CE-EMC	

5. Product Introduction

5.1 PACK

Each ESS-E261LP contains 5 units of liquid-cooled PACK, The PACK #5 is positioned at the top of the cabinet. PACK numbering decreases sequentially from top to bottom, ending with the PACK #1 at the bottom. Each PACK is composed of 52 units of LFP-314Ah cell in series.

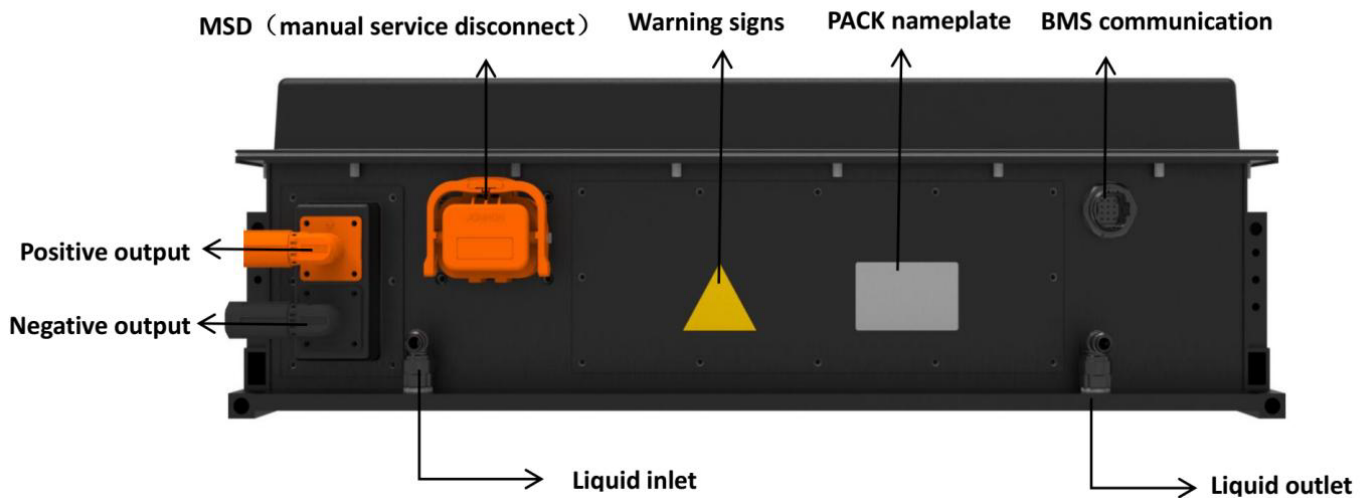


Diagram of Liquid-cooled PACK

The parameters are as per the table below:

No.	Item	Parameter	Condition
1	Model	ECO-P1P52LP	/
2	Cell capacity	LFP314Ah	Standard charge/discharge
3	Grouping mode	1P52S	/
4	Nominal energy	52.249kWh	Standard charge/discharge
5	Nominal voltage	DC 166.4V	Standard charge/ discharge
6	Recommended voltage range	DC145.6-187.2V	Cell voltage 2.8-3.6V
7	Charge/discharge rate	0.5P	Constant power
8	Cooling method	Liquid-cooling	
9	Dimensions (W * D * H)	800*1135*248 mm	See drawings
10	Weight	Appr. 352 kg	Including connecting copper bars
11	Protection level	IP65	
12	Cell operating temperature range	-25 to 55℃	discharging
13		0-55℃	charging
14	Recommended	15-35℃	

	working temperature range		
15	Storage temperature range	-25 to 55℃	Batteries shall be charged and maintained once every 3 months in storage
16	Storage humidity	<75%RH, without condensation	
17	Applicable system voltage level	≤1500V DC	
18	Communication method	CAN	/
19	Shipping SOC	30%-50%	(25±2)℃
20	Warranty operating conditions	(25±2)℃	/



Schematic Diagram of Liquid-cooled 1P52S PACK Panel

No.	Part	Model	Q'ty	Remarks
1	Output pole positive	ES-FT-BPC-B/S 35-70 OG	1	PACK polarity +
2	Output pole negative	ES-FT-BPC-B/S 35-70 BK	1	PACK polarity -
3	MSD	DLQ5-Z-B,200A, DC750V	1	Manual maintenance switch
4	BMU interface	Plug: USCM012-R03_A	1	Communication interface
6	Inlet	Inner Diameter: 10	1	Inlet
7	Outlet	Inner Diameter: 10	1	Outlet

5.2 DC High-voltage Box

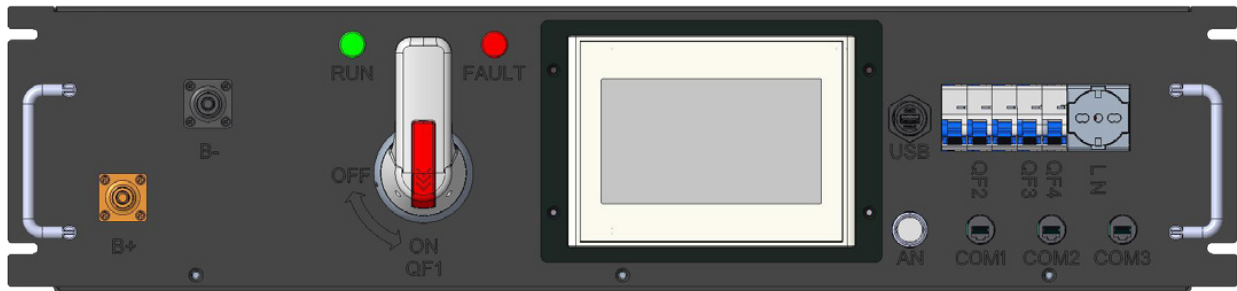
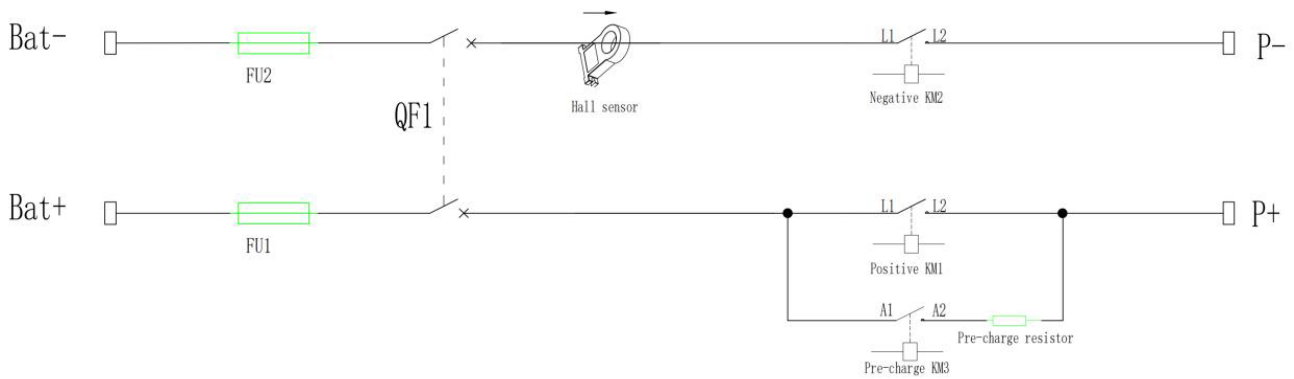


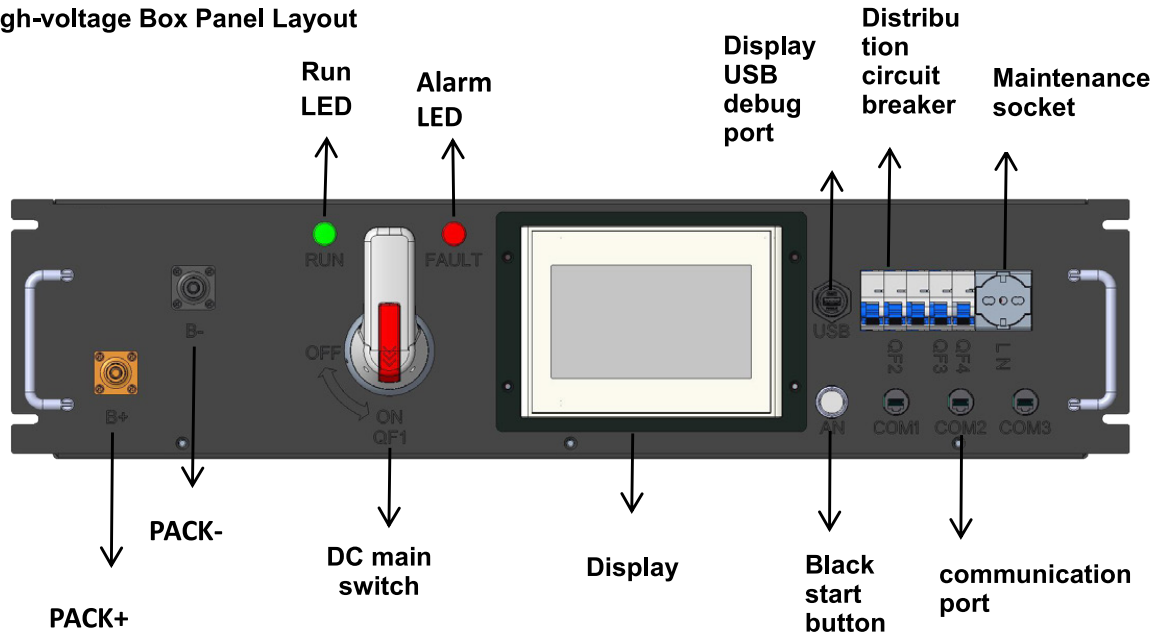
Diagram of High-voltage Control Box



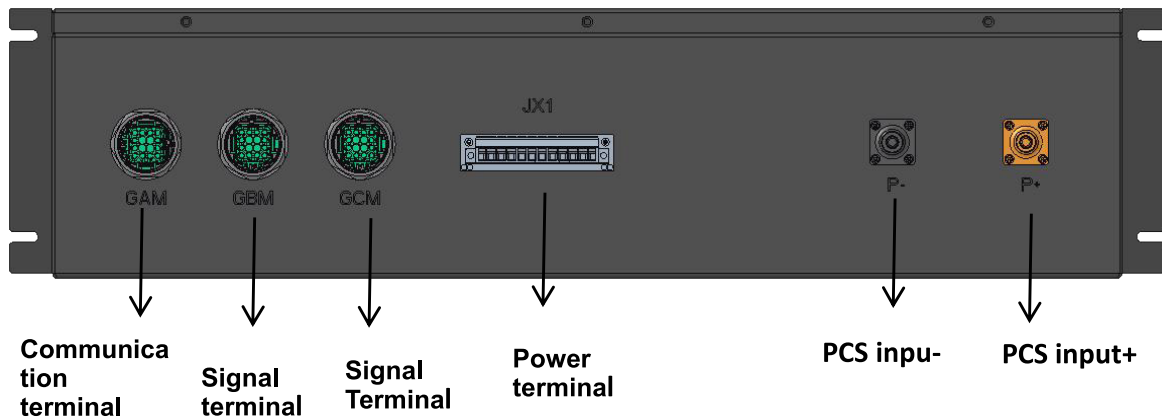
Main Wiring Diagram of High-voltage Control Box

No.	Item	Parameter	Remarks
1	Dimensions(W*D*H)	800*843*201mm	See drawings
2	Weight	Appr. 60kg	
3	Power input	AC 220V	Auxiliary supply of high-voltage box
4	Low-voltage output	DC 24V	Communication power of high-voltage box
5	Rated high-voltage output	DC 832V	DC 728V-DC 936V
6	Operating temperature	-25 to 55℃	
7	Current accuracy	±1%FSR	
8	Voltage accuracy	±1%FSR	
9	Protection level	IP20	

High-voltage Box Panel Layout



High-voltage Box Front Panel Layout



High-voltage Box Rear Panel Layout

No.	Part	Model	Q'ty	Remarks
1	P+	ES-FT-BPC-B/S 35-70 OG	1	+ Polarity to PCS
2	P-	ES-FT-BPC-B/S 35-70 BK	1	- Polarity to PCS
3	B+	ES-FT-BPC-B/S 35-70 OG	1	+ Polarity to PACK
4	B-	ES-FT-BPC-B/S 35-70 BK	1	- Polarity to PACK
5	GAM	USCM016-R03_A	1	Communication terminal A
6	GBM	USCM016-R03_A	1	Communication terminal B
7	GCM	USCM016-R03_A	1	Communication terminal C
8	JX1	LC10UMG-7.62-12P-1Y-00A	1	Power terminal D
9	QF1	NDG3VH-/315/2/02/CPG01	1	DC main switch
10	QF2	NDB2-63C32/2P +MX+OF2	1	Whole-cabinet power switch
11	QF3	NDB2-63C25/1P	1	Liquid-cooling unit
12	QF4	NDB2-63C10/1P	1	24V power switch

13	LN	M1175-C	1	Maintenance socket
13	Run	AD11-16/21-6GZC/DC24V/G	1	High-voltage box RUN indication
14	Fault	AD11-16/21-6GZC/DC24V/R	1	High-voltage box alarm indication
15	COM1	SPRJS-5EPFFJ-TC7002	1	Debug network communication
16	COM2	SPRJS-5EPFFJ-TC7002	1	Router Ethernet communication
17	COM3	SPRJS-5EPFFJ-TC7002	1	PCS network communication
18	USB	PVS-RU05PSL500	1	Display USB debug port
19	AN	LA38-20/20EA	1	Black start metal button
20	Display	TPC7071Ni	1	System data display

5.3 Chiller Unit



Physical Appearance of Chiller Unit

ESS -E261LP adopts a drawer type chiller product with a 5kW AC power supply standard. The chiller adopts an integrated structure, and all components are enclosed in one chassis, with a compact external structure, making it easy to install and maintain. The chiller unit supports multiple functions such as RS485 communication, power-off memory, self-starting, intelligent cooling and heating. The liquid cooling unit is equipped with a variable frequency compressor and a variable frequency water pump to achieve dual variable frequency regulation of the refrigeration system and the coolant circulation system, achieving high efficiency and energy saving during operation. The coolant is a 50% ethylene glycol solution, and the operating pressure of the coolant is 120 kPa.

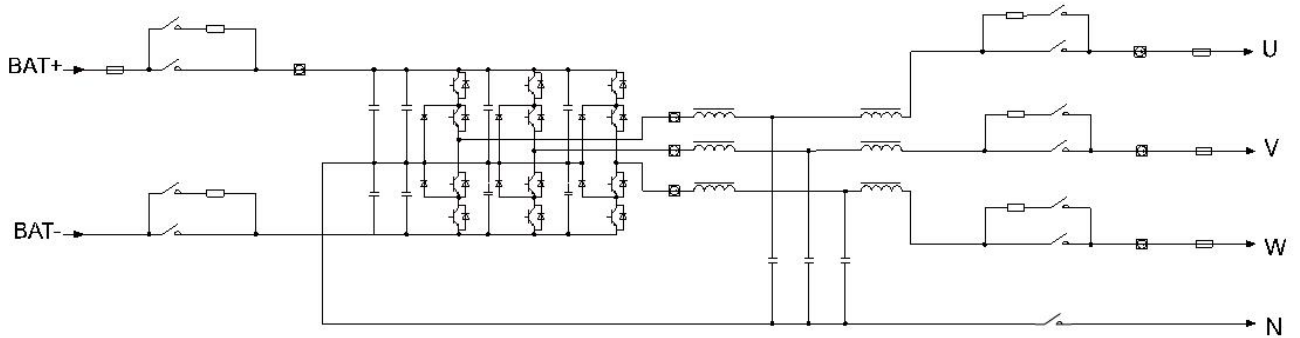
The liquid cooling method realizes a small temperature difference and fast cooling, which can effectively extend the battery life and delay decay.

5.4 PCS(Power Control System)



Physical Appearance of PCS

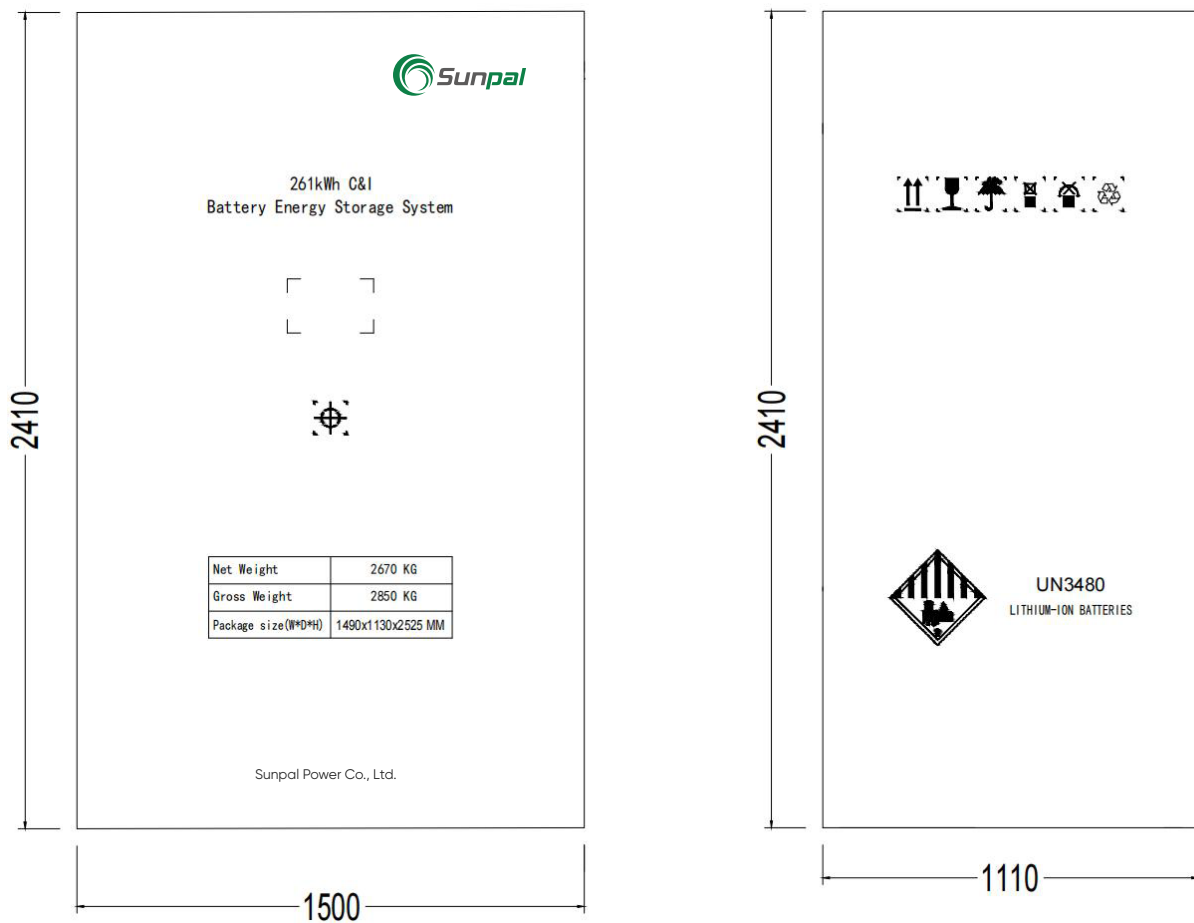
Power Control System (PCS) is a bidirectional current controllable conversion device that connects the energy storage battery system and the power grid. Its main function is to achieve energy exchange between lithium batteries and the power grid, and to control and manage the charging and discharging of the lithium battery system.



PCS schematic diagram

6. Packaging, Transportation and Storage

6.1 Packaging of Product



By default, this product is packed in a full-cabinet wooden crate upon delivery:

1. After removing the connection line between battery packs (PACK), pack them separately and attach corresponding information;
2. Place the whole cabinet on the prepared wooden support, and fix it to the corresponding bottom

foot of the cabinet with bolts;

3. Add a wooden box on the fixed wooden support and stick the corresponding energy storage cabinet information.

6.2 Transportation of Product

● Transportation Status

Upon delivery, the SOC of this product is 30%-50%, and all power (circuit) shall be disconnected. The positive and negative power cables between PACKs, as well as the power cables of high-voltage box and control box, are removed to ensure the safety during transportation. This cabinet shall be transported in one package.

● Transportation Requirements

- 1) The transportation of the ESS Cabinet shall meet the relevant requirements of UN 3536;
- 2) The lifting point for the Cabinet is the lifting rings on top of cabinet, and the lifting equipment's load capacity shall meet the requirements;
- 3) The battery PACKs shall be protected from inversion, severe vibration, external impact, and compression during transportation;
- 4) The ESS Cabinet may be transported by vehicles such as truck, train and ship;
- 5) During transportation, recommended speed of vehicle is below 80km/h on Grade-I highway, below 60km/H on Grade-II highway and below 36km/H on Grade-III highway. Measures shall be taken to avoid damage or deformation to the Cabinet;
- 6) The spare parts and other components shipped together with the cabinet must be packaged in good condition, with basic information including but not limited to names and quantities showing on the attached packing list to meet the requirements of sea transportation.

6.3 Storage of Product

The SOC of the ESS -E261LP shall be maintained within the range of 30%-50% during storage. In case that the Cabinet is to stay idle for a period of 1~3 months, the cabinet shall be charged and discharged (one cycle) in advance to keep the SOC to 30%-50%. Sunpal shall not be held liable for any loss of capacity due to failure of complying with this requirement.

7. Warranty Statement

The product warranty period is specified in the commercial contract. Within this period, Sunpal only provides technical consultation and paid repair/replacement services for safety, performance degradation, or abnormal attenuation issues not caused by design, manufacturing, or quality control defects. Free repair or replacement is not guaranteed.

1. Do not disassemble the ESS -E261LP liquid-cooled cabinet or its components without Sunpal's authorization. Unauthorized disassembly voids accident liability and warranty coverage.

2. Sunpal assumes no responsibility for issues or accidents caused by unauthorized operations or non-product defects, including:

- Violations of regulations, industry standards, technical agreements, or safety guidelines specified herein;
- Improper actions by non-Sunpal personnel during installation/use;
- Problems arising from incompatible electrical equipment;
- Issues due to usage beyond specified performance limits;
- Direct electrical connection with batteries of different types, models, or manufacturers;
- Unauthorized modifications to the product.

8. Safety Usage Guidelines

In order to avoid battery damage or personal injury caused by misuse of square lithium-ion battery module, please carefully read the following safety guidelines before using square lithium-ion battery:

- Improper use and storage of battery poses a risk of fire, explosion, and burn. Do not decompose, crush, incinerate or heat battery, or put battery into fire;
- It is necessary to replace the battery or PACK with the one from the same manufacturer. The use of batteries from different manufactures may result in reduced performance, and even the risks of fire and explosion;
- Do not put the battery into water or wet it;
- Do not short-circuit, overcharge, or over discharge the battery;
- Do not install, use, or store the battery-based energy storage device near any heat source (such as fire or heater);
- Do not puncture the battery shell, and do not hit, throw, step on, press heavily, or roll the battery;
- Do not dismantle, repair or modify the battery product in any way without authorization;
- If the battery emits any odor, heats up, gets deformed, gets discolored, or has any other abnormal phenomenon, immediately stop using it, and transfer the abnormal battery to the emergency disposal site;

- If the battery catches fire, immediately cut off the high and low voltage circuits and use dry powder fire extinguishers or sand to extinguish the fire. If water is used for fire extinguishing, it is necessary to use an absolutely sufficient amount of water for long-term submergence, and it is prohibited to splash insufficient water onto the battery device.
- Without the consent of Sunpal , it is prohibited to dismantle the Cabinet or modify or change the design and architecture of the Product; otherwise, the performance of the battery may get affected