

All-in-one Air-cooled ESS Cabinet ECO-E241WP-2A User Manual



Content

1. Application Scope	1
2. Normative References	1
3. Product Introduction	1
4. Technical Parameters of System	2
5. Product Introduction	3
5.1 PACK.....	3
5.2 High -voltage Box.....	5
5.4 Air conditioner	6
5.5 PcS.....	7
6. Packaging, Transportation and Storage.	8
6.1 Packaging of Product	8
6.2 Transportation of Product.....	8
6.3 Storage of Product	9
7. Warranty Statement.....	9
8. Safety Usage Guidelines.....	9

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 air-cooled ESS Cabinet ECO-E241WP-2A (hereafter referred to as ECO-E241WP-2A, or the ESS Cabinet, or the Cabinet, or the Product) produced by Sunpal Power Co., Ltd. (hereafter referred to as “Sunpal”) for energy storage scenarios.

2. Normative References

IEC 62619-2022	Secondary cells and batteries containing alkaline or other non-acid electrolytes- Safety requirements for secondary lithium cells and batteries, for use in industrial applications
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: Test Fc: Vibration (sinusoidal)

3. Product Introduction

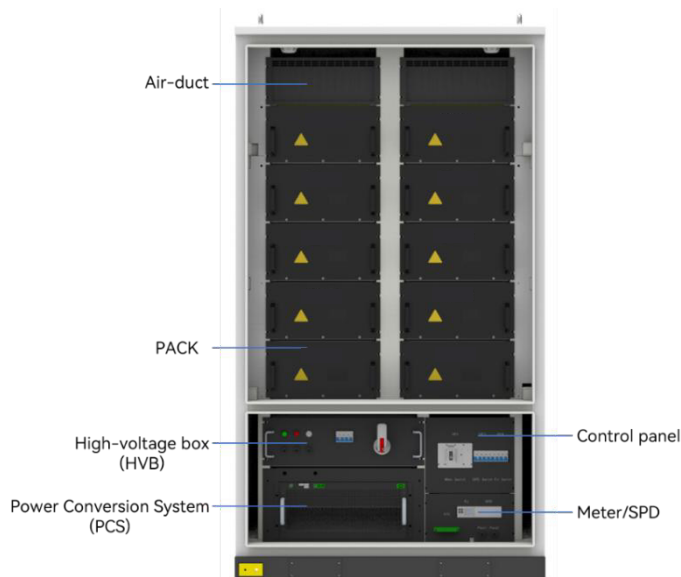


Figure 1 Layout of ECO-E241WP-2A

No.	Item	QTY	Remarks
1	PCS	1	
2	HVB	1	/
3	PACK	10	Grouping mode is 1P24S
4	Cabinet body	1	1250(W)*1450(D)*2250(H) (mm)

4. Technical Parameters of System



Figure 2 Physical Image of ECO-E241WP-2A

Item	Specifications	Remarks
DC Side		
Cell type	LFP 314Ah	
Grouping method	1P240S	
Rated energy	241.152kWh	100%DOD, (25±2)°C, 0.5P
Rated capacity	314Ah	
Rated voltage	768V	
Recommended voltage range	DC 672-864V	Cell lower limit voltage 2.8V Cell upper limit voltage 3.6V
AC Side		
Rated output power	125kW	
Maximum AC power	137.5kW	
Grid voltage	400Vac/3P+N+PE	
Grid frequency	50Hz/60Hz	
THDi	<3%	
DC component	<0.5%I _{pn}	
Power factor range	-1(lagging) to +1 (leading)	
System Parameters		
Energy conversion efficiency	≥89%	Excluding auxiliary power consumption
Charging/discharging rate	0.5P	Constant power
Discharge depth	95%DOD	
Protection level	IP55	
Cooling method	Forced air cooling	
Operating temperature	-25 to 55°C	
Relative humidity	0~95%RH, non-condensing	
Working Altitude	≤2000m	Derated above 2000m
Dimensions (W*D*H)	1250*1450*2250mm	

Total weight	Approximately 2500kg	
Fire protection system	Smoke/temperature detection + total-flooding aerosol fire suppression + water-based fire protection	
Communication	Ethernet/RS485	
Standards complied with	GB/T 36276, GB/T 34120, GB/T 34131, UN38.3, IEC62619, UL1973, UL9540, and CE-EMC	

5. Product Introduction

5.1 PACK

The cabinet contains ten 1P24S battery packs, all with identical internal module configurations.



Figure 3 Diagram of PACK

The parameters are as per the table below:

No.	Item	Parameter	Condition
1	Model	ECO-P1P24WP	/
2	Cell capacity	LFP314Ah	Standard charge/discharge
3	Grouping mode	1P24S	/
4	Nominal energy	24.11kWh	Standard charge/discharge
5	Nominal voltage	DC 76.8V	Standard charge/ discharge
6	Recommended voltage range	DC 67.2-86.4V	Cell voltage 2.8-3.6V
7	Charge/discharge rate	0.5P	Constant power
8	Cooling method	Air-cooling	
9	Dimensions (W×D×H)	470×1110×235 mm	See drawings
10	Weight	Appr. 149 kg	Including connecting copper bars
11	Protection level	IP20	
12	Cell operating temperature range	-20 to 55°C (discharging)	Cell temperature
13		0-55°C (charging)	
14	Recommended working temperature range	20-30°C	
15	Storage temperature range	-20 to 45°C	Batteries shall be charged and maintained once every 3 months in storage
16	Storage humidity	<75%RH, non-condensing	
17	Applicable system voltage level	≤1500Vdc	
18	Communication method	CAN	/
19	Shipping SOC	30%-50%	(25±2) °C
20	Warranty operating conditions	(25±2) °C	/

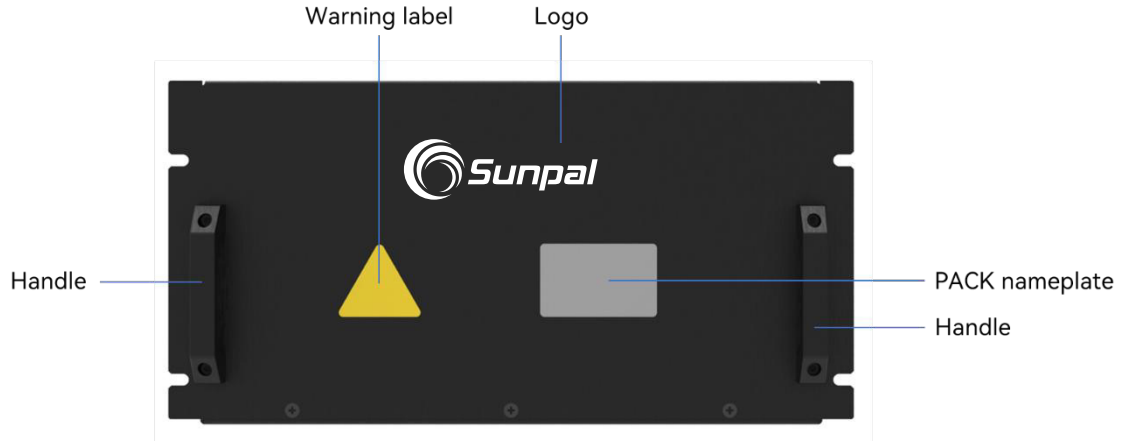


Figure 4 Front panel diagram of the PACK

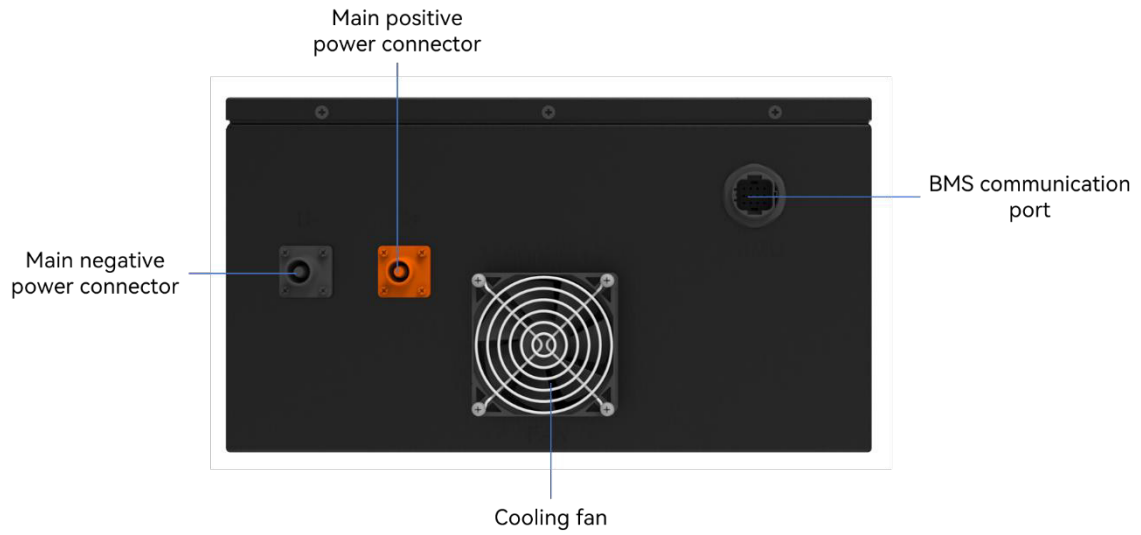


Figure 5 Rear panel diagram of the PACK

No.	Item	Model	QTY	Remarks
1	B+	ES-FT-BPC-B/S 35-70 OG	1	Module HV output +
2	B-	ES-FT-BPC-B/S 35-70 BK	1	Module HV output -
3	BMS communication port	CTB, 12-pin wire-to-board plug	1	BMU communication
4	Cooling fan	TX9232H24B-G	1	/
5	Warning label	Live voltage label	1	Electrical hazard
6	PACK nameplate	80×50 sticker label	1	Displays PACK parameter
7	Handle	Enclosure kit	2	PACK maintenance

5.2 High-voltage Box

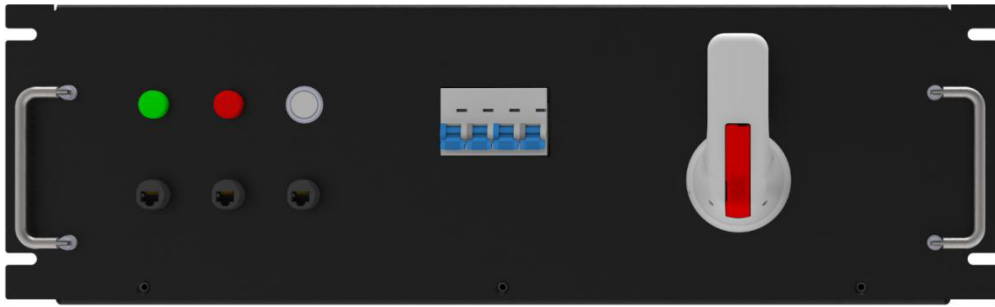


Figure 6 Diagram of high-voltage box

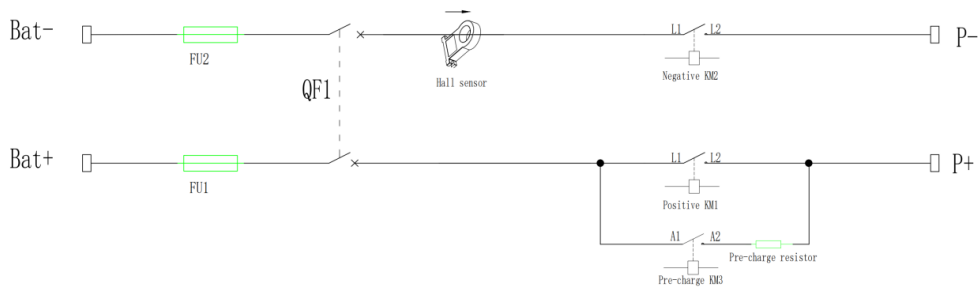


Figure 7 Main Wiring Diagram of High-voltage box

No.	Item	Parameter	Remarks
1	Dimensions(W*D*H)	600*953*200mm	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 768V	DC 672V-DC 864V
6	Operating temperature	-25 to 55°C	
7	Current accuracy	±1%FSR	
8	Voltage accuracy	±1%FSR	
9	Protection level	IP20	

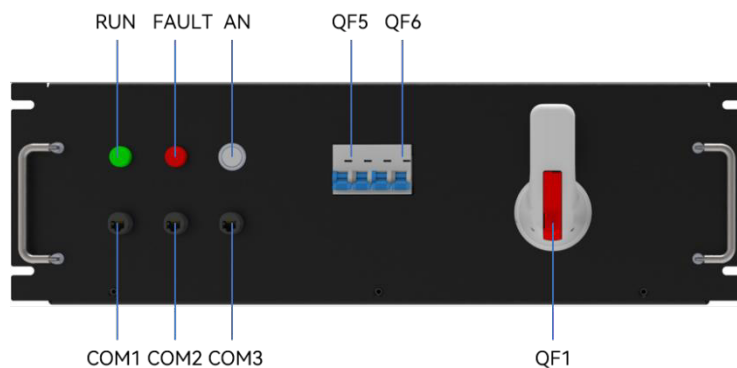


Figure 8 Front panel layout of the high-voltage box

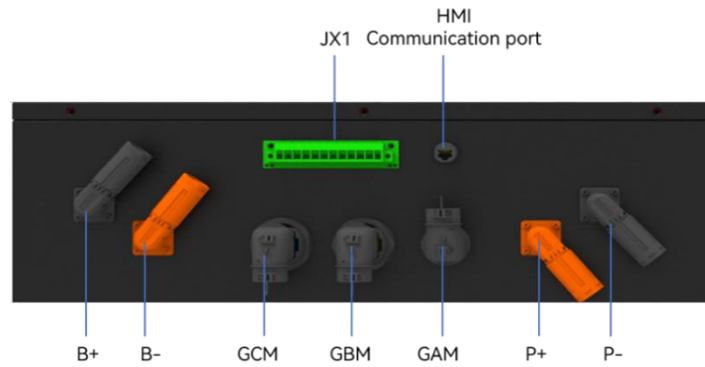


Figure 9 Rear panel layout of the high-voltage box

No.	Item	Model	QTY	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	JX1	12Pin terminal	1	Control Circuit Power Supply
6	GAM	CTB, 12-core (Wire-to-Board) 132012-004	1	BMU communication and power Terminal
7	GBM	CTB, 25-core (Wire-to-Board) 132025-004P	1	Power signal terminal
8	GCM	CTB, 16-core (Wire-to-Board) 132016-000P	1	Signal terminal
9	QF1	NDG3VH-315	1	DC isolator
10	QF5	NDB2-63C32/2P	1	Air conditioner circuit breaker
11	QF6	NDB2-63C10/2P	1	Control circuit breaker
12	AN	LA38-22/20E	1	Black-start Switch
13	RUN	AD11-16/21 Green	1	BCU output RUN Signal
14	FAULT	AD11-16/21 Red	1	BCU output FAULT Signal

5.4 Air conditioner

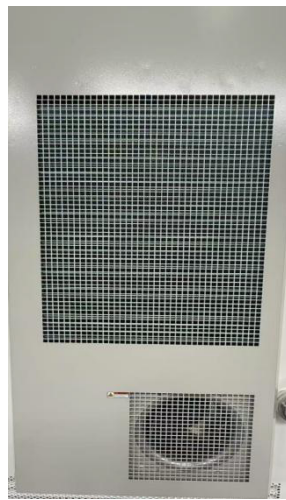


Figure 10 Physical Image of outdoor wall-mounted air conditioner

The ECO-E241WP-2A integrated cabinet is equipped with a 5 kW AC outdoor wall-mounted air conditioner featuring an integrated design for easy cabinet or enclosure integration. Each unit provides 5 kW cooling and heating capacity

(L35 L35), ensuring reliable operation in outdoor environments across a wide temperature range. With an IP55 protection rating, the cabinet can withstand most regional conditions and allows direct water cleaning from the exterior for convenient maintenance. The air conditioner supports RS485 communication, power-off memory, auto-start, and intelligent cooling and heating functions.

The air-cooled system offers low energy consumption, reduced maintenance costs, and environmentally friendly operation, effectively minimizing on-site labour and long-term maintenance expenses.

5.5 PCS



Figure 11 Physical Image 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.

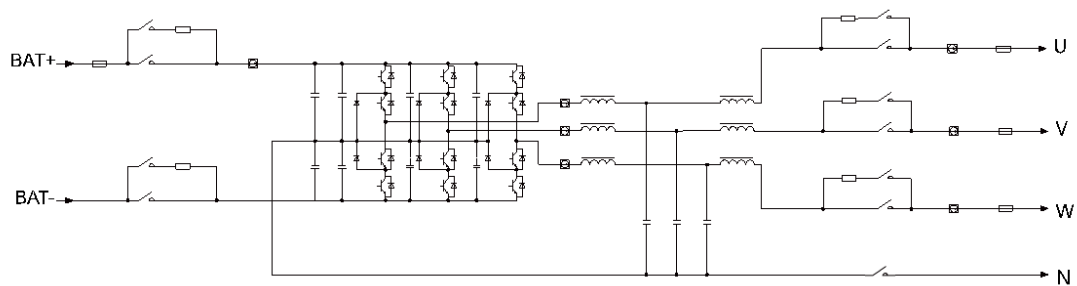


Figure 12 Schematic Diagram of PCS

6. Packaging, Transportation and Storage

6.1 Packaging of Product

By default, this product is packed in one package upon delivery:

- ◆ Remove the copper bars connecting the PACKs, wrap the bars together in one parcel, attaching packing-list; The bar parcel is shipped together with ESS Cabinet;
- ◆ Place shock-absorbing cotton between PACKs;
- ◆ Place ESS Cabinet on a wood pallet and fix the cabinet to the pallet with bolts by the feet of cabinet;
- ◆ Place pearl cotton around the cabinet and fix it with wrapping film;
- ◆ Put corrugated card board outside the fixed pearl cotton, attaching a packing list of ESS Cabinet and fix it again with wrapping film.



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

- ✓ The transportation of the ESS Cabinet shall meet the relevant requirements of UN 3536;
- ✓ 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;
- ✓ The battery PACKs shall be protected from inversion, severe vibration, external impact, and compression during transportation;
- ✓ The ESS Cabinet may be transported by vehicles such as truck, train and ship;
- ✓ 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;

- ✓ The spare parts and other components shipped together with the cabinet must be packaged in good condition, with basic information of names and quantities showing on the attached packing list so as to meet the requirements of sea transportation.
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6.3 Storage of Product

The SOC of the ECO-E233LS shall be maintained within the range of 20%-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 20%-50%. Sunpal shall not be held liable for any loss of capacity due to failure of complying with this requirement.

7. Warranty Statement

Refer to Limited Warranty Letter for Sunpal ESS Products (Standard Edition).

The warranty conditions are also subject to terms and conditions of a contract.

- ◆ For the purpose of continuously improving client satisfaction, our products and product manuals are being constantly updated. Due to version difference, discrepancies of warranty conditions and product specifications may take place. In this case, confirmed contract shall prevail. For any question, please contact us.

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 pose 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 discoloured, 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.
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(END)