Shenzhen Polinovel Tech Co., Ltd

4.6MWH

Containerized Battery Energy Storage System

Design Reference

CBESS4600

Cost Reference & Important Notes

4.6mwh cost reference: 597500-647280US$

Important Notes:

1. This design is only for reference, and the customer's technical configuration is subject to final communication;
2. For preliminary design and quotation, please help provide the following key information:
2.1. Will the system be installed outdoors or indoors?
2.2. What is the total power of the load and what device is included (Inductive load devices: e.g. motors, air conditioners, etc. Resistive load device: e.g. electric water heaters, rice cookers, etc.)?
2.3. Is the system off-grid or on-grid? What is the grid standard (e.g. 3-phase, 380v)? What to use to charge the battery (e.g. the pv solar, diesel generator, or state grid etc.). What is the output standard (e.g. single-phase, 220v)?
2.4. We appreciate it, if you could provide more information about your esteemed company.
2.5. More project information, the more detailed it is, the better we can give you the most appropriate design plan.

After you provide the above information, we can proceed with preliminary technical design and quotation. We do not intend to create barriers to collaboration. On the contrary, we place a strong emphasis on collaboration, so project evaluations are taken seriously. We hope to get your understanding and cooperation. After we confirm all the technical details and sign the contract, our company will make a formal design document and send it to you for confirmation before starting production.

Product Introduction

This CBESS consists of a 20ft container 4.6mwh Battery Unit and a 2500kw PCS Cabin Unit.

The 4.6mwh battery unit consists of 11 Battery Clusters, 1 Junction Cabinet, 1 Control Cabinet,1 Liquid Cooling System and 1 Fire Extinguishing System.

The Battery Unit is combined into 1 DC through the Junction Cabinet and then connected to the PCS Cabin Unit to form a complete CBESS system.

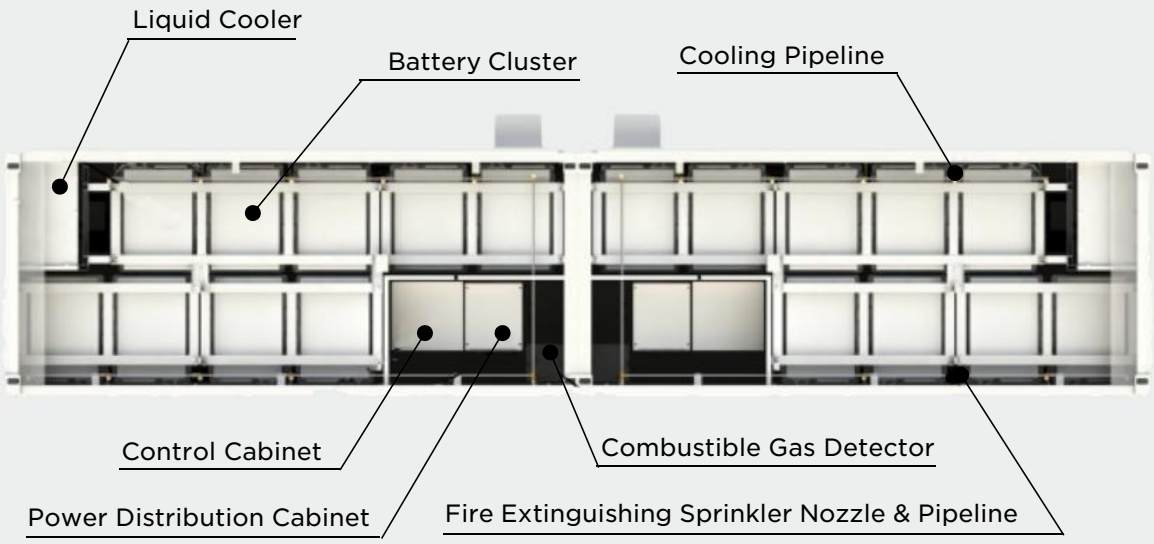
Battery Unit

◆ Basic Parameter

Item	Parameter
Single Cell	3.2v 314ah LFP
Cell series & parallel	11P416S
Nominal voltage	1331.2v
Nominal capacity	3454ah

Storage energy	4.597mwh
Voltage range	1164.8-1497.6vdc
Rated charging current	1800a
Rated discharging current	1800a
Operating temperature	-20℃~55℃
Auxiliary power supply	176-264vac
Weight	around 35000kg
Size (W*D*H)	6058*2600*2896mm

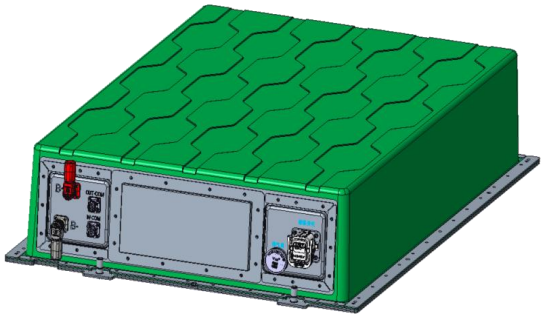
◆ Design Diagram



◆ Cell & Module Parameter

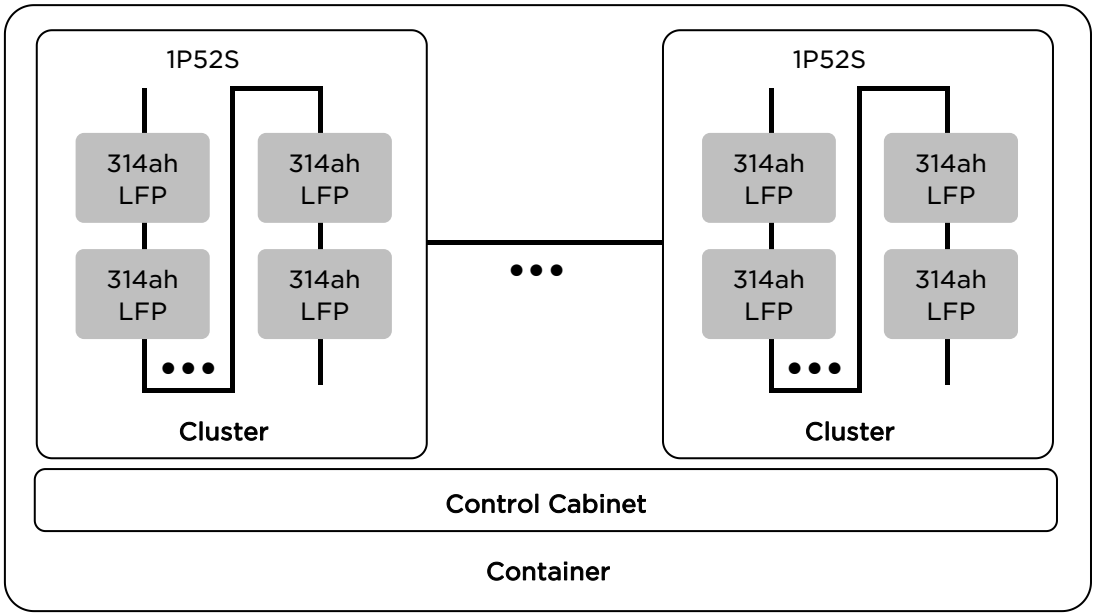
Item	Parameter
Nominal voltage	3.2v
Voltage range	2.8-3.6v
Capacity	314ah
Internal resistance	0.17±0.05mΩ
Storage temperature	-30℃~60℃
Cycles	≥6000
Cell weight	around 5.34kg
Cell size (W*D*H)	174*207*72mm

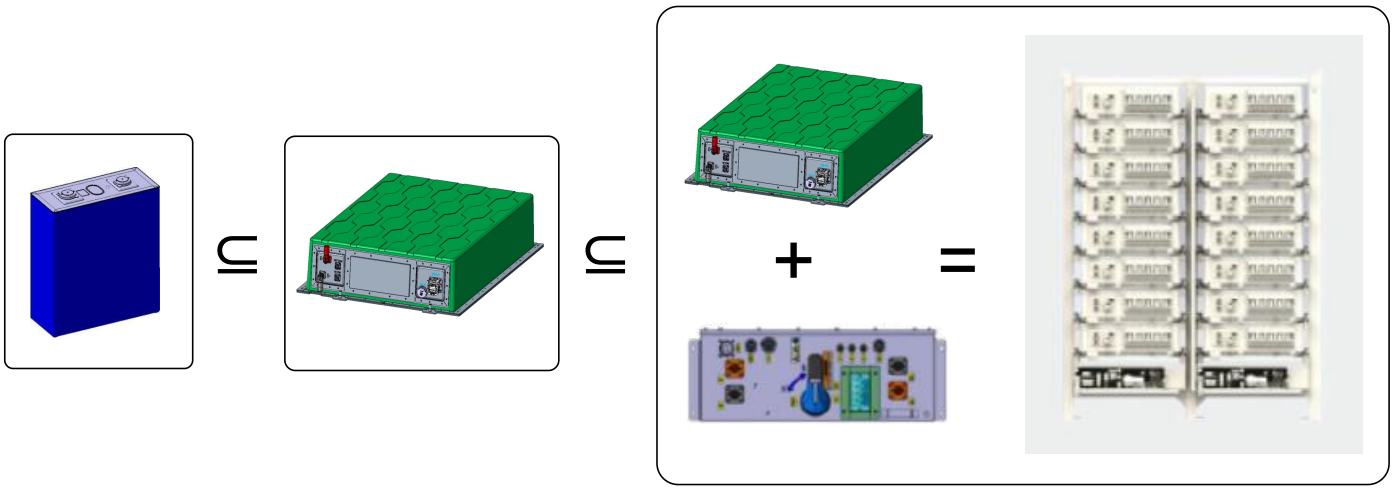
Item	Parameter
Cell series & parallel	1P52S
Nominal voltage	166.4v
Voltage range	145.6-187.2v
Storage energy	52.249kwh@0.5C
Operate temperature	-20℃~55℃
Module weight	around 330kg
Module size（W*D*H)	810*1172*245mm



◆ Frame

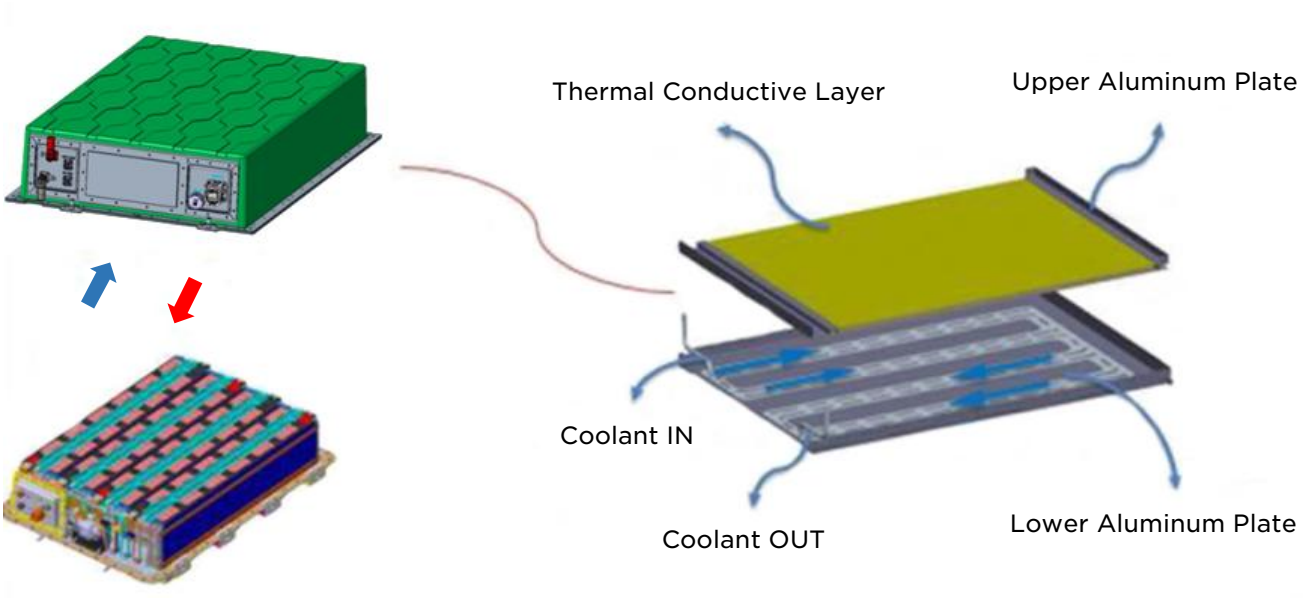
Cell: 3.2v 314ah
Module: 1P52S cells to form a 166.4v 52.249kwh module;
Cluster: 8 modules in series to form a 1331.2v 417.997kwh cluster;
Container: 11 clusters in parallel to form a 1331.2v 4.597mwh container (20ft).

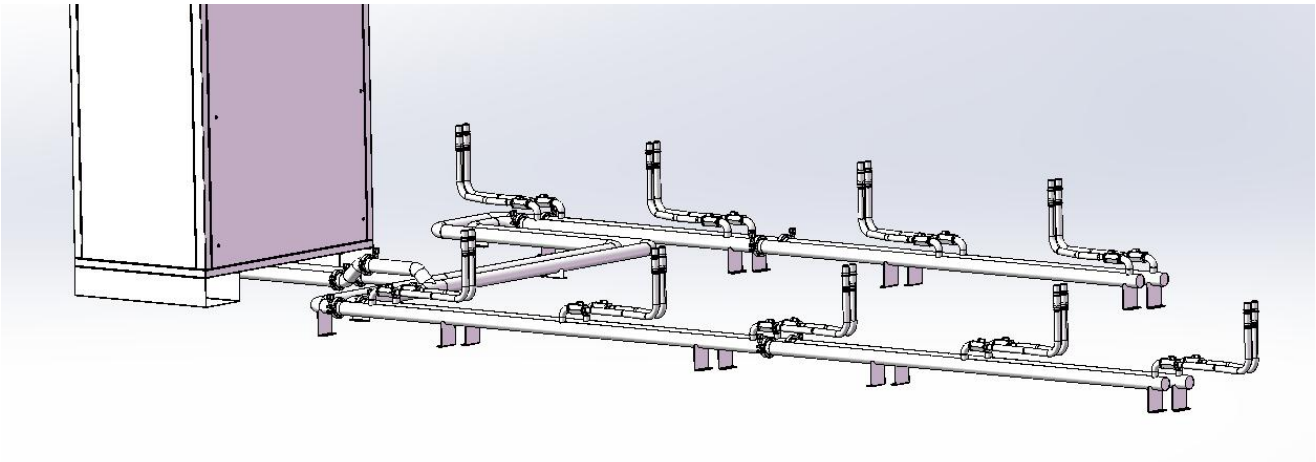


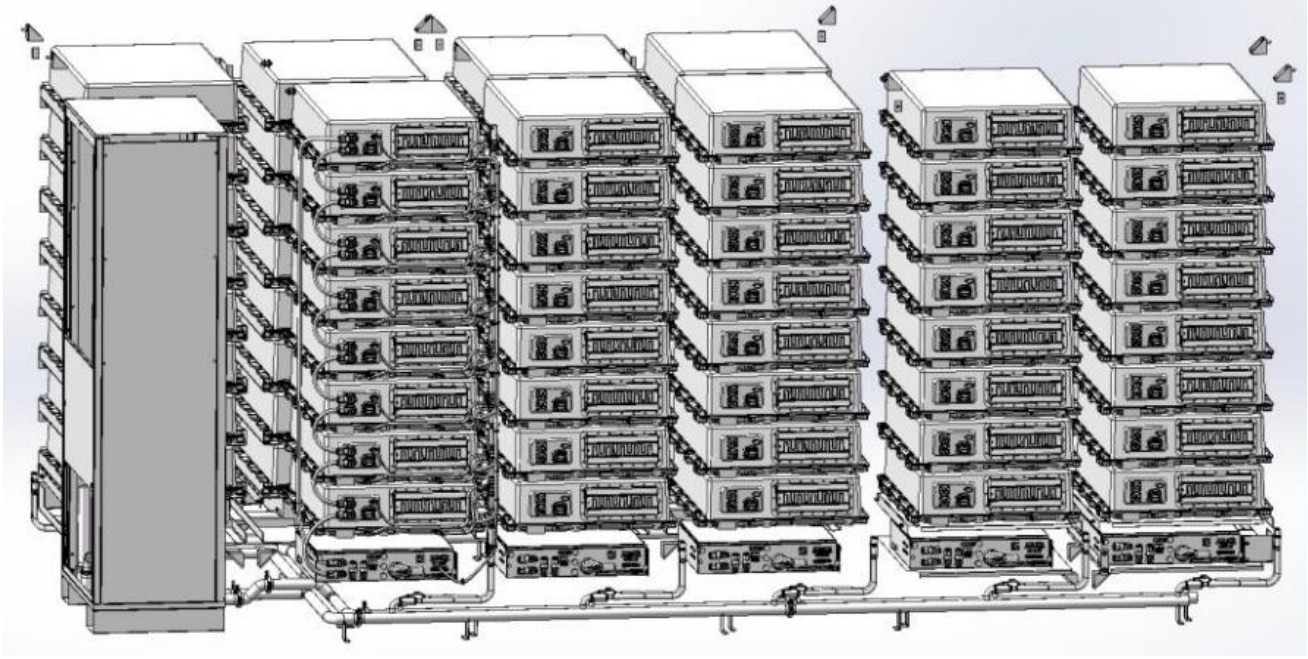


Liquid Cooling System

The liquid flows in the pipes and absorbs the heat of the battery through direct contact between the coolant and the battery. Since the water pump will continue to provide coolant circulation power when it is working, the coolant will flow away from the liquid cooling plate, and the new low-temperature circulating fluid produced will continue to absorb the heat of the battery.







◆ Fire Extinguishing System

- When any combustible gas detector triggers:

CBESS cut off — Start ventilation — Bell alarming — Send fire alarm signal

- When any smoke/heat detector triggers:

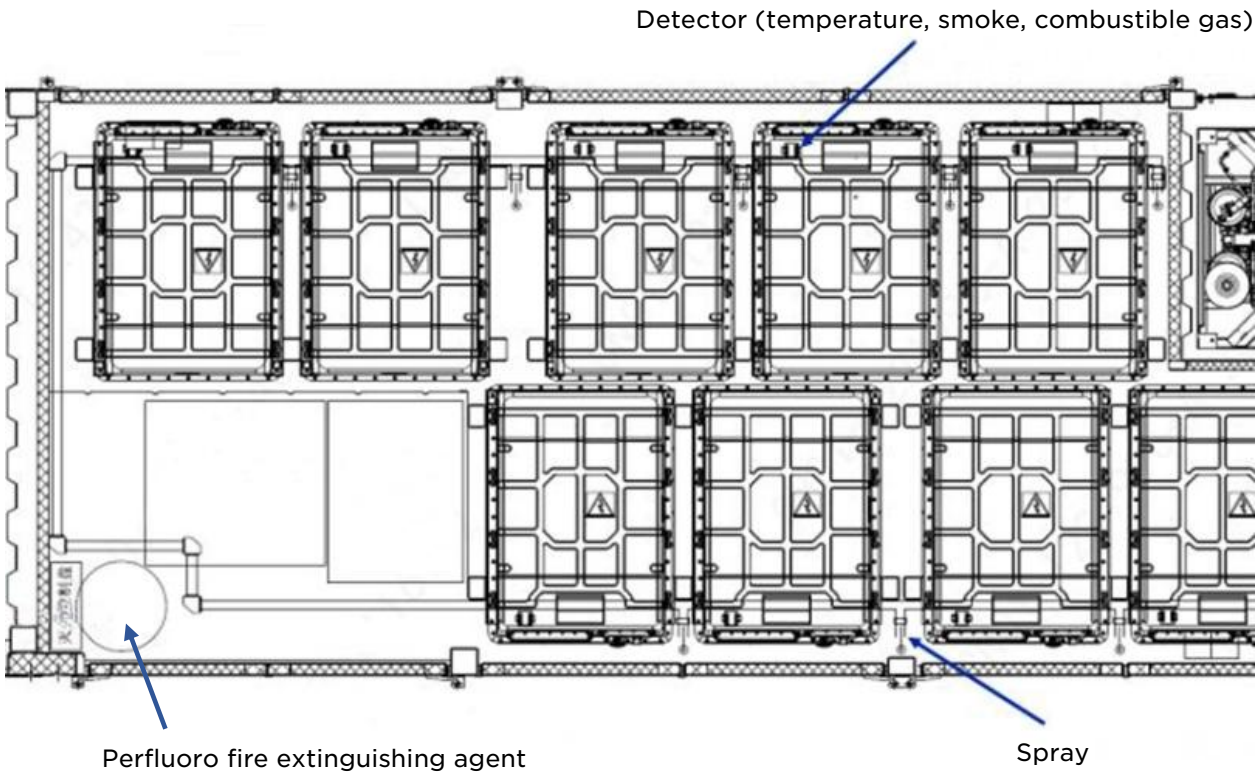
Bell alarming — Send fire alarm signal

- When any two detectors trigger at the same time:

Bell&Light alarming — Countdown to spraying fire extinguishing agent — The host outputs the fire extinguishing joint action signal — Close ventilation

Spray fire extinguishing agent — CBESS cut off — No entry warning light turns on

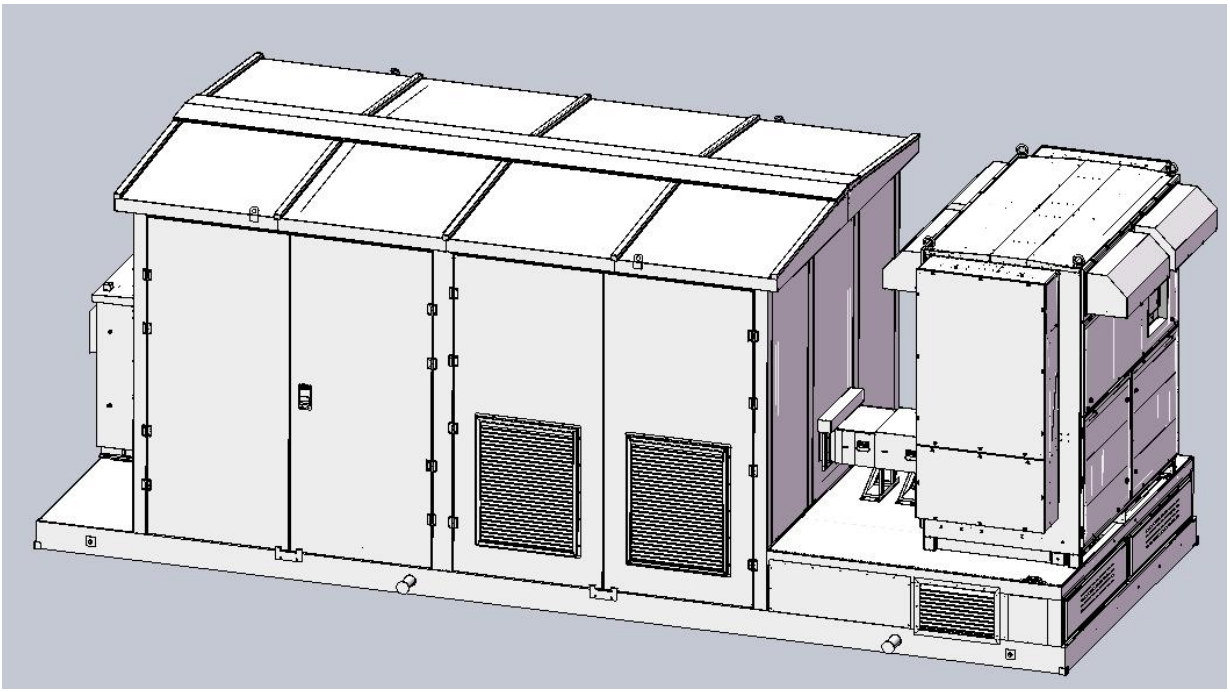
Spray for 90s → (20mins later) Spray for 60s → (15mins later) Spray out all fire extinguishing agents



PCS Cabin

The PCS cabin adopts a box structure to integrate the PCS（Power Conversion System）, isolation transformer, high-voltage input switch, low-voltage auxiliary power supply system and communication system. It can complete energy deployment and power control independently or by receiving external instructions.

It is easy to transport, install, use and maintain. It can realize "plug and play" on site, saving time and cost. This product can be used in new energy storage, AGC (Automatic Generation Control)-assisted frequency regulation for conventional generators, smooth load fluctuations, peak shaving and frequency regulation for power grid, peak shaving and valley filling in industrial and commercial energy storage, improve power supply reliability of micro grids and isolated grids.



◆ Main Configuration List

No.	Name	Specification	Quantity
1	PCS (Power Conversion System)	PCS-2500/0.69-OD	1 unit
2	Isolation transformer	SCB11-2500/0.4	1 unit
3	Auxiliary power control cabinet	Include control unit and UPS	1 unit
4	Outdoor Cabin	2700*5600*3000mm (W*D*H)	1 unit

◆ Features

- Tri-level topology design to assure 99% efficiency.
- Support multiple machines in parallel to expand capacity.
- Support 110% long-term overload to ensure system stability.
- Support seamless switching between off-grid and grid-connected.
- Have islanding prevention function.
- Have HVRT(High Voltage Ride Through) and LVRT(Low Voltage Ride Through) function.
- Have RS485/Ethernet/CAN multiple interfaces, supporting Modbus/RTU, Modbus/TCP, IEC104, IEC61850, CAN2.0B and other protocols.
- Easily switch between PQ(Power Quality/Power Control), VF(Voltage and Frequency Control Mode) and VSG(Virtual Synchronous Generator)modes online.
- Active and reactive power regulation function, supports black start. Black start means that after the grid completely loses power supply, the entire grid system is gradually restored through a generator or power supply with self-starting capability in the grid.

◆ Parameter

No.	Item	Parameter	Remark
AC Parameter			
1	Grid Standard	3-phase, 3-line	
2	Rated Power	2500kw	
3	Over-load Ability	110%：continuously running 120%：more than 1 minutes	
4	Rated Grid Voltage	0.4kv	It can adapt to ±10% fluctuation of grid voltage
5	Rated Grid Current	3608a	
6	Rated Grid Frequency	50Hz	
DC Parameter			
1	DC Input Line	1	
2	DC Voltage Range	1000-1500v	
3	DC Maximum Voltage	1500v	
4	DC Maximum Current	2619a	
System Parameter			
1	Maximum Efficiency	99%	
2	Temperature Range	-25℃~55℃	
3	Humidity	0-95%	

4	Cooling	Intelligent Air	
5	Installation Location	Outdoor	
6	Size (W*D*H)	2700*5600*3000mm	
7	Weight	<17T	

◆ Working Principle

The PCS (Power Conversion System) is a device used to connect battery, Grids, and Loads to achieve bidirectional conversion of electrical energy. When discharging, it inverts the DC power released by the battery into AC power; When charging, it rectifies the AC power of the grid into DC power, which is used to charge the battery, and manages the battery during the process.

On-Grid Mode: The AC side of the PCS is connected to the grid, and its DC side is connected to the battery. It can accept instructions from the EMS (Energy Management System) and, combined with the status of the battery, absorb or release active power through the grid, thereby implementing effective and safe charge or discharge management of the battery. It can realize various charging and discharging methods such as constant current, constant voltage and current limiting, and constant power. The PCS detects the status of the battery management system (BMS) in real time, and can standby or shut down at any time according to the BMS status to ensure the safe use and longer life of the battery.

Off-Grid Mode: Off-grid mode has two situations: planned islanding and unplanned islanding. The anti-islanding protection function of the PCS can avoid unplanned islanding operation of battery. When planned islanding operation, it can be separated from the main grid according to settings to provide power for some loads.

It can running automatically and has a high degree of visualization of its status. The screen can display real-time operating data, real-time fault data, historical fault data, etc.

Its VSG (Virtual Synchronous Generator) function can simulate the characteristics of the grid, participate in the primary/secondary frequency regulation of the grid, and maintain the stability of the grid.

It has the ability to regulate reactive power and can participate in the AVC(Automatic Voltage Control) voltage regulation of the grid. The power factor adjustment range is -1 (lead) ~ +1 (lag).

It can quickly switch operating modes, and the time required to change from charging mode to discharging state is less than 50 milliseconds.

POLINOVEL

Shenzhen Polinovel Tech Co., Ltd
Building 3, Vanke Timemark, 85
Longcheng Ave, Longgang Dist,
Shenzhen, China

Tel: +86 (0) 755 2890 6569
Fax: +86 (0) 755 2890 3442
E-Mail: sales@polinovel.com
Website: www.polinovel.com
www.polinovelgroup.com
www.polinovelbattery.com