PRODUCT SPECIFICATION

5 MWh/ 2.5MWh Energy Storage System

- Solutia A -

Pack design	Pack process	Pack approval	Cell approval	QA. approval	Sales approval

Client Approval	Signature:	Date:
	Company Code:	
	Company Stamp:	

Confidential: () Level 3 () Level 2 (√) Level 1

Update record

Revision	Description	Date	Approval
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Contents

Summary 5
Scope of application 5
Design criteria 5
System scheme 5
Design scheme 5
Configuration 9
System parameter 10
Monomer cell 10
Pack 11
Battery cluster 12
Battery System 13
High Voltage Box 14
3.5.1 Parameter table of high voltage box 14
3.5.2 External interface 14
HMI 15
Water cooling system 16
Describe 16
Parameter table 16
BMS 18
5.1 Topological graph 18
BMS Function description 19
BMS Parameters and configuration values 19
High voltage zone 20
7. Container 21
8. EMS 22
9. Fire control 22
10. Packaging,storage,transportation and maintenance 23
10.1 Packaging 23
10.2 Storage requirements 23
10.3 Transportation requirements 24
10.4 Maintenance requirements 24
10.5 Product identification 24

11. Matters needing attention 24
12. Risk warning 25
13. Boost inverter integrated cabin 25

Summary

Scope of application

This specification provides a detailed description of the performance indicators, parameter thresholds, product usage conditions, and risk warnings of 314Ah rechargeable lithium iron phosphate prismatic cells, battery modules, battery clusters, battery system liquid cooling units, BMS, and other applications in large-scale energy storage container systems produced by Orient Power.

Note: The specifications shall be defined in Chinese.

Design criteria

GB/T 13384-2008	General specification for packaging of mechanical and electrical products
GB/T 191-2008	Pictorial marks for packaging, storage and transportation
GB/T 2423.1-2008	Environmental testing of electric and electronic products Part 2: Test methods test a: low temperature
GB/T 2423.2-2008	Environmental testing of electric and electronic products Part 2: Test methods test B: high temperature
GB/T 4208-2017	Enclosure protection class (IP code)
GB/T 36276-2023	Lithium-ion batteries for electric energy storage
GB/T 34131-2023	Battery management system for electrical energy storage
GB/T 34120-2023	Technical specifications for electrochemical energy storage system energy storage inverters
GB/T 34133-2023	Technical specifications for testing energy storage inverters

System scheme

Design scheme

Environment Condition

Table 1.1 Environmental parameters of the project site in Romania

No	Name		Company	Buyer value
1	Connection method with other devices		/	RS485
2	Rated frequency		Hz	50
3	Ambient temperature	Maximum daily temperature	℃	38.5

4		Minimum daily temperature	℃	-25
5		Maximum daily temperature difference	℃	22
6		Average temperature of the hottest month	℃	22-38
7		Highest annual average temperature	℃	22.3
8	Humidity	Daily average relative humidity	%	76-78%
9		Monthly average relative temperature	%	75.8%
10	Altitude		m	80
11	Solar radiation intensity		W/cm^2	0.015-0.017
12	Maximum ice thickness		mm	120
13	Years, extremely high wind speed		m/s	27.7
14	Earthquake tolerance ability	Peak acceleration of vibration	g	0.08
15		Seismic fortification intensity	degree	0.10-0.15
16		Three cycle safety factor of sine resonance	1.5	
17	Installation site		outside	
18	Pollution level		Clean and tidy place	

The 3.2V/ 314Ah lithium iron phosphate prismatic battery cell manufactured is used in this scheme. The battery system consists of 1P416S * 12clusters, each containing 8 1P52S battery modules, and each module containing 4 1P13S modules. The battery management system inside the box uses high-precision BMS to collect and monitor data from the battery pack. The BMS has external communication function and is compatible with the supporting PCS, HMI, EMS, and water cooler Firefighting and other equipment can transmit data and operate safely and stably for a long time.

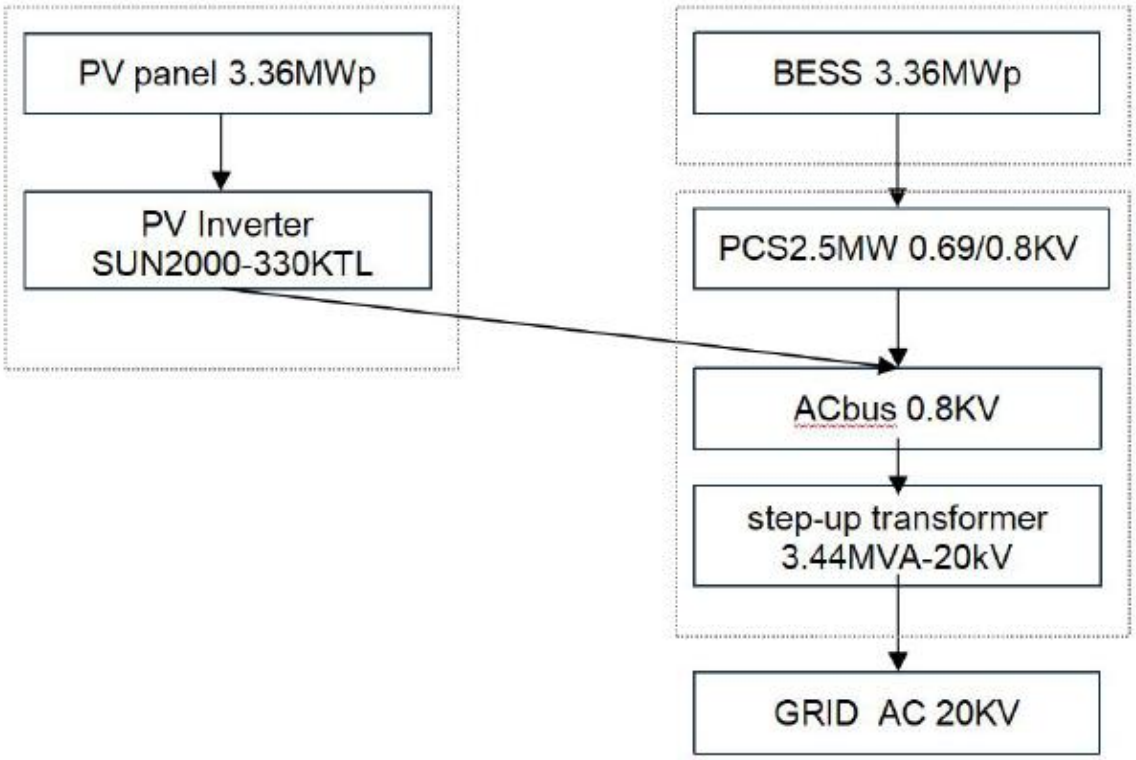
The AC side is connected to the grid on the 20kV side using a 2500kW boost inverter module through the transformer output.

According to the TCEC373-2020 standard, the fire separation distance between each prefabricated compartment should be greater than 3 meters. When using a firewall, the fire separation distance is not limited.

One energy storage unit needs to build a water storage tank, which is used as the water intake point for the water fire protection system. Lightning protection towers should be arranged around it, and the number should be based on the coverage range. They should be connected to the underground network together with the grounding point of the prefabricated cabin.

This program adopts one 5.015MWh containers configured with a 2.5MW boost inverter integrated cabin, 2500kW boost inverter consist of 2 set of 1250kW PCS, through the transformer output voltage of 20kv, the system operates at a multiplication rate of 0.5C.

The topology diagram is as follows ：



System Component:

Battery Pack

A battery pack is the core part of an energy storage system and consists of multiple battery cells used to store and release electrical energy.

Battery Management System (BMS)

The BMS is responsible for monitoring, managing and controlling the battery pack to ensure its safety and performance. It has the functions of battery status monitoring, temperature control, battery charging and discharging protection and equalization, etc. It can discover and solve the problems in the operation of the battery pack in time and improve the reliability and stability of the system.

EMS

Equipped with a user-side EMS (Energy Management System), the system has a capacity of 2.5 MW/5 MWh. It is responsible for monitoring and controlling the operation of the energy storage system. As the brain of the entire system, it manages the energy flow of the photovoltaic and energy storage systems, preventing issues where the transformer capacity (3.44 MVA) is less than

the sum of the rated power of the photovoltaic and energy storage systems (3.3 MW + 2.5 MW = 5.8 MW). It also enables peak-shaving and valley-filling (charging during off-peak/normal hours and discharging during peak hours), smoothing photovoltaic output, etc. The EMS can control charging and discharging based on feedback information, optimize scheduling and energy management of the battery pack, and ensure the safe and stable operation of the energy storage system.

PCS

PCS is a bi-directional converter, which can realize the bi-directional energy transfer between AC grid power and storage battery power. This means that it can convert AC power from the grid into DC power to charge the battery, and it can also convert the DC power in the battery into AC power to supply the grid or users.

Transformer

Its main function is to regulate the AC voltage of electrical energy during transmission, distribution and utilization. In the energy storage system, the transformer can convert the electric energy into the appropriate voltage according to the actual needs to ensure the normal operation of the energy storage system.

Function Description:

Grid-connected mode:

1) The energy storage system in grid-connected mode mainly plays the role of peak shaving and emergency backup. During the peak load period of the grid, the energy storage equipment can release power to reduce the pressure on the grid; charge during the trough of the grid tariff and discharge during the peak in order to optimize the electricity expenditure.
2) The energy storage system releases electricity during cloudy or inclement weather when photovoltaic power generation is insufficient, ensuring a stable power output from the entire system.

Off-grid mode:

1) When the grid fails or needs to be operated off the grid, the energy storage system forms an independent power supply system that does not rely on the grid for power supply to meet load demand.

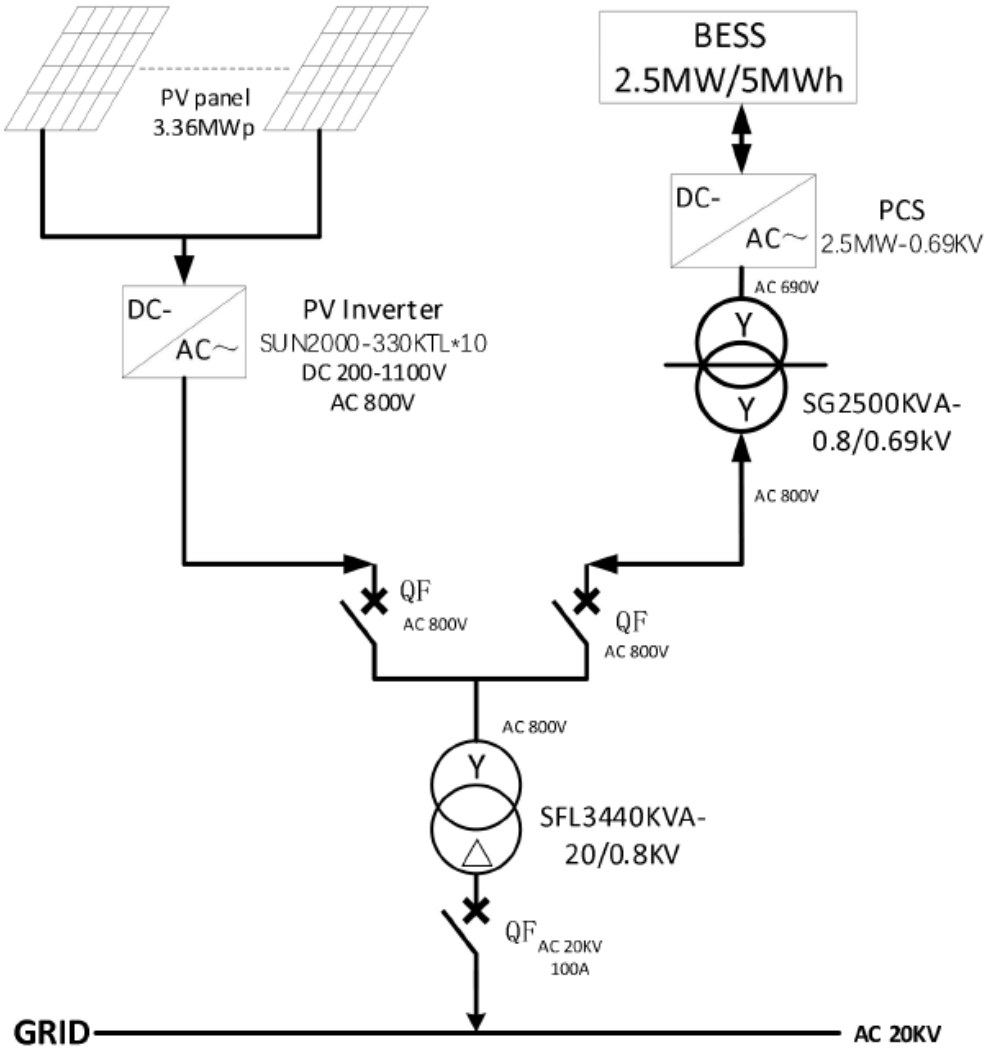


Fig. 2.3 topological diagram of system(for reference only)

Configuration

Based on standard battery modules, Zhuhai Oute designed a standard 20-foot containerized energy storage system (6058*2438*2896mm) with a total power capacity of one 5.015MWh prefabricated container and one 2500kW PCS + 3.44MVA step-up transformer integrated container. Due to the PCS, isolation transformer, step-up transformer, and ring main unit modules contained within the integrated step-up container, the step-up container is divided into two 20-foot containers connected by cables.

Table 2.2-1 20 foot container system configuration table

Type	Model	V Voltage min	V Voltage max	V Voltage rated	Wh Energy	Quantity
Cell	314Ah	2.8	3.55	3.2	1004.8	4992
Pack	1P104S	291.2	369.2	332.8	104499.2	48
cluster	1P416S	1164.8	1476.8	1331.2	417996.8	12
System	12P416S	1164.8	1476.8	1331.2	5015961.6	1

System parameter

Monomer cell

The following chart shows the main parameters of the cell:

NO.	Name		Product Specification	Condition
1	Cell capacity		≥314Ah	2.8~3.55V, 25±2℃0.5C discharge current, new battery state.
2	Working voltage		2.8~3.55V	N.A
3	Internal resistance（1kHz）		≤0.25mΩ	Refer to the specification of electric core for details
4	Operating temperature (charging)		0~55℃	Refer to the specification of electric core for details
5	Operating temperature (discharging)		-20~55℃	Refer to the specification of electric core for details
6	Weight		5.65±0.15kg	N.A
7	Standard operating current		157A	25 ± 2 ℃ ambient temperature
8	Max. sustainable operating current		314A	25 ± 2 ℃ ambient temperature
9	Storage temperature	1 Month	-30℃-45℃	SOC: 25% -40% Storage environment humidity ≤ 85% RH, no condensation
		6 Months	-20℃-35℃	

10	Monthly self discharge rate	≤3.5%/ month	25°C, 50% SOC, after 3 months of new battery storage
11	Cell dimension	(71.8*207.1*174.2) ±0.8mm	300 ± 20kg.f
12	Cycles	>6000	

Pack

The battery module consists of eight standard modules connected in series

The following chart shows the main parameters of the battery module

Table 3.2 314Ah battery box parameter list

NO.	Name	Product Specification	Condition
1	Combination mode	1P104S	N.A
2	Nominal voltage	332.8V	N.A
3	Voltage range	291.2~369.2V	Monomer protection 2.8to 3.55V
4	Nominal energy	104.499kWh	25℃±2,0.5C
5	Standard operating current	157A	N.A
6	MAX. operating current	170A	N.A
7	Installation mode	Plug in pack type	N.A
8	Charging temperature	0~55℃	N.A
9	Disharging temperature	-10~55℃	N.A
10	Cooling mode	Liquid cooling	N.A
11	Battery module size	See below	Please refer to the actual product for details
12	Pack weight	≤730kg	N.A
13	Protection grade	IP67	N.A

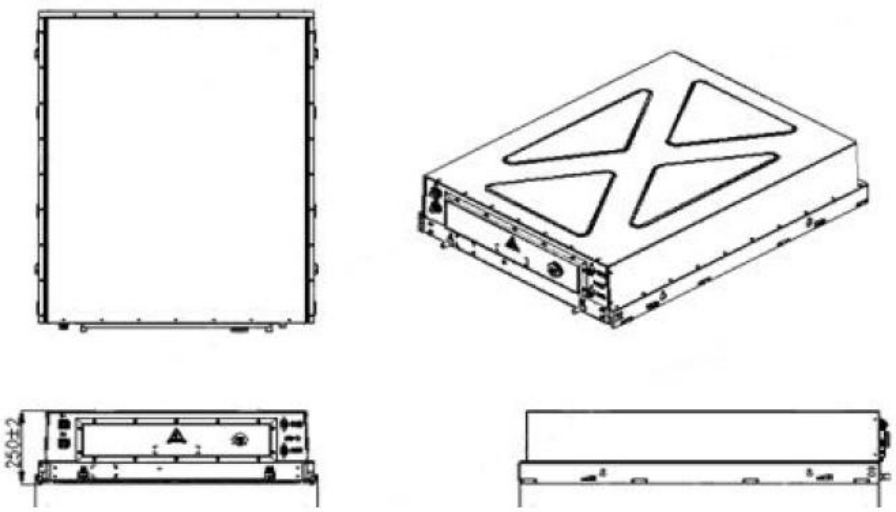


Fig. 3.2-1 Schematic diagram of battery box (for reference only)

Battery cluster

The battery cluster consists of 4 battery modules connected in series, a high-voltage box, and other wiring harness accessories.

The following chart shows the main parameters of a standard battery cluster:

Table 3.3 Standard battery cluster parameter

NO.	Name	Product Specification	Condition
1	Combination mode	1P416S	N.A
2	Nominal voltage	1331.2V	N.A
3	Voltage range	1164.8~1476.8V	Monomer protection 2.8 to 3.55V
4	Nominal energy	417.99kWh	25℃±2,0.5C
5	Available energy	≥388.73kWh	25℃±2,0.5C
6	Standard operating current	157A	N.A
7	MAX. operating current	170A	N.A
8	Charging temperature	0~55℃	N.A
6	Disharging temperature	-10~55℃	N.A
10	Cooling mode	liquid-cooled	N.A

11	Battery rack size	See below	Please refer to the actual product for details

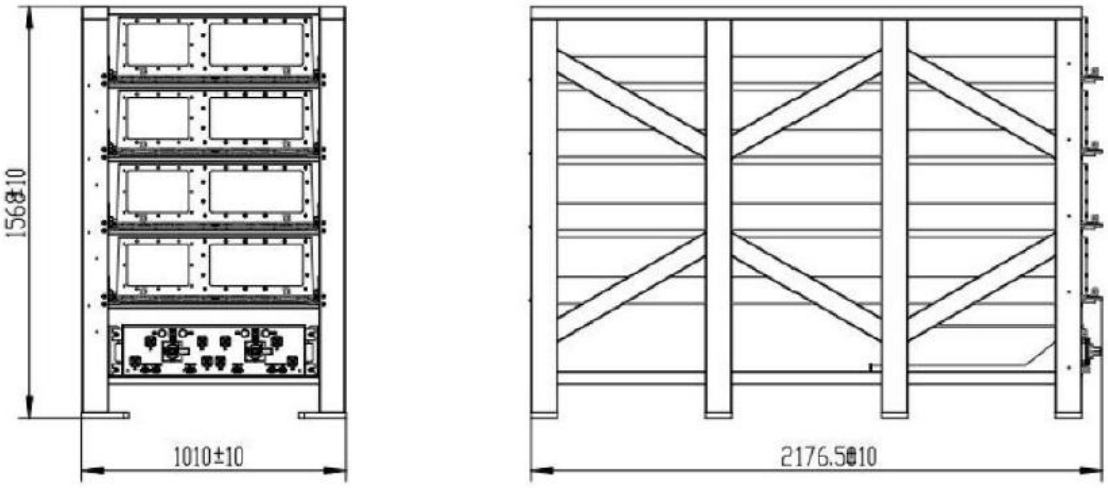


Fig. 3.3-1 Schematic diagram of battery cluster (for reference only)

Battery System

The following is the layout of a 20-foot container system:Built-in 12*1P416S batteries,one power distribution box,one water cooler,one fire control system,one temperature and humidity system,and exhaust system.

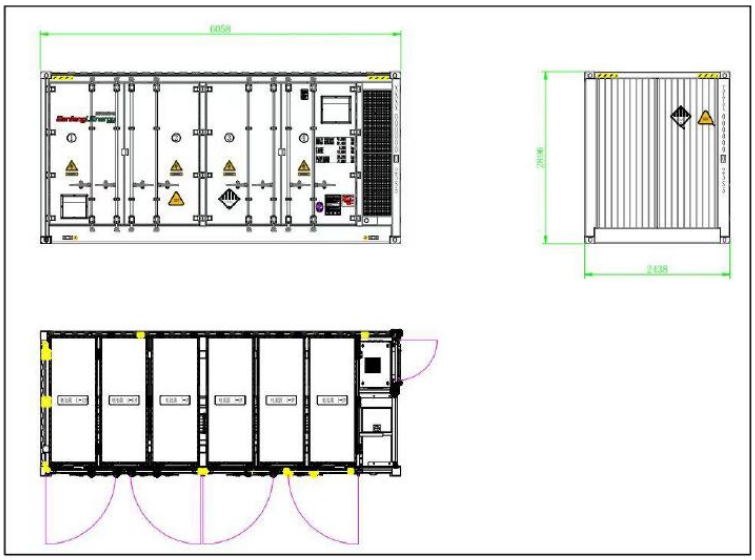


Fig. 3.4-1 20 ft container layout diagram (for reference only)

High Voltage Box

Each battery cluster contains one high-voltage box, which is mainly responsible for voltage and current collection of the battery cluster, summarizing the voltage and temperature information of individual batteries within the cluster, calculating the SOC/SOH status of the battery cluster, executing balancing strategy judgment and battery fault diagnosis functions, and implementing on-site protection and relay control of the battery cluster based on battery fault information. The high-voltage box has a communication interface, which can achieve data communication with the battery management unit (BAU) and battery array management unit (EMS). BMS has functions such as insulation collection and individual SOC/SOH state calculation.

3.5.1 Parameter table of high voltage box

The parameters of high voltage box areas follows ：

Table 3.5 1 Parameter table of high voltage box

NO.	Name	Describe
1	Main components	BCU, relay, fuse, shunt, etc
2	Panel device	Air switch, circuit breaker, 220 V AC interface, etc
3	Protection function	System protection, insulation / total voltage detection, etc
4	IP	IP2X
5	Installation mode	Plugin box

3.5.2 External interface

The definition of external interface of high voltage box is as follows ：

Table 3.6 2 external interface of high voltage box

NO.	Name	Describe	Observations
1	High voltage input positive	BAT1+	N.A
2	High voltage input negative	BAT1-	N.A
3	High voltage input positive	BAT2+	N.A
4	High voltage input negative	BAT2-	N.A
5	AC input	220Vac	N.A
6	Inter box communication	BCU-BMU	N.A
7	External communication	BCU-BAU	N.A
8	High voltage output positive	PCS1+	N.A

9	High voltage output negative	PCS1-	N.A
10	High voltage output positive	PCS2+	N.A
11	High voltage output negative	PCS2-	N.A
12	Ground point	M6 screw	N.A

HMI

Each energy storage system is equipped with a 10 inch display screen, which is used to display the main parameters such as the operating status and alarm information of all battery clusters under the overall control.

Table 3-6 Display parameters

NO.	Name	Describe	Observations
1	Dimensions and specifications	10-inch color touchscreen	N.A
2	Power supply mode	DC24V	N.A
3	Communication mode	RS485	N.A
4	Running state	Stop, standby, charging, discharging, fault, emergency stop, etc	N.A
5	Alarm information	Overcharge, over discharge, over current, over temperature, insulation fault, communication fault, self check fault, etc	N.A
6	Main parameter	SOC,total voltage, total current, maximum and minimum cell voltage, maximum and minimum temperature, etc	N.A
7	Display parameters	With the battery cluster details button, click to open the corresponding details page. The battery cluster details display the operation status, alarm information, SOC, total voltage, total current, insulation resistance value, maximum cell voltage difference, maximum temperature, all cell voltages, all temperature measurement values, and make special marks for the maximum cell voltage, minimum cell voltage, maximum temperature and other parameters.	N.A

8	Settings window	Display window, setting window, history record, etc.	N.A
9	Storage function	Historical data can be stored and read by SD card.	N.A
10	Installation	Combiner cabinet panel	N.A

Water cooling system

Describe

Containerized battery pack water cooler is air-cooled chiller. Outside the machine side through the fan will release heat into the air, the unit internal compressor refrigeration system through the heat exchanger and the refrigerant glycol solution heat exchange, computer control system through the upper computer and the unit of water temperature and pressure of the feedback signal logic control system output temperature, the water system based on the main line and the battery module resistance configuration of the circulating water pump, the system to control the module refrigerant (glycol solution) in and out of the module flow.

Each battery prefabrication compartment is equipped with a water-cooled machine. The liquid cooling unit is equipped with a comprehensive anti-condensation, anti-leakage liquid and automatic liquid replenishment design.

1. The liquid cooling tube is wrapped in anti-condensation foam to effectively prevent water droplets and condensation from damaging the battery pack.
2. After the installation of the liquid cooling pipe, an air tightness test will be carried out. Only after passing the test can the liquid be injected for operation. There is a pressure monitoring gauge at the inlet and outlet of the unit, and the pressure inside the pipe during the operation and static state of the liquid cooling unit will be detected. When the pressure value is abnormal, an alarm will be triggered, and information will be reported to the monitoring platform.
3. Each prefabricated compartment is equipped with two sets of sensitivity adjustable water immersion transmitters and probes at the bottom. The transmitters are equipped with RS485 communication function, which can quickly detect the leakage situation and report alarm signals and monitoring platforms in case of leakage.
4. The system has the function of automatically replenishing coolant. The additional stored coolant tank is connected to the main pipeline and isolated with a water stop valve in the middle. When the pressure gauge of the unit detects a liquid leak, the system will automatically open the water stop valve, and the main pipeline will suck in the stored coolant until the pressure value is normal, which can reduce the maintenance frequency of operation and maintenance personnel.

Parameter table

This project is equipped with a water-cooled machine with the following parameters:

NO.	Name	Describe	Observations
1	Working voltage	-	380Vac
2	Power	kW	60
3	Cryogen	-	R32
4	Refrigerant carrier	-	50% pure water + 50%glycol
5	Automatic fluid replenishment function	L	≥8L
6	Communication protocol	-	RS485
7	Refrigerating capacity	kW	60
8	Noise	dB	≤80
9	Protection grade	-	IPX5
10	Anti-corrosion grade	-	C3
11	Operating ambient temperature	℃	-30~55℃
12	Weight	kg	≤500

BMS

Topological graph

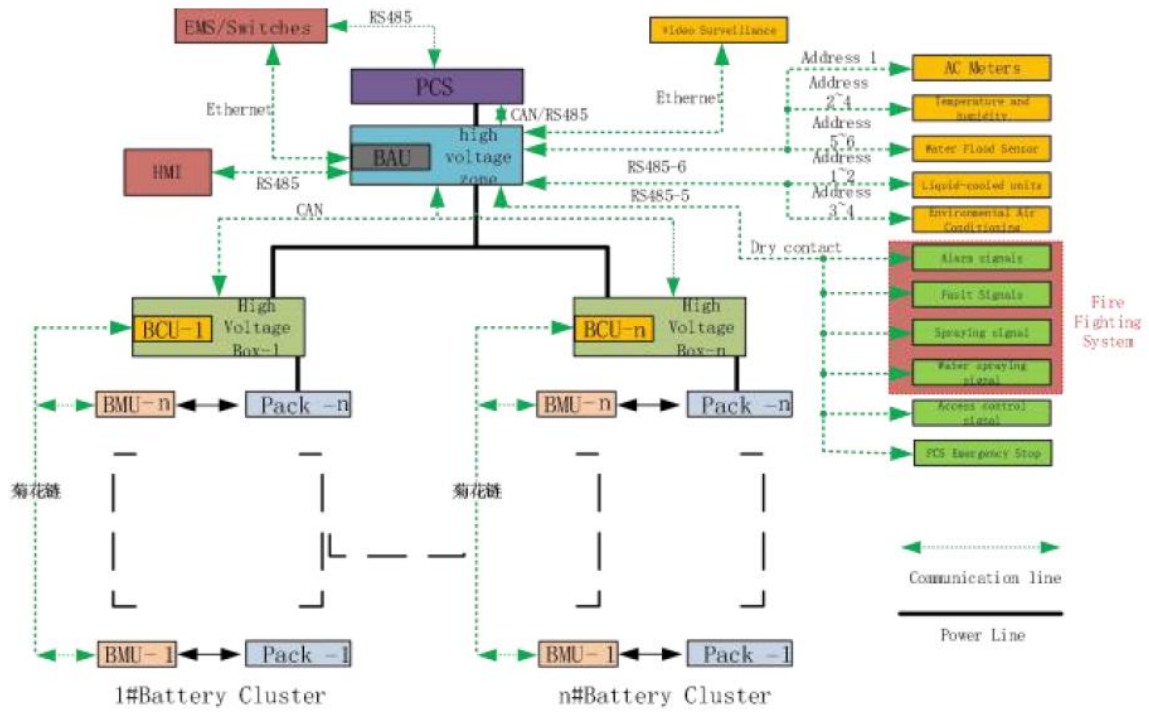


图 5.1 系统拓扑示意图（具体以设计为准）

Figure 5. 1 System Topology Schematic (as designed)

The battery management of the system adopts a three-level BMS architecture, which enables control management to achieve corresponding functions and ensure system stability and reliability.

BMU battery cell management unit: responsible for collecting information on each cell of the battery (voltage, temperature), providing calculation and analysis of the battery's SOC and SOH parameters, achieving balance of individual cells, and uploading abnormal information of individual cells to the battery cluster unit BCU.

BCU battery cluster management unit: responsible for collecting various individual battery information uploaded by BMU and collecting various information of battery pack (group voltage, group temperature). Calculate and analyse the SOC and SOH of the battery pack, including charging and discharging currents, and upload the information to the battery pack management unit (BAU).

BAU Battery Pack Management Unit: mainly responsible for collecting various battery information uploaded by BCU, controlling the charging and discharging of the system based on the current

working conditions and battery pack status, and uploading all information to PCS and EMS for battery status management. It can communicate with peripheral devices.

BMS Function description

The battery management system is a real-time monitoring system composed of electronic circuit devices, which can effectively monitor battery voltage, battery current, battery cluster insulation status, battery SOC, manage system charging and discharging safety, alarm and emergency protection for possible faults, optimize control of the battery system, and ensure safe, reliable, and stable operation of the battery.

BMS Parameters and configuration values

The battery management system consists of a battery cell management unit (BMU), a battery cluster management unit (BCU), a battery pack management unit (BAU), and its current, voltage, and temperature detection units. The BMS system has functions such as high-precision detection and reporting of analogue signals, fault alarms, uploading and storage, battery protection, parameter settings, active equilibrium, battery pack SOC calibration, and information exchange with other devices.

BMS parameters areas follows：

Table 5.3-1 BMS parameters

NO.	Name	Describe	Observations
1	Supply voltage	24Vdc	External power supply
2	Equilibrium mode	Active balance	N.A
3	Voltage acquisition	±0.3%	N.A
4	Current acquisition	±0.2%	N.A
5	Temperature acquisition accuracy	±1℃	N.A
6	SOC precision	≤8%	N.A
7	Voltage acquisition cycle	≤200ms	N.A
8	Current acquisition cycle	≤50ms	N.A
9	Temperature acquisition cycle	≤5s	N.A
10	Alarm protection	Overcharge,over discharge,over temperature and short circuit	Support the communication protocol of domestic mainstream PCS and EMS equipment
11	Communication mode	CAN、RS485 Ethernet	
12	Communication protocol	CAN2.0B/modbus-RTU/IP	

Table 5.3-2 system control strategy

Alarm level 1 (power reduction requested)	Alarm level 2 (PCS standby)	Protection level 3(relay cutoff)
Single-cell overcharge/ overdischarge alarm; single cell voltage difference alarm; single cell charge / discharge high temperature / low temperature alarm; temperature difference alarm; total voltage high / low alarm; charge / discharge current high alarm; insulation low alarm, etc	Single cell overcharge / overdischarge; large voltage difference of single cell; high / low temperature of single cell charge / discharge; large temperature difference; high / low total voltage; high charge / discharge current; low insulation	Overcharge / overdischarge of single cell, large voltage difference of single cell, high / low temperature of single cell charging / discharging, large temperature difference of total voltage, overvoltage / undervoltage charging / discharging overcurrent protection. Low insulation, communication timeout, cell failure, NTC failure, etc

High voltage zone

There is a high-voltage area inside the container, with the upper half containing AC power distribution, communication, and convergence functions, with auxiliary power switches, HMI, switches, BMS, switch power supply, etc. The lower half of the area serves as a convergence function, with 12 battery clusters converging to the input DC bus bar. After passing through the circuit breaker, it is connected to the PCS (the specific configuration of the convergence cabinet is designed according to the actual situation of the project).

Power distribution function (tentative)

1)Main circuit breaker for control power(3P5W);

2)Three-phase power supply of the water cooler is 380VAC, one circuit of 3L+PE, and the current is 40 A;

3)220V power supply for lighting and socket, several;

4)UPS input power supply 220V power supply;

5)BMS auxiliary 24V power supply (provided by UPS);

6)Auxiliary 220V power supply for fire protection (provided by UPS);

7)Switch power supply input power supply 220V power supply (provided by UPS);

8)220V power supply of explosion-proof fan (provided by UPS);

9)Control board power supply(provided by switching power supply);

10)Relay control power supply (provided by switching power supply);

11)Touch screen power supply(provided by switching power supply);

12)Electric shutter, temperature and humidity, sensing, temperature sensing, combustible gas, water immersion 24V power supply.

13)The auxiliary switch is required to be controlled by BAU with shunt;

Container

1.The container has excellent ventilation and heat dissipation, insulation and heat preservation. One of the good ventilation and heat dissipation ability to ensure that the container has sufficient airflow, with excellent dust proof system and excellent air circulation system, the same time in the night ventilation system does not work, the outlet for effective protection, to prevent small animals, dust, etc. to enter and outside the wind back flow; heat insulation and heat preservation ability. Container configuration has strengthened the insulation function, the effective thickness of not less than 50mm moisture-proof, flame retardant, heat insulation and heat preservation layer, to ensure that the outdoor high temperature, low temperature will not be passed to the inside of the container.

2.Container protection level is not less than IP54.

3.Waterproof: The top of the box is free from water accumulation, seepage, or leakage, the side of the box is free from rain, and the bottom of the box is free from water seepage. Conduct a rain test before leaving the factory. Test content: Keep the container in working condition, with doors, flaps, and openings closed. The rainfall intensity is between 5mm/min and7mm/min, and the test time is 1 hour. If there is no water seepage or leakage inside the cabin, walls, and openings, it is considered qualified.

4.Thermal insulation: The container's wall panels and doors are treated with heat insulation measures.

5.Corrosion resistance: The container bearing skeleton is coated, the outer wall is corrugated board, the inner wall is thermal insulation composite board, in the actual use of environmental conditions, the appearance of the container, mechanical strength, corrosion degree and so on to ensure that meet the requirements of actual use.

6.Fire resistance: The container shell structure, insulation materials, and interior and exterior decorative materials are all flame-retardant materials.

7.Sand resistance: Containers have the function of blocking sand.

8.Shockproof: Before leaving the factory, containers must undergo lifting, load bearing, and running tests to ensure that the mechanical strength of the container and its internal equipment meets the requirements under transportation and earthquake conditions, without deformation, functional abnormalities, and failure to operate after vibration.

9.UV protection: The properties of the materials inside and outside the container will not deteriorate due to UV radiation, nor will they absorb the heat of UV radiation.

EMS

The energy management system is the top management system of the energy storage system, which mainly monitors and analyses the energy storage system and load. Based on the results of data analysis, a reasonable power distribution is formulated. It can monitor the real-time data of the equipment in the system, view the real-time data of the equipment in the form of configuration or list, and control and dynamically configure the equipment through this interface.

According to the load forecasting results, combined with the measured data of the operation control module and the analysis results of the system analysis module, the energy management system determines the coordinated and optimal control strategy of energy storage / load. It mainly includes energy management, energy storage scheduling, and management strategy. The energy management system can operate in the grid connected mode, which not only ensures the power supply reliability of users, but also improves the economy of the system.

The system supports multi-level alarm. The alarm threshold parameters and thresholds can be set. When the alarm occurs, it can prompt the alarm in time and display the alarm information. When the alarm is eliminated within the alarm delay range, the alarm will not be submitted; When the alarm is generated again within the alarm recovery delay range, no alarm recovery information will be generated.

The following control functions are supported ：

1) New energy consumption

According to the power consumption situation, the stored energy can be used to store a certain amount of limited power when the power is limited; When the power is not limited, use the energy storage system to connect the stored energy to the grid for power generation, reduce the waste energy of the photovoltaic field, and improve the energy utilization efficiency and the economic benefits of the station;

2) Peak cutting and valley filling

That is, according to the peak and valley characteristics of the system load, the surplus light energy can be stored in the low load period, and the power and energy can also be absorbed from the grid; Release the energy stored in the energy storage battery during the peak load period, thus reducing the peak-valley difference of the grid load, reducing the power supply burden of the grid, and to a certain extent, making the output of photovoltaic power generation more stable during the peak load period.

3)Host computer control: The local EMS receives signals from SCADA/other controllers and controls the system's charging/discharging.

Fire control

This project is an aerosol fire extinguishing medium, which is used in each PACK and cabin. In order to adapt to the special needs of energy storage batteries for fire protection, an automatic fire extinguishing system is set up in the battery prefabricated cabin, accompanied by a

composite gas detection and fire alarm system such as CO,VOC or H2,and the gas host is independent of the fire alarm host.

Online monitoring and fire warning system (hereinafter referred to as "early warning system")is set up in the energy storage container, including online monitoring and fire warning device (hereinafter referred to as "early warning device")and system background software. The Early Warning System shall be able to monitor, diagnose and warn of potential safety hazards (including overheating of equipment, materials, cables, connectors, discharge of electrical equipment, thermal runaway of batteries, etc.)in the energy storage power station, so as to effectively prevent the operational safety and fire risks of the energy storage power station.

PACK level fire protection design in the judgment of the battery PACK box thermal runaway,rapid start aerosol fire extinguishing equipment, directly to the root cause of the fire extinguishing,rapid inerting inhibition,so as to prevent the expansion of the thermal runaway,to prevent the secondary re-ignition.It has the advantages of precise positioning detection, precise cooling and fire extinguishing,early warning and early disposal,so as to prevent the fire as far as possible and minimize the loss and impact.

Water fire fighting

The prefabricated cabin is reserved for fire-fighting piping interface,and the cabin is arranged with piping to the top of the battery rack with a stop valve,so that when a fire occurs,fire-fighting water can be accessed to reduce the temperature in the prefabricated cabin,effectively suppressing the fire and preventing recombustion.

Packaging,storage,transportation and maintenance

Packaging

The packaging box of parts and components is marked with the product name,model,quantity,gross weight, manufacturer and contact address,factory date,as well as necessary signs such as "handle with care","afraid of moisture","upward",etc.,and the signs of packaging,storage and transportation comply with the provisions of GB-191-2000.

Storage requirements

(1) When the battery pack needs long-term storage, please charge the battery pack to about 50% of the power. The standard charge and discharge current shall be cycled at least once a month, and the small current shall be conducted every three months (0.1C) activate once. Environmental requirements: temperature 25±5℃, relative humidity 45%～85%, atmospheric pressure 70kpa~106kpa.Place it in a dry and ventilated place to avoid contact with corrosive substances and away from fire and heat sources.

(2) The battery pack is packed and transported to prevent severe vibration,impact or extrusion during transportation,and to prevent exposure to the sun and rain.

Transportation requirements

The battery pack should be transported after packaging,and it should be protected from severe vibration, impact or extrusion during transportation,and protected from sun and rain.It can be transported by car, train,ship,etc.

Maintenance requirements

During maintenance,do not dissect,reassemble or replace the battery in the battery pack by yourself.

Product identification

Clearly visible on the surface of the battery module and high-voltage box are the high-voltage,positive and negative terminals,the symbols defining the interfaces,as well as the traceableQR code of the battery module, battery module,and battery system.

Matters needing attention

11.1 it is forbidden to expose the battery to high temperature environment exceeding the temperature conditions specified in this specification for a long time,otherwise it may cause fire;Under any normal use and storage conditions,the temperature of the battery module shall not exceed 55℃.If the temperature exceeds 55 ℃,the battery management system shall protect and turn off the battery,and prohibit the charging and discharging of the battery module.

11.2 it is forbidden to short circuit the positive and negative poles of the battery pack,and connect the positive and negative poles of the battery pack in strict accordance with the marking instructions.

11.3 it is forbidden to immerse the battery pack in water,fire,microwave oven or pressure vessel.

11.4 when electrolyte leakage is found in the battery pack,avoid skin and eyes from contacting the electrolyte.In case of contact,wash the exposed area with a large amount of water and seek help from a nearby hospital.It is forbidden for people or animals to swallow any parts of the battery.

11.5 in case of liquid leakage, peculiar smell and abnormal noise during the use of the battery pack, please stop charging and discharging immediately and contact the manufacturer. Do not disassemble and disassemble the battery module without permission. Orient Power lithium battery does not undertake any product quality assurance.

11.6 do not dispose the scrapped battery pack at will,so as to pollute the local environment. Please contact a regular and qualified recycling organization or manufacturer for special treatment.

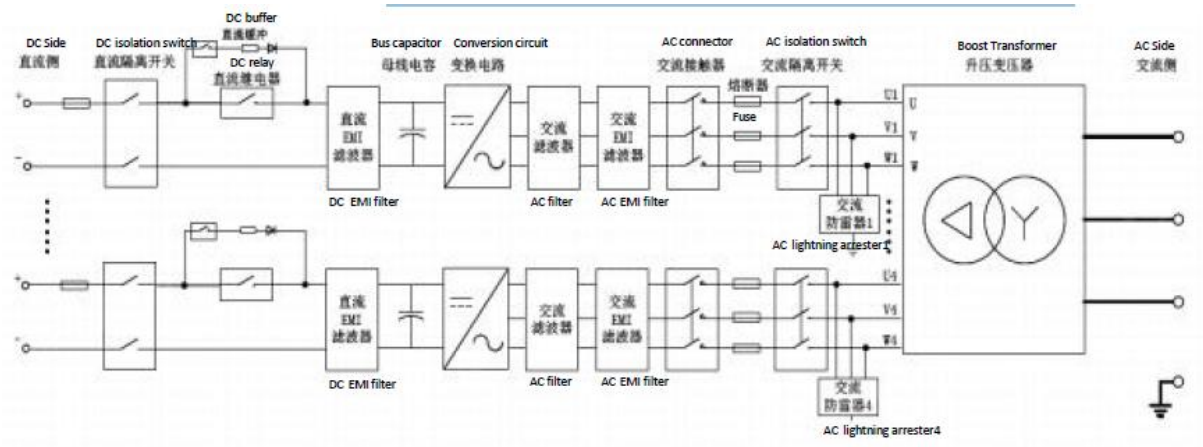
Risk warning

WARNING

CELLSARE POTENTIALLY DANGEROUS AND PROPER PRECAUTIONS MUST BE OBSERVED IN HANDLINGAND MAINTENANCE.
RUNNING TESTS ON THE CELLS IMPROPERLY MAY RESULT IN SEVERE PERSONAL BODY INJURY OR PROPERTY DAMAGES.
WORK ON CELLS MUST BE PERFORMED ONLY WITH PROPER TOOLSAND PROTECTIVE EQUIPMENT MUST BE USED.
CELL MAINTENANCE MUST BE CARRIED OUT BY PERSONNEL KNOWLEDGEABLE OF CELLSAND TRAINED IN THE SAFETY PRECAUTIONS INVOLVED.
FAILURE TO OBSERVE THE ABOVE MAY CAUSE VARIOUS HAZARDS.

Boost inverter integrated cabin

The topology diagram of bidirectional converter is as follows:



2500kW boost inverter integrated cabin, each 2500kW boost inverter consist of 2 set of 1250kW PCS, through the transformer output voltage of 20kV



The specific boost inverter integrated cabin is subject to the actual product

AC AND DC PARAMTER	
Rated Power	2500kVA
Overload capacity	1.1times long-term; 1.8 times overload 10s
AC Voltage	10kV-34.5kV (Consul for other voltage level)
AC Frequency	50Hz/60Hz
DC voltage range	1000~1500V (1040~1500V for full load discharging)
Number of DC BUS	1/2 (Based on PCS branches)
Maximum current per branch	2404A/1202A
THDi/THDu	<3%
LC AND AUXILIARY EQUIPMENT	
Aux. Transformer	150kVA, 690V\400V, 50Hz, 3P4W (Consult for Customized)
UPS	Up to 1kVA (0.5h Standard) (Consul for more capacity)
Meter	Meters for Aux. Power Consumption and PCS
Communication method	RS485, CAN, TCP/IP (via gateway)
Cooling Method	Temperature controlled forced air cooling
TRANSFORMER	
Capacity	2650kVA @45℃ Based on PCS rated power
Transformer Vector	Oil-immersed transformer
Transformer protection	Protection relay for pressure, temperature (two levels) and gas.
Oil retention tank	Galvanized steel. Integrated with hydrocarbon filter. Optional
Winding type	Dy11 (Consult for customized)
MV AC voltage level	6.3/12/24/36kV (Consult for other voltage level)
LV AC voltage	690V (Consult for other voltage level)
AC frequency	50\60Hz
Efficiency	Tier 2 (From EU548)
Transformer impedance	5.75%~8%
Cooling type	ONAN (Based on project requirement)
Insulation level	Class A

CONNECTION AND PROTECTION	
Switchgear configuration	DeV\CV\CCV (Consul for customized)
Switchgear protection	Medium-voltage vacuum circuit breaker(V)
Internal arc classification medium-voltage control room (according to IEC 62271-202)	20kA 3s
LV-MV connections	Copper bar or cable
LV protection	Motorized CB in PCS
MV protection	Microcomputer protection
DC protection	Circuit Breaker and Fuses
GENERAL PARAMETER	
Size (W*H*D)	6058*2896*2438 mm
Weight	≤20t
Enclosure	IP55 for Overall (IP68 for Transformer IP65 for PCS)
Corrosion Prevention	C5 (Only applicable to external mechanical part)
PCS cooling method	Air Cooling
Operating temp.	-40 ℃ to 60 ℃ (De-rating over 45 ℃)
Storage temp.	-50 ℃ to 70 ℃
Operating Humidity	0~95% (No condensing)
Storage Humidity	0~100%(No condensing)
Max elevation	Standard 1000 m (Consult for other elevation)
Inverter Max. Efficiency	98.4%
Voltage regulation accuracy	≤±1%
Current regulation accuracy	≤±1%
CERTIFICATION	
Compliance	IEC62477/IEC61000/G99/VDE4110/ EN50549-2/IEC60076/IEC62271 (Consul for more certification information)