

Solar Energy Storage All-in-one Cabinet Product Proposal

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| <p>This pre-sales proposal is not necessarily the final version. This pre-sales proposal can be revised based on customer needs and/or the company's own product optimization .</p> | | |

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1、 Overview

This series of All-in-one outdoor energy storage cabinets integrates energy storage battery PACK, battery management system(BMS), modular PCS, energy management system (EMS) , power distribution system, fire monitoring system, etc. The battery PACK is modular and the PCS modular design facilitates maintenance and capacity expansion. It has the advantages of small footprint, high integration , safety, reliability, low cost, high energy efficiency and intelligent management .

In common application scenarios, the operation strategy of the energy storage system is as follows:

Peak shaving and valley filling : When the time-of-use electricity price is in the valley section, the energy storage cabinet automatically charges and stands on standby after being fully charged; when the time-of-use electricity price is in the peak section, the energy storage cabinet automatically discharges; arbitrage of the electricity price difference is realized and the economic benefits of the optical storage and charging system are improved.

Solar energy-storage combination : Obtain local load power in real time, solar power generation is given priority for self-use, and excess power is stored. If solar power generation is insufficient to provide local loads, batteries are used first to store power.

The system is connected to the 0.4kV low-voltage power grid and mainly achieves the purpose of peak shaving and valley filling. Carry out regular charge and discharge control according to the peak and valley periods of the project. The charging and discharging control is carried out according to 2 charging and 2 discharging every day, that is, valley charging-peak discharging-flat charging-peak discharging.

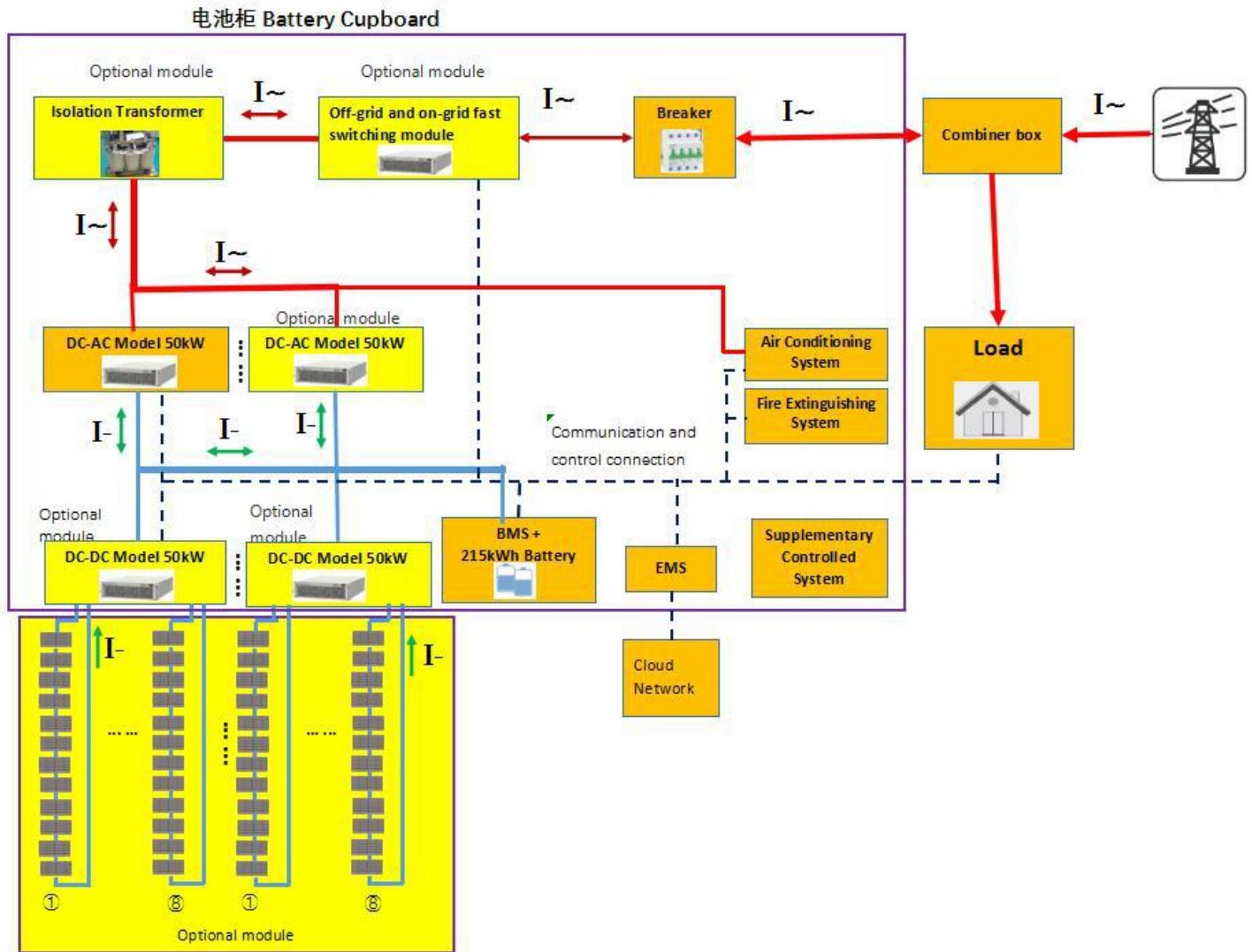
2、standard

| Standard | standard name |
|------------------|---|
| GB/T 36276-2018 | Lithium-ion batteries for power energy storage |
| GB/T 34131-2017 | Technical specifications for lithium-ion battery management systems for electrical chemical energy storage power stations |
| GB/T 34120-2017 | Technical specifications for energy storage converters for electrical chemical energy storage systems |
| GB/T 34133-2017 | Energy storage converter testing technical regulations |
| GB 51048-2014 | Design specifications for electric chemical energy storage power stations |
| GB/T 36558-2018 | General technical conditions for electric chemical energy storage systems in power systems |
| GB/T 36547-2018 | Technical regulations for connecting electric chemical energy storage systems to the power grid |
| | Test specifications for electric chemical energy storage systems connected to the power grid |
| GB/T 36548-2018 | Test specifications for electric chemical energy storage systems connected to the power grid |
| GB/T 32589-2017 | Technical regulations for micro grid access to power systems |
| GB/T 10228-2015 | Three-phase dry-type power transformer technical parameters and requirements |
| GB 4208-2017 | Enclosure protection level (IP code) |
| GB/T 2423.4-2008 | Environmental testing of electrical and electronic products Part 2: Test methods Test Db: alternating damp heat (12h + 12h cycle) |
| GB7251-2013 _ | National standard for low-voltage complete switchgear |
| GB 50217-2007 | Design specifications for power engineering cables |
| GB 17799.4-2012 | Common standards for electromagnetic compatibility Emissions in industrial environments |
| GB 8702-88 | Electromagnetic radiation protection regulations |
| GB 50150-2016 | Standard for handover test of electrical equipment for electrical installation installation projects |
| GB/T 15945-2008 | Power quality power system frequency deviation |
| GB/T 15543-2008 | Power quality three-phase voltage imbalance |
| GB/T 14549-2008 | Power Quality Utility Grid Harmonics |
| GB12325-2008 | Power quality supply voltage allowable deviation |
| GB/T 12326-2008 | Power Quality Voltage Fluctuation and Flicker |
| GB/ T191-2008 | Packaging, storage and transportation diagram |
| DL/T 860-2016 | Power enterprise automation communication network and system |
| DL/T 596-1996 | Preventive testing procedures for electrical equipment |

3、System diagram

3.1. Topology diagram

The type of this project is energy storage peak shaving and valley filling, and the system is connected to the 0.4kV low-voltage power grid .

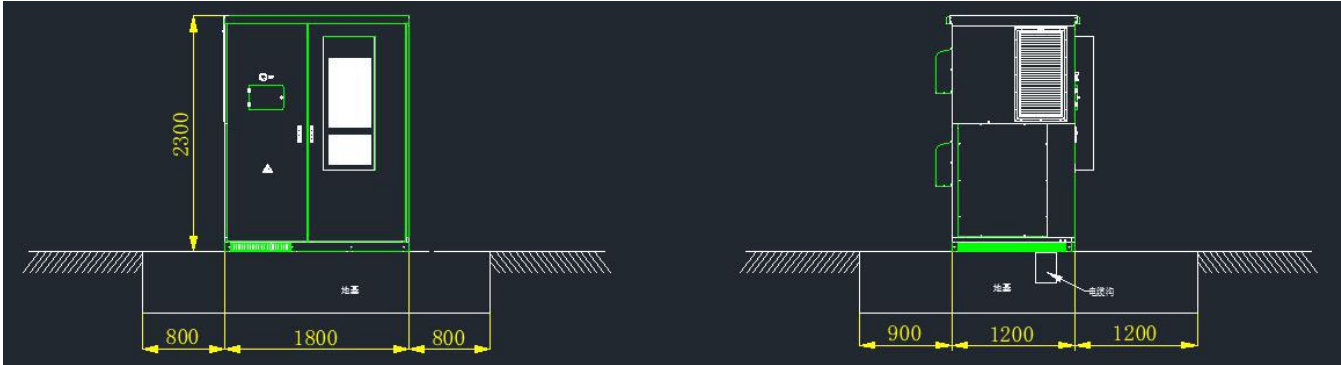


3.2. Diagram

This schematic diagram of the battery cabinet is for reference, and the specific shape and size are subject to the actual design.



3.3. Dimensional diagram



3.4. Product advantages

1) Integration Systematic Products, integrating energy storage batteries, power conversion module(pcs), power distribution systems,air conditioner, and fire extinguishing systems to fully control the system operating status and risks,EMS in one cabinet.

2) Configure the rack modular battery PACK and PCS, which supports parallel connection of multiple batteries and PCS and has good scalability. The number of PCS modules and total battery power can be selected according to the system capacity requirements of different scenarios. The typical configuration is: 100kw/215kwh.

3) Protection grade IP54, can be used directly outdoors and adapt to different types of weather.

4) The door-mounted embedded integrated air conditioner is used, which does not occupy cabinet space, increases the available space of outdoor cabinets, has better top structural integrity and better waterproof effect.

5) The local control panel can realize system operation monitoring, energy management policy limitation, remote equipment upgrade and other diversified functions.

6)This All-in-one cabinet is suitable for microgrid scenarios such as small-scale commercial and industrial energy storage, photovoltaic diesel storage, and photovoltaic storage and charging. The local control screen can perform a variety of functions, such as monitoring system operation, formulating energy management strategies, and upgrading remote equipment.

7)This microgrid management system utilizes a multi-energy complementary power supply mode with photovoltaic power generation supplemented by diesel engine/grid. It's ideal for areas without stable power supply such as islands and borders, as well as new energy photovoltaic self-consumption scenarios like green buildings and zero-carbon parks in urban areas.

4、All-in-one cabinet technique

4.1. System cabinet parameters

| Model | 100kwh/50kw | 215kwh/100kw |
|------------------------------------|--------------------------------------|--------------|
| PV port | | |
| Rated PV input power | 50kw | 100kW |
| Mppt quantity | 2/4 | 4/8 |
| PV voltage range | 200 ~850V | 200 ~850V |
| Grid / Diesel port | | |
| Rated AC power | 50kW | 100kW |
| Max. power | 55kVA | 110kVA |
| Rated current | 72A | 144A |
| Max. current | 79A | 158A |
| Rated AC voltage | 400V(-20%~+15%),,3P+N+PE,50/60Hz | |
| THDi | <3%(rated power) | |
| PF | -1 leading to+1 lagging | |
| Battery energy storage port | | |
| Battery material | Lithium iron phosphate battery (LFP) | |
| Rated battery capacity | 100kwh | 215kwh |
| Rated system voltage | 844.8V | 768V |
| Battery Cell capacity | 120Ah | 280Ah |
| Series of battery | 1P*24S*12S | 1P*20S*12S |
| Cycle Life | ≥ 6000times,0.5C / 0.5C, 25 °C | |
| BMS structure | two levels, BMU and BCU. | |
| Load port | | |
| Rated AC power | 50kW | 100kW |
| Overload capacity | 110%,normaloperation;120%,1minute; | |

| | | |
|---------------------------|--|--------------------|
| Rated AC voltage | 400V,3P+N+PE,50/60Hz | |
| THDi | <3%(linear load) | |
| PF | -1 leading to+1 lagging | |
| General Parameters | | |
| Max efficiency | 97.6% | |
| Protection level | IP54 | |
| Isolation mode | Non-Isolation (Adding isolation transformer is optional) | |
| Operating temperature | -25~60°C(Derating above 45°C) | |
| Altitude | 3000m(>3000m derating) | |
| Communication interface | RS485/CAN 2.0/ Ethernet/dry contact | |
| STS | STS optional | STS optional |
| Transformer | Transformer inside | Transformer inside |
| Dimension(W*D *H) | 1200*1000*2150mm | 1800*1200*2300mm |
| Weight (with battery) | 1500kg | 3000kg |

4.2 Components Introduction

4.2.1 Battery energy storage system



| Cell parameters | | |
|--|--------------|-------------|
| Battery model | 100kwh | 215kwh |
| Cells Chemical | LFP | LFP |
| Rated Voltage | 3.2V | 3.2V |
| Working Voltage Range | 2.8-3.6V | 2.8-3.6V |
| Nominal Capacity | 120Ah | 280Ah |
| Working Temperature Range, Charge | 0~+55 °C | 0~+55 °C |
| Working Temperature Range, Discharge | -20~ +55 °C | -20~ +55 °C |
| Battery Pack | | |
| Cell series and parallel connection qty | 1P24S | 1P20S |
| Rated Energy | 9.216kWh | 17.92kWh |
| Rated Voltage | 76.8V | 64V |
| Working Voltage Range | 60-87.6V | 56-72V |
| Weight | 39±1kg | 139±1kg |
| All-in-one cabinet battery capacity | | |
| Battery Pack Quantity | 11 | 12 |
| Rated Energy | 101kWh | 215.04kWh |
| Rated Voltage | 844.8V | 768V |
| Working Voltage Range | 660 ~ 963.6V | 600 ~ 876V |
| Gross Weight | 800kg | 1680kg |

4.2.2 Battery Management System(BMS)

The energy storage management system consists of the battery management system (BMS) and the energy management system(EMS). The battery selected by our company comes with its own BMS management system, which is divided into two levels, BMU and BCU.

The BMU is located in the battery box, completes the data collection of the individual cell information inside the battery box, and uploads the data to the BCU. At the same time, it completes the balancing of the individual cells in the battery box according to the instructions issued by the BCU.

The BCU is located in the main control box and is responsible for the management of the battery cabinet. It accepts detailed data uploaded by the BMU inside the battery, collects the voltage and current of the battery cabinet, performs SOC calculation and correction, is responsible for battery charge and discharge management, and transfers relevant data Upload to EMS.

| project | Parameter | Remark |
|----------------------------------|---|---|
| Working voltage range | 9V/36V | For reference only, the actual range shall prevail. |
| BMS working power consumption | Rated power≤30W | |
| BMS static consumption | ≤50μA | |
| BMS operating temperature range | -40℃~+85℃ | |
| BMS storage temperature range | -40℃~+95℃ | |
| BMS working humidity range | 0~85% | |
| SOC estimation accuracy | ≤8% | Pure electric working status |
| Cell voltage detection range | 0~5V | |
| Cell voltage sampling accuracy | ≤±10mV | 2V~5V -20℃~55℃ |
| Cell voltage sampling frequency | <100mS | |
| Total voltage detection accuracy | <0.5%FSR | FSR: full scale range |
| Temperature measurement range | -40~+120℃ | |
| Temperature detection accuracy | <±1℃ | |
| Current detection accuracy | <1%FSR | FSR: full scale range |
| Communication function | An RS232/RS485/CAN communication interface should be provided, and a corresponding communication protocol should be provided to upload the lithium battery to the monitoring platform in real time. | |

| | |
|----------|--|
| Function | Module high voltage alarm, module low voltage alarm, discharge over current alarm, charging over current alarm, discharge battery high temperature, rechargeable battery high temperature, discharge battery low temperature, rechargeable battery low temperature, charging system high voltage, discharge system low voltage |
|----------|--|

1) Single battery voltage detection

It adopts a special voltage measurement chip and contains a high-precision A/D conversion module. Accurately and timely monitor battery status and changes during use. Effectively prevent improper use of batteries.

2) Battery temperature detection

Using digital temperature measurement chip, it has good scalability and high detection accuracy.

3) Battery pack operating current detection

It adopts full-scale, high-precision sensors and high-precision integrated chips to meet the needs of current detection and energy accumulation.

4) Battery SOC estimation

Through the current sampling of the shunt, current measurement and SOC estimation are completed, and based on the control parameter requirements, fault classification alarms are performed for excessively high or low SOC.

5) Battery discharge capacity accumulation

In charging mode, the battery management master can record the cumulative charge and discharge capacity of the battery pack.

6) Battery failure analysis and online alarm

BMS has system self-diagnosis function. After the system is powered on, it detects voltage, temperature, communication, clock, memory, internal communication, etc. At the same time, it can judge and alarm the over voltage, under voltage, over current and over temperature of the battery. Consistency of SOC too low/high and battery failure.

7) Charging management

Based on the current information of the battery, the BMS provides the charger with the maximum charging current allowed by the battery in real time. The actual charging current of the battery should be the smaller value between the charging current allowed by the BMS and the maximum output current of the charger.

4.2.3 Electrical system

| project | skills requirement | Remark |
|----------------------------|---|--|
| enter | | |
| AC wiring | 3P3W+PE | |
| AC voltage range | 400±10%Vac; rated: 400Vac | 3P3W+PE |
| frequency adaptability | Range: 45Hz~65Hz; Rating: 50/60Hz | |
| Static withstand voltage | Can withstand 1100V input high voltage impact without damaging the module | Allow the module to enter the protected state. |
| power factor | -1~+1 | Adjustable |
| THDI | ≤3% | |
| Protective function | | |

| | | |
|---------------------------------------|--|---|
| Over current protection | All three AC phases are protected by fuses | |
| Over voltage protection | Protection point: 440±5V | Any one of the three phases will automatically recover |
| Over voltage recovery | Can automatically recover, the return difference is not less than 10V. | |
| Under voltage protection point | Protection point: 360±5V | Any one of the three phases will automatically recover |
| Under voltage recovery point | The return difference is not less than 15V | |
| Over temperature protection | Has over temperature protection | Long-term overheating will not damage the machine |
| DC side | | |
| DC voltage range | 600Vdc~1000Vdc | |
| Rated output power | 100kW | |
| Rated DC current | 166.7A | |
| Switching machine overshoot amplitude | ≤±5% | Full voltage input range, full load output |
| Charge and discharge switching time | ≤20ms | -100%~+100% switching |
| efficiency | ≥98.5% | Rated output voltage, 100% load current test |
| Voltage stabilization accuracy | ≤±1% | |
| Steady flow accuracy | ≤±1% | At 20%~100% rated current |
| Current imbalance | ≤5% | More than 20% of rated current (system tested) |
| Protection characteristics | | |
| DC over voltage protection | 1000Vdc±5Vdc | Can be set |
| AC short circuit protection | Short circuit is not damaged and needs to be restored manually. | |
| Battery reverse polarity protection | | Reverse battery connection will not cause personal safety hazards |

4.2.4 Energy Storage Converter Power Module (PCS)



This series of outdoor cabinet energy storage systems adopts a modular solution. Users can configure different numbers of power modules according to project requirements.

DC/AC module: offers multiple operating modes such as PQ, VF, VSG, CV, MPPT; Three-level topology ensures high conversion efficiency and compatibility with 3-phase 3/4-wire outputs.

DC/DC module: combines solar charging and energy storage functions, with high efficiency and low ripple current thanks to dual interleaved parallel control.

Product Features:

Flexible and convenient: standard rack-mounted modular design with flexible configuration, maintenance, and expansion.

Diversified functions: supports various types of energy storage batteries and photovoltaic modules, auto-identifies devices.

DC/ AC system is adaptive to three-phase three-wire/ four-wire and voltage phase sequences, offering more flexible applications.

DC/ DC DC/ DC system with two inputs enables multi-channel MPPT and battery management with advanced interleaved control technology, small ripple current, and extended battery life.

DC/ DC and DC/ AC adopt three-level circuit design, high conversion efficiency.

| Product Model | PCS-50DC-AC | Remark |
|------------------------------------|--|-----------------------|
| Rated power | 50kw | 2sets*50KW/ module |
| Rated power | 55kW | |
| DC working voltage range | 500-900V | |
| DC full load working voltage range | 500-900V | |
| Max DC current | 110 A | |
| Rated AC voltage | 400Vac,3W+PE | |
| Rated grid frequency | 50Hz | |
| Rated AC Current | 72A | |
| Overload capacity | 110%,normal working 120%, 1 minutes | |
| Power factor adjustable range | -0.1 (lead) ~+ 0.1 (lag) | |
| Reactive power response time | ≤ 30ms | |
| Power control accuracy | ≤ 5% | |
| Adapted DC power | Lead acid battery,Li-ion battery,solar panels | |
| Charge mode | BMS signal,mppt | |
| Working mode | Constant current,constant power,mppt,AC Power,DC power,VSG | |
| Max efficiency | 98.2% | |
| Noise | < 70 dB | |
| Cooling method | Air conditioner cooling | |
| Communication | CAN or RS485 | |
| Working temperature | -25 °C ~ + 60 °C | > 45 °C derating |
| Storage environment | -20 °C ~ + 70 °C | |

| Product Model | PCS-50DC-AC | Remark |
|-------------------|----------------------------|--------|
| temperature | | |
| Relative humidity | 0 ~ 95% , no condensation. | |
| Isolation way | Non-isolation | |
| Size(W*D*H) | 483*600*150mm | |
| Weight | 35kg | |

For islands, mountainous areas, border checkpoints, and other remote areas or areas with unstable power supply, or for the construction of light storage systems in zero carbon technology parks. Users can configure DC converter power modules according to project requirements to achieve an integrated photovoltaic and energy storage power supply system. The parameters of the DC converter power module are as follows:

| Product Model | PCS-50DC-DC | Remark |
|--|---|-------------------------------------|
| Rated power | 50kw | |
| Rated power | 55kW | |
| DC working voltage range | 200-1000V | |
| Low-voltage side ,full load working voltage range | 312-850V | |
| Low-voltage side ,Max DC current | 80 A*2 | |
| Low-voltage side,input ports | 2 | 2 ports can be combined to be 1port |
| High-voltage side ,full load working voltage range | 500-900V | |
| High-voltage side ,Max DC current | 110A | |
| High-voltage side,input ports | 1 | |
| Adapted DC power | Lead acid battery,Li-ion battery,solar panels | |
| Working mode | Constant current,constant voltage,constant power,mppt | |

| Product Model | PCS-50DC-DC | Remark |
|---------------------------------|----------------------------|---------------------|
| Max efficiency | 98.8% | |
| Noise | < 70 dB | |
| Cooling method | Air conditioner cooling | |
| Communication | CAN or RS485 | |
| Working temperature | -25 °C ~ + 60 °C | > 45 °C derating |
| Storage environment temperature | -20 °C ~ + 70 °C | |
| Relative humidity | 0 ~ 95% , no condensation. | |
| Isolation way | Non-isolation | |
| Size(W*D*H) | 440*600*150mm | |
| Weight | 25kg | |

4.2.5 Temperature control system

Considering the operating environment of the battery system, in order to ensure long-term reliable operation of the battery, the battery compartment should be equipped with a temperature control system, including a heating system and a ventilation system, and ventilation and heating ducts should be designed to ensure uniform temperature inside the box (25 ± 5 °C).

The energy storage outdoor cabinet uses an integrated industrial air conditioner. A temperature sensor is installed in the container, and the temperature sensor sends the temperature signal to the local control system (HMI).

4.2.6 Fire protection system

The aerosol fire extinguishing device used in the fire protection system is a new environmentally friendly fire protection product with the world's advanced level. Working principle: When the ambient temperature reaches the starting temperature of the thermal line or comes into contact with an open flame, the thermal line

will spontaneously ignite and be transferred to the aerosol series fire extinguishing device. After the aerosol fire extinguishing device receives the start signal, the fire extinguishing agent inside is activated, and the nano-type aerosol fire extinguishing agent is quickly generated and sprayed out to achieve rapid fire extinguishing.

The battery compartment is equipped with smoke detectors and water immersion sensors, and the signals are uploaded to the HMI.

4.2.7 Monitoring system



| project | requirement | Remark |
|-----------------------------|---|--------|
| Testing requirements | | |
| AC voltage detection | Detection extreme value: 584Vac; accuracy $\pm 1\%$ | |
| DC voltage detection | Detection range: 200Vdc~1000Vdc; detection accuracy $\pm 1\%$ | |
| Current Detection | Detection range: 0A~200A; detection accuracy $\pm 1\%A$ | |
| Current limit detection | Detection range: 0A~300A; detection accuracy $\pm 1\%A$ | |
| Display function | none | |
| Indicator light definition | The red and green light-emitting diodes can respectively display the fault, alarm and running status of the power supply. | |
| Alarm function | | |
| Module fault alarm | When the module fails to operate due to module failure, such as over voltage, over temperature, failure to operate due to internal module faults, etc., the module issues a fault alarm. When an alarm occurs, the red indicator light of the module flashes; this alarm can be reported to the host computer through the communication port. | |
| Fan failure alarm | When the fan fails or is blocked, a fan failure alarm is generated and the red light flashes. Alarms can be reported to the host computer through the CAN bus. The alarm is cleared after the fault is rectified. | |

| | | |
|--|---|---|
| | This alarm can be reported through the communication port. | |
| Mains power under voltage alarm | When the mains voltage is lower than 360Vac, the red light flashes; when the mains voltage is higher than 365Vac, the alarm is cleared. This alarm can be reported through the communication port. | |
| Mains over voltage alarm | When the mains voltage is higher than 440Vac, a mains over voltage alarm occurs and the yellow light flashes; when the mains voltage is lower than 430Vac, the alarm is cleared. This alarm can be reported through the communication port. | |
| Monitoring interface | | |
| Communication Interface | Provide RS485 for host computer communication and CAN communication for module parallel communication. | |
| Parallel communication function requirements | Configuration parameter synchronization parameter arbitration: AC/DC voltage: When there are differences in the modules of the parallel machine, the HMI can display the parameters of each module separately. Load current: reported separately by different modules. Alarm: Module failure and fan failure are reported separately. Public alarms are reported together. Status: Merged and reported. | |
| Parallel capability | Can support 10 modules working in parallel. | Can support up to 256 modules working in parallel |
| software upgrade | The module supports software upgrade function and can be loaded online through the monitoring interface. | During the upgrade process, load power loss is not allowed. Allow the conversion section to pause work. |

5、 Safety, EMC and lightning protection characteristics

| serial number | project | | Standard (or test condition) | Remark |
|---------------|---|-----------------------------|---|---|
| 1 | anti-electricity powerful Spend | input versus output | non-isolated | No flash over, no breakdown Leakage current <10mA |
| | | Input to PE | 2121Vdc/1min | |
| | | Output and PE | 2121Vdc/1min | |
| | | Input and output pair RS485 | 4242Vdc/1min | |
| 2 | Absolutely edge electricity block | input versus output | no request | |
| | | Input to PE | ≥1MΩ@1000Vdc | |
| | | Output and PE | ≥1MΩ@1000Vdc | |
| 3 | Leakage current to earth | | <10mA to ground | |
| 4 | Safety certification | | The design complies with the EN60950 standard and the product finally passed CE certification. | Safety certification altitude: 2000m |
| 5 | Lightning protection | | AC port lightning protection: 10kA | 8/20us impulse current wave, impulse current criterion B |
| 6 | Surge immunity SURGE | | Input surge: Line to line: 1kV, 2Ω; Line to ground: 2kV, 12Ω; Positive to negative: 500V, 40Ω; Positive and negative to ground: 1kV, 40Ω; | 1.2/50-8/20us mixed wave, plus and minus 5 times each, with an interval of 1 minute each time; level 3, criterion A; GB-T17626.5 (IEC61000-4-5) |
| | | | Output load port: 800V | |
| 7 | Radiated emission limit RE | | CLASS A; | (IEC61000-6-4) |
| 8 | Conducted emission limits CE | | CLASS A; | (IEC61000-6-4) |
| 9 | Conducted disturbance immunity CS induced by RF fields | | 10Vrms/m Level 3, Criterion A | (IEC61000-6-2) |
| 10 | Radio frequency electromagnetic field radiation immunity RS | | 10Vrms/m level 3, criterion A | (IEC61000-6-2) |
| 11 | Voltage dips and short interruptions AC-DIP | | 100% dip for 20ms 60% dip for 500ms 30% dip for 500ms 100% dip for 5000ms | GB-T17626.11 (IEC61000-4-11) 20ms test with half load |

| | | | |
|----|---|---|------------------------------------|
| | | The criteria are B, B, C, and C respectively; | |
| 12 | Fluctuations and Flicker | | EN61000-3-3 |
| 13 | Electrostatic discharge immunity ESD (casing, power port) | Shell, parts that can be touched by hands during normal operation: contact discharge $\pm 4\text{kV}$; air discharge $\pm 8\text{kV}$ Level 3, criterion B; (power on during test) | GB-T17626.2 (IEC61000-4-2) |
| 14 | Electrostatic discharge immunity ESD (signal port) | Conductor within the signal interface: contact discharge: 2kV ; Criterion R | GB-T17626.2 (IEC61000-4-2) |
| 15 | Electrical Fast Transient Burst Immunity EFT | AC: $\pm 2\text{kV}$, 120s; DC: $\pm 1\text{kV}$, 120s; Level 3 Criterion B | GB-T17626.4 (IEC61000-4-4) |
| 16 | Oscillatory wave immunity | Level 3 Criterion B | GB-T 17626.12& (IEC 61000-4-12) |
| 17 | Power frequency magnetic field immunity | 10A/m level 3, criterion A | GB-T 17626.8& (IEC 61000-4-8) |
| 18 | Pulsed magnetic field immunity | 300A/m level 4, criterion A | GB-T 17626.9& (IEC 61000-4-9) |
| 19 | Damped oscillating magnetic field immunity | 10A/m level 3, criterion A | GB-T17626.10 (IEC61000-4-10) |
| 20 | Rohs _ | Comply with Rohs R5 | |
| 21 | | <p>Criterion A: During the test process, the performance of the equipment is not allowed to change within the technical requirements, and the voltage fluctuation is within the voltage stabilization accuracy range.</p> <p>Criterion B: During the test process, the performance degradation of the equipment is allowed within the range required by the product specification (not exceeding the output voltage range). After the interference is eliminated, the equipment can return to normal. Reset and any form of manual intervention are not allowed. Voltage is allowed. Glitch with fluctuation range within 200us.</p> <p>Criterion C: Temporary loss of functionality is allowed, but can be restored by itself or through running control operations, or for switching equipment, the connection can be reestablished through normal control operations.</p> <p>Criterion R: Damage to any device other than the protection device is not allowed, and the performance of the test piece can be restored after replacing the damaged protection device.</p> <p>Criterion for impulse current: The equipment is tested under live working condition, and the service is monitored before and after the test. During the test, only optical fiber is allowed to detect the service. During the test, bit errors, temporary link interruption, and signal loss are</p> | |

allowed. Power outages, device damage, service interruptions that cannot be restored after the test, and permanent performance degradation are not allowed during the test.

6、 Environmental and Reliability Test Requirements

| Project | skills requirement | Remark |
|---|--|--------|
| Application Environment | | |
| Use | <ul style="list-style-type: none"> ■ Continuous operation in an indoor air-conditioned environment. ■ Continuous operation in indoor non-air-conditioned environment. ■ Continuous operation in an environment with simple weather protection. <input type="checkbox"/> Continuous operation outdoors <input type="checkbox"/> No fixed working environment. ■ Operate in a small space with high temperature. <input type="checkbox"/> Installed on vibrating devices or cars. <input type="checkbox"/> Used in mines. <input type="checkbox"/> Others (need detailed description) | |
| Transportation | <ul style="list-style-type: none"> ■ Land transportation ■ Water transport ■ Air transport <input type="checkbox"/> Manual handling <input type="checkbox"/> Others (details required) | |
| Storage | <ul style="list-style-type: none"> ■ Limit storage environment temperature and humidity ■ Limit ambient temperature to keep dry ■ No temperature limit but temperature must be controlled ■ Simple protection from weather and rain erosion environment <input type="checkbox"/> Environment without wind and rain protection measures <input type="checkbox"/> Others (details required) | |
| Note: Please select the actual working environment to change "□" into "■" | | |
| Reliability test | | |
| Low temperature working test | GB2423.1 Method Ad | |

| | | |
|---|---|--|
| High temperature working test | GB2423.2 Method Bd | |
| Low temperature storage test | GB2423.1 Method Ab | |
| High temperature storage test | GB2423.2 Method Bb | |
| High and low temperature cycle test | GB/T 2423.22 | |
| constant heat and humidity experiment | GB/T2423.3 Method Cab | |
| Low pressure test | GB/T 2423.21 | |
| random vibration experiment | ETSI EN3000 019-2-2 T2.3 | |
| Sinusoidal vibration experiment | GR-63-CORE 5.3.2 | |
| Drop test | GR-63-CORE 5.3.1 | |
| MTBF | >100,000h (at 25°C) | |
| Power supply repair rate | Annual repair rate of power board: ≤1%; | |
| Working temperature: -40°C to +65°C. -40°C~+45°C Full performance operation. +45°C~+65°C derated operation. Storage temperature: -40°C to +75°C. | | |

7、Photovoltaic (optional)

A single DC / DC photovoltaic charging module is a two-channel MPPT, supporting a maximum photovoltaic input of 50 kW. Taking a 560 Wp monocrystalline photovoltaic solar panel as an example, the lower limit of the bus voltage is 672 V. The panel's open circuit voltage is calculated based on the high and low voltage difference of 30 V. Taking into account the negative temperature coefficient in winter, the panel's open circuit voltage does not exceed 610 V. It supports a maximum of 96 photovoltaic panels and uses 2 * 4P12S for string connection. The maximum photovoltaic panels access of a single DC / DC module reaches 52.8 kW .

Photovoltaic module performance parameter table

| Photovoltaic Module(Solar Panel) | Monocrystalline silicon 560Wp | unit |
|----------------------------------|-------------------------------|------|
| Power | 560 | wp |
| Power Tolerance | 0~+3 | % |
| Operating Voltage | 41.09 | Vmp |
| Working Current | 13.63 | Imp |
| Open Circuit Voltage | 49.82 | Voc |

| Photovoltaic Module(Solar Panel) | Monocrystalline silicon 560Wp | unit |
|----------------------------------|-------------------------------|------|
| Short Circuit Current | 14.21 | Isc |
| Operating Temperature | -40~+85 | °C |
| Maximum System Voltage | 1000 | VDC |
| Dimensions | 2278 x 1134 x 35 | mm |
| Weight | 28 | kg |
| Current Temperature Coefficient | +0.048 | %/°C |
| Voltage Temperature Coefficient | -0.28 | %/°C |
| Maximum Wind Load | 2400 | Pa |
| Maximum Snow Load | 5400 | Pa |

8、Main configuration list

| No | Item | Specifications | Grid-connected type | Off-grid | Ongrid and off-grid switching | Remark |
|----|--|---|---------------------|----------|-------------------------------|--|
| 1 | Inverter module(AC-AC) | AC 50kW, AC400V | √ | √ | √ | |
| 2 | DC conversion power module(DC-DC) | DC 50kW | √ | √ | √ | Combine with Photovoltaic solar panels (optional) |
| 3 | Parallel and off-grid switching module | STS, switching time <20mS, | × | × | √ | |
| 4 | Main control board LED display | Soalr,battery data show | √ | √ | √ | |
| 5 | Technical services and platforms | User manual | √ | √ | √ | |
| 6 | Isolation transformer | SG- 100kVA 0.4kV/0.4kV Dyn11 (all copper) | × | × | √ | |
| 7 | Battery | 100kwh or 215kwh | | 1 | set | |

| | | | | | |
|----|--------------------------|--|---|-----|--|
| | capacity | | | | |
| 8 | High voltage control box | Built-in BMS main control box, DC power supply, shunt, fuse, connector, etc. | 1 | set | |
| 9 | Air conditioner | 3kw cooling capacity | 1 | set | |
| 10 | Fire extinguisher | QRRO.33GW/S | 1 | Pcs | |
| 11 | EMS system | Mobile platform | 1 | set | |

9、Packaging, transportation and storage

9.1. Packaging

The packaging box contains the product name, model, manufacturer's logo, inspection certificate from the manufacturer's quality department, manufacturing date, etc.; the packaging box contains product specifications and a list of accessories.

9.2. Transportation

It is suitable for transportation by vehicles, ships and airplanes. During transportation, it should be covered, protected from the sun, and loaded and unloaded in a civilized manner.

9.3. Storage

The product should be stored in the packaging box when not in use. The ambient temperature of the warehouse is $-40\text{--}+75^{\circ}\text{C}$, and the relative humidity is 5%-95%. Harmful gases, flammable, explosive and corrosive products are not allowed in the warehouse. Chemical products without strong mechanical vibration, impact or strong magnetic field. The packaging box should be at least 20cm high from the ground and at least 50cm away from walls, heat sources, windows or air inlets. The storage period under these specified conditions is generally 2 years, and should be re-inspected after more than 2 years.

10、revision

The company has the right to revise this product proposal. If there is a need to revise the product proposal, please communicate with the company.