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TCSN POWER

Merak100-241kWh-NP



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1 Introduction

The liquid-cooled energy storage battery system has a capacity of 241kWh, and the battery system includes battery PACK, L liquid-cooled, BMS and fire protection system. The entire system is connected to 380V AC.



Figure 1-1 Schematic diagram of the battery cabinet

Table 1-1 Battery cabinet parameter table

| Id | Category | Technical parameters |
|----|-----------------------------|--|
| 1 | Cell type | 3.2V/314Ah, LFP |
| 2 | Rated energy of the system | 314kWh |
| 3 | Battery grouping method | 5*1P48S |
| 4 | System voltage | 600~864V |
| 5 | Chargedischarge rate | ≤0.5P |
| 6 | Battery efficiency | ≥ 94% (excluding AC auxiliary power). |
| 7 | Operating temperature range | Discharge:-20~55°C; Charging: 0~55°C |
| 8 | Fire fighting methods | Aerosol firefighting |
| 9 | Methods of Communication | CAN、RS485、ModbusTCP、LAN |
| 10 | Cooling method | Liquid-cooling |
| 11 | Ingress protection | IP54 |
| 12 | Corrosion protection level | C3 |
| 13 | weight | 2.7t |
| 14 | Size (W*D*H) | 1200*1450*2100 mm (without lifting rings). |
| 15 | Humidity range | 0~95% (no condensation). |
| 16 | Maximum working altitude | 5000m (>3000m derating) |
| 17 | Authentication | GB_T 36276-2023, UN38.3, IEC62619 |

2 System Configuration

2.1 Battery Park



Figure 2-1 PACK Appearance Diagram

Table 2-1 Battery Box Parameter Table

| | | |
|----|--|---|
| 1 | Cell type | LFP |
| 2 | Charging rate | ≤ 0.5P |
| 3 | discharge rate | ≤ 0.5P |
| 4 | Composition | 1P48S |
| 5 | Nominal capacity | 314Ah |
| 6 | Nominal energy | 48230.4Wh |
| 7 | Nominal voltage | 153.6V |
| 8 | Operating voltage range | 120~172.8V |
| 9 | Voltage harvesting | Full collection + total positive/total negative |
| 10 | Temperature collection | High precision, stable and anti-interference |
| 11 | Maximum operating temperature range | Charging 0°C~55°C; Discharge -30°C~55°C |
| 12 | Optimal operating temperature | 25°C±2°C; |
| 13 | Transport & Storage Temperature (Battery 30% SOC). | -20°C~45°C within one month; -20°C~25°C within 6 months |
| 14 | Insulation properties | Resistance ≥ 500MΩ@2500VDC |

| | | |
|----|---------------------------|---|
| 15 | Withstand voltage | Leakage current ≤ 1mA @4500VDC, no spark and no breakdown |
| 16 | IP rating | ≥ IP67 |
| 17 | Ambient humidity | < 90% RH (non-condensing) |
| 18 | Cooling method | Liquid-cooled |
| 19 | Product weight | 340kg |
| 20 | Dimensions (W*D*.)High). | 795±2mm×1125±2mm×228±2mm |

2.2 Battery Rack Specifications

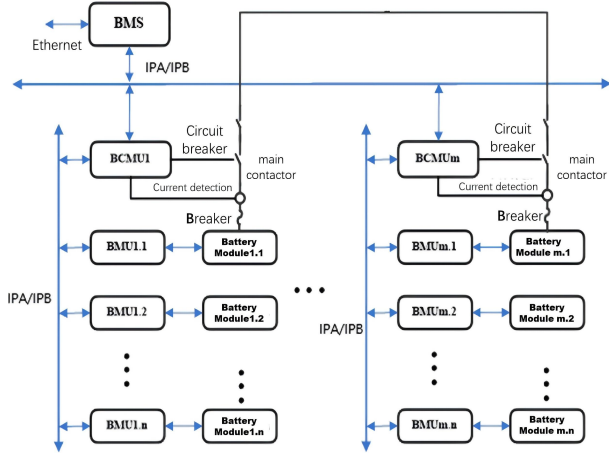
| | | |
|--|----------------|--------------------------------|
| Rated Voltage(V) | 768 | 【5modules series】 |
| Series & Parallels | 1P240S | |
| Rated Capacity(Ah) | 314 | |
| Voltage range(V) | 600~864 | |
| continuous charge/discharge current(A) | 157/157 | |
| Rated Energy(kWh) | 241 | 5modules series, singlecluster |
| Discharge cut-off voltage(V) | 600 | |
| Charge voltage(V) | 864 | |
| Cycle life (@25°C, 0.5C/0.5C,80%DOD) | > 6000 | 25±2°C, 0.5C/0.5C, 70%SOH |
| BatteryThermal Management | Liquid cooling | |
| Operating temperature | -20~55°C | |
| Operating humidity | 5%~95%R.H. | |
| Communication | CAN/RS485 | |

2.3 Battery Management System

| ESMU Technical Parameters | |
|--------------------------------|--|
| Project | Parameters |
| Central Processing Unit | ARM platform, quad - core, with a maximum main frequency of 2.0GHz |
| Memory | 4GB LPDDR4 |
| Operating System | Linux |
| SD Card Storage | 16GB eMMC 240G - 500G SSD 32G SD card (optional) |
| Number of Detectable Batteries | Up to 450 cells × 60 clusters |
| Liquid Crystal Screen | 10.1 - inch true - color touch - screen LCD |
| Data Recording Interval | ≥1S (configurable) |
| Query Methods | On - site panel query, remote access query, data export/download |
| Alarm Methods | Acoustic - optical alarm, display alarm content, fault output node closure |
| Communication Interfaces | 3 - way LAN, 3 - way isolated CAN, 5 - way isolated RS485, 2 - way USB |

| | |
|--------------------------|---|
| DO/DI Interfaces | 6 - way DIH IO input with photoelectric isolation 6 - way DIL IO input with electrical isolation 12 - way IO output with relay dry - contact mode 1 - way AC power - failure detection |
| Remote | Supports MQTT protocol; supports Modbus TCP, IEC61850 protocols |
| Event Log Database | >100000 event records, including anomaly types, occurrence times, and protection actions, supporting full - life - cycle data storage |
| ESMU Power Supply | DC24V |
| ESMU Power Consumption | <10W (initial state with screen on) |
| Communication Baud Rates | 9600bps @ RS485, 250Kbps @ CAN, 100Mbps/1000Mbps @ LAN |
| Dimensions/Mass | 288×190×41.2mm / 1.8kg |
| Material | Sheet metal |
| Process | Three - proof paint |
| Insulation Resistance | 500MΩ 1500VDC |
| Operating Environment | Ambient temperature: -10 - +55°C, relative humidity: <95% (non - condensing), ambient magnetic field: <400A/m, no corrosive or flammable and explosive gases allowed in the surroundings |

The energy storage system is equipped with a complete battery management system, adopts a three-level management architecture and three-level software protection, including module level, battery cluster level and system level, to achieve comprehensive control, management and protection of the battery system and ensure the safe and stable operation of the battery system.



2.4 High voltage box



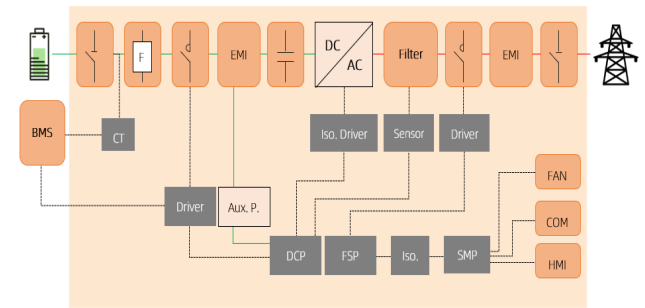
Table 2-2 Technical parameters of high-pressure box

| ID | Name | Technical parameters |
|----|-------------------|----------------------|
| 1 | Current rating | 250A |
| 2 | Operating voltage | 1000V |
| 3 | SOC accuracy | 5% |

2.5 PCS(100kW)



Electrical Connection



2.6 Thermal management system

The entire thermal management system uses liquid cooling to control the temperature of the battery system. The integrated liquid cooling unit and reasonable pipeline design are used to realize the effective temperature control of the battery cells in the battery system, so that the working environment of the energy storage system is in the best range, and the service life of the whole system is prolonged and the operation is safe and reliable.



Figure 2-3 Schematic diagram of a liquid-cooled unit

Table 2-3 Technical parameters of liquid cooling unit

| Parameter | Specification |
|---|-----------------------------------|
| Cooling Capacity | 3KW |
| Cooling Power | 1.5KW |
| Heating Capacity | 2KW |
| Refrigerant | R134a |
| Operating voltage range | 220V±15%,50/60Hz±3Hz |
| Operating environment temperature range | -30 +55 |
| Operating relative humidity range | 5%-95% |
| Storage environment temperature range | -40 +70 |
| Storage environment relative humidity range | 5%-95% |
| Working altitude | ≤1000m(above 1000m,derated) |
| Unit size(W×D×H) | 700mm×900mm×245mm(without flange) |
| Max.Flow(3kW/5KW) | 30L/min/50L/min |
| IP level | IP55 |
| Allowable range of water pressure | 0-1.6Mpa |

2.7 Fire protection system

This product divides the energy storage system into multiple levels for protection.

PACK level: early detection and rapid extinguishing of root fire sources;

Cluster level: Focus on controlling external fire sources, preventing their spread, and suppressing their growth.

附：产品外形尺寸图（单位：mm）

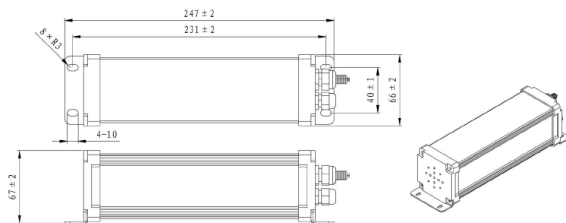


Figure 2-4 Schematic diagram of the fire extinguishing device

Table 2-4 Technical parameters of fire protection system

| ID | Project | Performance/Parameters |
|----|----------------------------------|--|
| 1 | Filling media | aerosol |
| 2 | The quality of the filling agent | 5*40g(PACK level)+1*300g(cluster level). |
| 3 | Supply voltage | 24V |
| 4 | Methods of Communication | CAN communication/485 communication |
| 5 | Protect the space | 5m ³ |
| 6 | expiration date | 10 years |

3 Precautions

3.1 Safety Precautions

- It must be operated by a professional electrical personnel or a trained technician.
- Make sure the high-voltage power switch is disconnected when installing.
- Please carefully inspect the materials before installation, if there is any missing or damaged, please do not install dangerously.
- Insulating gloves must be worn during installation, and the outside of the metal tool must be tightly wrapped with insulating tape before use.
- During installation, it is strictly forbidden to contact the total positive and total negative of the battery pack at the same time, so as not to hurt people with high voltage.
- Non-professionals are forbidden to disassemble the module shell, let alone touch the internal circuit board, so as not to cause electric shock accidents.
- Without the confirmation of the manufacturer's technical personnel, it is forbidden to modify or use this system on other projects to avoid serious accidents.

3.2 Guidelines for safe use

- Safeguard measures should be provided for the safe and reliable operating environment of the battery system.
- The power should not be greater than the rated power when in use, and the system should be kept away from fire, heat and water sources in use, if the battery leaks or emits peculiar smell, it should be stopped immediately, and the relevant personnel should be notified in time to deal with it.
- The battery system is fully charged and fully discharged every six months, and the recommended charge and discharge rate is 0.5C, and detailed records are made.
- Before the energy storage battery is stored for a long time and operated, the battery system must be inspected for safety to avoid equipment damage or system safety problems caused by loose connections, water vapor condensation, rust or mold.