500kWh Energy Storage Solutions

Your Professional Power Solution
Scalable Lithium Energy Storage System (ESS)

- House/Building
- Wind Power Storage
- Facility Supply
- Factory Supply
- Ferry Energy Adjustment
- Grid Peaking Shaving

- Power Shifting for Peak Shaving (on-grid)
- Pulse Load Compensation (on-grid)
- Power Shifting for Demand Compensation (on-grid)
- Storage During Low Grid Demand (on-grid)
- Grid Compensation (on-grid)

- UPS (off-grid)
- PV Array Input (MPPT charging)
Energy Storage System

- Scalable in 5760 watt increments
- Plug & Play with MOSFET
- Scalable Battery Module
- Customized Monitoring Software
- HMI

- Scalable Voltage
- Scalable Capacity
- Simple Installation
- Remote Monitoring
ESS Introduction

■ Introduction

The series of energy-type energy storage products adopts a lithium iron phosphate chemistry. It has high energy density and a long cycle life. The system design is highly integrated. The box structure is compact and the space utilization is high. It is easy to install using the rack with a flexible configuration and convenient transportation.

■ Advantages

● High energy density, small footprint, short construction period, strong environmental adaptability
● Standardized components, modular architecture, easy for expansion
● Battery module within the layered stack design
● BMS battery management system with SOC automatic calibration
● High precision detection includes cluster voltage detection in real time, cluster charging/discharging current detection, cell terminal voltage detection, cluster multipoint temperature, cluster electric leakage detection
● Equalization function
## Calculation for 500kWh Battery System

- **System energy**: 500kWh
- **Power**: 500kW
- The battery nominal voltage range is **480V~700.8V**
- Design redundancy **100%**

So the battery energy is

\[
\frac{500\text{kWh}}{100\%} = 500\text{kWh}
\]

Use the 38.64V module (38.64V module voltage range is **24~43.8V**)  
Series number of 18V module is

\[
\frac{700.8\text{V}}{43.8\text{V}} = 16
\]

The battery nominal voltage is (module nominal voltage is 38.4V)

\[
38.64\text{V} \times 16 = 618.24\text{V}
\]

The Discharge used in the pack is

\[
\frac{500\text{kWh} \times 1000}{618.24\text{V}} \approx 809\text{Ah}
\]

SO the battery pack is

\[
618.24\text{V} - 809\text{Ah}
\]

Use the 38.64V206Ah module

Parallel number of 38.64V206Ah module is

\[
\frac{809\text{Ah}}{206\text{Ah}} \approx 4
\]

SO the number of 38.64V206Ah module is

\[
16 \times 4 = 64
\]

We recommend 206Ah cell (**ETC, 206Ah, 3.22 V**)

The number of cells in 38.64V206Ah module is **12S*1P**

So the total number of 206Ah cell is

\[
12 \times 1 \times 16 \times 4 = 768
\]

## LIST

<table>
<thead>
<tr>
<th>Item</th>
<th>Details</th>
<th>Unit</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.22V 2066Ah cell</td>
<td>set</td>
<td>768</td>
</tr>
<tr>
<td>2</td>
<td>38.64V206Ah module(Cabinet, BMS)</td>
<td>set</td>
<td>64</td>
</tr>
<tr>
<td>3</td>
<td>500kWh Battery System (618.24V824Ah)</td>
<td>Rack</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>DC High voltage box (Install the rack/Cabinet)</td>
<td>set</td>
<td>/</td>
</tr>
<tr>
<td>5</td>
<td>PCS(200kW)</td>
<td>set</td>
<td>/</td>
</tr>
<tr>
<td>6</td>
<td>EMS</td>
<td>set</td>
<td>/</td>
</tr>
<tr>
<td>7</td>
<td>Intelligently Distribution Cabinet</td>
<td>set</td>
<td>/</td>
</tr>
</tbody>
</table>
**500kWh Battery System Introduction**

![Type-A(Rack) with Battery Module](image)

**Features**
- High energy density, small footprint, short construction period, strong environmental adaptability
- Standardized components, modular architecture, easy for expansion
- Battery module within the layered stack design, with more than 10 years of long design life
- Efficient battery module and system cooling design
- The use of international advanced IGBT and intelligent power module, with high power fast adjustment capability
- BMS battery management system with SOC automatic calibration and high current active balance function, combined with the perfect operation control and management strategies to achieve accurate and efficient management
- The combination of software and hardware protection, with alarm protection and automatic diagnostic functions, improve the protection strategy to ensure safe and efficient operation of the system

**System Parameter**

<table>
<thead>
<tr>
<th>Items</th>
<th>Technical Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery Type</td>
<td>LFP Battery</td>
</tr>
<tr>
<td>Rated Power</td>
<td>500kW</td>
</tr>
<tr>
<td>Capacity</td>
<td>509.43kWh (=800kWh)</td>
</tr>
<tr>
<td>Standard Charge current</td>
<td>250A (0.5C) / 500A(1C)</td>
</tr>
<tr>
<td>Standard Discharge current</td>
<td>500A(1C)</td>
</tr>
<tr>
<td>DC Normal Voltage</td>
<td>618.24</td>
</tr>
<tr>
<td>DC Voltage Range</td>
<td>480V~700.8V</td>
</tr>
<tr>
<td>Battery System Configuration</td>
<td>64 series of 38.64V206Ah Modules(64 models)</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>0~45℃</td>
</tr>
<tr>
<td>Protection Class</td>
<td>IP21/IP54</td>
</tr>
</tbody>
</table>

**Product Introduction**

The series of energy-type energy storage products adopts a lithium iron phosphate chemistry. It has high energy density and a long cycle life. The system design is highly integrated. The box structure is compact and the space utilization is high. It is easy to install using the cabinet or rack with a flexible configuration and convenient transportation.
500kWh Battery Management System Introduction

- **Product Introduction**
  Each set of BMS is included in the battery array. While monitoring related batteries at PCS direct current side, distant monitoring program, PCS conducts coordinating operation.

- **Features**
  - Battery system protective function
  - Battery system operation alarming, alarming local display and forward telling function
  - Battery analog quality high precision detection and forward telling function
  - High precision detection includes cluster voltage detection in real time, cluster charging/discharging current detection, cell terminal voltage detection, cluster multipoint temperature, cluster electric leakage detection.
  - Equalization function
Product Introduction

38.64V206Ah battery module consists of a battery system and BMS. The system adopts a 12-battery cell (3.22V206Ah) with high energy density and long life cycles.

Features

High-energy density and long life cycle (3000 cycles at 0.5C rate and 80% DOD).

Highly integrated, highly automated manufacture

Module combined, system can be made of a customized size.

<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>Parameters</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nominal Voltage</td>
<td>38.4V</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Nominal Energy (20±5°C0.3C@100%DOD)</td>
<td>7.96kWh</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Battery Module Configuration</td>
<td>12 serial 1 parallels of single 206Ah cells</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Battery System Operating Voltage Range</td>
<td>24V~43.8V</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Floating Charging Voltage</td>
<td>87.6V</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>System Maximal Charging Current</td>
<td>500A</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>System Maximal Discharging Current</td>
<td>500A 1000A (&lt;10s)</td>
<td></td>
</tr>
</tbody>
</table>
# 3.22V206Ah Battery

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension (Welding terminal)</td>
<td>53.9mm x 174.6mm x 207.1mm</td>
</tr>
<tr>
<td>Dimension (Screw terminal)</td>
<td>53.9mm x 174.6mm x 217.1mm</td>
</tr>
<tr>
<td>Weight</td>
<td>Max. 4200g</td>
</tr>
<tr>
<td>Min. capacity</td>
<td>206Ah (0.5C) @ 25°C</td>
</tr>
<tr>
<td>Min. energy</td>
<td>663Wh (0.5C) @ 25°C</td>
</tr>
<tr>
<td>SOC window</td>
<td>0 ~ 100 %</td>
</tr>
<tr>
<td>Terminal</td>
<td>Welding/Screwterminal</td>
</tr>
<tr>
<td>Voltage</td>
<td>Max. 3.65 V</td>
</tr>
<tr>
<td></td>
<td>Nominal 3.22 V</td>
</tr>
<tr>
<td></td>
<td>Min. 2.00V</td>
</tr>
<tr>
<td>Energy density</td>
<td>Gravimetric 161Wh/kg</td>
</tr>
<tr>
<td></td>
<td>Volumetric 355Wh/L</td>
</tr>
<tr>
<td>Temp. Condition</td>
<td>Operation (Charge) 0 ~ 55°C</td>
</tr>
<tr>
<td></td>
<td>Operation (Discharge) -20 ~ 55°C</td>
</tr>
<tr>
<td></td>
<td>Storage -30 ~ 55°C</td>
</tr>
<tr>
<td>Self-Discharge Rate</td>
<td>Count after fresh cell need Standard Charge to 50%SOC and storage at 25±2°C for 3 month ≤3%</td>
</tr>
<tr>
<td>Cycle Life</td>
<td>1C/1C, 80% DOD 25°C</td>
</tr>
<tr>
<td></td>
<td>3,000 cycles</td>
</tr>
</tbody>
</table>
PCS (Power Conversion System)
(If customer needs, we can provide it for customer)

Product Introduction

PCS can be accurate and efficient implementation of various cell types, voltage level and power level of the battery charging task, bidirectional power flow, which can charge the battery energy storage battery, can also convert the DC power into AC power to feed into the grid. Equipped with function control software, it can control the main operation parameter settings on the remote PC machine, and realize the energy flow between the battery and the power grid in a timely and two-way way. It has the functions of large capacity V/f source, parallel operation mode, on-line switching, short circuit support, high protection level, cabinet design and so on, so as to ensure efficient, safe and stable operation of the product.

Effect Diagram

The PCS ESS system is constructed using power electronic modules. These state of the art modules operate as inverters to convert the DC energy storage voltage to the desired AC voltage. Each power module incorporates an LC sine filter, cooling fan, circuit protection and RFI filtering as shown in the Figure.
EMS Introduction
(If customer needs, we can provide it for customer)

■ Product Introduction
Features
The energy storage energy management system is based on advanced communication network technology design, with open, hierarchical distributed structure to monitor the working status of the energy storage power plant and energy dispatch management. It covers the power grid access, renewable energy, Power generation, PCS and BMS system detailed information, to achieve the data acquisition, data processing, data storage, data query and analysis, visual monitoring, alarm management, statistical reports and other functions.

■ Application
Powerful advanced application function, using energy storage devices to achieve smooth output, plan tracking, AGC frequency regulation, demand response, peak shaving, demand control and other functions. It can be used for utility scaled energy storage plants, wind turbine storage plants and commercial energy storage plants, and can also be used for small energy storage system, photovoltaic ESS station, wind turbine +ESS station and other energy storage projects.
Intelligent Distribution Cabinet  
(If customer needs, we can provide it for customer)

- **Product Introduction**
  Microgrid and grid connected devices are intelligent AC power distribution devices, which mainly complete the fast switching of the off-grid mode of microgrids.

- **Features**
  1. Industry's original multi-branch input reduces battery string parallel
  2. Simple structure, reliable and stable, high efficiency
  3. Designed for smart grids
  4. Achievable and off-grid seamless switching
  5. Voltage source parallel technology
  6. Communicate with EMS
Successful Case Pictures
Successful Case Pictures
THANKS

Your Professional Power Solution