Home Energy Storage System

Li-Ion Phosphate Battery system series Instruction
Catalogue

Chapter One: Product Introduction ................................................................................ 3
  1.1 Statement ............................................................................................................... 3
  1.2 Characteristic ........................................................................................................ 3
  1.3 Advantage ............................................................................................................ 4
  1.4 Environment .......................................................................................................... 5
Chapter Two: Product Description ............................................................................... 6
  2.1 Appearance ............................................................................................................ 6
  2.2 Block Diagram ...................................................................................................... 8
  2.3 Indoor Controller .................................................................................................. 8
  2.4 Working Mode ...................................................................................................... 10
  2.5 Display Status ...................................................................................................... 11
  2.6 Technical Parameters .......................................................................................... 13
  2.7 ESS Composition ................................................................................................. 15
Chapter Three: Install and Run ..................................................................................... 17
Chapter Four: Attentions ............................................................................................... 18
Chapter One: Product Introduction

1.1 Statement

CATL Home Energy Storage System (HESS), powered by Li-Ion Phosphate rechargeable Battery with high energy density, high reliability and well safety performance, realized the integration of photovoltaic inverter, combining the advanced power electronics all over the world. It is a product with features of high efficiency, high reliability, high intelligence and excellent performance.

1.2 Characteristic

(1) Energy storage system using advanced Li-Ion Phosphate batteries, well safety performance, long cycle life, and good calendar life performance;

(2) The system is modular in design. Easy for installation, commissioning, maintenance;

(3) System have high reliability and well electromagnetic compatibility;

(4) Intelligent design with telemetry, remote, remote control and other functions. Remote operation make it safe and convenient;

(5) The leading BMS (battery management system) in the vehicle industry to monitor and control various parameters and running, can better protect the battery and system;

(6) Achieve 0s switching while power grid breakdown, can fully guarantee uninterrupted
power supply for important load

(7) Dual-mode conversion between PV and power grid, in order to solve the problem of instability in almost all urban power supply;

(8) Using solar PV by famous brands, safe, reliable, durable and easy to operate;

Powerful wireless controller, can set charge mode, discharge mode of the energy storage system by Wi-Fi, and also time setting, minimum retention power settings, and other setting. The key information and the remaining battery energy percentage(%) appears on the LCD. It will make the system more eyeable and straight forward to operate.

1.3 Advantage

(1) Solar electricity with solar power generation, solar power is insufficient in automatically converted to electricity to power the load, with a high rate of power supply protection;

(2) Solar controller with MPPT function, the conversion efficiency of up to 98%;

(3) Pure sine wave output, low operating noise, high conversion efficiency, with load capacity;

(4) It has a state of emergency overload protection, output short circuit protection, reverse battery protection, low battery voltage, battery overvoltage protection functions;

(5) Indoor LCD Display: visual display products running status, input and output parameters, battery capacity, power generation and other information;
(6) Intelligent battery management system: Active balanced, high-precision voltage acquisition, to ensure the consistency of batteries; humanized alarm function and perfect online protection features to ensure safe operation of the system in use, automatic switching, enabling unattended;

(7) Lightning protection;

(8) Stable, secure, reliable, long life;

(9) Powerful indoor wireless control.

1.4 Environment

This product should be stored following precautions to avoid possible adverse effects suffered.

(1) placed no dust, dry and ventilated place

(2) Ambient temperature: -20 °C ~ +60 °C (Recommended temperature: 23 °C + / -3 °C)

(3) Storage temperature: -30 °C ~ 50 °C

(4) Relative Humidity: 65 + / -20% RH, no condensation

(5) Altitude: not exceed 4000m

(6) No conductive dust and corrosive gases

(7) Long-term without power, once every six months should be powered
Chapter Two: Product Description

2.1 Appearance
Instructions for the chassis:

(1) The enclosure protection class: IP55

(2) Top with large fenced-in insulation and ventilation holes, the internal cooling fan installed in effectively prevent the entry of rain and insects while quickly ruled out heat

(3) Cabinet front is opening the doors, opened a glass window, the window of LED and other system operating status can be clearly demonstrated; door trim with rubber seals

(4) Waterproof and dustproof

(5) Sides bottom with inlet dust cover, built-in wide-area louvers inlet channel, a bottom-up air to the maximum extent take away the heat inside

(6) The bottom of the mounting bracket, make the system more solid and stable, set aside while the bottom outlet hole and sealed with a rubber ring
2.2 Block Diagram

2.3 Indoor Controller
Description:

(1) Level: Displays the current remaining battery energy storage system;

(2) Internet: Displays the chassis-Fi signals and their strength;

(3) Run mode: Displays the current storage system running;

(4) Time: Displays the user to manually set the charge and discharge time;

(5) Load power: energy storage system displays a discharged state, the load using electricity.

(6) Button: Used to manually force the charge and discharge, set the minimum discharge capacity and set the time and other functions;
2.4 Working Mode

1. Sunny, normal electricity

The PV panels will generate electricity for the interior usage. Excess electric energy will be stored in the ESS. The grid power is in standby power mode.

2. Sunny, mains power

The PV panels still act as the primary electricity generation unit. If the electricity generated by the PV panels can not meet the requirement, the ESS will supply the indoor power: When the ESS SOC ≤ 20%, will alarm (once/2sec), when the SOC ≤ 10%, will alarm (once/1sec), and cut off the indoor supply.

3. Lack sunlight, normal electricity

The ESS SOC> 50%, the ESS will supply the indoor power individually. If SOC <50%, switch to power grid supply and start ESS charging. In such cases, the PV panels will not operate.

4. Sunshine complement mains power

The ESS will supply the indoor power line individually. When the ESS SOC ≤ C will alarm (once/2sec), when the SOC ≤ C, will alarm once/ 1sec, and cut off the power supply of the indoor.
The above situation reflects the automatic mode of the system. It adjusts operation mode according to the weather and the grid power supply. Meanwhile, the system also supports users to force the charge and discharge mode manually by timer.

2.5 Display Status

The system operating status can be displayed on the wireless controller LCD and LED on the front of the chassis, running status include the following:

**Solar charging modes**: ESS is using photovoltaic panels indicate charging.

**Mains charging modes**: Indicates ESS is using mains charger.

**Discharge mode**: Foreign representation ESS is discharged.

**Backup power modes**: No representation mains power failure, the mains supply line special, ESS output is not connected to the circuit; when sudden mains power, ESS will
automatically gapless switch access this particular supply line, ensure that the line uninterruptible power equipment use.

**Time setting mode:** ESS access to power lines or not has nothing to do with the mains are off and only the user-set duration. When setting the time is up, ESS automatic access to the supply line, enabling the efficient use of clean energy. General Settings cheap electricity at night time charging your time to discharge electricity during the day, effectively saving electricity. Can be set from a minimum retention capacity, once the discharge reaches this value, the stop outside the discharge and return to standby power mode.

**Manual mode:** Including mandatory charging and forced discharge. Forced charging, without regard to time limitations, only the ESS charge, discharge will not be seen. Once filled immediately stop charging, back to back-up power mode; forced discharge, without regard to time constraints, ESS only Foreign discharges. Can be set from a minimum retention capacity, once the discharge reaches a minimum retention capacity, closed for discharge and return to standby power mode.
### 2.6 Technical Parameters

<table>
<thead>
<tr>
<th>Function</th>
<th>Project</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV</td>
<td>Specification</td>
<td>1000W</td>
</tr>
<tr>
<td></td>
<td>Voltage range</td>
<td>DC36V-72V</td>
</tr>
<tr>
<td>Show</td>
<td>Panel indicates</td>
<td>LCD</td>
</tr>
<tr>
<td>input (AC)</td>
<td>Input voltage range</td>
<td>220V±10%</td>
</tr>
<tr>
<td></td>
<td>Input frequency range</td>
<td>50/60Hz±5%(choose)</td>
</tr>
<tr>
<td></td>
<td>Short circuit protection</td>
<td>Open space to fuse</td>
</tr>
<tr>
<td></td>
<td>Input protection</td>
<td>Overcurrent protection</td>
</tr>
<tr>
<td></td>
<td>Maximum input current</td>
<td>20 A</td>
</tr>
<tr>
<td>System</td>
<td>Output Power</td>
<td>1500W</td>
</tr>
<tr>
<td></td>
<td>Rated Current</td>
<td>15 A</td>
</tr>
<tr>
<td></td>
<td>Switching time</td>
<td>0ms</td>
</tr>
<tr>
<td>Output</td>
<td>Output Voltage</td>
<td>100V/220V AC(choose)</td>
</tr>
<tr>
<td></td>
<td>Output Waveform</td>
<td>Sine</td>
</tr>
<tr>
<td></td>
<td>Output frequency</td>
<td>50/60Hz±5%(choose)</td>
</tr>
<tr>
<td></td>
<td>Inverter sine waveform distortion</td>
<td>&lt; 5 %</td>
</tr>
<tr>
<td></td>
<td>Phase</td>
<td>Single-phase 2-wire</td>
</tr>
<tr>
<td></td>
<td>Overload protection</td>
<td>Circuit breakers and fuses</td>
</tr>
<tr>
<td>Battery</td>
<td>Batteries Specifications</td>
<td>66Ah Lithium iron phosphate battery</td>
</tr>
<tr>
<td>---------</td>
<td>-------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td><strong>Composition form</strong></td>
<td>16S1P</td>
<td>16S2P</td>
</tr>
<tr>
<td><strong>Battery capacity</strong></td>
<td>48V 3300Wh</td>
<td>48V 6600Wh</td>
</tr>
<tr>
<td><strong>Cycle life</strong></td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td><strong>Charging current</strong></td>
<td>20A</td>
<td></td>
</tr>
<tr>
<td><strong>Charging cut-off voltage</strong></td>
<td>57.6V</td>
<td></td>
</tr>
<tr>
<td><strong>Discharge cut-off voltage</strong></td>
<td>44.8V</td>
<td></td>
</tr>
<tr>
<td><strong>Continuous discharge current</strong></td>
<td>1C</td>
<td></td>
</tr>
<tr>
<td><strong>Discharge power</strong></td>
<td>≥2000W</td>
<td>≥4000W</td>
</tr>
</tbody>
</table>

**Battery Protection**
- Overcharge protection
- Over-discharge protection
- Over-current protection
- Over temperature protection

**Battery Monitoring**
- Monitors the battery voltage and temperature

**Cell balancing**
- Active equalization

**Alarm**
- Battery over / under voltage, over temperature, connection failure, continuous overload, discharge fault, etc.

**Appearance**
- **Dimensions**
  - 480*240*638(mm)
and other | Weight | ≤70Kg
---|---|---
Visual indication | LED |
Altitude | ≤4000m |

2.7 ESS Composition

2.7.1 Solar PV panels:
Solar panels are solar photovoltaic systems throughout an important part, it will convert solar energy into electricity, the electricity needs of the user can select the appropriate size or the size of the power panels, solar panels to avoid power shortages caused by too small, or the battery board costs caused by excessive waste; using well-known brands of solar PV panels, long life, weather, waterproof ability, performance and stability.

2.7.2 Storage batteries:
Battery solar panels can be transformed energy stored up for the user to evening or instant electricity. The choice of storage batteries to power generation and solar panels to meet the electricity needs of the principle of the load; Therefore, energy storage battery model specifications also require accurate according to the load power consumption design, battery stores energy necessary to meet the electricity needs, and not because of excessive costs caused by excessive waste. At present, various types of batteries, and from the cost of speaking, high-performance lithium iron phosphate is more economical and longer service life, widely used, more suitable configuration independent solar home systems.

2.7.3 Control against one machine:
It is the solar photovoltaic home systems a key component. Internal control structure of one machine into reverse charge controllers and inverters, charge controller is used to control solar panels for battery charging, not only to put solar panels into electricity stored in the battery as much as possible, and according to the battery their performance characteristics of intelligent control the charging process, the better the extended battery life. Solar Inverter DC output is converted to our usual family used alternating current for use. Entire control against one machine to the user that may occur during the use of a short circuit, overcurrent, under-voltage, over-temperature, reverse polarity protection and other faults are implemented.

2.7.4 Distributor

Switchboard is this energy storage system power distribution hub, responsible for the system in different modes of operation safe and reliable switching. It must be installed by a qualified electrician and technical personnel to operate.

2.7.5 Transmission line:

For solar PV home systems, independent of the connection between the various components.
Chapter Three: Install and Run

Installation and wiring

3.1 First, the solar PV panels fixed to the bracket, and according to area all day sun irradiation angle selection best segment surface, adjust the side facing the sun exposure, the vertical angle of sunlight exposure as possible to the battery plate; adjustment is completed, the bracket foot firmly fixed on the ground or a suitable flat surface.

3.2 The home storage machine installed in the appropriate position.

3.3 The room controller is installed in ease of operation and observation position.

3.4 The positive battery cable on one machine with the corresponding negative battery terminal connected (cable and the terminals are all red is positive, black is negative).

3.5 The end of the input line of solar photovoltaic cells and solar photovoltaic panels connected, and the other end connected to the corresponding terminal on one machine (cables and terminals are all red is positive, black is negative).

3.6 Determine the cable intact, open the output switch, the system begins normal output.
Chapter Four: Attentions

4.1 Ensure clean surface of solar panels, such as bird droppings, dust, etc. should be promptly removed, usually available water to wash with a soft clean gauze and then gently dry.

4.2 Solar panel bracket should always check regularly for corrosion rust treatment, if any, bolts, nuts loose, timely solid; see whether there is leakage wire connector.

4.3 Solar panels peripheral considerations must ensure solar panels is not blocked, the terrain on the panels to ensure that rain water from erosion and bracket.

4.4 One machine is the automatic control equipment, usually just for the body unit's output opening and closing operations, without additional manual operation and modulation, do not open the cover, always check the machine is firmly fixed, if there is an odor, usually possible to avoid not drop other security risks.

4.5 One machine and the battery to maintain a good operating environment, pay attention to good ventilation and cleanliness, banned in sunlight exposure, away from ignition sources and flammable materials, batteries Do not use organic solvents for cleaning.

4.6 System installation wiring, one machine connected to the battery first, then connect the solar panels, the process of using solar panels is not prohibited in the case of disconnect disconnect the battery connections.

4.7 Under no circumstances should ensure that the battery and solar panels can not short-circuit the positive and negative power cord.

4.8 Solar panels or batteries connected with one wire will see sparks, which is normal, but not in the flammable gas before connecting the power cord, so as to avoid an explosion or fire.
4.9 Special warnings

4.9.1 Do not allow children near the installation location;

4.9.2 Do not allow the main control box and the conductive device soaking wet;

4.9.3 Keep away from heat, away from corrosive, flammable and explosive materials, not near the fire;

4.9.4 Do not throw, do not fall, do not stress, do not squeeze, do not shock, not strong vibration;

4.9.5 Use, do not exceed the specified maximum rated load requirements.

4.10 Common Faults and Solutions

<table>
<thead>
<tr>
<th>NO.</th>
<th>Symptom</th>
<th>Possible Causes</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| 1   | Power indicator does not light | 1. Enter photovoltaic panels poor contact with one machine  
2. Photovoltaic panels welded wire off  
3. Photovoltaic panels internal fault | 1. Disconnect the wiring Reseat  
2. Re-welding wires will come off  
3. Replace PV panels |
| 2   | Cannot charge      | 1. Charging circuit exists off-line, virtual access  
2. Storage batteries internal resistance faults | 1. Detection circuit, connected to wires  
2. Replace the failed storage batteries |
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>No Output</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1、Output Plug, seat bad</td>
<td>1、Unplug then plug the new patch</td>
</tr>
<tr>
<td></td>
<td>2、The internal temperature is too high</td>
<td>2、Improved ventilation to cool before use</td>
</tr>
<tr>
<td>4</td>
<td>Circuit breaker trips</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1、The output of the connected load short-circuit</td>
<td>1、Excluding short-circuit fault point</td>
</tr>
<tr>
<td></td>
<td>2、The output of the connected load is too large</td>
<td>2、Disconnect the larger the load, limiting the load power</td>
</tr>
<tr>
<td>5</td>
<td>Lack of insufficient power supply energy storage(Such as continuous rainy days)</td>
<td>Charging time under sunlight</td>
</tr>
</tbody>
</table>