

# **SP100HCPS/SP125HCPS**

## **Energy storage converter Product specification**

**version: V1.4**

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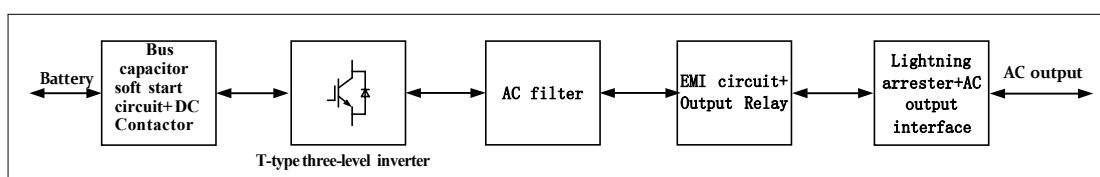
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# 1. Product introduction

An efficient and highly reliable energy storage converter is mainly developed for small and medium-sized energy storage microgrids, which includes a parallel and off-grid switching device, supports multiple parallel operation, supports hybrid operation of oil and gas engines, and supports fast parallel and off-grid switching. It is suitable for small-scale industry and commerce, small-scale island microgrid, farm, villa, battery cascade utilization and other scenarios to meet the needs of different users.

## 1.1 Main topology



Picture 1

## 1.2 Product features

### (1) Efficient and highly reliable:

- **Low power consumption:** standby power consumption is low  $\leq 15W$ , and no-load running loss is less than 160W;
- **High efficiency:** the highest conversion efficiency is 98.5%;
- **High protection:** the core control part has the protection level of IP5X, which can work stably in harsh environment, such as dust and high salt fog;
- **Air duct isolation design:** the isolated air duct design is adopted to improve the safety and reliability of the product;
- **High overload capacity:** it has 150% instantaneous overload capacity, which enhances the adaptability and durability of the system;
- **Seamless switching function:** support seamless switching between parallel and off-grid to ensure the continuity (External STS implementation required) and stability of power supply.

### (2) Function:

- **Oil-engine hybrid mode:** supports oil-engine hybrid operation, provides flexible energy combination mode, and improves energy utilization efficiency;
- **Three-phase independent grid-connected control technology:** three-phase independent control is realized, power distribution is optimized, and the flexibility and efficiency of the system are improved;
- **Seamless switching:** seamless switching (less than 10 ms, External STS implementation required) in parallel and off-grid;
- **Power grid adaptability:** perfect high and low voltage crossing function, island protection, black start and other functions;

- **Parallel machine function:** the AC side supports 15 parallel machines for grid-connected operation or off-grid operation, and the DC side also supports parallel use of multiple machines;
- **Flexible application scenarios:** suitable for small-scale industry and commerce, small-scale island microgrid, farms, villas and other scenarios to meet the specific needs of different users.

### **(3) Convenience:**

- **Communication and monitoring:** support a variety of communication protocols, support mainstream BMS protocols, and facilitate remote monitoring and management;
- **High maintainability:** front wiring and front maintenance;
- **Fault protection:** perfect fault protection and fault recording function;

## 2. Product model and size

### 2.1. product model

SP125HCPS、SP100HCPS

### 2.2. naming rule

This document is applicable to the model description of SP\*\*HC\*\* series products.

serial number	code	meaning
1	Name of the company	SP: Sino Soar
2	Ac rated power	125: Ac rated output power is 125kW 100: Ac rated output power is 100kW.
3	Dc voltage level	H: The input voltage of DC side is within 680~950V
4	Assembly mode	C: Insert frame
5	Module classification	G2: Hybrid energy storage inverter PS: Energy storage converter DC: DC converter PV: DC MPPT IV: Inverter

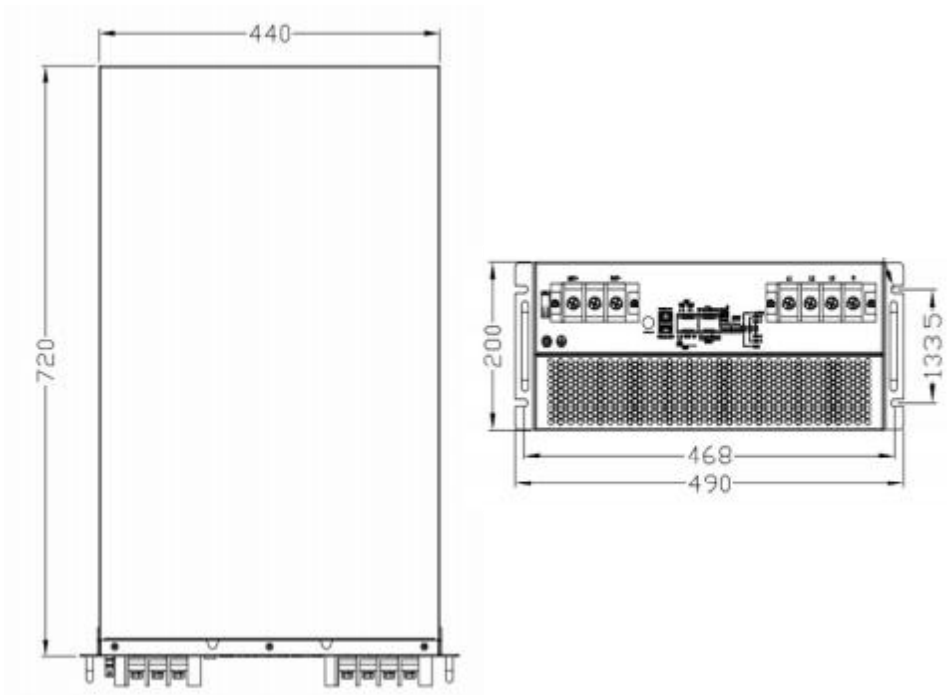
## 2.3. Product appearance and size

### (1) Product appearance



Picture 2

### (2) product size



Picture 3

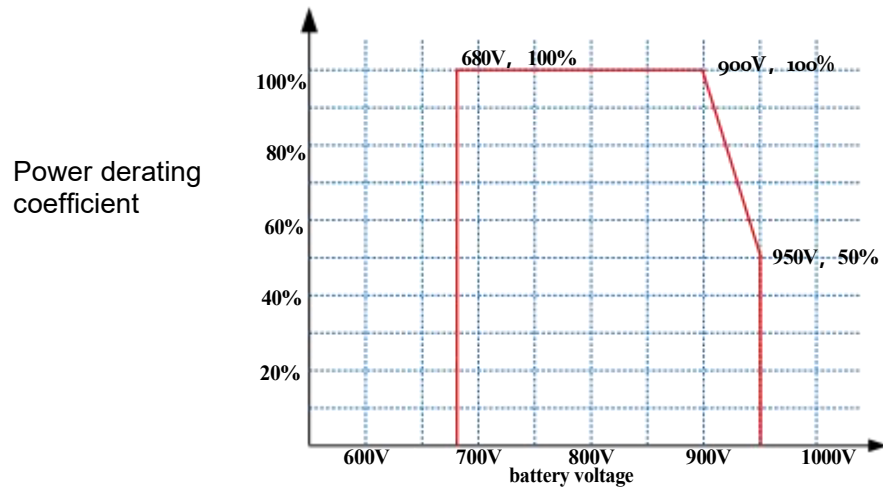
### 3. Specification parameter

#### 3.1. parameter

Parameter	SP100HCPS	SP125HCPS
<b>Battery parameters</b>		
Maximum battery voltage	950V	
Minimum battery voltage	680V	
Minimum battery voltage	680V-900V	680V-900V
Maximum battery current	150A	200A
<b>AC side (grid-connected)</b>		
rated power	100kVA	125kVA
rated current	145A	181A
Rated grid voltage	400V/230V	
Grid voltage range	-20%~15%	
Power grid frequency range	50Hz/47Hz~52Hz(60Hz/57Hz~62Hz)	
Current harmonics	<3% (more than 30%load)	
Power factor	-1~1	
<b>AC side (off-grid)</b>		
Output rating	100kVA	125kVA
Maximum output power	110kVA	137.5kVA
Rated output current	145A	181A
Maximum output current	160A	200A
Rated voltage	400V/230V	
Output voltage harmonics	<3%(Resistive load)	
Degree of unbalancedness	100%	
Frequency range	50/60Hz	
Output overload (current)	$I_e * 1.1 < I_{load} \leq I_e * 1.25$	100s
$I_e$ : Rated output current	$I_e * 1.25 < I_{load}$	300ms
<b>System parameter</b>		
Communication port	EMS: RS485 Battery: CAN or RS485	

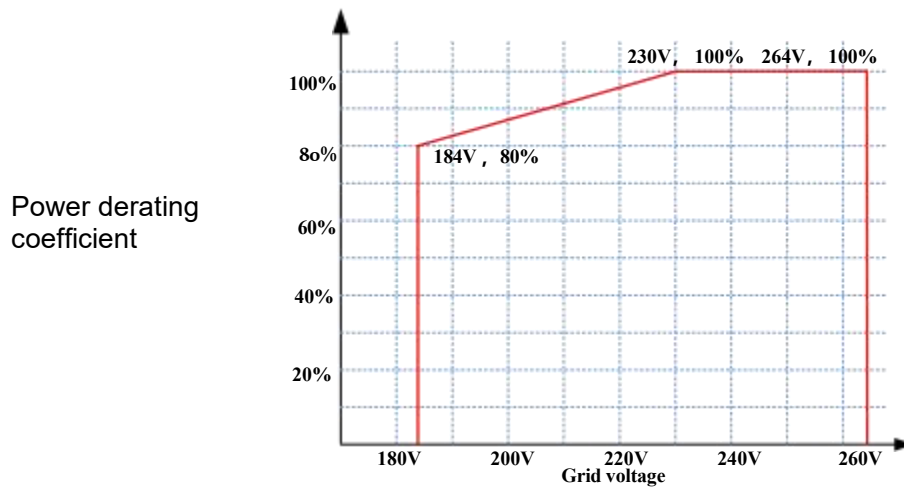
<b>DIDO</b>	<b>DI: 2 channels; DO: 2 channels</b>
<b>Maximum efficiency</b>	<b>98.5 %</b>
<b>Installation mode</b>	<b>Insert frame</b>
<b>Wastage</b>	<b>Standby &lt; 15W, no-load power &lt; 200W</b>
<b>Weight</b>	<b>≤50kg</b>
<b>Measure</b>	<b>W*L*H: 440*720*200mm</b>
<b>Protect</b>	<b>IP20</b>
<b>Temperature range</b>	<b>-30~60°C(45°C Derate)</b>
<b>Humidity range</b>	<b>5-95%</b>
<b>Cooling mode</b>	<b>Intelligent fan speed regulation air cooling</b>
<b>Altitude</b>	<b>4000m (2000m Use above derating)</b>
<b>Authentication</b>	<b>CE, IEC62477, IEC6100, EN50549</b>

### 3.2. Power derating curve (battery voltage)



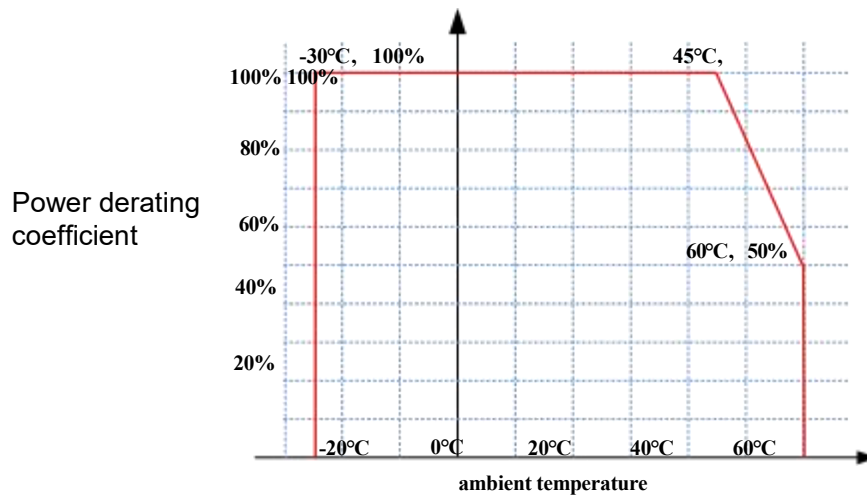
Picture 4

### 3.3. Power derating curve (grid voltage)



Picture 5

### 3.4. Temperature derating curve

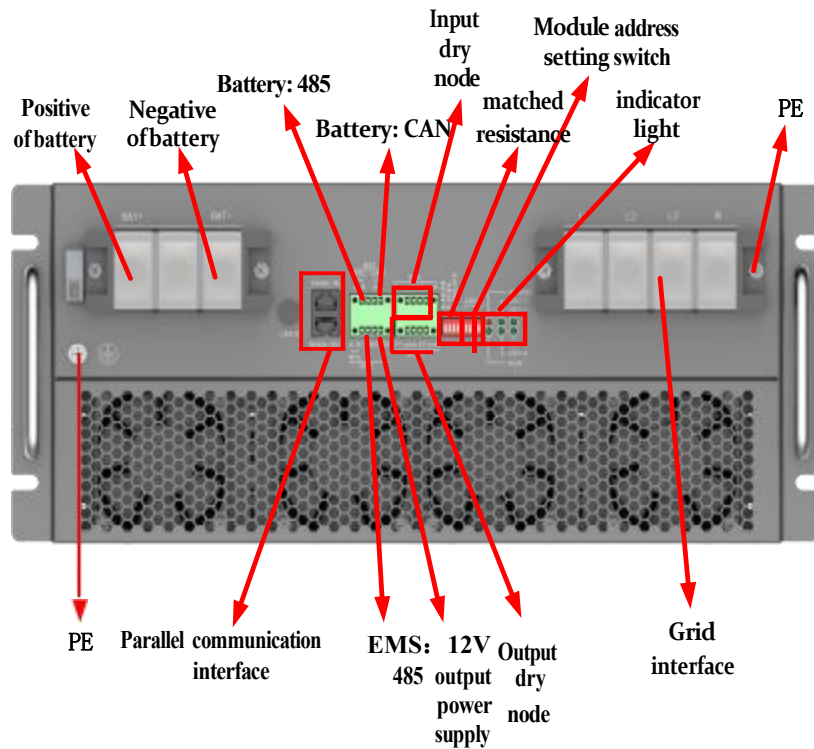


Picture 6

### 3.5. Safety protection

- Air duct isolation, salt spray prevention and control warehouse sealing;
- The humidity range is 5%-95%;
- Anti-interference 2KV grounding, Class III lightning protection, and Class II lightning protection is required for AC side or power distribution unit during the application of PCS;
- Run vibration test and transportation test with packing materials.

#### 4. port definition



Picture 7 Port definition schematic

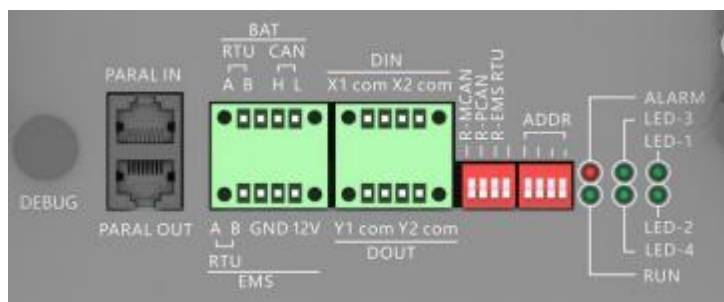
**Power port definition:**

name	function	remarks
BAT+/BAT-	Battery input terminal	OT terminal(RNB60-8), 50mm <sup>2</sup> wire cable
GRID/Load(L1/L2/L3/N)	AC power network terminal	OT terminal (RNB60-8), 50mm <sup>2</sup> wire cable
PE	ground terminal	OT terminal (RNB22-6S),10mm <sup>2</sup> wire cable

**⚠ watch**

- The power terminals of the battery interface and the power grid interface are fixed with M8 screws. Please fix the power cable with the screws provided with it, and the torque of the fixing screws is 15.5~16.5N.m . Too large will lead to terminal damage, and too small will lead to poor contact.
- When the module is running, it needs reliable grounding. Poor grounding may lead to electric shock danger and module damage. The torque of the fixing screw is 5N.m.

The definition of signal terminal interface is shown in picture 8.

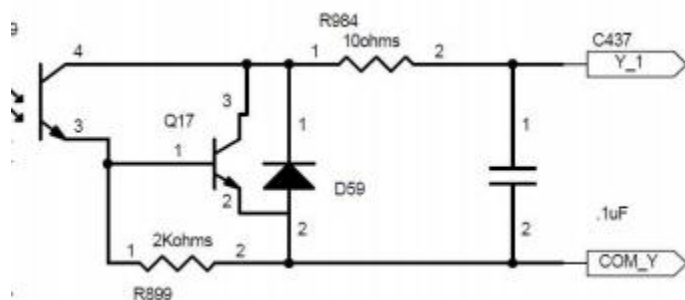


Picture 8 Definition of signal terminal interface

name	function	remarks
PARAL IN	Parallel line input	Parallel line
PARAL OUT	Parallel line output	Parallel line
BAT_RTU	Battery RS485 interface	BAT communication interface
BAT_CAN	Battery CAN interface	
RTU(A-B)	Communication interface with EMS	Upper computer or EMS or SAEMS100 (optional) coordinated control system
12V-GND	SAEMS Power supply port	output capability 12V/0.5A
X1	Input dry contact	Emergency stop button
X1_com	Input dry contact	
X2	Input dry contact	reserve
X2_com	Input dry contact	reserve
Y1	Output dry contact	Output capacity: the maximum voltage of the port is not higher than 24V, and the maximum current is not more than 200mA
com		
Y2	Output dry contact	
com		
R-MCAN	Parallel communication matching resistor	ON: indicates that the communication matching resistor is connected.
R-PCAN	Parallel communication matching resistor	Module 1 and the last module need to be connected with parallel communication matching resistors (dial the code to the ON position), that is, parallel communication matching resistors are needed at the beginning and end, and the rest are not needed.
R-EMS RTU	EMS RTU Communication matching resistance	
ADDR	Module address dialing	ON: 1, otherwise 0. The address of the module is expressed in binary, with the high position on the left and the low position on the right, that is, the No.1 module is expressed as 0001; Module 3 is indicated as 0011.
DEBUG	Debugging interface	For internal debugging only.

<b>ALARM</b>	<b>trouble lamp</b>	<b>The converter is always on when there is a fault, and always off when there is no fault.</b>
<b>RUN</b>	<b>status indicator lamp</b>	<b>The converter is always on during normal operation, flashing once per second when it is in trouble-free standby, and the converter failure often goes out.</b>
<b>LED1</b>	<b>reserve</b>	
<b>LED2</b>	<b>reserve</b>	
<b>LED3</b>	<b>Battery status indicator lamp</b>	<b>The function of the battery terminal circuit is always on when it is running, it flashes once per second when the battery is normal, and it is always off when the battery is abnormal.</b>
<b>LED4</b>	<b>Power grid status indicator lamp</b>	<b>Grid-connected operation is always on, and the power grid flashes once per second when there is no abnormality, and the power grid is always off when there is abnormality.</b>

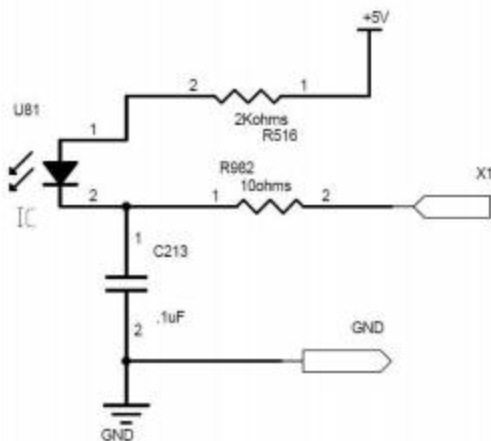
The internal schematic diagram of the output trunk node is shown in Picture 9:



Picture 9 Internal principle of output trunk node

The maximum voltage of the port is not higher than 24V, and the maximum current is not more than 200mA.

The internal schematic diagram of the input stem node is shown in Figure 10:

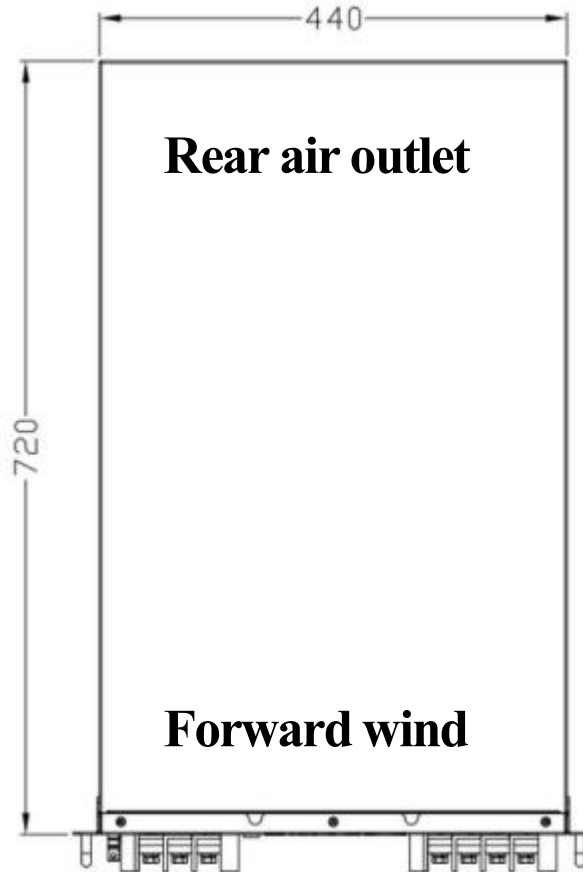


Picture 10 Input internal schematic diagram of dry node

The input trunk node has a built-in power supply, so it only needs to provide a switch for short circuit, and the sum of the short circuit impedance of the switch and the line impedance should be less than 0.1 Ω.

## 5. Heat dissipation requirements

### 5.1. Air inlet and outlet mode



Picture 11

### 5.2. Heat dissipation requirements

The cooling mode of converter module is forced air cooling, with air inlet on the front panel and air outlet on the back panel. The rated air inlet of converter module is 500CFM(14.1m<sup>3</sup>/min). When installed in an integrated system, the air inlet of the cabinet should face the air inlet of the front panel of the module, and the distance between the air inlet of converter module and the cabinet should be greater than 110mm; ; Corresponding air ducts and air outlets should also be added to the cabinet.

The air duct should face the module air outlet and the cabinet air outlet, and the distance between the converter module air outlet and the cabinet should be greater than 110mm,

So as to directly send the hot air outside the cabinet and prevent the hot air from flowing back in the cabinet. If there is no relevant air outlet duct, an exhaust fan should be added at the air outlet of the cabinet, and the air volume of the fan should be 2 times of the air intake requirement of the module.

Considering that dust-proof cotton needs to be added to the air inlet, the air inlet area of the cabinet should be three times larger than that of the converter module. It is recommended to use polyurethane reticulated foam cotton with 40PPI density for dust-proof cotton, and the flame retardant grade should meet 94V0. The air outlet area of the cabinet should be twice that of the converter module. At the same time, it is recommended to use 10 mesh insect-proof steel mesh at the air outlet. Refer to Figure 11 for air intake.

## 6. External EMS scheduling function (optional)

### 6.1. Introduction of microgrid EMS

Matching EMS series products can be selected, and the version is light storage diesel version of microgrid EMS. Micro-grid EMS is a key component to ensure the efficient, reliable and economical operation of micro-grid. It is responsible for dispatching and managing distributed power generation resources, energy storage equipment, load and possible grid-connection, off-grid and anti-reflux operations to ensure the stable and economical operation of the system.



Picture 18

### 6.2. EMS function

- Monitoring and data acquisition: real-time monitoring of energy flow in microgrid, including power generation, energy storage, photovoltaic and load. Collect and record key parameters, such as voltage, current, power and frequency, system diagnosis, cloud platform docking, etc.
- Control and optimization: optimize the operation of microgrid according to the energy demand and supply.
- Protection and safety: ensure the safe operation of microgrid, including overload protection, short circuit protection, equipment fault detection and response measures.
- Energy management: Manage the energy distribution in microgrid to ensure the effective use of energy and reduce waste, and may include demand response and peak-valley flattening strategy.
- Economic dispatch: based on the change of electricity price and energy cost, economic dispatch is carried out to minimize the overall operating cost.
- User interaction: provides a user interface, allowing users to view energy usage, set operation mode and operation parameters.
- Grid connection and islanding operation: manage the grid connection and disconnection of microgrid and main grid.

- **Remote OTA:** It can diagnose EMS and inverter faults remotely and upgrade the software remotely.

### **6.3. EMS working mode**

Economic model:

It is suitable for scenes with large peak-valley price difference.

In this mode, the charging and discharging time period is set manually, such as the low electricity price period at night is set as the charging time period, and the system charges the battery with the maximum charging power during this time period, so it is necessary to enable the "grid charging" function in the "energy storage control", and the high electricity price period is set as the discharging time period, so that the battery can be discharged only during the discharging time period, saving the electricity cost.

### **6.4. Other EMS parameter information**

See EMS specification for details.