CBLV5120-B energy storage battery with 6.2kwSMK inverter

Matching test Report

Review node	Examiners	Review time
Establishment	Liu Jiangbo	July 22
REVIEW		
Approval		

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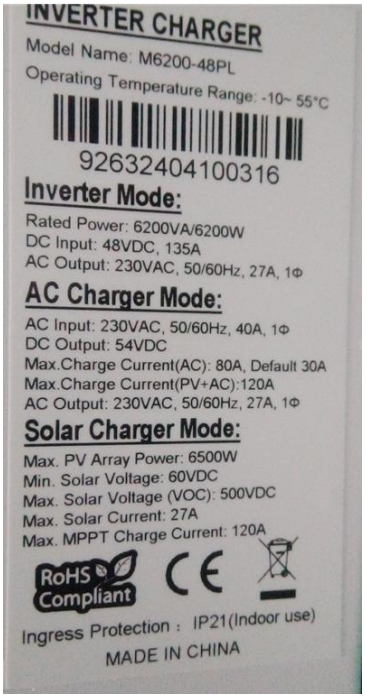
Version update record

Version	Dates	Chapters	Modifier	Update the content description

Basic information about inverters and batteries

<table>
<tr><td colspan="3">Basic information about the inverter</td></tr>
<tr><td>Prototype name
(nameplate model)</td><td colspan="2">M6200-48PL</td></tr>
<tr><td>Prototype serial number
(Nameplate SN)</td><td colspan="2">92632404100316</td></tr>
<tr><td rowspan="2">Sample photo</td><td> 
Prototype appearance</td><td> 

Nameplate</td></tr>
<tr><td>Hardware version</td><td colspan="2">/</td></tr>
<tr><td colspan="3">Basic battery information</td></tr>
<tr><td>Battery name</td><td colspan="2">Low-voltage energy storage battery</td></tr>
</table>

Battery model	CBLV 5120-B		
Battery Serial number	SN:21882100017B		
Sample photo	 Prototype appearance	Nameplate	Software version
BMS hardware version	P8S100A - 30453-1.00		
BMS S/N	007PB4DG0211WDCS0003000		
Test environment	25℃ at room temperature		
Test conclusion	**Pass**		

List of test equipment

A list of the main instruments and equipment used in this test				
Serial Number	Name of instrument	Model number	Code	Calibration expiration date
1	Two-way charge and discharge machine	IT6015C-80-450	0000000334	/
2	Multimeter	Fluke 12E+F17B	0000000012	2024.5
3	Single-phase AC load	JCH-15KW-AC220V-RCD	/	/

1. Test purpose

Check whether the internal structure of the product and the safety regulations, functional requirements, performance indicators of the system meet the technical requirements, and find the system software, hardware and design documents and technical contracts do not meet or contradict the provisions.

2. Normative reference documents

The following documents are essential for the application of this specification. For dated references, only the dated version shall apply to this Specification. For undated citations, the latest version (including all amendment orders) shall apply to this Specification.

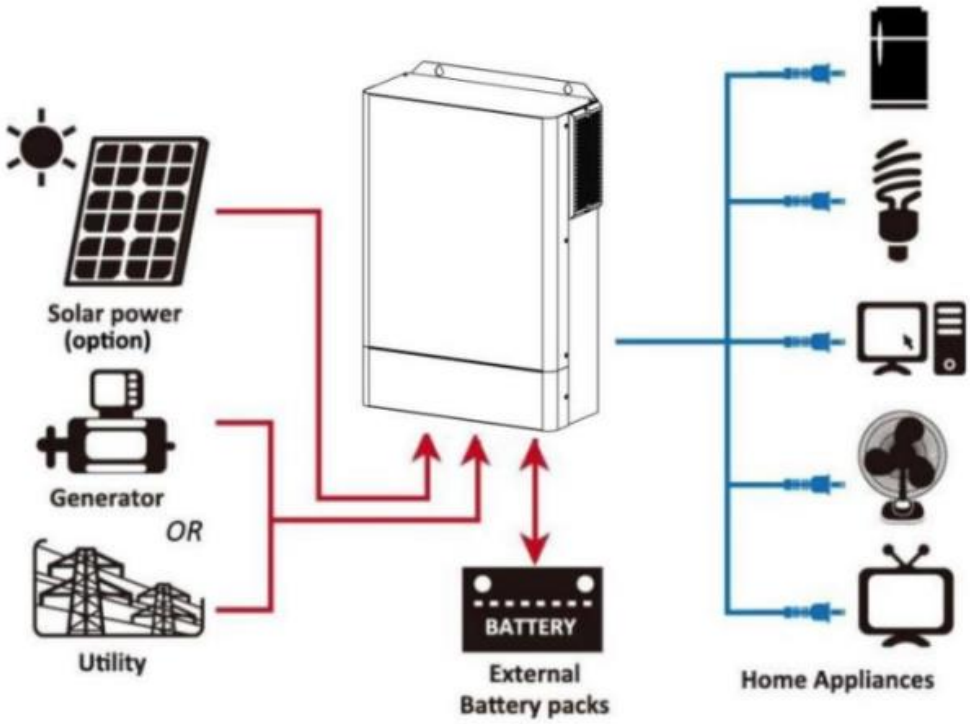
GB/T 36276-2018 "Lithium-ion Batteries for Electric Energy Storage"

GB/T4208-2017 "Housing Protection Class (IP Code)"

IEC62619 "Safety Standard for Industrial Batteries"

EN61000-1/3 European Electromagnetic Compatibility Directive CE-EMC

2.1 Test Scenarios



3. System overview

The energy storage battery system mainly includes :1 PCS(model: M6200-48PL)+1 5-degree battery (model: CBLV5120-B), including the BMS system.

Battery box: using lithium iron phosphate, 100Ah battery cell, single module 1P15S, a total of 1 module, the voltage range is 44.8 ~ 58.4Vdc, the whole system is 5 degrees of electricity, 4 parallel for 20 degrees of electricity;

The overall structure is shown as follows:

4. Internal structure inspection

Experiment name:	External structure inspection	Serial number:	1
Test purpose:	Verify that the external structure meets the design requirements		
Judging basis:	The external wiring harness is not damaged, the battery module is not deformed, the terminal is not damaged, the screw is intact, and the battery module voltage is normal.		

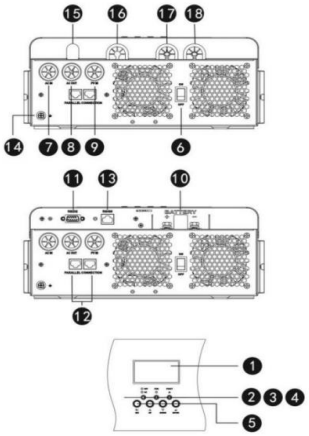
Experimental instruments:	Visual and handheld multimeters

What to watch for:

External installation should be tight, no omissions.

Test data:

1. 液晶显示器
2. 状态指示灯
3. 充电指示灯
4. 故障指示灯
5. 功能按钮
6. 电源开关
7. 交流输入
8. 交流输出
9. 光伏输入
10. 电池输入
11. RS232 通讯口
12. 并行通讯口（仅适用于并联型号）
13. RS485 通讯口



Test verdict: PASS

Remaining issues: None

5. Safety test

5.1 5120-B battery insulation resistance test

Test Name:	Insulation Resistance Test	Serial number:	2
Test purpose:	Check whether the insulation performance of the 5120-B battery meets the design requirements		
Judging basis:	Insulation resistance measurement results should not be less than 1MΩ		
Experimental instruments:	Insulation resistance tester, multimeter		

Precautions:

(1) Pay attention to high electrical hazards during testing to ensure the safety of personnel

(2) Avoid testing insulation resistance in cloudy, rainy and humid conditions

(3) Use a multimeter to confirm that the device under test is not live

Test data:

Test subjects	Batteries	Test conditions	Positive to ground insulation resistance (GΩ)	Negative ground insulation resistance (GΩ)	Test results
24V105Ah battery	2	Dc 500V	1.2	1.2	Pass

Test verdict: PASS

Remaining issues: None

5.2 Voltage Resistance Test of 5120-B Battery insulation

Experiment name:	Battery insulation withstand voltage test	Serial number:	3
Purpose of testing:	Check whether the insulation of the electric 5120-B battery has local defects, moisture, and aging, and ensure that the insulation and voltage withstand of the battery system meet the design requirements		
Judging	There is no destructive discharge phenomenon such as breakdown and		

basis:	flashover during the insulation withstand voltage test, and the test result of the withstand voltage meter is PASS
Experimental instruments:	Multimeter, insulation withstand voltage tester

Test data:

Test subjects	Test conditions	Positive to floor drain current (mA)	Negative to floor drain current (mA)	Test results
Battery system	AC 1000V, Test 1min	200	251	PASS

Test verdict: PASS

Remaining issues: None

6. Functional testing

6.1 On-off function test

Experiment name	On-off function test	Serial number	4
Purpose of testing	Test whether the system can be switched on and off normally		
Test conditions	The energy storage system is built		
Criteria	The inverter is powered by the battery and the power grid separately, and whether the inverter can be started normally.		

Test conclusion: PASS
Remaining issues: None

6.2 Display Testing

Experiment Name	Display test	Serial number	5
Purpose of testing	Test whether the inverter display is normal;		
Test conditions	Power on, inverter is powered on, check the display status;		
Decision criteria	The display screen is normally displayed, whether it is consistent with the actual working state;		
			
Test conclusion: PASS			
Remaining issues: None			

6.3 Inverter Parallel function test

Experiment name	Inverter and inverter parallel function test	Serial number	5
Purpose of testing	Test whether the parallel function of the inverter is normal;		
Test conditions	Turn on the power supply, the two inverters are connected through parallel communication, the inverters are in the power state, check the display status;		
Decision criteria	The display display is normal, the display data is the same, whether it is consistent with the actual working state;		

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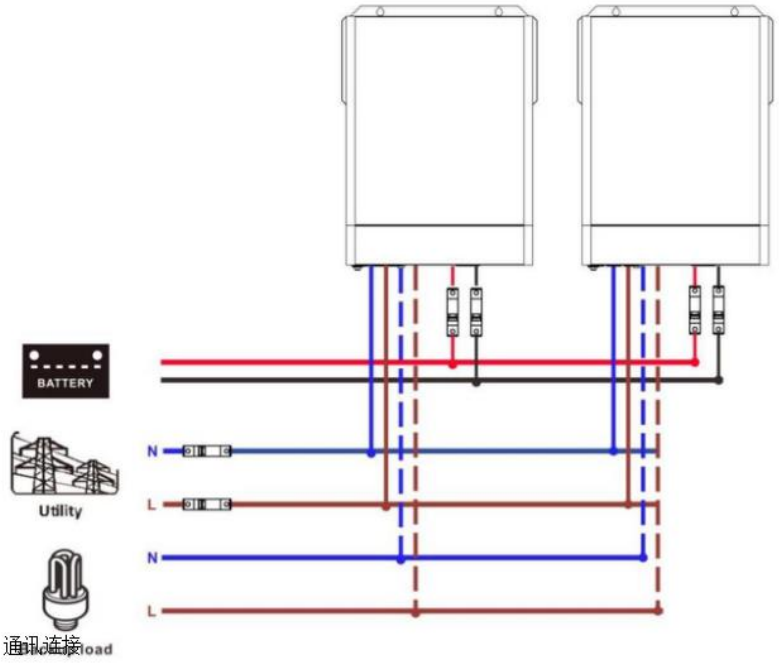


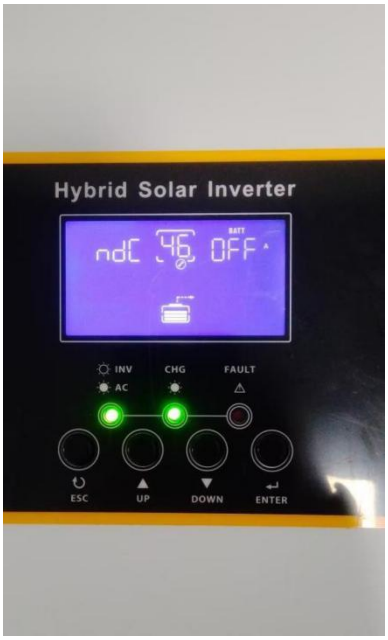
2 inverters parallel circuit diagram

通讯连接

Test conclusion: PASS
Remaining issues: None

6.4 Function test of Inverter Settings

Experiment name	Set up Functional test	Serial number	6
Purpose of testing	Test whether the inverter setting function is consistent with the manual.		
Test conditions	Turn on the power supply, the inverter is powered on, check the inverter setting function;		
Judging standard	Inverter Settings function is consistent with the manual.		



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Test verdict: PASS
Remaining issues: None

7. Parallel inverter performance test

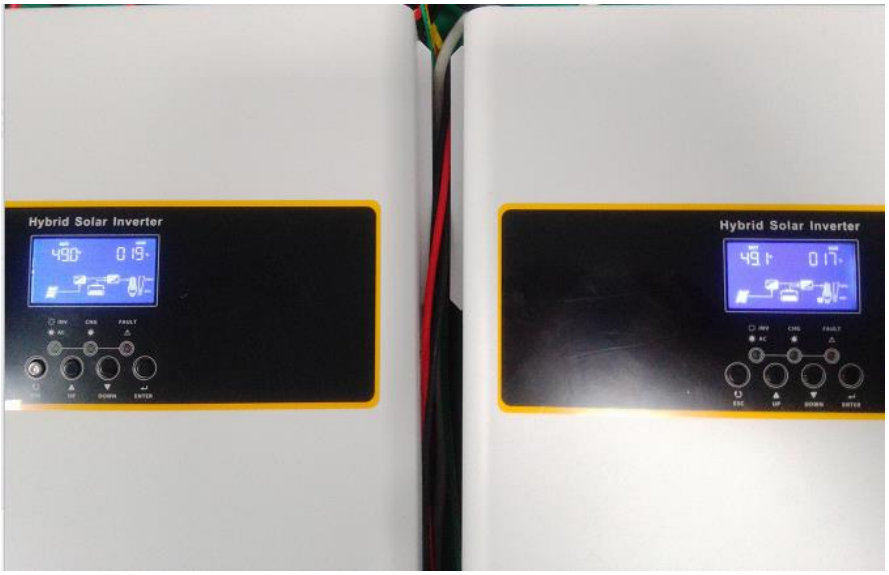
7.1 Battery charging test of parallel inverters

Experiment name	Inverters in parallel to parallel battery charging test	Serial number	7
Test purpose	After the inverter is connected in parallel, whether the output working state is consistent with the actual;		
Test conditions	Photovoltaic, load, battery parallel, inverter parallel to build energy storage system;		
Judging standard	Turn on the power grid separately, whether the photovoltaic can charge the battery and supply power to the load.		

The grid supplies power to the load and charges the battery at the same time

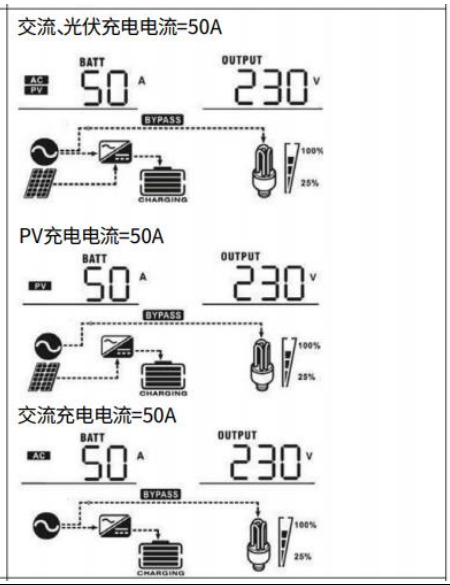
The grid and the photovoltaic output current

Pv individual charging voltage value



Pv input current value

The battery supplies power to the load separately, and the battery discharge current and voltage value are displayed

充电电流	

Test conclusion: PASS

Remaining issues: None

7.2 Parallel Alarm Fault Testing

Experiment name	Parallel alarm fault test	Serial number	87
Purpose of testing	Parallel battery alarm fault inverter response test;		
Test conditions	Photovoltaic, load, battery parallel, inverter parallel to build energy storage system;		
Judging standard	Whether the battery alarm or protection affects the normal operation of the inverter;		

Set the battery type inconsistent alarm 26 code Abnormal communication alarm 19 code

Fault Code	Fault Event	Icon on
01	Over temperature of inverter module	
02	Over temperature of DCDC module	
03	Battery voltage is too high	
04	Over temperature of PV module	
05	Output short circuited.	
06	Output voltage is too high.	
07	Overload time out	
08	Bus voltage is too high	
09	Bus soft start failed	
10	PV over current	
11	PV over voltage	
12	DCDC over current	
13	Over current or surge	
14	Bus voltage is too low	
15	Inverter failed (Self-checking)	
16	Over DC voltage in AC output	
17	Reserved	
18	Op current offset is too high	
19	Inverter current offset is too high	
20	DC/DC current offset is too high	
21	PV current offset is too high	
22	Output voltage is too low	
23	Inverter negative power	

Warning Code	Warning Event	Audible Alarm	Icon flashing
02	Temperature is too High	Beep three times every second	
04	Low battery	Beep once every second	
07	Overload	Beep once every 0.5 second	
10	Output power derating	Beep twice every 3 seconds	
15	PV energy is low	Beep twice every 3 seconds	
19	Lithium Battery communication is failed	Beep once every 0.5 second	
20	Battery low and it isn't up to the setting value of program 13	Beep twice every 3 seconds	
E9	Battery equalization	None	
bP	Battery is not connected	None	

Test conclusion: PASS

Remaining issues: None

7.3 SOC Consistency Test during Parallel Battery Discharge

Experiment Name	Parallel battery full test	Serial number	9
Test purpose	Parallel battery charging consistency test		
Test conditions	Build the energy storage system. After the construction is completed, the parallel battery will be emptied at 0.5C current.		
Judging criteria	In the process of parallel battery discharge, the current difference is less than 2A, and the SOC difference is less than 3%.		

Test conclusion: PASS

Remaining issues: None

7.4 SOC Conformance test during parallel battery charging

Experiment Name	Parallel battery full test	Serial number	10
Purpose of testing	Parallel battery charging consistency test		
Test conditions	The energy storage system will be built, and the parallel battery will be		

	charged with 0.5C current after construction.
Judging criteria	In the process of parallel battery discharge, the current difference is less than 2A, and the SOC difference is less than 3%.

Test conclusion: PASS

Remaining issues: None

7.5 Test different SOC batteries in parallel with inverters

Experiment Name	Parallel test of different SOC batteries	Serial number	11
Purpose of testing	Parallel battery equalization test		
Test conditions	1. Take a battery and charge SOC60% of the battery with 0.5C current; 2. Take another battery and drain SOC11% of the battery at 0.5C current; 3. Parallel the two battery boxes;		
criterion	The high-power battery will charge the low-power battery, and the charging current should be within the current limiting range. The inverter reads the battery SOC as the average SOC value of the battery;		


实时监控
并机监控
存储信息
导出记录
参数设置
系统设置
软件设置
工具
电池信息
总电压: 52.386 V
电流: -26.01 A
SOC: 61 %
SOH: 100 %
剩余容量: 61130 mAh
满充容量: 100000 mAh
循环次数: 2
独立总压1: 51.996 V
独立电流1: 0 A
当前PACK
PACK: 2
主机地址: 1
串口选择: COM12
地址: 1
关闭串口
停止监控
轮询
温度信息
温度含义 温度(℃)
温度1 28.6
温度2 28.9
温度3 28.4
MOS温度 30.4
环境温度 28.9
系统状态(只读)
充电MOS
放电MOS
充电电流有效
加热膜
放电电流有效
ACin
限流
满充
单体电压
电池编号 电压(mV) 均衡
1 3274
2 3273
3 3273
4 3275
5 3275
6 3275
7 3273
8 3276
9 3276
10 3275
11 3272
12 3276
13 3274
14 3274
15 3272
16 3273
单体最高电压: 3276 mV
压差: 4 mV
单体最低电压: 3272 mV
告警状态
无
开关控制
充电开启
放电开启
声音告警关闭
LED灯开启
限流开启
强制休眠
保护状态
无
故障状态
无


Hybrid Solar Inverter
INV
AC
CHG
FAULT
ESC
UP
DOWN
ENTER

The inverter reads the battery SOC as the average SOC value of the battery

Test conclusion: PASS
Remaining issues: None

7.6 Communication Test between Parallel inverters and batteries

Experiment name	Inverter and battery communication test	Serial number	12
Purpose of testing	Whether the inverter protocol matches the battery		
Test conditions	1. Build the energy storage system and connect the inverter to the battery 485 communication port with network cables; 2. Enter the inverter Settings 5, set the battery type LI2 or LI4 to match the lithium iron phosphate battery;		
Judging standard	The inverter can read the SOC, current and voltage values of the battery, and can monitor the battery parameters.		

Test conclusion: PASS
Remaining issues: None

7.6 Parallel battery charging activation

Experiment Name	Parallel battery blowdown test	Serial number	13
Purpose of testing	Parallel battery discharge consistency test		
Test conditions	Build the energy storage system. After the construction, discharge the parallel battery to the voltage < 2.7V with 0.5C current, disconnect the discharge MOS, and the battery enters deep sleep; 2. The power grid will charge and activate the deep hibernation battery through the inverter.		
Criteria for determination	The power grid is activated by charging the deep dormant battery through an inverter.		

1. Set the inverter setting item 05 to USE or LiX.
2. Enter 41 Settings to allow automatic activation.
3, automatic activation only the first power-on of the inverter will act once, the battery is empty during use. Need to power off and then power on again.
4, connect PV or grid call for battery charging activation;

05	Battery type	AGM (default) 05 AGn	Flooded 05 FLd
		User-Defined 05 USE	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.
		05 LI 2	Support PYLON US2000 Protocol 3.5 Version
		05 LI 4	Standard communication Protocol form inverter supplier

41	Automatic activation for lithium battery		Disable automatic activation (default)
			When Program05 is selected "Lix" as lithium battery and when the battery is not detected, the unit wi activate automatically the lithium battery at a time. If you want to activate automatically the lithium battery，you must restart the unit.

Test conclusion: PASS

Remaining issues: None

8 Test the inverter working mode

8.1 Solar First mode test

Experiment Name	Solar First Mode test (PV preferred)	Serial Number	14
Purpose of testing	Inverter mode running logic test		
Test conditions	1. Energy storage system, set the inverter working mode to SOL mode; 2. Adjust the load power of the photovoltaic grid battery, observe and record whether the operating status of the inverter conforms to the user manual: 3. Evaluate whether the inverter working mode can meet customer application scenarios.		
Judging criteria	Whether the inverter running state conforms to the user manual and meets customer application scenarios.		

Running logic:

1. Solar PV gives priority to power the load.
2. If solar PV is not already sufficient for this demand to power all the connected loads, the energy from the battery will power the loads at the same time.
3. The grid only provides power to the load under any of the following conditions

(1) There is no solar PV supply, such as at night;

(2) Battery voltage drops to low voltage alarm or set point in program 12.

Test conclusion: PASS

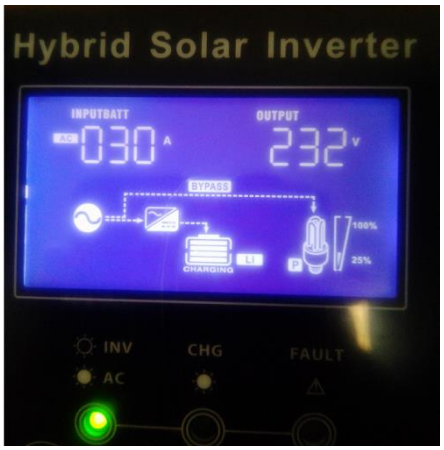
Remaining issues: None

8.2 Ulility First mode test

Experiment name	Ulility First Mode test (backup mode)	Serial number	15
Test purpose	Inverter mode running logic test		
Test conditions	1. Energy storage system, set the inverter working mode to Ulility First mode; 2. Adjust the load power of the photovoltaic grid battery, observe and record whether the operating state of the inverter conforms to the user manual: 3. Evaluate whether the working mode of the inverter can meet the customer's application scenario.		
Judging criteria	Whether the inverter running state conforms to the user manual and meets customer application scenarios.		

Running logic:

1. The grid preferentially supplies power to the load.
2. Only when the power grid is insufficient, solar energy and batteries can supply power to the load.



Test conclusion: PASS

Remaining issues: None

8.3 Testing the SBU Mode

Experiment Name	SBU Mode Test (Spontaneous Self-use mode)	Serial number	16
Purpose of testing	Inverter mode running logic test		
Test conditions	1. Energy storage system, set the inverter working mode to SOL mode; 2. Adjust the load power of the photovoltaic grid battery, observe and record whether the operating status of the inverter conforms to the user manual: 3. Evaluate whether the working mode of the inverter can meet the customer's application scenario.		
Judging criteria	Whether the inverter running state conforms to the user manual and meets customer application scenarios.		

Running logic:

1. Solar power gives priority to the load.
2. If solar is not enough to meet this demand to power all the connected loads, the energy from the battery will power the loads simultaneously.
3. The grid only supplies power to the load when the battery voltage drops to a low voltage alarm or set point in procedure 12.

Test verdict: PASS
Remaining issues: None