NXTGENbps SHAPE Emperor User Guide

1. Catalog

2. Abstract

2.1 Preface

a) • This manual contains important information, guidelines, operation and maintenance of the product and applies to the following models:

TPSG15

b) • Users must follow the contents of this manual during installation, use and maintenance.

2.2 Safety Notice

In order to ensure the user's personal and property safety when using this product, and to use this product more efficiently, relevant information is provided in the specification. Please read the following safety instructions carefully before using the product.

Warning! The symbol aim to remind if handled incorrectly or not avoided, may cause danger to the safety of the user or cause serious damage to the equipment.

Electric shock warning!
The places marked by this symbol are all parts with electric shock hazards, which may cause danger to the safety of users. Please DO NOT touch them at will.

Ground!
This symbol is the ground wire protection mark

Warning!
To prevent electric shock, the capacitor needs to be discharged for 5 minutes after disconnecting all power supplies.

2.3 Safety instruction

◆ When performing wiring and maintenance, be sure to cut off the air switch.

◆ Do not place the product in rainy, snowy, foggy, greasy, dusty environments. The place where the controller is installed should be well ventilated, and the air inlet of the box should be kept unblocked to ensure the normal operation of the control system.

◆ The ground terminal of the product must be well connected to ensure safe and stable operation of the system.

◆ Forbidden to reverse the positive (+) and negative (-) poles.

◆ To prevent the danger of electric shock, non-professionals are forbidden to open the equipment casing without permission.

◆ This equipment should avoid fire sources, and cannot be installed in flammable and explosive environments; nor can it be installed next to equipment without fire protection, such as gasoline generators, diesel barrels or other flammable products.

◆ Due to the large current while system is working, all terminals, sockets and bolts should be fastened well enough to ensure good contact.

◆ DO NOT touch any parts with electricity for the equipment.

◆ The equipment operational by qualified technicians ONLY. If there is no external power input, there may be high voltage inside the device, please do not touch it!
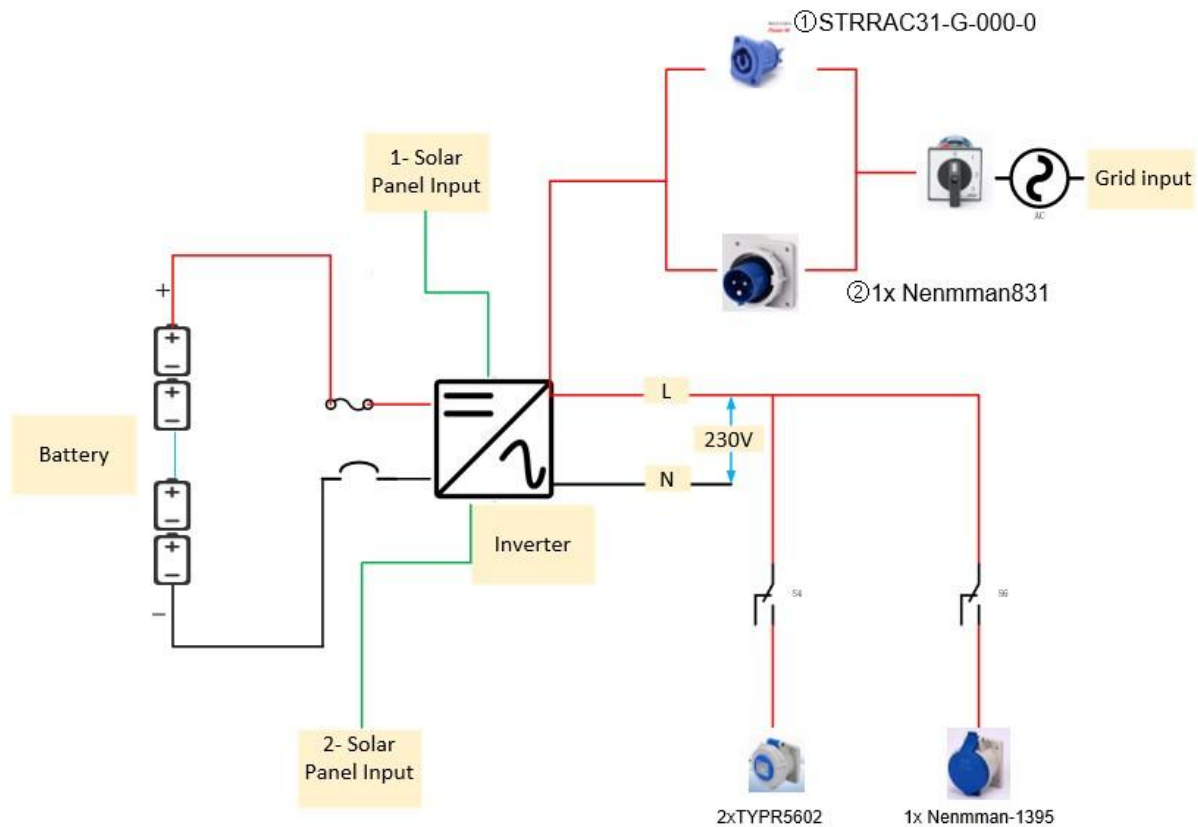
3. Product introduction

3.1 Naming rules.

Product full name:

SHAPE Power Station 15000 BASECAMP
SKU code: TPSG15

3.2 System connection diagram

3.3 Features

a) High internal battery storage capacity by 15KWh equipped.

b) High power inverter support 10KW loading, equals to 6HP motor loading

c) CAN protocol status monitoring to ensure safe operation of the system

d) Support split/single phase pure sin wave output.

e) Stand-alone or parallel systems support 200, 208, 220, 230 and 240Vac voltage levels

f) With 2 output modes: mains bypass and inverter output, and has uninterrupted power supply (UPS) function.

g) LCD screen dynamic flow chart design to facilitate understanding of system data and operating status

h) With complete protection mechanism, such as short-circuit protection, over-current protection, over- and under-voltage protection, overload protection and other functions;

i) Support WiFi remote monitor&control.

j) Contains four main functional modules: long-life lithium iron phosphate (LiFePO4) battery packs, battery BMS management system, solar MPPT controller, and sine wave inverter. The product supports solar panels to charge the battery, and also supports the mains AC to charge the battery. The battery provides AC230 (Single Phase) power to the loading device through the inverter; the battery BMS maintains communication with the inverter to better coordinate the safe and stable operation of the system. It can also Real-time reporting of data through remote monitoring.

3.4 Specifications

Item	Contents	Model	Unit
		TPSG15	-
Output specs	Output Voltage	230(L/N/PE) Single Phase	Vac
	Output Frequency	50/60 (adjustable)	Hz
	Wave	Pure Sine Wave	-
	Nominal output power	Max 10000 （230Vac）	W
	Peak output power	20000	W
	Load Capacity of motors	6	HP
	DC-AC Max transfer efficiency	92%	-
PV specs	PV Max input voltage	500 (MPPT Voltage Range 125~425)	Vdc
	Num. of MPP Trackers	2	-
	PV. Max input current	22/22	A
	Solar panel Max power	5500*2	W
	MPPT Voltage range	125≤Vmp≤425	Vdc
	MPPT efficiency	99.9%	
Utility grid/ Generator input specs	Input voltage range	90~275	Vac
	Input frequency	50/60	Hz
	Bypass Overload current	35	A
Internal battery specs	Battery type	LiFePO4	-
	Nominal system voltage	51.2	Vdc
	Nominal capacity		Ah

	Voltage range	304	Vdc
	Max discharging current	40~60	A
		250	A
	Max charging current	150	
	Continuous discharging current	250	A
	Continuous charging current	100	A
System specs	Display	LCD+LED	-
	Display contents	Solar indication, battery voltage, mains input voltage, inverter output voltage, load indication, working status indication	-
	Protect functions	Overload, low voltage, surge, short circuit, overcharge, over-discharge, over-temperature, etc.	-
	Still power lose	40	mA
	Inverter unloading self-discharge	<6	W
	Cooling method	Intelligence air cooling	-
	Noise	<60 (within 1 meter)	dB
	Working temp range	Charge, 0℃ ~ 55℃	℃
		Discharge, -20℃ ~ 55℃	
	Storage temp range	-20 ~ 45℃	℃
		-20 ~ 35℃	
		-20 ~ 25℃	
	Working humidity	0-90%	-
	Operable Altitude	<3000	m
Communication method	Embedded Interfaces	RS485/CAN	
	External module	WIFI	
Physical specs	Dimension	790*705*795 （Handle fold)	mm
	Weight	180	Kg

3.5 Product Indications
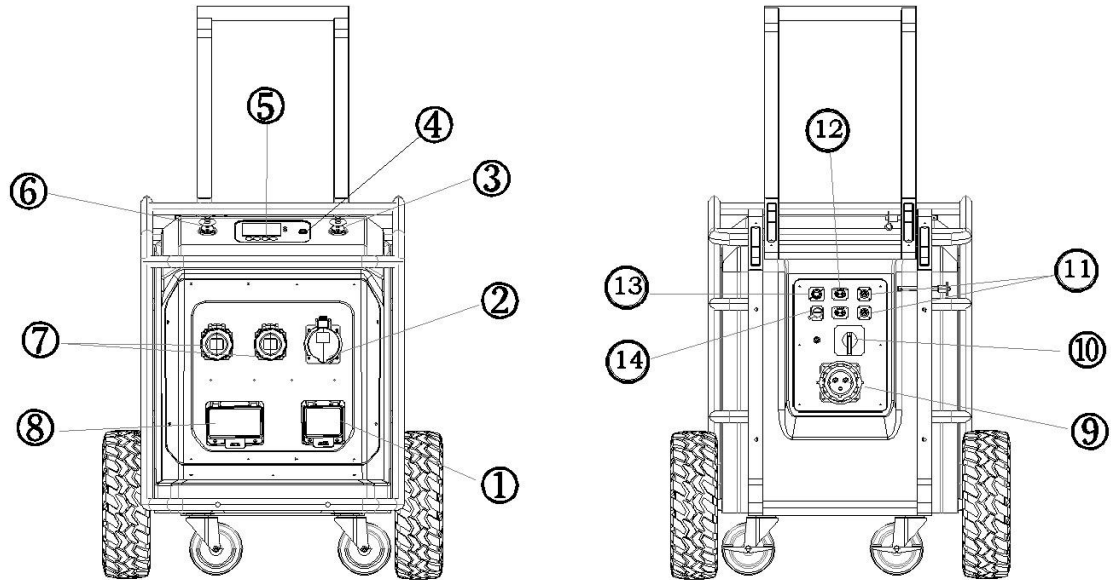
Description

Serial Number	Name	Label	Function Description
1	Battery general circuit breaker	Battery breaker	Battery output/input general breaker
2	AC output Nenmman-1395	230Vac 32A	
3	USB-Type A	/	2*Type-A, 5V3A max
4	Switch	ON/OFF	Inverter switch
5	LCD		Inverter LCD display
6	USB-type C	USB-type C	2*Type-C, 5V3A Max
7	AC output TYPR5602*2pcs	230Vac 16A	4*230Vac16AMax
8	AC output breaker	AC output breaker	Nenmman-1395 1P 32A
		AC output breaker	Socuko，4*1P16A
9	AC input	Nenmman831	230Vac, 32A Max
10	Knob switch	230Vac	0. Disconnected
			1. STRRAC31-G-000-0

|			2 .Nenmman831
11	FRCL04X-200-S8-T		BACKUP BATTERY P+ INPUT
	FRCL04Y-200-S8-T		BACKUP BATTERY P- INPUT
12	Solar panel charging port	Solar input 5500w MAX	2*PV input, 5.5KW max input for each
13	RS485communication	BACKUP BATTERY COMM	Battery parallel communication port
14	AC input	1* STRRAC31-G -000-0	230Vac 16A max

3.6 Dimension
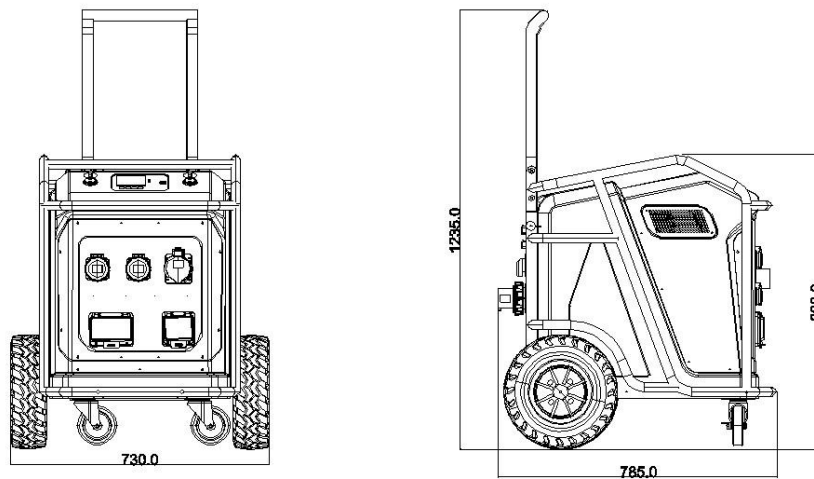
3.7 Knob switch controlling instruction:
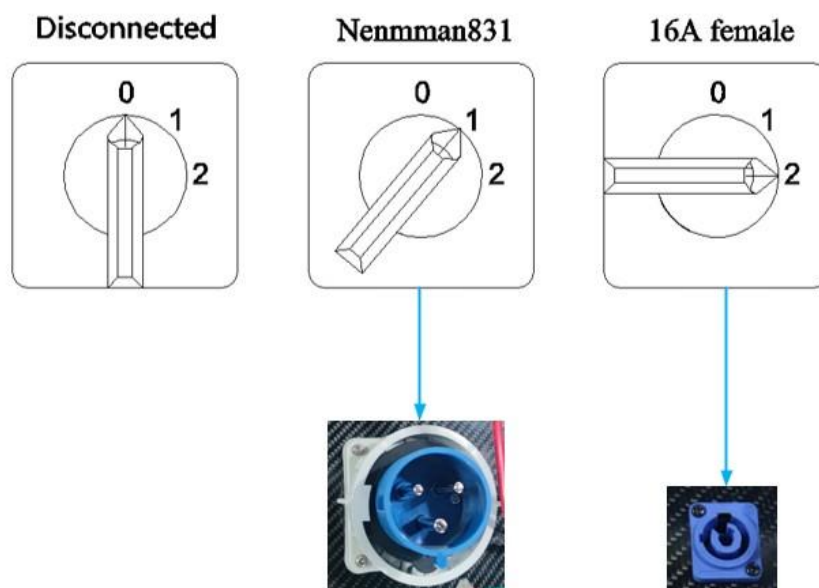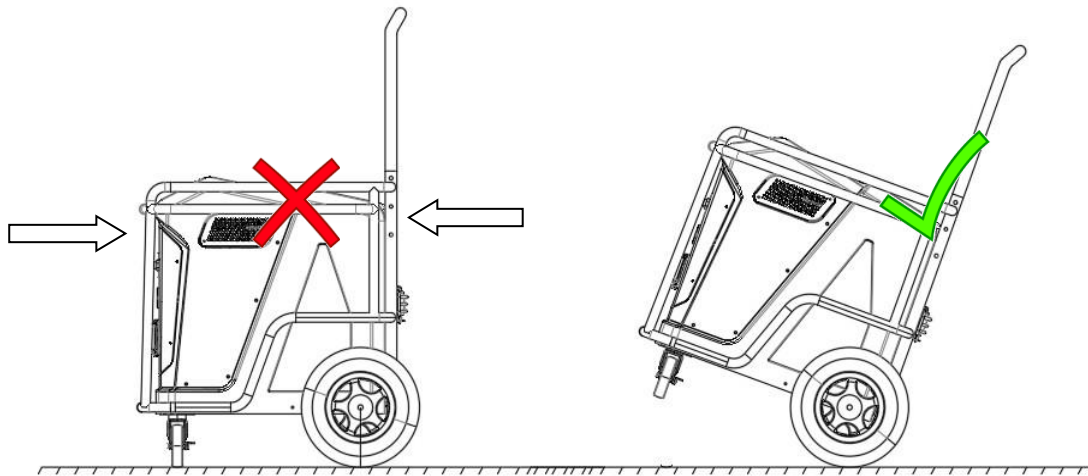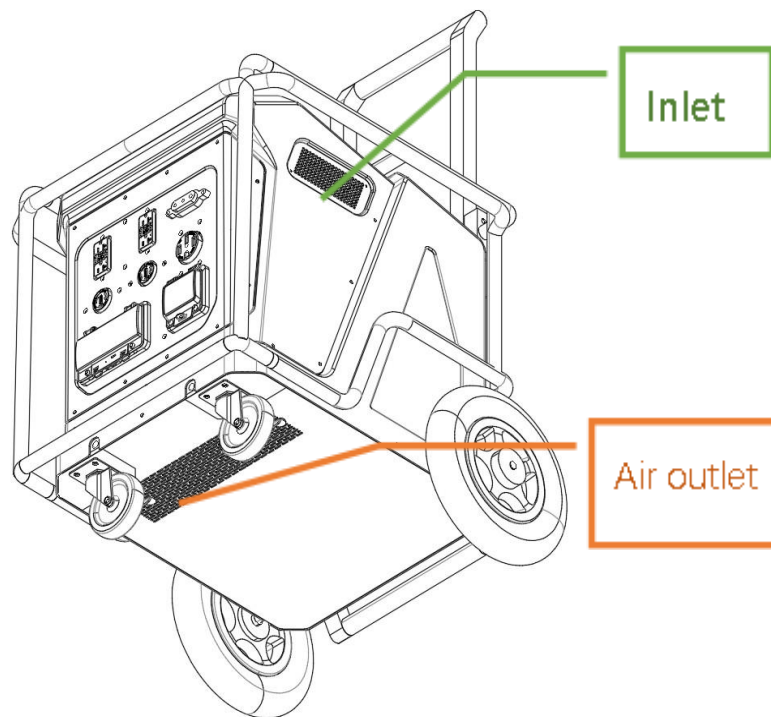

Switch breaker controlling instruction:
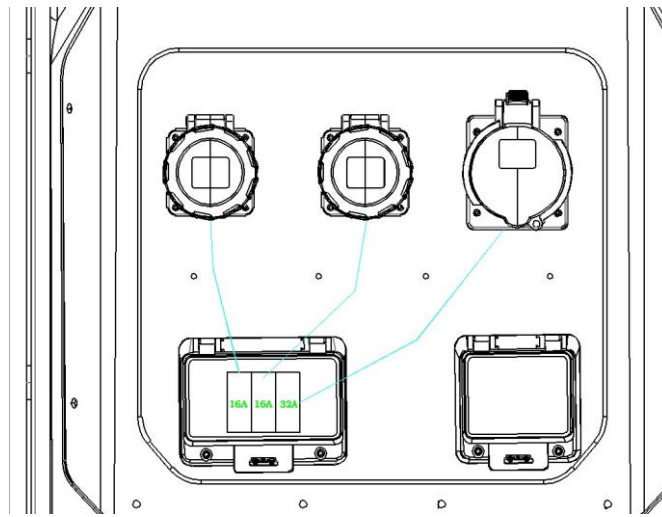
4. User manual

4.1 Precautions for use

·a.While in long-distances moving, highly recommend to drag with the rear wheels as below::

b. Keep in well-ventilated environment and avoid blocking the air inlet and outlet.

Inlet

Air outlet

4.2 Usage environment

⚠ DANGER

- DO NOT use the product where highly flammable materials are near by
- DO NOT use the product in potential explosive areas.
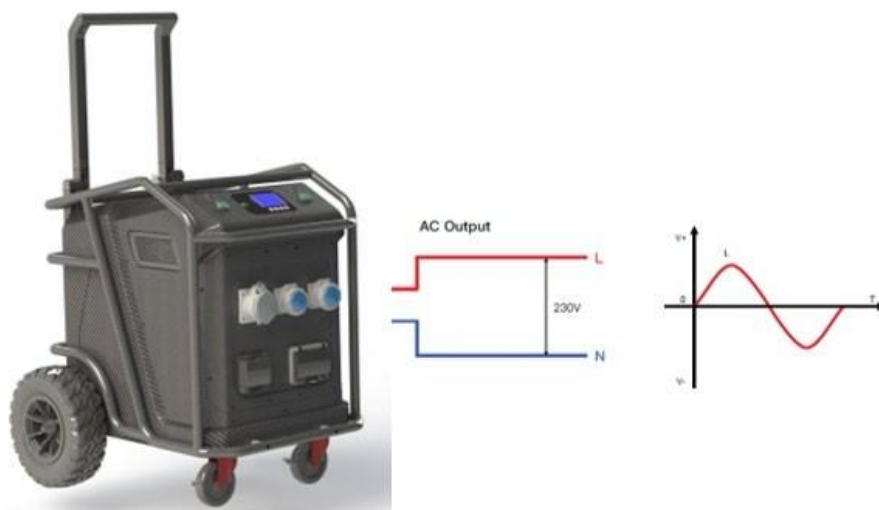- DO NOT use the product in a confined space.

⚠ CAUTION

- DO NOT use the product in direct sunlight.
- DO NOT use the product in a humid environment.

4.3 Output mode instructions

a) Single-phase output

Items	Description
Applicable Model	TPSG15
Output Voltage Range (L-N)	200~240Vac, 230Vac default

NOTICE

- Isers can change the output voltage by setup menu. Please read the chapter 5.2 Setting.
- Output voltage corresponds parameter 38 , the output voltage can be set from 200V to 240V.

4.4 Correct launch steps

- Step 1 : Close the circuit breaker of the battery. ①
- Step 2：Press the metal power switch next to the display, the screen and indicators light up to indicate that the inverter has been activated. ②
- Step 3：Start the loads one by one in order of power from small to large. ③

Correct close steps

- Step 1 : Start the loads one by one in order of power from small to large. ③
- Step 2：Press the metal power switch next to the display, the screen and indicators light up to indicate that the inverter has been activated. ②

• Step 3： Close the circuit breaker of the battery.①
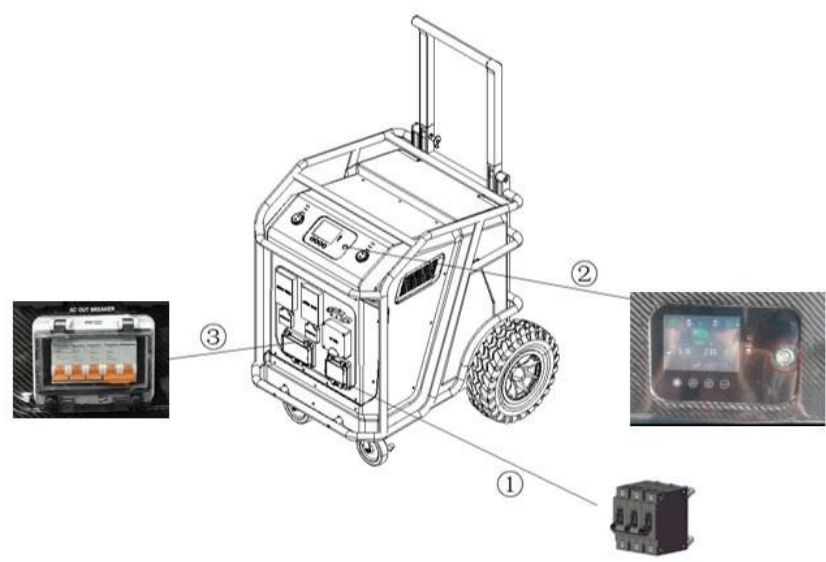
4.5 Operation and display panel

The operation and display panel below includes 1 x LCD screen, 3 x indicators, 4 x touchable keys, 1 x switch button.
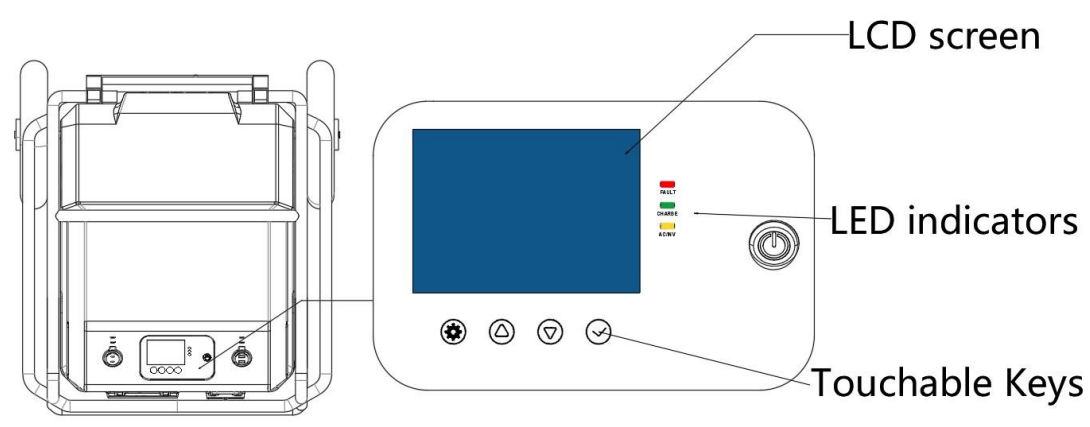
a) **Touchable Keys**

Touchable Keys	Description
	To enter/exit the setting menu
	To next selection
	To last selection
	To confirm/enter the selection in setting menu

b) LED Indicators

Indicators	Color	Description
AC/INV	Green	Continued: utility grid by-pass output
		Flash: inverter output
CHARGE	Yellow	Continued: charging complete
		Flash: charging
FAULT	Red	Flash: error occur

c) Display panel
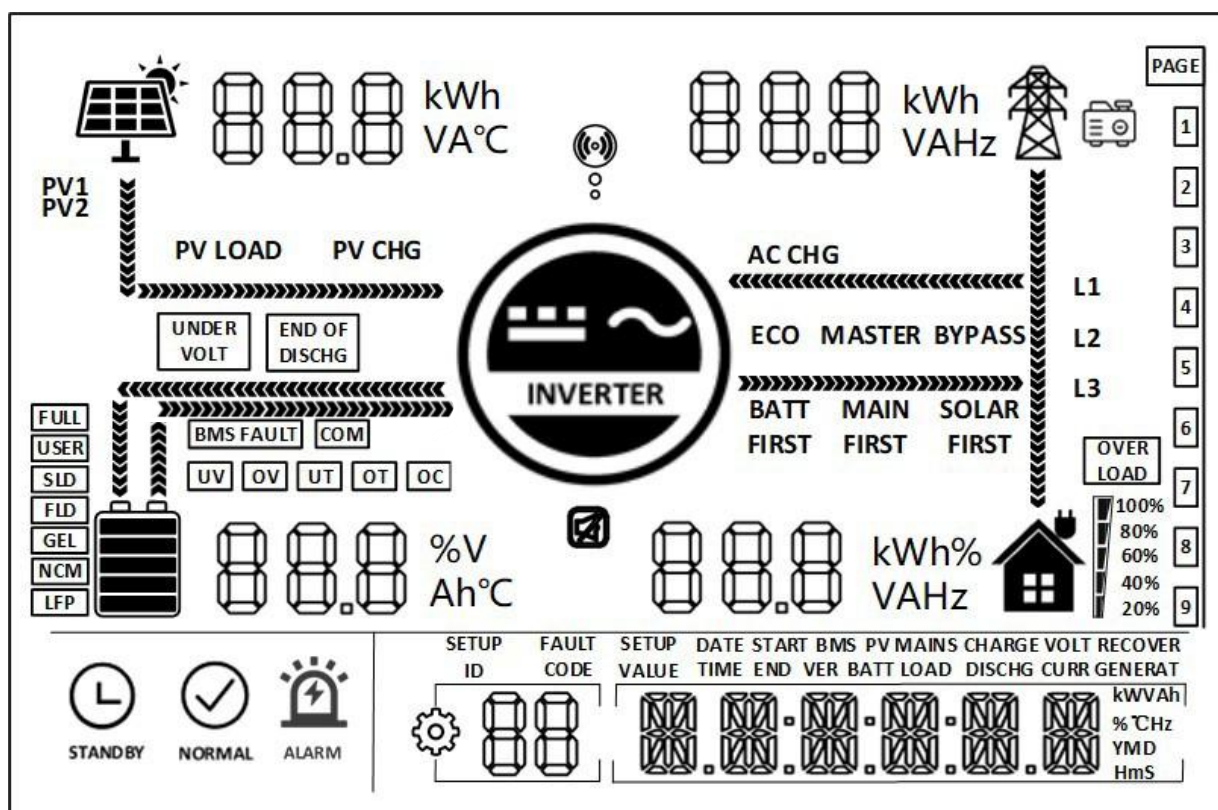
Icon	Description	Icon	Description
	Indicates the PV panel		Indicates the utility grid
	Indicates the battery		Indicates the generator

	Indicates the inverter is working		Indicates the home load
	Indicates the inverter is communicating with data collector		Indicates the buzzer muted

》》》》》》》》》	Indicates the direction of ener ɡy flow		
⏱ STANDBY	Indicates the inverter is standby	✓ NORMAL	Indicates the inverter is working normally
⚠ ALARM	Indicates error occur	⚙	Indicates setting

Icon	Description	Icon	Description
	Indicates load power 80%~100%		Indicates battery SOC 80%~100%
	Indicates load power 60%~79%		Indicates battery SOC 60%~79%
	Indicates load power 40%~59%		Indicates battery SOC 40%~59%
	Indicates load power 20%~39%		Indicates battery SOC 20%~39%
	Indicates load power 5%~19%		Indicates battery SOC 5%~19%
UNDER VOLT	Indicates battery under-voltage	END OF DISCHG	Indicates battery discharge
OVER LOAD	Indicates over-load	BMS FAULT	Indicates BMS fault
COM	Indicates system communication erro	UV	Indicates system under-voltage
OV	Indicates system over-voltage	UT	Indicates system undertemperature
OT	Indicates system overtemperatur	OC	Indicates system over-current
FULL	Indicates battery is full	USER	Indicates user defined battery
SLD	Indicates sealed lead-acid battery	FLD	Indicates flooded lead-acid battery
GEL	Indicates gel lead-acid battery	NCM	Indicates ternary li-ion battery
LFP	Indicates LFP li-ion battery	ECO	Indicates energy-saving mode
PV LOAD	Indicates PV energy is carrying the load	PV CHG	Indicates PV energy is charging the battery
AC CHG	Indicates AC IN energy is charging the battery	MAIN FIRST	Indicates the inverter output mode is mains power first
BYPASS	Indicates the inverter output mode is bypass	SOLAR FIRST	Indicates the inverter output mode is solar first
BATT FIRST	Indicates the inverter output mode is battery first		

d) View real-time data

In the main screen，press the UP / DOWN keys to view the real-time data of the inverter during operation.
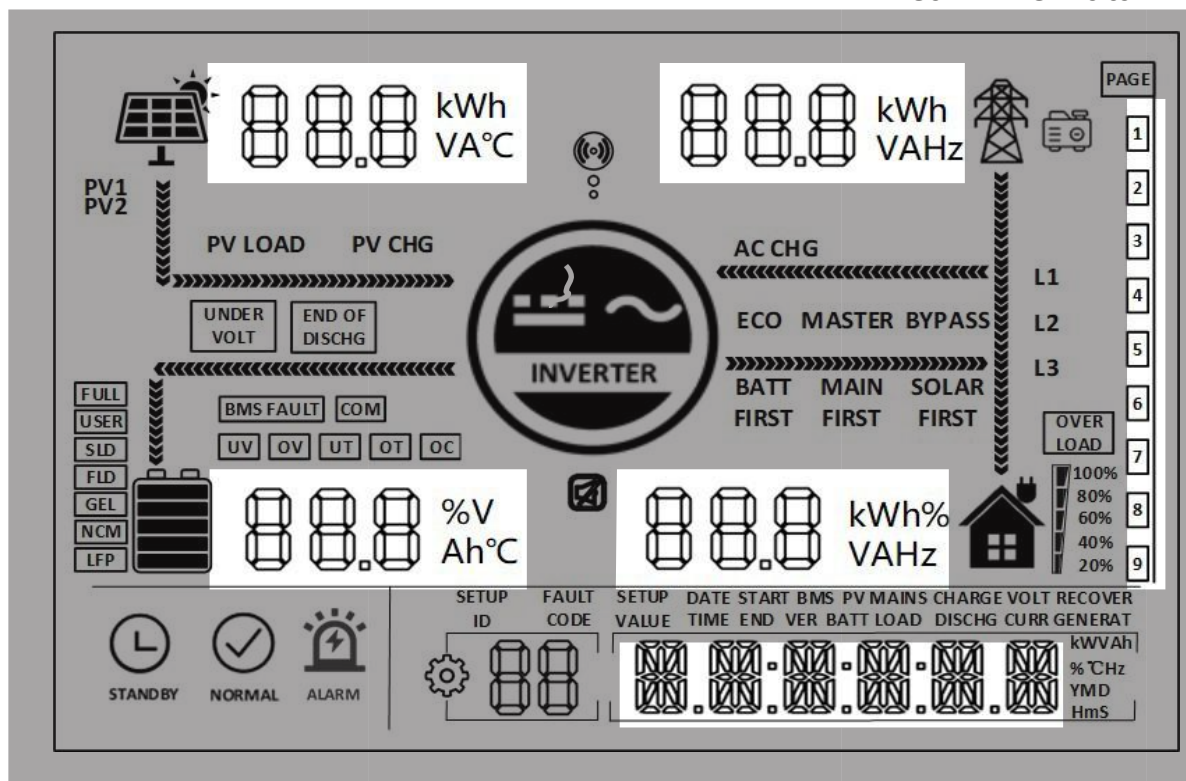
Page	PV side	BAT side	AC IN side	LOAD side	General
1	PV voltage	Batt Voltage	AC in voltage	Single phase voltage	Current Time
2	PV current	Batt Current	AC in current	Single phase Current	Current Date
3	PV power	Batt Voltage	Total AC charging power	Single phase active power	PV Total kWh
4	PV today kWh	Batt Current	Today AC charging kWh	Single phase apparent power	Load Total kWh
5	PV side heat sink temperature	INV Heat Sink Temperature	AC frequency	AC output frequency	RS485 Address
6	PV rated voltage	Batt Rated Voltage	Busbar voltage	AC output rated power	Soft Version
7	Max. PV charging current	Max.Batt charging current	Max. AC charging Current	Total AC output active power	/
8			/	Total AC output apparent power	/

5. Setting

ID	Parameter Meaning	Options	Description
00	Exit	ESC	Exit the setup menu.
01	AC output source priority	UTI default	Utility at first priority, utility and solar provide power to load at the same time when solar is available, battery will provide power to load only when utility power is not available.
		SbU	Solar power and battery at first priority,Utility will provide power to load when solar power is not available and the battery voltage below parameter [04] value.
		SOL	Solar power at first priority, Utility will provide power to load when solar power is not available and the battery voltage below parameter [04] value .

| 02 | AC output frequency | 50.0 | AC output frequency will adaptive utility frequency in bypass mode. Otherwise the output will follow the preset value. |
| | | 60.0 default | |

ID	Parameter Meaning	Options	Description
03	AC input voltage range	UPS default	When output range is 120/110V, input voltage range 90~140V
		APL	When output range is 100/105V, input voltage range 85~140V
04	Voltage point of battery switch to utility	43.6	When parameter1= SBU=SOL, output source will switch to utility from battery when the battery voltage below the preset value. Setting range:40~60V
05	Voltage point of utility switch to battery	57.6	When parameter 1=SBU/SOL, output source will switch to battery from utility when the battery voltage above the preset value. Range:40~60V
06	Battery charging mode	SNU default	Solar and utility charging the battery at the same time, solar at the first priority, utility power as a supplement when solar power is not sufficient.Notice: Solar and utility charging the battery at the same time only in bypass mode, only solar charging can be used when the invert circuit is in operation
		CUb	Utility is the first priority in charging, Solar charging the battery only when utility is not available.
		CSO	Solar is the first priority in charging, Utility charging the battery only when solar is not available
		050	Only solar charging the battery.
07	Battery charging current	60	SPI-8K-U current setting range:0~180A.
			SPI-10K-U current setting range:0~200A.(N/A)
08	Battery type	USER	User-defined, user can set all battery parameter.
		SLd	Sealed lead-acid battery.
		FLd	Flooded lead-acid battery.
		GEL default	Gel lead-acid battery.

ID	Parameter Meaning	Options	Description
		L14/ L15/ L16	LFP li-ion battery, L14\L15\L16 corresponds battery cells number in series.
		N13/ N14	Ternary li-ion battery.
09	Battery bulk charging voltage	57.6	Setting range:48V~58.4V, increment of each click is 0.4V, parameter can be set only when battery type is USER and L14/15/16,N13/14
10	Battery bulk charging delay time	120	Indicates the duration when battery voltage reached parameter 09 value in bulk charging procession, Setting range: 5min~900min, increment of each click is 5min, parameter can be set only when battery type is USER and L14/15/16,N13/14
ID	Parameter Meaning	Options	Description
11	Battery float charging voltage	55.2	Setting range: 48V~58.4V, parameters cannot be set only after successful BMS communication.
12	Battery over discharge voltage (delay off	42	When the battery voltage falls below this voltage point and parameter 13 value is reached, the inverter output will be switched off. Setting range: 40V~48V, increment of each click is 0.4V, parameter can be set only when battery type is USER and L14/15/16,N13/14
13	Battery overdischarge voltage delay time	5	Indicates the duration when battery voltage reached parameter 12 value in over-voltage procession. Setting range: 5s~50s, increment of each click is 5s, parameter can be set only when battery type is USER and LFP14/15/16,NCM13/14
14	Battery undervoltage alarm	44	When the battery voltage falls below this voltage point, alarm will be displayed on the screen and indicator. Setting range: 40V~52V, increment of each click is 0.4V, parameter can be set only when battery type is USER and L14/15/16,N13/14
15	Battery undervoltage limit voltage	40	When the battery voltage falls below this voltage point, the inverter output is switched off immediately. Setting range is 40V~52V, increment of each click is 0.4V, parameter can be set only when battery type is USER and L14/15/16,N13/14
16	Battery equalization charging	dIS	Disable equalization charging.
		ENA default	Enable equalization charging, parameter can be set only when battery type is FLd\SLd\USER

17	Battery equalization charging voltage	58	Setting range: 48V~58V, increment of each click is 0.4V, parameter can be set only when battery type is FLd\SLd\USER
18	Battery equalization charging duration	120	Setting range: 5min~900min, increment of each click is 5min, parameter can be set only when battery type is FLd\SLd\USER
19	Battery equalization charging delay time	120	Setting range: 5min~900min, increment of each click is 5min, parameter can be set only when battery type is FLd\SLd\USER
20	Battery equalization charging interval	30	Setting range: 0~30 days, increment of each click is 1 day, parameter can be set only when battery type is FLd\SLd\USER
21	Battery equalization charging stop-start	dIS default	Stop equalization charging immediately.
		ENA	Start equalization charging immediately
22	Power saving mode	dIS default	Disable power saving mode
		ENA	Enable power saving mode, When the load power below50W, the inverter output will switch off after a 5min delay . When the load is more than 50W, the inverter automatic restart

ID	Parameter Meaning	Options	Description
23	Over-load restart	dIS	When overload occurs and the output is switched off, the machine will not restart.
		ENA default	When overload occurs and the output is switched off, the machine will restart after a delay of 3 minutes. After it reaches 5 cumulative time, the machine will not restart automatically.
24	Over-temperature restart	dIS	When over temperature occurs and the output is switched off, the machine will not restart.
		ENA default	When overload occurs and the output is switched off, the machine will restart when the temperature drops.
25	Buzzer alarm	dIS	Disable buzzer alarm.
		ENA default	Enable buzzer alarm.
26	Power source switching reminder	dIS	Disable reminder when the status of the input power source changes.

ID	Parameter Meaning	Options	Description
		ENA default	Enable reminder when the status of the input power source changes.
27	Inverter overload switch to bypass	**dIS**	Disable switch to the bypass when the inverter is overload
		ENA default	Enable switch to the bypass when the inverter is overload.
28	Max. utility charging current	**60**	SPI-8K-U, setting range: 0~100A.
			SPI-10K-U, setting range: 0~120A.
30	RS485 address	**id:1**	RS485 address setting range: 1~254.
32	RS485 communication	**SLA** default	Enabling PC and remote monitoring protocols
		485	Enabling BMS communication based on RS485
		CAN	Enabling BMS communication based on CAN
33	BMS communication	When item 32 is set to 485 or CAN, the corresponding communication protocol must be selected in item 33	
		PAC=PACE, RDA=Ritar, AOG=ALLGRAND BATTERY, OLT=OLITER, HWD=SUNWODA, DAQ=DAKING, WOW=SRNE, PYL=PYLONTECH UOL=WEILAN	
34	Feed back & hybrid output function	**dIS** default	Disable this function.
		MIX LOD	When parameter 1=UTI ,the solar energy is prioritised to charge the batteries and any excess energy will be used to power the load. With an anti-backflow function, the PV energy is not feed back into the grid.
		ON GRD	When parameter 1=UTI ,solar energy will feed back into the grid when battery is full or disconnected.
35	Battery under voltage recover point	**52**	Battery recover discharge from under voltage protection when voltage above this value. Setting range: 44V~54V.

| ID	Parameter Meaning	Options	Description
37	Battery full recharge voltage point	52	Inverter stops charging when the battery is full. Inverter resumes charging when the battery voltage below this value. Setting range:

			44V~54V.
38	AC output voltage	**230**	Setting range: 200/208/220/230/240Vac
39	Charge current limitine method (when BMS is enabled)	**LC SET**	Max. battery charging current not greater than the value of setting [07].
		LC BMS default	Max. battery charging current not greater than the limit value of BMS.
		LC INV	Max. battery charging current not greater than the logic judgement value of the inverter.
40	1st slot start charging	00:00:00	Setting range: 00:00:00-23:59:00.
41	1st slot end charging	00:00:00	Setting range: 00:00:00-23:59:00.
42	2nd slot start charging	00:00:00	Setting range: 00:00:00-23:59:00.
43	2nd slot end charging	00:00:00	Setting range: 00:00:00-23:59:00.
44	3rd slot start charging	00:00:00	Setting range: 00:00:00-23:59:00.
45	3rd slot end charging	00:00:00	Setting range: 00:00:00-23:59:00.
46	Time slot charging function	**dIS** default	Disable this function.
		ENA	Enable this function, AC output source mode will switch to SBU, utility charging the battery and carry load only in charging time slot which user set or the battery is under voltage.
47	1st slot start discharging	00:00:00	Setting range: 00:00:00-23:59:00
48	1st slot end discharging	00:00:00	Setting range: 00:00:00-23:59:00
49	2nd slot start discharging	00:00:00	Setting range: 00:00:00-23:59:00
50	2nd slot end discharging	00:00:00	Setting range: 00:00:00-23:59:00

51	3rd slot start discharging	00:00:00	Setting range: 00:00:00-23:59:00
52	3rd slot end discharging	00:00:00	Setting range: 00:00:00-23:59:00

ID	Parameter Meaning	Options	Description
53	Time slot discharging function	dIS default	Disable this function.
		ENA	Enable this function, AC output source mode will switch to UTI , battery discharging only in discharging time slot which user set or utility is not available.
54	Local date	00:00:00	YY/MM/DD.Setting range: 00:01:01-99:12:31
55	Local time	00:00:00	Setting range: 00:00:00-23:59:59
57	Stop charging current	3	Charging stops when the charging current is less than the set value (unit:amp)
58	Discharging alarm SOC	15	Triggers an alarm when the battery SOC is less than the set value (unit:%)
59	Discharging cutoff SOC	5	Stops discharging when the battery SOC is less than the set value (unit:%)
60	Charging cutoff SOC	100	Stops charging when the battery SOC is touch the set value (unit:%)
61	Switching to utility SOC	10	Switch to utility power when the battery SOC is less than this setting (unit:%)
62	Switching to inverter SOC	100	Switches to inverter output mode when SOC is greater than this setting (unit:%)
63	N-PE bonding automatic switching function	dIS default	Allow automatic switching of N-PE bonding
		ENA	Prohibit automatic switching of N-PE bonding

6. Fault and Remedy

6.1、Fault code
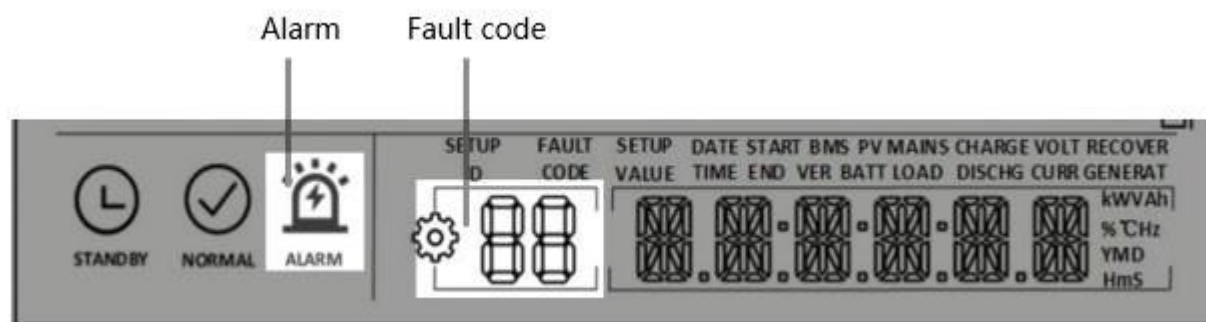
Fault Code	Meaning	Does it Affect the outputs	Instructions
01	BatVoltLow	Yes	Battery under-voltage alarm
02	BatOverCurrSw	Yes	Battery discharge over-current, software protection
03	BatOpen	Yes	Battery disconnected alarm
04	BatLowEod	Yes	Battery under-voltage stop discharging alarm
05	BatOverCurrHw	Yes	Battery over-current hardware protection
06	BatOverVolt	Yes	Battery over-voltage protection
07	BusOverVoltHw	Yes	Busbar over-voltage hardware protection
08	BusOverVoltSw	Yes	Busbar over-voltage software protection
09	PvVoltHigh	Yes	PV input over-voltage protection
10	PvBoostOCSw	NO	Boost circuit over-current software protection

11	PvBoostOCHw	NO	Boost circuit over-current hardware protection
12	SpiCommErr	Yes	Master-slave chip SPI communication failure
13	OverloadBypass	Yes	Bypass overload protection
14	OverloadInverter	Yes	Inverter overload protection
15	AcOverCurrHw	Yes	Inverter over-current hardware protection
16	AuxDSpReqOffPWM	Yes	Slave chip request switch off failure
17	InvShort	Yes	Inverter short-circuit protection
18	Bussoftfailed	Yes	Busbar soft start failure
19	OverTemperMppt	NO	MPPT heat sink over-temperature protection
20	OverTemperInv	Yes	Inverter heat sink over-temperature protection
21	FanFail	Yes	Fan failure
22	EEPROM	Yes	Reservoir failure

Fault Code	Meaning	Does it Affect the outputs	Instructions
23	ModelNumErr	Yes	Wrong model
24	Busdiff	Yes	Busbar voltage imbalance
25	BusShort	Yes	Busbar short circuit
26	Rlyshort	Yes	Inverter output back flow to bypass
28	LinePhaseErr	Yes	Utility input phase fault
29	BusVoltLow	Yes	Busbar under-voltage protection
30	BatCapacityLow1	Yes	Battery SOC below 10% alarm (Only enable BMS take effect)
31	BatCapacityLow2	NO	Battery SOC below 5% alarm (Only enable BMS take effect)
32	BatCapacityLowStop	Yes	Battery dead (Only enable BMS take effect)
58	BMSComErr	NO	BMS communication failure
59	BMSErr	NO	BMS failures occur
60	BMSUnderTem	NO	BMS under-temperature alarm (Only enable BMS take effect)

61	BMSOverTem	NO	BMS over-temperature alarm (Only enable BMS take effect)
62	BMSOverCur	NO	BMS over-current alarm (Only enable BMS take effect)
63	BMSUnderVolt	NO	BMS under-voltage alarm (Only enable BMS take effect)
64	BMSOverVolt	NO	BMS over-voltage alarm (Only enable BMS take effect)

6.2、 Troubleshooting

Fault Code	Meaning	Causality	Remedy
/	Screen no display	No power input, or in sleep mode.	Closing the circuit breaker. Ensure the rocker switch is ON. Push any button on the panel to exit sleep mode.
01	Battery under-voltage	The battery voltage is lower than the value set in parameter [14].	Charge the battery and wait until the battery voltage is higher than the value set in the parameter item [14].
03	Battery not connected	The battery is not connected, or the BMS in discharge protection	Check whether the battery is reliably connected; check whether the circuit breaker of the battery is not closed; ensure that the BMS of the Li-ion battery can communicate properly.

Fault Code	Meaning	Causality	Remedy
04	Battery over-discharge	The battery voltage is lower than the value set in the parameter [12].	Manual reset: Power off and restart. Automatic reset: charge the battery so that the battery voltage is higher than the value set in the parameter item [35].
06	Battery over-voltage when charging	Battery is in over-voltage condition.	Manually power off and restart. Check to see if the battery voltage exceeds the limit. If it exceeds, the battery needs to be discharged until the voltage is below the battery's over-voltage recovery point.
13	Bypass over-load (software detection)	Bypass output power or output current overload for a certain period of time.	Reduce the load power and restart the device. Please refer to item 11 of the

14	Inverter overload(software detection)	Inverter output power or output current overload for a certain period of time.	protection features for more details.
19	Heat sink of PV input over-temperature (software detection)	Heat sink of PV input temperature exceeds 90℃ for 3s.	Resume normal charge and discharge when the temperature of the heat sink has cooled to below the over-temperature recovery temperature
20	Heat sink of inversion over-temperature (software detection)	Heat sink of inversion temperature exceeds 90℃ for 3s.	
21	Fan failure	Fan failure detects by hardware for 3s.	Manually toggle the fan after switching off to check for blockage by foreign objects.
26	AC Input relay short circuit	Relay for AC input sticking	Manually power off and restart; if the fault reappears after restarting,You need to contact the after-sales service to repair the machine.
28	Utility input phase fault	AC input phase does not coincide with AC output phase	Ensure that the phase of the AC input is the same as the phase of the AC output, e.g. if the output is in split-phase mode, the input must also be in split-phase.

⚠ **NOTICE**

If you encounter a fault with the product that cannot be solved by the methods in the table above, please contact our after-sales service for technical support and do not disassemble the equipment yourself.。

7. Protection and Maintenance

7.1、 Protection features

No	Protection Feature	Instruction
1	PV input current/power limiting protection	When the charging current or power of the PV array configured exceeds the PV input rated value, the inverter will limit the input power and charge at the rated.
2	PV input over-voltage	If the PV voltage exceeds the maximum value allowed by the hardware, the machine will report a fault and stop the PV boost to output a sinusoidal AC wave.

3	PV night reverse current protection	At night, the battery is prevented from discharging through the PV module because the battery voltage is greater than the voltage of PV module.
4	AC input over-voltage protection	When the AC input voltage of each phase exceeds 140V, the mains charging will be stopped and switched to the inverter mode.
5	AC input under-voltage protection	When the AC input voltage of each phase below 90V, the utility charging will be stopped and switched to the inverter mode.
6	Battery over-voltage protection	When the battery voltage reaches the over-voltage cut-off point, the PV and the utility will automatically stop charging to prevent the battery from being overcharged and damaged.
7	Battery under-voltage protection	When the battery voltage reaches the under-voltage cut-off point, the inverter will automatically stop the battery discharge to prevent damage from over-discharging the battery.
8	Battery over-current protection	After a period when the battery current exceeds that allowed by the hardware, the machine will switch off the output and stop discharging the battery.
9	AC output short-circuit protection	When a short-circuit fault occurs at the load output terminal, the AC output is immediately turned off and turned on after 1 second.If the output load terminal is still short-circuited after 3 attempts, the inverter must be manually restarted after first removing the short-circuit fault from the load before the normal output can be restored.
10	Heat sink over-temperature protection	When the internal temperature of the inverter is too high, the inverter will stop charging and discharging; when the temperature returns to normal, the inverter will resume charging and discharging.
11	Inverter over-load protection	After triggering the overload protection the inverter will resume output after 3 minutes, 5 consecutive overloads will switch off the output until the inverter is restarted. (102%<load<110%) ±10%: error and output shutdown after 5min; (110% < load < 125%) ±10%: error and output shutdown after 10s. Load > 125% ±10%: error reported and output switched off after 5s.