SAIL SOLAR

USER MANUAL

Energy Storage Controller
Inverter Integrated Machine
(10000A15)

Preface

First of all, thank you for purchasing our Energy Storage Controller Inverter Integrated Machine!

This manual introduces the functional characteristics and usage of Energy Storage Controller Inverter Integrated Machine, including product parameters, installation and commissioning, fault maintenance check, etc. Please be sure to read this manual carefully before use.

Attention
➢ Please read the corresponding warning signs and the corresponding battery type specifications carefully before installing and using the equipment. ➢ Do not disassemble the equipment, if you need equipment repair and maintenance, please go to the designated maintenance center, if improper operation may lead to electric shock or even fire. ➢ To reduce the risk of electric shock, disconnect all circuits before performing repairs and maintenance. ➢ Warning: The battery must be installed by a professional technician. ➢ For maximum product functionality and efficiency, please configure the cable type as specified in the product. ➢ Please be careful to use metal tools for loading and unloading work to avoid short circuit and explosion caused by metal conductors. ➢ Equipment grounding requirements: Please select a permanently fixed place for product wiring! ➢ Do not short-circuit the AC output and DC input. Do not connect the power supply when the DC input is short-circuited. ➢ Warning! Only qualified service personnel should service this equipment. If the error persists after the troubleshooting sheet, return this unit to your local dealer or service center for maintenance.

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Chapter 1 Safety Information and Precautions

Safety Definition: In this manual, safety precautions are divided into the following two categories:

⚠ Danger: A situation in which serious injury, or even death, may result from a hazard caused by failure to operate as required;

⚠ Caution: Hazards caussed by failure to operate as required, which may result in moderate injuries or minor injuries, and equipment damage;

Please read this chapter carefully when installing, commissioning and maintaining this system, and be sure to follow the safety precautions required by the contents of this chapter. Any injury or loss caused by irregular operation is not the responsibility of our company.

Usage Stage	Security Level	Item
Before installation	⚠ Danger	➢ Do not install the equipment if you find water, missing parts or damaged parts when you open the box! ➢ If the packing list does not match the actual name, please do not install it!
	⚠ Attention	➢ Handling should be done gently, otherwise there is a risk of damage to the equipment! ➢ Please do not use equipment with damage or missing parts. There is a risk of injury! ➢ Do not touch the components in the equipment with your hands, otherwise there is a risk of electrostatic damage!
At installation	⚠ Danger	➢ Please install on metal and other flame retardant objects; keep away from combustible materials. Otherwise it may cause fire! ➢ Do not unscrew the fixing bolts of the equipment components at will.
	⚠ Attention	➢ You can't just open the device case! ➢ Please install the equipment in a place with little vibration and avoid direct sunlight.
Wiring time	⚠ Danger	➢ The instructions in this manual must be followed and the work performed by professional electrical engineers, otherwise unexpected dangers can occur!
	⚠ Attention	➢ Pay attention to the markings of the terminals, do not connect the wrong line! Otherwise cause equipment damage! ➢ Please refer to the recommendations in the manual for the wire diameter of the wire used. Otherwise accidents may occur!
Before power on	⚠ Danger	➢ Please confirm whether the voltage level of the input power supply is the same as the rated voltage level of this equipment; whether the wiring of the terminals is correct; and check whether there is a short circuit in the peripheral circuit connected with this equipment and whether the connected lines are tight, otherwise it will cause damage to the equipment! ➢ Any part of the equipment does not need to be tested for voltage resistance, the product has been tested at the factory. Otherwise it will cause an accident!
	⚠ Attention	➢ The wiring of all peripheral accessories must comply with the instructions in this manual and be wired correctly according to the circuit connection method provided in this manual. Otherwise cause an accident!

Usage Stage	Security Level	Item
After power on	Danger	➢ Do not open the cover after the power is applied. Otherwise there is a risk of electric shock! ➢ Do not touch the equipment and surrounding circuits with wet hands. Otherwise there is a risk of electric shock! ➢ Do not touch any input and output terminals of the device. Otherwise there is a risk of electric shock!
	Attention	➢ Please do not change the manufacturer's parameters of the equipment at will. Otherwise, damage to the equipment may result!
In operation	Danger	➢ Non-technical professionals should not test the signal while the equipment is in operation. Otherwise it may cause personal injury or equipment damage!
	Attention	➢ When the equipment is running, avoid having something fall into the equipment. Otherwise cause damage to the equipment! ➢ Do not start and stop the equipment frequently, otherwise it will cause damage to the equipment!
Maintenance time	Danger	➢ Do not perform maintenance and repair on the equipment without professional training. Otherwise, personal injury or equipment damage will result! ➢ Please do not carry out maintenance and repair of the equipment with electricity. Otherwise there is a risk of electric shock! ➢ Make sure that the input power of the equipment is disconnected for 10 minutes before implementing maintenance and repair of the equipment, and pay attention to the residual charge on the capacitor when maintenance will cause harm! ➢ All pluggable plug-ins must be plugged in the case of power failure!

Chapter 2 Product Information

2.1 Introduction

The Energy Storage Controller Inverter Integrated Machine combines the functions of inverter, MPPT solar controller and utility charging to provide stable power supply for power-using equipment in areas with no power, lack of power and unstable power. The product is based on a fully digital intelligent design with advanced SPWM technology, outputting pure sine wave, converting DC power into AC power, suitable for AC loads such as household appliances, power tools, industrial equipment, electronic video and audio. LCD screen display design, real-time display of system operation data and operating status. Comprehensive electronic protection function ensures the whole system is safer and more stable.

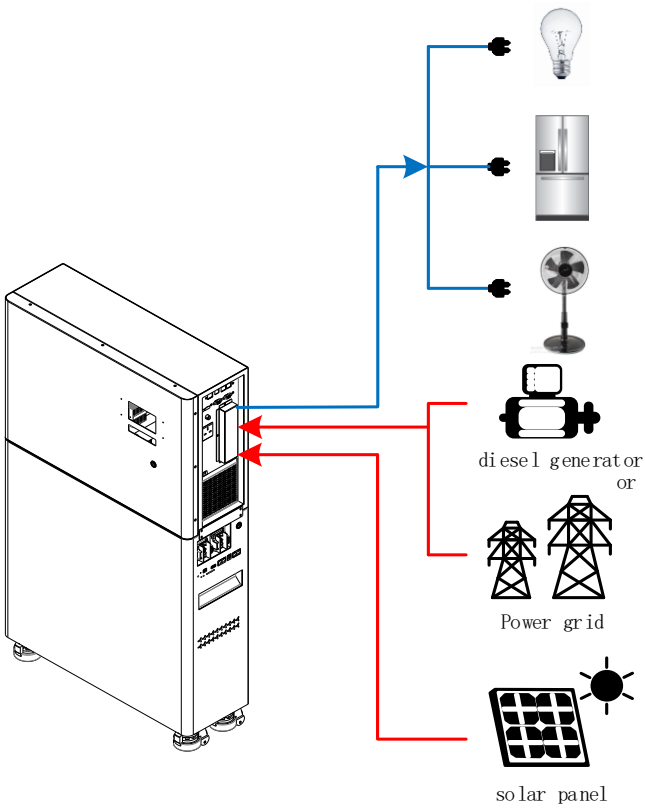
2.2 Functional Features

- Pure sine wave inverters;
- Integrated MPPT controller/charger;
- Settable priority of utility and PV power supply;
- Wide PV input voltage;
- Settable battery type, supporting lead-acid and lithium batteries;
- Functions and parameters can be set via the LCD;
- With battery equalization function to optimize battery performance and extend battery life.

2.3 System schematic

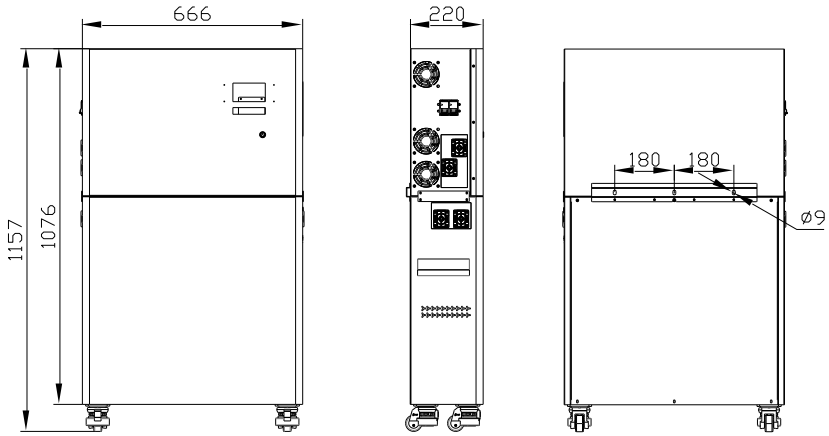
The following figure shows the system application scenario of this product. A complete system includes the following parts:

1. **Photovoltaic module:** Convert light energy into DC electric energy, charge the battery through energy storage inverter, or directly reverse it into AC to power the load.
2. **Utility or generator:** Connected at the AC input, it can supply power to the load and charge the battery at the same time. If no utility or generator is connected, the system can also operate normally, when the load power is provided by the battery and PV module.
3. **Battery:** The role of the battery is to ensure the normal use of power for the system load when the solar energy is insufficient and there is no utility power.
4. **Household load:** It can access various household and office loads, including refrigerators, lamps, TV sets, fans, air conditioners and other AC loads.
5. **Energy Storage Controller Inverter Integrated Machine:** The energy conversion device of the whole system.



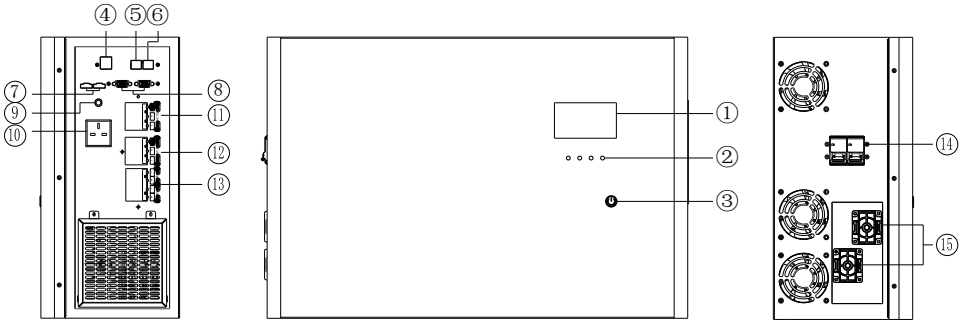
System schematic

2.4 Product Size (Unit: mm)



Chapter 3 Energy Storage Inverter Product Introduction

3.1 Interface Description



1、LCD display

2、Function button

3、Switch button

4、Dry contact

5、RS232 communication interface with monitoring module

6、CAN/RS485 communication interface with lithium battery

7、Parallel average current port

8、Parallel communication port

9、Circuit break switch

10、AC230V OUT

11、load output interface

12、grid-power input interface

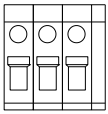
13、PV connectors

14、Battery circuit breaker

15、Battery interface

Dry Contact Signal

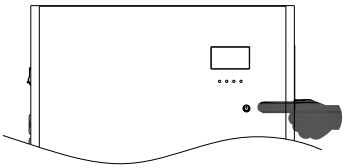
There is one dry contact (3A/250VAC) available on the rear panel. It could be used to deliver signal to external device when battery voltage reaches warning level.

Unit Status	Condition			Dry contact port: 	
				NC & C	NO & C
Power Off	Unit is off and no output is powered.			Close	Open
Power On	Output is powered from Battery power or Solar energy.	Program 01 set as USB (utility first) or SUB (solar first)	Battery voltage < Low DC warning voltage	Open	Close
			Battery voltage > Setting value in Program 13 or battery charging reaches floating stage	Close	Open
		Program 01 is set as SBU (SBU priority)	Battery voltage < Setting value in Program 12	Open	Close
			Battery voltage > Setting value in Program 13 or battery charging reaches floating stage	Close	Open

3.2 OPERATION

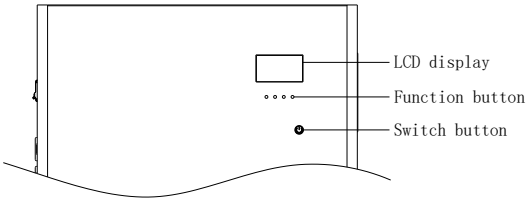
Power ON/OFF

Once the unit has been properly installed and the batteries are connected well, simply press power switch to turn on the unit.



Operation and Display Panel

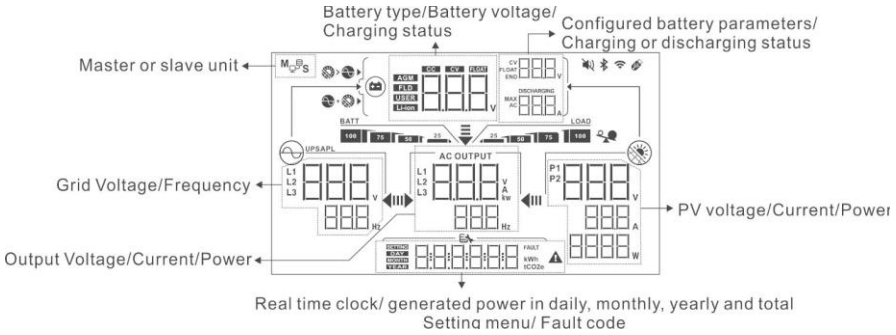
The operation and the LCD module, shown in the chart below, includes one power switch, four touchable function keys and a LCD display to indicate the operating status and input/ output power information.



Touchable Function Keys

Function Key		Description
↺	ESC	To exit the setting
	Access USB setting mode	To enter USB setting mode
▲	Up	To last selection
▼	Down	To next selection
↵	Enter	To confirm/enter the selection in setting mode

LCD Display Icons



Battery Information		
	Indicates battery level by 0-24%, 25-49%, 50-74% and 75- 100% in battery mode and charging status in line mode.	
When battery is charging, it will present battery charging status.		
Status	Battery voltage	LCD Display
C.C. mode C.V. mode	<2V/cell	4 bars will flash in turns.
	2 ～ 2.083V/cell	The right bar will be on and the other three bars will flash in turns.
	2.083 ～ 2.167V/cell	The right two bars will be on and the other two bars will flash in turns.
	> 2.167 V/cell	The right three bars will be on and the left bar will flash.
Floating mode. Batteries are fully charged.		4 bars will be on.
In battery mode, it will present battery capacity.		
Load Percentage	Battery Voltage	LCD Display
Load >50%	< 1.85V/cell	
	1.85V/cell ～ 1.933V/cell	
	1.933V/cell ～ 2.017V/cell	
	> 2.017V/cell	

<table>
<tr><td rowspan="4">Load < 50%</td><td>< 1.892V/cell</td><td> 
</td></tr>
<tr><td>1.892V/cell ～
1.975V/cell</td><td> 
</td></tr>
<tr><td>1.975V/cell ～
2.058V/cell</td><td> 
</td></tr>
<tr><td>> 2.058V/cell</td><td> 
</td></tr>
<tr><td colspan="2">Load Information</td></tr>
<tr><td>  </td><td>Indicates overload.</td></tr>
<tr><td> 
</td><td>Indicates the load level by 0-24%, 25-49%, 50-74% and 75-100%.</td></tr>
<tr><td colspan="2">Charger Source Priority Setting Display</td></tr>
<tr><td>  </td><td>Indicates setting program 16 “Charger source priority” is selected as “Solar first”.</td></tr>
<tr><td>  </td><td>Indicates setting program 16 “Charger source priority” is selected as “Solar and Utility”.</td></tr>
<tr><td>  </td><td>Indicates setting program 16 “Charger source priority” is selected as “Solar only”.</td></tr>
<tr><td colspan="2">Output source priority setting display</td></tr>
<tr><td>  </td><td>Indicates setting program 01 “Output source priority” is selected as “Utility first”.</td></tr>
<tr><td>  </td><td>Indicates setting program 01 “Output source priority” is selected as “Solar first”.</td></tr>
<tr><td>  </td><td>Indicates setting program 01 “Output source priority” is selected as “SBU”.</td></tr>
</table>

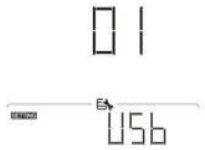
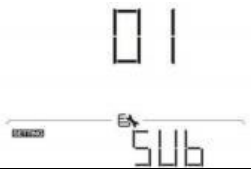
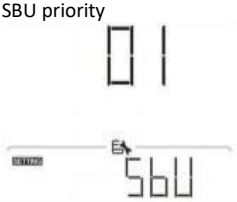
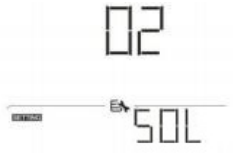
AC Input Voltage Range Setting Display	
UPS	Indicates setting program 03 is selected as "UPS". The acceptable AC input voltage range will be within 170-280VAC for 8KW.
APL	Indicates setting program 03 is selected as "APL". The acceptable AC input voltage range will be within 90-280VAC for 8KW.
Operation Status Information	
	Indicates unit connects to the mains.
	Indicates unit connects to the PV panel.
	Indicates battery type.
	Indicates parallel operation is working.
	Indicates unit alarm is disabled.
	Indicates Wi-Fi transmission is working.

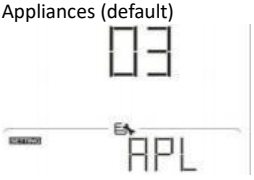
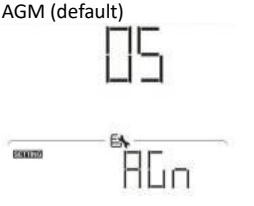
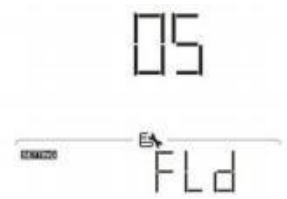
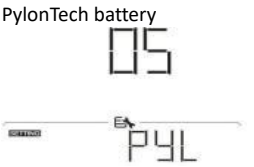
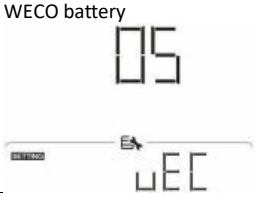
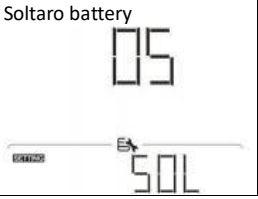
- **LCD Setting**

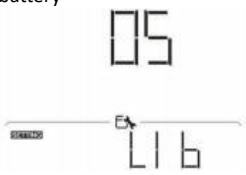
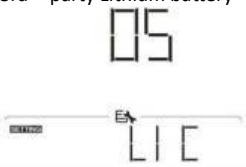
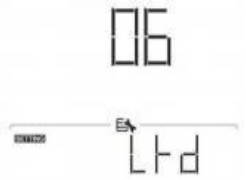
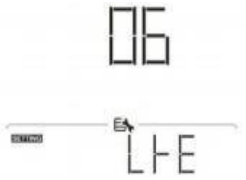
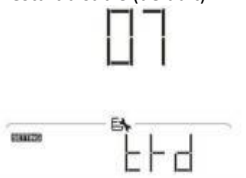
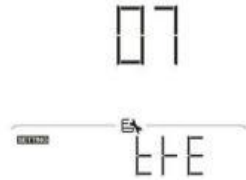
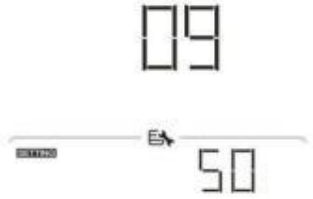
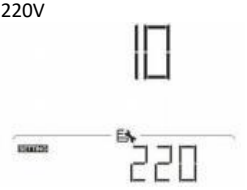
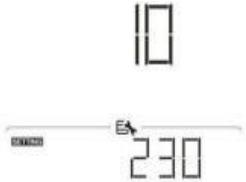
General Setting

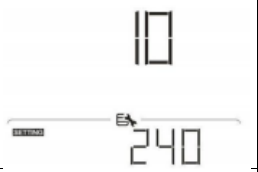
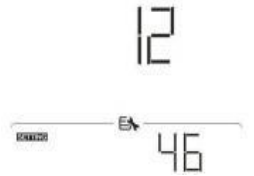
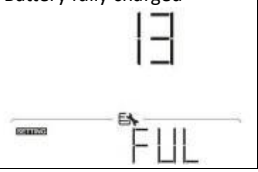
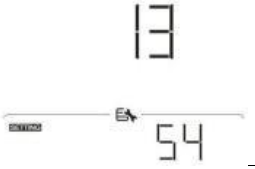
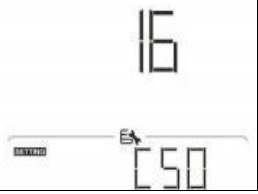
After pressing and holding "↵" button for 3 seconds, the unit will enter the Setup Mode. Press "▲" or "▼" button to select setting programs. Press "↵" button to confirm you selection or "↺" button to exit.

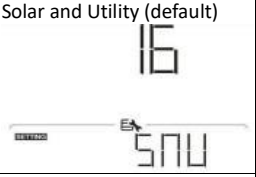
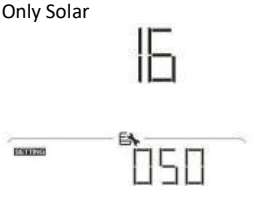
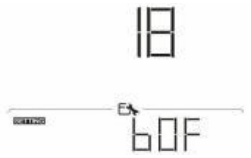
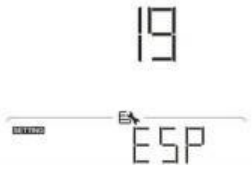
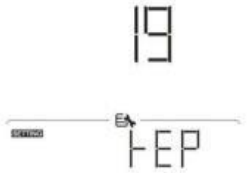
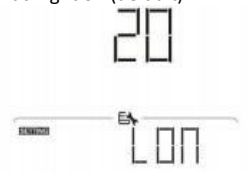
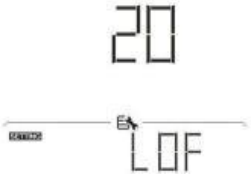
Setting Programs:

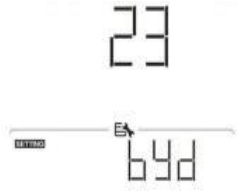
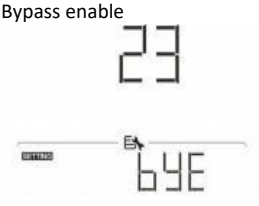
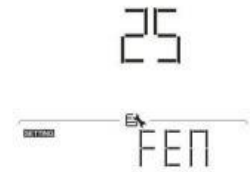
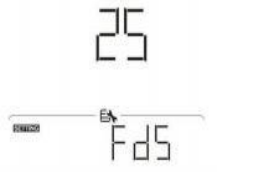
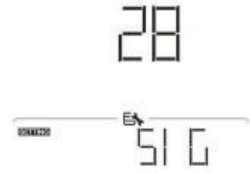
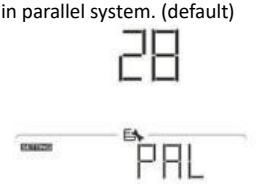
Program	Description	Selectable option	
00	Exit setting mode	Escape 	
01	Output source priority: To configure load power source priority	Utility first (default) 	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.
		Solar first 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, Utility energy will supply power to the loads at the same time.
		SBU priority 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage drops to either low- level warning voltage or the setting point in program 12.
02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	50A (default) 	Setting range is from 10A to 150A for 8KW model. Increment of each click is 10A.

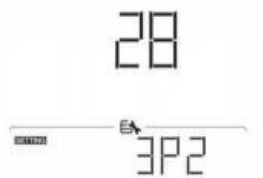
Program	Description	Selectable option	
03	AC input voltage range	Appliances (default) 	If selected, acceptable AC input voltage range will be within 90-280VAC for 8KW.
		UPS 	If selected, acceptable AC input voltage range will be within 170-280VAC for 8KW.
05	Battery type	AGM (default) 	Flooded 
		User-Defined 	If “User-Defined” is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.
		PylonTech battery 	If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.
		WECO battery 	If selected, programs of 02, 12, 26, 27 and 29 will be auto-configured per battery supplier recommended. No need for further adjustment.
		Soltaro battery 	If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.

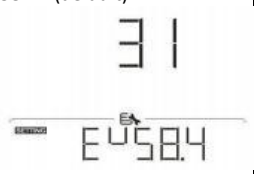
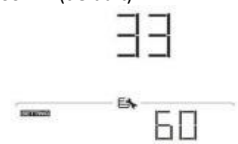
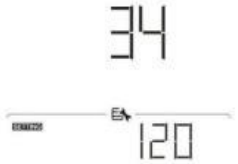
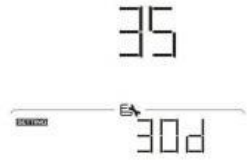
<table>
<tr><th>Program</th><th>Description</th><th colspan="2">Selectable option</th></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td>LIb-protocol compatible battery
 
</td><td>Select “LIb” if using Lithium battery compatible to Lib protocol. If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.</td></tr>
<tr><td>3rd party Lithium battery
 
</td><td>If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting. Please contact the battery supplier for installation procedure.</td></tr>
<tr><td>06</td><td>Auto restart when overload occurs</td><td>Restart disable (default)
 
</td><td>Restart enable
 
</td></tr>
<tr><td>07</td><td>Auto restart when over temperature occurs</td><td>Restart disable (default)
 
</td><td>Restart enable
 
</td></tr>
<tr><td>09</td><td>Output frequency</td><td colspan="2">50Hz (default for 8KW model)
 
</td></tr>
<tr><td rowspan="2">10</td><td rowspan="2">Output voltage</td><td colspan="2">Available options for 8KW model</td></tr>
<tr><td>220V
 
</td><td>230V (default)
 
</td></tr>
</table>

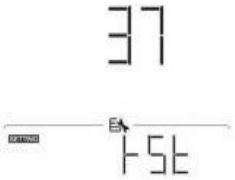
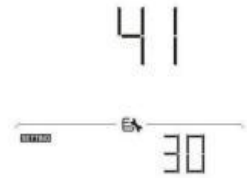
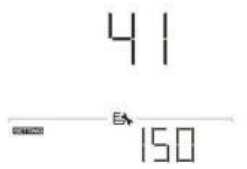
Program	Description	Selectable option	
		240V 	
11	Maximum utility charging current Note: If setting value in program 02 is smaller than that in program in 11, the inverter will apply charging current from program 02 for utility charger.	30A (default) 	Setting range is from 2A, then 10A to 120A. Increment of each click is 10A.
12	Setting voltage point back to utility source when selecting “SBU” (SBU priority) in program 01.	46V (default) 	Setting range is from 44V to 51V. Increment of each click is 1V.
13	Setting voltage point back to battery mode when selecting “SBU” (SBU priority) in program 01.	Setting range is FUL and from 48V to 62V. Increment of each click is 1V.	
		Battery fully charged 	54V (default) 
16	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:	
		Solar first 	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.

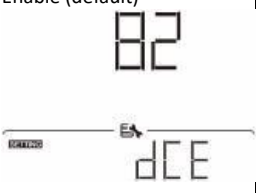
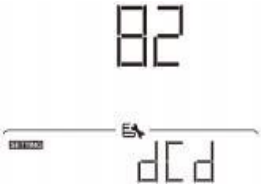
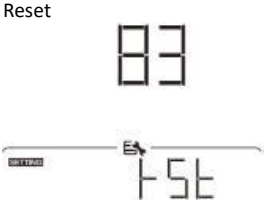
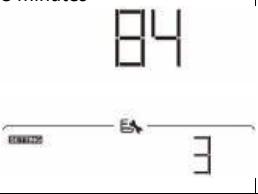
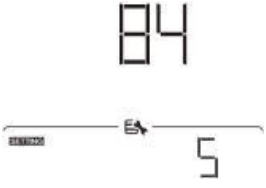
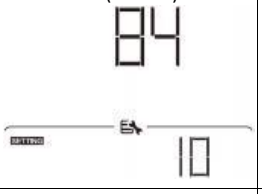
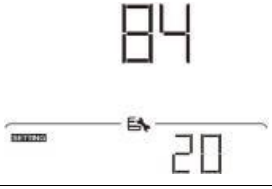
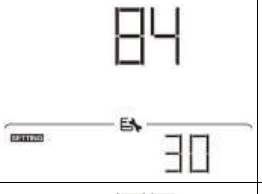
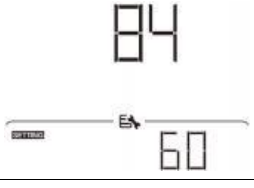
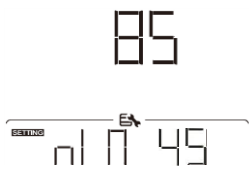
Program	Description	Selectable option	
16	Charger source priority: To configure charger source priority	Solar and Utility (default) 	Solar energy and utility will charge battery at the same time.
		Only Solar 	Solar energy will be the only charger source no matter utility is available or not.
18	Alarm control	Alarm on (default) 	Alarm off 
19	Auto return to default display screen	Return to default display screen (default) 	If selected, no matter how users switch display screen, it will automatically return to default display screen after no button is pressed for 1 minute.
		Stay at latest screen 	If selected, the display screen will stay at latest screen user finally switches.
20	Backlight control	Backlight on (default) 	Backlight off 

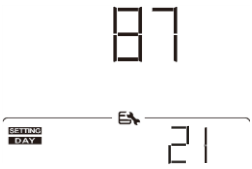
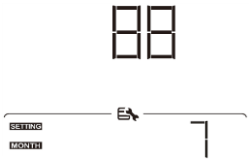
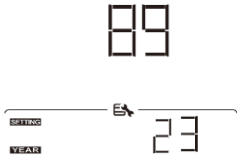
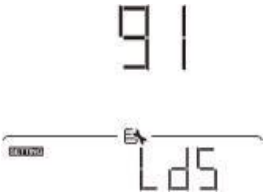
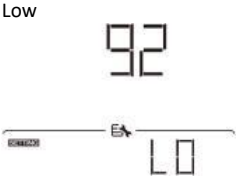
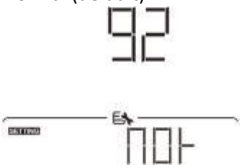
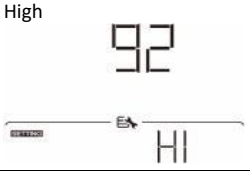
Program	Description	Selectable option	
22	Beeps while primary source is interrupted	Alarm on (default) 	Alarm off 
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable (default) 	Bypass enable 
25	Record Fault code	Record enable 	Record disable (default) 
26	Bulk charging voltage (C.V voltage)	56.4V (default) 	If user-defined is selected in program 5, this program can be set up. Setting range is from 48.0V to 62.0V. Increment of each click is 0.1V.
27	Floating charging voltage	54V (default) 	If user-defined is selected in program 5, this program can be set up. Setting range is from 48.0V to 62.0V. Increment of each click is 0.1V.
28	AC output mode *This setting is only available when the inverter is in standby mode (Switch off).	Single: This inverter is used in single phase application. 	Parallel: This inverter is operated in parallel system. (default) 

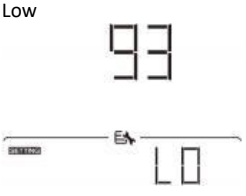
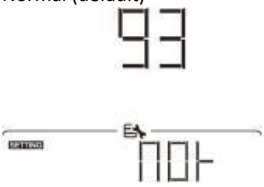
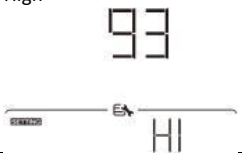
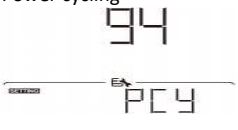
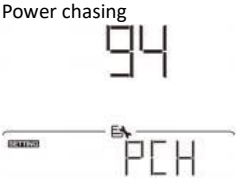
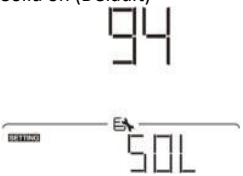
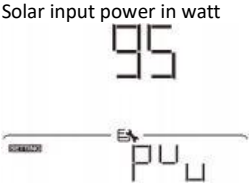
<table>
<tr><th>Program</th><th>Description</th><th colspan="2">Selectable option</th></tr>
<tr><td rowspan="3"></td><td rowspan="3"></td><td colspan="2">When the inverter is operated in 3-phase application, set up inverter to be operated in specific phase.</td></tr>
<tr><td>L1 phase:
  </td><td>L2 phase:
  </td></tr>
<tr><td>L3 phase:
  </td><td></td></tr>
<tr><td>29</td><td>Low DC cut-off voltage:
● If battery power is only power source available, inverter will shut down.
● If PV energy and battery power are available, inverter will charge battery without AC output.
If PV energy, battery power and utility are all available, inverter will transfer to line mode</td><td>44.0V (default)
  </td><td>If user-defined is selected in program 5, this program can be set up. Setting range is from 44.0V to 48.0V. Increment of each click is 0.1V. Low DC cut- off voltage will be fixed to setting value no matter what percentage of load is connected.</td></tr>
<tr><td>30</td><td>Battery equalization</td><td>Battery equalization
  </td><td>Battery equalization disable (default)
  </td></tr>
</table>

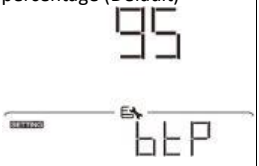
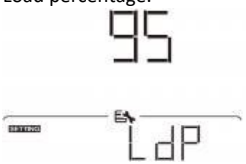
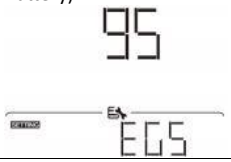
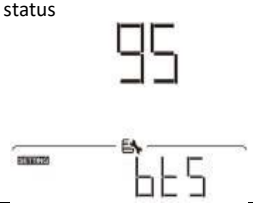
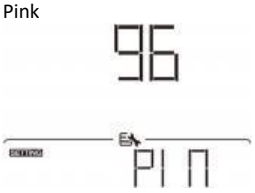
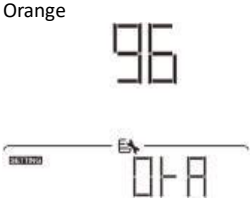
Program	Description	Selectable option	
		If “Flooded” or “User-Defined” is selected in program 05, this program can be set up.	
31	Battery equalization voltage	58.4V (default) 	Setting range is from 48.0V to 62.0V. Increment of each click is 0.1V.
33	Battery equalized time	60min (default) 	Setting range is from 5 min to 900 min. Increment of each click is 5 min.
34	Battery equalized timeout	120min (default) 	Setting range is from 5 min to 900 min. Increment of each click is 5 min.
35	Equalization interval	30days (default) 	Setting range is from 0 to 90 days. Increment of each click is 1 day
36	Equalization activated immediately	Enable 	Disable (default) 

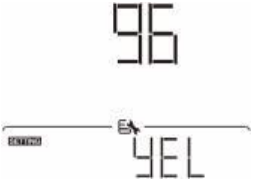
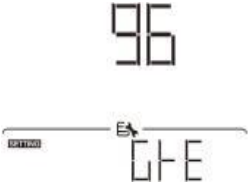
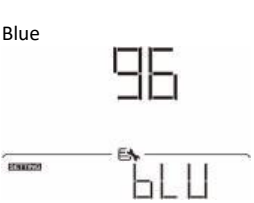
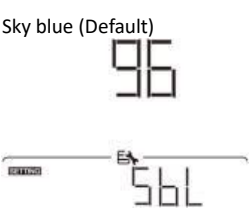
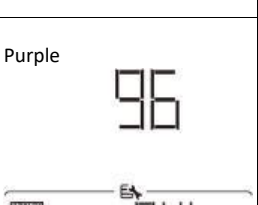
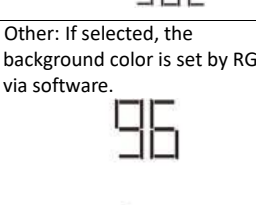
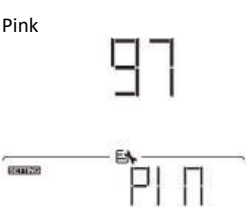
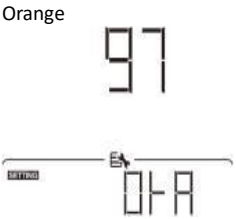
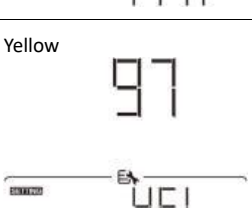
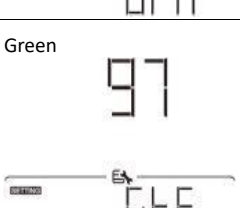
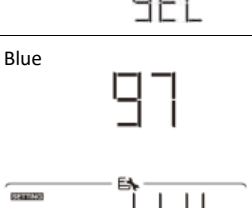
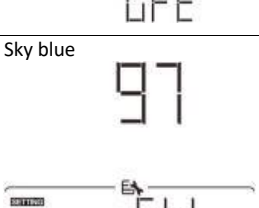
<table>
<tr><th>Program</th><th>Description</th><th colspan="2">Selectable option</th></tr>
<tr><td></td><td></td><td colspan="2">If equalization function is enabled in program 30, this program can be set up. If “Enable” is selected in this program, it’s to activate battery equalization immediately and LCD main page will show “  ”. If “Disable” is selected, it will cancel equalization function until next activated equalization time arrives based on program 35 setting. At this time, “  ” will not be shown in LCD main page.</td></tr>
<tr><td>37</td><td>Reset all stored data for PV generated power and output load energy</td><td>Not reset(Default)
  </td><td>Reset
  </td></tr>
<tr><td rowspan="3">41</td><td rowspan="3">Maximum battery discharging current</td><td>Disable (Default)
  </td><td>If selected, battery discharge protection is disabled.</td></tr>
<tr><td>30A
  </td><td rowspan="2">The setting range is from 30 A to 150 A. Increment of each click is 10A.
If discharging current is higher than setting value, battery will stop discharging. At this time, if the utility is available, the inverter will operate in bypass mode. If no utility is available, the inverter will shut down output after 5-minute operation in battery mode.</td></tr>
<tr><td>150A
  </td></tr>
</table>

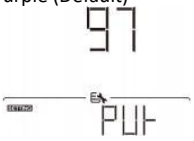
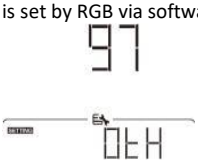
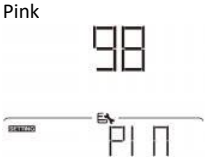
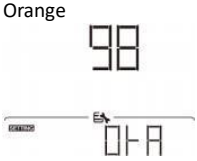
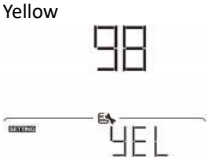
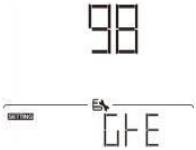
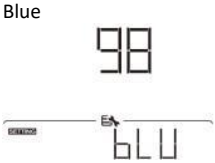
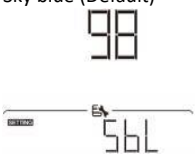
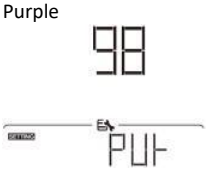
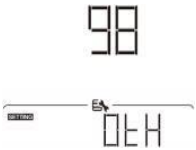
Program	Description	Selectable option	
82	On/Off control for 12V DC output	Enable (default) 	Disable 
83	Erase all data log	Not reset (Default) 	Reset 
84	Data log recorded interval *The maximum data log number is 1440. If it's over 1440, it will re-write the first log.	3 minutes 	5 minutes 
		10 minutes (default) 	20 minutes 
		30 minutes 	60 minutes 
85	Time setting – Minute		For minute setting, the range is from 0 to 59.

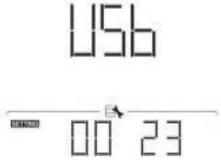
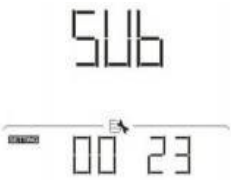
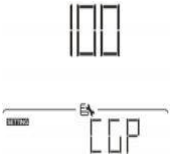
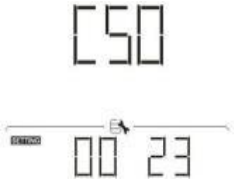
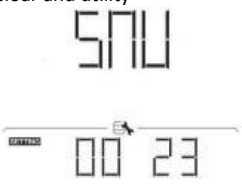
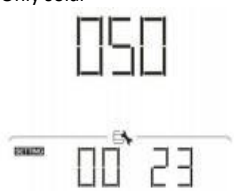
Program	Description	Selectable option	
86	Time setting – Hour		For hour setting, the range is from 0 to 23.
87	Time setting– Day		For day setting, the range is from 1 to 31.
88	Time setting– Month		For month setting, the range is from 1 to 12.
89	Time setting – Year		For year setting, the range is from 17 to 99.
91	On/Off control for RGB LED *It's required to enable this setting to activate RGB LED lighting function.	Enabled (default) 	Disable 
92	Brightness of RGB LED	Low 	Normal (default) 
		High 	

Program	Description	Selectable option	
93	Lighting speed of RGB LED	Low 	Normal (default) 
		High 	
94	RGB LED effects	Power cycling 	Power wheel 
94	RGB LED effects	Power chasing 	Solid on (Default) 
95	Data Presentation of data color *Energy source (Grid-PV- Battery) and battery charge/discharge status only available when RGB LED effects is set to Solid on.	Solar input power in watt 	LED lighting portion will be changed by the percentage of solar input power and nominal PV power. If “Solid on” is selected in #94, LED ring will light up with background color setting in #96. If “Power wheel” is selected in #94, LED ring will light up in 4 levels. If “cycling” or “chasing” is selected in #94, LED ring will light up in 12 levels.

Program	Description	Selectable option	
		Battery capacity percentage (Default) 	LED lighting portion will be changed by battery capacity percentage. If “Solid on” is selected in #94, LED ring will light up with background color setting in #96. If “Power wheel” is selected in #94, LED ring will light up in 4 levels. If “cycling” or “chasing” is selected in #94, LED ring will light up in 12 levels.
		Load percentage. 	LED lighting portion will be changed by load percentage. If “Solid on” is selected in #94, LED ring will light up with background color setting in #96. If “Power wheel” is selected in #94, LED ring will light up in 4 levels. If “cycling” or “chasing” is selected in #94, LED ring will light up in 12 levels.
		Energy source(Grid-PV-Battery) 	If selected, the LED color will be background color setting in #96 in AC mode. If PV power is active, the LED color will be data color setting in #97. If the remaining status occur, the LED color will be set in #98.
		Battery charge/discharge status 	If selected, the LED color will be background color setting in #96 in battery charging status. The LED color will be data color setting in #97 in battery discharging status.
96	Background color of RGB LED	Pink 	Orange 

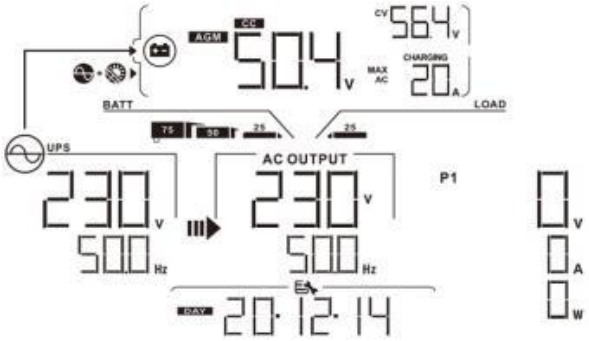
Program	Description	Selectable option	
		Yellow 	Green 
		Blue 	Sky blue (Default) 
		Purple 	Other: If selected, the background color is set by RGB via software. 
97	Data Color for RGB LED	Pink 	Orange 
		Yellow 	Green 
		Blue 	Sky blue 

<table>
<tr><th>Program</th><th>Description</th><th colspan="2">Selectable option</th></tr>
<tr><td></td><td></td><td>Purple (Default)
  </td><td>Other: If selected, the data color is set by RGB via software.
  </td></tr>
<tr><td rowspan="4">98</td><td rowspan="4">Background color of RGB LED
*Only available when data Presentation of data color is set to Energy source (Grid-PV-Battery).</td><td>Pink
  </td><td>Orange
  </td></tr>
<tr><td>Yellow
  </td><td>Green (Default)
  </td></tr>
<tr><td>Blue
  </td><td>Sky blue (Default)
  </td></tr>
<tr><td>Purple
  </td><td>Other: If selected, the background color is set by RGB via software.
  </td></tr>
<tr><td>99</td><td>Timer Setting for Output Source Priority
  </td><td colspan="2">Once access this program, it will show “OPP” in LCD. Press “↵” button to select timer setting for output source priority. There are three timers to set up. Press “▲” or “▼” button to select specific timer option. Then, press “↵” to confirm timer option. Press “▲” or “▼” button to adjust starting time first and the setting range is from 00 to 23. Increment of each click is one hour. Press “↵” to confirm starting time setting.Next, the cursor will jump to right column to set up end time. Once end time is set completely, press “↵” to confirmall setting.</td></tr>
</table>

<table>
<tr><th>Program</th><th>Description</th><th colspan="2">Selectable option</th></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td>Utility first timer
  </td><td>Solar first timer
  </td></tr>
<tr><td>SBU priority timer
  </td><td></td></tr>
<tr><td rowspan="3">100</td><td rowspan="3">Timer Setting for Charger Source Priority
  </td><td colspan="2">Once access this program, it will show “CGP” in LCD. Press “↵” button to select timer setting for charger source priority. There are three timers to set up. Press “▲” or “▼” button to select specific timer option. Then, press “↵” to confirm timer option. Press “▲” or “▼” button to adjust starting time first and the setting range is from 00 to 23. Increment of each click is one hour. Press “↵” to confirm starting time setting.Next, the cursor will jump to right column to set up end time. Once end time is set completely, press “↵” to confirmall setting.</td></tr>
<tr><td>Solar first
  </td><td>Sloar and utility
  </td></tr>
<tr><td>Only solar
  </td><td></td></tr>
</table>

LCD Display

The LCD display information will be switched in turn by pressing the "▲" or "▼" button. The selectable information is switched as the following table in order.

Selectable information		LCD display
Default Display Screen	Utility voltage/ Utility frequency	Input Voltage=230V, Input frequency=50Hz 
	PV voltage/ PV current/ PV power (PV1 and PV2 switch every 5 seconds)	PV1 voltage=300V, PV1 current=2.0A, PV1 power=600W 
		PV2 voltage=300V, PV2 current=2.0A, PV2 power=600W 

<table>
<tr><th colspan="2">Selectable information</th><th>LCD display</th></tr>
<tr><td></td><td>Battery voltage, charging stage/ Configured battery parameters/ Charging or discharging current</td><td>Battery voltage=50.4V, Bulk charging voltage=56.4V, Charging current=20A
  </td></tr>
<tr><td rowspan="2">Default Display Screen</td><td rowspan="2">Battery voltage, charging stage/ Configured battery parameters/ Charging or discharging current</td><td>Battery voltage=53.9V, Floating charging voltage=54.0V, Charging current=1A
  </td></tr>
<tr><td>Battery voltage=50.4V, Low DC cut-off voltage=44.0V, Discharging current=48A
  </td></tr>
</table>

<table>
<tr><th colspan="2">Selectable information</th><th>LCD display</th></tr>
<tr><td rowspan="2"></td><td rowspan="2">Output voltage, load in VA, load in Watt switch every 5 second/ Output frequency</td><td>Output voltage=230V, Output frequency=50Hz
  </td></tr>
<tr><td>Load in VA=2.4kVA, Output frequency=50Hz
  </td></tr>
<tr><td>Default Display Screen</td><td>Output voltage, load in VA, load in Watt switch every 5 second/ Output frequency</td><td>Load in Watt=2.4kW, Output frequency=50Hz
  </td></tr>
</table>

Selectable information		LCD display
	Real date.	Real date Dec 14, 2020. 
Real time.		Real time 11:38. 
PV energy generation today		PV energy generation today =888Wh. 

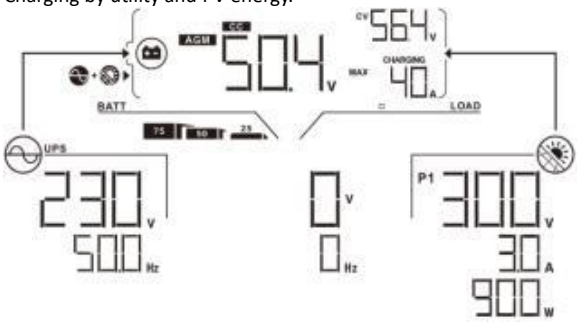
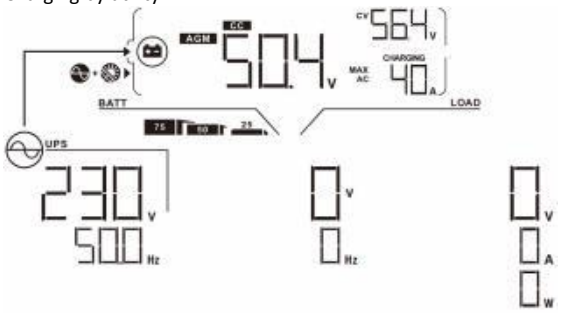
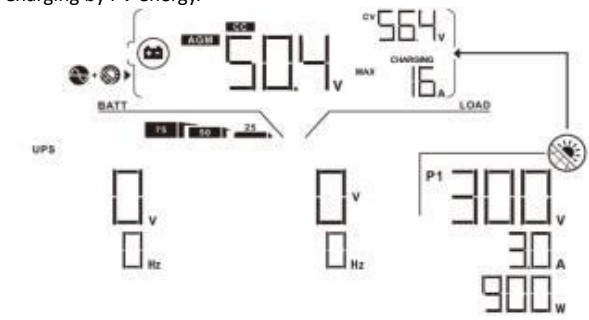
Selectable information	LCD display
PV energy generation this month	PV energy generation this month =8.88kWh. 
PV energy generation this year	PV energy generation this year =88.8kWh. 
Total PV energy generation	Total PV energy generation =888kWh. 

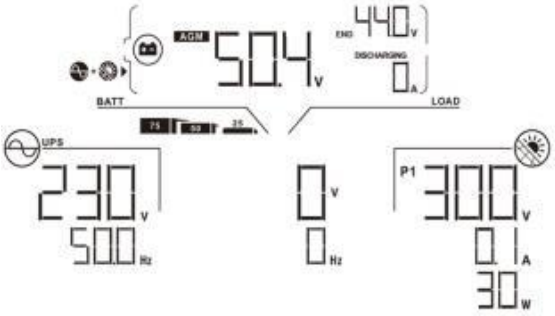
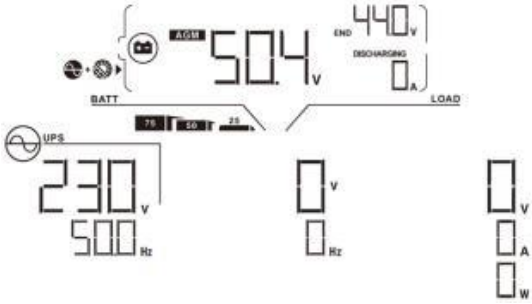
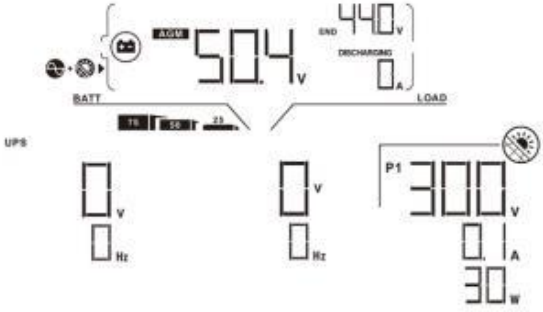
Selectable information	LCD display
Load output energy today	Load output energy today =888Wh. 
Load output energy this month	Load output energy this month =8.88kWh. 
Load output energy this year	Load output energy this year =88.8kWh. 

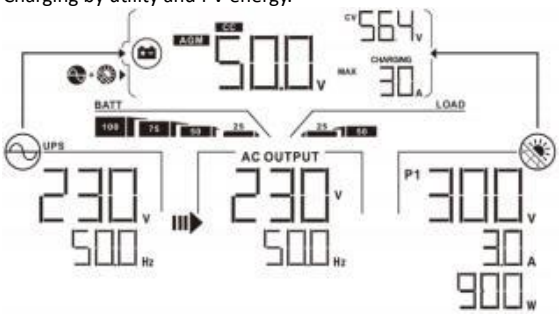
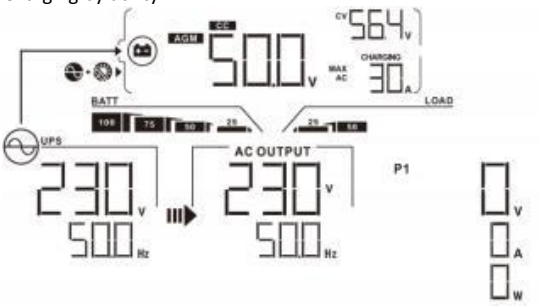
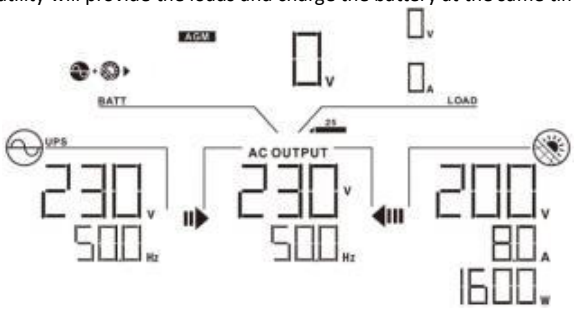
Selectable information	LCD display
Total load output energy	Total load output energy =888kWh. 
Main CPU version checking.	Main CPU version 00050.72. 
Secondary CPU version checking.	Secondary CPU version 00022.01. 

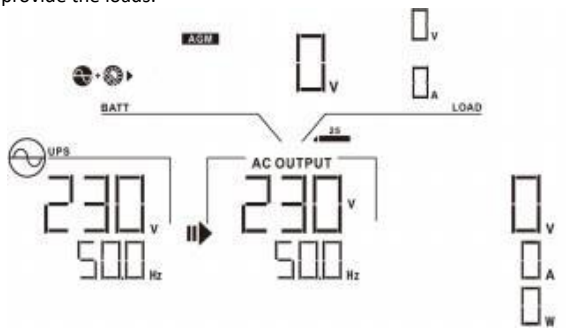
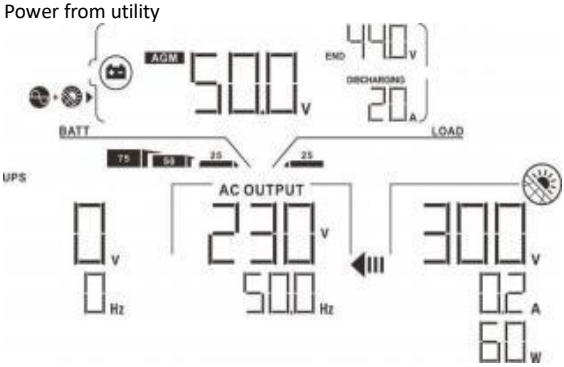
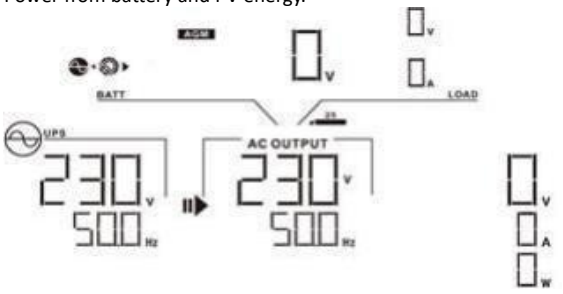
Selectable information	LCD display
Wi-Fi version checking	Wi-Fi version 00088.88. 

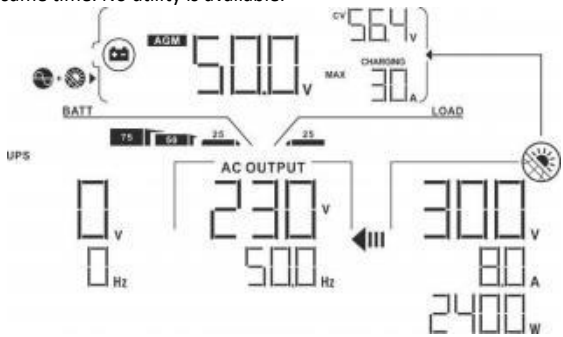
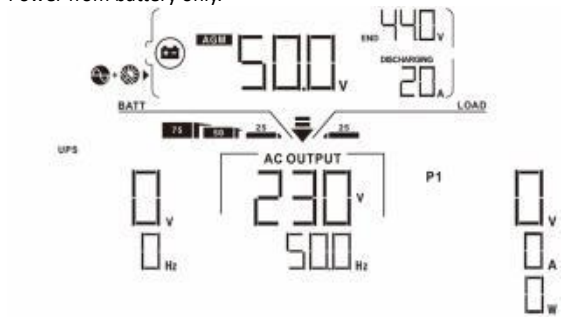
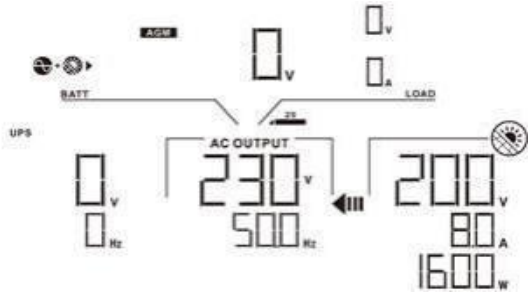
Operating Mode Description

Operation mode	Description	LCD display
Standby mode Note: *Standby mode: The inverter is not turned on yet but at this time, the inverter can charge battery without AC output.	No output is supplied by the unit but it still can charge batteries.	Charging by utility and PV energy. 
		Charging by utility. 
		Charging by PV energy. 
		No charging. 

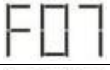
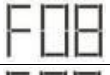
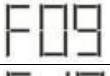
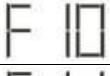
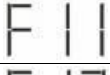
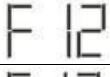
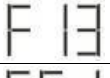
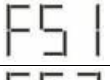
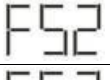
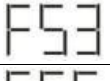
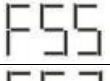
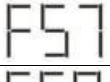
Operation mode	Description	LCD display
Fault mode Note: *Fault mode: Errors are caused by inside circuit error or external reasons such as over temperature, output short circuited and so on.	No charging at all no matter if grid or PV power is available.	Grid and PV power are available. 
Fault mode Note: *Fault mode: Errors are caused by inside circuit error or external reasons such as over temperature, output short circuited and so on.	No charging at all no matter if grid or PV power is available.	Grid is available. 
		PV power is available. 
		No charging. 

<table>
<tr><th>Operation mode</th><th>Description</th><th>LCD display</th></tr>
<tr><td rowspan="2">Line Mode</td><td rowspan="2">The unit will provide output power from the mains. It will also charge the battery at line mode.</td><td>Charging by utility and PV energy.
 
</td></tr>
<tr><td>Charging by utility.
 
</td></tr>
<tr><td>Line Mode</td><td>The unit will provide output power from the mains. It will also charge the battery at line mode.</td><td>If “SUB” (solar first) is selected as output source priority and solar energy is not sufficient to provide the load, solar energy and the utility will provide the loads and charge the battery at the same time.
 
</td></tr>
</table>

<table>
<tr><th>Operation mode</th><th>Description</th><th>LCD display</th></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td>If either “SUB” (solar first) or “SBU” is selected as output source priority and battery is not connected, solar energy and the utility will provide the loads.
  </td></tr>
<tr><td>Power from utility
  </td></tr>
<tr><td>Battery Mode</td><td>The unit will provide output power from battery and/or PV power.</td><td>Power from battery and PV energy.
  </td></tr>
</table>

Operation mode	Description	LCD display
Battery Mode	The unit will provide output power from battery and/or PV power.	PV energy will supply power to the loads and charge battery at the same time. No utility is available. 
		Power from battery only. 
		Power from PV energy only. 

Faults Reference Code

Fault Code	Fault Event	Icon on
01	Fan is locked when inverter is off.	
02	Over temperature	
03	Battery voltage is too high	
04	Battery voltage is too low	
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	Battery discharge over current	
51	Over current	
52	Bus voltage is too low	
53	Inverter soft start failed	
55	Over DC voltage in AC output	
57	Current sensor failed	
58	Output voltage is too low	

Warning Indicator

Warning Code	Warning Event	Audible Alarm	Icon flashing
01	Fan is locked when inverter is on.	Beep three times every second	
02	Over temperature	None	
03	Battery is over-charged	Beep once 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	
16	High AC input (>280VAC) during BUS soft start	None	
32	Communication failure between inverter and display panel	None	
E9	Battery equalization	None	

3.3 BATTERY EQUALIZATION

Equalization function is added into charge controller. It reverses the buildup of negative chemical effects like stratification, a condition where acid concentration is greater at the bottom of the battery than at the top. Equalization also helps to remove sulfate crystals that might have built up on the plates. If left unchecked, this condition, called sulfation, will reduce the overall capacity of the battery. Therefore, it's recommended to equalize battery periodically.

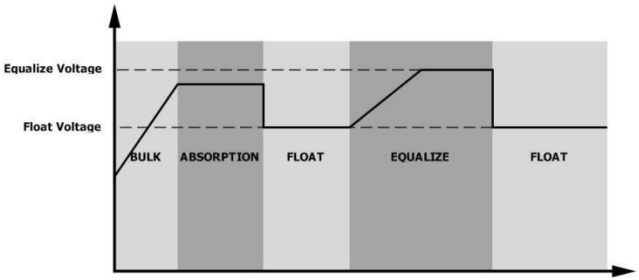
How to Apply Equalization Function

You must enable battery equalization function in monitoring LCD setting program 33 first. Then, you may apply this function in device by either one of following methods:

1. Setting equalization interval in program 37.
2. Active equalization immediately in program 39.

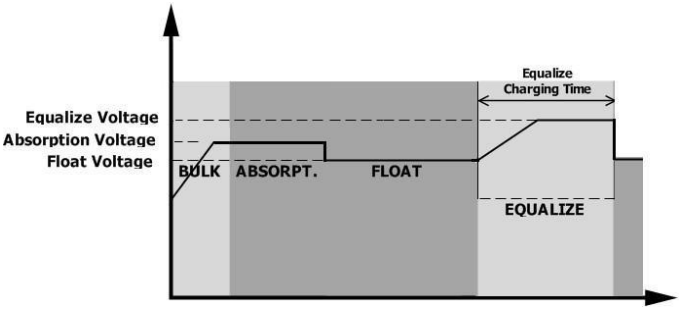
When to Equalize

In float stage, when the setting equalization interval (battery equalization cycle) is arrived, or equalization is active immediately, the controller will start to enter Equalize stage.

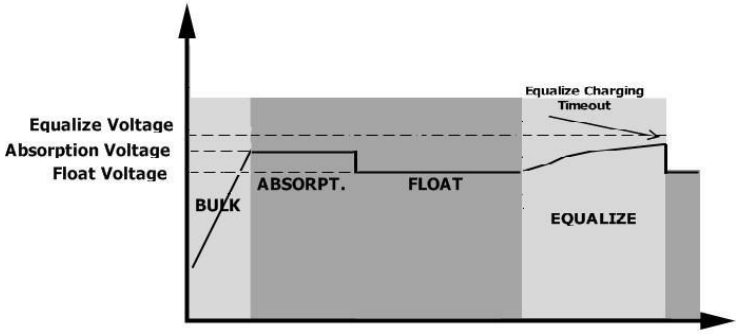


Equalize charging time and timeout

In Equalize stage, the controller will supply power to charge battery as much as possible until battery voltage raises to battery equalization voltage. Then, constant-voltage regulation is applied to maintain battery voltage at the battery equalization voltage. The battery will remain in the Equalize stage until setting battery equalized time is arrived.



However, in Equalize stage, when battery equalized time is expired and battery voltage doesn't rise to battery equalization voltage point, the charge controller will extend the battery equalized time until battery voltage achieves battery equalization voltage. If battery voltage is still lower than battery equalization voltage when battery equalized timeout setting is over, the charge controller will stop equalization and return to float stage.



3.4 SPECIFICATIONS

Table 1 Line Mode Specifications

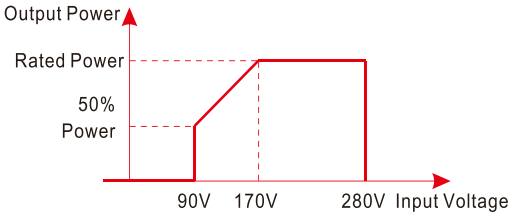
MODEL	8KW	10KW	11KW
Input Voltage Waveform	Sinusoidal (utility or generator)		
Nominal Input Voltage	230Vac		
Low Loss Voltage	170Vac± 7V (UPS) 90Vac± 7V (Appliances)		
Low Loss Return Voltage	180Vac± 7V (UPS); 100Vac± 7V (Appliances)		
High Loss Voltage	280Vac± 7V		
High Loss Return Voltage	270Vac± 7V		
Max AC Input Voltage	300Vac		
Max AC Input Current	60A		
Nominal Input Frequency	50Hz / 60Hz (Auto detection)		
Low Loss Frequency	40± 1Hz		
Low Loss Return Frequency	42± 1Hz		
High Loss Frequency	65± 1Hz		
High Loss Return Frequency	63± 1Hz		
Output Short Circuit Protection	Line mode: Circuit Breaker (70A) Battery mode: Electronic Circuits		
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)		
Transfer Time	10ms typical (UPS); 30s typical (Appliances)		
Output power de-rating: When AC input voltage under 170V the output power will be de-rated.			

Table 2 Inverter Mode Specifications

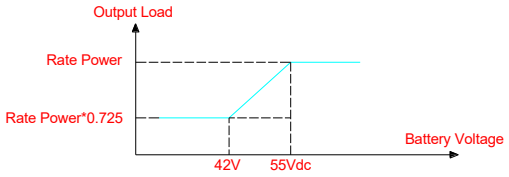
MODEL	8KW	10KW	11KW
Rated Output Power	8000W	10000W	11000W
Output Voltage Waveform	Pure Sine Wave		
Output Voltage Regulation	230Vac± 5%		
Output Frequency	60Hz or 50Hz		
Peak Efficiency	93%		
Overload Protection	100ms@≥205% load;5s@≥150% load; 10s@110%～150% load	100ms@≥180% load;5s@≥120% load; 10s@105%～120% load	
Surge Capacity	2* rated power for 5 seconds		
Low DC Warning Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	 46.0Vdc 42.8Vdc 40.4Vdc		
Low DC Warning Return Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	 48.0Vdc 44.8Vdc 42.4Vdc		
Low DC Cut-off Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	 44.0Vdc 40.8Vdc 38.4Vdc		
High DC Recovery Voltage	64Vdc	61Vdc	
High DC Cut-off Voltage	66Vdc	63Vdc	
DC Voltage Accuracy	+/-0.3V@ no load		
THDV	<5% for linear load,<10% for non-linear load @ nominal voltage		
DC Offset	≦ 100mV		
No Load Power Consumption	<75W		
Power Limitation When battery voltage is lower than 55Vdc, output power will be derated. If connected load is higher than this derated power, the AC output voltage will decrease until the output power reduces to this derated power. The minimum AC output voltage is output voltage setting – 10V.			

Table 3 Charge Mode Specifications

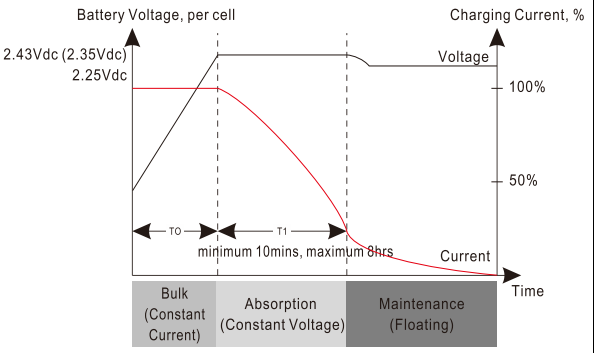
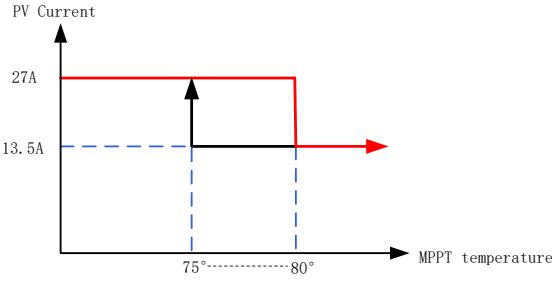
Utility Charging Mode			
MODEL	8KW	**10KW**	11KW
Charging Current (UPS) @ Nominal Input Voltage	120A (@VI/P =230Vac)	150A	150A
Bulk Charging Voltage	58.4Vdc（16 strings）（Square lithium iron battery）		
Floating Charging Voltage	56.4Vdc		
Overcharge Protection	66Vdc	63Vdc	
Charging Algorithm	3-Step		
Charging Curve			
Solar Input			
MODEL	8KW	**10KW**	11KW
Rated Power	8000W	10000W	11000W
Max. PV Array Open Circuit Voltage	250Vdc	500Vdc	
PV Array MPPT Voltage Range	90Vdc～230Vdc	90Vdc～450Vdc	
Max. Input Current	18A x 2	27A x 2 (MAX 40A)	
Start-up Voltage	80V +/- 5Vdc	80V +/- 5Vdc	
Power Limitation			

Table 4 General Specifications

MODEL	8KW	10KW	11KW
Safety Compliance	CE		
Operating Temperature Range	-10°C～ 50°C		
Storage temperature	-15°C～ 50°C		
Humidity	5% to 95% Relative Humidity (Non-condensing)		
Dimension (D*W*H), mm	500*480*179		

Table 5 Parallel Specifications

Max parallel numbers	6
Circulation Current under No Load Condition	Max 2A
Power Unbalance Ratio	<5% @ 100% Load
Parallel communication	CAN
Transfer time in parallel mode	Max 50ms
Parallel Kit	YES

Note: Parallel feature will be disabled when only PV power is available.

3.5 TROUBLE SHOOTING

Problem	LCD/LED/Buzzer	Explanation / Possible cause	What to do
Unit shuts down automatically during startup process.	LCD/LEDs and buzzer will be active for 3 seconds and then complete off.	The battery voltage is too low (<1.91V/Cell)	1. Re-charge battery. 2. Replace battery.
No response after power on.	No indication.	1. The battery voltage is far too low. (<1.4V/Cell) 2. Battery polarity is connected reversed.	1. Check if batteries and the wiring are connected well. 2. Re-charge battery. 3. Replace battery.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD and green LED is flashing.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing.	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS Appliance)
	Green LED is flashing.	Set “Solar First” as the priority of output source.	Change output source priority to Utility first.
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display and LEDs are flashing	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps continuously and red LED is on.	Fault code 07	Overload error. The inverter is overload 110% and time is up.	Reduce the connected load by switching off some equipment.
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.
	Fault code 02	Internal temperature of inverter component is over 100°C.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code 03	Battery is over-charged.	Return to repair center.

Problem	LCD/LED/Buzzer	Explanation / Possible cause	What to do
		The battery voltage is too high.	Check if spec and quantity of batteries are meet requirements.
	Fault code 01	Fan fault	Replace the fan.
	Fault code 06/58	Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac)	1. Reduce the connected load. 2. Return to repair center
	Fault code 08/09/53/57	Internal components failed.	Return to repair center.
	Fault code 51	Over current or surge.	Restart the unit, if the error happens again, please return to repair center.
	Fault code 52	Bus voltage is too low.	
	Fault code 55	Output voltage is unbalanced.	
	Fault code 56	Battery is not connected well or fuse is burnt.	If the battery is connected well, please return to repair center.

3.6 BMS Communication Installation

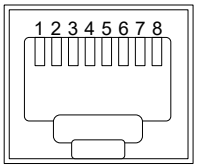
1. Introduction

If connecting to lithium battery, it is recommended to purchase a custom-made RJ45 communication cable. Please check with your dealer or integrator for details.

This custom-made RJ45 communication cable delivers information and signal between lithium battery and the inverter. These information are listed below:

- Re-configure charging voltage, charging current and battery discharge cut-off voltage according to the lithium battery parameters.
- Have the inverter start or stop charging according to the status of lithium battery.

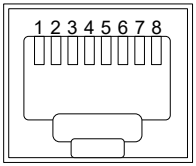
2. Pin Assignment for BMS Communication Port



Pin number	Definition
PIN 1	NC
PIN 2	NC
PIN 3	RS485B
PIN 4	NC
PIN 5	RS485A
PIN 6	NC
PIN 7	NC
PIN 8	GND

3.7 Communication interface with host computer/monitoring module

Through the RS485 communication port and the optional PC /APP developed by our company, we can monitor the running status of the off-grid energy storage inverter and set relevant parameters on the computer /APP.



Pin number	RS485 Port
1	RS232-TX
2	RS232-RX
4	VCC（12V）
8	GND

3.8 Parallel function

1. Introduction

This inverter can be used in parallel with two different operation modes.

a) Parallel operation in single phase is with up to 6 units. The supported maximum output power for 8KW model is 48KW/48KVA.

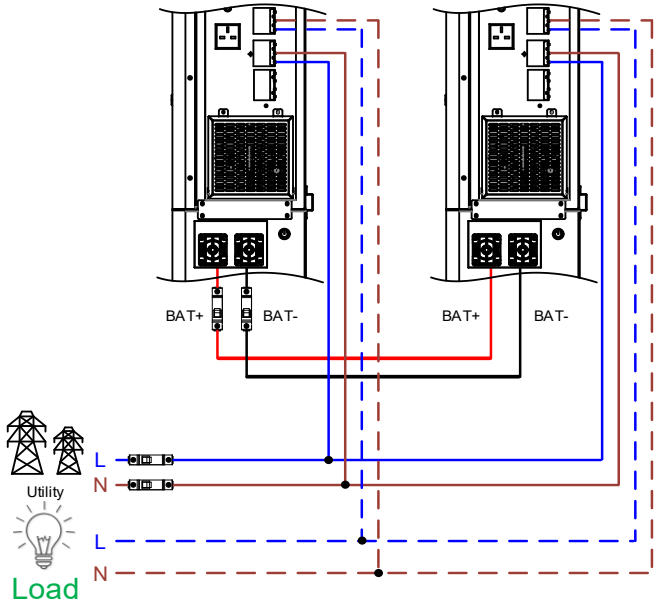
b) Maximum 6 units work together to support three-phase equipment. Maximum four units support one phase.

c) Maximum 5 units support one phase application. The supported maximum output power is 39KW/39KVA and one phase can be up to 32.5KW/32.5KVA.

2. Parallel Operation in Single phase

Two inverters in parallel:

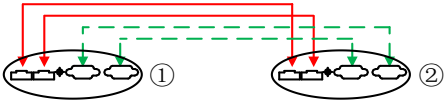
Power Connection



Attention

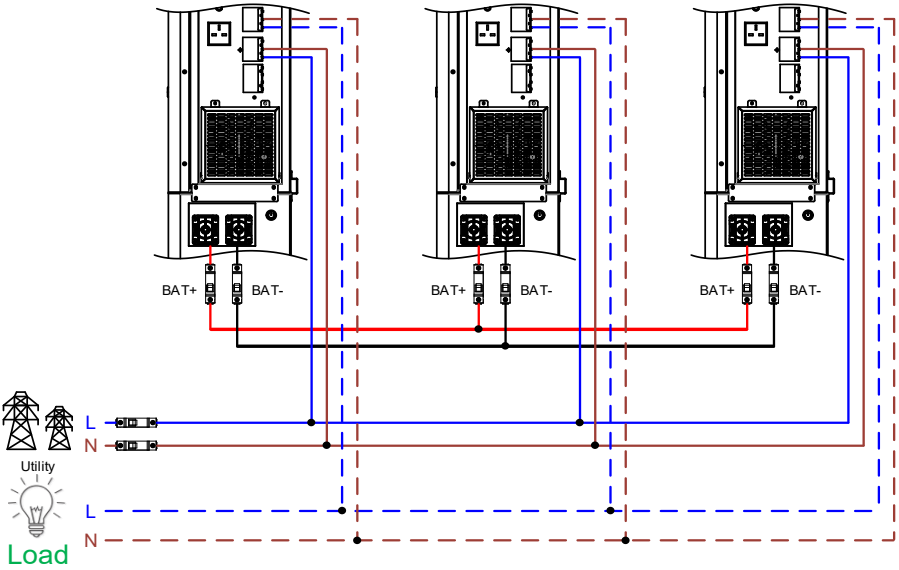
The inverter must be connected to a load of 500W and above when connected in parallel.

Communication Connection



Three inverters in parallel:

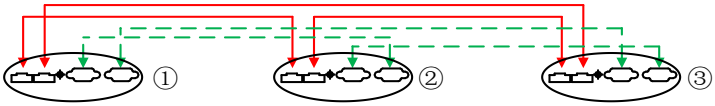
Power Connection



Attention

The inverter must be connected to a load of 500W and above when connected in parallel.

Communication Connection



WARNING: Do not connect the current sharing cable between the inverters which are in different phases. Otherwise, it may damage the inverters.

CAUTION: Each inverter should connect to PV modules separately.

3. LCD Setting and Display

Setting Program:

Program	Description	Selectable option	
28	AC output mode *This setting is able to set up only when the inverter is in standby mode. Be sure that on/off switch is in "OFF" status.	Single 	When the unit is operated alone, please select "SIG" in program 28.
		Parallel 	When the units are used in parallel for single phase application, please select "PAL" in program 28. Please refer to 5-1 for detailed information.
		L1 phase: 	When the units are operated in 3-phase application, please choose "3PX" to define each inverter. It is required to have at least 3 inverters or maximum 6 inverters to support three- phase equipment. It's required to have at least one inverter in each phase or it's up to four inverters in one phase. Please refers to 5-2 for detailed information. Please select "3P1" in program 28 for the inverters connected to L1 phase, "3P2" in program 28 for the inverters connected to L2 phase and "3P3" in program 28 for the inverters connected to L3 phase. Be sure to connect share current cable to units which are on the same phase. Do NOT connect share current cable between units on different phases.
		L2 phase: 	
		L3 phase: 	

Fault code display:

Fault Code	Fault Event	Icon on
60	Power feedback protection	
71	Firmware version inconsistent	
72	Current sharing fault	
80	CAN fault	
81	Host loss	
82	Synchronization loss	
83	Battery voltage detected different	
84	AC input voltage and frequency detected different	
85	AC output current unbalance	
86	AC output mode setting is different	

Code Reference:

Code	Description	Icon on
NE	Unidentified unit master or slave	
HS	Master unit	
SL	Slave unit	

4. Commissioning

Parallel in single phase

Step 1: Check the following requirements before commissioning:

- Correct wire connection.
- Ensure all breakers in Line wires of load side are open and each Neutral wires of each unit areconnected together.

Step 2: Turn on each unit and set “PAL” in LCD setting program 28 of each unit. And then shut down all units.

NOET: It’s necessary to turn off switch when setting LCD program. Otherwise, the setting cannot be programmed.

Step 3: Turn on each unit.

LCD display in Master unit	LCD display in Slave unit
	

NOTE: Master and slave units are randomly defined.

Step 4: Switch on all AC breakers of Line wires in AC input. It’s better to have all inverters connect to utility at the same time. If not, it will display fault 82 in following-order inverters. However, these inverters will automatically restart. If detecting AC connection, they will work normally.

LCD display in Master unit	LCD display in Slave unit
	

Step 5: If there is no more fault alarm, the parallel system is completely installed.

Step 6: Please switch on all breakers of Line wires in load side. This system will start to provide power to the load.

Support three-phase equipment

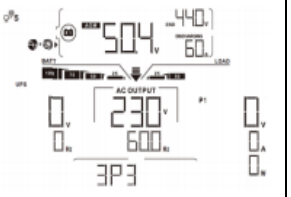
Step 1: Check the following requirements before commissioning:

- Correct wire connection
- Ensure all breakers in Line wires of load side are open and each Neutral wires of each unit are connected together.

Step 2: Turn on all units and configure LCD program 28 as P1, P2 and P3 sequentially. And then shut down all units.

NOET: It's necessary to turn off switch when setting LCD program. Otherwise, the setting cannot be programmed.

Step 3: Turn on all units sequentially.

LCD display in L1-phase unit	LCD display in L2-phase unit	LCD display in L3-phase unit
		

Step 4: Switch on all AC breakers of Line wires in AC input. If AC connection is detected and three phases are matched with unit setting, they will work normally. Otherwise, the AC icon  will flash and they will not work in line mode.

LCD display in L1-phase unit	LCD display in L2-phase unit	LCD display in L3-phase unit
		

Step 5: If there is no more fault alarm, the system to support 3-phase equipment is completely installed.

Step 6: Please switch on all breakers of Line wires in load side. This system will start to provide power to the load.

Note 1: To avoid overload occurring, before turning on breakers in load side, it's better to have whole system in operation first.

Note 2: Transfer time for this operation exists. Power interruption may happen to critical devices, which cannot bear transfer time.

5. Trouble shooting

Situation		Solution
Fault Code	Fault Event Description	
08	Bus voltage is too high	■ At least 500W load at the inverter output.
60	Current feedback into the inverter is detected.	■ Restart the inverter. ■ Check if L/N cables are not connected reversely in all inverters. ■ For parallel system in single phase, make sure the sharing are connected in all inverters. ■ For supporting three-phase system, make sure the sharing cables are connected in the inverters in the same phase, and disconnected in the inverters in different phases. ■ If the problem remains, please contact your installer.
71	The firmware version of each inverter is not the same.	■ Update all inverter firmware to the same version. ■ Check the version of each inverter via LCD setting and make sure the CPU versions are same. If not, please contact your instraller to provide the firmware to update. ■ After updating, if the problem still remains, please contact your installer.
72	The output current of each inverter is different.	■ Check if sharing cables are connected well and restart the inverter. ■ If the problem remains, please contact your installer.
80	CAN data loss	■ Check if communication cables are connected well and restart the inverter. ■ If the problem remains, please contact your installer.
81	Host data loss	
82	Synchronization data loss	
83	The battery voltage of each inverter is not the same.	■ Make sure all inverters share same groups of batteries together. ■ Remove all loads and disconnect AC input and PV input. Then, check battery voltage of all inverters. If the values from all inverters are close, please check if all battery cables are the same length and same material type. Otherwise, please contact your installer to provide SOP to calibrate battery voltage of each inverter. ■ If the problem still remains, please contact your installer.
84	AC input voltage and frequency are detected different.	■ Check the utility wiring conncetion and restart the inverter. ■ Make sure utility starts up at same time. If there are breakers installed between utility and inverters, please be sure all breakers can be turned on AC input at same time. ■ If the problem remains, please contact your installer.
85	AC output current unbalance	■ Restart the inverter. ■ Remove some excessive loads and re-check load information from LCD of inverters. If the values are different, please check if AC input and output cables are in the same length and material type. ■ If the problem remains, please contact your installer.
86	AC output mode setting is different.	■ Switch off the inverter and check LCD setting #28. ■ For parallel system in single phase, make sure no 3P1, 3P2 or 3P3 is set on #28. ■ For upporting three-phase system, make sure no “PAL” is set on #28. ■ If the problem remains, please contact your installer.

Chapter 4 Storage Battery Introduction

4.1 Appearance is introduced

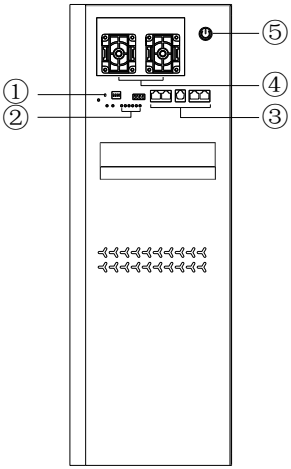
① Reset Switch

② Indicator Light

③ Communication Interface

④ Battery interface

⑤ Switch button

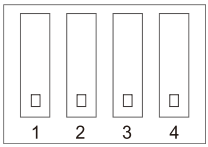


4.2 Technical Specifications

Rated capacity	15.36kWh
Nominal voltage	51.2V
Discharge voltage range	43.2-57.6V
Standard charging current	0.5C@25℃
Max.charging current	200A@25℃
Max.discharge current	200A@25℃
Depth of discharge DOD	0.9
Cycles	6000 cycles 80%DOD.@25℃
Working Temp.Range	Charge：0℃ ～ 50℃ Discharge：-10℃ ～ 50°C
Storage temperature(℃)	-15℃ ～ 50°C

Recommendation: Charge and discharge the battery every 3 months.

4.3 Comparison table of DIP switch settings



ADS	DIP Switch			
	#1	#2	#3	#4
0	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

4.4 LED indicator description

Table 1 LED operating status indication

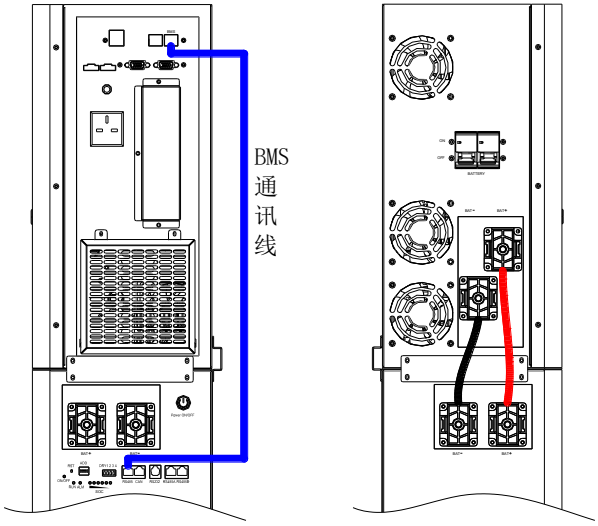
Status	Normal/Alarm/ Protection	ON/ OFF	RUN	ALM	Power indicator LED						Description
		●	●	●	●	●	●	●	●	●	
Turn off	Dormancy	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	Total extinction
Stand-by	Normal	Ever bright	Flash 1	extinguish	Based on power indicator						Standby status
	Alerts	Ever bright	Flash 1	Flash 3							Modular low voltage
Charge	Normal	Ever bright	Ever bright	extinguish	Maximum battery LED flashes (flashing 2), ALM does not flash on overcharge alarm						Maximum battery LED flashes (flashing 2), ALM does not flash on overcharge alarm
	Alerts	Ever bright	Ever bright	Flash 3							
	Overfill protection	Ever bright	Ever bright	extinguish	Ever bright	Ever bright	Ever bright	Ever bright	Ever bright	Ever bright	If there is no mains power, the indicator turns to standby
	Temperature,overcurrent, fail-safe	Ever bright	extinguish	Ever bright	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	Stop charging
Discha-rge	Normal	Ever bright	Flash 3	extinguish	Based on power indicator						
	Alerts	Ever bright	Flash 3	Flash 3							
	Under-voltage protection	Ever bright	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	Stop discharge
	Temperature, overcurrent, short circuit, reverse connection, failure protection	Ever bright	extinguish	Ever bright	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	Stop discharge
Failure		extinguish	extinguish	Ever bright	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	Stop charging and discharging

Table 2 Description of capacity indication

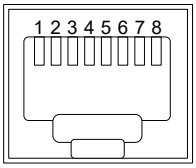
Status	Capacity indicator	Amount of electricity						Running light
		0 ~16.6%	16.6 ~33.2%	33.2 ~49.8%	49.8 ~66.4%	66.4 ~83.0%	83.0 ~100%	
Charging	L6	extinguish	extinguish	extinguish	extinguish	extinguish	Flash 2	Ever bright
	L5	extinguish	extinguish	extinguish	extinguish	Flash 2	Ever bright	
	L4	extinguish	extinguish	extinguish	Flash 2	Ever bright	Ever bright	
	L3	extinguish	extinguish	Flash 2	Ever bright	Ever bright	Ever bright	
	L2	extinguish	Flash 2	Ever bright	Ever bright	Ever bright	Ever bright	
	L1	Flash 2	Ever bright	Ever bright	Ever bright	Ever bright	Ever bright	
Discharge	L6	extinguish	extinguish	extinguish	extinguish	extinguish	Ever bright	Flash 3
	L5	extinguish	extinguish	extinguish	extinguish	Ever bright	Ever bright	
	L4	extinguish	extinguish	extinguish	Ever bright	Ever bright	Ever bright	
	L3	extinguish	extinguish	Ever bright	Ever bright	Ever bright	Ever bright	
	L2	extinguish	Ever bright	Ever bright	Ever bright	Ever bright	Ever bright	
	L1	Ever bright	Ever bright	Ever bright	Ever bright	Ever bright	Ever bright	

Connecting Signal Line

The signal line delivered with the product together shall be used to connect RS485 interface for each battery module. The communication port of the inverter needs to be connected to the RS485 interface.

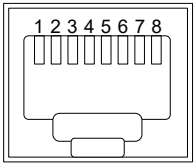


- **Battery BMS RS485 interface definition**



Pin number	RS485 Port
1、8	RS485-B
2、7	RS485-A
3、6	GND
4、5	NC

- **Battery BMS CAN interface definition**



Pin number	CAN Port
9、10、11、14、16	NC
12	CANL
13	CANH
15	GND

4.5 Safety and precautions

1.The battery module must be used in conjunction with BMS, and the mixed use of batteries from different manufacturers is strictly prohibited.

2.Check the battery module voltage for damage; if there is any abnormality, please stop using it.

3.It is strictly forbidden to stack the whole trailer battery with fork plate during transportation and storage,and it is forbidden to stack battery modules when installing and transporting batteries. There are positive and negative lead terminals or sampling line lead ends, and it is strictly forbidden to squeeze, stack and place them down.

4.Parallel matching requirements for battery modules: (Notes before picking and installation)

(1) Two identical models and same capacity, The battery modules of the same voltage are connected in parallel to 51.2V.

(2) Serial use is strictly prohibited.

5.Parallel wires are included in the battery module packing box, and the parallel wires correspond to the battery modules. Mixed insertion is strictly prohibited.

6.It is forbidden to use or leave the battery module near high temperature and high heat sources, away from fire and water sources.

7.It is forbidden to disassemble the battery module, knock, throw or step on the battery module, and dismantle the BMS and dismantle the yellow tamper-evident sticker without authorization.

8.Before installing the battery module, check whether the open circuit voltage of the battery is within the normal range. The "positive" and "negative" signs are printed on the module, and the electrical properties should be correctly determined. It is strictly forbidden to reverse or short-circuit the battery.

9.Insulation tools and gloves should be used during installation and transportation, and metal-containing conductors such as watches, bracelets (bracelets) and rings should be removed from the wrist to prevent electric shock and short-circuit the positive and negative electrodes. During installation, the battery module poles need to be insulated and protected. If the poles are close to the battery rack and other conductors, the battery poles or battery racks need to be insulated and protected.

10.The recommended transportation method is for two people to carry it at the same time. The transportation tool is a safety rope or a load-bearing net bag. The battery box must be carried to the site. Violent construction is strictly prohibited to damage the product.

11.Installation and maintenance requirements. After the battery module is installed on the wall, the poles and plug-ins are required to achieve frontal maintenance.

12.Please read this installation manual carefully before installation. If you have any questions, please contact your supplizer.

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Please read instructions carefully before use