All-In-One

Off-grid

Energy Storage System

ISPA15-10

ISPA10-10

User Manual

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Catalog

1.Information

1.1 System Introduction

ISPA15-10 can be used in DC coupled systems (mainly newly installed), Ac coupling system (mainly transformation) and off-grid system (mainly transformation, photovoltaic capacity increase), the scheme is as follows:

1.2 Application

ISPA15-10

Figure1 Working Diagram

Solution	Configuration	
	Inverter	Battery
ISPA10-10	10kw	10KWH
ISPA15-10	10kw	15KWH

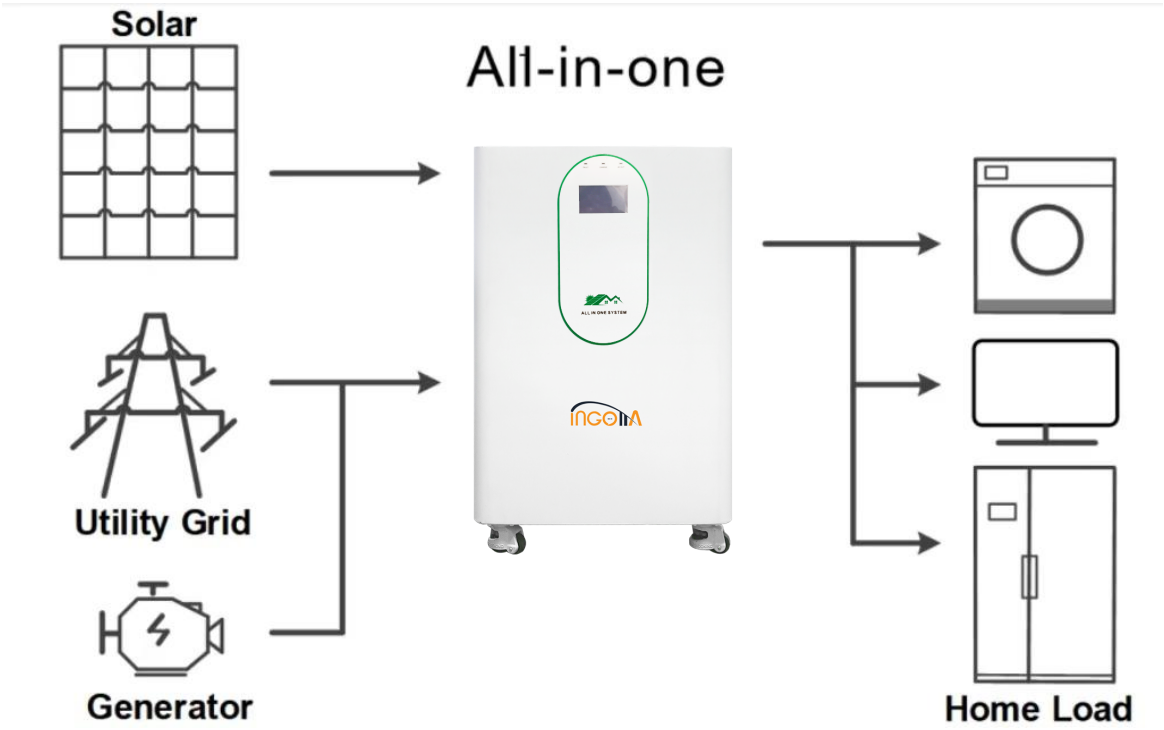


Figure2 Working Diagram

1.3 Safety Instructions

1.3.1 This sign indicates a hazardous situation which, if not avoided, could result in death or serious injury.

1.3.2 The All-In-One must not be touched or put into service until 5 minutes after it has been switched off or disconnected to prevent an electric shock or injury.

1.3.3 This sign shows danger of hot surface.

1.3.4 Refer to the operating instructions.

1.3.1.Setting of Warning Sign for Safety

During instruction, maintenance and repair, follow the instructions below to prevent non-specialist personnel from causing misuse or accident:

♦ Obvious signs should be placed at front switch and rear-level switch to prevent accidents caused by false switching.

♦ Warning signs or tapes should be set near operating areas.

♦ The system must be reinstalled after maintenance or operation.

1.3.2 Measuring Equipment

To ensure the electrical parameters to match requirements, related measuring equipment are required when the system is being connected or tested.

Ensure that the connection and use matched specification to prevent electric arcs or shocks.

1.3.3 Moisture Protection

It is very likely that moisture may cause damages to the system. Repair or maintaining activities in wet weather should be avoided or limited.

1.3.4 Operation After Power Failure

The battery system is part of the energy storage system which stores life-threatening high voltage even when the DC side is switched off. Touching the battery outlets is strictly prohibited. The inverter can keep a life-threatening voltage even after disconnecting it from the DC and / or AC side. Therefore, for safety reasons, it must be tested with a properly calibrated voltage tester before an installer works on the equipment.

1.4 Battery Safety Datasheet

1.4.1 Hazard Information

Classification of the hazardous chemical:

Exempt from classification according to Australian WHS regulations.

Other hazards:

This product is a Lithium Iron Phosphate Battery with certified compliance under the UN Recommendations on Transport of Dangerous Goods, Manual of Tests and Criteria, Part III, subsection 38.3. For the battery cell, chemical materials are stored in a hermetically sealed metal case, designed to withstand temperatures and pressures encountered during normal use. As a result, during normal use, there is no physical danger of ignition or explosion and chemical danger of hazardous materials' leakage. However, if the product is exposed to a fire, added mechanical shocks, decomposed,added electric stress by misuse, the gas release vent will be operated. The battery cell case will be breached at the extreme. Hazardous materials may be released.

Moreover, if heated strongly by the surrounding fire, acrid or harmful fume may be emitted.

1.4.2 Safety Datasheet

For detailed information please refer to the provided battery safety datasheet.

1.5 General Precautions

 DANGER

Danger to life due to high voltages of the PV array, battery and electric shock. When exposed to sunlight, the PV array generates dangerous DC voltage which will be present in the DC conductors and the live components of the inverter. Touching the DC conductors or the live components can lead to lethal electric shocks. If you disconnect the DC connectors from the system under load, an electric arc may occur leading to electric shock and burns.

♦ Do not touch uninsulated cable ends.

♦ Do not touch the DC conductors.

♦ Do not open the inverter and battery.

♦ Do not wipe the system with damp cloth.

♦ Have the system installed and commissioned by qualified people with the appropriate skills only.

♦ Prior to performing any work on the inverter or the battery pack, disconnect the inverter from all voltage sources as described in this document.

 WARNING

Risk of chemical burns from electrolyte or toxic gases. During standard operation, no electrolyte shall leak from the battery pack and no toxic gases shall form. Despite careful construction, if the Battery Pack is damaged or a fault occurs, it is possible that electrolyte may be leaked or toxic gases formed.

♦ Do not install the system in any environment of temperature below -10°C or over 50°C and in which humidity is over 90%.

♦ Do not touch the system with wet hands.

♦ Do not put any heavy objects on top of the system. Do not damage the system with sharp objects.

♦ Do not install or operate the system in potentially explosive atmospheres or areas of high humidity.

♦ Do not mount the inverter and the battery pack in areas containing highly flammable materials or gases.

♦ If moisture has penetrated the system (e.g. due to a damaged enclosure), do not install or operate the system.

♦ Do not move the system when it is already connected with battery modules.Secure the system to prevent tipping with restraining straps in your vehicle.

♦ The transportation of product must be made by the manufacturer or an instructed personal. These instructions shall be recorded and repeated.

♦ A certified ABC fire extinguisher with minimum capacity of 2kg must be carried along when transporting.

♦ It is totally prohibited to smoke in the vehicle as well as close to the vehicle when loading and unloading.

♦ For the exchange of a battery module, please request for new hazardous goods packaging if needed, pack it and let it be picked up by the suppliers.

♦ In case of contact with electrolyte, rinse the affected areas immediately with water and consult a doctor without delay.

 CAUTION:

Risk of injury through lifting or dropping the system. The inverter and battery are heavy. There is risk of injury if the inverter or battery is lifted incorrectly or dropped during transport or when attaching to or removing from the wall.

♦ Lifting and transporting the inverter and battery must be carried out by more than 2 people.

1.6 Components

After unpacking the package, please inspect the components based on the below table.

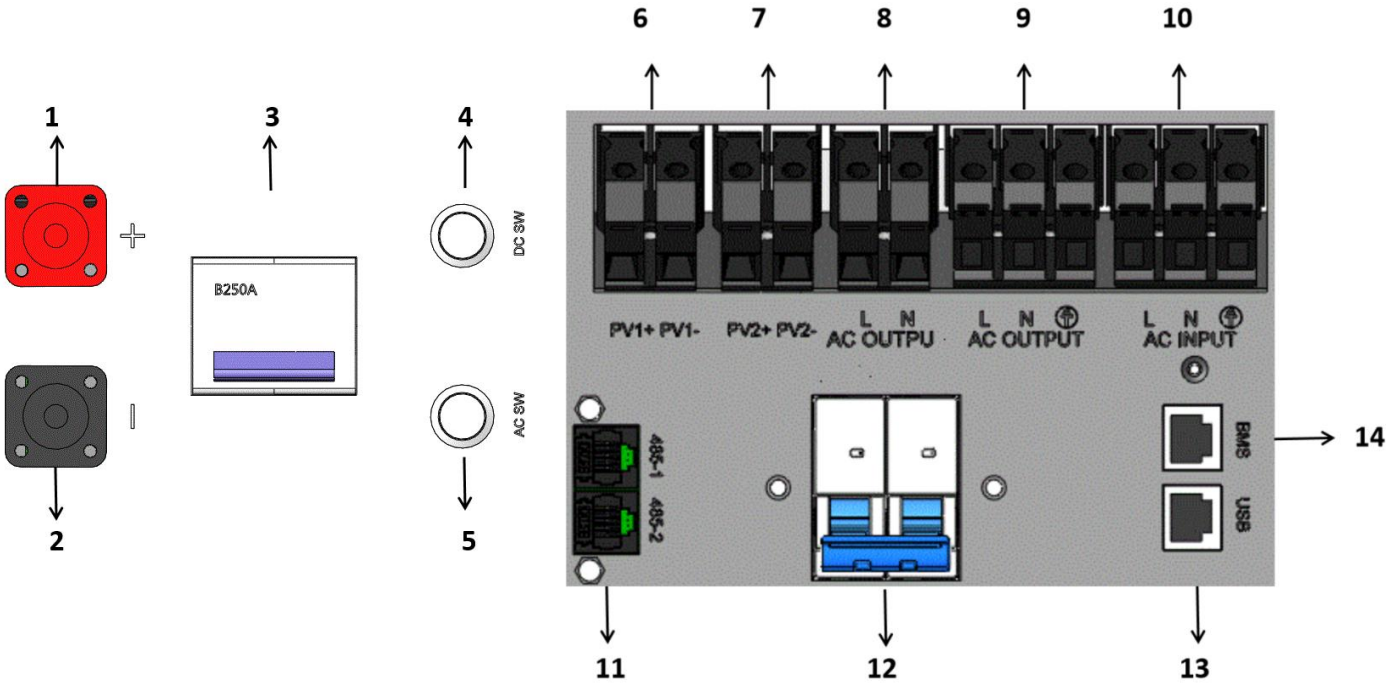
No.	Picture	Description	Quantity
1		ISPA-All-In-One OFF-GRID Energy Storage System	1 pcs
2		4G/WiFi module	1 pcs
3		User manual	1 pcs
4		Qualified Certificate	1 pcs
5		APP Operation Guide	1 pcs

1.7 Specifications

	10KWh+10KW	15KWh+10KW
Model	**ISPA10-10**	**ISPA15-10**
Battery		
Battery Type	LiFePO4 Battery	
Battery Energy	10KWh	15KWh
Nominal Voltage	51.2V	
Rated Capacity	200Ah	280Ah
Voltage Range	42.0~57.0V	
PV		
Max. Power	12KW(6000W*2)	
Max. PV Voltage	500Vdc	
MPPT Voltage Range	90~450Vdc	
Max. PV input Current	22A+22A	
AC Output		
Rated Power	10000W	
AC Voltage	120Vac (L1/N, L2/N)/240Vac(L1/L2)	
AC Frequency	50Hz+0.3Hz/60Hz+0.3Hz	
Efficiency	≤91%	
Transfer time	10ms (for PC) 20ms (for Appliance)	
Waveform	Pure sine wave	
AC Input		
Rated AC Voltage	120Vac (L1/N, L2/N)/240Vac(L1/L2)	
AC Voltage Range	(85Vac~140Vac)+2%	
Frequency Range	50Hz/60Hz(Auto sensing)	
General Parameters		
Altidude	≤2000m	
Humidity	5%~95%	
Work Temperature	-10℃~50℃	
Size (mm)	510*377*620	540*377*820
Weight (kg)	106	135

2.Installation

2.1 Product Overview



NO	NAME	Silk-SCREEN	REMARK
1	Positive	+	Red
2	Negative	—	Black
3	Breaker	Breaker	Output breaker(Battery)
4	Power button	ON/OFF	Power button(DC)
5	Power button	ON/OFF	Power button(AC)
6	PV IN	PV+ PV-	PV IN 1
7	PV IN	PV+ PV-	PV IN 2
8	AC OUT	AC OUT	AC OUTPUT
9	AC OUT	AC OUT	AC OUTPUT
10	AC IN	AC IN	AC input

11	RS485parallel port	485-1/485-2	Parallel communication port
12	Breaker	Breaker	Output breaker(AC)
13	USB	USB	/
14	BMS	BMS	Read the battery information through the upper computer software

2.1.1 AC Input/Output Connection

CAUTION: Before connecting to AC input power source, please install a separate AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended spec of AC breaker is 64A for 10KF1.

CAUTION: There are two terminal blocks with ‘IN’ and ‘OUT’ markings. Please do NOT mis-connect input and output connectors.

WARNING: All wiring must be performed by a qualified personnel.

WARNING: It’s very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable size as below.

Suggested cable requirement for AC wires

Model	Gauge	Torque Value
10KF2	1*8AWG	1.2 Nm

Please follow below steps to implement AC input/output connection:

Before making AC input/output connection, be sure to open DC protector or disconnector first.

Remove insulation sleeve 10mm for six conductors. And shorten phase L and neutral conductor N 3 mm.

Insert AC input/output wires according to polarities indicated on terminal and tighten the terminal screws. Be sure to connect PE protective conductor ⏚ first.

PE → Ground (yellow)

L → LINE (black)

N → Neutral (red)

AC IN AC OUT AC OUT

Make sure the wires are securely connected.

⚠	**WARNING:** Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

CAUTION: Important

Be sure to connect AC wires with correct polarity. If L and N wires are connected reversely, it may cause utility short-circuited when these inverters are worked in parallel operation.

CAUTION: Appliances such as air conditioner are required at least 2~3 minutes to restart because it's required to have enough time to balance refrigerant gas inside of circuits. If a power shortage occurs and recovers in a short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check with manufacturer of air conditioner that if it's equipped with time-delay function before installation. Otherwise, this off grid solar inverter will trig overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

2.1.2 PV Connection

CAUTION: Before connecting to PV modules, please install separately a DC circuit breaker between inverter and PV modules.

WARNING: All wiring must be performed by a qualified personnel.

WARNING: It'very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size as below.

Model	Gauge	Torque Value
12KW	2*12AWG	1.2-1.6 Nm

PV Module Selection:

When selecting proper PV modules, please be sure to consider below parameters:

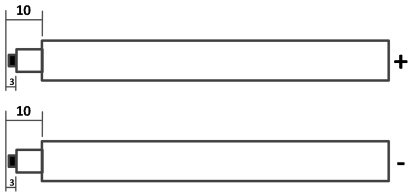
1. Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter.

2. Open circuit Voltage (Voc) of PV modules should be higher than min. battery voltage.

Inverter Model	12KW
Max. PV Array Open Circuit Voltage	500Vdc
Start-up Voltage	90Vdc
PV Array MPPT Voltage Range	90Vdc~450Vdc

Please follow below steps to implement PV module connection:

Remove insulation sleeve 10 mm for positive and negative conductors.



Step 1: Check the input voltage of PV array modules. This system is applied with One strings of PV array. Please make sure that the maximum current load of each PV input connector is 22A.

CAUTION: Exceeding the maximum input voltage can destroy the unit!! Check the system before wire connection.

Step 2: Disconnect the circuit breaker and switch off the DC switch.

Step 3: The corresponding positive and negative wires are connected to the photovoltaic ports

Make sure the wires are securely connected.

WARNING:
Be sure that DC power source is disconnected before attempting to hardwire it to the unit.

2.1.3 4G/Wi-Fi Connection

This unit is equipped with a 4G/Wi-Fi transmitter. 4G/Wi-Fi transmitter can enable wireless communication between off-grid inverters and monitoring platform.Users can access and control the monitored inverter with downloaded APP. You may find “Smart ESS” app from the Apple® Store or Smart ESS 4G/Wi-Fi” in Google®

Play Store. All data loggers and parameters are saved in iCloud. For quick installation and operation, please refer to Appendix III - The 4G/Wi-Fi Operation Guide for details.

2.1.4 Emergency Procedure

When the energy storage system appears to be running abnormally, you can turn off the grid-connected main switch that directly feeding the BESS , and turn off all load switches within the BESS ,turn off the battery switch at the same time. To prevent a potentially fatal personal injury, if you want to repair or open the machine after the power is switched off,please measure the voltage at the input terminals with a suitably calibrated voltage tester.Before working on this equipment, please confirm that there is no grid electric supply to the BESS! The upper cover plate cannot be opened until the DC-link capacitance inside the battery modules discharges completely about 15 minutes later.

2.2 Emergency Handling Plan

1. Disconnect the AC breaker.

2.Check the control power supply. If it is OK, return the power supply to find out the reason.

3. Please record every detail related to the fault, so Factory can analyse and solve the fault. Any operation of equipment during a fault is strictly forbidden, please contact Factory as soon as possible.

4.As battery cells contain a little Oxygen inside and all cells have got explosion-proof valves,explosion hardly happens.

5.When the indicator light on the battery shows a red fault, check the fault type through the communication protocol, and contact our after-sales service personnel for advice.

2.2.1 Hazards

If the battery pack leaks electrolyte, avoid contact with the leaking liquid or gas.

If one is exposed to the leaked substance, immediately perform the actions described below:

Inhalation: Evacuate the contaminated area, and seek medical attention.

Eye contact: Rinse eyes with running water for 5 minutes, and seek medical attention.

Contact with skin: Wash the affected area thoroughly with soap and water, and seek medical attention.

Ingestion: Induce vomiting and seek medical attention.

2.2.2 Fire

If a fire breaks out in the place where the battery pack is installed, perform the following countermeasures:

Fire extinguishing media

During normal operation, no respirator is required. Burning batteries can not be extinguished with a regular fire extinguisher, this requires special fire extinguishers such as the Novec 1230, the FM-200 or a dioxin extinguisher. If the fire is not from a battery, normal ABC fire extinguishers can be used for extinguishing.

Fire -fighting instructions

1.If fire occurs when charging batteries, if it is safe to do so, disconnect the battery pack circuit breaker to shut off the power to charge.

2.If the battery pack is not on fire yet, extinguish the fire before the battery pack catches fire.

3. If the battery pack is on fire, do not try to extinguish but evacuate people immediately.

	NOTE:There may be a possible explosion when batteries are heated above 150℃.When the battery pack is burning, it leaks poisonous gases . Do not approach.

Effective ways to deal with accidents

Battery in dry environment: Place damaged battery into a segregated place and call local fire department or service engineer.

Battery in wet environment: Stay out of the water and don’t touch anything if any part of the battery, inverter, or wiring is submerged.

Do not use a submerged battery again and contact the service engineer.

2.3 System Operation

Switch On

When turning on the system, it is very important to follow the steps below to prevent damage to the system.

WARNING: Please check the installation again before turning on the system.

Step 1:

Press the battery and inverter power buttons until the display lights up.switch.

Step 2:

Turn on the external PV

Step 3:

Turn on the external grid switch.

Step 4:

If backup load is applied, turn on the external Backup switch

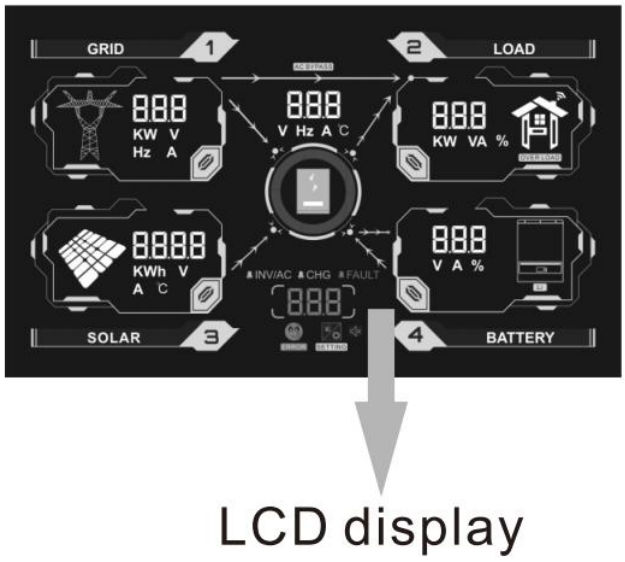
NOTE:

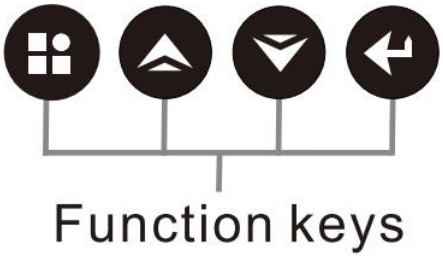
the Backup switch is only used when a backup load is applied.

3.Operation

3.1 Operation and Display Panel

The operation and display panel, shown in below chart, is on the front panel of the inverter. It includes three indicators, four function keys and a LCD display, indicating the operating status and input/output power information.





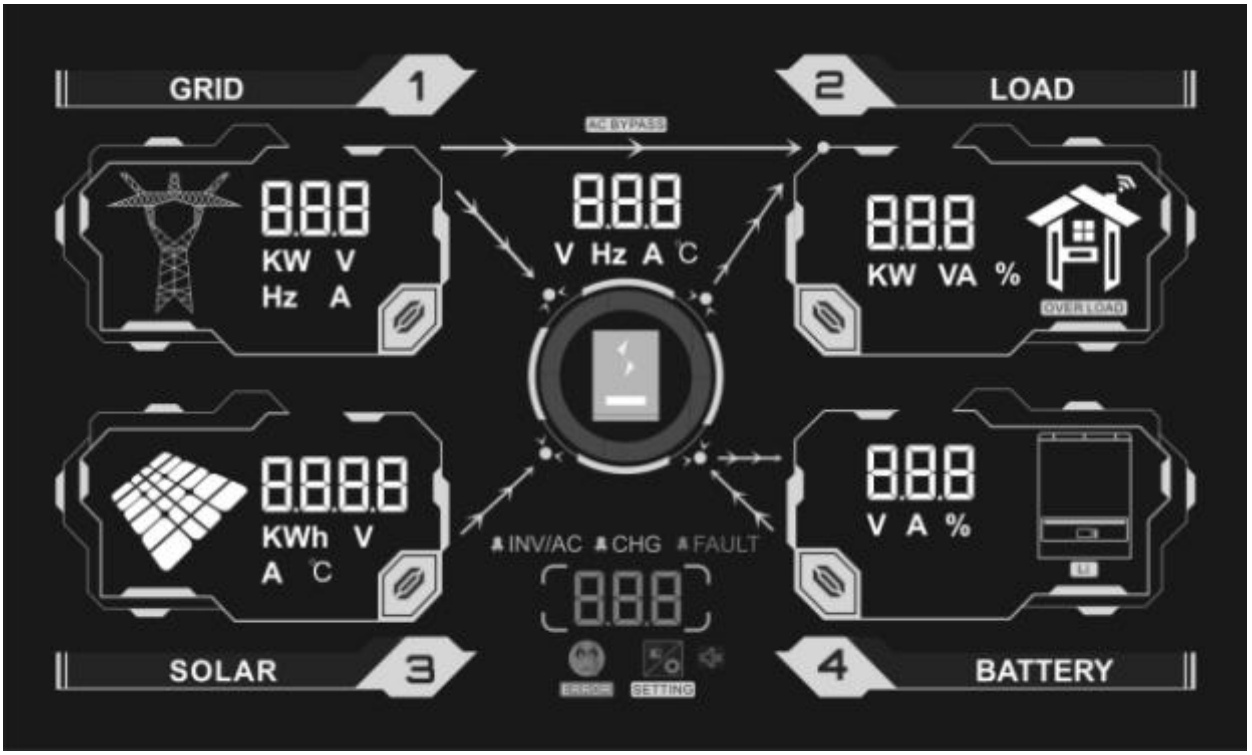
LED Indicator

LED Indicator			Messages
INV/AC	Green	solid on	output is powered by utility in Line mode .
		Flashing	output is powered by battery or PV in battery mode .
CHG	Green	solid on	Battery is fully charged .
		Flashing	Battery is charging
FAULT	Red	solid on	Fault occurs in the inverter
		Flashing	warning condition occurs in the inverter

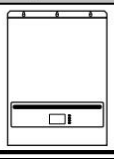
Function keys

Function key	Description
ESC	To exit setting mode
UP	Togo to previous selection
DOWM	Togo to next selection
ENTER	To confirm the selection in setting mode or enter setting mode

3.1.1 LCD Display Icons

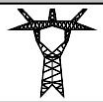


Icon	Function description
Input Source Information	
	Indicates the AC input.
	Indicates the PV input
KW V Hz A	Indicate input voltage, input frequency, PV voltage, charger current (if PV in charging for 10.2KW models), charger power, battery voltage.
Configuration Program and Fault Information	
	Indicates the setting programs.
ERROR	Indicates the warning and fault codes. Warning: flashing with warning code. Fault: lighting with fault code
Output Information	
KW VA %	Indicate output voltage, output frequency, load percent, load in VA, load in Watt and discharging current.

Battery Information	
	

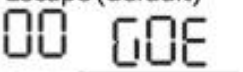
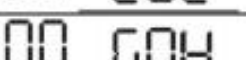
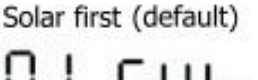
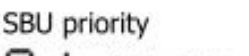
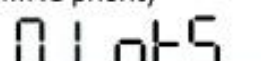
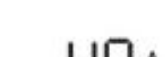
Load Information	
OVER LOAD	Indicates overload.
	

Mute Operation	
	Indicates unit alarm is disabled.

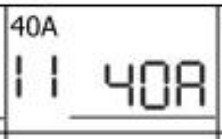
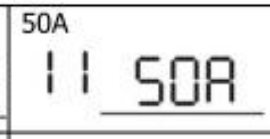
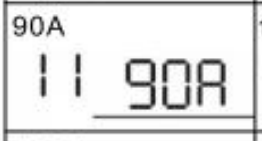
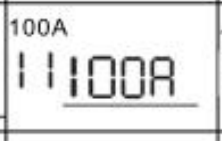
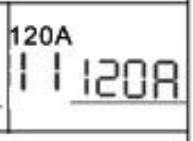
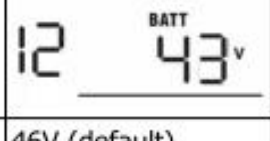
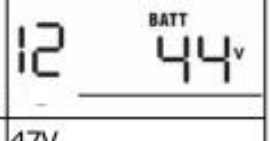
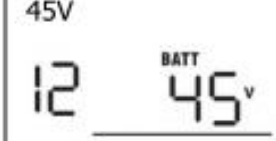
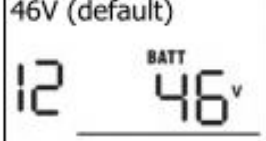
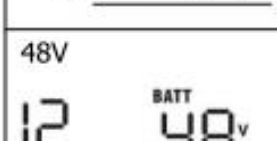
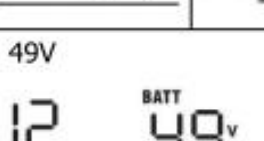
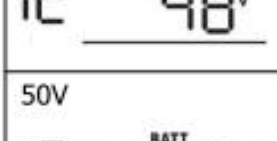
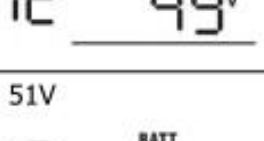
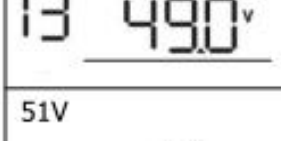
Mode Operation Information	
	Indicates unit connects to the mains.
	Indicates unit connects to the PV panel.
AC BYPASS	Indicates load is supplied by utility power.
	Indicates the utility charger circuit is working.
	Indicates the DC/AC inverter circuit is working.

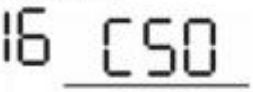
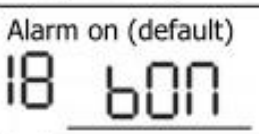
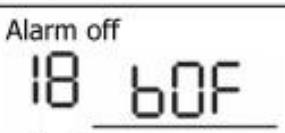
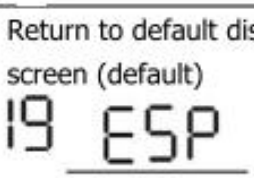
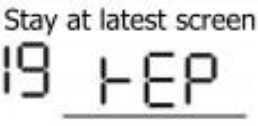
3.2 LCD Setting

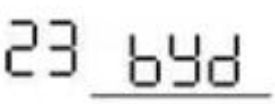
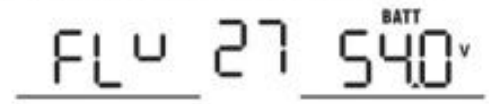
After pressing and holding ENTER button for 3 seconds, the unit will enter setting mode. Press "UP" or “DOWN”button to select setting programs. And then, press "ENTER" button to confirm the selection or ESC button to exit.

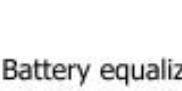
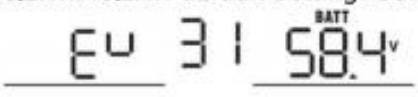
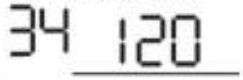
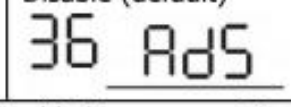
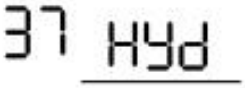
Program	Description	Selectable option	
00	Exit setting mode	Escape (default) 	One-button restore setting options
			
01	Output source priority: To configure load power source priority	Utility first 	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.
		Solar first (default) 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, utility will supply power to the loads at the same time. Battery provides power to the loads only when any one condition happens: - Solar energy and utility is not available. - Solar energy is not sufficient and utility is not available.
		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.
		MKS priority 	Solar energy provides power to the loads as frist priority , if solar energy is not sufficient to power all connected loads , utility energy will supply power to the loads at the same time. The battery only supplies energy to the load as a backup power.
02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	10A 	20A 
		30A 	40A 

02		50A 02 50A	60A 02 60A	70A 02 70A	80A 02 80A
		90A 02 90A	100A (default) 02 100A	110A 02 110A	120A 02 120A
		130A 02 130A	140A 02 140A	150A 02 150A	160A 02 160A
03	AC input voltage range	Appliances (default) 03 APL	If selected, acceptable AC input voltage range will be within 90-280VAC.		
		UPS 03 UPS	If selected, acceptable AC input voltage range will be within 170-280VAC.		
05	Battery type	AGM (default) 05 AGn	Flooded 05 FLd		
		User-Defined 05 USE	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.		
		User-Defined 05 LIb	When the solar energy exists,Set this item to LIB, and the lithiumbattery will be activated for 3 second.		
		User-Defined 05 LIC	If selected,Lithium battery communicotion connection for PACE 232 BMS. The lithium battery activation function is automatically enabled. (LIB fuction has built in)		
		User-Defined 05 LIP	If selected,Lithium battery communicotion connection for PACE 485 BMS.The lithium battery activation function is automatically enabled. (LIB fuction has built in)		
		User-Defined 05 LIL	If selected,Lithium battery communicotion connection for PYLON 485 BMS. The lithium battery activation function is automatically enabled. (LIB fuction has built in)		
06	Auto restart when overload occurs	Restart disable (default) 06 LrD	Restart enable 06 LrE		
07	Auto restart when over temperature occurs	Restart disable (default) 07 trd	Restart enable 07 trE		
09	Output frequency	50Hz (default) 09 50Hz	60Hz 09 60Hz		
10	Output voltage	220V 10 220V	230V (default) 10 230V		
		240V 10 240V			
11	Maximum utility charging current	2A 11 2A	10A 11 10A	20A 11 20A	

	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 	40A 	50A 
		60A 	70A 	80A (default) 
		90A 	100A 	110A  120A 
		130A 	140A 	
12	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	Available options in 8.2KW/10.2KW model:		
		42V 	43V 	44V 
		45V 	46V (default) 	47V 
		48V 	49V 	
		50V 	51V 	
13	Setting voltage point back to battery mode when selecting "SBU priority" or "Solar first" in program 01.	Available options in 8.2KW/10.2KW model:		
		Battery fully charged 	48V 	
		49V 	50V 	
		51V 	52V 	
		53V 	54V (default) 	

		55V 	56V 
		57V 	58V 
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.
		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.
		If this inverter/charger is working in Battery mode or Power saving mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient.	
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 (Input voltage /output voltage) 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 

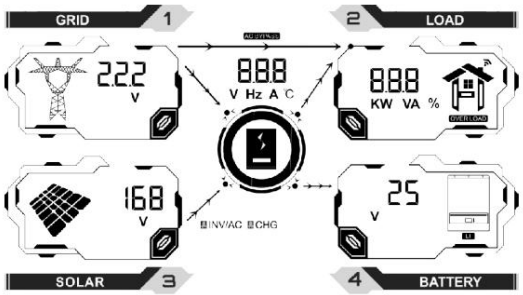
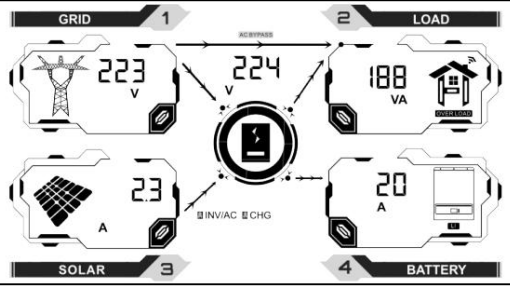
22	Beeps while primary source is interrupted	Alarm on (default) 	Alarm off 
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable (default) 	Bypass enable 
25	Record Fault code	Record enable (default) 	Record disable 
26	Bulk charging voltage (C.V voltage)	8.2KW/10.2KW default setting: 56.4V 	
		If self-defined is selected in program 5, this program can be set up. Setting range is from 48.0V to 61.0V for 8.2KW/10.2KW model. Increment of each click is 0.1V.	
27	Floating charging voltage	8.2KW/10.2KW default setting: 54.0V 	
		If self-defined is selected in program 5, this program can be set up. Setting range is from 48.0V to 61.0V for 8.2KW/10.2KW model. Increment of each click is 0.1V.	
29	Low DC cut-off voltage	8.2KW/10.2KW default setting: 40.0V 	
		If self-defined is selected in program 5, this program can be set up. Setting range is from 40.0V to 48.0V for 8.2KW/10.2KW model. 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.	

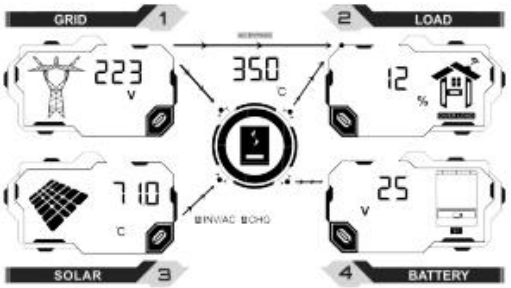
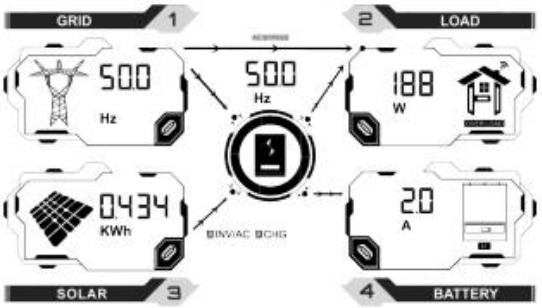
30	Battery equalization	Battery equalization 	Battery equalization disable (default) 
		If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.	
31	Battery equalization voltage	8.2KW/10.2KW default setting: 58.4V 	
		Setting range is from 48.0V to 61.0V for 8.2KW/10.2KW model. Increment of each click is 0.1V.	
33	Battery equalized time	60min (default) 	Setting range is from 5min to 900min. Increment of each click is 5min.
34	Battery equalized timeout	120min (default) 	Setting range is from 5min 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) 
		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 shows "  ". 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.	
37	GRID-tie operation	Off grid (default) 	Inverter operates only in off-grid mode. Solar energy provides power to the loads as first priority and charging second
		Hybrid 	Inverter operates hybrid mode. Solar energy provides power to the loads as first priority and charging second Excess energy feed to grid.

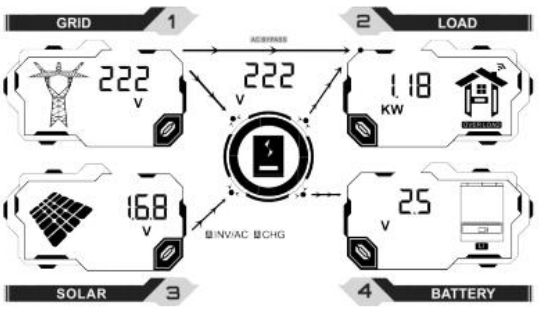
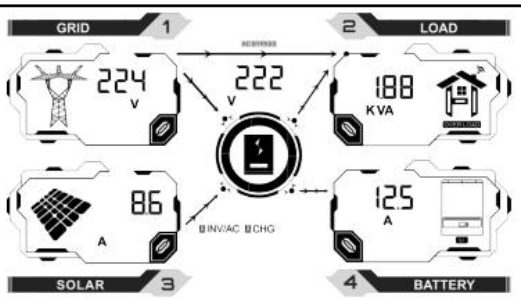
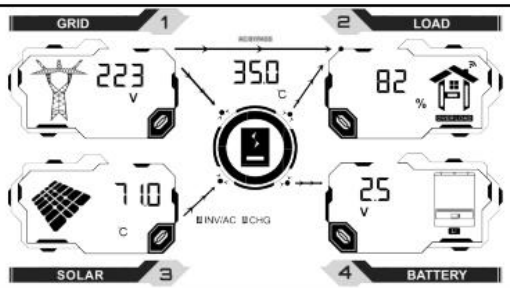
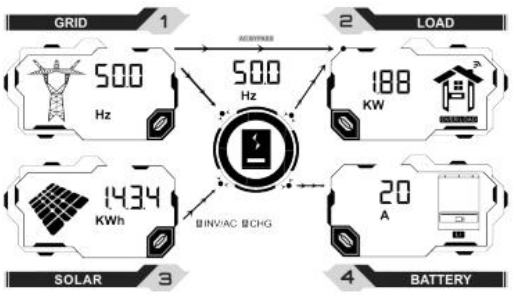
38	GRID-tie current	10A 38 10A	Increment of each click is 2A.
39	Led pattern light	Led pattern off 39 LOF	Led pattern on(default) 39 LON
41	Dual output	disable (default) 41 L2F	use 41 L20
42	Enter the dual output functional voltage point	8.2KW/10.2KW default setting: 44.0V 42 44.0	
		Setting range is from 40.0V to 52.0V for 48VDC model. Increment of each click is 0.1V.	

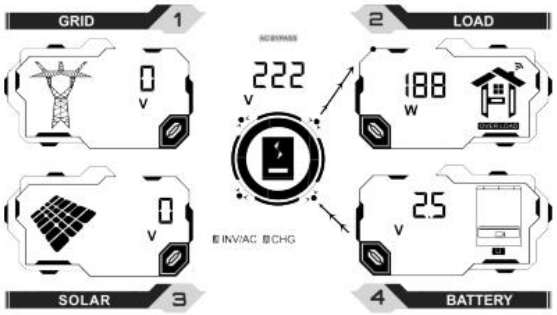
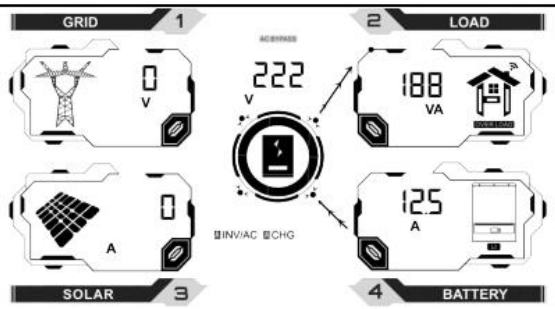
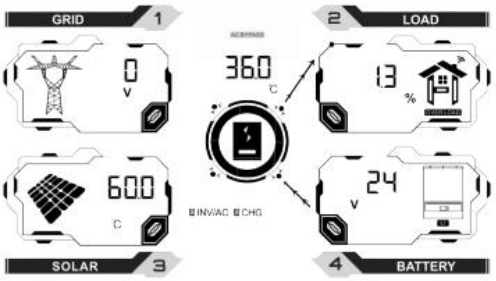
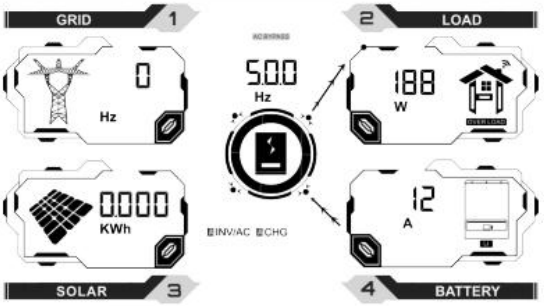
3.3 Display Setting

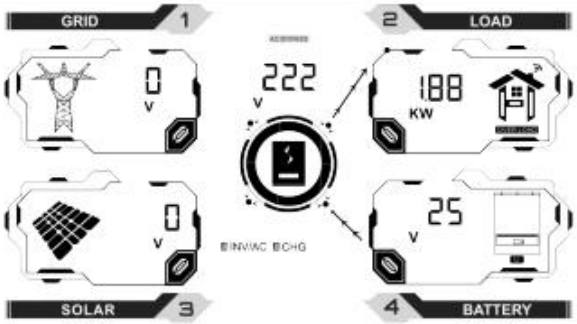
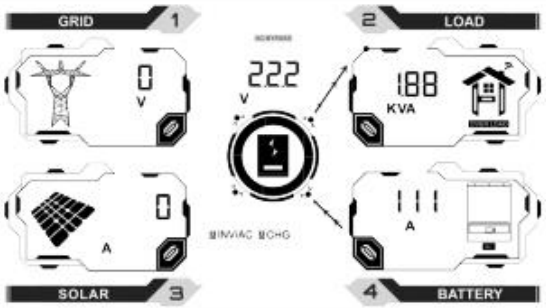
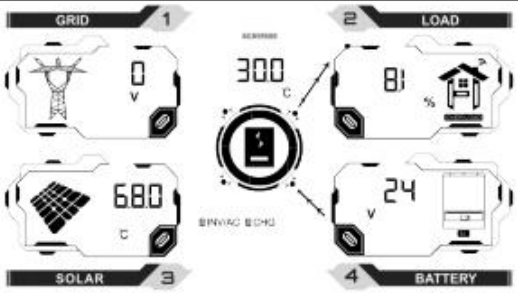
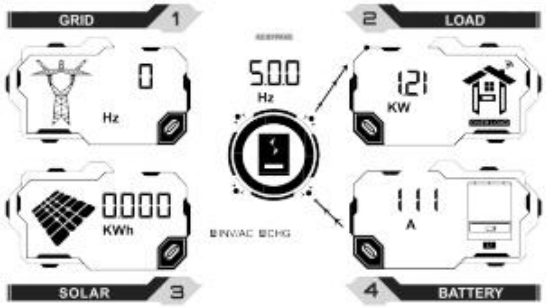
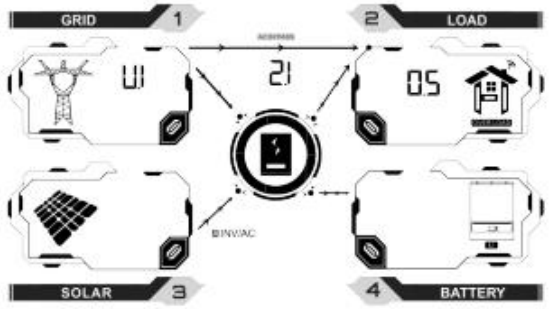
The LCD display information will be switched in turns by pressing "Up" or "DOWN" key. The selectable information is switched as below order: input voltage, input frequency, PV voltage, charging current, charging power, battery voltage, output voltage, output frequency, load percentage, load in Watt, load in VA, load in Watt,DC discharging current, main CPU Version

Selectable information	LCD display
Charged state, and the power is less than 1kw	
Input voltage=222V , PV voltage=168V, Battery voltage=25V, Output voltage=222V, Load in Watt=188W, Chg(Flashing), Inv/ac(bright)	
Input voltage=223V , PV current=2.3A, Battery current=20A, Output voltage=224V, Load in VA=188VA, Chg(Flashing), Inv/ac(bright)	

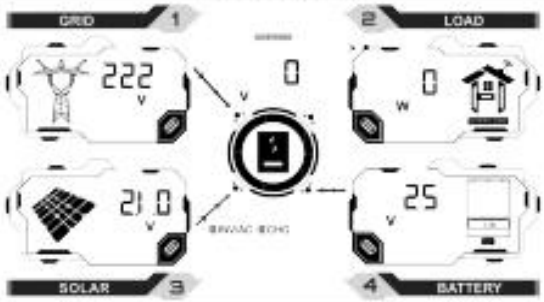
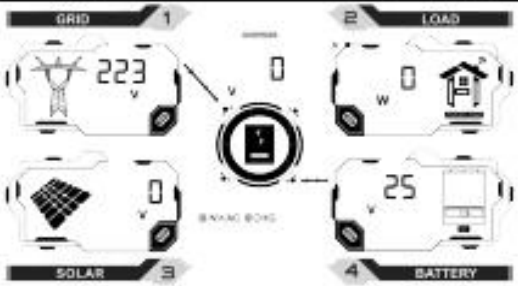
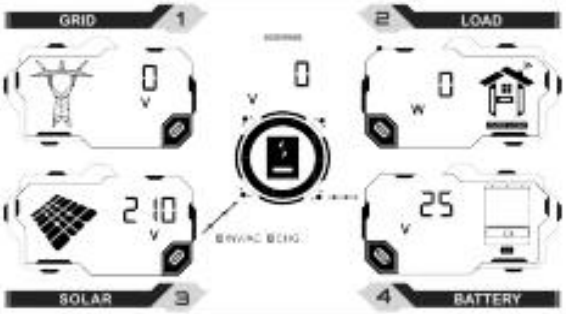
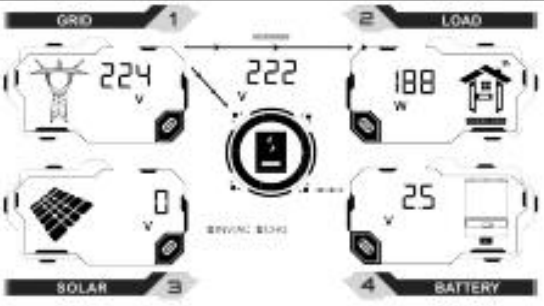
Input voltage=223V , Pv ntc temperture=71.0℃, Battery voltage=25V, Inv ntc temperture=35.0℃, Load percentage=12%, Chg(Flashing), Inv/ac(bright)	
Input frequency=50.0Hz , PV power=0.434KWh, Battery current=20A, Output frequency=50.0Hz, Load in watt=188W, Chg(Flashing), Inv/ac(bright)	

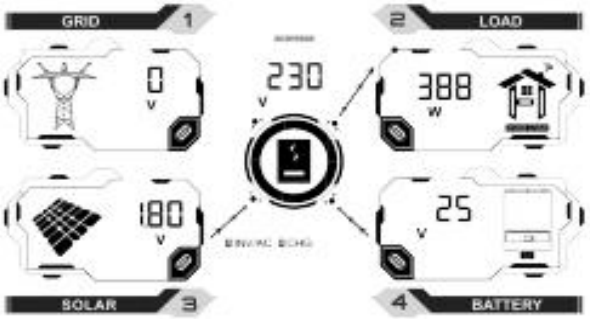
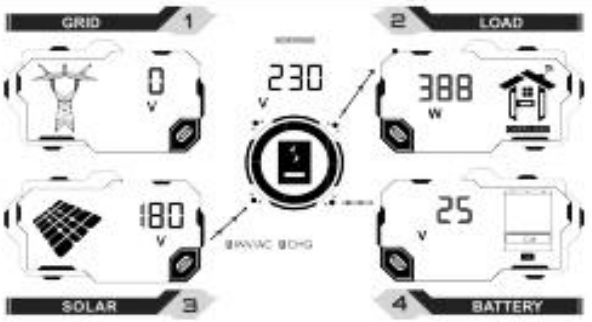
Charged state, and the power is greater than 1kw	
Input voltage=222V , PV voltage=168V, Battery voltage=25V, Output voltage=222V, Load in Watt=1.18KW, Chg(Flashing), Inv/ac(bright)	
Input voltage=224V , PV current=8.6A, Battery current=12.5A, Output voltage=222V, Load in VA=1.88KVA, Chg(Flashing), Inv/ac(bright)	
Input voltage=223V , Pv ntc temperture=71.0℃, Battery voltage=25V, Inv ntc temperture=35.0℃, Load percentage=82%, Chg(Flashing), Inv/ac(bright)	
Input frequency=50.0Hz , PV power=1.434KWh, Battery current=20A, Output frequency=50.0Hz, Load in watt=1.88KW, Chg(Flashing), Inv/ac(bright)	

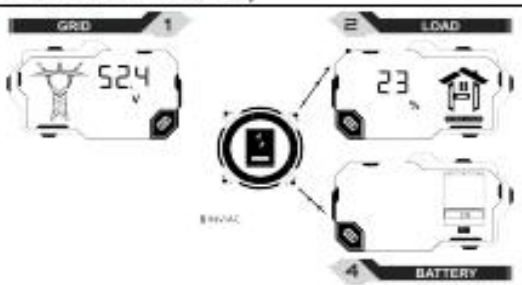
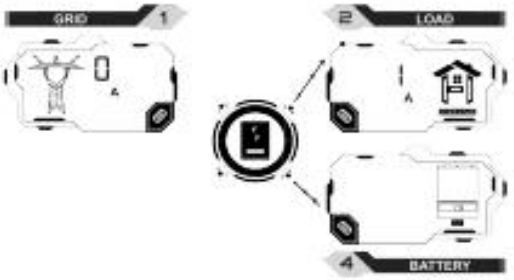
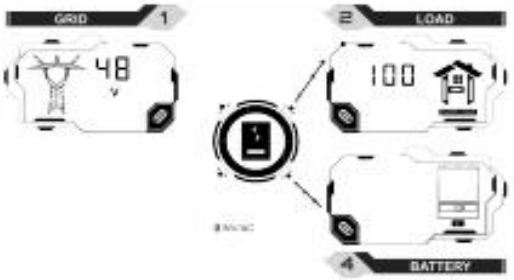
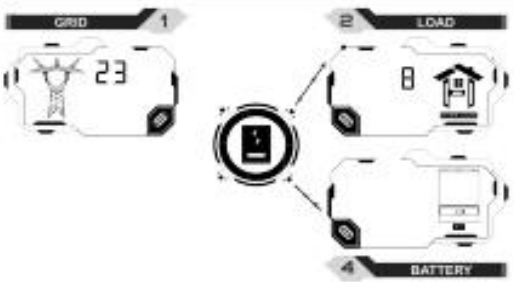
Discharged state, and the power is less than 1kw	
Input voltage=0V , PV voltage=0V, Battery voltage=25V, Output voltage=222V, Load in Watt=188W, Chg(turn off), Inv/ac(Flashing)	
Input voltage=0V , PV current=0A, Battery current=12.5A, Output voltage=222V, Load in VA=188VA, Chg(turn off), Inv/ac(Flashing)	
Input voltage=0V , Pv ntc temperture=60.0℃, Battery voltage=24V, Inv ntc temperture=36.0℃, Load percentage=13%, Chg(turn off), Inv/ac(Flashing)	
Input frequency=0Hz , PV power=0KWh, Battery current=12A, Output frequency=50.0Hz, Load in watt=188W, Chg(turn off), Inv/ac(Flashing)	

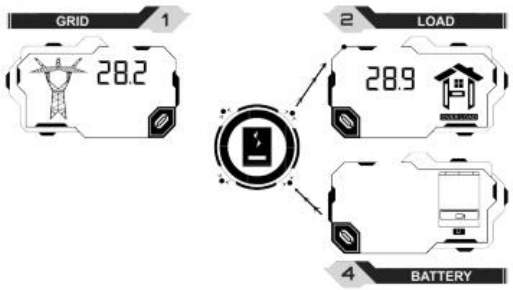
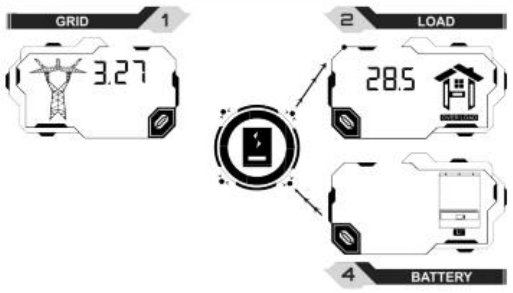
Discharged state, and the power is greater than 1kw	
Input voltage=0V , PV voltage=0V, Battery voltage=25V, Output voltage=222V, Load in Watt=1.88KW, Chg(turn off), Inv/ac(Flashing)	
Input voltage=0V , PV current=0A, Battery current=111A, Output voltage=222V, Load in VA=1.88KVA, Chg(turn off), Inv/ac(Flashing)	
Input voltage=0V , Pv ntc temperture=68.0℃, Battery voltage= 24V, Inv ntc temperture=30.0℃, Load percentage=81%, Chg(turn off), Inv/ac(Flashing)	
Input frequency=0Hz , PV power=0KWh, Battery current=111A, Output frequency=50.0Hz, Load in watt=1.21KW, Chg(turn off), Inv/ac(Flashing)	
Main CPU version checking	Main CPU version 21 05 

3.4 Operating Mode Description

Operation mode	Selectable information	LCD display
Stanby mode	Input voltage=222V , PV voltage=210V, Battery voltage=25V, Output voltage=0V, Load in Watt=0W, Chg(Flashing), Inv/ac(bright)	
	Input voltage=223V , PV voltage=0V, Battery voltage=25V, Output voltage=0V, Load in Watt=0W, Chg(Flashing), Inv/ac(bright)	
	Input voltage=0V , PV voltage=210V, Battery voltage=25V, Output voltage=0V, Load in Watt=0W, Chg(Flashing)	
Line mode	Input voltage=224V , PV current=8.6A, Battery current=12.5A, Output voltage=222V, Load in VA=1.88KVA, Chg(Flashing), Inv/ac(bright)	
	Input voltage=224V , PV voltage=0V, Battery voltage=25V, Output voltage=222V, Load in Watt=188W, Chg(Flashing), Inv/ac(bright)	
Grid-Tie Operation	Input voltage=224V , PV current=8.6A, Battery current=12.5A, Output voltage=222V, Load in VA=1.88KVA, Chg(Flashing), Inv/ac(bright)	 When working in Grid-Tie mode,the will be flash 3S/times.

Operation mode	Selectable information	LCD display
Battery mode	Input voltage=0V , PV voltage=180V, Battery voltage=25V, Output voltage=230V, Load in Watt=388W, Inv/ac(Flashing)	
	Input voltage=0V , PV voltage=180V, Battery voltage=25V, Output voltage=230V, Load in Watt=388W, Chg(Flashing), Inv/ac(Flashing)	

Selectable information	LCD display
LIC(Lithium battery communication connection)	
Total battery voltage=52.4V Battery residual capacity=23%	
Battery charging current=0A Battery discharge current=1A	
Nominal battery voltage=48V Total battery capacity=100AH	
Battery remaining capacity=23% Battery charger/discharge Times =8	

Battery ambient temperature=28.2℃ Battery MOS temperature=28.9℃	
Single battery voltage=3.27V Single battery temperature=28.5℃	

RGB Light (option)

① **Battery Mode:red Light**

② **Utility Mode:blue Light**

③ **PV Mode:purple Light**

3.5 Battery Equalization Description

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.

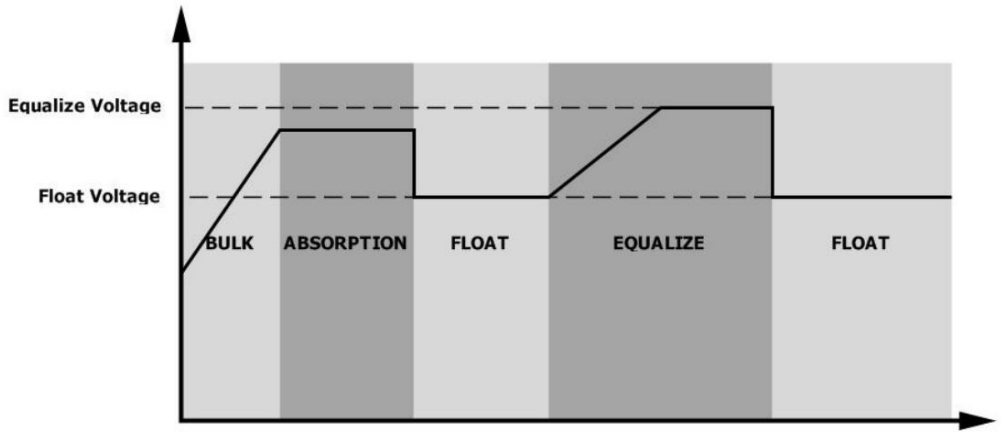
※ How to Apply Equalization Function

You must enable battery equalization function in monitoring LCD setting program 30 first. Then, you may apply this function in device by either one of following methods:

1. Setting equalization interval in program 35.
2.Active equalization immediately in program 36.

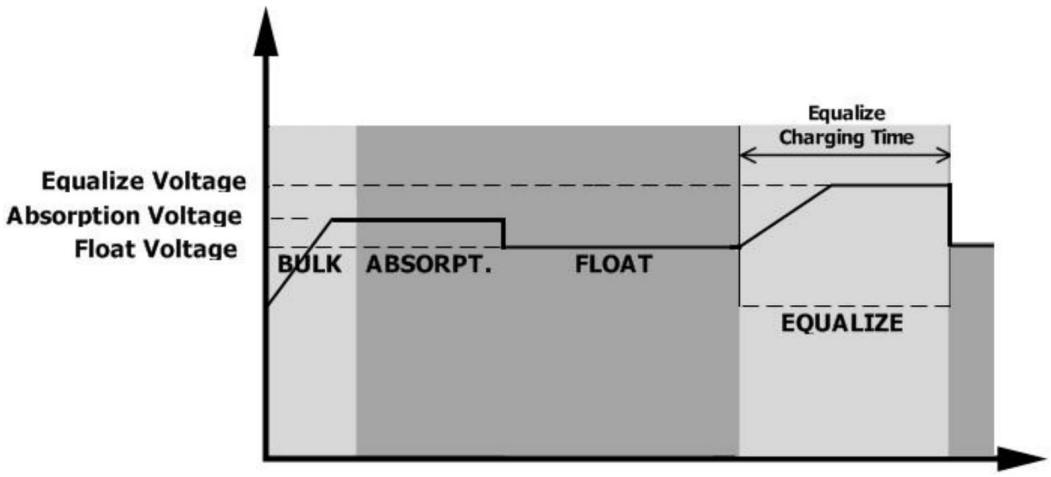
※When to Equalize

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.

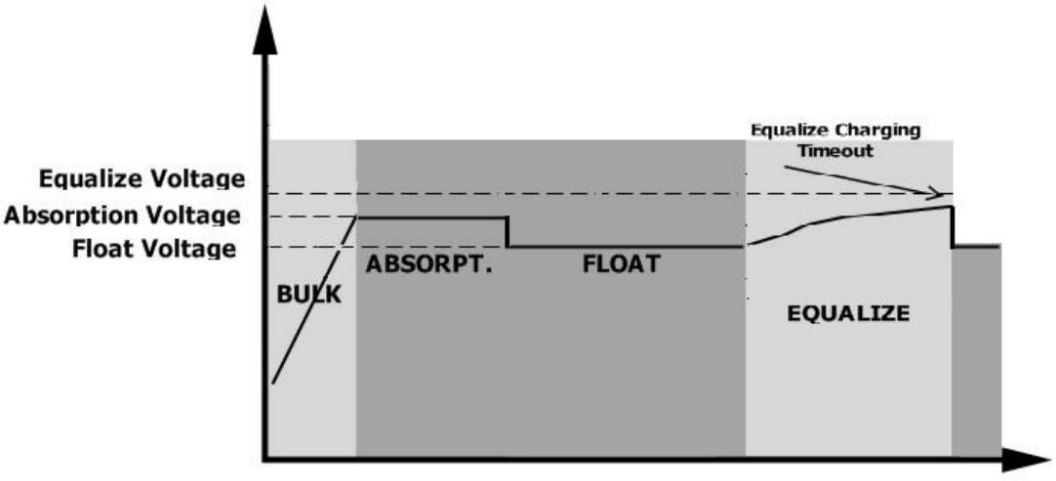


※Equalize charging time and timeout

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 stil lower than battery equalization voltage when battery equalized timeout setting is over, the charge controller will stop equalization and return to float stage.



3.6 Fault Reference Code

Fault Code	Fault Event	Icon on
01	Fan is locked when inverter is off.	01 ERROR
02	Over temperature	02 ERROR
03	Battery voltage is too high	03 ERROR
04	Battery voltage is too low	04 ERROR
05	Output short circuited or over temperature is detected by internal converter components.	05 ERROR
06	Output voltage is too high.	06 ERROR
07	Overload time out	07 ERROR
08	Bus voltage is too high	08 ERROR
09	Bus soft start failed	09 ERROR
51	Over current or surge	51 ERROR
52	Bus voltage is too low	52 ERROR
53	Inverter soft start failed	53 ERROR
55	Over DC voltage in AC output	55 ERROR
57	Current sensor failed	57 ERROR
58	Output voltage is too low	58 ERROR
59	PV voltage is over limitation	59 ERROR

3.7 Warning indicator

Warning Code	Warning Event	Audible Alarm	Icon flashing
01	Fan is locked when inverter is on.	Beep three times every second	01
03	Battery is over-charged	Beep once every second	03
04	Low battery	Beep once every second	04
07	Overload	Beep once every 0.5 second	07
10	Output power derating	Beep twice every 3 seconds	10
15	PV energy is low.	Beep twice every 3 seconds	15
E9	Battery equalization	None	E9
bP	Battery is not connected	None	bP

4.Routine Maintenance

4.1 Maintenance Plan

♦ Check if wire connections are loose.

♦ Check if cables are aged/damaged.

♦ Check if cable insulating ribbon drops.

♦ Check if cable terminal is loose, any overheat sign.

♦ Check if ground connection is good.

4.1.1 Operating Environment

(Every six months)

Carefully observe whether the battery system equipment is ineffective or damaged;

When the system is running, listen to any part of the system for abnormal noise;

Check whether the voltage, temperature and other parameters of the battery and other equipment parameters are normal during system operation;

4.1.2 Equipment Cleaning

(Every six months to one year, depending on the site environment and dust content, etc.)Ensure that the ground is clean and tidy, keep the maintenance access route unblocked,and ensure that the warning and guiding signs are clear and intact.

Monitor the temperature of the battery module and clean the battery module if necessary.

4.1.3 Cable, Terminal and Equipment Inspection

(Every six months to one year)

♦ Check if the cable connections are loose.

♦ Check whether the cables are aged / damaged.

♦ Check whether the cable tie of the cable has fallen off.

♦ Check if the cable terminal screws are loose and the terminal position has any signs ofoverheating.

♦ Check whether the management system of the system equipment, monitoring system and other related equipment are invalid or damaged.

♦ Check that the grounding of the equipment is good and the grounding resistance is less than 10 ohms.

4.2 Notes

After the equipment is out of operation, please pay attention to following notes while maintaining :

♦ Related safety standards and specifications should be followed in operation and maintenance.

♦ Disconnect all the electrical connections so that the equipment would not be powered on.

♦ Wait at least 5 minutes after disconnection, so that the residual voltage of the capacitors drops to a safe voltage. Use a multimeter to make sure that the equipment is completely discharged.

♦ The equipment should be repaired by professional staff only and it is strictly forbidden for maintenance staff to open equipment modules on their own.

♦ Appropriate protective measures should be taken while maintaining, such as insulated gloves, shoes, and anti-noise ear plugs.
♦ Life is priceless. Make sure no one would get hurt first.
♦ In case of a deep discharge, the battery must be charged to a SOC rate of 30% to 50% if the entire system is static (ie the battery has not been charged for two weeks or more).

Please contact us in time if there are any conditions that could not be explained in the manual.

5.Quality Assurance

When product faults occur during the warranty period, factory or his partner will provide free service or replace the product with a new one.

Evidence
During the warranty period, the customer shall provide the product purchase invoice and date. In addition, the trademark on the product shall be undamaged and legible. Otherwise, factory has the right to refuse to honor the quality guarantee.

Conditions
♦ After replacement, unqualifified products shall be processed by factory.
♦ The customer shall give manufacturer or his partner a reasonable period to repair the faulty device.

Exclusion of Liability
In the following circumstances, manufacturer has the right to refuse to honor the quality guarantee:
♦ The free warranty period for the whole machine/components has expired.
♦ The device is damaged during transport.
♦ The device is incorrectly installed, refifitted, or used.
♦ The device operates in harsh environment, as described in this manual.
♦ The fault or damage is caused by installation, repairs, modifification, or disassembly performed by a service provider or personnel not from manufacturer or his authorized partner .
♦ The fault or damage is caused by the use of non-standard or non-manufacturer.

components or software.
♦ The installation and use range are beyond stipulations of relevant international standards.
♦ The damage is caused by unexpected natural factors.
For faulty products in any of above cases, if the customer requests maintenance, paid maintenance service may be provided based on the judgment of manufacturer.

Warranty Card

User Information

Company/User Name:

Address:

Telephone:

Email:

Project installation location:

Product Information

Battery Model:

Serial No:

Invoice Number:

Purchase Date:

Dealer:

Commission date:

Fault/Error Description: