



User Guide

All-in-One **IESS-3K680N**



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1. Information on this Manual

1.1 Validity

This manual is valid for the following devices:

IESS-3K680N

1.2 Scope

This manual describes the assembly, installation, operation and troubleshooting of this energy storage system (Hereinafter referred to as ESS). Please read this manual carefully before installations and operations.

1.3 Target Group

This document is intended for qualified persons and end users. Tasks that do not require any particular qualification can also be performed by end users. Qualified persons must have the following skills:

- Knowledge of how an ESS works and is operated
- Training in how to deal with the dangers and risks associated with installing and using electrical devices and installations
- Training in the installation and commissioning of electrical devices and installations
- Knowledge of the applicable standards and directives
- Knowledge of the compliance with this document and all safety information

1.4 Label Description

In order to ensure the user's personal safety when using this product, the ESS and manual provides relevant identification information and uses appropriate symbols to alert the user, who should carefully read the following list of symbols used in this manual.

Labels on Inverter

	CAUTION Do not disconnect under load!
	Danger: High Voltage! Danger: Electrical Hazard!
	Start maintaining the INVERTER at least 5 minutes after the INVERTER disconnected from all external power supplies.
	Read instructions carefully before performing any operation on the INVERTER.
	Grounding: The system must be firmly grounded for operator safety.

Labels in the documentation

 WARNING!	A high level of potential danger, which, if not avoided, could result in death or serious injury to personnel.
 CAUTION!	A moderate or low level of potential danger, which, if not avoided, could result in moderate or minor injuries to personnel. In some bad situation, it could result in death or serious injury to personnel.

1.5 Safety Instructions



WARNING!

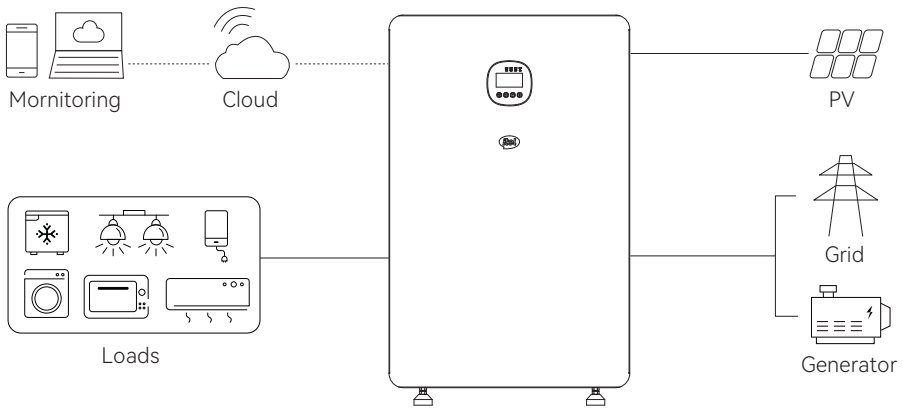
This chapter contains important safety and operating instructions. Read and keep this manual for future reference.

01. Before using the unit, read all instructions and cautionary marking on the unit, the batteries and all appropriate sections of this manual. The company has the right not to quality assurance, if not according to the instructions of this manual for installation and cause equipment damage.
02. All the operation and connection please professional electrical or mechanical engineer.
03. All the electrical installation must comply with the local electrical safety standards.
04. When install PV modules in the daytime, installer should cover the PV modules by opaque materials, otherwise it will be dangerous as high terminal voltage of modules in the sunshine.
05. CAUTION – To reduce the risk of injury, maintain and use the ESS according to the instructions.
06. Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
07. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
08. NEVER charge a frozen battery.
09. For optimum operation of the inverter, please follow required spec to select appropriate cable size. It's very important to correctly operate this inverter.
10. Be very cautious when working with metal tools on or around batteries. A potential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion.

11. Please strictly follow installation procedure when you want to disconnect AC or DC terminals. Please refer to INSTALLATION section of this manual for the details.
12. GROUNDING INSTRUCTIONS -This ESS should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this unit.
13. NEVER cause AC output and DC input short circuited. Do NOT connect to the mains when DC input short circuits.
14. Make sure the ESS is completely assembled, before the operation.

2. Introduction

2.1 Scope of Application



In daytime, solar power supports the loads first while the surplus power will be stored by system, to improve self-consumption rate.

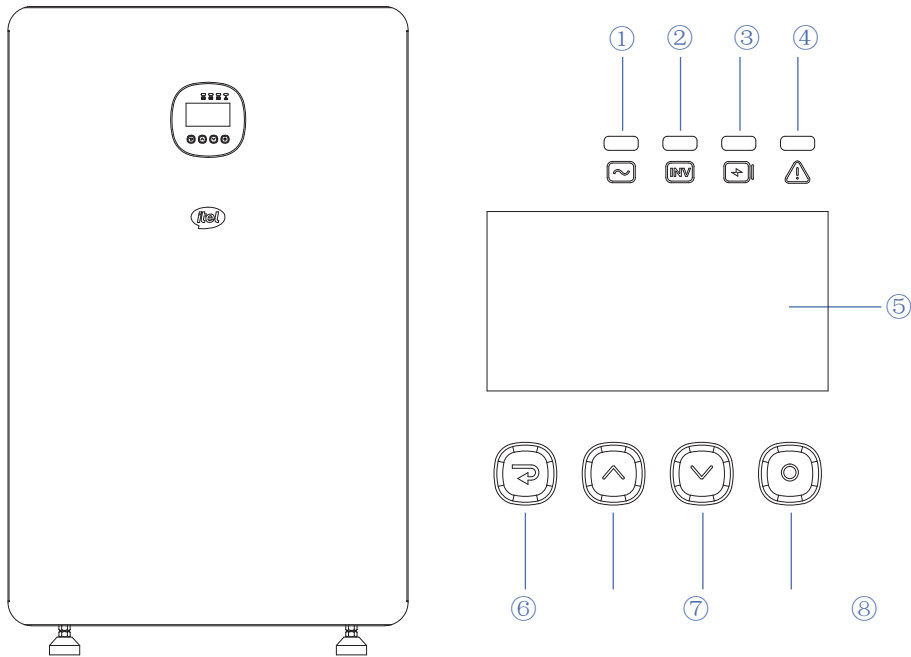
In peak power price hours, power from system supports the loads, while in valley power price hours, system is charged by the grid. Finally, a balance could be realized.

In case of grid fault, system will make sure no outage in the loads, achieving UPS function.

2.2 Features

- Rated power 3,6KW, power factor 1
- MPPT operating voltage ranges 40V-450V
- High frequency inverter with small size and light weight
- Pure sine wave AC output
- Solar and utility grid can power loads at the same time
- With the ability to work without battery
- Supports dual load outputs, one of which can be setup

2.3 Product Overview



① AC Indicator

② Inverter Indicator

③ Charging Indicator

④ Fault Indicator

⑤ LED Display

⑥ ESC Button

⑦ Up Button

⑧ Down Button

⑨ Enter Button

3. Installation

3.1 Safety Tips



DANGER!

- Potential fires and electric shocks that are life threatening.
- Do not place any flammable or explosive materials beside system.
- Equipment connected to high-voltage power generation equipment must be performed by qualified personnel in compliance with national and local standards and regulations.



NOTE!

- The pollution level applicable to system is Class II.
- Inappropriate or inconsistent installation environment can shorten the life of system.
- Do not install IESS-3K680N directly by exposing it under strong sunlight.
- Please do not install in damp places.
- The installation location must be well ventilated.

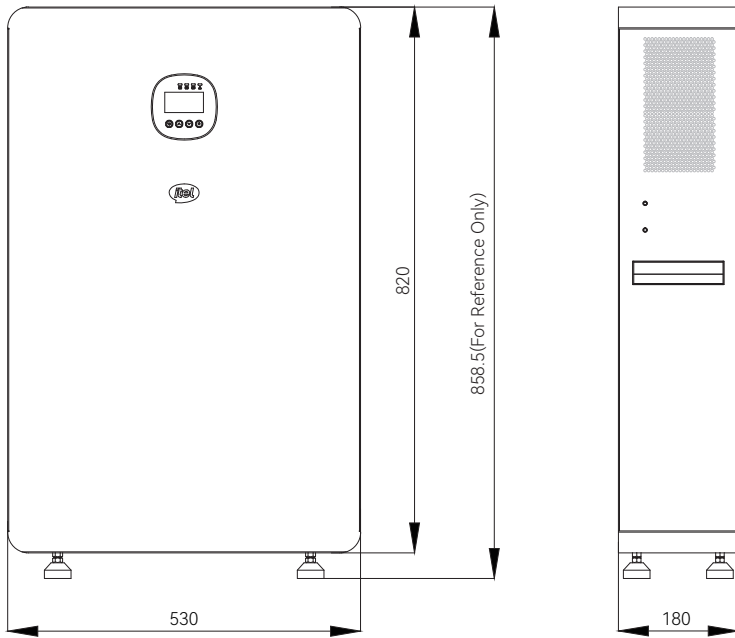
3.2 Packing List

This manual is an integral part of IESS-3K680N.

			
IESS-3K680N OFF-GRID Energy System × 1 Pcs	Fix Bracket × 2 Pcs	Expansion Screw M6*50 × 2 Pcs	Screw M5-12 × 4 Pcs
			
WiFi Plug (Optional) × 1 Pcs	PV Connector (Male) × 1 Pcs	PV Connector (Female) × 1 Pcs	Circular Terminal RNB 5.5-4L × 1 Pcs
			
Tube Terminal (Yellow) × 3 Pcs	Tube Terminal (Red) × 3 Pcs	Tube Terminal (Black) × 3 Pcs	User Manual × 1 Pcs
			
Warranty Form × 1 Pcs	Qualified Certificate × 1 Pcs	Packing List × 1 Pcs	

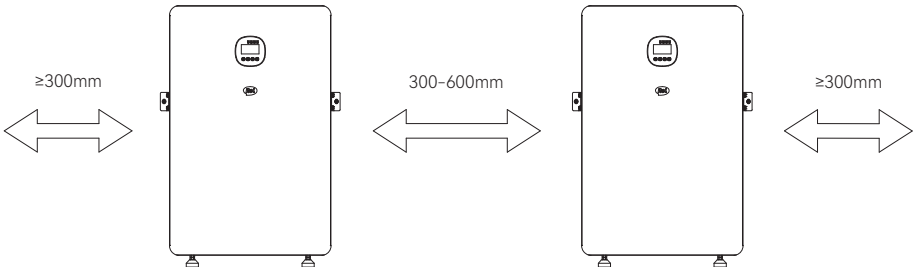
3.3 Mounting Unit

IESS-3K680N Dimension (mm) :



IESS-3K680N heat dissipation by fan cooling. It is recommended to install in indoors or sheltered areas to avoid direct sunlight, rain and snow.

Please ensure that the air at the installation point is circulated. Bad air ventilation will affect the working performance of internal electronic components and shorten the service life of IESS-3K680N.



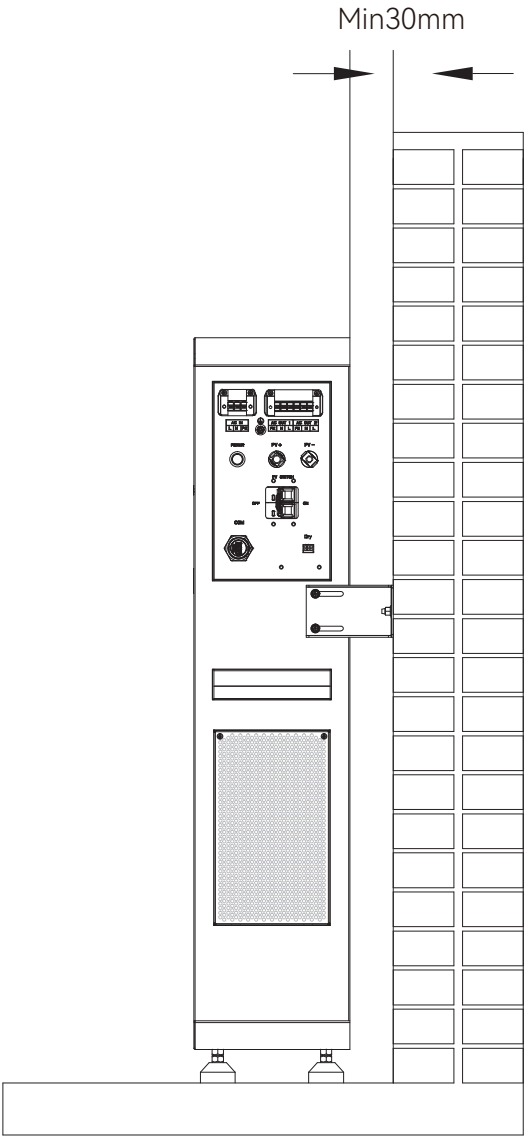
The following sites are not allowed for installation:

- within 300mm of any exit.
- within 300mm of any vertical side of a window or building ventilation that ventilates a habitable room.
- in ceiling spaces.
- in wall cavities or under stairways.
- on roofs, except for were specially deemed suitable.
- under access walkways.
- sites where the freezing point is reached, like garages, carports or other places.
- places with plenty of salt.
- flooded areas.
- within 300mm of any hot water unit, air conditioning unit or any other appliance associated with the pre-assembled integrated battery energy system.

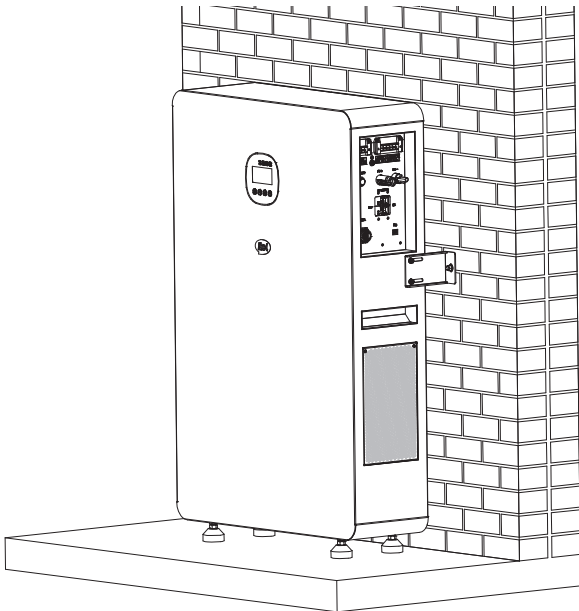
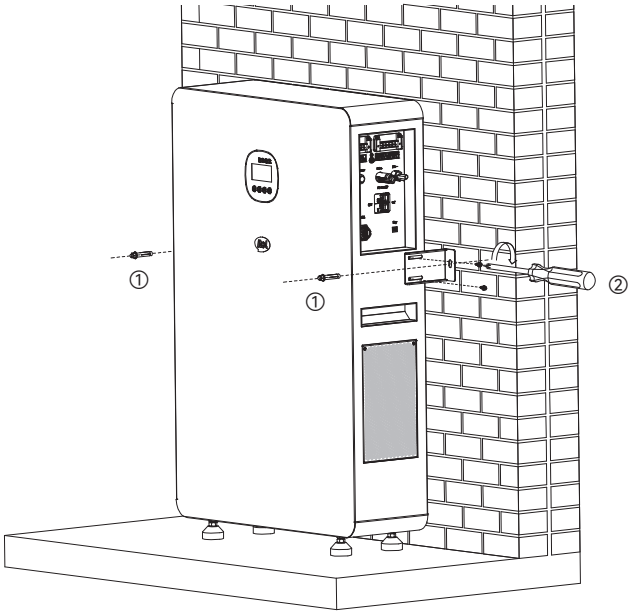
3.4 Installation Tools

Installation Tools	Multi-meter 	Protective gloves 	Insulated anti-smashing shoes 
	Safety glasses 	ESD wrist strap 	Hammer drill 
	Electric screwdriver 	Cross screwdriver 	Rubber mallet 
	Spirit level 	Wire cutter / stripper 	Terminal crimping tool 

Install the unit against the wall (25~35mm) and fix it to the wall with expansion screws.

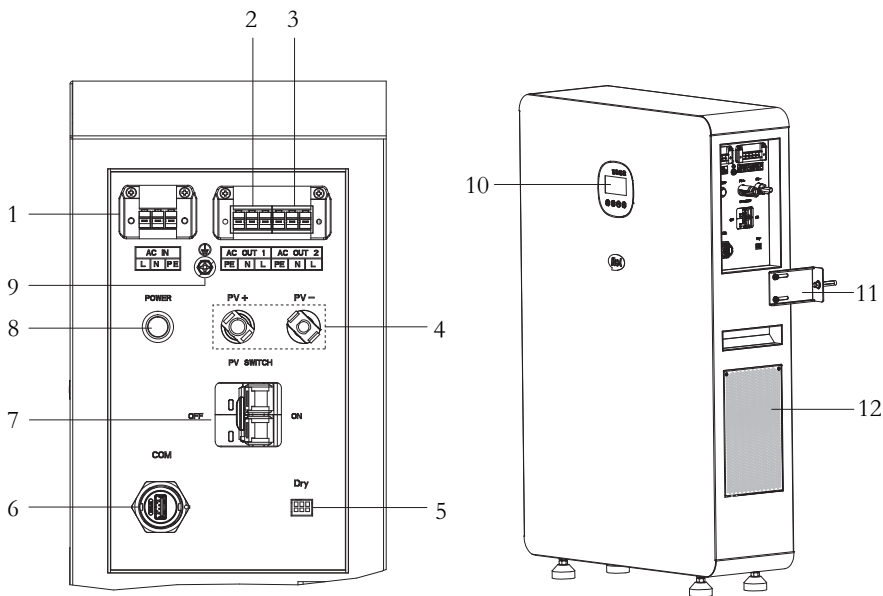


NOTE: The distance from the device to the wall can be adjusted through the device suspension loop.



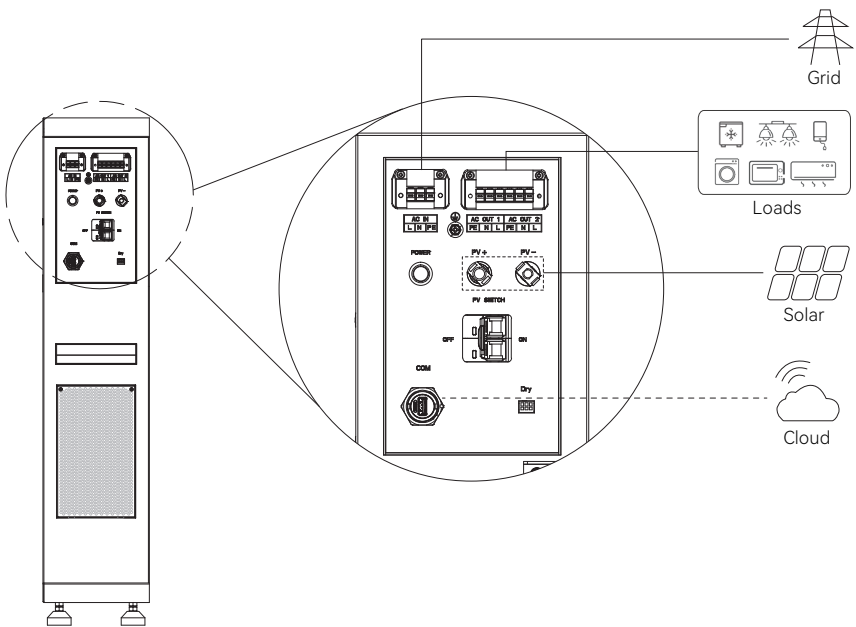
4 Electrical Connections

4.1 Electrical Interface Description

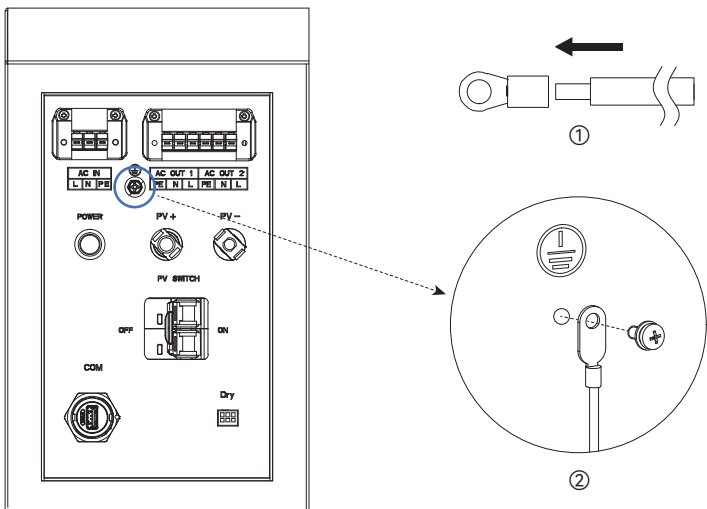


Object	Description	Object	Description
1	AC Input	7	PV Switch
2	AC Output 1	8	Power Button
3	AC Output 2	9	Grounding Screw
4	PV Input	10	LED Screen
5	Dry Contact	11	Fix Bracket
6	COM (Wi-Fi)	12	Dust Mesh Guards

4.2 System Wiring Schematic



4.3 Connect the Ground Wire With M4 Screw



4.4 PV Input Wiring

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 start-up voltage.

INVERTER MODEL	IESS-3K680N
Max. PV Array Open Circuit Voltage	500Vdc
Start-up Voltage	60Vdc
PV Array MPPT Voltage Range	40Vdc~450Vdc



WARNING!

Please do not connect any DC switches or AC/DC circuit breakers before completing the electrical connections.



WARNING!

It's 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. The cable color mentioned below is for typical reference.

Cable Type	Core Cross Sectional Area (mm ²)
12AWG	3~4



WARNING!

- Make sure that the DC voltage of each PV string is less than 450V and the polarity of PV cables are correct.
- Ensure wiring is not energized.



CAUTION!

Before connecting to PV modules, please install a separate DC circuit breaker between unit and PV modules.

The recommended spec of DC breaker is 25A with a maximum operating voltage greater than 500VDC for IESS-3K680N

**WARNING!**

Do not ground the positive or negative terminals of the PV modules, as this can severely damage the ESS.

**WARNING!**

Exposure to sunlight can generate lethal high voltages in photovoltaic strings, so strictly adhere to the safety precautions listed in the photovoltaic string and related documents.

**WARNING!**

Make sure to connect the PV terminals to the corresponding ports on the unit, as reversing the polarity can damage the ESS.

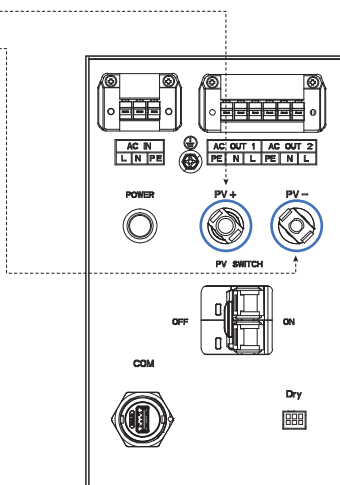
**WARNING!**

All wiring must be performed by a qualified personnel.

3. Use multi-meter check to ensure the polarities are correct.
4. Insert PV cables according to polarities indicated on terminal block and tighten the terminal screws.

+ → PV+ (Red)

- → PV- (Black)



5. Make sure the cables are securely connected.

4.5 AC in/AC out Wiring



WARNING!

- Turn off the external AC breaker after unpacking in any cases before and during wiring in case of electric shock.

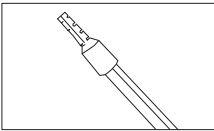
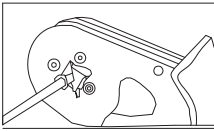
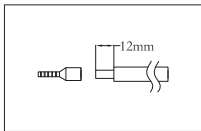
Step 1:

① Choose the right cable.

Cable Type	Core Cross Sectional Area (mm ²)
12AWG	3~4

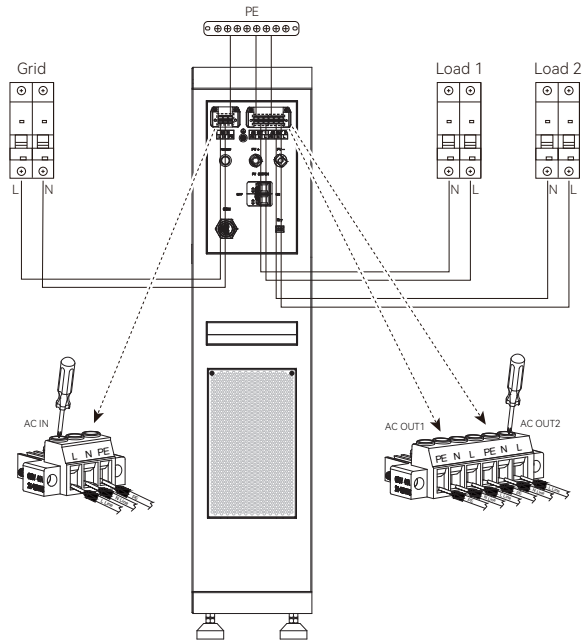
② Peel off the cable insulation sleeve for 12mm, as shown in Figure:

Step 2: Crimp terminals with special tools.



Cable	Color
L	Red
N	Black
PE	Yellow-green

Step 3: Connect cable to AC in/AC out terminals.



**CAUTION!**

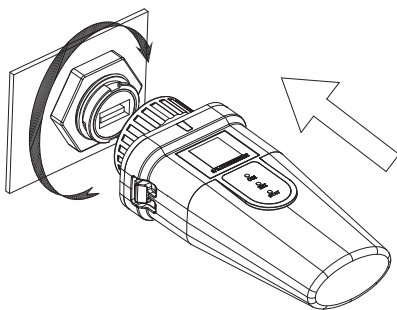
Appliances such as air conditioner are required at least 2~3 minutes to restart because it's required to have enough time to balance refrigerant gas inside of circuits. If a power shortage occurs and recovers in a short time, it will cause damage to your connected appliances. To prevent this kind of 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 condition.

**NOTE!**

This unit supports dual load output. The load configuration logic and setting method are described in Chapter 5.3 of this manual.

4.6 Monitor Installation (Optional)

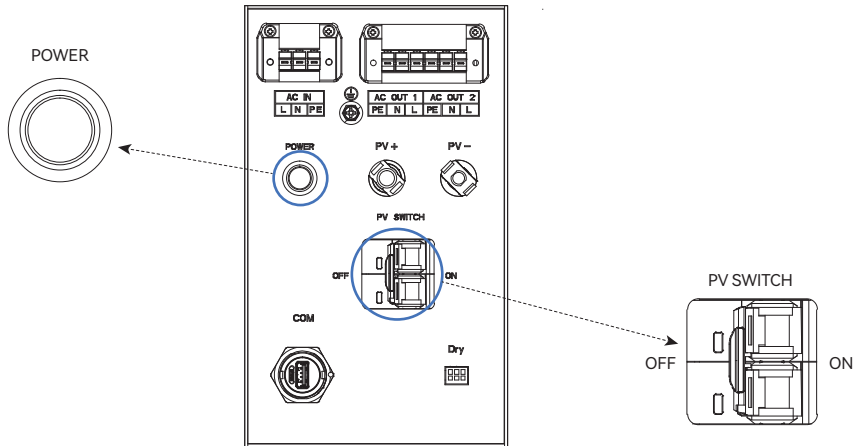
Installation of monitor. Refer to the monitor's manual (in the monitor box) for specific instructions on how to use it.



4.7 System Commissioning

4.7.1 Turn On the System

- 1) Once the device is installed correctly and the battery connection is good, simply press the POWER button (located on the chassis button) to turn on the device.



- 2) Wait for 30s and observe the LED to check the running status.
- 3) If the system is running normal, please do commission configuration.
If the system is not work normally, please re-check the wiring and setting until the system runs normal.
- 4) Turn on the PV SWITCH if there is PV access. If the system has no PV access, keep the PV SWITCH off.
- 5) Set the details on the local screen.

4.7.2 Shut Down the System

System shall be turned OFF in the correct sequence as follows:

Turn off the PV SWITCH (if there is PV access).

Simply press the POWER BUTTON to turn off the system.

The LED screen turning off indicates that the system has stopped working.

4.8 Dry Contact Signal

Unit Status	Condition			Dry contact port :	
					NC&C
Power off	Unit is off and no output is powered			Close	Open
Power On	Output is powered from Utility.			Close	Open
	Output is powered from Battery or PV	Output priority is set to USB	Battery voltage< Setting value in BTG SOC< Low SOC to Grid	Open	Close
			Battery voltage> Setting value in BTB or Battery charging reaches floating stage SOC>High soc to Battery	Close	Open
		Output priority is set to SBU or SUB	Battery voltage< Setting value in BTG SOC< Low SOC to Grid	Open	Close
			Battery voltage> Setting value in BTB or Battery charging reaches floating stage SOC>High soc to Battery	Close	Open

Note: Lithium battery mode looks at SOC, lead-acid mode looks at battery voltage

BTB is the voltage point for switching back to battery mode

BTG is the point at which the battery returns to the mains voltage

SBU is an output mode prioritized according to the order of photovoltaic cell mains power supply

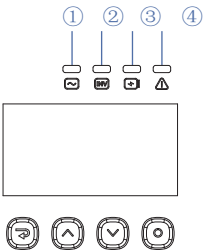
High SOC to Battery is the SOC point for switching back to battery mode

Low SOC to Grid is the point where the battery returns to the mains SOC

5. Operation

5.1 Operation and Display Panel

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



LED Indicator			Messages
① AC	Status indicator (Green)	Solid On	The mains power is normal and enters the mains power operation.
		Flashing	The mains power is normal, but it has not entered mains power operation.
		Off	The mains power is abnormal.
② Inverter	Invert indicator (Yellow)	Solid On	Output is powered by battery or PV in battery mode.
		Off	Other states.
③ Charging	Charging indicator (Yellow)	Solid On	The battery is in float charging.
		Flashing	The battery is in constant voltage charging.
		Off	Other states.
④ Fault	Fault indicator (Red)	Solid On	Fault occurs in the inverter.
		Flashing	Warning condition occurs in the inverter.
		Off	The inverter is working properly.



ESC



UP



DOWN

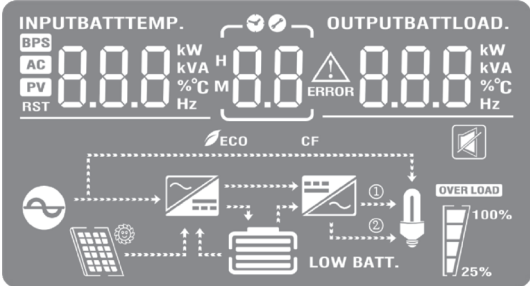


ENTER

Function Buttons

Button	Description
ESC	To exit setting mode
UP	To go to previous selection
DOWN	To go to next selection
ENTER	To confirm the selection in setting mode or enter setting mode

5.1.1 LED Display Icons



Icon	Description
AC Input Information	
	AC input icon.
	Indicate AC input power, AC input voltage, AC input frequency, AC input current.
PV Input Information	
	PV input icon.
	Indicate PV power, PV voltage, PV current, etc.
Output Information	
	Inverter icon.
	Indicate output voltage, output current, output frequency, inverter temperature.
Load Information	
	Load icon.
	Indicate power of load, power percentage of load.
	Indicate overload happened.
Battery Information	
	Indicate battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.
	Indicate battery voltage, battery percentage, battery current.
Other Information	
	Indicate alarm code or fault code.
	Indicate a fault is happening.
	Indicate the alarm is disabled.
	Indicate power saving mode.

For Lead-acid battery, detailed description of battery icon as following:

In battery mode, battery icon will present Battery Capacity		
Load Percentage	Battery Cells Voltage	Display
Load >50%	< 22.292V	
	22.292V ~ 23.37V	
	23.37V ~ 24.448V	
	> 24.448V	
50%> Load > 20%	< 23.59V	
	23.59V ~ 24.668V	
	24.668V ~ 25.746V	
	> 25.746V	
Load < 20%	< 24.24V	
	24.24V ~ 25.318V	
	25.318V ~ 26.396V	
	> 26.396V	

5.1.2 LED Setting

After pressing and holding ENTER button for 2 seconds, the unit will enter setting mode. Press “UP” or “DOWN” button to select setting programs. Then press “ENTER” button to confirm the selection or ESC button to exit.

Program	Description	Setting Option	
01	Output voltage	OPV 01 230.	
		230V (default) Adjustable/settable value: 208V, 220V, 230V, 240V	
02	Output frequency	OPF 02 50.	
		50Hz(default) Adjustable/settable frequency: 50Hz, 60Hz	
03	Output source priority	Solar first	OPP 03 SUB
		Solar energy provides power to the loads as first priority. If solar energy is sufficient, battery will be charged with solar energy. If solar energy is not sufficient to power all connected loads, Grid will supply power to the loads at the same time. The extra power will charge the battery. If solar energy and grid are not sufficient, battery will supply power to the loads at same time. If solar, grid and battery power is not sufficient to power loads, inverter will go to standby and charge battery.	
		Grid first (default)	OPP 03 USB
		Grid provides power to the loads as first priority. Solar power will charge the battery. If solar is not sufficient to charge battery, grid will charge the battery at the same time. If grid is not sufficient to power all connected loads, solar energy will supply power to the loads at the same time. If solar energy and grid are not sufficient, battery will supply power to the loads at same time. If solar, grid and battery power is not sufficient to power loads, inverter will go to standby and charge battery.	

03	Output source priority	SBU priority	OPP 03 SBU
		Solar energy provides power to the loads as first priority. If solar energy is sufficient, battery will be charged with solar energy. If solar energy is not sufficient to power all connected loads, battery will supply power to the loads at the same time. If solar energy and battery are not sufficient, grid will supply power to the loads at same time. If solar, grid and battery power is not sufficient to power loads, inverter will go to standby and charge battery.	
04	Output mode	APP: Appliance (default)	OPP 04 APP
		Applied to household appliances	
		UPS	OPP 04 UPS
		Applied to computer and other devices. Typical switching time is 10ms.	
		GEN	OPP 04 GEN
		Applied to connect generator by using grid input port	
05	Charger source priority	SNU: PV and Grid (default)	CHP 05 SNU
		OSO: Only PV	CHP 05 OSO
		CSO: PV first	CHP 05 CSO
		There are three options for charging priority. The default is SNU (PV and Grid). PV and Grid are charged at the same time;. The second is OSO (Only PV). Only PV charge.The third is CSO. PV gives priority to charging.	
06	Grid charging current	ACC 06 40	
		40A(default) Setting range is [2, 100A]	

07	Maximum charging current	ACC 07 30	
		Set total charging current for solar and grid chargers. The default is 60A. Available options: 2/10/20/30/40/50/60/70/80/90/100A	
08	Menu Default	ndF 08 00	
		During setting: Set to ON. If the current page is not on the first page and no operation with 1 minute, the system will return to display the first page. Set to OFF. If the current page is not on the first page and no operation with 1 minute, the system will stay on the current page.	
09	Auto restart when overload occurs	The default is ON.	L+S 09 00
10	Auto restart when over temperature occurs	The default is ON.	L+S 10 00
11	Main input cut warning	nlp 11 00	
		Enable/Disable Mains or PV loss alarm. The default setting is ON. If the main input detected lost, the buzzer will sound for 3 seconds. when set to OFF, after the main input is lost, the buzzer will not sound.	
12	Energy-saving mode	PLS 12 00	
		The default setting is OFF. When set to ON, in battery mode, if the load is lower than 25W, the system will stop output for a period then resume. If the load is still lower than 25W, the system will do the loop stop then resume. If the load is higher than 35W, the system will resume continuous normal output.	
13	Overload transfer to bypass	OLG 13 OFF	
		The default setting is OFF. When set to ON, in the case of SBU priority output, if there is an overload, the system will immediately transfer to bypass mode (utility power output, also known as bypass mode).	

14	Silent mode setting	Bt 14 OFF	
		Enable/disable buzzer sound. The default setting is OFF. When set to ON, in any situation such as alarms or faults, the buzzer will not sound. This setting can be applied to all modes .	
15	Battery return to mains voltage point	Bt 15 230	
		When the battery is set to the CUS (Customer Setting Type) mode. The adjustable range is [22, 26V]. .	
		When the battery is set to the AGM (Lead Acid Battery Type) or FLD (Flooded Battery Type) mode. The default setting is 23V, and it can be adjusted within a range of [22, 26V].	
16	Switching back to battery mode voltage points	Bt 16 270	
		When the battery is set to CUS (Customer Set Type) mode, The default setting is 26V, The voltage range is [24, 29V].	
		When the battery is set to AGM (Absorbent Glass Mat) or FLD (Flooded) mode,The default is 26V. It can be adjusted within a range of [24, 29V].	
		When the battery is set to LIB (Lithium Battery) mode, The default setting is 27V. It can be adjusted within a range of [23, 28.5V].	
17	Battery type	Lithium (default)	Bt 17 LIB
		Flooded	Bt 17 FLD
		AGM	Bt 17 AGM
		User-Defined	Bt 17 CUS

18	Battery low voltage point	BAL 18 22.0
		It is not possible to set the battery definition mode to AGM or FLD mode. The initial default setting is 22V. When the battery type is set to CUS, the adjustable range for the battery voltage is [21, 27V].
		Battery low voltage alarm setting. When the battery type is set to LIB, the default setting is 23.8V. The adjustable range for the voltage is [20.6, 25V].
19	Battery shutdown voltage point	BAU 19 21.0
		The battery low voltage shutdown point setting function cannot be adjusted when the battery is defined as AGM or FLD mode. The default setting is 21V. When the battery type is set to CUS, the default setting is 21V. The adjustable range for the voltage is [20, 24V].
		When the battery type is set to LIB, the battery shutdown point can be modified. The default setting is 23V, and the adjustable range is [20, 24V].
20	Constant voltage mode voltage point setting	BCV 20 28.2
		When the battery is defined in AGM or FLD mode, the voltage set point cannot be configured. The default setting for AGM mode is 28.2V, for FLD mode is 29V. When the battery type is CUS, It can be set within the range of [24, 29V] for the constant voltage charging set point. It is important to note that the constant voltage set point voltage needs to be higher than the float charge set point voltage.
		When the battery type is set to LIB, the default constant voltage charging set point is 28.2V, and it can be adjusted within the range of [25, 29V]. It is important to ensure that the constant voltage set point voltage is higher than the float charge set point voltage.
21	Floating charge mode voltage point setting	BFL 21 27.0
		When the battery is defined in AGM or FLD mode, the voltage set point cannot be configured. The default setting for AGM/FLD mode is 27V. When the battery type is CUS, It can be set within the range of [26.6, 27.8V] for the floating charging voltage set point. If the battery type is LIB, the default setting for the floating charging point is 27.6V. The setting range is between 24V and 28V. It is important to note that the constant voltage point voltage should always be set higher than the floating charge point voltage.

22	Grid low voltage point setting	LLV 22 154
		If output mode is APP/GEN, Grid low voltage point can be set within a range of 90V to 154V. The default setting is 154V.
		If output mode is UPS, Grid low voltage point can be set within a range of 170V to 200V. The default setting is 185V.
23	Grid high voltage point setting	LHV 23 264
		If output mode is APP/GEN, Grid high voltage point can be set within a range of 264V to 280V. The default setting is 264V.
		If output mode is UPS, Grid high voltage point is set as 264V.
24	Low power discharge time setting	Lpd 24 8
		When in battery mode and operating under a low load, unrestricted discharge for an extended period can deplete the battery, affecting its lifespan. When the inverter reaches the set low power discharge time, the low voltage shutdown point will be raised to 22V. The default low power discharge time is 8 (8 hours), adjustable range [1, 8]. In inverter mode,the low power discharge time setting,the default is 8(8 hours),the setting range is [1, 8].
		In battery mode, after the continuous discharge time exceeds 8 hours and the battery shutdown point has not been reached, the battery voltage shutdown point will be modified to 22V, and the system will alarm for 1 minute when the battery continues to discharge to 22V. Then shut down again.When the battery voltage exceeds 26.4V exceeds 30s, the battery discharge time will be reset..

25	Inverter soft start setting	SE 25 OFF
		Default setting is OFF. If it set to ON, the inverter output gradually increases from 0 to the target voltage value. If OFF, the inverter output directly increases from 0 to the target voltage value. Setting Condition: It can be set in single-machine operation mode.
26	Reset factory setting	SEd 26 OFF
		Restore all settings to factory default values. Before the setting, this interface is displayed as OFF. When set to ON, the system will restore to default settings. After the setting is completed, this interface will display OFF again. The setting can be applied immediately in mains and standby modes, but cannot be set in battery mode.
27	Parallel operation mode	PAR 27 SIG
		Not Applicable for this model.
28	Battery Disconnection Alarm	SEdA 28 OFF
		Enable/Disable battery disconnection alarm. Default setting is OFF. When set to OFF, there will be no battery disconnection, low battery voltage, or battery under voltage alarms when the battery is disconnected.
29	Battery Equalization Mode	EQn 29 OFF
		Enable/Disable Battery equalization. Default setting is OFF. If it is set to ON, the controller will start to enter the equalization phase when the set equalization interval (battery equalization period) is reached during the float charging stage, or the equalization is activated immediately.

30	Equalization Voltage Point Setting	E90 30 29.2
		The default setting is 29.2V, with a configurable range of [25,31.5V].
31	Equalization Charging Time Setting	E90 31 60
		During the equalization stage, the controller will charge the battery as much as possible until the battery voltage rises to the battery equalization voltage. Then, it will adopt constant voltage regulation to maintain the battery voltage. The battery will remain in the equalization stage until the set battery equalization time is reached. The default setting is 60 minutes, with a configurable range of [5, 900], and an increment of 5 minutes for each setting.
32	Equalization Delay Time Setting	E90 32 120
		During the equalization stage, if the battery equalization time expires and the battery voltage has not risen to the battery equalization voltage point, the charging controller will extend the battery equalization time until the battery voltage reaches the battery equalization voltage. When the battery equalization delay setting is completed and the battery voltage is still below the battery equalization voltage, the charging controller will stop equalization and return to the floating stage. The default setting is 120 minutes, with a configurable range of [5, 900], and an increment of 5 minutes for each setting.
33	Equalization Interval Time Setting	E91 33 30d
		When the battery connection is detected during the float phase with the equalization mode turned on, the controller will start to enter the equalization phase when the set equalization interval (cell equalization period) is reached. The default setting is 30 days, the settable range is [1,90], and the increment of each setting is 1 day.

34	Enable Equalization Immediately	E9n 34 OFF
		The default setting is OFF, the function is not turned on; when it is set to ON, in the float charging stage when the equalization mode is turned on and the battery connection is detected. The balance charging is activated immediately, and the controller will start to enter the equalization stage.
35	Grid tie inverter	CH 35 OFF
		The default setting is OFF. When set to ON, enable the feeder function.
36	Battery dual output low voltage shutdown point	dbv 36 292
		The second output starts with a default battery voltage of 24V. When the battery voltage is lower than the set value, the 'AC Output 2' will be cut-off. DBV = 24.0V, it means when the battery voltage is lower than the 24.0V, the 'AC Output 2' will be cut-off. The restore value is 24V + 2V = 26.0V When there is communication between the battery and BMS, check the SOC; when there is no communication, check the battery voltage.
37	Battery duration dual output	dbt 37 OFF
		OFF: the 'AC Output 2' will be always disabled in all working mode. (Default Value) 005~890: Set any value from 005 to 890 (5 minutes per step).
38	BMS Communication Function	bn5 38 PYL
		Enable/Disable lithium battery communicates with inverter. Default setting is PYL. Choose the corresponding option based on the battery pack type.if a communication abnormality occurs, alarm 56 is generated.

39	Low SOC Shutdown	b5U 39 OFF Set the inverter to shut down when the State of Charge (SOC) of the battery is low. Default setting is 20, with a configurable range of [5, 50]. When the lithium battery SOC reaches the set value in battery mode, the inverter shuts down and generates alarm 68. The alarm 68 is cleared when the SOC returns to the set value + 5%. In standby mode, the inverter can switch to battery mode only when the SOC reaches the set value + 10%. If it does not reach this threshold, alarm 69 is generated. Once the function is enabled, alarm 69 is triggered when the lithium battery SOC reaches the set value + 5%, and it is cleared when it returns to the set value + 10%. It can be set to OFF, in which case the inverter no longer performs shutdown, startup, or alarm operations based on the SOC condition. Once the function is enabled, if a communication abnormality occurs, the inverter no longer operates based on the SOC information and clears the related alarms.
40	High SOC to Battery	5t6 40 OFF Set the SOC value for the inverter to switch to battery mode. Default setting is 95, with a configurable range of [10, 100]. In SBU priority mode, when the lithium battery SOC reaches the set value in normal grid mode, the inverter switches to battery mode. Once enabled, the inverter will only switch to battery mode when the SOC is above the set point and the battery voltage is higher than the voltage point to switch back to battery mode It can be set to OFF, in which case the inverter no longer switches from grid mode to battery mode based on the SOC condition. Once the function is enabled, if a communication abnormality occurs, the inverter no longer operates based on the SOC information and clears the related alarms.

41	Low SOC to Grid	STG 41 OFF
		Set the SOC value for the inverter to switch to grid mode. The default setting is 50, with a configurable range of [10, 90]. In SBU priority mode, when the lithium battery SOC reaches the set value in battery mode, the inverter switches to grid mode. Once enabled, the inverter will switch to grid mode when the SOC is below the set point or the battery voltage is lower than the voltage point to switch back to grid mode It can be set to OFF, in which case the inverter no longer switches from battery mode to grid mode based on the SOC condition. Once the function is enabled, if a communication abnormality occurs, the inverter no longer operates based on the SOC information and clears the related alarms. When this setting is higher than the STB point, STB and STG will no longer take effect after the next activation.
42	Mains charging start time	ACD 42 0
		One hour from the start time of mains charging is the minimum setting unit; The range can be set [0,23], and the default setting is 0; Setting to 0 at the same time as 43 items means that mains charging is allowed throughout the day.
43	Mains charging end time	ACF 43 0
		One hour at the end of mains charging is the minimum setting unit; The range can be set [0,23], and the default setting is 0; Setting to 0 at the same time as 42 items means that mains charging is allowed throughout the day.
44	Battery dual output SOC shutdown point	DBS 44 20%
		The second output defaults to a battery SOC of SOC20%. When the battery SOC is lower than the set value, disconnect the second output. Hysteresis battery SOC5%; DBS=SOC20%, When the battery SOC is below SOC20%, the second output will be disconnected. Low SOC Alarm: $SOC < DBS + 5\%$. The recovery value is $SOC20\% + 5\% = SOC25\%$. When there is communication between the battery and BMS, check the SOC; when there is no communication, check the battery voltage.

5.2 Operation Guide for Work Mode

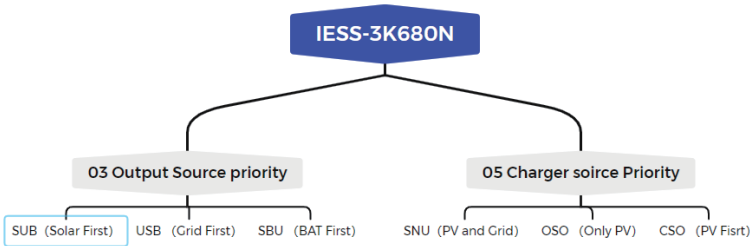
5.2.1. Purpose

This guide is designed to provide customers and technical personnel with comprehensive operational instructions for the IESS-3K680N device mode settings. It explains the operational functions, switching methods, and status displays of each working mode. By clarifying operational standards and configuration solutions for different on-site application scenarios, it helps users quickly master device operation techniques, accurately match practical needs, ensure stable device operation, and fully leverage its performance advantages.

5.2.2. Pattern Introduction

The ESS-3K680N output mode has three settings, namely photovoltaic priority, mains priority, and battery priority;

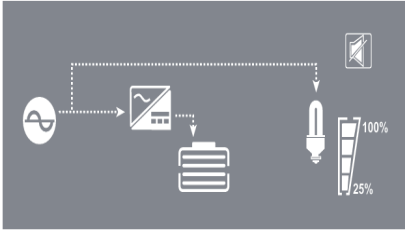
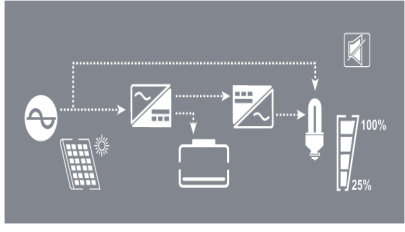
The IESS-3K680N charging mode has three settings, namely photovoltaic and mains charging, photovoltaic only charging, and photovoltaic priority charging.

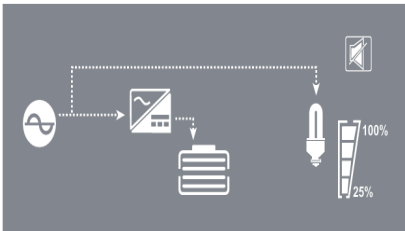


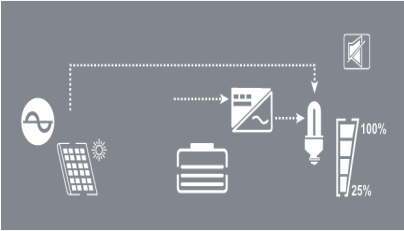
There are 9 combinations of IESS-3K680N mode settings, and there may be differences in operating conditions such as missing Solar, BAT, and Grid in the mode settings.

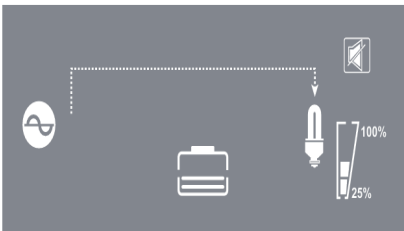
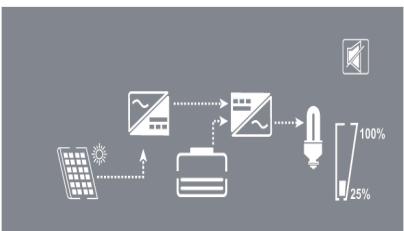
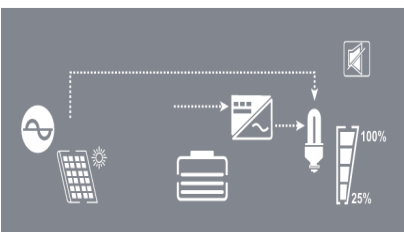
5.2.3. Matching status of output and charging modes

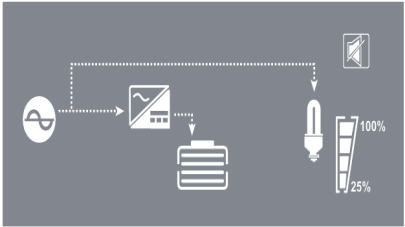
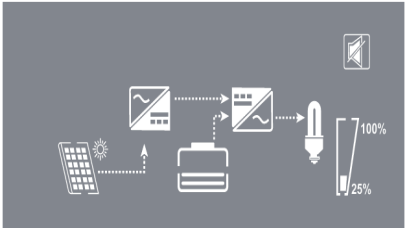
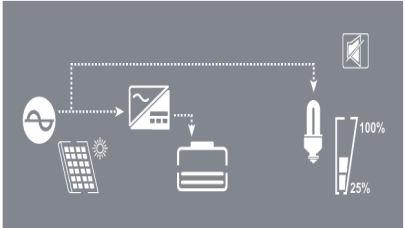
- ① The single input status is not specified, and the single PV, BAT, or Grid status is not affected by the mode settings
- ② SUB+SNU, SUB+CSO, SUB+OSO mode settings
- ③ USB+SUN, USB+CSO, USB+OSO mode settings
- ④ SBU+SUN, SBU+CSO, SUB+OSO mode settings

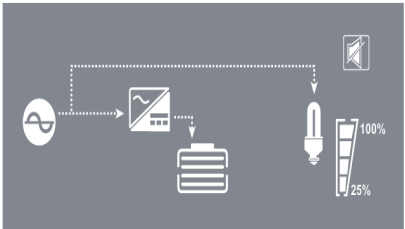
SUB+SNU Indicate existence ● Indicates non-existent ○					
Grid	BAT	Solar	Display screen interface	Output status	
●	●	○		The mains power carries the load and charges the battery, while the battery does not carry the load.	
○	●	●		1. Photovoltaics carry loads, and the excess energy from photovoltaics charges the battery. 2. Insufficient photovoltaic energy, prioritize reducing battery charging power. 3. When the photovoltaic power is insufficient to provide load power alone, the battery discharges to supplement, and at this time, the battery and photovoltaic power are loaded together.	
●	●	●		1. Photovoltaics are prioritized for loading and excess energy is used to charge the battery. 2. When the photovoltaic energy is insufficient, prioritize reducing the battery charging power 3. When the photovoltaic power is insufficient to provide load power alone, the mains power supplements the energy load, and the battery is not charged or loaded.	

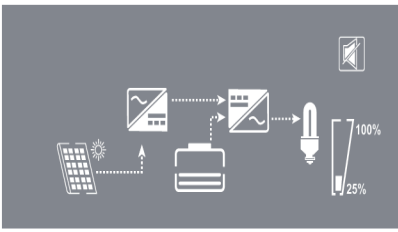
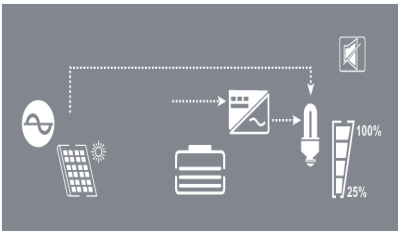
SUB+CSO Indicate existence ● Indicates non-existent ○					
Grid	BAT	Solar	Display screen interface	Output status	
●	●	○		The mains power carries the load and charges the battery, while the battery does not carry the load.	

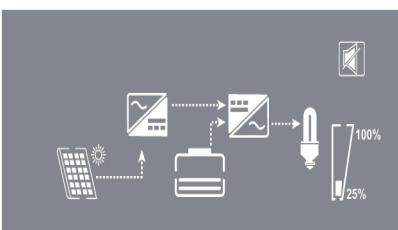
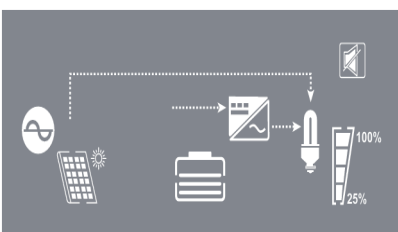
○	●	●		1. Photovoltaics carry loads, and the excess energy from photovoltaics charges the battery. 2. Insufficient photovoltaic energy, prioritize reducing battery charging power. 3. When the photovoltaic power is insufficient to provide load power alone, the battery discharges to supplement, and at this time, the battery and photovoltaic power are loaded together.
●	●	●		1. Photovoltaics are prioritized for loading and excess energy is used to charge the battery. 2. When the photovoltaic energy is insufficient, prioritize reducing the battery charging power 3. When the photovoltaic power is insufficient to provide load power alone, the mains power supplements the energy load, and the battery is not charged or loaded.

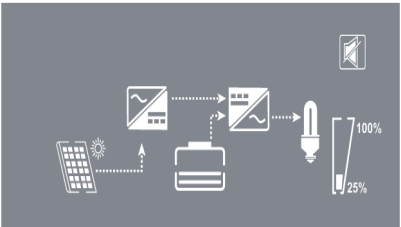
SUB+OSO Indicate existence ● Indicates non-existent ○				
Grid	BAT	Solar	Display screen interface	Output status
●	●	○		The mains power carries the load and charges the battery, while the battery does not carry the load.
○	●	●		1. Photovoltaics carry loads, and the excess energy from photovoltaics charges the battery. 2. Insufficient photovoltaic energy, prioritize reducing battery charging power. 3. When the photovoltaic power is insufficient to provide load power alone, the battery discharges to supplement, and at this time, the battery and photovoltaic power are loaded together.
●	●	●		1. Photovoltaics are prioritized for loading and excess energy is used to charge the battery. 2. When the photovoltaic energy is insufficient, prioritize reducing the battery charging power 3. When the photovoltaic power is insufficient to provide load power alone, the mains power supplements the energy load, and the battery is not charged or loaded.

USB+SNU Indicate existence ● Indicates non-existent ○				
Grid	BAT	Solar	Display screen interface	Output status
●	●	○		The mains power carries the load and charges the battery, while the battery does not carry the load.
○	●	●		1. Photovoltaics carry loads, and the excess energy from photovoltaics charges the battery. 2. Insufficient photovoltaic energy, prioritize reducing battery charging power. 3. When the photovoltaic power is insufficient to provide load power alone, the battery discharges to supplement, and at this time, the battery and photovoltaic power are loaded together.
●	●	●		1. The mains power carries a load, while the photovoltaic and battery systems do not carry a load. 2. Photovoltaic energy charges the battery.

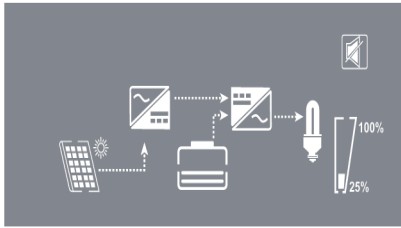
USB+CSO Indicate existence ● Indicates non-existent ○				
Grid	BAT	Solar	Display screen interface	Output status
●	●	○		The mains power carries the load and charges the battery, while the battery does not carry the load.

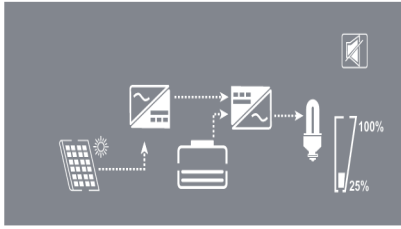
○	●	●		1. Photovoltaics carry loads, and the excess energy from photovoltaics charges the battery. 2. Insufficient photovoltaic energy, prioritize reducing battery charging power. 3. When the photovoltaic power is insufficient to provide load power alone, the battery discharges to supplement, and at this time, the battery and photovoltaic power are loaded together.
●	●	●		1. The mains power carries a load, while the photovoltaic and battery systems do not carry a load. 2. Photovoltaic energy charges the battery.

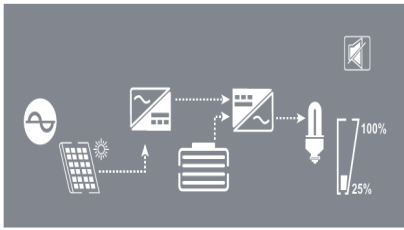
USB+OSO Indicate existence ● Indicates non-existent ○				
Grid	BAT	Solar	Display screen interface	Output status
●	●	○		The mains power is loaded without charging, and the battery is unloaded.
○	●	●		1. Photovoltaics carry loads, and the excess energy from photovoltaics charges the battery. 2. Insufficient photovoltaic energy, prioritize reducing battery charging power. 3. When the photovoltaic power is insufficient to provide load power alone, the battery discharges to supplement, and at this time, the battery and photovoltaic power are loaded together.
●	●	●		1. The mains power carries a load, while the photovoltaic and battery systems do not carry a load. 2. Photovoltaic energy charges the battery.

SBU+SNU Indicate existence ● Indicates non-existent ○				
Grid	BAT	Solar	Display screen interface	Output status
●	●	○		The battery is under load, while the mains power is not under load and not charging.
○	●	●		1. Photovoltaic system under load, with excess energy from the photovoltaic system charging the battery. 2. When photovoltaic energy is insufficient, prioritize reducing battery charging power. 3. When photovoltaic power is insufficient to independently supply the load, the battery discharges to compensate, and both the battery and photovoltaic system share the load.
●	●	●		1. Photovoltaics are prioritized for loading, and excess energy from photovoltaics is used to charge the battery. Commercial power is not loaded or charged. 2. If the photovoltaic energy is insufficient, priority should be given to reducing the battery charging power. 3. When photovoltaics are insufficient to provide the load alone, the battery discharges to replenish. At this time, the battery and photovoltaic are loaded together, and the mains power is not loaded or charged.

SBU+CSO Indicate existence ● Indicates non-existent ○				
Grid	BAT	Solar	Display screen interface	Output status
●	●	○		The battery is loaded, while the mains power is unloaded and not charged.

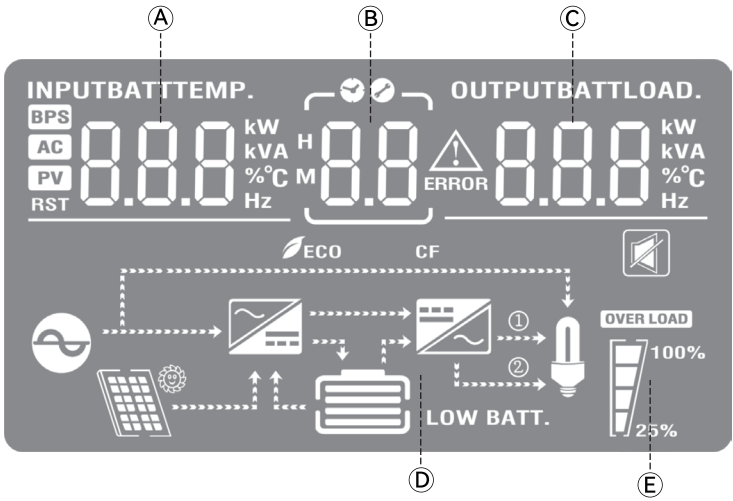
○	●	●		1. Photovoltaics carry loads, and the excess energy from photovoltaics charges the battery. 2. Insufficient photovoltaic energy, prioritize reducing battery charging power. 3. When the photovoltaic power is insufficient to provide load power alone, the battery discharges to supplement, and at this time, the battery and photovoltaic power are loaded together.
●	●	●		1. Photovoltaics are prioritized for loading, and excess energy from photovoltaics is used to charge the battery. Commercial power is not loaded or charged. 2. If the photovoltaic energy is insufficient, priority should be given to reducing the battery charging power. 3. When photovoltaics are insufficient to provide the load alone, the battery discharges to replenish. At this time, the battery and photovoltaic are loaded together, and the mains power is not loaded or charged.

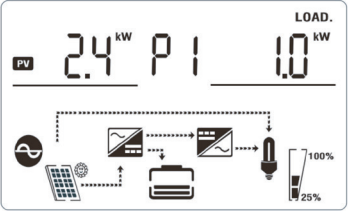
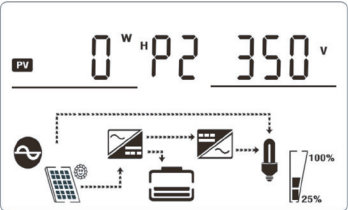
SBU+OS Indicate existence ● Indicates non-existent ○				
Grid	BAT	Solar	Display screen interface	Output status
●	●	○		The battery is loaded, while the mains power is unloaded and not charged.
○	●	●		1. Photovoltaics carry loads, and the excess energy from photovoltaics charges the battery. 2. Insufficient photovoltaic energy, prioritize reducing battery charging power. 3. When the photovoltaic power is insufficient to provide load power alone, the battery discharges to supplement, and at this time, the battery and photovoltaic power are loaded together.

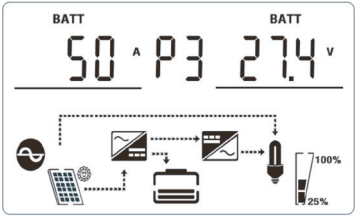
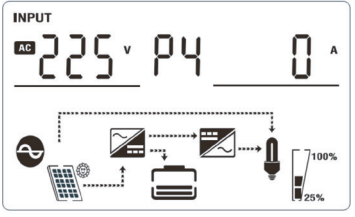
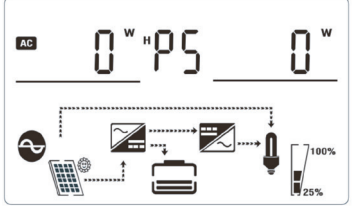
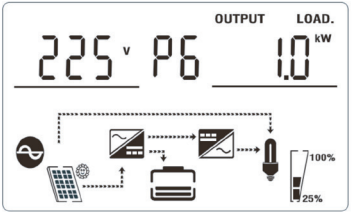
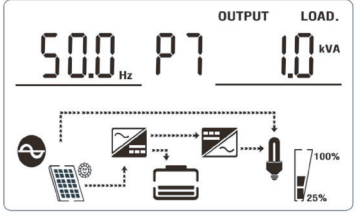
●	●	●		1. Photovoltaics are prioritized for loading, and excess energy from photovoltaics is used to charge the battery. Commercial power is not loaded or charged. 2. If the photovoltaic energy is insufficient, priority should be given to reducing the battery charging power. 3. When photovoltaics are insufficient to provide the load alone, the battery discharges to replenish. At this time, the battery and photovoltaic are loaded together, and the mains power is not loaded or charged.
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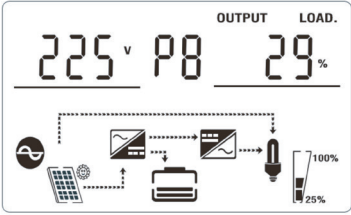
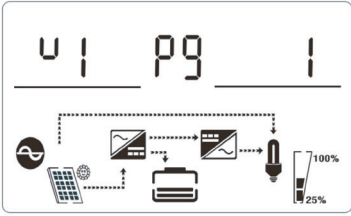
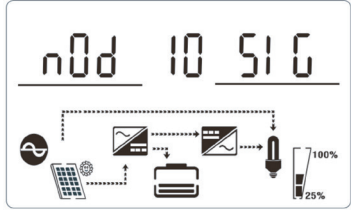
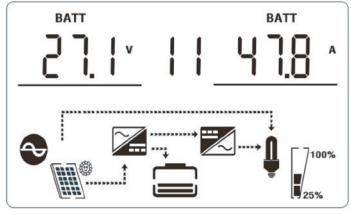
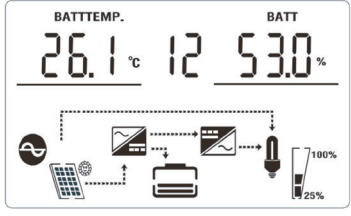
5.3 Display Information

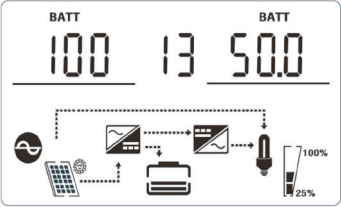
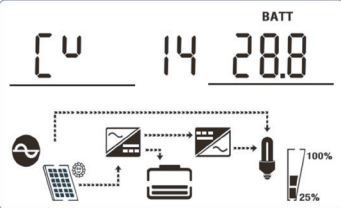
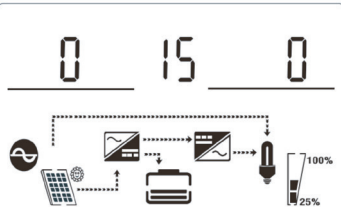
The LED display information will be switched in turns by pressing “UP” or “DOWN” key. The selectable information is switched as below order: voltage, frequency, current, power, firmware version.



Information	LCD display
Ⓐ PV input power Ⓑ Alarm or fault code display (default display screen) Ⓒ Output power Ⓓ Battery capacity Ⓔ Load percentage	
Ⓐ Daily power generation from solar Ⓑ Alarm or fault code display Ⓒ PV voltage Ⓓ Battery capacity Ⓔ Load percentage	

Ⓐ Battery current Ⓑ Alarm or fault code display Ⓒ Battery voltage Ⓓ Battery capacity Ⓔ Load percentage	 The LCD display shows 'BATT' at the top. The main display area shows '50 A', 'P3', and '27.4 V'. Below the display is a diagram of the system components (AC source, solar panel, battery, inverter, and load) with a battery level indicator showing 25%.
Ⓐ AC input voltage Ⓑ Alarm or fault code display Ⓒ AC input current Ⓓ Battery capacity Ⓔ Load percentage	 The LCD display shows 'INPUT' at the top. The main display area shows '225 V', 'P4', and '0 A'. Below the display is a diagram of the system components with a battery level indicator showing 25%.
Ⓐ Daily power consumption of AC Ⓑ Alarm or fault code display Ⓒ AC power(load consumption power or grid-tied power according the power flow arrow) Ⓓ Battery capacity Ⓔ Load percentage	 The LCD display shows 'AC' at the top. The main display area shows '0 W', 'H P5', and '0 W'. Below the display is a diagram of the system components with a battery level indicator showing 25%.
Ⓐ Output voltage Ⓑ Alarm or fault code display Ⓒ Active power output Ⓓ Battery capacity Ⓔ Load percentage	 The LCD display shows 'OUTPUT' and 'LOAD.' at the top. The main display area shows '225 V', 'P6', and '1.0 kW'. Below the display is a diagram of the system components with a battery level indicator showing 25%.
Ⓐ Output frequency Ⓑ Alarm or fault code display Ⓒ Apparent power output Ⓓ Battery capacity Ⓔ Load percentage	 The LCD display shows 'OUTPUT' and 'LOAD.' at the top. The main display area shows '50.0 Hz', 'P7', and '1.0 kVA'. Below the display is a diagram of the system components with a battery level indicator showing 25%.

Ⓐ Output voltage Ⓑ Alarm or fault code display Ⓒ Load percentage Ⓓ Battery capacity Ⓔ Load percentage	
Display software version	
Network status of lithium batteries When sIG is solid on in the upper right of display , the battery pack is operating as a single group. When PAR is solid on, the battery pack is operating as multiple groups in series and parallel. When blinking PAR, the battery pack is in the state of multi-group series and parallel connection state establishment.	
Lithium battery voltage and current information The upper left displays BMS battery voltage information. The upper right displays BMS battery current information. When BMS communication fails, both the upper left and upper right displays blinking ERR.	
Lithium battery temperature and SOC The upper left displays BMS temperature information. The upper right displays BMS SOC information. When BMS communication fails, both the upper left and upper right displays blinking ERR.	

Lithium battery capacity The upper left displays rated capacity. The upper right displays current capacity. When BMS communication fails, both the upper left and upper right displays blinking ERR.	
Lithium battery constant voltage point The upper left displays the fixed letter Cv. The upper right displays the BMS constant voltage charging point. When BMS communication fails, the upper right displays blinking ERR.	
Lithium battery fault alarm information The upper left displays BMS alarm information. The upper right displays BMS fault information. When BMS communication fails, both the upper left and upper right displays blinking ERR.	

5.4 Introduction to Dual Load Output Settings

The ‘AC Output 2’ can be enabled or disabled from LCD setting page.

5.4.1 Dual-Output Duration Time in battery mode (DBT) Setting

Enter setting page 37, you can set the DBT value. When the duration of the ‘AC Output 2’ reaches the set value, the output will be cut-off.



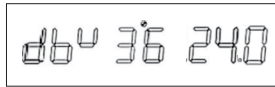
OFF: the ‘AC Output 2’ will be always disabled in all working mode. (Default Value)

005~890: Set any value from 005 to 890 (5 minutes per step). When working in battery mode, and the duration of the ‘AC Output 2’ reaches the set value, the output will be cut-off. For example, 030 means 30 minutes. When working in Grid mode, any value from 005 to 890 is equal to ON, and there is not time limitation for ‘AC Output 2’.

FUL: When set to FUL, the ‘AC Output 2’ will keep working until the battery voltage is lower than DBV value.

5.4.2 Dual-Output cut-off voltage in battery mode(DBV) Setting

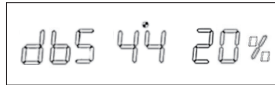
Enter setting page 36, you can set the DBV value. When the battery voltage is lower than the set value, the 'AC Output 2' will be cut-off.



For example: DBV = 24.0V, it means when the battery voltage is lower than the 24.0V, the 'AC Output 2' will be cut-off. The restore value is $24V + 2V = 26.0V$

5.4.3 Dual-Output cut-off SOC in battery mode(SOC) Setting

Enter setting page 44, you can set the SOC value. When the battery SOC is lower than the set value, the 'AC Output 2' will be cut-off.



For example: SOC = 20%, it means when the battery SOC is lower than the 20%, the 'AC Output 2' will be cut-off. The restore value is $20\% + 5\% = 25\%$

6. Fault Reference Code

Fault display:



Function description: If alarm occurs, Fault indicator flashes and buzzer sounds every one second for 1 minute, then stop. If fault occurs, the fault indicator is always on, the buzzer sounds 10 seconds then stops. System will try restart automatically. If the machine does not work after six times' restart, the machine and LCD display will always in the fault status. You need to completely power off (off the screen) or wait for 30 minutes to restart the machine. The fault LCD display is shown in the figure above. In fault mode fault icon is bright, in alarm state alarm icon is flashing, and contact the manufacturer to troubleshoot the abnormal situation according to the fault information.

Fault: The inverter enters fault mode, with a constant red LED light and LCD displaying a fault code.

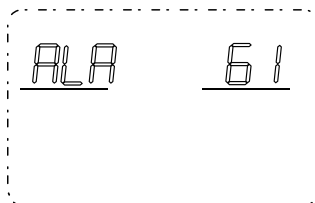
Fault code sheet

Fault code	Meaning	Relevant action	Trigger conditions	Resume conditions	Fault / Alarm
1	Bus soft boost start failed	Turn fault mode	Bus voltage does not reach set value for more than 30 seconds.	Cannot restore.	Fault
2	Bus voltage high	Turn fault mode	The bus voltage is higher than protection point.	Cannot restore.	Fault
3	Bus voltage low	Turn fault mode	Bus voltage is below the under voltage protection point.	Cannot restore.	Fault
4	Battery over current	Turn fault mode	TZ interrupt triggered more than 2 times within 2ms.	Cannot restore.	Fault
5	Over temperature	Turn fault mode	The PFC temperature exceeds the protection threshold. Fan stuck for more than 5 minutes.	Tried to restart six times, if failed, cannot restore.	Fault
6	Battery high voltage	Turn fault mode	Battery voltage is higher than set value.	Restore after voltage is lower set value.	Fault
7	Bus soft start fault	Turn fault mode	Turn fault mode. The soft start process has exceeded but the bus voltage has not reached set value.	Cannot restore.	Fault
8	Bus short circuit	Turn fault mode	Inverter on or PFC on, bus voltage below threshold.	Cannot restore.	Fault
9	Inverter soft start fault	Turn fault mode	The bus voltage is higher than protection point, or the DC component is greater than 20V. or the inverter is not completed within 5 minutes.	Cannot restore.	Fault
10	INV over voltage	Turn fault mode	The inverter voltage is higher than the set value [276V].	Cannot restore.	Fault

Fault code	Meaning	Relevant action	Trigger conditions	Resume conditions	Fault / Alarm
11	INV under voltage	Turn fault mode	Battery mode and there is no short circuit in the inverter, the inverter voltage is lower than 160V.	Cannot restore.	Fault
12	INV short circuit	Turn fault mode	In battery mode or Standby mode, if the inverter voltage is lower, current is greater than set value.	Tried to restart six times, if failed, cannot restore.	Fault
13	Negative power protection	Turn fault mode	In battery mode, the load power is lower than set value(negative power, such as -1200W).	Cannot restore.	Fault
14	Over load	Turn fault mode	Overload exceeds limit (list in specification).	Tried to restart six times, if failed, cannot restore.	Fault
15	Model fault	Turn fault mode	Cannot match any model in model number detection.	Cannot restore. Check whether the control board is assembled incorrectly or whether the program is burned incorrectly.	Fault
26	BMS fault	Turn fault mode	Error code in BMS message.	Turn off BMS communication function or BMS fault recovery.	Fault
28	NTC fault	Turn fault mode	NTC open circuit	Cannot restore	Fault
29	Inverter over current	Turn fault mode	Instantaneous current of inverter is higher than set value.	Tried to restart six times, if failed, cannot restore.	Fault

7. Alarm Reference Code

Alarm: the inverter does not enter the fault mode, LED red light flashing, LCD displays the Alarm code.



Alarm code sheet

Alarm code	Meaning	Relevant action	Trigger conditions	Resume conditions	Fault / Alarm
50	Battery open	Alarm, battery does not charge.	Battery voltage is below set point.	Restore after battery voltage recover.	Alarm
51	Battery low voltage shutdown	Alarm, battery low voltage shutdown or cannot power on.	Battery voltage is below set point.	Restore after battery voltage recover.	Alarm
52	Battery low voltage	Alarm	Battery voltage is below set point.	Restore after battery voltage recover.	Alarm
53	Charger short circuit	Warning, battery does not charge.	The battery voltage is less than 5V and the charging current is greater than 4A.	Cannot restore.	Alarm
54	Low power discharge	Alarm	The battery voltage is greater than 26.4V and the discharge time exceeds the set low-power discharge time.	Restore after battery voltage recover.	Alarm
55	Battery over charge	Alarm, battery does not charge.	Battery voltage is higher than the set value.	Can restore.	Alarm

Alarm code	Meaning	Relevant action	Trigger conditions	Resume conditions	Fault / Alarm
56	BMS disconnect	Alarm, lock standby mode.	No correct BMS communication response within 10 seconds.	Restore after communication recover.	Alarm
57	Over temperature	Alarm, battery does not charge.	The temperature of PFC or INV is above the set value.	Restore after temperature is under set value.	Alarm
58	Fan error	Alarm, if one fan fails and the other fan is running at full speed.	Fan speed is less than the set value.	Restore after fan recover.	Alarm
59	EEPROM error	Alarm	Numerical calibration error.	Restore after calibration right.	Alarm
60	Overload	Alarm, battery does not charge.	When not in mains mode or the PV is normal and the output priority is not mains priority, the load exceeds 102% and the duration is 200-220 ms.	Restore after load back to normal	Alarm
61	Abnormal generator waveform	Alarm, continuously operating in battery mode.	Generator waveform detection result is abnormal.	Can restore.	Alarm
62	PV Energy Weak	Alarm, turn off PV output and charging.	When the battery is not connected, the bus voltage is lower than the set value.	Restore after 10mins.	Alarm

Alarm code	Meaning	Relevant action	Trigger conditions	Resume conditions	Fault / Alarm
63	Synchronization signal fail	Alarm, turn fault mode.	Host or slave with host present, no synchronization signal restored within set value	Restore after signal recover.	Alarm
68	SOC Under	Alarm, turn standby mode.	Lithium battery SOC is lower than the set value.	Restore after turning off the low SOC shutdown function, or turning off the BMS communication function, or when the SOC returns to the set value + 5%.	Alarm
69	SOC Low	Alarm, if it is in standby mode, it will remain in standby mode and not power on.	Lithium battery SOC is lower than the set value + 5% (mains mode or battery mode), lower than the set value + 10% (standby mode).	Restore after turning off the low SOC shutdown function, or turning off the BMS communication function, or when the SOC returns to the set value + 10%.	Alarm
70	Battery terminal source fail	Alarm, turn standby mode	Battery is not connected and the voltage of battery terminal is lower than set value.	Restore after battery is detected or detected that the battery terminal voltage exceeds the set value for one consecutive minute.	Alarm

8. 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.

Note:*Don't activate this mode when using lithium batteries.

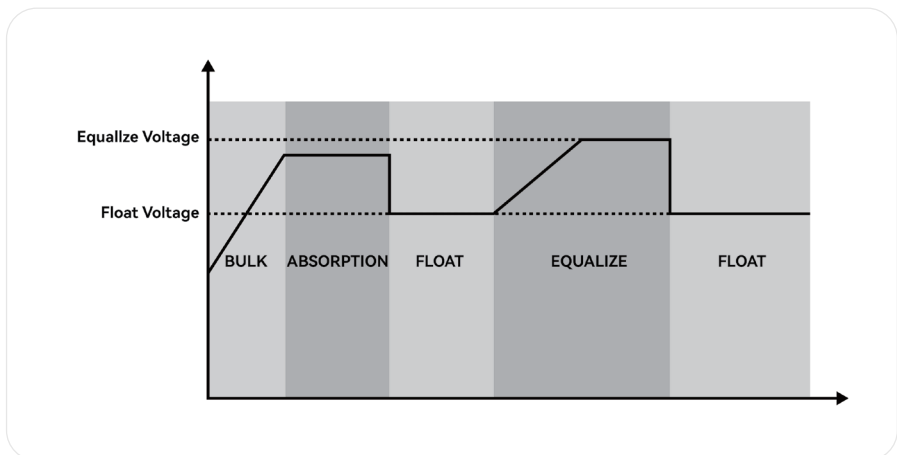
- How to Apply Equalization Function

You must enable battery equalization function in monitoring LCD setting Program 29 first. Then, you may apply this function in device by either one of following methods:

- 1.Set balance mode on Program 29.
- 2.Set balance voltage point on Program 30.
- 3.Set balance charging time on Program 31.
- 4.Set balance delay time on Program 32.
- 5.Set balance interval time on Program 33.
- 6.Set immediate balance mode activation on Program 34.

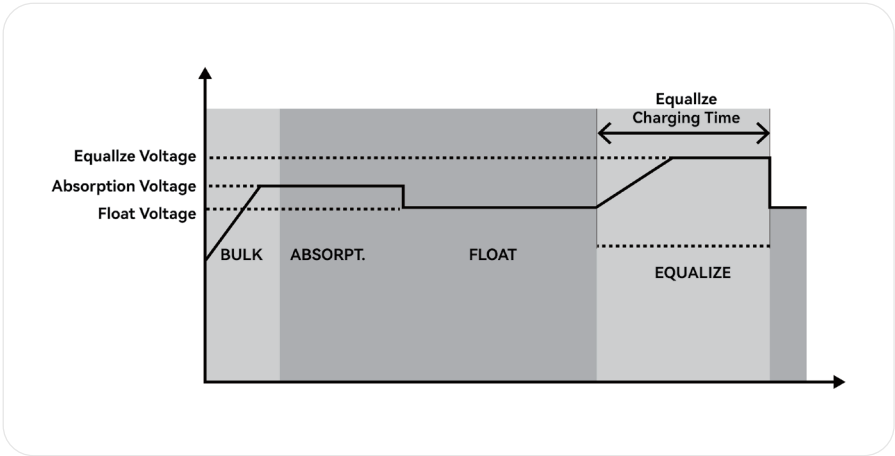
- When to Equalize

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.

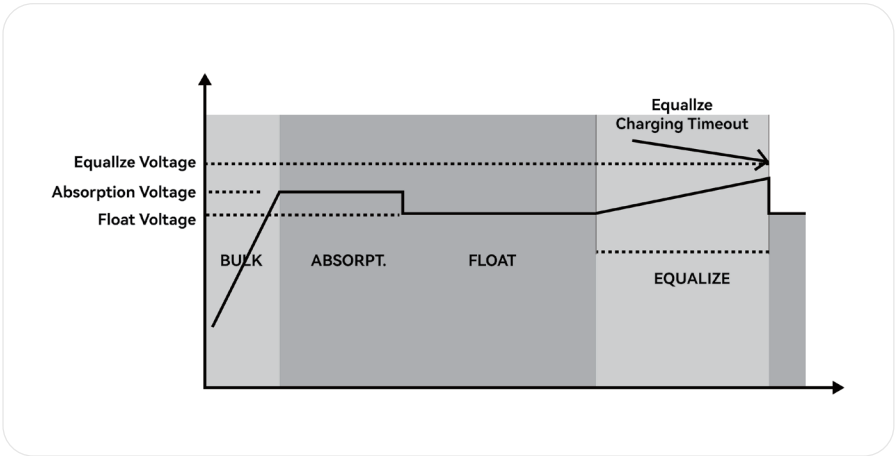


- Equalize charging time and timeout

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.



9. Specifications

9.1 Line Specifications

	Item	Value	Comments
Input voltage	Main topology	L + N + PE	
	Nominal voltage	220Vac	Settable: 208/220/230/240 Vac
	Input voltage range	90~280Vac	Settable
	Input low loss	154Vac (default) Settable: 90-154	Appliance mode Generator mode
		185Vac (default) Settable: 170-200	UPS mode
	Input low comeback	Low loss voltage +9V	
	Input high loss	264Vac(default) Settable:264-280	Appliance mode Generator mode
		264Vac	UPS mode
	Input high comeback	High loss voltage -9V	
	Nominal frequency	50 / 60Hz	
	Frequency range	40 / 70Hz	
	Freq. low loss / Comeback	40/43.5Hz@50Hz(UPS mode) 40/40.5HZ@50HZ(APP/GEN mode)	

	Item	Value	Comments
Input voltage	Freq. low loss / Comeback	50/53.5Hz@60Hz(UPS mode) 50/50.5Hz@60Hz(APP/GEN mode)	
	Freq. High loss / Comeback	60/56.5Hz@50Hz(UPS mode) 70/69.5Hz@50Hz(APP/GEN mode)	
		70/66.5Hz@60Hz(UPS mode) 70/69.5Hz@60Hz(APP/GEN mode)	
	Max current (RMS)	20A	>20A,60s; >22A,10s; >24A,3s; >26A,200ms;

Note: When the specification of the external circuit breaker is greater than 20A, the maximum input current is 20A.

When the external circuit breaker specification is less than 20A, the maximum input current depends on the external circuit breaker specification.

Battery	
Electrical Parameter	
Battery Type	LiFePO ₄
Battery Capacity per Kit [Wh]	8038
Usable Energy [Wh]	7235
Rated Voltage [V]	25.6
Voltage Range [V]	22.4~28.8
Max. Charging and Discharging Rate	0.5C
Depth Of Discharge [DOD]	≤90%
Cycle Life(25°C, 0.5C)	≥6000 times,80% Capacity retention
General Data	
Operating Temperature Range	0~50°C (Charge)/-10~50°C(Discharge)
Storage Temperature Range	-15°C~60°C
Cooling Method	Natural Convection

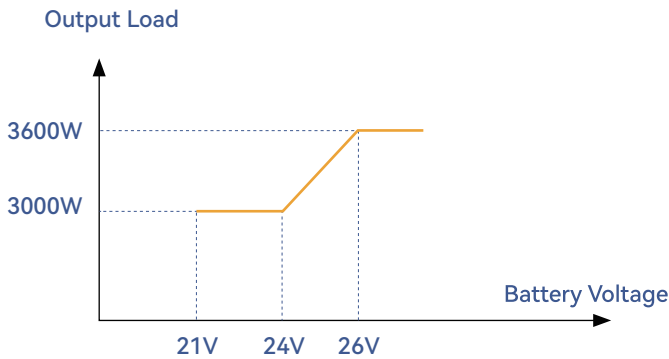
9.2 Charger Specifications

	Item	Value	Comments
Charger(line mode)	Charging voltage	FV MODE: 27V Settable: 26.6~27.8V CV MODE: 28.2V Settable: 28~29V	
	Temperature compensation	No	
	Charging current	2~100A	Settable
	Default charging current	40A	
	Charging mode	Two/Three/Auto Settable	Three states: CC/CV/Float Two states: CC/Float
	Charge voltage accuracy	±5%	Calibrated by RS232
Charger(PV)	PV charging method	MPPT	
	PV maximum input power	5000W	
	PV maximum input current	18A	
	Efficiency	99.5%max	
	PV voltage accuracy	±2%	
	MPPT voltage	40~450Vdc	
	Default charging current	60A	
	Recommended PV configuration voltage	MPPT Voltage: 300~340V Open Circuit Voltage: 370~430V	
	Max PV voltage	500Vdc	
	Min PV voltage	40Vdc	
	PV start-up voltage	60Vdc	If PV voltage is below 60V, inverter needs to be connected to the battery for use. While PV voltage is above 60V, inverter can work without battery.
	Max PV charge current	100A	

9.3 Output Specifications

	Item	Value	Comments
Output power rating	Output topology	L+N+PE	
	Output power	3.6KW	When setting the Output voltage to 208V, the Output Power rating will be reduced to 90%; Please refer to the Battery Voltage Derating Curve ① and Max Output Power rating ② for more details.
Output voltage	Nominal voltage	208/220/230/240 VAC	Default 220V, manual set by RS232 or LCD
	Waveform	Sinusoidal	
	Voltage regulation	±5%	
	DC offset	±200mV (Bat mode)	Empty load and linear load mode
Output frequency	Nominal frequency	50 / 60Hz	50/60Hz auto selection (default on) manual set by RS232, default 50 Hz
	Line mode	50Hz: (43.5 - 56.5)Hz (UPS mode) (40 - 70)Hz (APP/GEN mode) 60Hz: (53.5 - 66.5)Hz (UPS mode) (40 - 70)Hz (APP/GEN mode)	
	Battery mode	50 / 60Hz	
	Frequency regulation	±0.1Hz	
Output overload battery mode	102%<Load ≤110%	1 minute minimum, then alarm and turn off output	
	110%< Load ≤130%	10 seconds minimum, then alarm and turn off output	
	130%<Load ≤150%	3 seconds minimum, then alarm and turn off output	
	Load>150%	200 ms minimum, then alarm and turn off output	
Output short circuit protection	Battery mode	Current limitation	
	Line mode	Breaker (20A)	

① Battery Voltage Derating Curve



② Max Output Power rating

Max Output Power rating			
Battery	PV	AC Input	Max Output Power
L	N	N	Follow the battery voltage derating curve as shown in ① .
N	L	N	Depends on the PV input power and Maximum is 3.6KW.
N	N	L	Input Voltage * Input Max current 20A
L	L	N	Two ways to achieve 3.6KW are as follows: 1.Battery Voltage $\geq$ 26V; 2.Battery Voltage $\geq$ 21V and PV Input Power $\geq$ 900W; If none of the above conditions are met, then follow the battery voltage derating curve as shown in ① .
N	L	L	Input Voltage * Input Max current 20A
L	N	L	Input Voltage * Input Max current 20A
L	L	L	Input Voltage * Input Max current 20A

Note:The "L" in the diagram represents the meaning of being accessed or connected, while the "N" signifies the meaning of not being accessed or not being connected.

9.4 Switch Time Specifications

	Items	Value	Comments
Switch time	Line Mode To Battery Mode	10ms(typical)	UPS mode
		10ms(typical)	Appliance mode
		20ms(typical)	Generator mode

9.5 Efficiency Specifications

	Item	Value	Comments
Efficiency	Line Mode	>99.5%@3KVA >99.5%@5KVA	Full R load, without battery connect.
	Battery Mode	>92%@1KVA >92%@2KVA >90%@3KVA	Full R load.
	Standby power	<65W	Empty load mode, battery disconnected.

10. Trouble Shooting

Problem	Fault Event	Trigger conditions	What to do
LED screen display fault code 5	Overtemperature	1.PFC temperature exceeds the protection threshold [85°C when not locked rotor, 65°C when locked rotor] for more than 20 seconds. 2.Fan lock exceeds 30 seconds.	Please check if the fan is not connected or if there are loose wiring issues. If the fan is not connected for more than 30 seconds, the machine will report fault code 5.
LED screen display fault code 12	Inverter short circuit	In battery mode or standby mode, if the inverter voltage is lower than 100V and the inverter current is greater than 40A, it should respond within 80–100ms.	1.Check if there is a short circuit at the output terminals (such as a screw piercing through the locking terminal causing a LN short circuit). 2.Verify if the inverter voltage and inverter current meet the triggering conditions.
LED screen display fault code 15	Model malfunction	The model number detection does not match any model number.	Check if the control board is assembled incorrectly or if the program is burned incorrectly.
LED screen display fault code 20	CAN communication error	In battery mode, if the battery mode is set to mains power mode and the parallel mode is set to mains power mode, the number of responses from the slave devices does not match the previously defined number of slave devices. Receiving communication from two or more devices with a slave number of 0 consecutively.	1.Check if the parallel mode is set but the machine is turned on in single machine mode. 2.Check if the parallel connection cable and the parallel board are connected according to the parallel SOP (Standard Operating Procedure).

		Trigger conditions	
LED screen display fault		Any of the fans rotating	1.Check if the fan is not connected properly or if there are any loose 2.If the fan is properly a) Check if there is any circuit, usually caused by excessive soldering b) Check if the fan itself is
Unable to start	Battery	Due to the need for a voltage of $\geq 11.5V/N$ to start the machine in battery mode, to start include improper calibration or insufficient battery voltage.	1.Check if the battery functioning properly and if the battery voltage has 2.Use a multimeter to battery terminals (using a DC power supply or a real battery) to see if it reaches 11.5V per cell for startup. Note: It is crucial to configure the battery Connecting the wrong battery voltage can cause
Unable to start	Utility power	Due to the need for a voltage of $\geq 11.5V/N$ to start the machine in battery mode, common reasons for failure to start include improper calibration or insufficient battery voltage.	1.Check for any short circuits at the mains terminal (such as a screw piercing through and causing a short circuit between the live and neutral terminals). 2.Check if there are any wiring errors, such as mistakenly connecting the mains input to the output terminals.

Problem	Fault Event	Trigger conditions	What to do
Unable to start	PV	Due to the need for a voltage of $\geq 11.5V/N$ to start the machine in battery mode, common reasons for failure to start include improper calibration or insufficient battery voltage.	1.Check if the PV input voltage is too close to the critical threshold. 2.For low voltage versions of the machine, check if the software version numbers of the main control is compatible. If the software versions differ significantly, the machine may not be activated.
PV not charging			1.For low voltage versions of the machine, check if the software version numbers of the main control is compatible. If the software versions differ significantly, the machine may not be activated. 2.Connecting the wrong battery voltage can result in damage to the auxiliary power supply on the PV side, causing a loss of power and inability to communicate with the main control.

11. System Maintenance

11.1 Transportation

Lithium batteries are dangerous goods. Passed the test of UN38.3, this product meets the transportation requirements for dangerous goods for lithium batteries. After the installation of the unit on site, the original packaging (contains the lithium battery identification) should be kept. When the unit needs to be returned to the factory for repair, please pack the unit with the original packaging to reduce unnecessary trouble.

11.2 Storage

After purchasing the system, please store it with following instructions:

- 1) Please store it in a dry and ventilated environment, keep it away from heat sources.
- 2) Please keep it in an environment with storage temperature as $-15^{\circ}\text{C} \sim 60^{\circ}\text{C}$, humidity $<85\% \text{ RH}$.
- 3) For long-term storage (>3 months), please put it in an environment with a temperature of 18°C to 28°C and a humidity of $<85\% \text{ RH}$.
- 4) The system should be stored in accordance with the storage requirements mentioned above, and the system should be installed within 6 months since delivered from the factory. Failure to install beyond 6 months is not covered by the manufacturer's warranty.
- 5) Failure to complete the installation within 6 months from the factory is subject to recharge operation. Consult the dealer or manufacturer for details of the operation.



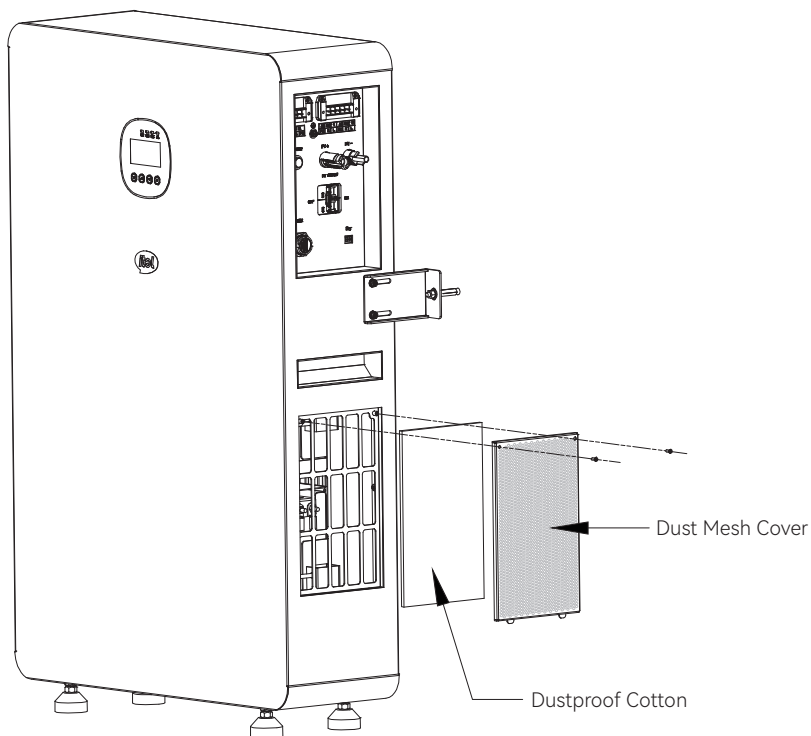
NOTE!

- The battery remains 30% power when it is sent from the factory.
- The longer the battery is stored, the DOD value is getting bigger. When the battery remaining voltage fails to reach the startup voltage requirement, the battery may be damaged.

The battery cannot be disposed of as household refuse. When the service life of the battery reaches to the limit, it is not required to return it to the dealer, but it must be recycled to the special waste lithium battery recycling station in the area.

11.3 Cleanliness

1. Use only a damp cloth moistened with water to clean the inverter housing cover and the LEDs. Do not use any cleaning agents as this may damage the parts.
2. Periodically clean or replace the internal dust wadding by removing the outer panel of the dust screen.





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