

Off-Grid Solar Inverter 2kW IP21

User Manual

Version 2.0

About This Manual

Scope of Validity

This manual describes the assembly, installation, operation and troubleshooting of this unit. Please read this manual carefully before installations and operations.

Target Group

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

- Knowledge of how an inverter 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

Symbol Description

Different levels of warning messages in this manual are defined as follows:



DANGER!

Indicates a high-level hazard that, if not avoided, will result in death or serious injury.



WARNING!

Indicates a medium-level hazard that, if not avoided, could result in death or serious injury.



CAUTION!

Indicates a low-level hazard that, if not avoided, could result in minor or moderate injury.



NOTICE

Provide important operation information and techniques for high efficient, proper using and maintenance.

Change History

Version 2.0 (05/18/2026)

Modified some LCD Settings and LCD Display to match the actual device.

Version 1.0 (03/31/2026)

Initial release.

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1 Safety

1.1 Symbols on the Label and Inverter

Table 1-1 Symbols

Symbol	Description
	Do not disconnect under load!
	Danger: High Voltage! Danger: Electrical Hazard!
	Delayed discharge. Wait 5 minutes after power completely discharged.
	Read instructions carefully before performing any operation on the INVERTER.
	Grounding: The system must be firmly grounded for operator safety.

1.2 Safety Instructions

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



DANGER!

- To reduce risk of injury, charge only deep-cycle lead-acid type rechargeable batteries and lithium batteries. Other types of batteries may burst, causing personal injury and damage.
- To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
- 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.



WARNING!

- Do not disassemble the upper cover. 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.
- Be very cautions 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.
- NEVER cause AC output and DC input short circuited. Do NOT connect to the grid when DC input short circuits.
- Make sure the inverter is completely assembled before the operation.



WARNING!

- NEVER charge a frozen battery.
- For optimum operation of this inverter, please follow required spec to select appropriate cable size. It's very important to correctly operate this inverter.
- GROUNDING INSTRUCTIONS – This inverter should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.



NOTICE

- Provide important operation information and techniques for high efficient, proper using and maintenance.
- Please be clear which kind of battery system you want, lithium battery system or lead-acid battery system, if you choose the wrong system, energy storage system can not work normally.
- Before using the device, read all instructions and cautionary making on the devices 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.
- All the operation and connection please professional electrical or mechanical engineer.
- All the electrical installation must comply with the local electrical safety standards.
- 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.

1.3 Inverter Load Management Instruction

This product features excellent overload handling capability, allowing it to operate continuously for short periods under various overload conditions. When the load exceeds the allowable limit, the protection mechanism is promptly activated to ensure equipment safety. The specific overload capabilities are as follows:

- Capable of withstanding a load between 102% and 125% continuously
- Capable of withstanding a load between 125% and 250% for up to 10 seconds
- With off-grid supply from Battery + PV

The system will automatically trigger the protection mechanism when the above time or load limits are exceeded, preventing damage to the equipment.

Table 1-2 Load type and power requirements

Type of load	Equipment	Power(W)	Start power
Resistive Load(R)	Lamp	40~100	1.5 x
	Hair dryer	1200~1800	1.5 x
	Iron	1000~2200	1.2 x
	Heater	1000~3000	1.2 x
Inductive Load(L)	Refrigerator	100~200	5~8 x
	Air conditioner	800~3500	4~7 x
	Washing machine	400~800	4~7 x
	Fan	30~100	3~5 x
	Vacuum cleaner	800~2000	3~6 x
	Induction Cooker	1200~2200	3~5 x
	Microwave oven	700~1200	2~3 x
Capacitive Load(C)	Laser Printer / Copier	300~1500	5~30 x
	Phone charger	5~30	10~100 x (<1 ms)
	Old radio,record player DC supply, Cheap half-wave rectified appliances	5~30	20 x

*** Inductive loads and capacitive loads can referred to as shock loads.**

Shock loads may experience shock currents or surges during startup, which can cause voltage fluctuations, current inrushes, motor vibrations, and voltage surges. These anomalies may exceed the load-bearing capacity of the inverter, resulting in damage or even failure.

Therefore, it is necessary to control the total amount of inductive and capacitive loads connected to the inverter to ensure safe and stable operation.

- When selecting an inverter, the loading capacity should be taken into consideration to ensure that the total amount of connected inductive and capacitive loads fall within its rated capacity.
- When connecting Shock loads to the off-grid inverter, it is necessary to limit the total load capacity according to the following table to ensure safe and reliable operation of the inverter. Please refer to the table for the allowed load capacities for each load type.

Continuous Output	Surge Power (< 200 m)	The maximum supported load power
2000 W	4000 VA	R: Lamp < 200W
		L: Refrigerator + Fan + Washing machine < 400W
		C: Phone charger + Old radio < 100W



WARNING!

- Earth connection essential before connecting supply.
- Be sure that AC power source is disconnected before attempting to hardwire it to the unit.
- 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.



NOTICE

- It is important to make sure that the combined power required for all devices connected to this EPS output does not exceed the power rating of the inverter.
- 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 manufacturer of air conditioner if it is equipped with time-delay function before installation. Otherwise, this inverter will trig overload fault and cutoff output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

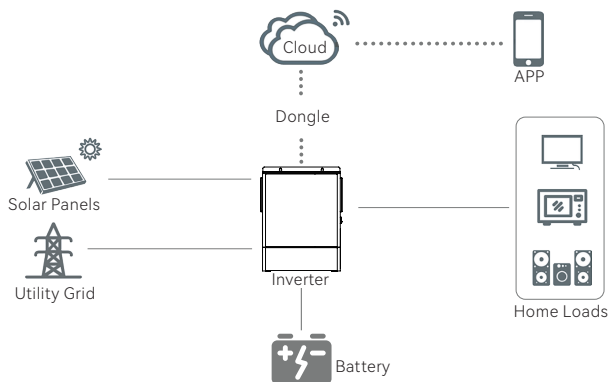


Figure 2-1 Off-grid energy storage system

This is a multifunctional solar inverter, integrated with an MPPT solar charge controller, a high-frequency pure-sine-wave inverter, and a UPS function module in one machine—perfect for off-grid backup power and self-consumption applications. The inverter can operate with or without batteries.

To run the whole system, you will also need PV modules or the utility. Please consult your system integrator for other possible architectures tailored to your needs.

2.1 Features

- Pure sine wave AC output
- High frequency inverter with small size and light weight.
- Solar and utility can power loads at the same time
- With RS485 or CAN for BMS communication
- With the ability to work without battery
- Dual AC output

2.2 Product Overview

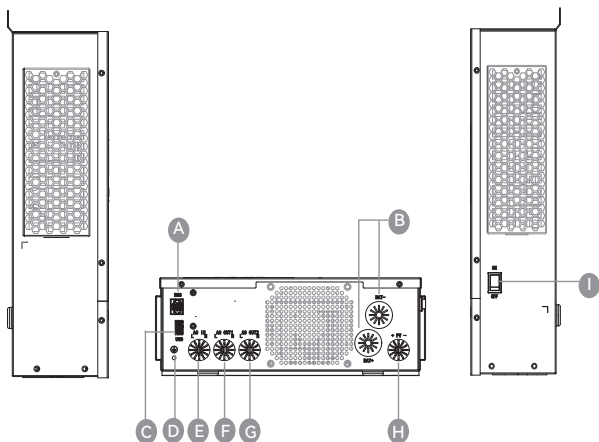


Figure 2-2 Terminal

A BMS Interface

B Battery Input

C USB Interface

D PE Port

E AC Input

F AC Output1

G AC Output2

H PV Input

I Power ON/OFF Switch

3 Installation

3.1 Unpacking and Inspection

Products have been strictly tested before leaving the factory. Please sign for them after inspection. If the product is damaged, please contact the local distributor. Please open the box to check whether the outer packaging is intact or damaged, whether the internal equipment is damaged.

3.1.1 Installation Tools



Goggles



Safety shoes



Safety gloves



Dust mask



RJ45 crimping tool



Diagonal pliers



Wire stripper



Hammer drill



Heat gun



Vacuum cleaner



Marker



Level



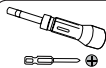
Heat shrink tube



Cable tie



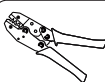
Rubber hammer



Torque wrench



Multimeter



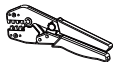
PV crimping tool



Tube type terminal crimping tool



Measuring tape



Crimping tool



Hex socket

3.1.2 Packing List

Item	Quantity
Inverter	1 pc
Document	-
Expansion Screw	2 pcs
E1510 Terminal	8 pcs

3.2 Mounting Unit

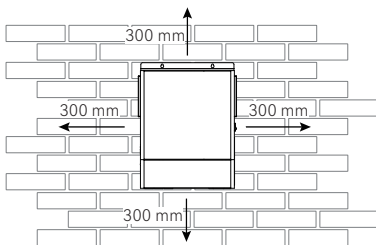


Figure 3-1 Installation distance recommendation

Consider the following points before selecting where to install:

- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface.
- Install this inverter at eye level in order to allow the LCD display to be read at all times.
- The recommended installation position is to be adhered to the wall vertically.
- Be sure to keep other objects and surfaces as shown in the diagram above to guarantee sufficient and to have enough space for removing wires.



WARNING!

- Inverter is suitable for mounting on concrete or other non-combustible surface only.

Follow the installation steps:

Step 1: Mark two drilling positions.

Step 2: Drill holes and knock the expansion bolts into the holes.

Step 3: Secure the device to the wall with screws by torque wrench.

Step 4: Before installing the cables, remove the upper cover.

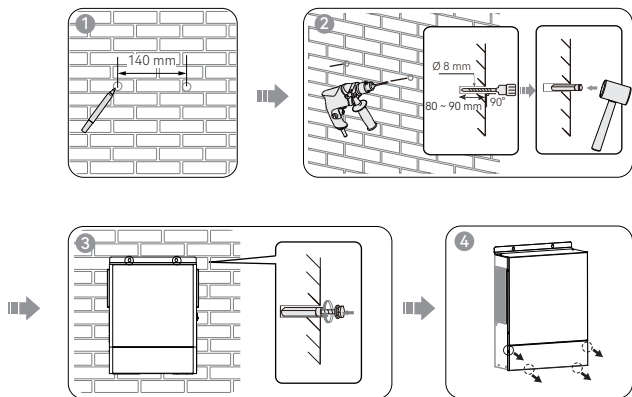


Figure 3-2 Installing the inverter

4 Electrical Connection



WARNING!

- Make sure AC power is disconnected before attempting to connect AC power to the unit.
- All operations during the electrical connection process, as well as the specifications of cables and components used, must comply with local laws and regulations.
- All wiring must be performed by a qualified personnel.
- To ensure safe and efficient operation of the system and reduce the risk of injury, please use the recommended cable specifications.

4.1 PE Connection

Be sure to connect PE protective cable on the inverter side first.

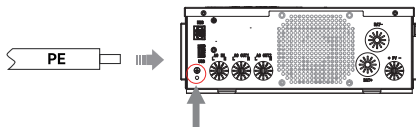


Figure 4-1 PE connection

4.2 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. The recommended spec of AC breaker is at least 17A for 2kW inverter.
- There are three terminal blocks with "AC IN", "AC OUT1" and "AC OUT2" markings. Please DO NOT mis-connect input and output connectors.

Table 4-1 Suggestion for AC input/output wires

Wire Size	Cable
10 AWG (Copper)	6 mm ²

AC input/output connection steps:

Step 1: Before connecting to AC power, make sure that the AC circuit breaker is disconnected

Step 2: Remove 9 mm insulation. Insert the cable into the tubular terminal. Then use terminal crimping tool make the terminal and cable connected tightly.

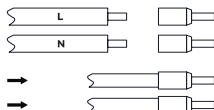


Figure 4-2 AC cable connection

Step 3: Insert AC input cables, tighten the terminal screws and tighten the terminal block.

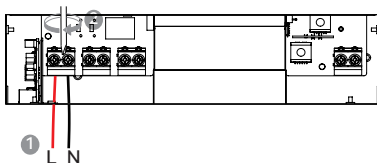


Figure 4-3 AC wire connection

NOTICE

- Output 1 is for connecting general loads, while Output 2 is designated for heavy loads. Please ensure this distinction is maintained to guarantee the safe and effective operation of the equipment.

4.3 PV Connection



DANGER!

- Direct sunlight can cause dangerous high voltages in solar panels. Therefore, be sure to follow the safety guidance in the solar panel manual plus related documents.



WARNING!

- Make sure to connect the PV terminals to the corresponding ports inverter, as reversing the polarity can damage the inverter.



CAUTION!

- Before connecting to PV modules, please install a separate DC circuit breaker between inverter and PV modules. Do not connect any DC switches or AC/DC circuit breakers before completing the electrical connections.

Table 4-2 Suggestion for PV wires

Wire Size	Cable
10 AWG (Copper)	6 mm ²

PV Module Selection:

When selecting proper PV modules, please consider following 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.

Max. PV Array Open Circuit Voltage [Vdc]	450
Start-up Voltage [Vdc]	40
PV Array MPPT Voltage Range [Vdc]	30~400



WARNING!

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

PV module connection steps:

Step 1: Before connecting the PV module, make sure that the DC circuit breaker is disconnected.

Step 2: Remove 9mm insulation. Insert the cable into the tubular terminal. Then use terminal crimping tool make the terminal and cable connected tightly.

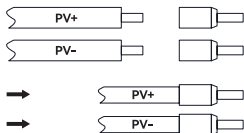


Figure 4-4 PV cable connection



WARNING!

- Use multi-meter check to ensure the polarities are correct.

Step 3: Insert PV input cables, tighten the terminal screws.

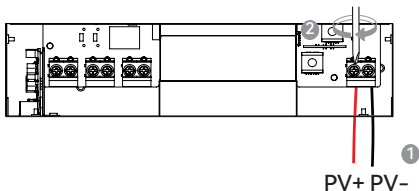


Figure 4-5 PV wire connection

4.4 Battery Connection

4.4.1 Lead-acid Battery Connection

User can choose proper capacity lead acid battery with a nominal voltage at 12V. Also, you need to choose battery type as 'AGM or FLD (flooded)'. For specific settings, please refer to "5.3.3 LCD Setting".



CAUTION!

- Avoid placing anything between the inverter terminal's flat part and the DT terminal to prevent overheating.
- For safety, install a separate DC over-current protector or disconnect device between the battery and inverter. It's recommended to have a 175 A protector or disconnect.

Table 4-3 Suggestion for battery cable and terminal

Wire Size	Cable
2 AWG (Copper)	35 mm ²

NOTICE

- The recommended charge current is $0.3C$ ($C >$ battery capacity).

Battery connection steps:

Step 1: Unscrew the pre-fixed screws on battery poles. Prepare 2 DT terminals.

Step 2: Remove 12 mm insulation. Insert the cable into the DT terminal. Then use terminal crimping tool make the terminal and cable connected tightly.



Figure 4-6 Battery cable connection

Step 3: Pass the battery cable through the battery installation hole on bottom, and secure the DT terminals with flat washers and nuts. Make sure polarity at both the battery and inverter are correctly connected and DT terminals are tightly screwed to the battery terminals (Torque: $5 \text{ N}\cdot\text{m}$).

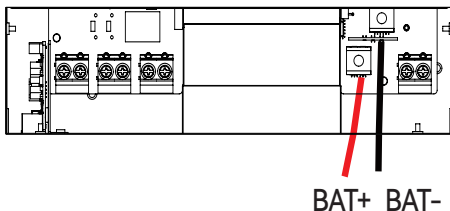


Figure 4-7 Battery side connection



CAUTION!

- Do not apply anti-oxidant substance on the terminals before terminals are connected tightly.
- Before making the final DC connection or closing DC breaker / disconnecter, be sure positive (+) must be connected to positive (+) and negative (-) must be connected to negative (-).

4.4.2 Lithium Battery Connection

If choosing lithium battery for inverter, please check the compatibility of the protocol first.

There are two connectors on the lithium battery, RJ45 port of BMS and power cable.

Lithium battery connection steps:

Step 1: Follow “[4.4.1 Lead-acid Battery Connection](#)” to implement the power cable connection.

Step 2: Connect RJ45 terminal of battery communication cable to BMS communication port of inverter.

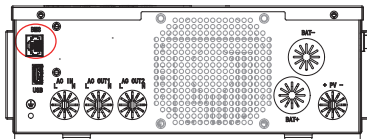


Figure 4-8 Lithium battery connection

Step 3: Insert the other end of battery communication cable to battery communication port of lithium battery.

Lithium battery communication and settings:

In order to communicate with battery BMS, you should set the battery type to “LiB” in “[5.3.3 LCD Setting](#)” Program 5 “[Battery type](#)”.

Make sure the lithium battery BMS port connects to the inverter is Pin to Pin, the inverter BMS port pin assignment shown as below:

Table 4-4 Pin assignment for BMS Port

Pin	BMS Port
1	RS485B
2	RS485A
3	-
4	CANH
5	CANL
6	-
7	-
8	-

4.5 Final Assembly

After connecting all wiring, please put bottom cover back by screwing four screws mentioned in “[3.2 Mounting Unit](#)”.

5 Operation

5.1 Power ON

Step 1: Turn on the battery breaker to connect the battery to the inverter.

Step 2: Turn on the switch on the inverter to start the inverter.

Step 3: Turn on the PV breaker.

Step 4: Turn on the AC breaker between the inverter and the power grid.

Step 5: Turn on the load breaker to supply power to the connected loads.



WARNING!

- After AC mains power is connected, the product must remain undisturbed for 30 seconds; during this period, disconnecting PV or battery connections is prohibited.

5.2 Power OFF

Step 1: Turn off the load switch to ensure that all connected loads are disconnected.

Step 2: Turn off the PV breaker to disconnect the PV from the inverter.

Step 3: Turn off the AC switch between the inverter and the power grid.

Step 4: Turn off the switch on the inverter.

Step 5: Turn off the battery switch to disconnect the battery from the inverter.



CAUTION!

- After the inverter system is powered down, there is still residual electricity and heat, which may cause electric shock or burns. Therefore, wear protective gloves to operate the inverter after the inverter system has been powered down for 5 minutes.

5.3 Operation and Display Panel

The panel indicates the operating status and input/output power information.

NOTICE

- The illustrations and specifications in this section are for reference only. Please refer to the actual product.

5.3.1 Introduction of Control Panel

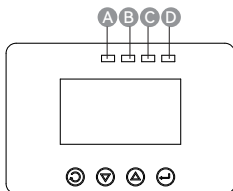


Figure 5-1 LED panel

Table 5-1 LED indicator

LED Indicator		Description
 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.
 Inverter indicator (Yellow)	Solid On	Output is powered by battery or PV in battery mode.
	Off	Other states.
 Charging indicator (Yellow)	Solid On	The battery is in float charging.
	Flashing	The battery is in constant voltage charging.
	Off	Other states.
 Fault indicator (Red)	Solid On	Fault occurs in the inverter.
	Flashing	Warning condition occurs in the inverter.
	Off	The inverter is working properly.

Table 5-2 Function Buttons

Button	Description
	To exit setting mode.



To decrease the page number or the parameter value.



To increase the page number or the parameter value.



To confirm the selection in setting mode or enter setting mode.

5.3.2 LCD Display

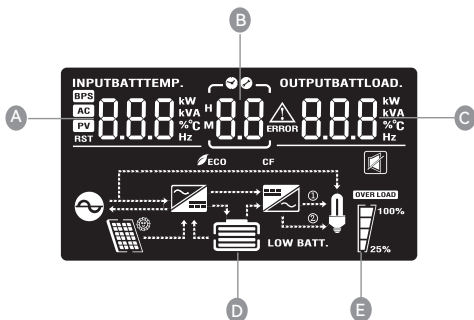


Figure 5-2 LCD display

Table 5-3 LCD Icons

Icon	Description
AC Input Information	
	AC input icon
	Indicate AC input power, AC apparent power, AC input frequency
PV Input Information	
	PV input icon
	Indicate PV power, PV apparent power
Load Information	
	Load icon

Icon	Description
	Indicate power of load, apparent power, power percentage of load, Output frequency
	Indicate overload happened
Battery Information	
	Indicate battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode (PV/DC charging) and charging status in line mode (AC charging)
	Indicate battery power, apparent power, battery SOC, Lithium battery temperature.
Other Information	
	Indicate alarm code or fault code.
	Indicate a fault is happening.
	Indicate the buzzer is disabled.
	Indicate power saving mode.

Table 5-4 LCD display information

LCD display	Information
	A PV voltage B Page number C PV power D Battery capacity E Load percentage
	A AC output voltage B Page number C Apparent power output D Battery capacity E Load percentage
	A Battery voltage B Page number C Battery current D Battery capacity E Load percentage



- A** PV voltage
- B** Page number
- C** PV to bat current
- D** Battery capacity
- E** Load percentage



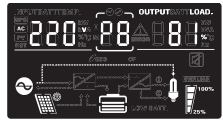
- A** AC input voltage
- B** Page number
- C** AC output voltage
- D** Battery capacity
- E** Load percentage



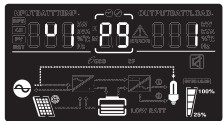
- A** AC output voltage
- B** Page number
- C** Active power output
- D** Battery capacity
- E** Load percentage



- A** AC input frequency
- B** Page number
- C** AC output frequency
- D** Battery capacity
- E** Load percentage



- A** AC output voltage
- B** Page number
- C** Load percentage
- D** Battery capacity
- E** Load percentage



Display software version.



Display photovoltaic power generation quantity. The upper left displays the total power generated. The upper right displays the power generated today.



Parallel operation status.

After enabling BMS, the following pages are available.

Network status of lithium battery



When the upper right display shows SIG constant, the battery pack is operating as a single group; When it shows PAR constant, the battery pack is operating in multiple groups in series and parallel; When it flashes PAR, the battery pack is establishing a state of multiple groups in series and parallel.



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 will flash 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 will flash 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 will flash 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 display will flash 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 will flash ERR.



Display photovoltaic power generation quantity. The upper left displays the power generated this year. The upper right displays the power generated this month.

5.3.3 LCD 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.

Table 5-5 LCD Setting

No.	Description	Setting Option
00	Exit setting mode	00 ESC • Return to main page
01	Output source priority	OPP 01 SUB • Solar powers loads first OPP 01 SUB • Default setting OPP 01 SUB • Solar and battery powers loads first
02	Max. Charging current	nCC 02 60 • Set total charging current for PV and grid chargers nCC 02 60 • Default: 60A nCC 02 60 • Available options: 2/10/20/30/40/50/60/70/80/90/100A
03	Input mode	nOd 03 APL • Default mode nOd 03 APL • Applied to household appliances. nOd 03 UPS • Applied to computer and other devices. nOd 03 GEN • Applied to generator input at mains port; typical transfer time is 20ms..
04	Energy-saving mode	PUS 04 OFF • Default OFF PUS 04 OFF • ON: In battery mode, if load < 25W, output stops temporarily then resumes. Repeats if load remains < 25W. Resumes normal output if load > 35W

No.	Description	Setting Option
05	Battery type	bAt 05 AGn • Default: AGM (Lead-Acid Battery)
		bAt 05 FLd • FLD (Flooded Battery)
		bAt 05 LIb • LIB (Lithium Battery)
		bAt 05 FEL • FEL (Lithium iron)
		bAt 05 USE • USE (User-Defined)
06	Auto restart when overload occurs	LtS 06 ON • Default ON
07	Auto restart when over temperature occurs	LtS 07 ON • Default ON
08	Reset factory setting	Std 08 OFF • Default OFF • ON: Resets all settings to factory defaults. Automatically returns to OFF after reset. • The setting is invalid in mains and battery modes, but takes effect immediately in standby mode. • In parallel mode, settings can be adjusted when all rocker switches are OFF
09	Output frequency	OPF 09 50 • Default: 50 Hz • Options: 50 Hz, 60 Hz • Configurable in standby or mains modes. When switching from mains to battery mode, the frequency changes gradually.
10	Output voltage	OPV 10 230 • Default: 230 V • Options: 208V, 220 V, 230 V, 240 VThe setting can be applied immediately in mains and standby modes. When switching back to battery mode, the frequency changes gradually.
11	Grid charging current	Uti 11 20 • Default: 20 A • Options: 2/10/20/30/40/50/60/70/80/90/100A

No.	Description	Setting Option
12	Battery return to mains voltage point	AGM/FLD Type
		• Default: 11.5V • Range: 11–13V
		LIB/USE Type
13	Switching back to battery mode voltage points	b6C 12 11.5^v • Default: 11.9V • Range: 10–12.5V
		FEL Type
		• Default: 12.4V • Range: 10–12.5V
14	Grid low voltage point setting	After the battery shuts down due to low voltage, it needs to reach a certain voltage level to restart in battery mode. The value can be set to FUL or battery voltage. If set to FUL, the battery will only recharge to full capacity before it can restart in battery mode.
		AGM/FLD Type
		• Default: 13V • Range: 12–14.5V
15	Grid high voltage point setting	LIB/FEL/USE Type
		• Default: 13.6V • Range: 11.5–14.5V
		APL/GEN Mode
16	Charger source priority	• Default: 154V • Range: 90–154V
		UPS Mode
		• Default: 185V • Range: 170–200V
16	Charger source priority	APL/GEN Mode
		• Default: 264V • Range: 264–300V
		UPS Mode
16	Charger source priority	UHI 15 264^v • Default: 264V
		CHP 16 570 • PV and Grid are charged at the same time
		CHP 16 050 • Default: Only PV charge
16	Charger source priority	CHP 16 150 • PV first: Charges PV if available, else Grid

No.	Description				Setting Option
17	PV charging current	PV _C	17	60	• Default: 60A • Options: 2/10/20/30/40/50/60/70/80/90/100A
18	Silent mode setting	nUE	18	0N	• Default ON: buzzer silent in all modes.
19	Menu Default	ndF	19	0N	• Default ON: Returns to the first page if no operation for 1 minute (when not on the first page) • OFF: Stays on current page
20	Automatic screen shutdown setting	ALb	20	0N	• Default: ON • If turn on the function, the backlight will shutdown after 1 minutes of no button operation
21	Battery disconnection alarm	SBa	21	OFF	• Default OFF: No alarm • ON: Alarms when battery disconnection and low battery voltage
22	Main input cut warning	nI P	22	OFF	• Default OFF: No sound • ON: Buzzer sounds if grid or PV input lost
23	Overload transfer to bypass	OLb	23	OFF	• Default OFF • ON: Transfers to bypass mode on overload in PBG mode
24	Alarm setting	ALC	24	OFF	• Default OFF: All the alarm have no sound or light display • ON: Alarms active
25	Inverter soft start setting	StE	25	OFF	• Default OFF: The inverter output directly increases from 0 to the target voltage value. • If it set to ON, the inverter output gradually increases from 0 to the target voltage value.
26	Constant voltage mode voltage point setting	CV	26	14.1 ^v	AGM/FLD Type
					• Default: 14.1V(AGM), 14.5V(FLD)
					Notice: Unable to adjust
					LIB/USE Type
					• Default: 14.1V • Range: 12-15V
					Notice: Must > Float Charge Voltage
					FEL Type
• Default: 13.8V • Range: 12-15V					
Notice: Must > Float Charge Voltage					

No.	Description	Setting Option
27	Floating charge mode voltage point setting	AGM/FLD Type • Default: 13.5V Notice: Unable to adjust
		LIB Type • Default: 13.8V • Range: 12.5–14.5V Notice: Must < Constant Voltage
		USE Type • Default: 13.8V • Range: 12–15V Notice: Must < Constant Voltage
		FEL Type • Default: 13.6V • Range: 12.5–14.5V Notice: Must < Constant Voltage
		AGM/FLD Type • Default: 11V Notice: Unable to adjust
28	Battery low voltage alarm setting	LIB/USE Type • Default: 11.9V • Range: 10.3–12.5V
		FEL Type • Default: 12V • Range: 10.3–12.5V
		AGM/FLD Type • Default: 10.5V Notice: Unable to adjust
29	Battery shutdown voltage point	LIB/USE Type • Default: 11.5V • Range: 10–12V
		FEL Type • Default: 10.5V • Range: 10–12V

No.	Description	Setting Option		
				AGM/FLD/LIB/USE Type
30	Equalization voltage point setting	E90	30	14.6V
				• Default: 14.6V • Range: 12-15V
				FEL Type
				• Default: 14V • Range: 12-15V
31	Equalization charging time setting	E91	31	OFF
				• Default: OFF • Range: 5-900 min (adjust in 5-min steps)/OFF • Controller charges at max current until equalization voltage, then switches to constant voltage mode for set duration.
32	Equalization delay time setting	E90	32	120
				• Default: 120 minutes • Range: 5-900 min (adjust in 5-min steps)/OFF • Extends equalization if voltage not reached; returns to float charging if voltage is still below equalization voltage after delay • The function can be set as OFF
33	Equalization interval time setting	E91	33	30
				• Default: 30 days • Range: 1-90 days (increment of 1 day) • Enters equalization phase when interval is reached
34	Enable equalization immediately	E90	34	OFF
				• Default OFF • Activates equalization immediately when ON and battery connection is detected
				• Default: BLU (PV Priority Charging)
40	Photovoltaic Charging Priority	SSP	40	BLU
				• LBU (PV Priority for Load) • LUB (PV + Grid for Load)
				• Manages communication with BMS protocols • Default OFF • Supported protocols:
44	BMS communication function	b05	44	OFF
				CVT: CVTE protocol(485) PYL: PYLON protocol(485) GRO: GROWATT protocol(485) VOL: VOLTRONIC protocol(485) IRF: IRON TOWEL protocol(485) PAC: PACE protocol(485)

No.	Description	Setting Option
45	BMS ID setting	bnl 45 AtO • Sets ID for BMS communication. • Default: ATO(Auto) • Range: [0,9]/A/B/C/D/E/F/ATO/OVE • When system poll for the first ID with a correct response, it locks the ID and only asks the BMS with that ID
46	Low SOC shutdown	bSU 46 20 • Inverter shutdown when SOC falls below the set value • Default: 20% • Range: 5-50% • In battery mode, if SOC reaches the set value, the inverter shuts down and triggers alarm 68, which clears when SOC returns to set value + 5% • In standby mode, inverter switches to battery mode when SOC reaches set value + 10%; otherwise, it triggers alarm 69 • Alarm 69 is triggered when $SOC \leq +5\%$ of set value and cleared at +10% of set value. • If off, inverter ignores SOC status for shutdown/startup/alarm operations. • Communication errors cause SOC data to be ignored and related alarms to be cleared
47	High SOC to battery	Stb 47 90 • Set the SOC value for the inverter to switch to battery mode • Default: 90% • Range: 10-100% • In PBG mode, if $SOC \geq$ set value and battery voltage > grid voltage, switch to battery mode • Can be set to OFF to disable switching based on SOC • If communication fails, inverter stops using SOC and clears alarms
48	Low SOC to grid	StG 48 25 • Set SOC for inverter to switch to grid mode • Default: 25% • Range 10-90% • In PBG mode, if $SOC \leq$ set value and battery voltage < grid voltage, switch to grid mode • Can be set to OFF to disable switching based on SOC • If communication fails, inverter stops using SOC and clears alarms

No.	Description		Setting Option
49	Max. discharge current	ndC 49 OFF	• Default OFF: the inverter will not limit the battery discharging current • Range: [10,150A]/OFF • Set a value (10–150A, step 5A) to limit current. Over-limit triggers alarm 60. Over 5 seconds, fault 14 occurs, inverter to fault mode
60	Battery dual output duration	dbt 60 FUL	• Default FUL • Range: [5,900min]/OFF/FUL • When enabled, the secondary output of the inverter is enabled by default. In battery mode, it turns off when the discharge time reaches the set point • Setting to FUL allows unlimited output time
61	Battery dual output low voltage shutdown point	dbv 61 120	• Default: 12V • Range:11–13V • After entering battery mode, when the battery voltage falls below the set point, the secondary output is turned off.
62	Dual output battery mode cut-off SOC	dbS 62 30%	• Default: 30% • Range: OFF/[5–90%] • After entering battery mode, when the battery voltage falls below the set point, the secondary output is turned off.
63	Battery dual output restart setting	dv 63 13	• Default: 13V • Range:11–15V • After entering battery mode, when the battery voltage is higher than the set point, the secondary output is turned on.
64	Dual output battery mode restart SOC	dvS 64 90	• Default: 90 • Range: OFF/[30–100]
85	Timing setting-Minute	nt U 85 0	• Default: Current minutes • Range: 0–60 minutes • Set it to current time during first setup.
86	Timing setting-Hour	ntH 86 0	• Default: Current hour • Range: 0–24 hour • Set it to current time during first setup.
87	Timing setting-Day	ntD 87 1	• Default: Current day • Range: 1–31 day • Set it to current time during first setup.
88	Timing setting-Month	ntM 88 1	• Default: Current month • Range: 1–12 month • Set it to current time during first setup.

No.	Description	Setting Option
89	Timing setting- Year	YEA 89 0 • Default: Current year • Range: 0-99 • Set it to current time during first setup.

6 Troubleshooting Guide

Contact the Customer Service for further assistance.

6.1 Inverter Fault Code

When a fault occurs, the inverter enters fault mode, with a constant red LED light and LCD displaying a fault code.



Figure 6-1 Fault display

Table 6-1 Fault code

Fault Code	Meaning	Trigger conditions	Resume conditions
1	Bus soft boost start failed	Bus voltage does not reach set value for more than 30 seconds.	Cannot restore.
2	Bus voltage high	Bus voltage is higher than protection point.	Cannot restore.
3	Bus voltage low	Bus voltage is lower than the under voltage protection point.	Cannot restore.
4	Battery over current	TZ interrupt triggered more than 2 times within 2ms.	Cannot restore.
5	Over temperature	The PFC temperature exceeds the protection threshold. Fan stuck for more than 5 minutes.	Tried to restart six times. If failed, cannot restore.
6	Battery high voltage	Battery voltage is higher than set value.	Restore after voltage is lower set value.
7	Bus soft start fault	The soft start process has exceeded but the bus voltage has not reached set value.	Cannot restore.
8	Bus short circuit	Inverter on or PFC on, bus voltage below threshold.	Cannot restore.

Fault Code	Meaning	Trigger conditions	Resume conditions
9	Inverter soft start fault	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.
10	INV over voltage	The inverter voltage is higher than the set value [276V].	Cannot restore.
11	Inverter under voltage	Battery mode and there is no short circuit in the inverter, the inverter voltage is lower than 160V.	Cannot restore.
12	INV short circuit	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.
13	Negative power protection	In battery mode, the load power is lower than set value (negative power, such as -1200W).	Cannot restore.
14	Over load	Overload exceeds limit (list in specification).	Tried to restart six times. If failed, cannot restore.
15	Model fault	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.
16	No boot loader	No boot loader.	Cannot restore. Try to send command TIDA1911000000000000.
26	BMS fault	Error code in BMS message.	Turn off BMS communication function or BMS fault recovery.
28	NTC fault	NTC open circuit	Cannot restore.

6.2 Inverter Alarm Code

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



Figure 6-2 Alarm display

Table 6-2 Alarm code

Alarm code	Meaning	Relevant action	Trigger conditions	Resume conditions
50	Battery open	Alarm, battery does not charge.	Battery voltage is lower than set value.	Restore after battery voltage recovery.
51	Battery low voltage shutdown	Alarm, battery low voltage shutdown or cannot power on.	Battery voltage is lower than set value.	Restore after battery voltage recovery.
52	Battery low voltage	Alarm	Battery voltage is lower than set value.	Restore after battery voltage recovery.
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.
54	Low power discharge	Alarm	The battery voltage is greater than 16V and the discharge time exceeds the set low-power discharge time.	Restore after battery voltage recovery.
55	Battery over charge	Alarm, battery does not charge.	Battery voltage is higher than the set value.	Can restore.
56	BMS loss	Alarm, lock standby mode.	No correct BMS communication response within 10 seconds.	Restore after communication recovery.

Alarm code	Meaning	Relevant action	Trigger conditions	Resume conditions
58	Fan error	Alarm, if one fan fails and the other fan is running at full speed	Fan speed is lower than the set value	Restore after fan recovery.
59	EEPROM error	Alarm	EEPROM read/write exception	Restore after calibration right.
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.
61	Abnormal generator waveform	Alarm, continuously operating in battery mode.	Generator waveform detection result is abnormal.	Can restore.
62	PV energy weak	Alarm, turn off the PV output to the load, but keep the PV charging the battery	When the battery is not connected, the bus voltage is lower than the set value	Restore after 10 mins.
68	Battery under SOC	Alarm, turn to 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%.
69	Low SOC	Alarm, if it is in standby mode, it will remain in standby mode and not power on.	Lithium battery SOC is lower than set value +5% (grid mode or battery mode), lower than set value +10% (standby mode)	Restore after turning off the low SOC shutdown function, turning off the BMS communication function, or when the SOC returns to the set value + 10%.

Alarm code	Meaning	Relevant action	Trigger conditions	Resume conditions
71	Battery short circuit	Alarm	Battery short circuit is detected.	Cannot restore.
72	Battery can not startup	Alarm	During standby, battery voltage is lower than the allowed startup voltage	Restore after the battery voltage is higher than the allowed startup voltage

7 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.

NOTICE

- Do not activate this mode when using lithium batteries.

How to Apply Equalization Function

- 1 Set balance voltage point on "Program 30".
- 2 Set balance charging time on "Program 31".
- 3 Set balance delay time on "Program 32".
- 4 Set balance interval time on "Program 33".
- 5 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 equalization stage.

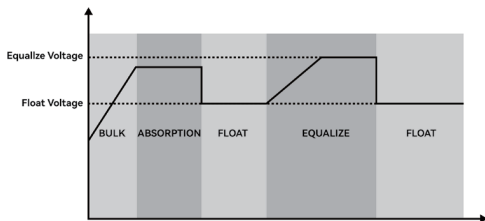


Figure 7-1 Equalization stage

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 remains in the Equalize stage until setting battery zed time is arrived.

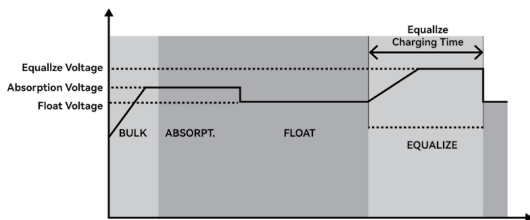


Figure 7-2 Equalize time

However, in Equalize stage, when battery equalized time is expired and battery voltage does not 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.

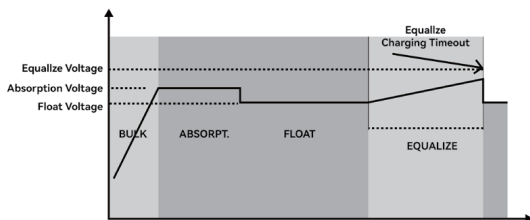


Figure 7-3 Equalize timeout

8 Specifications

• PV INPUT

Max. PV Power	3000 W
Max. PV Array Open Circuit Voltage	450 Vdc
MPPT Range @ Operating Voltage	30–400 Vdc
Number of MPP Tracker	1

• AC OUTPUT

Nominal Output Voltage	230 Vac
AC Voltage Range	208–240 Vac
AC Frequency Range	49–51 ± 0.1% Hz / 59–61 ± 0.1% Hz
Nominal Output Current	8.7 A
Power Factor Range	> 0.99

• GRID INPUT

Acceptable Input Voltage Range	170–280 ± 3 Vac (UPS mode) 90–280 ± 3 Vac (Appliance mode)
Frequency Range	50–60 Hz (Auto-Sensing)
Rating of AC Transfer Relay	17 A

• BATTERY MODE OUTPUT

Nominal Output Voltage	230 Vac
Output Waveform	Pure Sine Wave

• BATTERY & CHARGER

Nominal DC Voltage	12 Vdc
Maximum Charging Current (from Grid)	100 A
Maximum Charging Current (from PV)	100 A
Maximum Charging Current	100 A

• GENERAL

Dimension	360 mm × 281 mm × 100 mm (W × D × H)
Net Weight	5 kg

• INTERFACE

Communication	RS485 / CAN / Wi-Fi
---------------	---------------------

• ENVIRONMENT

Humidity	5%–95% (Non-condensing)
Operating Temperature	–10 °C to +60 °C
Ingress protection	IP21

9.1 Filter Cotton Cleaning



CAUTION!

- Before cleaning the filter cotton, please refer to “5.2 Power OFF” to power off the inverter.

Step 1: Remove the screws from the vents and store them properly.

Step 2: Remove the filter cotton and clean it.

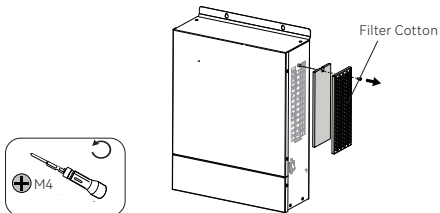


Figure 9-1 Remove the filter cotton

Step 3: Install the cleaned filter cotton and vent back onto the inverter, tighten the screw.

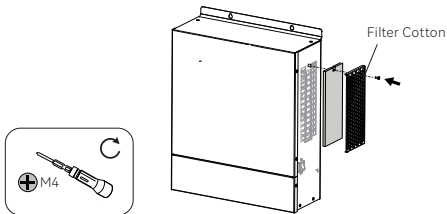


Figure 9-2 Install the cleaned filter cotton



NOTICE

- Make sure the filter cotton is dry when installing it. Otherwise, water may enter the inverter, which may damage the inverter.

