

Off-Grid Solar Inverter 1.2kW 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 (2025-12-03)

Initial release

Version 1.0 (2025-09-16)

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.
- After a factory reset, reconfigure using only the values in this manual; operation outside these limits may cause malfunction, and any risk or damage is borne solely by the user.

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 120% for up to 10 minutes;
- Capable of withstanding a load between 120% and 150% for up to 1 minute;
- Capable of withstanding a load between 150% and 200% for up to 10 seconds;
- Capable of withstanding a load exceeding 200% for up to 200 milliseconds.

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)
Half-wave Load(HW)	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 ms)	The maximum supported load power
1200 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.

2 Introduction

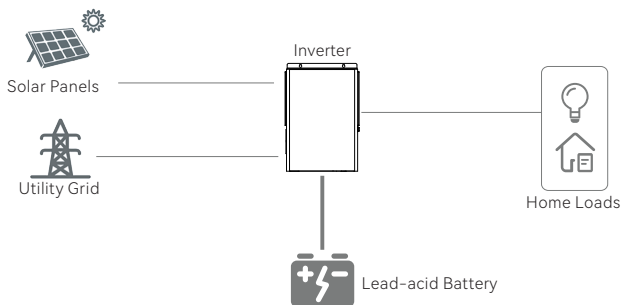


Figure 2-1 System Overview

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 the ability to work without battery
- Dual AC output

2.2 Product Overview

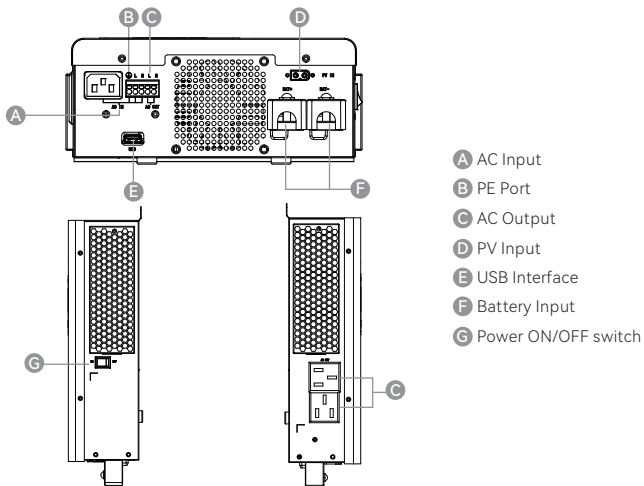


Figure2-2 Terminal

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



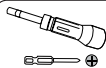
Heat shrink tube



Cable tie



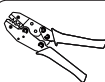
Rubber hammer



Torque wrench



Multimeter



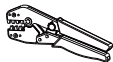
PV crimping tool



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
Crimp Terminal	5 pcs
PV Joints	1 pc

3.2 Mounting Unit

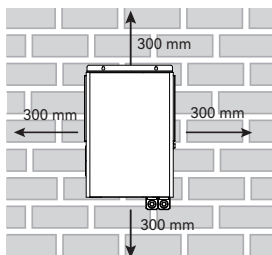


Figure 3-1 Installation distance recommendation

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.

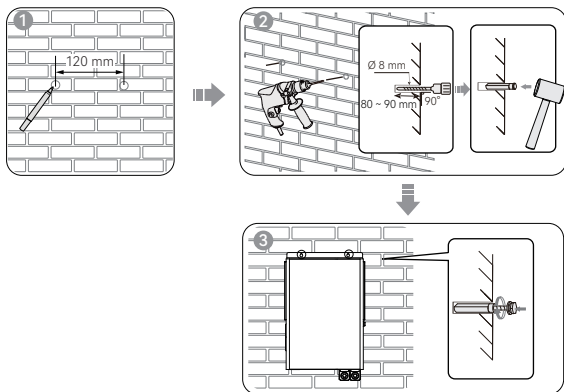


Figure 3-2 Installing the inverter

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.

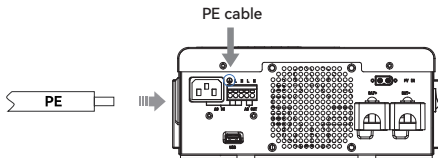


Figure 4-1 PE connection

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 16A for 1200W inverter.
- There are two terminal blocks with "AC IN", "AC OUT" markings. Please DO NOT mis-connect input and output connectors.

Table 4-1 Suggestion for AC input/output wires

Wire Size	Cable
16 AWG	1.5 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.

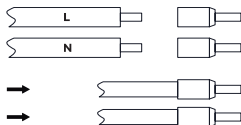


Figure 4-2 AC cable connection

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

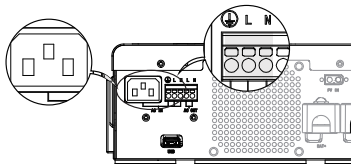


Figure 4-3 AC wire connection

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
14 AWG	2 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.

Table 4-3 PV module

Max. PV Array Open Circuit Voltage [Vdc]	125
PV Array MPPT Voltage Range [Vdc]	20~100

**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 5–6mm insulation. Solder the PV leads to the PV joints supplied in the accessory kit, and replace the cover.
- Step 3:** Insert PV input cables.

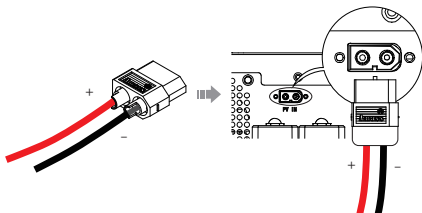


Figure 4-4 PV cable connection

**WARNING!**

- Use multi-meter check to ensure the polarities are correct.
- Do not connect the positive and negative poles together during soldering, as this will create a short circuit, causing sparks, component damage, or even fire.

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 4-4 Suggestion for battery cable and terminal

Wire Size	Cable
4 AWG (Copper)	25 mm ²
2 AWG (Aluminum)	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 4-5 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 N·m).

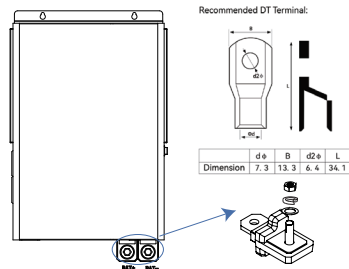


Figure 4-6 Battery side connection



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 (-).

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.

5.3.1 Introduction of Control Panel

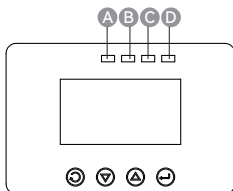


Figure 5-1 LED panel

Table 5-1 LED indicator

LED Indicator	Description	
A 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.
B Inverter indicator (Yellow)	Solid On	Output is powered by battery or PV in battery mode.
	Off	Other states.
C Charging indicator (Yellow)	Solid On	The battery is in float charging,
	Flashing	The battery is in constant voltage charging.
	Off	Other states.
D 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

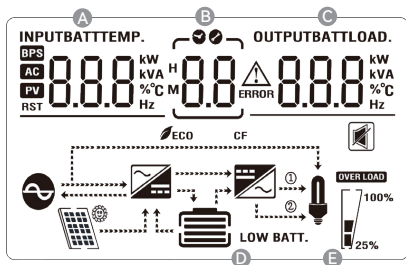


Figure 5-2 LCD display

Table 5-3 LCD Icons

Icon	Description
AC Input Information	
	AC input icon.
	Indicate AC input power, AC apparent power and AC input frequency.
PV Input Information	
	PV input icon.
	Indicate PV power and PV apparent power.
Load Information	
	Load icon.
	Indicate power of load, apparent power, power percentage of load and 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.

Icon	Description
	Indicate the buzzer is disabled.
	Indicate power saving mode.

Table 5-4 LCD display information

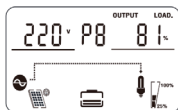
LCD display	Information
	- A AC input voltage - B Page number - C Output voltage - D Battery capacity - E Load percentage
	- A AC input frequency - B Page number - C Output frequency - D Battery capacity - E Load percentage
	- A Battery voltage - B Page number - C Charge current - D Battery capacity - E Load percentage
	- A PV voltage - B Page number - C PV charging current - D Battery capacity - E Load percentage
	- A PV voltage - B Page number - C PV power - D Battery capacity - E Load percentage
	- A Output voltage - B Page number - C Active power output - D Battery capacity - E Load percentage

LCD display

Information



- A Output voltage
- B Page number
- C Apparent power output
- D Battery capacity
- E Load percentage



- A Output voltage
- B Page number
- C Apparent power output
- D Battery capacity
- E Load percentage



Display software version.



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



Parallel operation status.

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 Battery icon description (Lead-acid battery)

No.	Description	Setting Option
01	Output voltage	OPU 01 230 V • Default: 230 V • Options: 220 V, 230 V, 240 V

No.	Description	Setting Option	
02	Output frequency	OPF 02 50 _{Hz}	• Default: 50 Hz • Options: 50 Hz, 60 Hz • This parameter can only be set at power-up; adjustment under load is prohibited and may damage the inverter
03	Output source priority	OPP 03 PGb	• Grid is given priority to power the load. • If the grid power exit, battery will power the load. • Solar only charge the battery in all conditions. • If grid and battery power is not sufficient to power loads, inverter will go to standby and charge battery.
		OPP 03 GPb	• Same as PGb
		OPP 03 P6G	• Default setting • Battery is given priority to power the load. • If the energy of battery is insufficient, the grid will power the load. • Solar only charge the battery in all conditions. • If grid and battery power is not sufficient to power loads, inverter will go to standby and charge battery.
04	Input mode	OPP 03 n6P	• Comprehensive priority. • When PV exists, the battery takes priority, and when PV does not exist, the grid takes priority.
		oOd 04 APP	• Default mode • Applied to household appliances.
05	Charger source priority	oOd 04 UPS	• Applied to computer and other devices. • Typical switching time is 10 ms.
		CHP 05 PnG	• PV and Grid are charged at the same time
		CHP 05 OPu	• Default: Only PV charge
06	Grid charging current	CHP 05 PUF	• PV first; if both PV and grid available, PV charge
		FCC 06 40	• Default: 40 A • Options: 2-60A continuously selectable

No.	Description	Setting Option	
07	Max. Charging current	nCC 07 40	- Set total charging current for PV and grid chargers - Default: 40A - Available options: 2/10/20...100/110/120A
08	Menu Default	ndF 08 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
09	Auto restart when overload occurs	LtS 09 0N	Default ON
10	Auto restart when over temperature occurs	EtS 10 0N	Default ON
11	Main input cut warning	nI P 11 OFF	- Default OFF: No sound - ON: Buzzer sounds for 5 sec if grid or PV input lost
12	Energy-saving mode	PuS 12 OFF	- Default OFF - ON: In battery mode, if load < 25W, output stops temporarily then resumes. Repeats if load remains < 25W. Resumes normal output if load > 35W
13	Overload transfer to bypass	OLG 13 OFF	- Default OFF - ON: Transfers to bypass mode on overload in PBG mode
14	Silent mode setting	nUt 14 0N	Default ON: buzzer silent in all modes.
15	Battery return to mains voltage point	bEtG 15 11.9 ^v	AGM/FLD Type
			- Default: 11.5V - Range: 11-13V
16	Switching back to battery mode voltage points	bEtB 16 13.6 ^v	LIB/FEL/CUS Type
			- Default: 11.9V - Range: 10-12.5V
16	Switching back to battery mode voltage points	bEtB 16 13.6 ^v	AGM/FLD Type
			- Default: 13V - Range: 12-14.5V
16	Switching back to battery mode voltage points	bEtB 16 13.6 ^v	LIB/FEL/CUS Type
			- Default: 13.6V - Range: 11.5-14.5V

No.	Description	Setting Option			
17	Battery type	bAt	17	AGn	• AGM (Lead-Acid Battery)
		bAt	17	FLd	• FLD (Flooded Battery)
		bAt	17	LIb	• Default: LIB (Lithium Battery)
		bAt	17	CUS	• CUS (User-Defined)
		bAt	17	FEL	• FEL (Lithium iron)
18	Battery low voltage point	bAL	18	110 ^v	AGM/FLD Type • Default: 11V Notice: Unable to adjust
					LIB/FEL/CUS Type • Default: 11V • Range: 10.3-12.5V
19	Battery shutdown voltage point	bAU	19	105 ^v	AGM/FLD Type • Default: 10.5V Notice: Unable to adjust
					LIB/FEL/CUS Type • Default: 10.5V • Range: 10-12V
20	Constant voltage mode voltage point setting	bC ^v	20	14.1 ^v	AGM/FLD Type • Default: 14.1V(AGM), 14.5V(FLD) Notice: Unable to adjust
					LIB/FEL/CUS Type • Default: 14.1V • Range: 12-15V Notice: Must > Float Charge Voltage

No.	Description	Setting Option
		AGM/FLD Type • Default: 13.5V Notice: Unable to adjust
21	Floating charge mode voltage point setting	bFL 21 138^v LIB/FEL Type • Default: 13.8V • Range: 12.5-14.5V Notice: Must < Constant Voltage
		CUS Type • Default: 13.8V • Range: 12.5-14.5V Notice: Must < Constant Voltage
22	Grid low voltage point setting	LL^v 22 154^v APP/GEN Mode • Range: 90-154V • Default: 154V
		UPS Mode • Range: 170-200V • Default: 185V
23	Grid high voltage point setting	LH^v 23 264^v APP/GEN Mode • Range: 264-280V • Default: 264V
		UPS Mode • Default: 264V
24	Automatic screen shutdown setting	AtG 24 ON • Default ON • If turn on the function, the backlight will shutdown after 10 minutes of no button operation
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	Reset factory setting	Std 26 OFF • Default OFF • ON: Resets all settings to factory defaults. Automatically returns to OFF after reset. • The setting can be applied immediately in mains and standby modes, but can not be set in battery mode

No.	Description	Setting Option			
29	Battery disconnection alarm	5bA	29	OFF	• Default OFF: No alarm • ON: Alarms when battery disconnection and low battery voltage
30	Battery equalization mode	E9n	30	OFF	• Default OFF • If 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.
31	Equalization voltage point setting	E9v	31	14.6 ^v	• Default: 14.6V • Range: 12-15V
32	Equalization charging time setting	E9t	32	60	• Default: 60 min • Range: 5-900 min (adjust in 5-min steps) • Controller charges at max current until equalization voltage, then switches to constant voltage mode for set duration.
33	Equalization delay time setting	E90	33	120	• Default: 120 minutes • Range: 5-900 min (adjust in 5-min steps) • 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
34	Equalization interval time setting	E9i	34	30d	• Default: 30 days • Range: 1-90 days (increment of 1 day) • Enters equalization phase when interval is reached
35	Enable equalization immediately	E9n	35	OFF	• Default OFF • Activates equalization immediately when ON and battery connection is detected
61	Max. discharge current	ndC	61	OFF	• Default OFF: the inverter will not limit the battery discharging current • Set a value (10-120A, step 5A) to limit current. Over-limit triggers alarm 60. Over 5 seconds, fault 14 occurs, inverter to fault mode
62	OPL (only PV loadable)	OPL	62	ON	• If the system without battery, set OPL to ON (default) • If the system with battery, set it to OFF.

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 26.4V 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 10mins.
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 build up 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 mode on Program 30.
- 2 Set balance voltage point on Program 31.
- 3 Set balance charging time on Program 32.
- 4 Set balance delay time on Program 33.
- 5 Set balance interval time on Program 34.
- 6 Set immediate balance mode activation on Program 35.

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.

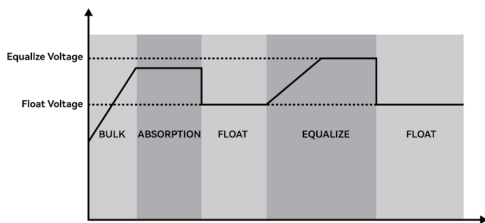


Figure 7-1 Equalization stage

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.

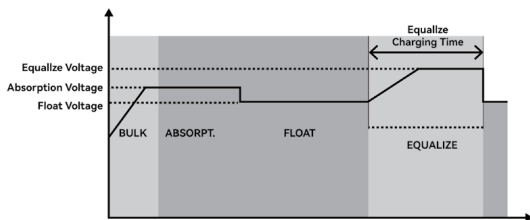


Figure 7-2 Equalize time

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.

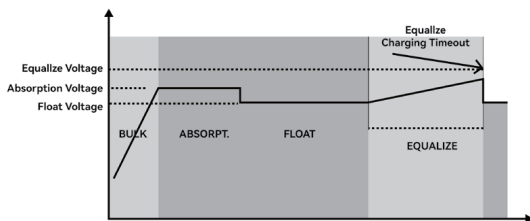


Figure 7-3 Equalize timeout

8 Specifications

• PV INPUT

Model	1.2kW IP21
Max. PV Power [W]	1000
Max. PV Array Open Circuit Voltage [Vdc]	125
MPPT Range @ Operating Voltage [Vdc]	20 ~ 100
Number of MPP Tracker	1

• AC OUTPUT

Model	1.2kW IP21
Nominal Output Voltage [Vac]	230
AC Voltage Range [Vac]	195 ~ 253
AC Frequency Range [Hz]	49-51 ± 0.1% / 59-61 ± 0.1%
Nominal Output Current [A]	5.2
Power Factor Range	> 0.99

• GRID INPUT

Model	1.2kW IP21
Acceptable Input Voltage Range [Vac]	170~280 ± 3 (UPS mode) 90~280 ± 3 (Appliance mode)
Frequency Range [Hz]	50 ~ 60 (Auto-Sensing)
Rating of AC Transfer Relay [A]	16

• BATTERY MODE OUTPUT

Model	1.2kW IP21
Nominal Output Voltage [Vac]	230
Output Waveform	Pure Sine Wave

• BATTERY & CHARGER

Model	1.2kW IP21
Nominal DC Voltage [Vdc]	12
Maximum Charging Current (from Grid) [A]	60
Maximum Charging Current (from PV) [A]	60
Maximum Charging Current [A]	108

• GENERAL

Model	1.2kW IP21
Dimension (W*D*H) [mm]	240 * 100 * 385
Net Weight [kg]	4.5

• INTERFACE

Model	1.2kW IP21
Communication	USB

- ENVIRONMENT

Model	1.2kW IP21
Humidity	5% ~ 95% (Non-condensing)
Operating Temperature [°C]	-10 ~ +50

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.

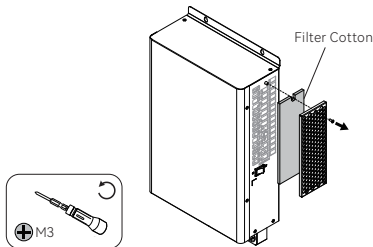


Figure 9-1 Remove the filter cotton

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

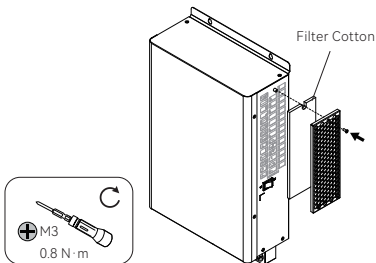


Figure 9-2 Install the cleaned filter cotton



NOTICE

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

