ECO-WORTHY
ENERGY FOR INDEPENDENCE

Version: A-1 V1.01

All-in-one

Solar Charge Inverter User Manual



SUPPORT

If you encounter technical issues and cannot find a solution in this manual, please contact ECO-WORTHY for further assistance.

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READ THE INSTRUCTIONS COMPLETELY BEFORE OPERATING THE EQUIPMENT

[Disregarding these instructions could result in permanent damage to the unit]

Due to product iteration and upgrade requirements, the equipment specifications, parameters and functional configurations are subject to timely updates and adjustments. The latest version of the user manual can be obtained via the official website: https://www.ECO-WORTHY.com. We have made every effort to ensure the completeness and accuracy of the content in this document; however, ECO-WORTHY reserves the right to modify product and document content without prior notice.
Users must strictly follow the provisions of this manual throughout the entire process of equipment installation, operation and maintenance. ECO-WORTHY shall not be liable for any consequences arising from failure to operate in accordance with the requirements specified in this manual. Meanwhile, ECO-WORTHY shall only be responsible for the inverter equipment supplied herewith, and shall not assume joint and several liability for any associated upstream or downstream systems related to the equipment.
The Company shall not be liable for damage caused by:

① Damage caused by improper use or use in a wrong location.

② PV modules with an open-circuit voltage exceeding the maximum permissible voltage.

③ Damage caused by the operating temperature exceeding the restricted operating temperature range.

④ Dismantling and repair of the inverter by unauthorised persons.

⑤ Damage caused by force majeure: damage during transport or handling of the inverter.

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1. Safety Precautions

1.1 How to Use This Instruction Manual

This manual contains important product information, guidelines, and operating and maintenance instructions.
Read the manual and other related documents before performing any operation on the inverter. Documents must be stored carefully and be available at all times.

1.2 Meanings of Symbols in the Manual

Symbol	Description
	DANGER : indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	WARNING : indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	CAUTION : indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
	NOTICE : provides important information related to the operation of the product.

1.3 Safety Instructions

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

• Be sure to comply the local requirements and regulation to install this inverter.

• Beware of high voltage. Please turn off the switch of each power sources before and during the installation to avoid electric shock.

• For optimum operation of this inverter, please follow required specification to select appropriate cable size and necessary protective device.

• Do not connect or disconnect any connections when the inverter is working.

• Do not open the terminal cover when the inverter working.

• Make sure the inverter is well grounding.

• Never cause AC output and DC input short circuited.

• Do not disassembly this unit, for all repair and maintenance, please take it to the professional service center.

• Never charge a frozen battery.

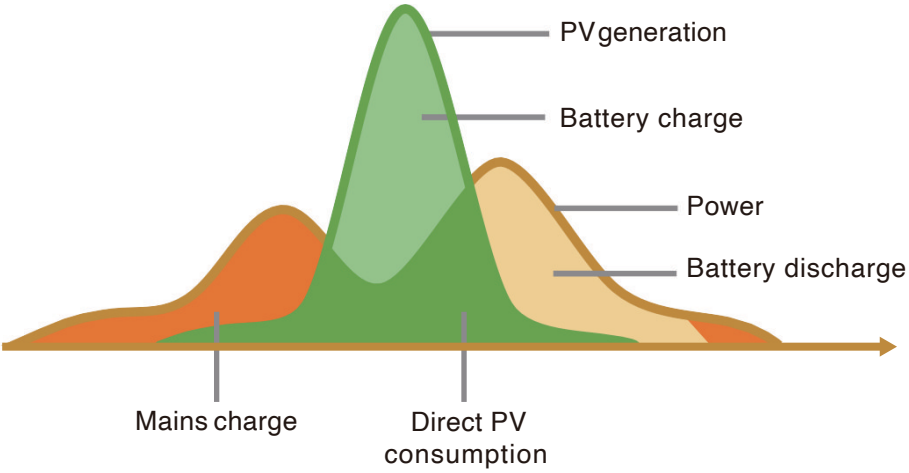
• Please keep children away from touching or mishandling the inverter.

• Please make sure that this inverter is the only input power source for the load, do not use it in parallel with other input AC power sources to avoid damage. Ensure this inverter is the sole input power source for the load. Do not parallel it with other AC input power sources to avoid damage.

2. Product Introduction

2.1 Product Description

The product is a new type of solar energy storage inverter integrating solar energy storage, utility power charging storage, and AC sine wave output. Adopting DSP control and advanced control algorithms, it features fast response speed, high reliability, and compliance with industrial standards.



2.2 Product Features

• Supports connection of lead-acid batteries and lithium-ion batteries.

• Features Dual activation function when lithium-ion batteries are in hibernation; activation of lithium-ion batteries can be triggered by either mains power or photovoltaic power input.

• Supports three-phase pure sine wave output (156~242V).

• Supports phase voltage adjustment within the AC range of 100, 105, 110, 120 and 127 volts.

• Supports two-way photovoltaic input, with the function of simultaneously tracking the maximum power charging or load-carrying capacity of two MPPTs.

• Dual MPPT with 99.9% efficiency and maximum 36A current in a single circuit, perfectly adapted to high power modules.

• 2 charging modes are available: solar only, grid + PV hybrid charging.

• With the time-slot charging and discharging setting function, you can set the time period for cutting in/out of mains charging and switch the time period between battery discharging and mains bypass power supply mode.

• Energy saving mode function to reduce no-load energy losses.

• With two output modes of utility bypass and inverter output, with uninterrupted power supply function.

• Dedicated generator port, which can also serve as a secondary load output.

• LCD large screen dynamic flow diagram design, easy to understand the system data and operation status.

• 360° protection with complete short circuit protection, over current protection, over under voltage protection, overload protection, backfill protection, etc.

• Support CAN, USB, and RS485 communication.

2.3 System Connection Diagram

The diagram below shows the system application scenario of this product. A complete system consists of the following components:

• PV modules: Converts light energy into DC energy, which can be used to charge the battery via an inverter or directly inverted into AC power to supply the load.

• Utility grid or generator: Connected to the AC input, it can supply the load and charge the battery at the same time. The system can also operate generally without the mains or generator when the battery and the PV module power the load.

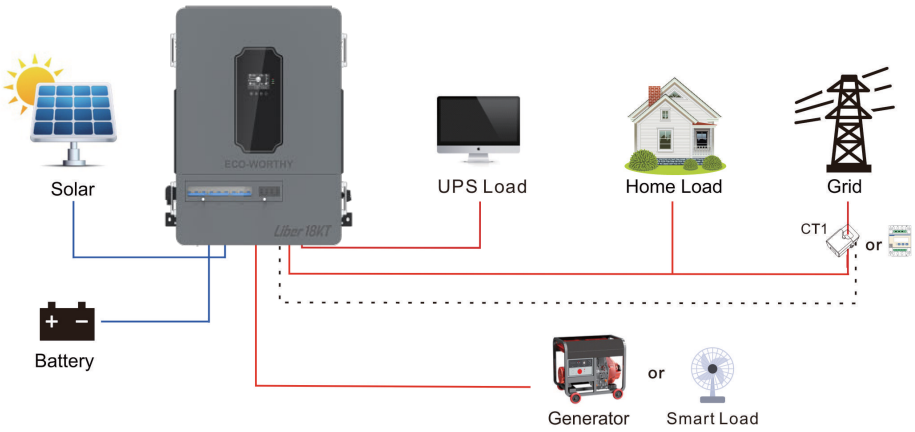
• Battery: The role of the battery is to ensure the regular power supply of the system load when the solar energy is insufficient and there is no mains power。

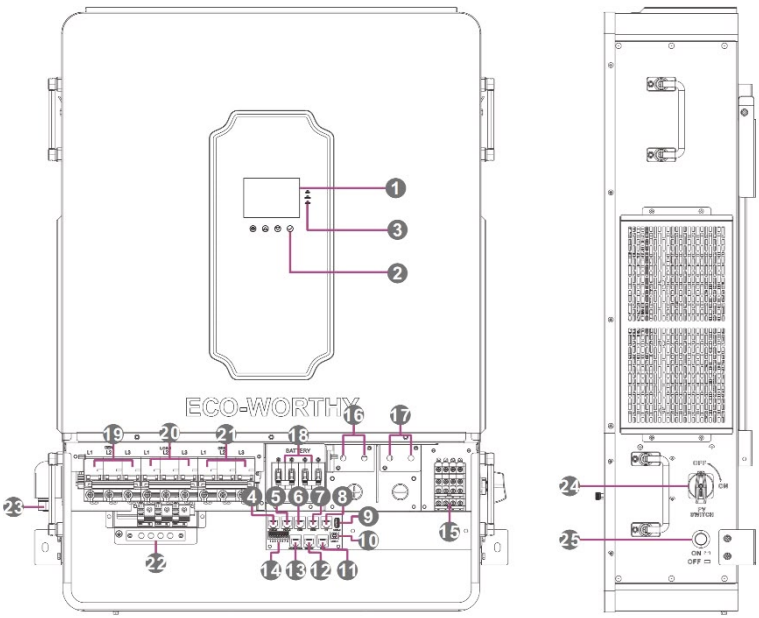
• Home load: Various household and office loads can be connected, including refrigerators, lamps, televisions, fans, air conditioners, and other AC loads.

• Inverter: The energy conversion device of the whole system.

Note: The actual application scenario determines the specific system wiring method.

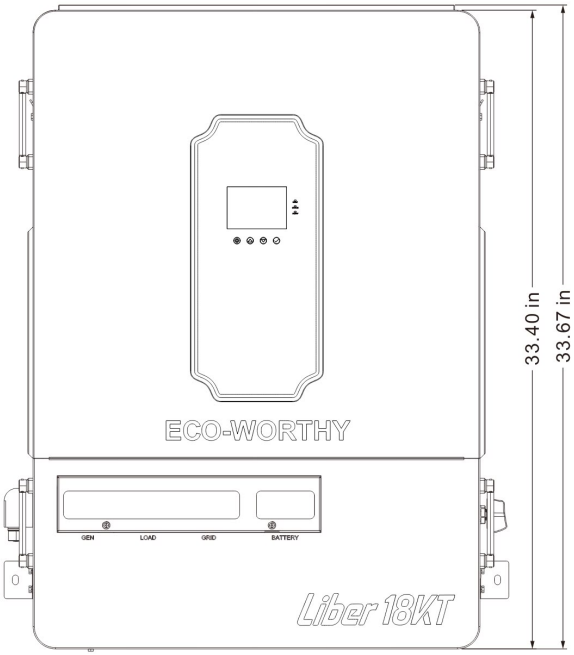
2.4 Product Overview

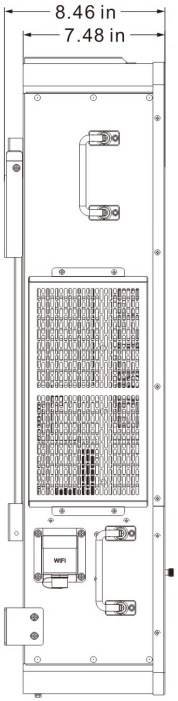


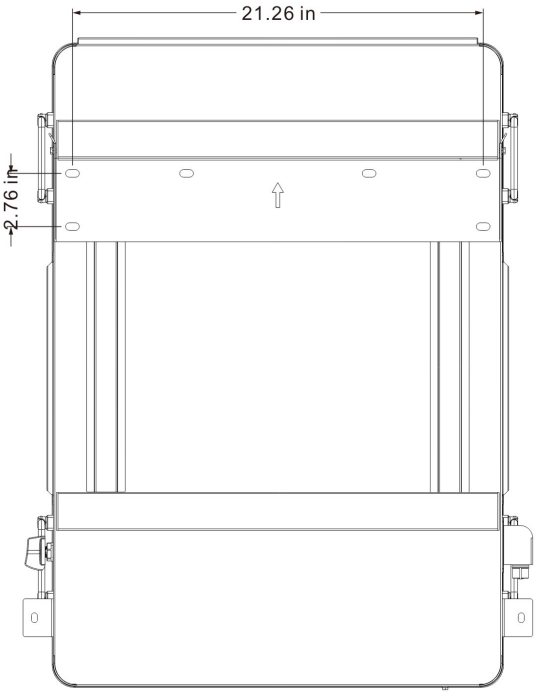


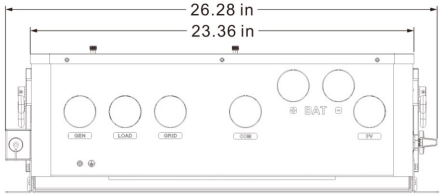
1	LCD Screen	2	Operation Buttons	3	LED Indicators
4	Parallel Port (PAR-B)	5	Parallel Port (PAR-A)	6	CAN Port
7	DRM Port	8	CT Port	9	USB-2 Port
10	USB-1 Port	11	WiFi Port 1	12	Meter Port
13	RS485/CAN Port	14	Dry Contact Prot	15	PV Input (PV1+PV2)
16	Battery (Positive Terminal)	17	Battery (Negative Terminal)	18	Battery Circuit Breaker
19	Generator Input (L1+L2+L3+N)	20	Load Output (L1+L2+L3+N)	21	Grid Input (L1+L2+L3+N)
22	PE Terminal	23	WiFi Port 2	24	PV Switch
25	Power ON/OFF Switch				

2.5 Product Size









3.Installation

3.1 Parts List

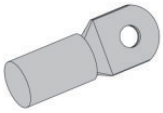
Pleasecheck the equipment before installation. Make sure that there is no damage to the packaging. You should have received the following items in the package:



Inverter
x 1pcs



Wall mount bracket
x 1pcs



Crimp Terminal SC95-8
x 4pcs



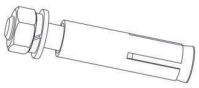
Gasket M8*20mm
× 4pcs



Hexagon Socket Cross Countersunk Head Screw M8*12mm
× 5pcs



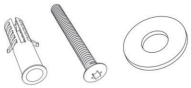
Hexagon Socket Cross Countersunk Head Screw M5*10mm
× 4pcs



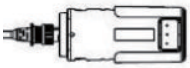
Expansion Bolt
M8*60mm
× 4pcs



Socket Wrench M8
× 1pcs



Round-head self-tapping screws FA6*35 + white rubber plugs + washers
x 1bag



WiFimodule
x 1pcs



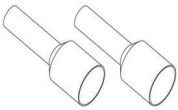
Parallel cable
x 1pcs



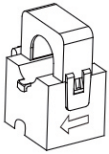
Black screw M4*8mm
x 4pcs



Hex Key_L-Type_5mm
x 1pcs



Ferrule terminal
x 8pcs



CT (Optional)
x 1pcs



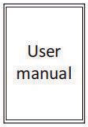
Meter (Optional)
x 1pcs



Quality certificate
x 1pcs



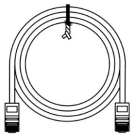
Outgoing inspection report
x 1pcs



User manual
x 1pcs



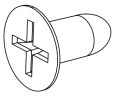
Warranty Card
x 1pcs



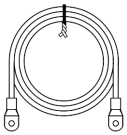
Communication network cable x 1pcs



Expansion bolt x 2pcs



Countersunk Head Screw KA6 x 30 x 2pcs



Cable 1500mm x 4 pcs

3.2 Mounting Instructions

3.2.1 Installation Location Selection

The product is designed for indoor use only (IP20 rated). Consider the following factors when selecting the installation location:

• Choose the solid wall to install the inverter.

• Mount the inverter at eye level.

• Adequate heat dissipation space must be provided for the inverter.

• The ambient temperature should be between 14 ~ 131°F to ensure optimal operation.



DANGER

• Do not install the inverter where highly flammable materials are near by.
• Do not install the inverter in potential explosive areas.
• Do not install the inverter with lead-acid batteries in a confined space.

CAUTION

• Do not install the inverter in direct sunlight.
• Do not install or use the inverter in a humid environment.

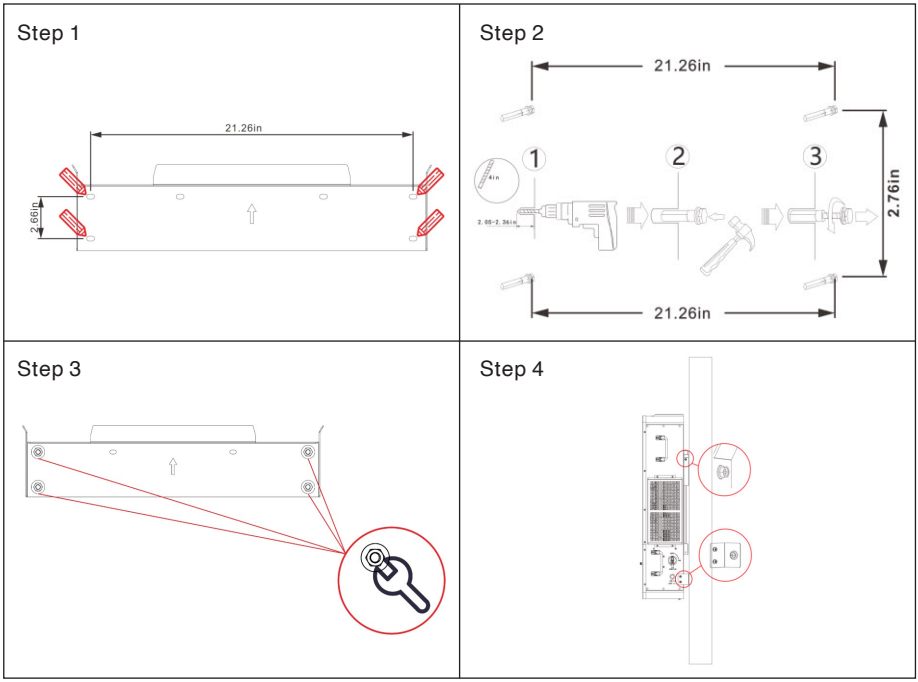
3.2.2 Mounting the Inverter

• Step 1: Use the wall-mounting bracket as a template to determine the drilling positions. Ensure the holes are level, mark them with a marker, and use a rotary hammer to drill into the wall. Keep the drill perpendicular to the wall to avoid shaking and prevent surface damage. If there is significant deviation in hole positioning, re-measure and reposition.

• Step 2: Select a solid wall with a thickness of at least 3.15 in (≥80 mm), and drill four holes according to the marked positions (hole diameter: 0.4 in (Φ10 mm), depth: 2.05～2.36 in (52～60 mm)). Insert M8 expansion bolts into the holes and tighten the nuts securely.

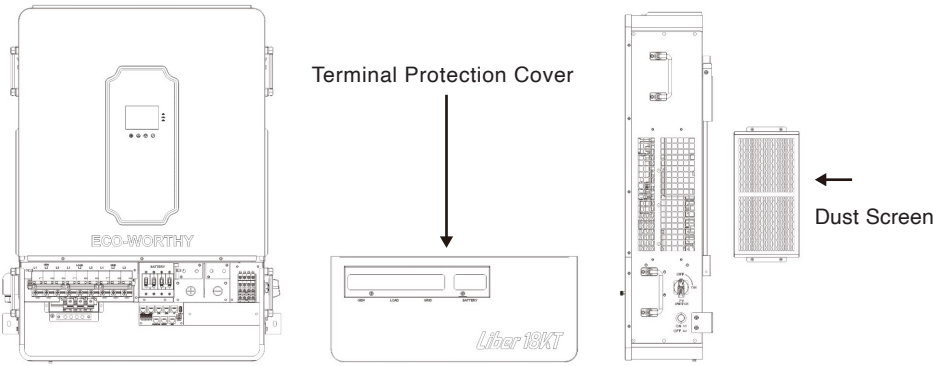
• Step 3:Align the wall-mounting bracket with the drilled holes, and fasten it firmly to the wall by tightening the expansion bolts and nuts.

• Step 4:① Install the inverter. Slowly hang the inverter on the frame via the matching hooks, then tighten the screws on both sides.②Mark the positions of the bent feet on both sides according to the hole positions. Remove the bent feet and drill two holes with a diameter of ϕ6 and a depth of 1.38～1.57 in (35～40 mm). Then install the bent feet and tighten them with M6 self-tapping screws.



3.2.3 Removing the Terminal Protection Cover

Using a screwdriver, remove the terminal protection cover and anti-insect net.

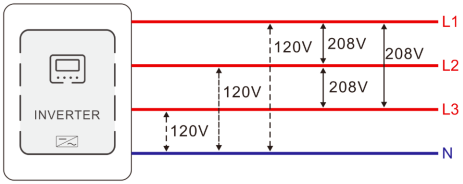


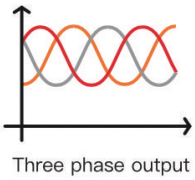
NOTICE

When using the device in areas with poor air quality, the dust screen is prone to being blocked by air particles. Please regularly remove and clean the dust screen to avoid affecting the internal air circulation rate of the frequency converter, which may cause over-temperature protection faults (Fault 19/20) and affect the service life of the power supply and inverter.

4. Connection Instructions

4.1 Three-Phase Mode



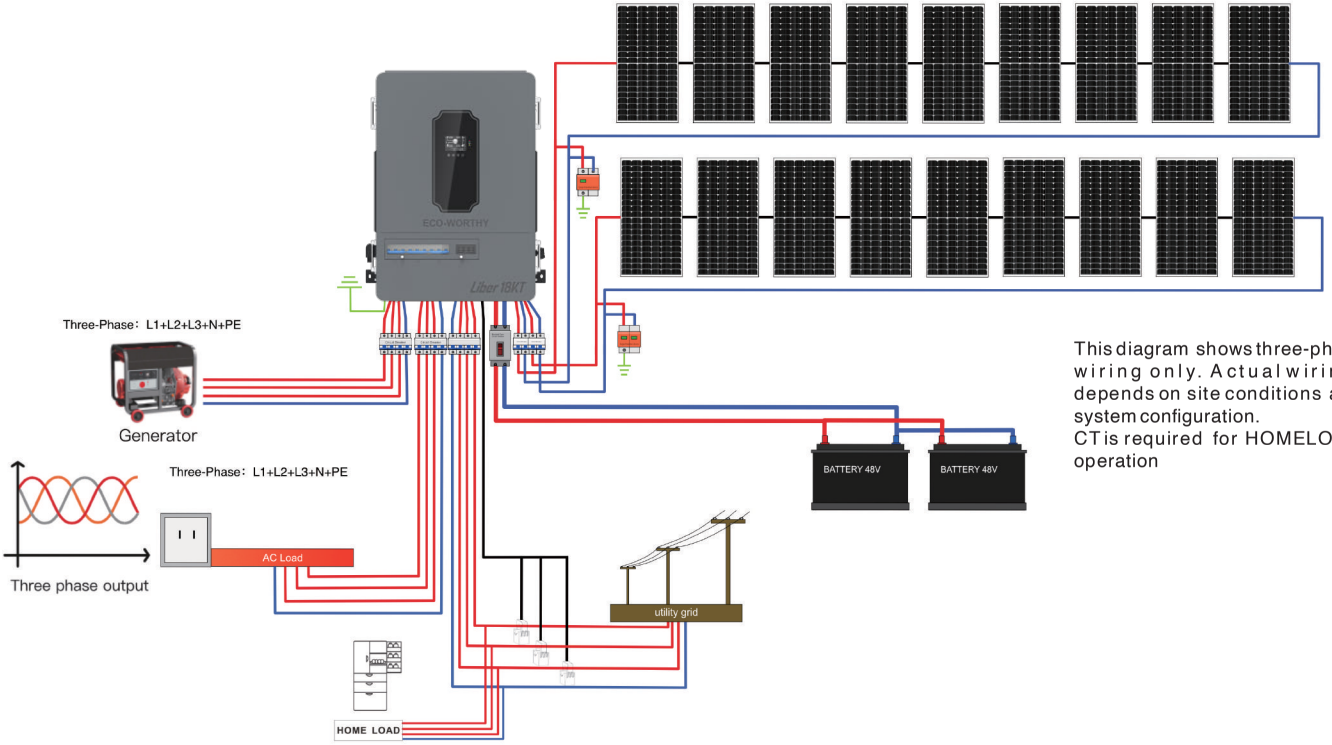


Projekt	Description
ACOutput Phase Voltage (L-N)	(100, 105, 110, 115, 120, 127) Vac, 120 Vac as default
ACOutput Line Voltage (L-L)	(173, 182, 191, 199, 208, 220) Vac, 208 Vac as default

NOTICE

- The user can change the output voltage via the settings menu; for details, refer to Chapter 5.2.
- The output voltage corresponds to parameter setting item [38], and the output phase voltage can be set within the range of 100V to 127V.

Three-phase Mode



This diagram shows three-phase wiring only. Actual wiring depends on site conditions and system configuration.
CT is required for HOMELOAD operation

Note: This diagram only shows the standard schematic for the three-phase wiring of the inverter and does not cover all wiring scenarios. Actual wiring shall be performed by qualified professional electricians, in strict accordance with relevant national industry specifications. It shall be comprehensively determined based on on-site power grid parameters, load capacity, inverter model and overall system configuration to ensure standardized, safe wiring and compliance with system operation requirements.

When the HOME LOAD function is enabled, a Current Transformer (CT) is required to accurately monitor the load current and ensure stable operation of the function. The CT is an optional component. It is recommended to select it reasonably according to actual load monitoring demands and system control requirements. For specific models, please refer to the product specification or consult professional technical personnel.

4.2 Cable & Circuit Breaker Requirement

- PV

Models	Cable Diameter	Max. Input Current	Circuit Breaker Specifications
ECO-INV-48V18KWTSR01	6mm²/ 10AWG	36A	2P-45A

- Battery

Models	Cable Diameter	Max. Input Current	Circuit Breaker Specifications
ECO-INV-48V18KWTSR01	70mm²/ 00AWG	360A	2P-400A

- Grid

Models	Output Mode	Cable Diameter	Max. Input Current	Circuit Breaker Specifications
ECO-INV-48V18K WTSR01	Three-phase	35mm²/2 AWG (L1/L2/L3/N)	100A	4P-125A

- Generator

Models	Output Mode	Cable Diameter	Max. Input Current	Circuit Breaker Specifications
ECO-INV-48V18K WTSR01	Three-phase	35mm²/2 AWG (L1/L2/L3/N)	100A	4P-125A

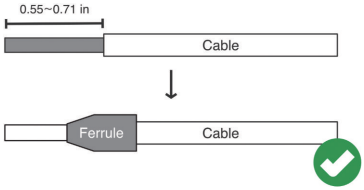
- Load

Models	Output Mode	Cable Diameter	Max. Input Current	Circuit Breaker Specifications
ECO-INV-48V18K WTSR01	Three-phase	35mm²/2 AWG (L1/L2/L3/N)	100A	4P-125A

NOTICE

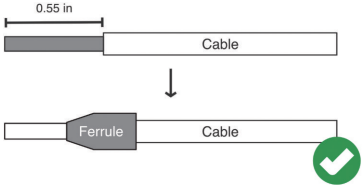
● Grid & Generator input & Load output:

1.Usea wire stripper to remove 0.55-0.71in of insulation from the cable.
Fixthe ferrule (to be prepared by the user) at the cable end.



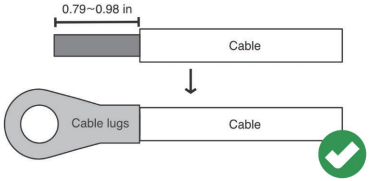
● PVinput:

1.Usea wire stripper to remove 0.55in of insulation from the cable.
2.Fixthe ferrule (provided with the package) at the cable end.



● Battery:

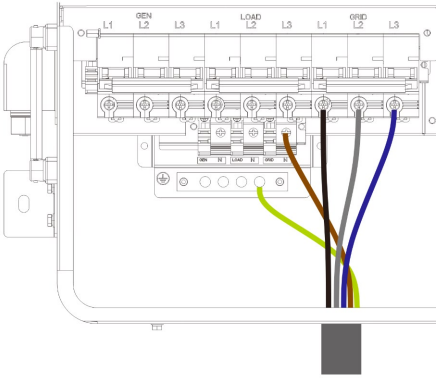
1.Usea wire stripper to remove 0.79-0.98in of insulation from the cable.
2.Fixthe cable lugs (provided with the package) at the cable end.



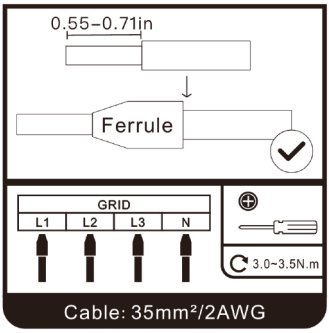
The wire diameter is for reference only. If the distance between the PVarray and the inverter or between the inverter and the battery is long, using a thicker wire will reduce the voltage drop and improve the performance of the system.

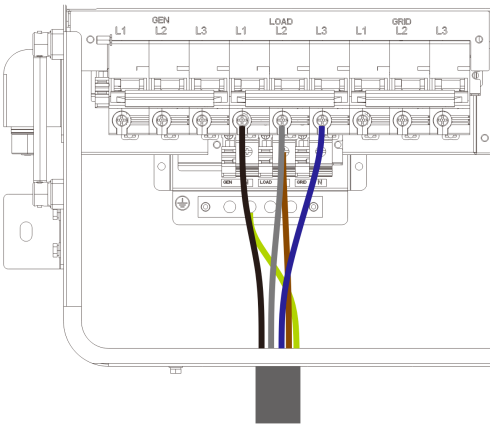
4.3 Grid & Load & Generator Connection

Connect the live,neutral and ground wires according to the cables'position and order shown in the diagram below.

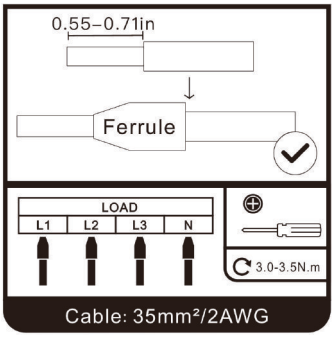


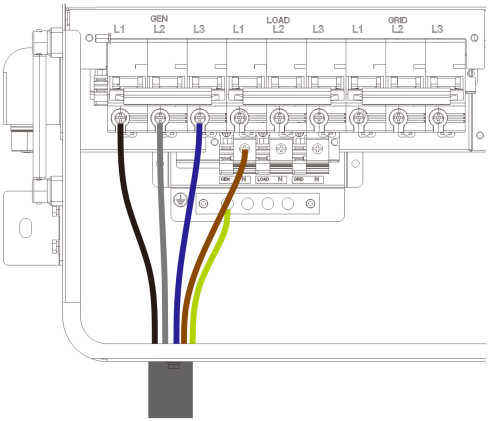
GRID



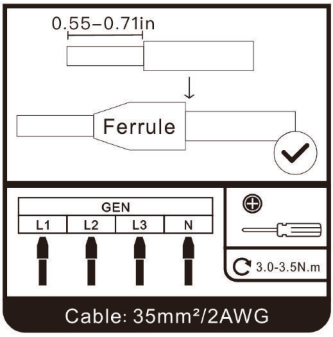


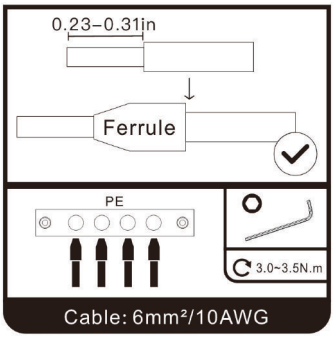
LOAD





GEN



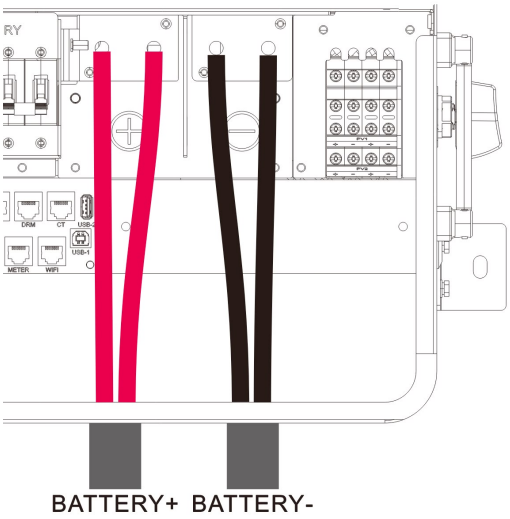


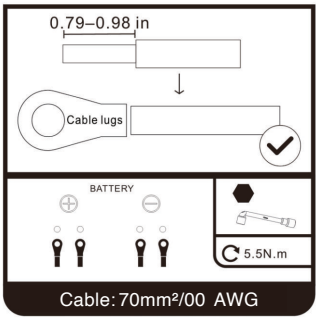
DANGER

- Before connecting AC input and output, the circuit breaker must be turned off to avoid electric shock hazards, and never operate with electricity.
- Please ensure the cables used meet the required specifications. Undersized or poor-quality cables pose a serious safety hazard.

4.4 Battery Connection

Connect the positive and negative cable of the battery according to the diagram below.
Each cable is recommended to be 70 mm² / 00 AWG, using crimp terminals SC95-8.





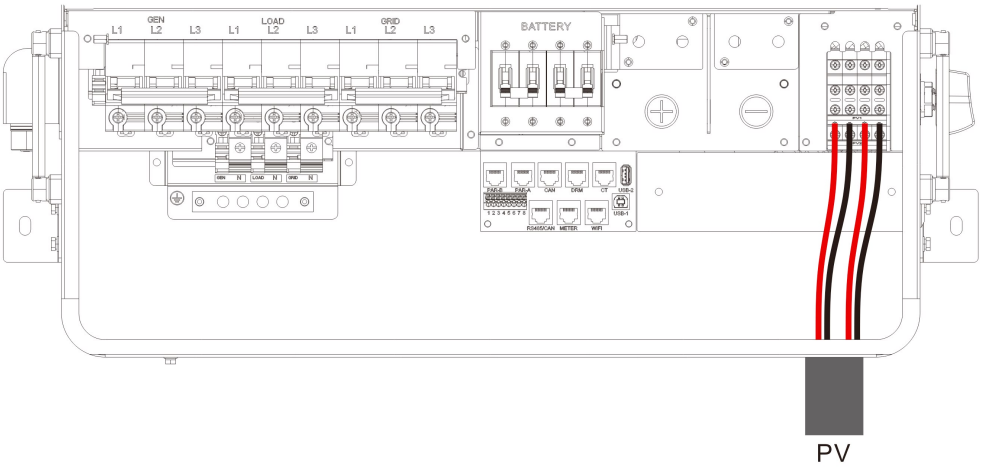
DANGER

- Before connecting battery, the circuit breaker must be turned off to avoid electric shock hazards, and never operate with electricity.
- Make sure that the positive and negative terminals of the battery are connected correctly, reversed polarity connection on battery will damage the inverter.
- Please check that the cable used is sufficient for the requirements, too thin, poor quality cables are a serious safety hazard.

4.5 PV Connection

① Before wiring, disconnect the external circuit breaker first, and confirm whether the cable used is sufficiently thick; refer to Section "4.2 Cable and Circuit Breaker Selection".

② Follow the cable sequence and terminal positions shown in the figure below to correctly connect the PV input wires; when using multiple units in parallel, different units need to be connected to different PV arrays or PV sources.



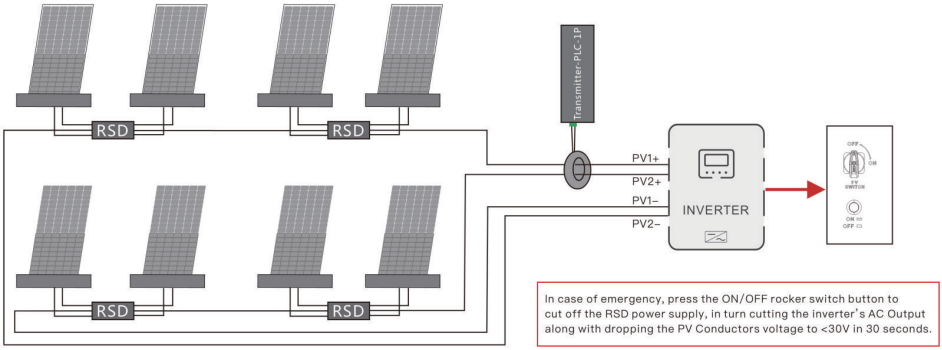
DANGER

- Before connecting the PV, the circuit breaker must be turned off to avoid electric shock hazards, and never operate with electricity.
- Make sure that the open-circuit voltage of the PV modules connected in series does not exceed the maximum open-circuit voltage of the inverter (the value is 600V), otherwise the inverter may be damaged.

Transmitter-PLC Device (Optional)

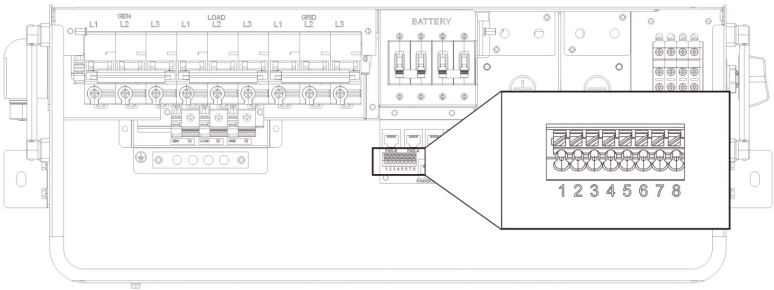
The inverter includes a rapid shutdown system that complies with 2017 and 2020 NEC690.12 requirements. A rapid shutdown switch should be connected to the RSD terminals on the inverter and mounted on a readily accessible location outdoors (check with your AHJ for requirements).
The APsmart Rapid Shutdown System Transmitter-PLC is part of a rapid shutdown solution when paired with APsmart RSD, a PV module rapid shutdown unit. While powered on, the Transmitter-PLC sends a signal to the RSD units to keep their PV modules connected and supplying energy.
RSD units automatically enter rapid shutdown mode when the Transmitter-PLC is switched off and resume energy production when power is restored to the Transmitter-PLC.





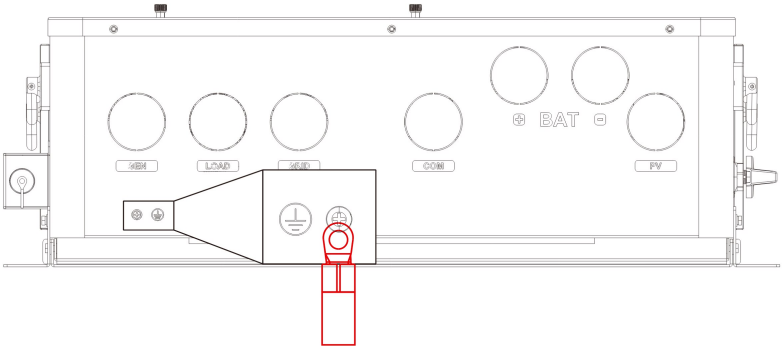
4.6 Dry Contact Connection

Use a small screwdriver to push back the direction indicated by the arrow, then insert the communication cable into the dry junction port. (Communication cable diameter 0.2~1.5mm²)



4.7 Grounding Connection

Pleasemake sure the grounding terminal connect to the Grounding Bar.



NOTICE

rounding wire shall be not lessthan 4 mm² in diameter and asclose aspossible to the earthing point.

4.8 Inverter Start-Up

After ensuring that the wiring is reliable and the wire sequence is correct, install the terminal protection cover in place.

• Step 1:Close the circuit breaker of the battery.

• Step 2:Press the ON/OFF switch on the side of the inverter. The screen and indicator lights turning on indicates that the inverter has been activated.

• Step 3:Sequential close of the circuit breakers for PV, AC input and AC output.

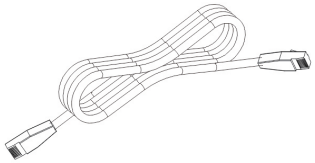
• Step 4:Start the loads one by one in order of power from small to large.

4.9 Parallel Connection

4.9.1 Introduction to Parallel Connection

① Up to 6 units connected in parallel.

② When using the parallel operation function, the following connecting lines (package accessories) shall be firmly and reliably connected.



Parallel communication cable *1

4.9.2 Precautions for Connecting Parallel Connection Cables

Warning

1.PV connection:

In parallel operations, the PV arrays connected to each inverter must be independent of each other. The PV arrays corresponding to PV1, PV2 ports of the same inverter must also be independent.

2.Battery connection:
In parallel operations, all solar energy storage inverters must be connected to the same battery, with BAT+connected to BAT+and BAT-connected to BAT-.Before powering on and starting, it is necessary to check and ensure that the connections, wiring length, and cable size are correct to prevent abnormal operation of the parallel system output caused by incorrect connections.

3.Load connection:
In parallel operations, all solar storage inverters must be connected in the manner of N-to-N and PE-to-PE.The L lines of all inverters in the same phase shall be connected together, but the AC output L lines of different phases shall not be connected together. Other cautions are the same as those for single-phase parallel connection.Refer to the schematic diagram for wiring.

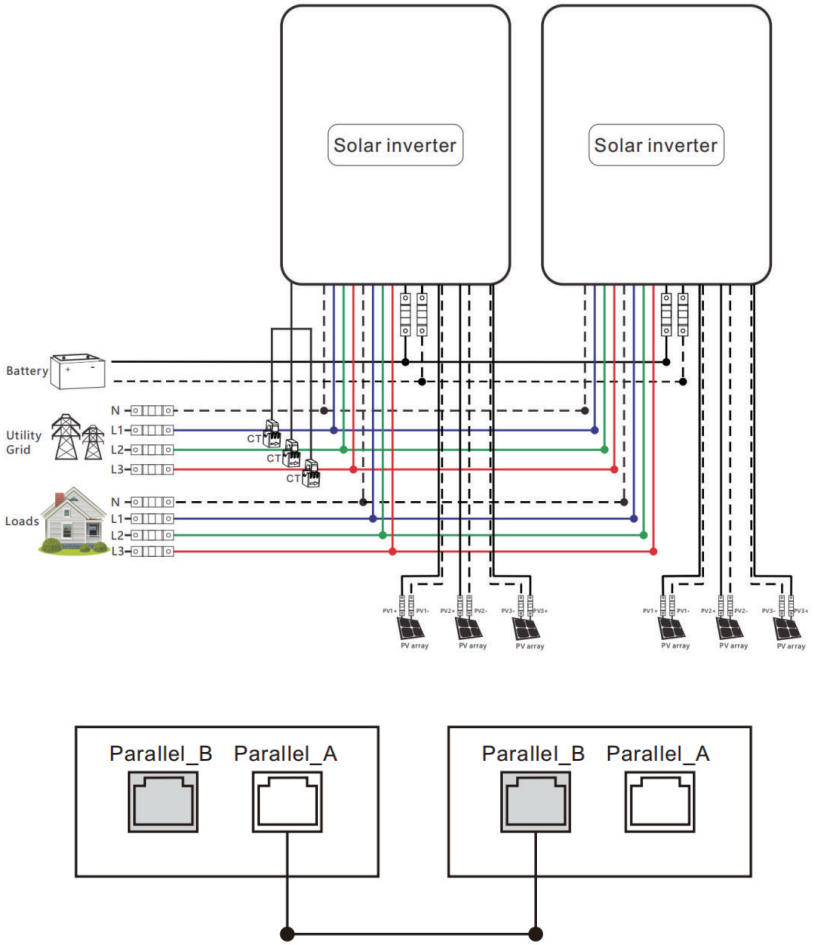
4.Grid connection:
In parallel operations, all solar storage inverters must be connected in the manner of N-to-N and PE-to-PE.The L lines of all inverters in the same phase shall be connected together, but the AC output L lines of different phases shall not be connected together. Refer to the schematic diagram for wiring.

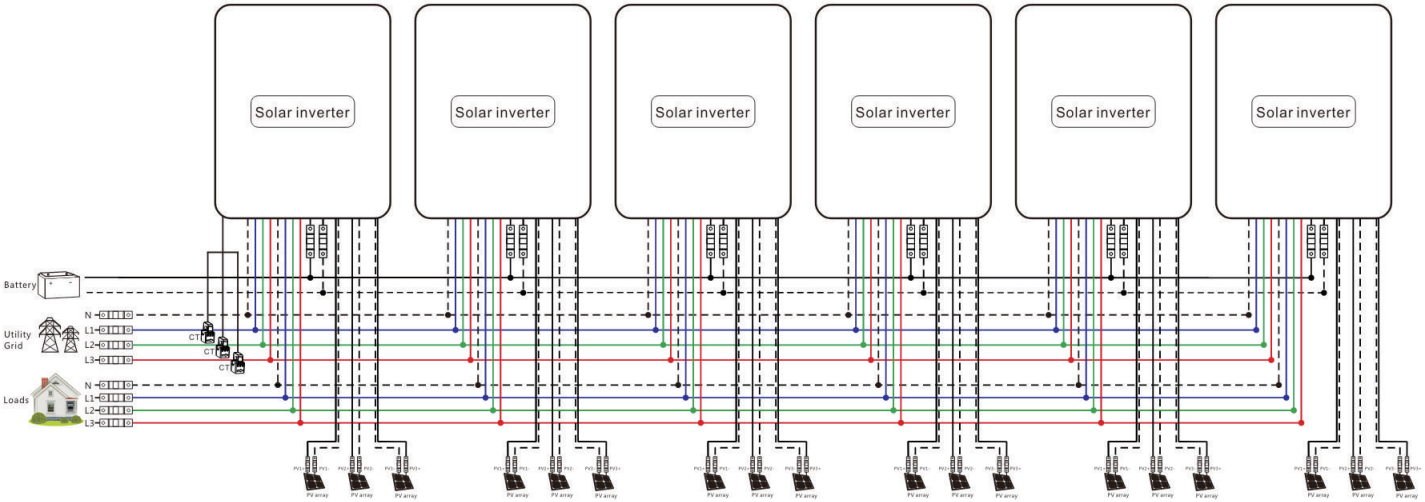
5.Communication Lines:
Our parallel communication cable is a shielded 8-pin network cable suitable for both single-phase and three-phase parallel connections. Each unit must have one input and one output connection. In a parallel system, the "Parallel A" interface of this machine must be connected to the "Parallel B" interface of the target machine. It is strictly prohibited to connect the "Parallel A" interface of this machine to either the "Parallel B" interface of the same machine or the "Parallel A" interface of the target machine. Additionally, secure each unit's parallel communication cable firmly to the 8-pin network connector to prevent disconnections or poor contacts, which may lead to abnormal system operation or damage to the output.

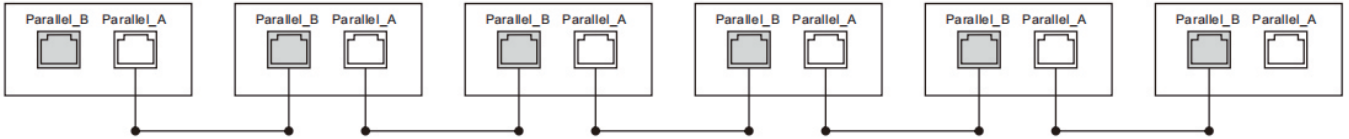
6. Before and after connecting the system, carefully refer to the system wiring diagram below. Ensure all connections are correct and secure before powering on.

7.After the system is correctly wired, powered on, and operating normally, if a new inverter needs to be connected, ensure that the battery input, PV input, AC input, and AC output are disconnected, and all solar energy storage inverters are powered off before reconnecting to the system.

4.9.3 Schematic of Parallel Connection



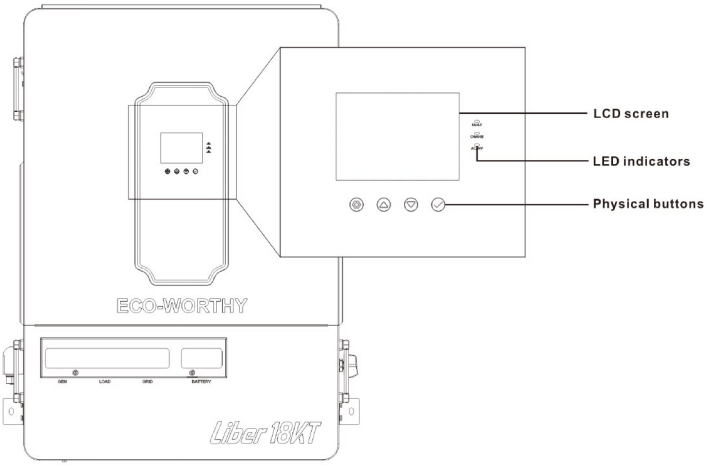

Solar inverter
Solar inverter
Solar inverter
Solar inverter
Solar inverter
Solar inverter
Battery
Utility Grid
Loads
N
L1
L2
L3
CT
PV array


Parallel_B
Parallel_A

5.Operation

5.1 Operation and Display Panel

The operation and display panel below includes 1 LCDscreen, 3 LEDindicators, and 4 Operation buttons.



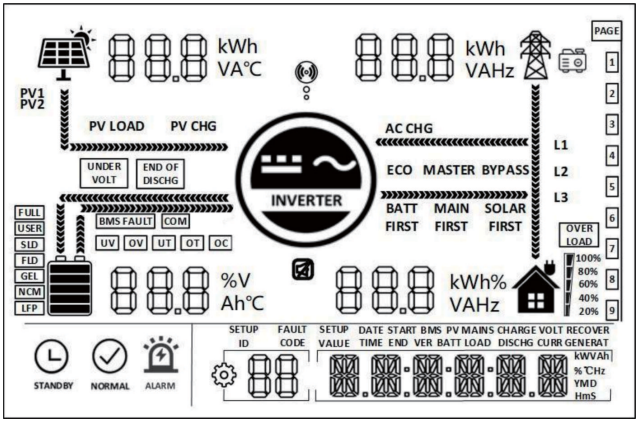
- Operation buttons

Button	Description
	To enter/exit settings menu
	To go to previous selection
	To go to next selection
	To confirm/enter selection in settings menu

- LEDindicators

Indicator	Color	Description
AC/INV	Green	Steady on: Mains bypass output
		Flashing: Inverter output
CHARGE	Yellow	Steady on: Charging completed
		Flashing: Charging in progress
FAULT	Red	Flashing: Error occurred, Primary Fault Steady on: Error occurred, Secondary Fault Not lit: Error occurred, Level 3 or Level 4 fault

■ LCD-Bildschirm



Icon	Description	Icon	Description
	Solar Panel		Grid
	Battery		Generator
	Inverter Working Status		Home load
	The inverter is communicating with the data collector		The buzzer is in mute mode
	Power Flow Direction		
STANDBY	The inverter is in standby mode	NORMAL	The inverter is working normally
ALARM	There is a fault		Settings
	Load power: 80% - 100%		Battery level displayed: 80%-100%
	Load power: 60% - 79%		Battery level displayed: 60%-79%
	Load power: 40% - 59%		Battery level displayed: 40%-59%
	Load power: 20% - 39%		Battery level displayed: 20%-39%
	Load power: 5% - 19%		Battery level displayed: 5%-19%
UNDER VOLT	Battery under-voltage	END OF DISCHG	Battery over-discharge
OVER LOAD	Overload	BMS FAULT	BMS fault

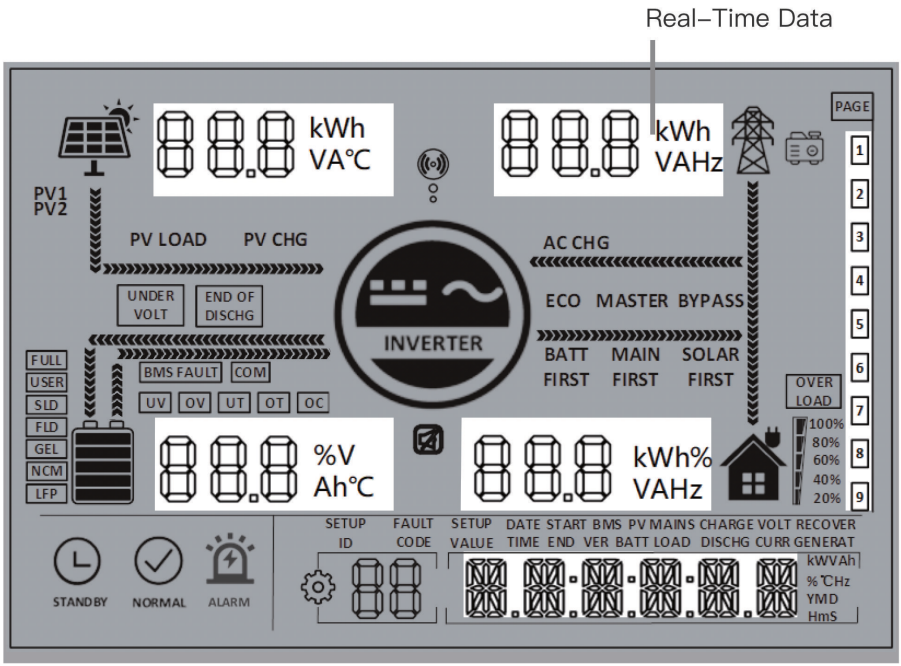
COM	Solar Panel	UV	System under-voltage
OV	Battery	UT	System temperature too low
OT	Inverter Working Status	OC	System over-current
FULL	The inverter is communicating with the data collector	USER	User-defined battery
SLD	Power Flow Direction	FLD	Flooded lead-acid battery
GEL	The inverter is in standby mode	NCM	Ternary Li-ion battery
LFP	There is a fault	ECO	Energy-saving mode
FULL	Load power: 80% - 100%	PV CHG	PV power is charging the battery
PV LOAD	Load power: 60% - 79%	MAINS FIRST	The output mode of the inverter is mains first
AC CHG	Load power: 40% - 59%	SOLAR FIRST	The output mode of the inverter is mains first
BYPASS	Load power: 20% - 39%		
BATT FIRST	Load power: 5% - 19%		

■ View real-time data

On the screen, press the UP/DOWN button to view real-time data of the inverter in operation.

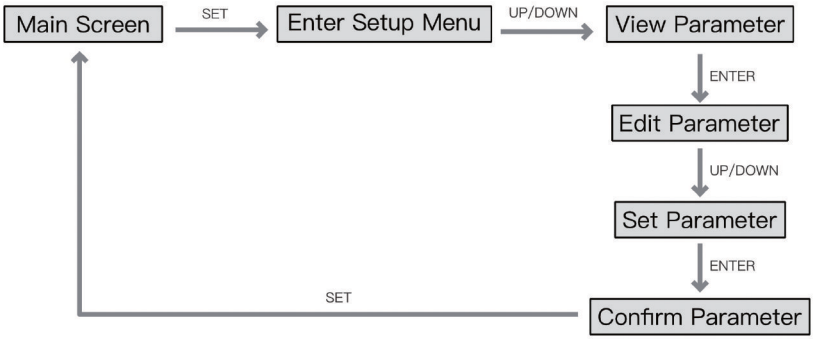
NOTICE

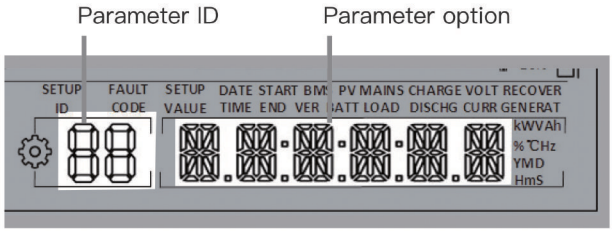
Main Screen → (UP/DOWN) → View Real-Time Data



Page	PV	Battery	ACinput	Load	General
1	PVinput voltage	Battery voltage	ACinput voltage	Load phase voltage	Current time
2	PVinput current	Battery current	ACinput current	Load phase current	Current date
3	PVinput power	Battery power	ACtotal input power	Load phase active power	Total PV power generation
4	PVdaily power generation	BMS battery voltage	ACdaily charging capacity	Load phase apparent power	Total load power consumption
5	PV- side heat sink temperature	Battery SOC	ACfrequency	ACoutput frequency	RS485 address
6	INV heat sink temperature	Max. charging current	Busvoltage	UPSphase active power	Main chip software version
7	BAT heat sink temperature	Grid Max. charging current	Grid / diesel generator maximum current	UPSphase apparent power	Slave chip software version
8		Diesel generator Max. charging current	Home load active power	Secondary load phase active power	Parallel operation mode
9				Secondary load phase apparent power	Customer ID

5.2 Setting





ID	Battery	Battery	Description
Battery voltage setting logic:【15】<【12】<【04】<【14】<【35】<【37】<【05】<【09/11】			
00	Exit	ESC	Exit the setup menu.
01	Exit the setup menu.	UTI	PV energy priority with the load, When PV power is insufficient, the grid and PV jointly supply the load. When PV power exceeds the load demand, the surplus charges the battery. Grid charging is activated only when the battery is over-discharged. (parameter item [06] Settings As "OSO(only PV)" , the grid power will not charge), the battery discharges during the scheduled discharge period or when operating in off-grid mode.
		SBU	Prioritises the use of PV to power the load and switches back to the grid to power the load only when the battery voltage is lower than the set value in parameter item [4] or battery under-voltage (When connected to a BMS, the condition will be triggered when the SOC is less than or equal to the value specified in Parameter Item [61] or parameter item [59]). When the battery voltage is higher than the value in parameter item [5] or reaches the preset full-charge threshold (when connected to a BMS, this condition applies when the SOC is greater than or equal to the value of parameter item [62] or parameter item [60]), it switches back to the PV from the grid to supply the load.

		SUB default	PV energy first used for charging. When PV is insufficient, the battery will be charged by a combination of the utility grid and PV power (if parameter item [06] settings as " OSO(only PV) " , he grid energy will not used for charging), and the utility grid will supply power to the loads simultaneously. When the PV system can fully meet the charging demand, the surplus PV energy will be combined with the utility grid to supply power to the loads. The battery will discharge during the scheduled discharge period or when operating in off-grid mode.
		SOL	PV first mode. When the PV power is unavailable or the battery voltage is lower than the set value in the parameter item [04] or battery under-voltage, it will switch to the grid mode.
02	AC output frequency	50.0	In grid mode the AC output frequency will adapt to the grid frequency, otherwise the output will follow the preset values.
		60.0 default	
03	AC input voltage range	UPS default	When the output phase voltage is 120V, the input phase voltage range is 90-140V. For the UPS frequency range: 50Hz frequency grade is 47-55Hz, and 60Hz frequency grade is 57-65Hz.
		APL	When the output phase voltage is 120V, the input phase voltage range is 90-140V. For the APL frequency range: 40-70Hz
04	Voltage point of battery switch to grid	49.2 default	When parameter [01]= SBU/SOL, output source will switch to grid from battery when the battery voltage below the preset value. Setting range: 40~52V.
05	Voltage point of grid switch to battery	56.8 default	When parameter [01]= SBU/SOL, output source will switch to battery from grid when the battery voltage above the preset value. Setting range: 48~60V.
06	Battery charging mode	SNU default	PV and grid hybrid charging, with PV charging prioritized. When PV energy is insufficient, mains charging supplements it. When PV energy is sufficient, mains charging stops. Note: PV and grid power can charge the battery simultaneously only when the system is in utility bypass mode. In inverter mode, only PV charging is enabled.
		OSO	Only PV charging, without activating grid charging.
07	Battery charging current	275A	Corresponding to ECO-INV-48V18KWTSR01, setting range: 0~300A
08	Battery type	USER	User-defined, user can set all battery parameter.
		SLd	Sealed lead-acid battery.
		FLd	Flooded lead-acid battery.
		GEL	Gel lead-acid battery.
		L14/ L15/ L16 default	L14/ L15/ L16 lithium iron phosphate batteries, corresponding to lithium iron phosphate batteries 14, 15, 16 series.

		N13/ N14	Ternary lithium batteries, N13/N14, corresponding to ternary lithium batteries 13 series, 14 series.
		No bat	No battery.
09	Boost charging voltage	56.8 default	Setting range 48V~58.4V, step 0.4V, valid when battery type is custom and lithium battery.
10	Boost charging maximum time	120 default	Boost charging maximum time setting, refers to the constant voltage charging when the voltage reaches the parameter [09] setting voltage maximum charging time, set the range of 5min~900min, step of 5 minutes.
11	Battery float charging voltage	56.8 default	Setting range 48V~58.4V, step 0.4V, this parameter can not be set after the BMS communication is successful.
12	Battery over - discharge voltage (delayed shutdown)	48.8 default	When the battery voltage is lower than the judgement point, and triggers the parameter [13], the inverter output is switched off, the setting range is 40V~51V.
13	Battery over-discharge delay time	30 default	The battery voltage is lower than parameter [12], and the inverter output is switched off after triggering the delay time set in this parameter, the setting range is 5s~50s, the step is 5s.
14	Battery under-voltage alarm point	49.6 default	When the battery voltage is lower than this judgement point, the device will under-voltage alarm, the output will not be switched off, the setting range is 40V~52V, the step is 0.4V.
15	Battery discharge limiting voltage	43.2 default	When the battery voltage is lower than this parameter value, the output will be turned off immediately. The setting range is 40V~52V, the step is 0.4V.
16	Battery equalization charging	DIS default	Disable equalization charging.
		ENA	Enable equalization charging, valid when battery type is FLd, SLd, and USER.
17	Battery equalization charging voltage	58	Setting range 48V~58V in 0.4V steps, valid when battery type is FLd, SLd, and USER.
18	Battery equalization charging duration	120	Setting range 5min~900min in 5 min steps, valid when battery type is FLd, SLd, and USER.
19	Battery equalization charging delay time	120	Setting range 5min~900min in 5 minute steps, valid when battery type is FLd, SLd, and USER.
20	Battery equalization charging interval	30	Setting range 0~30 days in 1 day steps, valid when battery type is FLd, SLd, and USER.

21	Battery equalization charging stop-start	DIS default	Stop equalization charging immediately.
		ENA	Start equalization charging immediately.
22	Energy-saving mode	DIS default	Disable energy-saving mode.
		ENA	Enable energy-saving mode, when the load power is less than 25W, the output of the inverter will switch off after a 5-minute delay. When the load exceeds 50W, the inverter will restart automatically.
23	Overload automatic restart	DIS	Disable overload automatic restart, if an overload occurs to shut down the output, the machine will not be restored to power on again.
		ENA default	Enable overload automatic restart. If an overload occurs that shuts down the output, the machine delays for 3 minutes before restarting the output. After accumulating 5 times, it will not restart again.
24	Over-temperature auto restart	DIS	Disable over-temperature auto restart and when over-temperature occurs, it will turn off the output and the inverter will no longer turn on the output
		ENA default	Enable over-temperature auto restart and when over-temperature occurs, it will turn off the output and the output will restart when the temperature drops
25	Buzzer alarm	DIS	Disable buzzer alarm.
		ENA default	Enable buzzer alarm.
26	Mode change alarm	DIS	Disable alarm prompt when the status of the main input source changes.
		ENA default	Enable alarm prompt when the status of the main input source changes.
27	Inverter overload switch to bypass	DIS	Disable automatic switching to grid to power the load when the inverter is overloaded.
		ENA default	When the inverter is overloaded, it automatically switches to grid to power the load.
28	Grid charging current	180A	Corresponds to ECO-INV-48V18KWTSR01, setting range: 0~360A.
29	BMS fault causes the battery to stop working.	DIS default	Disable BMS Faulty battery stops working.
		ENA	Enable BMS Faulty battery stops working.
30	RS485 communication address	ID: 1	RS485 address setting range: 1~253.

31	AC output mode (can be set in the standby mode only)	SIG default	When single inverter is used, the default is SIG mode.
		PAL	In parallel operation.
32	RS485 communication	DIS default	Disable the BMS communication function.
		485	RS485 BMS communication function.
		CAN	CAN BMS communication function.
33	BMS communication	When item [32] = 485 / CAN, the corresponding lithium battery manufacturer brand should be selected for communication.	
		WOW default	485 protocol: PAC=PACE, RDA=RITAR, AOG=ALLGRAND , OLT=OLITER, CEF=CFE, XWD=SUNWODA, DAQ=DYNESS, WOW=SRNE, PYL=PYLONTECH , POW=POWMr, VOL=VILION, SGP=SGP, GSL=GSLEnergy, PYT=Pylon tech 2, LUX=Luxpower, DUNEXT=NATON, DYE=DEYE , SHO=MAITIAN , GUX=Gotion
			CAN protocol: UZE=YUZE, SGP=SGP, GSL=GSLEnergy, PYT=Pylon tech 2, WOW=SRNE,LUX=Luxpower, DUNEXT=NATON
34	Anti-reverse current	DIS default	Disable this function.
		HOME LOAD	When parameter [01]=UTI, PV energy will be prioritized for load supply. Excess energy will be subject to anti-backflow control, and any remaining excess energy will be used to charge the battery. When parameter [01]=SUB, PV energy will be prioritized for charging. After meeting the battery's requirements, the remaining energy will be used for load supply, and any further excess energy will be subject to anti-backflow control. Note: When the HOME LOAD function is enabled, a Current Transformer (CT) is required to accurately monitor the load current and ensure stable operation. The CT is an optional accessory. It is recommended to select a suitable CT model according to actual load monitoring needs and system control requirements. For specific model specifications, please refer to the product datasheet or consult professional technical personnel. For details, see Section 6.8 in the table of contents.
35	Battery under-voltage recovery point	52.8V default	When the battery is under-voltage, the battery voltage needs to be higher than this setting value in order to restore the battery inverter AC output, setting range: 44V~54.4V.

37	Battery full charge and recharging recovery point	53.6V default	Inverter stops charging when the battery is full. Inverter resumes charging when the battery voltage below this value. Setting range: 44V~54V.
38	ACoutput phase voltage	120Vac default	Setting range: 100/105/110/115/120/127Vac.
39	Charging current limiting method (when BMS is enabled)	LCSET	[SET] The maximum battery charging current is limited according to the setting in [07].
		LCBMS default	[BMS] Default Maximum battery charging current is limited according to the current limit value of the BMS.
		LC INV	[INV] Maximum battery charging current is limited by the machine's derating logic.
40	1st slot grid start charging	00:00:00 default	Setting range: 00:00:00-23:59:00.
41	1st slot grid end charging	00:00:00 default	Setting range: 00:00:00-23:59:00.
42	2nd slot grid start charging	00:00:00 default	Setting range: 00:00:00-23:59:00.
43	2nd slot grid end charging	00:00:00 default	Setting range: 00:00:00-23:59:00.
44	3rd slot grid start charging	00:00:00 default	Setting range: 00:00:00-23:59:00.
45	3rd slot grid end charging	00:00:00 default	Setting range: 00:00:00-23:59:00.
46	Time slot grid charging function	DIS default	Setting range: 00:00:00-23:59:00.
		ENA	When the segmented scheduled grid charging function is enabled, grid charging will only be performed during the set charging time periods.
47	1st slot battery start discharging	00:00:00 default	Setting range: 00:00:00-23:59:00.
48	1st slot battery end discharging	00:00:00 default	Setting range: 00:00:00-23:59:00.
49	2nd slot battery start discharging	00:00:00 default	Setting range: 00:00:00-23:59:00.
50	2nd slot battery end discharging	00:00:00 default	Setting range: 00:00:00-23:59:00.
51	3rd slot battery start discharging	00:00:00 default	Setting range: 00:00:00-23:59:00.

52	3rd slot battery end discharging	00:00:00 default	Setting range: 00:00:00-23:59:00.
53	Time slot battery discharging function	DIS default	Disable this function.
		ENA	After enabling the segmented timed battery discharge function, the battery will discharge only during the specified discharge period.
54	Local date	00:00:00	YY/MM/DD. Setting range: 00:01:01-99:12:31.
55	Local time	00:00:00	Setting range: 00:00:00-23:59:59.
56	Leakage current detection protection	DIS default	Setting range: 00:00:00-23:59:00.
		ENA	Enable detecting Leakage current value.
57	Stop charging current	3	Charging stops when the charging current is less than this setting (unit: A).
58	Discharging alarm SOC setting	15	Triggers an alarm when the battery SOC is less than the set value (unit: %, valid only when BMS communication is normal).
59	Discharging cut-off SOC setting	5	Stops discharging when the battery SOC is less than the set value (unit: %, valid only when BMS communication is normal).
60	Charging cut-off SOC setting	100	Stops charging when the battery SOC is higher than the set value (unit: %, valid only when BMS communication is normal).
61	Switching to grid SOC setting	10	Switch to grid power when the battery SOC is less than this setting value (unit: %, valid only when BMS communication is normal).
62	Switching to inverter output SOC setting	100	Switches to inverter output mode when SOC is higher than this setting value (unit: %, valid only when BMS communication is normal).
63	N-PE bonding automatic switching function	DIS default	Disable automatic switching of N-PE connections.
		ENA	Enable automatic switching of N-PE connections.
68	AC output phase mode (turn off the rocker switch can be set)	THREE default	For three-phase four-wire system, where the mains input has a N line connected.
		3 NO N	For three-phase three-wire system, where the mains input has no N line connected.
70	Insulation impedance detection	DIS default	Disable detecting insulation impedance value.
		ENA	Enable detecting insulation impedance value.

73	Generator charging current setting	180A	Configurable when the generator is GEN_IN, with a maximum of 360A for ECO-INV-48V18KWTSR01
74	Generator power setting	36kW	Configurable when the generator is GEN_IN. For ECO-INV-48V18KWTSR01, the maximum is 36kW, corresponding to a maximum generator input of 18kW for charging and 18kW for load supply.
76	External CT transformation ratio	3000	Setting range: 0~5000
77	External CT anti-backflow error power	100W default	It can be set between 0W and 500W, which means that in order to prevent power sampling errors, 0-500W of electricity is drawn from the grid to ensure that there is no backflow at all.
78	Battery hybrid load discharging current setting	100W default	Setting Range: 0-360A
79	AFCI enable	DIS default	Disable AFCI function.
		1-10	Enable AFCI function. Detection Threshold: 1-10
80	AFCI fault manual clearing	NULL default	Do not clear.
		CLEAR	Manually clear the AFCI fault.
81	Generator operating mode	GEN IN default	Generator interface used as generator function input.
		AC OUT	Generator interface used as secondary load port output.
82	CT manual enabling	NO CT default	No CT input.
		TO INV	CT direction set to inverter flow as positive direction.
		TO GRD	CT direction set to grid flow as positive direction.

NOTICE

The configuration of parameters 30, 31, 63, and 81 must be performed while the system is in standby mode.

Procedure for Restoring Factory Settings:

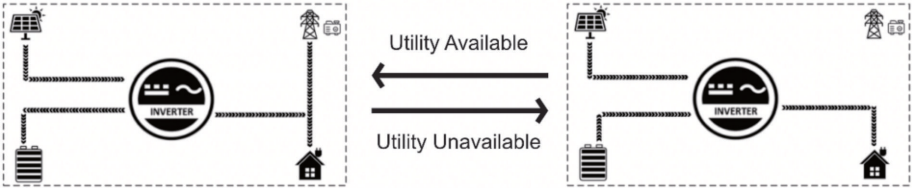
Press and hold the UP and DOWN operation keys simultaneously until the border around the time display begins to flash, indicating that the system has entered factory reset mode. At this point, simply power off the device and restart it to complete the reset successfully.
If the factory reset mode is accidentally triggered during operation, press and hold the UP and DOWN keys again until the border around the time display stops flashing, which indicates that the system has successfully exited the factory reset mode.

5.3 AC Output Mode

The AC output mode corresponds to parameter setting item 01 and 34, which allows the user to set the AC output power source manually.

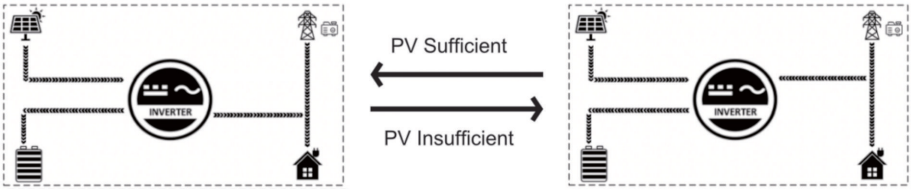
• Utility Priority, PV Loading Priority 01 UTI

PV energy priority with the load, When PV power is insufficient, the grid and PV jointly supply the load. When PV power exceeds the load demand, the surplus charges the battery. Grid charging is activated only when the battery is over-discharged. (parameter item [06] Settings as" OSO(only PV)", the grid power will not charge), and the battery is only discharged when off the grid.



• Utility Priority, PV Charging Priority 01 SUB (default)

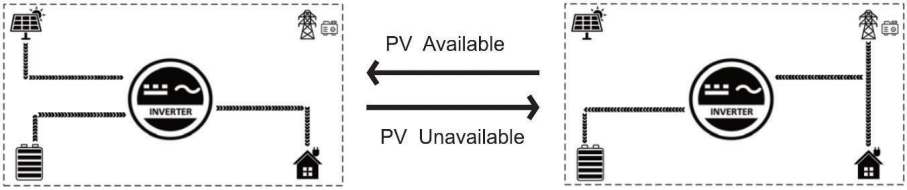
PV priority charging; When PV power is insufficient, utility power and PV will perform hybrid charging (when item 06 is set to "PV-only charging", utility power will not be used for charging), and utility power will supply the load. When PV power meets the charging demand but cannot meet the load demand, PV and utility power will perform hybrid loading, and the battery will only discharge in off-grid mode.



• PV Priority Output 01 SOL

PV prioritizes power supply to the load. When PV meets the load demand, the excess power will charge the battery. When PV energy is insufficient, the battery will supplement energy to power the load. When PV is invalid, it will switch to utility power supply, and finally use battery power supply. When PV energy is insufficient, and when the battery level is lower than the parameter (Battery to utility) or the SOC setting value for switching to utility, it will switch to utility power supply for the load and charging. PV charges when there is no load. This mode can maximize the use of PV power generation while maintaining battery capacity, and is suitable for areas with stable power grids.

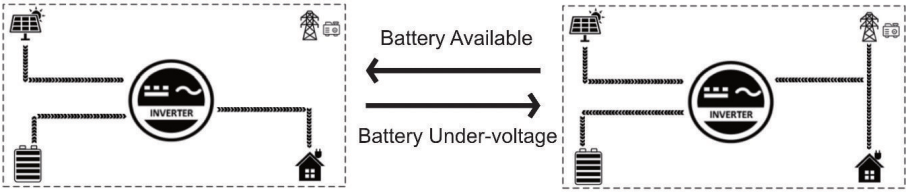
(Priority: PV> Utility > Battery)



• Inverter Priority Output 01 SBU

The PV will supply power to the loads on a priority basis. If the PV is insufficient or unavailable, the battery will be used as a supplement to supply power to the load. When the battery voltage touches the value of parameter [04] (Voltage point of battery switch to utility), it will switch to utility power supply to the load (without BMS connected) / When the BMS is connected and the Li-ion battery SOC touches the value of parameter [61] (Switching to utility SOC setting), it will switch to utility power supply to the load. This mode maximises the use of DC energy, and it is suitable for the areas where the utility power is stable.

(Priority: PV> Battery > Utility)



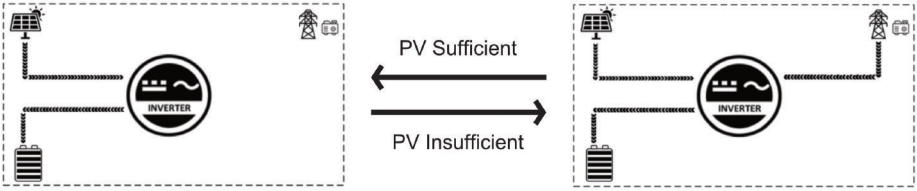
5.4 Battery Charging Mode

The charging mode corresponds to parameter [06], which allows the user to set the charging mode manually.

• Hybrid Charging SNU (default)

PV and utility power charge the battery at the same time, with PV taking priority and mains power acting as a supplement when PV is insufficient. This is the fastest charging method and is suitable for areas with insufficient power supply, providing sufficient backup power for users. (Priority: PV > Utility)

(Priority: PV > Battery > Utility)



• Only PV Charging OSO

Only PV power is used to charge the battery, without starting the utility charging. This is the most energy-efficient method, with all battery power coming from solar energy, and is usually used in areas with good radiation conditions.



5.5 Secondary Load Work Mode

• The "Generator Operating Mode" parameter is used to configure the function of the generator port, with the default setting being "Generator Input". It can also be set to "Secondary Load Output". When this function is set, ensure that a load is connected to the generator port, and refer to the wiring diagram for the connection method.

• When selecting the generator port as the input port, the [81] setting item needs to be configured to the corresponding (GENIN).

• When selecting the generator port as the output port for secondary load power supply, the [81] setting item needs to be configured to the corresponding (ACOUT).

• Enabling Conditions and Settings of Secondary load:"item 81 is set to AC OUT" When parameter item 81 is set to AC OUT, the secondary load is enabled, and the inverter can carry both the primary load and the secondary load simultaneously.

How this Secondary load works:

(1)In inverter mode, when the load is overloaded and the set delay time is reached, the secondary load will be disconnected while the primary load is retained. After the user reduces the load, the secondary load will be automatically restored after a 3-minute delay.

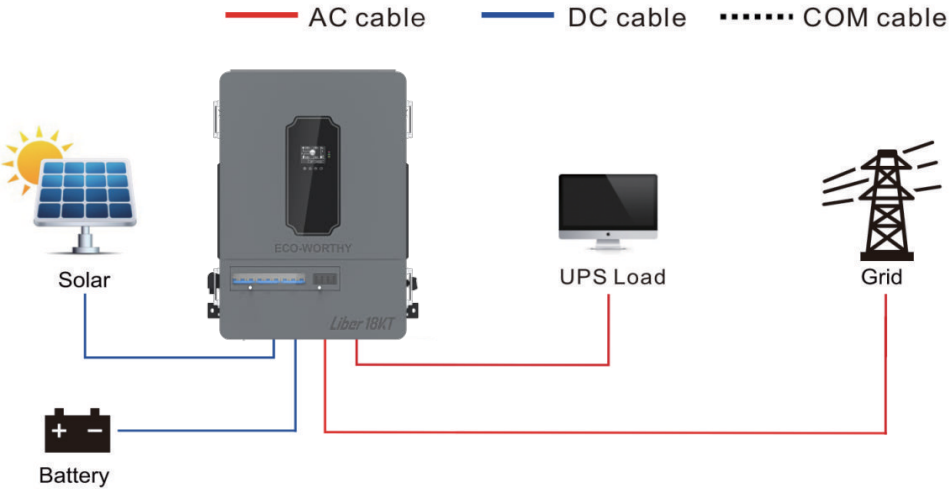
(2)In mains mode, if the load is overloaded and the set delay time is reached, the secondary load will similarly be disconnected with the primary load retained. Once the user reduces the load, the secondary load will be automatically restored after a 3-minute delay.

(3)In off-grid mode (Non-BMS), when the battery voltage drops below the set value of parameter 04, the secondary load will be disconnected while keeping the primary load. The secondary load will be restored when the battery is fully charged or the battery voltage reaches the set value of parameter 05.

(4)In off-grid mode (BMS), if the battery SOC is lower than the set value of parameter 61, the secondary load will be disconnected with the primary load retained. The secondary load will be restored when the battery is fully charged, or when the battery SOC reaches the set value of parameter 60 or 62.

Operating Mode	Trigger Condition	Load Operation	Recovery Condition
Inverter Mode	The load is overloaded and the set delay time is reached	Disconnect the secondary load and retain the primary load	After the user reduces the load, the secondary load is automatically restored after a 3-minute delay.
Mains Mode	The load is overloaded and the set delay time is reached	Disconnect the secondary load and retain the primary load	After the user reduces the load, the secondary load is automatically restored after a 3-minute delay.
Off - Grid Mode (Non - BMS)	The battery voltage is lower than the set value of parameter 04	Disconnect the secondary load and retain the primary load	The battery is fully charged; or the battery voltage reaches the set value of parameter 05.
Off - Grid Mode (BMS)	The State of Charge (SOC) of the battery is lower than the set value of parameter 61	Disconnect the secondary load and retain the primary load	The battery is fully charged; or the battery SOC reaches the set value of parameter 60 or 62.

With generator or smart load

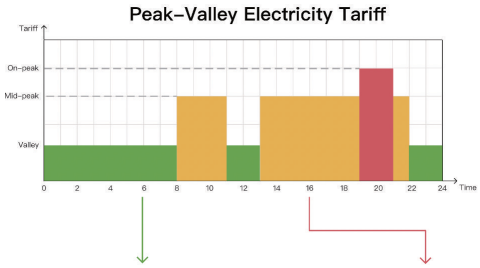


5.6 Time-slot Charging/Discharging Function

The product is equipped with time-slot charging / discharging function, users can set different charging/discharging time slots according to the local peak-valley tariff, so as to make efficient use of utility power and PV energy. When the utility price is expensive, the battery can be used to supply power to the loads. When the utility price is cheap, the utility power can be used to supply to the loads and charge, which can help users save the electricity bill to the greatest extent. User can turn on/off the time-slot charging/discharging function in the setting menu parameters [46] and [53], and set the charging and discharging time periods in parameters [40-45], [47-52] for timed mains charging start/time setting and timed battery discharging start/time setting. Here is a case example to help users understand the function.

NOTICE

Before using this function for the first time, please set the local time in parameter [54], [55], then the user can set the corresponding time slot according to the local peak and valley tariff charges.



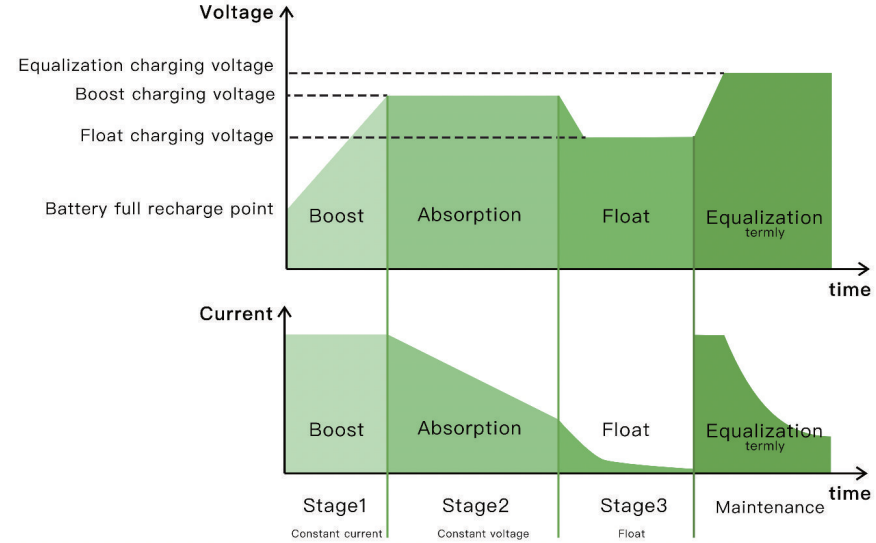
Time-slot Utility Charging & Loading Function	Time-slot Battery Discharging Function
	
With 3 definable periods, the user can freely set the mains charging/supplying power time within the range of 00:00 to 23:59. During the time period set by the user, if PV energy is available, PV energy will be used first, and if PV energy is not available or insufficient, utility energy will be used as a supplement.	With 3 definable time periods, users can freely set the battery discharge time within the range of 00:00 to 23:59. During the time set by the user, the inverter will give priority to the battery inverter to carry the load, and if the battery power is insufficient, the inverter will automatically switch to mains power to ensure stable operation of the load.

5.7 Battery Parameters

• Lead-acid battery

Battery type / Parameters	Sealed lead acid battery (SLD)	Gel lead acid battery (GEL)	Flooded lead acid battery (FLD)	User-defined (USE)
Overvoltage Disconnect Voltage	60V	60V	60V	60V
Equalization Charging Voltage	58V	56.8V	58V	40～60V settable
Boost Charging Voltage	57.6V	56.8V	57.6V	40～60V settable
Float Charging Voltage	55.2V	55.2V	55.2V	40～60V settable
Undervoltage Alarm Voltage	44V	44V	44V	40～60V settable
Undervoltage Disconnect Voltage	42V	42V	42V	40～60V settable
Discharge Limit Voltage	40V	40V	40V	40～60V settable
Over-discharge Delay Time	5s	5s	5s	1～30s settable
Equalization Charging Duration	120 min	-	120 min	0～600 min settable
Equalization Charging Cycle	30d	-	30d	0～250d settable
Bulk Charging Cycle	120m	120m	120m	10～900m settable

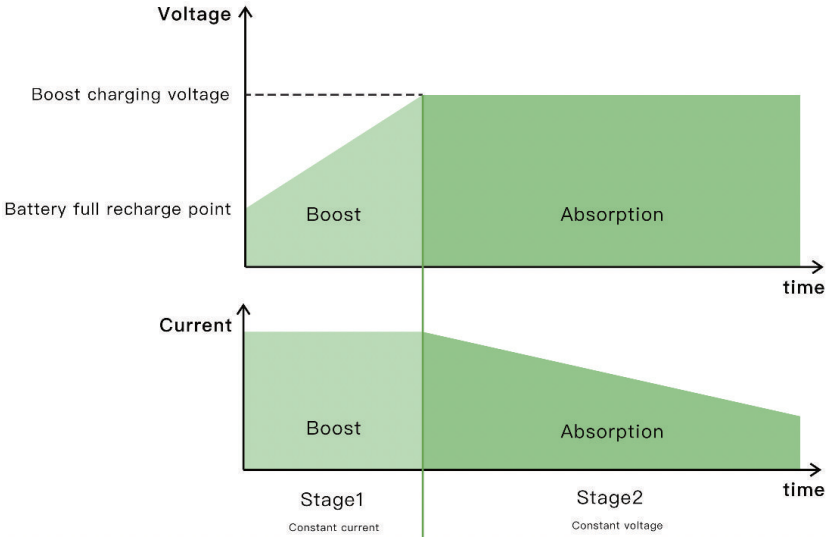
NOTICE



Battery type / Parameters	Ternary (N13)	Ternary (N14)	LFP (L16)	LFP (L15)	LFP (L14)	Adjustable
Overvoltage Disconnect Voltage	60V	60V	60V	60V	60V	60V
Equalization Charging Voltage	-	-	-	-	-	40～60V settable
Boost Charging Voltage	53.2V	57.6V	56.8V	53.2V	49.2V	40～60V settable
Float Charging Voltage	53.2V	57.6V	56.8V	53.2V	49.2V	40～60V settable
Undervoltage Alarm Voltage	43.6V	46.8V	49.6V	46.4V	43.2V	40～60V settable
Undervoltage Disconnect Voltage	38.8V	42V	48.8V	45.6V	42V	40～60V settable
Discharge Limit Voltage	36.4V	39.2V	46.4V	43.6V	40.8V	40～60V settable
Over-discharge Delay Time	30s	30s	30s	30s	30s	1～30s settable
Equalization Charging Duration	-	-	-	-	-	0～600 min settable
Equalization Charging Cycle	-	-	-	-	-	0～250d settable
Boost Charging Cycle	120 min settable	120 min settable	120 min settable	120 min settable	120 min settable	10～900 min settable

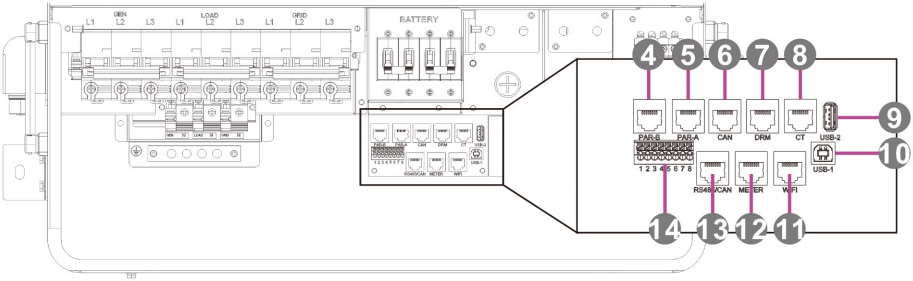
NOTICE

If no BMS is connected, the inverter will charge according to the battery voltage with a preset charging curve. When the inverter communicates with the BMS, it will follow the BMS instructions to perform a more complex stage charging process.



6. Communication

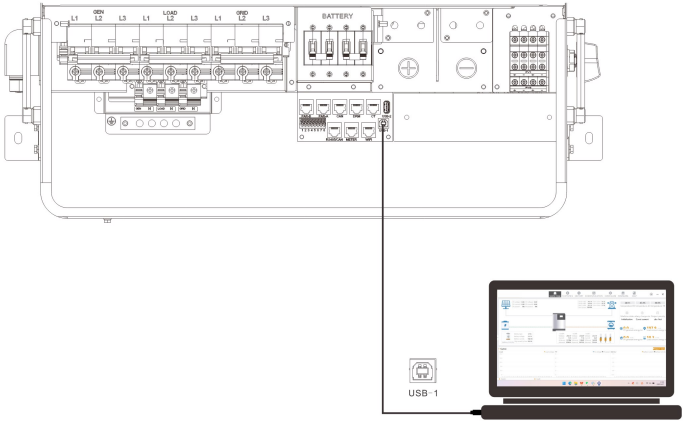
6.1 Product Overview



4	Parallel Port (PAR-B)	5	Parallel Port (PAR-A)	6	CAN Port
7	DRM Port	8	CT Port	9	USB-2 Port
10	USB-1 Port	11	WiFi Port 1	12	Meter Port
13	RS485/CAN Port	14	Dry Contact Prot		

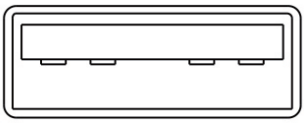
6.2 USB-1 Communication Function

Users can use the host computer software to read and modify the device parameters through this port. If you need the installation package of the host computer software, The installation package is available for download on the official website, or you may contact us to get it.



6.3 USB-2 Display Port (Reserved)

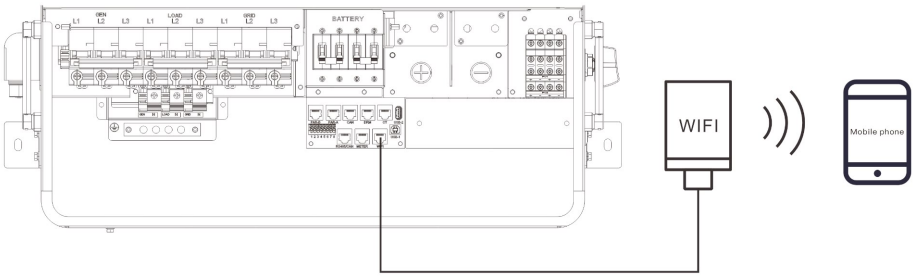
This interface is used to upgrade firmware.

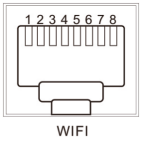


6.4 WiFi Communication Function

The WiFi port is used to connect to the Wi-Fi / 4G Stick logger module, which allows users to view the operating status and parameters of the inverter via mobile APP.

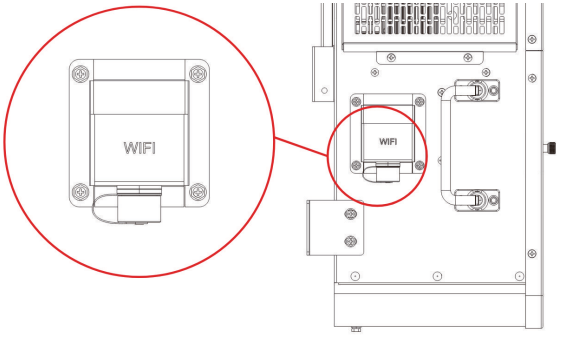
• WiFi Port 1 (Either Option)





RJ45	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
Description	5V	GND	/	/	/	/	RS485-A	RS485-B

• WiFi Port 2 (Either Option)

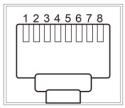




Pin	Description
1	VCC
2	GND
3	RS485-A
4	RS485-B

6.5 RS485/CANCommunication Function

The RS485/CANcommunication port connects to the Li-ion battery BMS.



RS485/CAN

RJ45	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
Description	RS485-B	RS485-A	/	CANH	CANL	/	RS485-A	RS485-B

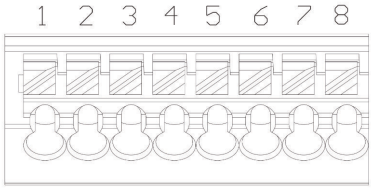
NOTICE

If you need to use the inverter to communicate with the lithium battery BMS, please contact us for the communication protocol or upgrade the inverter to the appropriate software programme.

6.6 Dry Contact Function

The dry contact port has 5 functions:

① RSDpower supply
② Remote switch on/off (reserved)
③ Switching signal output (reserved)
④ Battery temperature sampling (reserved
⑤ Generatorremote start/stop

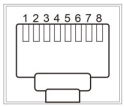


Function	Description
RSDpower supply	PIN 1 is GND , PIN 2 is RSD 12V+
Remote switch on/off (reserved)	When pin 1 is connected to pin 3, the inverter will shut off ACoutput. When pin 1 is disconnected from pin 3, the inverter will resume normal output.
Switching signal output (reserved)	When the battery voltage reachesthe battery discharge limit voltage (parameter [15]), the voltage between pin 4 and pin 1 is 0V. When the battery is charging normally, the voltage between pin 4 and pin 1 is 5V.
Temperature sampling (reserved)	Pin 1 & Pin 5 can be used for battery temperature sampling compensation.
Generator remote switch	When the battery voltage reachesthe battery under-voltage alarm point (Parameter[14]) or the voltage point for switching to mains power (Parameter [04]), pins 7 to 6 are normally open, and pins 8 to 6 are normally closed. When the battery voltage reachesthe voltage point for switching to mains power (parameter [05]) or the battery is fully charged, pins 7 to 6 are normally closed, and pins 8 to 6 are normally open.

NOTICE

If you need to use the remote start/stop function of the generator with dry contact, ensure that the generator has ATSand supports remote start / stop.

6.7 DRM (Reserved, Only Australia)

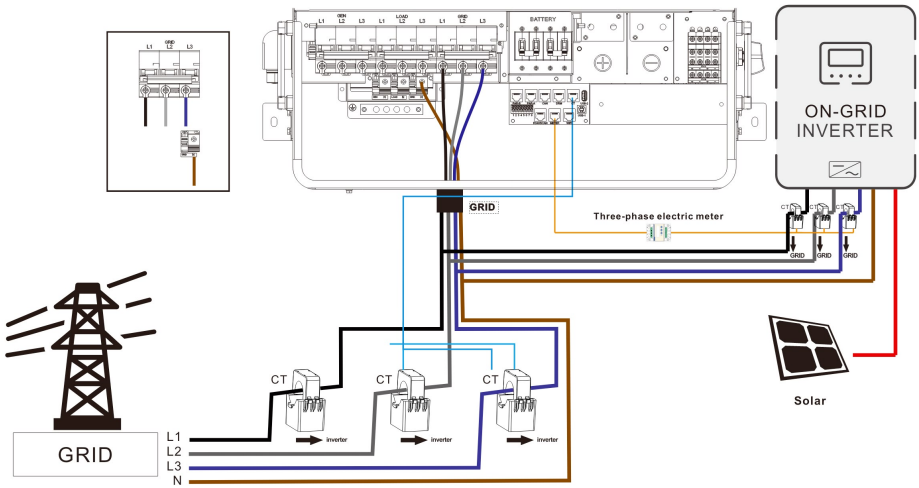


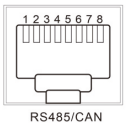
RS485/CAN

RJ45	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
Description	DRM5	DRM6	DRM7	DRM8	RefGen	COM/ DRM0	V+	V-

MODEL	RJ45 socket asserted by shorting pins		Requirement
DRM0	5	6	Operate the power-off device.
DRM5	1	5	Do not generatepower to the grid.
DRM6	2	5	The power generation shall not exceed50% of the rated power.
DRM7	3	5	The power generation shall not exceed75% of the rated power, and reactive power shall be absorbed when possible.
DRM8	4	5	Increasepower generation (limited by other active DRM).

6.8 External CT Connection (Optional)

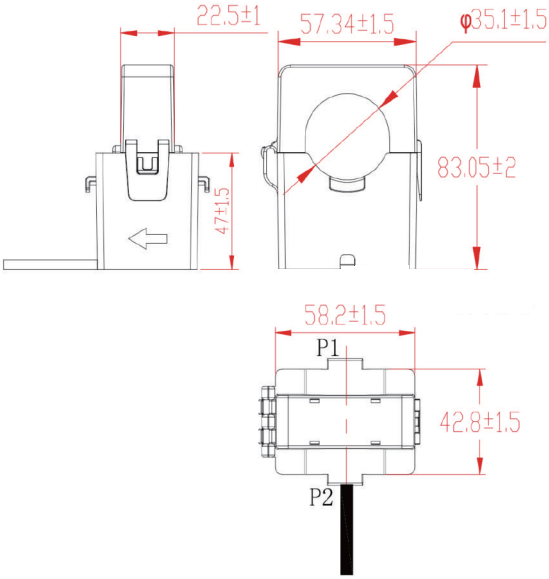




RJ45	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
Description	CT1+	CT1-	/	CT2+	CT2-	/	CT3+	CT3-

(1)Split Core Current Transformer (CT)dimension: (mm)

(2)Secondary output cable length is 4m (157.48in).





6.9 Remote Monitoring

When operating the equipment, it is recommended to enable a remote monitoring configuration.
The inverter supports APP application to provide more comprehensive and intuitive monitoring of power plant data, creating the ultimate user experiencewith extremely simplified product designthinking to meet the convenient operation of offline applications.

6.9.1 Download App

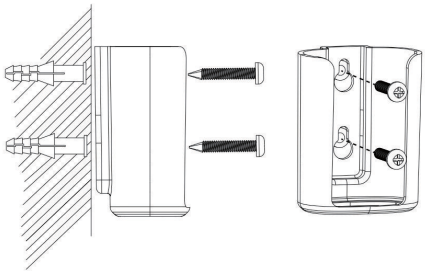
• App Download: Android system can search“ SOLARMANSmart" through application market/store for downloading, while IOSsystem can choose to download SOLARMANSmartAPPin Apple Store.

• QR code download: SOLARMANSmartAPPcan also support scanning QRcode with mobile phone for downloading. Pleasescan the code with mobile phone.

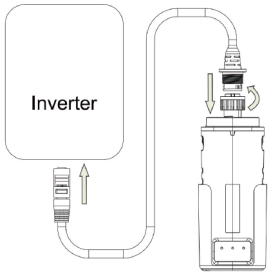
SOLARMAN Smart

6.9.2 Stick Logger Installation

Step1: Install the fixed bracket on the wall next to the inverter.



Step2: Connect inverter with data logger, and tighten it.



The normal operation status of the stick logger, when router connected to the network normally:

① Connection to the server succeeded:NETlight keeps on after the logger powered on.

② Logger running normally: READYlightflashes.

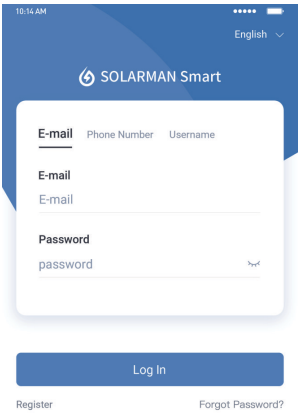
③ Connection to the inverter succeeded:COMlight keeps on.

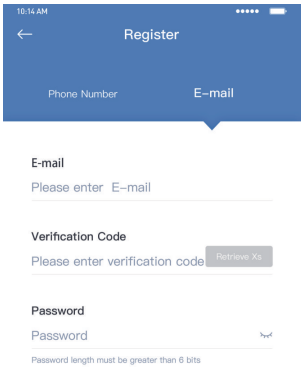
6.9.3 SOLARMANSmart APP Operation

Pleasemake sure Bluetooth and WiFiare ON and the router can connect to the network normally.

• Registration

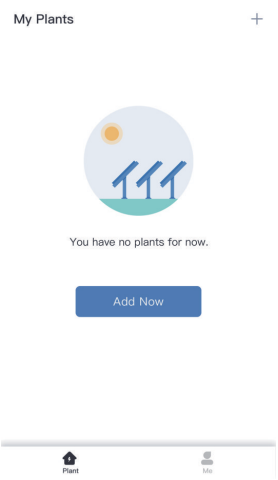
Go to SOLARMANSmart and register.
Click“ Register” and create an account here.

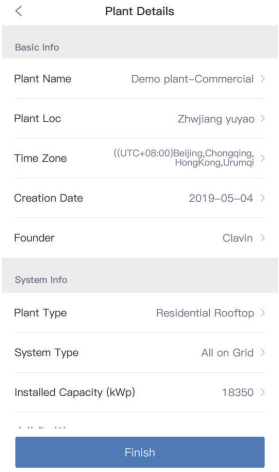




• Create a Plant

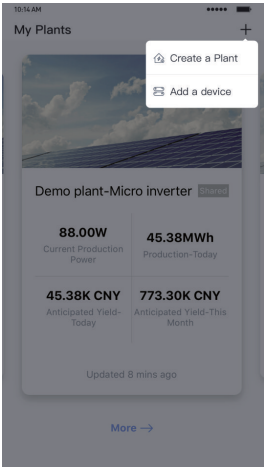
Click"Add Now" to create your plant.
Pleasefill in plant basic info and other info here.

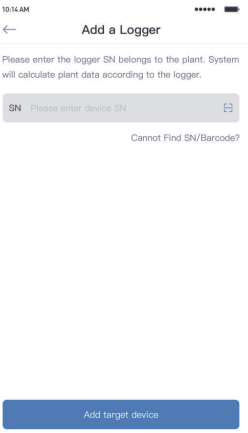




• Add a Logger

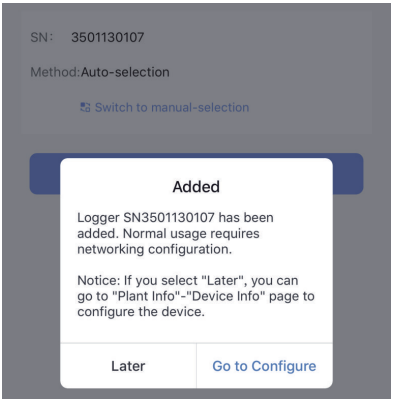
Method 1: Enter logger SN manually.
Method 2: Click the icon in the right and scan to enter logger SN
You can find logger SN in the external packaging or on the logger body

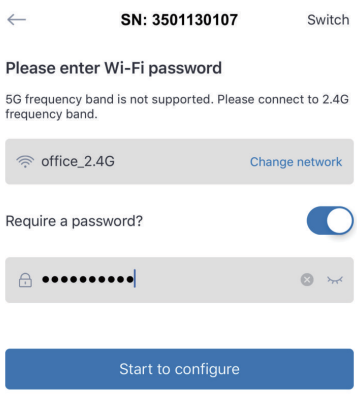




• Network Configuration

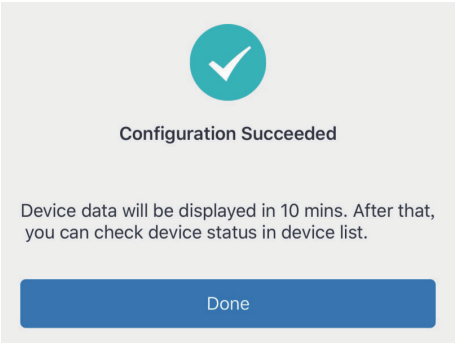
Step 1: Click“Go to Configure”to set the network. (Please make sure Bluetooth and WiFi are ON.)



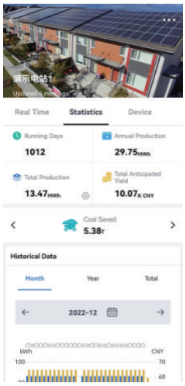


Step 2: Please wait for a few minute. Then click "Done" and view plant data.





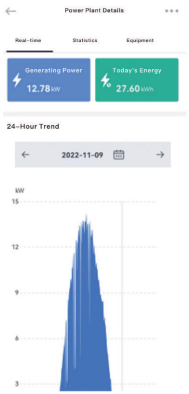
6.9.4 Plant Detail

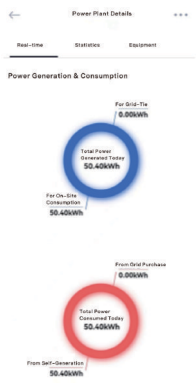


After the photovoltaic plant is created and connected to the Logger, you can select the plant to view the corresponding plant data and related settings, including Real time, Statistical, Device, Alerts, Plant Info and Layout, so as to meet the end user's maintenance of plant information and data browsing.

Note: In general, the Plant data can be viewed normally only after 5-10 minutes after the Logger networking configuration is completed.

• Real-time Data





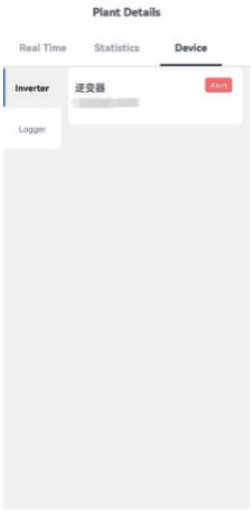
In the "Real time" interface, you can see the real-time data of the Plant, such as real-time generation power and output, energy flow chart, 24-hour power curve, generation and consumption data, etc. The system will display different page layouts according to your plant grid connection type. Please set your plant according to the actual situation.
Depending on your equipment, we recommend:

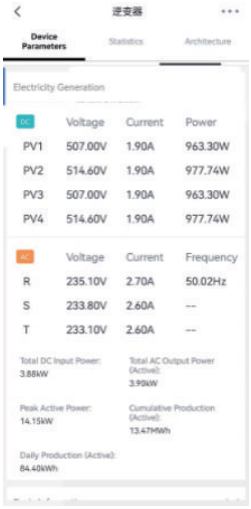
① If your equipment (such as inverter) only collects power generation data and transmits it to the grid company, it is recommended that you select "All on Grid" as the System Type of the Plant.

② If your equipment (such as inverter) collects power generation data and power consumption data at the same time, it is recommended that you select "Self consumption" as the System Type of the Plant.

③ If your equipment (such as inverter) collects power generation data, power consumption data, battery data and grid data at the same time, it is recommended that you select "Storage System" as the System Type of the Plant.

• Device info



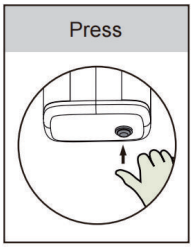


In the "Device" interface, you can view the device information under plant. Select and click a specific device to view the specific information of the device, including the device parameters, data statistics and connection information.
Through these data, you can determine whether the device is in normal working state. It can support networking configuration, meter configuration and other functional operations for the corresponding equipment. If the equipment is a logger, networking configuration can be carried out.
If the equipment is an electricity meter, meter configuration can be carried out.

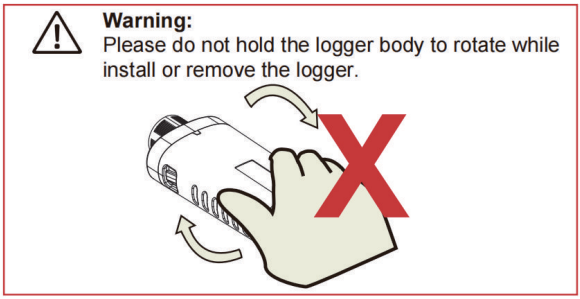
6.9.5 Abnormal State Processing

If the data on platform is abnormal when the stick logger is running, please check the table below and according to the status of indicator lights to complete a simple troubleshooting. If it still can not be resolved or indicator lights status do not show in the table below, please contact Customer Support.
(Note: Please using the following table query after power-on for 2mins at least.)

NET ● NET	COM ● COM	READY ● READY	Fault Description	Fault Cause	Solution
Any state	OFF	Slow flash	Communicate with inverter abnormally	1.Connection between stick logger and inverter loosen. 2.Inverter does not match with stick logger's communication rate.	1.Check the connection between stick logger and inverter. Remove the stick logger and install again. 2.Check inverter's communication rate to see if it matches with stick logger's. 3.Long press Reset button for 5s, reboot stick logger.
OFF	ON	Slow flash	Connection between logger and router abnormal	1.Stick logger does not have a network. 2.Router WiFi signal strength weak.	1.Check if the wireless network configured. 2.Enhance router WiFi signal strength.
Slow flash	ON	Slow flash	Connection between logger and router normal, connection between logger and remote server abnormal.d.	1.Router networking abnormal. 2.The server point of logger is modified. 3.Network limitation, server cannot be connected.	1.Check if the router has access to the network. 2.Check the router's setting, if the connection is limited. 3.Contact our customer service.
OFF	OFF	OFF	Power supply abnormal	1.Connection between stick logger and inverter loosen or abnormal. 2.Inverter power insuffi cient. 3.Stick Logger abnormal.	1.Check the connection, remove the stick logger and install again. 2.Check inverter output power. 3.Contact our customer service.
Fast flash	Any state	Any state	Networking status	Normal	1.Exit automatically after 2mins. 2.Long press Reset button for 5s, reboot stick logger. 3.Long press Reset button for 10s, restore factory settings.
Any state	Any state	Fast flash	Restore factory settings	Normal	1.Exit automatically after 1mins. 2.Long press Reset button for 5s, reboot stick logger. 3.Long press Reset button for 10s, restore factory settings.



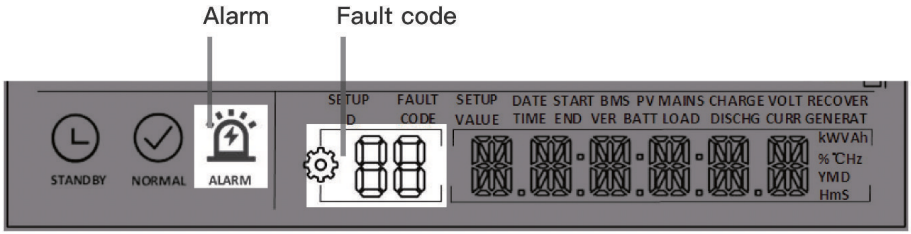
Key-press	Status Description	Light Status
Long press 5s then release	Rebooting the stick logger.	All lights are extinguished immediately.
Long press 10s then release	Resetting the stick logger.	1.All lights are extinguished after 4s. 2.READY light flashes fast for 100ms.





7. Fault Codes and Countermeasures

7.1 Fault Codes



Fault Code	Fault name	Whether it affects the output or not	Description
【01】	BatVoltLow	No	Battery undervoltage alarm.
【02】	BatOverCurrSw	Yes	Battery discharge average current overcurrent (software protection).
【03】	BatOpen	Yes	Battery not-connected alarm.
【04】	BatLowEod	Yes	Battery undervoltage stop discharge alarm.
【05】	BatOverCurrHw	Yes	Battery overcurrent (hardware protection).
【06】	BatOverVolt	Yes	Charging overvoltage protection.
【07】	BusOverVoltHw	Yes	Bus overvoltage (hardware protection).
【08】	BusOverVoltSw	Yes	Bus overvoltage (software protection).
【09】	PvVoltHigh	No	PV overvoltage protection.
【10】	PvAFCIErr	No	PV arc fault.
【11】	PvOCHw	No	Boost overcurrent (hardware protection).
【12】	SpiCommErr	Yes	SPI communication fault of master and slave chips.
【13】	OverloadBypass	Yes	Bypass overload protection.
【14】	OverloadInverter	Yes	Inverter overload protection.
【15】	AcOverCurrHw	Yes	Inverter overcurrent (hardware protection).
【16】	AuxDSpReqOffPWM	Yes	Slave chip OFF request fault.
【17】	InvShort	Yes	Inverter short-circuit protection.
【18】	Bussoftfailed	Yes	Bus soft-start failure.
【19】	OverTemperMppt	No	PV radiator over-temperature protection.
【20】	OverTemperInv	Yes	Inverter heat dissipation over-temperature protection
【21】	FanFail	Yes	Fan blockage or failure fault.
【22】	EEPROM	Yes	Memory failure.
【23】	ModelNumErr	Yes	Model setting error.
【24】	Busdiff	Yes	Positive and negative bus voltage imbalance.
【25】	BusShort	Yes	Bus short-circuit.
【26】	RlyShort	No	Inverted AC Output Backfills to Bypass AC Input.

【27】	LinePhaselose	Yes	Grid input phase lose.
【28】	LinePhaseErr	Yes	Grid input phase error
【29】	BusVoltLow	Yes	Bus voltage undervoltage protection.
【30】	BatCapacityLow1	No	Alarm given when battery capacity rate is lower than 10% (setting BMSto enable validity).
【31】	BatCapacityLow2	No	Alarm given when battery capacity rate is lower than 5% (setting BMSto enable validity).
【32】	BatCapacityLowStop	Yes	Inverter stops when battery capacity is low (setting BMSto enable validity).
【33】	ControlCanFault	Yes	Control CANfault in parallel operation.
【34】	CanCommFault	Yes	CANcommunication fault in parallel operation.
【35】	ParaAddrErr	Yes	ParallelID (communication address) setting error.
【36】	Balance currentOC	Yes	Balance bridge arm overcurrent failure.
【37】	ParaShareCurrErr	Yes	Parallel current sharing fault .
【38】	ParaBattVoltDiff	Yes	Parallel mode, inconsistent utility input source.
【39】	ParaAcSrcDiff	Yes	Inconsistent ACinput source in parallel mode.
【40】	ParaHwSynErr	Yes	Hardware synchronization signal error in parallel mode.
【41】	InvDcVoltErr	Yes	Inverter DCcomponent of voltage abnormality.
【42】	SysFwVersionDiff	Yes	Inconsistent parallel operation program versions.
【43】	ParaLineContErr	Yes	Parallel wiring fault.
【44】	Serial number error	Yes	Serial number not set at factory.
【45】	BMSbattery undervoltage alarm	Yes	[31] Incorrect settings for parallel operation mode.
【46】	MeterComErr	Yes	Meter communication error.
【48】	AFCIComErr	Yes	AFCIcommunication error.
【56】	Low insulation resistance fault	No	PV1+,PV2+and PV- abnormally low impedance to ground.
【57】	Leakage current overload fault	Yes	System leakage current exceeds limit.
【58】	BMScommunica-tion error	No	BMScommunication fault.
【60】	BMSbattery low temperature alarm	No	BMSlow-temperature alarm (takes effect after successful BMScommunication).
【61】	BMSbattery over temperature alarm	No	BMSover-temperature alarm (takes effect after successful BMScommunication).
【62】	BMSbattery over current alarm	No	BMSover-current alarm (takes effect after successful BMScommunication).
【63】	BMSbattery undervoltage alarm	No	BMSunder-voltage alarm (takes effect after successful BMScommunication).

7.2 Troubleshooting

Fault Code	Meaning	Causes	Remedy
/	No screen display	No power input, or the switch on the bottom of the unit is not switched on	Check whether the battery air circuit breaker or PV air circuit breaker is closed. Check if the switch is in the "ON" position. Press any button on the screen to exit the screen sleep mode.
01	Battery under-voltage	The battery voltage is lower than the value set in parameter [14].	Charge the battery until the battery voltage exceeds the set value in parameter [14].
03	Battery not connected	The battery is not connected, or the BMS is in discharge protection state.	Check whether the battery is reliably connected. Check if the battery circuit breaker is closed. Ensure that the BMS can communicate normally.
04	Battery over-voltage when charging	The battery voltage is lower than the value set in parameter [12].	Manual reset: Turn off and restart the device. Automatic reset: Charge the battery to make the battery voltage higher than the value set in parameter [35].
05	Bypass over-load (software detection)	Battery is in over-voltage condition.	Manually turn off the power and restart. Check if the battery voltage exceeds the limit value. If it does, the battery needs to be discharged until the voltage is lower than the battery overvoltage recovery point.
13	Inverter over-load (software detection)	Bypass output power or output current over-load for a period of time.	Reduce the load power and restart the device. For details, please refer to item 11 of the protection functions.
14	Heat sink of PV input over-temperature (software detection)	Inverter output power or output current over-load for a period of time.	
19	Heat sink of inverter output over-temperature (software detection)	Heat sink of PV input temperature exceeds 90°C for 3s.	Normal charging and discharging will resume when the temperature of the radiator cools down below the over-temperature recovery temperature.
20	Heat sink of inverter output temperature exceeds 90°C for 3s.	Heat sink of inverter output temperature exceeds 90°C for 3s.	
21	Fan failure	Hardware detects fan failure.	After turning off the machine's power, manually switch the fan and check for any foreign objects blocking it.

26	ACinput relay short-circuit	The relay is used to control the ACinput.	Manually shut down and restart the machine. If the fault reappears after restarting, contact the after-sales service department to repair the machine.
28	Utility input phase fault	ACinput phase does not match ACoutput phase.	Ensure that the ACinput phase is the same as the ACoutput phase.

NOTICE

If you encounter product faults that cannot be solved by the methods in the above table, please contact our after-sales service department for technical support and do not disassemble the equipment by yourself.

8. Protection and Maintenance

8.1 Protection Functions

NO.	Protection Functions	Definition
1	PVinput current / power limiting protection	When the configured PVarray charging current or power exceeds the rated PVinput value, the inverter will limit the input power and charge at the rated value.
2	PVovervoltage protection	If the PVvoltage exceeds the maximum value allowed by the hardware, the device will report a fault and stop PV boosting to output a sinusoidal ACwaveform.
3	Night anti-reverse charging protection	At night, the battery will be prevented from discharging to the PVmodule because the battery voltage is greater than the PVmodule voltage.
4	Mains input overvoltage protection	When the grid voltage of per phase exceeds 140Vac, the mains charging will be stopped and will switch to inverter output.
5	Mains input undervoltage protection	When the mains voltage of per phase falls below 90Vac, the mains charging will be stopped and will switch to inverter output.
6	Battery overvoltage protection	When the battery voltage reaches the over-voltage disconnection voltage point, it will automatically stop the PVand grid charging of the battery to prevent over-charging and damage to the battery.
7	Battery undervoltage protection	When the battery voltage reaches the low-voltage disconnection voltage point, it will automatically stop discharging the battery to prevent the battery from being over-discharged and damaged.

8	Battery overcurrent protection	When the battery current exceeds the range allowed by hardware, the machine will turn off output and stop discharging the battery.
9	AC output short-circuit protection	In the event of a load short-circuit fault, the AC output voltage will be shut down immediately. To resume normal output, the load short-circuit fault must first be eliminated, followed by a manual re-powering.
10	Radiator over-temperature protection	When the internal temperature of the inverter is too high, the inverter will stop charging and discharging; when the temperature returns to normal, the inverter will resume charging and discharging.
11	Inverter overload protection	After triggering the overload protection, the inverter will resume output after 3 minutes, 5 consecutive overloads will switch off the output until the inverter restarts. (102%<load<110%): error, output switched off after 5 minutes. (110%<load<125%): error reported and output switched off after 10s. (>125%load): error reported and output switched off after 10s.
12	AC backfeed protection	Prevents backfeeding of battery inverter AC to bypass AC inputs.
13	Bypass overcurrent protection	Built-in AC input overcurrent protection circuit breaker.
14	Bypass wiring error protection	When the phase of the two bypass inputs is different from the phase of the inverter phase split, the machine will prohibit cutting into the bypass to prevent the load from dropping out or short-circuiting when cutting into the bypass.

8.2 Maintenance

To maintain optimal long-term performance, it is recommended to perform the following inspections twice a year for inverter systems:

• Ensure that the airflow around the inverter is not blocked and remove any dirt or debris from the radiator.
• Check that all exposed conductors are not damaged by sunlight, friction with other surrounding objects, dry rot, insect or rodent damage, etc. The conductors need to be repaired or replaced if necessary.
• Verify that the indications and displays are consistent with the operation of the equipment, note any faults or incorrect displays and take corrective action if necessary.

• Check all terminals for signs of corrosion, insulation damage, high temperatures or burning/discolouration and tighten terminal screws.
• Check for dirt, nesting insects and corrosion, clean as required, clean insect screens regularly.
• If the lightning arrester has failed, replace the failed arrester in time to prevent lightning damage to the inverter or other equipment of the user.

DANGER

Before performing any inspections or operations, ensure that the inverter is disconnected from all power sources and that the capacitors are fully discharged to prevent the risk of electric shock.

8.3 Storage

If the inverter is not to be put into use immediately, the following requirements shall be met for storage:

• Do not remove the original packaging of the inverter.

• The storage temperature shall be maintained at -13 ~140°F; the relative humidity shall be maintained at 5%~95% RH.

• Store in a clean and dry place to protect against dust and moisture erosion.

• Maximum stacking height: 5 layers. When stacking, place the inverters with care to prevent tipping over, which may cause personal injury or equipment damage.

• Conduct regular inspections during storage (recommended once every three months). Replace the packaging materials in a timely manner if moth damage, rat bites or packaging damage is found.

• If the storage period is 2 years or longer, the inverter must be inspected and tested by professional personnel before being put into use.

9. Datasheet

MODEL	ECO-INV-48V18KWTSR01	Setting
INVERTER OUTPUT		
Rated Output Power	18000W	
Max. Peak Power	2 times rated power, 10s	
Max. ACOutput Power	19800VA	
Rated ACOutput Current	50.0Aac	
Rated Output Frequency	50/60Hz	
Rated Output Voltage	120/208Vac (L1+L2+L3+N+PE)	√
Output Voltage Range	120/208Vac± 5%	
BATTERY INPUT		
Battery Types	Li-ion / Lead-Acid/ User Defined	√
Rated Battery Voltage	48Vdc	
Battery Voltage Range	40-60Vdc	
Max. PV Charging Current	360Adc	√
Max. Grid/Generator Charging Current	360Adc	√
Max. Charging/Discharging Current	360Adc	√
Charging Curve	3 Stages/ Equalization	
Charging Strategy for Li-Ion Battery	Self-adaption to BMS	
PV INPUT		
No. of MPPT Trackers	2	
Max. PVInput Power	14.4kW + 14.4kW	
Input Current	36Adc +36Adc	
Min. PVInput Voltage /Start-up Voltage	100Vdc / 100Vdc	
Max. PVInput Voltage	600Vdc / 600Vdc	
MPPT Operating Voltage Range	120-550Vdc / 120-550Vdc	

GRID / GENERATOR INPUT		
Rated Input Frequency	50/60Hz	
Rated Input Voltage	120/208Vac (L1+L2+L3+N+PE)	
AC Voltage Range	Phase Voltage 90~140Vac; Line Voltage 156~242Vac	
Bypass Overload Current	100A	
EFFICIENCY		
MPPT Tracking Efficiency	>99%	
Max. Efficiency	97.6%	
GENERAL DATA		
Parallel Capacity	1~6 units	
Dimensions (W× H× D)	23.36"×33.40"×8.47"	
Weight	118 lbs	
Protection Degree	IP20, indoor use only	
Operating Temperature	14 ~ 131 °F, >113 °F Derated	
Noice	<60dB	
Cooling Method	Intelligent Air Cooling	
COMMUNICATION		
Internal Interface	RS485 / CAN / WiFi	√
External Module (optional)	Wi-Fi Stick	√
PROTECTION		
Has PV Current Limiting Protection, PV Overvoltage Protection, Night Anti - backcharging Protection, Mains Input Overvoltage Protection, Mains Input Undervoltage Protection, Battery Overvoltage Protection, Battery Undervoltage Protection, Battery Overcurrent Protection, AC Output Short - circuit Protection, Heat Sink Overtemperature Protection, Overload Protection, AC Backfeed Protection, Bypass Overcurrent Protection, Bypass Wiring Error Protection, Arc Fault Protection, Leakage Current Protection, Rapid Shutdown Signal Generator (Optional), AFCI/GFCI/RSD(Optional)		
PROTECTION		
Safety Standards	IEC62109-1, IEC62109-2	
EMC	EN61000-6-1, EN61000-6-3, FCC15 class B	
RoHS	Yes	

10. Technical Support

1) Customer service email:

E-mail: customer. service@eco-worthy.com

2) Customer service telephone numbers:

Tel(DE): +49 6175 6514 999

Tel(US/CA): +1 713 906 2097

Tel(UK): +44 7553 406988

Note:

Customer Service Hours:

US: Mon-Fri 8 :3AM - 6:00 PM(CST)

UK: Mon-Fri 9 AM - 5 PM(GMT)

DE: Mon-Fri 9 AM - 5 PM(CET)

3) Company address: USA/Germany

Address(US): 10920 W Sam Houston Pkwy N,Suite 700, Houston, TX 77064

Address(DE): ECO-WorthyEurope GmbH Otto-Hahn-Str. 20 61381 Fried richsdorf - Köppern Germany

4) Official website address:

Web: https://www.eco-worthy.com/

5) Official social media:

Facebook: https://www.facebook.com/ecoworthy.store/

Youtube: @ecoworthy

Tiktok: https://www.tiktok.com/@eco_worthy

ECO-WORTHY

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