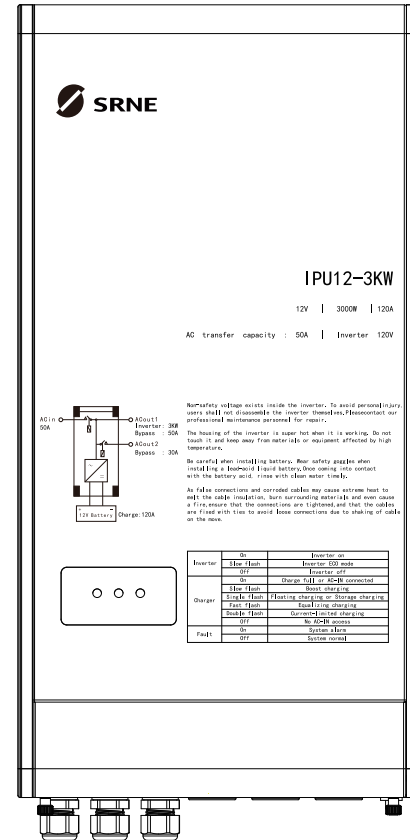


IPU Series Charging Bidirectional Inverter

User Manual



Dear user:

Thank you very much for choosing our product !


Important safety instructions


Please keep this manual for future reference

This manual contains all safety, installation, and operating instructions for the IPU series frequency and pure sine wave charging bidirectional inverter (hereinafter referred to as "the inverter"). Please read all instructions and precautions in the manual carefully before installation and use.

- 1. Non-safety voltage exists inside the inverter. To avoid personal injury, users shall not disassemble the inverter themselves. Please contact our professional maintenance personnel for repair.
- 2. Do not place the inverter within the reach of children.
- 3. Do not install the inverter in harsh environments such as moist, oily, flammable or explosive, or heavily dusty areas.
- 4. The AC output of the inverter is high voltage, so please do not touch the wiring terminals.
- 5. The housing of the inverter is super hot when it is working. Do not touch it and keep away from materials or equipment affected by high temperature.
- 6. Do not open the terminal protective cover when the inverter is working.
- 7. Suitable fuse or circuit breaker is recommended to be mounted outside the inverter.
- 8. Make sure to disconnect the fuse or circuit breaker near the terminals of the battery and AC output before installing and adjusting the wiring of the inverter.
- 9. After installation, check whether all wiring is tightly connected to avoid the danger of heat accumulation due to loose connection.
- 10. The inverter is off-grid. It is necessary to confirm that it is the only input device for load, and it is forbidden to use it in parallel with other input AC power to avoid damage.
- 11. In order to ensure that users can protect their personal and property safety while using this product, relevant information is highlighted in the manual with following symbols. The following symbols in the manual indicate that you should read the relevant words carefully.

 **Warning: Electric shock that may damage devices or electrocution/injury if it is not avoided.**

 **Caution: Potential dangers that may damage devices if they are not avoided.**

 **Note: Important notices in operation that may trigger the device fault alarm if they are not performed.**

Contents

1、 Introduction	03
1.1 Overview	03
1.2 Features	03
1.3 Appearance and interface description	04
1.4 Dimension drawing	05
2、 Technical Parameters	06
3、 Function Introduction	07
3.1 Charging curve	07
3.2 Charging stage description	08
3.3 Battery parameter table	09
4、 Description of Interface Function	09
4.1 RS485 communication interface	09
4.2 CAN communication	09
4.3 TTL communication interface	10
4.4 Bluetooth communication	10
4.5 BTS interface	10
4.6 BVS interface	11
4.7 Remote ON/OFF interface	11
4.8 Operating mode switch power	12
4.9 LED indicator	12
5、 Installation Instructions	13
6、 Common Problems and Solutions	20
7、 Protection Function	21
8、 System Maintenance	22

1. Introduction

1.1 Overview

The IPU series frequency and pure sine wave charging bidirectional inverter integrates pure sine wave inverter, battery charger, and AC power bypass loading.

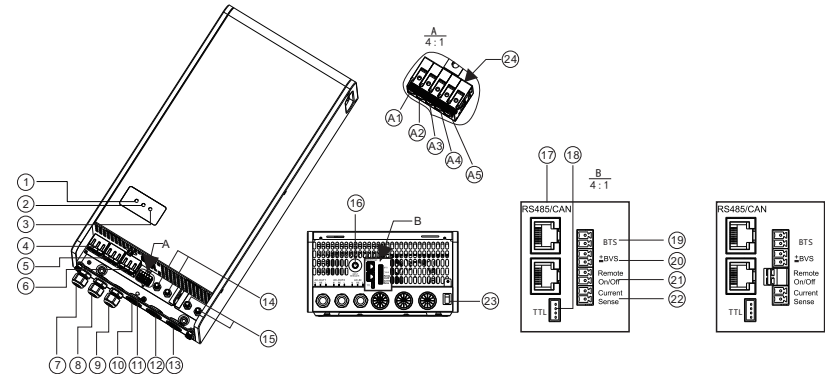
Thanks to the full-digital intelligent control technology and voltage-current double closed-loop control algorithm adopted, the inverter has a fast dynamic response, high conversion efficiency, low harmonic component and stable operation; Key components with high power density and long service life provide the inverter with continuous long-time and full-power output. And comprehensive electronic protections keep the entire system safer and more stable;

The IPU series inverter is specifically developed as an integrated inverter and charger for RV systems. Its strong load capacity can meet the load requirements of various types of household appliances, including air conditioner, electric kettle, hair dryer, induction cooker, coffee machine, etc., meeting the needs of household appliances in RV life.

1.2 Features

- ◆ Full digital voltage-current double closed-loop control, in high response speed and reliability.
- ◆ Advanced SPWM technology, pure sine wave output, and low Total Harmonic Distortion (THD).
- ◆ Advanced wave-filter and current-limiting technology, with impact load such as large capacitive and inductive available.
- ◆ Design scheme of power frequency transformer can meet the stable load requirements of various inductive loads.
- ◆ No-load loss as low as 14W, with a maximum efficiency of 94%, maximizing energy utilization.
- ◆ Supporting ECO energy-saving mode, with losses as low as 5W; and automatic wake-up of load output, maximizing energy saving.
- ◆ Supporting multiple battery charging such as sealed battery, gel battery, flooded battery, lithium battery, and user-defined batteries.
- ◆ Provided with automatic activation function of lithium battery charging.
- ◆ 6-stage battery charging management function, which can quickly charge the battery and effectively extend its service life.
- ◆ Maximum charging current and full cut-off current can be set, providing comprehensive care for the battery.
- ◆ Supporting 3A-5A constant current charging for starter battery.
- ◆ Automatic energy distribution, which can automatically adjust the charging power according to the size of the load power.
- ◆ Provided with AC power bypass, inverter output automatic and uninterrupted switching power supply, and UPS function.
- ◆ With mixed load function, inverter power and grid power simultaneously provide the power needed by the load.
- ◆ Two bypass loading outputs under AC power mode, which meets the electricity demand under complex conditions.
- ◆ AC input overload protector for safe and reliable operation
- ◆ Supporting Bluetooth communication, and view product operation state/real-time data and fault state through mobile app.
- ◆ Supporting RS485 communication interface.
- ◆ Supporting TTL communication interface.
- ◆ Supporting Controller Area Network (CAN) communication of RV-C.
- ◆ Design of remote On/OFF contact switch.
- ◆ Programmable relay dry contact output, which can be used for control of other devices.
- ◆ Intelligent air cooling control system, for detecting the output of fan blocked control.
- ◆ Complete hardware and software protection functions to ensure stable and reliable operation.
- ◆ High power density and long-life devices for product reliability.

1.3 Appearance and interface description

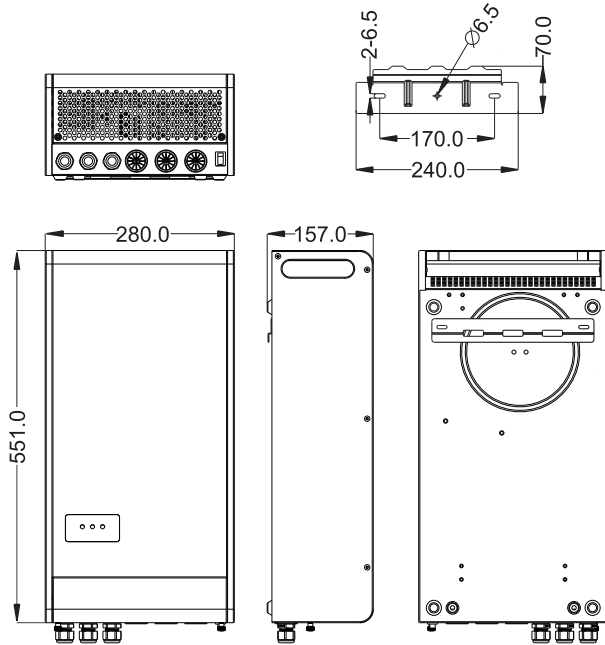


S/N	Name	S/N	Name
①	Inverter indicator	⑬	Battery negative outlet M8*2
②	Charge indicator	⑭	Battery positive terminal M8*2
③	Fault indicator	⑮	Battery negative terminal M8*2
④	AC output ACout1(Inverter+Bypass)	⑯	AC input overload protector
⑤	AC output ACout2(Only Bypass)	⑰	RS485/CAN communication interface
⑥	AC input ACin	⑱	TTL communication interface
⑦	AC output ACout1 outlet	⑲	Battery temperature sampling BTS interface
⑧	AC output ACout2 outlet	⑳	Battery voltage sampling BVS interface
⑨	AC input ACin outlet	㉑	Remote ON/OFF interface
⑩	Functional line outlet	㉒	NA
⑪	Ground terminals M6	㉓	Device switch
⑫	Battery positive outlet M8*2	㉔	Terminal A (interface defined as follows)

Terminal A interface description:

S/N	Name	S/N	Name
A1	Programmable relay NC	A4	Starter battery positive
A2	Programmable relay C	A5	Starter battery negative
A3	Programmable relay NO		

1.4 Dimension drawing



Product size : 551*280*157mm
 Installation size : 240*170mm
 Hole size : φ6.5mm

2. Technical Parameters

Product model	IPU12-3KW
Inverter mode:	
output rating	3000W
Withstand instantaneous impact power	6000W
Output power factor	1.0
Output voltage	100VAC/110VAC/115VAC/120VAC(default)(±2%)
Output frequency	50HZ/60HZ(default)(±0.1%)
Output wave	Pure sine wave
Output harmonic component	THDV < 4%(pure resistance load)
Rated input voltage	12VDC
Input voltage range	10.0 ~ 16.0VDC
Rated output efficiency	> 83.0%
Maximum output efficiency	> 94.0%(20% load)
No-load loss	< 14W
ECO energy-saving mode loss	< 5W
ECO starting power	< 30W , 30 ~ 100W adjustable
ECO exit power	> ECO starting power +10W
ECO interval time	1min , 30s ~ 30min adjustable
N-G grounding	Supported, enabled by default
Charger mode:	
Ac input voltage	Single phase 90VAC~140VAC
Ac input frequency	45 ~ 65HZ
Rated charging current	120A
Maximum charging current	The default is 120A, and 0~120A is adjustable.
Full cut-off current	Default 1A, 0~12A adjustable
Battery type	USE/FLD/GEL/LI/SLD(adjustable)
Starter battery charging current	≤3A
Other parameters:	
AC output mode	Bypass loading + battery charging (default), and bypass loading only
Acin rated input current	50A
Acin maximum input current	5 ~ 50A adjustable
Acout1 rated bypass loading current	50A
Acout2 rated bypass loading current	30A
Acout1 output mode	Inverter output or bypass output
Acout2 output mode	Bypass output only, delay output
Acout2 delayed output time	30s ~ 5min , default 2 min
Acout1 output priority	Mains priority (default)-access to mains for charging and bypass loading; Inverter priority-when the battery voltage is greater than a certain value, the access to the mains will give priority to inverter load; When the battery voltage is less than A certain value will be switched to mains charging and bypass loading, and then it will be converted to inverter output when the battery meets the requirement of constant voltage charging for 2 hours.
Battery voltage of inverter to bypass when inverter takes precedence	< 13.2V(12.0 ~ 14.0V adjustable)
Battery voltage from bypass to inverter when inverter takes precedence	Constant voltage charging for 2 hours
UPS switching time	< 10ms
Communication function	Bluetooth, TTL, RS485, and CAN (RV-C)
Remote Startup & Shutdown Remote On/Off interface	Supported
Charging cable drop compensation BVS interface	Supported
Lead-acid battery charging temperature compensation BVS interface	Supported
RTC real-time clock	Supported
Programmable relay output	DPST 10A/250VAC ; 10A/30VDC
Indicator	Green-inverter indication; Yellow-charging indication; Red-Fault indication
Protection function	DC input overvoltage/over-discharge protection, AC output overload/short-circuit protection, AC input overvoltage/under-voltage protection, device over-temperature protection, fan stall protection
Operating ambient temperature	- 20°C ~ 60°C
Storage ambient temperature	- 35°C ~ 80°C
Relative humidity	≤95%
Protection level	IP20
Heat-dissipating method	Natural heat dissipation + intelligent air cooling
Noise	≤60dB
Product dimension	551x280x157mm
Installation dimension	Installation hole spacing: 170mm, fixed hole position: 6.5mm
Net weight	22.5kg

3. Function Introduction

3.1 Charging curve

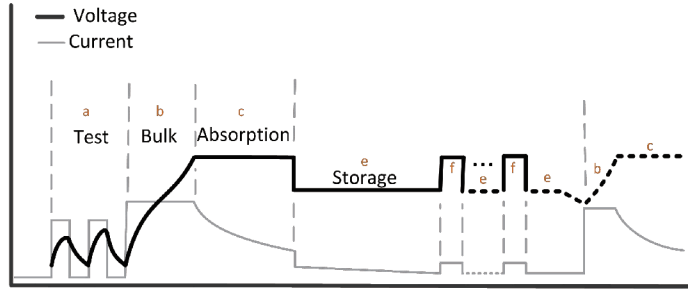


Figure 1 Charging curve of lithium battery

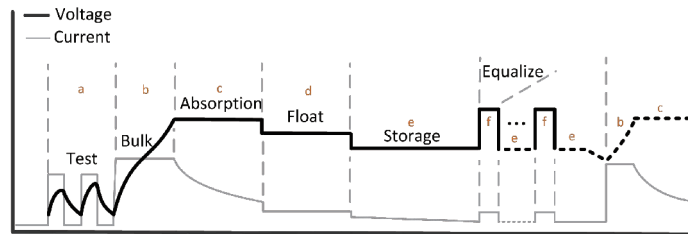


Figure 2 Charging curve of lead-acid battery

3.2 Charging stage description

Corresponding to the charging curve in 3.1 above, explain each charging stage:

3.2.1 Stage a- precharge -Test

Lead-acid batteries or lithium batteries are deeply discharged or not charged for a long time, resulting in a very low battery voltage, even down to 0V. After the charger is connected, the charging current will be limited to 8% of the set charging current and the battery will be precharged by pulse voltage. When the battery voltage is charged above 10.5V, it will enter Bulk charging.

3.2.2 Stage b- high current charging -Bulk

When the battery voltage is less than the constant charging voltage, the charger charges the battery quickly with the set charging current. When the battery voltage is charged to the constant-voltage charging voltage, it will enter Absorption charging.

3.2.3 Stage c- boost charging -Absorption

At the end of Bulk charging, the battery voltage rises to the Absorption voltage, and the charger will maintain the Absorption voltage to charge the battery at constant voltage.

In the lead-acid battery mode, keep the Absorption voltage for 2 hours (or a user-defined time), and then enter the Float charging;

In the lithium battery mode, if the charging current is less than 5% of the set charging current after charging at the Absorption voltage for 2 hours (or a user-defined time), it will enter the Storage charging; If the charging current is greater than 5% of the set charging current, it will continue to be charged in Absorption mode, and after more than 48 hours, it will also be charged in Storage mode to further reduce the charging voltage.

3.2.4 Stage d-Floating charge-float

In lead-acid battery mode, after Absorption charging for 2 hours, the charging voltage will be further reduced to enter the Float charging stage. After Float charging is maintained for 2 hours, if the charging current is less than 5% of the set charging current, it will enter the Storage charging stage. If the charging current is greater than 5% of the set charging current, it will continue to be charged in floating charge, and after more than 48 hours, it will also be charged in Storage to further reduce the charging voltage.

Lithium batteries have no Float charging stage.

3.2.5 Stage e-Storage charging-storage

After the battery is fully charged, the charger is always connected, which will further reduce the charging voltage, store and charge the battery, supplement the battery's own loss, and keep the battery fully charged.

In the Storage charging stage, if one of the following conditions is met, the Storage charging will be exited:

- 1) When the charging current is greater than 5% of the set charging current for about 10 seconds, exit Storage charging and enter a new charging cycle.
- 2) When the battery voltage is lower than "Storage charging voltage minus 0.3V" for about 10 seconds, exit Storage charging and enter a new charging cycle.

3.2.6 Stage f- balanced charging-equal

When the battery is in the Storage charging state for a long time, the battery is charged evenly every 7 days. The battery benefits from regular balanced charging, which can stir the electrolyte, vaporize the electrolyte, balance the battery voltage, complete the chemical reaction, and effectively prolong the battery life. At this stage, the charging voltage of lead-acid battery is balanced charging voltage, and the charging voltage of lithium battery is boosted charging voltage.

3.2.7 Full

In the constant voltage charging stage (as shown in "c/d" stage of Figure 1 and Figure 2), the charging current is less than "full cut-off current" for 1 minute, and the charger will stop charging. If the battery voltage is lower than the storage voltage of -0.3V, it will enter a new charging cycle again.

3.3 Battery parameter table

Battery Type Parameter Item	Sealed Lead-acid SLD	Gel Battery GEL	Flooded Battery FLD	Lithium battery LI	Customized USE
Overvoltage disconnect voltage	16.0V	16.0V	16.0V	16.0V	9.0 ~ 17.0V
Limited charging voltage	15.5V	15.5V	15.5V	15.5V	9.0 ~ 17.0V
Equalizing voltage	14.6V	—	14.8V	—	9.0 ~ 17.0V
Boost voltage	14.4V	14.2V	14.6V	14.4V	9.0 ~ 17.0V
Float charging	13.8V	13.8V	13.8V	—	9.0 ~ 17.0V
Storage voltage	13.2V	13.2V	13.2V	13.5V	9.0 ~ 17.0V
Over-discharge voltage	11.1V	11.1V	11.1V	11.1V	9.0 ~ 17.0V
Over-discharge restc	12.6V	12.6V	12.6V	12.6V	9.0 ~ 17.0V
Equalizing charging interval	7days	7days	7days	—	0~60days (0 indicates off)
Equalizing charging time	60min	60min	60min	—	0 ~ 60min
Boost charging time	120min	120min	120min	120min	10 ~ 600min
Float charging time	120min	120min	120min	—	Equal to increasing the charging time
Temperature compensation factor mV/°C/2V	-3	-3	-3	—	0~-5
Custom lithium setting method: the balanced charging voltage is equal to the boosted charging voltage, and the temperature compensation coefficient is 0.					

4. Description of Interface Function

4.1 RS485 communication interface

- 1) Default baud rate: 9,600 bps, check bit: none, data bit: 8 bit, stop bit: 1 bit
- 2) Interface type: RJ45, communication power supply output specification: 5VDC/200mA
- 3) The RS485 communication line sequence is defined as follows, with interface integrating remote switch interface and CAN communication interface. When the switch interface (SW1/SW2) is open, it can work normally; and when the switch interface (SW1/SW2) is short-circuited, the inverter and charging can be turned off.

序号	定义
①	CANL
②	CANH
③	SW2
④	SW1
⑤	GND
⑥	D-
⑦	D+
⑧	VCC 5.0VDC

4.2 CAN communication

Built-in CAN communication function, supporting RV-C protocol, real-time monitoring of inverter operation data, fault status and adjustment of inverter operation parameters through PC. See 4.1 for the pin definition of CAN communication interface.

4.3 TTL communication

- 1) Default baud rate: 9,600 bps, check bit: none, data bit: 8 bit, stop bit: 1 bit
- 2) Communication power output specification: 12.5V/200mA

S/N	Description
①	VCC : communication power supply output
②	RX : inverter data receiving end
③	TX : inverter data sending end
④	GND : power ground

4.4 Bluetooth communication

Built-in Bluetooth communication function, real-time monitoring of inverter operation data, fault status and adjustment of inverter operation parameters through mobile phone APP.

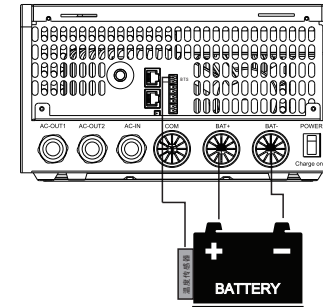
You can scan the following QR code to download the APP:



4.5 Battery temperature sampling BTS interface

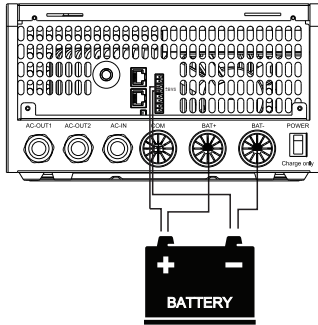
Connect the temperature sensor to the corresponding BTS interface to achieve the high and low temperature protection for the battery and the temperature compensation for the charging voltage of lead-acid battery (no temperature compensation for the lithium battery); if the temperature sensor is not connected, the default temperature is 25°C;

The wiring method is shown in the figure:



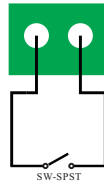
4.6 Battery voltage sampling BVS interface

Since the line diameter from the battery to the inverter is too small, when the charging power is large, the voltage collected by the inverter terminal will be higher than the actual voltage of the battery terminal, resulting in the battery being not fully charged; connecting the voltage compensation line can more accurately collect the battery terminal voltage, and timely output the voltage difference compensation, so that the battery terminal can get a more proper charging voltage. The wiring method is shown in the figure:

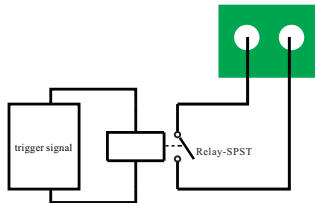


4.7 Remote ON/OFF interface of remote switch

2P switch interface: Inverter can work when the interface is short-circuited; inverter fails to work when the interface is open. The interface can be connected to a mechanical switch or relay to control the inverter to start/stop (this application requires keeping the inverter power supply in the I position) in practical application.



Application drawing 1: external mechanical switch



Application drawing 2: external relay switch

4.8 Operating mode switch power

Using a 3-position rocker switch, with the Remote ON/OFF interface in the closed state, the inverter has three operating modes: OFF, I, and II.

Switch Position	Definition of Mode	Description of Mode
OFF	Off mode	The device is in off state, not working, and has no loss
I	Normal mode	The device is in normal operating condition and can provide inverter output or charged based on the battery and AC input conditions
II	Charging mode only-Charge only	The device is only used for charging or bypass loading and will not operate in inverter mode

4.9 LED indicator

- 1) Inverter indicator-green; Charging indicator-yellow; Fault indicator-red
- 2) Indicators are defined as follows:

Indicator	Color	State	State Description
Inverter	Green	Normally on	Inverter output
		Slow flash	Inverter ECO output
		Off	Inoperative inverter
Charger	Yellow	Normally on	Battery is fully charged or ACin access is not charged/or only bypass output
		Slow flash	Boost charge/absorption
		Single flash	Float charging/float or storage charging/storage
		Fast flash	Equalizing charging/equalize
		Double flash	Current-limited charging/bulk/test
		Off	No ACin connected
Fault	Red	Normally on	System fault
		Single flash	Stand-by, no inverter or not charging
		Off	Normal system

Definition of indicator flashing:

Slow flash	1s ON, 1s OFF in 2s	
Single flash	0.1s ON, 1.9s OFF in 2s	
Double flash	0.1s ON, 0.1s OFF, 0.1s ON and 1.7s OFF in 2s	
Fast flash	1s ON, 0.1s OFF in 0.2s	

5. Installation instructions

5.1 Installation precautions

Please read this manual carefully before installation to be familiar with the installation steps.

- ◆ Be careful when installing battery. Wear safety goggles when installing a lead-acid liquid battery. Once coming into contact with the battery acid, rinse with clean water timely.
- ◆ Keep away from metal objects to prevent short-circuit of battery.
- ◆ The battery may produce acid gas when charging. Make sure that the ambient environment is well-ventilated.
- ◆ When installing the cabinet, there must be enough space around the inverter for heat dissipation; Do not install the inverter and lead-acid battery in the same cabinet to avoid corrosion by acid gas generated during battery operation.
- ◆ As false connections and corroded cables may cause extreme heat to melt the cable insulation, burn surrounding materials and even cause a fire, it is necessary to ensure that the connections are tightened, and the cables are fixed with ties to avoid loose connections due to shaking of cable on the move.
- ◆ The system connection cables selected shall have a current density $\leq 5A/mm^2$.
- ◆ During outdoor installation, direct sunlight and rainwater infiltration shall be avoided.
- ◆ After the power switch is turned off, there is still high voltage inside the inverter. Do not turn on or touch the internal devices. Carry out relevant operations after the capacitor is discharged.
- ◆ Do not install the inverter in harsh environments such as moist, oily, flammable or explosive, or heavily dusty areas.
- ◆ Polarity at the battery input terminal of this product shall not be reversed. Otherwise, it may damage the device or cause unpredictable danger.
- ◆ The AC output is a high voltage, so please do not touch the wiring.
- ◆ Do not touch the working fan to prevent injury.
- ◆ It is necessary to confirm that the inverter is the only input device for load, and it is forbidden to use it in parallel with other input AC power to avoid damage.

5.2 Wiring specifications and circuit breaker selection

Wiring and installation must comply with national and local electrical codes.

- ◆ Battery input wiring specifications and circuit breaker selection

Model	Rated input current	Battery input wiring specifications	Circuit breaker selection
IPU12-3KW	300A	60mm ² /(2AWG*2)	DC-2P-315A

- ◆ AC output wiring specifications and circuit breaker selection

Model	Rated output current	AC output wiring specifications	Circuit breaker selection
IPU12-3KW	25A	5mm ² /10AWG	AC-2P-32A

- ◆ AC input wiring specifications and circuit breaker selection

Model	Rated input current	AC output wiring specifications	Circuit breaker selection
IPU12-3KW	50A	10mm ² /7AWG	AC-2P-60A



- ◆ The above are reference specifications. Please select the appropriate specification and model according to actual situations.
- ◆ The wiring diameter is for reference only. If the distance between the inverter and the battery is relatively long, using a thicker wire can reduce the voltage drop to improve system performance.
- ◆ The above are only recommended wiring diameter and circuit breaker. Please select the appropriate wiring diameter and circuit breaker according to actual situations.

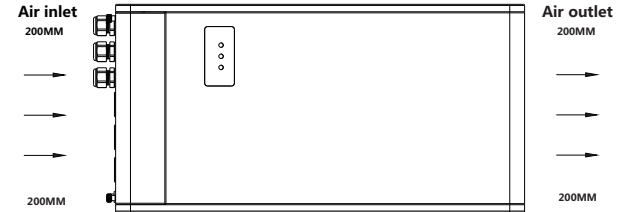
5.3 Installation and wiring

Installation steps:

Step 1: Please read the user manual carefully.

Step 2: Determine the installation position and the space for heat dissipation

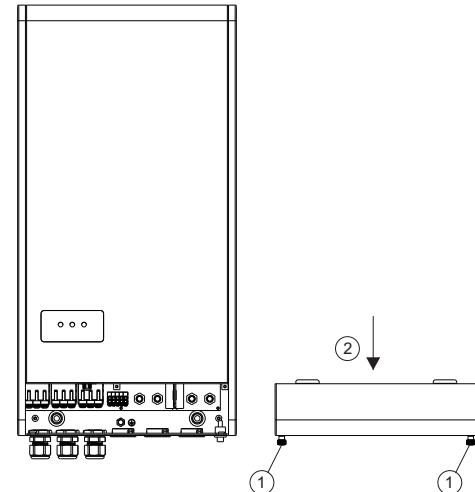
Determine the installation position (wall-mounted or horizontal installation method can be adopted); when installing the inverter, confirm that there is enough space of at least 200mm reserved between the air outlet and air inlet of the inverter to facilitate air circulation.





If the device is installed in a closed box, ensure that heat dissipation is allowed through the container. Otherwise, derate to use the device.

Step 3: Remove the terminal protection cover: Loosen the two screws ① of the terminal protection cover and push it in the direction of arrow ②.

Remove the terminal protection cover, as shown below:

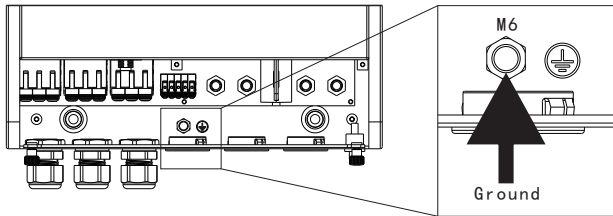


Step 4: Wiring

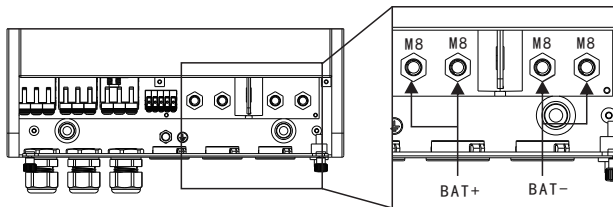
	<ul style="list-style-type: none"> ◆ The AC device shall be determined based on the inverter's continuous output power. The impact power of the AC device cannot be higher than the inverter's instantaneous impact power. Otherwise, the inverter may be damaged.
	<ul style="list-style-type: none"> ◆ Before wiring, switch the inverter to the OFF. ◆ Do not close the circuit breaker or fuse during wiring, and check if the electrode leads of each component are properly connected. ◆ The battery terminal shall be equipped with a fuse selected according to 2-2.5 times of the rated input current of the inverter, and the fuse must be at least 150 mm away from the battery terminal. ◆ There is no reverse connection protection for the input, check if the Positive and Negative are connected correctly before connecting.


Please connect the wires in the following recommended order:

1) Ground wire: Connect the ground wire to M6 grounding bolt post through o-shaped terminal, as shown below:



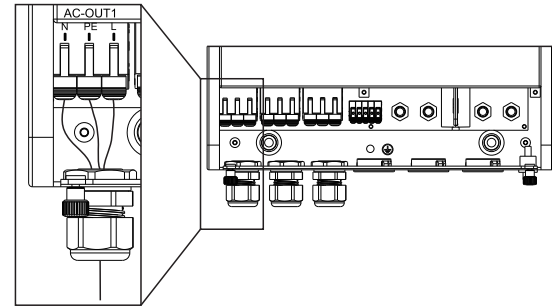
2) Battery positive and negative wires: connected to M8 grounding bolt column through o terminal (battery positive electrode corresponds to BAT+, battery negative electrode corresponds to BAT-), as shown below:



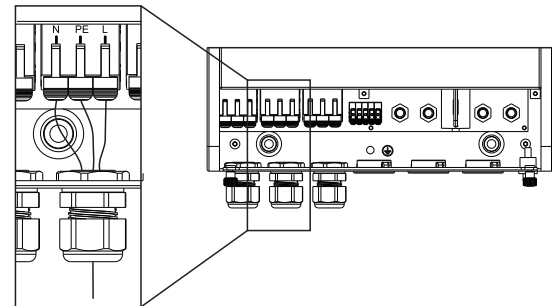
	<ul style="list-style-type: none"> ◆ The input is not protected by reverse connection. Please ensure that the positive and negative electrodes are connected correctly before connecting the battery line, otherwise the inverter will be damaged! ◆ There are two bolts at the positive and negative poles of the battery. Don't connect only one bolt when using high power, otherwise it may cause local overheating of the equipment! ◆ Be sure to confirm the battery type, battery quantity, battery capacity and other parameters before installation. ◆ No access to non-rechargeable batteries!
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3) Ac output line

Connect the load equipment with inverter load and bypass load to the AC output terminal AC-OUT1, which is defined as follows:

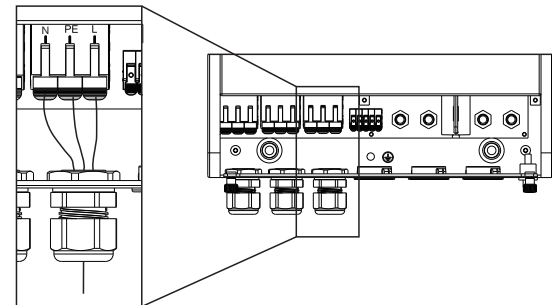


Connect the load equipment that only needs to bypass the load to the AC output terminal AC-OUT2, which is defined as follows:



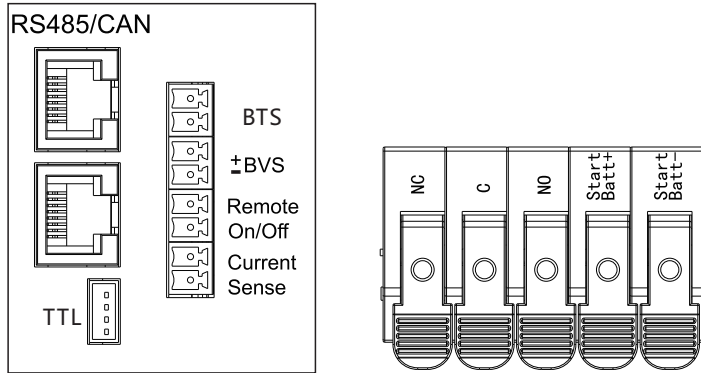
4) Ac input line

Connect the power grid or alternator to the AC input terminal AC-IN, which is defined as follows:



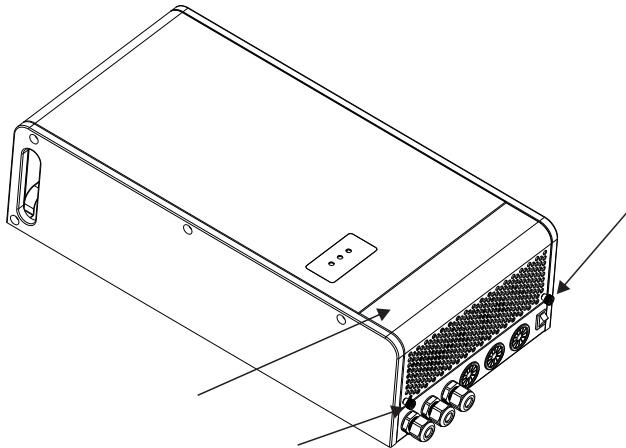
Step 5:

Install other functional wiring according to actual needs, such as communication line (RS485/CAN/TTL), battery temperature sampling line (BTS), battery voltage sampling line (BVS), remote switch control line (Remote On/Off, short circuit of terminal line by default), relay dry contact output line (NC O NO), positive and negative lines for starting battery charging (positive Start Batt-)



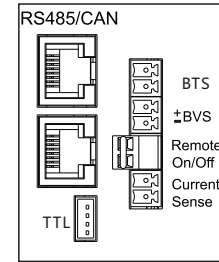
Step 6:

Installation of terminal protection cover: After carefully checking that all wiring is reliable and firm according to the above wiring method, install the terminal protection cover, as shown in the following figure:

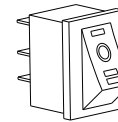


Step 7: Start the inverter

- 1) Close the breaker at the DC input end of the inverter or fuse at the battery end;
- 2) Confirm that the Remote On/Off of the remote switch interface is in short circuit state, as shown below:

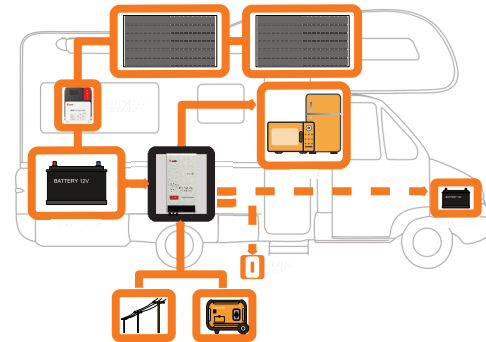


- 3) Set the mode switch of the inverter to I position, and start the inverter output: the inverter indicator light is always green and normally outputs alternating current;



- 4) Close the circuit breaker on the AC load line, turn on the AC loads one by one, and check the operation status of the inverter and the loads;
- 5) If after starting the inverter, the fault indicator light is red, accompanied by buzzer alarm, please turn off the load and inverter. See. Troubleshooting of Common Problems and Solutions. After troubleshooting, please follow the above steps again.

Wiring diagram of RV application system:

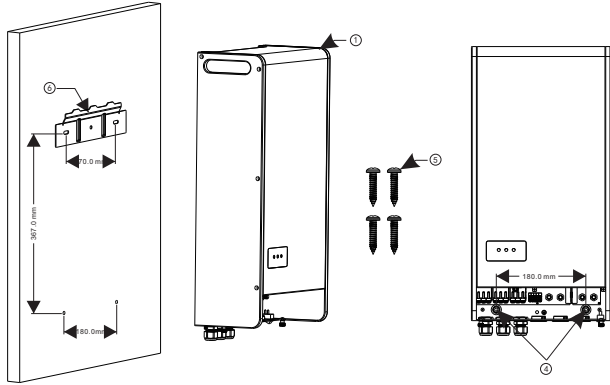


There are three installation methods for inverter design: wall-mounted installation, horizontal installation and lateral vertical installation. The specific installation details and dimensions are shown in the following figure, and the materials ①-⑥ in the figure are shown in the following table:

①	②	③	④	⑤	⑥
product	dead plate	M4X8 cross countersunk head screw	Product installation hole position	M6X30 Phillips head screw	wall hanger

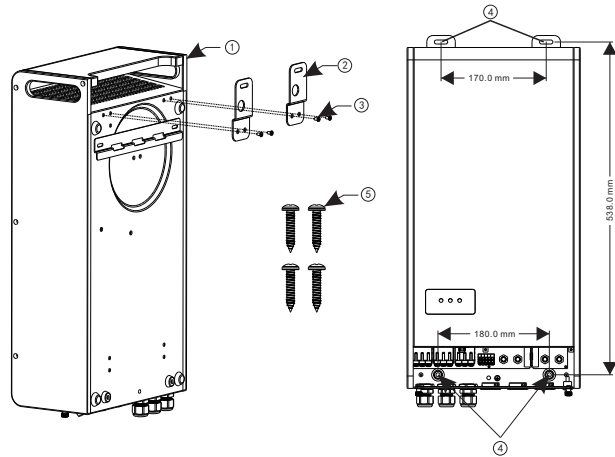
一、 Wall mounting

- Step 1: Install the wall hanger ⑤ on the wall or board with M6X30 Phillips head screw ⑤;
 Step 2: Hang the product ① into the wall hanger ⑤ from top to bottom, and then drive the M6X30 Phillips head screw ⑤ into the product installation hole ④ for fixing.



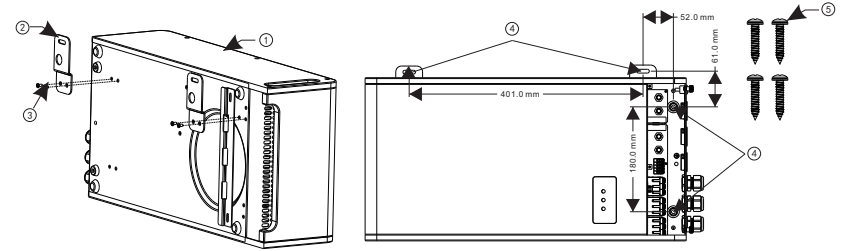
二、 Flat installation

- Step 1: Install two fixing plates ② on the product ① with M4X8 countersunk head screws ③.
 Step 2: Screw M6X30 Phillips head screw ⑤ into the product installation hole ④ for fixing.



三、 Side vertical installation;

- Step 1: Install two fixing plates ② on the product ① with M4X8 countersunk head screws ③.
 Step 2: Screw M6X30 Phillips head screw ⑤ into the product installation hole ④ for fixing.



6. Common Problems and Solutions

S/N	Phenomenon	Cause	Possible cause	Solutions
1	Red light always on, green/yellow light off, buzzer buzzing, no AC output	Over-low battery input voltage	1.Excessive voltage drop due to over-small battery wiring diameter 2.Low battery power	1.Choose the suitable wires. 2.Timely charge the battery until the low voltage recovery voltage can self-restore the output
2	Red light always on, green/yellow light off, buzzer buzzing, no AC output	Over-high battery input voltage	Mismatch between battery voltage and device system voltage	Measure the positive and negative terminal voltage of the device with a voltmeter to determine whether they are higher than the overvoltage protection voltage, and recover by adjusting the input voltage
3	Red/green light always on, yellow light off, buzzer buzzing, With AC output	Overload	Power of load device higher than rated output power	Check whether the AC load is within the rated power range of the inverter
4	Red light always on, green/yellow light off, buzzer buzzing, no AC output	Overload	Power of load device higher than rated output power	Check whether the AC load is within the rated power range of the inverter; and eliminate the load overload fault and restart the inverter to restore normal operation
5	Red light always on, green/yellow light off, buzzer buzzing, no AC output	Load short-circuited	1.AC output of the inverter short-circuited 2.AC device L/N short-circuited	Check whether the AC load wiring is short-circuited. Clear the load short-circuit fault, and restart the inverter to restore normal operation
6	Green light always on, yellow light off, mains connected but not charged, With AC output	AC input Overvoltage	Connected AC voltage exceeded the maximum input voltage of the device by 140V	Check whether the AC connection voltage is within the range of 90V-140V
7	Green light always on, yellow light off, mains connected but not charged, With AC output	AC input Under-voltage	Connected AC voltage lower than the minimum input voltage of the device by 90V	Check whether the AC connection voltage is within the range of 90V-140V
8	Red light always on, green/yellow light off, buzzer buzzing, no AC output, No charge	Over-high device temperature	Internal temperature of device higher than the set over-temperature protection	Improve the quality of ventilation, clear the vent, reduce the temperature around the inverter, and restart the device after the temperature is reduced. Please derate the amount if troubleshooting fails.
9	Red light always on, green/yellow light off, buzzer buzzing, no AC output, No charge	Fan fault	The fan is blocked by foreign matter	Check whether the fan works properly
10	Red light Single flash, green/yellow light off, no AC output, No charge	misemploy	1.AC-IN is not connected, but the equipment switch is in. Second gear "Charge only" mode 2. Lead-acid battery mode but equipment electricity Pool missed	1.Turn the equipment switch to I position 2.Set the correct battery type or the battery is damaged

7. Protection Function

7.1 DC input overvoltage protection

When the battery voltage is higher than the input voltage of overvoltage protection, turn off the AC output, and the fault indicator lamp and buzzer will prompt; When the battery voltage is lower than the input voltage (1V) of overvoltage protection, the AC output is recovered.

⚠ Although the inverter has a DC input of overvoltage protection, the input voltage of the 12V system shall not be higher than 20V; The 24V system input voltage shall not be higher than 35V, otherwise, the inverter may be damaged.

7.2 DC input low-voltage protection

When the battery voltage is lower than the input voltage of low-voltage protection, turn off the AC output, and the fault indicator lamp and buzzer will prompt; When the battery voltage is higher than the input recovery voltage of low-voltage protection, the AC output is recovered.

7.3 AC output overload protection

Make corresponding protection according to different overload levels when the AC load is greater than the rated output power, as follows:

Load power	Possible duration
$102\% \leq P_o \leq 120\%$	1min
$120\% < P_o \leq 150\%$	30s
$P_o > 150\%$	10s

⚠ When the inverter has overload protection, the AC output has three automatic recovery functions (the first delay is 5s, the second delay is 10s, and the third delay is 15s). It will not recover automatically for the fourth time. Check the equipment and restart the inverter after troubleshooting to recover the AC output.

7.4 AC output short-circuit protection

When the AC output L/N is short-circuited, the inverter automatically turns off the AC output, and fault indicator and buzzer prompt.

⚠ The AC output has three automatic recoveries for inverter's short-circuit protection (the first time delay is 5s, the second time delay is 10s, and the third time delay is 15s). The AC output will not automatically recover at the fourth time until restarting the inverter after removing the faults.

7.5 AC input overcurrent protection

When the AC input current of ACin is greater than 50A, the inverter will automatically disconnect the AC input, and the fault indicator and buzzer will prompt.

The AC output has three automatic recoveries when the inverter experiences AC input overcurrent protection (the first time delay is 5s, the second time delay is 10s, and the third time delay is 15s).
⚠ The AC output will not automatically recover at the fourth time until restarting the inverter after checking the device and removing the faults.

7.6 AC input overvoltage protection

When the input voltage of ACin is greater than 140VAC, the ACin input will be automatically disconnected.

7.7 AC input under-voltage protection

When the input voltage of ACin is lower than 90VAC, the ACin input will be automatically disconnected.

7.8 Inverter N-G ground protection

In the inverter mode, the zero line controlled by the relay inside the inverter is connected to the grounding wire, simulating the grounding of the zero line of the AC power transformer. At this time, the external leakage protection can work normally and provide protection in case of leakage.

When the AC power bypass is loaded, the zero line controlled by the relay inside the inverter is not connected to the grounding wire. As the side zero line of the AC power transformer is already grounded, the leakage protection can work normally and provide protection in case of leakage. If the customer connects the zero line to the ground without authorization, it may cause the leakage protection to trigger the shutdown circuit.

⚠ Customers are prohibited from connecting the zero line and grounding wire on their own, as connecting them on their own may cause misoperation and pose a risk of device damage.

7.9 Over-temperature protection of device

With multiple internal temperature detections, the device under any temperature higher than the device over-temperature protection will automatically turn off the AC output, and fault indicator and buzzer will prompt; The AC output will be recovered if the temperature is lower than the over-temperature protection.

⚠ Please keep a good ventilation environment to ensure that the inverter can operate reliably and stably at full power for a long time.

7.10 Fault protection of fan

If the fan is stall or not operate for other reasons, the AC output power of the inverter can only work within 30% of the rated output power and will be turned off when the load power or charging power is higher than 30% of the rated power.

⚠ To ensure that the inverter can run reliably and stably at full power for a long time, please keep a good installation environment to avoid fan stall caused by oil and wire. And check the fan operation regularly.

8. system maintenance

In order to maintain the best long-term performance, it is recommended to conduct following checks twice a year.

- ◆ Make sure that the airflow around the inverter is smooth and remove any dirt or debris from the heat sink.
- ◆ Check whether all exposed wires are damaged by exposure to sunlight, friction with other objects around them, dryness, bite by insects or rodents, etc. The wires shall be repaired or replaced if necessary.
- ◆ Verify for the consistency of indicator and display with the operation of the device. Please pay attention to any faults or errors, and take corrective actions if necessary.
- ◆ Check all wiring terminals for corrosion, insulation damage, signs of high temperature or burning/discoloration, and tighten the screws.
- ◆ Check for dirt, nesting insects and corrosion, and clean up as required.
- ◆ The arrester failed shall be replaced in time against lightning damage to the inverter or even other device of the user.

⚡ **Danger of electric shock! Make sure that the inverter power is disconnected and the power in the capacitor is discharged before carrying out the corresponding checks or operations!**

The Company does not assume any liability for damage caused by:

- ◆ Improper use or use in improper site.
- ◆ Current, voltage and power of the load exceeding the limit of the inverter.
- ◆ Temperature in the operating environment exceeding the limited operating temperature range.
- ◆ Arcing, fire and explosion caused by failure to follow inverter markings or manual instructions.
- ◆ Disassemble and repair the inverter without permission.
- ◆ Force majeure.
- ◆ Damage that occurs in transportation or handling of the inverter