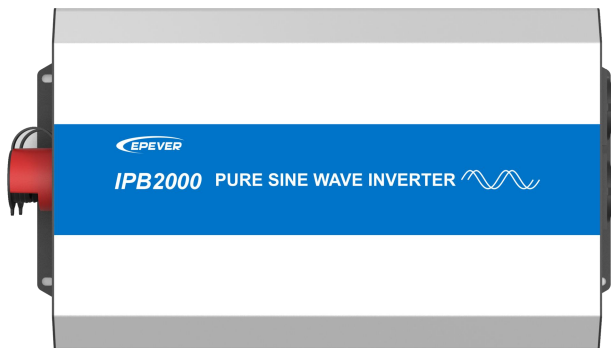




# Pure Sine Wave Inverter

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# USER MANUAL



IPB500-12

IPB1000-12

IPB1500-12

IPB2000-12

IPB3000-12

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# Important Safety Instructions






**Please reserve this manual for future review.**


This manual contains instructions on the safety, installation, and operation of the IPB series pure sine wave inverter ("inverter" as referred to in this manual).

## 1. Explanation of symbols

Please read related literature accompanying the following symbols to enable users to use the product efficiently and ensure personal and property safety.

Please read the literature accompanying the following symbols.

Symbols	Definition
<b>TIP</b>	Indicates any practical advice for reference
	<b>IMPORTANT:</b> Indicates a critical tip during the operation, if ignored, may cause the device to run in error.
	<b>CAUTION:</b> Indicates potential hazards. If not avoided, it may cause the device to be damaged.
	<b>WARNING:</b> Indicates the danger of electric shock. If not avoided, it would cause casualties.
	<b>WARNING HOT SURFACE:</b> Indicates the risk of high temperature, if not avoided, would cause scalds.
	Read the user manual carefully before any operation.

 <b>WARNING</b>	The entire system should be installed by professional and technical personnel.
------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------

## 2. Requirements for professional and technical personnel




- Professionally trained;
- Familiar with related safety specifications for the electrical system;
- Read this manual carefully and master related safety cautions.

## 3. Professional and technical personnel is allowed to do


- Install the inverter to a specified location.

- Conduct trial operations for the inverter.
- Operate and maintain the inverter.


#### 4. Safety cautions before installation


 <b>IMPORTANT</b>	<p>When you receive the inverter, check whether there is any damage in transportation. Contact the transportation company, our local distributor, or our company for any problem.</p>
 <b>CAUTION</b>	<ul style="list-style-type: none"> <li>• When placing or moving the inverter, follow the instructions in the manual.</li> <li>• When installing the inverter, evaluate whether the operation area exists arc danger.</li> <li>• The inverter needs to be connected to a battery. The battery's minimum capacity (Ah) is recommended to be five times the current that equals the inverter's rated output power divided by the battery's voltage.</li> </ul>
 <b>WARNING</b>	<ul style="list-style-type: none"> <li>• Keep the inverter out of the reach of children.</li> <li>• This inverter is an off-grid type. It is strictly prohibited to connect the inverter to the grid. Otherwise, the inverter will be damaged.</li> <li>• This inverter is only allowed for stand-alone operation. It is prohibited to connect multiple units in parallel or series. Otherwise, the inverter will be damaged.</li> </ul>

#### 5. Safety cautions for mechanical installation




 <b>WARNING</b>	<ul style="list-style-type: none"> <li>• Before installation, ensure the inverter has no electrical connection.</li> <li>• Confirm enough heat dissipation space for the inverter before installation. Do not install the inverter in a harsh environment such as humid, salt spray, corrosion, greasy, flammable, explosive, or dust accumulation.</li> </ul>
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#### 6. Safety cautions for electrical connection

 <b>CAUTION</b>	<ul style="list-style-type: none"> <li>• Check whether wiring connections are tight to avoid the danger of heat accumulation due to loose connections.</li> <li>• The protective grounding is connected to the ground. The cross-section of the wire should not be less than 4mm<sup>2</sup>.</li> <li>• The DC input voltage must strictly follow the parameter table. Too high or too low DC input voltage will affect the inverter's normal operation and damage it.</li> </ul>
-------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

	<ul style="list-style-type: none"> <li>It is recommended that the connection length between the battery and the inverter be less than 3 meters. If greater than 3 meters, please reduce the current density of the connection wire.</li> <li>A fast-acting fuse or breaker should be used between battery and inverter; the fast-acting fuse or breaker's rated current should be twice the inverter rated input current.</li> <li>DO NOT install the inverter close to the flooded lead-acid battery because the terminals' sparkle may ignite the hydrogen released by the battery.</li> </ul>
 <b>WARNING</b>	<ul style="list-style-type: none"> <li>The AC output terminal is only for the load connection. Do NOT connect it to another power source or utility. Otherwise, the inverter will be damaged. Turn off the inverter when connecting loads.</li> <li>It is strictly forbidden to connect a transformer or a load with a surge power (VA) exceeding the overload power at the AC output port. Otherwise, the damage will be caused to the inverter.</li> <li>Do not connect battery chargers or other similar products to the input terminal of the inverter. Otherwise, the inverter will be damaged.</li> </ul>

#### 7. Safety cautions for controller operation

 <b>WARNING</b> <b>HOT</b> <b>SURFACE</b>	When the inverter is working, the cover temperature is very high because of the accumulated heat; please do not touch it.
 <b>CAUTION</b>	When the inverter is running, please do not open the cabinet.
 <b>WARNING</b>	The inverter's AC output is of high voltage, do not touch the wiring connection to avoid electric shock.

#### 8. Dangerous operations which would cause an electric arc, fire, or explosion

- Touch the wire end that hasn't been insulation treated and may be electriferous.
- Touch the wiring copper row, terminals, or internal inverter modules that may be electriferous.
- The connection of the power cable is loose.
- Screw or other spare parts inadvertently falls into the inverter.
- Improper operations by untrained non-professional or technical personnel.



**WARNING**

Once an accident occurs, it must be handled by professional and technical personnel. Improper operations would cause more serious accidents.

#### **9. Safety cautions for stopping the inverter**

- The internal conductive modules could be touched after the inverter stopped running for five minutes.
- The inverter is allowed to restart after removing the faults, which affects the safety performance.
- There are no serviceable parts inside. If any maintenance service is required, please contact our local distributor or the service personnel.



**WARNING**

Do NOT touch or open the shell after the inverter is powered off within ten minutes.

#### **10. Safety cautions for inverter maintenance**

- It is recommended to check the inverter with testing equipment to ensure no voltage and current.
- When conducting electrical connection and maintenance, post a temporary warning sign or put up barriers to prevent the unrelated personnel from entering the electrical connection or maintenance area.
- An improper operation of the inverter may cause personal injury or equipment damage.
- It is recommended to wear an antistatic wrist strap or avoid unnecessary contact with the circuit board.

# 1 Overview

The IPB series, a high-frequency sine wave inverter, adopts a fully digital intelligent design and voltage-current dual closed-loop control algorithm. It is designed with the Utility bypass function (when the Utility is normal, the inverter output will automatically switch to the Utility bypass, i.e. utility priority). Featured with fast response, high conversion efficiency, low Total Harmonic Distortion(THD), and high reliability running, the IPB series can be widely used in the DC-AC off-grid systems (such as vehicle systems, security monitoring systems, emergency lighting systems, household power systems, field power systems, and other systems requiring higher power quality).

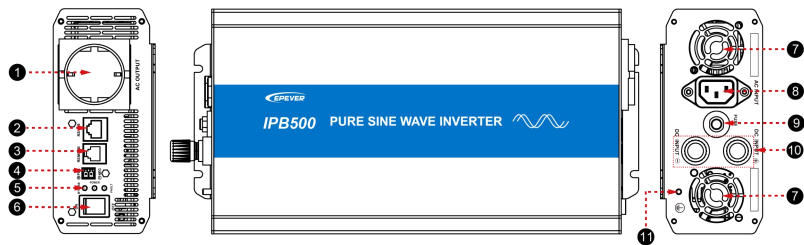
## Features:

- Pure sine wave output
- Input to output electrical isolation
- Output power factor up to 1
- Input Protection: Low-voltage, Over-voltage
- Output Protection: Overload, Short circuit, Overheating
- RS485 com. port to realize remote monitoring<sup>①</sup>
- Utility bypass automatic switching function (utility supplies load when the utility is normal)
- External switch design, matched with EPEVER products, to expand inverter control function and reduce power consumption
- Diversified AC output sockets

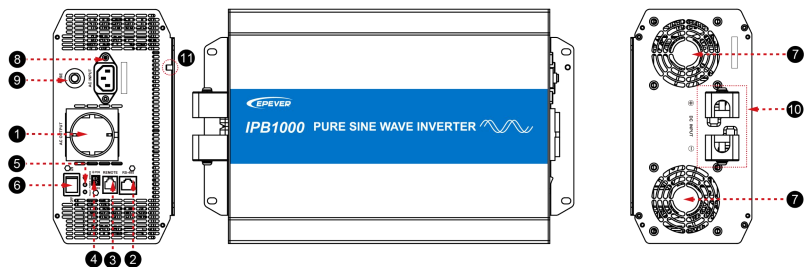
**① For inverters with 12V input voltage, there is no communication isolation design for the RS485/RJ11 port.**

## 2 Appearance

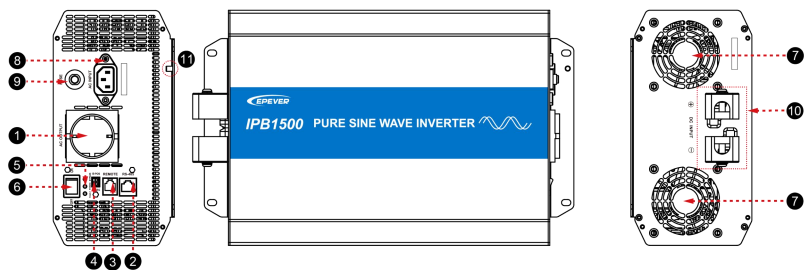
- IPB500-12



- IPB1000-12

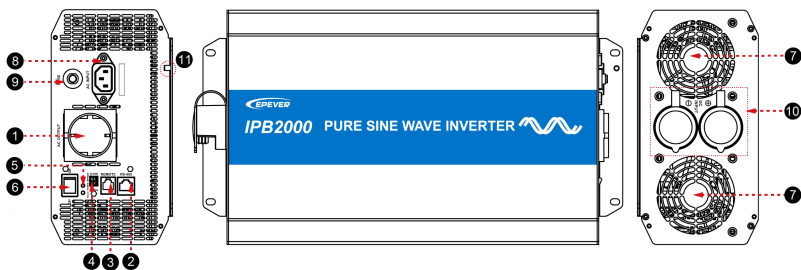


- IPB1500-12

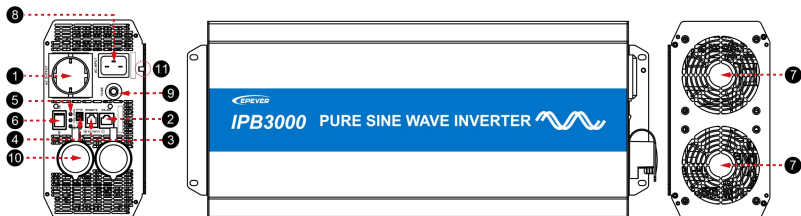




● IPB2000-12



● IPB3000-12



①	AC output port (European socket)	⑦	Cooling fan
②	RS485 communication port <sup>①</sup>	⑧	AC input port <sup>③</sup>
③	Remote switch port (RJ11, Reserved)	⑨	Fast-acting fuse terminal <sup>④</sup>
④	External switch port (To connect an external relay)	⑩	DC input terminals <sup>⑤</sup>
⑤	Indicator <sup>②</sup>	⑪	Grounding terminal
⑥	Inverter switch	--	--

① The RS485 communication port can be connected to the remote meter, Bluetooth module, WIFI module, PC, etc., for parameter setting and remote monitoring.

② Indicators include the Power indicator, Fault indicator, and Bypass indicator. For the indicator and buzzer status under different working conditions, refer to chapter 8, **Troubleshooting**.

③ The AC input port can be connected with the Utility or an oil generator. The Utility input is recommended. When connecting with an oil generator, it must be a digital inverter generator.

④ The main purpose of the fast-acting fuse terminal ⑨ is to protect the AC socket. The load

connected to the product, equipped with a fast-acting fuse terminal, cannot exceed the marked value.

⑤ The DC input terminals vary with different products. Please refer to the real product.

➤ **Cooling fan**

<b>Conditions to start the cooling fan</b>	
The heat sink temperature is higher than 45°C or The internal inverter temperature is higher than 45°C or The output power is higher than 50% of the rated power	All IPB models
<b>Conditions to stop the cooling fan</b>	
The heat sink temperature is lower than 40°C and The internal inverter temperature is lower than 40°C and The output power is lower than 30% of the rated power	IPB500-12
The heat sink temperature is lower than 40°C and The internal inverter temperature is lower than 40°C and The output power is lower than 40% of the rated power	IPB1000-12 IPB1500-12 IPB2000-12 IPB3000-12

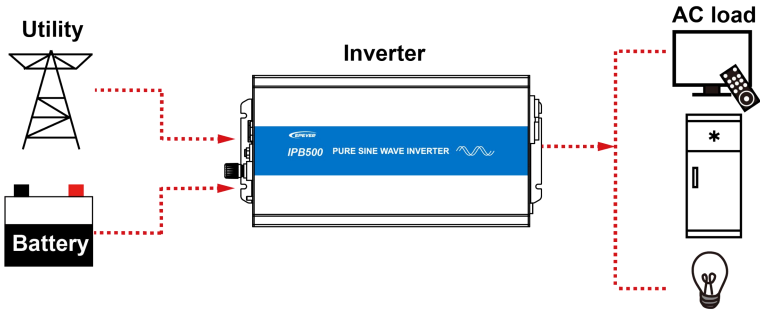
### 3 Naming Rule

IPB 2000 - 1 2 (E / R)

- 
- Reverse polarity protection
  - AC output port: European socket
  - Output voltage: 2 means 220/230/240VAC
  - Rated input voltage: 1 means 12VDC
  - Continuous output power: 500W, 1000W, 1500W, 2000W, 3000W
  - IPB series

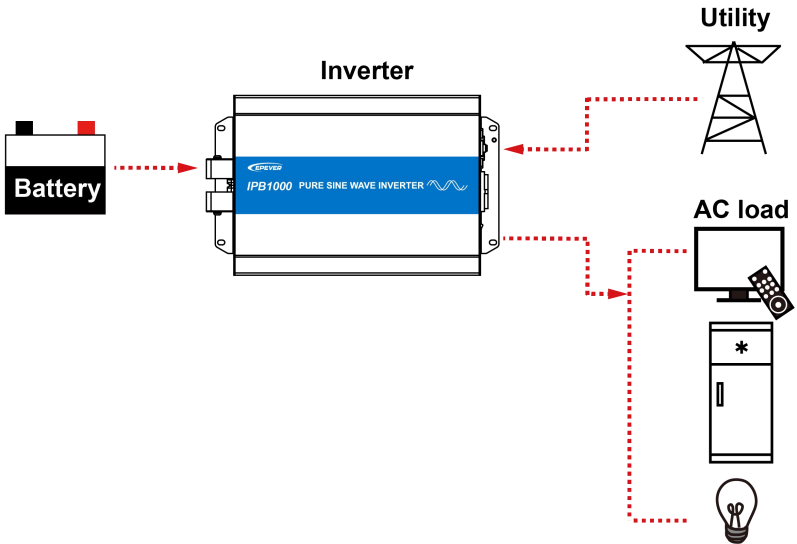
## 4 Connection Diagram

- IPB500-12

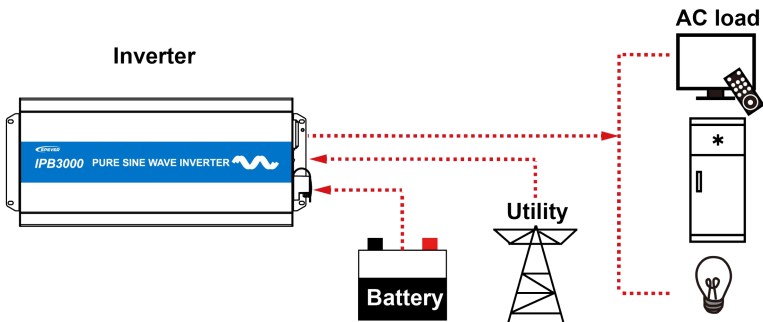


- IPB1000-12/IPB1500-12/IPB2000-12

The connection diagram is the same for IPB1000-12, IPB1500-12, and IPB2000-12, the following takes IPB1000-12 as an example to introduce the system connection.



- IPB3000-12



**CAUTION**

It is recommended to directly connect the inverter DC input terminal to the battery terminal. DO NOT connect it to the charge source terminal. Otherwise, the charging voltage spikes of the charge source may cause over-voltage protection of the inverter.

# 5 Installation

## 5.1 Attentions

- Read all the installation instructions carefully in the manual before installation.
- Be very careful when installing the batteries. When installing the open-type lead-acid battery, please wear eye protection and rinse with clean water for battery acid contact.
- Keep the battery away from any metal objects, which may cause a short circuit of the battery.
- Loose power connectors and corroded wires may result in high heat, melt wire insulation, burn surrounding materials, or cause a fire. Ensure tight connections and secure cables with cable clamps to prevent them from swaying in moving applications.
- The DC input voltage must strictly follow the parameter table. Too high or too low DC input voltage affects the normal operation and may damage the inverter. DC input 12V: Surge voltage < 20V.
- Select the system cables according to 3.5A/mm<sup>2</sup> or less current density.
- Avoid direct sunlight and rain infiltration when installing it outdoor.
- After turning off the power switch, do not open or touch the internal component immediately. Performing related operations after 10 minutes is recommended.
- Do not install the inverter in a harsh environment such as humid, salt spray, corrosion, greasy, flammable, explosive, or dust accumulation.
- The AC output is of high voltage, do not touch the wiring connection to avoid electric shock.
- To prevent injury, do not touch the fan while it is working.

## 5.2 Wire Size and Circuit Breaker

The wiring and installation methods conform to the national and local electrical code requirements.

### ➤ Wire, terminals, and circuit breaker selection for battery

Model	Battery wire size	Ring terminal	Circuit breaker
IPB500-12	10mm <sup>2</sup> /7AWG	RNB8-6S	DC/2P—63A
IPB1000-12	25mm <sup>2</sup> /3AWG	RNB38-6	DC/2P—125A
IPB1500-12★	25mm <sup>2</sup> /3AWG	RNB60-6	DC-100A(2P in parallel)
IPB2000-12★	35mm <sup>2</sup> /2AWG	RNB70-10	DC-125A(2P in parallel)
IPB3000-12★	25mm <sup>2</sup> /3AWG	RNB80-10	DC-125A(3P in parallel)

★ According to the recommended battery wire size, **2** battery wires, connected in parallel, are necessary for IPB1500-12 and IPB2000-12. For connection method, refer to the right figure.

**4** battery wires, connected in parallel, are necessary for IPB3000-12.



**CAUTION**

The above wire size and circuit breaker size are for reference only; please choose a suitable wire and circuit breaker according to the actual situation.

➤ **Wire and circuit breaker selection for AC output and AC input**

Model	Wire size	Circuit breaker
IPB500-12	1mm <sup>2</sup> /18AWG	AC/2P—6A
IPB1000-12	1.5mm <sup>2</sup> /15AWG	AC/2P—10A
IPB1500-12	1.5mm <sup>2</sup> /15AWG	AC/2P—10A
IPB2000-12	2.5mm <sup>2</sup> /13AWG	AC/2P—16A
IPB3000-12	4mm <sup>2</sup> /11AWG	AC/2P—25A



**CAUTION**

- The above wire size and circuit breaker size are for reference only; please choose a suitable wire and circuit breaker according to the actual situation.
- The wire size is only for reference. Suppose there is a long distance between the inverter and the battery. In that case, larger wires shall be used to reduce the voltage drop and improve the system performance.
- The above wire size and circuit breaker size are for reference; please choose a suitable wire and circuit breaker according to the actual situation.

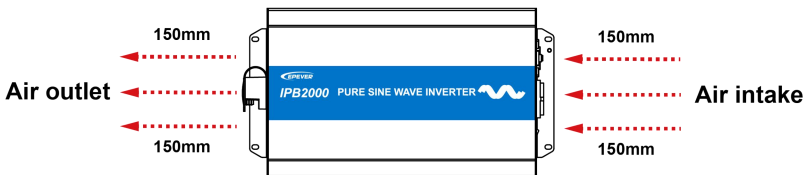
## 5.3 Mounting


**Installation procedures:**

**Step1: Professional personnel reads this manual carefully.**


**Step 2: Determine the installation location and heat-dissipation space**

The inverter shall be installed in a place with sufficient airflow through the dissipation pad of the inverter. And a minimum clearance of 150mm from the upper and lower edges of the inverter is recommended to ensure natural thermal convection. The following takes IPB2000-12 as an example.



 <b>CAUTION</b>	<p>It is not recommended to install the product in an enclosed cabinet, where the device cooling will be influenced. If mounted in an enclosure cabinet, ensure effective ventilation and not turn on all loads. Or else the device over temperature protection is caused.</p>
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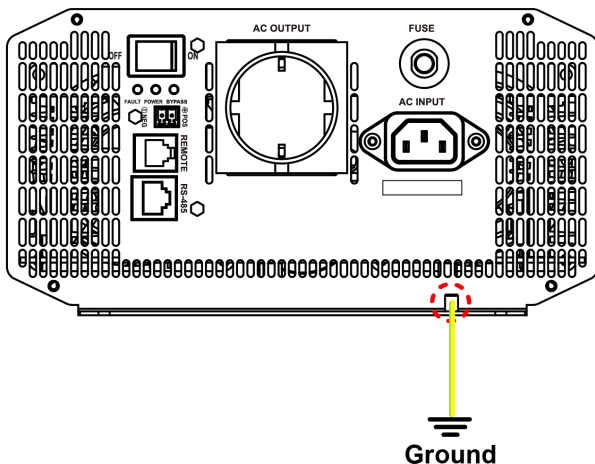
### Step3: Wiring

 <b>CAUTION</b>	<ul style="list-style-type: none"> <li>• Turn off the inverter switch before wiring.</li> <li>• Please do not connect the circuit breaker or fast-acting fuse during the wiring and ensure that the poles' leads are connected correctly.</li> <li>• The terminals and ports on the side vary from the product models.</li> </ul>
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Wiring sequence (The following wiring sequence is illustrated in the appearance "IPB2000-12", wiring positions of other inverters. Please refer to chapter **2 Appearance** for reference.)

#### 1. Ground connection

The wire size for the ground connection must be thicker or equal to that for the AC output. Refer to chapter **5.2 Wire size and circuit breaker** for detailed wire size.





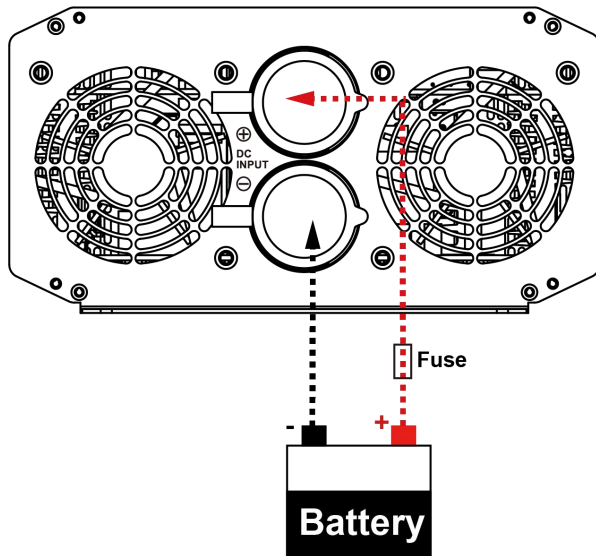
## 2. Battery connection



### CAUTION

A fast-acting fuse must be installed on the battery side, conformed to the following requirements:

1. Fast-acting fuse voltage is 1.5 to 2 times the inverter's rated voltage.
2. Fast-acting fuse current is 2 to 2.5 times the inverter's rated current.
3. Distance between the fast-acting fuse and the battery cannot be farther than 150mm.

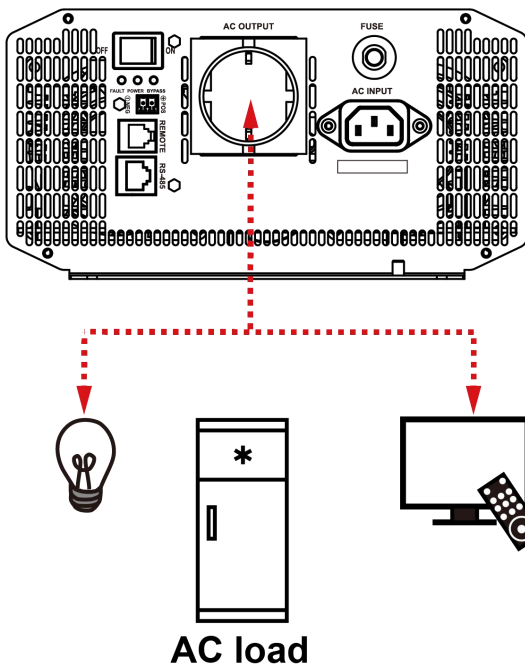


## 3. AC load connection



### WARNING

- The AC loads shall be determined by the continuous output power of the inverter. The surge power of the AC load must be lower than the instantaneous surge power of the inverter, or the inverter will be damaged.
- The N pole of the AC output port cannot be grounded.

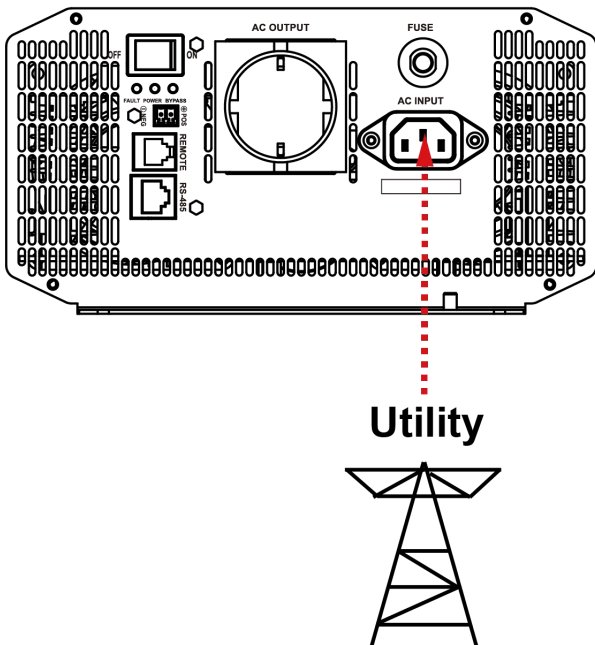


#### 4. Connect the Utility



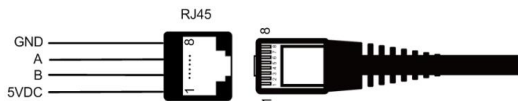
#### WARNING

- Risk of electric shock! The Utility input can generate dangerous high-voltage! Disconnect the circuit breaker or fast-acting fuse before wiring, and ensure that the poles' leads are connected correctly.
- After the Utility is connected, the battery cannot be grounded. In contrast, the inverter cover must be grounded reliably (to shield the outside electromagnetic interference effectively and prevent the cover from causing electric shock to the human body).



## 5. Optional accessories connection

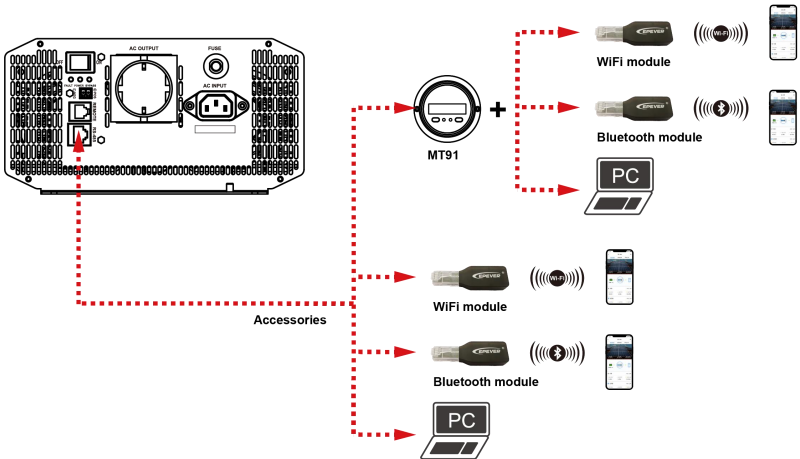
### 1) RS485 communication port



#### RJ45 Pin Definition:

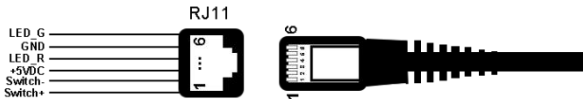
Pin	Definition	Instruction	Pin	Definition	Instruction
1	+5VDC	5V/200mA	5	RS485-A	RS485-A
2	+5VDC		6	RS485-A	
3	RS485-B	RS485-B	7	GND	Power GND
4	RS485-B		8	GND	

## 2) Connect optional accessories



## 6. (Reserved) Remote switch connection

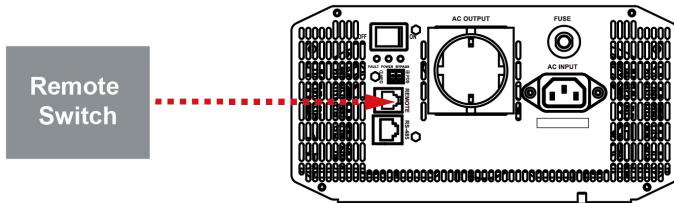
### 1) RJ11 port



### RJ11 Pin Definition:

Pin	Definition	Instruction	Pin	Definition	Instruction
1	Switch+	Switch+	4	LED_R	Red light drive
2	Switch-	Switch-	5	GND	Power GND
3	+5VDC	5V/200mA	6	LED_G	Green light drive

### 2) Connect remote switch



#### Step 4: Power on the inverter

- (1) Connect the breaker at the inverter input terminal or the fast-acting fuse at the battery terminal.
- (2) Turn on the inverter switch, and the green indicator will be lighted on, which states a normal AC output.
- (3) Connect the breaker at the AC load terminal, turn on the AC loads, and check the system working status.



#### CAUTION

When supplying power for different loads, it is recommended to first turn on the load with a large impulse current. And then turn on the load with a smaller impulse current after the load output is stable.

- (4) If the FAULT indicator flashes red and the buzzer alarms after powering the inverter, please immediately turn off the load and the inverter. Clear the faults according to chapter **8** **Troubleshooting**. After clearing the faults, please operate the inverter again by following the above steps.

## 6 Parameters Setting

IPB parameters such as power saving mode, baud rate, output voltage class, and output frequency class can be set by the remote meter (optional, you need to purchase it additional), phone APP, or PC software.

The following chapters take parameters setting on the remote meter as an example (for connection of the remote meter, please refer to chapter [5.3 Mounting](#)).


### 6.1 Power Saving Mode



Users can enable the power saving mode and set the PSI/PSO value by the remote meter (The minimum power step is 1VA).


When the actual load power is lower than the PSI (the power to enter the power saving mode), the system will automatically switch to the power saving mode. And then, the device output is turned on for 1s and turned off for 5s.



When the actual load power exceeds the PSO (the power to exit the power saving mode), the inverter will automatically exit the power saving mode and resume work.

#### 1) Enable power saving mode (PSE)


**Step1:** In the real-time interface of the remote meter, press and hold the  button to enter the parameters setting interface.

**Step2:** Click the  or  button to select the PSE parameter.

**Step3:** Press and hold the  button until the PSE parameter (OFF default) flashes.

**Step4:** Click the  or  button to set the PSE state.



- Select ON to enable the power saving mode.
- Select OFF to disable the power saving mode.





**Step5:** Press and hold the  button to confirm.


#### 2) Set the power to exit the power saving mode (PSO)

**Step1:** In the parameters setting interface, click the  or  button to select the PSO parameter.

**Step2:** Press and hold the  button until the PSO value flashes.

**Step3:** Click the  or  button to set the PSO parameter.



- Click the  button to decrease the PSO value by 1.
- Click the  button to increase the PSO value by 1.
- Press and hold the  button to increase the PSO value by 10. After ten adding, the PSO value will increase by 100 each time. When the  button is released, press and hold it again to repeat the above operation. **Note: The setting parameter cannot exceed the user define, or else; it will return to the initial value to start the loop.**





**Step4:** Press and hold the  button to confirm.

### 3) Set the power to enter the power saving mode (PSI)

**Step1:** In the parameters setting interface, click the  or  button to select the PSI parameter.

**Step2:** Press and hold the  button until the PSI value flashes.

**Step3:** Click the  or  button to set the PSI parameter.

- Click the  button to decrease the PSI value by 1.
- Click the  button to increase the PSI value by 1.
- Press and hold the  button to increase the PSI value by 10. After ten adding, the PSI value will increase by 100 each time. When the  button is released, press and hold it again to repeat the above operation. **Note: The setting parameter cannot exceed the user define, or else; it will return to the initial value to start the loop.**



**Step4:** Press and hold the  button to confirm.

## 6.2 Other Parameters

Users can set the baud rate, output voltage class and output frequency class, etc. by the remote meter.


### Operation:

**Step1:** In the real-time interface, press  for 2s to enter the parameter setting interface.

**Step2:** Click  or  to select the parameter to be configured.












**Step3:** Press  for 2s to enter the configuration interface of the specified parameter.

**Step4:** Click  or  to configure the parameter value.

**Step5:** Press  for 2s to confirm the configuration.

**Step6:** Click  +  to exit the current interface.

#### **Parameters user define:**

Display	Parameters	Default	User define
 VPT	Output voltage class <sup>①</sup>	230VAC	220VAC/230VAC/240VAC
 FRE	Output frequency class <sup>①</sup>	50Hz	50Hz/60Hz
 BLT	LCD backlight time	30s	30s/ 60s/100s(ON solid)
 PSE	Power Saving Enable	OFF	ON/OFF
 PSI	Power Saving In	20VA	20VA ~ (20%*rated power)
 PSO	Power Saving Out	40VA	(20VA + PSI) ~ (50%*rated power)
 BDR	Baud Rate <sup>②</sup>	115200	9600/115200
 LVD	Low voltage disconnect voltage <sup>③</sup>	10.8V	10.5V~14.2V; step size 0.1V
 LVR	Low voltage reconnect voltage <sup>③</sup>	12.5V	11.5V~15.2V; step size 0.1V
 OVR	Over voltage reconnect voltage <sup>③</sup>	14.5V	11.5V~15.2V; step size 0.1V
 OVD	Over voltage disconnect voltage <sup>③</sup>	16V	10.5V~14.2V; step size 0.1V

① After configuring the parameters marked with ①, the inverter will restart automatically. It will resume work according to the new parameter value.

② Due to the length limit of the LCD displayed data. When the baud rate is set to 115200, the value displayed on the LCD is 1152.

③ For the parameters marked with ③, please set them by the input voltage rules in chapter 7 Protections. Otherwise, the parameter settings will not succeed.



# 7 Protections

## 1) Input voltage protection

- **The following rules must be followed when modifying the battery's input voltage parameters:**
  - Over voltage limiting voltage (16.2)  $\geq$  Over voltage disconnect voltage  $\geq$  Over voltage reconnect voltage +1V.
  - Over voltage reconnect voltage  $\geq$  Low voltage reconnect voltage.
  - Low voltage reconnect voltage  $\geq$  Low voltage disconnect voltage +1V.
  - Low voltage disconnect voltage  $\geq$  Low voltage limiting voltage (10.5).
- **Detailed status is shown as the following when the input voltage protection occurs.**

Input voltage protection	Status
Over voltage protection	The output is switched OFF immediately. The green indicator fast flashes. Buzzer beeps.
Over voltage recovery protection	The green indicator is ON solid. The output voltage is normal.
Low voltage protection	The output is switched OFF immediately. The green indicator Slowly flashes. Buzzer beeps.
Low voltage recovery protection	The green indicator is ON solid. The output voltage is normal.




### CAUTION

Although the inverter is supplied with the input over-voltage protection, the surge voltage cannot higher than 20V for the 12V system. Otherwise, the inverter may be damaged.


## Overload protection

IPB500-12 IPB1000-12 IPB1500-12 IPB2000-12	S=1.2P <sub>e</sub> (S: Output power; P <sub>e</sub> : Rated power)	The output is switched OFF after 1 minute. Buzzer beeps. Red indicator slowly flashes.
	S=1.5P <sub>e</sub> (S: Output power; P <sub>e</sub> : Rated power)	The output is switched OFF after 30 seconds. Buzzer beeps. Red indicator slowly flashes.
	S=1.8P <sub>e</sub> (S: Output power; P <sub>e</sub> : Rated power)	The output is switched OFF after 10 seconds. Buzzer beeps.

		Red indicator slowly flashes.
	$S \geq 2P_e$ (Rated input voltage) (S: Output power; $P_e$ : Rated power)	The output is switched OFF after 5 seconds. Buzzer beeps. Red indicator slowly flashes.

 <b>CAUTION</b>	When the overload protection happens, the AC output will be recovered automatically three times (recover after 5s, 10s, and 15s separately). After three times recovery attempts fail, you need to restart the inverter to recover the AC output.
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IPB3000-12	$S = 1.2P_e$ (S: Output power; $P_e$ : Rated power)	The output is switched OFF after 1 minute. Buzzer beeps. Red indicator slowly flashes.
	$S = 1.5P_e$ (S: Output power; $P_e$ : Rated power)	The output is switched OFF after 10 seconds. Buzzer beeps. Red indicator slowly flashes.
	$S \geq 1.7P_e$ (S: Output power; $P_e$ : Rated power)	The output is switched OFF after 5 seconds. Buzzer beeps. Red indicator slowly flashes.

 <b>CAUTION</b>	When the overload protection happens, the AC output cannot recover automatically. The AC output will be shut down according to the multiple of the overload. You can recover the AC output after clearing the overload faults and restarting the inverter.
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#### 4) Output short circuit protection

Faults	Instruction
The output is switched OFF immediately. Buzzer beeps. Red indicator fast flashes.	Note: When the short circuit protection happens, the AC output will be recovered automatically three times (recover after 5s, 10s, and 15s separately). After three times recovery attempts fail, you need to restart the inverter to recover the AC output.

### 5) Inverter over temperature protection

<b>Faults</b>	<b>Instruction</b>
The red indicator is ON solid.	The inverter stops working after the temperature of the heat sink or the internal modules is higher than a set value.
Red indicator OFF	The inverter resumes work after the temperature of the heat sink or the internal modules is lower than a set value.

## 8 Troubleshooting



### WARNING

A high voltage occurs inside the inverter. DO NOT try to repair or maintain the inverter by yourself, and it may cause an electric shock.

No.	Faults	AC input	Power indicator	Fault indicator	Bypass indicator	Buzzer	Troubleshooting
1	Output voltage normal (Inverter)	No	ON	OFF	OFF	No beeps	--
2	Output voltage normal (Utility)	Yes	ON	OFF	ON	No beeps	--
3	Output voltage abnormal	--	OFF	OFF	OFF	Beeps	The inverter will not be turned on and used. You need to contact our after-sales and if necessary, return the inverter to the factory for repair.
4	DC input under voltage	NO	Green slowly flashing(1/4Hz)	OFF	OFF	Beeps	Check whether the DC input voltage is lower than 10.8V by a multi-meter. The inverter resumes work after adjusting the input voltage.
5	DC input over voltage	NO	Green fast flashing (1Hz)	OFF	OFF	Beeps	Check whether the DC input voltage is higher than 16V by a multi-meter. The inverter resumes work after adjusting the input voltage

No.	Faults	AC input	Power indicator	Fault indicator	Bypass indicator	Buzzer	Troubleshooting
6	Overload	NO	Green ON	Red slowly flashing(1/4Hz)	OFF	Beeps	Check whether the AC load's power is within the inverter's rated power; clear the overload faults, and restart the inverter.
7	Load short-circuit	NO	OFF	Red fast flashing (1Hz)	OFF	Beeps	Check the load connection carefully. Clear the short circuit faults and restart the inverter.
8	Inverter over-temperature	NO	OFF	Red ON	OFF	Beeps	Improve the ventilation situation and cool the surrounding temperature. It is recommended to restart the inverter after the temperature drops. If the fault cannot be cleared after performing the above operations, decline the rated power.
9	AC input under voltage	Yes	Green slowly flashing(1/4Hz)	Red slowly flashing(1/4Hz)	OFF	Buzzer beeps for 5 seconds, and then keeps silent	Check if the AC input voltage is less than 150V. ① If the AC input is connected to the Utility, disconnect the Utility input and reconnected when the Utility is normal. ② If the AC input is from an oil generator, adjust the generator parameters to restore the voltage and frequency to the normal range. If the generator cannot be adjusted, disconnect the generator input.

No.	Faults	AC input	Power indicator	Fault indicator	Bypass indicator	Buzzer	Troubleshooting
10	AC input over-voltage	Yes	Green fast flashing (1Hz)	Red slowly flashing(1/4Hz)	OFF	Buzzer beeps for 5 seconds, and then keeps silent	Check if the AC input voltage is higher than 290V. Then carry out the troubleshooting just as the operations for AC input under voltage.
11	AC input low frequency	Yes	Green slowly flashing(1/4Hz)	Red fast flashing (1Hz)	OFF	Buzzer beeps for 5 seconds, and then keeps silent	Check if the AC input frequency is less than 40Hz. Then carry out the troubleshooting just as the operations for AC input under voltage.
12	AC input over-frequency	Yes	Green fast flashing (1Hz)	Red fast flashing (1Hz)	OFF	Buzzer beeps for 5 seconds, and then keeps silent	Check if the AC input frequency is higher than 70Hz. Then carry out the troubleshooting just as the operations for AC input under voltage.

## 9 Maintenance

The following inspections and maintenance tasks are recommended at least two times per year for good performance.

- Make sure no block on airflow around the inverter. Clear up any dirt and fragments on the heat sink.
- Check all the naked wires to ensure insulation is not damaged by sun exposure, frictional wear, dryness, insects or rats, etc.
- Verify the indicator display is consistent with the actual operation.
- Confirm that terminals have no corrosion, insulation damage, high temperature, burnt/discolored sign, and tighten terminal screws to the suggested torque.
- Clear up dirt, nesting insects, and corrosion in time.
- Check and confirm that the lightning arrester is in good condition. Replace a new one in time to avoid damaging the inverter and other equipment.



**WARNING**

Risk of electric shock! Confirm all the power is turned off and all the capacitor's energy has been discharged before performing the above operations.

## 10 Specifications

Parameter	IPB500-12	IPB1000-12	IPB1500-12
AC Input Voltage Range	190~265VAC		
Fast-acting Fuse <sup>①</sup> Rated Current	3A	5A	8A
AC Input Frequency Range	45Hz~55Hz/55Hz~65Hz		
Battery Rated Voltage	12VDC		
Battery Work Voltage Range	10.8 ~ 16.0VDC		
Battery Rated Input Current	46.7A	92.3A	141.1A
Continuous Output Power	500W@35°C@Battery Rated Voltage	1000W@35°C@Battery Rated Voltage	1500W@35°C@Battery Rated Voltage
5-second Transient Surge Output Power	1000W	2000W	3000W
Inverter Output Voltage	220VAC (±3%); 230VAC (-6%~+3%); 240VAC (-9%~+3%)		
Inverter Frequency	50/60Hz ± 0.2%		
Output Voltage Waveform	Pure Sine Wave		
Output Voltage Harmonic Distortion Rate	≤ 3% (Resistive load)		
Load Power Factor	0.2 ~ 1 (Load power ≤ Continuous output power)		
Maximum Output Current	4.6A	9.2A	13.8A
Rated Output Current	2.3A	4.6A	6.9A
Rated Output Efficiency <sup>②</sup>	90.2%	91.4%	89.7%
Maximum Output Efficiency <sup>③</sup>	> 91.0% (40% loads)	> 93.0% (40% loads)	> 93.0% (30% loads)
Idle Current	< 0.15A	< 0.2A	< 0.2A



No-load Current	< 0.9A	< 1.1A	< 1.2A
RS485 Communication Port	5VDC/200mA	5VDC/200mA	5VDC/200mA
<b>Mechanical parameters</b>			
Input Terminal	M6	M6	M6
Dimension (Length x Width x Height)	335 × 160 × 73mm	371 × 228 × 118mm	387 × 228 × 118mm
Mounting Size (Length x Width)	311 × 75mm	345 × 145mm	361 × 145mm
Mounting Hole Size	Φ5mm	Φ6mm	Φ6mm
Net Weight	2.3kg	4.8kg	6.0kg

- ① For details about the Fast-acting fuse, see instruction of the terminal ⑨ in chapter 2, **Appearance**.
- ② It means the rated output efficiency when the load power equals the "continuous output power" under the battery rated voltage.
- ③ It means the maximum output efficiency when the inverter is connected with different loads under the battery rated voltage.

Parameter	IPB2000-12	IPB3000-12
AC Input Voltage Range	190~265VAC	
Fast-acting Fuse <sup>①</sup> Rated Current	10A	15A
AC Input Frequency Range	45Hz~55Hz/55Hz~65Hz	
Battery Rated Voltage	12VDC	
Battery Work Voltage Range	10.8 ~ 16.0VDC	
Battery Rated Input Current	185.6A	283.7A
Continuous Output Power	2000W@35°C@Battery Rated Voltage	3000W@35°C@Battery Rated Voltage
5-second Transient Surge Output Power	4000W	6000W
Inverter Output Voltage	220VAC (±3%); 230VAC (-6%~+3%); 240VAC (-9%~+3%)	
Inverter Frequency	50/60Hz ± 0.2%	
Output Voltage Waveform	Pure Sine Wave	

Output Voltage Harmonic Distortion Rate	≤ 3% (Resistive load)	
Load Power Factor	0.2 ~ 1 (Load power ≤ Continuous output power)	
Maximum Output Current	18.4A	27.6A
Rated Output Current	9.2A	13.8A
Rated Output Efficiency <sup>②</sup>	90.9%	89.2%
Maximum Output Efficiency <sup>③</sup>	> 94.0% (30% loads)	> 94.0% (30% loads)
Idle Current	< 0.2A	< 0.2A
No-load Current	< 1.2A	< 1.6A
RS485 Communication Port	5VDC/200mA	5VDC/200mA
<b>Mechanical parameters</b>		
Input Terminal	M10	M10
Dimension (Length x Width x Height)	420 × 228 × 118mm	545 × 228 × 118mm
Mounting Size (Length x Width)	395 × 145mm	520 × 145mm
Mounting Hole Size	Φ6mm	Φ6mm
Net Weight	7.0kg	9.5kg

① For details about the Fast-acting fuse, see instruction of the terminal ④ in chapter 2, **Appearance**.

② It means the rated output efficiency when the load power equals the "continuous output power" under the battery rated voltage.

③ It means the maximum output efficiency when the inverter is connected with different loads under the battery rated voltage.

<b>Environment parameters</b>			
Work Temperature Range	-20°C ~ +60°C (Refer to the Derating Curve)	Enclosure	IP20
Storage Temperature Range	-35 °C ~ +70 °C	Altitude	< 5000m (If the altitude exceeds 1000 meters, the rated power will be reduced according to IEC62040.)
Relative Humidity	≤ 95% (N.C.)		

# Appendix 1 Disclaimers

**The warranty does not apply to the following conditions:**

- Damage is caused by improper use or an inappropriate environment (humid, salt spray, corrosion, greasy, flammable, explosive, dust accumulative, or other severe environments).
- The actual current/voltage/power exceeds the limit value of the inverter.
- Damage caused by working temperature exceeds the rated range.
- Arc, fire, explosion, and other accidents are caused by failure to follow the inverter stickers or manual instructions.
- Disassemble and repair the inverter without authorization.
- Damage caused by force majeure.
- Damage occurred during transportation or handling.
- Before using precise instruments, such as a medical instrument, end-users must read the manual carefully and ensure the inverter's output power/output voltage is suitable. We are not responsible for the instrument damage caused by improper use.

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