



# PNI SP500W / PNI SP1000W / PNI SP2000W

Power inverter / Invertor de tensiune



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## Main features

- Pure sine wave output
- THD (Total Harmonic Distorsion) <3%
- Protections: undervoltage, overvoltage, overheating, overload, short circuit

## Introduction




SP series PNI inverters convert 12V DC input voltage into 230V AC 50Hz voltage.

We recommend that you read this manual carefully before putting the product into operation.

## Warnings

- Do not store the product in environments with corrosive gases, high humidity and high temperature, dust and electromagnetic interference.
- In the event of a fault, do not open or repair this product by yourself. Call a specialized service center.

## Symbol convention

| Symbol                                                                                      | Signification                                                                                                            |
|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
|  DANGER  | Potential serious danger that could cause casualties.                                                                    |
|  WARNING | Potential medium danger that could cause minor injuries.                                                                 |
|  CAUTION | Potential danger that could cause device failure, data loss, device performance impairment, and other unexpected losses. |

## Safety precaution

We recommend that you read this chapter carefully before using the product, in order to avoid personal injury and product damage.

### Symbols description

|                                                                                   |                                                                                   |                                                                                   |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|  |  |  |
| Safety sign                                                                       | Antistatic sign                                                                   | Danger, electric shock                                                            |

The inverter generates high temperatures during usage.

Carefully read the installation and operating instructions to avoid personal injury or damage to the equipment.

**Warning:** We do not take responsibility for non-compliance with safety measures.

Batteries of different sizes and from different manufacturers may have different voltage. Make sure that the inverter voltage corresponds to the battery voltage. Contact the seller for more details. Any change in the configuration or structure of the system may affect its proper functioning.



### **Danger High Voltage!**

Touching the inverter in a humid or wet object (or hands) can put you in a dangerous situation.

1. Do not open the product's housing under any circumstances. The input and output of the inverter presents a high voltage danger. Opening the inverter and touching the internal components can put you in a dangerous situation.
2. Before maintenance, you must completely disconnect the power supply of the inverter. It is recommended that you check both the input and output of the inverter with a voltmeter to ensure that it is disconnected properly.
3. Even if the power is completely disconnected, residual energy may remain in the inverter. Leave the inverter disconnected for 10 minutes to ensure that the system is completely discharged.

4. Keep the inverter packaged before installation and use.
5. Do not manipulate the inverter in the presence of electrical conductors: metal watch, bracelets, rings.
6. The inverter must be repaired, installed and maintained only by qualified personnel.

**Inductive load and half-wave rectification load attentions!**

We recommend choosing an inverter with a power 2-3 times higher than the half-wave rectification or inductive load.

**Avoid antistatic danger**

We recommend that you wear antistatic wrist strap to protect sensitive parts from static discharge equipment.

**Do not disconnect the inverter when turned on**

Do not install or disconnect the appliance while it is switched on. Pay maximum attention when connecting the power cords.

**Use only regulated batteries**

Use only regulated batteries. Use of unregulated batteries may result in product malfunction.

**Use the battery according to the manufacturer's rules**

Use the battery according to the connection rules provided by its manufacturer. Improper operation can endanger you.

1. Do not shortcircuit the wires. The connections must be made very tightly.
2. Do not touch both battery terminals or wires connected to them at the same time.
3. Avoid spilling electrolyte. The electrolyte is corrosive for metal and poses a short-circuit hazard.
4. Keep the battery safe, away from fire or a source of sparks.

**Avoid fans harm**

Avoid accidental blocking of the fans. Do not use tools or your fingers to stop them.

**Keep the inverter well ventilated**

Make sure that the ventilation and air exhaust outputs of the inverter are

not blocked in any way. Also, do not mount the passive radiator part of the housing attached to a wall, ceiling or floor, but at a distance that allows air to pass.

## Inverter installation

### Environment conditions

Keep the inverter in a dry and ventilated environment. Keep the inverter away from moisture, dust, heat, sunlight, volatile gas or high salinity.



### Caution

The operating temperature range of the product is  $-26^{\circ}\text{C} \sim +60^{\circ}\text{C}$ . Do not overload the inverter in conditions with temperatures above  $40^{\circ}\text{C}$ . If you use the inverter excessively at temperatures above  $40^{\circ}\text{C}$ , reduce the consumption by 10% for each degree above  $40^{\circ}\text{C}$ .

The optimum operating temperature of the inverter is between  $+20^{\circ}\text{C} \sim +30^{\circ}\text{C}$ .

If used at temperatures above  $30^{\circ}\text{C}$ , the battery life will decrease considerably. Below  $20^{\circ}\text{C}$  the electric storage time will decrease.

### Keep safety distance

The inverter must be mounted at least 60 mm from the surrounding walls, with the cooling radiator unobstructed by other objects.

Do not cover the side panels of the inverter to ensure efficient cooling and to avoid overheating.

### The electric cables connection

Make sure the power button of the inverter is OFF.

Observe the polarity of the wires and do not connect them in reverse to avoid shorting the inverter.

Follow these steps to connect the inverter cables:

1. Switch off the inverter with the ON / OFF button.
2. Connect the wires to the battery terminals respecting the polarity.
3. Make sure that the 2 cables are connected tightly, to avoid overheating.

4. Connect the load to the Schuko socket.
5. After making sure all connections are made correctly, turn on the inverter. If the green LED indicator lights up, it means that the output voltage is correct and the inverter is working properly.

The correct connection of the inverter is shown in the following diagram.



### Caution

1. Do not use the AC output of the inverter to connect it to the 230V mains, so as not to burn the inverter.
2. Connect the loads one by one and do not exceed the declared maximum power of the inverter.
3. For inductive loads choose an inverter with a maximum power 2-3 times higher.
4. It is recommended to start the car only with the inverter turned off, because this procedure will consume a lot of current and can affect the inverter.
5. The inverter must be mounted in a ventilated place, must not be covered and must be protected from access by people.
6. Do not connect the inverter to discharged, defective or old batteries, as this may cause the inverter to burn out.

## About battery

A storage battery or accumulator is a device that generates energy following a chemical process. Make sure you have chosen a suitable battery for this inverter, to ensure a correct and optimal operation.

### Battery performance index

1. Capacity: Represents the amount of energy at maximum power composed of the discharge current multiplied by the discharge time.  
Capacity = Discharge current (I) x Discharge time (H)
2. Discharge rate: Represents the speed of each discharge current per specific time
3. Discharge current: The discharge current is the output current. It is usually expressed in Amperes or volume multiplied by a coefficient.
4. Final discharge voltage: Represents the voltage when the battery is not discharged. It is usually about 1.75V / cell
5. Nominal capacity: Represents the capacity after 20 hours of unloading.
6. Self-discharge rate: The battery is discharged even if it is not used. The unit is C / unit.

### Choosing the right battery

Because inverters need strong current when operating, the maximum capacity and current of the battery are factors that determine the efficiency at which the inverter operates (50% - 100%).

These factors can also damage the battery.

Battery storage capacity depends on the maximum discharge current:

Maximum discharge current = Rated power / (storage voltage x 0.85)

Battery storage capacity = average discharge current discharge time

Example:

PNI SP1000W has a rated power of 1000W, 12V input voltage:

Average discharge current =  $1000 / (12 \times 0.85) = 98A$

If kept on for 2 hours:

Battery storage capacity =  $98 \times 2 = 196 Ah$



Choose a battery with a capacity greater than 196 Ah.

## Recommended values for the batteries

| <b>Invertor</b> | <b>Power (W)</b> | <b>Recommended battery</b> |
|-----------------|------------------|----------------------------|
| SP500W          | 500              | 12V, $\geq 100\text{Ah}$   |
| SP1000W         | 1000             | 12V, $\geq 150\text{Ah}$   |
| SP2000W         | 2000             | 12V, $\geq 200\text{Ah}$   |

# Troubleshooting

|                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The inverter does not turn on and the Power LED does not light up</p>        | <ol style="list-style-type: none"> <li>1. The battery is defective</li> <li>2. The battery connection is abnormal</li> <li>3. The fuse is blown</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                              | <ol style="list-style-type: none"> <li>1. Replace the battery</li> <li>2. Connect the battery carefully</li> <li>3. Change the fuse</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p>The inverter is under protection and the red error LED (Fault) lights up</p> | <p>The inverter is protected and the red Fault LED is on.</p> <ol style="list-style-type: none"> <li>1. The inverter enters protection when the total number of consumers exceeds the rated power of the inverter.</li> <li>2. The starting power of the consumers is higher than the declared peak power for the inverter. The inverter enters protection.</li> <li>3. The battery voltage is too low. The inverter triggers surge protection.</li> <li>4. The battery voltage is too high. The inverter triggers overvoltage protection.</li> <li>5. The inverter temperature is too high.</li> </ol> | <ol style="list-style-type: none"> <li>1. Reduce the number of connected consumers and restart the inverter.</li> <li>2. Inductive consumers (motors, pumps) have a very high starting consumption. Choose an inverter with a nominal power 4-5 times higher in these cases.</li> <li>3. If the battery voltage rises above the minimum protection level, the inverter restarts automatically. (or change the battery).</li> <li>4. If the battery voltage drops below the maximum protection level, the inverter restarts automatically (or change the battery).</li> <li>5. Close the inverter for 15 minutes, check and clean the fans and side vents and keep ventilation space around the housing.</li> </ol> |

|                                         |                                                                                                                                                                                 |                                                                                                                                                                                                                         |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The inverter does not work at 100% load | <ol style="list-style-type: none"> <li>1. The wires between the battery and the inverter are too long.</li> <li>2. The connection to the battery / inverter is weak.</li> </ol> | <ol style="list-style-type: none"> <li>1. Shorten the threads or use thicker threads. We recommend using the wires in the package.</li> <li>2. Check and tighten the connectors on the inverter and battery.</li> </ol> |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

If the inverter does not work after applying the above solutions, we recommend that you contact the Seller, Importer or Service Representative, consulting the warranty certificate.

Do not unpack the product as you will lose the product warranty.

We recommend a regular maintenance of the product to prolong its life.

1. Avoid using the inverter in humid, dusty environments with too high a temperature.
2. Avoid subjecting the product to mechanical shocks
3. Periodically check cables and connections
4. Periodically clean the inverter fans.

## Technical specifications

|                                       | SP500W                                                          | SP1000W | SP2000W |
|---------------------------------------|-----------------------------------------------------------------|---------|---------|
| Input voltage                         | 12V DC                                                          |         |         |
| Output power                          | 500W                                                            | 1000W   | 2000W   |
| Output voltage                        | 230V AC                                                         |         |         |
| Frequency                             | 50Hz/60Hz                                                       |         |         |
| Transfer efficiency                   | >88%                                                            |         |         |
| Output wave                           | Pure sine wave                                                  |         |         |
| Total harmonic distortion             | THDV $\leq$ 3% (100% linear load)                               |         |         |
| Overload capacity                     | >120%                                                           |         |         |
| Protections                           | undervoltage, overvoltage, overheating, overload, short circuit |         |         |
| <b>Recommended battery parameters</b> |                                                                 |         |         |
| Type                                  | Plumb-acid/Litium                                               |         |         |
| Voltage                               | 12V                                                             |         |         |
| Maximum current                       | 100A                                                            | 150A    | 200A    |
| Under / over voltage protection       | 10V/15.5V                                                       |         |         |
| Voltage warning level                 | 10.5V                                                           |         |         |
| Cut-off level (interrupt)             | 9.7V-10.2V                                                      |         |         |
| Recovery level                        | 12.5V                                                           |         |         |
| <b>General parameters</b>             |                                                                 |         |         |
| LED indicators                        | Green, Red                                                      |         |         |
| Active cooling                        | Fan                                                             |         |         |
| Working temperature                   | -26°C ~ +60°C                                                   |         |         |
| Working humidity                      | $\leq$ 90% (non-condensing)                                     |         |         |