

GE4ALL

# User Manual SGPV grid tied inverter, 250W.





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## User manual for the SGPV grid tied inverter

The Small Grid tied Photo Voltaic system (SGPV) is:

- A unique plug and play small grid tied photovoltaic system
- A stackable small grid tied photovoltaic system

### Introduction

The SGPV inverter can obtain the solar energy from a solar panel, and can be connected to the electrical the grid without the need for any other equipment. The installation is plug & play and is very convenient and reliable.

The SGPV system includes solar panels and small type grid tie power inverter. The SGPV inverter can be connected to any type of solar panels such as mono, poly, non-crystal film or any other type that transforms solar energy into electrical energy. When the sun shines, the PV panel(s) will produces DC voltage and the SGPV inverter will change the DC voltage to AC voltage suitable for the electrical grid. The power of SGPV inverter should be matched to the power of solar panels connected.

The SGPV inverter can be connected to any grid connected outlet at home. The SGPV inverter monitors the voltage, frequency and phase of the electricity grid and only connects the inverter to the grid in the case of a stable grid condition. The inverter produces a pure sine wave with the same frequency and phase as of the grid's it connects with. If there is sufficient solar power from the connected panels and if the grid conditions are stable, then the SGPV inverter will start to deliver power to into the grid.

When the total power consumption of the electric apparatus in the house is larger than the output power of the SGPV inverters, the power from these inverters will be consumed in the house. It will reduce the amount of power taken from your electricity utility supplier. In the case that the inverter produce more energy than consumed in the house, the excess power will be fed in the main electricity grid and the power meter in your home will run backwards. In most countries, the utility supplier will refund you then for the supplied electrical power.

### BACKGROUND

In today's society, oil, coal and other fossil fuels become increasingly strained and eventually will be completely exhausted, so solar energy, wind energy and other renewable energy sources are inevitable directions in the future development of the energy field. Promoting large-scale solar photovoltaic power is an important way to solve the problem of the world's energy and environmental crisis.

PV power systems need adequate installation areas.

One way is the use of open ground, such as large plots in semi-desert regions, coastal areas and farms to build large-scale PV power stations. In the same way as for traditional power plants, these kind of power stations need the construction of long-distance transmission grids, the investment costs are high.



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Another way is the promotion of Building Integrated Photo Voltaic systems (BIPV). In this way, to build in the PV power system into all types of buildings in the cities, you can make full use of the building walls, windows, sunshade and other resources to increase the area for capturing solar energy to generate electrical energy. In most cases, utilising BIPV systems can only be properly achieved for new buildings, where the solar system is fully integrated into the architecture and design of the building

To gather solar energy from existing buildings, the "SOLAR ROOF" concept is used. It promotes to gather the solar energy from everyone's home roof. This initiates a new mode of clean renewable energy - "local production near local consumption".

Both environmental protection and energy savings are realized, the land is conserved and the cost is reduced.

Governments around the world are promoting now the new energy production methods. How to tie the "million solar roofs" to the grid is a great obstacle and it the solution for this is the key to promote the "Solar Roofs" concept. The SGPV is a powerful method to solve this obstacle.

## ADVANTAGE

There are many advantages of SGPV system compared with the traditional grid tied systems.

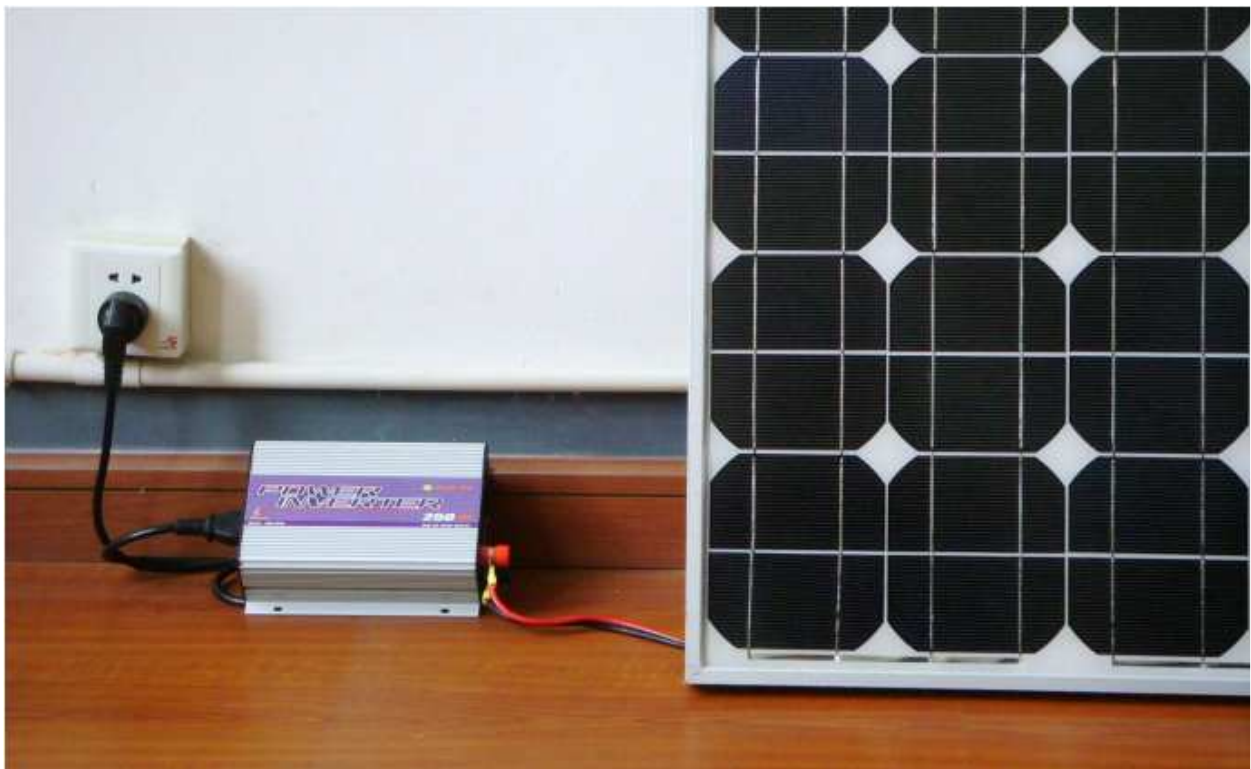
1. Low cost and easy installation – The SGPV system can make full use of all types of buildings surfaces that face to the sun in the city as well as fast and easy installation of solar modules and grid tied inverter. It's very low on maintenance costs.
2. Easy stacking of systems – The SGPV system can be used in multiple grid tied systems and can be setup as a large solar array. The quantity of SGPV systems in the array is determined by your current needs. The number of systems can be increased easily without the need of changing already placed systems.
3. If you are planning to install a grid-tied PV system in a traditional way, the solar array and inverter need to be carefully matched to ensure that the inverter's voltage and power limits are not exceeded. When you want to increase 'the number of solar panels and if the total power of the solar panels exceeds the grid inverter specification, it is necessary to change to a larger and more expensive grid inverter leaving the installed inverter redundant.
4. There is no negative interaction when combining multiple SGPV systems – With a traditional solar grid tied system, solar panels are put in series to make a string of modules to deliver the required power to the inverter. In most cases, multiple strings are connected in parallel (a panel array) to one inverter. The traditional grid inverter has a feature known as Maximum Power Point Tracking (MPPT), the MPPT tracking point is determined based on the mean performance of the panel array. Should one or more panels deliver less power due to shadowing, leaves, bird droppings etc., the performance of the whole system will be affected, not just the performance of the affected panels. When using a SGPV system, this disadvantage will not occur because the SGPV inverter will determine the MPPT point per SGPV system. Only the shadowed panels will deliver less power, other

SGPV systems will still deliver power using each individual panel MPPT point to it's maximum effect.

5. Improving the efficiency of the entire solar power system – In traditional grid tied systems, the solar panels are connected in series, so the MPPT of the inverter is set for the total string of panels put in series, not for each individual panel. Not each panel will be working at its maximum power point, which will reduce the total power. The SGPV system has no such disadvantage. Every SGPV inverter has its own MPPT function, so every panel is working at the maximum power point, increasing the efficiency of the entire system.
6. Low power consumption – Most of the parts in the SGPV inverter are digital IC's and a low power MCU. The power consumption of the inverter is very low so even though the amount of inverters is more compared to a traditional grid tied system, it will not lead to an increase of the power consumption of the entire system.

## INSTALLATION

A complete SGPV system is shown in Figure 1. Install the solar panel of the SGPV system at a suitable location that has sufficient sunshine during the whole day. Connect the cables of the panel to the SGPV inverter. Mind here the correct polarity of the cables. Insert mains the plug of the inverter into the mains socket in your home. Now, when the sun shines, the SGPV will convert the solar energy to electrical energy fed into the home grid.



**Figure 1** A complete SGPV system connected to the home grid.



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The SGPV systems can be stacked and all SGPV systems will function independent of each other. The total power delivered to the grid is the sum of the power of each individual SGPV system. The installation of each SGPV system is the same. When you connect large quantity of SGPV systems to the grid, it will construct a high-power grid-tied system

## Operation Procedures

1. Please set the AC output voltage switch on the inverter to the correct position (115V or 230V) according to your location home grid AC voltage.
2. Connect the Solar Panel or Wind Turbine's DC supply cables to the DC input terminals of the inverter. Ensure that the polarity is correct. The recommended DC minimum input cable size for 8AWG or cables that can handle more than 30A. Optimal length would be less than 8 m, longer cables will experience a higher voltage drop causing unwanted energy loss. The range of output power of the solar panel or wind turbine is 20W~250W depending on the amount sun or wind.
3. Connect the supplied AC power cord into the inverter and plug it into a home wall socket.
4. The 3 green LED indicators will start to cycle from left to right when the grid and DC supply from the solar panel is detected. This indicates the inverter is working normally. The rate of the cycling is according to how much power is being provided by the solar panels or the wind turbine. The bigger the amount of solar power, the faster the cycling rate is. If there is no AC grid detected, the red LED will be on, the inverter will then not provide any output power, this is the so called "Island Protection".



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## Electrical Specifications

Model	SUN-250G	
Normal AC Output Power	200W	
Maximum AC Output Power	250W	
AC Output Voltage Range	Switch is at 230V Position	190V ~ 260V
	Switch is at 115V Position	90V ~ 130V
AC Output Frequency Range	46Hz ~ 65Hz	
Total Harmonic Distortion(THD)	<5%	
Power Factor	0.99	
DC Input Voltage Range	14V ~ 28V	
Peak Inverter Efficiency	92%	
Standby Power consumption	<0.5W	
Output Current Waveform	Pure Sine-wave	
MPPT Function	Yes	
Over Current Protection	Yes	
Over Temperature Protection	Yes	
Reverse Polarity Protection	Yes	
Island Protection	Yes	
Stackable	Yes	

## Mechanical Specifications

Operating Temperature Range	-10 °C ~ 45 °C
N.W.	1.4Kg
G.W	1.6Kg
Dimension	220mm*170mm*60mm