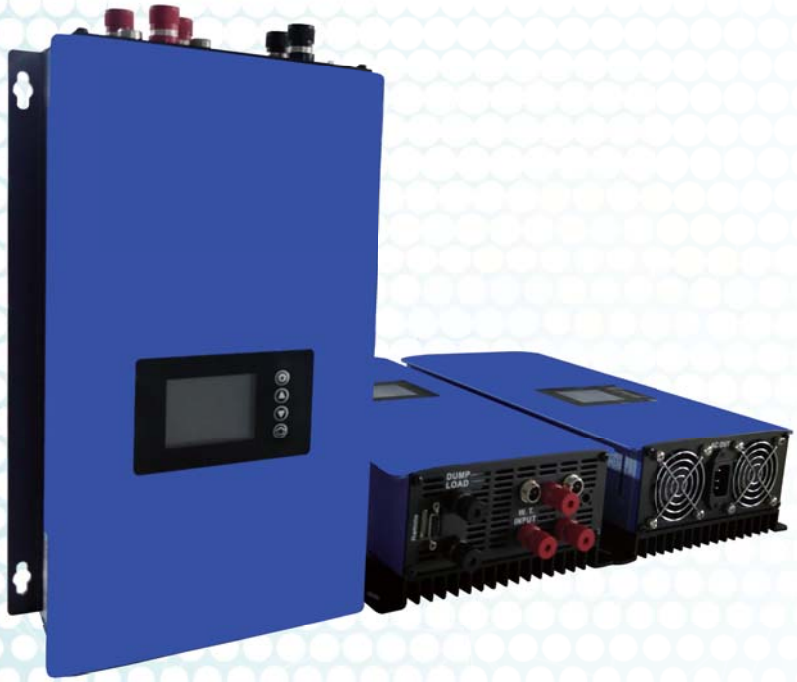
Wind Turbine Grid Tie Inverter

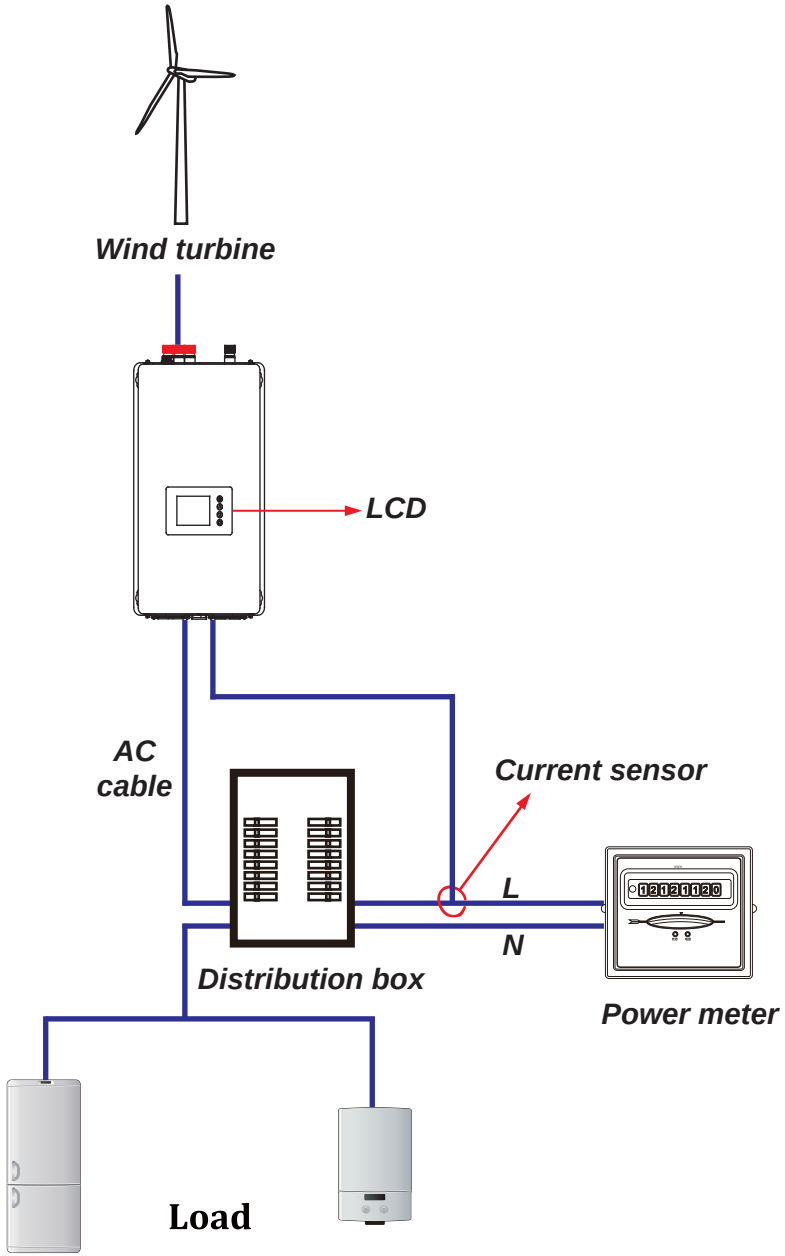
Installation and Operations Manual



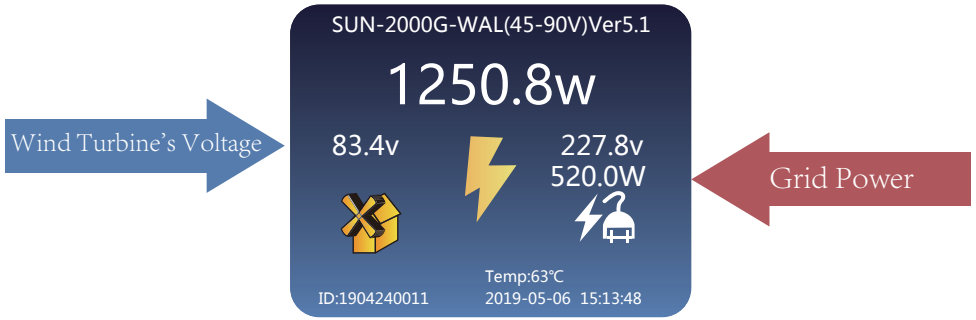
SUN-1000G2

SUN-2000G2

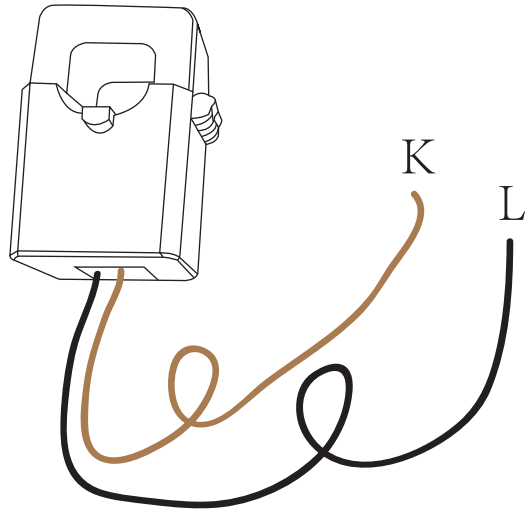
The Connection of Wind Turbine Grid Tie Inverter



The Connection of Current Sensor



1. The Grid Power should always indicate a positive number under limit mode.
2. Grid Power is a negative number indicates the current sensor's direction is wrong, reverse the direction.



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Wind Turbine Grid Tie Inverter Models

Sunshine grid tie inverters for wind turbines include a series of models, refer to table 1 and table 2

Table 1, DC Input Inverter Models

Model	Rated Power (Max./Continuous)	DC Input Voltage	AC Output Voltage	AC Output Frequency	Max. Efficiency	Night Power Consumption
SUN-1000G2-WDL-M	1000W / 900W	22V~65V	95V~140V 185V~265V	50/60Hz 50/60Hz	90%	0.5W
SUN-1000G2-WDL-H	1000W / 900W	45V~90V	95V~140V 185V~265V	50/60Hz 50/60Hz	92%	1.5W
SUN-2000G2-WDL-H	2000W / 1850W	45V~90V	185V~265	50/60Hz	92%	1.5W

Table 2, Three Phases Input Inverter Models

Model	Rated Power (Max./Continuous)	DC Input Voltage	AC Output Voltage	AC Output Frequency	Max. Efficiency	Night Power Consumption
SUN-1000G2-WAL-M	1000W / 900W	22V~65V	95V~140V 185V~265V	50/60Hz 50/60Hz	90%	0.5W
SUN-1000G2-WAL-H	1000W / 900W	45V~90V	95V~140V 185V~265V	50/60Hz 50/60Hz	92%	1.5W
SUN-2000G2-WAL-H	2000W / 1850W	45V~90V	185V~265	50/60Hz	92%	1.5W

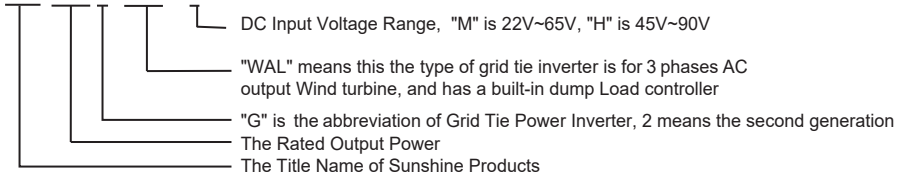
Model Name description:

SUN-XXXG2-WDL-X

- DC Input Voltage Range, "M" is 22V~65V, "H" is 45V~90V
- "WDL" means this type of grid tie inverter is for DC output Wind turbine, and has a built-in dump Load controller
- "G" is the abbreviation of Grid Tie Power Inverter, 2 means the second generation The Rated Output Power
- The Title Name of Sunshine Products

Some models also have built-in LCD displayer; for example, the model SUN-1000G2-WDL-H is the Sunshine grid tie power inverter model that the rated power is 1000W, the DC input voltage range is 45V~90V, the AC output voltage range is 185V~265V or 95V-140V, with LCD displayer on the panel of the inverter.

Model Name description:
SUN-XXXG2-WAL-X



For example, the model SUN-1000G2-WAL-H is the Sunshine grid tie power inverter model that the rated power is 1000W, the DC input voltage range is 45V~90V, the AC output voltage range is 185V~265V or 95V-140V, and with LCD displayer on the panel of the inverter.

The DC input range of the "WAL" model inverter is different with the "WDL" type, the test point should be at the DC side of the built-in rectifier of the inverter, but you can calculate from 3 phases of AC output voltage of the wind turbine to get the DC voltage, the formula is Vac = Vdc/1.732. For example, if the DC input voltage range of the inverter is 45~90V, then the wind turbine's output AC range of the should be 45/1.732~90/1.732 = AC26V~ 52V.

Important Safety Information

Read this First!

This manual contains important instructions to follow during the installation and maintenance of Sunshine Grid Tie Inverter.
To reduce the risk of electrical shock and ensure the safe installation and operation of the Sunshine Grid Tie Inverter, the following safety symbols appear throughout this document to indicate dangerous conditions and important safety instructions.

WARNING! This indicates a situation where failure to follow instructions may be a safety hazard or cause equipment malfunction. Use extreme caution and follow instructions carefully.

NOTE: This indicates information particularly important for optimal system operation. Follow instructions closely

Safety Instructions

WARNING!

Be aware that the Sunshine Grid Tie Inverters' body is the heat sink and can reach a temperature of 80℃ under extreme conditions. To reduce the risk of burns, do not touch.
-Perform all electrical installations in accordance with all local electrical codes and the National Electrical Code.
-Be aware that only qualified personnel should install or replace Sunshine Grid Tie Inverters.
-Do not attempt to repair the Sunshine Grid Tie Inverter; it contains no user-serviceable parts. If it failed, please contact Sunshine customer service to obtain an RMA number and start the replacement process. Tampering with or opening the Sunshine Grid Tie Inverter will void the warranty.
Before installing or using the Sunshine Grid Tie Inverter, please read all instructions and cautionary markings in the technical description and on the Sunshine Grid Tie Inverter and the Wind turbine.

Instruction of Wind Turbine Grid Tie Inverter

Sunshine Grid Tie Power Inverter is the world's most technologically advanced inverter for use in utility-interactive applications. This manual details the safe installation and operation of the Sunshine Grid Tie Inverter.

This integrated system maximizes energy harvest, increases system reliability, and simplifies design, installation, and management.
The small type of wind grid tie power inverter can obtain the wind energy from wind turbines and tie to the grid through its output cables with no extra equipment. The installation is very convenient and reliable.

We call a system combining with a small grid tie inverter and a wind turbine as "SGWT". The system includes a wind turbine and a small grid tie inverter, and a set of the installation kit. Some "SGWT" also will include a controller, dump load resistor.
The inverter can be connected to any outlets of the utility grid at the house. The small grid tie inverter monitors the volume, frequency, and phase of the home utility grid, producing pure sine wave AC power that the frequency and phase are the same as the grids. The volume is a bit higher than the grid's, then according to the current-controlled PWM, to control the output power to the grid. The small grid tie inverter puts out power when the home grid is on.
When the wind turbine is rotating, and its output of the voltage is in the range of the rated input voltage of the inverter, the wind turbine will produce power, and the grid tie inverter will change the power from the wind turbine to the home grid. When the total power of the electric appliance that is using in the house is larger than the output power of the inverters, this power from the inverters will be consumed in the house. This will slow down the power meter; otherwise, the difference of the output power of the inverter between the total used power of the appliance will go out from the house to the out grid.

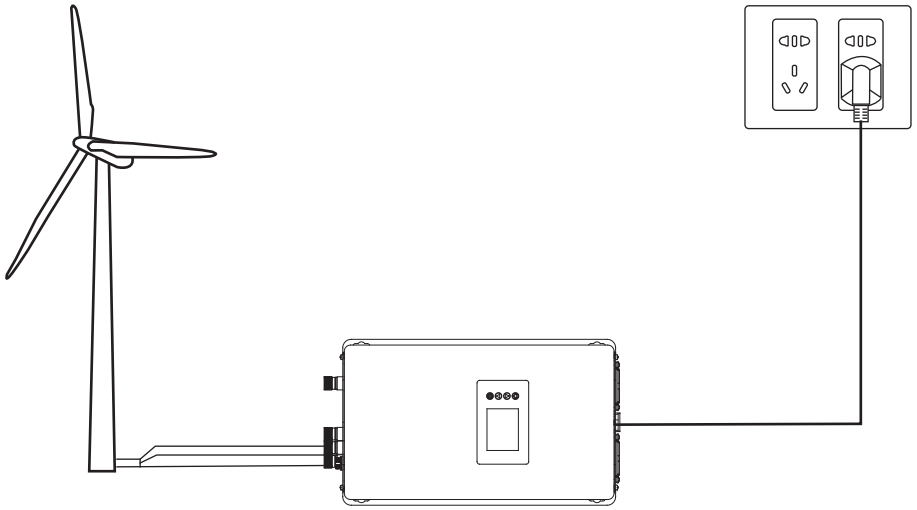


Fig 1.A Small Grid Tie Power System with the Sunshine Grid Tie Inverter

Wind Turbine Grid Tie Inverter Installation

Follow the instructions in this section to install Sunshine Grid Tie Inverters.

WARNING! Before installing the Sunshine Grid Tie Inverter, read all instructions and cautionary markings in the user manual, on the Sunshine Grid Tie Inverter, and the wind turbine.

WARNING! Perform all electrical installations in accordance with all local electrical codes and the National Electrical Code (NEC)

WARNING! Connect the Sunshine Grid Tie Inverter to the electrical utility grid only after receiving prior approval from the utility company.

WARNING! Be aware that only qualified personnel should connect the Sunshine Grid Tie Inverter to the electrical utility grid.

WARNING! Be aware that the installation of this equipment includes the risk of electric shock. Normally grounded conductors may be ungrounded and energized when a ground fault is indicated.

Installation Procedure

Installing Sunshine Grid Tie Power System involves several key steps:

1. Considering the total capacity of the grid tie power system that you need
2. Choosing an applicable wind turbine for Sunshine Grid Tie Inverter
3. Selecting a set of accessory for installation of the Grid Tie Power System
4. Selecting the correct model of Sunshine Grid Tie Inverter
5. Installing the wind turbine to a suitable place
6. Installing Sunshine Grid Tie Inverter to a suitable place
7. Connecting Sunshine Grid Tie Power System with cables and connectors
8. Grounding the system

Each of the detailed installation steps in the following sections is numerically referenced in the installation diagram below.

WARNING! DO NOT connect Sunshine Grid Tie Inverters to the utility grid or energize the AC circuit(s) until you have completed all of the installations.

Step1. Considering the total capacity of the grid tie power system that you need.

The whole grid tie power system's total capacity is according to your power consumption in the site you want to install, or how much power you want it to feed to the utility grid. The volume is just according to your will because when the total power of electric appliances used in the installation site is larger than the output power of the grid tie power system, this power from the system will be consumed in the site, this will slow down the power meter; otherwise, the difference of the system's output power between the total used power of the appliances will feed to the utility grid.

For example, suppose you want to install a grid tie power system in your house. In that case, you could decide the total power volume according to the total power the appliances that you use in your house, maybe the consumption of total energy per day is about 5KWH. You should realize the averaged speed of the wind per day at your site, check the power to the speed of the wind curve from the specifications of the wind turbine, then you can estimate the average power that the wind turbine can generate, actually the real average power the wind turbine can generate at your side is not easy to estimate, you need to check the history data of the climate because it will vary every day according to the climate, just assume a 1KW rated wind turbine is suitable for the grid tie power system that you plan to set, with this capacity of the system, it can supply all power consumption in the whole year. When the grid tie power system is working, sometimes, there is extra power feed to the utility grid if the power from the grid tie system is larger than the power consumed by the appliances in your house, and sometimes will not when it is not larger.

If you use a 1KW wind turbine, then we call the "GTWT" system is a 1KW grid tie power system. Of course, you can install a 500W grid tie power system or a 2KW grid tie system, even more large capacity or more small capacity grid tie system, it doesn't matter. But if the capacity is too big, you should consider the volume of the AC system of your house, whether it can hold the fed power or not.

Step2. Choosing Applicable Wind Turbine For Wind Turbine Grid Tie Inverter

Description of Wind Turbine

A wind turbine is a device that converts kinetic energy from the wind into electrical power. A wind turbine used for charging batteries may be referred to as a wind charger. A wind turbine also can be connected to a grid tie inverter like SUN WAL or WDL series grid tie inverter to feed energy to utility gird.

The result of over a millennium of windmill development and modern engineering, today's wind turbines are manufactured in a wide range of vertical and horizontal axis types. The smallest turbines are used for applications such as battery charging for auxiliary power for boats or caravans or to power traffic warning signs. Slightly larger turbines can be used for making small contributions to a domestic power supply while selling unused power back to the utility supplier via the electrical grid. Arrays of large turbines, known as wind farms, are becoming an increasingly important source of renewable energy and are used by many countries as part of a strategy to reduce their reliance on fossil fuels.

A quantitative measure of the wind energy available at any location is called the Wind Power Density (WPD). It is a calculation of the mean annual power available per square meter of the swept area of a turbine and is tabulated for different heights above ground. Calculation of wind power density includes the effect of wind velocity and air density. Color-coded maps are prepared for a particular area described, for example, as "Mean Annual Power Density at 50 Metres". In the United States, the results of the above calculation are included in an index developed by the National Renewable Energy Laboratory and referred to as "NREL CLASS". The larger the WPD calculation, the higher it is rated by class. Classes range from Class 1 (200 watts per square meter or less at 50 m altitude) to Class 7 (800 to 2000 watts per square m). Commercial wind farms generally are sited in Class 3 or higher areas, although isolated points in an otherwise Class 1 area may be practical to exploit.

Most wind turbines have similar curves of wind speed to power. Fig2 is a typical curve of wind speed to power of 1000W wind turbine.

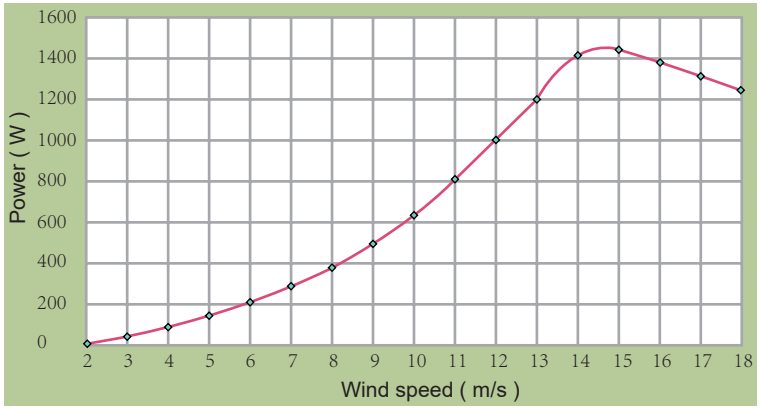


Fig 2.Wind speed--Power Curves

SUN series grid tie inverters for wind turbines are suitable for wind turbines. Their rated power is from 200W to 2000W.

Choosing Wind Turbine

The most kinds of specifications that the factories marked about the wind turbines:

1, Starting wind speed(m/s);
2, Cut-in wind speed(m/s);
3, Rated wind speed(m/s);
4, Rated power;
5, Max. power;
6, Safe wind speed(m/s);
7, Rated DC voltage.

You need to choose a wind turbine that the rated power can meet the power consumption for your use. When you choose a wind turbine, you also need to consider ahead what model grid tie inverter of SUN series you want to use. Wind turbines have two output types, one is the AC output type, and another is the DC output type. If the wind turbine is DC output type, it must be integrated with a rectifier. So if the wind turbine is AC output type, you should use the WAL model of SUN series grid tie inverter. If the wind turbine is DC output type, you should use the WDL model of SUN series grid tie inverter.

Step3. Selecting Accessory for Grid Tie Power System installation.

The accessory for grid tie power system including:

1, Connecting cables will be connected with wind turbines and inverters.
2, Connectors.
3, AC cables.
4, Power meter(Optional).
5, Bracket for wind turbine installation(not included in this user manual).

Selecting connecting cables

Before you connect a wind turbine to a SUN series grid tie inverter, a suitable specification of cables should be selected. The selection of specifications of the cables is according to the max. power(Pmax.) and the rated DC voltage(Vdc) of the wind turbine. You should calculate the maximum current(Imax) that will transit through the cables, we mark it as Imax. First, calculate the Pmax of the wind turbine, maybe some factories just submit the rated power(P) of their wind turbines. If so, you can estimate about the Pmax, just multiply 1.5 (Pmax = P*1.5). We can get the Imax using formula (1) shown below.

Imax = Pmax/Vdc ------ (1)

After finished the calculation of Imax, then we can pick suitable cables according to Table 3.
It's the best way that you choose cables for outdoor use.
If the wind turbine is AC output type, then you can choose thinner cables than you get the result according to formula(1).

Selecting Connectors

When installing the SGWT system, maybe you should use some connectors for connecting wind turbines and inverters, be sure that the connectors must hold the Imax.

Selecting AC cables

AC cables will be supplied with inverters by our factory. We will supply different types of AC cables according to the standards of different countries. You should provide the information to the dealers where you will install the system.

Step4. Selecting Correct Model of Wind turbine Grid Tie Inverter.

When finished step1 to step3, then you can select a correct model of SUN series inverter. If the wind turbine is DC output type, then you should choose the WDL model inverter, and the input DC voltage range of the inverter should fit the DC output voltage of the wind turbine, the rated power of the inverter should also fit the max. power of the wind turbine, and the AC output of the inverter should fit the standard of the AC utility grid.

If the wind turbine is AC output type, then you should choose our WAL model inverter. Most factories don't supply the specification of the AC rated voltage, just supply the DC rated voltage, so we supply the specification of the DC input range of our WAL model inverter. The test point is at the built-in rectifier output in the inverter. Please check the DC rated voltage of the wind turbine should fit the DC input range of the grid tie inverter.

Table 3: American Wire Gauge (AWG) Cables / Conductor Sizes and Properties

AWG	Diameter [inches]	Diameter [mm]	Area [mm2]	Resistance [Ohms /1000 ft]	Resistance [Ohms/ km]	Max Current [Amperes]	Max Frequency for 100% skin depth
0 (1/0)	0.3249	8.25246	53.5	0.0983	0.322424	150	250 Hz
1	0.2893	7.34822	42.4	0.1239	0.406392	119	325 Hz
2	0.2576	6.54304	33.6	0.1563	0.512664	94	410 Hz
3	0.2294	5.82676	26.7	0.197	0.64616	75	500 Hz
4	0.2043	5.18922	21.2	0.2485	0.81508	60	650 Hz
5	0.1819	4.62026	16.8	0.3133	1.027624	47	810 Hz
6	0.162	4.1148	13.3	0.3951	1.295928	37	1100 Hz
7	0.1443	3.66522	10.5	0.4982	1.634096	30	1300 Hz
8	0.1285	3.2639	8.37	0.6282	2.060496	24	1650 Hz
9	0.1144	2.90576	6.63	0.7921	2.598088	19	2050 Hz
10	0.1019	2.58826	5.26	0.9989	3.276392	15	2600 Hz
11	0.0907	2.30378	4.17	1.26	4.1328	12	3200 Hz
12	0.0808	2.05232	3.31	1.588	5.20864	9.3	4150 Hz
13	0.072	1.8288	2.62	2.003	6.56984	7.4	5300 Hz
14	0.0641	1.62814	2.08	2.525	8.282	5.9	6700 Hz
15	0.0571	1.45034	1.65	3.184	10.44352	4.7	8250 Hz
16	0.0508	1.29032	1.31	4.016	13.17248	3.7	11 k Hz
17	0.0453	1.15062	1.04	5.064	16.60992	2.9	13 k Hz
18	0.0403	1.02362	0.823	6.385	20.9428	2.3	17 kHz
19	0.0359	0.91186	0.653	8.051	26.40728	1.8	21 kHz
20	0.032	0.8128	0.518	10.15	33.292	1.5	27 kHz
21	0.0285	0.7239	0.41	12.8	41.984	1.2	33 kHz
22	0.0254	0.64516	0.326	16.14	52.9392	0.92	42 kHz
23	0.0226	0.57404	0.258	20.36	66.7808	0.729	53 kHz
24	0.0201	0.51054	0.205	25.67	84.1976	0.577	68 kHz
25	0.0179	0.45466	0.162	32.37	106.1736	0.457	85 kHz
26	0.0159	0.40386	0.129	40.81	133.8568	0.361	107 kHz
27	0.0142	0.36068	0.102	51.47	168.8216	0.288	130 kHz
28	0.0126	0.32004	0.081	64.9	212.872	0.226	170 kHz
29	0.0113	0.28702	0.0642	81.83	268.4024	0.182	210 kHz
30	0.01	0.254	0.0509	103.2	338.496	0.142	270 kHz
31	0.0089	0.22606	0.0404	130.1	426.728	0.113	340 kHz
32	0.008	0.2032	0.032	164.1	538.248	0.091	430 kHz
33	0.0071	0.18034	0.0254	206.9	678.632	0.072	540 kHz
34	0.0063	0.16002	0.0201	260.9	855.752	0.056	690 kHz
35	0.0056	0.14224	0.016	329	1079.12	0.044	870 kHz
36	0.005	0.127	0.0127	414.8	1360	0.035	1100 kHz
37	0.0045	0.1143	0.01	523.1	1715	0.0289	1350 kHz
38	0.004	0.1016	0.00797	659.6	2163	0.0228	1750 kHz
39	0.0035	0.0889	0.00632	831.8	2728	0.0175	2250 kHz
40	0.0031	0.07874	0.00501	1049	3440	0.0137	2900 kHz

Step5. Installing Wind Turbine to a suitable place.

Install the wind turbine of the "SGWT" to a suitable location where the wind is strong enough to drive the wind turbine.

WARNING! Please read the user manual of wind turbine before you install the wind turbine, don't install the wind turbine under high wind.

WARNING! Ensure using a strong bracket to fix the wind turbine to avoid the danger under high wind.

WARNING! The blades of the wind turbine should be taken down before the hurricane is coming.

Step6. Installing Wind turbine Grid Tie Inverter to a suitable place.

Place the Sunshine Grid Tie Inverter on a surface protected from direct sunlight, high temperatures, and water. The inverter requires at least 150mm of clearance around itself for ventilation. The inverters are for indoor use, can't use outdoor. You can use screws to fix the inverter to the surface because some models of Sunshine grid tie inverter have fans on the bottom cover, so the surface should be flat.

Step7. Connecting the Wind turbine Grid Tie Power System with Cables and Connectors

After finished from Step1 to Step6, you should connect the wind turbine and inverter with cables and connectors to integrate the Sunshine Grid Tie System.

Step8. Grounding the system.

Connect the ground terminal of the wind turbine to the NEC approved AC grounding electrode.
Connect the grid tie inverters to the grounded racking using a grounding washer approved for the racking.
The ground wire of the AC cables are connected to the housing of the inverter when the AC cables are connected to the inverters, so when the AC plug is inserted to the socket of the AC outlet of the utility grid in the house, the ground pin of the socket must be connected to the Earth ground.

Step9. Connecting the wind turbine output cables after complete from Step1 to Step8.

WARNING! Before connecting the wind turbine output cables to the grid tie inverter, you should stop the wind turbine rotating just to avoid the sparkle when connecting the cables.

Example of Installation of 1KW grid tie power system

To explain the installation operation, we assume that there is a house the usual electricity consumption is about 5KWH per day, and the wind is high enough to drive the wind turbine.

1, Considering the total capacity of the grid tie power system that you need.

As we stated at Step1, we can get a result that a 1kW Sunshine Grid Tie Power System is suitable for this house, so we will establish a 1KW grid tie power system step by step. We also assume that we will install the system in the house where the utility grid is 230V/50Hz.

2, Choosing Applicable Wind Turbine.

If you purchased a wind turbine, it is DC output type, this means there is already a rectifier that has been integrated into the wind turbine, or there is a wind turbine controller that can transform AC to DC connected with the wind turbine. Please read the specifications of the wind turbine carefully.

1, Starting wind speed(m/s) : 3m/s
2, Cut-in wind speed(m/s) : 3.5m/s
3, Rated wind speed(m/s) : 12m/s
4, Rated power : 1000W
5, Safe wind speed(m/s) : 25m/s
6, Rated DC voltage : 48V

To choose which model of SUN series grid tie inverter can fit with this wind turbine, the specifications of "Rated power" and "Rated DC voltage" are very important. We can use these two specifications to choose a suitable grid tie inverter.
Because there is no specification of max. power, so we can estimate it using the formula "Pmax = P*1.5" to get it, so Pmax=1500W.
Because the rated DC voltage is 48V, so we can get the max. current output from the wind turbine using the formula "Imax = Pmax/Vdc", so Imax=31.25A. If you purchased a wind turbine, it is AC output type, this means the wind turbine will put out 3 phased AC voltage. You can estimate the Imax= 31.25/1.5 = 21A.

3, Choosing connecting cables and connectors that will be connected between wind turbines and grid tie inverter.
If the wind turbine is DC output type, then you should choose AWG 6 connecting cables. If the wind turbine is AC output type, then you should choose AWG 8 connecting cables according to table 3. When you choose connectors, the connectors must have the ability to hold the current above the Imax.

4. Selecting Correct Model of Sunshine Grid Tie Inverter.

Because you have gotten the specifications of the wind turbine, you can decide which SUN series grid tie inverter can fit the wind turbine.

According to the given specifications, if the wind turbine is DC output type, you can choose the model: SUN-1000G2-WDL-M.
According to the given specifications, if the wind turbine is AC output type, you can choose the model: SUN-1000G2-WAL-M.

Because of the max. power of this wind turbine is about 1500W, so when the wind is high, the inverter can't carry the max. power from the wind turbine, this will cause the output voltage of the wind turbine to become very high, will be out of the input range of the inverter, maybe will cause the inverter to be damaged, so at this situation, a suitable dump load resistor should be connected to the dump load terminals of the grid tie inverter. It's better that you choose a grid tie inverter that its rated power will be the same or a bit higher than the max. power of the wind turbine.

5, Till now, you can follow step5 to step9 to complete the installation of the "SGWT" system.

Choosing a suitable dump load resistor.

Because the SUN series grid tie inverter for the wind turbine has a built-in dump load controller, so the inverter can be connected with the dump load resistor directly. There are two terminals for the dump load resistor connection on the panel of the inverter.

Different models of grid tie inverters need to be connected with different types of dump load resistors, we will send you the applicable resistors according to the inverter model you ordered.

The connecting drawing of "SGWT "

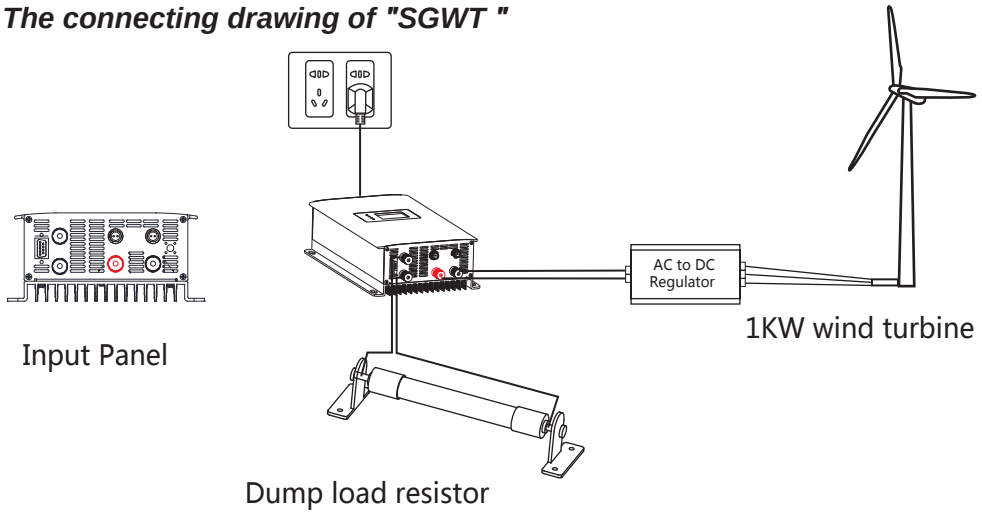


Fig 3. WDL model of SUN series grid tie inverter connected with AC output type of wind turbine.

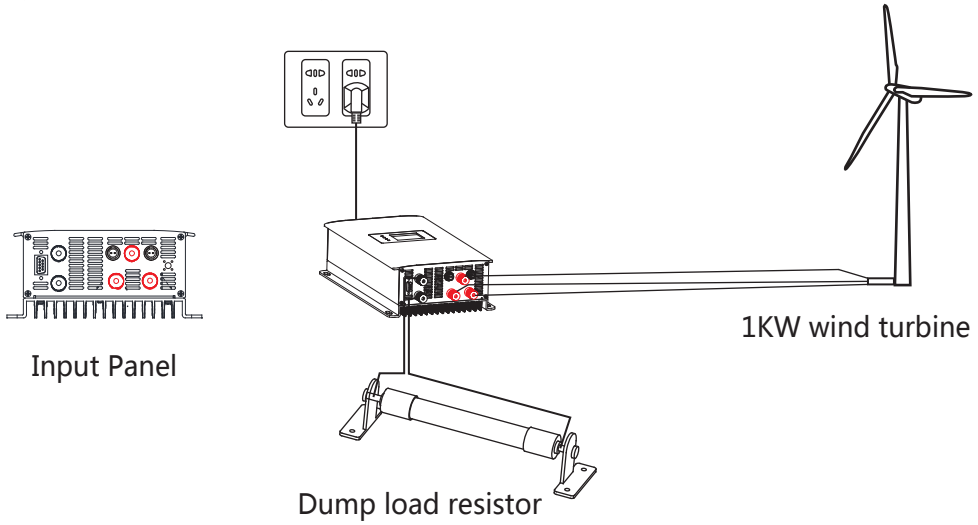


Fig 4. WAL model of SUN series grid tie inverter connected with AC output type of wind turbine.

Installing Wind turbine Grid Tie Power System to Three Phases Utility Grid.

When the total Capacity of the Grid Tie Power Systems is large, install all the power systems to one phase of the utility grid is not reasonable. Maybe this will cause an unbalance of the three phases of the utility grid. In this section, we will explain how to install a Sunshine Power System to three phases of the utility grid separately to balance the fed power.

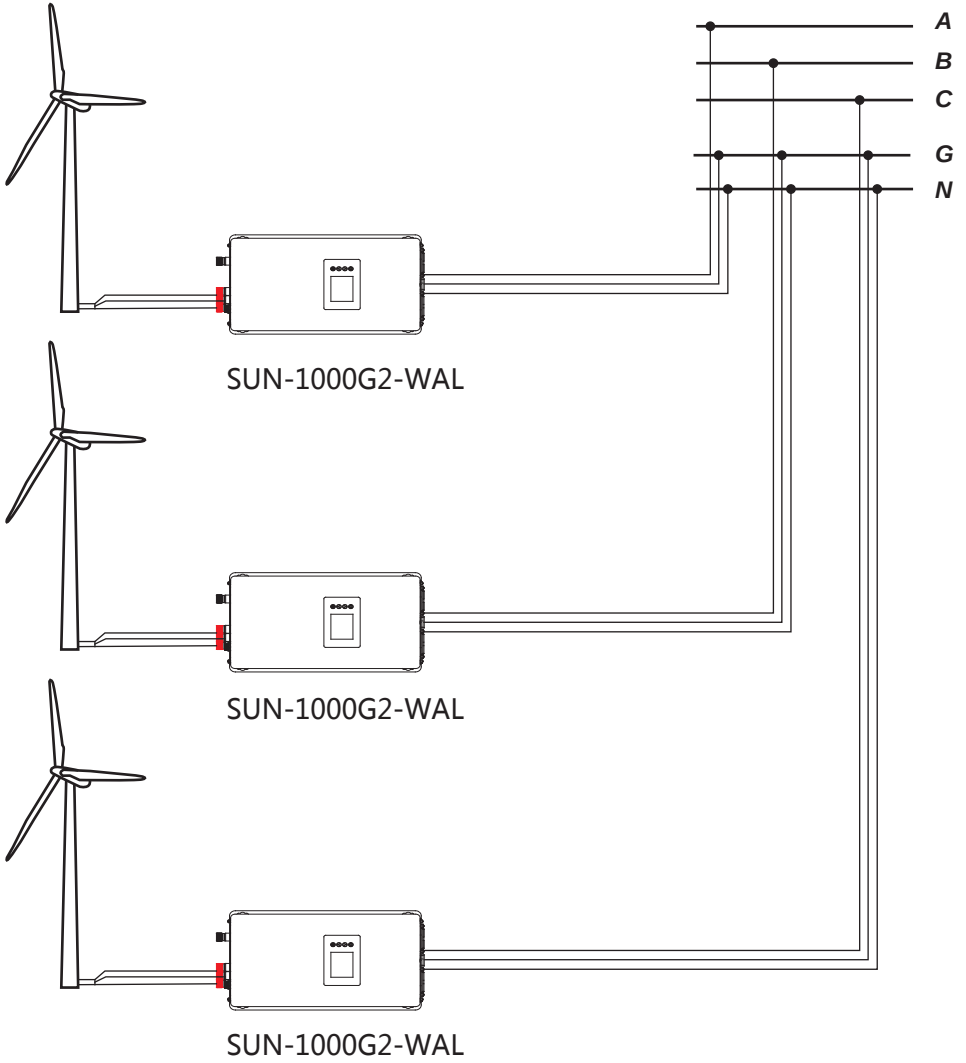


Fig 5. Three Phase Grid Tie Power System

For example, install a 3KW grid tie power system to a three phases utility grid.
The diagram is shown in Fig. 5, we separate the 3KW power system to three power system units, every unit has 1KW power. Connecting every system unit to a different phase can balance all grid tie power to three phases of the utility grid.

Follow this way, you can install a more large grid tie power system to three phases, just separate the whole power system to three equal power system units.

The layout of Wind turbine Grid Tie Power Inverter

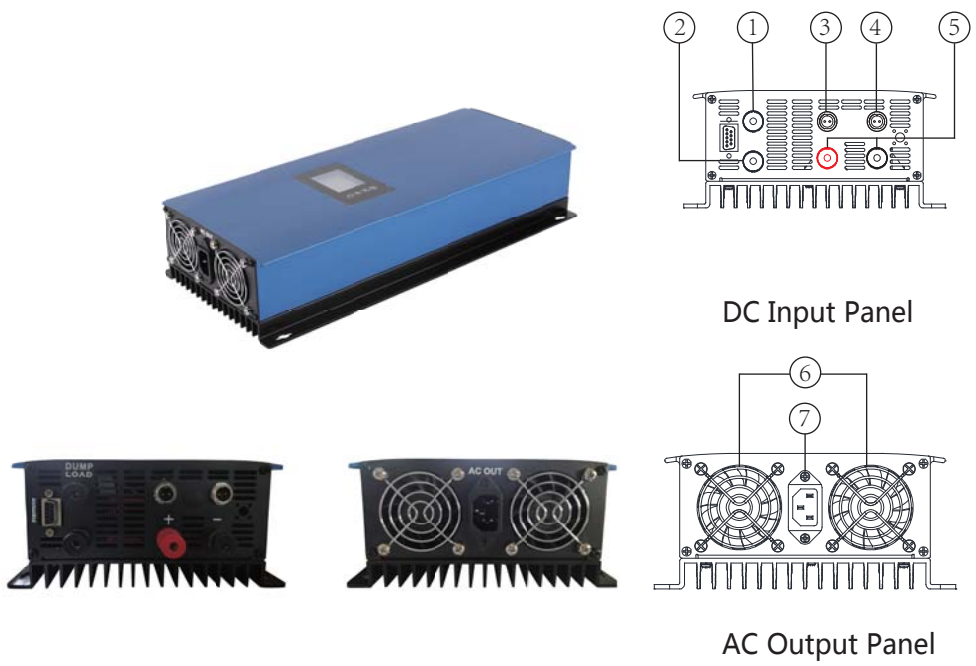


Fig.6 WDL inverter layout

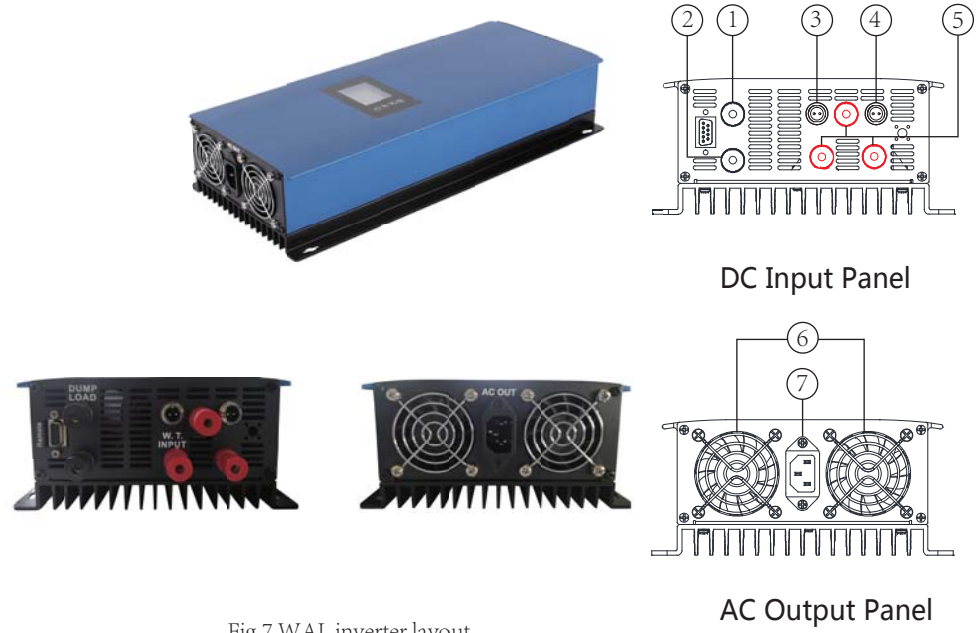


Fig.7 WAL inverter layout

① ② These two terminals will connect to the dump load resistor.

③ External limiter

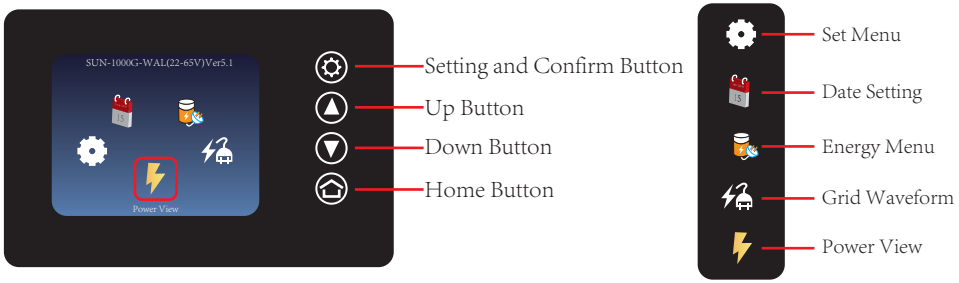
④ Internal limiter. This terminal will connect a current sensor.

⑤ Input Terminals. These terminals will connect to the wind turbine.

⑥ Cooling fans.

⑦ AC socket. This socket will connect the inverter to the public grid via the AC cable.

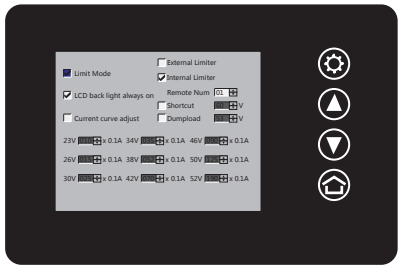
Inverter Display Instruction

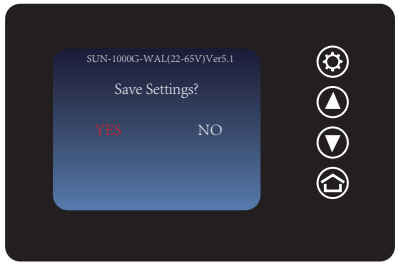


The Inverter display can show many information. The main interface of the display and the icon explanations are shown below.

Set Menu: Choose the set menu icon on the main screen interface, click the confirm button to enter into the interface shown below. In this interface, the LCD backlight can be set to always on or auto turn off after 3 minutes no action.

The inverter also integrates with limit function, preventing excess power from going to the public grid. Select the limit mode, the inverter will work under limit mode. The inverter's output power will be determined by load power. For more details about the limit function, please read the user manual of the limit function.

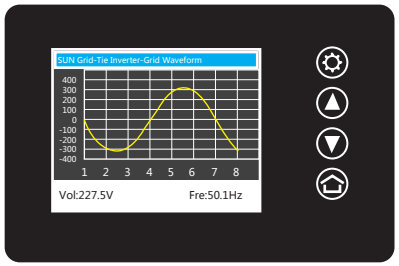




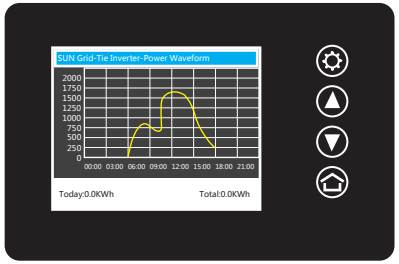
"Shortcut" option sets the input voltage point of the inverter disconnecting from the wind turbine.
"Dumpload" option sets the dump load resistor shift-in input voltage point.
"Current curve adjust" option sets the P-V(power to voltage) curve of the inverter to fit the P-V curve of the wind turbine.

Notes: Save the setting after you reconfigure the working mode or backlight setting.

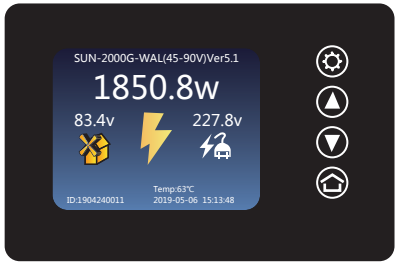
Grid Waveform: This interface will show the real time grid waveform. The grid voltage and frequency also will show in this interface.



Energy Menu: The energy interface will show the power generation curve every day. Today KWh and Total KWh are also shown in this interface.



Power View: In this interface, the display shows real time power, input voltage, inside temperature, date, time, etc..



Date Setting: Set the clock and date on this page, save the setting before exit.

Technical Data of Wind turbine Grid Tie Inverter

Table 3. Common Specifications for SUN Series Grid Tie Power Inverter

INPUT DATA (DC)	SUN-XXXG2-M	SUN-XXXG2-H
Maximum Input DC Voltage	65 V	90 V
Peak power Tracking Voltage	25 V - 60V	50 V - 90 V
Operating DC Voltage Range	22 V - 65 V	45 V - 90 V
Peak Inverter Efficiency	22 V - 60 V	45 V - 90 V
OUTPUT DATA (AC)	SUN-1000G2-X	SUN-2000G2-X
Nominal Voltage/Range	110V(95-140V)/230V(185-265V)	230V(185-265V)
Frequency Range	50Hz(45-55 Hz)/60Hz(56-64Hz)	50Hz(45-55 Hz)/60Hz(56-64Hz)
Power Factor	>0.95	>0.95
Output Waveform	Pure Sine Wave	Pure Sine Wave
CHARACTERISTIC DATA	SUN-XXXG2-X-X	
Power Curve Adjustable	Yes	
Over Current Protection Over	Yes	
Temperature Protection	Yes	
Reverse Polarity Protection	No	
Anit-Island Protection	Yes	
Stackable	Just for AC Output	
Operating Temperature Range	-20℃ ~ 45℃	
Storage Temperature Range	-40℃ ~ 65℃	

There are some common specifications of SUN Series Grid Tie Power Inverter shown in Table 3. Other electrical specifications of every model are listed in Table 1.

Weight and Dimension of SUN series Grid Tie Power Inverter

Model	SUN-1000G2-X-X	SUN-2000G2-X-X
Net Weight	4.3Kg	5.4Kg
Gross Weight	5.5Kg	7.0Kg
Dimension(Package)	430×310×155	540×310×155

Outline Drawing of Wind turbine Grid Tie Inverter

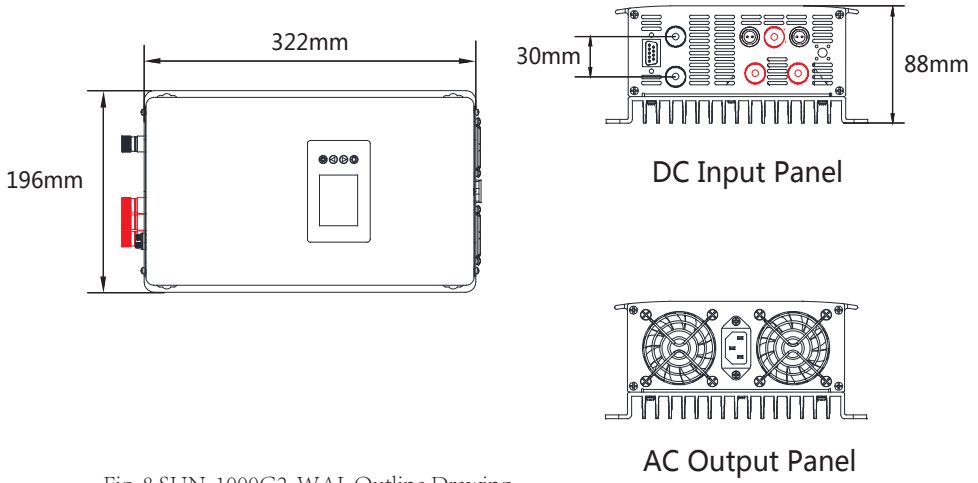


Fig. 8 SUN-1000G2-WAL Outline Drawing

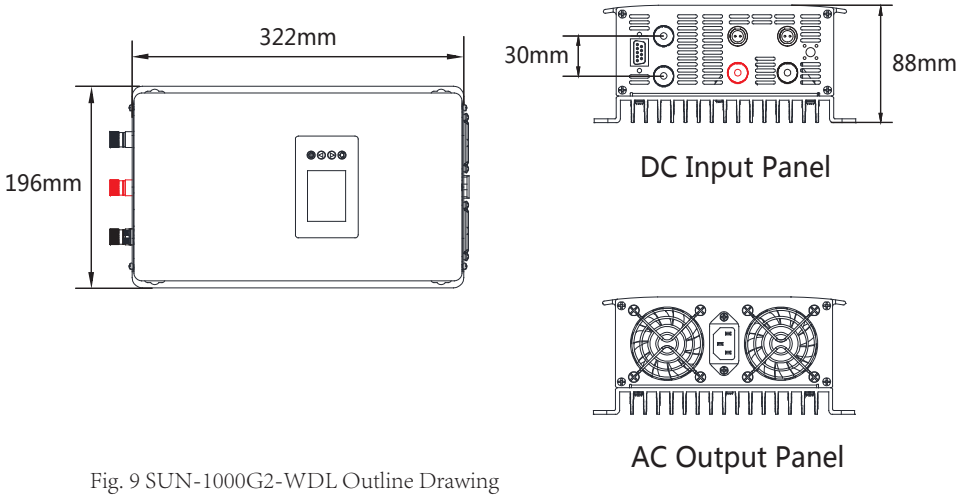


Fig. 9 SUN-1000G2-WDL Outline Drawing

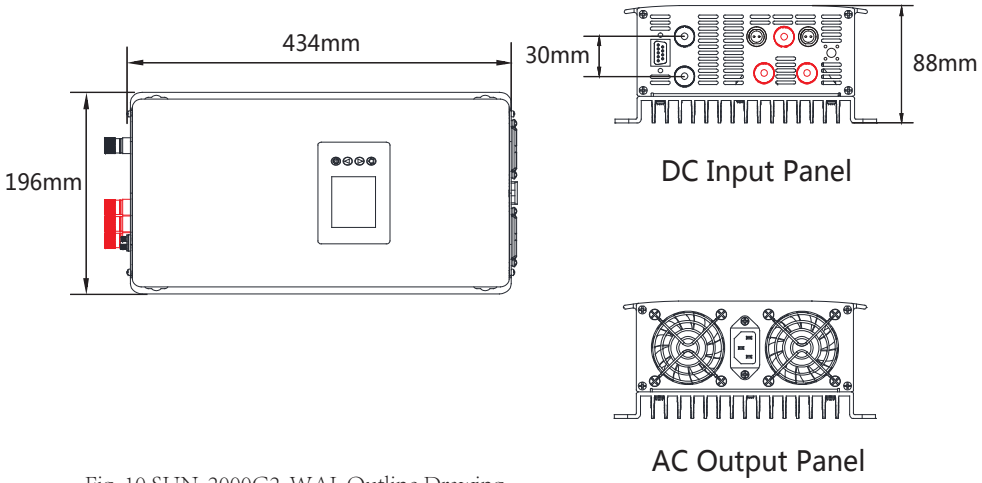


Fig. 10 SUN-2000G2-WAL Outline Drawing

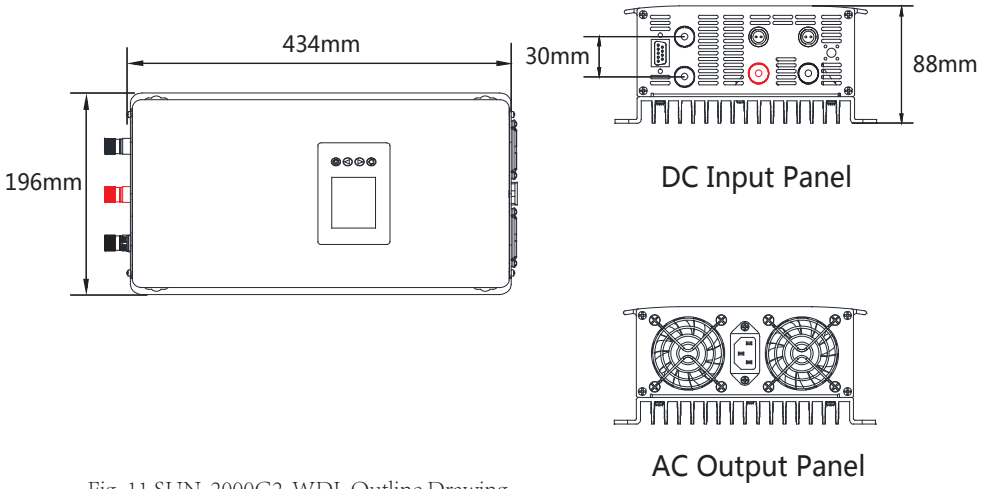


Fig. 11 SUN-2000G2-WDL Outline Drawing

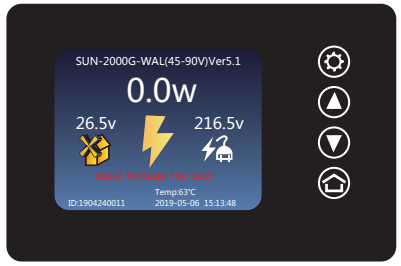
Troubleshooting

After all the installation step described throughout this manual, qualified personnel can use the following troubleshooting steps if the Sunshine Grid Tie Power System does not operate correctly.

WARNING: Do not attempt to repair the Sunshine Grid Tie Inverter, it contains no user-serviceable parts. If it fails, please contact Sunshine customer service to obtain an RMA number and start the replacement process.

Status LCD Indications and Error Reporting

The status of errors will be displayed with red letters on the grid tie inverter LCD display.



1) Overtemperature: The inverter will stop working if the temperature reaches 75℃ inside the inverter. Make sure the inverter is installed in good condition to prevent it from going overheat.

2) Input Voltage Too Low: This indicates that the input voltage is too low or the input connection is not good. You should measure the output voltage of the wind turbine.

3) Input Voltage Too High: This indicates that the input voltage is too high. This means the wind turbine is not suitable for the inverter or the wind is too strong.

4) Grid Error: This indicates that the AC voltage or frequency of the utility grid is out of the range of the specification of the inverter. If the utility grid is good, most situations of this kind error are caused by the inverter's components fault.

5) Dumping Load Shorted: This indicates something shorted inside the inverter or outside connection has somewhere shorted.

6) Starting Voltage Too Low: This indicates the output voltage of the wind turbine is too low.

WARNING: Never disconnect the DC wire connectors under load.

AC Output Current Waveform and PF Test Of 2000W Model

Tested 2000W model at nearly full load, output current waveform shows good pure sine wave in the oscilloscope, the PF value also shows a good result, 99.8% PF value.