100% PURE SINE WAVE SOLAR INVERTER

USER'S MANUAL

SOLAR INVERTER

1000VA/1500VA/2000VA

Please download the software "PowerMonitor 1.6.84".

Download link: https://en.must-ee.com

Scan QR code for manual

4200-020300-04A1

Table Of Contents

ABOUT THIS MANUAL

Purpose

This manual describes the assembly, installation, operation and troubleshooting of this unit. Please read this manual carefully before installations and operations. Keep this manual for future reference.

Scope

This manual provides safety and installation guidelines as well as information on tools and wiring.

The following cases are not within the scope of warranty:

(1) Out of warranty.
(2) Series number was changed or lost.
(3) Battery capacity was declined or external damaged.
(4) Inverter was damaged caused of transport shift, remissness, ect external factor.
(5) Inverter was damaged caused of irresistible natural disasters.
(6) Not in accordance with the electrical power supply conditions or operate environment caused damage.

GENERAL PRECAUTIONS

1 .Before using it, read all instructions and markings:
(1)inverter (2) the batteries (3) this manual
2. CAUTION --To reduce risk of injury, charge only lead-acid rechargeable batteries. If customer use flooded batteries, they must maintain them. Other types of batteries may cause damage and injury.
3. Do not expose it to rain, snow or liquids of any type. It is designed for indoor.
4. Do not disassemble it. Take it to a qualified service center when service or repair is required.
5. To prevent the risk of electric shock, disconnect all wiring before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
6. WARNING: Provide ventilation to outdoors from the battery compartment. The battery enclosure should be designed to prevent accumulation and concentration of hydrogen gas at the top of the compartment.
7. NEVER charge a frozen battery and connect the inverter with 12V to 24V battery.
8. Input/output AC wiring must be no less than 16 AWG gauge copper wire and rated for 75 °C or higher. Battery cable must be rated for 75°C or higher and should be no less than 6AWG gauge.
9. Be extra cautious when working with metal tools around batteries. Short-circuiting the batteries could cause an explosion.
10. Read the battery manufacturer's installation and maintenance instructions prior to operating.

PERSONNEL PRECAUTIONS

1 .Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing or eyes.
2. Avoid touching eyes while working near batteries.
3. NEVER smoke or allow a spark or flame in vicinity of a battery.
4. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with batteries. Batteries can provide heavy short-circuit current, enough to make metal melt and causes severe burn.
5. If a remote or automatic generator start system is used, disable the automatic starting circuit or disconnect the generator to prevent accident during servicing.

FOLLOW STANDARD.

EN 60950-1:2006+A2:2013+A11:2009+A1:2010+A12:2011
EN 55022:2010. EN 55024:2010. EN 61000-3-3:2008

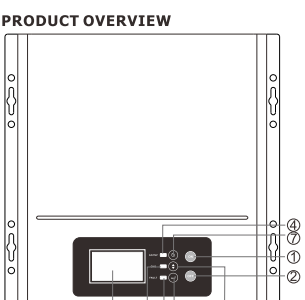
INTRODUCTION

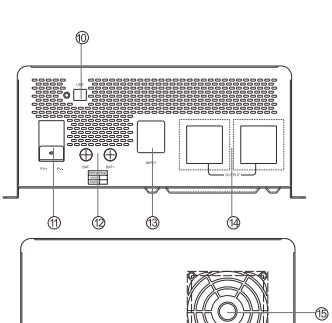
It is a cost effective, intelligent solar inverter. The comprehensive LCD offers user-configurable and easy-accessible button adjustment such as battery charge current, battery charge Voltage, frequency, buzzer etc.

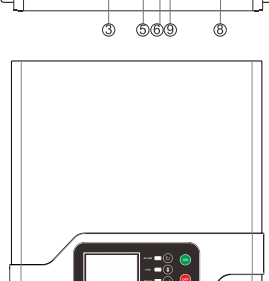
Features:

- Sine wave inverter
- Built-in 50A solar charge controller
- Adjustable charging current from utility
- Adjustable battery charging current
- 3 steps charging algorithm
- Friendly user interface
- Multi-function display
- Overload and short-circuit protection
- Battery reverse polarity protection
- PV reverse polarity protection
- Deep discharge protection
- Automatic voltage regulation
- Communication with PC

PRODUCT OVERVIEW







1. POWER ON
2. POWER OFF
3. LCD
4. AC/Inverter LED
5. Charge LED
6. Fault LED
7. ESC
8. SEL
9. ENTER
10. USB
11. PV Input
12. Battery input
13. AC input
14. AC Output
15. Fan

INSTALLATION

Unpacking and inspection

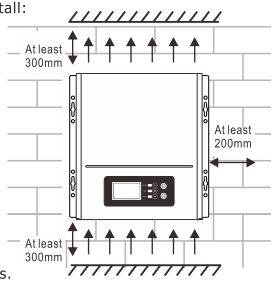
Before installation, please inspect the unit. Be sure that nothing inside the package is damaged. You should have received the following items inside of package.

- The unit X 1
- Communication cable X 1
- User manual X 1
- AC input cable X 1
- Software CD X 1 (Optional)

Mounting the Unit

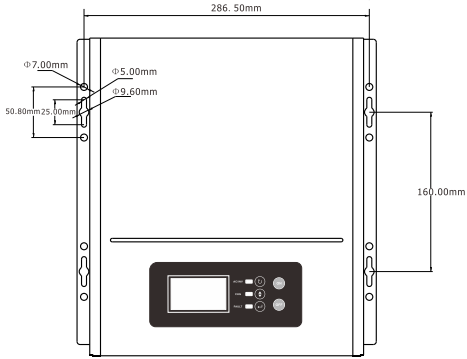
Consider the following points before selecting where to install:

- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface
- Install this inverter at eye level in order to allow the LCD display to be read at all times.
- For proper air circulation to dissipate heat, allow a clearance of approx. 200mm to the side and approx. 300mm above and below the unit.
- The ambient temperature should be between 0°C and 40°C to ensure optimal operation.
- The recommended installation position is to be adhered to the wall vertically.
- Be sure to keep other objects and surfaces as shown in the below diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.



SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.

Install the unit by screwing four screws.



Battery connection

Step1: Away the cover of external battery terminal.

Step2: Following battery polarity guide printed near the battery terminal.

RED cable to the positive terminal(+);

BLACK cable to the negative terminal (-);

WARNING! Please use the appropriate battery cable. Please refer to the following table.

Model	Battery Voltage	Wiresize
1000VA/700W	12V	1*8AWG
1500VA/900W	12V	2*10AWG
2000VA/1200W	24V	1*8AWG

Step3: Install a DC breaker in a positive line.

The rating of the DC breaker must be according to the inverter's battery current (75 A for 24V battery, 150 A for 12V battery).

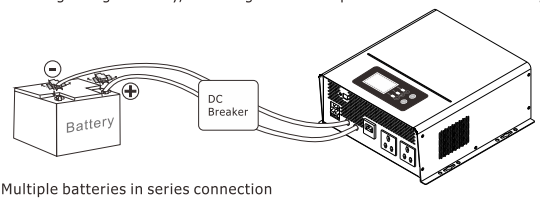
Note: you must keep the DC breaker off.

Step4: Connect battery cable to the external batteries.

Note: For the user operation safety. We strongly recommend that you should use tape to isolate the battery terminals before you start to operate the unit.

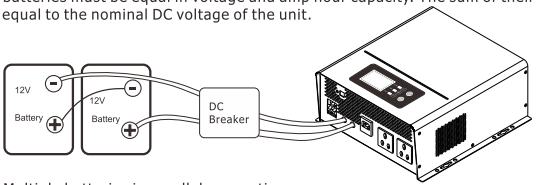
1)Single battery connection

When using a single battery, its voltage must be equal to the Nominal DC voltage of the unit.



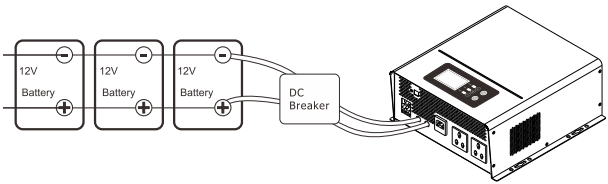
2) Multiple batteries in series connection

All batteries must be equal in voltage and amp hour capacity. The sum of their voltages must be equal to the nominal DC voltage of the unit.



2) Multiple batteries in parallel connection

Each battery's voltage must be equal to the nominal DC voltage of the unit.



Step 5: Make sure to connect the polarity of battery side and unit correctly.
- Connect positive pole (Red) of battery to the positive terminal (+) of the unit.
- Connect Negative pole (Black) of battery to the negative terminal (-) of the unit.

Step 6: Put the covers back to the external battery terminals.

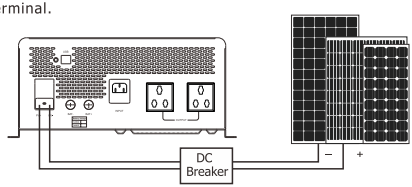
Step 7: Take the DC breaker on.
WARNING! Wiring must be performed by a qualified person.

Connect to utility and charge battery
WARNING! Please do not misconnect input and output connector.
Plug the AC input cord into the wall outlet. Battery of the machine will be charged automatically

Connect to Solar Panel
CAUTION: Before connecting to PV modules. Please install separately a DC circuit breaker between inverter and PV modules.
WARNING! All wiring must be performed by a qualified person.
WARNING! It's very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, Please use the proper recommended cable size as below.

Typical Amperage	Gauge	Torque Value
50A	8AWG	14-16Nm

Step 1- Connect one cable to the positive (+) pole of solar panel and solar charger positive (+) terminal.
Step 2- Connect the other cable to the negative (-) pole of solar panel and solar charger negative (-) terminal.



Solar Panel Connection

PV Module Selection

When selecting proper PV modules, please be sure to consider below requirements first:
1. Open circuit Voltage (Voc) of PV modules not exceeds max.

INVERTER MODEL	1000VA/700W	1500VA/900W	2000VA/1200W
Charging Current (PWM)	50Amp		
System DC Voltage	12Vdc		24Vdc
Max. PV Array Open Circuit Voltage	60Vdc		80Vdc

2. Max. Power Voltage (Vmpp) of PV modules should be close to best Vmp of inverter or within Vmp range to get best performance. If one PV module can't meet this requirement, it's necessary to have several PV modules in series connection. Refer to below table.

INVERTER MODEL	Best Vmp	Vmp range
Charging Current (PWM)	15Vdc	15~18V
System DC Voltage	30Vdc	30~32V

Note: Vmp: panel max power point voltage.
The PV charging efficiency is maximized while PV system voltage is close to Best Vmp.

Maximum PV module numbers in Series: Vmpp of PV module*X pcs = Best Vmp of Inverter or Vmp range
PV module numbers in Parallel: Max. charging current of inverter/Imp
Total PV module numbers=maximum PV module numbers in series*PV module numbers in parallel .

Take 1000VA/700W 1500VA/900W inverter as an example to select proper PV modules. Except for considering Voc of PV module not exceeds 30Vdc and Vmpp of PV module is within 15Vdc ~ 18Vdc, we can choose PV module as the following specification.

Maximum Power (Pmax)	85W	Max. PV module numbers in series 1→17.6 x 1≒15~ 18
Max. Power Voltage Vmpp(V)	17.6V	
Max. Power Current Impp(A)	4.83A	module numbers in parallel1→50A/4.83 Total PV module numbers1x10 = 10
Open Circuit Voltage Voc(V)	21.6V	
Short Circuit Current Isc(A)	5.03A	

Maximum PV module numbers in Series: 1
PV module numbers in Parallel: 10
Total PV module numbers: 1 x 10=10

Take 2000VA/1200W inverter as an example to select proper PV module. After considering Voc of PV module not exceed 60Vdc and max. Vmpp of PV module close to 30Vdc or within 30Vdc ~ 32Vdc, we can choose PV module with below specification.

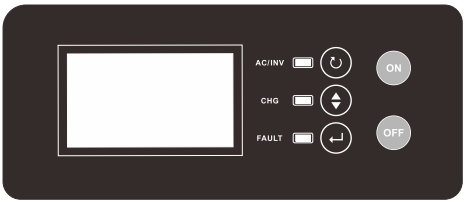
Maximum Power (Pmax)	260W	Max. PV module numbers in series 1→30.9 x 1≒30~ 32
Max. Power Voltage Vmpp(V)	30.9V	
Max. Power Current Impp(A)	8.42A	module numbers in parallel 6→50A/8.42 Total PV module numbers1x 6 = 6
Open Circuit Voltage Voc(V)	37.7V	
Short Circuit Current Isc(A)	8.89A	

Maximum PV module numbers in Series: 1
PV module numbers in Parallel: 6
Total PV module numbers: 1 x 6 = 6

OPERATION

Press "ON" for 2 seconds to turn on the unit. The unit will work automatically in line mode or inverter mode according to input utility status. When "OFF" is pressed and hold for 2 seconds, the unit will be turned off. When machine is working, buzzer can be controlled by pressing "ON".

The display panel, shown in below chart, is on the front panel of the inverter. It includes four front indicators, three function keys and a LCD display, indicating the operating status and input/output power information.

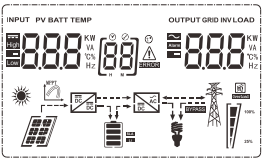


LED indicators & audible alarms

There are three LED indicators in the front panel.

LED_FAULT	Warning	Buzzing every 2 seconds and blinking red LED
	Fault	Buzzing continuously and red LED is on
	Normal	Red led is off
LED_CHG	Charging	Yellow led is on
	Stop charge	Yellow led is off
LED_AC/INV	Backup mode	Blinking Green led
	Line mode	Green led is on
	Charger mode	Green led is off

LCD Display



Icon	Function description
Input Source Information and Output Information	
AC	Indicates the AC input
PV	Indicates the PV input
	Indicate input voltage, input frequency, PV voltage, battery voltage and charger current. Indicate output voltage, output frequency, load in VA, load in Watt and discharging current.
Configuration Program and Fault Information	
	Indicates the setting programs.
	Indicates the warning and fault codes. Warning: flashing with warning code. Fault: lighting with fault code.
Output Information	
	Indicates output voltage, output frequency, load percent,load in VA,load in W.
Battery Information	
	Indicates battery level by 0-25%, 25-50%, 50-75% and 75-100% in battery mode and charging status in line mode.

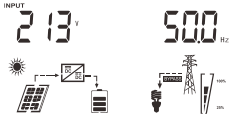
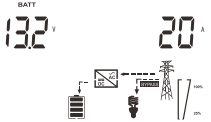
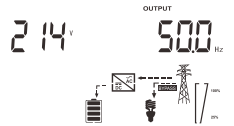
In AC mode, it will present battery charging status.		
Status	Battery voltage	LCD Display
Constant Current mode / Constant Voltage mode	<2V/cell	4 bars will flash in turns.
	2 ~ 2.083V/cell	Bottom bar will be on and the other three bars will flash in turns.
	2.083 ~ 2.167V/cell	Bottom two bars will be on and the other two bars will flash in turns.
	> 2.167 V/cell	Bottom three bars will be on and the top bar will flash.
Floating mode. Batteries are fully charged.		4 bars will be on.

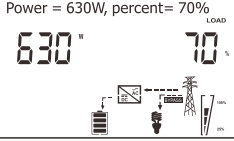
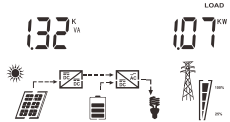
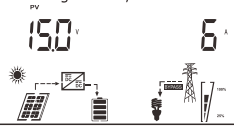
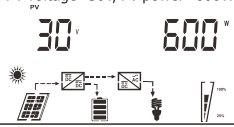
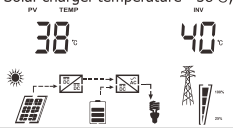
In battery mode, it will present battery capacity.	
Battery voltage	LCD Display
0%~25%	
25%~50%	
50%~75%	
75%~100%	

Load Information				
OVER LOAD	Indicates overload.			
100% 25%	Indicates the load level by 0-24%, 25-50%, 50-74% and 75-100%.			
	0%~25%	25%~50%	50%~75%	75%~100%
				
Mode Operation Information				
	Indicates unit connects to the mains.			
	Indicates unit connects to the PV panel.			
BYPASS	Indicates load is supplied by utility power.			
	Indicates the solar charger is working.			
	Indicates the DC/AC inverter circuit is working.			
Mute Operation				
	Indicates unit alarm is disabled.			

Display Select

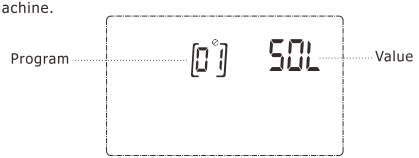
The LCD display information will be switched in turns by pressing "SEL" key. The selectable table information is as following table.

Selectable Information	LCD display
Input	Input voltage=213 V, input frequency=50Hz 
Battery	Battery voltage=13.2 V, battery current = 20A 
Output	Output voltage=214 V, output frequency=50Hz 

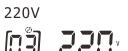
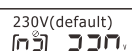
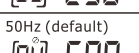
Load	Power = 630W, percent= 70% 
Load	Power =1.07KW, apparent power=1.32KVA 
PV voltage and current	PV voltage=15.0V, PV current=6A 
PV voltage and power	PV voltage=30V, PV power=600W 
Temperature	Solar charger temperature =38℃, inverter temperature =40℃ 

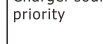
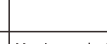
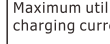
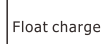
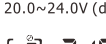
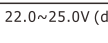
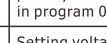
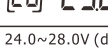
LCD Setting

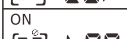
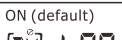
After pressing and holding "ENTER" button for 2 seconds, the unit will enter setting mode. Press "ENTER" button to select setting programs. Press "SEL" button to change parameter. Press "ESC" button for 2 seconds to exit. Most of the parameters will take effect when you exit from setting menu. But frequency and output voltage settings are special. The two settings will take effect, after resetting machine.



Setting program information

Program	Description	Selectable option	
01	Output source priority	Solar first(default) 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when any one condition happens: - Solar energy is not available. - Battery voltage drops to low-level cut-off voltage or the setting point in program 20.
		Utility first 	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.
		SBU priority 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to me loads at the same time. Utility provides power to the loads only when battery voltage drops to either low-level cut-off voltage or the setting point in program 20.
03	Output voltage	220V 	
		230V(default) 	
04	Output frequency	50Hz (default) 	
		60Hz 	
07	Auto restart when overload occurs	Restart disable 	Restart enable (default) 

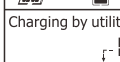
10	Charger source priority	Utility first 	Utility will charge battery as first priority. Solar energy will charge battery only when utility power is not available.
		Solar first(default) 	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Only Solar 	Solar energy will be the only charger source no matter utility is available or not.
		Solar energy and utility 	Solar energy and utility will charge battery at the same time.
11	Maximum battery charging current	5~50A (default value is 10A) 	
		Model: 12 VDC	Model: 24 VDC
13	Maximum utility charging current	5~25A (default value is 10A) 	5~15A (default value is 10A) 
17	Absorption charge voltage	13.8~14.5V (default value is 14.1V) 	27.6~29.0V (default value is 28.2V) 
18	Float charge voltage	13.5~14.5 V(default value is 13.6V) 	27.0~29.0 V (default value is 27.2V) 
19	Shutdown voltage	10.0~12.0V (default value is 10.5V) 	20.0~24.0V (default value is 21.0V) 
20	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	11.0~12.5V (default value is 11.5V) 	22.0~25.0V (default value is 23.0V) 
21	Setting voltage point back to battery mode when selecting "SBU priority" or "Solar first" in program 01	12.0~14.0V (default value is 13.5V) 	24.0~28.0V (default value is 27.0V) 

23	Backlight	OFF (default) 	
		ON 	
24	Buzzer	ON (default) 	
		OFF 	

If you want to reset all the parameters, in operation menu, pressing "SEL" button for 2 seconds will enter into reset settings dialog. Please select "DEF" through "SEL" button. Press "ESC" button for 2 seconds to exit and all parameters will be default state.

00	Restore factory settings	no (default) 	yes

Operating mode description

Selectable Information	Description	LCD display
Fault mode	If any fault has happened, the machine will enter to the mode. And fault code is displayed on the LCD.	
Charger mode	In this mode, the battery will be charged through grid power or PV. When there are no grid and PV, the machine will power off.	Charging by PV  Charging by utility 
Line mode	Input power will provide energy to load directly. And it will charge the battery at the same time. If voltage of input power is outside of section, [200v, 240v], AVR will work. When input power is abnormal or satisfied with settings, the machine will switch to battery mode.	Charging by PV  Charging by utility 
Battery mode	The unit will get energy from battery and PV.	Power from battery and PV energy  Power from battery only 

Fault Reference Code

Fault Code	Fault Event	Icon on
02	Over temperature	
03	Battery voltage is too high.	
04	Battery voltage is too low.	
05	Output short circuited	
06	Inverter output voltage is high.	
07	Over load	
11	Main relay fault	
33	Solar charger driver fault	
41	Input voltage is too low.	
42	Input voltage is too high.	
43	Input frequency is too low.	
44	Input frequency is too high.	
45	AVR fault	
51	Over current	
58	Inverter output voltage is low.	
73	Solar charger stops due to high PV voltage	
75	Solar charger over temperature	
77	Parameter error.	
78	PV reverse polarity	

COMMUNICATION
Refer to User Guide of SolarPowerMonitor.

TROUBLE SHOOTING
If machine enters into fault mode, please remove input power. And according to the table, deal with the followin problems.

LED/Buzzer	LCD	Explanation / Possible cause	What to do
Buzzer beeps And red LED is off	Blink battery ICON	Battery voltage is too Low.	Charge the unit at least 8 hours
	Blink load ICON	Over load	Decrease your load
Buzzer beeps continuously and red LED is on	Fault code 02	Temperature of machine is too high.	Power off and waiting for minutes
	Fault code 03	Battery voltage is too high.	Check the battery specifications
	Fault code 04	Battery voltage is too low.	Check the battery specifications
	Fault code 05	Output short circuited	Return to repair center
	Fault code 06	Inverter output voltage is high	Return to repair center
	Fault code 07	Over load	Decrease your load
	Fault code 11	Main relay fault	Restart the machine. If it still can't work, please return to repair center.
	Fault code 33	Solar charger driver fault	Restart the machine. If it still can't work, please return to repair center.
	Fault code 41	Input voltage is too low.	Check input power
	Fault code 42	Input voltage is too high.	
	Fault code 43	Input frequency is too low.	
	Fault code 44	Input frequency is too high.	
	Fault code 45	AVR fault	Restart the machine. If it still can't work, please return to repair center.
	Fault code 51	Output short circuited	Check if wiring is connected well and remove abnormal load.
	Fault code 58	Output voltage is too low.	Decrease your load
	Fault code 73	Solar charger stops due to high PV voltage	Check the PV voltage
	Fault code 75	Solar charger over temperature	Check the PV specifications
	Fault code 77	Parameter error	Make sure that absorption charge voltage is higher than float charge voltage, and voltage in program 21 is higher than voltage in program 20.
	Fault code 78	PV reverse polarity	Check the PV polarity

SPECIFICATIONS

CAPACITY	1000VA/700W	1500VA/ 900W	2000VA/1200W
	12VDC		24VDC
INPUT			
Voltage Range	140~280 VAC +/-5%		
Frequency Range	50+/-5Hz or 60+/-5Hz		
OUTPUT			
Output Voltage regulation	Battery mode		Line mode
	220 or 230 VAC+/-5%		200 VAC ~ 240 VAC
Output Frequency	60Hz or 50Hz		
Transfer Time	6 ms (typical), 10 ms (max)		
Waveform	sine wave		
BATTERY			
Battery Voltage	12Vdc		24Vdc
Min battery voltage for power on	Shutdown voltage + 0.5V		Shutdown voltage + 1V
Maximum Charge Current	1000VA/700W	1500VA/ 900W	2000VA/1200W
	20A	25A	15A
Over load	>110%~125%Load Fault after 60S >125% ~150%Load Fault after 3s >150% Load Fault after 500ms		
PHYSICAL			
Dimension (D*W*H) mm	391*325*187mm		
Net Weight (kg)	1000VA/700W	1500VA/ 900W	2000VA/1200W
	9.0Kg	10.0Kg	10.5Kg
Gross Weight (kg)	10.0Kg	11.0Kg	11.5Kg
SOLAR CHARGER			
Charging current	50A		
System voltage	12Vdc		24Vdc
Max. PV array open circuit voltage	60Vdc		80Vdc
OTHER			
Storage temperature	-15°C to 60°C		
Ambient temperature	0°C~40°C		
Noise	≦ 60dB		
Communication	USB		

GUARANTEE CERTIFICATE

Serial No.: _____

Customer`s Name				Contact Person	
Address				Telephone No.	
Product/Model:		Post Code		Fax No.	
Date of purchase			Expire Date		
Dealer Signature			Customer Signature		

GUARANTEE CERTIFICATE

Serial No.: _____

Customer`s Name				Contact Person	
Address				Telephone No.	
Product/Model:		Post Code		Fax No.	
Date of purchase			Expire Date		
Dealer Signature			Customer Signature		