

# USER MANUAL

**1KW-6KW**

Pure Sine Wave Combined Solar Inverter  
(Built-in MPPT solar controller)



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**Warning : Do not open unit high internal voltage! Please read these instructions before use!**

## 1、 The product introduction

### 1.1 Appearance of the Figure



### 1.2 Front to introduce



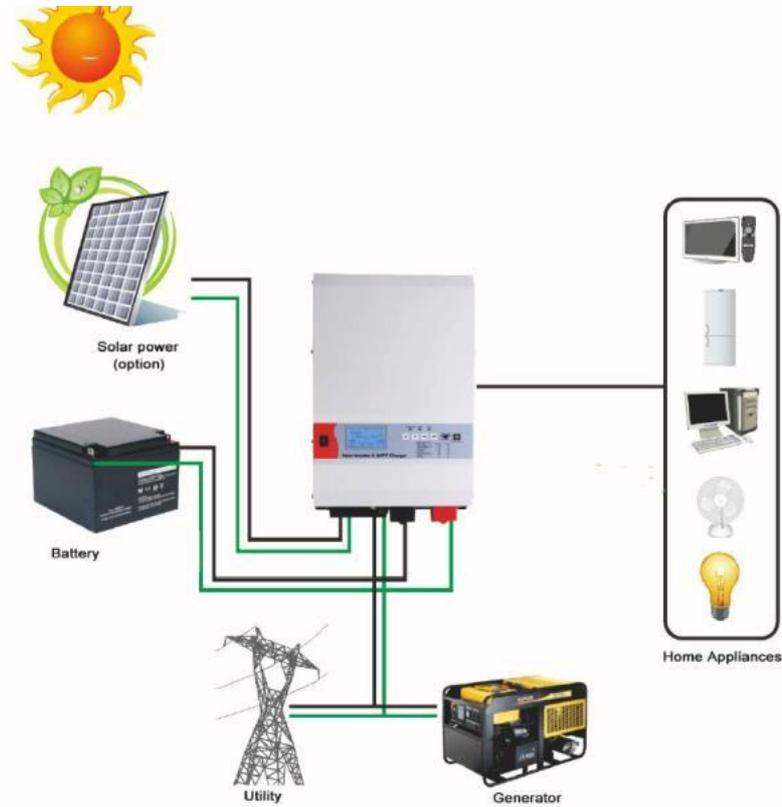
- A: Output Socket
- B: Inverter Output Protect
- C: Negative DC Terminal
- D: Positive DC Terminal
- E: Charger Input Protect
- F: BTS
- G: Auto GEN Start
- H: PV / AC Terminal
- I: DC fan
- J: Remote Port
- K: DIP Switch

### 1.3 Back to introduce

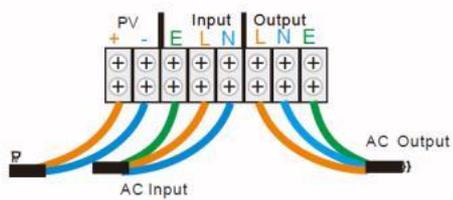


- A: AC Fan
- B : RS232
- C : Intelligent slot
- D : Dry Contact

## 2 、 Basic wiring for the UPS Inverter



### Terminal row wiring diagram



### What cable to use in mm sq

A charger or inverter 125-180A	cable run distance 0-1.5m 50 mm <sup>2</sup>	cable run distance 1.5-4.0m 70 mm <sup>2</sup>	Watt 2000Watt
180-330A	70 mm <sup>2</sup>	90 mm <sup>2</sup>	3000Watt

Please note that if there is a problem obtaining for example 90 mm sq cable, use 2x50 mm sq, or 3x35mm sq. One cable is always best but, cable is simply copper and all you require is the copper, so it does not matter if it is one cable or 10 cables as long as the square area adds up. Performance of any product can be improved by thicker cable and shorter runs, so if in doubt round up and keep the length as short as possible.

### 3 、 Safety And Summary

- 1) Ensure that the inverter has the correct d/c voltage for your boat or vehicle system is 12 or 24 V.
- 2) Fit as close to the batteries as possible. the shorter the d/c cables the better. Voltage drop on long cables will effect the unit's performance..
- 3) Do not reverse the cables! Connect the red cable to the positive terminal and the black cable to the negative terminal of the battery. In the event of reverse polarity the unit could be totally destroyed.
- 4) Always use the inverter in an environment which is well ventilated, not exposed to direct sunlight or a heat source, away from water, moisture, oil or grease, away from any highly inflammable substance, out of reach from children.
- 5) The output voltage of this unit must never be on your AC system at the same time as any other a/c source such as the 230/110V external mains line or a generator. All external power must go through the.
- 6) Always switch on the first, before plugging in any appliance.
- 7) Under new electrical legislation only professional electricians should install this product. Ensure the fitting instructions are fully understood before fitting this product.

### 4 、 Installation

- 1) Position the unit as close to the main battery bank as possible.
- 2) Position in a cool, dry & well ventilated space.
- 3) Orientation of the unit is not critical.
- 4) Either purchase the standard cable set from which is about 1.5 metres, or if using your own cable, use the cable size chart provided on the installation drawing to ensure you have thick enough cable for the d/c leads. In the event of not being able to get the size requested (it can be hard to get thick cable) then simply add multiple length of thinner cable, i.e. if you cannot get 90mm cable then use 3x 35mm cable, at the end of the day its just copper we need.
- 5) Fit a fuse suitable for the job, again look at the installation drawing, have a full range of high current fuses in the GANLR range of gold fuse products, ranging from 100-500 amps. on the d/c side.
- 6) Connect the cables from the batteries to the fuse then to the unit, this way if there is a fault at the unit the fuse is already in place and this will be safe. In the event of a isolation switch being used, please ensure the rating of the switch can handle the power of the unit.
- 7) Ensure the unit is switched off during installation.
- 8) On the a/c side ensure the shore power (all external a/c sources) are totally disconnected, connect the output from the inverter to suitable Residual Current Breaker (R.C.D. for earth protection) and current over load trips. Fuse the a/c input side depending on through power requirements, the max through power is 30 amps, so fuse at 40A (allowing also for charger consumption) if you intend to use the full through power for standard 13-16 amps throughput then a 20A fuse would be appropriate.
- 9) Recommend Multi core tri rated a/c cable, if used on a boat or vehicle, as this is much safer

where vibration is likely. Only use single solid household a/c cable if the product is being used as a power source for a house or platform free of vibration.

10) Before attempting to switch on the unit, please ensure you have selected the correct battery type on the small battery type selector switch on the front of the main box, rotate the switch to your battery type. The Progressive charge control software will automatically adjust for battery bank size and state.

## 5、 The battery type and charge voltage

Some battery types may look confusing such as gel usa and gel euro, AGM usa and AGMeuro. If you find this confusion then join the club, we have had the different voltage curves supplied to us by different companies from the U.S.A. and Europe for what we seem the same product, however it's not our call, we simply supply the options, if in doubt call your battery supplier and ask which charge voltage they want you to use for their battery type, and select the closest to it. If totally confused then use the lower voltage setting until you have had a higher voltage setting confirmed to you by whoever supplied the batteries to you.

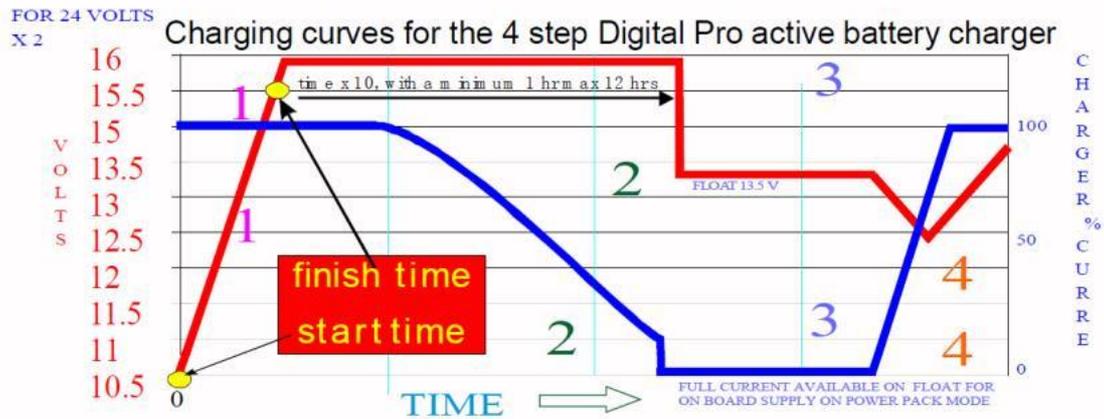
The de-sulphation cycle on switch position 8 is marked in red because this is a very dangerous setting if you do not know what your are doing. Before even attempting to use this cycle you must clearly understand what it does and when and how you would use it.

What causes sulphation? This can be occur with infrequent use of the batteries, or if the batteries have been left discharged so low that they will not accept a charge. This cycle is a very high voltage charge cycle designed to try to break down the sulphate 'crust' that is preventing the plates taking a charge and thus allow the plates to clean up and so accept charge once again.

### Batter Type Selector, for 24 v x voltages by 2

4 step digital controlled progressive charge			
Switch setting		Boost (*2,24V;*4,48V)	Float
0	to be used		
1	GEL USA	14.0	13.7
2	AGMI	14.4	13.4
3	AGM2	14.6	13.7
4	sealedlead acid	14.4	13.6
5	GEL EURO	14.4	13.8
6	open lead acid	14.8	13.3
7	calcuim	15.1	13.6
8	de sulphation	15.5 (4 hrs then off)	
9	to be used		

Charging curves for the 4 step Digital Pro active battery charger



## 6、 How to use this function (only suitable for open lead acid batteries)

- 1) Ensure the battery bank is totally isolated from anything else on the boat or vehicle; the high voltage applied by this setting could destroy all your electronics and other electrical equipment still connected (hence all these instructions are in red, this is a very expensive mistake).
- 2) Make sure the battery compartment is very well ventilated and battery caps are removed.
- 3) Switch the battery type selector switch to the correct position, then switch the a/c power on..
- 4) Because this is such a dangerous setting there is a 4 hr time out period build into the software, however on a very large battery bank this may not be enough and the unit may need to be switched off and on again to do another cycle.

## 7、 What to expect on this cycle

I would recommend you monitor the voltage of the sulphated battery bank. When you switch on the cycle the voltage should shoot up to the full 15.5 volts very fast (within minutes) this is because the batteries cannot accept the charge (assuming they are sulphated). However, over a period of 1-2 hrs the voltage should start to drop (as the plates start to clean and the batteries start to take a charge) the voltage could drop way down to about 12.5 volts then start to rise. This shows the batteries are now taking a charge and starting to fill up. In this case it would be safe to switch the unit off and select your normal charging curve and hopefully this will bring your batteries back from the dead. You may need to repeat the process a few times. Please note this is a professional guess tool, which most times helps, but it's not magic, so

expect the worst and hope for the best. Never leave a system unattended when on this mode. If the battery temperature reaches above 50 degc (ie if the batteries are almost too hot to touch) then stop the process).

## 8、 Remote control

Before operation, to ensure that the host power supply is disconnected, the host front panel can also be used as a remote control, remove the main box panel screw, be careful with the switch panel and disconnect the continuous host continuous slot.

Using the remote control host replication is partially filled with the host

Using a remote control line reconnection host panel

## 9 、 Operation

1) After the unit is installed, using the panel on the front of the unit, and with the shore power (230/110 VAC) still disconnected, switch the unit on. The leds will cycle through their test routine, then the unit should go into inverter mode and 230/110 v should be produced on the output a/c terminals (provided the batteries are over 11 volts).

2) If the above is ok, then connect the shore power to feed 230/110V into the , after a short while, the inverter should go off line, and feed the shore power through the inverter. Changeover is about 20 milli secs (so fast that you should not be able to notice it) and the battery charger should come on-line and go through its charge sequence ending, after 1-10 hrs, with float voltage.

## 10 、 DIP Switches

Sign	Meaning	Position: 0	Position: 1
SW1	Low Battery Trip Volt AC Input Range	10.0VDC	10.5VDC
SW2(230V)		*2 for 24VDC, *4 for 48VDC 184-253VAC	154-264VAC(45Hz+)
SW2(120V)	AC Input Range	100-135VAC	90-135VAC(40Hz+)

### Low Battery Trip Volt:

Deep discharge of the lead acid battery leads to high losses in capacity and early aging. In different applications, different low voltage disconnection level is preferred. For example, for solar application, user intended to have less DOD to prolong the battery cycle life. While for mobile application, users intend to have more DOD to reduce battery cycle life. While for mobile application, users intend to have more DOD to reduce battery capacity and on board weight. For 12VDC model, the Low Battery Trip Volt is set at 10.0VDC by default. It can be customized to 10.5VDC using SW1, this is to prevent batteries from over-discharging while there is only a small load applied on the inverter. \*2 for 24VDC, \*4 for 48VDC

### AC Input Range:

There are different acceptable AC input ranges for different kinds of loads.

For some relatively sensitive electronic devices, a narrow input range of 184-253VAC (100-135V for 120VAC model) is required to protect them.

While for some resistive loads which work in a wide voltage range, the input AC range can be customized to 154-264VAC (90-135V for 120VAC model), this helps to power loads with the

most AC input power without frequent switches to the battery bank.

In order to make the inverter accept dirty power from a generator, when the SW2 is switched to position "1", the inverter will bypass an AC input with a wider voltage and frequency (45Hz plus for 50Hz/60Hz). Accordingly, the AC charger will also work in a wider freq range (46Hz plus for 50Hz/60Hz).

This will avoid frequent switches between battery and generator. But some sensitive loads will suffer from the low quality power.

The pros and cons should be clearly realized.

## 11、 Inverter technical specification

<b>General specification</b>	<b>Solar Inverter</b>	
Input Wave form	Pure sine wave	Pure sine wave
Nominal voltage	110VAC	230VAC
Low voltage trip	90V±4%	184V±4%
Minimum engage	100V ±4%	194V±4%
High voltage trip	135V±4%	264V±4%
High voltage re engage	125V±4%	254V±4%
Max input a/c voltage	140VAC	270VAC
Nominal input frequency	50Hz or 60Hz (auto detect)	
Low freq trip	45Hz for 50Hz,57Hz for 60H	
High freq trip	55Hz for 50Hz,65Hz for 60Hz	
Output wave form	(on bypass mode ) same as input	
Overload protection	Circuit breaker	
Short circuit protection	Circuit breaker	
Transfer switch rating	30 amp or 40 amp	
Efficiency on line transfer mode	95%+	
Line transfer time	10ms	
Bypass without battery connected	yes	
Max by pass current	30 amp or 40 amp	
Bypass over load current	35 amp or 45 amp ( Alarm )	
<b>Inverter Specification / output</b>		
Output wave form	Pure sine wave	
Output continuous power watts	1000W 2000W 3000W 4000W 5000W 6000W	
Output continuous power VA	1000VA 2000VA 3000VA 4000VA 5000VA 6000VA	
Power factor	0.9-1.0	
Nominal output voltage rms	230V	
Output voltage regulation	±10%rms	
Output frequency	50hz +/- 0.3hz or 60hz +/- 0.3hz	
Nominal efficiency	>80%	
Short circuit protection	yes	
Nominal input voltage	12 ,24 or 48 v depending on model	
Minimum start voltage	10 v for 12 v model, 20v for 24 v model,40v for 48v model	
Low battery alarm	10.5v for 12 v model, 21v for 24 v model,42v for 48v model	
Low battery trip	10 v for 12 v model, 20v for 24 v model,40v for 48v model	
High voltage alarm	16 for 12v model, 32 v for 24 v model, 64v for 48v model	
<b>Charger Mode specification</b>		
Input voltage range	(194~244) ±4% vac / (164~254) ±4% vac	
Output voltage	dependent on battery type	
Charge current	35A/70A	
Battery initial voltage for start up	0-16.5v for 12v(* 2 for 24v ; * 4 for 48v)	
Over charge protection shutdown	2v(* 2 for 24v ; * 4 for 48v)	
Charger curves (4 stage constant current )Battery types		

4 step digital controlled progressive charge						
<b>Battery type</b>	<b>charge v</b>	<b>float v</b>	<b>(x 2 for 24 v , x 4 for 48 v)</b>			
GEL USA	14.0	13.7				
AGMI	14.4	13.4				
AGM2	14.6	13.7				
sealedlead acid	14.4	13.6				
GEL EURO	14.4	13.8				
open lead acid	14.8	13.3				
calcium	15.1	13.6				
de sulphation	15.5(4 hrs then off)					
Remote control	Remote Port					
Size: in mm	1-3K W	400*320*184mm				
	4-6K W	580*320*184mm				
Net Weight	1000	2000	3000	4000	5000	6000
	16kg	21kg	25kg	35kg	44kg	46kg

## 12、 The solar controller electrical specifications

Rated Voltage	24Vdc	48Vdc
Rated charge current(include load current)	40/60Amp	
Input voltage range	24-150Vdc	48-100Vdc
Max. PV open circuit array voltage	150Vdc	100Vdc
Overload protection (DC load)	2.0 * Inom > 5s 1.5 * Inom > 20s 1.25 * Inom temperature controlled	
Bulk charge	29.2Vdc (default)	58.4Vdc (default)
Floating charge	26.8Vdc (default)	53.6Vdc (default)
Equalization charge	28.0Vdc (default)	56.0Vdc (default)
Over charge disconnection	29.6Vdc	59.2 dc
Over charge recovery	27.2Vdc	54.4Vdc
Over discharge disconnection	21.6Vdc (default)	43.2Vdc (default)
Over discharge reconnection	24.6Vdc	49.2Vdc
Temperature compensation	-26.4mV/°C	-52.8mV/°C
Lead acid battery settings	Adjustable	
NiCad battery settings	Adjustable	
Load control mode	1. Low Voltage Reconnect (LVR): Adjustable 2. Low Voltage Disconnect (LVD): Automatic disconnection 3. Reconnection: Includes warning flash before disconnect and reconnection	
Low voltage reconnect	24.0-28.0Vdc	48.0-56.0Vdc
Low voltage disconnect	21.0-25.0Vdc	42.0-50.0Vdc
Ambient temperature	0-40°C (full load) 40 – 60°C (de-rating)	
Altitude	Operating 5000 m, Non-Operating 16000 m	
Protection class	IP21	
Battery temperature sensor	BTS - optional remote battery temperature sensor for increased charging precision	
Terminal size (fine/single wire)	#8 AWG	

## 13、 Front Panel Specifications



Switch	Function	Description
	up	Move up to pre-select
	down	Move down to pre-select
	left&right	Move left&right to pre-select
	enter	Select&Enter

Switch	Function	Description
• AC/• INV	green light is on	output works fine
• CHG	yellow light is on	the machine is charging
FAULT	red light is on	the machine works abnormal

### Charge model priority:

- PV
- AC
- PV+AC

### Frequency:

- 50HZ
- 60HZ

### Output voltage:

- 220V
- 230V
- 240V

### Output model priority:

- INVERTER
- AC

## 14、 Fault code/ Audible alarm

The solar controller fault code

Fault Code	Protection Function
1	PV over voltage protection
2	PV low voltage protection
3	BAT over voltage protection
4	BAT low voltage protection
5	SYS over temperature protection
6	BAT over temperature protection
7	Over load protection

Inverter Fault Code:

<b>Code</b>	<b>Fault mode</b>	<b>Code</b>	<b>Fault mode</b>
21	Fan locked fault	26	No feedback fault
22	Over load fault	27	Half short circuit fault
23	Short circuit fault	28	Charge fault
24	Over temperature fault	29	Over voltage fault
25	Battery trouble		

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