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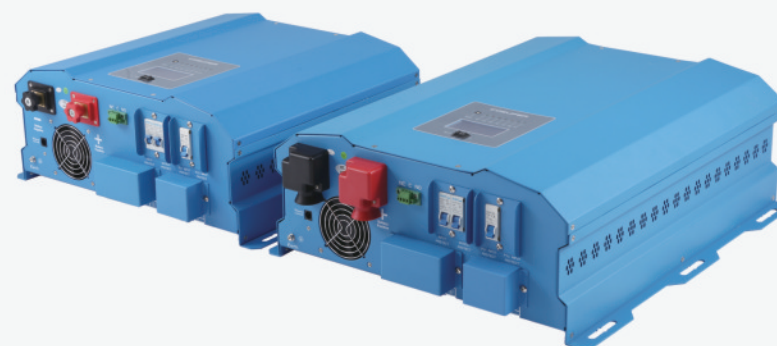
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COSUPER

USER MANUAL

Hybrid Controller Inverter & Charger

SPS Series



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1. Important Safety Information



WARNING! Before using the Inverter, you need to read and save the safety instructions.

1-1. General Safety Precautions

1-1-1. Do not expose the Inverter to rain, snow, spray, bilge or dust. To reduce risk of hazard, do not cover or obstruct the ventilation openings. Do not install the Inverter in a zero-clearance compartment. Overheating may be resulted. Allow at least 30CM of clearance around the inverter for air flow. Make sure that the air can circulate freely around the unit. A minimum air flow of 145CFM is required.

1-1-2. To avoid a risk of fire and electronic shock. Make sure that existing wiring is in good electrical condition; and that wire size is not undersized. Do not operate the Inverter with damaged or substandard wiring.

1-1-3. This equipment contains components which can produce arcs or sparks. To prevent fire or explosion do not install in compartments containing batteries or flammable materials or in locations which require ignition protected equipment. This includes any space containing gasoline-powered machinery, fuel tanks, or joints, fittings, or other connection between components of the fuel system. Refer Warranty for instructions on obtaining service.

1-1-4. Do not disassemble the Inverter/Charger. It contains no user-serviceable parts. Attempting to service the Inverter/Charger by yourself may result in a risk of electrical shock or fire. Internal capacitors remain charged after all power is disconnected.

1-1-5. To reduce the risk of electrical shock, disconnect both AC and DC power from the CPT Series Inverter/Charger before attempting any maintenance or cleaning. Turning off controls will not reduce this risk

CAUTION: Equipment damage

The output side of the inverter's AC wiring can not at no time be connected to public power or a generator. This condition is far worse than a short circuit. If the unit survives this condition, it will shut down until corrections are made.

Installation should ensure that the inverter's AC output is, at no time, connected to its AC input.



Warning: Limitations On Use

SPECIFICALLY, PLEASE NOTE THAT THE GLOBAL LF INVERTER/CHARGER SHOULD NOT BE USED IN CONNECTION WITH LIFE SUPPORT SYSTEMS OR OTHER MEDICAL EQUIPMENT OR DEVICES.

1.2 Precautions When Working with Batteries

1-2-1. If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running cold water and get medical attention immediately.

1-2-2. Never smoke or allow a spark or flame in vicinity of battery or engine.

1-2-3. Do not drop a metal tool on the battery. The resulting spark or short-circuit on the battery of other electrical part may cause an explosion.

1-2-4. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid battery produces a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn.

1-2-5. To reduce the risk of injury, charge only deep-cycle lead acid, lead antimony, lead calcium gel cell, absorbed mat, or NiCad/NiFe type rechargeable batteries. Other types of batteries may burst, cause personal injury and damage.

2. Introduction

2-1. General Information

Thank you for purchasing the SPS Series Inverter/Charger.

SPS Series Pure Sine Wave Inverter is a combination of an inverter, charger, solar power and Auto-transfer switch into one complete system. It is packed with unique features and it is one of the most advanced inverter/chargers in the market today.

The inverter features an AC pass-through circuit, powering your home appliances from utility or generator power while charging the battery. When utility power fails, the battery backup system keeps your appliances powered until utility power is restored. Internal protection circuits prevent over-discharge of the batteries by shutting down the inverter when a low battery condition occurs. When utility or generator power is restored, the inverter transfers to the AC source and recharges the batteries.

2-2. Application

Power tools—circular saws, drills, grinders, sanders, buffers, weed and hedge trimmers, air compressors.

Office equipment – computers, printers, monitors, facsimile machines, scanners.

Household items – vacuum cleaners, fans, fluorescent and incandescent lights, shavers, sewing machines.

Kitchen appliances – coffee makers, blenders, ice makers, toasters.

Industrial equipment – metal halide lamp, high – pressure sodium lamp.

Home entertainment electronics – television, VCRs, video games, stereos, musical instruments, satellite equipment.

2-3. Features

- ◆ Professional solution for Off-Grid solar system
- ◆ Auto switch 5 FUN:DC to AC, AC bypass, AC charger, solar charger and UPS
- ◆ PWM Solar Charger. Max solar panel power: 2880W
- ◆ Pure sine wave output, for various load
- ◆ Low power saving mode to conserve energy
- ◆ Solar power mode and Grid power mode, can be free choose
- ◆ Built-in transfer switch and AC/DC circuit breaker
- ◆ Advanced microprocessor control design
- ◆ Input polarity/UVP/OVP/OSP/OLP/OTP
- ◆ Remote control function RS232 (optional)

3. General specification

Input Wave form:	Sine wave(utility or generator)	
Nominal voltage:	120VAC	230VAC
Low voltage trip:	85v±4%	184v/154v±4%
Low voltage re engage:	95v±4%	194v/164v±4%

High voltage trip:	135v±4%	253v±4%
High voltage re engage:	127v±4%	253v±4%
Max input AC voltage:	150VAC	270VAC
Nominal input frequency:	50Hz or 60Hz(auto detect)	
Low freq trip:	47Hz for 50Hz,57Hz for 60Hz	
High freq trip:	55Hz for 50Hz,65Hz for 60Hz	
Output wave form:	(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 typical	
Bypass without battery connected:	Yes	
Max bypass current:	80A	
Bypass over load current:	85A: alarm	

Inverter Specification/output					
Output wave form:	Pure sine wave or quasi sine wave				
Output continuous power watts:	1000	1500	2000	3000	4000
	5000	6000	8000	10000	12000
Power factor:	0.9-1.0				
Nominal output voltage rms:	120/230VAC				
Output voltage regulation:	+/- 10% rms				
Output frequency:	50Hz±0.3Hz or 60Hz±0.3Hz				
Nominal efficiency:	>88%				
Surge ratings:	3000	4500	6000	9000	12000
	15000	18000	24000	30000	36000
Short circuit protection:	Yes, fault after 10 secs				

Inverter specification/input			
Nominal input voltage:	12V	24V	48V
Minimum start voltage:	10V	20V	40V
Low battery alarm:	10.5V	21V	42V
Low battery trip:	10V	20V	40V
High voltage alarm:	16V	32V	64V
Power saver:	Below 25 watts when enabled		
Power saver:	Same switched on/off on remote		

Charger mode specification	
Input voltage range:	95-127VAC 194-243VAC/164-243VAC(W)
Output voltage:	Dependent on battery type
AC/DC Charge current:	15A to 45Amp
Battery initial voltage for start up:	0-15.7v for 12v(*2 for 24v;*4for48v)
Over charge protection shutdown:	15.7v for 12v(*2 for 24v;*4for48v)

Charger curves (4 stage constant current)battery types												
4 step digital controlled progressive charge												
1-6 UPS Mode			Float V(*2for24v;*4for48v)									
Position	Charge V	Float V	7-9-Battery Priority (Solar Inv.mode)									
Not used			Low Battery Trip				High Battery Trip					
Gel U.S.A	14.0	13.7	7.11V				14V					
A.G.M.1	14.1	13.4	8.10.5V				13.5V					
A.G.M.2	14.6	13.7	9.10V				13V					
Sealed lead acid	14.4	13.6										
Gel european	14.4	13.8										
Open lead acid	14.8	13.8										
Size : in mm			1000	1500	2000	3000	4000	5000	6000	8000	10000	12000
			455*520*205				630*520*205					
Net Weight:			21kg	23kg	25kg	29kg	40kg	48kg	50kg	60kg	68kg	70kg

4. Ordering Information

Typical part number→

SPS 2000 - 2 12 6P

1.Basic Series

SPS=Pure Sinewave inverter&Charger

2.Power Rating

1000=1000W 1500=1500W 2000=2000W 3000=3000W
4000=4000W 5000=5000W 6000=6000W 8000=8000W
10K=10KW 12K=12KW

3.AC Voltage

2=230VAC 1=120VAC

4.Battery Voltage

12=12VDC 24=24VDC 48=48VDC

5.Solar Controller

60A PWM Solar Controller (otherwise, it is do not contain Solar controller)



SYSTEM OVERVIEW	
Input AC: 000 V	Output AC: 225 V
Batt DC: 11.8 V	Output Freq: 50 Hz
Output Load: 000%	Work mode: Inverter
Alarm: NO	
Fault: NO	

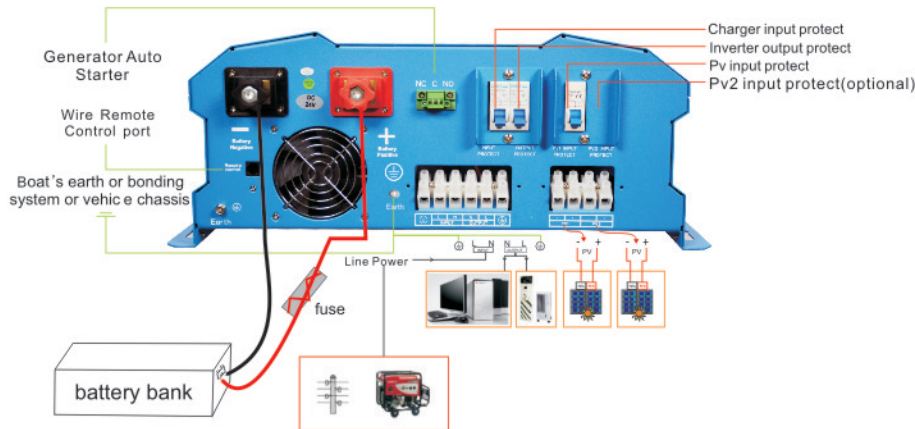
Indication & fault finding chart

Status	Function	L.E.D.s on main unit				L.E.D.s on remote		audible alarm
		Green	Red	Yellow	Blue	Green	Red	
Charge function	Constant current charge			on	on	on		
	Constant voltage charge			flash	on	on		
	Float			on		on	on	
	Standby					on		
Inverter mode	inverter on				on		on	
	Power saver on	on						
Alarms	Battery low voltage				on		on	on
	Battery high voltage						on	on
	Over load (inverter mode)	on			on		on	on
	Over temp (inverter mode)							beep 0.5s every 5s
	Over temp (line mode)		on	on	on	on	on	beep 0.5s every 5s
Fault mode	Over charge			on	on	on	on	beep 0.5s every 5s
	Fan lock							beep continuous
	Battery high v				on		on	beep continuous
	Inverter mode overload	on						beep continuous
	Over temperature		on					beep continuous
	Back voltage					flash	flash	beep continuous

Inverter With AC/DC Charger Combined Solar Charge Controller

Basic Wiring for the SPS Series
Please read instructions
Before working on this product

Warning high voltage
do not open unless
qualified to do so



When the SPS is in inverter mode the "through the box" earth line is automatically disconnected from the input earth and joined to the output neutral, complying with the natural earth inverter requirements if you wish to maintain a through earth simply connect the input earth to the output earth

How to select UPS Mode and Solar Inverter Mode

The 1-6 position is for UPS Mode(Grid Power First/AC First)
The 7-9 position is for Solar Inverter Mode(Solar Power First/Battery first)

UPS Mode

Position 1-6, Turn the selector you can select the different charge voltage.
When the Grid Power ON, anytime the SPS will charge battery by Grid Power together with solar power, the SPS output is from Grid Power Bypass, when Grid Power OFF, the SPS will transfer to Battery mode(inverter mode).

Solar Inverter Mode

Position 7-9, Turn the selector you can select the different battery trip point.
When battery Energy is enough, the SPS only work under inverter Mode (Battery mode).
When battery voltage is lower than Low Battery trip voltage, the SPS will transfer to AC mode (Line Mode), the Grid power will recharge battery together with Solar Power.
When Battery was recharged over the high voltage trip voltage, the SPS will transfer back to inverter Mode (Battery mode).

ATTENTION:

On the sticker the voltage is for 12VDC mode, for the 24VDC 48VDC, it's multiple.
Not to adjust the position frequently
Better to change positions while SPS switch off

WHAT CABLE TO USE in mm2 :

A charge or inverter	cable run distance 0-1.5m	cable run distance 1.5-4.0m
125-180A	50 mm ²	70mm ²
180-330A	70mm ²	90mm ²

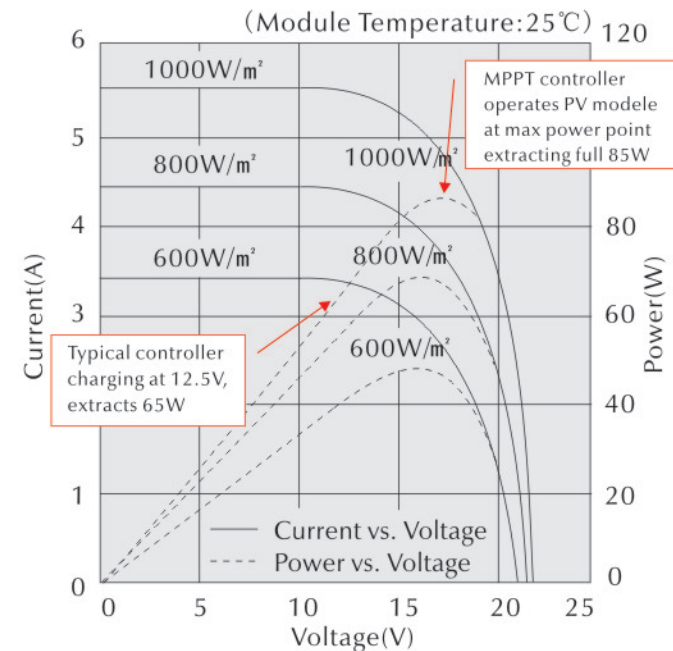
Please note that if there is a problem obtaining for example 90 mm² cable, use 2*50mm², or 3*35mm². One cable is always best but, cable is simply copper and all you require is the copper, so it does not matter if it is one cables or 10 cables as long as the square area adds up. Performance of any product can be improved by thicker cable and shorter runs, so if in doubt round up and keep the length as short as possible.

5. The Controller Maximum Power Point Tracking function

The SPS Grid Hybrid inverter combined MPPT PWM Solar Charge controller which is a microprocessor-based system designed to implement the Controller. And it can increase charge current up to 30% or more compared to traditional charge controllers. (see figure as following)

Efficiency

The efficiency of the controller shall be a minimum of 97% @ fully charge current.



Current power vs. Voltage Characteristics

6. Solar Controller Chg Mode Indications

Error Mode	Single Color LED	Multi Color LED
Low Voltage Disconnect	Turn off	Blink 1,off6s(orange)
Over Voltage of Load	Blink 1,off6s	Turn off
Over temperature	Blink2,off6s	Turn off
Over current	Blink3,off6s	Turn off

Check list

- 1) Ensure that the inverter has the correct DC voltage for your boat or vehicle system. ie 12v or 24v/48v.
- 2) Fit as close to the batteries as possible. The shorter the DC 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 AC source such as the 230V external mains line or a generator. All external power must go through the SPS.
- 6) Always switch on the SPS first, before plugging in any appliance.
- 7) Under new electrical legistion only professional electrictrictions should install this product. Ensure the fitting instructions are fully understood before fitting this product.

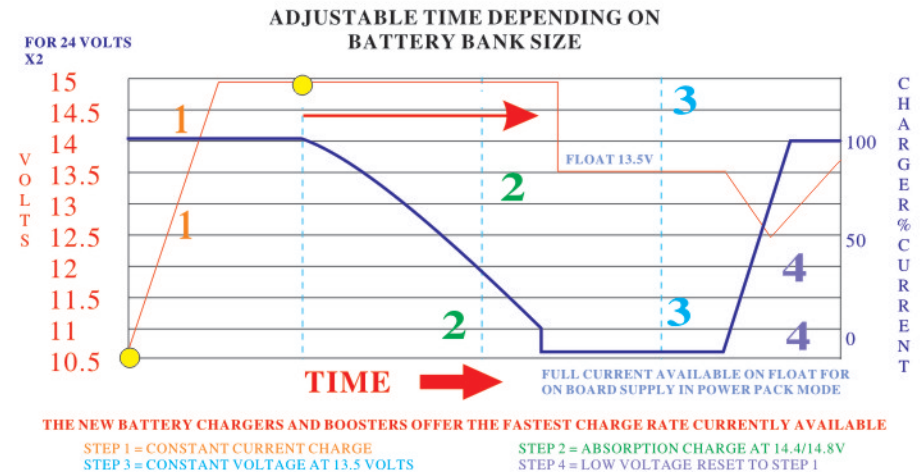
7. Installation

- 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 we 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 DC leads. In the event of not being able to get the size requested (it cab be hard to get thick cable) then simply add multiple length of thinner cable, i.e. if you cannot get 90mm2 cable then use 3*35mm2 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. We have a full range of high current fuses in the GANLR range of gold fuse products, ranging from 100-500AmPs. on the DC 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 AC side ensure the Line power (all external AC 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 AC 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) We recommend Multi core tri rated AC cable, if used on a boat or vehicle, as this is much safer where vibration is likely. Only use single solid household AC 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.

8. Charge Stage Transition Definitions

- Boost CC Stage: If AC input is applied, the charger will run at full current in CC mode until the charger reaches the boost voltage.
- Software timer will measure the time from AC start until the battery charger reaches 0.3V below the boost voltage, then take this time as T0 and T0 x 10=T1.
- Boost CV Stage: Start a T1 timer; the charger will keep the boost voltage in Boost CV mode until the T1 timer has run out. Then drop the voltage down to the float voltage. The timer has a minimum time of 1 hour and a maximum time of 12 hours.
- Float Stage: In float mode, the voltage will stay at the float voltage.
- If the AC is reconnected or the battery voltage drops below 12Vdc/24Vdc, the charger will reset the cycle above.
- If the charge maintains the float state for 10 days, the charger will reset the cycle.



The battery type and charge voltage recommendations are set out above For 24V unit x the above by 2. Some battery types may look confusing such as gel usa and gel euro., AGM usa and AGM euro. 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 you 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 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 an so accept charge once again.

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 AC power on.
- 4) Because this is such a dangerous setting there is a 4hr 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.

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 1-2hrs the voltages 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 12.5volts 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 its 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 deg c (ie. if the batteries are almost too hot to touch) then stop the process).

Install remote control.

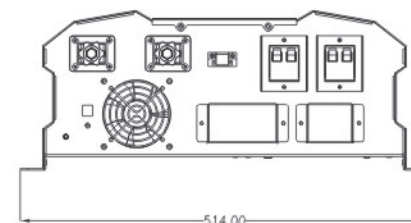
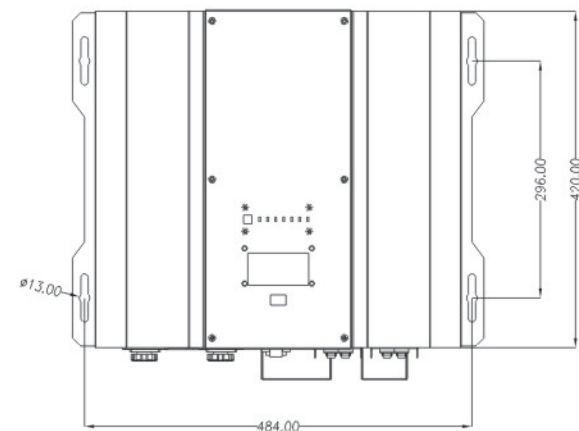
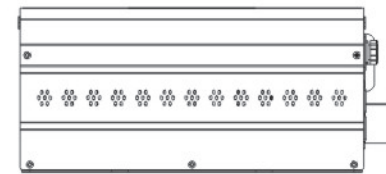
Isolate the unit before attempting this so there are no high voltages. The local control panel on the front of the unit can also be used as a remote control, reveal the screws holding the panel onto the main box, carefully remove the panel and disconnect it from the connection socket behind the unit. Fill the hole on the main unit using the blank replica of the remote control unit. Using the remote cable supplied then re-connect the panel to the unit

Operation and what to expect

- 1) After the units installed, using the panel on the front of the unit, and with the Line power (120/230VAC) still disconnected, switch the unit on. The leds will cycle through there test routine, then the unit should go into inverter mode and 120/230V should be produced on the output AC terminals (provided the batteries are over 11 volts).
- 2) If the above is ok, then connect the Line power to feed 120/230V into the SPS, after a short while, the inverter should go off line, and feed the Line power through the inverter. Changeover is about 20 milliseconds (so fast that you should not be able to notice it) and the battery charger should come on-Line and go through it's charge sequence ending, after 1-10hrs, with float voltage.

Common Faults:

There are numerous faults which the unit can detect and transmit the fault to you by the use of l.e.d.s and alarm on the unit itself. The remote control gives a little help but the real fault finding can only take place at the unit .Please see the fault finding chart over the page for full information.



SPS 1000/1500/2000/3000W

9. Warranty

Dear Customers,

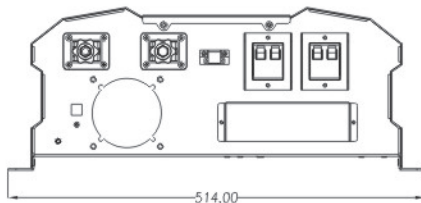
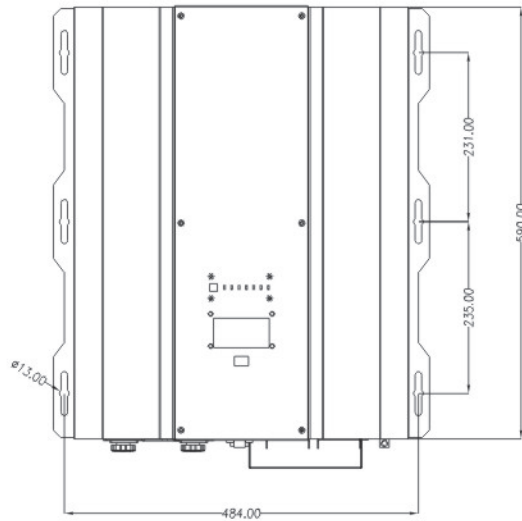
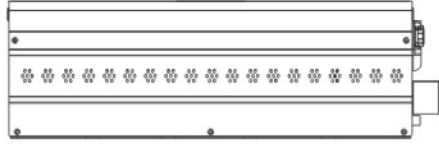
Many thanks for selecting products from Cosuper. In order to extend better service to you, pls read our product manual carefully and keep warranty card. Welcome to log in www.cosuper.com to enjoy full scale support and service.

The products are under strict inspection before delivery. We offer 18 month limited warranty:
I In the warranty period, we will provide free repair and service parts when the machine is under normal use. Damaged parts shall be owned by Cosuper.

II The following cases are not covered under warranty.

- 1 Change the company trademark unauthorized
- 2 Damage due to misoperation, negligence use, and irresistible factors
- 3 Repair, modification or remove the label unauthorized

*Note: The Specifications are subject to changes without notice.



SPS 4000/5000/6000/8000/10K/12KW