



CSC Series



PURE SINE WAVE INVERTER WITH CHARGER

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1. INTRODUCTION

Thank you for choosing our CSC series Pure sine wave Inverter with Charger (herein after called CSC). The perfect combination of a pure sine wave inverter and a 3 stage battery charger.

When the mains power fails, it converts the battery's DC to AC to support household electrical appliance's. When the mains power is on, it auto switches to use the mains AC power and the 3 stage battery charger will monitor the state of the batteries and auto adjust as required (constant current, constant voltage, floating charge).

With a transfer time of less than 15 ms AC appliance operation is uninterrupted.

2. FEATURES

- Fully auto. protection functions: Earth Leakage Protection, Reverse Polarity, Overload, Over Voltage, Over Temperature, Low Voltage, Short Circuit.

- Transfer time between bypass and inverter mode less 15ms, no interruption to your appliance's when mains power is off.

- Three LED indicators: Power, Fault, Charger

- Pure sine wave output, THD<3%

- AVS protection function: low voltage, over voltage, time delay

3. SAFETY FIRST

To ensure reliable service, it must be installed and used properly. Please read the installation and operating instructions thoroughly prior to installation and use. Pay special attention to the WARNINGS and CAUTIONS statements in this manual. The CAUTION statements advise against certain conditions and practices that may result in damage in your CSC. The WARNINGS statements identify conditions or practices that may result in personal injury. Read all instructions before using this CSC!



WARNING! To reduce the risk of fire, electric shock, explosion or

- Sparking may occur when connecting the unit to the battery, make sure no flammable fumes are present before making any connections.

- Remove appliance plug from outlet socket and turn off CSC before working on the appliance. And do not expose CSC to the water, rain ,snow or spray environment.

- This is not a toy please keep away from children.

- Do not install any other object into the air vents.

- No user-serviceable components inside. Do not attempt to open the CSC by yourself.



WARNING! To reduce the risk of fire, electric shock, explosion

- Do not operate this CSC if it is wet, and do not install it in engine compartment- please install it in a well ventilated area, to avoid too high temperature.

- Do not connect live AC main power to the CSC's AC outlets, it may cause the CSC's permanent damage.

- Please pay special attention to the connecting method part in this manual, avoid polarity reverse connection.

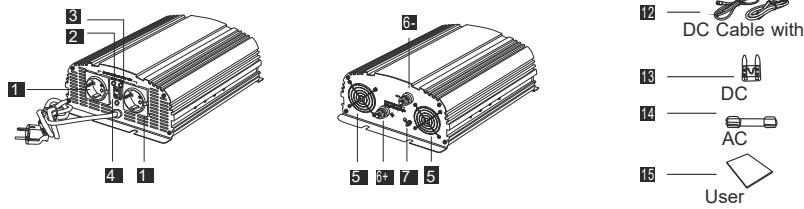
4. OPERATION ENVIRONMENT

For best operating performance, the CSC should be placed on flat surface, such as ground or other solid surface, install the CSC in a location that is:

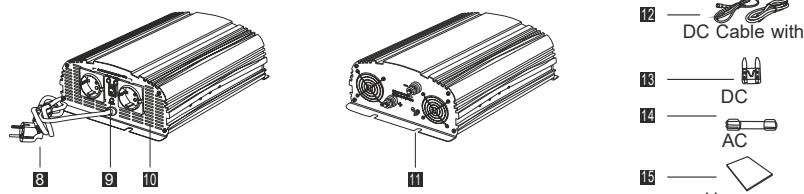
- DRY.** Do not allow water and/ or other liquids to come into contact with the CSC. In all marine applications, do not install the CSC below or near the waterline and keep the CSC away from moisture or water.
- COOL.** Ambient air temperature should be between 30° F (-1°C) non-condensing, and 105° F (40 °C). Do not place the CSC on or near a heating vent or any pieces of equipment which is generating heat above room temperature. Keep the CSC away from direct sunlight, if at all possible.
- VENTILATED.** Keep the area surrounding the CSC clear to ensure free air circulation around the unit, do not place items on or over the CSC during operation. A fan is helpful if the CSC is operating at maximum power outputs for extended periods of time. The units will shut down if the internal temperature exceeds operating temperatures and restart after it cools.
- SAFE.** Do not use the CSC near flammable materials or in any locations that may accumulate flammable fumes of gasses.

5. PRODUCT MATERIALS LIST AND INDICATION

5.1. CSC600~CSC1000W



5.2. CSC1500~CSC2000W



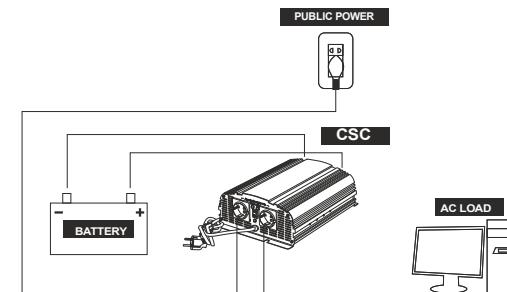
Indication:

1. AC Outlet
2. Power LED
3. Fault LED
4. ON/OFF Switch
5. Cooling Fan
6. DC Input Terminal (Red-Positive)
DC Input Terminal (Black-Negative)
7. Grounding Terminal
8. AC Power Cord
9. Charger LED
10. Ventilation Hole
11. Slots for installation
12. DC Cable with Ring
13. DC Fuse
14. AC Fuse
15. User Manual

6. AVS PROTECTION FUNCTION

- Lower voltage protection: when the mains power is lower than 170VAC, the CSC shall be shut down to protect it. Once voltage increase to normal range, The CSC restarts automatically.
- High voltage protection: When the mains power is too high, the CSC shut down automatically. Restarts once voltage is down to normal range.
- Time delay: The restart protection delay is 17 seconds this time delay function avoids damage to the unit when AC grid power failure is frequent.

7. Installation



NOTE:

- You can use one or more batteries. Preferably use 100 Ah or larger batteries for long back-up time.
- If grid power is available, AC bypasses the inverter & power-for the electrical appliances is provided by the mains (inverter switched on) for battery charging.
- If grid power fails, the CSC convert the battery DC power to AC power-for the electrical appliances. (the inverter must be switched on).

7.1. There are cables with terminal rings included, use the cables to connect the unit directly to the batteries.

The input terminals on the rear side of the unit are Red-positive and Black-Negative . Connect the red cable to the red terminal and the positive pole of the battery. Connect the black cable to the black terminal and the negative pole of the battery. Where units are supplied with four cables two red, two black all four must be connected . Make sure all connections are solid and secured. Poor connections may cause the cables and terminals to overheat and shorten the battery backup time. (ensure that the inverter and charger mode are OFF before connecting to the battery).

WARNING!

- Reverse polarity will burn the fuse or may cause damage to the CSC avoid at all cost as damage caused by wrong connection is not cover by our warranty.
- The CSC must be connect only to batteries with a normal output voltage of 12 volts. The power source can be a 12V battery or several 12V batteries connected in parallel to increase the backup time. The unit will not operate from a 6 volt battery, and will sustain permanent damage if connected to a 24 volt battery.
- Keep ventilation when using batteries. Batteries may generate flammable gas during charging or discharging.

- Sparking may occur when connecting the unit to the battery, make sure no flammable fumes are present before making any connections.
- Please use the DC cables supplied to ensure best performance.

7.2. Connect the grounding terminal to earth if possible for added safety.

WARNING!

Before using the CSC, use a grounding cable. There is a terminal fitted with a nut in the CSC's output panel. Please choose heavy duty, green and yellow insulated cable driven into the ground at a depth of 1-2m or more.

7.3. Plug into the mains power, when the charger LED is on the CSC will charge your battery.

7.4. Plug your AC appliance into the CSC's outlet.

Make sure your appliance is turned off before connecting to the unit. Please turn your appliances on one by one. Now your appliance are functioning if the rated power is overloaded, the red LED will come on and the inverter will shut down. To reset, reduce the load and if the appliance requires power within CSC's rated power the inverter will restart automatically.

WARNING!

We advise that you do not use appliance/s with a power rating more than 90% of the CSC's rated power.

Although there is a overload protection in CSC, this may damage the unit.

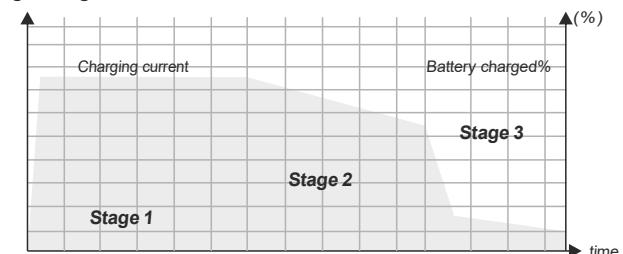
8. PROTECTION FUNCTION

The CSC is designed with a universal protection circuit that provide added safety features not only for your AC appliances, batteries but also for itself.

| | | |
|-------------------------------------|---|---|
| | Earth Fault Protection | The CSC shut down when the load has electric leakage. |
| | Low Voltage Alarm | Alarm activated when battery is discharge to 10.6V/21.2V. |
| Bypass and Inverter Mode Protection | Over Voltage Protection | The CSC shuts down when the battery is discharge to 10V/20V (prevents damage to the battery) |
| | Over temperature Protection | The CSC will shuts down when overheated. |
| | Overload Protection | The CSC shuts down when the loading power exceeds it's power rating |
| | Short Circuit Protection | The CSC shuts down when output short circuit happen |
| Soft Start Circuit | Reverse Polarity Protection | By fuse open. |
| | Gradual voltage ramp-Up during inverter start-up | This eliminates failed cold start under load. |
| | Output that momentarily dips in voltage and quickly recovers. | This eliminates most shutdown from momentary overload. |
| | Automatically restart | The inverter part automatically re-start when overload remove. |

| | | |
|-------------------------|-------------------------------|--|
| Charger Mode Protection | Auto 3 stage battery charging | Stage 1. Constant Current- Rapid charge the battery with constant high current. Fit for heavy-loaded condition. Stage 2. Constant Voltage-Moderate charge the battery with constant voltage. this allow the battery to well absorb the charge and maximum battery's life. Stage 3. Floating Charge-After the battery charged to around 99% full. The charger automatically switch to "floating-mode" that keeping the battery in well condition. |
|-------------------------|-------------------------------|--|

IV Auto.3 stage charge



9. OPERATING TIPS

9.1. Rated Versus Actual Current Draw of Equipment

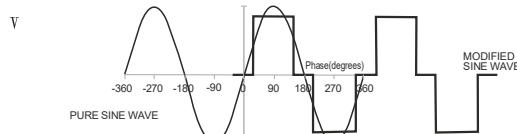
Most electrical tools, appliances and audio/video equipment have labels that indicate the power consumption in amps or watts. Be sure that the power consumption of the item you wish to operate is rated within CSC wattage or less. (if the power consumption is rated in amps AC, simply multiply by the AC volts to determine the wattage). The CSC (inverter mode) will shut down if it is overloaded. The appliances causing the overload must be removed before the CSC will restart. Resistive loads are the easiest for the CSC to run. However larger resistive loads such as electric stoves or heaters, usually require more wattage than the inverter can deliver. Inductive loads, such as TV's and stereos, require more current to operate than do resistive loads of the same wattage rating. Induction motors, as well as some televisions, may require 2 to 6 times their wattage rating to start up. The most demanding in the category are those that start under load, such as compressors and pumps. Testing is the only definitive way to determine whether a specific load will run. To restart the unit after a shutdown due to overloading, remove the overload and if necessary turn the power switch OFF then ON.

9.2. Power Tools and Microwave Ovens Won't Start

Read the information panel on each power tool carefully to accurately determine the tool's input wattage. The wattage output may be sufficient to operate most power tools and microwave ovens but remember that the power needed to start the power tool may be as much as 2 to 6 times its continuous wattage requirements.

9.3. The AC output waveform of the CSC (inverter mode) is know as the "pure sine wave".

Figure 1: Modified Sine Wave and Pure Sine Wave Comparison



9.4. Battery's Back up time depends on the appliances you will be using.

The batteries must provide between 10.5 and 15.5 volts DC (if 12V CSC) and must be able to supply the necessary current to operate the load. The power source should be a good condition deep-cycle Lead-acid battery. To obtain a rough estimate of the current (in amperes) the power source must deliver, simply divide the power consumption of the load (in watts AC) by

10. Example: if a load is rated at 100 watts AC, the power source must be able to deliver: $100/10=10\text{A}$ On larger applications the power source may be several batteries connected in parallel. It is important to make sure the cables are suitable sized. This manual does not describe all of the possible types of battery configurations, battery charging configurations and battery isolation configurations.

9.5. Battery Charger

We recommend you use deep cycle batteries. If you hear the low voltage protection alarm, please stop using the appliance, when the battery is fully charged, you can use it again.

Please plug into the mains power to charge the battery.

The battery operation time depends on the battery capacity(Ah) and the loading power (Watt)

The method to calculate the operation time is:

Battery capacity (Ah) x input voltage(V)/ loading power(W)

Example:

| | |
|---------------------|-------|
| Battery capacity= | 150Ah |
| Input voltage= | 12V |
| Loading power= | 600W |
| (150Ah x 12V)/600W= | 3H |

10. TROUBLE SHOOTING

10.1. When mains power fails and the Inverter switch is ON, the problem happened in the inverter mode.

| TROUBLE | POSSIBLE CAUSE | SUGGESTED REMEDY |
|--------------|---|---|
| No AC output | Battery over discharge, low battery protection. | Change the battery or charging for it |
| | Over temperature protection | Remove or reduce load, wait for CSC to cool |
| | Overload protection | Remove or reduce load or use more big power CSC |
| | Short circuit protection | Reduce load or remove short circuit |
| No AC output | Red and green LED not lit | Fuse burned Change fuse or contact technical support(refer to the part 10.4) |
| No AC output | Red and green LED not lit | Fuse burned Change fuse or contact technical support(refer to the part 10.4) |
| | | PCB broken Contact Seller for repair or changed |
| | | Battery's defective or poor connection Change battery or re- connect the battery |

| | | | |
|--|---|---|--|
| No AC output | Red and green LED lit | Earth fault protection | Unplug the fault load |
| | | Strong collision cause the circuit loosen | Contact seller for repairing or change |
| Battery run time is less than expected | AC loads power consumption is higher than the rated power | Use a larger battery or connect more batteries in parallel to increase the back up time | |
| | | Battery is old or defective | Replace the battery |
| | Battery over discharge | Charge for the battery | |
| | Power dissipation caused by the too long or thin cable | Use more shorter/heavier DC cables | |

10.2. When public power on, the problem happened in bypass and charge

| TROUBLE | POSSIBLE CAUSE | SUGGESTED REMEDY |
|---|---------------------------------------|--|
| When the public power available, inverter mode can't be switch to charge mode | Poor AC wire connection | Tighten connection or re-connect the AC power |
| | built in fuse burned | Change fuse or contact technical support(refer to the part 10.4) |
| CSC beep long time but still on working | Battery will be fully charged soon | It will be auto stop the charge or you switch off charger mode |
| | AC input voltage under 170V/70V | Stop to use it or switch off the charger mode or adjust AC voltage |
| | Using time too long, high temperature | Switch off 10 minutes for cool down |
| | | |

10.3. Other

| TROUBLE | POSSIBLE CAUSE | SUGGESTED REMEDY |
|-----------------------------|---|--|
| Cooling fan not working | It will work when in charge mode, fully charged it will auto stop | It is normal |
| Cooling fan not working | When AC main power failure, it could be working in inverter mode, but it no working | Contact seller for repairing or replace it |
| CSC output show low voltage | Reading voltmeters can't get accurate data | Use a true RMS reading voltmeters |

11. CLEANING, CARE AND MAINTENANCE

Always disconnect the power inverter from the 12V/24V power source and the external appliance from the socket before starting any cleaning or maintenance. Keep all air inlets and vents free of dirt and dust. Clean the power inverter with a moistened cloth. Do not use abrasive utensils for cleaning. Store the power inverter in a dry place, well ventilated and in a temperature range between 0°C and 40°C. Do not store in direct sunlight, near heater, radiators or under moist and wet environment conditions.

12. DISPOSAL



Old electrical appliances are recyclable. Do not dispose of them in the domestic waste!
Take to your local recycling centre. Dispose of the packing material in an environmentally friendly way.

13. SPECIFICATION

| | MODEL | CSC600 | CSC1000 | CSC1500 | CSC2000 |
|---------------------|------------------|--|------------|------------|------------|
| Output | Rated Power | 600W | 1000W | 1500W | 2000W |
| | Surge Power | 1200W | 2000W | 3000W | 4000W |
| | Ac output | 220±10% 50Hz or 110V±10% 60Hz (refer product's cable) | | | |
| | Wave form | Pure Sine | | | |
| | | | | | |
| Input | DC Input | 12V(10-15V) or 24V(21-30V) | | | |
| | AC Input range | 170-250V(220V) or 70-150V (110V) | | | |
| Charger | Max. Current | 12V 24V | 10A 5A | 15A 7A | |
| | Charge Way | Constant Current, Constant Voltage; Floating Charge(Auto.3 Stage) | | | |
| | Transfer time | <15ms | | <25ms | |
| | | | | | |
| Protection Function | Overload | 630-700W | 1100-1200W | 1600-1700W | 2100-2200W |
| | Over Temperature | >60°C auto. shutdown | | | |
| | Other | earth leakage polarity reverse, over voltage, low voltage, overload, overheat short circuit protection | | | |
| | AVS Protection | low voltage, over voltage, time delay | | | |

14. Limited product warranty and exclusions:

We provides a limited warranty that covers defects of the products you ordered caused by material or manufacturing faults. The warranty period is for 12 months and begins on the date of purchase by the original end user.

This limited warranty is made only to the original purchase of the unit, and is not transferable to any subsequent owner.

We will, as an option, repair or replace the defective component(s) free of charge, provide that our factory is notified of the defect during the warranty period and a dated proof of purchase is provided. We reserve the right to inspect the faulty component(s) and determine if the defect is due to material or manufacturing flaws. We also reserve the right to charge for service time if the defect is not due to material or manufacturing flaws or is not for some other reason subject to this limited warranty.

The warranty does not cover defects or damages caused by :

- A. Normal wear and tear
- B. Shipping or transportation damages
- C. Improper use or installation

D. Exposure to unsuitable environment conditions (including but not limited to damage due to lightning strikes)

E. Unauthorized or abnormal use or operation

F. Negligence or accidents

G. Material or workmanship not provide by us

H. This warranty does not cover costs related to removal, installation, or troubleshooting of your electrical systems we will, as an option, use new and / or reconditioned parts in performing warranty repair and in building replacement products.

We reserve the right to use parts or products of original or improved design in the repair or replacement. If we repair or replace a product, its warranty continues for the remaining portion of the original warranty period. All replaced products and all parts removed from repaired products become the property of us.

14.1. Buyer (customer) information:

| | | | |
|----------------|--|------------------|--|
| Customer Name | | Date of Purchase | |
| Products model | | Contact Number | |
| Product No. | | E-mail Address | |

Signature: _____

| | |
|------------------|-----------------|
| Selling Company: | |
| Product model | |
| Product Number | Contact Number: |



Our factory authorized the dealer to sign or stamp, and for this table to come into effect it should be signed or stamped by the dealer.

14.2. You will need to provide the following information for your warranty and repair of the device:

- this table or manual.
- copy of the till receipt(invoice, receipt) with the date of purchase.
- reason for the complaint or a description of the fault.
- returns number authorising the return



Standards Organization of Nigeria Conformity Assessment Programme



The Restriction of the use of certain hazardous substances in electrical and electronic equipment



Conform to European standards



Layer Limited



Read the instruction before using your product.



For indoor use only



Handle with Care