# INVERTER

***12 VDC / 230 VAC***
***24 VDC / 230 VAC***

**Users Manuel**

## SUMMARY

# 1 Important safety Instructions

**Warning**
Before using the inverter, read and save the safety instructions.

## 1.1 General safety instructions

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.

To avoid a risk of fire or electric shock, make sure that the existing wiring is in good electrical condition; and that wire size is not undersized. Do not operate the inverter with damaged or substandard wiring.

This equipment contains components that 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 petrol-powered machinery, fuel tanks, or joints, fittings, or other connections between components of the fuel system.

## 1.2 Precautions when working with Batteries

- If battery acid gets in contact with skin or clothing, wash immediately with soap and water. If acid enters the eye, immediately flood the eye with cold running water for at least 20mns and get medical attention immediately.
- Never smoke or allow a spark or flame in vicinity of the battery or engine.
- 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.
- 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 to metal, causing a severe burn.

# 2 Functional Characteristics

- Pure Sine wave output (THD < 3%).
- Output frequency: 50/60 Hz switch selectable.
- Low consumption in "Power saving mode".
- Totally isolated on inlet and on outlet.
- High efficeincy: 90 to 94 %.
- Capable of driving highly reactive & capacitive loads at the start moment.
- 3 LED indicators with tri-color display, all operation status..
- Loading controlled cooling fan.
- Built in advanced microprocessor to make friendly interface with user.
- Protections :
    - Input over voltage and input low voltage
    - Low battery alarm
    - Overheating
    - Power surges
    - Short-circuits
    - Polarity inversion

## 2.1 Applications

- **Power tools** : circular saws, drills, grinders, sanders, buffers, weed and hedge trimmers, air compressors.
- **Office equipment** : computers, printers, monitors, fax machine, scanners.
- **Household items** : vacuum cleaners, fans, fluorescent and regular lights, shavers, sewing machines.
- **Kitchen appliances** : coffee machines, blenders, ice makers, toasters.
- **Industrial equipment** : metal halide lamps or high pressure sodium.
- **Home entertainment** : television, VCR, video games, stereos, musical instruments, satellites.

## 2.2 Electrical Characteristics

## Version 12 VDC / 230 VAC

| **Model (nominal power)** | **600 W** | **1000 W** | **1500 W** | **2000 W** | **3000 W** |
|---|---|---|---|---|---|
| **Reference** | CPS 600 12 | CPS 1000 12 | CPS 1500 12 | CPS 2000 12 | CPS 3000 12 |
| **Peak Output power** | 800 W | 2000 W | 3000 W | 4000 W | 6000 W |
| **Input voltage** | 12 VDC | | | | |
| **Output voltage** | 220 / 230 / 240 VAC, +/-3% | | | | |
| **Frequency (switch selectable)** | 50 / 60 Hz +/-0,05% | | | | |
| **Output waveform** | Sinusoïdal wave < 3% DHT | | | | |
| **Efficiency** | 90 % | 91 % | 90 % | 91 % | 90 % |
| **No load current draw** | 0,83 A | 1,20 A | 1,40 A | 2,64 A | 2,80 A |
| **Stand-by current draw** | -- | 0,25 A | 0,28 A | 0,60 A | 0,50 A |
| **Input level indicator** | LED red / orange / green | | | | |
| **Output level indicator** | | | | | |
| **Failure indicator** | LED red | | | | |
| **Overheating** | Automatic power cut,<br>Automatic restart when cooled down. | | | | |
| **Protection** | Overload, short-circuit, polarity inversion,over temp, Over/under input voltage<br>AC input circuit breaker . | | | | |
| **Remote control unit** | Optional | | | | |
| **Security** | EN60950-1<br>UL458 | | | | |
| **EMC** | FCC Classe A<br>EN55022 classe A<br>EN61000-3-2, 3<br>Marquage e 13 * 72/245/EEC, 95/54/EC | | | | |
| **Operating temp range** | 0 to +40°C | | | | |
| **Storage temp** | -30°C to +70°C | | | | |
| **Cooling** | Loading controlled cooling fan | | | | |
| **Dimensions (mm)** | L : 295<br>l : 180<br>H : 72 | L : 383<br>l : 182<br>H : 88 | L : 415<br>l : 191<br>H : 88 | L : 422<br>l : 208<br>H : 166 | L : 452<br>l : 208<br>H : 166 |
| **Weight (Kg)** | 2,7 | 4 | 4,8 | 9 | 9,8 |

Note : the specifications are subject to change without notice.

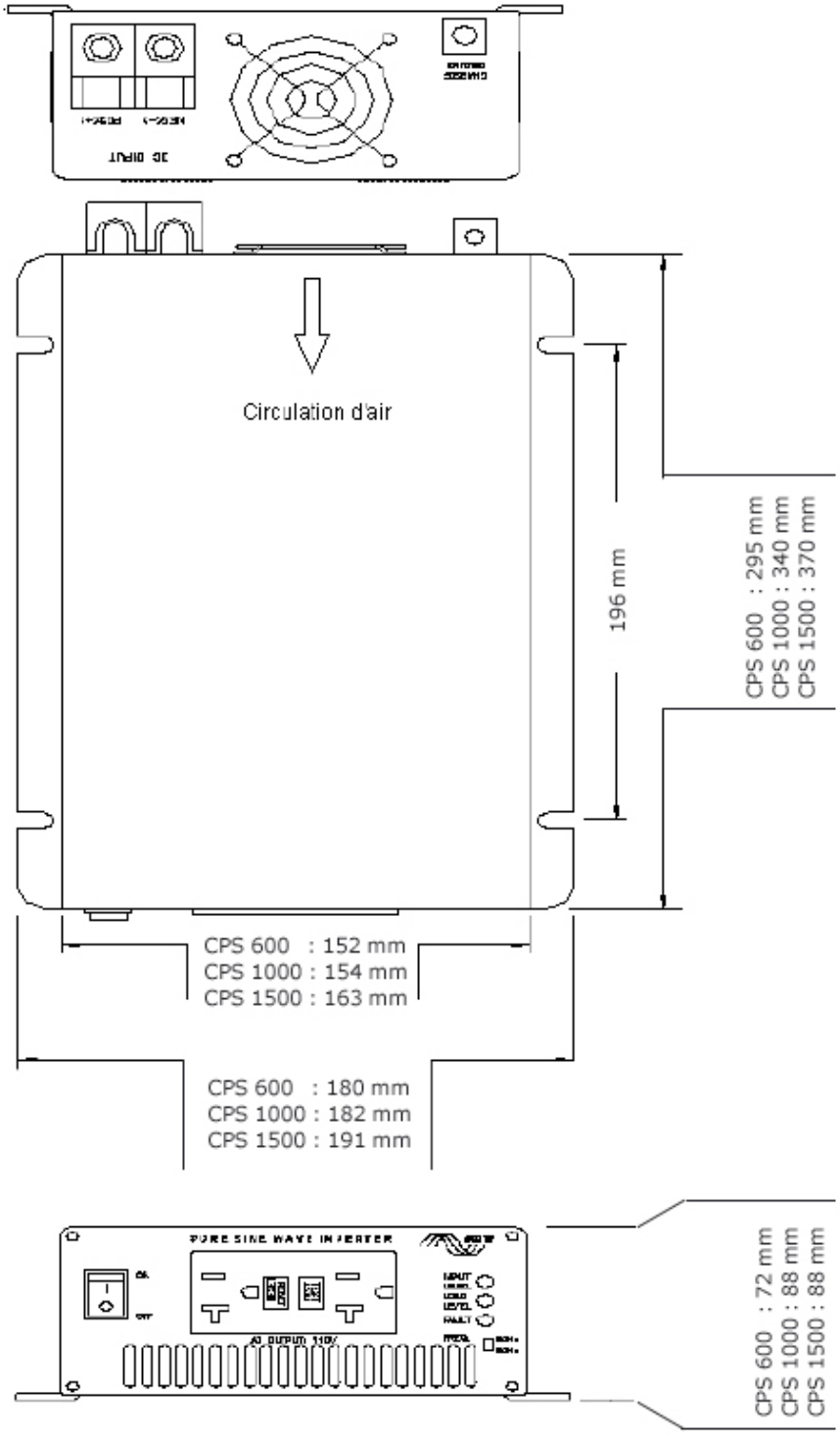
## Version 24 VDC / 230 VAC

| **Model (nominal power)** | **600 W** | **1000 W** | **1500 W** | **2000 W** | **3000 W** |
|---|---|---|---|---|---|
| **Reference** | CPS 600 24 | CPS 1000 24 | CPS 1500 24 | CPS 2000 24 | CPS 3000 24 |
| **Peak Output power** | 800 W | 2000 W | 3000 W | 4000 W | 6000 W |
| **Input voltage** | 24 VDC | | | | |
| **Output voltage** | 220 / 230 / 240 VAC, +/-3% | | | | |
| **Frequency (switch selectable)** | 50 / 60 Hz +/-0,05% | | | | |
| **Output waveform** | Sinusoïdal wave < 3% DHT | | | | |
| **Efficiency** | 93 % | 93 % | 93 % | 94 % | 93 % |
| **No load current draw** | 0,43 A | 0,60 A | 0,70 A | 1,32 A | 1,50 A |
| **Stand-by current draw** | -- | 0,15 A | 0,15 A | 0,25 A | 0,35 A |
| **Input level indicator** | LED red / orange / green | | | | |
| **Output level indicator** | | | | | |
| **Failure indicator** | LED red | | | | |
| **Overheating** | Automatic power cut,<br>Automatic restart when cooled down. | | | | |
| **Protection** | Overload, short-circuit, polarity inversion,over temp, Over/under input voltage<br>AC input circuit breaker . | | | | |
| **Remote control unit** | Optional | | | | |
| **Security** | EN60950-1<br>UL458 | | | | |
| **EMC** | FCC Classe A<br>EN55022 classe A<br>EN61000-3-2, 3<br>Marquage e 13 * 72/245/EEC, 95/54/EC | | | | |
| **Operating temp range** | 0 to +40°C | | | | |
| **Storage temp** | -30°C to +70°C | | | | |
| **Cooling** | Loading controlled cooling fan | | | | |
| **Dimensions (mm)** | L : 295<br>l : 180<br>H : 72 | L : 383<br>l : 182<br>H : 88 | L : 415<br>l : 191<br>H : 88 | L : 422<br>l : 208<br>H : 166 | L : 452<br>l : 208<br>H : 166 |
| **Weight (Kg)** | 2,7 | 4 | 4,8 | 9 | 9,8 |

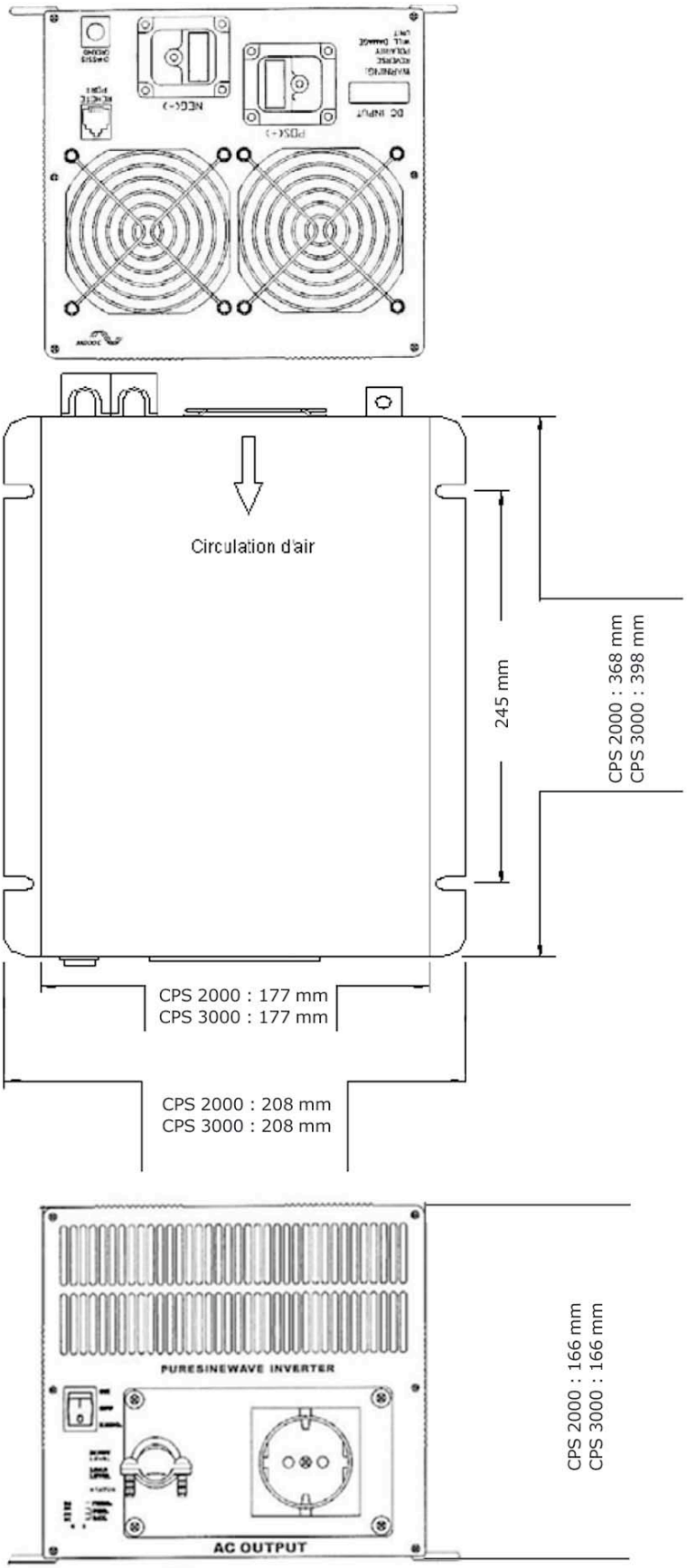
Note : : the specifications are subject to change without notice.

## 2.3 Volume

### Models 600 W – 1000 W – 1500 W



## Models 2000 W – 3000 W



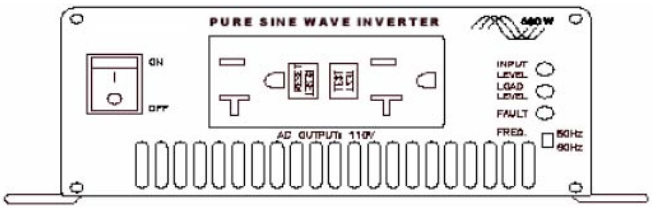
# 3 Introduction

This range of DC/AC inverters are part of the mobile alternative power supply systems, the most advanced available on the market today.

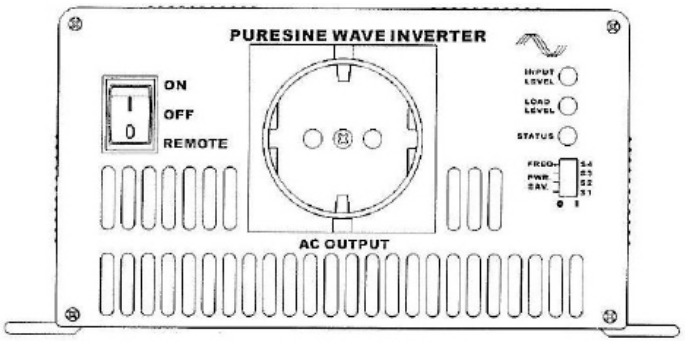
To attain these optimal performances, the inverter must be installed correctly. Pleas read the instructions in this manual before using the inverter.

## 3.1 Operations on the front face

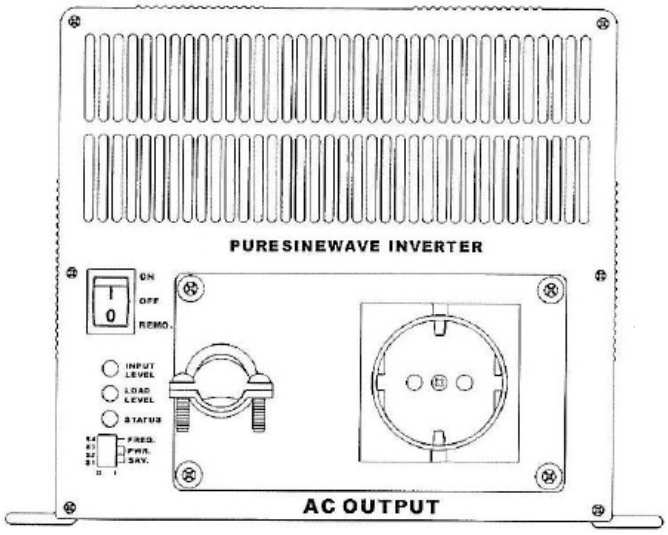
**Model 600 W**




**Model 1000 W & 1500 W**




**Model 2000 W & 3000 W**




**Switch On / Off / Remote**

-Before using the inverter, make sure the main switch is « Off ».

- Before using the remote control, make sure that the sitch is on « Remote ».

**Current voltage reading**

| | **12 VDC** | **24 VDC** |
|---|---|---|
| Led red (flashes slow) | 10.5 to 10.9 | 21.0 to 21.8 |
| Led red | 10.9 to 11.3 | 21.8 to 22.6 |
| Led orange | 11.3 to 12.0 | 22.6 to 24.0 |
| Led green | 12.0 to 14.0 | 24.0 to 28.0 |
| Led orange (flashes slow) | 14.0 to 14.7 | 28.0 to 29.4 |
| Led orange (flashes rapidly) | > 14.7 | > 29.4 |

**Charge levels : Consomption display AC (Watts)**

| | **Led black** | **Led green** | **Led orange** | **Led red** | **Led red (flash)** |
|---|---|---|---|---|---|
| **CPS 600** | 0 to 30 | 30 to 200 | 200 to 450 | 450 to 580 | > 580 |
| **CPS 1000** | 0 to 50 | 50 to 330 | 330 to 750 | 750 to 960 | > 960 |
| **CPS 1500** | 0 to 75 | 75 to 495 | 495 to 1125 | 1125 to 1450 | > 1450 |
| **CPS 2000** | 0 to 100 | 100 to 660 | 660 to 1500 | 1500 to 1920 | > 1920 |
| **CPS 3000** | 0 to 150 | 150 to 990 | 990 to 2250 | 2250 to 2880 | > 2880 |

**Functioning mode display and the default causes**

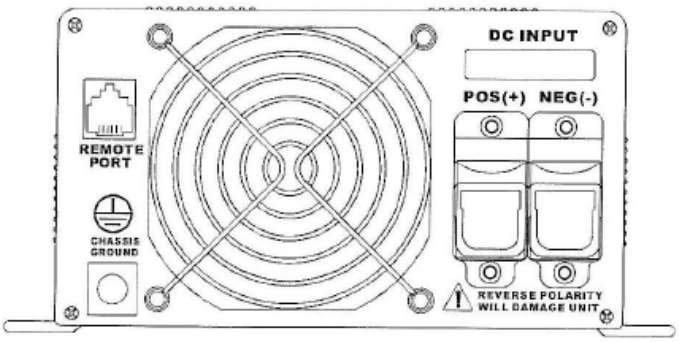
| | **Signal** | **État** |
|---|---|---|
| Led green (fix) | ——— | In function |
| Led green (flashing) | **- - - - - - - - - -** | Power save |
| Led red (rapid flashing) | **----------** | Overload |
| Led red (slow flash) | **- - - - - - - - - -** | Underload |
| Led red (intermittant) | **-- -- -- -- --** | Overheating |
| Led red (fix) | ——— | Overload |

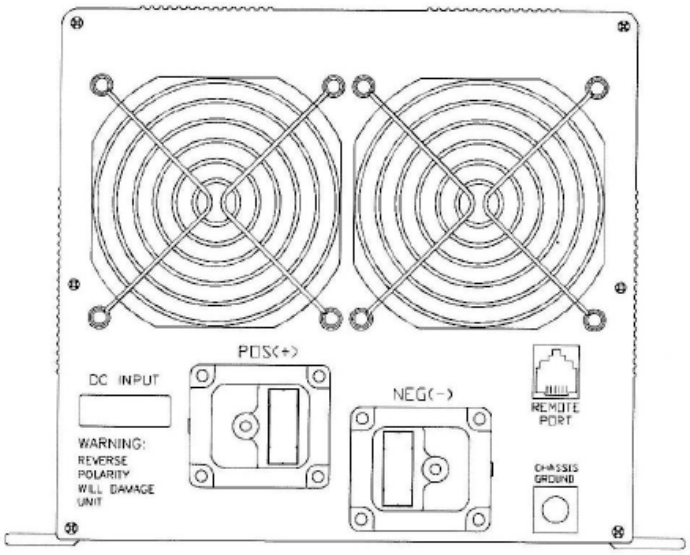
**Power Save Mode**
Selected and adjusted Dip Switches S1, S2 & S3 on the face plate.

*Example : with a 15W setting, a charge of more than 15 W will make the inverter work normally, but with a charge of less than 15 W, the inverter will commute to Power save mode.*

| **CPS 1000 CPS 1500** | **CPS 2000 CPS 3000** | **S1** | **S2** | **S3** |
|---|---|---|---|---|
| Disactivated | Disactivated | OFF | OFF | OFF |
| 20W | 40W | ON | OFF | OFF |
| 40W | 80W | OFF | ON | OFF |
| 50W | 100W | ON | ON | OFF |
| 60W | 120W | OFF | OFF | ON |
| 80W | 160W | ON | OFF | ON |
| 90W | 180W | OFF | ON | ON |
| 110W | 220W | ON | ON | ON |

### 3.2 Operations on the rear face




**Remote Control connector (remote port)** : Available on option.
Before using the remote control be sure that the main switch is on the « remote » position.

**<u>600 W model exclusivly</u> : ON/OFF terminal for remote control**
In order to make the remote control work, it is necessary that the switch be at the OFF position on the face of the inverter. Before connecting, make sure that the remote is on the OFF position.
Make the connection between the remote and the terminal marked « Remote port » at the rear of the inverter with a 2,5 à 0,5 $mm^2$ (14-20 AWG) cable section depending on the distance. If the contact on the remote control is closed, the inverter starts working.

**Airiation & ventilator slots**
Do not obstruct; foresee at least 3 cm of space for air circulation.

**DC entry connectors**
To connect to a 12 or 24V battery or Direct current sources in 12 or 24V.
(+) is the positive pole.
(-) is the negative pole.
A polarity inversion will blow the internal fuse and could damage the inverter irreversibly.

| Version | DC entry current | |
|---|---|---|
| | Mini | Maxi |
| 12 V | 10,5 | 15,0 |
| 24 V | 21,0 | 30,0 |

**Earthing the chassis**
Connect the earth terminal of the chassis to the chassis of the vehicle via an 8 $mm^2$ section of cable.

**WARNING :**
- Using the inverter without an earth connection could result in a severe electrocution.
- Do not connect a 12 V inverter to a 24 V battery. The inverter would be instantly destroyed.

### 3.3 Installation

Where to install it :
- **Dry** : Do not allow water to splash or drip onto the inverter.
- **Cool** : Ambiant air temperature should be between 0°C & 40°C. The cooler the better.
- **Safety** : Do not install the inverter near or in the battery compartment where flammable fumes exist, such as fuel storage areas or engine compartments.
- **Ventilated** : Allow for at least 2,5 cm clearance minimum around the inverter for air circulation. Assure that the vent shafts on the rear and the bottom of the unit are not obstructed.
- **Dust free** : Do n ot install the inverter in a dusty environment, where dust, wood particles or other shavings are present. The dust can be pulled into the unit when the cooling fan is in operation.
- **Close to the batteries** : Avoid excessive cable lengths, but do not instal the inverter in the same compartment as the batteries. Use the recommended wire lengths and sizes– see section 3.4. Do not mount the inverter at the place where it is exposed to the gases produced by the battery. These gases are corrosive and prolonged exposure will damage the inverter.

**Warning : Shock hazard.**
Before proceeding further, carefully check that the inverter is NOT connected to any batteries and that all wiring is disconnected from any electrical sources. Do not connect the output terminals to any incoming AC source.

### 3.3 DC Wiring Connections
Follow the instructions to connect the battery cabls to DC input terminals of the inverter. The cable should be as short as possible (ideally inferior to 1,80 m) so that it can handle the required current in accordance with the electrical codes or regulation applications.

Inappropriate length of cables will deteriorate the inverter performance such as poor surge capability, frequent low input voltage warnings and shutdown. UVP warnings occur when DC voltage drops across the cables from the inverter to the batteries.

The longer or narrower the cable, the more the voltage drops. Increasing your DC cable size will help improve the situation.

The following recommended cables are for the best performance of the inverter.

| **Model** | **Recommended Section** | **Recommended Fuse** |
|---|---|---|
| CPS 600 12 | 25 $mm^2$ | 100 A |
| CPS 600 24 | 16 $mm^2$ | 50 A |
| CPS 1000 12 | 35 $mm^2$ | 150 A |
| CPS 1000 24 | 25 $mm^2$ | 80 A |
| CPS 1500 12 | 35 $mm^2$ | 200 A |
| CPS 1500 24 | 25 $mm^2$ | 100 A |
| CPS 2000 12 | 70 $mm^2$ | 250 A |
| CPS 2000 24 | 50 $mm^2$ | 125 A |
| CPS 3000 12 | 100 $mm^2$ | 400 A |
| CPS 3000 24 | 70 $mm^2$ | 200 A |

Connect the cables to the power input terminals on the front panel of the inverter. The red terminal is positive (+) and the black terminal is negative (-). Insert the cables into the terminals and tighten the screw to clamp the wires securely.

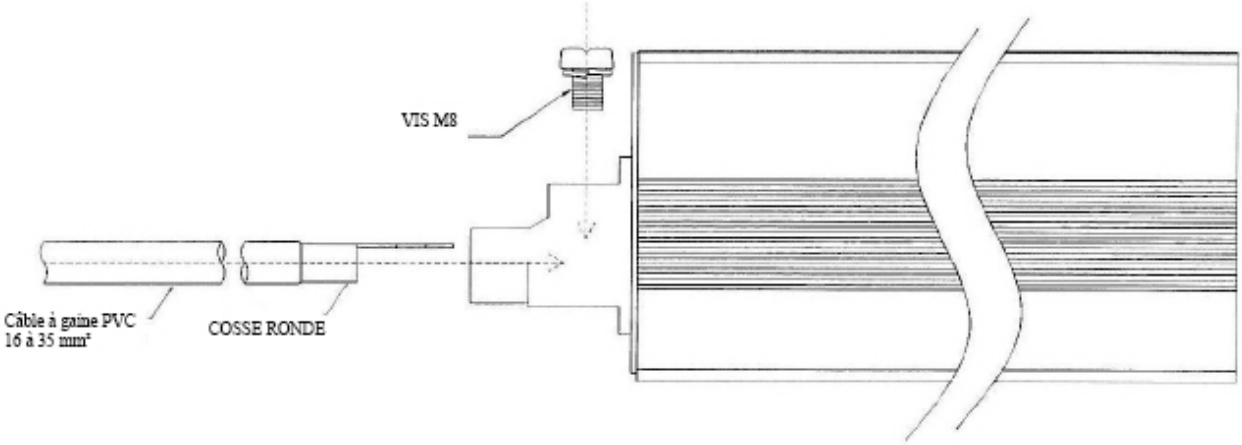
**WARNING**
Make sure all the DC connections are tight (tighten from 11,7 to 13 Nm). Loose connections could result in overheating and become a potential hazard.

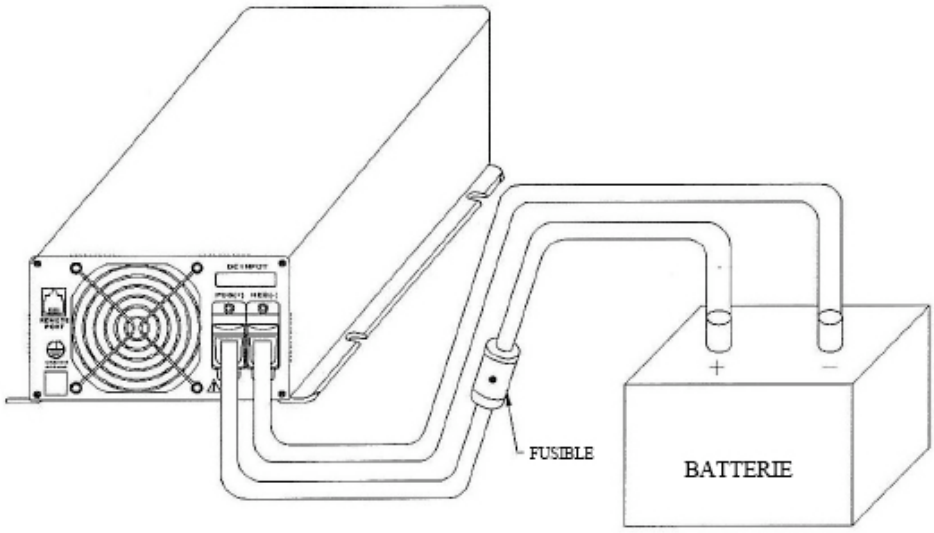
The installation of the fuse must be on a positive cable. Failure to place the fuse on a "+" cable running between the inverter and battery may cause damage to the inverter and will void the warranty.

We also advise you to use high quality copper wire and keep the cable lengths short, a maximum of 1 to 2m.

## Models 600 W, 1000 W & 1500 W

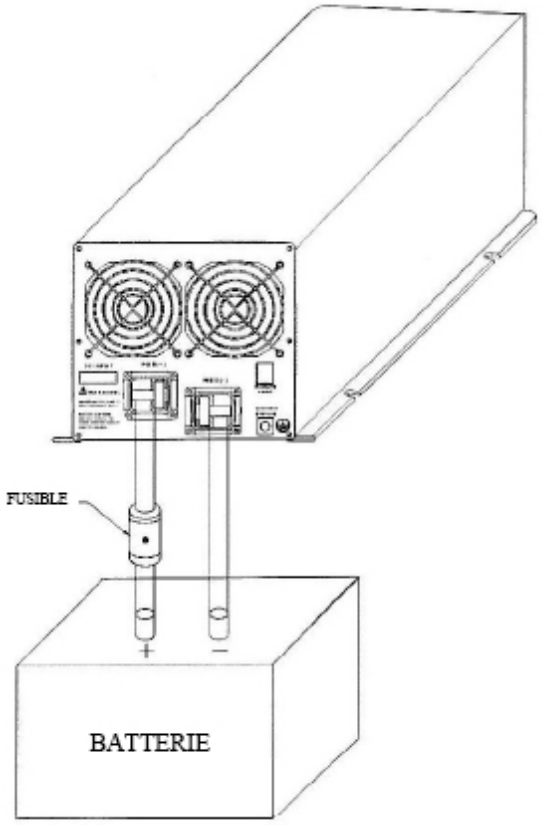
Connection of the battery cables to the inverter



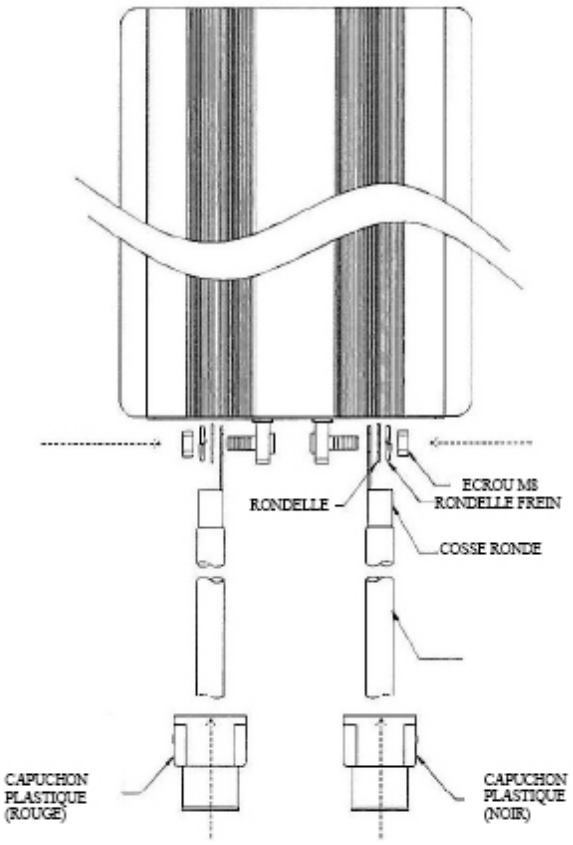




Do not place anything between the battery and the surface of the terminal.
Assemble exactly as indicated in the diagram.

**Models 2000 W & 3000 W**




Connecting the battery cable to the inverter




Do not place anything between the battery and the surface of the terminal.
Assemble exactly as indicated in the diagram.

## 3.4 AC Earthing

The Earth ground cable at the AC outlet must go to the common ground (for example the earth terminal on an electrical board).

**Neutral to ground earth**
The phase and neutral are totally isolated from the ground chassis and consequently, from the earth cable.

Differential circuit breakers (G.F.C.I : Ground Fault Circuit Interrupters) :
The installations embedded in leasure vehicles (for North American approbations), necessitates protection via a differential trip switch of the totality of the connected circuits at the AC outlet for inverters equipped with an outlet terminal. Electrical regulations require that certain pieces have a differential protection in certain residential installations.
The sinusoïdal outlet wave of the inverter, being equivalent to that of mains power, the agreement to UL standards imposes us to test and recommend specific differential switches.

## 3.5 Using the Inverter

To use the inverter, put it in function via the switch ON / OFF. On the front face. The inverter is now ready to supply alternative currant to your equipment. If your are powering many appliances, switch them on one afetr the other, in function to the power of the. This will help the inverter to avoid simultaneous power peaks on the start up phase.

Set the inverter switch to the ON position ; the « buzzer » generates « beeps » while the inverter proceeds with its auto diagnostic, then the LED indicators will light up diverse colors.
At the end, the « buzzer » will generate another « beep » and the entry and charge level indicators turn to green, and the inverter will start to function correctly.

Switch the inverter to the OFF position; the inverter will stop and all the LED witness lights will stop.

Switch the inverter ON, and start the charge test. The inverter should start the charge power. If you wish to measure precisely the true outlet current of the inverter, you must use a voltmeter which reads “true r.m.s.”

# 4 Trouble shooting guide

**WARNING**
Do not open or dismantle the inverter.
Attempting to repair the inverter yourself will expose you to the risk of electrical shocks, or fire.

| Problems & symptoms | Possible Causes | Solutions |
|---|---|---|
| *No AC power « Output » : status illuminates the red LED.* | | |
| LED blinking fast | Over input voltage | Check the input voltage, reduce input voltage |
| LED blinking slowly | Low input voltage UVP | Recharge the battery. Check the connections and cables |
| Intermittent Blinking | Thermal shutdown | Improve ventilation. Make sure ventilation shafts at the rear are not obstructed. Lower ambient temp. |
| Steady light | Short circuit. Wiring error. Over load (OLP) | Check AC wiring for short circuits. Reduce load |

# 5 Maintenance

Very little maintenance is required to keep your inverter operating correctly. You should clean the exterior of the unit periodically with a damp cloth to prevent accumulation of dust and dirt. At the same time, tighten the screws on the DC input terminals.

# 6 Garantie

We guarantee this product against defaults in materials and workmanship for a period of **2 years from the date of purchase**. All material returned directly by paid postage will be either repaired or replaced.

This guarantee will be **void** if the inverter has been damaged or suffered internal or external modifications, resulting *in non conformity of use*, i.e. connecting to a non adequate energy source, attempts to connect to equipment with excessive and inappropriate powers, or use in environments where this type of inverter is not recommended. TECSUP is not liable for anything that occurs as a result of the users fault.

# 7 Compliancy Declarations

Tecsup holds in your disposition all certificates compliance declarations relative to these Inverters :

- EU Compliancy Declaration
- FCC Compliancy Declaration
- e Marking Compliancy Declaration
- Certificat UL 458

## To Contact Us

**TECSUP**
32, route des Moulins - BP116 - 74410 Saint-Jorioz - Annecy - France
www.tecsup.fr