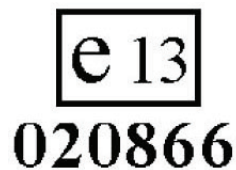


# S600,S600R Series Pure Sine Wave Inverter User's Manual



# List of contents

<b>1. Important Safety Instructions.....</b>	<b>1</b>
1-1 General Safety Precautions.....	1
1-2 Precautions When Working With Batteries.....	1
<b>2. Features.....</b>	<b>2</b>
2-1 Application.....	2
2-2 Electrical Performance.....	3
2-3 Mechanical Drawings.....	4
<b>3. Introduction.....</b>	<b>5</b>
3-1 Front Panel Operations.....	5~6
3-2 Rear Panel Operations.....	7~8
3-3 Installation.....	9
3-4 Quick hook – up and testing.....	10~11
3-5 AC Safety Grounding.....	12~13
3-6 Making DC Wiring Connections.....	13~14
3-7 Inverter Operation.....	15
<b>4. Troubleshooting guide.....</b>	<b>16</b>
<b>5. Maintenance.....</b>	<b>17</b>
<b>6. Warranty.....</b>	<b>17</b>

# 1. Important Safety Instructions



## **WARNING!**

Before you install and use Your Inverter, be to read and save these 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 result.
- 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.

### **1-2. Precautions When Working with Batteries**

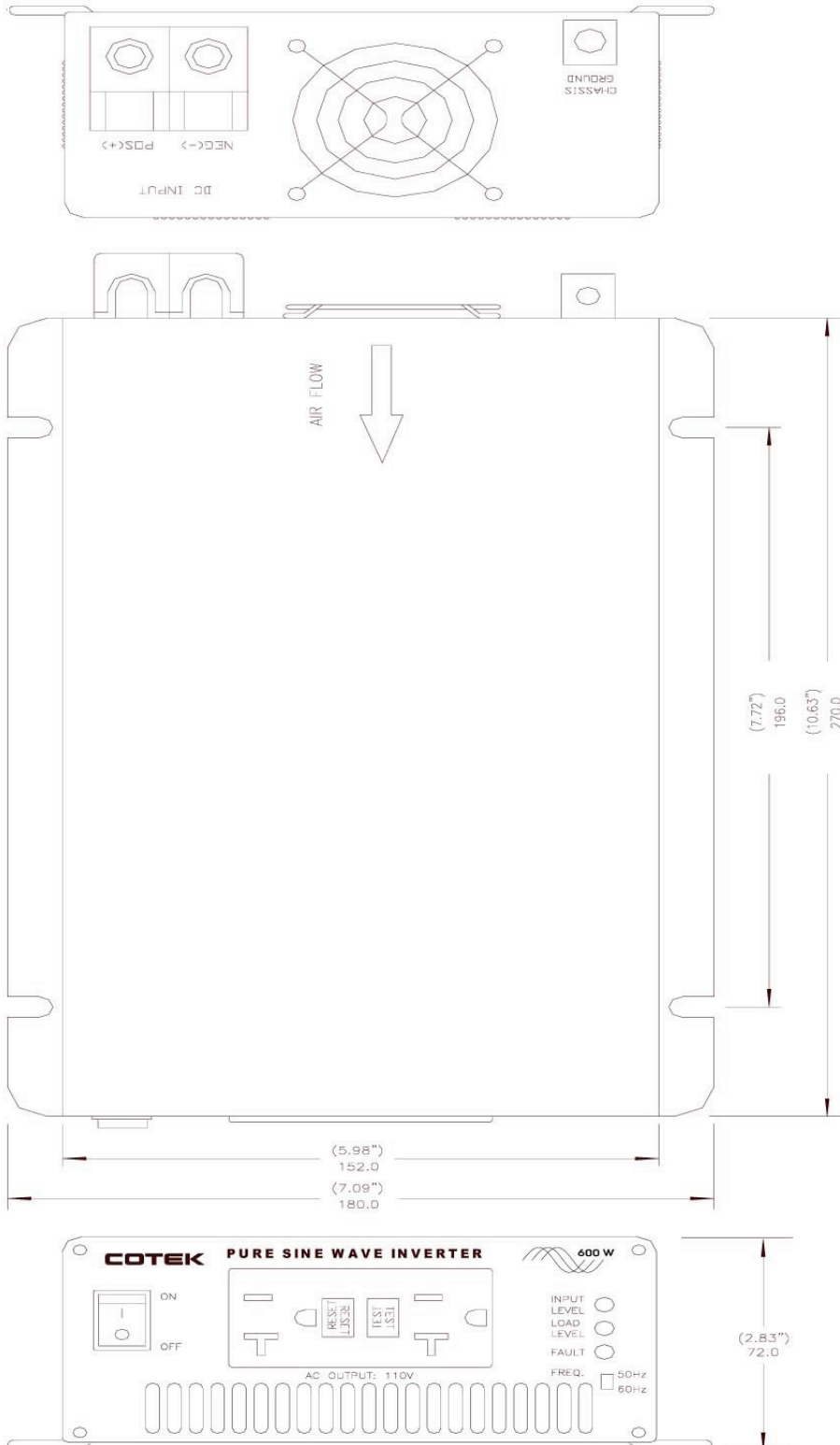
- 1-2-1. If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running cold water for at least 20 minutes and get medical attention immediately.
- 1-2-2. Never smoke or allow a spark or flame in vicinity of battery or Engine.
- 1-2-3. Do not drop a metal tool on the battery. The resulting spark or short-circuit on the battery or 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.



## 2-2. Electrical Performance

Specification	Model No.					
	S600-112	S600-124	S600-148	S600-212	S600-224	S600-248
Continuous Output Power	600W					
Maximum Output Power (3Min.)	680W					
Surge Rating	800W					
Input voltage	12V	24V	48V	12V	24V	48V
Output Voltage	100 / 110 / 120V ± 3%			220 / 230 / 240V ± 3%		
Frequency (Switch Selectable)	50 / 60Hz ± 0.05%					
Efficiency (full load)	87.0%	90.0%	92.0%	90.0%	93.0%	94.0%
No Load Current Draw	0.87A	0.43A	0.23A	0.83A	0.43A	0.22A
Output Waveform	Pure Sine Wave ( THD < 3% )					
Output voltage Regulation	100 / 110 / 120V RMS -10%/+4%			220 / 230 / 240V RMS -10%/+4%		
Input Voltage Regulation	10.5-15 VDC	21.0-30 VDC	42-60 VDC	10.5-15 VDC	21.0-30 VDC	42-60 VDC
Input Level Indicator	Red / Orange / Green LED					
Load Level Indicator						
Failure Indicator	Red LED					
Protection	Overload, Short Circuit, Reverse Polarity (Fuse), Over / Under Input Voltage, Over Temperature.					
Safety	UL458			EN60950		
EMC	FCC Class B			EN50081-1 : 1992 EN50082-1 : 1992 EN55022B : 1994 EN61000-4-2 : 1995 EN61000-4-3 : 1996 ENV50204 : 1995		e-Mark e13-020866
Operating Temperature Range	0 – 40 °C					
Storage Temperature Range	-30°C to 70°C					
Cooling	Loading controlled cooling fan					
Dimensions	295(L) x 180(w) x 72(H) mm / 11.61(L) x 7.09(W) x 2.83(H) Inch					
Weight	2.7 kgs. / 5.4 Lbs.					
★★ Model S600R differs from Model S600 by the addition of a remote ON/OFF port . ★★						

## 2-3. Mechanical Drawings



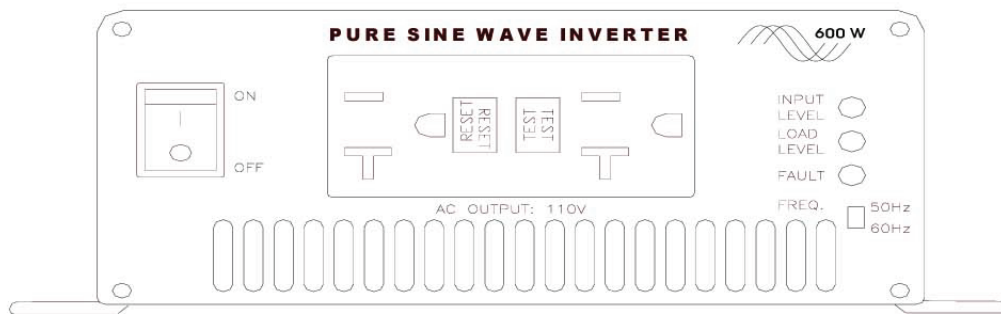
# 3. Introduction

This power inverter series is a the member of the most advanced line of mobile AC power systems available.

To get the most out of the power inverter, it must be installed and used properly. Please read the instructions in this manual before installation and operation this model.

## 3-1. Front Panel Operations :

### 3-1-1. Front view :



### 3-1-2. ON / OFF switch :

Power ON / OFF switch, leave in the OFF position during installation.

### 3-1-3. Input Level : Display Input Voltage

LED Status	DC 12V	DC 24V	DC 48V
Red Blink (Slow)	10.5~10.9	21.0~21.8	42.0~43.6
Red	10.9~11.3	21.8~22.6	43.6~45.2
Orange	11.3~12.0	22.6~24.0	45.2~48.0
Green	12.0~14.0	24.0~28.0	48.0~56.0
Orange Blink	14.0~14.7	28.0~29.4	56.0~58.8
Red Blink (Fast)	14.7↑	29.4↑	58.8↑

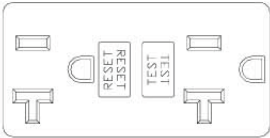

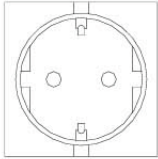
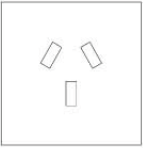
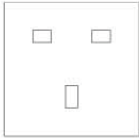
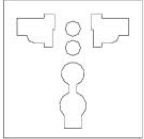
### 3-1-4. Load Level : Display AC Load Watts

LED Status	Load Condition
Dark	0 ~ 30W
Green	30W ~ 200W
Orange	200W ~ 450W
Red	450W ~ 580W
Red Blink	Over 580W

### 3-1-5. Fault : Display fault status

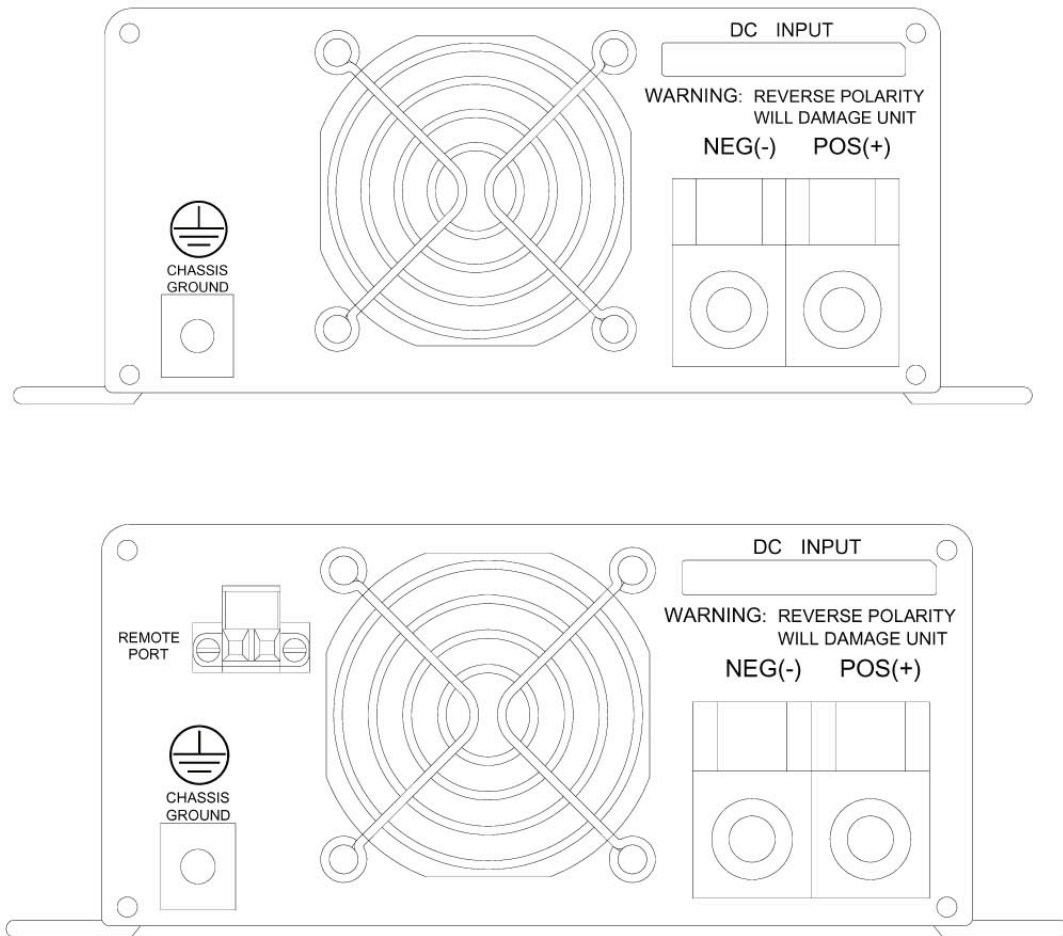
Red LED	Conditions	Status
Blink (Fast)	-----.	OVP
Blink (Slow)	- - - -	UVP
Blink (Intermittently)	.. ..	OTP
Blink (Solid)	—————	OLP

### 3-1-6. AC outlet (Outlet sockets available) :

<b>North America (GFCI)</b>	<b>North America</b>
	
<b>Continental European (SCHUKO)</b>	<b>Australia / New Zealand</b>
	
<b>United Kingdom</b>	<b>Universal</b>
	



## 3-2. Rear Panel Operations :



### 3-2-1. Remote ON / OFF switch for S600R model only.

3-2-1-1. In order for the Remote ON / OFF switch to operate inverter, ON / OFF switch on the Front Panel must be off.

3-2-1-2. Make sure the remote control contact is off.

3-2-1-3. Using 14 ~ 20 AWG wire, make remote ON / OFF connection from the Rear Panel Terminal marked "REMOTE PORT" to a remote control contact. If the remote control contact is in low impedance ( short ) state, the inverter will be turned ON and if the remote control contact is in high impedance ( open ) state, the inverter will be turned OFF.

### 3-2-2. Ventilation window :

Do not obstruct, allow at least 3 inch for proper air flow.

### 3-2-3. Input terminals :

Connect to 12v / 24V / 48V battery or other 12V / 24V / 48V power source.

【 + 】 is positive, 【 - 】 is negative. Reverse polarity connection will blow internal fuse and may damage inverter permanently.



#### **WARNING!**

Do not connect the 12V model to a 24 battery,  
The unit will be destroyed immediately.

### 3-2-4. Chassis ground or to vehicle chassis using #8 AWG wire.



#### **WARNING!**

Operation of the inverter without a proper ground connection may result in an electrical safety hazard.

### 3-3. Installation :

Where to install. The power inverter should be installed in a location that Meets the following requirements :

- 3-3-1. Dry – Do not allow water to drip or splash on the inverter.
- 3-3-2. Cool – Ambient air temperature should be between 0°C and 33°C, the cooler the better.
- 3-3-3. Safe – Do not install in a battery compartment or other areas where flammable fumes may exist, such as fuel storage areas or engine compartments.
- 3-3-4. Ventilated – Allow at least one inch of clearance around the inverter for air flow. Ensure the ventilation openings on the rear and bottom of the unit are not obstructed.
- 3-3-5. Dust – Do not install the Inverter in a dusty environments where are dust, wood particles or other filings/shavings are present. These dust can be pulled into the unit when the cooling fan is operating.
- 3-3-6. Close to batteries – Avoid excessive cable lengths but do not install the Inverter in the same compartment as batteries. Use the recommended wire lengths and sizes (see section 3-6). Also do not mount the Inverter where it will be exposed to the gases produced by the battery. These gases are very corrosive and prolonged exposure also 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 of the Inverter to an incoming AC source.

### 3-4. Quick hook – up and testing :

For a quick hook – up of the power inverter to check its performance before going ahead with installation, please follow these guidelines :

3-4-1. Unpack and inspect the power inverter to check its performance switch in the OFF position.

3-4-2. Connect the cables to the power input terminals on the rear panel of power inverter. The red terminal is positive (+) and black terminal is negative (-). Insert the cables into the terminals and tighten screws to clamp the wires securely.



#### **WARNING!**

You may observe a spark when you make this connection since current may flow to charge capacitors in the power inverter. Do not make this connection in the presence of Flammable fumes. Explosion or fire may result.



#### **WARNING!**

Make sure all the DC connections are tight (torque to 9 – 10 ft-lbs, 11.7 – 13 Nm). Loose connections overheat and could result in a potential hazard.

3-4-3. Before proceeding further, carefully check that cable you have connected does tie negative terminal of inverter to the negative output power source.



**CAUTION !**

Reverse polarity connection will blow a fuse in inverter and may permanently damage the inverter. Damage caused by reverse polarity connection is not covered by warranty.

3-4-4. Connect the cable from the negative terminal of the inverter to the negative terminal of the power source. Make a secure connection.

3-4-5. Set the power switch to the “ON” position and the buzzer will send out “Beep sounds” sounds at the moment the inverter will do self-diagnosis and the LED’s indicators will also appear various colors. Finally the buzzer will send out another “Beep” sound and the Input Level LED indicators will turn to “Green” color and the inverter starts working successfully.

3-4-6. Set the power switch to the OFF position, the inverter stops and all the lights that are On, and then go Off.

3-4-7. Set power inverter switch to the ON position and turn the test load on. The inverter should supply power to the load. If you plan to accurately measure the true output r.m.s. voltage of inverter, a meter such as FLUKE 45 BECKMAN 4410 or TRIPLETT 4200 must be used.

### 3-5. AC Safety Grounding :

During the AC wiring installation, AC input and output ground wires are connected to the inverter. The AC input ground wire must connect to the incoming ground from your AC utility source.

The AC output ground wire should go to the grounding point for your loads ( for example, a distribution panel ground bus ).

#### 3-5-1. Neutral Grounding (GFCI'S) :

3-5-1-1. **120V models** : The neutral conductor of the AC output circuit of the Inverter is automatically connected to the safety ground during inverter operation. This conforms to National Electrical Code requirements that separately derived AC sources (such as inverter and generators) have their neutral conductors tied to ground in the same way that the neutral conductor from the utility is tied to ground at the AC breaker panel. For models configured with a transfer relay, while AC utility power is presenting and the Inverter is in bypass mode, this connection (neutral of the Inverter's AC output to input safety ground) is not present so that the utility neutral is only connected to ground at your breaker panel, as required.



#### **WARNING!**

Risk of electronic shock. Use only Pass and Seymour, type 2091-W, 2094-W, GFCI receptacles. Other types may fail to operate properly when connected to this inverter equipment .

3-5-1-2. **230V models** : There is no connection made inside the Inverter from either the line or neutral conductor to the safety ground.

## Ground Fault Circuit Interrupters (GFCI) :

Installations in Recreational Vehicles (for North American approvals) will require GFCI protection of all branch circuit connected to the AC output of the hardwire terminal equipped Inverter. In addition, electrical codes require GFCI protection of certain receptacles in residential installations. While the pure sine wave output of the Inverter is equivalent to the waveform provided by utilities, compliance with UL standards requires us to test and recommend specific GFCI.

Cotek has tested the following GFCI – protected 20A receptacles and found that they functioned properly when connected to the output of the Inverter.



### **WARNING!**

Do not operate the power inverter without connecting it to ground.

Electrical shock hazard may result.

## 3-6. Making DC Wiring Connections :

Follow this procedure to connect the battery cables to the DC input terminals on the Inverter. Your cables should be as short as possible ( ideally, less than 10 feet / 3 meters ) and large enough to handle the required current in accordance with the electrical codes or regulations applicable to your installation.

Cables that are not an adequate gauge (too narrow) or are too long will cause decreased inverter performance such as poor surge capability and frequent low input voltage warnings and shutdowns.

These low input voltage warnings are due to DC voltage drop across the cables from the inverter to the batteries.

The longer and narrower these cables, the greater the voltage drop.



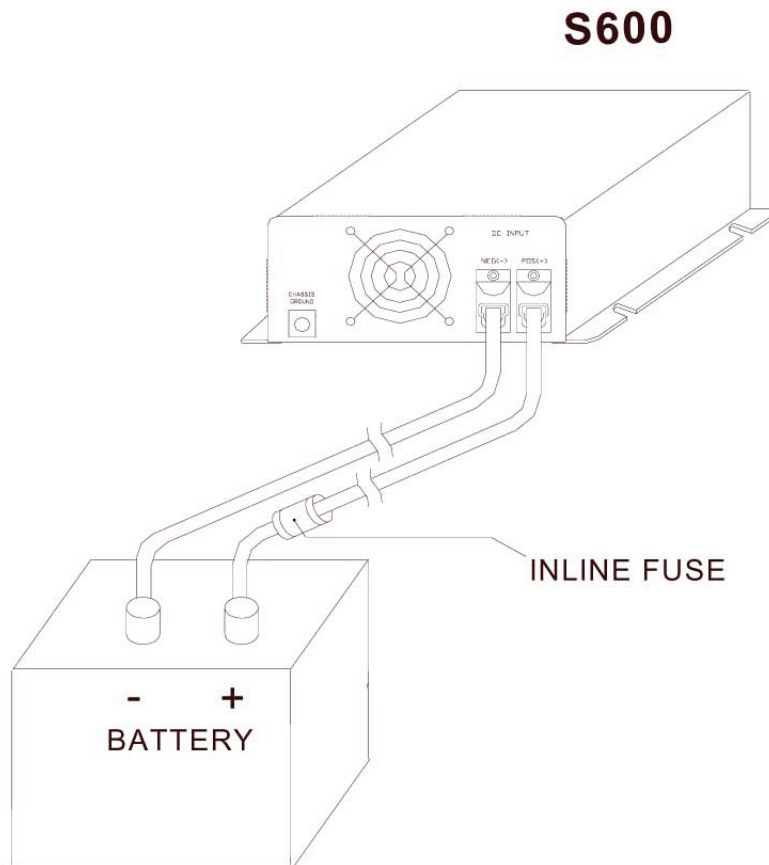
### **WARNING!**

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

Increasing your DC cable size will help improve the situation.  
 Cotek recommends the following cables for optimum inverter performance  
 ( apply both 120V and 230V versions )

Model No	Wire AWG	Inline Fuse
S600-112	# 4	100A
S600-212	# 4	100A
S600-124	# 6	50A
S600-224	# 6	50A

Also, use only high quality copper wiring and keep cable length short, a maximum of 3-6 feet.





### 3-7. Inverter Operation :

To operate the power inverter, turn it on using the ON / OFF switch on the Front panel. The power inverter is now ready to deliver AC power to your loads.

If you are operating several loads from the power inverter, turn them on separately after the inverter has been turned on.

This will ensure that the power inverter does not have to deliver the starting currents for all the loads at once.

#### 3-7-1. Controls and indicators :

The ON / OFF switch turns the control circuit in the power inverter on and off. It does not disconnect power from the power inverter. The Inverter operates from an input voltage ranging from :

10.5 to 15.0 VDC for 12V models

21.0 to 30.0 VDC for 24V models

42.0 to 60.0 VDC for 48V models

The Inverter will indicate high and low DC voltage conditions as follows :

Model	Dc Input over Voltage shut-down	Dc Input under Voltage alarm	Dc Input under Voltage shut-down
S600-112 S600-212	15.3	11.0	10.5
S600-124 S600-224	30.6	22.0	21.0
S600-148 S600-248	61.2	44.0	42.0

## 4. Troubleshooting guide :



### WARNING!

Do not open or disassemble the S600 Inverter. Attempting to service the unit yourself may result in a risk of electrical shock or fire.

Problems and Symptoms	Possible Cause	Solutions
<b>No output voltage, "FAULT" LED lights RED.</b>		
a. Fault level light is blinked fast.	Over input voltage. ( OVP )	Check input voltage. Reduce input voltage.
b. Fault level light is blinked slowly.	Low input voltage. ( UVP )	Recharge battery. Check connections and cable.
c. Fault level light is blinked Intermittently.	Thermal shutdown. ( OTP )	Improve ventilation. Make sure ventilation openings in inverter are not obstructed. Reduce ambient temperature.
d. Fault level light is ON.	Short circuit or Wiring error. Overload. ( OLP )	Check AC wiring for short circuit. Reduce load.

## **5. Maintenance :**

Very little maintenance is required to keep your inverter operating properly. 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. Warranty :**

We warrant this product against defects in materials and workmanship for a period of 24 months from the date of purchase and will repair or replace any defective Power Inverter when directly returned, postage paid, to us.

This warranty will be considered void if the unit has suffered any obvious physical damage or alteration either internally or externally and does not cover damage arising from improper use such as plugging.

The unit into an unsuitable power sources attempts to operate products with excessive power consumption requirements, or use in unsuitable environments.

This is the only warranty that the company makes.

No other warranties express or imply including warranties of merchantability and fitness for a particular purpose.

Repair and replacement are your sole remedies and the company shall not be liable for damages, whether direct, incidental, special or consequential, even though caused by negligence or other fault.