



2U x 19" rack mount

# FA - PSW5KVA Series

**Pure Sine Wave Inverter**

**Instruction Manual**

**FA-PSW245KVA/E**

**FA-PSW485KVA/E**

**FA-PSW1105KVA/E**

**FA-PSW2205KVA/E**

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# 1 Features

- n R Load Pure sine wave output (THD < 3%)
- n By pass function
- n Output frequency: 50 / 60Hz switch
- n RS-232 interface / remote controls port / Wire connection to PC
- n Wired Remote Control
- n Loading controlled cooling fan
- n Advanced microprocessor
- n Protection: Input Undervoltage  
Input Overvoltage  
Overload  
Short circuit  
Low battery alarm  
Over temperature

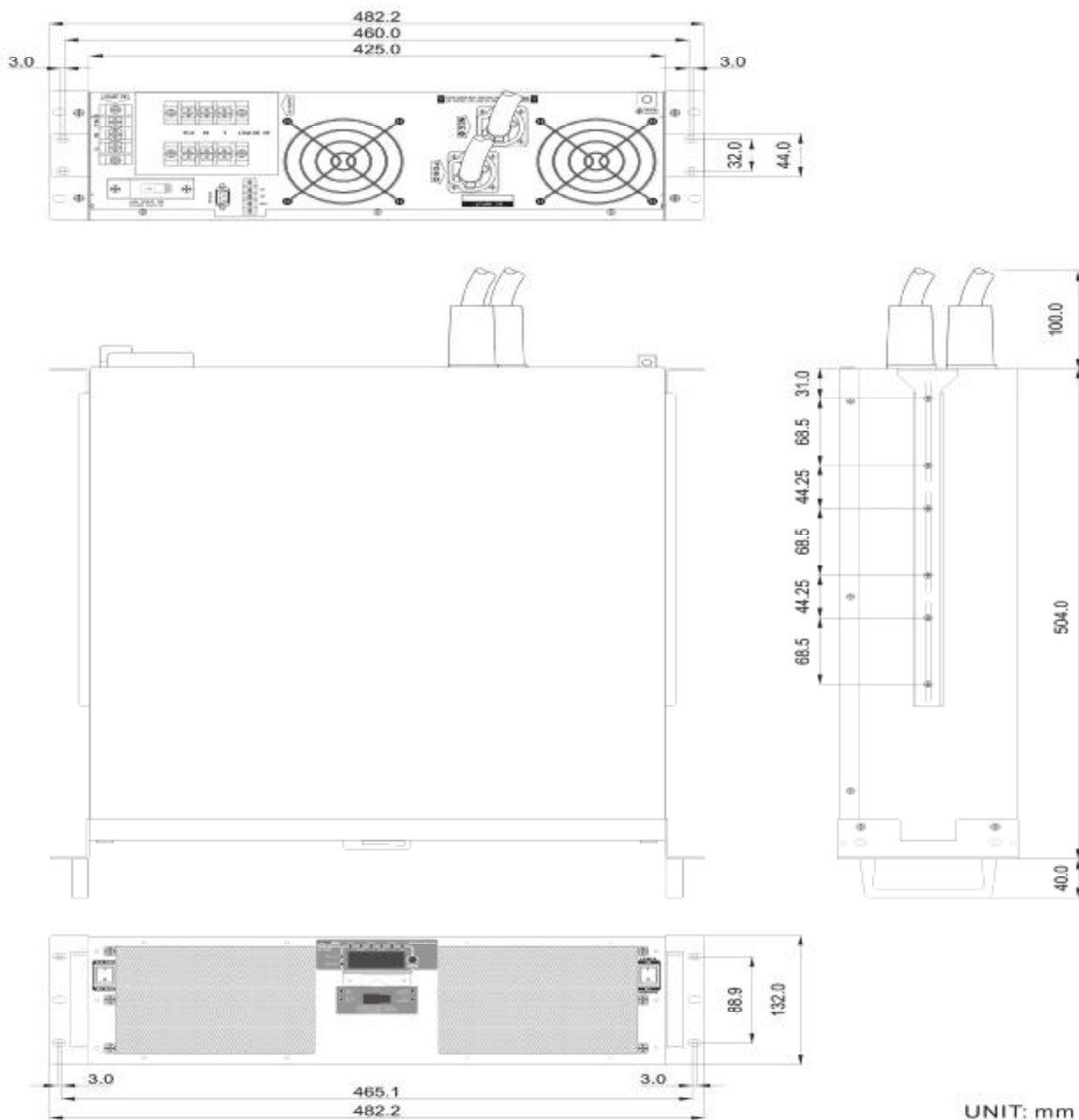
## 1-1 Utilities Application

- I Power tools – circular saws, drills, grinders, sanders, buffers, weed and hedge trimmers, air compressors.
- I Office equipment – computers, printers, monitors, facsimile machines, scanner.
- I Household items – vacuum cleaners, fans, fluorescent and incandescent lights, shavers, sewing machines,
- I Kitchen appliances – microwave ovens, refrigerators and freezers, coffee makers, blenders, ice markers, toasters.
- I Industrial equipment – metal halide lamp, high – pressure sodium lamp.
- I Home entertainment electronics – television, VCRs, video games, stereos, musical instruments, satellite equipment.

## 1-2 Electrical Performance

Specification	Model							
Item	RM-PSW 245KVA	RM-PSW 485KVA	RM-PSW 1105KVA	RM-PSW 2205KVA	RM-PSW 245KVAE	RM-PSW 485KVAE	RM-PSW 1105KVAE	RM-PSW 2205KVAE
Continuous Output Power	5000W							
Maximum Output Power	5200W (3 mins)							
Surge Rating	10000W							
Input Voltage	24V	48V	110V	220V	24V	48V	110V	220V
Input Voltage Range	20-32 VDC	42-62 VDC	90-140 VDC	180-275 VDC	20-32 VDC	42-62 VDC	90-140 VDC	180-275 VDC
DC Input over voltage alarm	31VDC	61VDC	135VDC	270VDC	31VDC	61VDC	135VDC	270VDC
DC Input over voltage shut-down	32VDC	62VDC	140VDC	275VDC	32VDC	62VDC	140VDC	275VDC
DC Input under voltage alarm	21VDC	43VDC	95VDC	185VDC	21VDC	43VDC	95VDC	185VDC
DC Input under voltage shut-down	20VDC	42VDC	90VDC	180VDC	20VDC	42VDC	90VDC	180VDC
No load Current Draw	1.64A	0.82A	0.42A	0.24A	1.30A	0.68A	0.35A	0.18A
Output Voltage Adjustment	100 ~ 120V (Tune VR)				200~240V (Tune VR)			
Frequency	50/60Hz ± 0.05% ( Switch Selectable)							
Peak Output Current	91A				45A			
Efficiency (full load)	85%	87%	90%	92%	90%	92%	94%	94%
Stand by Current Draw	≤ 1.5W Power Saving Mode							
Output Waveform	R Load Pure Sine Wave < 3% TH							
Protection	Overload, Short Circuit, Reverse Polarity (fuse), Input Undervoltage, Input Overvoltage , Over Temperature.							
Digital Display	OVP, UVP, OTP, OLP, VAC, AMP, WATT, VDC, TEMP, Hz							
Safety	EN60950-1							
Interface Control Unit	RS-232C with Baud Rate 2400, 4800, 9600, 19200 (Switch Selectable)							
Remote Control Unit	Optional							
AC Input	110V AC				220V AC			
AC Frequency	(50Hz ~ 60 Hz) ± 3%				(50Hz ~ 60 Hz) ± 3%			
Bypass	4~6ms				4~6ms			
Operating Temperature Range	-20°C to 50°C							
Storage Temperature Range	-30°C to 70°C							
Dimensions	504(L) x 425(W) x 132(H)mm							
Cooling	Loading controlled cooling fan							
Weight	19kgs							

### 1-3 Mechanical Drawings



UNIT: mm

## 2 Introduction:

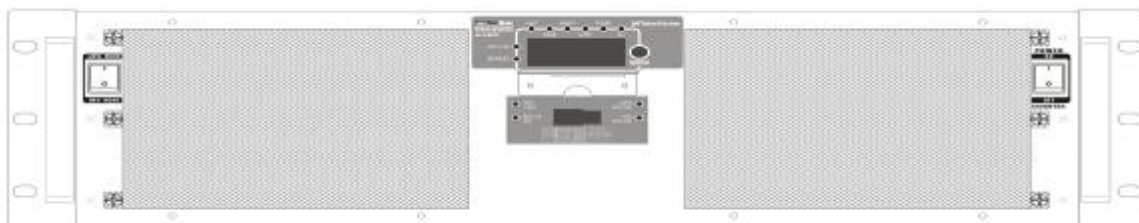
The power inverter series are the member of the most advanced line of mobile AC power systems available.

To get the most out of the power inverter, it must be installed and used properly.

Please read the instructions in this manual before installing and using this model.

### 2-1 Front Panel Operation:

2-1-1 Front view:



2-1-2 ON / OFF switch:

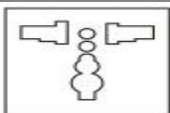
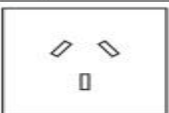
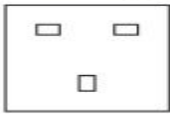
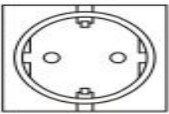

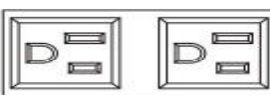
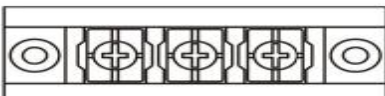
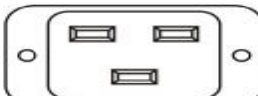
Please leave in the OFF position during installation.

2-1-3 Function Key

When sequentially push "Function Key", it will display various status on the function screen, Such as VAC, Amp, watts... and so on.

When malfunction is occurred, its display will be flashed on the screen.

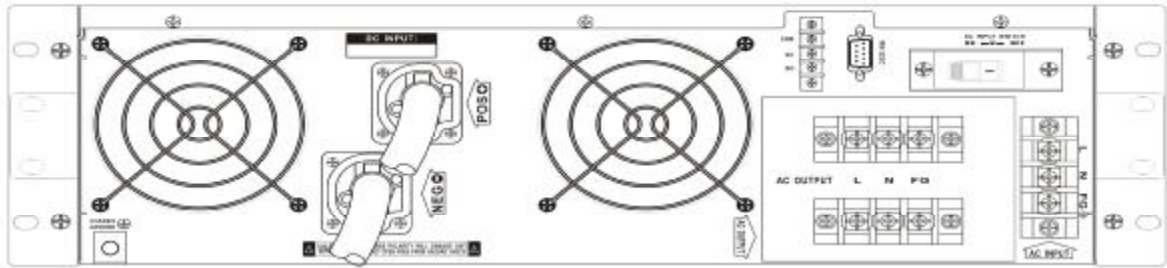
2-1-4 AC outlet (Outlet sockets available):

<b>Universal</b>	<b>Australia / New Zealand</b>
	
<b>United Kingdom</b>	<b>Continental European(SCHUKO)</b>
	
<b>North America(GFCI)</b>	<b>North America</b>
	
<b>Connector</b>	<b>0723-CQ</b>
	



Electrical hazard.  
Contact with water can cause electric shock.

## 2-2 Rear Panel Operation:



### 2-2-1 Ventilation openings:

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

### 2-2-2 AC input switch: This switch is to be operated by qualified personnel only.

### 2-2-3 Battery terminals:

Connect to 24V/48V/110V/220V battery or other 24V/48V/110V/220V power Source.

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

### Alarm relay operation:

Voltage free contacts ( NO, COM, NC )

1) With normal dc supply ON and inverter output OK, and AC by pass supply available:

- NC and COM is closed.

2) With normal dc supply ON and inverter output OK, and AC by pass supply not available:

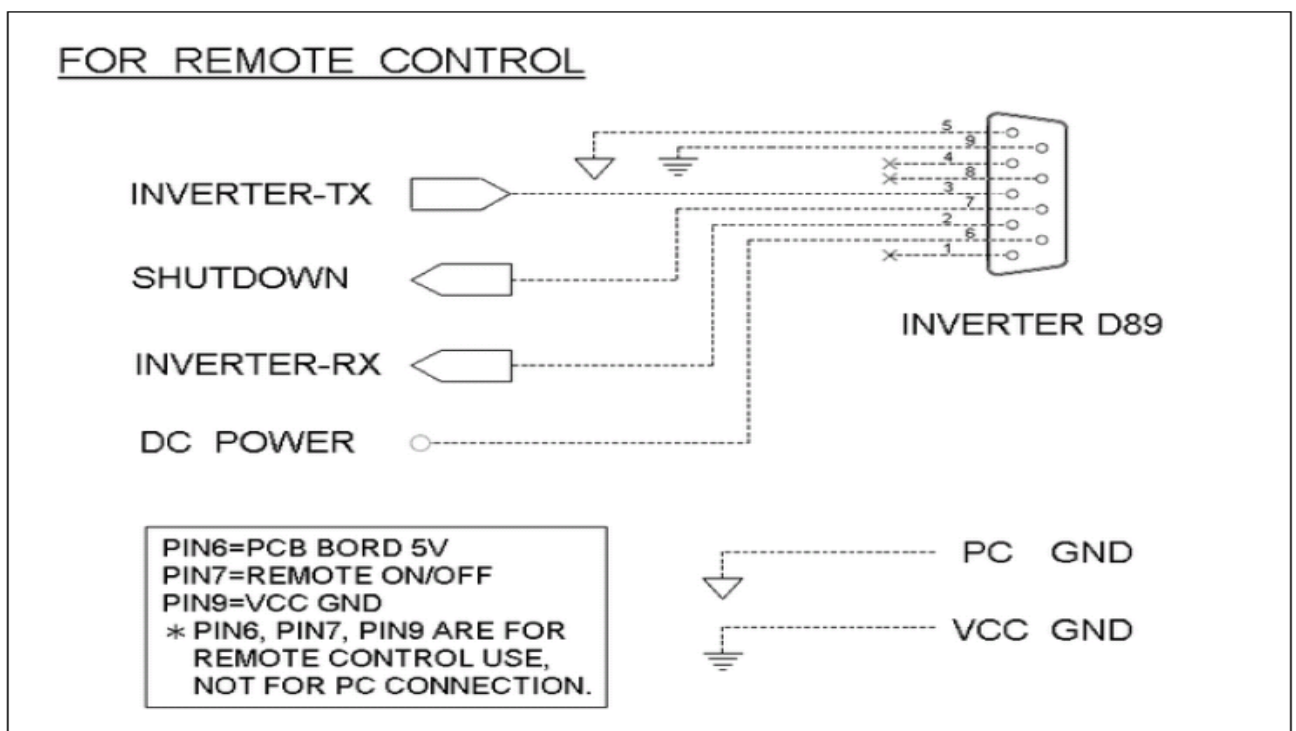
- NO and COM is closed.

3) Inverter shutdown due to: "OTP, OVP, UVP, OLP, short load"

- NC and COM is closed.

### 2-2-4 RS-232:

Connect to computer to remote control working status.



## FOR COMPUTER

• #See Appendix A for RS232 protocol

PC RS232

INVERTER RS232



### **WARNING!**

Any damages caused by using incorrect RS232 cable will be outside of our warranty scope. If you are not sure which one is correct RS232 cable, please purchase the correct RS232 cable from us directly.

2-2-5 Connect chassis ground terminal to earth using # 8 AWG wire.



### **WARNING!**

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



### **WARNING!**

Shock Hazard. Before proceeding further, carefully check 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.

## **2-3 Installation:**

Where to install.

The power inverter should be installed in a location that meets the following requirements

2-3-1 Dry – Do not allow water to drip or splash on the inverter.

2-3-2 Cool – Ambient air temperature should be between -20°C and 50°C, the cooler the better.



2-3-3 Safe – Do not install in a battery compartment or other areas where flammable fumes may exist, such as fuel storage areas or engine compartments.

2-3-4 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.

2-3-5 Dust-free – Do not install the Inverter in a dusty environments where are dust, wood particles or other filings/shavings. The dust can be pulled into the unit when the cooling fan is operating.

2-3-6 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 (Ref. point 2-6).

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 will damage the Inverter.

#### 2-4 Quick hooking – up and testing:

2-4-1 Unpack and inspect the power inverter, check to see that the power switch in the OFF position.

2-4-2 Connect the cables to the DC 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 relative nut 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, 11.7-13Nm). Loose connections will overheat and could result in a potential hazard.

2-4-3 Before proceeding further, carefully check that cable you have just connected 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 reversing polarity connection is not covered by our warranty.

2-4-4 Connect the cable from the negative terminal of the inverter to the negative terminal of the power source. Make a secure connection.



**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.

2-4-5 Set the power switch to the ON position; you will hear the “bi-bi-bi” sound. At the same time, the display is showed the word “ASIAN” for two times. After that, you will hear the continuous sound from internal alarm. Then, the AC voltage shows on the display. It means the device has done the operation.

2-4-6 Set the power switch to the OFF position; the device shut down completely.

2-4-7 Please use a power meter accurately measure the true output R.M.S. voltage of Inverter. We use a power meter such as IDRC CP-350 or ABM 2019 to measure our product.

**2-5 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 of bus chassis).

2-5-1 Neutral Grounding (GFCI' s ):

**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 GFCI 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.

**230V models:** There is no connection made inside the YK-PSW5KVA/E Inverter from either the line or neutral conductor to the safety ground.

**Ground Fault Circuit Interrupters (GFCI'S):**

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. Our company 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.

**2-6 Marking DC Wiring Connections:**



**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.

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.

Increasing your DC cable size will help improve the situation.

Our company recommends the following cables for optimum inverter performance

Model No	Wire AWG	Inline Fuse
RM-PSW245KVA/E	#4/0	300A
RM-PSW485KVA/E	#2/0	200A
RM-PSW1105KVA/E	#4	100A
RM-PSW2205KVA/E	#6	50A

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

## 2-7 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.

### 2-7-1 Controls and indicators:

The ON / OFF switch turns the control circuit in the power inverter on and off.

The Inverter operates from an input voltage ranging from :

20 to 32 VDC for 24V models

42 to 62VDC for 48V models

90 to 140VDC for 110V models.

180 to 275VDC for 220V models

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

Model	DC Input over voltage shut-down	DC Input over voltage alarm	DC Input under voltage alarm	DC Input under voltage shut-down
RM-PSW245KVA/E	32VDC	31VDC	21VDC	20VDC
RM-PSW485KVA/E	62VDC	61VDC	43VDC	42VDC
RM-PSW1105KVA/E	140VDC	135VDC	95VDC	90VDC
RM-PSW2205KVA/E	275VDC	270VDC	185VDC	180VDC

Note: Inverter will automatically start operating when input returns back to normal voltage range, as per 2-7-1

### 2-7-2 Output Voltage Indicator:

LED displays light on VAC as show as output Voltage value

### 2-7-3 Output Current Indicator

LED displays light on AMP as show as output current value

### 2-7-4 Output Watts Indicator

LED displays light on Watts as show as output Watts value

### 2-7-5 Input DC Voltage Indicator

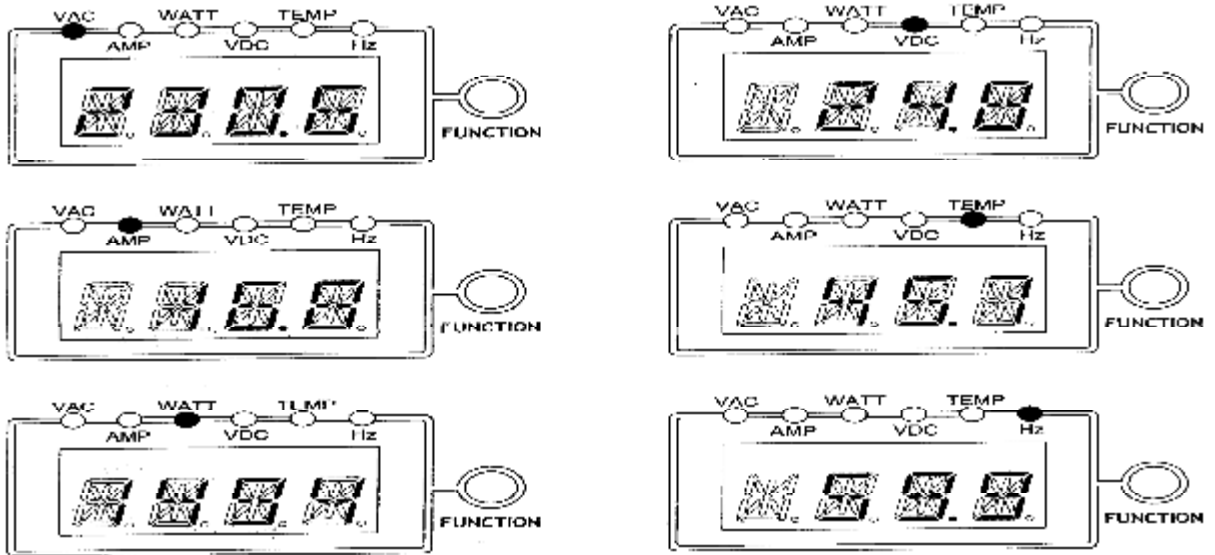
LED displays light on VDC as show as input DC voltage value

### 2-7-6 Temperature Indicator

LED displays light on TEMP as show as internal operating temperature value

### 2-7-7 Output Frequency AC Indicator

LED displays light on Hz as show as output frequency value



Please have the accuracy of 6 functions of display, as below:

Function	VAC		AMP	WATT	VDC				TEMP	Frequency	
Range	100-120 VAC	200-240 VAC	0-60A	0-6KW	20-32 VDC	42-62 VDC	90-140 VDC	180-275 VDC	0-120°C	50Hz	60Hz
Accuracy	± 1%	± 1%	1%±0.5A	± 3%	± 2%	± 2%	± 2%	± 2%	± 1%	±0.01	±0.01

### 2-7-8 Over voltage protection indicator: (OVP)

The over voltage indicator indicates that the power inverter has shut itself down because its input voltage exceeded 24V/48V/110/220VDC version.(Ref. point 2-7-1)

### 2-7-9 Under voltage protection indicator: (UVP)

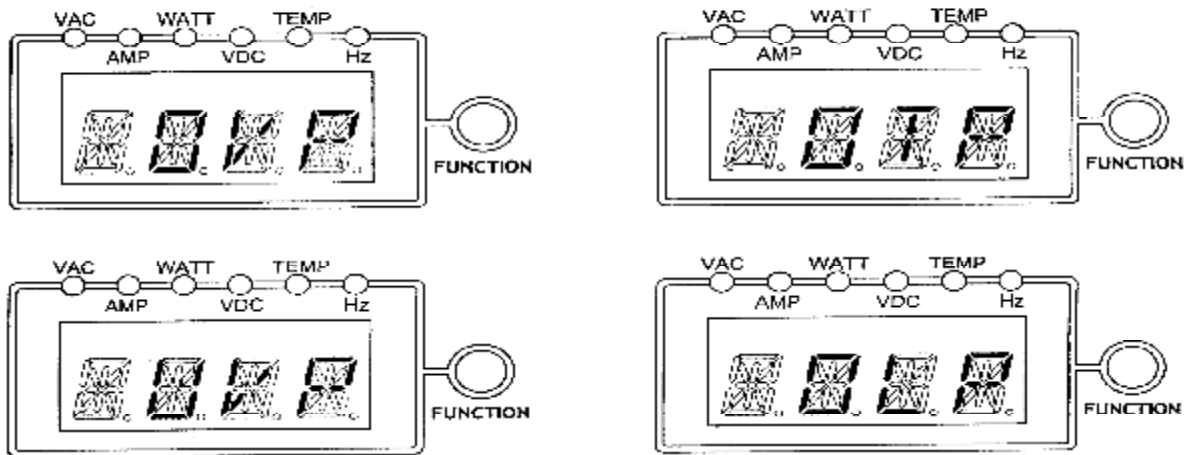
The under voltage indicator indicates that the power inverter has shut itself down because its input voltage fell below 24V/48/110/220VDC. (Ref. point 2-7-1)

### 2-7-10 Over temp protection indicator: (OTP)

The over temp indicator indicates that the power inverter has shut itself down because its temp has become overheated. The power inverter may overheat because it has been operated at power levels above its rating, or because it has been installed in a location which does not allow it to dissipate heat properly. The power inverter will automatically back up, once it has cooled off.

### 2-7-11 Overload protection indicator: (OLP)

The overload indicator indicates that the power inverter has shut itself down. When output voltage over continue power, then must return to operate manually.



### 2-8 Cooling fan working code:

Cooling fan of inverter is through detecting output power and over temperature situation to work.

When start to turn on the inverter and output power is under 300W, the cooling fan does not start running. It complies with saving energy sources requirement. Until, output power is up to 300W, the cooling fan will start to work in order to drop the inner temperature.

If the ventilation opening is obstructed, the inverter will enter over temperature protection mode (OTP). The cooling fan will continue working to drop the inner temperature. When the temperature comes down to normal situation, the inverter will turn on automatically.

## 3 Maintenance:

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

You should clean the exterior of the unit periodically with a dry cloth to prevent accumulation of dust and dirt. At the same time, tighten the Screws on the DC input terminals.

## 4 Troubleshooting guide:



### **WARNING!**

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

Common problems – television interference:

Operation of the power inverter can interfere with television reception on some channels, If this situation occurs, the following steps may help to alleviate the problems.

- I Make sure that the chassis ground lug on the back of the power inverter is solidly connected to the ground system of your vehicle, boat or home.
- I Do not operate high power loads with the power inverter while watching television.
- I Make sure that the antenna feeding your television provides an adequate (“ snow free”) signal and that you are using good quality cable between the antenna and the television.
- I Move the television as far away from the power inverter as possible.
- I Keep the cables between the battery and the power inverter as short as possible and twist them together about 2 to 3 twists per foot.

This mini radiated interference from the cables.

Problem and Symptoms	Possible Cause	Solution
Low output voltage (110V:95-105VAC 220V: 190-210VAC)	Using average reading voltmeter	Use true RMS reading meter and cable (Ref. point 2-4-7)
Load Display OLP flash.	Overload	Reduce load.
No output voltage. And fault Input voltage.	Low / High input voltage.	Recharge battery, check connections and cable. (Ref. point 2-7-1)
No output voltage. Over Temp indicator. Load less than: 1000W	Thermal shutdown	Improve ventilation Make sure ventilation openings in inverter are not obstructed, reduce ambient temperature.
No output voltage, Over Load indicator	Short circuit or wiring error.	Check AC wiring for short circuit or improper polarity (hot and neutral reversed)
	Very high power load	Remove load

## 5 Warranty :

We warrant this product against defects in materials and workmanship during warranty period 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 damage by natural and man-made factors, or alteration either internal or external and does not cover damage arising from improper use such as plugging the unit into an unsuitable power source, attempts to operate products with excessive power consumption requirement, 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

## 6 Important Safety Instructions



### **WARNING!**

Before you install and use your inverter, be to read and save these safety instructions.

### 6-1 General Safety Precautions

6-1-1 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.

6-1-2 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.

6-1-3 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 where 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.



## 6-2 Precautions When Working with Batteries

6-2-1 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.

6-2-2 NEVER smoke or allow a spark or flame in vicinity of battery or engine.

6-2-3 Do not drop a metal tool on the battery. The resulting sparks or short-circuit on the battery or other electrical part may cause an explosion.

6-2-4 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.

## 7 Appendices A

### 7-1 Dip Switch (at the left side of inverter)

S1	FREQ. (Hz)	S2	S3	BAUD RATE	S4	POWER SAVING	ACV-ADJ
ON	60	ON	ON	2400	ON	DISABLE	H-----L 240V 200V
OFF	50	OFF	ON	4800	OFF	ENABLE	H-----L 120V 100V
----	----	ON	OFF	9600	----	----	----
----	----	OFF	OFF	19200	----	----	----

**S1 ( FREQ. Hz ) – 50Hz/60Hz**

**S2 S3 (BAUD RATE ) – 2400 / 4800 / 9600 / 19200**

**S4 S5 (VOLTAGE OUTPUT ) – 100VAC/110VAC/115VAC/120VAC**

**When you set up S1~S5, please reset the inverter and let update data through CPU.**

### 7-2 AC Output Voltage Tune (VR)

Tune VR ( VAC ) output voltage from 100 – 120 VAC or 200 – 240 VAC

The VAC value will gradually increase, tune VR from right to left.

### 7-3 RS232 Protocol

#### A. COMMUNICATION PROTOCOL: ( SF / RM Series Inverters )

##### 1. Status Inquiry:

Computer: Q1<cr>

INV INV data stream, such as

(MMM.M NNN.N PPP.P QQQ RR.R S.SS TT.T b7b6b5b4b3b2b1b0<cr>

INVERTERdata stream :

There should be a space character between every field is list as followed:

a. Start byte : (

b. I/P voltage : MMM.M------(SPEC)

M is an integer number ranging from 0 to 9.

The unit is Volt.

c. I/P fault voltage : NNN.N------(SPEC)

N is an integer number ranging from 0 to 9.

The unit is Volt.

d. O/P voltage : PPP.P

P is an integer number ranging form 0 to 9.

The unit is Volt.

e. O/P current : QQQ

QQQ is a percent of maximum current, not an absolute value.

f. I/P frequency : RR.R

R is an integer number ranging from 0 to 9.

The unit is HZ.

g. Battery voltage : SS.S or S.SS

S is an integer number ranging from 0 to 9.

For on-line units battery voltage/cell is provided in the form S.SS

For standby units actual battery voltage is provided in the form SS.S

UPS type in UPS status will determine which reading was obtained.

h. Temperature : TT.T

T is an integer number ranging form 0 to 9.

The unit is degree of centigrade.

i. INVERTER Status : <U>------(SPEC)

<U> is one byte of binary information such as <b7b6b5b4b3b2b1b0>.

Where bn is a ASCII character '0' or '1'.

INVERTER status:

Bit	Description
7	1 : Utility Fail (Immediate)
6	1 : Battery Low
5	SPEC
4	SPEC
3	SPEC
2	SPEC
1	SPEC
0	SPEC

j. Stop Byte : <cr>

Example : Computer : Q1<cr>

INVERTER

(208.4 140.0 208.4 034 59.9 2.05 35.0 00110000<cr>

Means : I/P voltage is 208.4V.------(SPEC)

I/P fault voltage is 140.0V.------(SPEC)

O/P voltage is 208.4V.

O/P current is 34%.

I/P frequency is 59.9 HZ.

Battery voltage is 2.05V.

Temperature is 35.0 degrees of centigrade.