

Natural Power System

Inverter Wind / Solar

5 in 1 Pure Sine Wave

Inverter / Solar Charge Controller / Battery Charger
UPS / Wind Charge Controller

USER MANUAL

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1. INTRODUCTION

1.1 General Description

This product combines system of supplying to electricity.

1.2 Five key features







- 1.Energy recycle for wind / solar
- 2.The best pure power system
- 3.Special airflow design to avoid dust accumulation.
- 4.Front door installation and repairing. Considerate and user friendly design.
- 5.Green Power minimizes environment pollution.

1.3 Important Notices

To be sure that the Inverter wind/solar (5in1) will be operated correctly, the following items should be noticed:

- 1.Read instructions carefully before operating the Inverter wind/solar (5in1).
- 2.All operating instruction should be followed.
- 3.Be careful not to damage the Inverter wind/solar (5in1) while transporting.
- 4.Inverter wind/solar (5in1) power connect instruction should be followed.
- 5.Please don't open the case to prevent danger.
- 6.If the Inverter wind/solar (5in1) will be stored for long period, the battery must be charged once every 90 days.
- 7.Retain the load within the rating of Inverter wind/solar (5in1) to prevent faults.
- 8.Keep the manual for reference.
- 9.Handle unusual events according to the trouble-shooting guide.
- 10.Keep the Inverter wind/solar (5in1) clean and dry.

2. FUNCTION

- 1.Input LED : This indicates the incoming power source line is normal.
- 2.Bypass LED : This indicates the output outlet is supplied via bypass.
- 3.Output LED : This means the Inverter wind/solar (5in1) power is from its inverter to the load.
- 4.Battery Capacity LED : The batteries are almost exhausted out.
- 5.Overload LED : This indicates the Inverter wind/solar (5in1) is connected with overload.
- 6.Fault LED : This indicates an Inverter wind/solar (5in1) fault condition.
- 7.LCD Display: This indicates digital signals.

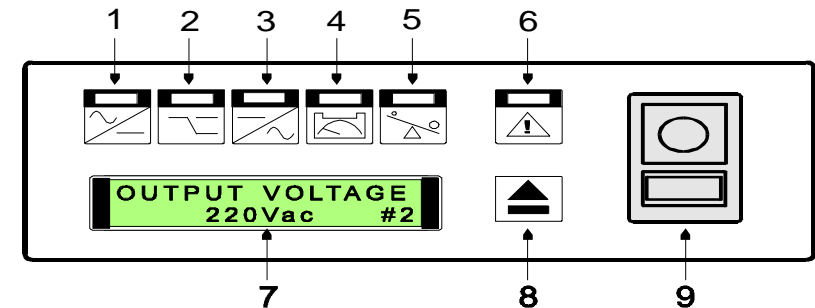


Figure 1 : Front View LCD Indicators

- (1) Inverter wind/solar (5in1) Status
AC: LOSS (OK) BAT: OK(LOW)
NO OUTPUT (BYPASS OUTPUT, INVERTER OUTPUT)

(2) INPUT VOLTAGE

Wind system: 3 ϕ 220Vac Solar system: 160V~400Vdc

(3) OUTPUT VOLTAGE

115Vac / 230Vac

(4) INPUT FREQUENCY

50Hz or 60Hz

(5) OUTPUT FREQUENCY


50Hz or 60Hz

(6) BATTERY VOLTAGE

220Vdc

(7) OUTPUT POWER

100%

8.LCD Switch : This switch is pressed to select the Inverter wind/solar (5in1) status on LCD Display.

9.PUSH ON-OFF Switch (SW4): This switch will turn the Inverter wind/solar (5in1) on or off.

10.Ventilation Holes: Please keep the ventilation holes free.

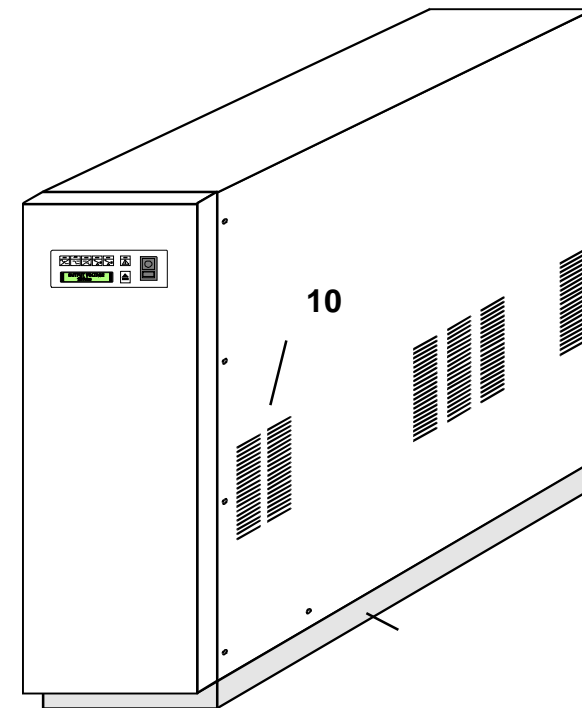


Figure 2 : Front View of Outer Construction

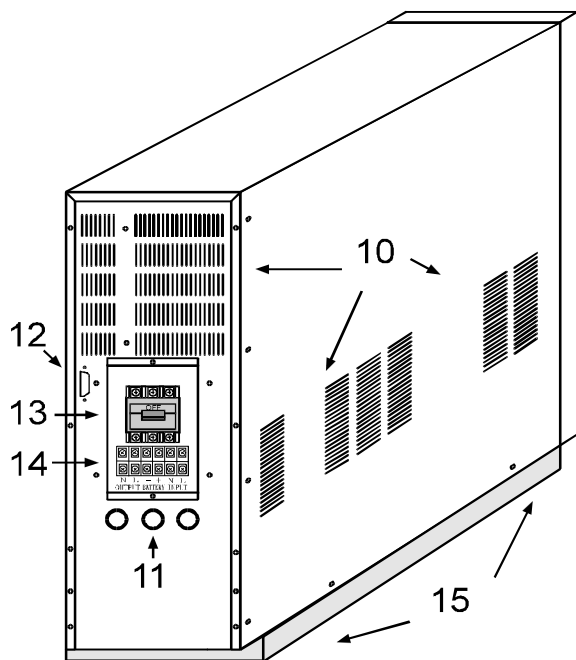


Figure 3: Rear View of Outer Construction

- 11.Power Cords Holes: Input/output/by pass power cords, solar charge controller and batteries power cords channel.
- 12.DB-9 Interface: Communication port between the Inverter wind/solar (5in1) and computer.
- 13.Main Breaker (NO-FUSE-BREAKER): Control the wind input/ AC output power ,by pass, solar charge controller and external battery power.
- 14.Terminal Block: The input/output ,by pass ,solar charge controller and external battery's power cords will be wired on terminal block.
- 15.Wheel: 4 wheels for easy transportation.

3. LOCATION OF THE INVERTER WIND/SOLAR

3.1 Transporting

- 1.Disconnect all power cables if necessary.
- 2.Be careful not to damage the Inverter wind/solar (5in1) while transporting.
- 3.Don't move the Inverter wind/solar (5in1) upside down.

3.2 Positioning

- 1.Do not put the Inverter wind/solar (5in1) on rugged or declined surface.
(Fig.4)
- 2.Allow a minimum distance of 10 cm in the rear and two sides of the Inverter wind/solar (5in1) for ventilation. (Fig.5)
- 3. Do not expose the Inverter wind/solar (5in1) to direct sunlight or rain.
(Fig. 6,7)

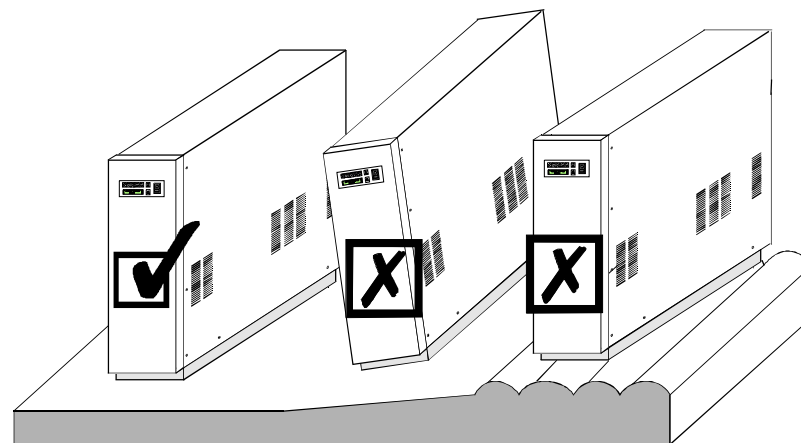


Figure 4 : Inverter wind/solar (5in1) Positioning

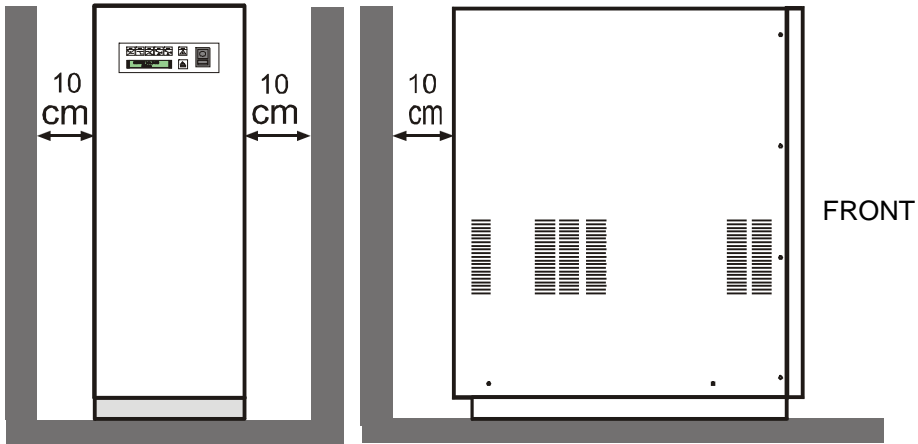


Figure 5

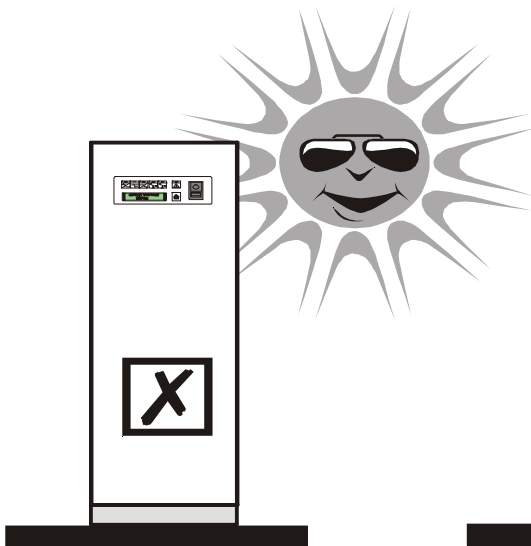


Figure 6

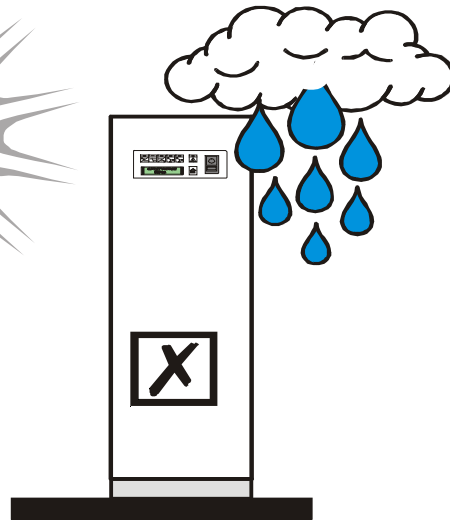


Figure 7

4.Keep the Inverter wind/solar (5in1) far away from heat emitting sources.

(Fig.8)

5.Do not leave objects on the top of the Inverter wind/solar (5in1). (Fig.9)

6.Do not expose it to corrosive gas. (Fig.10)

7.Ambient temperature : 0°C - 40°C

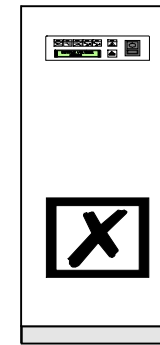


Figure 8

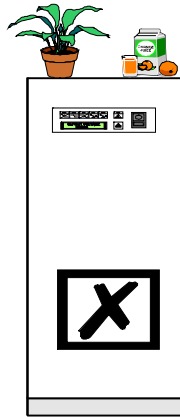


Figure 9

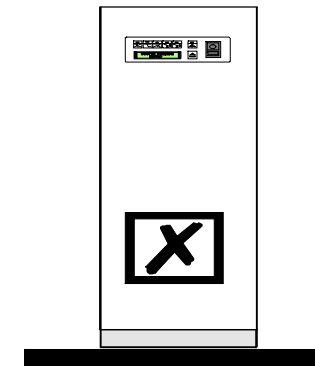


Figure 10

4. CABLE CONNECTION

4.1 Caution

1. Do not use household outlet (only 15A), because the outlet hasn't sufficient capacity to support the Inverter wind/solar (5in1).
2. Please connect the 220V power of nearest switch box to Inverter wind/solar (5in1) by pass block. (Fig.11)

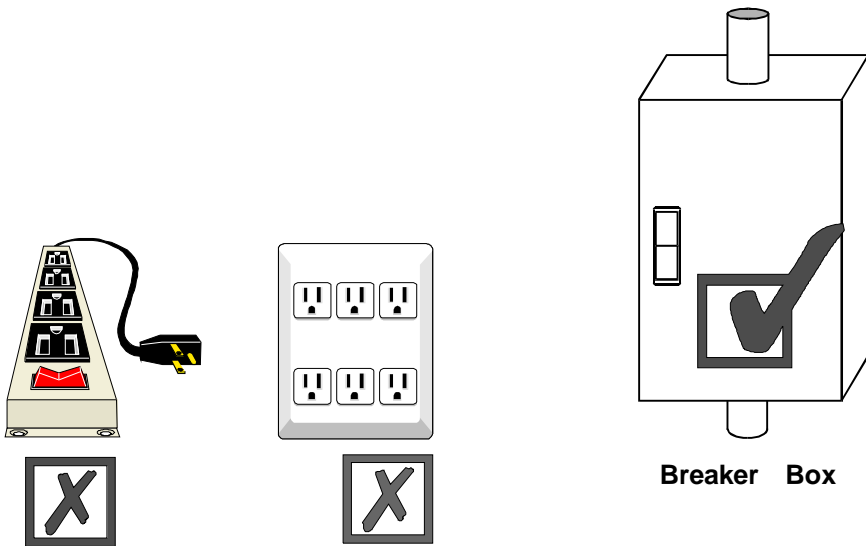


Figure 11

4.2 Power Supply Connection

1. First, detach 2pcs screws on the rear panel with a screwdriver to find the terminal block. (Fig.12,13)

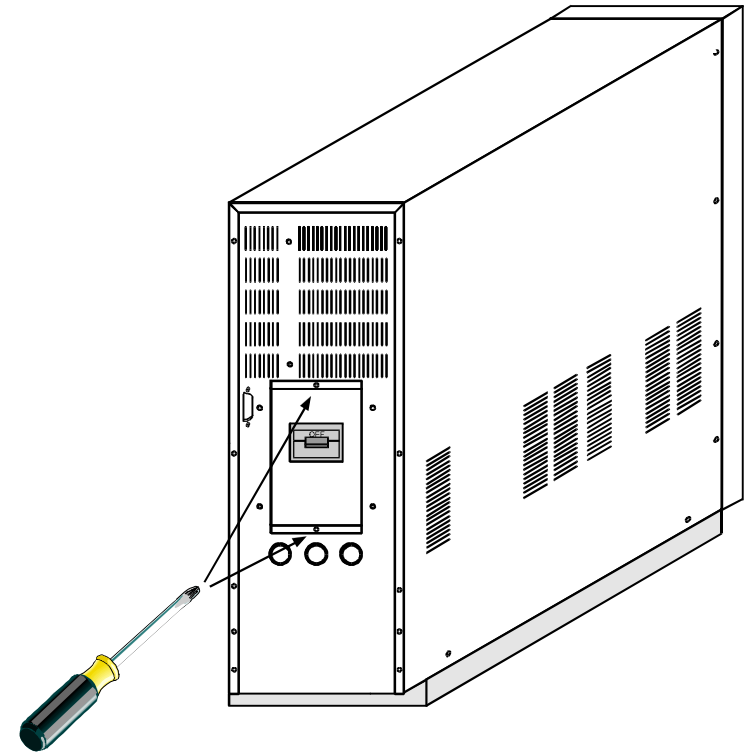


Figure 12

2. Once power cords are connected, make sure all connectors are made properly and all the terminal block screws are tightened.
3. The hole to insert input/output power cords is on below of the rear panel. Please connect power cords from the hole.
4. Use power cables to connect the LINE(L), NEUTRAL(N) and GROUND(G) lines to the connector terminals.

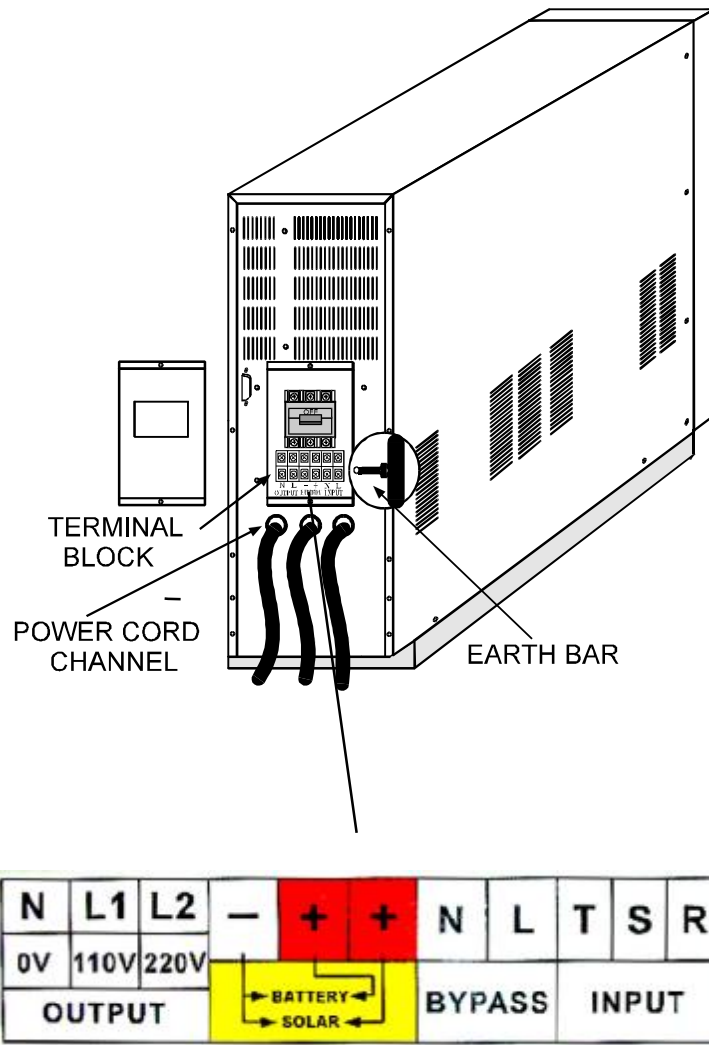


Figure 13

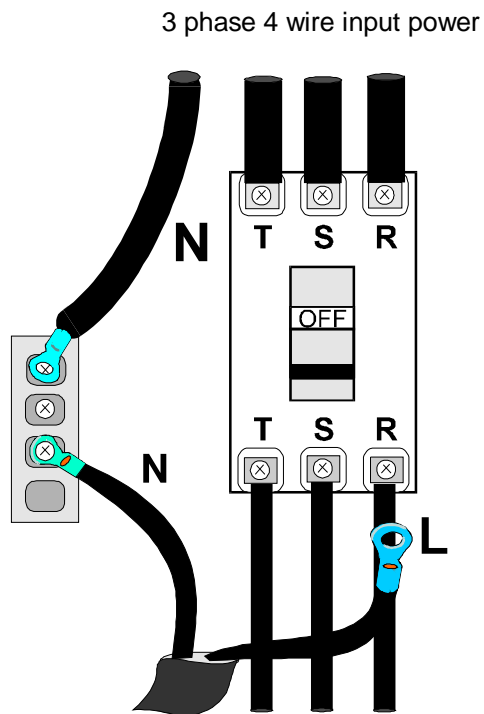
5. The checklist of by pass input current and input power cord is as below.

MODEL	INPUT CURRENT	INPUT POWER CORD
6KVA/5KW	38Amax	5.5 mm ² (SOFT CORD)

6. Once the by pass input power cords are fixed, please check to confirm that the conductors are unable to contact with the case or other conductive material to avoid short circuit.

7. Please turn off AC supply to prevent short circuit while connecting lines.

8. Please follow an electrician law.



Inverter wind/solar (5in1) Input Power Cord Figure 14

NOTE: THE Inverter wind/solar IS 3 phase 220Vac SYSTEM, PLEASE DO NOT CONNECT WITH 110Vac AND 380Vac. IF YOU NEED TO MOVE THE Inverter wind/solar OR RESET WIRE, PLEASE FOLLOW ABOVE INSTRUCTIONS.

4.3 Output Connections

1. Please refer to Fig.15 for connections.
2. Please follow load current design for output power cord.
3. Ensure the connected load doesn't exceed the capacity of the Inverter wind/solar (5in1).

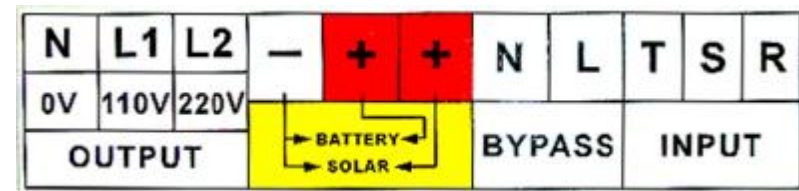


Figure 15

4. The checklist of output current and output power cord is as below.

MODEL	OUTPUT CURRENT	OUTPUT POWER CORD	TERMINAL
6KVA/5KW	28Amax	5.5 mm ² (SOFT CORD)	5.5-6

5. Improper use of the grounding plug can result in a risk of electric shock.

Consult a qualified electrician or serviceman if the grounding instructions are not completely understood.

6. Please provide good grounding system.

7. Please use the nearest point of earth bar or switch box for GROUND line.

(Fig.16)

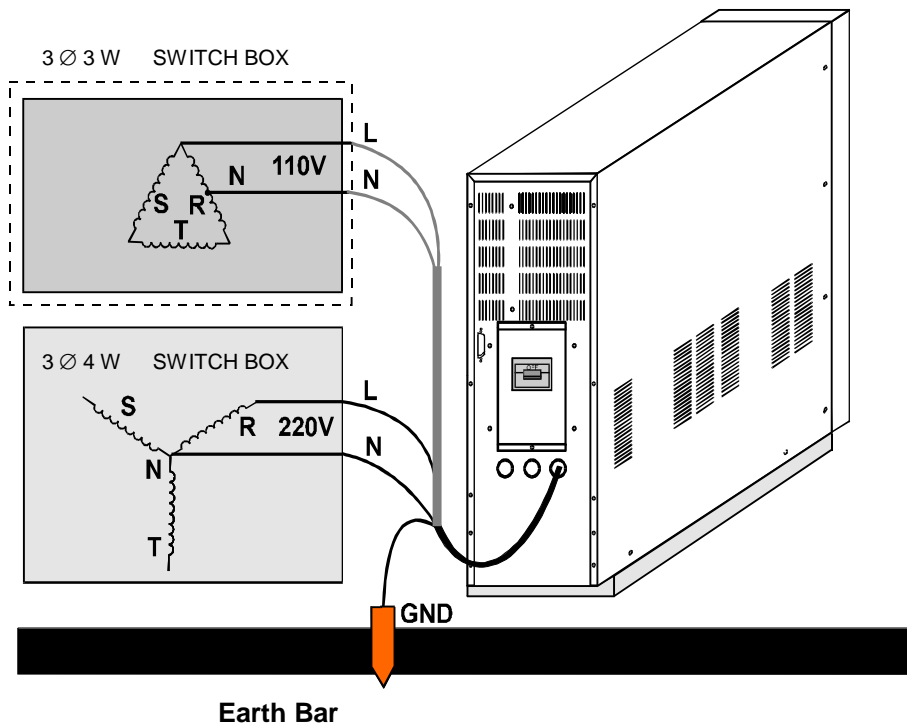


Figure 16

5. OPERATION

5.1 Check Prior to Start Up

1. Make sure the “Main Breaker” and “PUSH ON-OFF switch” are in the OFF.
2. Ensure the Inverter wind/solar is in a suitable location. (Refer to Fig.4-10)
3. Check all input /output cords are secured.
4. Make sure the load is disconnected or in the “OFF” position.
5. Check if input voltage meets the Inverter wind/solar (5in1) requirement

By pass: 220Vac $\pm 10\%$ Wind system: 3 ϕ 220Vac

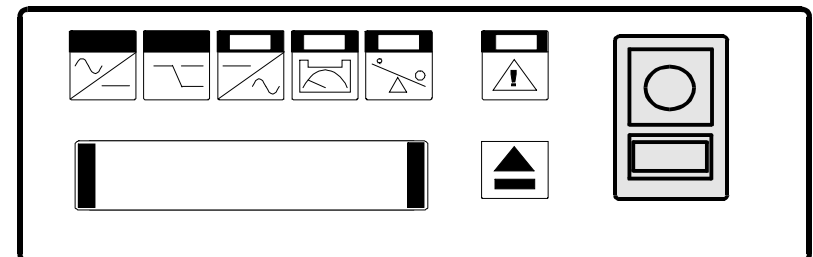
Solar system: 160V~400Vdc.

5.2 Initial Start Up Procedure

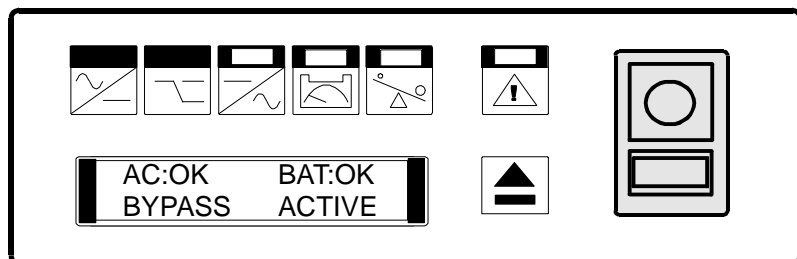
Please follow the instructions below to start the Inverter wind/solar (5in1).

(Refer to Fig.1,2,3)

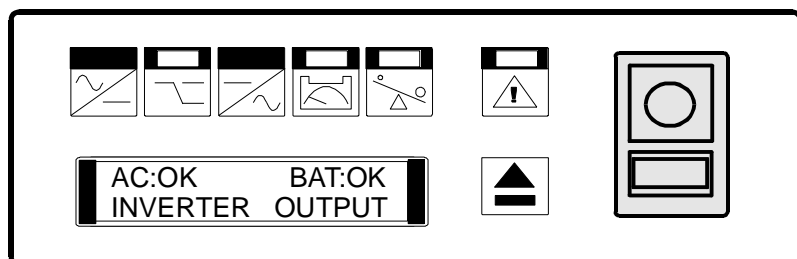
1. Be sure “Main Breaker” AND “PUSH ON-OFF switch” in the condition “OFF” and no load to be connected to output terminal of Inverter wind/solar (5in1).
2. Pull “Main Breaker” (NO-FUSE-BREAKER in rear panel) up to “ON” position; LED of “Input” and “Bypass”, should light up simultaneously.



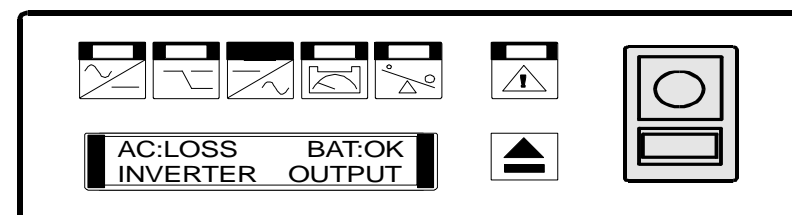
3. Press "PUSH ON-OFF switch" to the position "ON", "LCD Display" shall light up immediately to indicate the AC utility power and batteries are normal. And the output outlet is supplied via bypass.



4. About 20 seconds later, "Output LED" will also illuminate and "Bypass LED" fade out at the same time, indicating Inverter wind/solar (5in1) is operating correctly. The Inverter wind/solar (5in1) power is from its inverter to the load.



5. Disconnect AC input of Inverter wind/solar (5in1) for blackout simulation, the "Input LED" will extinguish and Inverter wind/solar (5in1) beeps every 4 seconds to remind user Inverter wind/solar (5in1) failure. This means Inverter wind/solar (5in1) is in the condition of battery operation. The beep will stop automatically after 90 seconds. When approaching battery low level, Inverter wind/solar (5in1) will beep every second for warning purposes.



6. Re-supply AC utility power, "Input LED" will light up again, then first installation is completed. You can connect your equipping load into output terminal of Inverter wind/solar (5in1).

5.3 Normal Operation

Daily operation procedure :

Press "PUSH ON-OFF Switch (SW4)" to turn on or off the Inverter wind/solar (5in1).

5.4 Storage Instruction








1. Turn off the Inverter wind/solar (5in1) and "Main Breaker" in rear panel if

you will not use it for long period.

- If you do not use the Inverter wind/solar (5in1) over 3 months, please follow initial start up procedure and keep supplying power to the Inverter wind/solar (5in1) for at least 24 hours to ensure battery fully recharged.

6. TROUBLE SHOOTING GUIDE

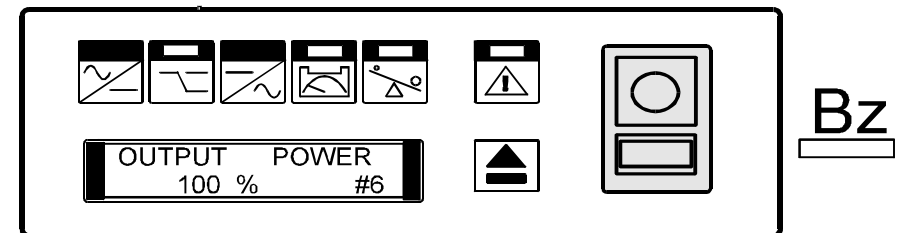
6.1 Symbol Reference

 LIGHTS UP	 EXTINGUISH	 FLASH	
			
BUZZER SOUNDS CONTINUOUSLY	BUZZER SOUNDS EVERY 4 SECONDS	BUZZER SOUNDS EVERY SECOND	BUZZER NO SOUND

6.2 Inverter wind/solar (5in1) Status and Action

The description of the following guideline may be helpful in problem solving.

- LED Status as below:

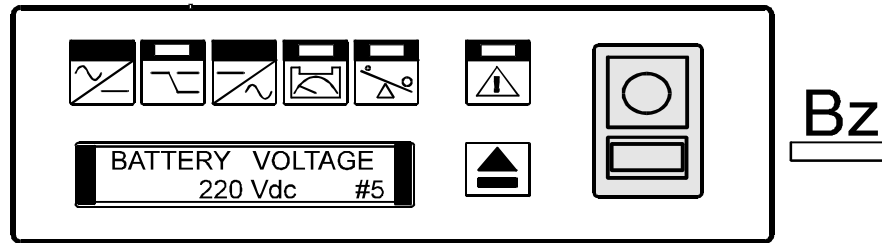


Inverter wind/solar (5in1) Status:

AC utility power is normal, Inverter wind/solar (5in1) is running normally with full load.

Action: No.

2.LED Status as below:

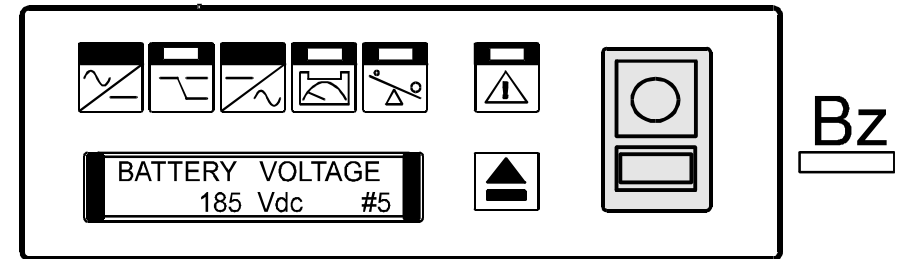


Inverter wind/solar (5in1) **Status:**

AC utility power is normal, Inverter wind/solar (5in1) is running normally.
Batteries have been charged to 90% or more.

Action: No.

4.LED Status as below:

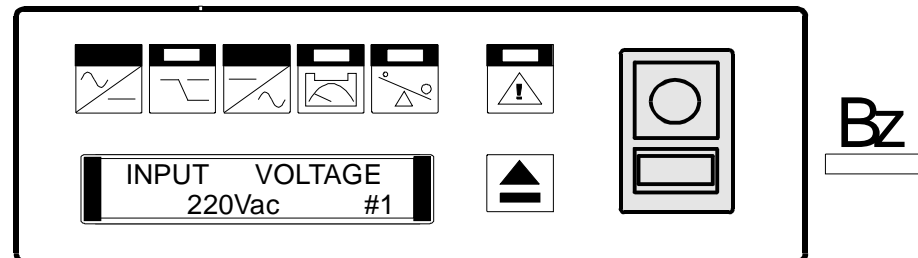


Inverter wind/solar (5in1) **Status:**

AC utility power is normal. Inverter wind/solar (5in1) is running normally,
but battery capacity is low.

Action: Charger broke down. Please replace charger board.

3.LED Status as below:

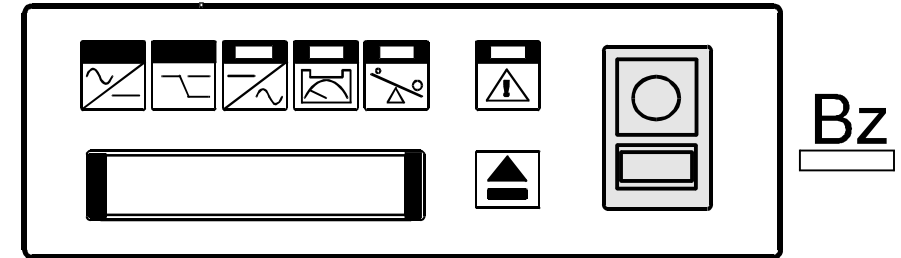


Inverter wind/solar (5in1) **Status:**

AC utility power is 220V, Inverter wind/solar (5in1) is running normally.

Action: No.

5.LED Status as below:

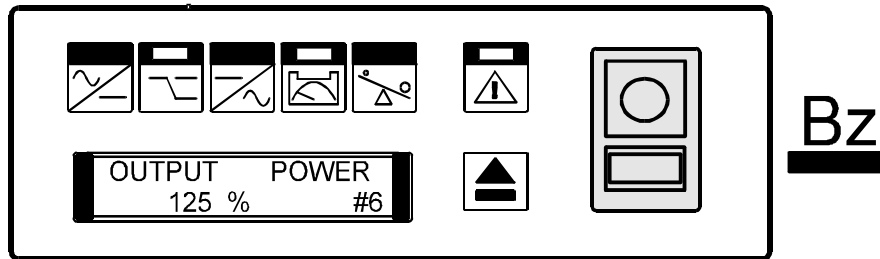


Inverter wind/solar (5in1) **Status:**

AC utility power is normal. The output load is supplied by utility power. If
“PUSH ON-OFF Switch” is not on, Inverter wind/solar (5in1) does not
start up.

Action: Refer to flowchart Fig.18.

6.LED Status as below:

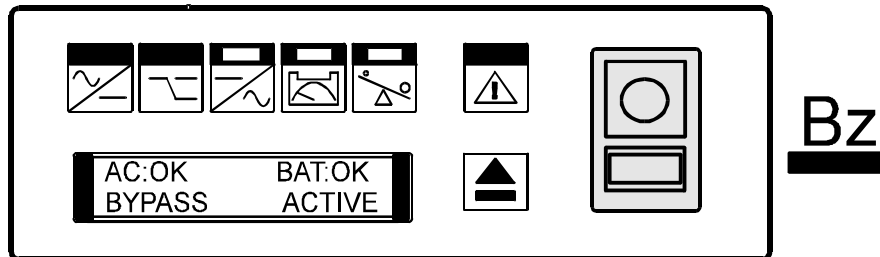


Inverter wind/solar (5in1) **Status:**

AC utility power is normal but Inverter wind/solar (5in1) is overloaded.
“Overload LED” lights up and buzzer beeps continuously.

Action: Please reduce the critical load to POWER($\%$)<math><100\%</math>. If the situation continues, Please refer to flowchart Fig.19.

7.LED Status as below:

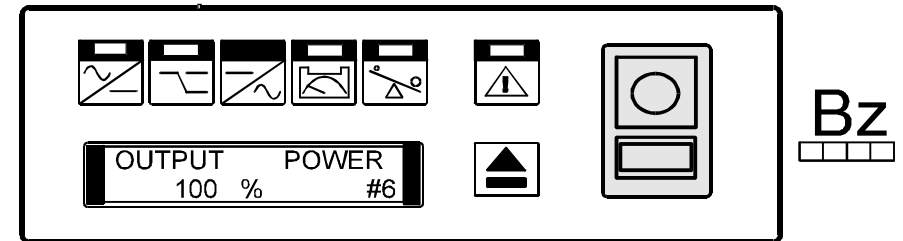


Inverter wind/solar (5in1) **Status:**

AC utility power is normal, but Inverter wind/solar (5in1) is abnormal.
The load is supplied by AC utility power via bypass.

Action: Refer to flowchart Fig.20.

8.LED Status as below:

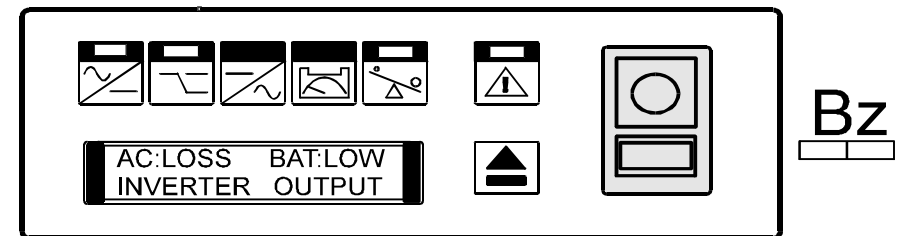


Inverter wind/solar (5in1) **Status:**

AC utility power fails .The load is supplied by battery power in Inverter wind/solar (5in1) .The Inverter wind/solar (5in1) is connected with full load. Buzzer alarm sounds every 4 seconds.

Action: If AC utility power fails, reduce the less critical load in order to extend backup time. If it is not abnormal power failure, refer to flowchart Fig.17.

9.LED Status as below:



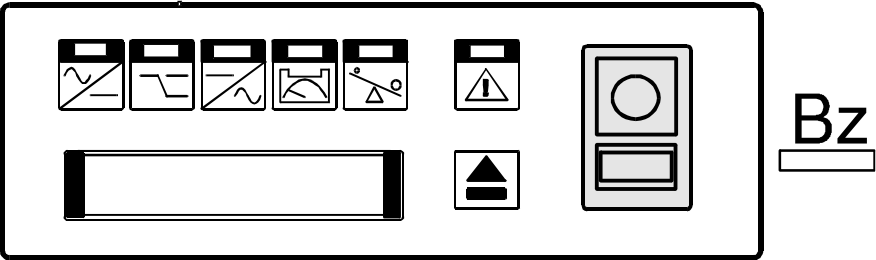
Inverter wind/solar (5in1) **Status:**

AC utility power fails .The load is supplied by Inverter wind/solar (5in1), and battery power is running out. Buzzer alarm beeps every second.

Action: Inverter wind/solar (5in1) will shut down automatically.

Please save date soon.

10.LED Status as below:



Inverter wind/solar (5in1) **Status:**

AC utility power fails and battery runs out. Inverter wind/solar (5in1) has shut down automatically.

Action: Inverter wind/solar (5in1) will restart up when AC utility power is restored. If AC utility power failure is more than 6 hours, please follow storage instruction.

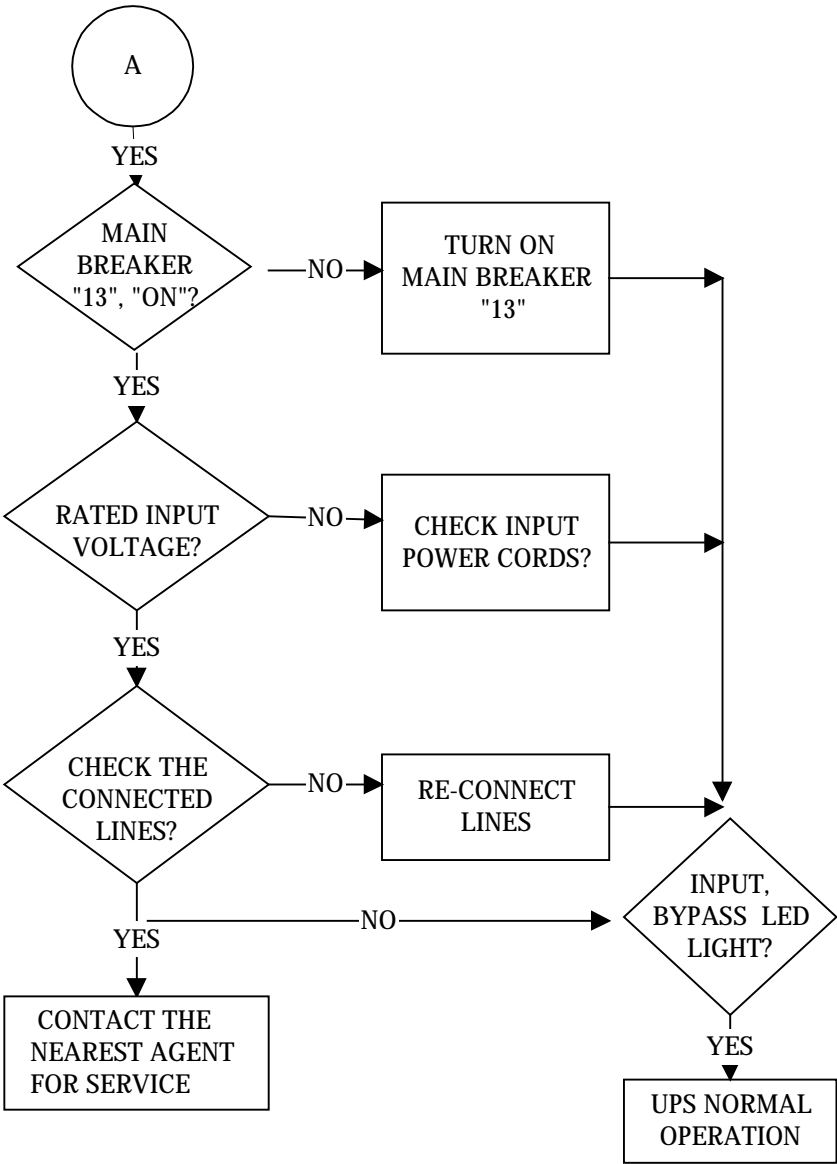


Figure 17: Trouble Shooting Guide

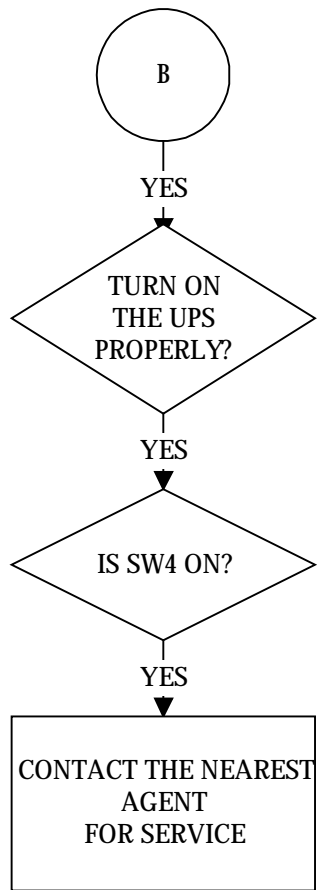


Figure 18: Trouble Shooting Guide

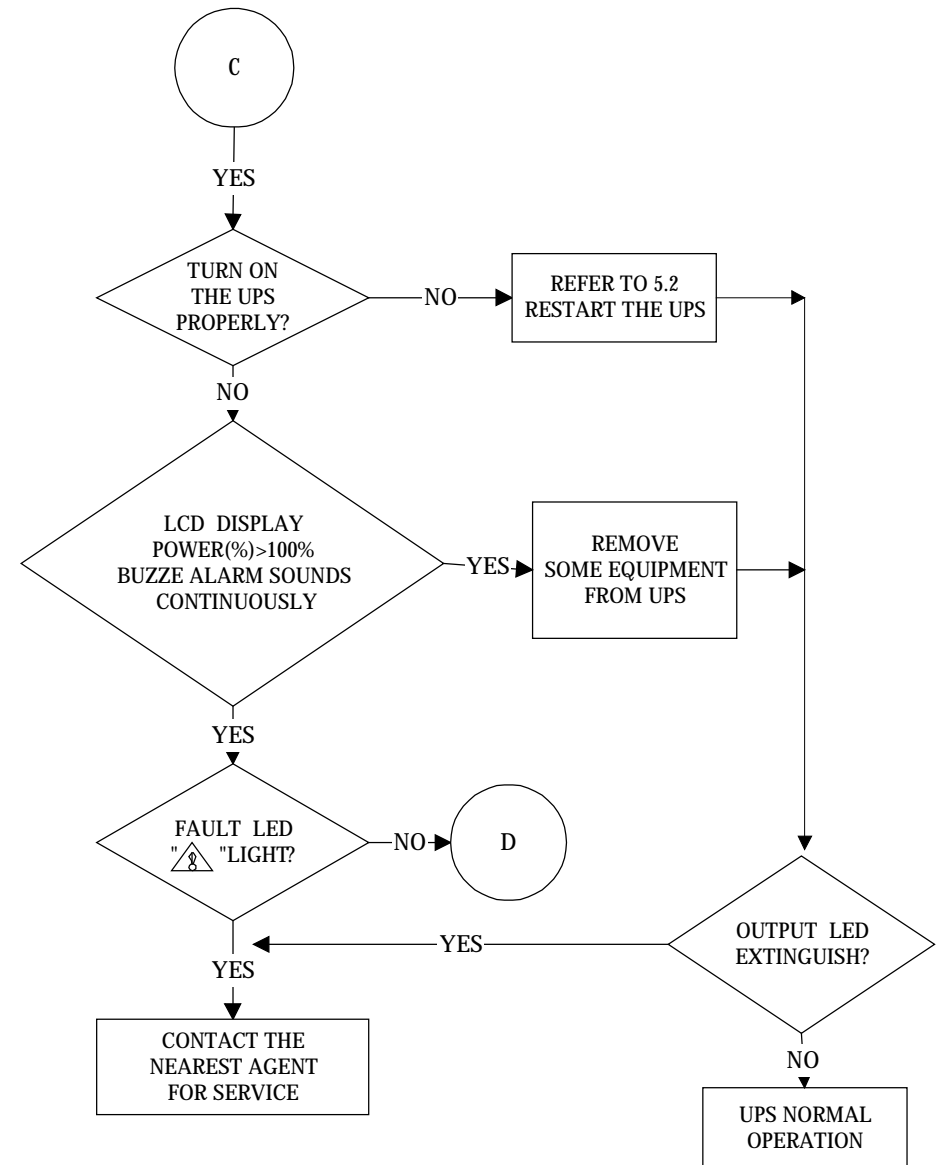


Figure 19: Trouble Shooting Guide

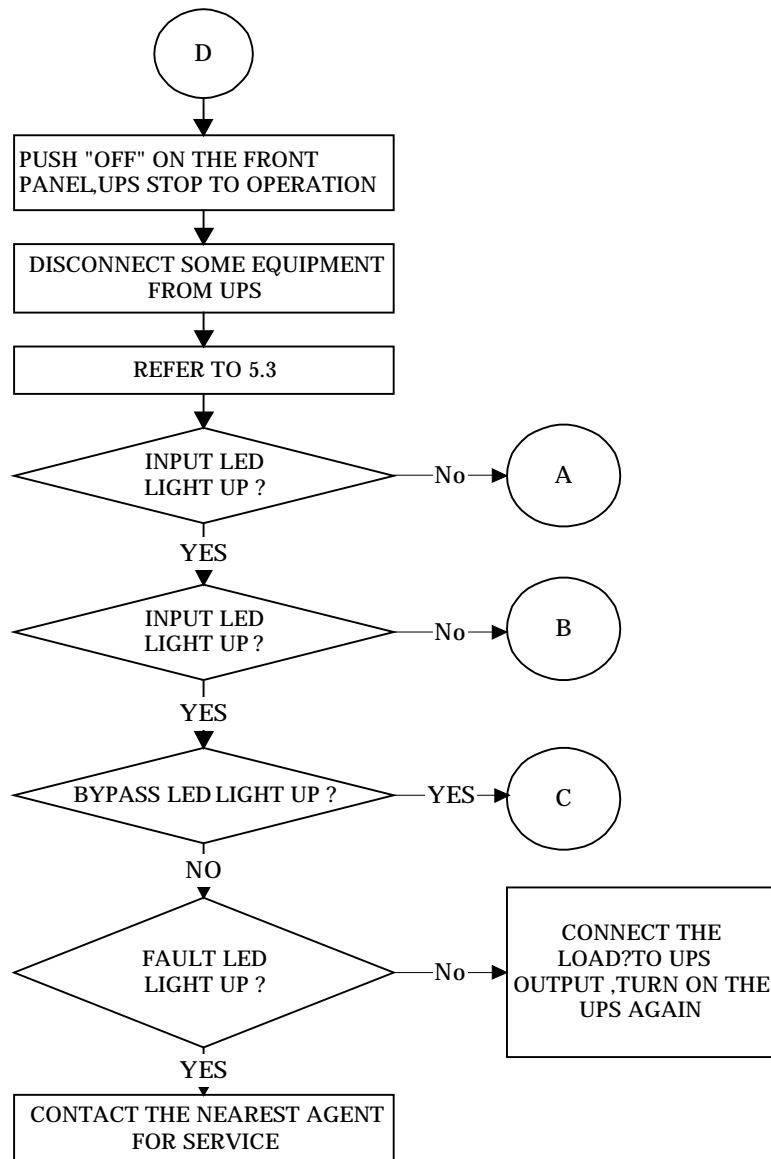


Figure 20: Trouble Shooting Guide

7. OPERATION MODES OF THE INVERTER WIND/SOLAR

7.1 Inverter wind/solar (5in1) System Block Diagram (Fig.21)

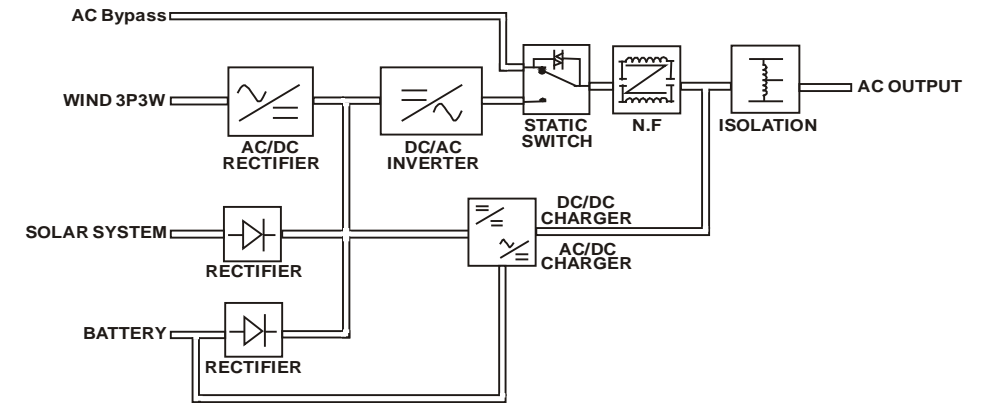


Figure 21: Inverter wind/solar (5in1) System Block Diagram

7.2 Normal Operation (Fig.22)

There are two main loops when AC utility is normal: the AC loop and the battery charging loop. The AC output power comes from AC utility input and passes through AC/DC rectifier, DC/DC booster, DC/AC inverter and static switch to support power to load. The battery charging voltage comes from AC utility input and converted by AC/DC charger to support battery-charging power.

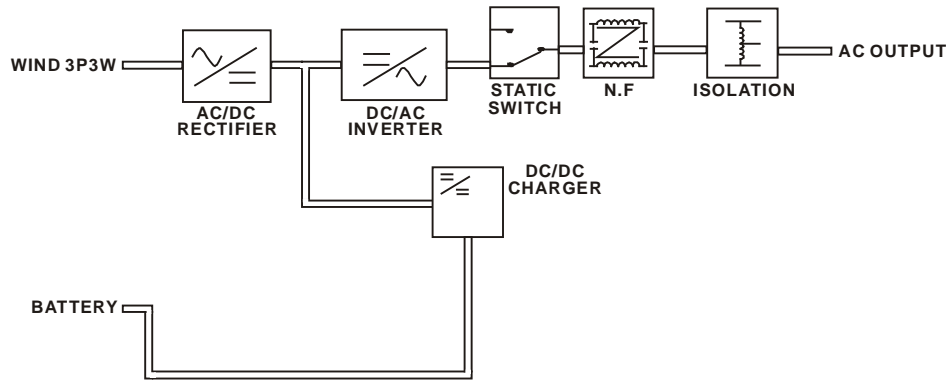


Figure 22-1: Wind System Block Diagram

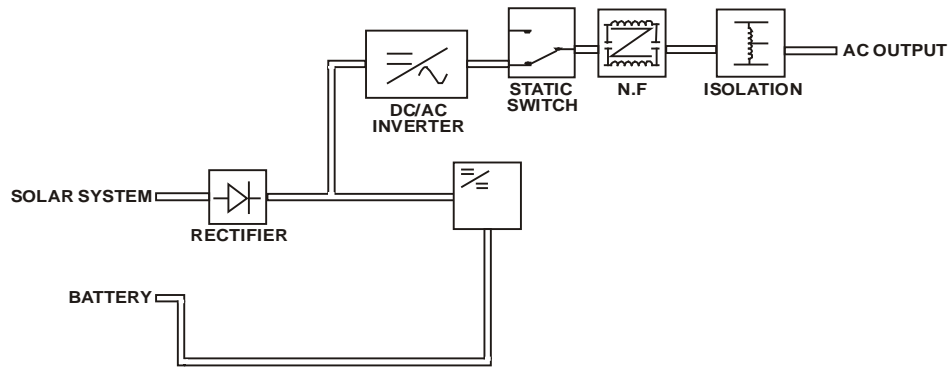


Figure 22-2: Solar System Block Diagram

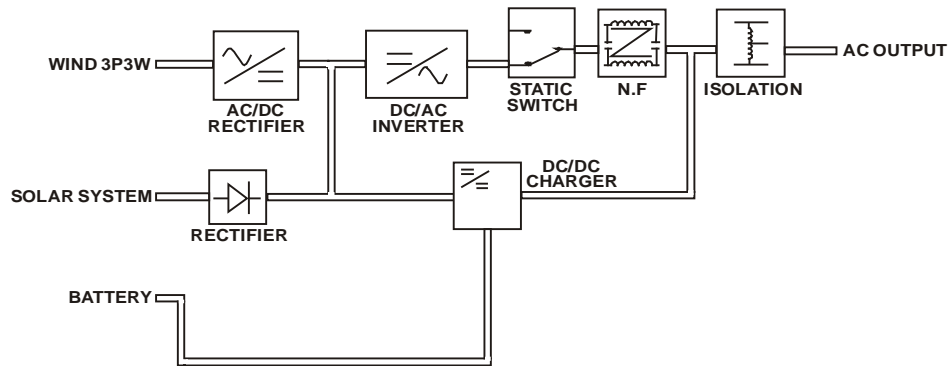


Figure 22-3: Wind + Solar System Block Diagram

7.3 AC Utility Failure (Fig.23)

The AC output comes from battery, passing through DC/DC converter, DC/AC inverter and static switch within the battery backup time.

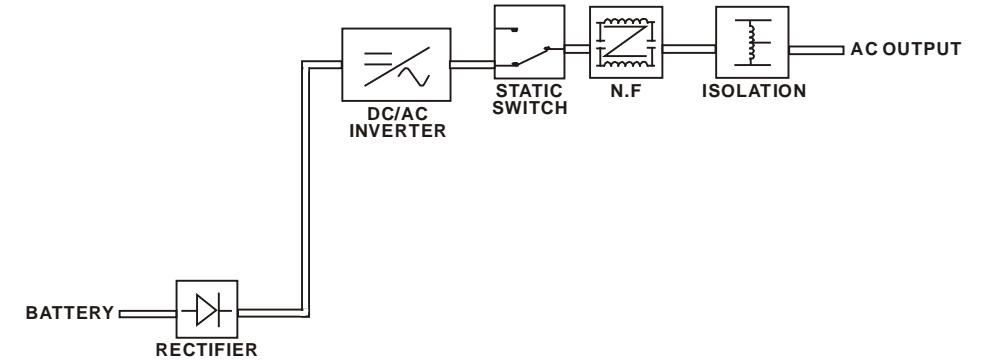


Figure 23: Battery System Block Diagram

7.4 Bypass Enable (Fig.24)

Under the following 5 conditions, the bypass will be enabled:

1. Overload.
2. Inverter failure.
3. Inverter start initially (about 20 seconds).
4. Turn off, SW4 is pressed.
5. Over-temperature

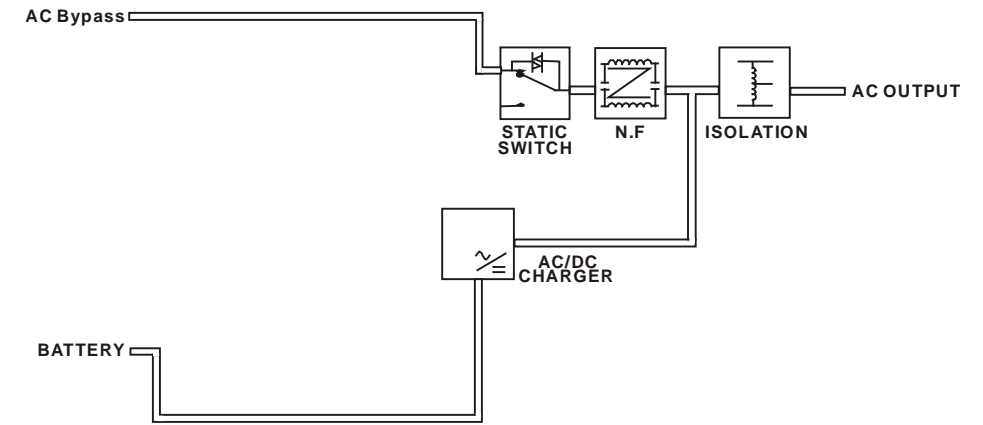


Figure 24: Bypass System Block Diagram

7.5. Battery and Recharge

1. Inverter wind/solar (5in1) is "ON", or main breaker "ON", batteries can be recharged automatically, and about 8-10 hours to 90% capacity.
2. Battery Back Up Time (Fig.25)

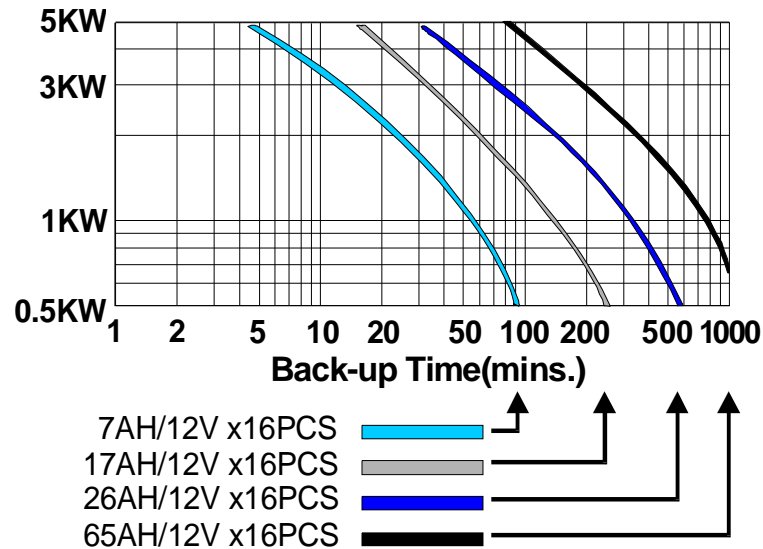


Figure 25: Battery Back Up Time

7.6 Daily Maintenance

1. The environment in which the Inverter wind/solar (5in1) is located must be kept dry and relatively dust free.
2. The exterior panels can be cleaned with a mild cleaning solution.
3. All power connections at the input, battery, output terminals and circuit breaker must be periodically checked every month.
4. The battery cells used are the sealed maintenance-free type. The factory adjusts both charging voltage and current according to the battery specifications.
5. If external battery is the vented lead-acid type, the electrolyte should be inspected every three months. If liquid level is below the low limit, pure water must be added to the battery cells.

3. Please contact the agent, if the external battery set is needed to extend the backup time.

- (1) Please keep battery fully recharged to extend the battery life.
- (2) There are no customer serviceable components inside, do not open the cover or attempt to serve the unit. High voltage may remain when the unit shuts down.
- (3) Please follow all operational instructions.

8. COMPUTER INTERFACE

The communication interface (DB9 port) on the back of the Inverter wind/solar (5in1) may be connected to a host computer. The port provides two different modes for communicating with the computer.

Mode 1: Supply **RUPS** monitoring and management software.

Mode 2: Supply **RUPSII** monitoring and management software (default).

8.1 DB9 PIN Assignment

1.Change to Mode 1 or Mode 2 of Method

Mode 1: Supply RUPS Monitoring And Management software

The port simulates relays closing to communicate with the computer. Its major functions are as follows.

- (1) To broadcast a warning when power fails.
- (2) To close any open files before the battery exhausted out.
- (3) To turn off the Inverter wind/solar (5in1).

Mode 2: Supply RUPSII Monitoring And Management software

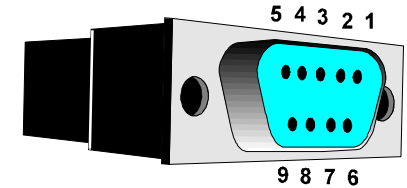
The Inverter wind/solar (5in1) communicates with the computer by sending out RS-232 data streams to one of the serial ports. By this method the user is able to monitor the following parameters.

Input Voltage	Indicates the present input voltage to the Inverter wind/solar (5in1) system when AC power is present.
Output Voltage	Indicates the present output voltage of the Inverter wind/solar (5in1)
AC Frequency	Indicates the actual output frequency of the Inverter wind/solar (5in1).
Battery Voltage	Indicates the present DC voltage of the Inverter

	wind/solar (5in1) battery.
Temperature	Indicates the actual temperature inside the Inverter wind/solar (5in1).

8.2 DB9 PIN Assignment

- PIN 1: Inverter wind/solar Fault
- PIN 2: AC POWER Failure
- PIN 3: Inverter Power On
- PIN 4: Common GND of Pin 1,2,3,5,8
- PIN 5: Inverter wind/solar Battery Low
- PIN 6: Turn off Inverter wind/solar
- PIN 7: GND of PIN6
- PIN 8: inverter Output
- PIN 9: RS232 TXD



DB9 INTERFACE CONNECTOR

SPECIFICATION:

Natural Power System 5KW Inverter Wind/Solar	SPEC.
1. Connection 1 - WT generator input	
Input voltage range (3 phases input)	115Vac to 280Vac
Input voltage frequency	0 to 60 Hz
Maximum input current (continuous)	w/limitation
Maximum input power (continuous)	w/limitation W
OR	
2. DC Input (solar pannel)	160Vdc~400Vdc
3. By pass(UPS Mode)	Yes (220Vac)
4. Connection battery bank	Yes
Nominal battery voltage	192Vdc
Battery voltage range	160Vdc to 215 Vdc
5. Maximum charging power (continuous)	1000W
Maximum charging current (continuous)	5 Amp @ 215Vdc
Output type	AC single phase
Output voltage (master mode)	230V +/-1%
Output frequency (master mode)	50 or 60hz +/-0.2%
Total harmonic distortion	< 3%
Maximum output power (continuous)	6.25 kVA
Maximum output power 20s	7.2 kVA
Maximum output current (continuous)	22 A