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POWER TECHNOLOGIES

2 Year Warranty

Service Manual

Atlas 2-3KVA Model

Power Inverter/UPS System

General Information

Getting started

- **Overview and UPS features**
- **Replacing the battery**
- **Steps to Open the Case**
- **Principles of Operation**
- **Alignments**
- **Trouble Shooting**
- **Electrical Specifications**

Conventions

The following conventions are used in this manual to provide important information for a quick and safe operation of the UPS.

Warning: Denotes a procedure or operation, which, if not perform correctly, may result in personal injury. **Be sure not to continue operation until indicated conditions are fully understood and met**.

Caution: Denotes a procedure or operation, which, if not perform correctly, may cause damage to the UPS. **Be sure not to continue operation until indicated conditions are fully understood and met**.

Information and Tips: This symbol means that there are some tips or actions recommended by our design engineers during service operations as a way to help you finish your job.

Important Safety Instructions

1. **For qualified personnel only:**
2. AVOID performing any internal service or adjustment to this product unless there is qualified personnel who can perform first aid or CPR.
3. AVOID touching any exposed connections or components while the UPS is working since there is dangerous voltage at several points in this product.
4. Turn off the UPS and disconnect the input power cable before removing the external protective cover.
5. AC voltage may be present when AC power is being supplied.

6. High voltage may be present at DC capacitors. Before opening the external cover, wait for at least five minutes after turning off the UPS.
7. Verify the input source (voltage and frequency) before performing service work.

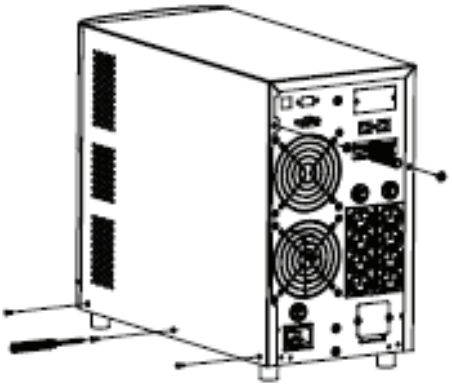
1. DO NOT short circuit the batteries.
2. If the battery connectors (P6, P8) are disconnected, plug in the input power cord and verify that that there is input power available before re-connecting the battery connectors.
3. After servicing the UPS and before restarting it, perform a polarity test on the batteries, and make sure the screws and connectors are tight.
4. After opening the cover, always make sure that all wires, connectors, and screws are tight. Then, check if any components inside are discolored.

Steps to open the case

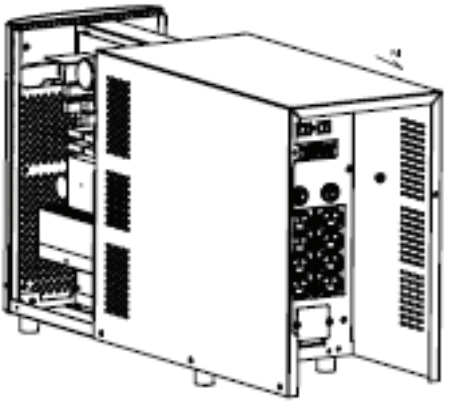
To open the external case, follow the illustrations below:

1. Remove related screws as shown in STEP 1.
2. Slide external cover in the direction shown in STEP 2.
3. You will see the internal panel.

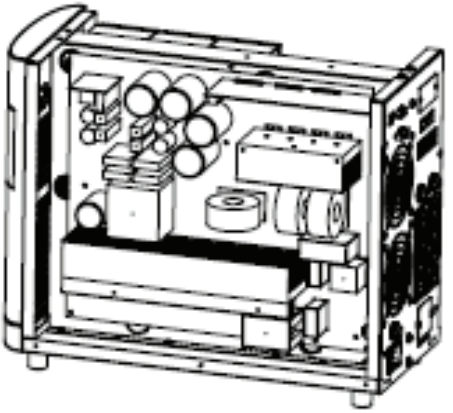
Step 1



Step 2



Step 3



I. INTRODUCTION

All the UPS series are strictly tested and carefully designed. We always do our best to make our products more reliable and safer. However, due to the lifetime of electrical components and some unpredictable reasons, malfunctioning may occur. If this happens, consult with qualified and trained personnel. This service manual will help technicians repair and adjust any trouble that you may find in your UPS. If the UPS still does not work properly, contact us and we will gladly solve any problems that you may have encountered.

Due to the unique features of this UPS series (Uninterruptible Power System), this unit is very easy to maintain and service.

- The PBC has all the major power components.
- All PCBs are interconnected.
- Major parts are connected with flexible insulated wires and plugs.

This service manual consists of 4 major parts:

1. Introduction.
2. Principle of operation: This section describes the functions and principles of each part.
3. Alignments: This section describes the locations and methods needed to adjust this UPS.
4. Troubleshooting: This section describes the possible failure conditions and procedures to repair it.

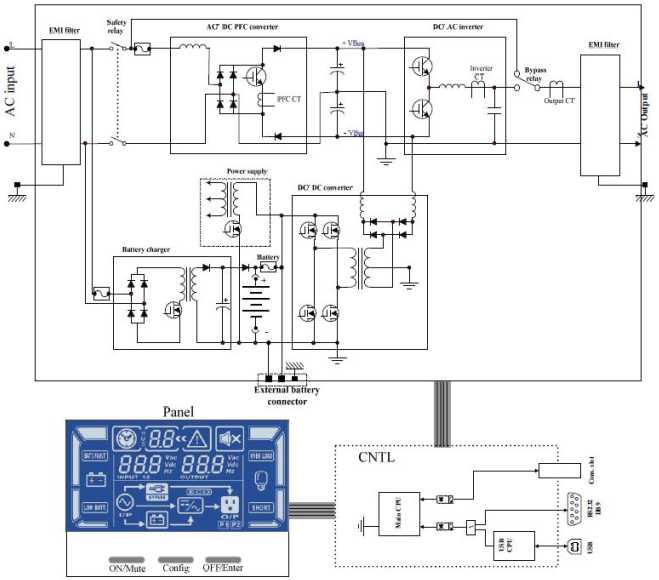
For a correct and safe operation, make sure to read this manual carefully before servicing the UPS.

II. PRINCIPLE OF OPERATION

This 3KVA (2KVA) high input power factor UPS system contains two major PCB assemblies. They are:

1. PSDR	Includes (1) a charger, (2) a DC power supply, (3) a power factor correction, (4) a DC-DC converter, (5) an inverter and (6) output circuits.
2. CNTL	Includes protection parts, signaling circuits, regulation and inverter control circuits.

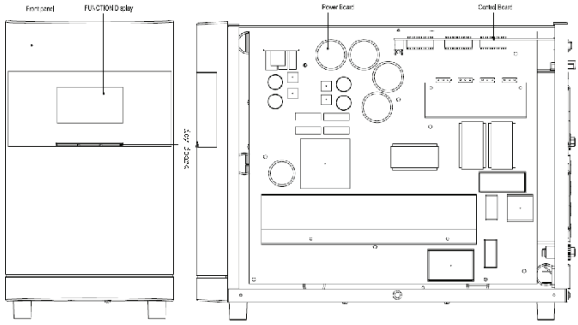
Picture 1 shows how the major circuits are connected and how the entire system works.

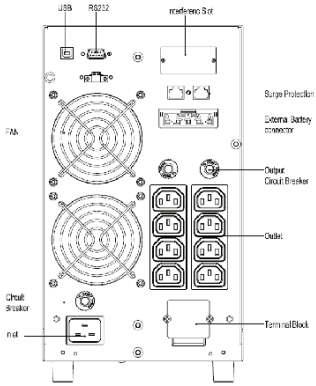


Picture 1: Circuit connection for 2-3KVA.

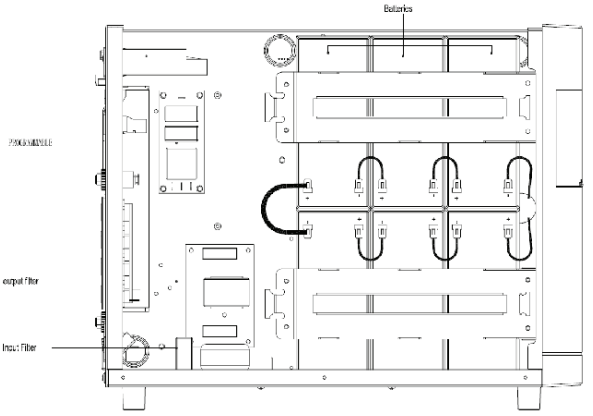
Picture 1 shows how the major circuits are connected and how the entire system works.

The location of the assemblies in the machine are shown in picture 2.





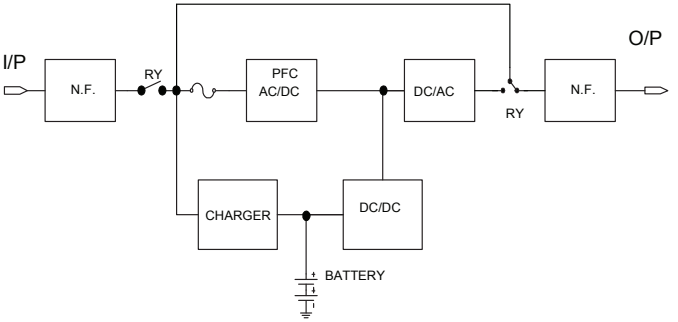
The location of the assemblies in the machine are shown in picture 2.



Picture 2 : Sub-assembly location

The block diagram in picture 3 shows the UPS at normal operation from left to right. When a protection circuit is triggered or a fault condition occurs, the output supply is transferred immediately from the inverter to the AC mains by a bypass relay. This operation will be explained in another section.

This ON-LINE UPS system resorts to high frequency PWM techniques to achieve high efficient performance. When the Full mode is on, the UPS can deliver a clean, regulated sine-wave output at any load. Each sub-system is described as follows:



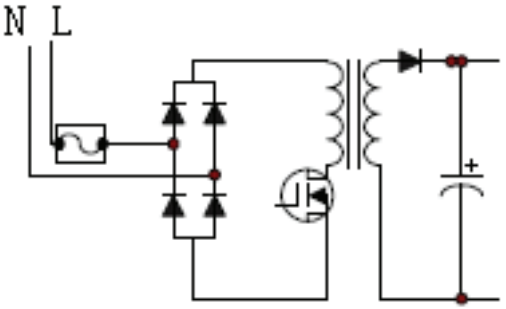
Picture 3: Block Diagram for UPS

1.POWER STAGE (PSDR)

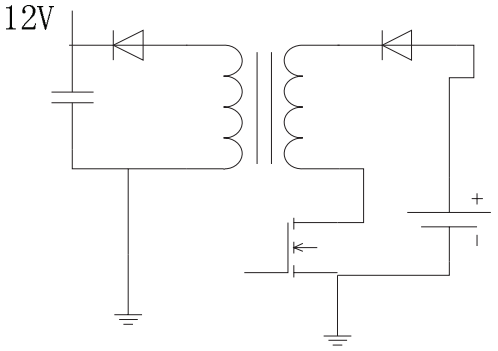
As shown in picture 1, the power stage consists of a charger, a power factor correction unit, a DC power supply, a DC-DC converter, an inverter and output circuits.

1-1 Charger Sub-System:

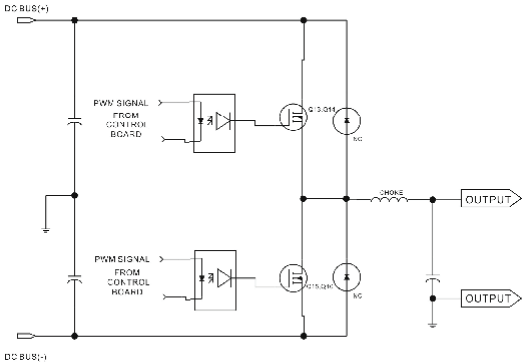
The purpose of the charger is to provide power to keep the batteries full, (Refer to picture 4). The voltage flyback switching power supply delivers a constant DC voltage (83.8 VDC) to the batteries. Apart from providing constant voltage, the power supply also limits the current going into the batteries thus, protecting and extending their life.



Picture 4: Charger Circuit Diagram



Picture 5: Schematic for DC power supply



Picture 6: Schematics for inverter

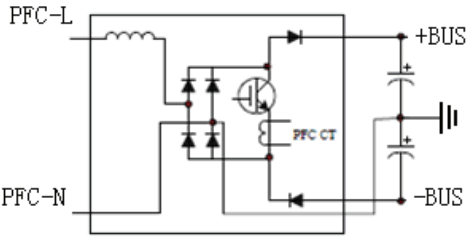
1-4 Output Sub-System:

The bypass relay receives a signal from the control circuit to switch the output of the UPS from bypass to inverter, and vice versa. The output noise filter circuit blocks the EMI noise to the loads.

1-5 Input Power Factor Correction Sub-System:

The purpose of the power factor correction (PFC.) system is to ensure that the level of the input current is less than 1, as shown in picture 7.

When the input AC power cord is plugged in, the AC relay is activated and the AC power goes through noise filter to the charger and to the line detector. Both DC buses have voltages at about 1.4 times of input RMS voltage. When the "on" switch is pressed, the P.F.C. circuit is enabled and the DC buses are regulated at ±360 Vdc.

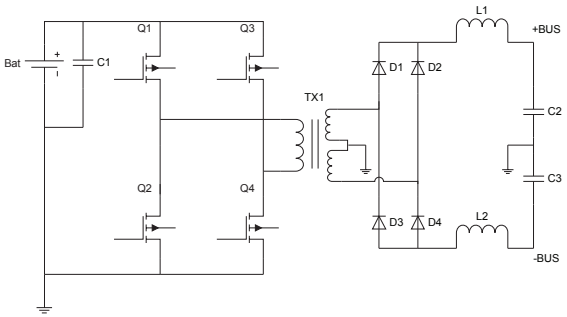


Picture 7: I/P PFC configuration

1-6 DC-DC Converter Sub-System:

The primary role of a UPS is to deliver accurate AC power to the loads connected to it whether the AC line exists or not. The batteries in the UPS release the stored energy to start supplying the inverter once the loss in the AC line is detected.

Refer to picture 8, the battery voltage is transformed through a full bridge DC-DC converter to ±360Vdc as DC buses for inverter. When the line fails, the ±360Vdc DC sources are caught up to supply the power needed by the inverter immediately.



Picture 8: Schematics for DC/DC Booster

2. MAIN CONTROL PCB ASSEMBLIES (CNTL)

The UPS is controlled by the PCB assemblies which are composed of three mayor circuits:

(1) Regulation & control
(2) Protection
(3) Signaling

2-1 REGULATION & CONTROL SUB-SYSTEM:

This section can be considered the brain of the UPS. It provides the control pulses to the switching elements which deliver power to the output. The sub-system also regulates the output to ensure that the UPS is delivering constant AC voltage to the loads.
When the main is applied and the switch is turned on, a 10-second timer is triggered. The bypass relay stays at bypass position in this time period. At the end of this period, the bypass signal is removed and the relay transfers to inverter output.

2-2 PROTECTION SUB-SYSTEM:

The UPS provides the following protection circuits:
1. Overload protection

The load detector identifies the load current, i.e. the inverter current, and sends the signal through two paths. When the battery mode is on, the UPS will go onto failure mode if the overload occurs.
The overload status will be indicated on the UPS panel. There are two kinds of protection provided by our UPS:

a. **Overload Protection:** The UPS collects the continuous overload signals through the CPU switch, the bypass relay. If the output load is lower than 110% of rated load (VA or Wattage), the UPS keeps running on inverter mode, showing the warning status. If the output load is between 110% and 130% of rated load (VA or Wattage) the UPS transfers to bypass after 12s. If the output load is higher than 130% of rated load, the UPS immediately transfers to bypass after 1.5 seconds.

b. **Cycle by Cycle Current Limit:** When output loads sink a high surge current for a short time, a high inverter current is detected and the inverter switches, i.e. the IGBT's, are turned off pulse by pulse to protect themselves from thermal runaway. The output relay stays at inverter output position unless a continuous overload is detected or an abnormal inverter operation occurs.

2. Battery over or under shut down

When the battery voltage is under or over the level, the UPS will activate a warning signal which will turn off later. After that, the fault code will be displayed on the LCD.

3. Inverter output abnormal protection

When there is a failure signal, the inverter shuts down immediately. When this happens, the alarm continues buzzing and the LCD displays the following fault code. "The failure signal remains on latching mode until it is switched off or until the battery depletes".

4. Over temperature protection

The thermal switch detects the temperature of PSDR heat sink. The thermal switch is electrically connected to the CPU. An opened thermal switch is considered as temperature failure by the UPS. The LCD will display the fault code.

5. Bus over/under/unbalance-voltage protection

To protect any BUS over/under/unbalance -voltage condition especially for the half-bridge load. The LCD will display the fault code.

2-3 Signaling Sub-System:

When the AC line is unable to supply, the batteries release energy inside to supply the inverter immediately. At the same time, the buzzer beeps every 4 seconds.

When the batteries are depleted, the battery-low signal will be activated and the buzzer will beep every 1 second.

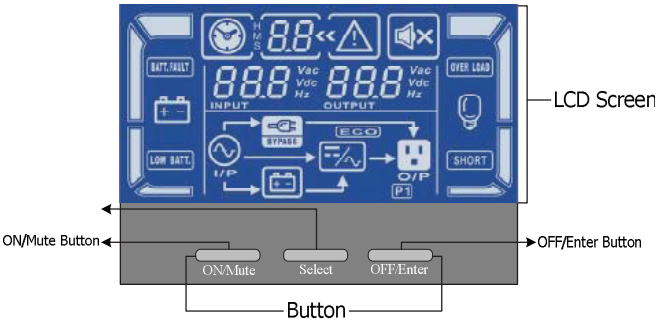
Remote shutdown signal is enabled only when the line fails.

3. Front Panel:

The front panel consists 2 parts: push button and display LCD set.

The push button is used to turn on and off the UPS. LCD display indicates the load level,the battery voltage level and operation status of the UPS.

When the system is not working properly, the LCD will display the fault code.

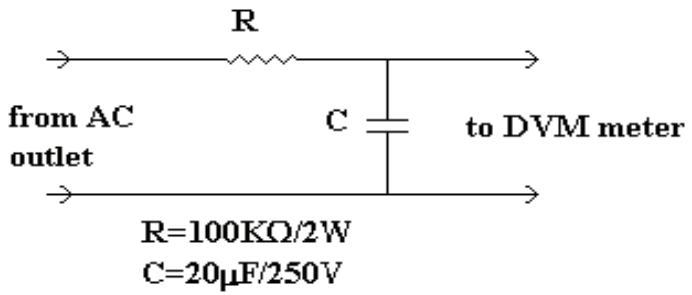


Button	Function
ON/Mute Button	**Turning the UPS on:** Press and hold the **ON/Mute** button for at least 2 seconds to turn on the UPS. **Muting the alarm:** After the UPS is turned on, press and hold this button for at least 5 seconds to disable the alarm system. This does not apply when warnings or errors occur. **Down key:** Press this button to display previous selection on the UPS setting mode.
OFF/Enter Button	**Turning the UPS off:** Press and hold the **OFF/Enter** button for at least 2 seconds to turn off the UPS on Battery mode. The UPS will be on Stand-by mode under normal power or will switch to Bypass mode. **Muting the alarm:** After the UPS is turned on, press and hold this button for at least 5 seconds to disable the alarm system. This does not apply when warnings or errors occur. **Down key:** Press this button to display previous selection on the UPS setting mode.
Select Button	**Switching the LCD messages:** Press this button to display the following messages showing values related to input voltage, input frequency, battery voltage, output voltage and output frequency. The default values will be restored after pressing it for 10 seconds. **Setting mode:** After pressing and holding this button for 5 seconds, if the UPS is off, it will go onto setting mode. **Up key:** Press this button to display the next selection on the UPS setting mode.
ON/Mute + Select Button	**Switching to bypass mode:** When the main power is normal, press the **ON/Mute** and the **Select** buttons simultaneously for 5 seconds. The UPS will then go onto **Bypass mode**. This action will be ineffective when the input voltage is beyond the acceptable range.
ON/Mute + OFF/Enter Button	**Switching to UPS self-test mode:** Press the **ON/Mute** and **OFF/Enter** buttons simultaneously for 5 seconds to go onto **UPS self-testing** mode while on **AC** mode, **ECO** mode, or **Converter** mode.

IV. ALIGNMENTS

Below, there is a list of the tests to be performed by qualified personnel to ensure the EUT is working properly. Before beginning, **make sure that the device is OFF and disconnected from the utility line**.

TEST ITEM	TEST POINT	TEST AND ADJUSTMENT SEQUENCE	EXPECTED RESULT
Charger Voltage	P5/P6/P9, +- P7/P8P10(-)	1. Disconnect P5(+) and P8(-) wires from pins respectively. 2. Connect DVM (set to measure DC) to test pins and plug input power cord to utility.	1. Cooling fans on back panel begin to rotate. 2. 82.8Vdc±1.8V
+DC Bus Voltage @ Line Mode	JP16/JP17(+). JP48/JP49/JP50 (GND)	1. Connect DVM (Set to measure DC) to test point. 2. Plug input power cord to utility. 3. Press "ON" button for 2 seconds to turn EUT on. 4. Waiting for 10 seconds to make sure the EUT work in line mode according to the LCD display. 5. Check reading on DVM.	+360VDC±10V
-DC Bus Voltage @ Line Mode	JP18/JP19(+). JP48/JP49/JP50 (GND)		-360VDC±10V
+DC Bus Voltage @ Baterry Mode	JP16/JP17(+). JP48/JP49/JP50 (GND)	1. Disconnect I/P power cord from utility and press "ON" button for 2 seconds to turn the EUT ON. 2. Connect DVM (Set to measure DC) to test point. 3. Waiting for 4 seconds to make sure the ETU word in baterry mode.	+360VDC±10V
-DC Bus Voltage @ Baterry Mode	JP18/JP19(+). JP48/JP49/JP50 (GND)		-360VDC±10V
O/P DC Balance @ Line Mode	O/P socket	1. Keeping UPS on @ Line mode. 2. Connect DC measurement tool[1] to O/P socket. 3. Check reading on DVM.	100mV max.

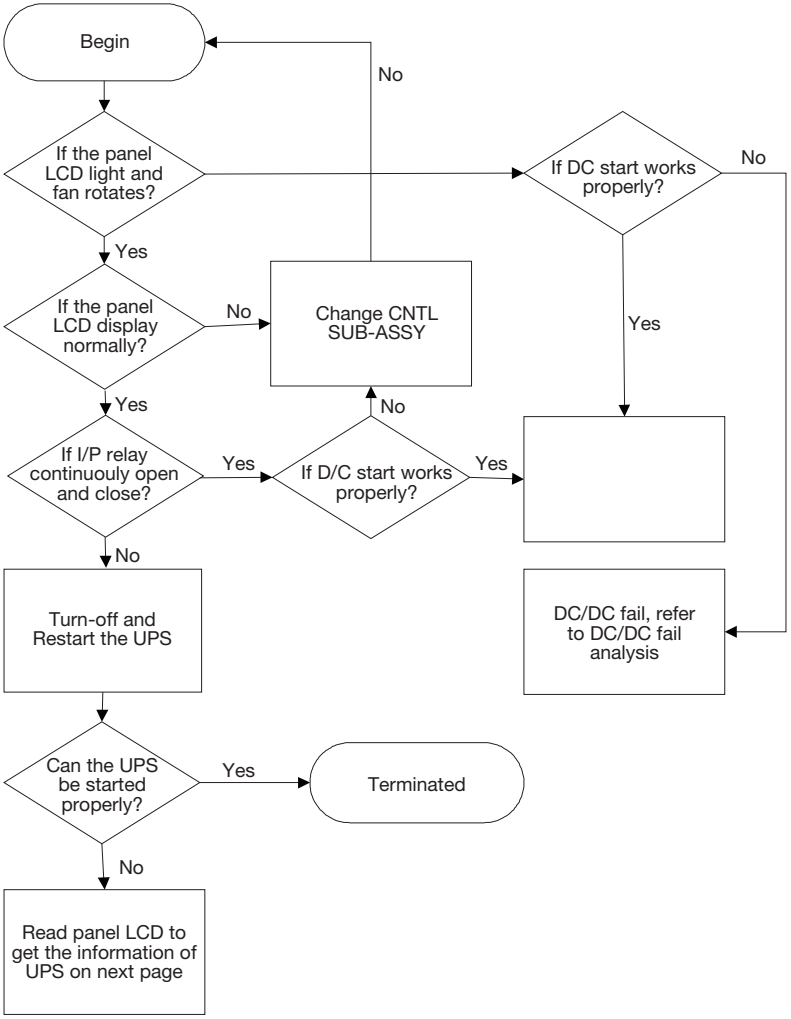


Picture 9 : Circuit for test output balance

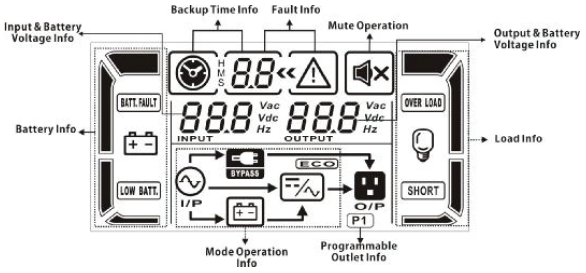
V. TROUBLE SHOOTING

Our products are carefully designed and strictly tested to prevent malfunctioning. However, if failure occurs, refer to the following **Trouble Shooting Chart**.

Trouble Shooting Chart



Panel LCD Display Explanation

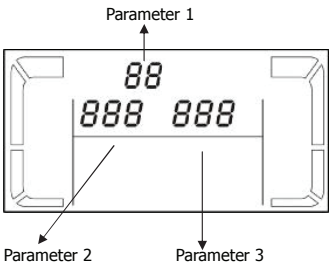


Display	Function
Backup time information	
	Indicates the remaining backup time in pie chart
H M S 88	Indicates the remaining backup time in numbers H: hours, M: minute, S: second
Fault information	
	Indicates a warning or a malfunction.
88	Warning and fault code indicators. The meaning of the codes is listed in the section below.
Mute operation	
	Indicates that the UPS alarm is disabled
Output & Battery voltage information	
888 Vac Vdc Hz OUTPUT	Output voltage, frequency or battery voltage. VAC: output voltage VDC: battery voltage Hz: frequency
Load information	
	Load level indicator at 0-25%, 26-50%, 51-75%, and 76-100% of its capacity
OVER LOAD	Overload indicator
SHORT	Indicates the load or the UPS output is short circuited
Programmable outlets information	
P1	Indicates that programmable management outlets are working
Mode operation information	
I/P	Indicates the UPS is connecting to the mains
	Indicates the battery is working
BYPASS	Indicates the bypass circuit is working
ECO	Indicates the ECO mode is enabled
	Indicates the Inverter circuit is working
O/P	Indicates the output receptacle is working
Battery information	
	Battery level indicator at 0-25%, 26-50%, 51-75%, and 76-100% of its capacity
BATT. FAULT	Battery fault indicator
LOW BATT.	Low battery level and low voltage indicator
Input & Battery voltage information	
888 Vac Vdc Hz INPUT 12	Input voltage or frequency or battery voltage indicator. VAC: Input voltage, VDC: battery voltage, Hz: input frequency

LCD display wordings index

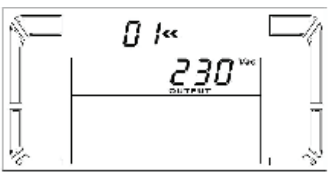
Abbreviation	Display content	Meaning
ENA	ENA	Enable
DIS	dIS	Disable
ESC	ESC	Escape
HLS	HLS	High loss
LLS	LLS	Low loss
BAT	bAt	Battery
CF	CF	Converter
EP	EP	EPO
FA	FA	Fan
TP	tP	Temperature
CH	CH	Charger

UPS Setting



There are three parameters to set up the UPS. Parameter 1: It's for program alternatives. There are 8 programs to set up: output voltage setting, frequency converter enable/ disable, output frequency setting, ECO enable/disable, ECO voltage range setting, Bypass enable/disable, Bypass voltage range setting, programmable outlets enable/disable, programmable outlets setting and exit.

01: Output voltage setting Interface



Setting
For 208/220/230/240 VAC models, you may choose the following output voltage:
208: current output voltage is 208Vac
220: current output voltage is 220Vac
230: current output voltage is 230Vac
240: current output voltage is 240Vac
For 110/150/120/127 VAC models, you may choose the following output voltage:
110: current output voltage is 110Vac
115: current output voltage is 115Vac
120: current output voltage is 120Vac
127: current output voltage is 127Vac

02: Frequency Converter enable/disable Interface

Setting
CF ENA: converter mode enabled
CF DIS: converter mode disabled

03: Output frequency setting Interface

Setting
The initial frequency may be set on battery mode:
BAT 50: current output frequency is 50Hz
BAT 60: current output frequency is 60Hz
If the converter mode is enabled, you may choose the following output frequency:
CF 50: current output frequency is 50Hz
CF 60: current output frequency is 60Hz

04: ECO enable/disable Interface

Setting
ENA: ECO mode enabled
DIS: ECO mode disabled

05: ECO voltage range setting Interface

Setting
Press the Down key or Up key to set the acceptable high voltage point and acceptable low voltage point:
HLS: High loss voltage in ECO mode (For 208/220/230/240 VAC models, the setting range is from +7V to -24V of the nominal voltage. For 110/115/120/127 VAC models, the setting range is from +3V to -12V of the nominal voltage). LLS: Low loss voltage in ECO mode (For 208/220/230/240 VAC models, the setting range is from -7V to -24V of the nominal voltage. For 110/115/120/127 VAC models, the setting voltage is from +3V to -12V of the nominal voltage)

06: Bypass mode enable/disable Interface

Setting
ENA: Bypass mode enabled
DIS: Bypass mode disabled

07: Bypass voltage range setting Interface

Setting
Press the Down key or Up key to set the acceptable high voltage point and acceptable low voltage point:
HLS: Bypass high voltage point
LLS: Bypass low voltage point
For 208/220/230/240 VAC models:
230-264: setting the high voltage point from 220Vac to 264Vac
170-220: setting the low voltage point from 170Vac to 220Vac
For 110/115/120/127 VAC models:
120-132: setting the high voltage point from 120Vac to 140Vac
85-115: setting the low voltage point from 85Vac to 115Vac

08: Programmable outlets enable/disable Interface

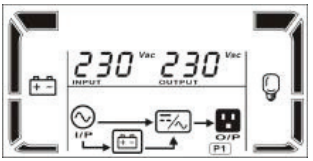
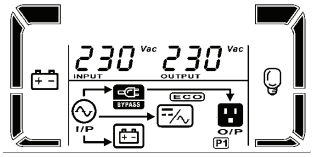
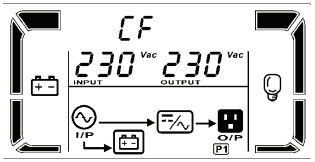
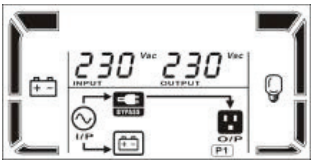
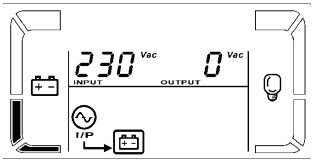
Setting
ENA: Programmable outlets enabled
DIS: Programmable outlets disabled

09: Programmable outlets setting Interface

Setting
0-999: setting the backup time limits in minutes from 0-999 for programmable outlets which connect to non-critical devices on battery mode.

00: Exit setting

Operating Mode Description

Operating mode	Description	LCD display
Online mode	When the input voltage is within an acceptable range, the UPS will provide pure and stable AC power to output. The battery is also charged when the online mode is set.	
ECO mode	Energy saving mode: When the input voltage is within voltage regulation range, UPS will bypass voltage to output for energy saving.	
Converter mode	When input frequency is within 40 Hz to 70 Hz, the UPS can be set at a constant output frequency, 50 Hz or 60 Hz. The UPS will still charge battery under this mode.	
Battery mode	When the input voltage is beyond the acceptable range or when power is failing, the alarm will beep every 4 seconds and the battery will start supplying power to the UPS.	
Bypass mode	The bypass mode can be set automatically or manually when the UPS is overloaded but the input voltage is within an acceptable range. In this case, the alarm will beep every 10 seconds.	
Standby mode	UPS is powered off and there is no output supply power however, batteries are being charged.	

Faults Reference Code

Fault event	Fault code	Icon	Fault event	Fault code	Icon
Bus start fail	01	x	Inverter voltage Low	13	x
Bus over	02	x	Inverter output short	14	SHORT
Bus under	03	x	Battery voltage too high	27	BATT.VOLT
Bus unbalance	04	x	Battery voltage too low	28	BATT.VOLT
Inverter soft start fail	11	x	Over temperature	41	x
Inverter voltage high	12	x	Over load	43	OVER LOAD

Warning indicator

Warning	Icon (flashing)	Alarm
Low Battery	⚠ LOW BATT.	Beeping every second
Overload	⚠ OVER LOAD	Beeping twice every second
Battery is not connected	⚠	Beeping every second
Over Charge	⚠	Beeping every second
Site wiring fault	⚠	Beeping every second
EPO enable	EP ⚠	Beeping every second
Fan Failure	FA ⚠	Beeping every second
Over temperature	tP ⚠	Beeping every second
Charger failure	CH ⚠	Beeping every second
Out of bypass voltage range	⚠	Beeping every second

Failure Diagnosis

1. OVERVIEW:

Related Circuit Block	Components to be checked	Component Type	Fail condition
BAT FUSE	F2, F3	Fuse	open
I/P FUSE (on PSDR)	F1,	Fuse	open
U.P.F. Correction	D10, D11,REC1	Diode	short or open
	Q1	IGBT	C-E short or open
Full-Bridge Booster	Q2, Q4, Q5, Q6, Q9、Q10、Q11、Q12	MOSFET	D-S short or open
	D15、D16、D17、D18	Power Diode	short or open
Inverter	Q14, Q13, Q7, Q8	IGBT	C-E short or open
Charger	Q3	MOSFET	D-S short or open
	D3	Power Diode	short or open
DC Power Supply	Q2	MOSFET	D-S short or open

2. U.P.F. CORRECTION:

Step	Checked components	Instrument function	Reference Value	Failed condition
1	F1	Ω	short	open
2	Q1(D,S)	DIODE	0.46	short or open
3	D10, D11	DIODE	0.44	short or open
4	R18	Ω	47.00	open or value change
5	REC1 (+,~),(~,-)	DIODE	0.46	short or open

3. FULL-BRIDGE DC-DC CONVERTER:

Step	Checked components	Instrument function	Reference Value	Failed condition
1	F2, F3	Ω	short	open
2	Q2, Q4, Q5, Q6, Q9, Q10, Q11, Q12 (D,S)	DIODE	0.47	short or open
3	R31, R54, R41, R42, R47, R48, R49, R50	Ω	10.00	open
4	D15, D16, D17, D18	DIODE	0.41	short or open

4. DC/AC INVERTER:

Step	Checked components	Instrument function	Reference Value	Failed condition
1	F1、F2、F3	Ω	short	open
2	Q14, Q13, Q7, Q8 (D,S)	DIODE	0.47	short or open
3	R64、R85、R90、R91	Ω	47 Ω	open

5. DC POWER SUPPLY :

Step	Checked components	Instrument function	Reference Value	Failed condition
1	Q2(D,S)	DIODE	0.47	short or open
2	R18	Ω	22	open
3	R104	Ω	0.22	open
4	U1 (3845) PIN: 5-6 5-7 5-8 6-8	Ω	>1M >1M 3.5k >1M	too low

6. AC/DC CHARGER:

Step	Checked components	Instrument function	Reference Value	Failed condition
1	Q3(D,S)	DIODE	0.49	short or open
2	R6	Ω	47	open
3	R37	Ω	0.5Ω	open
4	U1 (3845) PIN: 5-6 5-7 5-8 6-8	Ω	45k >1M 3.5k 53.5k	too low
5	D2, D3, D5	DIODE	0.57	short or open
6	C1, C2	Ω visual	open	short deformed

After replacing all defective components on the power stage (PSDR), proceed to make the connection on the control board. Supply the DC voltage 36V dc/2Amp (limited current) with the DC power supply via P6+ and P8-.
Turn on the switch on the panel. After doing that, the message Current limit will be displayed on the DC power supply for about 2 seconds. If not, there might still be some defective components that have not been found. When everything seems to be working, turn off the switch on the panel and remove the DC power supply. Plug in the power cord and supply the UPS with the mains. Test the output of the charger (P5+,P6-). If it is 41.2Vdc, the fan will also start working. If there are no issues with the charger, connect the batteries via P6, P8.

Finally, turn on the switch on the panel again and follow the procedure listed in part III (Alignment) to adjust the DC offset, and measure the output voltage on the DC bus.

CAUTION: DO NOT supply the UPS with the mains until all defective components have been replaced.

APPENDIX I: ENGINEERING SPEC.

I/P Specification

Cold Start	Yes, default frequency = 50 Hz
Acceptable Input Voltage	110-300 VAC
Low line transfer	160VAC; ± 5% (Full Load)
Line low comeback	175 VAC; ± 5%(Full Load)
Line high transfer	300 VAC; ± 5%
Line high comeback	285 VAC; ± 5%
Start-up Voltage with Output Power	110 VAC to 300 VAC; ± 2%
Ratings (at nominal input voltage)	2000/3000 8A/11A
earth leakage	3.5 mA, maximum (UPS only)
Input power factor	> 0.95
Input frequency	40 Hz to 70 Hz
Input protection type	circuit protector

O/P Specification

O/P Power	
Power (VA)	2000 / 3000
Power (Watts)	1600 / 2400
Output Power Factor Rating	0.8
Load Power Factor Range	0.5 lagging to 1.0 (unity)
Output Voltage	208/220/230/240
Waveform	Sinusoidal
Nominal Voltage	230 VAC
Line Mode Voltage Regulation	± 3% of nominal; no load to full load, resistive & RCD loads
Battery Mode Voltage Regulation	± 3% of nominal; no load to full load, resistive & RCD loads
Transient Response (line mode)	0%-100%-0%; ± 9% max. 20%-100%-20%; ± 6 % max.

APPENDIX II: COMMUNICATION

1. RS232 PORT

The RS232 provides proprietary command sequence for the computer to monitor the line and UPS status and to control the UPS. The data format is listed as following:

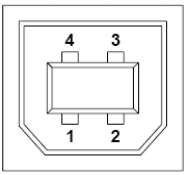
PIN TYPE .....: female
BAUD RATE ..... : 2400 bps
DATA LENGTH ..... : 8 bits
STOP BIT ..... : 1 bit
PARITY ..... : NONE

The pin assignment and description are listed in the following table and the interface configuration is indicated in illustration VI-1. Note that, the computer will control information exchange by a query followed by <cr> (Character Return). UPS will respond with information followed by a <cr> or action. UPS data will be provided at 2400 baud rate and consist of 8 data bits, 1 stop bit, and no parity bit. All the information is provided in ASCII format.

200PIN #	Description	I/O type
1,4,6,7,8,9	not connecteed	
3	UPS RS232 receiver Rx from computer	input
2	UPS RS232 transmitter to computer	output
5	GND	

2. USB PORT

CAUTION: DO NOT supply the UPS with the mains until all the defective components have been replaced.



PIN#	SIGNAL
1	VBUS
2	D-
3	D+
4	GND