



HT80 Outdoor UPS

2000VA Model

User & Installation Manual

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About This Manual

Purpose

This manual contains important instruction that must be followed when install, service or maintain the product. Please read the instruction and drawings carefully before installations and operations. Keep this manual in a safe place for future reference.

Scope

This manual provides safety and installation guidelines as well as information on tools and wiring.

Safety Instructions



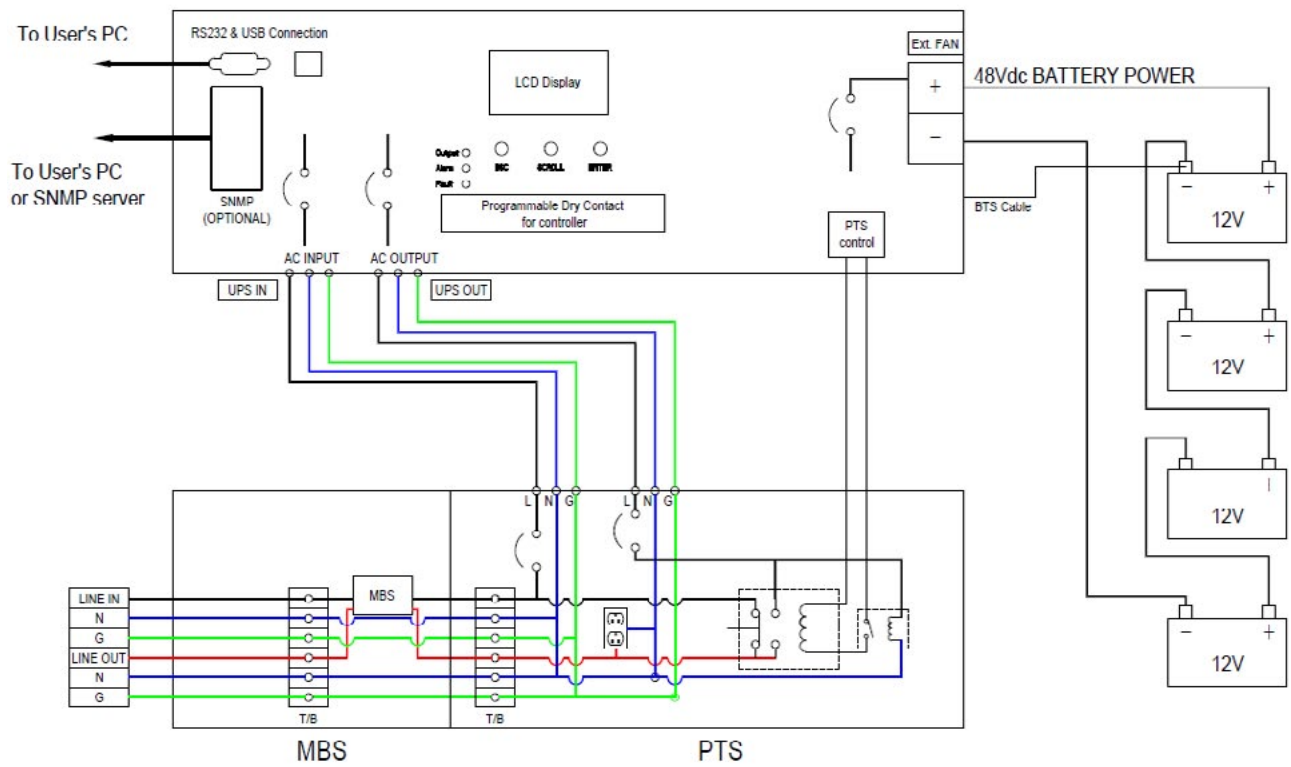
WARNING: This chapter contains important safety and operating instructions. Read and keep this manual for future reference.

1. Before using the unit, read all instructions and cautionary markings on the unit, the batteries and all appropriate sections of this manual.
2. CAUTION --To reduce risk of injury, charge only deep-cycle lead acid type rechargeable batteries. Other types of batteries may burst, causing personal injury and damage.
3. Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
4. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
5. CAUTION – Only qualified personnel can install this device with battery.
6. NEVER charge a frozen battery.
7. For optimum operation of this unit, please follow required spec to select appropriate cable size. It's very important to correctly operate this unit.
8. Be very cautious when working with metal tools on or around batteries. A potential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion.
9. Please strictly follow installation procedure when you want to disconnect AC or DC terminals. Please refer to INSTALLATION section of this manual for the details.
10. Battery breaker (60A) is provided as over-current protection for the battery supply.
11. GROUNDING INSTRUCTIONS -This unit should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this unit.
12. NEVER cause AC output and DC input short circuited. Do NOT connect to the mains when DC input short circuits.
13. Warning!! Only qualified service persons are able to service this device. If errors still persist after following troubleshooting table, please send this unit back to local dealer or service center for maintenance.

Introduction

The battery backup system provides constant and reliable backup power to outdoor equipment. It consists of Uninterruptible Power Supply (UPS) System and optional Power Transfer Switch (PTS) that provide backup power when the line is unqualified. These components should be mounted inside an enclosure to provide protection from most weather conditions.

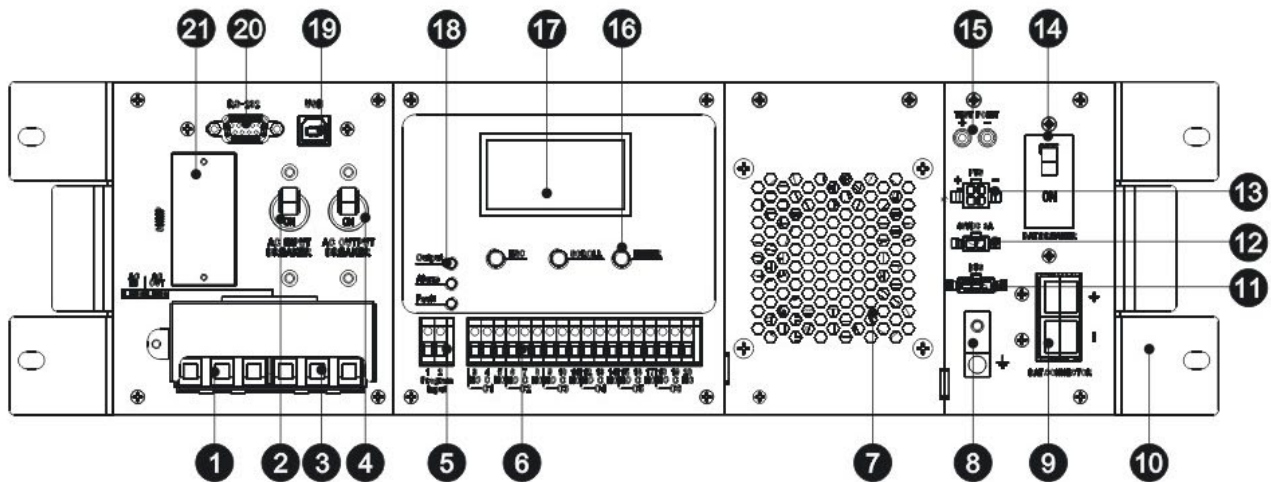
System Architecture



Battery Backup System Block Diagram

UPS Module

The UPS module provides utility power to load when line is qualified. And an automatic voltage regulator (AVR) is embedded to provide stable power to the load. It will instantly switch to emergency backup power during utility power failure or interruption. The front panel view is shown as below.



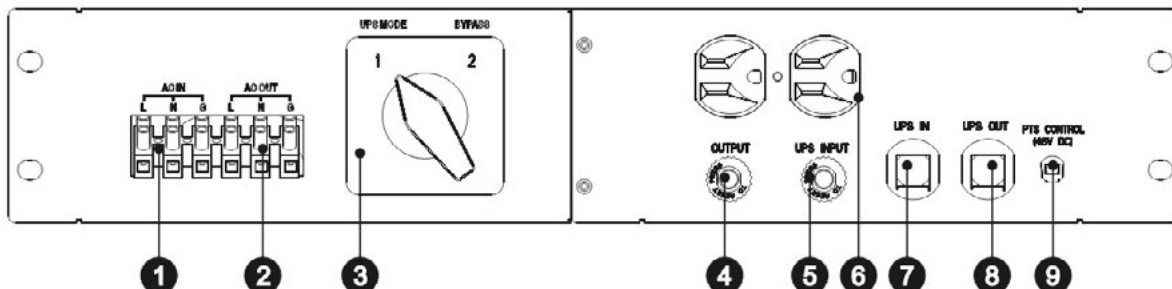
Front Panel of UPS

1. **AC Input Terminal Block** - This terminal block is the UPS AC line power input.

2. **AC Input Breaker** - This circuit breaker is an on/off switch for the line power into the UPS that also provides input protection. It must be switched on for proper UPS operation.
3. **AC Output Terminal Block** - This terminal block is the UPS AC power output.
4. **AC Output Breaker** - This circuit breaker is a resettable protective thermal circuit breaker to protect UPS output from overload and short circuits.
5. **Input Contact** - To activate a programmable alarm by shorting this input contact.
6. **Dry Contact** - Six sets of dry contacts will energize when programmable event occurs.
7. **Internal Fan** - It's to cool down inside temperature of the UPS. The fan is flexibly replaced for maintenance.
8. **GND** - This connector is permanent ground of the UPS.
9. **Battery Connector** - The battery connector is to connect external batteries.
10. **Mounting Bracket & Handle** - This part is for unit mounting on the size of 19" cabinet and for people moving unit conveniently.
11. **Battery Temperature Connector** - This is used to monitor battery temperature. The temperature probe connector must be plugged in UPS for normal operation. The other end should be firmly attached to the terminal of the battery.
12. **External FAN Connector** - To provide DC Power (48Vdc, 3 Amp Max) to an optional 48Vdc fan.
13. **PTS Control Connector** - This connector provides power to control the PTS unit.
14. **Battery Breaker** - This over-current protection is used as an on/off switch for the battery power. It must be switched on for proper UPS operation.
15. **Battery Voltage Test Points** - The test points allow you to measure battery voltage. They accept 2 mm diameter test probe tips. The battery circuit breaker must be turned on before measuring voltage. CAUTION: The battery voltage test points are NEVER be used as a power outlet.
16. **Function Keys** - These buttons are used to operate and control the LCD panel.
17. **LCD Display Panel** - It shows the UPS information in four-line texts.
18. **Indicator LEDs** - Three LEDs show the information of output status, alarm and fault.
19. **USB Connector** - This is used to connect the UPS to the computer for remote control and monitoring.
20. **RS232 Connector** - A straight-through DB-9 to DB-9 connector cable can be connected in. It is used to connect the UPS to the computer for remote control and monitoring.
21. **Intelligent Slot (optional)** - This optional slot is for SNMP card insertion to communicate with UPS. The UPS can be monitored and controlled via a web browser or with SNMP protocols.

PTS Module (Optional)

The Power Transfer Switch (PTS) shown below allows the UPS to be removed for service, replacement or maintenance without interrupting power to the outdoor equipment.



Front Panel of PTS with terminal block

1. **AC Input Terminal Block** - The line input power is connected to the terminal block marked with "AC IN".
2. **AC Output Terminal Block** - The output power is connected to the terminal block marked with "AC OUT".
3. **Switch** - UPS or bypass output can be selected by this switch.
4. **AC Output Breaker** - This circuit breaker marked with "OUTPUT" is a resettable protective thermal circuit

breaker to protect the output from overloads and short circuits.

5. **AC Input Breaker** - This circuit breaker marked with "UPS INPUT" provides input power protection for the UPS.
6. **AC Output Receptacles** - These receptacles are ready to use for optional battery heating pads or a PC for maintenance.
7. **UPS Input Connector** - This "UPS IN" power cord is connected to AC input connector or terminal blocks on UPS.
8. **UPS Output Connector** - This "UPS OUT" power cord is connected to the AC output connector or terminal blocks on UPS.
9. **PTS Control Wiring** - The Black and Red PTS control wires are used to connect to PTS control connector on UPS.

Installation

Unpacking and Inspection

Before installation, please remove the unit from its box carefully since the UPS is heavy. Follow the below guidelines to unpack and inspect the unit.

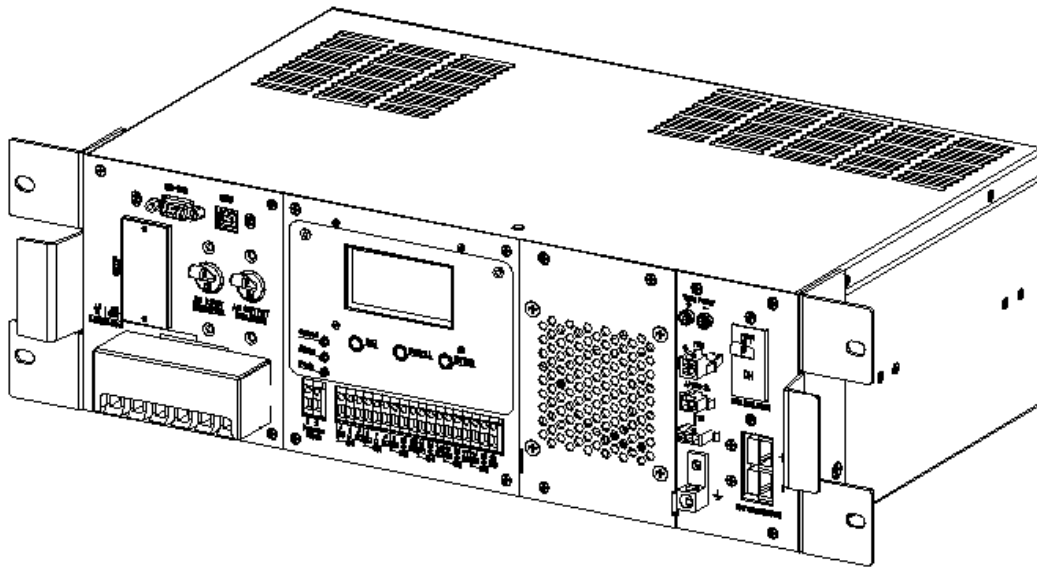
1. Select a suitable area for unpacking and be sure that nothing inside is damaged.
2. Store all the packing materials and boxes for possible equipment returns.
3. Inspect the package contents and make sure all standard items as well as purchased options are included.

Standard Items		
Item	Contents	Quantity
UPS	UPS Unit	1
	Manual	1
	Temperature sensor cable	1
	Mounting bracket	2
	Screws for Mounting bracket	8
SNMP card (optional)	1	1
PTS (optional)	PTS Unit	1
	Fasteners	4

4. Compare the listed parts with the items you received. If the listed parts on your package does not match the items you received, or any items appear damaged, please immediately notify your carrier agent and the supplier who prepared your shipment.

Mounting the UPS

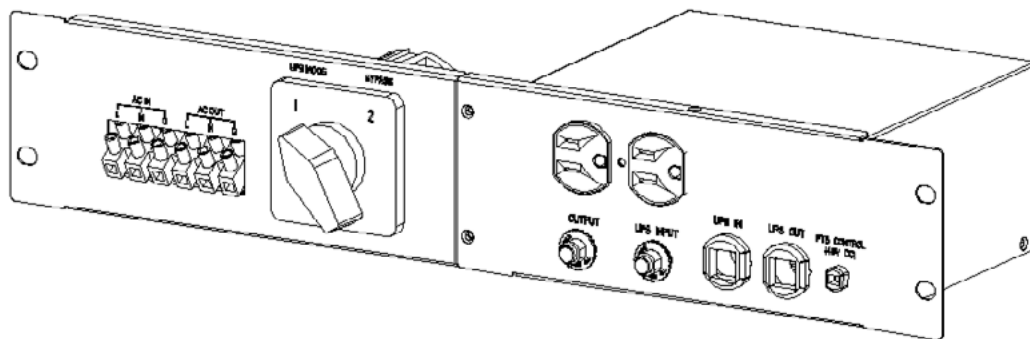
The UPS unit can be placed on a shelf with no other parts needed. It can be rack mounted or secured to a shelf such as in an outdoor cabinet, with the mounting brackets shown in the following figure. The brackets and the screws to attach them to the UPS case are available as part of the standard packaging.



UPS with Bracket for rack mounting

Mounting the PTS (Optional)

The power transfer switch is designed and factory-installed with a 19" rack mounting bracket accessory shelf. It can be rack mounted or placed on a shelf. The fixing screws and washers are packaged as accessories of PTS.



PTS with Bracket for rack mounting

Wiring

WARNING!

All electrical wiring must be performed by a qualified electrician or trained personnel. Make sure the line power is off. Switch off all input and output circuit breakers on the UPS unit before making any electrical connections.

Wiring the UPS

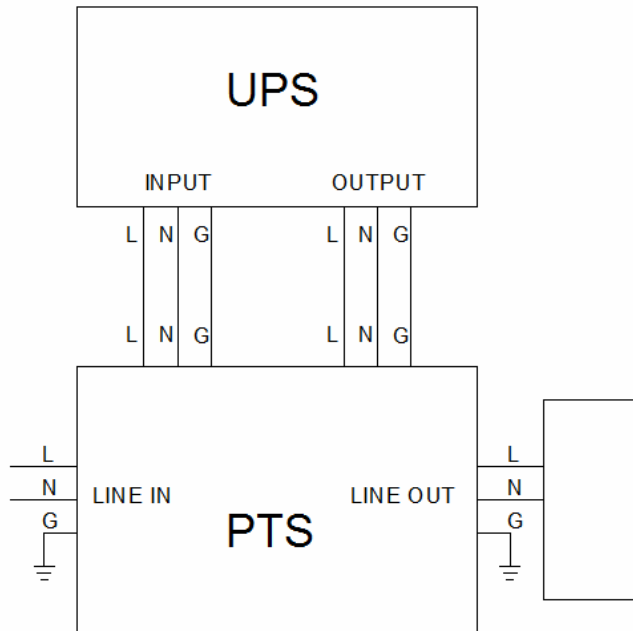
1. Connect the temperature sensor to the UPS unit (Battery Temperature connector). The other end is connected to the batteries later in the procedure.
2. Connect the following ports if used.
 - USB Connector
 - RS-232 Connector
 - Dry contacts
 - Program input

- Intelligent Slot (optional)
- External FAN Connector

Wiring the PTS to the UPS

Wire the PTS to the UPS according to the schematic shown below.

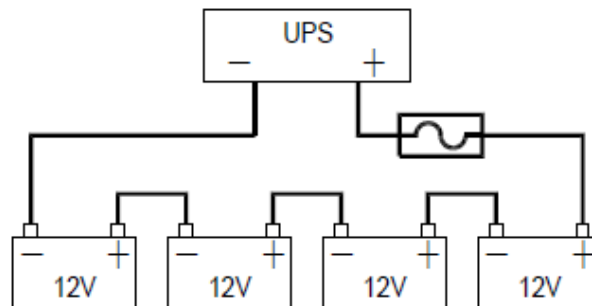
1. The PTS is pre-wired with 2 cables marked as "UPS IN" and "UPS OUT". Connect these cables from PTS to the respective connectors on the UPS.
2. Connect the AC input wires to the AC input terminal blocks on the PTS. Ensure proper polarity (Line, Neutral and Ground to the respective terminal).
3. Connect AC output wires to the AC output terminal blocks on the PTS. Ensure proper polarity (Line, Neutral and Ground to the respective terminal).



Wiring the PTS to the UPS

Wiring External Batteries

Unit supports 48Vdc battery. Connect all battery packs as below chart. It's suggested to connect at least 100Ah capacity battery.



Battery Connection Chart

Operation

To power up the UPS, ensure the switch on PTS is in “UPS Mode” position. Before commissioning, make sure batteries are fully charged and line power is qualified.

Switch on UPS in Line Mode

1. Switch on battery circuit breaker. All LEDs will be on and LCD will display Startup page, and fan will be on.
2. Switch on AC input breaker. After line power is qualified, the LCD will display normal, buck or boost according to line voltage range and line threshold setting.

Note: AVR function default setting is disabled. You may activate it via LCD panel or USB/RS232/SNMP communication.

Switch the UPS From Line Mode to Battery Mode

UPS will operate in battery mode if manually switch the input circuit breaker off. The LCD will display Battery and output LED will flash to show the UPS is running on backup battery power.

Switch from Battery Mode to Line Mode

After switching on the input circuit breaker, if line input is qualified, UPS will transfer to line mode with output LED on to show UPS is running from utility power.

Note: If UPS keeps switching between inverter and line mode because of a noisy line, the setting of “UPS Sense type” should be changed from Normal to Generator.

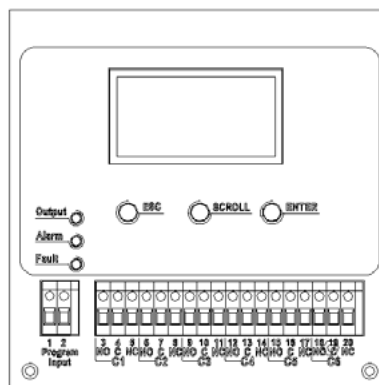
Switch Off Procedure

For any reason you need to switch off UPS, please follow below procedure.

1. Switch off output circuit breaker.
2. Switch off input circuit breaker.
3. Switch off battery circuit breaker. The output LED will turn off and LCD display will shut off.

Operation the Control Panel

The control panel includes four-line LCD display, three indicators, three function keys, input contacts and six sets of dry contacts. It can be rotated 90 degree for vertical installation.



Control Panel

LED Indicator

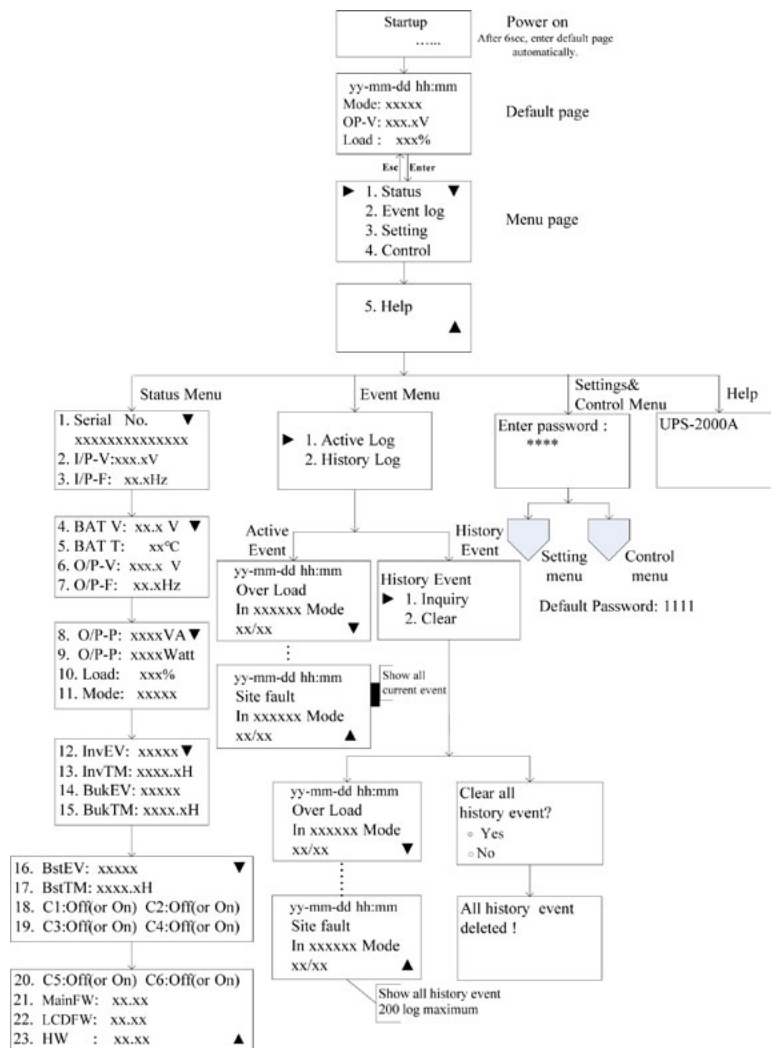
LED Indicator		Messages	
Output	Green	Solid On	Output is available in line mode
		Flashing	Output is available in battery mode
		Off	Output is not available
Alarm	Yellow	Solid On	Alarms occur in the system, indicating a condition not serious enough to stop it from providing output power.
Fault	Red	Solid On	Faults occur in the system, indicating a condition where backup power is not available.

Function Keys

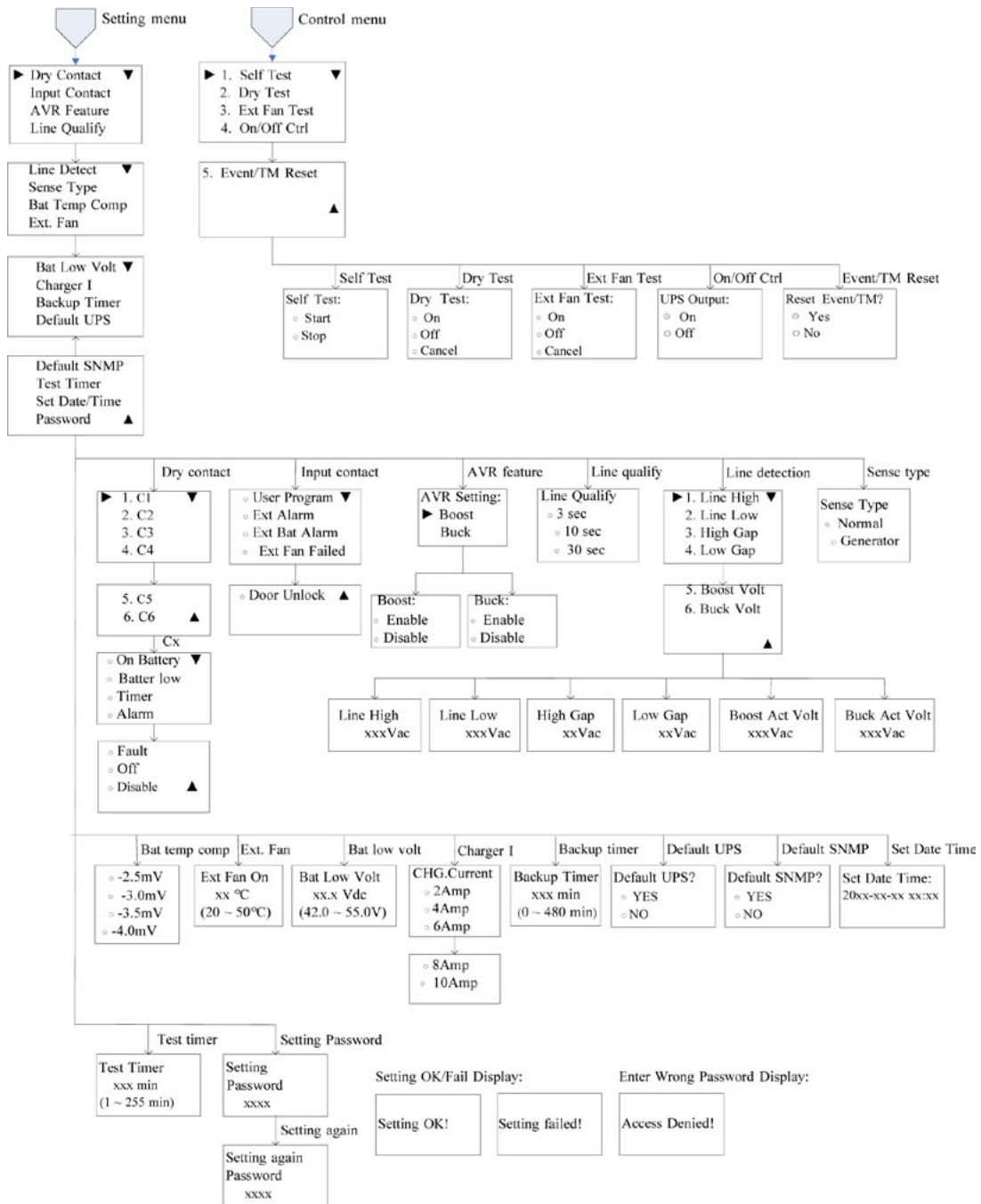
Function Key	Description
ESC	Back to previous menu/page
SCROLL	Jump to next page or next selection
ENTER	Enter submenu or confirm selection

LCD Menu Tree

Users can check the status, view event log, set parameters and control of UPS via LCD panel. See below Menu Tree.



LCD Menu Tree



Setting and Control page

Pressing the ESC, SCROLL and ENTER buttons to navigate through the menus and submenus to control, monitor and troubleshoot the UPS.

Default page

After power on, Startup page will display. It will automatically switch to default page after 6 sec.

Default page	Explanation
yy-mm-dd hh:mm	Date and time
Mode: xxxxx	UPS current operation mode
OP-V: xxx.xV	UPS output voltage
Load : xxx%	UPS load percent

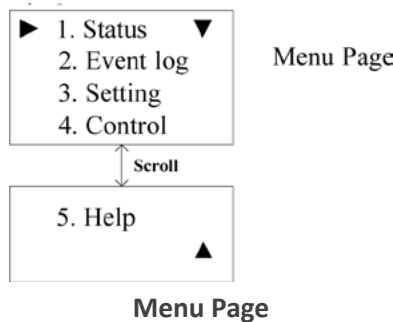
Operation mode

The LCD automatically displays the following texts when the UPS changes status.

LCD Display	UPS status and Explanation
Normal	The normal operating mode. Input line is qualified and bypasses to power the loads. At the same time, batteries are charging.
Boost	The unit automatically transfers to Boost mode to raise the lower input line voltage when output voltage drops to the user programmable preset limit.
Buck	The unit automatically transfers to Buck mode to reduce the higher input line voltage when output voltage achieves the user programmable preset limit.
Battery	The unit automatically transfers to battery mode when input line power is unqualified or not present. Batteries provide power to the loads.
SelfTest	When "Self Test" is executed, the unit will enter "Battery Mode" automatically to test output voltage and waveform. After testing, the unit will return back to "Line Mode". Users may program Test Timer in Setting menu to configure a longer time for self-test. Default testing time is 1 minute.
Standby	No output power from UPS to the loads.

Menu page

After pressing ENTER button in default page, it will enter menu page.



Press SCROLL button to browse all 5 submenus below.

Menu Screen	Explanation
Status	Indicates input and output information, and other values monitored in UPS.
Event log	Indicates the active event log and the history event log which users can inquiry or clear.

Setting	Indicates the parameters of UPS can be adjusted.
Control	Indicates the operational conditions of UPS can be controlled.
Help	Indicates the Model name

Status menu

Status menu shows the basic measured information of UPS. Users can select displayed parameters by pressing ENTER key. Press ESC button in any page will return to default page.

Menu item	LCD display	Explanation
Page 1	1. Serial No. ▼ xxxxxxxxxxxxxx 2. I/P-V:xxx.xV 3. I/P-F: xx.xHz	The Serial number of UPS
		The input line (utility) voltage
		The input line (utility) frequency
Page 2	4. BAT V: xx.x V ▼ 5. BAT T: xx°C 6. O/P-V: xxx.x V 7. O/P-F: xx.xHz	The average battery voltage
		The temperature of battery terminal
		The output voltage (ture RMS)
		The output frequency
Page 3	8. O/P-P: xxxxVA ▼ 9. O/P-P: xxxxWatt 10. Load: xxx% 11. Mode: xxxxx	The output power in VA
		The output power in watt
		The percentage of connected load
		The operation mode of UPS
Page 4	12. InvEV: xxxxx ▼ 13. InvTM: xxxx.xH 14. BukEV: xxxxx 15. BukTM: xxxx.xH	The number of times the unit has been in battery mode
		The total time duration the unit has been in battery mode since the latest reset.
		The number of times the unit has been in buck mode
		The total time duration the unit has been in buck mode since the latest reset.
Page 5	16. BstEV: xxxxx ▼ 17. BstTM: xxxx.xH 18. C1:Off C2:Off 19. C3:Off C4:Off	The number of times the unit has been in boost mode
		The total time duration the unit has been in boost mode since the latest reset.
		The status of the dry contact C1 and C2.
		The status of the dry contact C3 and C4.
Page 6	20. C5:On C6:On 21. MainFW: xx.xx 22. LCDFW: xx.xx 23. HW : xx.xx ▲	The status of the dry contact C5 and C6.
		The firmware version of Main CPU in UPS.
		The firmware version of LCD panel in UPS.
		The hardware version of UPS.

Event menu

User can view the active event log and history event log via this menu. After pressing ESC button in Event page, it will return to default page.

Event Log Page	Explanation
▶ 1. Active Log	Active event log enquiry.
2. History Log	History event log enquiry and clear. Maximum log number is 200.

Active Log Page	Explanation
yy-mm-dd hh:mm Over Load In xxxxxx Mode xx/xx ▼	Date and time when this event occurs
	Event type
	UPS operation mode when this event occurs
	Viewing event index/Total active event number

Setting menu

User can set various critical parameters in this menu. Choose the desired function on the screen by pressing ENTER button. Press ESC button to return to default page.

Setting page	Explanation
► Dry Contact ▼ Input Contact AVR Feature Line Qualify	<p>Dry Contact: It indicates programmed values of C1-C6 contacts. Factory default settings: C1,C2=On battery; C3,C4=battery low; C5,C6=Timer. Illustrations for each programmed values as below.</p> <ul style="list-style-type: none"> • On battery: Energized when Unit in INV mode. • Battery low: Energized when the battery voltage is lower than the configurable battery low voltage. The default value is 46VDC. • Timer: Energized after the unit has been in INV mode for the setting backup time. The factory default value is 2 hours. • Alarm: Energized when any alarm occurs in UPS. • Fault: Energized when any fault occurs in UPS. • Off: Energized while the UPS is off. • Disable: The dry contacts become invalid.
	<p>Input Contact: It indicates selectable options for input contacts. Factory default setting is "Ext Fan Failed". Selectable options are listed as below.</p> <ul style="list-style-type: none"> • User program • Ext Alarm • Ext Battery Alarm • Ext Fan Failed • Door Unlocked
	<p>AVR Feature: Enable or disable Buck and Boost function. Factory default setting is "disable".</p>
	<p>Line Qualify: Set AC recovery time after the line is qualified. It's to make sure the line is stable. The selectable options are: 3 sec, 10 sec or 30 sec. Default value is "30 sec".</p>

<p>Line Detect ▼ Sense Type Bat Temp Comp Ext. Fan</p>	<p>Line Detect: It allows users to set up detection levels for AC input voltages, setting points to go in and out from battery mode, boost or buck modes.</p> <ul style="list-style-type: none"> • Line High: When input voltage exceeds this level, unit will transfer from Line Mode to Battery Mode. Refer parameter descriptions and setting values in 5.6.9 Parameter Descriptions Table. • Line Low: When input voltage is lower than this level, unit will transfer from Line Mode to Battery Mode. Refer parameter descriptions and setting values in 5.6.9 Parameter Descriptions Table. • High Gap: The voltage gap between Line High and High Back, Buck High and Buck Back. Refer parameter descriptions and setting values in Parameter Descriptions Table. • Low Gap: The voltage gap between Line Low and Low back, Boost Low and Boost Back. Refer parameter descriptions and setting values in Parameter Descriptions Table. • Boost Low: When AVR function is enabled and input voltage drops between Boost Back point and this level, unit will transfer to Boost Mode. Refer parameter descriptions and setting values in Parameter Descriptions Table. • Buck High: When AVR function is enabled and input voltage increase between Buck Back point and this level, unit will transfer to Buck Mode. Refer parameter descriptions and setting values in Parameter Descriptions Table.
	<p>Sense Type: Users can change the Sense Type according to operation condition. Two types for selection:</p> <ul style="list-style-type: none"> • Normal mode: The UPS can operate successfully with general line conditions. The maximum transfer time is 12ms. • Generator mode: This setting allows UPS to work with the fluctuations caused by a generator or noisy line. The maximum transfer time is 25ms.
	<p>Bat. Temp Comp: It adjusts the battery temperature compensated voltage to -2.5, -3.0, -3.5 or -4.0 mV/°C/Cell. The factory default setting is -3.0 mV/°C/Cell.</p>
	<p>Ext. Fan: It indicates ambient temperature setting to switch on the external fan. The default value is 25°C.</p>
<p>Bat Low Volt ▼ Charger I Backup Timer Default UPS</p>	<p>Bat. Low Volt: It's allowed to set the low battery warning voltage. The resettable range is 42.0~55.0V. The default value is 46V.</p>
	<p>Charger I: It's to configure the charger current. There are 2, 4, 6, 8 or 10Amp for selection. The default value is 10A.</p>
	<p>Backup Timer: It's to configure the warning time for backup time. This function is available only when timer is set in dry contact. The adjustable range is 0~480 min with 15-min increment of each click by pressing SCROLL button. The default value is 120min.</p>
	<p>Default UPS: Restore factory settings of UPS.</p>
<p>Default SNMP Test Timer Set Date/Time Password ▲</p>	<p>Default SNMP: Restore factory settings of SNMP.</p>
	<p>Test Timer: It's to define the time of Self-Test. The adjustable range is 1~255min.</p>
	<p>Set Date/Time: It indicates setting for date and time.</p>
	<p>Password: The Password to access Setting and Control Menu can be changed here. Use the SCROLL key with ENTER keys to enter a correct Password. Re-entry is required if an error occurs when entering the password.</p>

Control menu

Press SCROLL button to switch desired option in Control menu and press ENTER button to confirm new option. Pressing ESC button will return to default page.

Control page	Explanation
Self Test: ° Start ○ Stop	Starts the Self Test. CAUTION: The unit must be in Normal, Boost or Buck Mode before starting the self-test.
Dry Test: ° On ○ Off ○ Cancel	Starts the dry contact test. <ul style="list-style-type: none"> • On: All dry contacts are energized. This action will be finished automatically after 1 minute. • Off: All dry contacts are ineffective. This action will be finished automatically after 1 minute. • Cancel: Cancel this test immediately.
Ext Fan Test: ° On ○ Off ○ Cancel	Starts the external fan test. <ul style="list-style-type: none"> • On: The external fan has power from battery. This action will be finished automatically after 1 minute. • Off: Cut off battery power. This action will be finished automatically after 1 minute. • Cancel: Cancel this test.
UPS Output: ° On ○ Off	UPS output can be turned ON or OFF. This option is available when the UPS is in INV, Boost, Buck or Normal Mode.
Reset Event/TM? ° Yes ○ No	It resets all event numbers and time duration to zero.

Help menu

It shows UPS model name in Help menu.

Help page	Explanation
UPS-2000A	Indicates UPS model name.

RS232/USB Interface

Users can check UPS status, view event log, set parameters and control UPS via RS232/USB interface.

RS232/USB connection

Connect the UPS and computer with standard RS232 or USB cable.

HyperTerminal Set Up

With built-in communication tool HyperTerminal in Windows, device can communicate with computer. Follow below steps to step up HyperTerminal.

Step 1: The path of HyperTerminal communication tool is Programs/Accessories/Communications/ HyperTerminal as shown below.



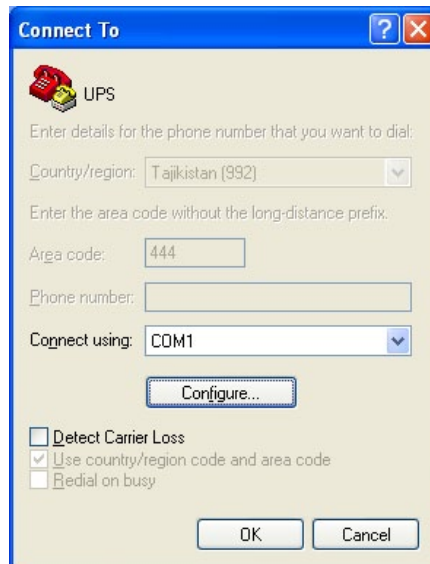
Hyper Terminal Selection Screen

Step 2: Click on the HyperTerminal icon. It will pop up “Connection Description” screen as shown below. Enter a name and select an icon for your unit. Then, click OK.



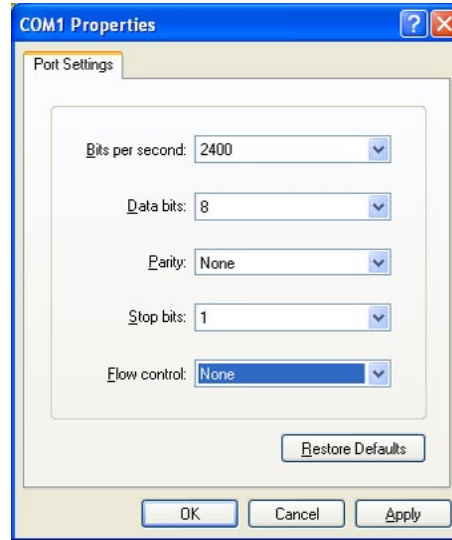
Connection Description Screen

It will pop up “Connect To” screen as shown below. Select the COM port from the drop down menu and then click OK.



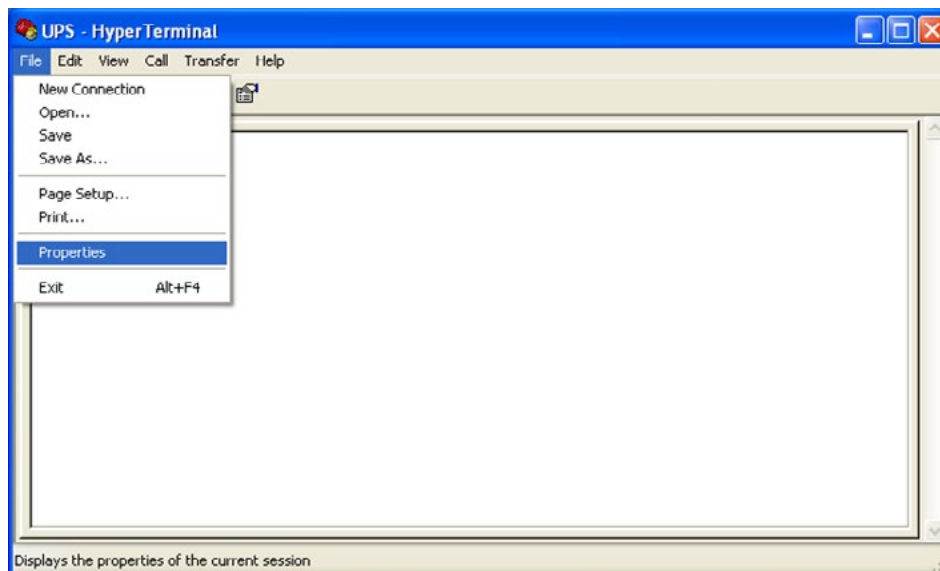
Connect To Screen

Step 4: It will pop up "COM Properties" screen and select port setting as shown below and click OK.



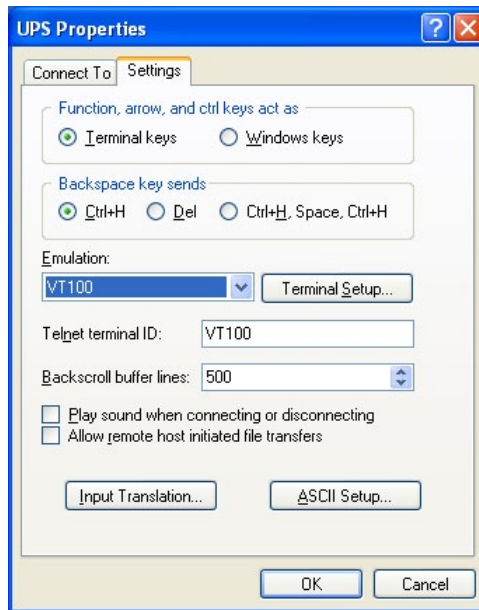
COM Properties

Step 5: A blank window with the entered file name will pop up. In the File menu, select Properties and Click.



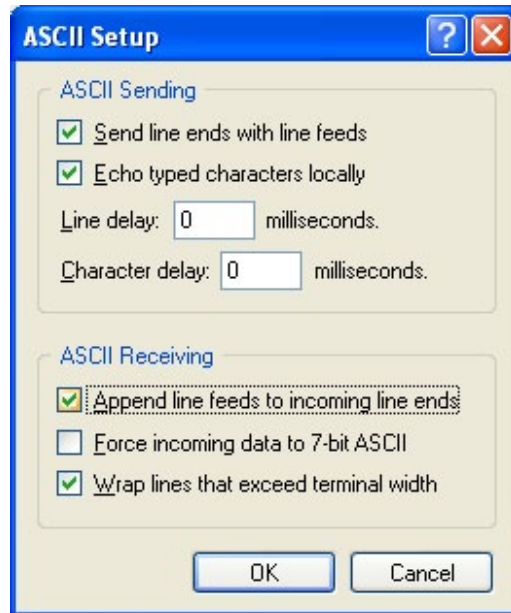
HyperTerminal Screen

Step 6: The [Name of Unit] Properties screen will pop up as shown below. Click on the Settings tab. Select all columns as below figure and click ASCII Setup button.



ASCII Properties Screen

Step 7: Set up all columns in the ASCII Setup screen as shown below Click OK and HyperTerminal setup is completed.

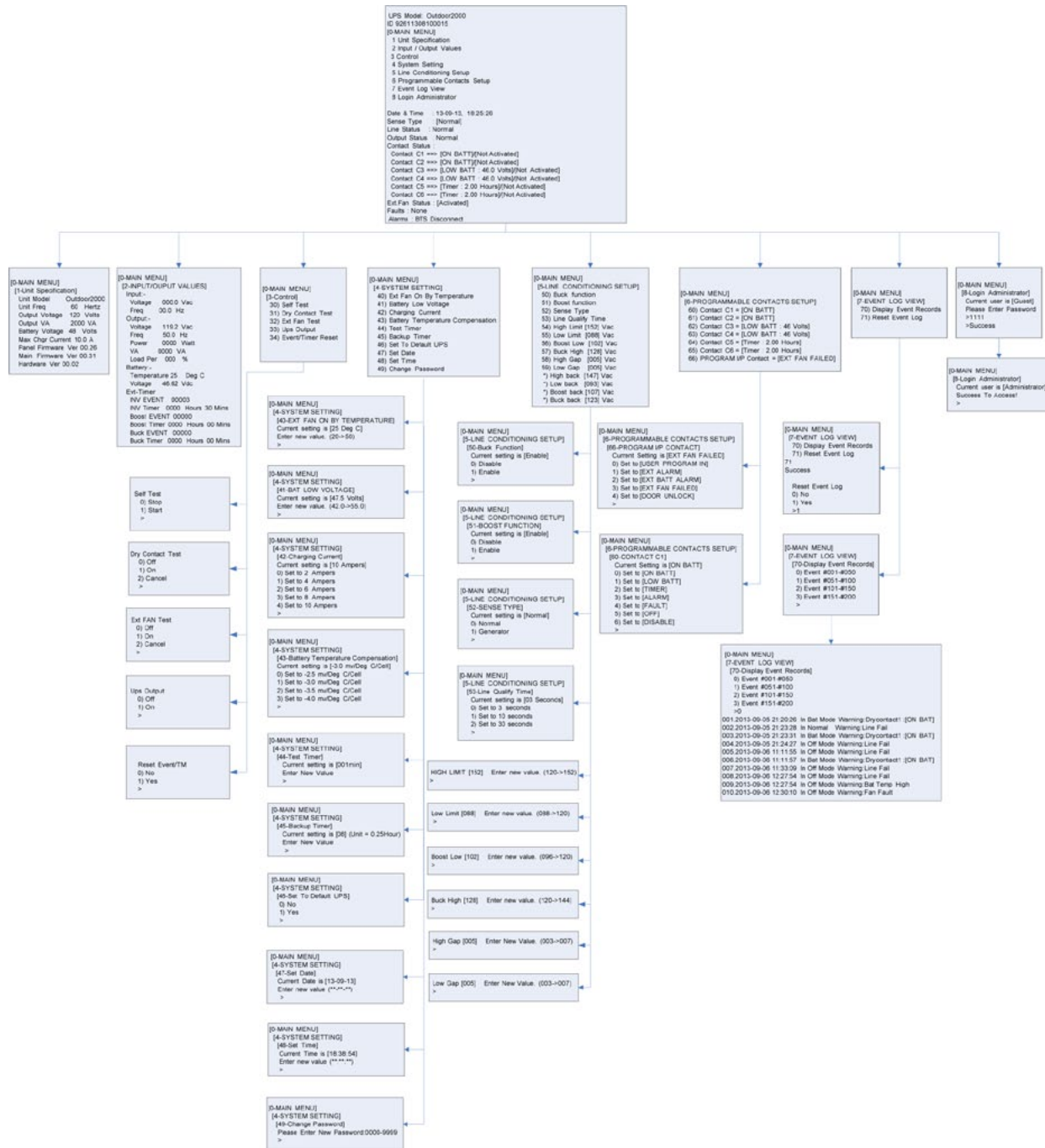


ASCII Setup Screen

Step 8: Press Enter to go to UPS screen and access the UPS via RS232/USB communications.

RS232/USB Menu Tree

The complete Menu Tree is shown below with all default values.



RS232/USB Menu Tree

RS232/USB Main Menu

The RS232 / USB menus are hierarchical. Press **ENTER** to access main menu as shown below. Type in the number of submenu and press Enter button to access a particular submenu. Press **Enter** to refresh the screen, the Status, Faults, and Alarms readouts.

Note: It's requested to enter passwords in 8 Login Administrator first to access submenu 3~7. The factory default password is 1111.

The main menu displays the submenu numbers, the line status, the unit's output status and any faults or alarms that may be present.

```
UPS Model:
ID: 92611310100001
[0-MAIN MENU]
1 Unit Specification
2 Input / Output Values
3 Control
4 System Setting
5 Line Conditioning Setup
6 Programmable Contacts Setup
7 Event Log View
8 Login Administrator

Date & Time      : 13-10-14, 09:24:02
Sense Type       : [Normal]
Line Status      : Not Good
Output Status    : Inverter
Contact Status   :
Contact C1 ==> [ON BATT]/[Activated]
Contact C2 ==> [ON BATT]/[Activated]
Contact C3 ==> [LOW BATT : 46.0 Volts]/[Not Activated]
Contact C4 ==> [LOW BATT : 46.0 Volts]/[Not Activated]
Contact C5 ==> [Timer : 2.00 Hours]/[Not Activated]
Contact C6 ==> [Timer : 2.00 Hours]/[Not Activated]
Ext.Fan Status   : [Activated]
Faults : None
Alarms : Line Fail/BTS Disconnect
```

Main Menu Screen

Displayed contents of Line Status, Output Status, Faults and Alarms are listed below.

```
Line Status: [Current Status]
Output Status: [Current Status]
Contact Status: [Current Status]
Ext. Fan Status: [Current Status]
Faults: [If any, otherwise blank]
Alarms: [If any, otherwise blank]
>_
```



Line Status Displays	Output Status Displays	Fault Displays	Alarm Displays
Normal	Self Test	Bus Voltage Over	Bus Voltage Over
Not Good	Inverter	Bus Voltage Under	Bus Voltage Under
	Buck	Bus Soft Fail	Bus Soft Fail
	Boost	Output Short	Line Fail
	Normal	INV Output Voltage Low	Output Short
	Off	INV Output Voltage High	INV Output Voltage Low
		Over Temperature	INV Output Voltage High
		Fan Fault	Over Temperature
		Battery Voltage High	Fan Fault
		Over Load	Battery Voltage High
			Battery Voltage Low
			Over Charge
			Battery Voltage Under
			Temp Derating
			Over Load
			Eeprom Fault
			Battery temperature low
			Battery temperature high
			BTS Disconnect
			Battery Disconnect
			Site Fault

Contact Status/ Ext. Fan Status Displays
Activated
Not Activated

Displayed contents in Main Menu

Unit Specifications

To access Unit Specification menu, type 1 and press Enter on the main menu. To return to the main menu, press Esc and then press Enter buttons.

It lists unit specifications as following table.

[1 - Unit Specifications]	
Unit Model	The model name
Unit Freq	Nominal operating frequency
Input Voltage	Nominal input voltage
Output Voltage	Nominal output voltage
Output VA	The output capacity in VA
Battery Voltage	Nominal battery voltage
Max Charge Current	Maximum charging current
Panel Firmware Version	Panel board firmware version
Main Firmware Version	Main board firmware version
Hardware Version	Hardware version

Input/Output Values

To access Input/Output Values menu, type 2 and press Enter on the main menu. To return to the main menu, press Esc and then press Enter buttons.

Following table lists the actual measurements of input / output parameters.

[2 – Input / Output Values]	
Input	
Voltage	The Input voltage
Freq	The Input frequency
Output	
Voltage	The output voltage
Freq	The output frequency
Power	The output active power
VA	The output apparent power
Load Per	The load percent of output power
Battery	
Temperature	The ambient temperature of the battery case as read via attached temperature probe.
Voltage	The battery DC voltage
Evt-Timer	
INV Event	The number of times that input power failure occurs
INV Timer	Total time that the battery was discharged since the latest RESET
BUCK Event	The number of times that BUCK function activates
BUCK Timer	Total time that the BUCK function activates since the latest RESET
BOOST Event	The number of times that BOOST function activates
BOOST Timer	Total time that the BOOST function activates since the latest RESET

Control

To access Control menu, type 3 and press Enter on the main menu. To return to the main menu, press Esc and then press Enter button.

Following table lists all control options.

[3 - Control]	
30 Self Test	Start or stop for the self test. The test duration is user-programmable. Please refer to 44 in system setting for the details. Tip: The time duration can be changed only when the UPS in line mode.
31 Dry Contact Test	Turn on or switch off the dry contacts. The test will end after 1 minute automatically.
32 Ext Fan Test	Turn on or switch off the external fan. The test will end after 1 minute automatically.
33 Ups Output	This option allows user to control the inverter to be switched OFF or turned ON.
34 Event/Timer Reset	Resets INV, BUBK, BOOST Event to 0. Resets INV, BUBK, BOOST Timer to 0.

System Setting

To access System Setting menu, type 4 and press Enter on the main menu. To return to the main menu, press Esc and then press Enter buttons.

Following table lists all options in system setting.

[4 – System Setting]	
40. Ext Fan On By Temperature	Setting temperature in °C to trigger external cooling fan. When temperature is higher than setting, battery power will be provided for external cooling fan. The temperature can be set from 20 to 55°C with 1°C increment by each increase. The factory default temperature is 25°C.
41. Battery Low Voltage	Voltage level for low battery alarm. The voltage level is user-programmable from 42VDC to 55VDC. The factory default setting is 46VDC.
42. Charging Current	Setting battery charging current. It can be configured to 2A, 4A, 6A, 8A or 10A. The factory default value is 10A.
43. Battery Temperature Compensation	Setting charging rate based on the battery case temperature. The factory default value is -3mv/°C /Cell. It can be configured to -2.5, -3, -3.5 or -4 mv/°C /Cell.
44. Test Timer	Setting time duration for self-test. The factory default setting is 1 minute. It can be configured from 1 to 255 minutes.
45. Backup Timer	Setting backup time. The factory default setting is 120 minutes. It can be configured from 0 to 480 minutes with 15-minute increment of each increase.
46. Set To Default Ups	Set all the configurations to factory default value.
47. Set Date	Adjust the date.
48. Set Time	Adjust the time.
49. Change Password	Change password. The factory default password is 1111. Note: The password can only be changed in Line mode.

Line Conditioning Setup

This option allows user to change various detection and warning levels for input AC voltages, qualified and unqualified values, transfer & re-transfer setting points for going in & out Battery mode, Boost or Buck modes.

See detailed descriptions in the following Parameter Description table.

Electrical equipment is designed to operate at maximum efficiency under specific standard supply voltage. Buck and boost voltage regulator is an ideal solution when the line voltage is consistently higher or lower than nominal. The transformer can buck (lower) or boost (raise) the supply voltage without battery backup or involving other active UPS board level components.

When activated, the transformer will automatically switch to the secondary tap to buck or boost voltage 10% to keep the output voltage within acceptable range.

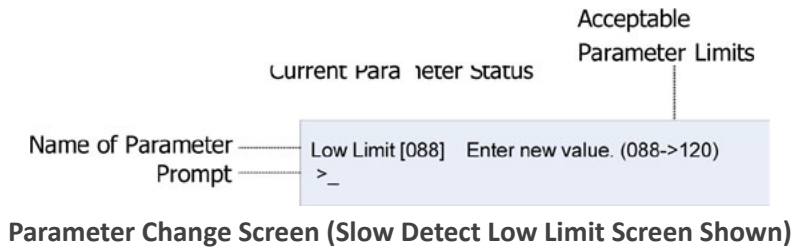
CAUTION: Improperly parameter value setting can cause **permanent** damage to the unit. Changes should only be made by qualified and trained personnel.

Note: Parameter values are interdependent. Changing one value can affect range and permissible value in another field. This feature is to avoid users entering contradictory values.

Users can change parameters as following procedure.

Step 1: Go to the Menu 5.

Step 2: When Parameter Change Screen appears (below), type the new value within acceptable range and press Enter. The screen will return to the Line Slow Detection Screen. For example:



Parameter Descriptions Table (All levels are user-programmable. Some values are interdependent.)

	AVR Function Disable		AVR Function Enable	
	Default Setting	Selections or Selectable Range	Default Setting	Selections or Selectable Range
50. Buck Function			√	
51. Boost Function			√	
52. Sense Type	Normal	Normal	Normal	Normal
	Generator		Generator	
53. Line Qualify Time	Battery to Line -----	30s 3s 10s 30s	30s 3s 10s 30s	
54. Line High When input voltage exceeds this level, unit transfers to Battery Mode from either Buck Mode (when AVR is enabled) or Line mode.	Line to Battery -----	130VAC or 260VAC	120~152VAC or 241~300VAC	152VAC or 300VAC
55. Line Low When input voltage is lower than this level, unit transfers to Battery Mode from either Boost Mode (when AVR is enabled) or Line Mode.	Line to Battery -----	100VAC or 200VAC	90~120VAC or 176~240VAC	88VAC or 176VAC
56. Boost Low When input voltage drops between Boost Back point and Boost Low point, unit will transfer to Boost Mode only when AVR is enabled.	Normal to Boost -----	[DISABLE]	102VAC or 216VAC	96~120VAC or 192~240VAC
57. Buck High When input voltage increases between Buck High point and Buck Back point, unit will transfer to Buck Mode only when AVR is enabled.	Normal to Buck -----	[DISABLE]	128VAC or 264VAC	120~144VAC or 241~288VAC
58. High Gap		5VAC or 10VAC	3~7VAC or 6~14VAC	5VAC or 10VAC
59. Low Gap		5VAC or 10VAC	3~7VAC or 6~14VAC	5VAC or 10VAC
* High Back When input voltage drops below this level, unit transfers back to Line Mode from Battery Mode.	Battery to Line -----	(Line High - High Gap)	(Line High - High Gap)	
* Low Back When input voltage rises above this level, unit transfers back to the Line Mode from Battery Mode.	Battery to Line -----	(Line Low + Low Gap)	(Line Low + Low Gap)	
* Boost Back When input voltage rises above this level, unit transfers to Normal Mode.	Boost to Normal -----	[DISABLE]	(Boost Low + Low Gap)	
* Buck Back When input voltage drops below this level, unit transfers back to the Normal Mode.	Buck to Normal -----	[DISABLE]	(Buck High - High Gap)	

Event Log View

Menu 7 lists the Event log status. To access Event Log menu, type 7 and press Enter on the main menu. To return to the main menu, press Esc and then press Enter buttons.

[7 – Event Log View]	
70. Display Event Log Records	Display the history event log records. The maximum log number is 200.
71. Reset Event Log	Clear all the event log records.

Optional SNMP Card

This is an optional communication function for UPS over a company intranet or the internet via a web browser. Refer to SNMP card user manual to know the operation of SNMP card.

Specifications**Line Mode Specifications**

Rated Power	2000VA/1600W		
Power factor	0.8		
Utility Voltage Waveform	Sinusoidal (utility or generator)		
Utility qualify time setting	3/10/30 seconds adjustable		
Nominal Input Voltage	120Vac or 230/240Vac		
AVR function	Enable/ Disable		
Utility voltage range	88 ~152 Vac or 176 ~ 300Vac user programmable. Defaults set @ 100 ~ 130Vac or 200 ~ 260Vac		
Nominal Input Frequency	50Hz / 60Hz (Auto detection, 55Hz as boundary)		
Default frequency	Last utility frequency		
Utility frequency range	47 ~ 53 Hz(50Hz mode) / 57 ~ 63Hz(60Hz mode)		
Transfer Time	UPS without PTS	Normal mode	12ms maximum
		Generator mode	25ms maximum
	UPS with PTS	40ms maximum	
Overload Protection	5s@≥125 ~150% load; 60s@110%~125% load		
Output short circuit	Input/Output Breaker		
Site fault detection	Yes		
Efficiency (Line mode)	95%		
Efficiency (AVR mode)	90%		
External PTS power capacity	30A		
External PTS	When UPS is good, the PTS allows UPS output to flow out to the outdoor cabinet		
	If the UPS is not functioning, the PTS will bypass the UPS allowing the utility to flow out to the outdoor cabinet.		

Battery Mode Specifications

Output Waveform	Pure sine wave
Output Voltage Regulation	120 or 230/240Vac± 5%
Output Frequency	50/60Hz ± 0.1%
Nominal DC Voltage	48Vdc
DC voltage range	42.5 ~ 60Vdc(48V)
Low DC warning voltage	42 ~ 55Vdc adjustable
Peak Efficiency	>90%
No Load Power Consumption	28W @48Vdc
THD (Bat. mode)	<3% (Full resistive load)
Load crest factor	3:1 @ rated load
Overload protection	5s@≥125 ~150% load; 60s@110%~125% load
Output short circuit protection	Output breaker/ electronic current limit/ firmware
Surge Capacity	200% * rated power for 5sec
Back feed protection	Yes
Power limitation	<p>The graph plots Output Power (W) against Temperature (°C). Three power levels are shown: 2000VA/1600W, 1500VA/1200W, and 1250VA/1000W. The 2000VA model has a power limit of 1600W from -40°C to 55°C. The 1500VA model has a power limit of 1200W from -40°C to 75°C. The 1250VA model has a power limit of 1000W from -40°C to 80°C. For the 120Vac model, the power limit drops to 75W at 80°C. For the 230/240Vac model, the power limit drops to 65W at 70°C.</p>

Charger Mode Specifications

Appropriate battery type	AGM									
Charging Current	2Amp/ 4Amp/ 6Amp/ 8Amp/10Amp adjustable									
Max charger current limitation	<p>The graph plots Max charger current (A) against Temperature (°C). The current is constant at 10A from -40°C to 40°C. Above 40°C, the current is limited to 8A.</p>									
Charging Algorithm	3-Step									
Charger voltage Setting @25 °C	<table border="1"> <thead> <tr> <th>Battery Type</th> <th>Boost CC, CV</th> <th>Float</th> </tr> </thead> <tbody> <tr> <td></td> <td>24/48Vdc</td> <td>24/48Vdc</td> </tr> <tr> <td>AGM</td> <td>28.2/56.4Vdc</td> <td>27.0/ 54.0Vdc</td> </tr> </tbody> </table>	Battery Type	Boost CC, CV	Float		24/48Vdc	24/48Vdc	AGM	28.2/56.4Vdc	27.0/ 54.0Vdc
Battery Type	Boost CC, CV	Float								
	24/48Vdc	24/48Vdc								
AGM	28.2/56.4Vdc	27.0/ 54.0Vdc								

Battery Temperature Control	Charging voltage is compensated according to battery temperature
	-2.5mV /-3.0mV/ -3.5mV/ -4.0mV per cell per °C compensated coefficient adjustable
	Charger on when battery temperature between - 20 °C to 50 °C

General Specification

Dimension, W*D*H (mm)	400*240*133
Net Weight (Kgs)	13kg
Operation Temperature Range	-40°C ~ 80°C for 120Vac model; -40°C ~ 70°C for 230/240Vac model
Storage Temperature Range	-50°C ~ 80°C
Relative humidity	5% ~ 95% non-condensing
Audible Noise	< 48dB
Cooling	Forced Air
EMI	Class A FCC/CISPR [EN50091-2: 1995]
Surge protection	IEEE/ANSI C.62.41 & 2KV, L-N

Troubleshooting

For PTS Module

Problem	Possible Cause	Remedy
No output available from PTS.	External AC circuit breaker may be OPEN.	Close the external AC input breaker.
	Line AC power is not available.	Check if utility is available with the AC voltmeter and contact Utility Company.
	Wiring error on PTS terminal blocks.	Correct wirings on PTS.
	PTS fault.	If utility power voltage is present at AC IN "L" and "N" on the PTS terminal blocks, replace the PTS.
PTS is not allowed to transfer to battery mode.	UPS output power is not connected to PTS.	Verify if power cord from "UPS OUT" on PTS is properly connected to the AC output terminal blocks on UPS.
	"UPS INPUT" circuit breaker on PTS is open status.	Reset breaker.
	Black and red control wires from PTS are not connected to PTS control connector of UPS.	Connect black and red control wires from PTS to PTS control connector of UPS.
	48VDC signal not available at the PTS control connector on the UPS.	Replace UPS.
	PTS fault.	Replace PTS

UPS does not return back to Line mode.	Line power is missing.	Verify if power cord from "UPS IN" on PTS is properly connected to the AC input terminal blocks on UPS.
		Verify if the "UPS INPUT" circuit breaker on PTS is closed status.
		Verify if AC input circuit breaker on UPS is closed status.
		Ensure that Line input is present.

For UPS Module

Problem	Possible Cause	Remedy
No output.	AC input and output circuit breakers are off.	Turn on input and output circuit breakers.
	No line power input.	Turn on AC input breaker.
	Red LED is lit solid on front panel indicating fault.	Read fault event under Event Log in LCD display. Manually restart UPS. Contact the factory if fault persists.
Output LED is off.	Line power or battery power is not available.	Apply qualified input power and make sure if battery breaker is closed.
	UPS fault.	Return to repair center.
UPS does not transfer to battery mode during a power failure or backup time is shorter than expected.	Battery is not connected.	Connect batteries (48VDC nominal).
	Battery circuit breaker is off.	Turn on battery breaker
	Battery is not fully charged.	Recharge the battery and then test discharge time.
	Dead battery.	Replace with new batteries.
	UPS fault.	Return to repair center.
Alarm LED is lit.	Abnormal conditions are detected.	Solve the problem according to alarm information.
Batteries will NOT charge.	Battery circuit is open.	<ol style="list-style-type: none"> 1. Check if battery cable is connected firmly and make sure battery connection is correct. Any connection error, loose or open connection will cause circuit open. 2. Check if proper battery voltage is detected on battery connector of UPS. 3. Check if battery breaker is closed. 4. If battery is bad, replace it.
	Wrong or bad temperature probe connected.	Only use factory-supplied temperature probe reading approximately 15,000 OHMS @ 25°C (77°F)
LCD text is not readable.	UPS fault.	Return to repair center.
Password access is NOT available	Password is LOST or forgotten.	Contact repair center for resetting the new password.

Appendix: Approximate Back-up Time Table

Model	Load (VA)	Backup Time @ 48Vdc 100Ah (min)	Backup Time @ 48Vdc 200Ah (min)
2000VA	200	1581	3161
	400	751	1581
	600	491	1054
	800	331	760
	1000	268	615
	1200	221	508
	1400	172	387
	1600	136	335
	1800	120	295
	2000	106	257