

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |       |    |      |       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|----|------|-------|
| 维修手册 Service manual                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |    |      |       |
| 专案名称:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | X9 II |       |    |      |       |
| 专案编号:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       | 修订版次: | 00 | PAGE | 1 / 3 |
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## 1 简介 General information

### Getting start

If you want to know:

? Overview and what special for this UPS, refer to section Introduction.

? Replacing Battery Pack, refer to Replacing The Battery Pack.

? Open external case, refer to Steps to Open the Case.

? Electrical function and principle, refer to Principle of Operation.

? Whether UPS works properly, refer to Alignments.

? What happened to the UPS, refer to Trouble Shooting.

? Electrical performance, refer to Electrical Spec.

### Conventions

This service manual uses the following conventions to alert you some important information for safe operation and quick working.



**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:** There are some tips and skills after this symbol. During service operations, these skills are provided by our design engineers which may help you quickly finish your work.

## 2 安全说明 safety instructions



1. **For qualified service personnel only.**
2. **DO NOT** perform any internal service or adjustment of this product unless another person is capable of rendering first aid and resuscitation is present.
3. Dangerous voltage exists at several points in this product. To avoid personal injury, don't touch any exposed connections or components while UPS is active.
4. Turn off the UPS and disconnect input power cord before removing outside protective cover.
5. AC voltage is always present if the input AC power is still available.
6. High voltage may present at DC capacitors. Before opening the outside cover, wait for at least five minutes after turning off the UPS.
7. Verify input source (voltage and frequency) before service.



1. **DO NOT** make internal batteries short-circuited.
2. If the battery connectors are disconnected, be sure to plug in the input power cord and the input power is available before re-connect the battery connectors.
3. After service, verify the polarity of batteries, the tightness of all screws and connectors before restarting the UPS.



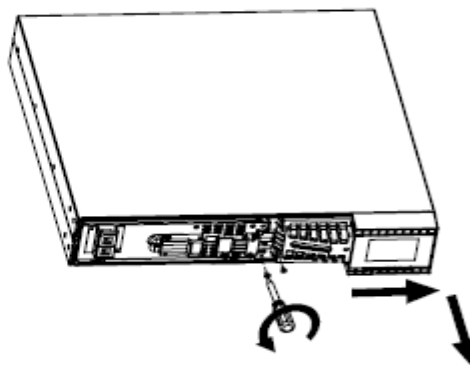
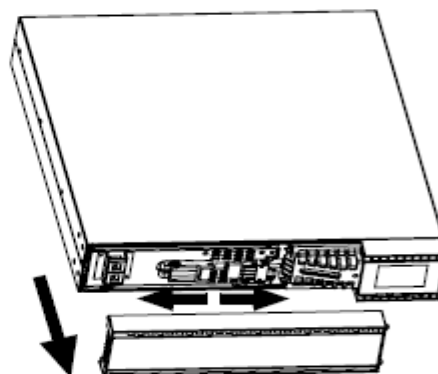
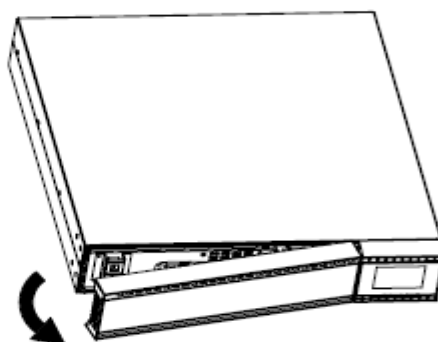
After opening the cover, please always check the tightness of all wires, connectors, and screws first. Then check if there is any de-colored components inside

### 3 包装拆卸说明 Packing and dismounting instructions

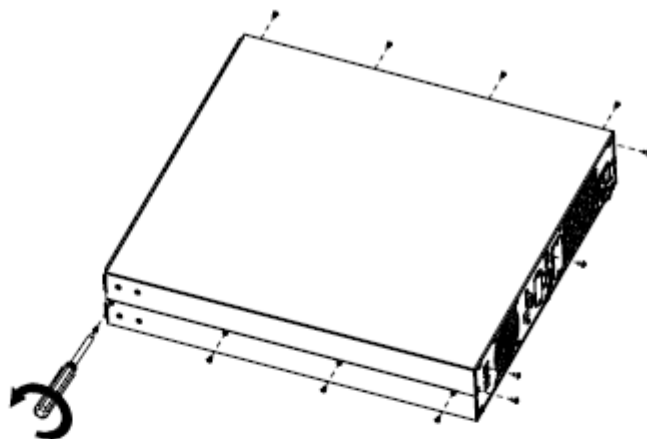
#### STEPS TO OPEN THE CASE

1. Remove the front Panel as shown in STEP1figure.
2. Remove related screws on STEP2 figure.
3. Slide outside cover in the direction shown in STEP3 figure.
4. Done.

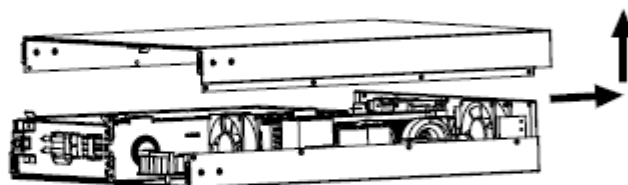
STEP1



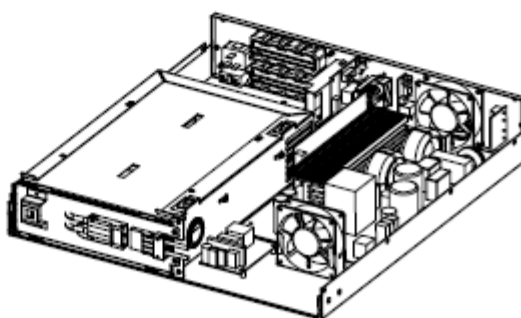
STEP2



STEP3



STEP4

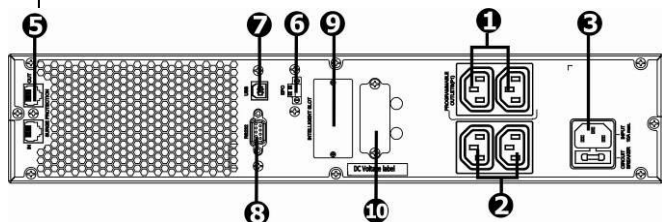


## 4 外观图 External view

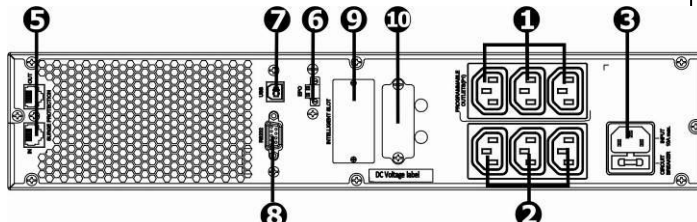


## Rear panel view

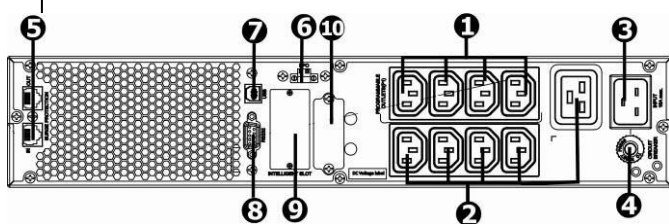
1K/1.5K IEC



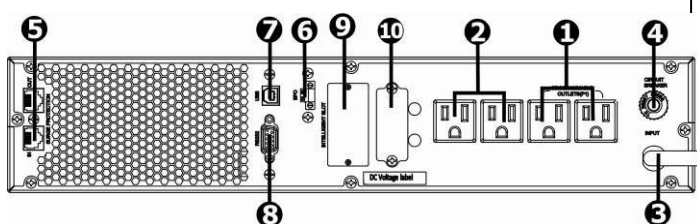
2K IEC



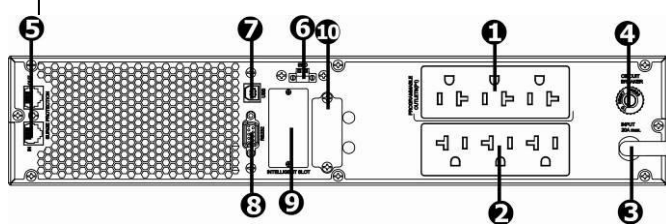
3K IEC



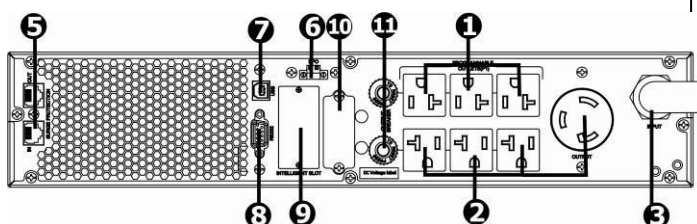
1K/1.5K NEMA



2K NEMA



3K NEMA

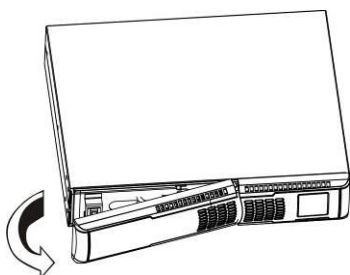


1. Programmable outlets: connect to non-critical loads.
2. Output receptacles: connect to mission-critical loads.
3. AC input
4. Input circuit breaker
5. Network/Fax/Modem surge protection
6. Emergency power off function connector (EPO)
7. USB communication port
8. RS-232 communication port
9. SNMP intelligent slot
10. External battery connector (only available for long-run models)
11. Output circuit breaker

## 5 安装说明 Installation instructions

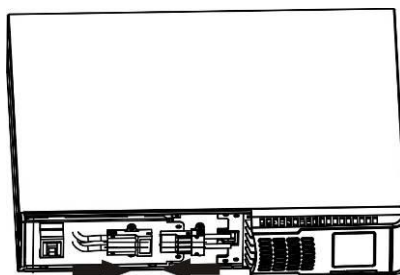
For safety consideration, the UPS is shipped out from factory without connecting battery wires. Before install the UPS, please follow below steps to re-connect battery wires first.

### Step 1



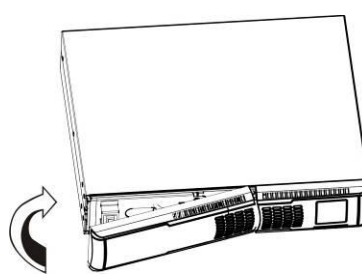
Remove front panel.

### Step 2



Connect the AC input and re-connect battery wires.

### Step 3

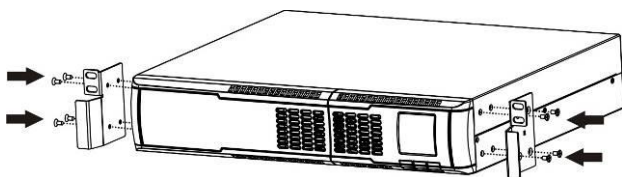


Put the front panel back to the unit.

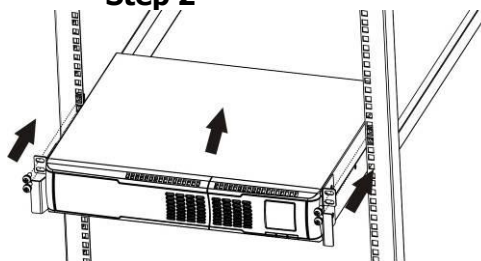
This UPS can be either displayed on the desk or mounted in the 19" rack chassis. Please choose proper installation to position this UPS.

### Rack-mount Installation

#### Step 1

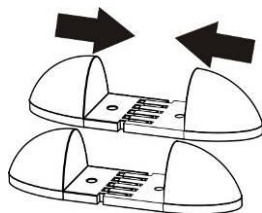


#### Step 2

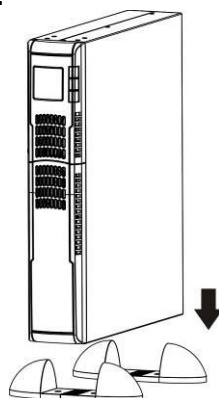


### Tower Installation

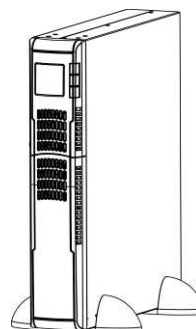
#### Step 1



#### Step 2



#### Step 3





The block diagram in figure 2, shows the UPS at normal operation from left to right. The sub-systems are described as below:

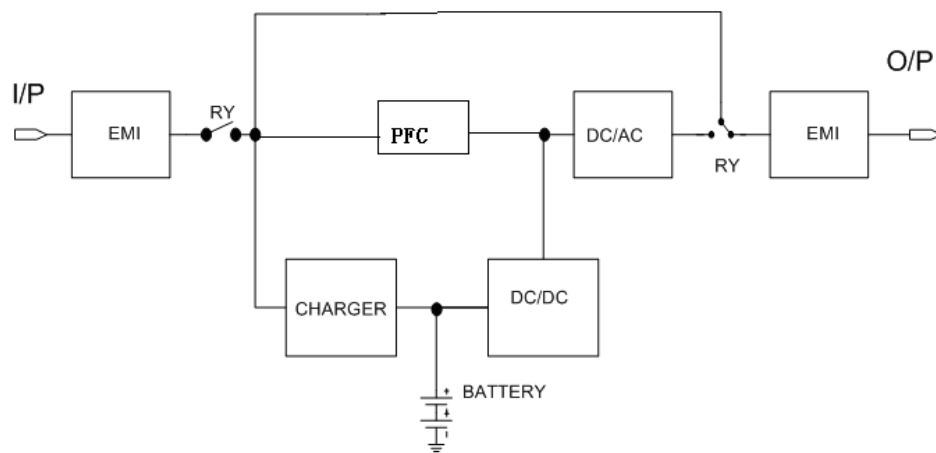


Figure 2: Block Diagram for UPS.

### 1. POWER STAGE (PSDR)

As shown in figure1, the power stage consists of DC power supply, DC-DC converter, inverter, Input and output circuits.

#### 1-1 DC Power Supply Sub-System:

The input of the DC power supply is connected to the battery bus, i.e., the output of the charger. The output of DC power supplies provide +12 Vdc for the bias supply of IC's working voltage and the fan(s) voltage. The DC power supply works only when the 12 Vdc regulator supplies Vcc to its control IC. To have proper operation of 12 Vdc regulator, its input power is controlled by the switch as indicated in figure 3.

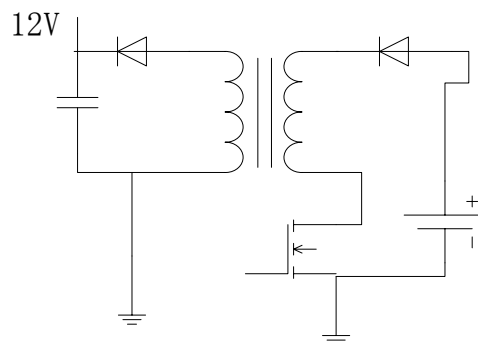


Figure 3: Schematic for DC power supply

#### 1-2 Inverter Sub-System:

The UPS transfers DC bus voltages to the AC output voltage through an inverter of full bridge configuration in battery mode. The schematic diagram of inverter is shown in figure 4.

To construct a high frequency ([19.2kHz](#)) PWM inverter, the drivers receive switching signals from PWM generation circuit through 2 PWM ICs to trigger the four IGBT alternately. The output of IGBT is filtered by an LC circuit to reduce the o/p voltage harmonics distortion.

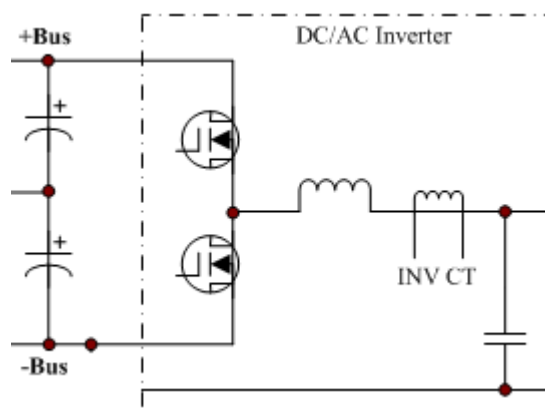


Figure 4: Schematics for inverter

### 1-3 The Input and Output Sub-System:

All the relays receive signals from control circuit.

The Input relay is a safety relay to switch the mains in or not.

The output relay switch the output of the UPS from bypass to inverter or reverse.

The input and output noise filter circuit blocks EMI noise to the loads.

### 1-4 DC-DC Converter Sub-System:

The major function of the UPS is to deliver accurate AC power to the loads connected to it whenever the AC line is correct or fails. In this system, the batteries release the stored energy to supply inverter immediately upon AC line fails.

Refer to figure 5, the battery voltage is transformed through a DC-DC converter to DC BUS for inverter. When the line fails, the BUS DC sources are caught up to supply the power needed by the inverter immediately

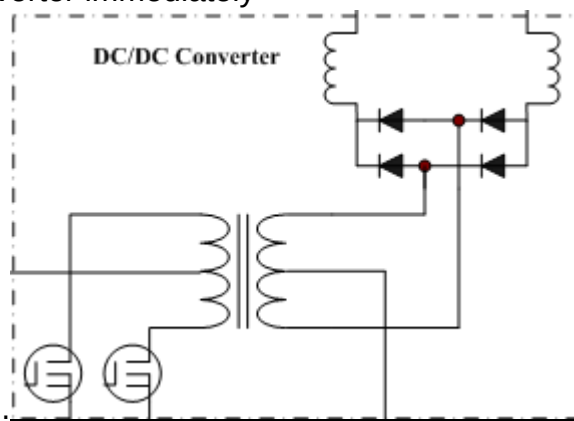


figure 5 DC -DC circuit

## 2. MAIN CONTROL PCB ASSEMBLIES (CNTL)

These assemblies are the control center of UPS. It is composed of three major circuits as following.

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

### 2-1 REGULATION & CONTROL SUB-SYSTEM:

This portion can be seen as 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.

The inverter signal is sensed directly by resistor division. It is compared with a reference signal from sine wave generator. The difference of these two signals (error signal) alter the pulse widths of PWM signals which control the duty cycles of switching elements to regulate the output voltage within specification.

### 2-2 PROTECTION SUB-SYSTEM:

The UPS provides the following protection circuits :

#### 1. Overload protection

The load detector senses the load current. i.e. the inverter current, and sends the signal by two paths. The UPS will go to failure mode if overload condition happened. The panel will indicate the fault condition. There are two kinds of protection in our UPS:

- a. **Overload Protection:** The UPS collects the continuous overload signals through CPU switch the output relay.

In line mode, if the output load is higher than 103% and lower than 110% of rated load (VA ,or Wattage) the UPS will warning, after 5minutes go to fault mode. If the output load is between 110% and 130% of rated load (VA ,or Wattage) the UPS will warning, after 10seconds go to fault mode.. If the output load is higher than 130% of rated load, the UPS will go to fault mode after 1second.

In battery mode, if the output load is higher than 110% and lower than 120% of rated load (VA ,or Wattage) the UPS will warning, after 0.5minutes go to fault mode. If the output load is between 120% and 130% of rated load (VA ,or Wattage) the UPS will warning, after 10seconds go to fault mode.. If the output load is higher than 130% of rated load, the UPS will go to fault mode after 1second.

- 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

IGBTs, 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

Upon the battery voltage declines to battery-under/over level, the UPS will warning and the LCD will display the fault code ,then shut down.

In case of the battery voltage is high voltage, the UPS will warning and the LCD will display the fault code.

## 3. Inverter output abnormal protection

The inverter failure signal shuts down the inverter immediately, makes the buzzer a continuous alarm, and the LCD displays the fault code.

" The failure signal latches itself unless SW off or battery is empty".

## 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 thought as temperature failure by the UPS. The LCD will display the fault code.

## 5. Bus over/under protection

To protect any BUS over/under condition. 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.

Upon the batteries are discharged to battery-low level, the battery-low signal is activated and the buzzer beeps every 1 second.

Remote shutdown signal is enabled only when the line fails.

## 3. Charger Sub-System

The purpose of charger is to charge and to maintain the batteries at fully charged condition. Refer to figure 6, the voltage flyback switching power supply provides a constant DC voltage for batteries. Besides providing constant voltage, the power supply also limits the current flowing into batteries and therefore protects and prolongs the life time of charged batteries.

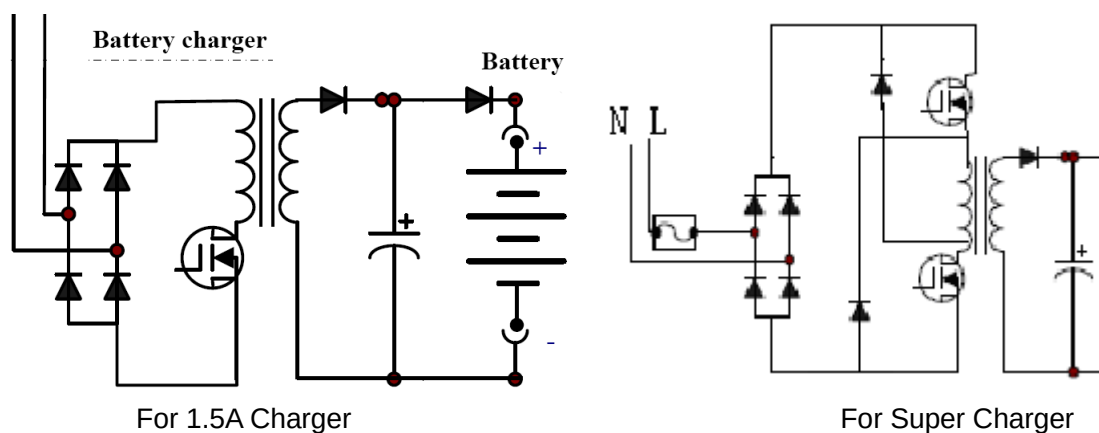


Figure 6: Charger Circuit Diagram

#### 4. Input Power Factor Correction Sub-System:

The purpose of power factor correction (P.F.C.) circuit is to make a constant bus for Inverter in Buck and Boost mode. The schematic is indicated in figure 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 present voltages at about 1.4 times of input RMS voltage. When the UPS is in Buck or Boost mode, the P.F.C. circuit is enabled and the DC bus is regulated at 190Vdc.(LV) 380V(HV)

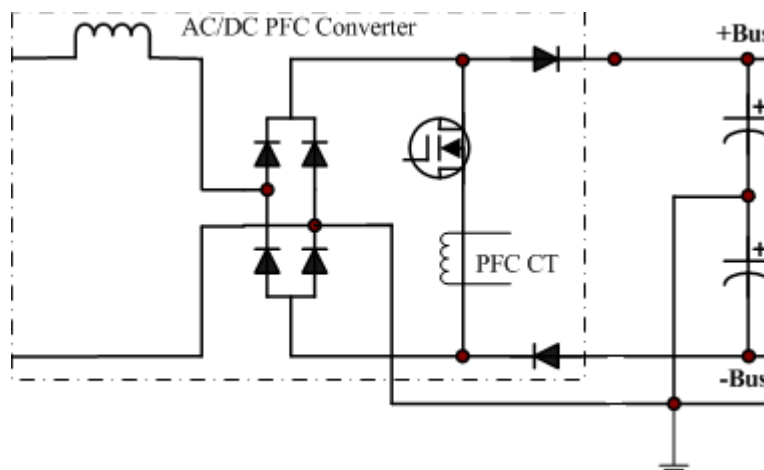
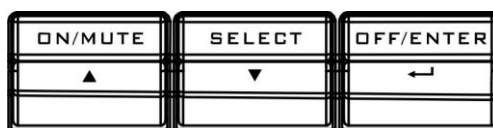


Figure 7: PFC Circuit Diagram

## 5. Front Panel:

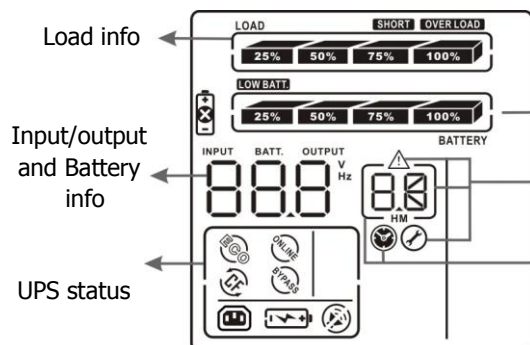
### Switch panel



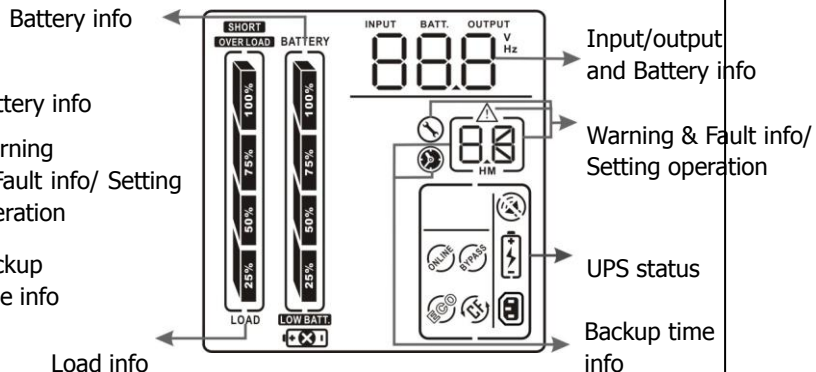
| Button                    | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ON/Mute Button            | <ul style="list-style-type: none"> <li>➤ Turn on the UPS: Press and hold ON/Mute button for at least 2 seconds to turn on the UPS.</li> <li>➤ Mute the alarm: After the UPS is turned on in battery mode, press and hold this button for at least 3 seconds to disable or enable the alarm system. But it's not applied to the situations when warnings or errors occur.</li> <li>➤ Up key: Press this button to display previous selection in UPS setting mode.</li> <li>➤ Switch to UPS self-test mode: Press ON/Mute buttons for 3 seconds to enter UPS self-testing while in AC mode, ECO mode, or converter mode.</li> </ul> |
| OFF/Enter Button          | <ul style="list-style-type: none"> <li>➤ Turn off the UPS: Press and hold this button at least 2 seconds to turn off the UPS. UPS will be in standby mode under power normal or transfer to Bypass mode if the Bypass enable setting by pressing this button.</li> <li>➤ Confirm selection key: Press this button to confirm selection in UPS setting mode.</li> </ul>                                                                                                                                                                                                                                                            |
| Select Button             | <ul style="list-style-type: none"> <li>➤ Switch LCD message: Press this button to change the LCD message for input voltage, input frequency, battery voltage, output voltage and output frequency.</li> <li>➤ Setting mode: Press and hold this button for 3 seconds to enter UPS setting mode when Standby and Bypass mode.</li> <li>➤ Down key: Press this button to display next selection in UPS setting mode.</li> </ul>                                                                                                                                                                                                     |
| ON/Mute + Select Button   | <ul style="list-style-type: none"> <li>➤ Switch to bypass mode: When the main power is normal, press ON/Mute and Select buttons simultaneously for 3 seconds. Then UPS will enter to bypass mode. This action will be ineffective when the input voltage is out of acceptable range.</li> <li>❑ Exit setting mode or return to the upper menu: When working in setting mode, press ON/Mute and Select buttons simultaneously for 0.2 seconds to return to the upper menu. If it's already in top menu, press these two buttons at the same time to exit the setting mode.</li> </ul>                                              |
| Select + OFF/Enter Button | <ul style="list-style-type: none"> <li>➤ Rack or Tower display switch: Press Select and OFF/Enter buttons simultaneously for 3 seconds. The display change from/to Rack to/from Tower.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## LCD Panel

### Rack Display



### Tower Display



| Display                                       | Function                                                                                                                  |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Backup time information</b>                |                                                                                                                           |
|                                               | Indicates the backup time in pie chart.                                                                                   |
|                                               | Indicates the backup time in numbers.<br>H: hours, M: minute                                                              |
| <b>Warning &amp; Fault information</b>        |                                                                                                                           |
|                                               | Indicates that the warning and fault occurs.                                                                              |
|                                               | Indicates the warning and fault codes, and the codes are listed in details in 3-5 section.                                |
| <b>Setting Operation</b>                      |                                                                                                                           |
|                                               | Indicates the setting operation.                                                                                          |
| <b>Input/Output &amp; Battery information</b> |                                                                                                                           |
|                                               | Indicates input voltage, input frequency, battery voltage, output voltage, output frequency.<br>V: voltage, Hz: frequency |
| <b>Load information</b>                       |                                                                                                                           |
|                                               | Indicates the load level by 0-25%, 26-50%, 51-75%, and 76-100%.                                                           |
|                                               | Indicates overload.                                                                                                       |
|                                               | Indicates the load or the UPS output is short circuited.                                                                  |
| <b>UPS status</b>                             |                                                                                                                           |
|                                               | Indicates that programmable management outlets are working.                                                               |
|                                               | Indicates the UPS working in line mode.                                                                                   |
|                                               | Indicates the UPS is working in converter mode.                                                                           |



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|                                                                                   |                                                                    |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------|
|  | Indicates the UPS is working in bypass mode.                       |
|  | Indicates the UPS powers the output directly from the mains        |
|  | Indicates that the UPS alarm is disabled.                          |
|  | Indicates the battery charger is working.                          |
| <b>Battery information</b>                                                        |                                                                    |
|  | Indicates the Battery level by 0-25%, 26-50%, 51-75%, and 76-100%. |
|  | Indicates low battery.                                             |
|  | Indicates there is something wrong with battery.                   |

### LCD display wordings index

| Abbreviation | Display content | Meaning                   |
|--------------|-----------------|---------------------------|
| ENA          | ENR             | Enable                    |
| DIS          | dl S            | Disable                   |
| ESC          | ESC             | Escape                    |
| HS           | HS              | High loss                 |
| LS           | LS              | Low loss                  |
| ON           | ON              | ON                        |
| OK           | OK              | OK                        |
| SF           | SF              | Site fault                |
| EP           | EP              | EPO                       |
| TP           | TP              | Temperature               |
| CH           | CH              | Charger                   |
| FU           | FU              | Bypass frequency unstable |
| EE           | EE              | EEPROM error              |
| FA           | FA              | Fan failure               |
| BR           | bt              | Battery Replace           |

### UPS Setting

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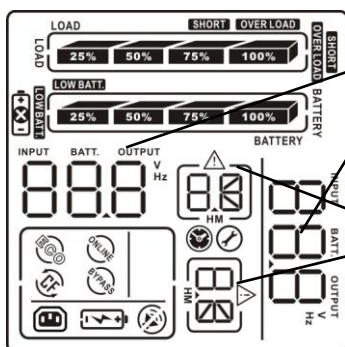
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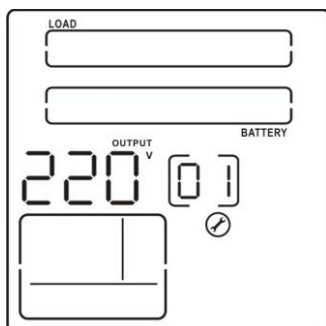
Parameter 2

Parameter 1

There are two parameters to set up the UPS.  
Parameter 1: It's for program alternatives.  
There are 15 programs to set up:  
Parameter 2: It's for setting information display.

### ● 01: Output voltage setting

#### Interface



#### Setting

##### Parameter 2: Output voltage

For 200/208/220/230/240 VAC models, you may choose the following output voltage:

**200:** presents output voltage is 200Vac

**208:** presents output voltage is 208Vac

**220:** presents output voltage is 220Vac

**230:** presents output voltage is 230Vac (Default)

**240:** presents output voltage is 240Vac

For 100/110/150/120/127 VAC models, you may choose the following output voltage:

**100:** presents output voltage is 100Vac

**110:** presents output voltage is 110Vac

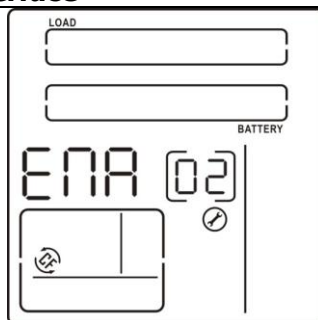
**115:** presents output voltage is 115Vac

**120:** presents output voltage is 120Vac (Default)

**127:** presents output voltage is 127Vac

### ● 02: Frequency Converter enable/disable

#### Interface



#### Setting

**Parameter 2:** Enable or disable converter mode. You may choose the following two options:

**CF ENA:** converter mode enable

**CF DIS:** converter mode disable (Default)

●

●

●

●

●

●

### ● 03: Output frequency setting

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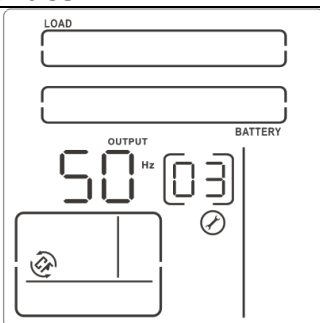
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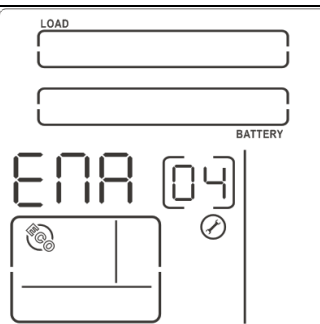
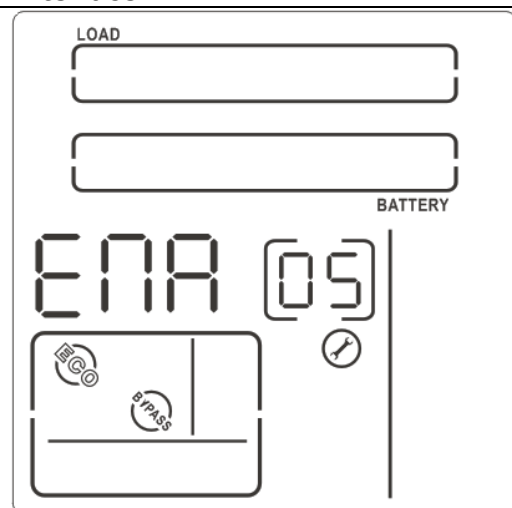
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**Interface****Setting****Parameter 2: Output frequency setting.**

You may set the initial frequency on battery mode:

**BAT 50:** presents output frequency is 50Hz**BAT 60:** presents output frequency is 60Hz

If converter mode is enabled, you may choose the following output frequency:

**CF 50:** presents output frequency is 50Hz**CF 60:** presents output frequency is 60Hz● **04: ECO enable/disable****Interface****Setting****Parameter 2:** Enable or disable ECO function. You may choose the following two options:**ENA:** ECO mode enable**DIS:** ECO mode disable (Default)● **05: AEEO enable/disable****Interface****Setting**

ENA: Advanced ECO mode enable

DIS: Advanced ECO mode disable(Default)

● **06: ECO voltage range setting****Interface****Setting**

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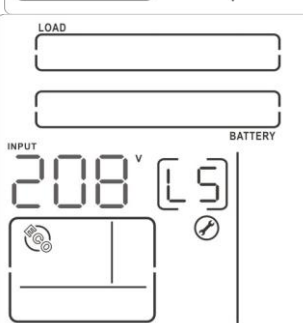
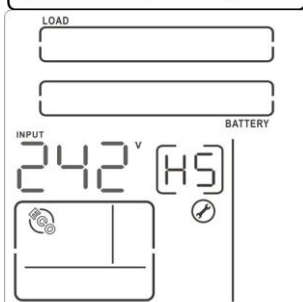
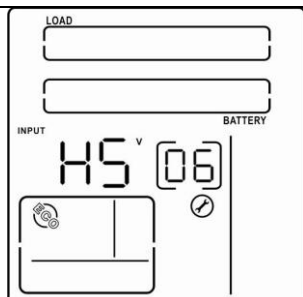
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**Parameter 1 & 2:** Set the acceptable high voltage point and low voltage point for ECO & **AECO** mode by pressing Down key or Up key.

**HS:** High loss voltage in ECO & **AECO** mode in parameter 2. For 200/208/220/230/240 VAC models, the setting range in parameter 3 is from +7V to +24V of the nominal voltage. (Default: +12V)

For 100/110/115/120/127 VAC models, the setting range in parameter 3 is from +3V to +12V of the nominal voltage.

(Default: +6V)

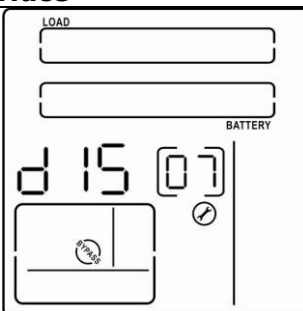
**LS:** Low loss voltage in ECO & **AECO** mode in parameter 2. For 200/208/220/230/240 VAC models, the setting range in parameter 3 is from -7V to -24V of the nominal voltage. (Default: -12V)

For 100/110/115/120/127 VAC models, the setting voltage in parameter 3 is from -3V to -12V of the nominal voltage.

(Default: -6V)

● **07: Bypass enable/disable when UPS is off**

**Interface**



**Setting**

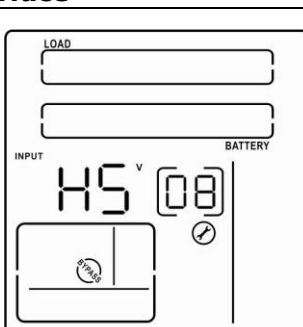
**Parameter 2:** Enable or disable Bypass function. You may choose the following two options:

**ENA:** Bypass enable

**DIS:** Bypass disable (Default)

● **08: Bypass voltage range setting**

**Interface**



**Setting**

**Parameter 1 & 2:** Set the acceptable high voltage point and acceptable low voltage point for Bypass mode by pressing the Down key or Up key.

**HS:** Bypass high voltage point

For 200/208/220/230/240 VAC models:

**230-264:** setting the high voltage point in parameter 3 from 230Vac to 264Vac. (Default: 264Vac)

For 100/110/115/120/127 VAC models:

**120-140:** setting the high voltage point in parameter 3

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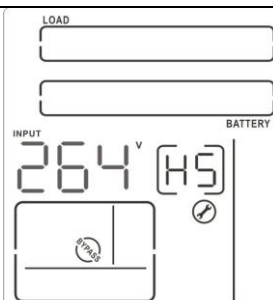
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from 120Vac to 140Vac(Default: 132Vac)

**LS:** Bypass low voltage point

For 200/208/220/230/240 VAC models:

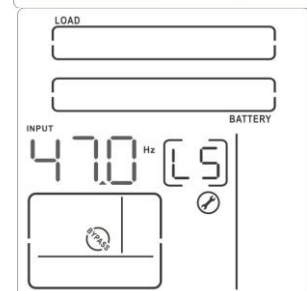
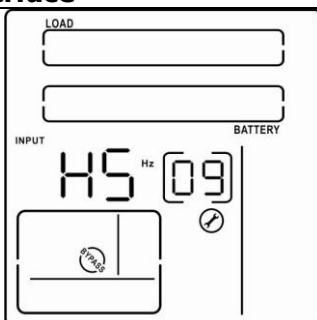
**170-220:** setting the low voltage point in parameter 3 from 170Vac to 220Vac (Default: 170Vac)

For 100/110/115/120/127 VAC models:

**85-115:** setting the low voltage point in parameter 3 from 85Vac to 115Vac. (Default: 85Vac)

### ● 09: Bypass frequency range setting

#### Interface



#### Setting

**Parameter 1 & 2:** Set the acceptable high frequency point and acceptable low frequency point for Bypass mode by pressing the Down key or Up key.**HS:** Bypass high frequency point

For 50Hz output frequency models:

**51-55Hz:** setting the frequency **high** loss point from 51Hz to 55Hz(Default: 53.0Hz)

For 60Hz output frequency models:

**61-65Hz:** setting the frequency **high** loss point from 61Hz to 65Hz(Default: 63.0Hz)**LS:** Bypass low Frequency point

For 50Hz output frequency models:

**45-49Hz:** setting the frequency low loss point from 45Hz to 49Hz(Default: 47.0Hz)

For 60Hz output frequency models:

**55-59Hz:** setting the frequency low loss point from 55Hz to 59Hz(Default: 57.0Hz)

### ● 10: Programmable outlets enable/disable

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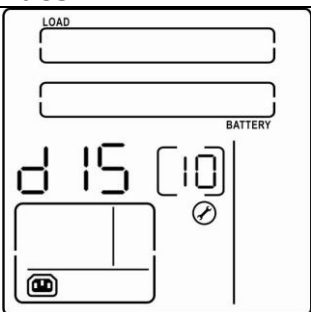
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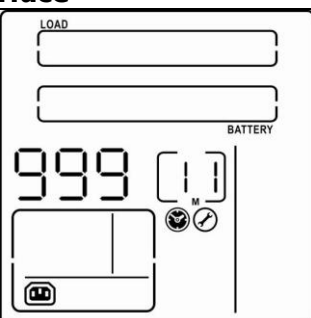
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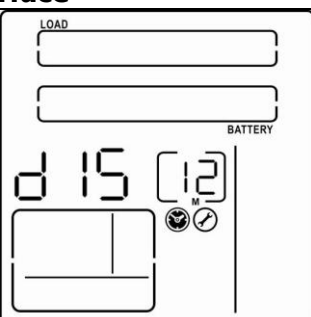
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| Interface                                                                         | Setting                                                                                                                                                                 |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>Parameter 2:</b> Enable or disable programmable outlets.<br/> <b>ENA:</b> Programmable outlets enable<br/> <b>DIS:</b> Programmable outlets disable (Default)</p> |

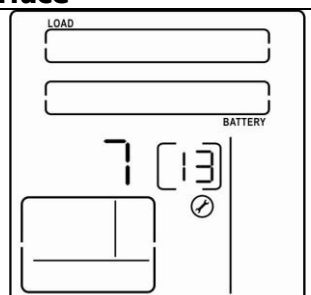
- 11: Programmable outlets setting

| Interface                                                                          | Setting                                                                                                                                                                                                                                               |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>Parameter 2:</b> Set up backup time limits for programmable outlets.<br/> <b>0-999:</b> setting the backup time limits in minutes from 0-999 for programmable outlets which connect to non-critical devices on battery mode. (Default: 999)</p> |

- 12: Autonomy limitation setting

| Interface                                                                           | Setting                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>Parameter 2:</b> Set up backup time on battery mode for general outlets.<br/> <b>0-999:</b> setting the backup time in minutes from 0-999 for general outlets on battery mode.<br/> <b>DIS:</b> Disable the autonomy limitation and the backup time will depend on battery capacity. (Default)<br/> <b>Note:</b> When setting as "0", the backup time will be only 10 seconds.</p> |

- 13: Battery total AH setting

| Interface                                                                           | Setting                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>Parameter 2:</b> Set up the battery total AH of the UPS.<br/> <b>7-999:</b> setting the battery total capacity from 7-999 in AH. Please set the correct battery total capacity if external battery bank is connected.</p> |

- 14: Charger maximum current setting

专案名称: X9 II

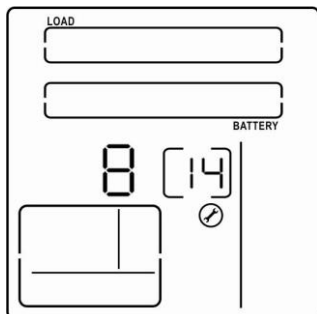
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**Interface****Setting**

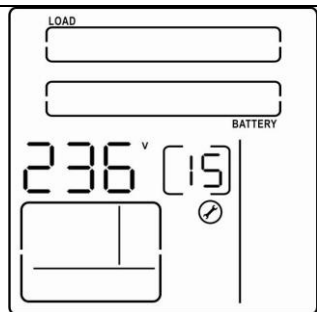
**Parameter 2:** Set up the maximum charger current. When the UPS is equipped with additional charger, the available setting options are 2/3/4.

**2/3/4:** setting the maximum charger current in 2/3/4 Ampere.

When the UPS is long run model, the available setting options are 1/2/4/6/8.

**1/2/4/6/8:** setting the maximum charger current in 1/2/4/6/8 Ampere. (Default: 8A)

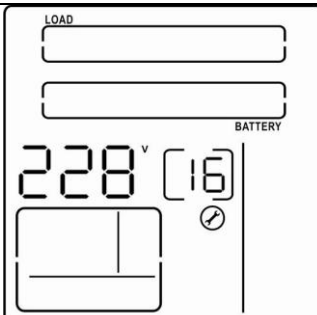
- **15: Charger Boost voltage setting**

**Interface****Setting**

**Parameter 2:** Set up the charger boost voltage.

**225-240:** setting the charger boost voltage from 225 to 240(unit: 0.01V/cell). (Default: 236)

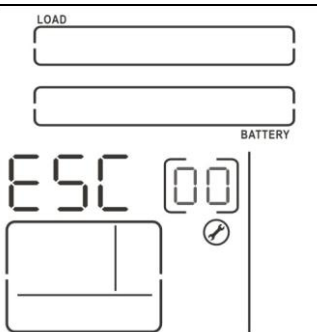
- **16: Charger Float voltage setting**

**Interface****Setting**

**Parameter 2:** Set up the charger float voltage.

**220-233:** setting the charger float voltage from 220 to 233(unit: 0.01V/cell). (Default:228)

- **00: Exit setting**

**Interface****Setting**

Exit the setting mode.

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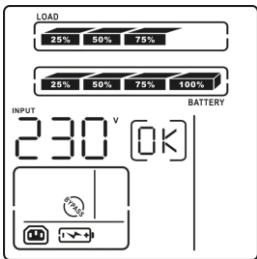
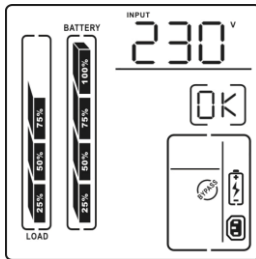
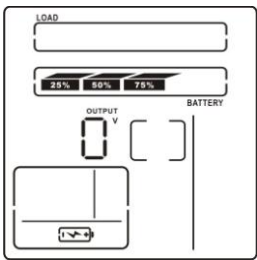
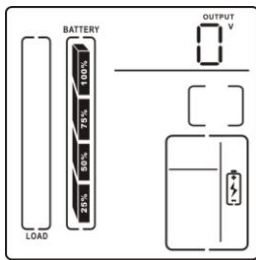
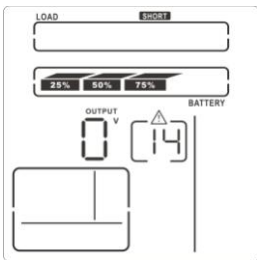
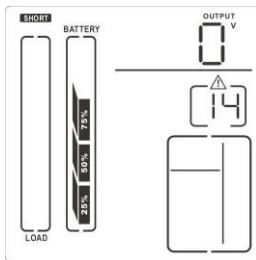
## Operating Mode Description

| Operating mode           | Description                                                                                                                                                                                         | LCD display  |               |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------|
|                          |                                                                                                                                                                                                     | Rack Display | Tower Display |
| Online mode              | When the input voltage is within acceptable range, UPS will provide pure and stable AC power to output. The UPS will also charge the battery at online mode.                                        |              |               |
| ECO mode                 | Energy saving mode: When the input voltage is within voltage regulation range, UPS will bypass voltage to output for energy saving. The UPS will also charge the battery at ECO mode.               |              |               |
| AECO mode                | Advanced Efficiency Corrective Optimizer mode: When the input voltage is within setting range ( $\pm 3\%V_o$ max), UPS will bypass voltage to output for energy saving. (PFC and INVERTER are off.) |              |               |
| Frequency 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 power failure, the UPS will backup power from battery and alarm is sounding every 5 second.                                                |              |               |



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|              |                                                                                                                                                                            |                                                                                     |                                                                                      |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Bypass mode  | When input voltage is within acceptable range but UPS is overload, UPS will enter bypass mode or bypass mode can be set by front panel. Alarm is sounding every 10 second. |   |   |
| Standby mode | UPS is powered off and no output supply power, but still can charge batteries.                                                                                             |   |   |
| Fault mode   | When a fault has occurred, the ERROR icon and the fault code will be displayed.                                                                                            |  |  |

### Faults Reference Code

| Fault event              | Fault code | Icon | Fault event              | Fault code | Icon                                                                                  |
|--------------------------|------------|------|--------------------------|------------|---------------------------------------------------------------------------------------|
| Bus start fail           | 01         | x    | Inverter output short    | 14         |  |
| Bus over                 | 02         | x    | Battery voltage too high | 27         |  |
| Bus under                | 03         | x    | Battery voltage too low  | 28         |  |
| Inverter soft start fail | 11         | x    | Over temperature         | 41         | x                                                                                     |
| Inverter voltage high    | 12         | x    | Over load                | 43         |  |
| Inverter voltage Low     | 13         | x    | Charger failure          | 45         | x                                                                                     |

## Warning indicator

| Warning                     | Icon (flashing)                                                                                                                                                         | Alarm                                                                                               |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| Low Battery                 |  <b>LOW BATT.</b>                                                                      | Sounding every 2 seconds                                                                            |
| Overload                    |  <b>OVER LOAD</b>                                                                      | Sounding every second                                                                               |
| Battery is not connected    |       | Sounding every 2 seconds                                                                            |
| Over Charge                 |       | Sounding every 2 seconds                                                                            |
| Site wiring fault           |  <b>SF</b>                                                                             | Sounding every 2 seconds                                                                            |
| EPO enable                  |  <b>EP</b>                                                                             | Sounding every 2 seconds                                                                            |
| Over temperature            |  <b>TP</b>                                                                             | Sounding every 2 seconds                                                                            |
| Charger failure             |  <b>CH</b>                                                                             | Sounding every 2 seconds                                                                            |
| Battery fault               |       | Sounding every 2 seconds<br>(At this time, UPS is off to remind users something wrong with battery) |
| Out of bypass voltage range |   | Sounding every 2 seconds                                                                            |
| Bypass frequency unstable   |  <b>FU</b>                                                                           | Sounding every 2 seconds                                                                            |
| EEPROM error                |  <b>EE</b>                                                                           | Sounding every 2 seconds                                                                            |
| Fan failure                 |  <b>FA</b>                                                                           | Sounding every 2 seconds                                                                            |
| Battery replace             |  <b>bt</b>                                                                           | Sounding every 2 seconds                                                                            |

**Note 1 :** When the fault is happened on line mode, the UPS must transfer to bypass mode except Inverter short circuit if the input voltage within the range of bypass mode.

**Note 2 :** If the site fault is happened after the UPS turned on, the UPS can't transfer to on line mode.

## . ALIGNMENTS

List below are some test points and procedures when a qualified service person wants to check whether EUT (Equipment Under Test) will works properly. Before beginning following procedures, please ***make sure that EUT is OFF and disconnected from Utility.***

| TEST ITEM                     | TEST POINT                                      | TEST AND ADJUSTMENT SEQUENCE                                                                                                                                                                                                                                                                                                                                     | EXPECTED RESULT                                                                                                                                               |
|-------------------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Charger Voltage               | External battery connector for Long run model,. | <ol style="list-style-type: none"> <li>1. Disconnect TP3(+)TP4(-) wires from pins respectively.</li> <li>2. Connect DVM (set to measure DC) to test pins and plug input power cord to utility.</li> </ol>                                                                                                                                                        | <ol style="list-style-type: none"> <li>1. Cooling fans on back panel begin to rotate.</li> <li>2. (13.7Vdc±0.1V)N (N=2,3,4,6 for different models)</li> </ol> |
| DC Bus Voltage @ Battery Mode | BUS+, GND<br>GND, BUS-.                         | <ol style="list-style-type: none"> <li>1. Connect DVM (Set to measure DC) to test point.</li> <li>2. Disconnect input power cord to utility.</li> <li>3. Press "ON" button for 2 seconds to turn EUT on.</li> <li>4. Waiting for 10 seconds to make sure the EUT work in Battery mode according to the LCD display.</li> <li>5. Check reading on DVM.</li> </ol> | +185VDC±10V(LV)<br>+380VDC±20V(HV)                                                                                                                            |
| O/P DC Balance @ Battery Mode | O/P socket                                      | <ol style="list-style-type: none"> <li>1. Keeping UPS on @ Battery mode.</li> <li>2. Connect DC measurement tool<sup>1</sup> to O/P socket.</li> <li>3. Check reading on DVM.</li> </ol>                                                                                                                                                                         | 230mV max.                                                                                                                                                    |

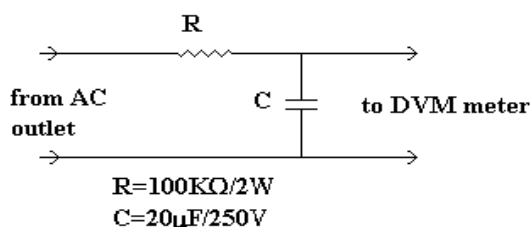


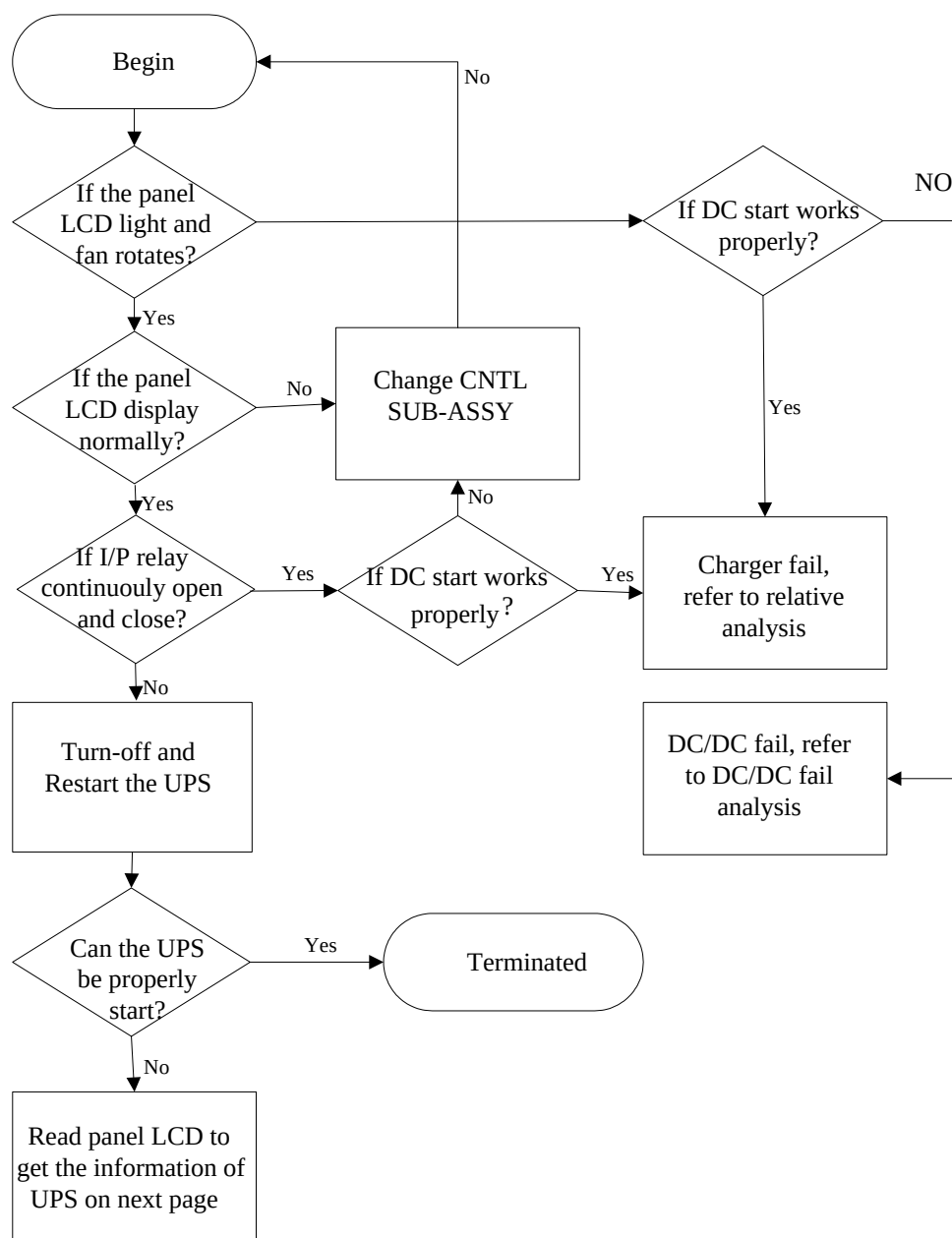
Figure 9 : Circuit for test output balance

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |       |    |      |        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|----|------|--------|
| 维修手册 Service manual                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |       |    |      |        |
| 专案名称:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | X9 II |       |    |      |        |
| 专案编号:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       | 修订版次: | 00 | PAGE | 28 / 3 |
| <p><b>7 维护说明 Maintain instructions</b></p> <p>The UPS system operates with hazardous voltages. Repairs may be carried out only by qualified maintenance personnel.</p> <p>Caution - risk of electric shock. Even after the unit is disconnected from the mains (building wiring outlet), components inside the UPS system are still connected to the battery and electrically live and dangerous.</p> <p>Before carrying out any kind of service and/or maintenance, disconnect the batteries and verify that no current is present and no hazardous voltage exists in the terminals of high capability capacitor such as BUS-capacitors.</p> <p>Only persons are adequately familiar with batteries and with the required precautionary measures may replace batteries and supervise operations. Unauthorized persons must be kept well away from the batteries.</p> <p>Caution - risk of electric shock. The battery circuit is not isolated from the input voltage. Hazardous voltages may occur between the battery terminals and the ground. Before touching, please verify that no voltage is present!</p> <p>Batteries may cause electric shock and have a high short-circuit current. Please take the precautionary measures specified below and any other measures necessary when working with batteries:</p> <ul style="list-style-type: none"> <li>—remove wristwatches, rings and other metal objects</li> <li>—use only tools with insulated grips and handles.</li> </ul> <p>When changing batteries, install the same number and same type of batteries.</p> <p>Do not attempt to dispose of batteries by burning them. This could cause battery explosion.</p> <p>Do not open or destroy batteries. Escaping electrolyte can cause injury to the skin and eyes. It may be toxic.</p> <p>Please replace the fuse only with the same type and amperage in order to avoid fire hazards.</p> <p>Do not dismantle the UPS system.</p> |       |       |    |      |        |

## 8 常见问题处理 Trouble shooting

Due to careful design and strict tests of our products, fail of UPS seldom occurs. However, once they do fail in some situations, please check them according to **Trouble Shooting Chart**, that will help you solve the most problems on UPS.

### Trouble Shooting Chart



## Failure Diagnosis

### 1. OVERVIEW :

| Circuit Block   | Components to be checked                    | Fail condition    |
|-----------------|---------------------------------------------|-------------------|
| Battery FUSE    | F2-F10,F12-F18                              | short or open     |
| PFC FUSE        | F1,F23                                      | short or open     |
| DC-DC Booster   | Q6,Q20,Q3 Q15 Q4 Q2 ( +Q28 , Q29 for 3K ) , | D-S short or open |
|                 | PCB1                                        | short or open     |
| Inverter        | Q31,Q32                                     | D-S short or open |
| DC Power Supply | Q17                                         | D-S short or open |

### 2. DC-DC CONVERTER:

| Step | Checked components                                    | Instrument function | Reference Value | Failed condition |
|------|-------------------------------------------------------|---------------------|-----------------|------------------|
| 1    | F2-F10,F12-F18                                        | $\Omega$            | short           | open             |
| 2    | Q6,Q20,Q3 Q15 Q4 Q2 ( +Q28 , Q29 for 3K ) ,           | DIODE               | 0.44            | short or open    |
| 3    | R56,R44,R32,R54,R31+ ( R35,R42,R228 3K,) ( R33 1-2K ) | $\Omega$            | 22              | open             |
| 4    | PCB1                                                  | DIODE               | 0.42            | short or open    |

### 3.DC/AC INVERTER:

| Step | Checked components | Instrument function | Reference Value | Failed condition |
|------|--------------------|---------------------|-----------------|------------------|
| 1    | Q31,Q32            | DIODE               | 0.42            | short or open    |
| 2    | R241, R239         | $\Omega$            | 22 $\Omega$     | open             |

### 4.DC POWER SUPPLY :

| Step | Checked components | *Instrument function | Reference Value | Failed condition |
|------|--------------------|----------------------|-----------------|------------------|
|------|--------------------|----------------------|-----------------|------------------|

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|   |                                            |          |                           |               |
|---|--------------------------------------------|----------|---------------------------|---------------|
| 1 | Q17(D,S)                                   | DIODE    | 0.535                     | short or open |
| 2 | R146                                       | $\Omega$ | 10                        | open          |
| 3 | R192                                       | $\Omega$ | 0.05                      | open          |
| 4 | U1(1252) PIN :<br>5-6<br>5-7<br>5-8<br>6-8 | $\Omega$ | 38k<br>4K<br>412k<br>415K | too low       |

**5.AC/DC PFC :**

| Step | Checked components | Instrument function | Reference Value | Failed condition |
|------|--------------------|---------------------|-----------------|------------------|
| 1    | Q1,Q31 (D,S),      | DIODE               | 0.39            | short            |
| 2    | R235,R18           | $\Omega$            | 22              | open             |
| 4    | D10,D11            | DIODE               | 0.39            | short or open    |

**AC/DC CHARGER :****Long-run charger**

| Step | Checked components                              | Instrument function | Reference Value           | Failed condition |
|------|-------------------------------------------------|---------------------|---------------------------|------------------|
| 1    | Q301,Q306 (D,S)                                 | DIODE               | 0.49                      | short or open    |
| 2    | R303 ,R313                                      | $\Omega$            | 10                        | open             |
| 3    | R326                                            | $\Omega$            | 0.22 $\Omega$             | open             |
| 4    | <u>U300</u> (1252) PIN 5-6<br>5-7<br>5-8<br>6-8 | $\Omega$            | 38k<br>4K<br>412k<br>415K | too low          |
| 5    | D305                                            | DIODE               | 0.57                      | short or open    |

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**1.5A charger**

| Step | Checked components                             | *Instrument function   | Reference Value           | Failed condition  |
|------|------------------------------------------------|------------------------|---------------------------|-------------------|
| 1    | <u>Q19</u>                                     | DIODE                  | 0.49                      | short or open     |
| 2    | <u>R155</u>                                    | $\Omega$               | 33                        | open              |
| 3    | <u>R202</u>                                    | $\Omega$               | 0.1 $\Omega$              | open              |
| 4    | <u>U14</u> (1252) PIN 5-6<br>5-7<br>5-8<br>6-8 | $\Omega$               | 38k<br>4K<br>412k<br>415K | too low           |
| 5    | <u>D14</u> , <u>D20</u> ,                      | DIODE                  | 0.57                      | short or open     |
| 6    | C81, <u>C73</u>                                | $\Omega$<br><br>visual | open                      | short<br>deformed |

After you have replaced all defect components on power stage ( PSDR ) , connect with control board. Supply DC voltage 12\*N, (N=23,4,6)Vdc/2Amp (limited current) with DC power supply via (TP3+) and (TP4-). Turn on the switch on panel, you will see "current limit" on the DC power supply for about 2 seconds (If not, there are some defective components you have not found).

When everything seems good, turn off the switch on panel and remove DC power supply. Plug in the power cord and supply UPS with the mains. Test the output of charger CN4+/- ( ECHG ) . Is it 13.6\*N, (N=2,4,6,8)Vdc.The fan will also active. If there is no problem in charger, connect the batteries via P10+ and P8-..→3/5/6K (TP1+ and TP2-→1K&2K)

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

**CAUTION:** DO NOT supply UPS with the mains unless you are sure that you have replaced all defective components



| MODEL                      |                       | 1K                                                                                                                                            |               | 1.5K             |  | 2K               |                | 3K               |  |
|----------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|--|------------------|----------------|------------------|--|
| Capacity                   | VA/W                  | 1000 VA / 900 W                                                                                                                               |               | 1500 VA / 1350 W |  | 2000 VA / 1800 W |                | 3000 VA / 2700 W |  |
| INPUT                      |                       |                                                                                                                                               |               |                  |  |                  |                |                  |  |
| Voltage Range              | Low Line Transfer     | 80 VAC/70 VAC/60 VAC/55 VAC ± 5 % or 160 VAC/140 VAC/120 VAC/110 VAC ± 5 %<br>(based on load percentage 100%-80% / 80%-70% / 70%-60% / 60%-0) |               |                  |  |                  |                |                  |  |
|                            | Low Line Comeback     | 85 VAC/75 VAC/65 VAC/60 VAC ± 5 % or 170 VAC / 150 VAC / 130 VAC / 120 VAC ± 5 %                                                              |               |                  |  |                  |                |                  |  |
|                            | High Line Transfer    | 150 VAC ± 5 % or 300 VAC ± 5 %                                                                                                                |               |                  |  |                  |                |                  |  |
|                            | High Line Comeback    | 140 VAC ± 5 % or 290 VAC ± 5 %                                                                                                                |               |                  |  |                  |                |                  |  |
| Frequency Range            |                       | 40Hz ~ 70Hz                                                                                                                                   |               |                  |  |                  |                |                  |  |
| Power Factor               |                       | ≧0.99 @normal voltage                                                                                                                         |               |                  |  |                  |                |                  |  |
| OUTPUT                     |                       |                                                                                                                                               |               |                  |  |                  |                |                  |  |
| Output Voltage             |                       | 100*/110*/115*/120/127 VAC or 200/208/220/230/240 VAC                                                                                         |               |                  |  |                  |                |                  |  |
| AC Voltage Regulation      |                       | ± 1%                                                                                                                                          |               |                  |  |                  |                |                  |  |
| Frequency Range            |                       | 47 ~ 53 Hz or 57 ~ 63 Hz (Synchronized Range)                                                                                                 |               |                  |  |                  |                |                  |  |
| Frequency Range            |                       | 50Hz ± 0.1 Hz or 60Hz ± 0.1 Hz (Bat. Mode)                                                                                                    |               |                  |  |                  |                |                  |  |
| Current Crest Ratio (CF)   |                       | 3:1 (max.)                                                                                                                                    |               |                  |  |                  |                |                  |  |
| Harmonic Distortion (THDU) |                       | ≡ 2% THD (Linear load) ; ≡ 4% THD (Non-linear load)                                                                                           |               |                  |  |                  |                |                  |  |
| Transfer Time              | AC to DC              | Zero                                                                                                                                          |               |                  |  |                  |                |                  |  |
|                            | Inverter to Bypass    | 4 ms (Typical)                                                                                                                                |               |                  |  |                  |                |                  |  |
| Waveform (Batt. Mode)      |                       | Pure Sinewave                                                                                                                                 |               |                  |  |                  |                |                  |  |
| EFFICIENCY                 |                       |                                                                                                                                               |               |                  |  |                  |                |                  |  |
| AC Mode                    |                       | 90%                                                                                                                                           |               | 90%              |  | 91%              |                | 91%              |  |
| Battery Mode               |                       | 88%                                                                                                                                           | 89%           | 89%              |  | 88%              | 89%            | 90%              |  |
| ECO Mode                   |                       | 97%                                                                                                                                           |               | 97%              |  | 97%              |                | 97%              |  |
| BATTERY                    |                       |                                                                                                                                               |               |                  |  |                  |                |                  |  |
| Standard Model             | Battery Type          | 12V/9Ah                                                                                                                                       | 12V/7Ah       | 12V/9Ah          |  | 12V/9Ah          | 12V/7Ah        | 12V/9Ah          |  |
|                            | Battery Numbers       | 2                                                                                                                                             | 3             | 3                |  | 4                | 6              | 6                |  |
|                            | Typical Recharge Time | 4 hours recover to 90% capacity                                                                                                               |               |                  |  |                  |                |                  |  |
|                            | Charging Current      | 1.5 A (Max.)                                                                                                                                  |               |                  |  |                  |                |                  |  |
|                            | Charging Voltage      | 27.4 VDC ± 1%                                                                                                                                 | 41.1 VDC ± 1% | 41.1 VDC ± 1%    |  | 54.8VDC ± 1%     | 82.1VDC ± 1%   | 82.1VDC ± 1%     |  |
| Long-run Model             | Type                  | Depending on application                                                                                                                      |               |                  |  |                  |                |                  |  |
|                            | Battery Numbers       | 2                                                                                                                                             | 3             | 3                |  | 4                | 6              | 6                |  |
|                            | Charging Current      | 1A/2A/4A/8A                                                                                                                                   |               |                  |  |                  |                |                  |  |
|                            | Charging Voltage      | 27.4 VDC ± 1%                                                                                                                                 | 41.1 VDC ± 1% | 41.1 VDC ± 1%    |  | 54.8VDC ± 1%     | 82.1VDC ± 1%   | 82.1VDC ± 1%     |  |
| INDICATORS                 |                       |                                                                                                                                               |               |                  |  |                  |                |                  |  |
| LCD                        |                       | UPS status, Load level, Battery level, Input/Output/battery info, Discharge time and Fault indicators                                         |               |                  |  |                  |                |                  |  |
| ALARM                      |                       |                                                                                                                                               |               |                  |  |                  |                |                  |  |
| Battery Mode               |                       | Sounding every 4 seconds                                                                                                                      |               |                  |  |                  |                |                  |  |
| Low Battery                |                       | Sounding every second                                                                                                                         |               |                  |  |                  |                |                  |  |
| Overload                   |                       | Sounding twice every second                                                                                                                   |               |                  |  |                  |                |                  |  |
| Fault                      |                       | Continuously sounding                                                                                                                         |               |                  |  |                  |                |                  |  |
| PHYSICAL                   |                       |                                                                                                                                               |               |                  |  |                  |                |                  |  |
| Standard Model             | Dimension, DxWxH (mm) | 410 x 438 x 88                                                                                                                                |               | 410 x 438 x 88   |  | 510 x 438 x 88   | 630 x 438 x 88 | 630 x 438 x 88   |  |
|                            | Net Weight (kgs)      | 11.6                                                                                                                                          | 14.2          | 14.5             |  | 19.5             | 26.9           | 27.4             |  |
| Long-run Model             | Dimension, DxWxH (mm) | 410 x 438 x 88                                                                                                                                |               | 410 x 438 x 88   |  | 410 x 438 x 88   |                | 510 x 438 x 88   |  |
|                            | Net Weight (kgs)      | 6.4                                                                                                                                           | 6.4           | 6.5              |  | 6.5              |                | 10.5             |  |
| ENVIRONMENT                |                       |                                                                                                                                               |               |                  |  |                  |                |                  |  |
| Humidity                   |                       | 20-90 % RH @ 0- 40°C (non-condensing)                                                                                                         |               |                  |  |                  |                |                  |  |

维修手册 Service manual

专案名称: X9 II

专案编号: 修订版次: 00 PAGE 34 / 3

Noise Level Less than 55dBA @ 1 Meter

**MANAGEMENT**

Smart RS-232/USB Supports Windows 2000/2003/XP/Vista/2008/7/8, Linux, Unix, and MAC

Optional SNMP Power management from SNMP manager and web browser

\* Derate capacity to 80% when the output voltage is adjusted to 100VAC, 200VAC or 208VAC.

## APPENDIX I: 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

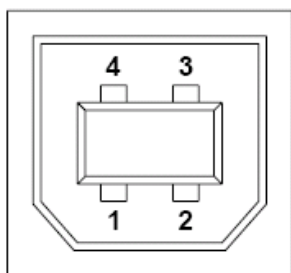
The pin assignment and description are listed in the following table and the interface configuration is indicated in figure VI-1. Note that, the computer will control information exchange by a query followed by <cr> (Character Return). UPS will respond with information followed by a <cr> or action. UPS 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.

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

### 2. USB PORT

The USB is compatible to USB1.1 specification, and implemented for HID device and bus-powered.

The USB connector is "B" receptacles, seeing the following figure . The following table is signal definition of USB interface.



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

|                     |       |       |    |      |        |
|---------------------|-------|-------|----|------|--------|
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## APPENDIX II: Wiring diagram

