TP600SERIES
INVERTER POWER SUPPLY

USER MANUAL

General Instruction

This chapter contains important safety and operating instructions. Read and keep this User Guide for later reference.

Before using TP600, read and follow all instructions and caution marking on TP600, the batteries, and in all sections of this instruction manual.

Contents

1.Important Safety Instruction

1.1 Safety Instruction

As dangerous voltages and high temperature exist within the INVERTER, only qualified maintenance personnel are permitted to open and repair it.

This manual contains information concerning the installation and operation of the TP600。All relevant parts of the manual should be read prior to commencing the installation.

Such actions are not warranted as operating against safety requirement or against design, manufacture, safety standard, and are out of the service responsibility.

1.2 General Precaution

1. Do not expose TP600 to rain, snow or liquids of any type，it is designed for indoor use. To reduce risk of damage, do not block off ventilation, or otherwise the INVERTER would be overheating.
2. To avoid fire and electric shock， make sure all cables selected with right gauge and connected well。Smaller diameter and broken cable are not permitted to use.

1.3 Precaution for battery

1. Keep plenty of fresh water and soap at hand in case battery acid contacts skin, clothing, or eyes.
2. NEVER smoke or allow a spark or flame in vicinity of a battery。
3. Do not put the metal tool on the battery; spark and short circuit will lead to explosion.

4. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with batteries. Batteries can cause short-circuit current high enough to make metal melt, and could cause severe burns.

2.Foreword

2.1 Instruction

TP600SERIES INVERTER is designed for DC/AC application especially for high qualify require environment like as communication and electric power field.

2.2 Feature

- DSP (Digital Signal Processing) Controller: The DSP monitors the unit output state in real time, and provides excellent transient response comparing to the intelligent program.
- PWM+SPWM (Pulse Width Modulation + Switch Pulse Width Modulation): PWM technology is used to supply pure and stable power for 3% distortion and 2% stability pure sine wave.
- Advanced isolation technology between DC and AC, meet safety and EMC requirement of system.
- Ideal Self-diagnosis function: The DSP is to monitor the system operation.
- Automatic Bypass: Under the circumstance of DC input faulty or servicing the battery, the main power will switch to load automatically via the built-in Bypass circuit and the power is supplied by input side directly.
- Selectable input frequency ranges 44Hz~66Hz, with output frequency is 50Hz or 60Hz.
- Auto restart: When the utility mains reactivation, the unit will restart automatically.
- Ideal protection function: When the system is in abnormal condition or other protection mode like Over Current Protection, Over Voltage Protection, Over Power Protection, and Over Temperature Protection, or the components is failure, the DSP will take actions.
- Advanced technology of reducing reflected noise, no disturbance to other equipments connected on the same DC distribution frame, multicomplex filtering in AC input to eliminate the utility interference, meeting the requirement for default AC status.
- Two operation modes: A and D
  - A) Type A: When AC mains power is normal, unit operates on AC mode. In case AC mains power is abnormal, unit transfer to inverter mode.
  - B) Type D: When DC mains power is normal, unit operates on inverter mode. In case DC mains power is abnormal, unit transfer to AC mode.
- Multi-function LED indicators and LCD interface and buzzer alarms.
- 3 dry contact provided for alarm of DC input undervoltage, AC input fault,

equipment faulting.

- Standard RS232 communication port: the unit can be controlled and managed by the monitoring software.
- Connect external SNMP card to transmit the data between the unit and PC.

2.3 Specification and Technical Data

2.3.1 Technical Data

Rating		500VA	1000VA	1500VA	2000VA	3000VA	4000VA	5000VA	4000VA	5000VA
Rated DC Input Voltage		48V/110V/220V					110V/220V		48V	
DC Operating Range		48V/110V/220V -18% ～ 48V/110V/220V +25%								
Input Reflected Noise		Input voltage and load current rated: less than 10%								
AC Input Voltage		230V-25% ～ 230V+20%								
Input Frequency		50Hz±10%								
AC Output Voltage		230V±2%								
Output Frequency		50Hz±0.1%								
Rated Output Current		1.7A	3.5A	5.2A	7.0A	10.4A	13.9	17.4	13.9	15.2
Power Factor		0.8								0.7
THD		≤3%								
Transient Response		Load from 0 to 100%，less than 30ms								
Bypass Transfer Time		＜5ms								
Overload		AC mode：120%/3min， 150%/30sec INVERTER mode：120%/30sec， 150%/10sec								
Efficiency		＞88%								
Protection		Overload – short circuit – overvoltage – undervoltage – thermal								
Interface		LED+LCD								
Communication Port		RS232								
Dry Contact		Yes								
Electric Strength		Conform to EN62040-1-1								
Noise（1m）		≤45dB								
Ambient Temperature（℃）		-10℃ ～ 45℃								
Relative Humidity		0-95% no dew								
Altitude（m）		＜1500								
Rack	W×H×D（mm）	482×88×250			482×88×330				516×88×320	
	Weight（Kg）	5.7	6.2	6.5	9	9.9	12.5	13.5	13.5	14.7
Tower	W×H×D（mm）	158.5×214.2×461			183.5×293×506		183.5×293×570			
	Weight（Kg）	7.6	8	8.3	12	12.9	14	15	14	15

2.3.2 DC input voltage and operate range

Rated voltage	12V	24V	48V	110V	220V
Power ON voltage	10.5～14.8	21～29.5	42～59.5	96～136	192～272
DC operated range	10～14.8	20～29.5	40～59.5	91.5～136	183～272
Low warning voltage	11	22	44	101	202

Notes：

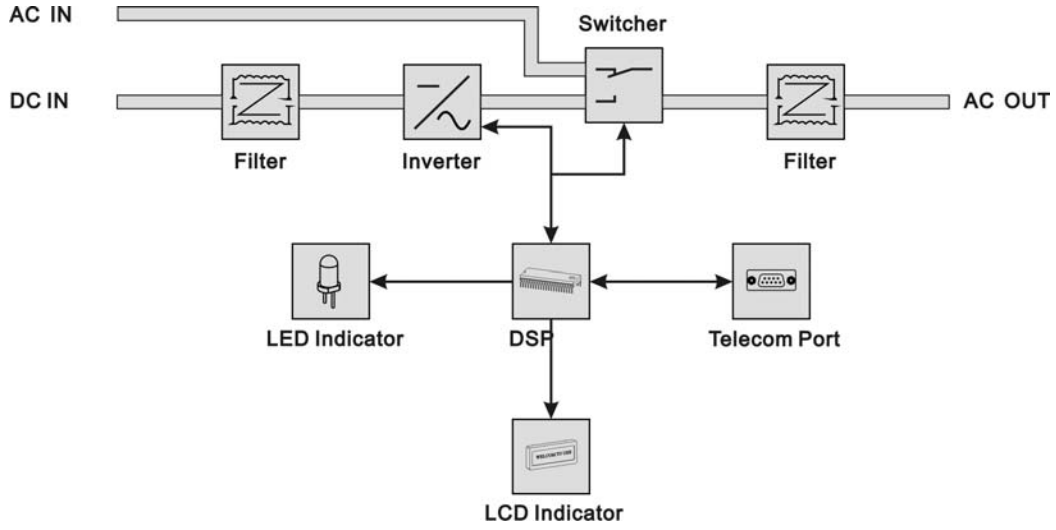
1. To protect battery， TP600 only powered ON as battery voltage in DC operated range.
2. When battery voltage is lower to the level of warning point then audible alarm is start up. In case the battery voltage is lower than the limit, unit will shut down.

3.Principle of Design

3.1 Block Diagram

Note：TP600 based on PWM+SPWM high frequency technology with DSP as control. It is ideal form of protection for all important data processing and telecommunication applications.

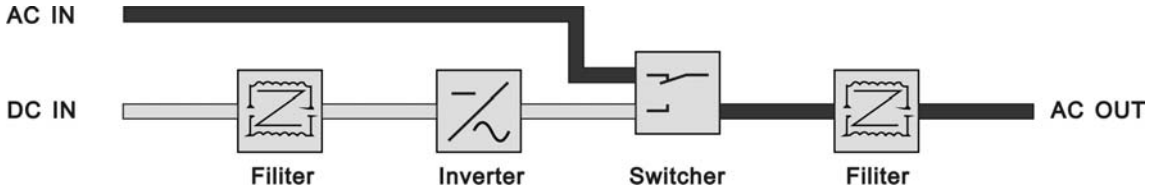
Block Diagram



3.2 Operation Mode

3.2.1 AC mode

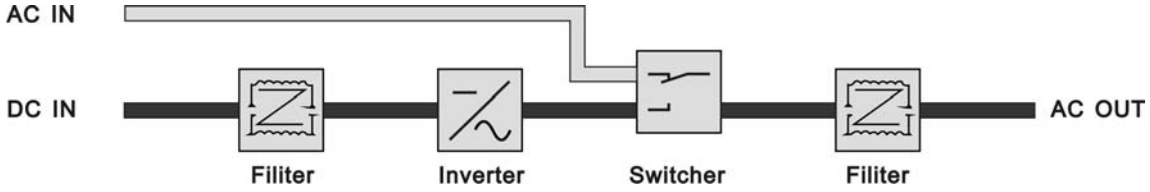
That is A operation mode: When mains power is normal, TP600 works in mains mode or inverter mode in case mains is failure.



3.2.2 DC mode

That is D operation mode: In ， inverter works all the time in the event of DC failure, unit transfers to

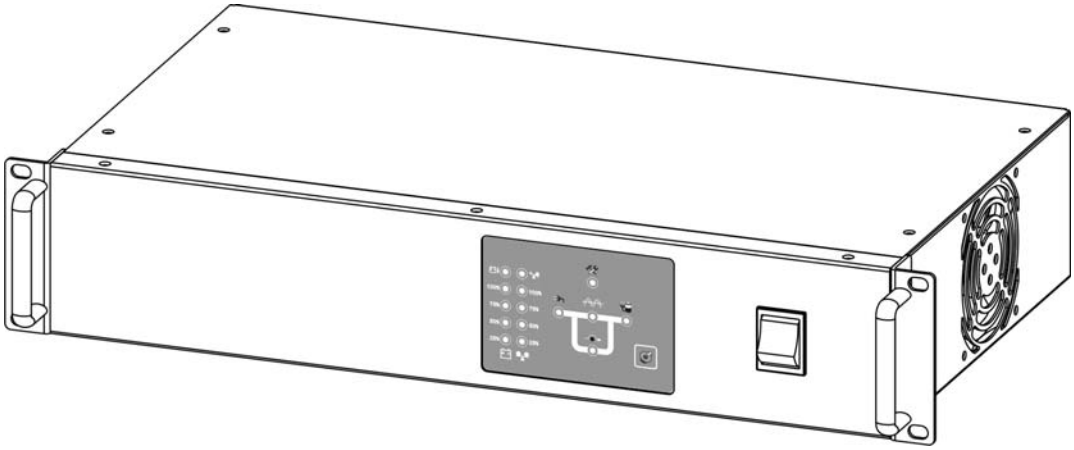
bypass mode.



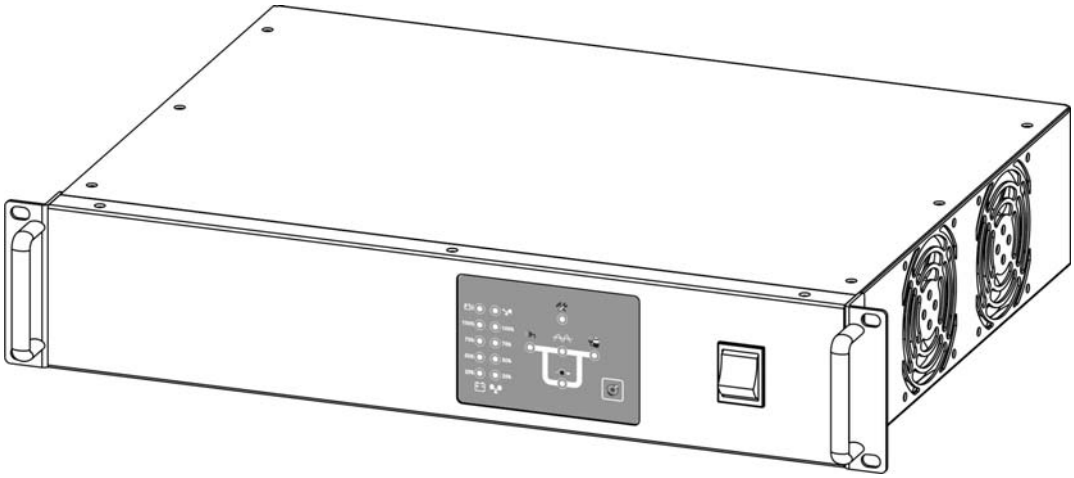
3.3 Outline and LED Indicators

3.3.1 Outline

Rack standard model

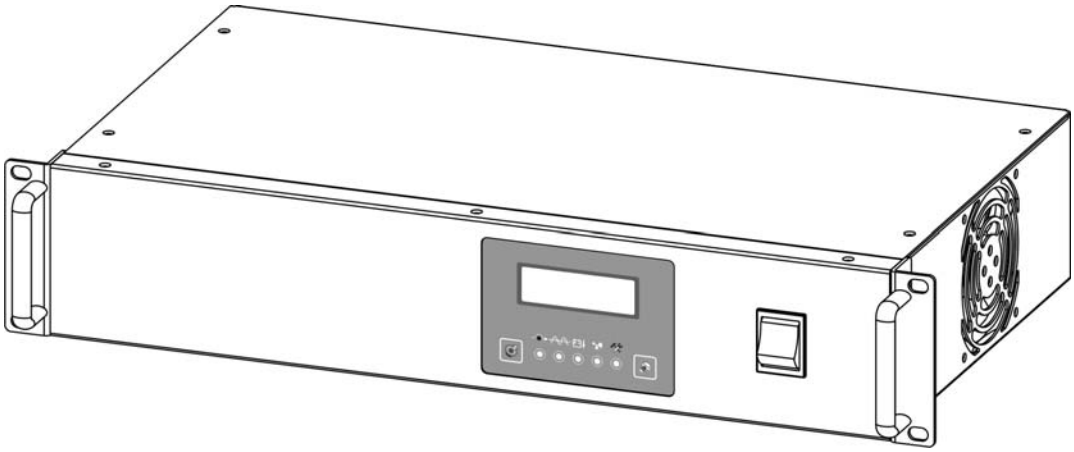


0.5~1.5KVA

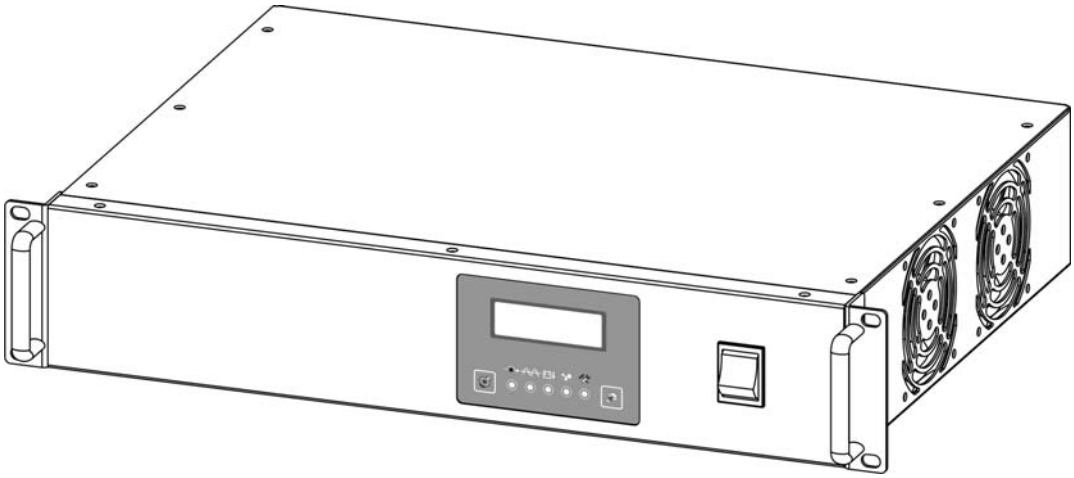


2~5KVA

Rack professional model

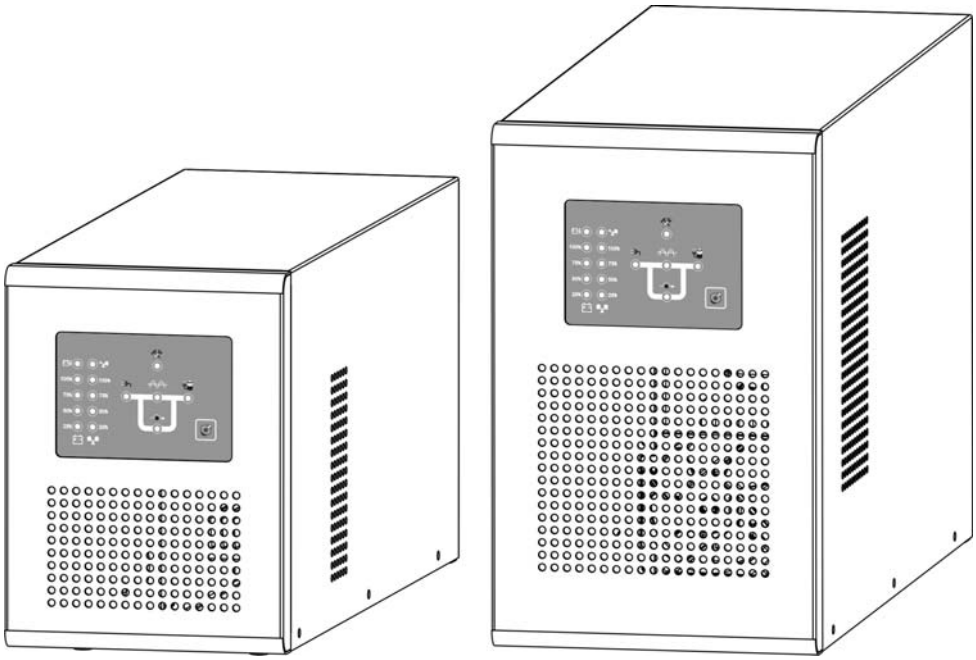


0.5~1.5KVA



2~5KVA

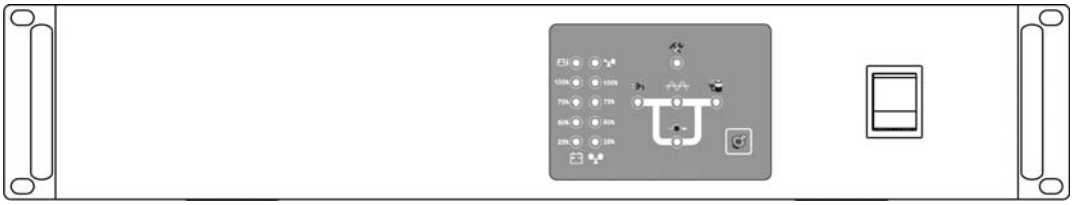
Tower model



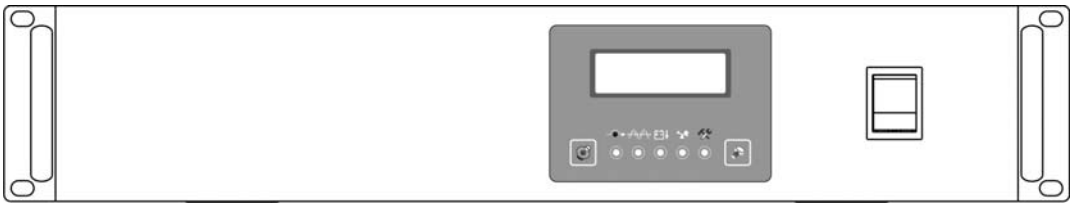
0.5~1.5KVA **2~3KVA**

3.3.2 Front panel

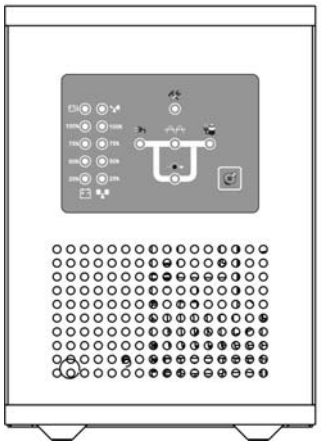
Rack standard model

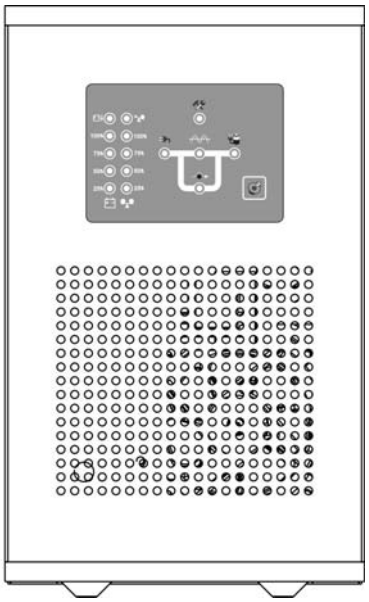


Rack professional model



Tower model

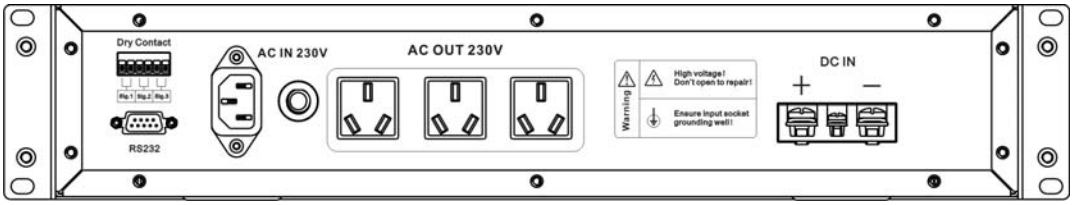




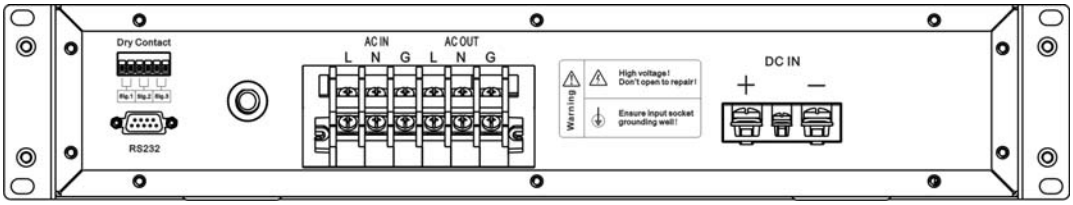
0.5~1.5KVA **2~3KVA**

3.3.3 Rear panel

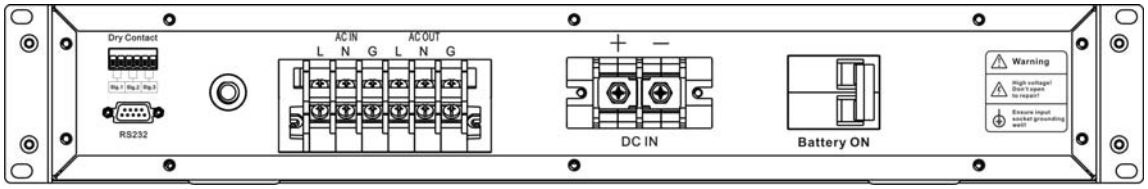
Rack standard model



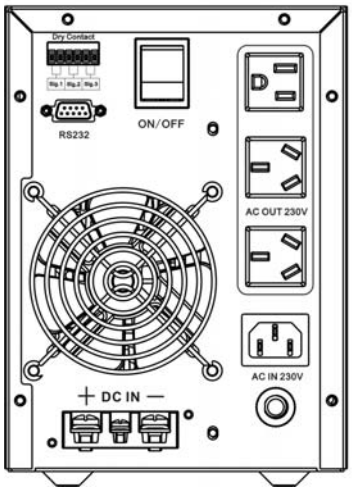
Rack simplified model



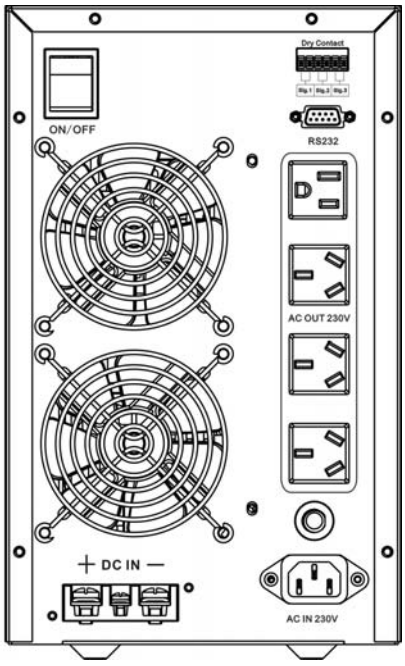
Rack simplified model 4~5KVA 48V



Tower model

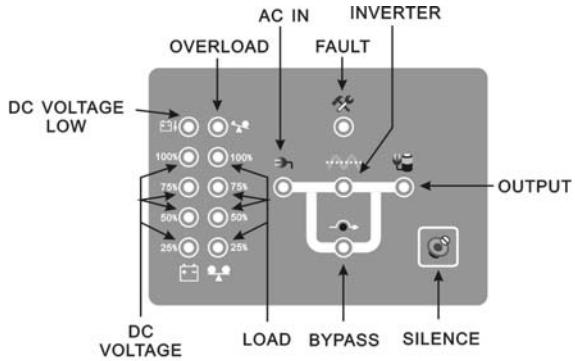


0.5~1.5KVA

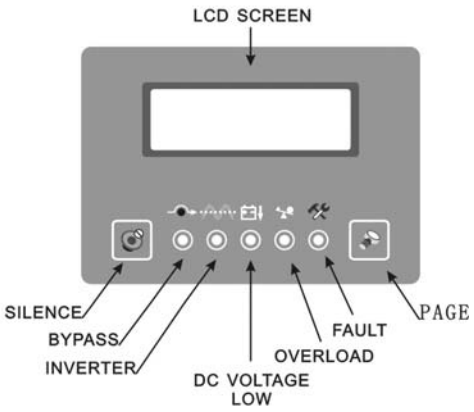


2~3KVA

3.3.4 LED indicators



Standard model



Professional model

4.Installation

4.1 Preparation

★ *Only a technician is permitted to install the unit.*

4.1.1 Tool, Information

Multi-meter、tool box、user manual、cable

4.1.2 Ambient Condition

Environment requirements:

- Working temperature：0-40℃
- Storage temperature：-40-70℃
- Relative Humidity：0%-95%，no dew
- Cooling：nature
- Altitude：1500m, meet derating requirements in GB3859.2-93
- Vertical angle：No vibration and hading angle less than 5 degree
- Pollution：Class II

Working temperature of 20~25□ and Humidity of 50% are recommended.

Caution

The INVERTER must be installed in a location with good ventilation, far away from water, inflammable gas and corrosive agent.

4.1.3 Connect the Cable

AC input power cord：Tower and Rack Standard model use the cord prepared by manufacture, but user should prepare the cord for Rack Simplified model and terminal block is installed on rear panel.

Recommended size of cable：

Rating	Diameter of cable
500VA	0.75mm^2
1000VA	1mm^2
1500VA	1.5mm^2
2000VA/3000VA	2.5mm^2
4000VA/5000VA	4 mm^2

AC output cord：Choose by user

DC input cord：Recommended size of cable：

Rating	Diameter of Cable		
	48V	110V	220V
500VA	2.5 mm^2	1mm^2	0. 5mm^2
1000VA	4 mm^2	1.5 mm^2	1mm^2
1500VA	6 mm^2	2.5 mm^2	1.5mm^2
2000VA	10 mm^2	4 mm^2	2.5mm^2
3000VA	16 mm^2	6mm^2	2.5mm^2
4000VA/5000VA	25 mm^2	10mm^2	4 mm^2

4.1.4 Inspection

Unit should be saved on the right environment and the term for preserving is less than 3months.

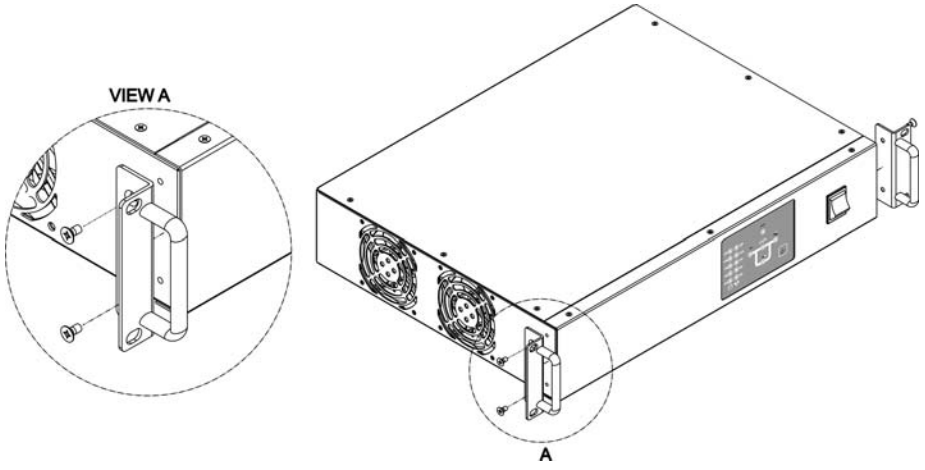
Before installation, unit should be placed on the spot. Unpack the package and check the package contents. Keep all spare part and accessories for future use.

4.2 Installation

4.2.1 Rack model

1. Install handle

Take out two L brackets and handles from packing bag and use M4 to fix them on the left and right sides of unit. Figure as below:



2. Place the unit

Put the unit on the right location of 19inch rack(Caution：Additional support must be added as bottom！). Try to push the unit from the front and side to see it moves; and repeat the above actions until it is firmly secured..

3. Cable Connection

1）Connect DC input cable

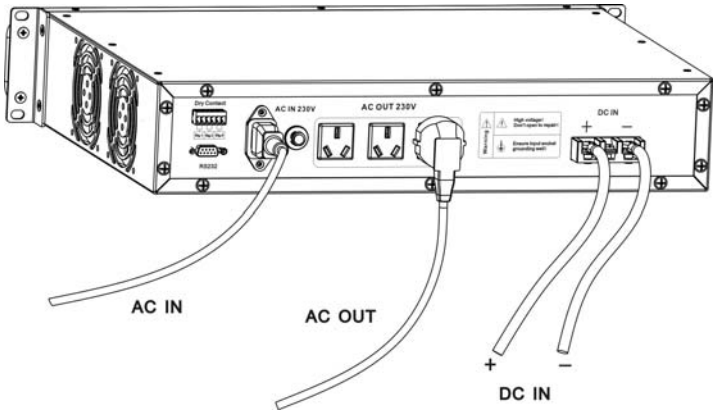
Following battery polarity guide marked on rear panel! Place the battery cable over TP600's DC terminal.

For the user operation safety, cut off the power when install the unit!

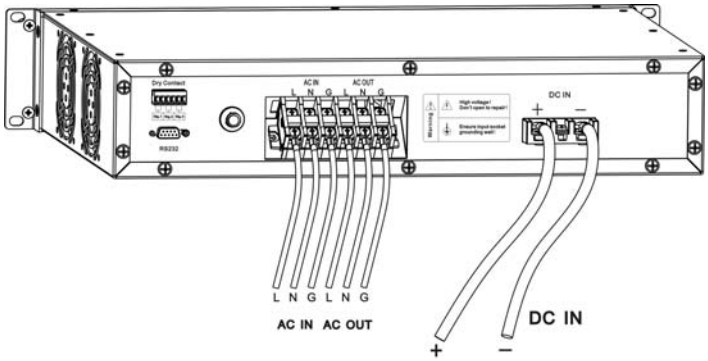
2）Connect AC input and output

Use right cable according to different terminal of rear panel.

For Standard model: take out the cable in accessories, plug the cable into the socket of rear panel showed as follow figure:



For Simplified model: use terminal block and notice LINE , NETURAL and polarity：



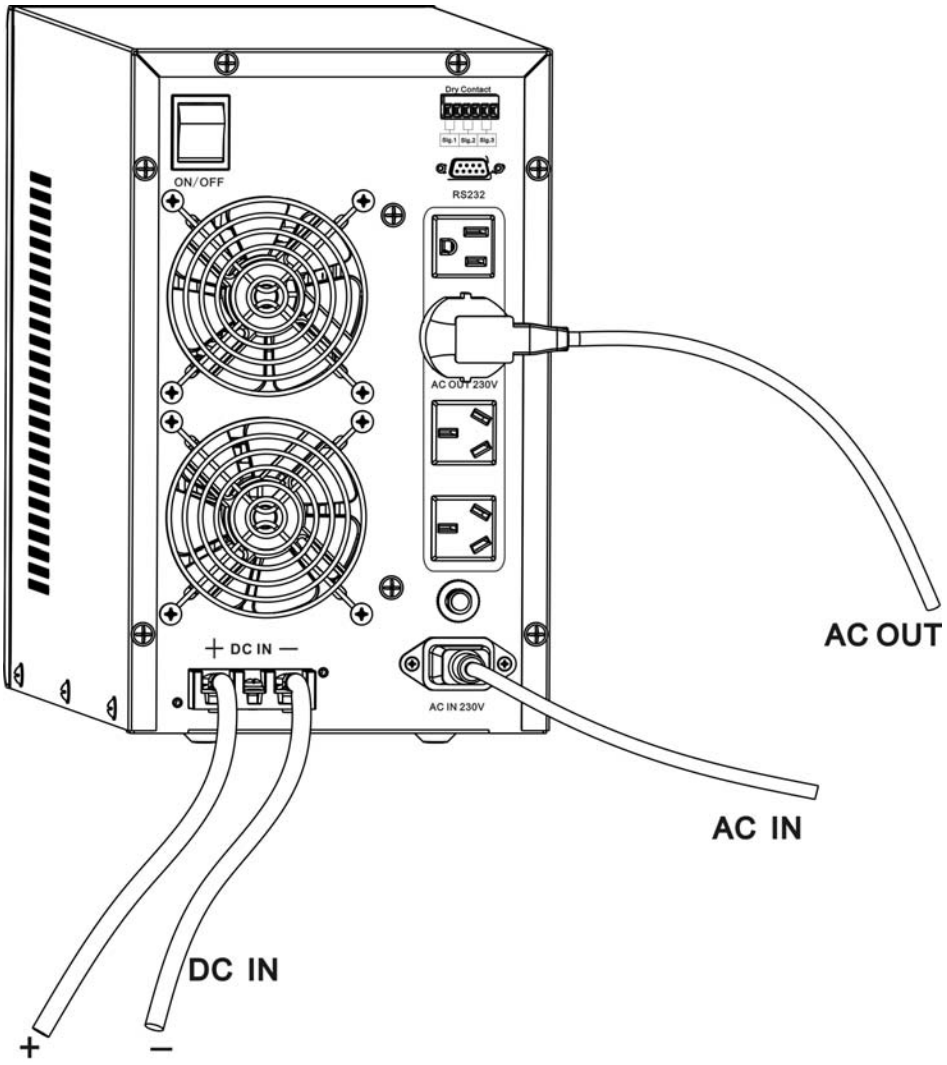
4.2.2 Tower model

1. Fix up

Install the unit in any protected environment that provided adequate airflow around the unit, and is free from water. Also, place the unit away from the object at least 20cm around the unit.

2. Cable Connection

Refer to Rack Standard Model. Figure as below：



5.Operation

5.1 Power ON/OFF

5.1.1 First power ON

- Make sure the DC input voltage is according to the symbol on rear panel. Or, DO NOT turn on and unit would be damaged. Consult from manufacture to confirmation.
- Inspect the polarity is correct，or unit can not power ON.
- Inspect AC input and output is correct, make sure unit is not short-circuited.
- Verify above mentioned, open DC and AC power.
- Press power ON button:
  - All LEDs illuminate in turn and unit will perform self-diagnosis.
  - Unit is already running in normal mode

5.1.2 General operation

- Only press ON/OFF button in daily use.
- Power off: load→INVERTER.
- Cut off the DC and AC input power and output load if long-term no use.
- Switch on the unit according to the program of first power on after long-term no use.

5.2 Operation

5.2.1 POWER ON

1． Make sure the DC input and AC output connect is correct；

2． Turn on the unit，unit beeps one time and perform self-diagnosis. 。

note：ON/OFF button located on rear panel for Tower model.

Self-diagnosis status: before output is steady, it takes 10ms for DSP to monitor the system operation. When the systems is in abnormal condition or other

protection mode like Over Current Protection, Over Voltage Protection, Over Power Protection, and Over Temperature Protection, or the component is failure, the DSP will take action to remain its safety. In the mean time, the DSP will show an Error Code on the display. Otherwise, if all parameters are normal, unit will run the normal mode.

5.2.2 Shutdown

Press ON/OFF button and inverter LED is winked.

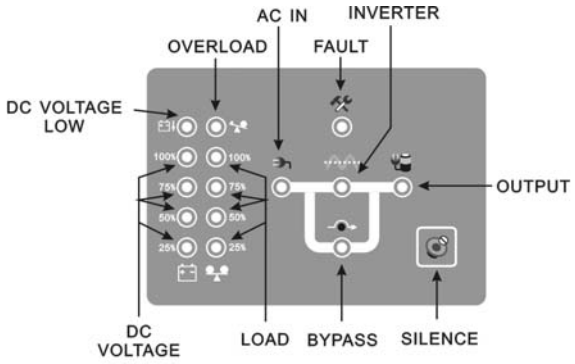
5.2.3 Inaudible

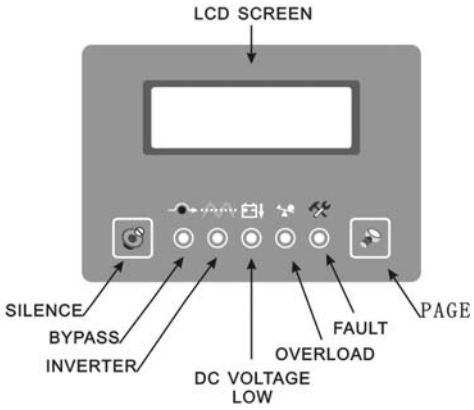
In case trouble is shooting during INVERTER is running, unit will alarm with beep and alarm LED will light. Press inaudible button to be inaudible.

Press the button continuously for 3sec to turn off the alarm. Alarm will be turned on after press for 3sec again. The original alarm will not beep automatically after inaudible unless other alarm is occurred.

6.Operation Mode and Status Display

6.1 LED Indicator and Button Definition

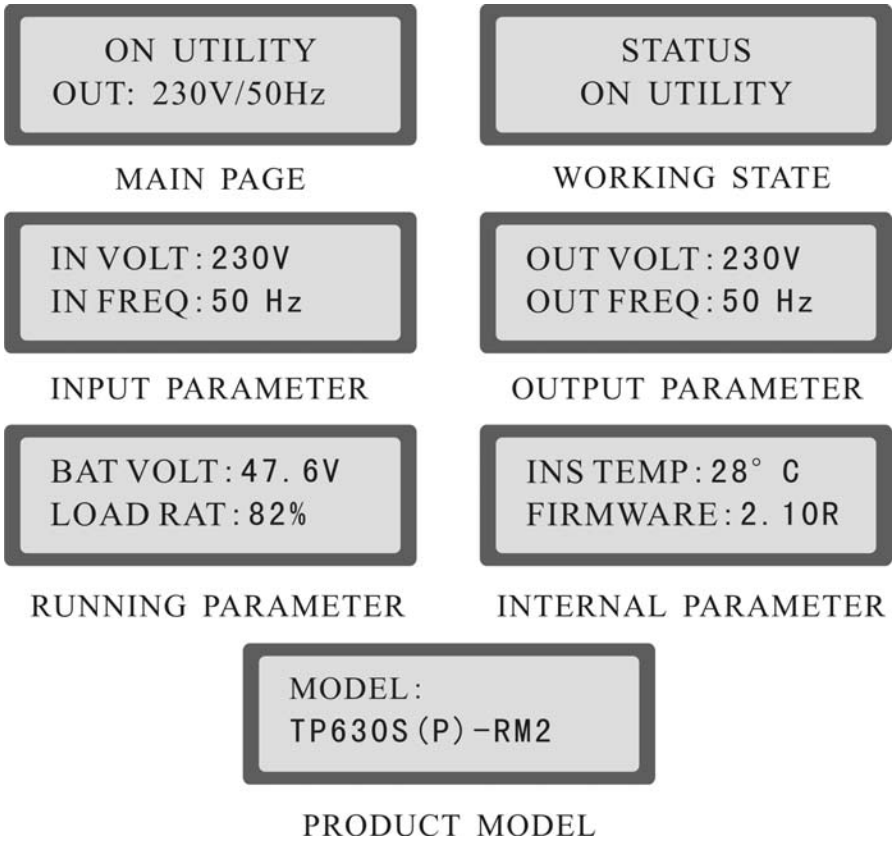




LED/Button	Symbol	Qty	Color	Status
Inaudible		1		Press continually for 3sec to turn ON INAUDIBLE
Turn page		1		Change one status interface by pressing once
Mains power		1	Green	It illuminates when the mains input is normal, flashed when abnormal and goes off when it fails
Inverter		1	Blue	It illuminates when inverter is normal operation
Bypass		1	Green	It illuminates when unit is on bypass mode
Output		1	Green	Output is normal
DC voltage		4	Green	≤25%，≤50%，≤75%，≤100%
Load capacity		4	Green	≤25%，≤50%，≤75%，≤100%
DC low		1	Yellow	It illuminates when DC voltage is lower than limit
Overload		1	Yellow	It illuminates when load > 100%
Troubleshooting		1	Red	It is on in the event of INVERTER faulty

6.2 LCD Interface

There are 7 interfaces indicated on LCD: Home page, Working status, Input parameter, Output parameter, running parameter, Parameter inside of unit, Model name. Press Turn page button to change the interface. Home page will be hold in long time no changing interface：



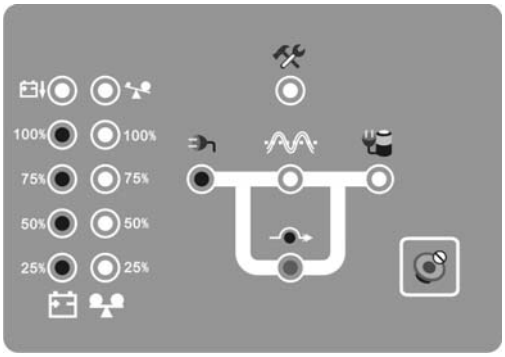
6.3 Work status

●illuminate，◎dim，●flash

6.3.1 Standard model

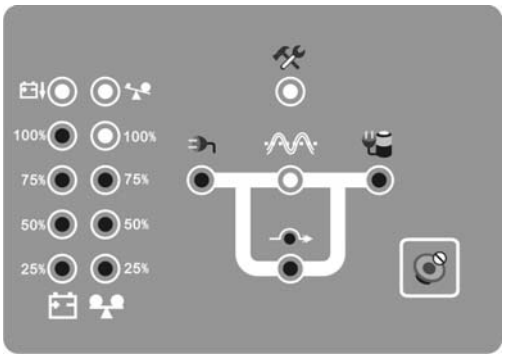
6.3.1.1 Standby mode

In case AC mains input is normal without turning on the unit, the LED indicator of mains power is illuminating, LED indicator of bypass is flashing, and LED indicator of DC shows the capacity.



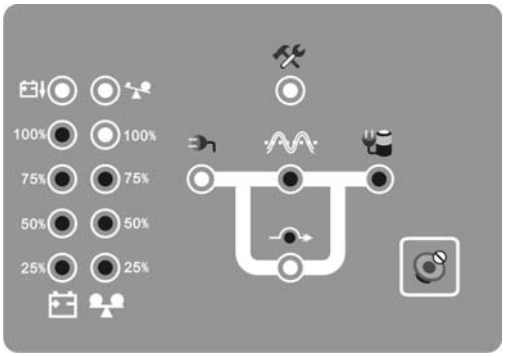
6.3.1.2 AC mode

Mains power LED, bypass LED and output LED are illuminating; DC voltage/load show battery capacity and load proportion



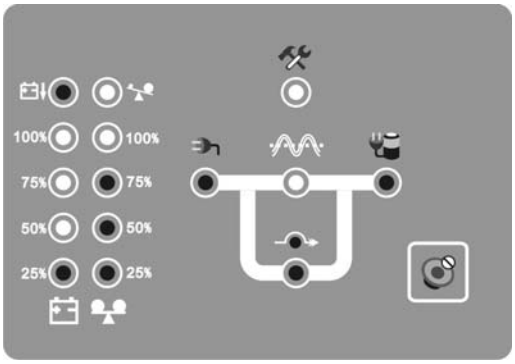
6.3.1.3 Inverter mode

Inverter LED and output LED are illuminating; DC voltage/load show battery capacity and load proportion

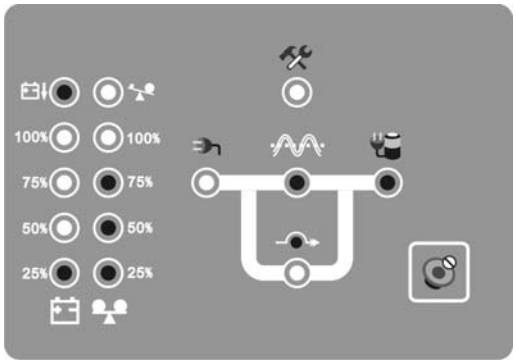


6.3.1.4 DC low

Output LED and DC low LED are illuminating; DC voltage/load show battery capacity and load proportion



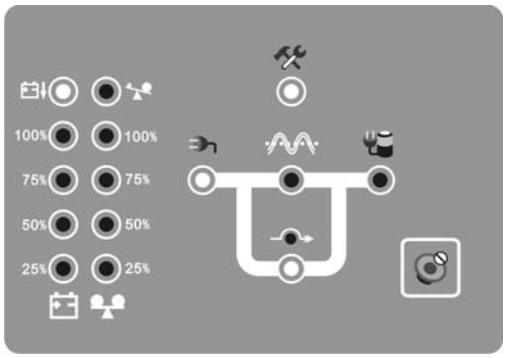
AC mode



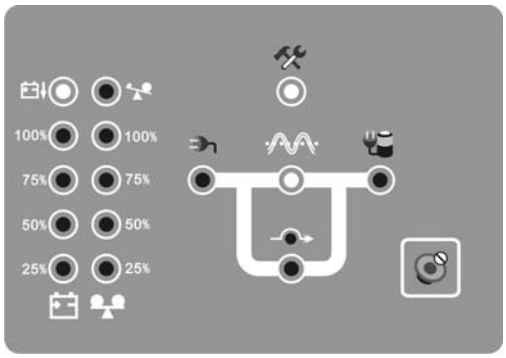
Inverter mode

6.3.1.5 Overload

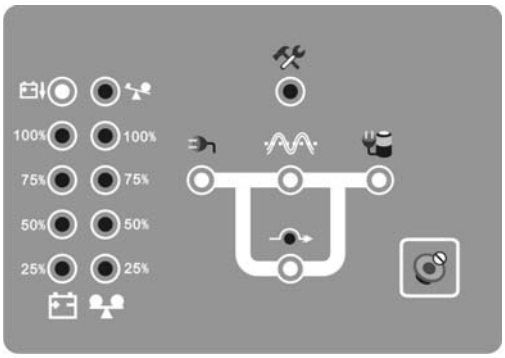
Overload LED is illuminating，in case lighting overload, buzzer beeps once every 2s with normal output. Otherwise, buzzer continually beep without output because of heavy overload and troubleshoot LED is illuminating.



Overload on inverter mode



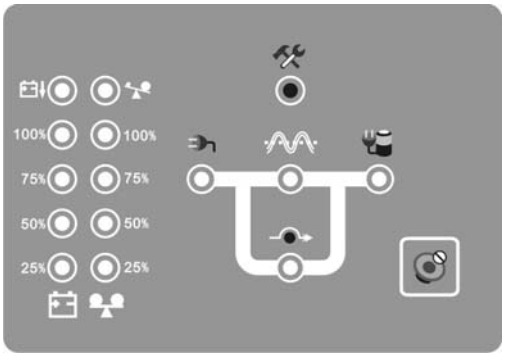
Overload on AC mode



Shutdown via overload

6.3.1.6 Troubleshooting

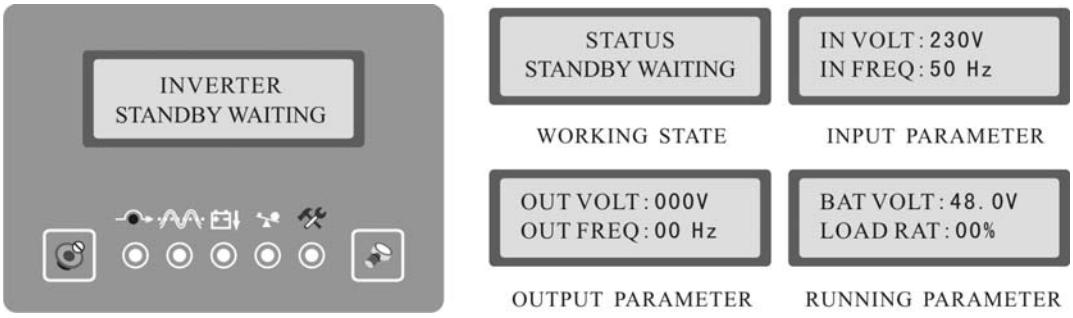
Troubleshoot LED is illuminating，detailed refer to 7.1



6.3.2 Professional model

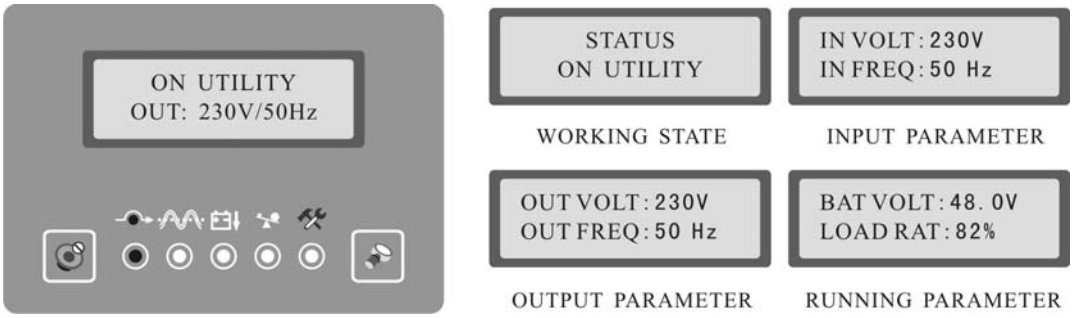
6.3.2.1 Standby mode

In case AC mains input is normal without turning on the unit, the LED indicator of mains power is illuminating, LED indicator of bypass is flashing, press Turn page button to check the parameter.



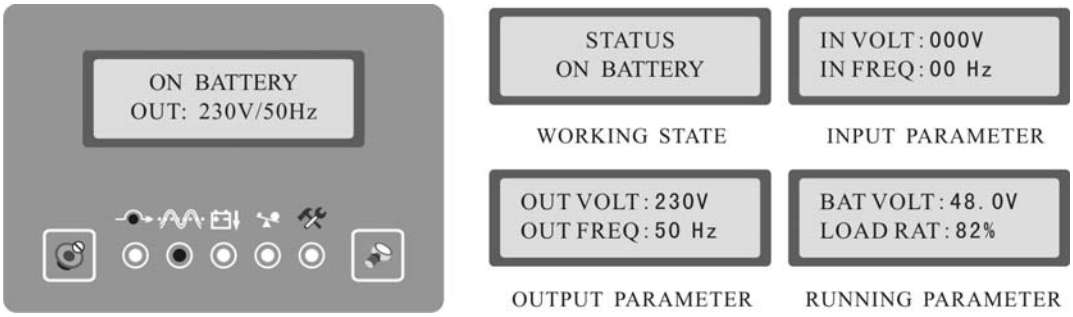
6.3.2.2 AC mode

Bypass LED is illuminating, press Turn page button to check the parameter.



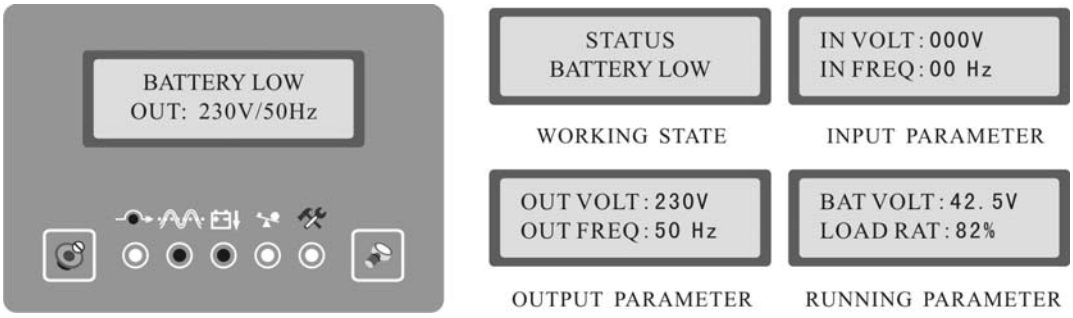
6.3.2.3 Inverter mode

Inverter LED is illuminating, press Turn page button to check the parameter.

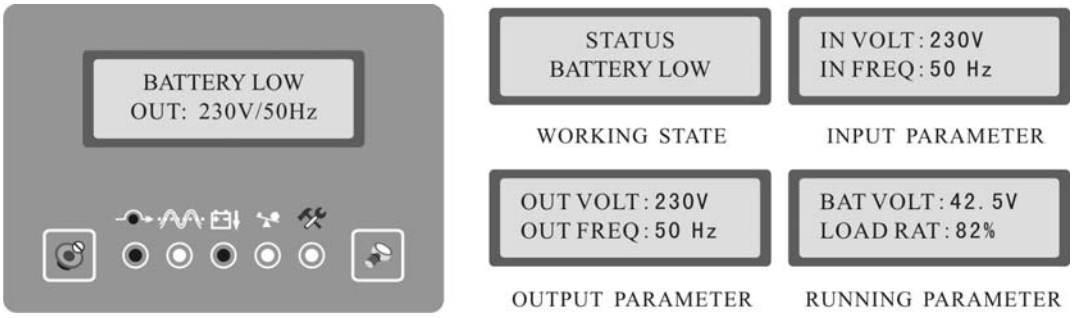


6.3.2.4 DC low

Output LED and DC low LED are illuminating; DC voltage/load show battery capacity and load proportion



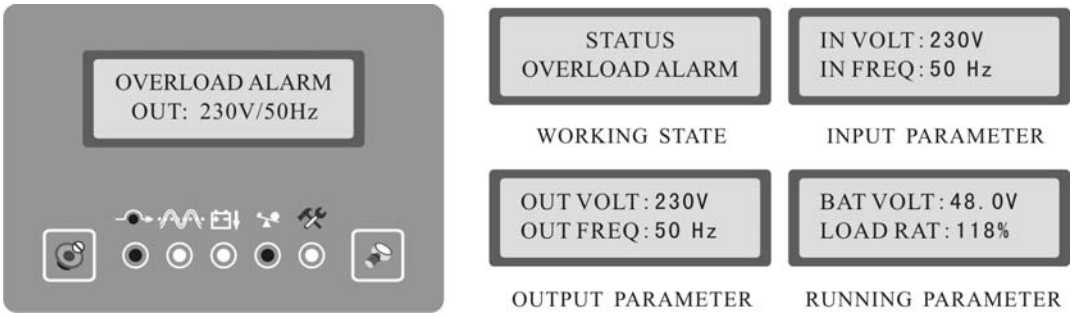
DC low in Inverter mode



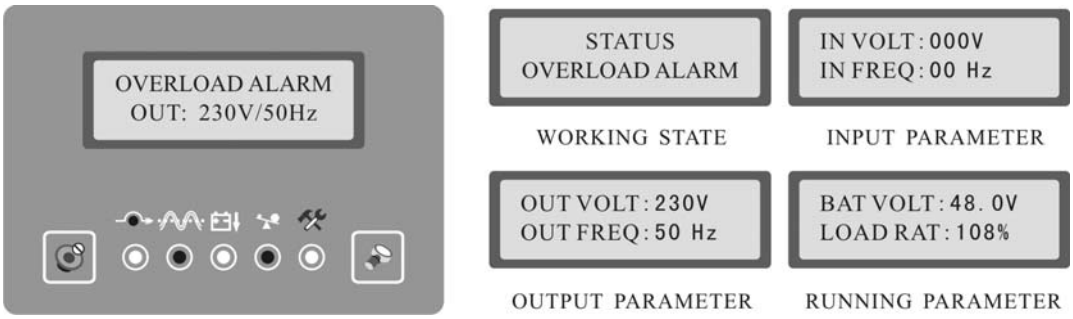
DC low in AC mode

6.3.2.5 Overload

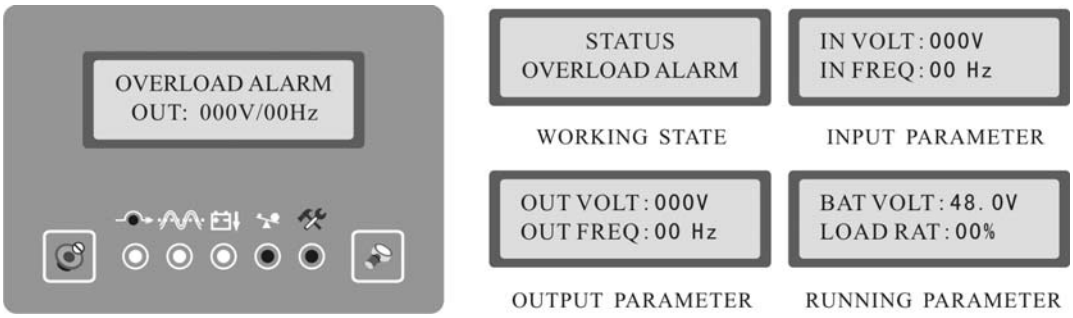
Overload LED is illuminating，in case lighting overload, buzzer beeps once every 2s with normal output. Otherwise, buzzer continually beep without output because of heavy overload and troubleshoot LED is illuminating.



Overload in AC mode



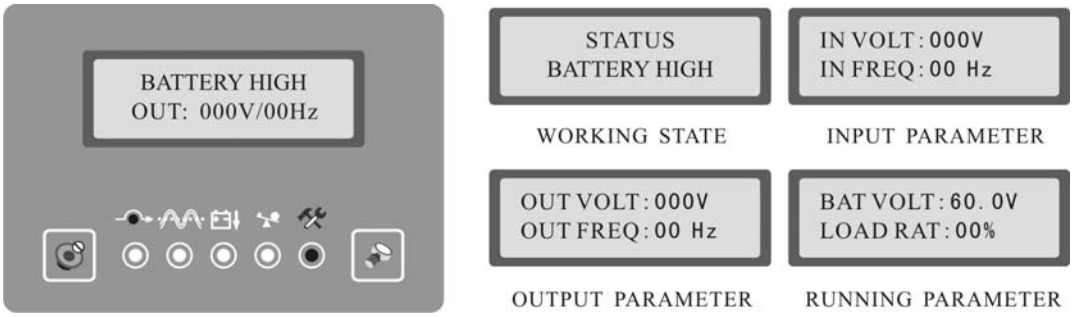
Overload in Inverter mode



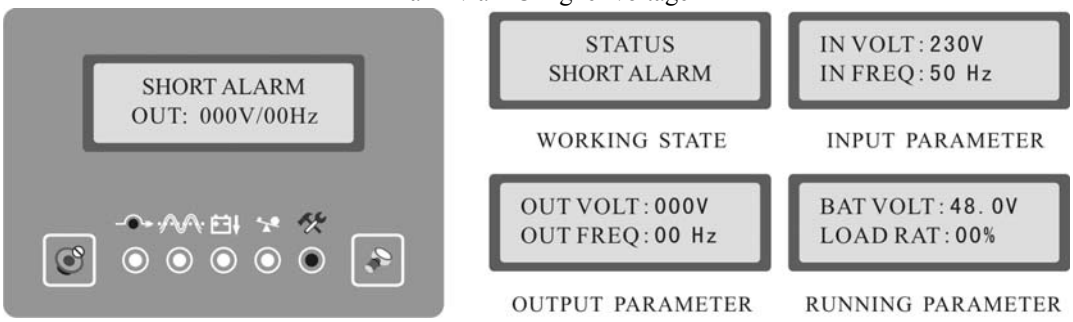
Overload Shutdown

6.3.2.6 Troubleshooting

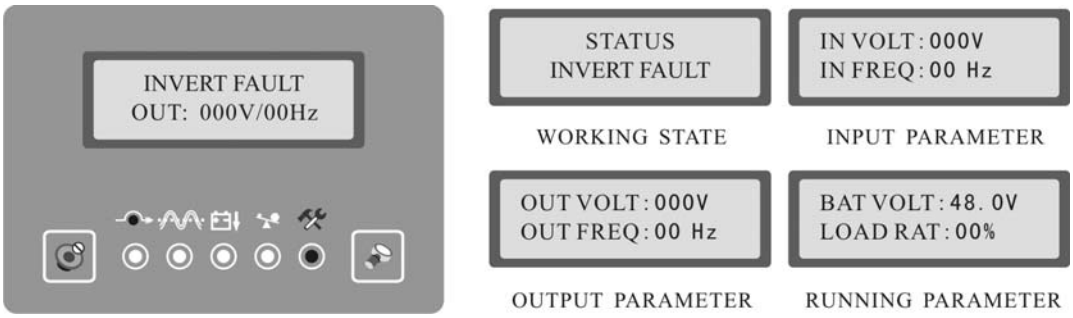
Troubleshoot LED is illuminating: Shutdown due to overload, DC power on (DC higher voltage), DC power on (inverter faulty), Shutdown due to short-circuited, overheating. See table 7.1



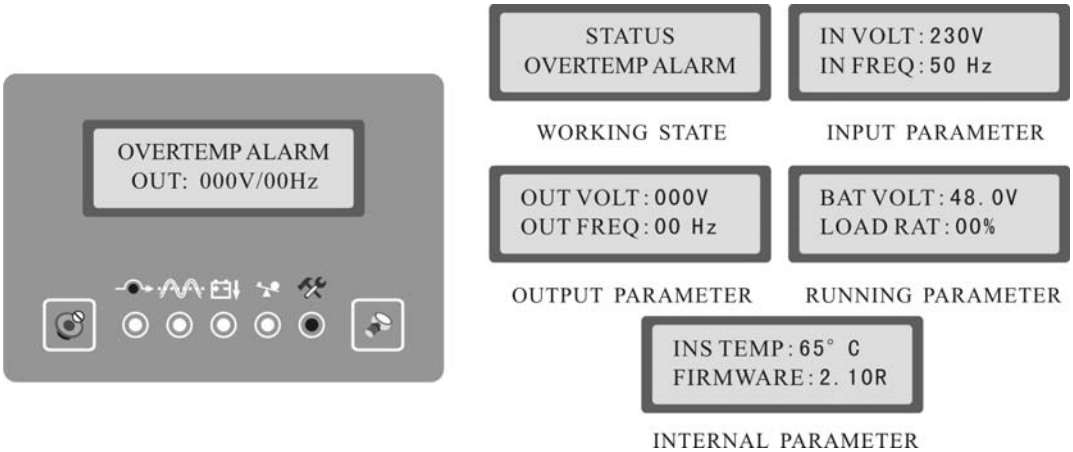
Alarm via DC higher voltage



Alarm due to short-circuit



Alarm via inverter faulty



Alarm due to Overheating

7.Alarm、Remote Control

7.1 Alarm signal and Error code description

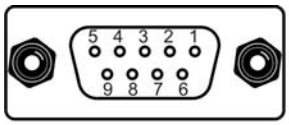
Trouble Level	Trouble Description	LED indicator							Error code	Beep	Output status
		Mains input	Bypass	Inverter	Trouble shoot	Output	DC lower	Overload			
N/A	AC mode (AC and DC are normal)	●	¤	◎	◎	◎	◎	◎	N/A	N/A	NO o/p
N/A	AC mode(DC is normal)	●	●	◎	◎	●	◎	◎	N/A	N/A	normal
N/A	DC mode(DC is normal)	×	◎	●	◎	●	◎	◎	N/A	N/A	normal
Note	Standby mode on AC mode(with AC and DC lower voltage)	●	¤	◎	◎	◎	●	◎	N/A	N/A	NO o/p
Caution	DC power ON (DC voltage is lower than limit)	×	◎	●	◎	●	●	◎	N/A	Once/5s	normal
Caution	AC power ON (DC voltage is lower than limit)	●	●	◎	◎	●	●	◎	N/A	Once/5s	normal
Warning	Standby mode on AC mode(with AC and DC higher voltage)	●	¤	◎	¤	◎	◎	◎	N/A	Once/1s	normal
Warning	AC power ON (DC voltage is higher than limit)	●	●	◎	¤	●	◎	◎	N/A	Once/1s	normal
Warning	AC power ON (overload)	●	●	◎	◎	●	◎	●	N/A	Once/2s	normal
Warning	DC power ON (overload)	×	◎	●	◎	●	◎	●	N/A	Once/2s	normal
Troubleshoot	DC power ON (DC voltage is higher than limit)	×	◎	◎	●	◎	◎	◎	40	Once/1s	No o/p
Troubleshoot	DC power ON (inverter faulty 1)	×	●	◎	●	◎	◎	◎	00	Beep continually	NO o/p
Troubleshoot	DC power ON (inverter faulty 2)	×	●	◎	●	◎	◎	◎	01	Beep continually	NO o/p
Troubleshoot	Shutdown via overload	×	◎	◎	●	◎	◎	●	04	Beep continually	NO o/p
Troubleshoot	Shutdown via short-circuit	×	◎	◎	●	◎	◎	◎	44	Beep continually	NO o/p
Troubleshoot	Overheating	×	◎	◎	●	◎	◎	◎	41	Beep continually	NO o/p

Note	
●	Illuminating
◎	Dim
¤	Flash

×	Uncertainty , via the status of mains power, DC voltage and rated load. Herein, Error Code showed by Capacity and load LEDs, for example: 41=4capacity LEDs+1load LED
Trouble Level	Trouble Level: five class
	1. N/A ----- normal
	2. Note ----- abnormal but no influence for the operation, unnecessary to take action
	3. Caution ----- abnormal and influence the operation of inverter, must be solved
	4. Warning----- abnormal and dangerous, to avoid inverter faulty, must be solved immediately
	5. Trouble ----- trouble is shooting and inverter does not operate, must be solved immediately

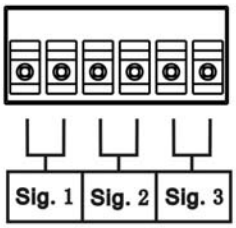
7.2 Remote control and Alarm

7.2.1 Communication port



2pin——RS232 TX
3pin——RS232 RX
5pin——RS232 GND

RS232



Sig.1: AC Fault
Sig.2: Battery Low
Sig.3: Inverter Fault

Dry contact

Dry contact signal: The inverter provides 3 dry contacts (normal open) for alarm with the capacity of 220V and 0.5A

7.3 Troubleshooting

Condition	Possible Cause	Action
1. Unit does not operation after the power switch is ON.	1. DC/AC cable is not connected 2. DC polarity is wrong 3. DC/AC power on voltage is out of range	Correct the connection of DC/AC cable and adjust the voltage range.
2. Alarm LED is illuminating when unit operates normally, the Error Code is 44 without output		
3. AC mode, buzzer beeps once every 5s, the LED of DC low is illuminating but output is normal	DC input is abnormal, voltage is lower than limit	Adjust the DC voltage
4. AC mode, buzzer beeps once every 1s, the LED of Troubleshooting is flashing but output is normal	DC input is abnormal, voltage is higher than limit	Dangerous higher voltage would damage inverter, turn off the unit and check the DC voltage.
5. DC mode, buzzer beeps once every 5s, the LED of DC low is illuminating but output is normal	DC input is abnormal, voltage is lower than limit	Adjust the DC voltage
6. Inverter mode, buzzer beeps once every 1s, the LED of Troubleshooting is illuminating without normal	DC input is abnormal, voltage is higher than limit	Dangerous higher voltage would damage inverter, turn off the unit and check the DC voltage.