USER MANUAL

FOR

MU10KXS/MU10KXL/MU20KXS/MU20KXL

MU30KXS/MU30KXL/MU40KXS/MU40KXL/MU60KX

3PH Smart Online double conversion technology UPS

MAGNIZON
GREEN ENERGY

ISO9001:2015 AND ISO14001:2015 COMPANY

Concent

Preface

Usage

The manual contains information on installation, use, operation and maintenance of UPS. Please carefully read this manual prior to installation.

Users

Authorized Person

Note

Our company is providing a full range of technical support and service. Customers can contact our local office or customer service center for help.
The manual will update irregularly, due to the product upgrading or other reasons.
Unless otherwise agreed, the manual is only used as guide for users and any statements or information contained in this manual make no warranty expressed or implied.

Safety Precautions

This manual contains information concerning the installation and operation of UPS. Please carefully read this manual prior to installation.
The UPS cannot be put into operation until it is commissioned by engineers approved by the manufacturer (or its agent). Not doing so could result in personnel safety risk, equipment malfunction and invalidation of warranty.

Safety Message Definition

Danger: Serious human injury or even death may be caused, if this requirement is ignored.
Warning: Human injury or equipment damage may be caused, if this is requirement is ignored.
Attention: Equipment damage, loss of data or poor performance may be caused, if this requirement is ignored.
Commissioning Engineer: The engineer who installs or operates the equipment should be well trained in electricity and safety, and familiar with the operation, debug, and maintenance of the equipment.

Warning Label

The warning label indicates the possibility of human injury or equipment damage, and advised the proper step to avoid the danger. In this manual, there are three types of warning labels as below.

Labels	Description
 Danger	Serious human injury or even death may be caused, if this requirement is ignored.
 Warning	Human injury or equipment damage may be caused, if this requirement is ignored.
 Attention	Equipment damage, loss of data or poor performance may be caused, if this requirement is ignored.

Safety Instruction

 Danger	★Performed only by commissioning engineers. ★This UPS is designed for commercial and industrial applications only, and is not intended for any use in life-support devices or system.
 Warning	★Read all the warning labels carefully before operation, and follow the instructions.
	★When the system is running , do not touch the surface with this label, to avoid any hurt of scald.
	★ESD sensitive components inside the UPS, anti-ESD measure should be taken before handling.

Move & Installation

 Danger	★Keep the equipment away from heat source or air outlets. ★In case of fire, use dry powder extinguisher only, any liquid extinguisher can result in electric shock.
 Warning	★Don't start the system if any damage or abnormal parts founded. ★Contacting the UPS with wet material or hands may be subject to electric shock.
 Attention	★Use proper facilities to handle and install the UPS. Shielding shoes, protective clothes and other protective facilities are necessary to avoid injury. ★During positioning, keep the UPS way from shock or vibration. ★Install the UPS in proper environment, more detail in section 2.3.

Debug & Operate

 Danger	★Make sure the grounding cable is well connected before connecting the power cables, the grounding cable and neutral cable must be in accordance with the local and national codes practice. ★Before moving or re-connecting the cables, make sure to cut off all the input power sources, and wait for at least 10 minutes for internal discharge. Use a multi-meter to measure the voltage on terminals and ensure the voltage is lower than 36V before operation.
 Attention	★The earth leakage current of load will be carried by RCCB OR RCD. ★Initial check and inspection should be performed after long time storing of UPS.

Maintenance & Replacement

 Danger	★All the equipment maintenance and servicing procedures involving internal access need special tools and should be carried out only by trained personnel. The components that can be accessed by opening the protective cover with tools cannot be maintenance by user. ★This UPS full complies with "IEC62040-1-1-General and safety requirements for use in operator access area UPS". Dangerous voltages are present within the battery box. However, the risk of contact with these high voltages is minimized for non-service personnel. Since the component with dangerous voltage can only be touched by opening the protective cover with a tool, the possibility of touching high voltage component is minimized. No risk exists to any personnel when operating the equipment in the normal manner, following the recommended operating procedures in this manual.

Battery Safety

 Danger	★All the battery maintenance and servicing procedures involving internal access need special tools or keys and should be carried out only by trained personnel. ★When connected together, the battery terminal voltage will exceed

	400Vdc and is potentially lethal. ★Battery manufacturers supply details of the necessary precautions to be observed when working on, or in the vicinity of a large bank of battery cells. These precautions should be followed implicitly at all times. Particular attention should be paid to the recommendations concerning local environmental conditions and the provision of protective clothing, first aid and fire-fighting facilities. ★Ambient temperature is a major factor in determining the battery capacity and life. The nominal operating temperature of battery is 20℃. Operating above this temperature will reduce the battery life. Periodically change the battery according to the battery user manuals to ensure the back-up time of UPS. ★Replace the batteries only with the same type and the same number, or it may cause explosion or poor performance. ★When connecting the battery, follow the precautions for high-voltage operation before accepting and using the battery, check the appearance of the batteries. If the package is damaged, or the battery terminal is dirty, corroded or rusted or the shell is broken, deformed or has leakage, replace it with new product. Otherwise, battery capacity reduction, electric leakage or fire may be caused. ★Before operating the battery, remove the finger ring, watch, necklace, bracelet and any other metal jewelry. ★Wear rubber gloves. ★Eye protection should be worn to prevent injury from accidental electrical arcs. ★Only use tools (e.g. wrench) with insulated handles. ★The batteries are very heavy. Please handle and lift the battery with proper method to prevent any human injury or damage to the battery terminal. ★Don't decompose, modify or damage the battery. Otherwise, battery short circuit, leakage or even human injury may be caused. ★The battery contains sulfuric acid. In normal operation, all the sulfuric acid is attached to the separation board and plate in the battery. However, when the battery case is broken, the acid will leak from the battery. Therefore, be sure to wear a pair of protective glasses, rubber gloves and skirt when operating the battery. Otherwise, you may become blind if acid enters your eyes and your skin may be damaged by the acid. ★At the end of battery life, the battery may have internal short circuit, drain of electrolytic and erosion of positive/negative plates. If this condition continues, the battery may have temperature out of control, swell or leak. Be sure to replace the battery before these phenomena happen. ★If a battery leaks electrolyte, or is otherwise physically damaged, it must be replaced, stored in a container resistant to sulfuric acid and disposed of in accordance with local regulations. ★If electrolyte comes into contact with the skin, the affected area should be washed immediately with water.

Disposal

 Warning	★Dispose of used battery according to the local instructions.

1 UPS Structure and Introduction

1.1 UPS structure

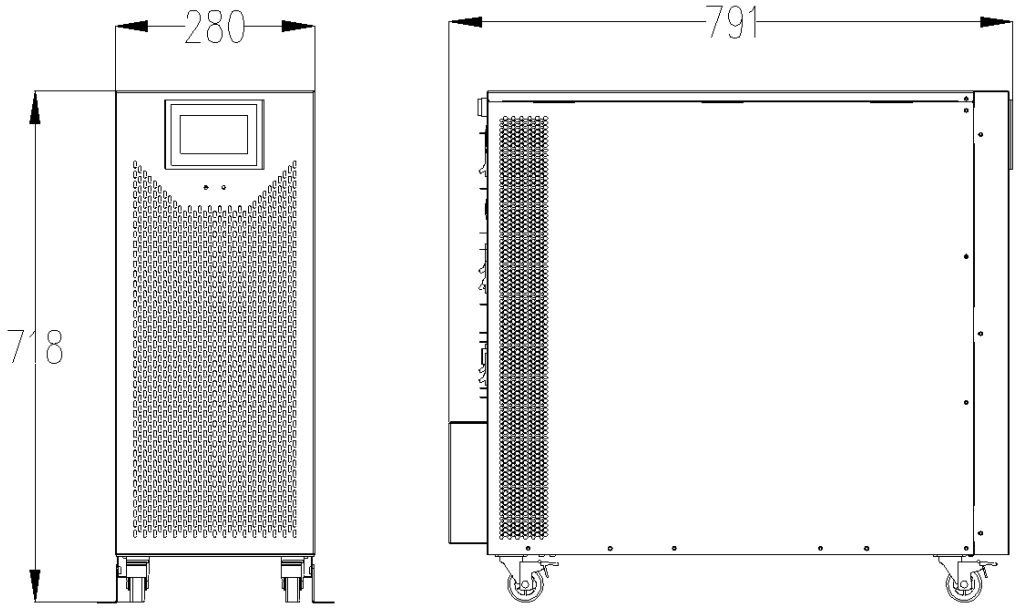
1.1.1 UPS Configuration

The UPS configurations are provided in the table below.

Item	Components	Quantity	Remark
MU10KS-MU40KS	Circuit Breakers	5	Standard
	Dual Input	1	Standard
	Parallel Card	1	Standard
	Dry Contact Card	1	Optional
MU10KS-MU40KXL	Circuit Breakers	4	Standard
	Dual Input	1	Standard
	Parallel Card	1	Standard
	Dry Contact Card	1	Optional
60KXL	Circuit Breakers	4	Standard
	Dual Input	1	Standard
	Parallel Card	1	Standard

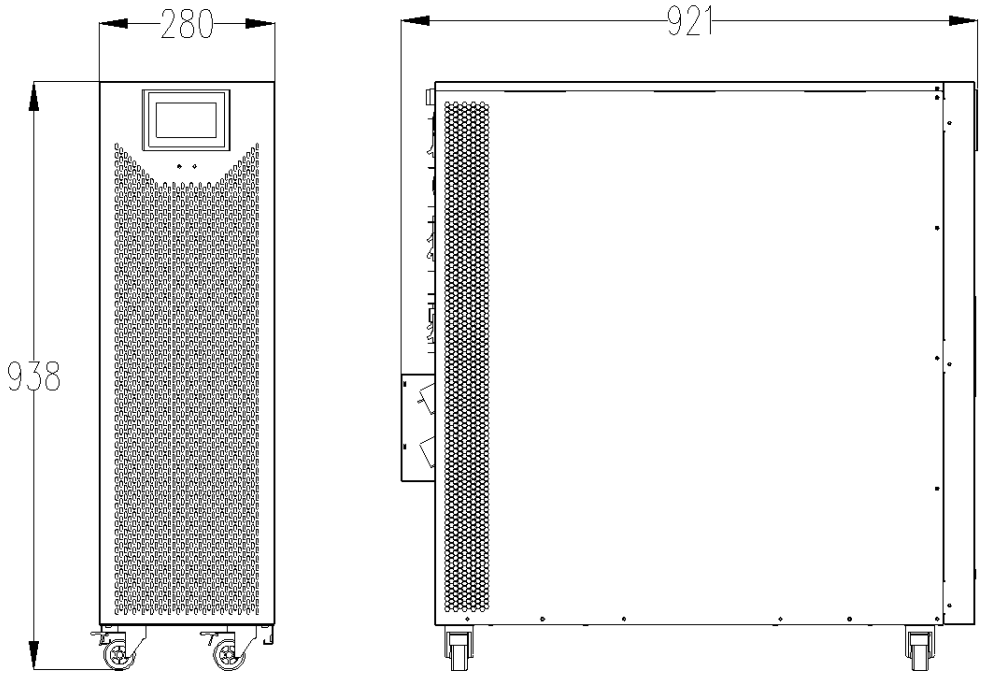
1.1.2 UPS Outlook

(A) Outlook of 10-40kVA UPS with external battery and 10-40kVA UPS with 40 pcs 9Ah batteries



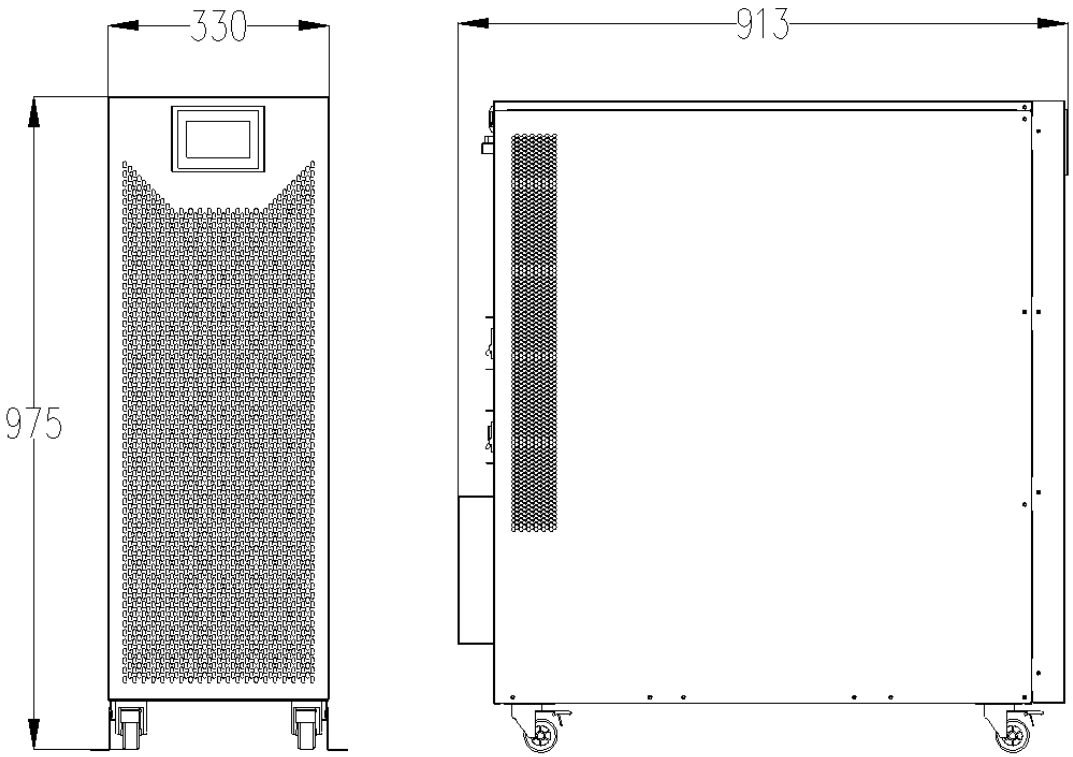
Unit: mm

(B) Outlook of 10-40kVA with internal 80pcs 9Ah batteries



Unit:mm

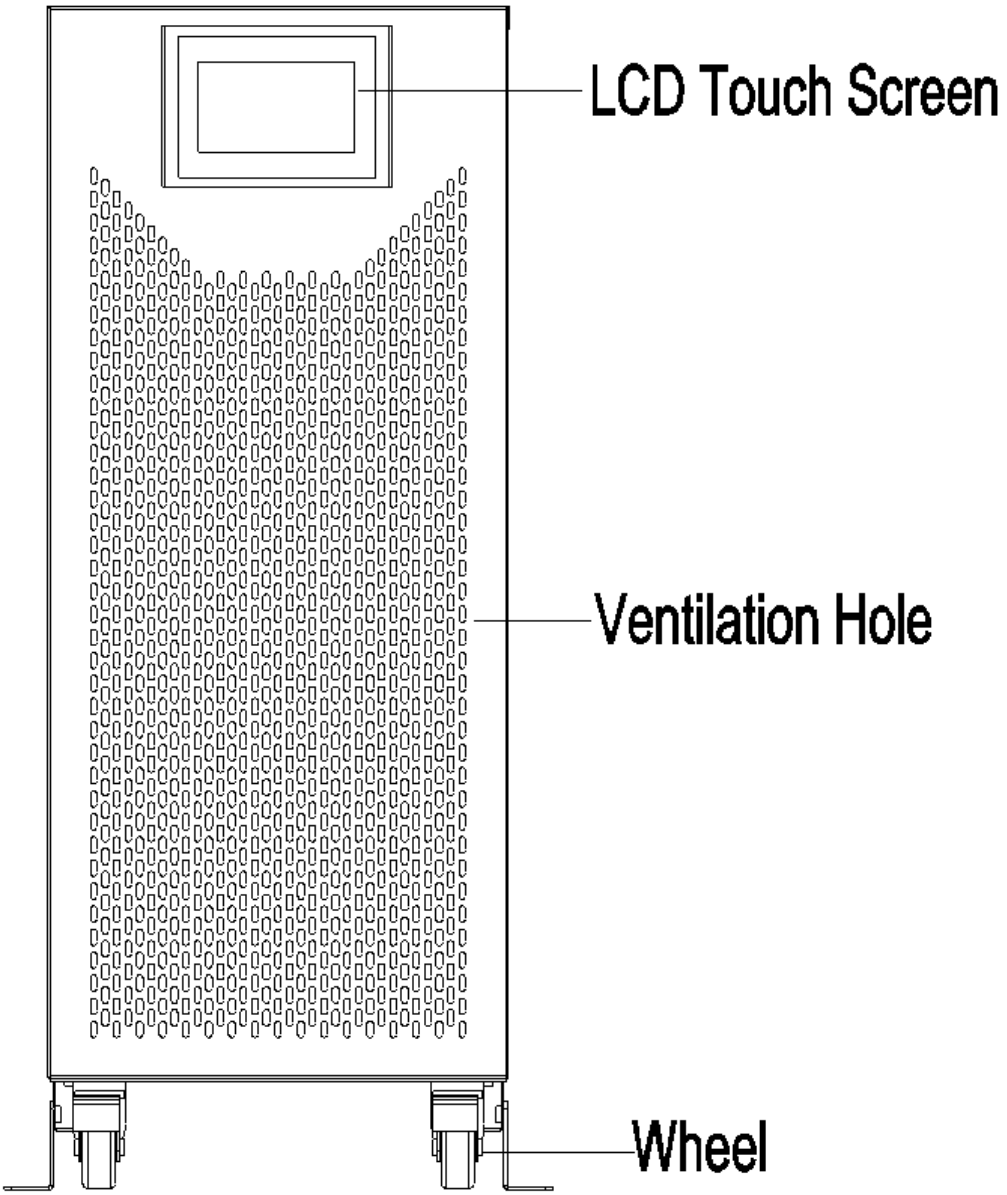
(C) Outlook of 60K UPS with external batteries



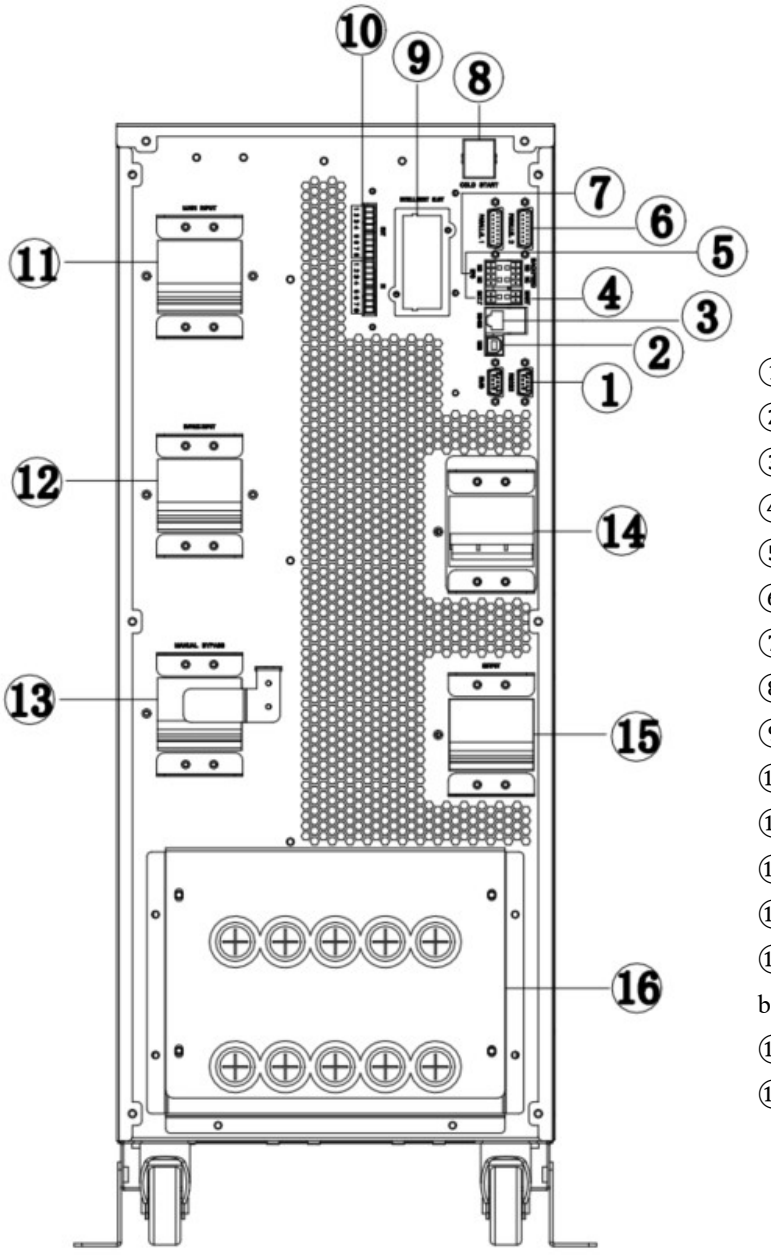
Unit: mm

1.1.3 Details of UPS front and rear views

(A) Details of front view for all models

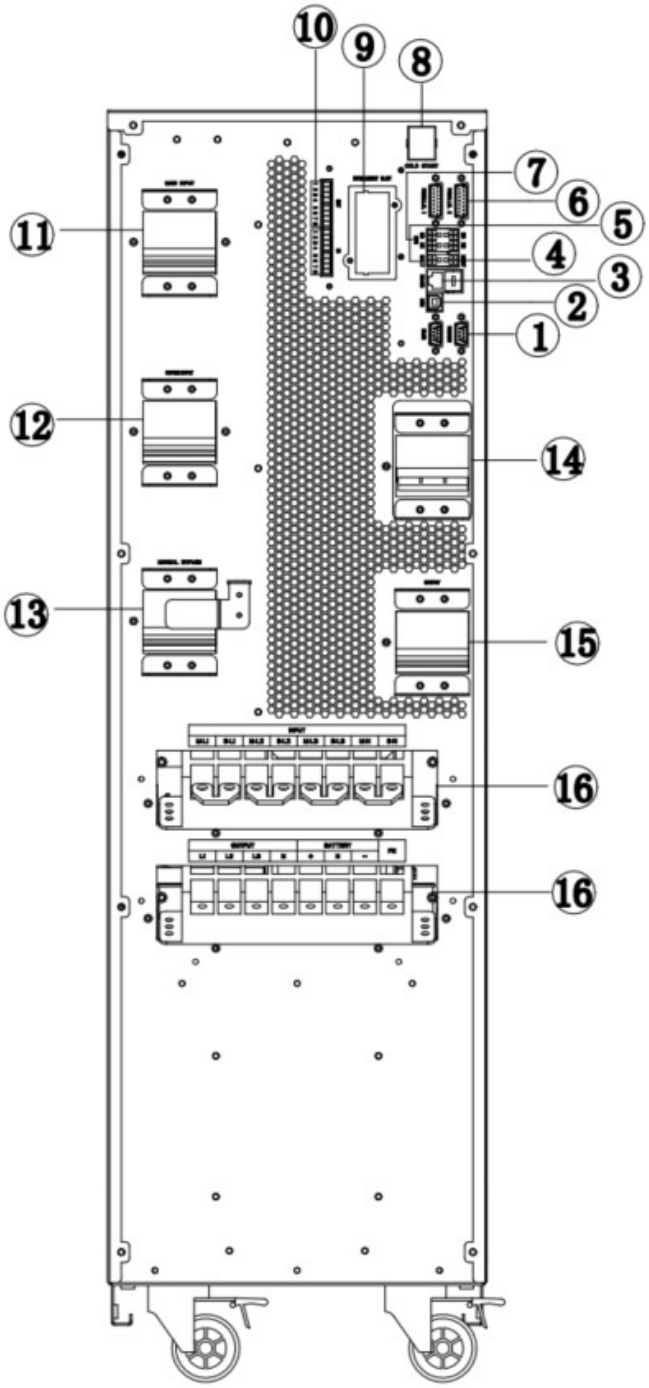


(B) Details of rear view for 10-40kVA UPS with external battery and 10-40kVA UPS with 40 pcs 9Ah batteries



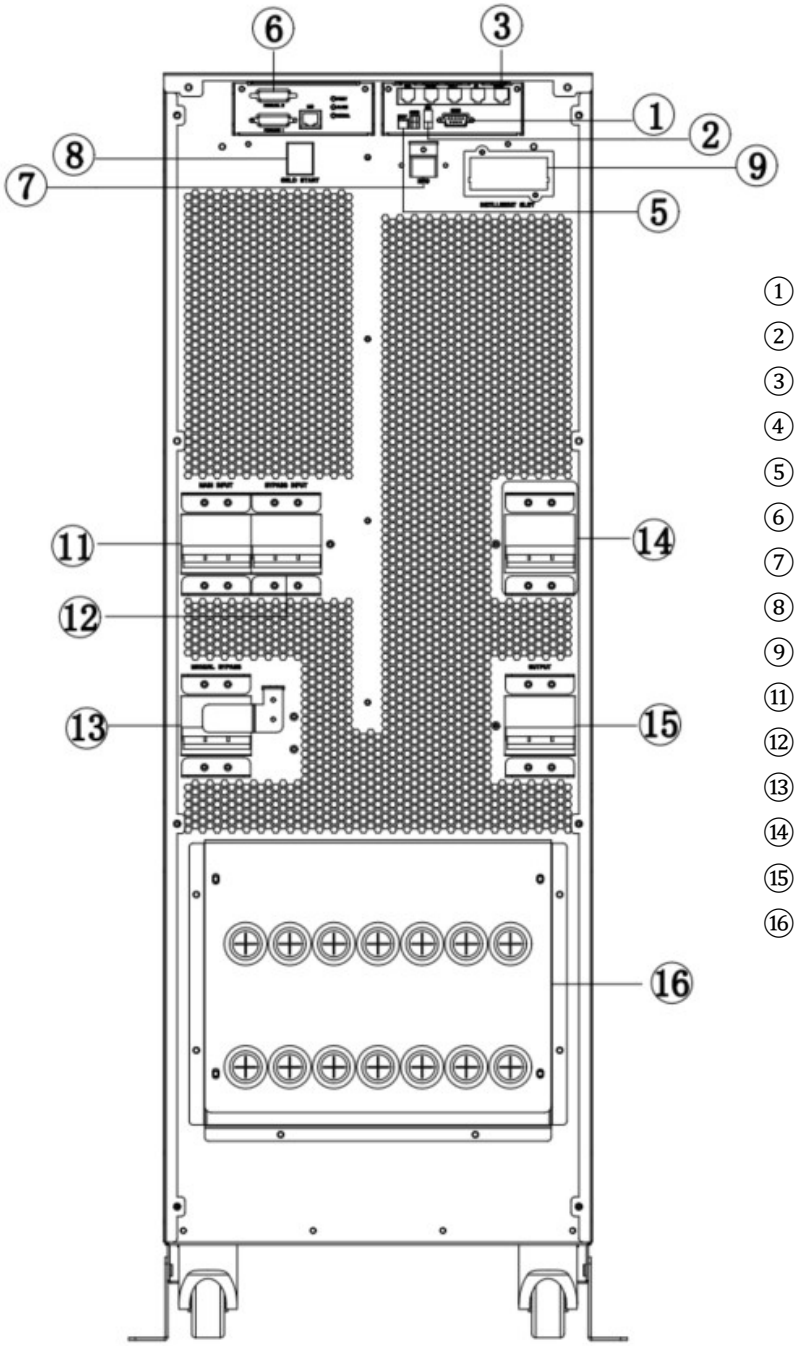
① RS232
② USB
③ RS485
④ Maintenance status
⑤ Battery temperature compensation
⑥ Parallel communication
⑦ Remote EPO
⑧ Battery cold start
⑨ SNMP slot
⑩ Programmable dry contacts
⑪ Rectifier input breaker
⑫ Bypass input breaker
⑬ Maintenance bypass breaker
⑭ Battery breaker(optional for external battery models)
⑮ Output breaker
⑯ Connection terminals

(B) Details of rear view for 10-40kVA with internal 80pcs 9Ah batteries



① RS232
② USB
③ RS485
④ Maintenance status
⑤ Battery temperature compensation
⑥ Parallel communication
⑦ Remote EPO
⑧ Battery cold start
⑨ SNMP slot
⑩ Programmable dry contacts
⑪ Rectifier input breaker
⑫ Bypass input breaker
⑬ Maintenance bypass breaker
⑭ Battery breaker
⑮ Output breaker
⑯ Connection terminals

(C) Details of rear view for 60kVA UPS with external battery



① RS232
② USB
③ RS485
④ Maintenance status
⑤ Battery temperature compensation
⑥ Parallel communication port
⑦ Remote EPO
⑧ Battery cold start
⑨ SNMP slot
⑪ Rectifier input breaker
⑫ Bypass input breaker
⑬ Maintenance bypass breaker
⑭ Battery breaker(optional)
⑮ Output breaker
⑯ Connection terminals

1.2 Product Introduction

1.2.1 UPS System Description

The tower UPS is configured by the following part: rectifier, charger, inverter, static bypass switch and Maintenance bypass breaker. One or several battery strings should be installed to provide backup energy once the utility fails. The UPS structures are shown in Figure 1-1.

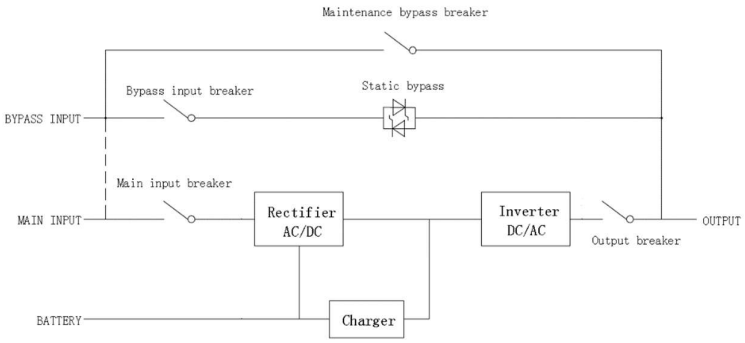


Figure 1-1 UPS Block Diagram

1.2.2 Operation Mode

The tower UPS is an on-line, double-conversion UPS that permits operation in the following modes:

- Normal mode
- Battery mode
- Bypass mode
- Maintenance mode(manual bypass)
- ECO mode
- Frequency Converter mode

1.2.2.1 Normal Mode

The inverters continuously supply AC power to the critical AC load. The rectifier derives power from the AC mains input source and supplies DC power to the inverter, meanwhile the charger derives the DC power from the rectifier and charger its associated backup batteries.

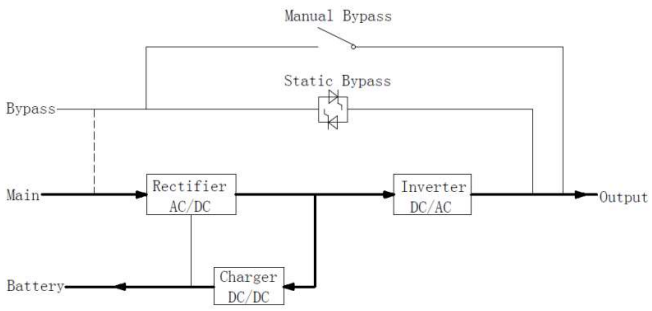


Figure 1-2 Normal mode operation diagram

1.2.2.2 Battery Mode

Upon failure of the AC mains input power, the inverters of power modules will obtain power from the batteries, and supply AC power to the critical AC load. There is no interruption to the critical load. After restoration of the AC mains input power, UPS will transfer automatically to normal mode without users' intervention.

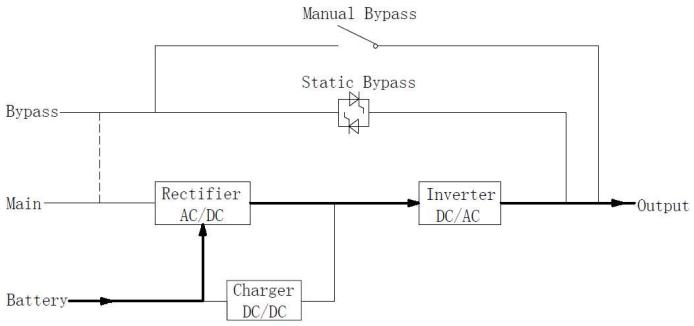


Figure 1-3 Battery Mode operation diagram

1.2.2.3 Bypass Mode

If the inverter overload capacity is exceeded under normal mode, or if the inverter becomes unavailable for any reason, the static switch will perform a transfer of the load from the inverter to the bypass source, without interruption to critical AC load. If the inverter is asynchronous with the bypass source, an interruption would exist in the transfer from the inverter to the bypass. This is to avoid large cross current due to the paralleling of unsynchronized AC sources. This interruption is programmable, but the typically setting is less than 3/4 of an electrical cycle, e.g. less than 15ms (50HZ) or less than 12.5ms (60HZ). The action of transfer/re-transfer can be done by the command through the monitor screen.

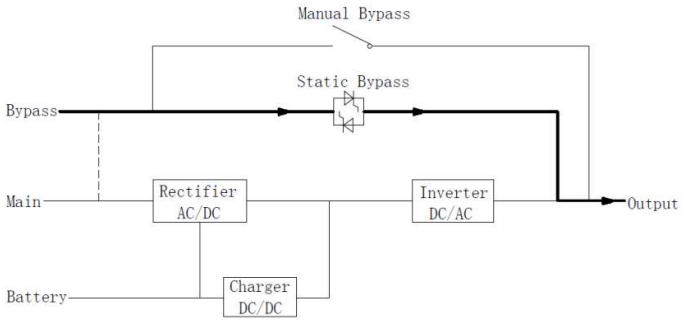


Figure 1-4 Bypass mode operation diagram

1.2.2.4 Maintenance Mode (Manual Bypass)

A manual bypass switch is available to ensure continuity of supply to the critical load when the UPS

becomes unavailable e.g. during a maintenance procedure.

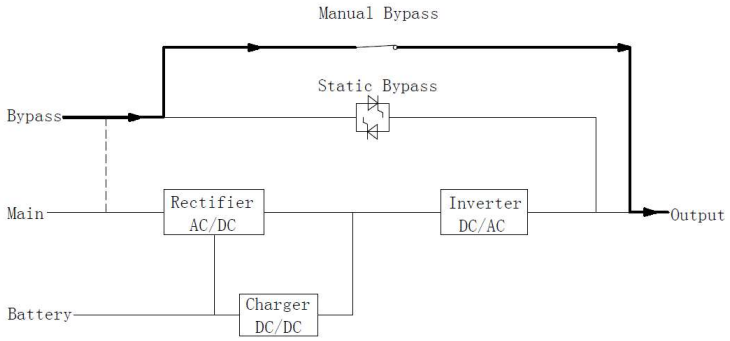


Figure 1-5 Maintenance mode operation diagram

Danger

During Maintenance mode, dangerous voltages are present on the terminal of input, output and neutral, even with all the modules and the LCD turned off.

1.2.2.5 ECO Mode To improve system efficiency, UPS system works in Bypass Mode at normal time, and the inverter is standby, when the utility from the bypass fails, the UPS will transfer to Battery Mode and the inverter powers the load.

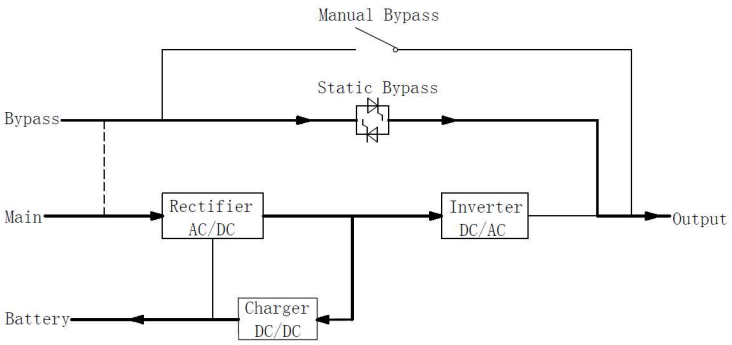


Figure 1-6 ECO Mode operation diagram

Note: There is a short interruption time (less than 10ms) when transferring from ECO mode to battery mode, it must be sure that the interruption has no effect on loads.

1.2.2.6 Frequency Converter Mode

By setting the UPS to “Frequency Converter Mode”, the UPS could present a stable output of fixed frequency (50 or 60HZ), and the bypass static switch is not available.

2 Installation

2.1 Location

As each site has itself requirements, the installation instructions in this section are as a guide for the general procedures and practices that should be observed by the installing engineer.

2.1.1 Installation Environment

The UPS is intended for indoor installation and uses forced convection cooling by internal fans. Please make sure there is enough space for the UPS ventilation and cooling.
Keep the UPS far away from water, heat and inflammable and explosive corrosive material. Avoid installing the UPS in the environment with direct sunlight, dust, volatile gases, corrosive material and high salinity.
Avoid installing the UPS in the environment with conductive dirt.
The operating environment temperature for batteries is 20℃-25℃. Operating above 25℃ will reduce the battery life, and operation below 20℃ will reduce the battery capacity.
The battery will generate a little amount of hydrogen and oxygen at the end of charging; ensure the fresh air volume of the battery installation environment must meet EN50272-2001 requirements.
When external batteries are used, the battery circuit breakers (or fuses) must be mounted as close as possible to the batteries, and the connecting cables should be as short as possible.

2.1.2 Site Selection

Ensure the ground or installation platform can bear the weight of the UPS cabinet, batteries and battery racks.
No vibration and less than 5 degree inclination horizontally.
The equipment should be stored in a room so as to protect it against excessive humidity and heat sources.
The battery needs to be stored in dry and cool place with good ventilation. The most suitable storage temperature is 20℃ to 25℃.

2.1.3 Size and Weight

Ensure there is enough space for the placement of the UPS. The room reserved for the UPS cabinet is shown in Figure 2-1.

Attention

Ensure there is at least 0.8m before the front of the cabinet so as to easily maintain the power module and at least 0.5mbehind for ventilation and cooling. The room reserved for the cabinet is shown in Figure2-1.

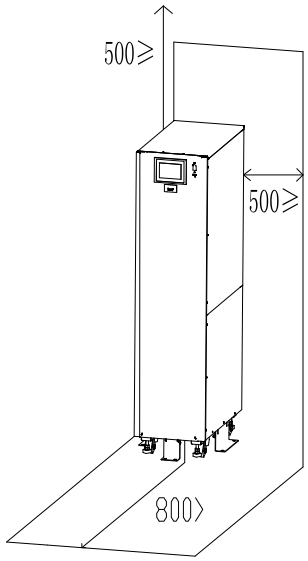


Figure 2-1 Space reserved for the cabinet (Unit: mm)

2.2 Unloading and Unpacking

2.2.1 Moving and Unpacking of the Cabinet

The steps to move and unpack the cabinet are as follows：

1. Check if any damages to the packing. (If any, contact to the carrier)
2. Transport the equipment to the designated site by forklift.
3. Unpack the package.
4. Remove the protective foam around the cabinet.
5. Check the UPS.

   (a)Visually examine if there are any damages to UPS during transportation. If any, contact to the carrier.

   (b)Check the UPS with the list of the goods. If any items are not included in the list, contact to our company or the local office.
6. Dismantle the bolt that connects the cabinet and wooden pallet after disassembly.
7. Move the cabinet to the installation position.

Attention

Be careful while removing to avoid scratching the equipment.

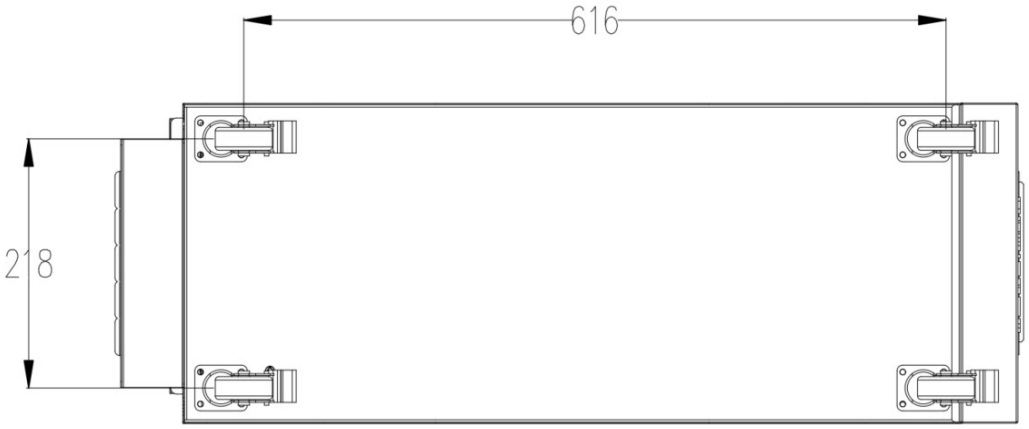
Attention

The waste materials of unpacking should be disposed to meet the demand for environmental protection.

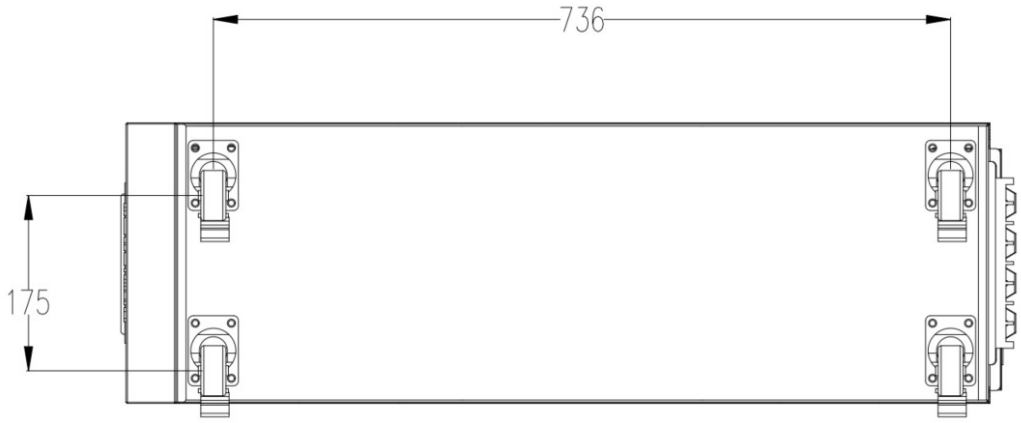
2.3 Positioning

2.3.1 Positioning Cabinet

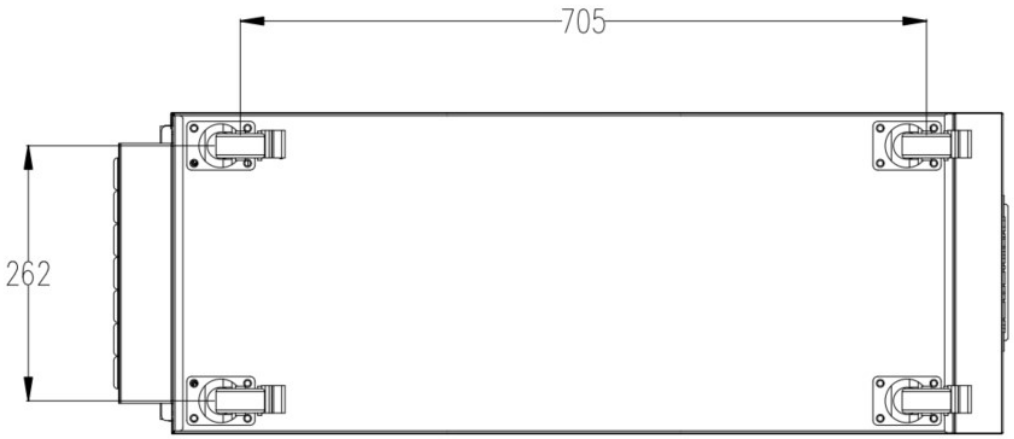
The UPS cabinet supports itself by the four wheels at the bottom. The supporting structures are shown below.



For 10-40K UPS with external battery & 10-40K UPS with internal 40 pcs 9Ah batteries (Unit: mm)



For 10-40K UPS with internal 80 pcs 9Ah batteries (Unit:mm)



For 60K UPS with external battery(Unit:mm)

The steps to position the cabinet are as follows：

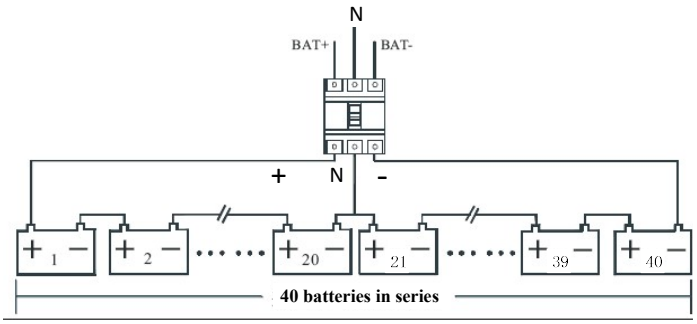
1. Ensure the supporting structure is in good condition and the mounting floor is smooth and strong.
2. Retract the anchor bolts by turning them counter clockwise using wrench, the cabinet is then supported by the four wheels.
3. Adjust the cabinet to the right position by the supporting wheels.

Attention

Auxiliary equipment is needed when the mounting floor is not solid enough to support the cabinet, which helps distribute the weight over a larger area. For instance, cover the floor with iron plate or increase the supporting area of the anchor bolts.

2.4 Battery

Three terminals (positive, neutral, negative) are drawn from the battery group and connected to UPS system. The neutral line is draw from the middle of the batteries in series.



Battery connection diagram

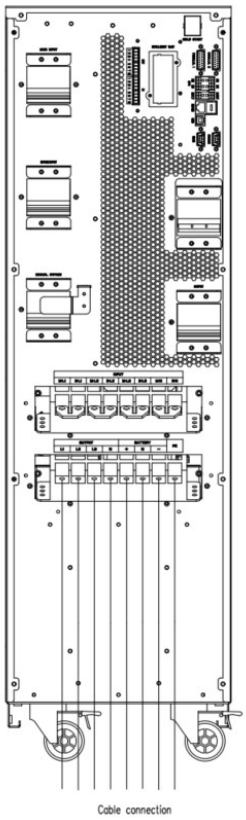
Danger

The battery terminal voltage is of more than 400Vdc, please follow the safety instructions to avoid electric shock hazard.

Ensure the positive, negative, neutral electrode is correctly connected from the battery unit terminals to the breaker and from the breaker to the UPS system.

2.5 Cable Entry

For all models, cables enter from the bottom of the rear side.
These cable entry ways are shown below.



Cables entry

2.6 Power Cables

2.6.1 Specifications

The UPS power cables are recommended in the table below.

Contents			10K	20K	30K	40K	60K
Main Input	Main Input Current(A)		19	38	57	76	114
	Cable Section（mm²）	L1	6	10	10	16	25
		L2	6	10	10	16	25
		L3	6	10	10	16	25
		N	6	10	10	16	25
Output	Main Output Current(A)		15	30	45	60	91
	Cable Section（mm²）	L1	6	10	10	16	25
		L2	6	10	10	16	25
		L3	6	10	10	16	25
		N	6	10	10	16	25
Bypass Input（Optional）	Bypass Input Current(A)		15	30	45	60	91
	Cable Section（mm²）	L1	6	10	10	16	25
		L2	6	10	10	16	25
		L3	6	10	10	16	25
		N	6	10	10	16	25
Battery	Battery Input current(A)		21	42	63	83	125
	Cable Section（mm²）	+	8	16	16	25	35
		-	8	16	16	25	35
		N	8	16	16	25	35
PE	Cable Section（mm²）	PE	6	10	10	16	25

Note

The recommended cable section for power cables are only for the situations described below:

- Ambient temperature: +30℃.
- AC loss is less than 3%, DC loss is less than 1%, the length of the AC power cables should be no longer than 50 meters and the length of the DC power cables should be no longer than 30 meters.
- Currents listed in the table are based on the 380V system (line to line voltage). For 400V system, the current is 0.95 times and for the 415V system the current is 0.92 times.
- The size of neutral lines should be 1.5-1.7 times the value listed above when the predominant load is non-linear.

2.6.2 Specifications for Power Cables Terminal

Specifications for power cables connector are listed as the table below.

Port	Connection	Bolt	Bolt	Torque
Mains input	Cables crimped OT terminal	M6	7mm	4.9Nm
Bypass Input	Cables crimped OT terminal	M6	7mm	4.9Nm
Battery Input	Cables crimped OT terminal	M6	7mm	4.9Nm
Output	Cables crimped OT terminal	M6	7mm	4.9Nm
PE	Cables crimped OT terminal	M6	7mm	4.9Nm

2.6.3 Circuit Breaker

The external circuit breakers (CB) for the system are recommended in the table below.

Item	10K	20K	30K	40K	60K
Input	32A/3P	63A/3P	100A/3P	100A/3P	125A/3P
Bypass input	32A/3P	63A/3P	63A/3P	100A/3P	100A/3P
Output	32A/3P	63A/3P	63A/3P	100A/3P	100A/3P
External maintenance	32A/3P	63A/3P	63A/3P	100A/3P	100A/3P
Battery	32A/3P	63A,250Vdc	100A,250Vdc	125A,250Vdc	125A,250Vdc

Attention

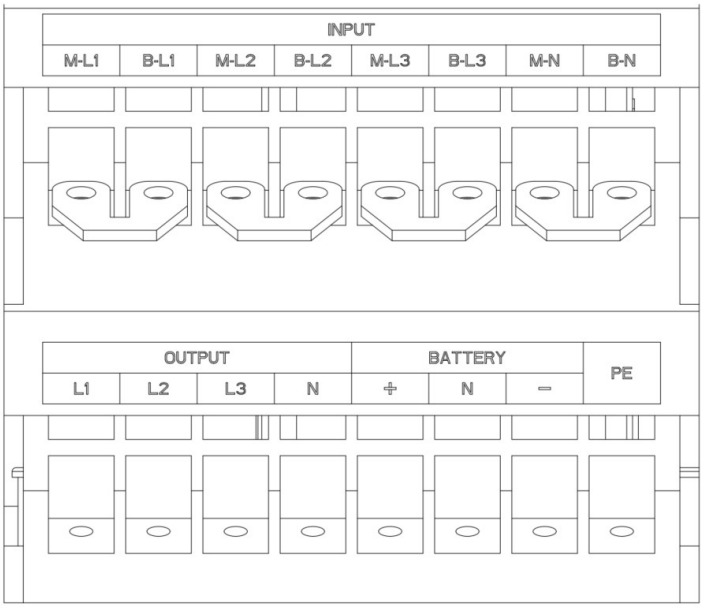
The CB with RCD (Residual Current Device) is not suggested for the system.

2.6.4 Connecting Power Cables

The steps of connecting power cables are as follows:

1) Verify that all the external input distribution switches of the UPS are completely open and the UPS internal maintenance bypass switch is open, Attach necessary warning signs to these switches to prevent unauthorized operation.

2) Remove the metal protective cover, the terminals are shown below.



Cable connection terminals

3) Connect the protective earth wire to protective earth terminal (PE).

4) Connect the AC input supply cables to the main input terminal and AC output supply cables to the output terminal.

5) Connect the battery cables to the battery terminal.

6) Check to ensure there is no mistake and re-install all the protective covers.

Note: M-L1, M-L2 and M-L3 standard for Main input phase L1, L2 and L3; B-L1, B-L2 and B-L3 standard for Bypass Input phase L1, L2 and L3.

Attention

The operations described in this section must be performed by authorized electricians or qualified technical personnel. If you have any difficulties, contact the manufacturer or agency.

Warning

- Tighten the connections terminals to enough torque moment, refer to Table 2-3, and please ensure correct phase rotation.
- Before connection，ensure the input switch and the power supply are off，attach warnings label to warn not to operate by others
- The grounding cable and neutral cable must be connected in accordance with local and national codes.
- When the cable holes does not goes through by cables, it should be filled by the hole stopper.

2.7 Control and Communication Cables

All UPS models are configured with RS232, USB and RS485 interfaces, dry contact and SNMP card are optional for 10-40K UPS, and for 60K UPS, it hasn't the dry contacts, only has SNMP card to be optional.

2.7.1 Dry Contact Interface

The UPS provides 4 groups of input dry contacts and 4 groups of output dry contacts, as shown in the below figure, Group1 is made up with Port1 and Port2, Group2 is made up with Port3 and Port4, Group3 is made up with Port5 and Port6, Group4 is made up with Port7 and Port8.
These dry contacts can be programmed on the display screen, please refer to the table below.

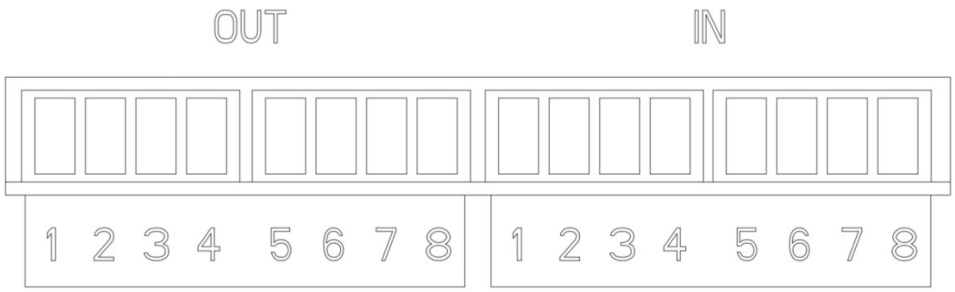


Table 2-6 Input Programmable Events

NO.	Event	Description
1	Generator	The input power is supplied by the generator
2	LightPro	SPD failure
3	ExteMaint	External maintenance bypass breaker closed
4	BATchanFB	Shut down the charger

Table 2-7 Output Programmable Events

NO.	Event	Description
1	Urgent	Primary alarm
2	Minor	Secondary alarm
3	BYP-POW	The output power is from bypass
4	BAT-POW	The output power is from battery
5	BAT-LOW	Battery voltage low
6	Low-Trip	Battery low voltage trip signal

Take the first group of the dry contacts for example.
For input dry contacts, when “1” and “2” are closed, it means the event or alarm is triggered.
For output dry contacts, when “1” and “2” turn closed from open, it means the event or alarm occurs.

2.7.2 Communication Interface

RS232, RS485 and USB ports can provide series data which can be used for commissioning and maintenance by authorized engineers or can be used for networking or integrated monitoring system in the service room. SNMP is used on site for communication (Optional).

3 Control and LCD display Panel

3.1 Sound alarm

There are two different types of audible alarm during UPS operation, as shown in the table below.

Alarm	Description
Two short alarm with a long one	when system has general alarm (for example: AC fault),
Continuous alarm	When system has serious faults (for example: hardware fault)

3.2 LCD Touch Screen

After the monitoring system starts self-test, the system first enters into the welcome page, and click anywhere on the welcome page, it will enter into the home page. The home page is shown in Figure 3-2.

Figure 3-2 Home page

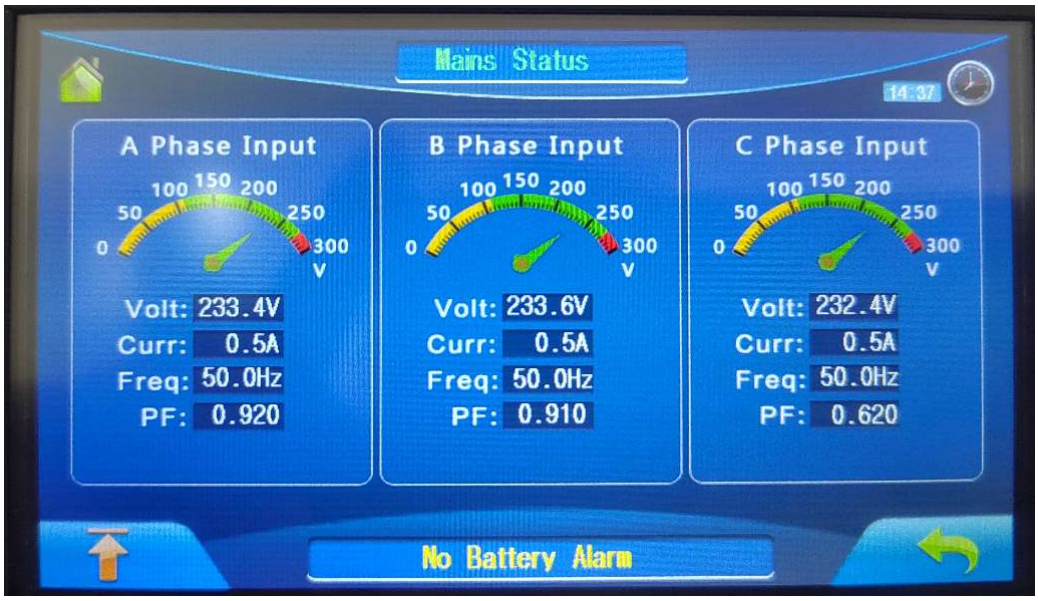
The home page shows the operating status, the UPS capacity, the current alarm information and the system time.

3.3 Main Menu

Click anywhere on the home page, it will enter into the main menu. Main menu includes Cabinet, Data, Setting, Log, Operate and System and it is described in details below.

3.3.1 INPUT

Touch “INPUT” icon, it will show the input datas, as it is shown below.



3.3.2 OUTPUT

Touch “OUTPUT” icon, it will show the output data, as it is shown below.

3.3.3 BATTERY

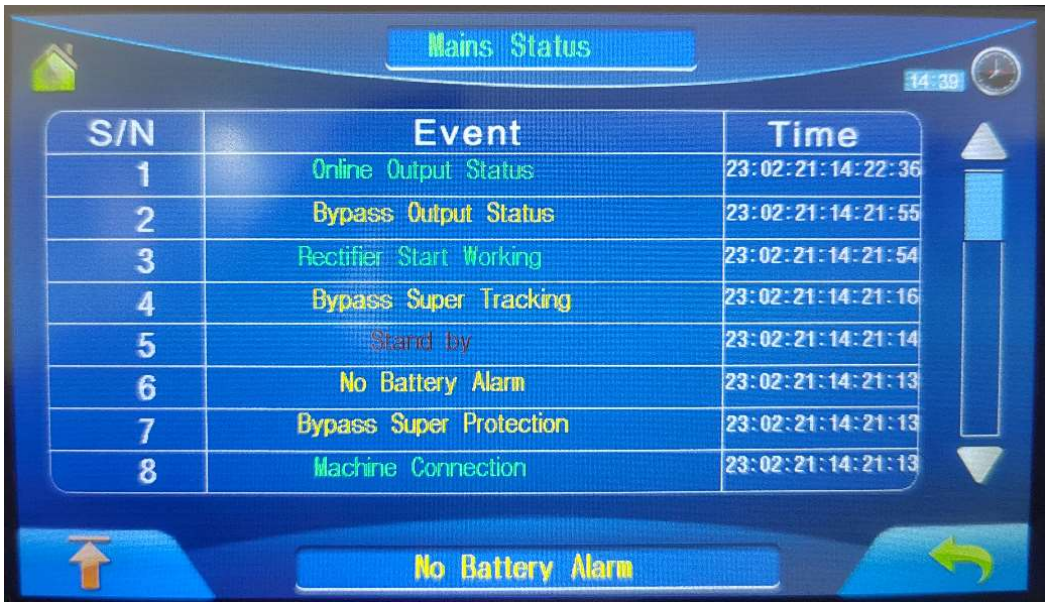
Touch “BATTERY” icon, it will show the battery datas, as it is shown below.

3.3.4 SYSTEM

Touch “SYSTEM” icon, it will show the bypass voltage, the inverter voltage, the BUS voltage, the firmware version information and the codes, as it is shown below.

3.3.5 RECORD

Touch “RECORD” icon, it will show history log, as it is shown below.



The following table shows events of UPS History Log.

NO.	LCD Display	Explanation
1	Batt. Over voltage	Battery over voltage
2	Batt. EOD Pre-alarm	Battery EOD pre-alarm
3	Batt. Reverse	Battery positive and negative electrodes connected to reverse
4	Batt. EOD Alarm	Battery EOD alarm
5	Batt. Low Voltage Alarm	Battery voltage low
6	No Battery Alarm	Battery not connected
7	Input Voltage Phase Reverse	Input phase sequence error
8	Input No Neutral	Input neutral lost

9	Abnormal Mains Frequency	Input frequency abnormal
10	Abnormal Mains Voltage	Input voltage abnormal
11	Mains Without	Utility power fails
12	Monitoring Settings data error	Parameter setting error
13	Rectifier System Over-temp	Rectifier over temperature
14	Rectifier Over-curr Fault	Rectifier over current
15	Auxiliary Power 1 Fault	Auxiliary Power 1 Fault
16	Auxiliary Power 2 Fault	Auxiliary Power 2 Fault
17	Input Phase A SCR Fault	Input Phase A SCR Fault
18	Input Phase B SCR Fault	Input Phase B SCR Fault
19	Input Phase C SCR Fault	Input Phase C SCR Fault
20	Discharging P SCR Fault	Discharging P SCR Fault
21	Discharging N SCR Fault	Discharging N SCR Fault
22	Charging P SCR Fault	Charging P SCR Fault
23	Charging N SCR Fault	Charging N SCR Fault
24	Fan 1 Fault	Fan 1 Fault
25	Fan 2 Fault	Fan 2 Fault
26	Fan 3 Fault	Fan 3 Fault
27	Fan Power Fault	Fan Power Fault
28	Charger Over-temp.Fault	Charger Over-temp.Fault
29	Positive Batt. Charger Fault	Positive Batt. Charger Fault
30	Negative Batt. Charger Fault	Negative Batt. Charger Fault
31	Rec Bus Over-volt	Rec Bus Over-volt
32	Rec Bus Under-volt	Rec Bus Under-volt
33	Large Volt Gap P and N Bus	Large voltage difference between the positive and negative bus
34	Control CAN Fault	Control CAN Fault
35	Inv Status Parallel Line Fault	Parallel inverter state signal is abnormal
36	Zero-crossing Signal Fault	Abnormal three-phase zero-crossing synchronization signal of parallel system
37	Carrier Syn Signal Fault	Abnormal parallel carrier synchronization signal
38	Inverter Overload	Inverter Overload
39	Inv Not Synchronized	Inv Not Synchronized
40	Inverter Fault Phase C	Inverter Fault Phase C
41	Inverter Fault Phase B	Inverter Fault Phase B
42	Inverter Fault Phase A	Inverter Fault Phase A
43	Inv Bridge Arm Passthrough C	Inv Bridge Arm Pass through C
44	Inv Bridge Arm Passthrough B	Inv Bridge Arm Pass through B
45	Inv Bridge Arm Passthrough A	Inv Bridge Arm Pass through A
46	Inv Relay Short Circuit C	Inv Relay Short Circuit C
47	Inv Relay Short Circuit B	Inv Relay Short Circuit B
48	Inv Relay Short Circuit A	Inv Relay Short Circuit A
49	Inv Relay Open Circuit C	Inv Relay Open Circuit C
50	Inv Relay Open Circuit B	Inv Relay Open Circuit B

51	Inv Relay Open Circuit A	Inv Relay Open Circuit A
52	Output Short Circuit C	Output Short Circuit C
53	Output Short Circuit B	Output Short Circuit B
54	Output Short Circuit A	Output Short Circuit A
55	Inv Hardware Ver Fault	Inverter firmware error
56	Short Requirement of Inv Relay	Inverter relay open circuit
57	Abnormal Inv Voltage	Inverter voltage abnormal
58	Abnormal Inv Output Volt	Inverter output voltage abnormal
59	Inv DC Component Fault C	DC component fault of C-phase inverter
60	Inv DC Component Fault B	DC component fault of B-phase inverter
61	Inv DC Component Fault A	DC component fault of A-phase inverter
62	Bus Volt Fault of Inv Side	Inverter bus voltage fault
63	15V Power Fault	15Vdc power fault
64	1.5V Bias Power Fault	1.5Vdc bias power fault
65	Parallel Current Sharing Fault	Parallel Current Sharing Fault
66	Fuse Fault	Fuse Fault
67	Bypass Switching Times	Bypass switch time limit
68	Control CAN Fault Bypass	Bypass control CAN fault
69	Bypass Reverse	Bypass phase sequence reverse
70	Bypass Super Protection	Bypass abnormal
71	C-phase Bypass SCR Open	C-phase Bypass SCR Open
72	B-phase Bypass SCR Open	B-phase Bypass SCR Open
73	A-phase Bypass SCR Open	A-phase Bypass SCR Open
74	C-phase Bypass SCR Short	C-phase Bypass SCR Short
75	B-phase Bypass SCR Short	B-phase Bypass SCR Short
76	A-phase Bypass SCR Short	A-phase Bypass SCR Short
77	Bypass Hardware Ver Fault	Bypass Hardware Ver Fault
78	Auxiliary Power 1 Fault	Auxiliary Power 1 Fault
79	Auxiliary Power 2 Fault	Auxiliary Power 2 Fault

3.3.6 CONTROL

Touch “CONTROL” icon, it will enter into the control page, as it is shown below, on the control page, users can shut down and start the inverter, battery discharge test, mute, clear fault and dry contact setting.

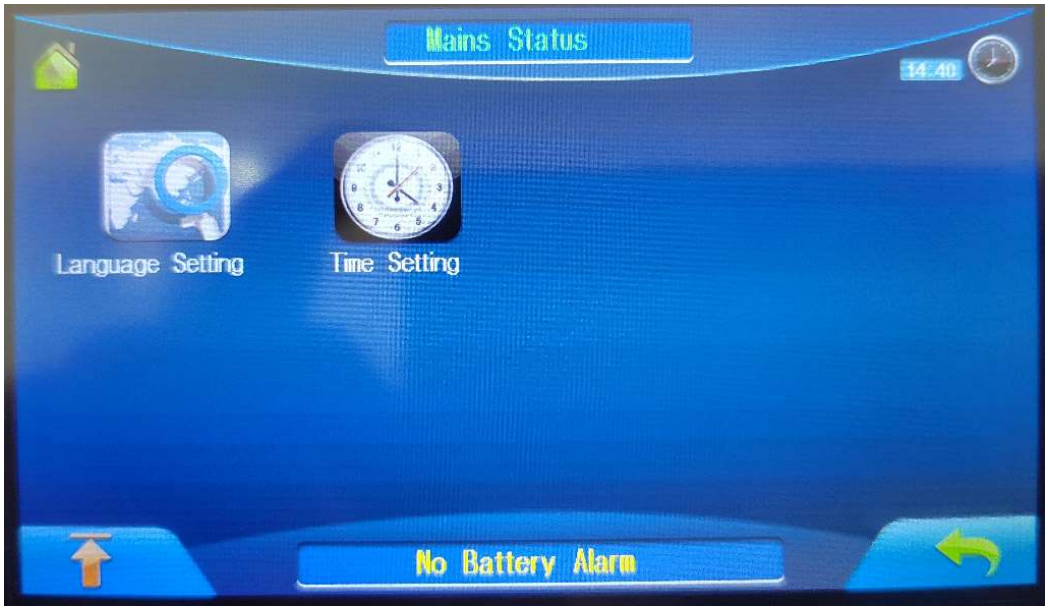
3.3.7 SETTING

Touch “SETTING” icon, and then input the passwords “666888”, it will enter into the setting page, as are shown below.

Note: Before setting, please transfer the UPS to bypass mode.

Battery setting page

Parallel setting page



Time setting page

Bypass setting page

Output setting page

4 Operations

4.1 UPS start-up

4.1.1 Startup in normal mode

The UPS must be started up by commissioning engineer after the completeness of installation. The steps below must be followed:

1) Ensure all the circuit breakers are open. One by one to turn on the bypass input breaker, the input breaker, and the output.
2) Wait for about 2 minutes, after the UPS runs in online mode, switch on the battery breaker.

4.1.2 Start from battery

The start from battery refers to the battery cold start. The steps of the start-up are as follow:
1) Confirm the batteries are correctly connected, and then close the internal or external battery circuit breakers.
2) Press and hold the red button of battery cold start for 1 second, the system will start up.

4.2 UPS Shut down

If need to shut down UPS completely, please first ensure the load is shut down correctly, and then turn off the external battery breaker, the main input breaker (internal or external), the bypass input breaker (internal or external, if have) one by one, the display screen will be off completely.
Note: If UPS in maintenance bypass mode, please also turn off the maintenance bypass breaker.

4.3 Procedure for Switching between Operation Modes

4.3.1 Switching the UPS from normal mode into battery mode

The UPS transfers to battery mode immediately after the utility (mains voltage) fails or drops down below the predefined limit.

4.3.2 Switching the UPS from normal mode into bypass mode

Touching the icon 

and then confirm the command to transfer the system to Bypass Mode.

Warning

Ensure the bypass is working normally before transferring to bypass mode. Or it may cause failure.

4.3.3 Switching the UPS into normal mode from bypass mode

Touch the icon 

, UPS will return to Normal Mode from bypass mode.

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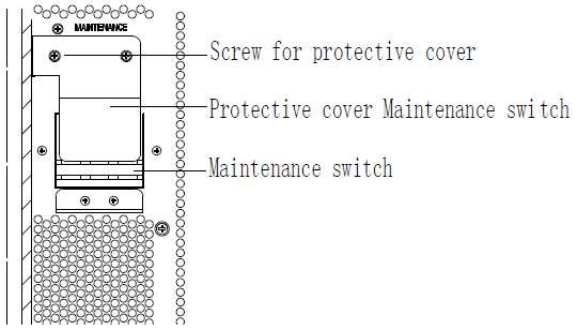
4.3.4 Switching the UPS into maintenance bypass mode from normal mode

These following procedures can transfer the load from the UPS inverter output to the maintenance bypass supply, which is used for maintaining the UPS.

1. Transfer the UPS into Bypass mode as per the chapter 4.3.2.
2. Remove the cover of maintenance bypass breaker.
3. Turn on the maintenance bypass breaker. And the load is powered through maintenance bypass and static bypass.
4. One by one to turn off the battery breaker, input breaker, bypass input breaker and output breaker.
5. The load is powered through maintenance bypass.



Waring

Once the cover on the maintenance bypass breaker is removed, the system will transfer to bypass mode automatically.

Waring

Before making this operation, confirm the messages on LCD display to ensure that bypass supply is regular and the inverter is synchronous with it, so as not to risk a short interruption in powering the load.

Danger

Even with the LCD turned off, the terminals of input and output may be still energized.

Wait for 10 minutes to let the DC bus capacitor fully discharge before removing the cover.

4.3.5 Switching the UPS into normal mode from maintenance bypass mode

These following procedures can transfer the load from the Maintenance Bypass mode to inverter output.

1. After finish of maintenance. One by one to turn on the bypass input breaker, the input breaker the output breaker and the battery breaker.
2. After 30S, confirm whether the static bypass starts successfully on the screen on the screen, if it's, the load is powered through maintenance bypass breaker and static bypass.
3. Turn off the maintenance bypass breaker and fix the protection cover, and then the load is powered through static bypass. The rectifier starts followed by the inverter.
4. After 60 seconds, the system transfers to normal mode.

Waring

The system will stay on bypass mode until the cover of maintenance bypass breaker is fix.

4.4 Battery Maintenance

If batteries not discharged for a long time, it is necessary to test the condition of batteries.

Touch the icon 

, and then confirm the command, the system transfers into Battery Mode for discharge. If no human intervention, the system will continue to discharge until the alarm of "Battery low voltage" is given. Users can stop the discharge by touching the icon 

, and then confirm the "STOP" command.

Touch the icon 

, the system will discharge for about 10 seconds, and then re-transfer to normal mode.

Warning

The load for the auto maintenance discharge should be 20%-100%，if not, the system will not start the process automatically.

4.5 Remote EPO

The EPO dry contact is located on the rear panel (with the cover to avoid disoperation), which is designed to switch off the UPS in emergency conditions (e.g., fire, flood, etc.). To achieve this, just make the EPO dry contact open, the system will turn off the rectifier, inverter and stop powering the load immediately (including the inverter and bypass output), and the battery stops charging or discharging.
If the input utility is present, the UPS control circuit will remain active; however, the output will be turned off. To completely isolate the UPS, users need to open the external mains input supply to the UPS.

Warning

When the EPO is triggered, the load is not powered by the UPS. Be careful to use the EPO function.

4.6 Installation of parallel operation system

Normally 4 cabinets can be paralleled; and the parallel function is optional, if users need the function, please confirm the configuration with the supplier in advance. For the details of the parallel system, please refer to the annex “Instructions of the parallel system for UPS”.

5 Maintenance

This chapter introduces UPS maintenance, including the maintenance instructions of power module and monitoring bypass module and the replacement method of dust filter.

5.1 Precautions

Only maintaining engineers can maintain the power module and monitoring bypass module.
1) The power module should be disassembled from top to bottom, so as to prevent any inclination from high gravity center of the cabinet.
2) To ensure the safety before maintaining power module and bypass module, use a multi-meter to measure the voltage between operating parts and the earth to ensure the voltage is lower than hazardous voltage, i.e. DC voltage is lower than 60Vdc, and AC maximum voltage is lower than 42.4 Vac.
3) Bypass module is not recommended to hot swap; only when UPS is in Manual Bypass Mode or UPS is completely powered off, the bypass module can be disassembled.
4) Wait 10 minutes before opening the cover of the power module or the bypass after pulling out from the cabinet.

5.2 Instruction for maintaining UPS

For the maintenance of the UPS, please refer to Chapter 4.3.4 to transfer to maintenance bypass mode. After maintenance, re-transfer to normal mode according to Chapter 4.3.5.

5.3. Instruction for Maintaining Battery String

For the Lead-Acid maintenance free battery, when maintaining the battery according to requirements, battery life can be prolonged. The battery life is mainly determined by the following factors:
1) Installation. The battery should be placed in dry and cool place with good ventilation. Avoid direct sunlight and keep away from heat source. When installing, ensure the correct connection to the batteries with same specification.
2) Temperature. The most suitable storage temperature is 20 ℃ to 25℃.
3) Charging/discharging current. The best charging current for the lead-acid battery is 0.1C. The maximum charging current for the battery can be 0.2C. The discharging current should be 0.05C-3C.
4) Charging voltage. In most of the time, the battery is in standby state. When the utility is normal, the system will charge the battery in boost mode (constant voltage with maximum limited) to full and then transfers to the state of float charge.
5) Discharge depth. Avoiding deep discharge, which will greatly reduce the life time of the battery.

When the UPS runs in battery mode with light load or no load for a long time, it will cause the battery to deep discharge.

6) Check periodically. Observe if any abnormality of the battery, measure if the voltage of each battery is in balance. Discharge the battery periodically.

Warning

Daily inspection is very important!

Check and confirm the battery connection is tightened regularly, and make sure there is no abnormal heat generated from the battery.

Warning

If one battery has leakage or is damaged, it must be replaced, stored in a container resistant to sulfuric acid and disposed of in accordance with local regulations.

The waste lead-acid battery is a kind of hazardous waste and is one of the major contaminants controlled by government.

Therefore, its storage, transportation, use and disposal must comply with the national or local regulations and laws about the disposal of hazardous waste and waste batteries or other standards. According to the national laws, the waste lead-acid battery should be recycled and reused, and it is prohibited to dispose of the batteries in other ways except recycling. Throwing away the waste lead-acid batteries at will or other improper disposal methods will cause severe environment pollution, and the person who does this will bear the corresponding legal responsibilities.

6 Product Specifications

This chapter provides the specifications of the product, including environment characteristics mechanical characteristics and electrical characteristics.

6.1 Applicable Standards

The UPS has been designed to conform to the following European and international standards:

Table 6-1 Compliance with European and International Standards

Item	Normative reference
General safety requirements for UPS used in operator access areas	IEC62040-1-1
Electromagnetic compatibility (EMC) requirements for UPS	IEC62040-2
Method of specifying the performance and test requirements of UPS	IEC62040-3

Note

The above mentioned product standards incorporate relevant compliance clauses with generic IEC and EN standards for safety (IEC/EN/AS60950), electromagnetic emission and immunity (IEC/EN61000 series) and construction (IEC/EN60146 series and 60950).

6.2 Specification

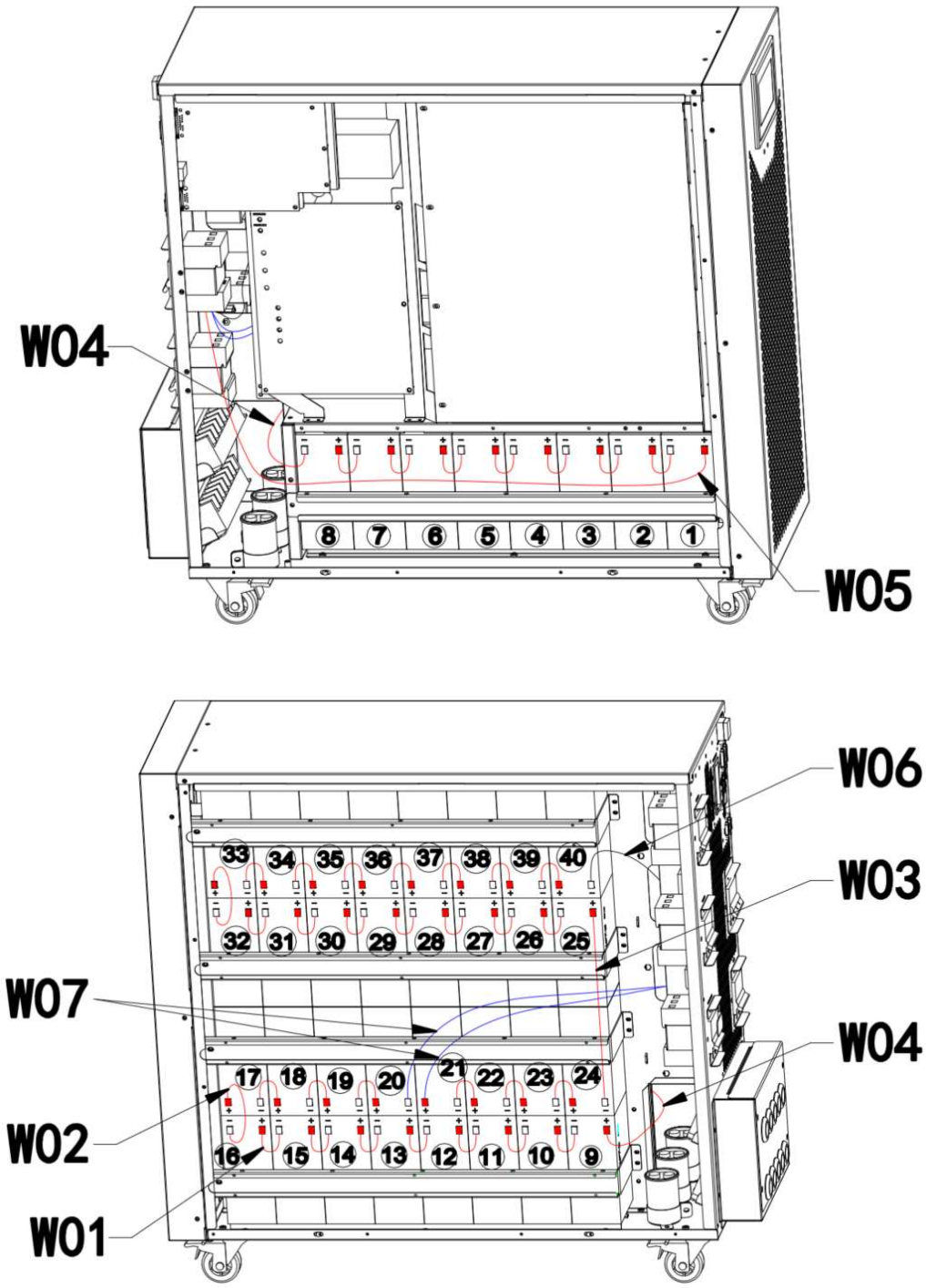
Model		MU10KXS	MU15KXS	MU20KXS	MU30KXS	MU40KXS
Capacity		10kVA	15kVA	20kVA	30kVA	40kVA
Input	Phase	3 Phase+Neutral+Ground				
	Rated Voltage	380/400/415Vac				
	Voltage Range	208-478Vac				
	Frequency Range	40-70Hz				
	Power Factor	≥0.99				
	THDi	≤3% (100% linear load)				
Bypass	Voltage Range	Upper limit: 380V+25% (+10%, +15%, +20%, settable); 400V+20% (+10%, +15%, settable) 415V+15% (+10%, settable); Lower limit: -45% (-10%, -20%, -30%, settable)				
	Frequency Range	50/60Hz±10%				
Output	Phase	3 Phase+Neutral+Ground				
	Rated Voltage	380/400/415Vac				
	Power Factor	1				
	Voltage Regulation	±1%				
	Output Frequency	Normal Mode: ±1%/±2%/±4%/±5%/±10%, settable; Battery Mode: 50/60Hz±0.1%				
	Crest Factor	3:1				
	THDu	≤2% (linear load); ≤4% (non-linear load)				
	Overload	110% for 60 mins; 125% for 10 mins; 150% for 1 min; ＞150%, transfer to bypass				
Battery	Rated Voltage	±240VDC				
	Quantity	40pcs*9Ah				
	Charging Current	1A（1-5A, settable）			1A（1-15A, settable）	
System	Efficiency	96%				
	Display	4.3-inch color touching screen				
	IP Class	IP20				
	Interface	USB, CAN, RS485, LBS, Parallel card (optional), Relay card (optional), SNMP card (optional)				
	Temperature	Operation: 0-40℃; Storage: -25-55℃				
	Humidity	0-95% (non-condensing)				
	Altitude	＜1500m, within 1500-4000m, power derates 1% every 100m rise				
	Noise	＜58dB				
Physical	Weight(kg)	147	148	155	158	165
	Dimension W*D*H (mm)	280*792*718				

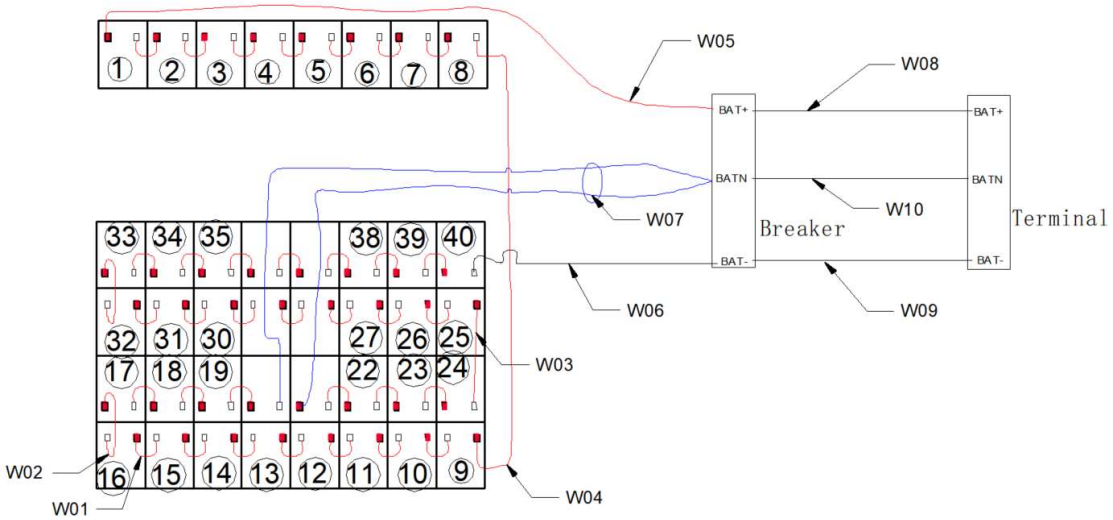
Model		MU10KXS	MU15KXS	MU20KXS	MU30KXS	MU40KXS
Capacity		10kVA	15kVA	20kVA	30kVA	40kVA
Input	Phase	3 Phase+Neutral+Ground				
	Rated Voltage	380/400/415Vac				
	Voltage Range	208-478Vac				
	Frequency Range	40-70Hz				
	Power Factor	≥0.99				
	THDi	≤3% (100% linear load)				
Bypass	Voltage Range	Upper limit: 380V+25% (+10%, +15%, +20%, settable); 400V+20% (+10%, +15%, settable) 415V+15% (+10%, settable); Lower limit: -45% (-10%, -20%, -30%, settable)				
	Frequency Range	50/60Hz±10%				
Output	Phase	3 Phase+Neutral+Ground				
	Rated Voltage	380/400/415Vac				
	Power Factor	1				
	Voltage Regulation	±1%				
	Output Frequency	Normal Mode: ±1%/±2%/±4%/±5%/±10%, settable; Battery Mode: 50/60Hz±0.1%				
	Crest Factor	3:1				
	THDu	≤2% (linear load); ≤4% (non-linear load)				
	Overload	110% for 60 mins; 125% for 10 mins; 150% for 1 min; ＞150%, transfer to bypass				
Battery	Rated Voltage	±240VDC				
	Quantity	40pcs*9Ah*2strings				
	Charging Current	2A（1-5A, settable）			2A（1-15A, settable）	
System	Efficiency	96%				
	Display	4.3-inch color touching screen				
	IP Class	IP20				
	Interface	USB, CAN, RS485, LBS, Parallel card (optional), Relay card (optional), SNMP card (optional)				
	Temperature	Operation: 0-40℃; Storage: -25-55℃				
	Humidity	0-95% (non-condensing)				
	Altitude	＜1500m, within 1500-4000m, power derates 1% every 100m rise				
	Noise	＜58dB				
Physical	Weight(kg)	555	556	558	560	564
	Dimension W*D*H (mm)	280*891*933				

Model		MU10KXL	MU15KXL	MU20KXL	MU30KXL	MU40KXL	MU60KX
Capacity		10kVA	15kVA	20kVA	30kVA	40kVA	60kVA
Input	Phase	3 Phase+Neutral+Ground					
	Rated Voltage	380/400/415Vac					
	Voltage Range	208-478Vac					
	Frequency Range	40-70Hz					
	Power Factor	≥0.99					
	THDi	≤3% (100% linear load)					
Bypass	Voltage Range	Upper limit: 380V+25% (+10%, +15%, +20%, settable); 400V+20% (+10%, +15%, settable) 415V+15% (+10%, settable); Lower limit: -45% (-10%, -20%, -30%, settable)					
	Frequency Range	50/60Hz±10%					
Output	Phase	3 Phase+Neutral+Ground					
	Rated Voltage	380/400/415Vac					
	Power Factor	1					
	Voltage Regulation	±1%					
	Output Frequency	Normal Mode: ±1%/±2%/±4%/±5%/±10%, settable; Battery Mode: 50/60Hz±0.1%					
	Crest Factor	3:1					
	THDu	≤2% (linear load); ≤4% (non-linear load)					
	Overload	110% for 60 mins; 125% for 10 mins; 150% for 1 min; ＞150%, transfer to bypass					
Battery	Rated Voltage	±180---±300VDC, settable					
	Quantity	External					
	Charging Current	5A（1-5A, settable）				5A（1-15A, settable）	
System	Efficiency	96%					
	Display	4.3-inch color touching screen					
	IP Class	IP20					
	Interface	USB, CAN, RS485, LBS, Parallel card (optional), Relay card (optional), SNMP card (optional)					
	Temperature	Operation: 0-40℃; Storage: -25-55℃					
	Humidity	0-95% (non-condensing)					
	Altitude	＜1500m, within 1500-4000m, power derates 1% every 100m rise					
	Noise	＜58dB					
Physical	Weight(kg)	44	45	52	55	62	80
	Dimension W*D*H (mm)	280*792*718					330*914*975

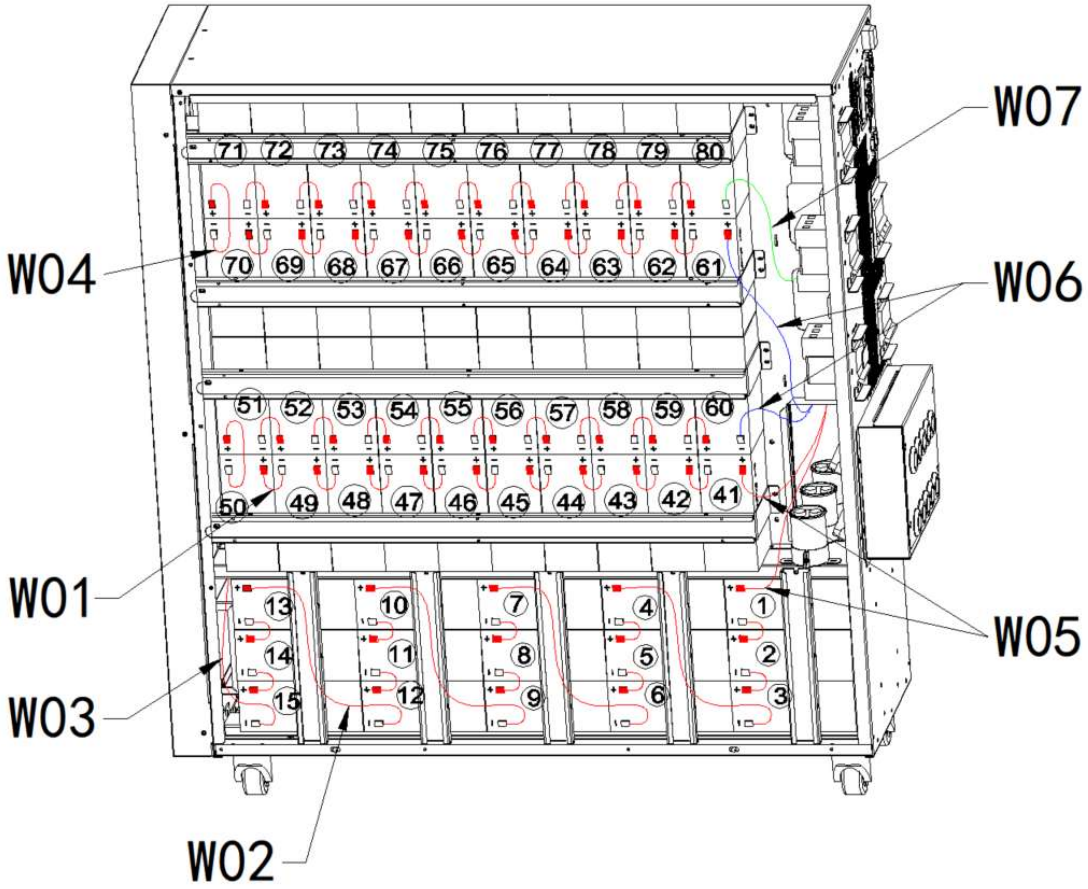
Annex. A Drawings of internal batteries connection

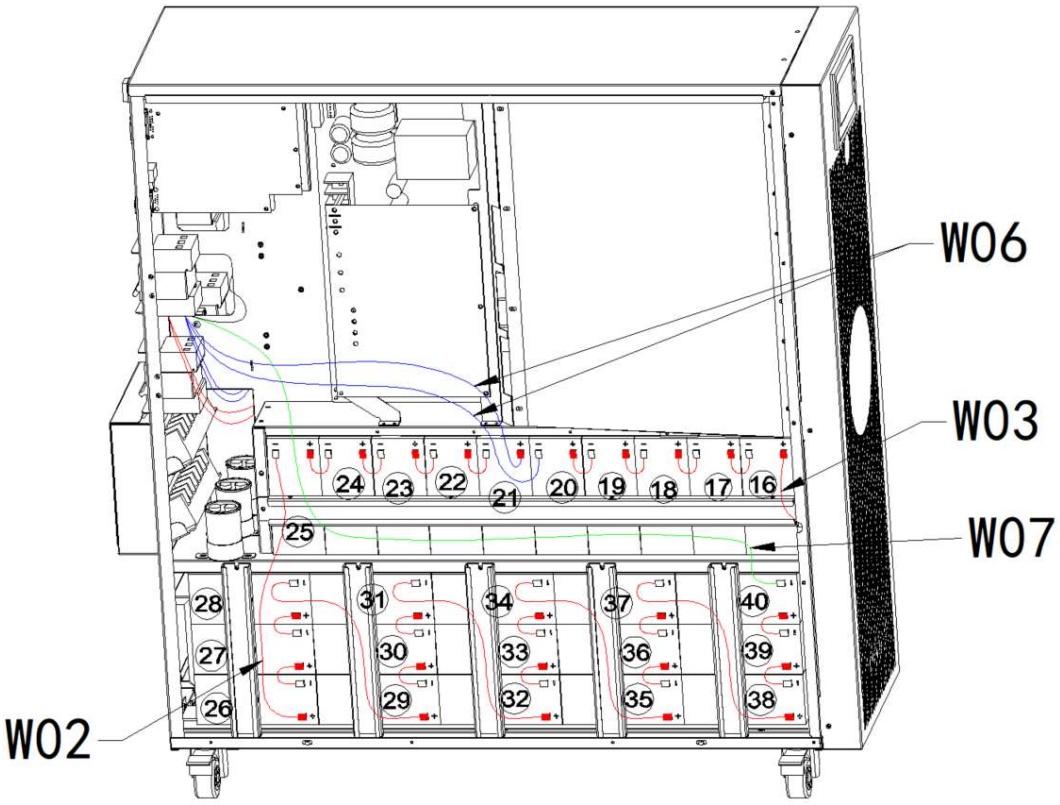
1. Drawings of internal batteries connection for 10-40K UPS with internal 40 pcs batteries:

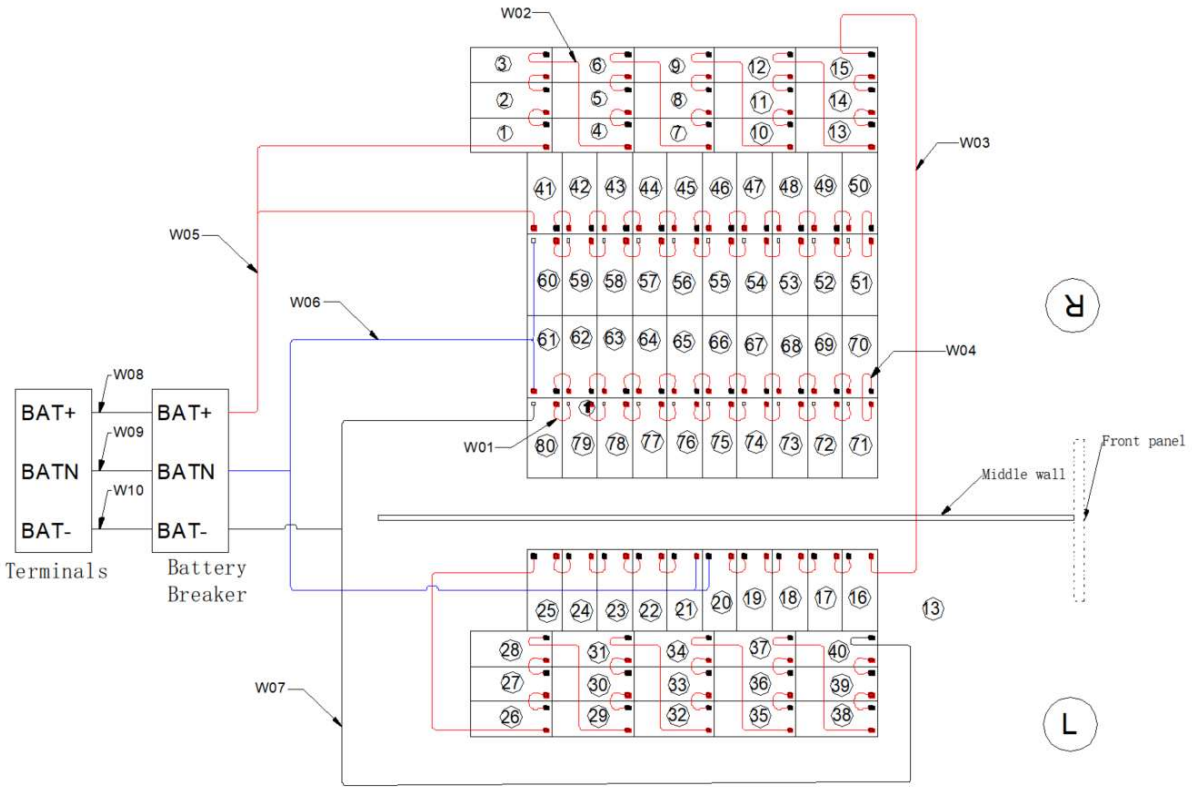




2. Drawings of internal batteries connection for 10-40K UPS with internal 80pcs batteries:




W06
W03
W07
W02
24 23 22 21 20 19 18 17 16
25
28 31 34 37 40
27 30 33 36 39
26 29 32 35 38


W02
W03
W05
W06
W04
W01
W08
W09
W10
BAT+
BATN
BAT-
Terminals
BAT+
BATN
BAT-
Battery Breaker
Front panel
Middle wall
R
L
W07

Annex. B Trouble shooting

In case the UPS cannot work normally, it might be wrong in installation, wiring or operation. Please check these aspects first. If all these aspects are checked without any problem, please consult with local agent right away and provide below information.

（1） Product model name and serial number.

（2） Try to describe the fault with more details, such as LCD display info, LED lights status, etc.

Read the user manual carefully, it can help a lot for using this UPS in the right way. Some FAQ (frequently asked questions) may help you to troubleshoot your problem easily.

No.	Problem	Possible reason	Solution
1	Utility is connected but the UPS cannot be powered ON.	Input power supply is not connected; Input voltage low; The input breaker is not switched on.	Measure if the UPS input voltage/frequency is within the window. Check if UPS input is switched on
2	Utility normal but Utility LED does not light on, and the UPS operates at battery mode	The input breakers is not switched on; input cables not well connected	Switch on the input breaker; Make sure the input cable is well connected.
3	The UPS does not indicate any failure, but output do not have voltage	Output cables are not well connected; Output breaker is not switched on	Make sure the output cable is well connected; Switch on the output breaker.
4	Utility LED is flashing	Utility voltage exceeds UPS input range.	If the UPS operates at battery mode, please pay attention to the remaining backup time needed for your system.
5	Battery LED is flashing but no charge voltage and current	Battery breaker is not switched on, or batteries are damaged, or battery is reversely connected. Battery number and capacity are not set correctly.	Switch on the battery breaker. If batteries are damaged, need to replace whole group batteries, Connect the battery cables correctly; Go to LCD setting of the battery number and capacity, set the correct parameters.
6	Buzzer beeps every 0.5 seconds and LCD display “output overload”	Overload	Remove some load

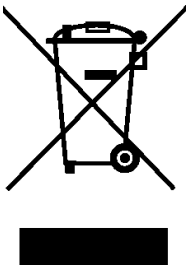
7	The UPS only works on bypass mode	The UPS is set to ECO mode, or the transfer times to bypass mode are limited.	Set the UPS working mode to UPS type(non-parallel) or to reset the times of transferring to bypass or re-start the UPS
8	Cannot start from batteries	Battery switch is not properly closed: Battery fuse is not open: Or Battery low: Battery quantity set wrong; Power breaker in the rear panel not switch ON.	Close the battery switch: Change the fuse: Recharge the battery: Power ON the UPS with AC to set the battery quantity &quantity; Switch on the power breaker.

Recycling information in accordance with the WEEE

The product is marked with the wheelie bin symbol. It indicates that at the end of life the product should enter the recycling system.

You should dispose of it separately at an appropriate collection point and not place it in the normal waste stream.

The figure below shows the wheelie bin symbol indicating separate collection for electrical and electronic equipment (EEE).



The Horizontal bar underneath the crossed-out wheelie bin indicates that the equipment has been manufactured after the Directive came into force in 2005.

The main parts of the drive can be recycled to preserve natural resources and energy. Product parts and materials should be dismantled and separated.

Contact your local distributor for further information on environmental aspects. End of life treatment must follow international and national regulations.