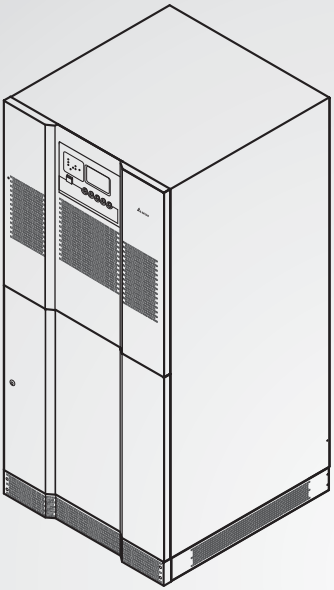

The power behind competitiveness

Delta UPS - Ultron Family

NT Series, Three Phase
10-500 kVA

User Manual

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Smarter. Greener. Together.

Save This Manual

This manual contains important instructions and warnings that you should follow during the installation, operation, storage and maintenance of this product. Failure to heed these instructions and warnings will void the warranty.

Table of Contents

Chapter 1 : Important Safety Instructions

- This manual contains important instructions that should be followed during installation and maintenance of the UPS and batteries. Before wiring and operation, read all instructions thoroughly.
- Install the UPS in a well-ventilated area, away from flammable liquid and gas. Do not let the unit come in contact with water. The UPS is only suitable for being installed on the concrete and non-combustible surface.
- The external slits and openings in the UPS are provided for ventilation. To ensure reliable operation of the UPS and to protect the UPS from overheating, these slits and openings must not be blocked or covered. Do not insert any object into the slits and openings that may hinder ventilation.
- Do not put beverages on the UPS, battery cabinet or any other accessory associated with the UPS.
- The UPS is designed to power modern computer loads and associated peripheral devices, such as monitors, modems, cartridge tape drives, external floppy drives, etc. Do not connect (1) inductive loads, (2) capacitive loads or (3) life support equipment to the UPS.
- All maintenance and installation should be performed by qualified service personnel. The UPS contains high voltage which is potentially hazardous.
- The risk of dangerous high voltage is possible when batteries are still connected to the UPS even though the UPS is disconnected from AC power sources. Before maintenance, please turn off the external battery cabinet's circuit breaker to cut off the battery power from the UPS.
- Isolate the UPS before working on the circuit. A readily accessible disconnect device shall be installed.
- Before applying electrical power to the UPS, make sure the UPS is grounded to avoid a possible risk of current leakage.
- The protective device shall be a four-pole device and shall disconnect all line conductors and the neutral conductor.
- Do not dispose of the battery or batteries in a fire. The batteries may explode.
- Do not open or damage the battery or batteries. The released electrolyte is harmful to the skin and eyes and may be toxic.

- A battery can present a risk of electric shock and high short-circuit current. The following precautions should be observed before replacement of batteries:

  1. Remove watches, rings, or other metal objects.
  2. Use tools with insulated handles.
  3. Wear insulating gloves and boots.
  4. Do not lay tools or metal parts on the top of batteries.
  5. Disconnect the charging source prior to connecting or disconnecting the batteries' terminals.

  WARNING:
  This is a class-A UPS. In a domestic environment, the product may cause radio interference, in which case, the user may be required to take additional measures.

- **Standard Compliance:**

  - EN 62040-1
  - EN 62040-2
  - IEC 61000-4-2 Level 4
  - IEC 61000-4-3 Level 3
  - IEC 61000-4-4 Level 4
  - IEC 61000-4-5 Level 4
  - IEC 61000-4-6

- **Symbol Introduction**

  
  Protective grounding terminal: a terminal which must be connected to earth ground prior to making any other connection to the equipment.

  
  A terminal to which or from which a direct current or voltage may be applied or supplied.

  
  This symbol indicates the word "phase".

Chapter 2 : Introduction

The NT series UPS is a dedicated design for large scales of power systems such as data centers, communication systems, satellite systems, network rooms, medical devices, monitoring, safety and emergency systems as well as factory facilities.

The UPS adopts high frequency SPWM (Sinusoidal Pulse-Width Modulation) inverter technology. The inverter uses an advanced IGBT module capable to reduce the MTTR (Mean Time to Repair) and easier to be maintained, came with advantages in high efficiency, low thermal loss, low noise, small volume, and long product life expectation. The applied MCU simplifies complicated control circuits and reduces number of components. To improve reliability, the NT series UPS is designed with the following two functions:

Hot standby redundancy: dual input application.

Parallel redundancy: no need to add external parallel control cards and capable to parallel up to 8 UPS units.

The LCD display with multi-language graphical interface makes the user easier to operate. System block diagram and status are also available on the LCD providing the user with clear operating modes and overall conditions. The user can also implement long-distance monitoring via various communication ports, computers and network systems. As a result, direct monitoring and control of the UPS is available (all messages on the LCD are generated by MCU). With the installation of the provided exclusive software, UPSentry 2012, a total of 31 UPS units' status can be monitored at the same time via only one PC, which greatly reduces manpower and facilitates centralized control. The circuit boards of the NT Series UPS are interchangeable which minimizes component inventory management, and the friendly design of the NT series UPS provides optimal and durable quality power and enhances the unit's availability and reliability.

Chapter 3 : Operation Modes

There are four basic operation modes for the NT series UPS, either of which can deliver loads with reliable and high quality power source in any conditions. The operation modes are described as follows.

3.1 Normal Mode (Single)

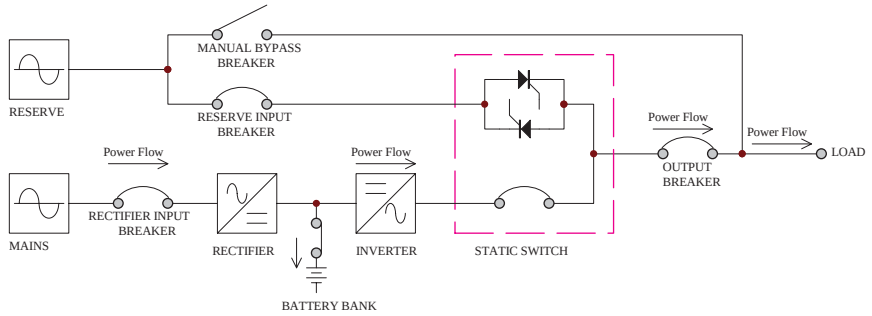


Figure 3-1-a: Status Block of Normal Mode (10-200kVA)

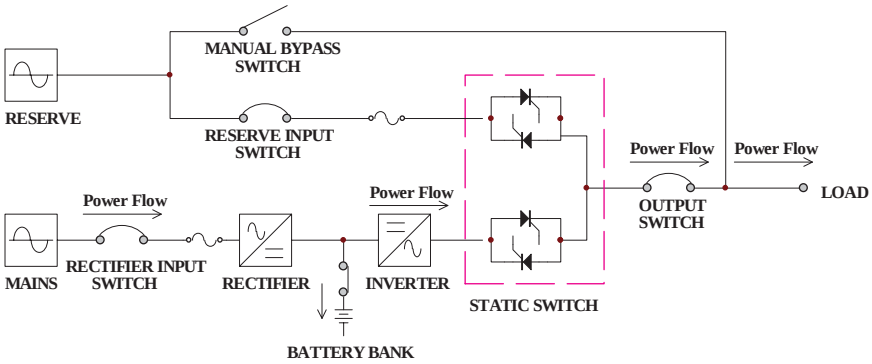


Figure 3-1-b: Status Block of Normal Mode (260-500kVA)

In normal mode, DC power, rectifying from AC input power, charges batteries and powers the inverter that transforms DC power to stable and clean AC power to the loads (see ***Figure 3-1-a*** and ***Figure 3-1-b***).

3.2 Back-up Mode (Single)

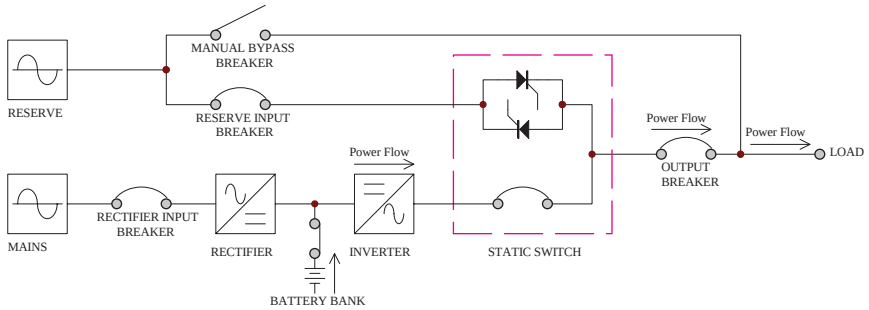


Figure 3-2-a: Status Block of Back-up Mode (10-200kVA)

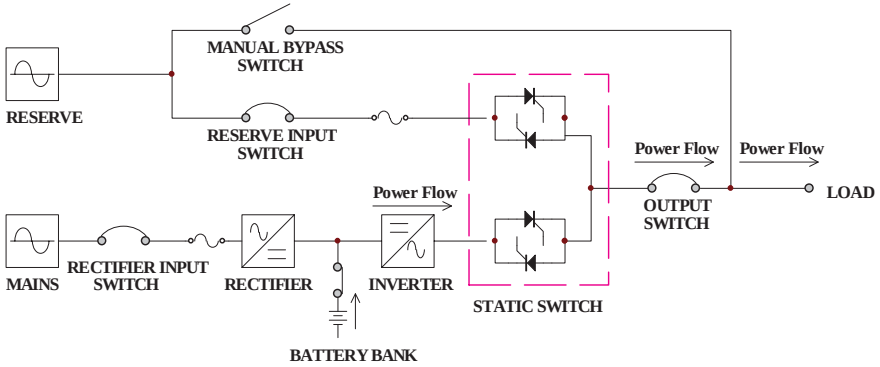


Figure 3-2-b: Status Block of Back-up Mode (260-500kVA)

When the utility AC power fails or unstable voltage occurs, the batteries will instantly provide DC power to keep continuous operation. Hence, the UPS output will not be interrupted.

3.3 Reserve AC Supply Mode (Single)

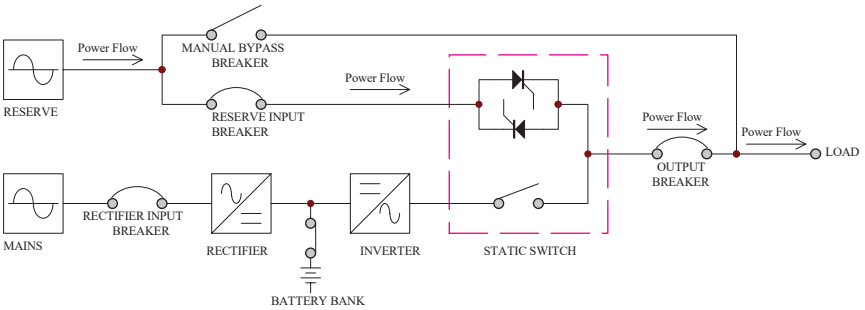


Figure 3-3-a: Status Block of Reserve AC Power Supply Mode (10-200kVA)

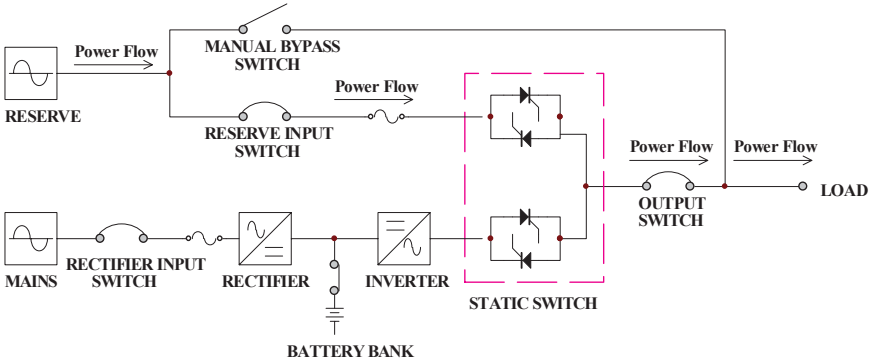


Figure 3-3-b: Status Block of Reserve AC Power Supply Mode (260-500kVA)

When the inverter encounters abnormal situations such as over temperature, long-time overload, output short circuit, abnormal output voltage and exhausted battery, the inverter will automatically shut down itself for self-protection. Meanwhile, if the reserve AC power is normal, the static switch will switch to the reserve AC power to supply power to the loads without any interruption of power supply. After the abnormal situations mentioned above are eliminated, the static switch will switch back to the main AC source (see ***Figure 3-3-a*** and ***3-3-b***).

3.4 Maintenance Bypass Mode (single)

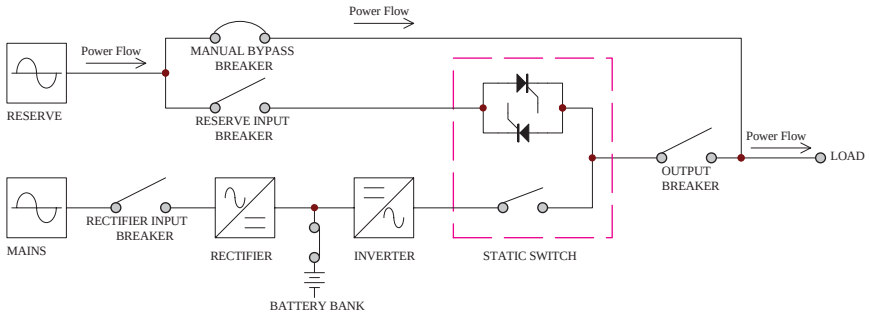


Figure 3-4-a: Status Block of Maintenance Bypass Mode (10-200kVA)

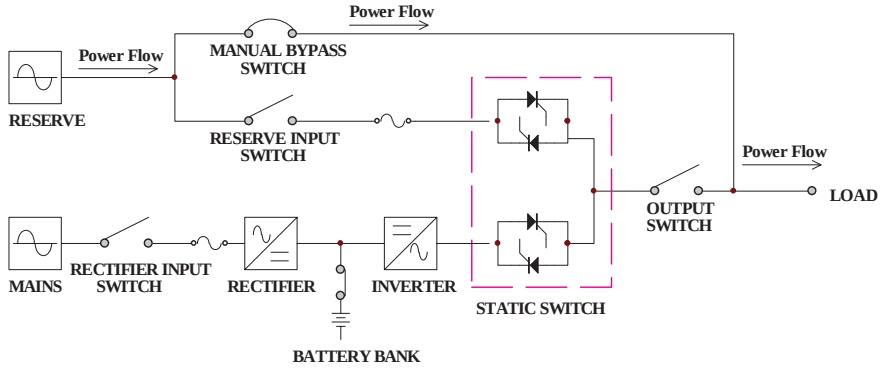


Figure 3-4-b: Status Block of Maintenance Bypass Mode (260-500kVA)

When maintenance is needed and the reserve AC power is normal, the UPS can be switched from inverter mode to bypass mode manually with continuous power delivering to the loads. Under such conditions, the internal power will be completely cut off except that the terminals and manual bypass breaker or switch still have high voltage. As a result, risks will not exist in the UPS so service personnel can perform maintenance safely (see ***Figure 3-4-a*** and ***3-4-b***).

NOTE: If only single input power is available, please utilize the same power source for reserve AC input and rectifier input.

3.5 ECO Mode (only for Single Unit)

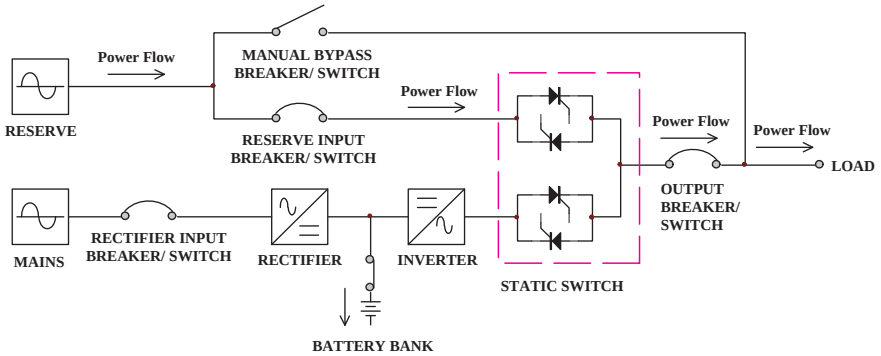


Figure 3-5: Status Block of ECO Mode (10-500kVA)

In ECO mode, it is the reserve AC power to supply power to the connected loads via the reserve input breaker or switch, static switch and the output breaker or switch. In this mode, the inverter, after reaching to the specified rated voltage, will transfer to standby status. (1) If the reserve AC power is abnormal, the UPS will transfer to run in normal mode. (2) If the main AC and reserve AC sources are both abnormal, the UPS will run in battery mode. After the main AC source is recovered to normal stable status, the UPS will run in normal mode first, and then transfer to run in ECO mode after 40 seconds.

NOTE:

ECO mode is only applicable to the UPS with capacity above 260kVA (included). For the capacity below 200kVA (included), the function of ECO mode is optional. Please note that ECO mode is not applicable to parallel applications.

3.6 Normal Mode (Parallel)

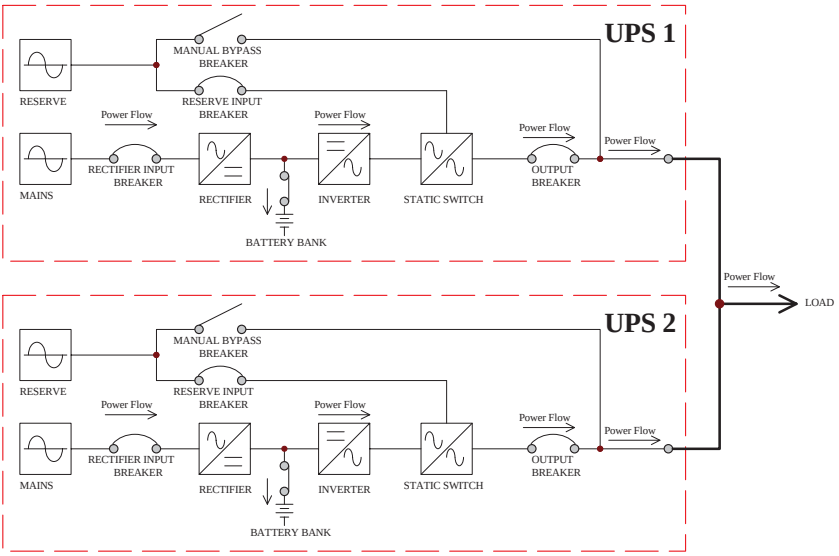


Figure 3-6-a: Parallel Status Block of Normal Mode (10-200kVA)

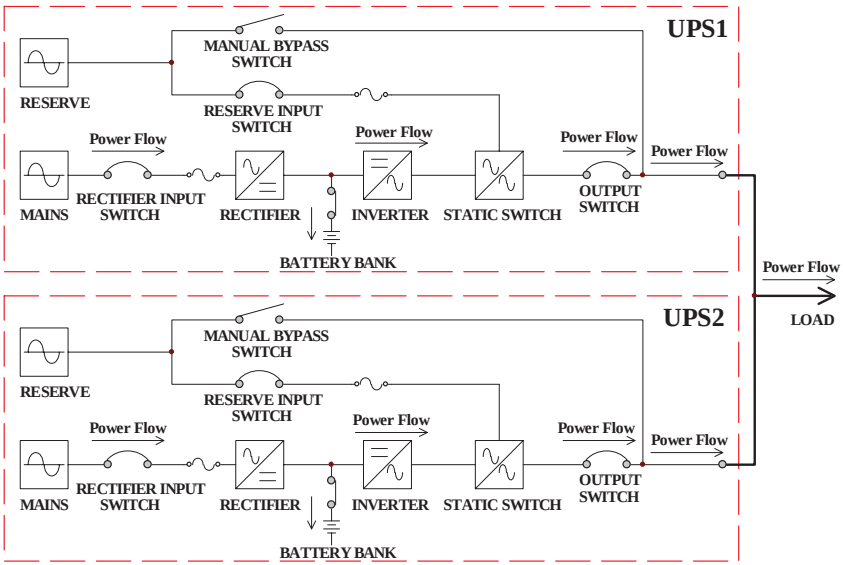


Figure 3-6-b: Parallel Status Block of Normal Mode (260-500kVA)

Two or more UPS units operating in parallel mode have to satisfy requirements of the same capacity, output voltage, frequency, and equal load share. If one of the units fails and its loads are less than the sum of rated-load values of other units in parallel, the rest of units can share the sum of loads; otherwise, all UPS units will shut down inverters and switch to the reserve AC power to supply power to the loads (see ***Figure 3-6-a*** and ***3-6-b***).

3.7 Back-up Mode (Parallel)

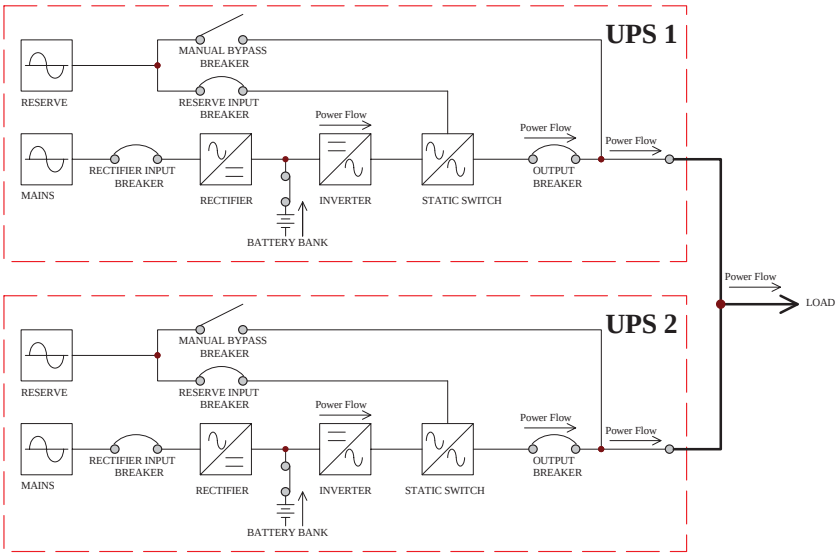


Figure 3-7-a: Parallel Status Block of Back-up Mode (10-200kVA)

When the utility AC power fails or other unstable voltage occurs, the batteries will instantly provide the inverter with DC power to keep continuous operation. Hence, the UPS output will not be interrupted (see ***Figure 3-7-a*** and ***3-7-b***).

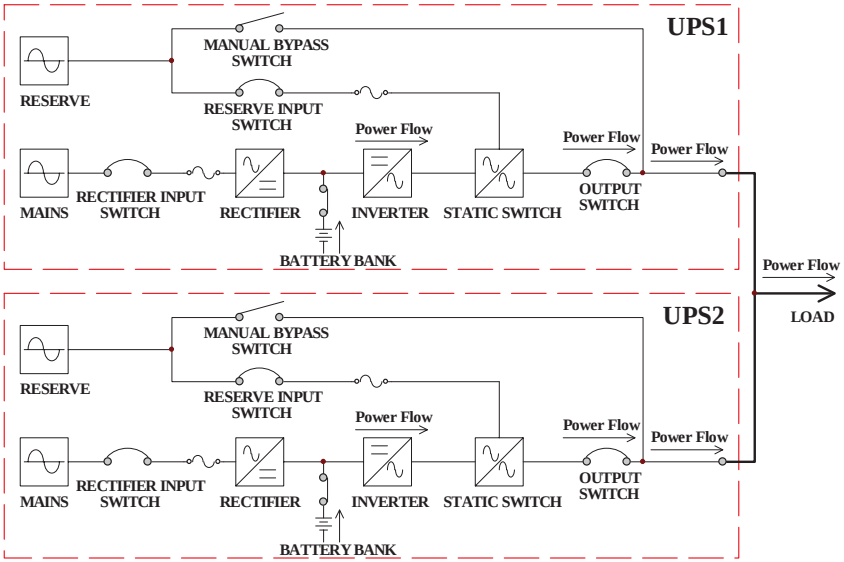


Figure 3-7-b: Parallel Status Block of Back-up Mode (260-500kVA)

3.8 Reserve AC Supply Mode (Parallel)

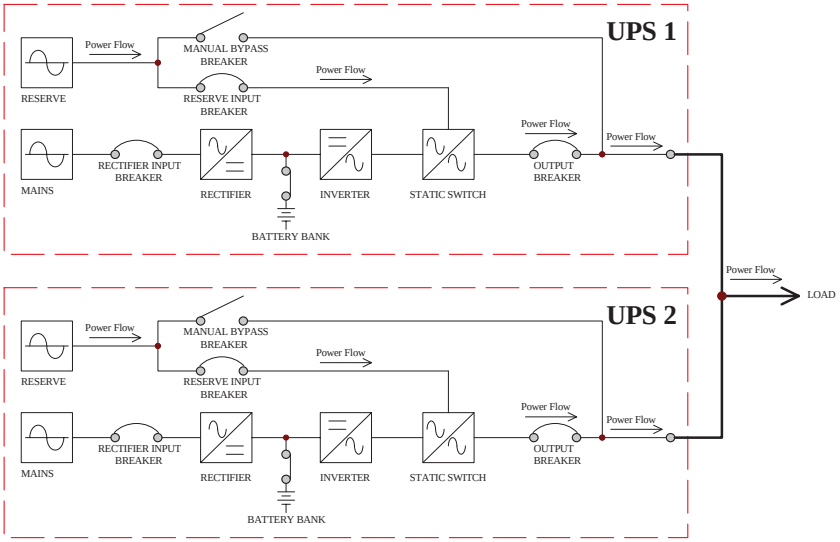


Figure 3-8-a: Parallel Status Block of Reserve AC Power Supply Mode (10-200kVA)

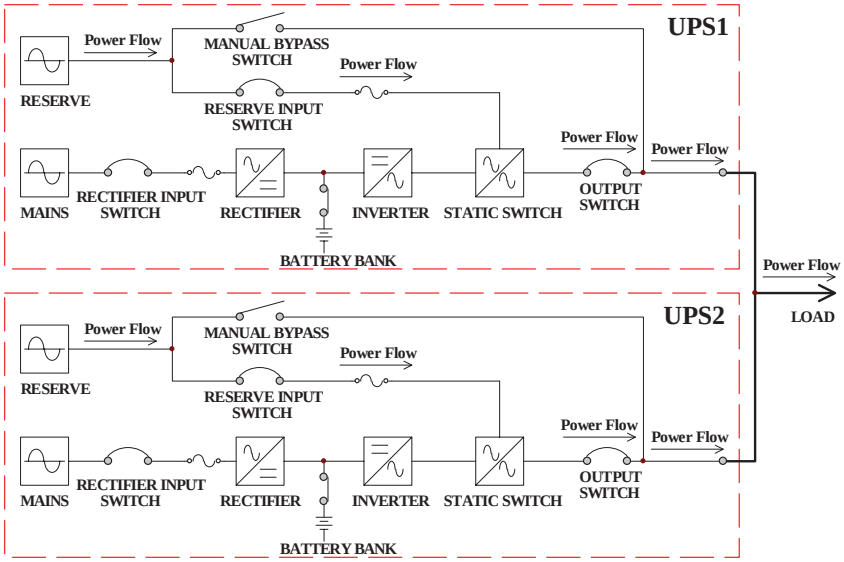


Figure 3-8-b: Parallel Status Block of Reserve AC Power Supply Mode (260-500kVA)

When the inverter is in abnormal situations such as over temperature, long-time overload, output short circuit, abnormal output voltage and exhausted battery, the inverter will shut down itself for self-protection. If the reserve AC power is normal, the static switch of each parallel UPS will switch to the reserve AC power to supply power to the loads without any interruption of power supply. After the abnormal situations mentioned above are eliminated, the static switch will switch back to the main AC source (see ***Figure 3-8-a*** and ***3-8-b***).

3.9 Maintenance Bypass Mode (Parallel)

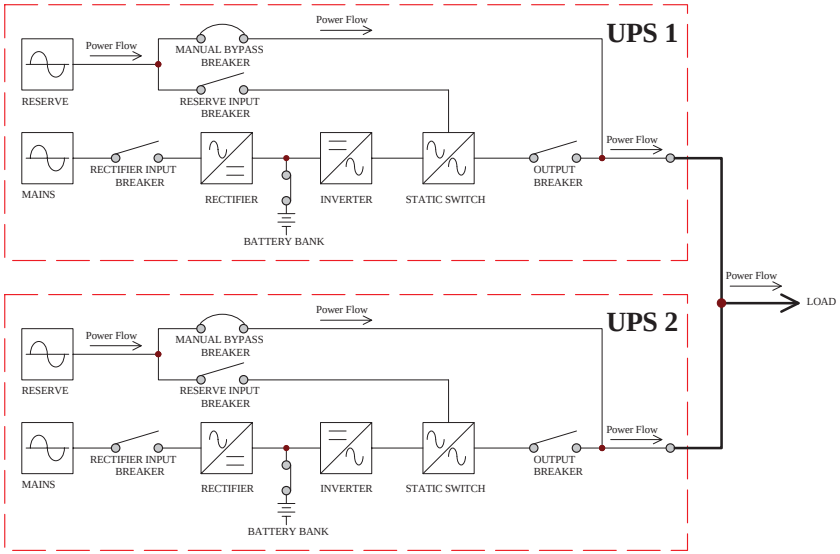


Figure 3-9-a: Parallel Status Block of Maintenance Bypass Mode (10-200kVA)

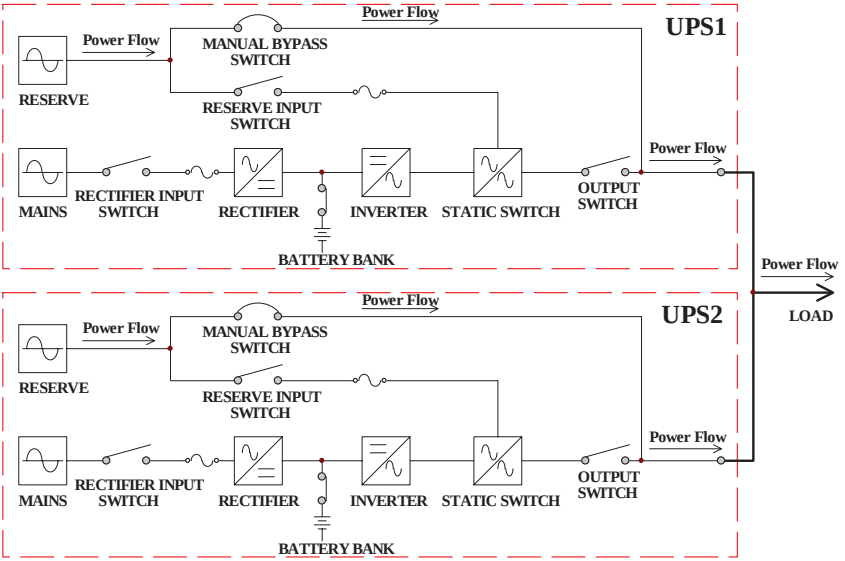


Figure 3-9-b: Parallel Status Block of Maintenance Bypass Mode (260-500kVA)

When maintenance is needed and the reserve AC power is normal, the parallel UPS units can be switched from inverter mode to bypass mode manually with continuous power delivering to the loads. Under such conditions, the internal power will be completely cut off except that each parallel UPS's terminals and manual bypass breaker or switch still have high voltage. As a result, risks will not exist in the parallel UPS units so service personnel can perform maintenance safely (see ***Figure 3-9-a*** and ***3-9-b***).

3.10 Hot Standby Redundancy

For hot standby redundancy configurations, UPS1 O/P is connected to the reserve AC power of UPS2 (see ***Figure 3-10-a*** and ***3-10-b***). Such configurations could reduce the probability of power cut-off and improve the quality of power supply.

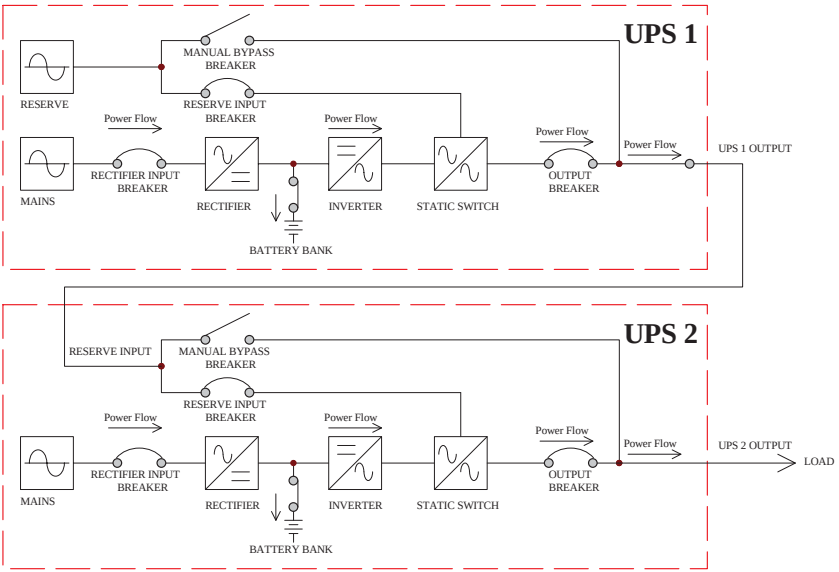


Figure 3-10-a: Status Block of Hot-standby Redundancy (10-200kVA)

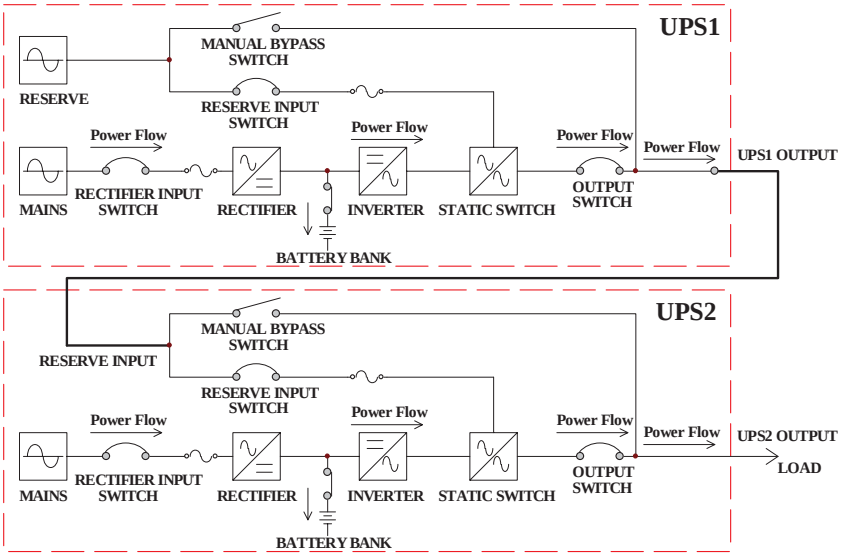


Figure 3-10-b: Status Block of Hot-standby Redundancy (260-500kVA)

In normal condition, the UPS2 supplies the loads. If the UPS2 fails, the static switch will switch to UPS1 (the reserve AC power of UPS2) without a break of the power supply. In order to reduce costs, the O/P of UPS1 could simultaneously connect to UPS2, UPS3, etc..

3.11 Common Battery

To save on costs and installation space, the parallel UPS units can share the same external battery cabinet(s). Please see ***Figure 3-11-a*** and ***3-11-b***.

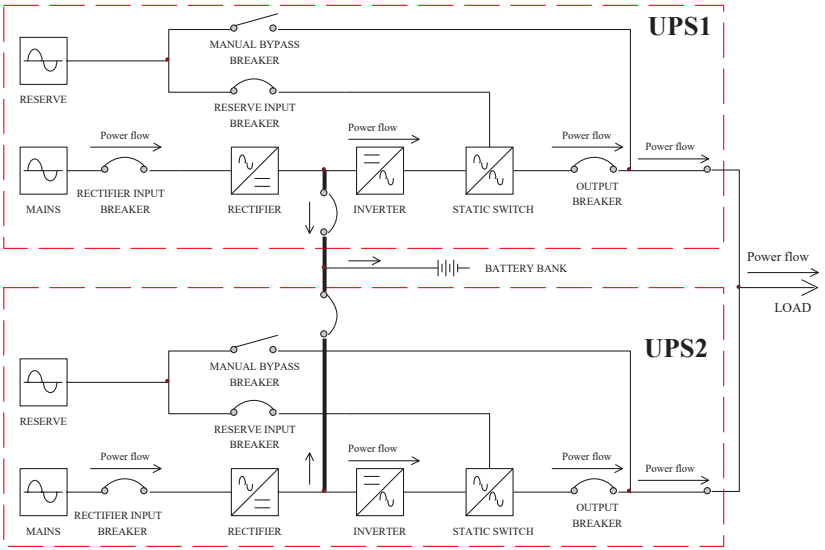


Figure 3-11-a: Status Block of Common Battery (10-200kVA)

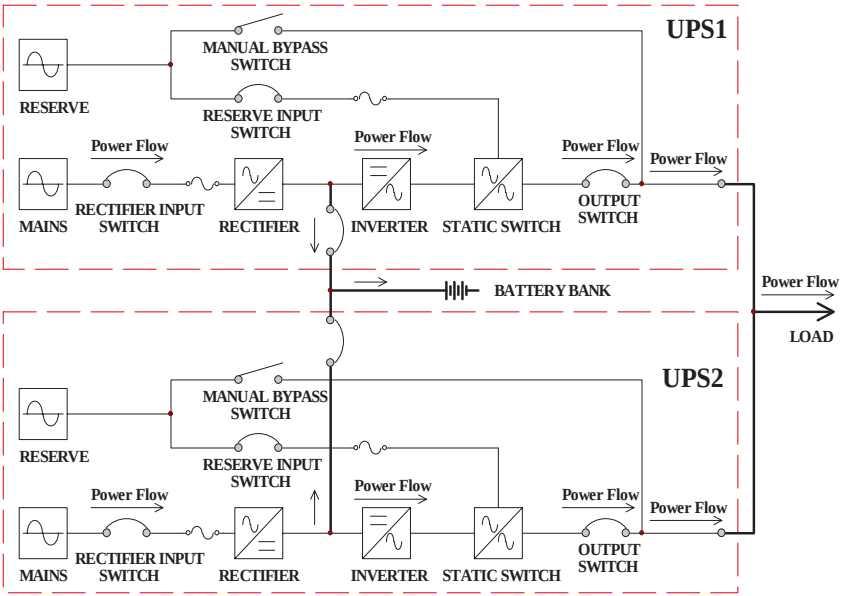


Figure 3-11-b: Status Block of Common Battery (260-500kVA)

1. When many UPS units share one external battery cabinet, you can't execute **'Battery Test'** from the LCD control panel.
2. For common battery configurations, the settings of **'Battery Capacity AH'** and **'Battery Charge Current'** shown on the LCD display shall be the actual AH and the total charge current divided by the total number of the parallel UPS units.

   For example:

   When two UPS units are in parallel, the capacity of common battery is 100AH and the charge current is 12A, the settings of **'Battery Capacity AH'** and **'Battery Charge Current'** for each UPS should be **'50AH'** and **'6A'** respectively.

3.12 Dry Contacts

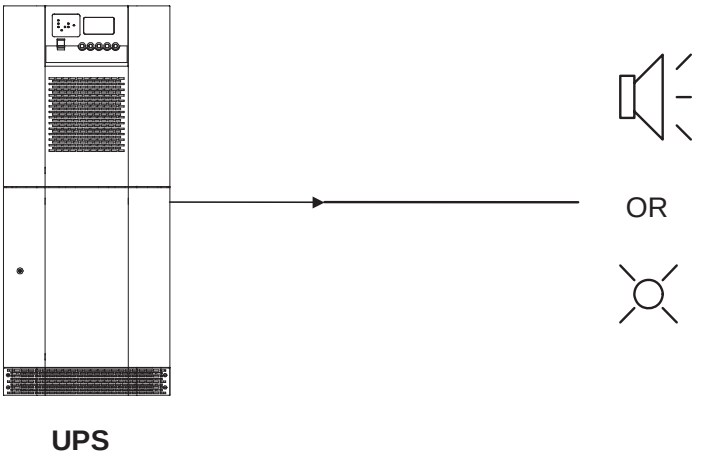


Figure 3-12

The NT series UPS provides 6 sets of programmable dry contacts that can be set as Normally Open or Normally Closed. The default settings of the 6 sets of dry contacts are described as follows.

1. Normal: The UPS runs in normal mode.
2. Reserve: When the inverter is abnormal, it is the reserve AC power to supply power to the loads.
3. Back-up: When the main AC power is abnormal, it is the batteries to supply power to the loads.

4. BAT_LOW: When the main AC power is abnormal, it is the batteries to supply power to the loads and the battery discharging voltage exceeds the setting values (lower than 330V).
5. RES Fail: When the UPS runs in normal mode and the reserve AC power is abnormal, the output frequency will be based on the rated frequency.
6. BATT Test Fail: When the battery test is executed, the battery test result shows abnormalities.

A total of 20 events can be selected to set up the 6 sets of dry contacts. Please refer to ***Table 3-1***.

Table 3-1: Dry Contact Event Description

No.	Event Description	No.	Event Description
1	UPS Normal	**11**	Rectifier I/P Abnormal
2	Load On Bypass	**12**	Rectifier O/P Abnormal
3	Load On Battery	**13**	Inverter Fuse Failure
4	Battery Low	**14**	Battery Replacement
5	Bypass Abnormal	**15**	UPS Failure
6	Battery Ground Fault	**16**	Emergency Power Off
7	Battery Test Failure	**17**	Parallel Communication Abnormal
8	Inverter Overload	**18**	Manual Bypass On
9	Inverter Voltage Abnormal	**19**	UPS Over Temperature
10	Inverter Short Circuit	**20**	Battery Over Temperature

Chapter 4 : Installation & Wiring

4.1 UPS Mechanism Data

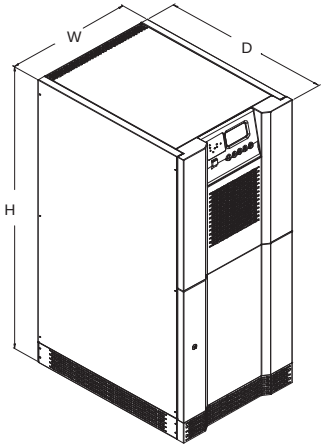
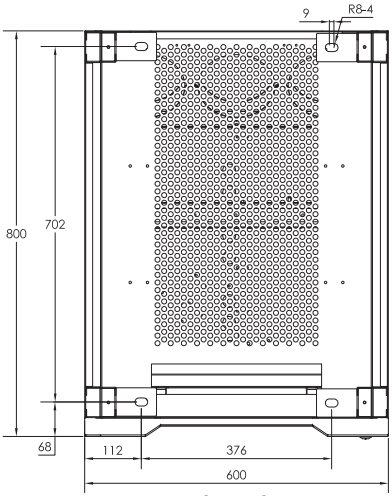


Figure 4-1

UPS unit profile dimensions table (Model 400/ 230Vac only)			
Figure 4-1			
Rating (kVA)	Width (mm)	Depth (mm)	Height (mm)
10~80K - 6P	600	800	1400
10~60K - 12P			

Bottom View



(Front)

Figure 4-2

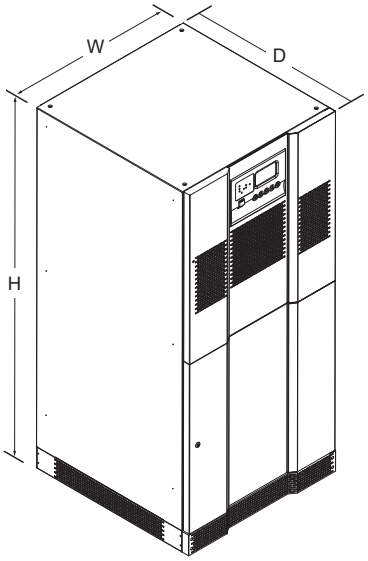


Figure 4-3

UPS unit profile dimensions table (Model 400/ 230Vac only)			
Figure 4-3			
Rating (kVA)	Width (mm)	Depth (mm)	Height (mm)
80K - 12P	800	830	1700
100~120K - 6P			

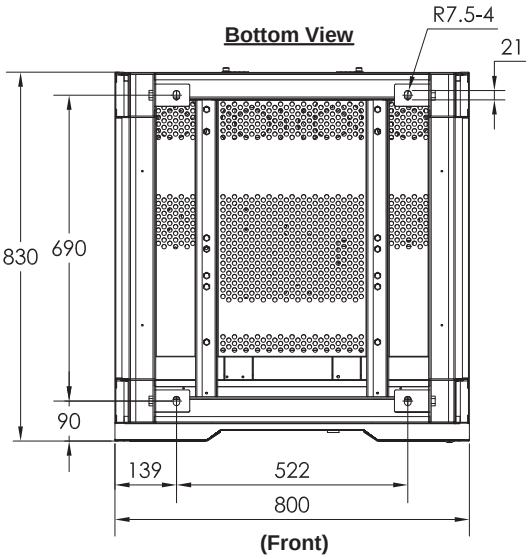


Figure 4-4

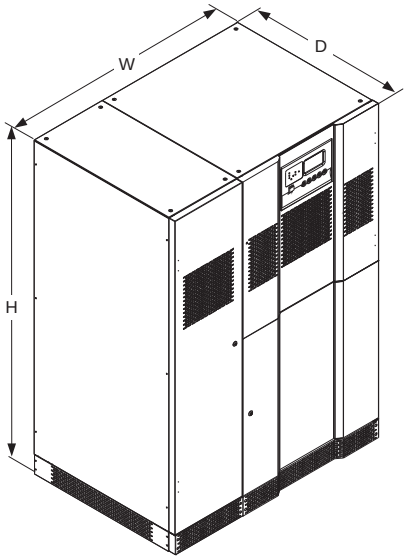


Figure 4-5

UPS unit profile dimensions table (100kVA Model_ Input: 480Vac; Bypass: 208/ 120Vac; Output: 208/ 120Vac)			
Figure 4-5			
Rating (kVA)	Width (mm)	Depth (mm)	Height (mm)
100	1200	830	1700

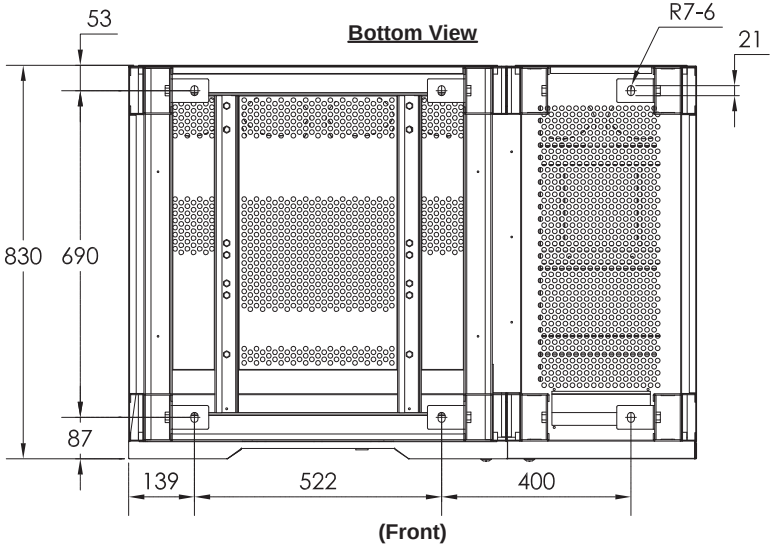


Figure 4-6

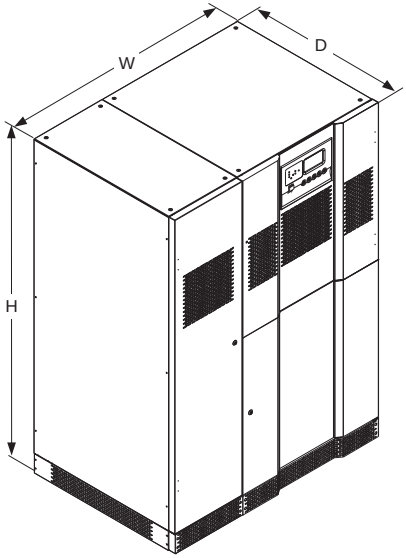


Figure 4-7

UPS unit profile dimensions table (Model 400/ 230Vac only)			
Figure 4-7			
Rating (kVA)	Width (mm)	Depth (mm)	Height (mm)
100~160K - 12P	1200	830	1700
160~200K - 6P			

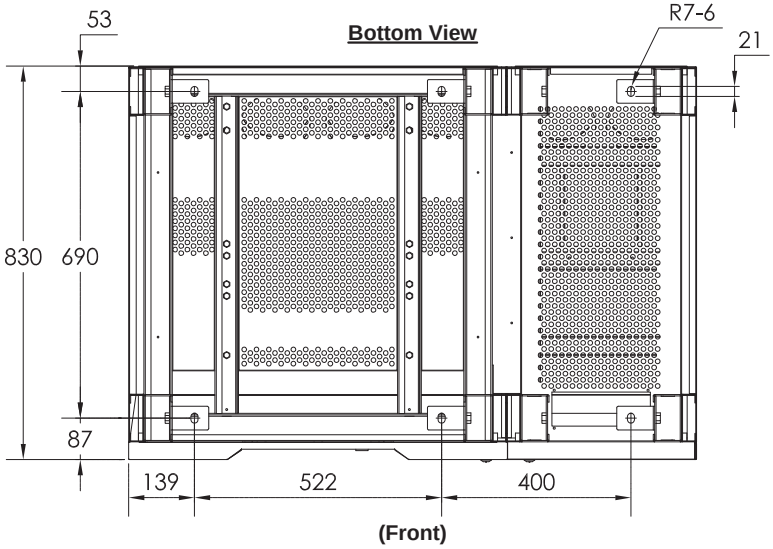


Figure 4-8

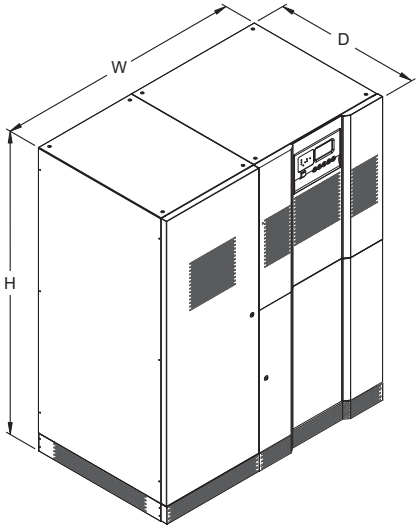


Figure 4-9

UPS unit profile dimensions table (Model 400/ 230Vac only)			
Figure 4-9			
Rating (kVA)	Width (mm)	Depth (mm)	Height (mm)
200K - 12P	1400	830	1700

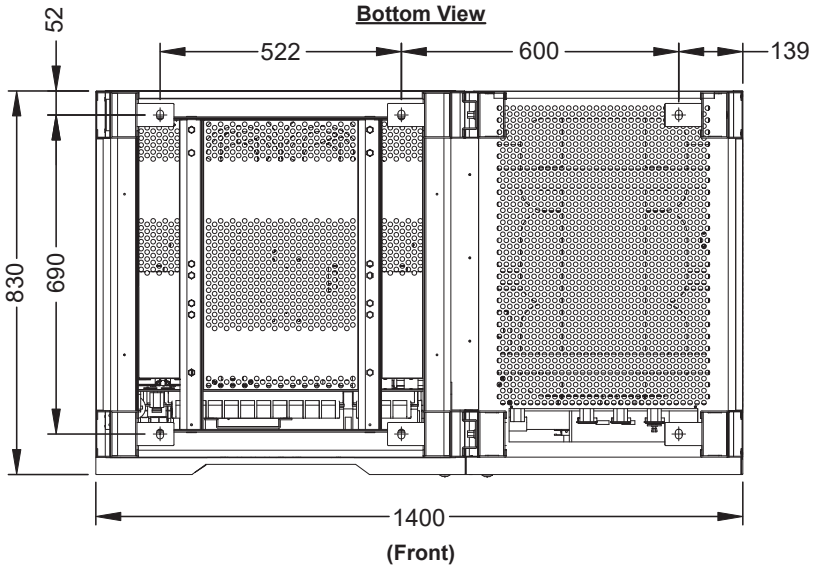
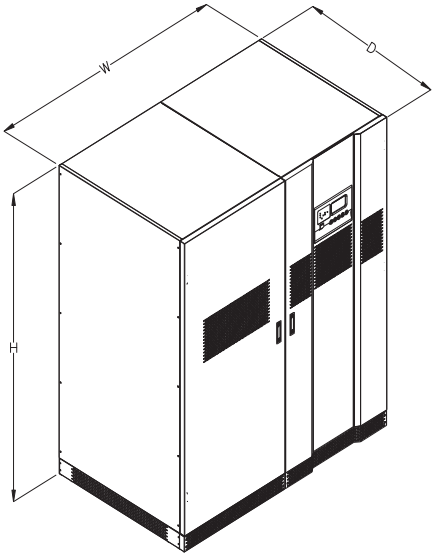


Figure 4-10



UPS unit profile dimensions table (Model 400/ 230Vac only)			
Figure 4-11			
Rating (kVA)	Width (mm)	Depth (mm)	Height (mm)
260	1600	995	1950
320			
400			

Figure 4-11

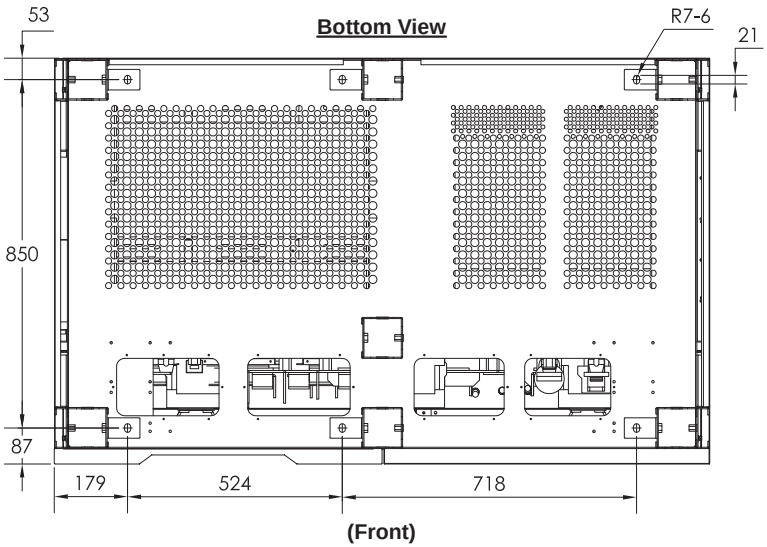
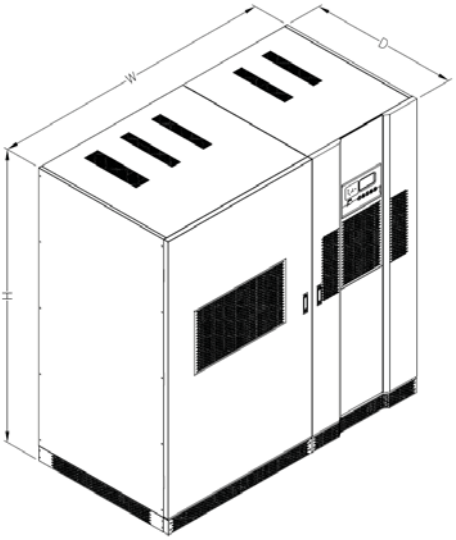


Figure 4-12



UPS unit profile dimensions table (Model 400/ 230Vac only)			
Figure 4-13			
Rating (kVA)	Width (mm)	Depth (mm)	Height (mm)
500	800+ 1100	995	1950

Figure 4-13

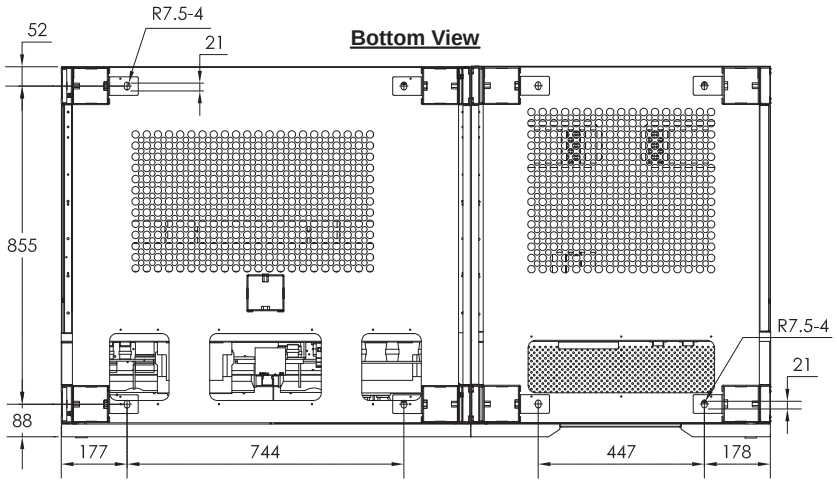


Figure 4-14

4.2 External Battery Cabinet

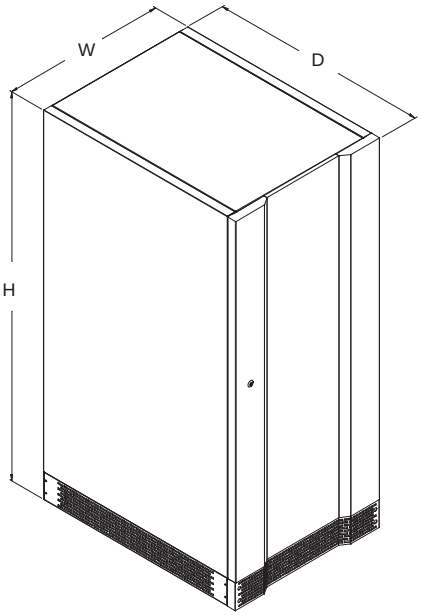


Figure 4-15

External Battery Cabinet Dimensions Table (***Figure 4-15***)			
Battery Type	Width (mm)	Depth (mm)	Height (mm)
12V/ 26AH × 29PCS	600	800	1400
12V/ 40AH × 29PCS	600	800	1400
12V/ 26AH × 58PCS	900	830	1700
12V/ 40AH × 58PCS	900	830	1700
12V/ 100AH × 29PCS	970	830	1700

4.3 External & Internal Views

4.3.1 10~80kVA

Figure 4-16 Front view: LCD control panel

Figure 4-17 Lateral view: open the front door

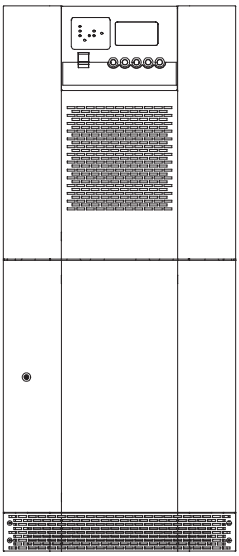


Figure 4-16

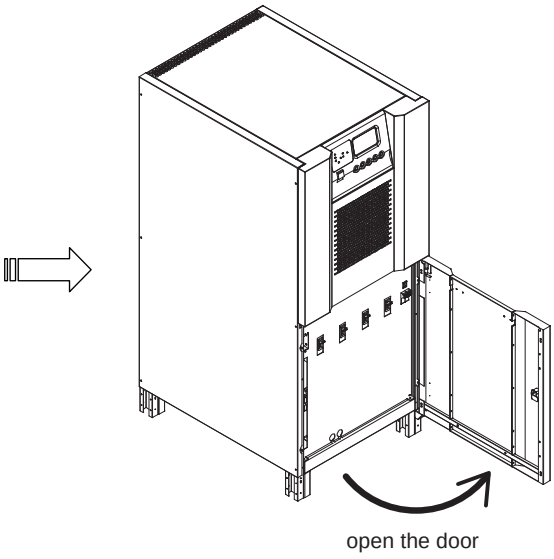


Figure 4-17

Figure 4-18 Front view with door open: one battery start-up switch, two fuses, four breakers, one SMART slot, and communication interfaces (NT-Q board).

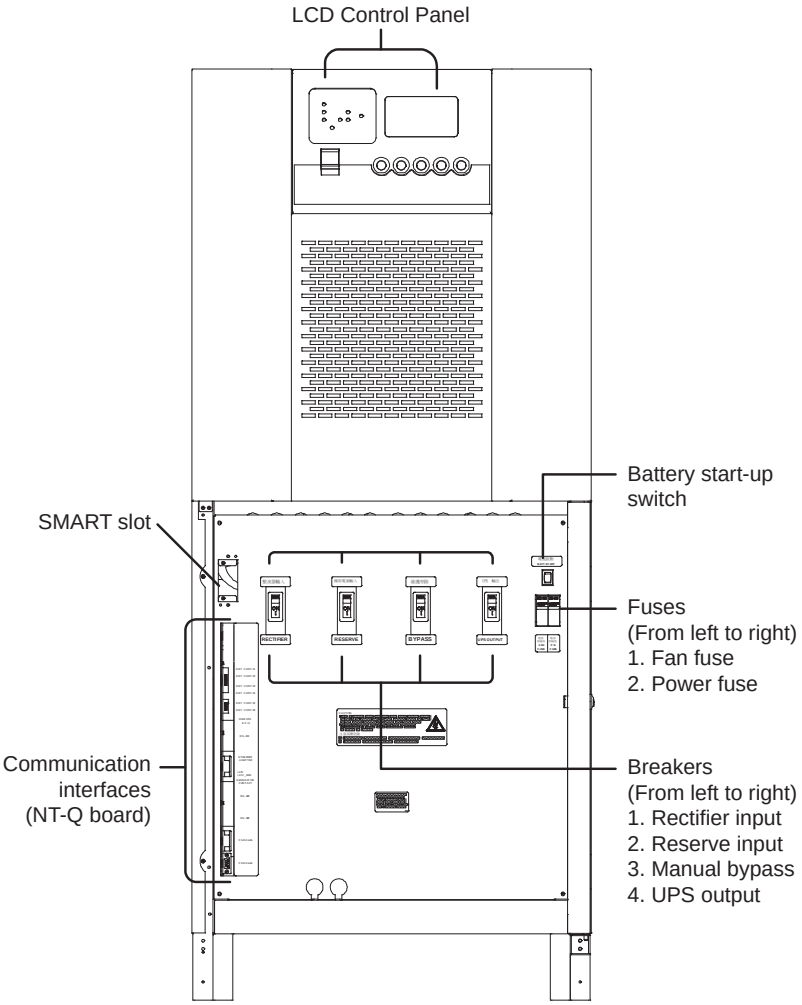


Figure 4-18

4.3.2 100~120kVA

Figure 4-19 Front view: LCD control panel.

Figure 4-20 Lateral view: open the front door.

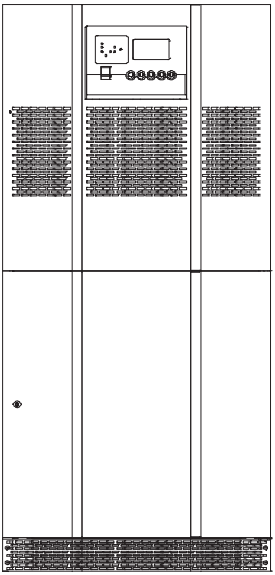


Figure 4-19

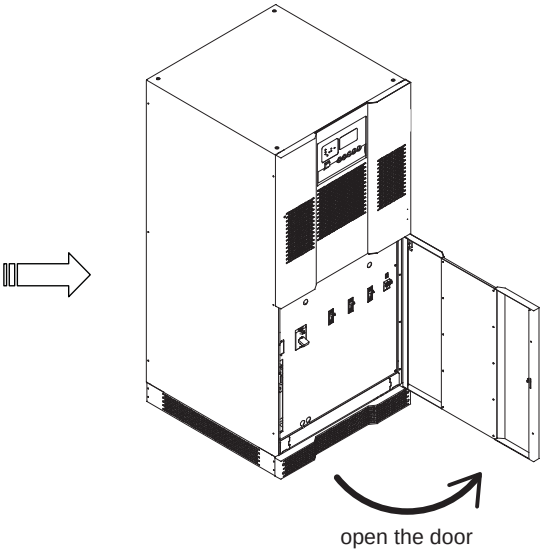


Figure 4-20

Figure 4-21 Front view with door open: one battery start-up switch, two fuses, four breakers, one SMART slot, and communication interfaces (NT-Q board).

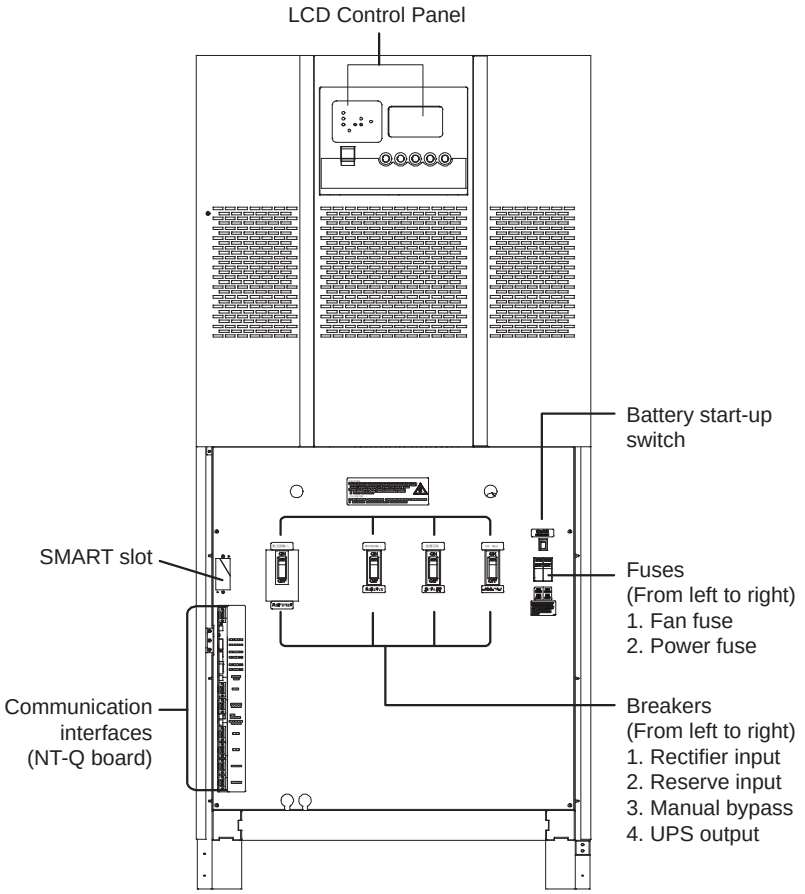


Figure 4-21

4.3.3 100kVA (Input: 480Vac; Bypass: 208/ 120Vac; Output: 208/ 120Vac)

Figure 4-22 Front view: LCD control Panel.

Figure 4-23 Lateral view: open the front doors.

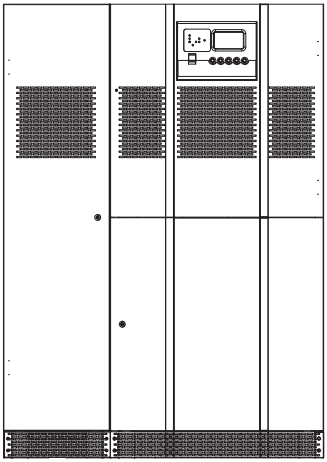


Figure 4-22

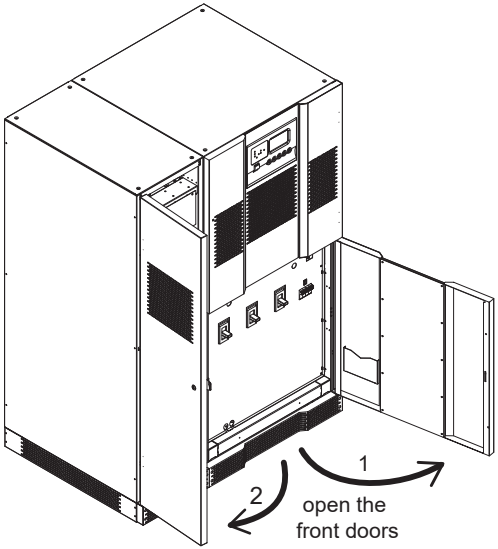


Figure 4-23

Figure 4-24 Front view with door open: one battery start-up switch, four fuses, four breakers, one SMART slot, and communication interfaces (NT-Q board).

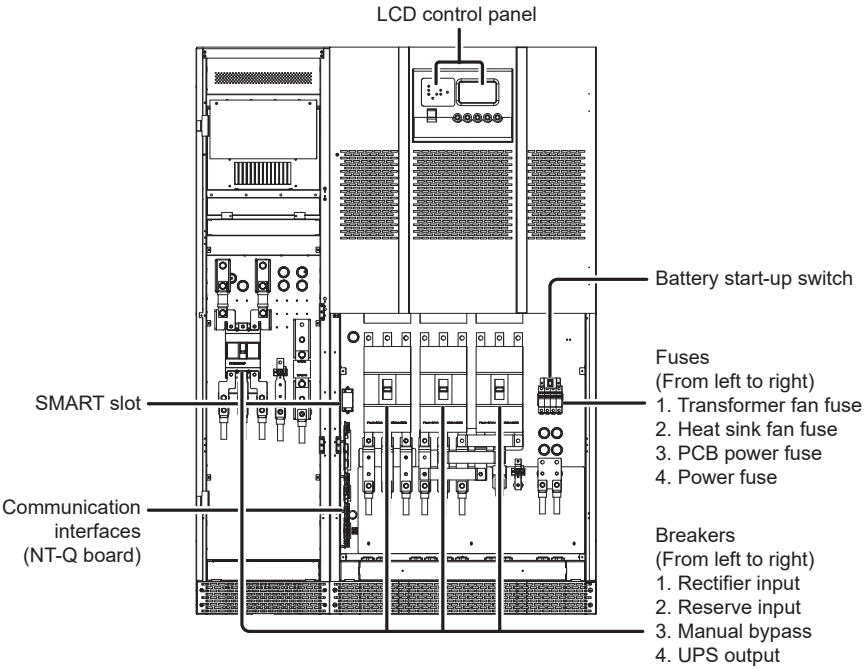


Figure 4-24

4.3.4 160~200kVA

Figure 4-25 Front view: LCD control Panel.

Figure 4-26 Lateral view: open the front doors.

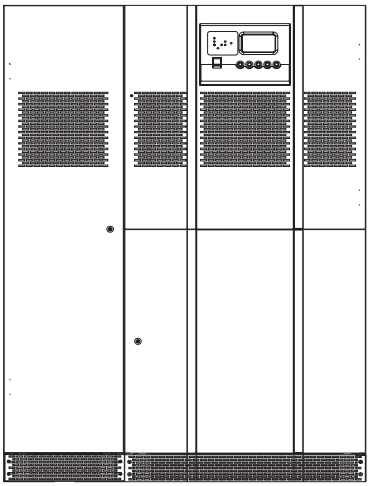


Figure 4-25

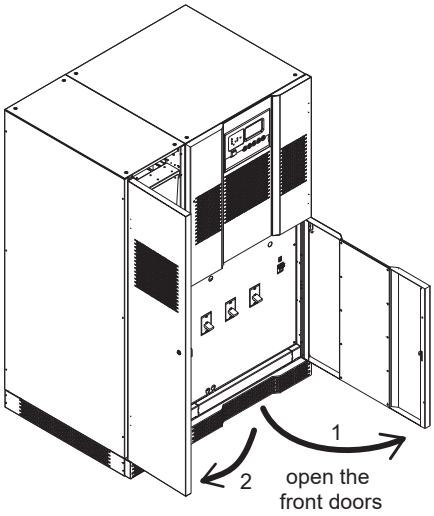


Figure 4-26

Figure 4-27 Front view with door open: one battery start-up switch, two fuses, four breakers, one SMART slot, and communication interfaces (NT-Q board).

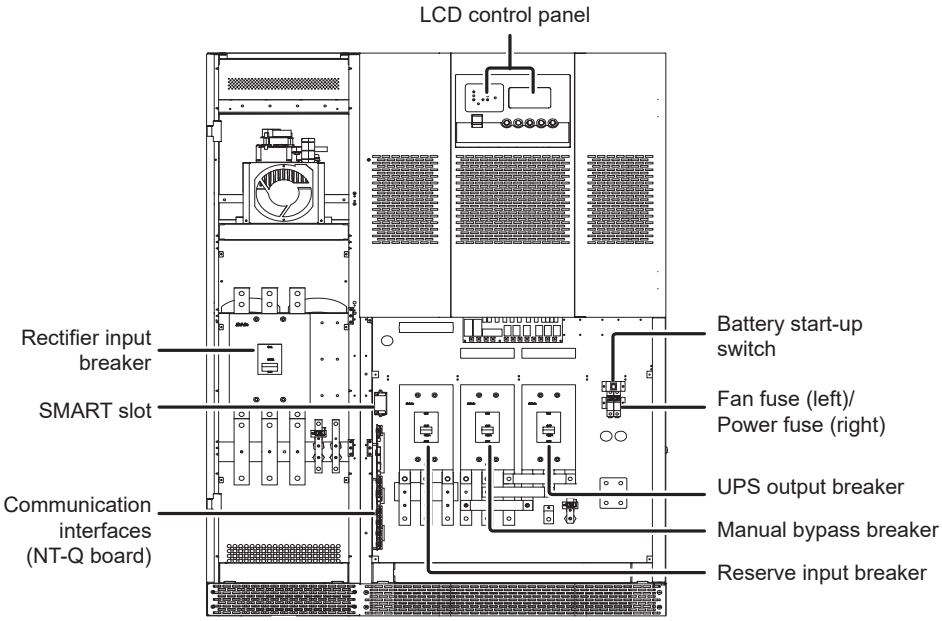


Figure 4-27

4.3.5 260~400kVA

Figure 4-28 Front view: LCD control Panel.

Figure 4-29 Lateral view: open the front doors.

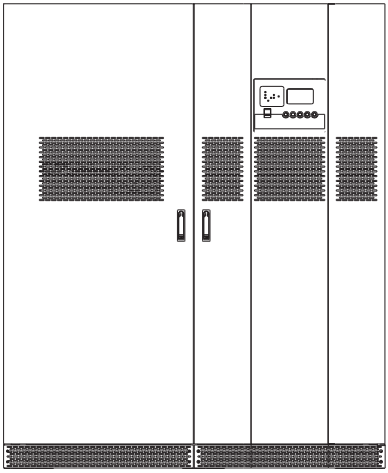


Figure 4-28

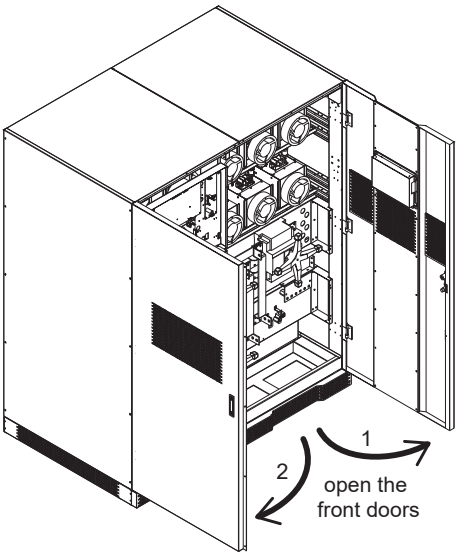


Figure 4-29

Figure 4-30 Front view with door open: four fuses, four switches, one SMART slot, and communication interfaces (NT-Q board).

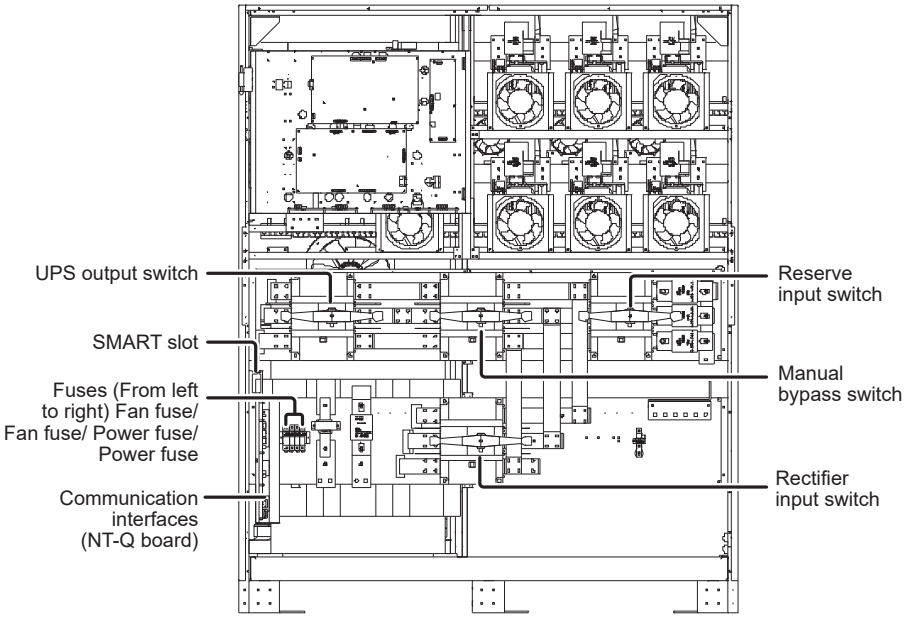


Figure 4-30

4.3.6 500kVA

Figure 4-31 Front view: LCD control panel.

Figure 4-32 Lateral view: open the front doors.

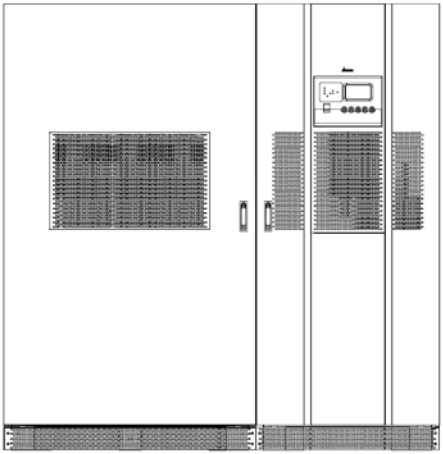


Figure 4-31

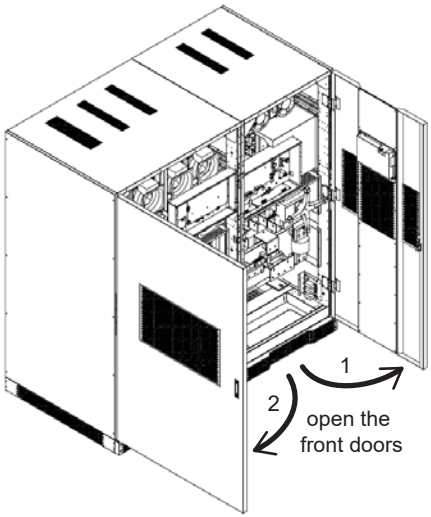


Figure 4-32

Figure 4-33 Front view with door open: seven fuses, four switches, one SMART slot, and communication interfaces (NT-Q board).

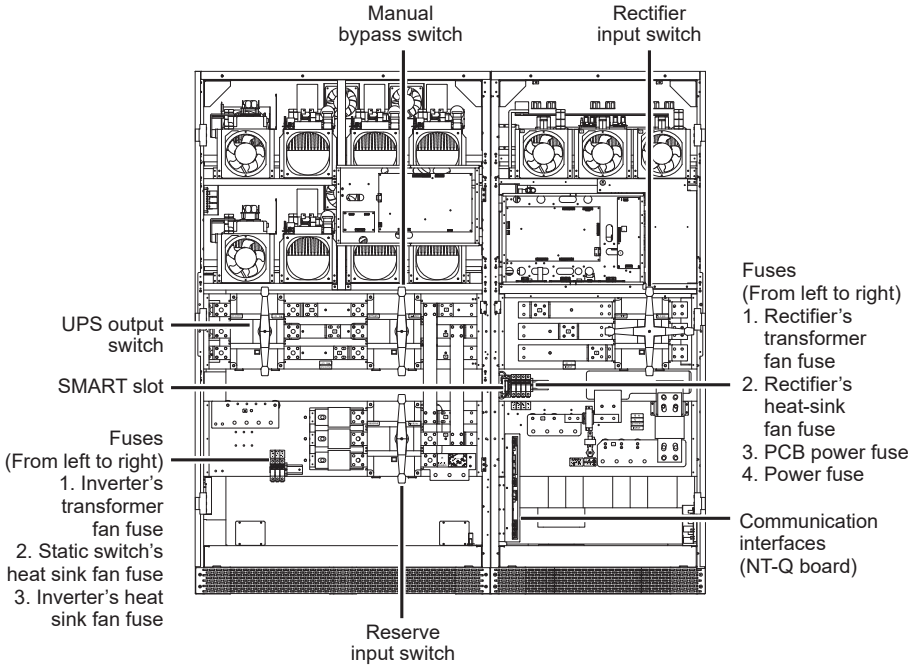


Figure 4-33

4.4 Installation Environment and Safety Precaution

To ensure UPS normal operation, prolong UPS lifetime, and protect UPS from disorder and malfunction, the user should select an optimal installation location and environment according to the following safety instructions.

1. Install the UPS indoors. Do not place it outdoors.
2. The weight of the UPS is concentrated on a relatively small floor area due to the cabinet design. The installation location must therefore have a sufficient floor loading capacity to bear the weight of the UPS.
3. The UPS and battery cabinet should be located on enough space for maintenance and good ventilation.

Rear panel should be kept away from wall at least 50 cm.

The front of the UPS should be kept at least 100cm.

The top of the UPS should be kept at least 50cm.

4. For optimum performance and reliability to prolong UPS lifetime, the temperature should be kept below 25°C, and humidity must be maintained within a range of 0 to 95% (non-condensing).
5. Check if the length and diameter of wires conform to the safety standard or not.
6. Walls, ceilings, floors, as well as everything surrounding or near the UPS should be preferably constructed by noncombustible materials. The room should be equipped with portable fire extinguishers.
7. The floor area surrounding the UPS should be kept clean. Access to the UPS room should be limited to a minimum number of operation and maintenance personnel only. The doors should be kept locked and the keys should be controlled to authorized personnel only.

4.5 Electrical Connection Precaution

4.5.1 Wiring Precaution

1. Before wiring, ensure that the input power is cut off.
2. Check that the size, diameter, phase, and polarity are correct for each cable that needs connecting to the UPS.
3. Check the accessories of the UPS and external battery cabinet, and inspect if exterior has any collision caused during shipment process or if anything is loosen or missing. If yes, please immediately contact the dealer from whom you purchased the unit.
4. If the input and output of the UPS is a Y connection, do not connect the UPS neutral (N) with the ground (⏚). If there is a floating voltage between the input power's neutral (N) and the ground (⏚) and you require that the VNG of the UPS should be zero, we suggest that you install an isolation transformer in front of the input of the UPS, and connect the UPS neutral (N) with the ground (⏚).
5. When UPSs are paralleled, the length of each unit's input cables (reserve AC power) plus output cables must be the same. This ensures that the parallel UPSs can equally share the critical loads in reserve AC supply mode.

NOTE:

When the total number of the parallel UPS units is more than four, please install a load sharing choke between each parallel UPS and its connected bypass input power to ensure that each bypass input power's current is even. For more information, please contact your local dealer, sales representative or Delta customer service.

6. The external battery cabinet must be grounded and connected to the UPS's 'Battery Cabinet Ground' terminal. Do not connect the external battery cabinet to any other grounding system.

4.5.2 NT-series 500kVA Installation and Wiring

NT-series 500kVA consists of two cabinets. Before wiring, you have to join them together first (***Figure 4-34***).

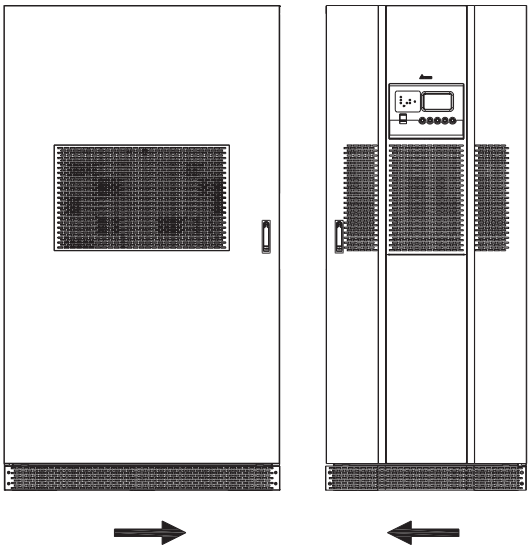


Figure 4-34

Installation Procedures:

1. Join the cabinets:

- Position two cabinets.
- Use the provided screws to join the two cabinets together.
- There are 5 junction points (see ***Figure 4-35***).

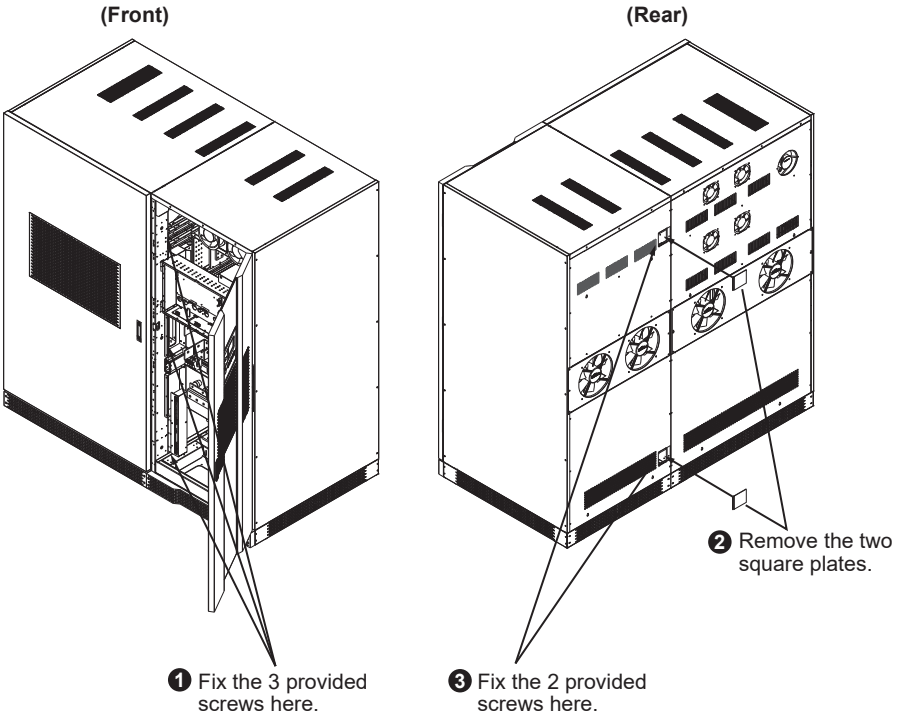


Figure 4-35

NOTE:

The above mentioned cabinet connection procedures can only be executed after the UPS is fixed in the designated location. After the cabinet connection is done, do not move the UPS by any tools or equipment.

2. Connect the grounding wire

See ***Figure 4-36***.

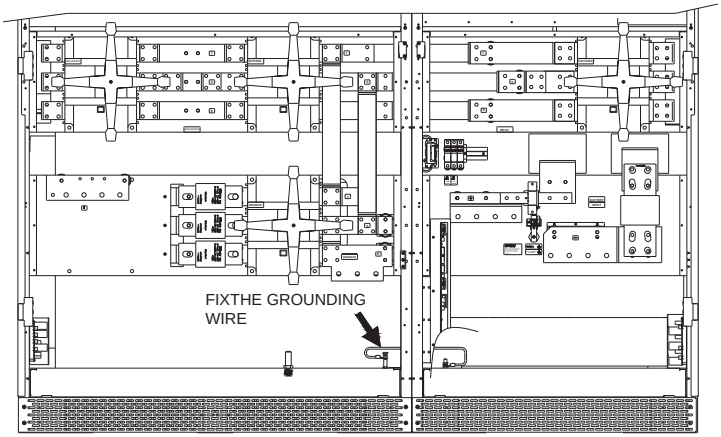


Figure 4-36

3. Connect the W95 wire to CNQ6

See ***Figure 4-37***.

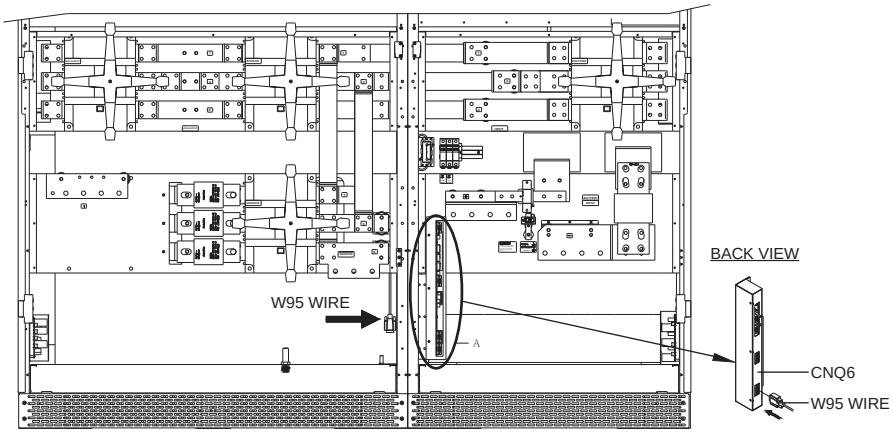


Figure 4-37

4. Connect the communication cables

- Connect the two cabinets' 18-pins communication cables.
- Connect the two cabinets' 20-pins communication cables.

Please see ***Figure 4-38***.

5. Connect the control cables

- Connect the 20-pins flat wire (A4) to the M-board's CNM208.
- Connect the 14-pins flat wire (A6) to the M-board's CNM202.

Please see to ***Figure 4-38***.

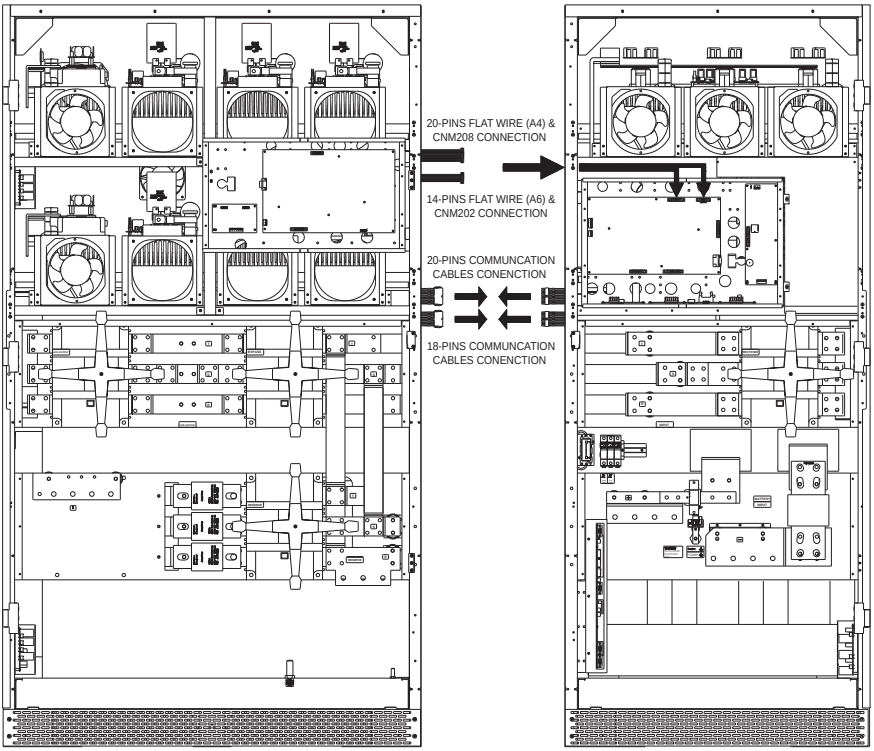


Figure 4-38

6. Connect the provided + & - cooper bars to the inverter's + & - bus bars

Take out the provided screws and + & - cooper bars from the package, and connect them to the inverter's + & - bus bars shown in ***Figure 4-39***. The size of the provided + & - cooper bars are the same.

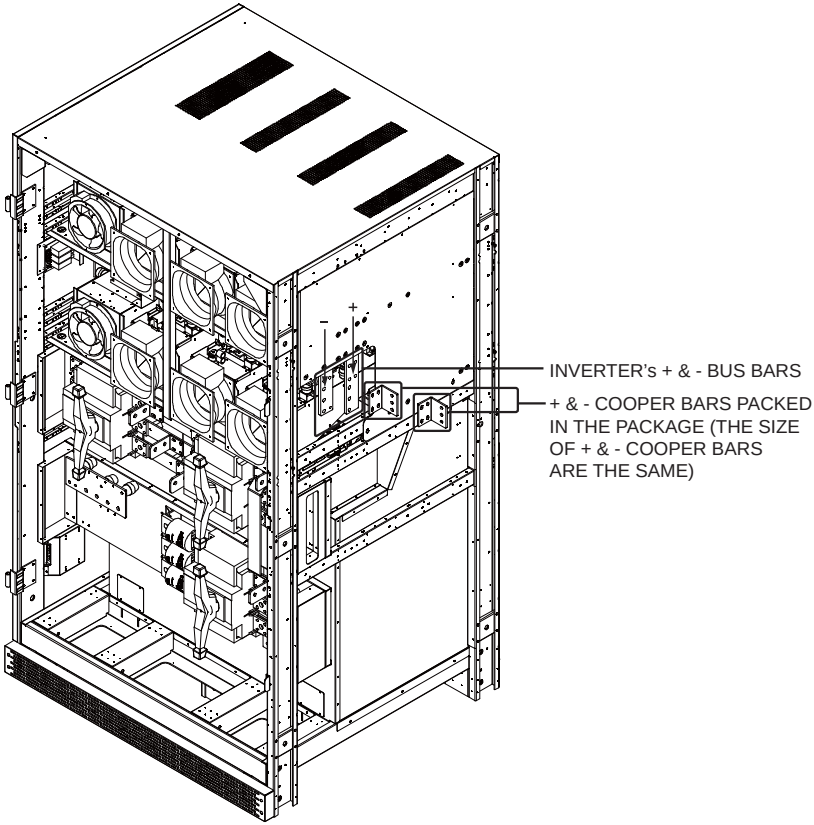


Figure 4-39

7. Connect the provided + & - cooper bars to the rectifier's + & - bus bars

(1) Find the rectifier's + & - cooper bars. Please see ***Figure 4-40***.

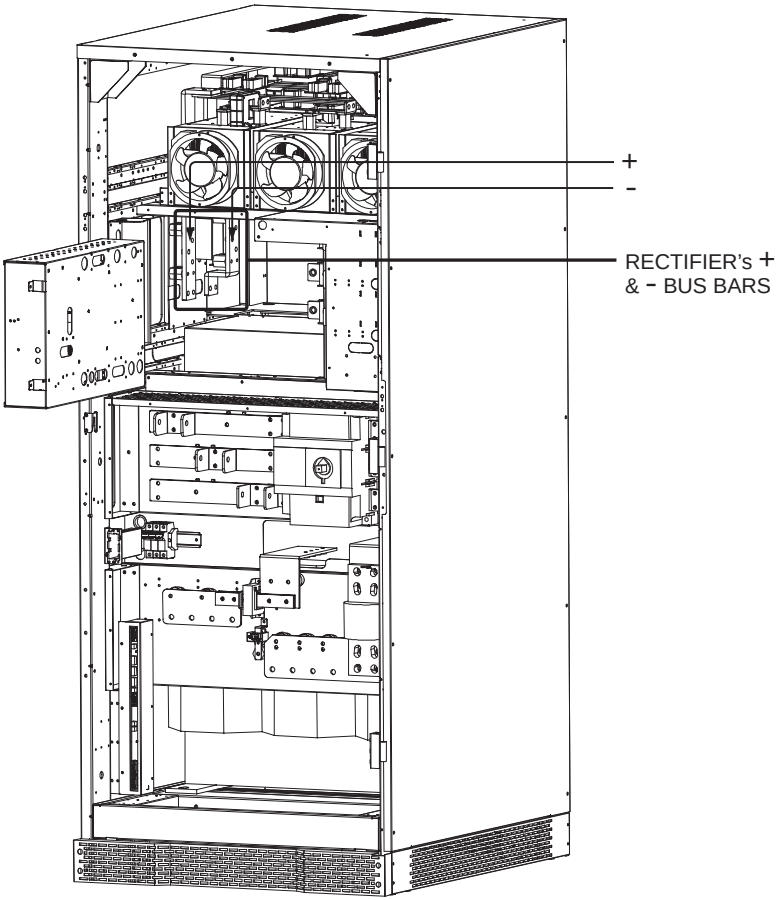


Figure 4-40

(2) Take out the provided screws and + & - cooper bars from the package, and connect them to the rectifier's + & - bus bars shown in ***Figure 4-41***. The size of the provided + cooper bar is smaller than that of the provided - cooper bar.

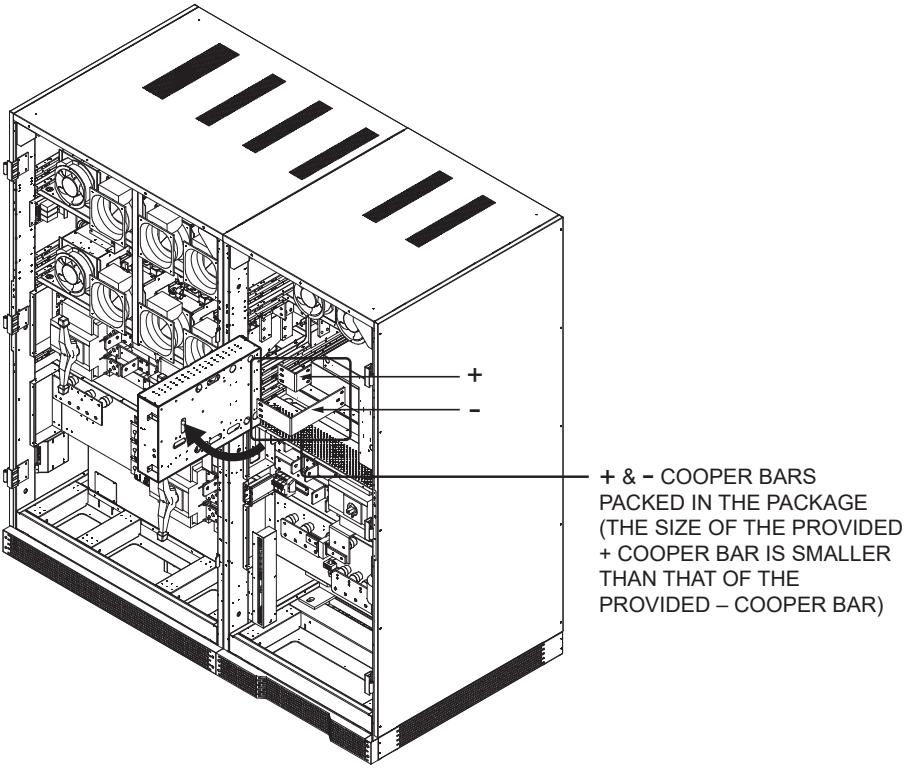


Figure 4-41

8. Set up single input/ dual input

(1) Single input: connect the cooper bars (shown in ***Figure 4-42***) between the main input terminals and reserve input terminals.

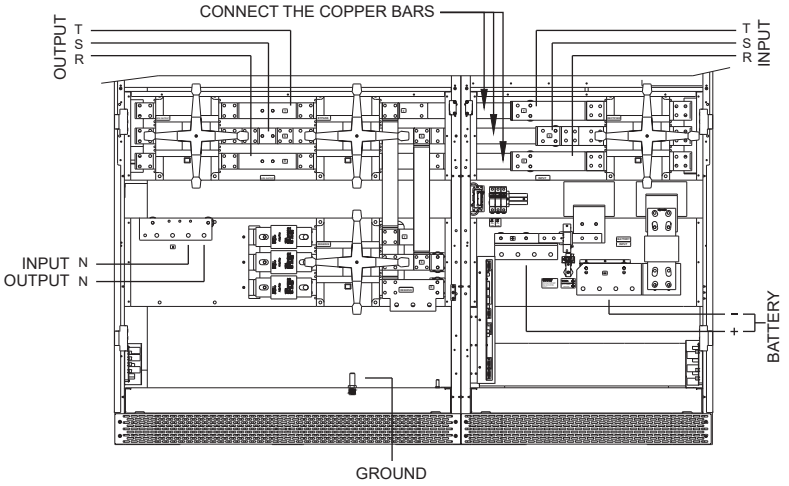


Figure 4-42

(2) Dual input: disconnect the cooper bars (shown in ***Figure 4-43***) between the main input terminals and reserve input terminals.

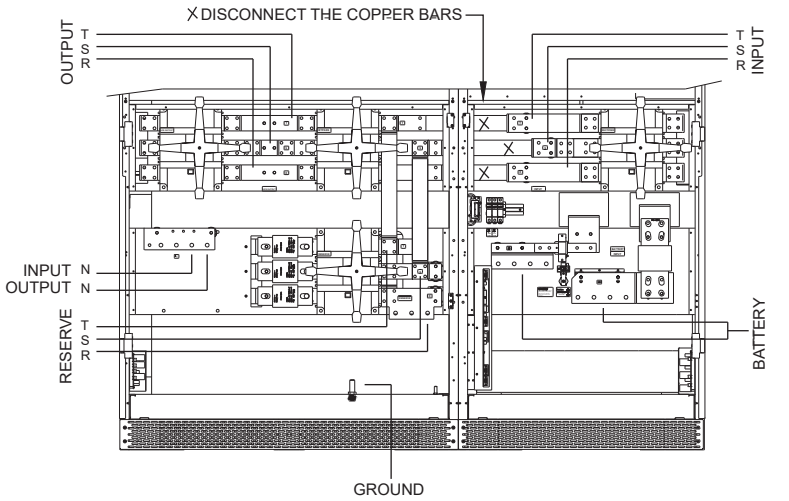


Figure 4-43

4.6 UPS Installation Checklist

All the following items need to be checked before UPS installation:

1. Whether the floor area where the UPS is placed has enough supporting strength.
2. Whether the entrances and hallways have enough space for UPS transportation.
3. Whether the UPS room has enough space for UPS ventilation and personnel maintenance.
4. Whether the space between the top of the UPS and the ceiling is large enough for heat ventilation.
5. Whether the air conditioning is capable of keeping ambient around 25°C.
6. Whether the humidity is in rated limit.
7. Whether the UPS room is periodically inspected, and all unrelated things are kept away from the UPS.
8. Whether the noise insulation devices are set to reduce noise.
9. Whether wiring is correct, and diameter of each wire complies with the electrical standard.
10. Confirm that the input power source has been switched off before wiring.
11. Make sure that each wire has clear labels for polarities and phases.
12. Whether the floors, walls, and ceilings are made of flameproof materials.
13. Whether the fire extinguishers comply with the safety standard.
14. Whether the UPS room equips with a sprinkler system (not essential).
15. Whether the user knows how to operate the fire extinguishers.
16. Whether the UPS room has a security lock and UPS door key is in charge by authorized personnel.
17. Whether all operators and maintenance personnel have sufficient training for the following tasks:

    ---- Normal and emergency operation procedures.

    ---- Emergency first-aid.

    ---- Usage of fire extinguishers.

18. During installation, ensure that the UPS input neutral is firmly connected to the utility power neutral.
19. The top cover of UPS model 260kVA~500kVA is designed with air flow ventilation holes. Ensure that there is no dust or liquid dropping from the top of the UPS.

4.7 Floor Weight Loading Table

UPS

Input voltage: 400/ 230V (3Φ4W) Output voltage: 400/ 230V (3Φ4W)																
UPS rating (kVA)	10	15	20	30	40	50	60	80	100	120	160	200	260	320	400	500
Weight (Kg)	335	335	365	365	425	460	506	525	700	745	1050	1085	1680	1720	1920	2410
Weight loading (kg/m^2)	698	698	760	760	885	958	1054	1094	1054	1122	1054	1089	1055	1080	1206	1346

Input voltage : Δ480V (3Φ3W) Output voltage : 208/ 120V (3Φ4W)	
UPS rating (kVA)	100
Weight (Kg)	1125
Weight loading (kg/m^2)	1130

External Battery Cabinet

Battery Type (AH)	12V/ 26AH x 29PCS	12V/ 40AH x 29PCS	12V/ 26AH x 58PCS	12V/ 40AH x 58PCS	12V/ 100AH x 29PCS
Weight (Kg)	360	520	796	1118	1420
Weight loading (kg/m^2)	750	1084	1066	1497	1764

4.8 Cable Selection

The table below shows the cable rating of each model.

UPS Capacity (VA)	I/P Voltage (V)	O/P Voltage (V)	I/P C.B. (A)	I/P Cable (mm^2)	RES C.B. (A)	RES Cable (mm^2)	O/P C.B. (A)	O/P Cable (mm^2)	BAT. Cable (mm^2)	BAT. Fuse (A)	GND. Cable (mm^2)
10K	120/ 208	120/ 208	40	14	40	14	40	14	14	63	14
	220/ 380	220/ 380	30	14	20	14	20	14			
	277/ 480	277/ 480	20	14	20	14	20	14			
15K	120/ 208	120/ 208	75	22	50	14	50	14	14	63	14
	220/ 380	220/ 380	40	14	30	14	30	14			
	277/ 480	277/ 480	30	14	30	14	30	14			
20K	120/ 208	120/ 208	100	22	75	14	75	14	14	80	22
	220/ 380	220/ 380	50	14	40	14	40	14			
	277/ 480	277/ 480	40	14	30	14	30	14			
	220/380	220	50	14	100	22	100	22			
30K	120/ 208	120/ 208	125	38	100	22	100	22	22	125	22
	220/ 380	220/ 380	75	14	75	14	75	14			
	277/ 480	277/ 480	75	14	50	14	50	14			
	220/380	220	75	14	175	50	175	50			
40K	120/ 208	120/ 208	175	50	150	38	150	38	38	160	38
	220/ 380	220/ 380	100	22	75	14	75	14			
	277/ 480	277/ 480	75	22	75	14	75	14			
	220/380	220	100	22	225	80	225	80			
50K	120/ 208	120/ 208	200	80	175	50	175	50	50	200	38
	220/ 380	220/ 380	125	38	100	22	100	22			
	277/ 480	277/ 480	100	22	75	22	75	22			
	220/ 380	220	125	38	300	100	300	100			
60K	120/ 208	120/ 208	250	100	200	80	200	80	50	200	38
	220/ 380	220/ 380	150	38	100	22	100	22			
	277/ 480	277/ 480	125	38	100	22	100	22			
	220/ 380	220	150	38	350	125	350	125			
80K	120/ 208	120/ 208	350	125	300	100	300	100	80	315	50
	220/ 380	220/ 380	200	50	150	38	150	38			
	277/ 480	277/ 480	150	38	125	38	125	38			
	220/ 380	220	200	50	400	80*2	400	80*2			
100K	120/ 208	120/ 208	400	150	350	125	350	125	100	400	50
	220/ 380	220/ 380	225	80	200	80	200	80			
	277/ 480	277/ 480	175	50	150	38	150	38			
	220/ 380	220	225	80	600	100*2	600	100*2			
	Δ480	120/208	175	50	350	50*2	350	50*2	100	400	50

UPS Capacity (VA)	I/P Voltage (V)	O/P Voltage (V)	I/P C.B. (A)	I/P Cable (mm^2)	RES C.B. (A)	RES Cable (mm^2)	O/P C.B. (A)	O/P Cable (mm^2)	BAT. Cable (mm^2)	BAT. Fuse (A)	GND. Cable (mm^2)
120K	120/ 208	120/ 208	500	80*2	400	150	400	150	125	400	80
	220/ 380	220/ 380	300	100	225	80	225	80			
	277/ 480	277/ 480	225	80	175	50	175	50			
	220/ 380	220	300	100	800	125*2	800	125*2			
160K	120/ 208	120/ 208	800	125*2	630	100*2	630	100*2	100*2	600	80
	220/ 380	220/ 380	350	125	300	100	300	100			
	277/ 480	277/ 480	300	100	250	100	250	100			
200K	120/ 208	120/ 208	1000	150*2	800	125*2	800	125*2	125*2	600	125
	220/ 380	220/ 380	500	80*2	400	150	400	150			
	277/ 480	277/ 480	350	150	300	100	300	100			
260k	220/ 380	220/ 380	630	100*2	500	80*2	500	80*2	150*2	800	150
	277/ 480	277/ 480	500	80*2	400	150	400	150			
320k	220/380	220/380	800	125*2	630	100*2	630	100*2	125*3	1000	180
	277/ 480	277/ 480	630	100*2	500	80*2	500	80*2			
400k	220/380	220/380	1000	150*2	800	125*2	800	125*2	150*3	1200	240
	277/480	277/480	800	125*2	630	100*2	630	100*2			
500K	220/ 380	220/ 380	1250	100*4	1000	150*2	1000	150*2	150*4	1600	300
	277/ 480	277/ 480	1000	150*2	800	125*2	800	125*2			

* The cable rating above is based on 105°C PVC type.

** Please follow local regulations to install suitable cables and circuit breakers.

UPS Rated VA	I/P Voltage (V)	O/P Voltage (V)	RECTIFIER Fuse (A)	INVERTER Fuse (A)	RESERVE Fuse (A)	BATTERY Fuse (A)
260k	220/380	220/380	315NHG2B	660GH-315A FWH-300A	A50QS800-4	A50QS800-4
	277/480	277/480				
320k	220/380	220/380	400NHG2B	FWH-400A	A50QS1000-4	A50QS1000-4
	277/480	277/480				
400k	220/380	220/380	500NHG3B	FWH-400A	A50QS1000-4	A50QS1200-4
	277/480	277/480				
500K	220/380	220/380	630NHG3B	FWH-600A	A50QS1200-4	FWH-1600A A50QS800-4*2
	277/480	277/480				

Wiring Information: Use adequate wire gauge(*1), copper wires with temperature resistance up to 90°C and lb-in torque force (*2) when connecting to AC and DC wiring terminals.

Model	Wiring Location	Wire Gauge (*1)	Bolt Type	Torque (lb-in) (*2)
GES104NT, NT-100K	Main Input	4/0 AWG X 1	M10	220±8
	Res. Input	2/0 AWG X 2	M10	220±8
	Output	2/0 AWG X 2	M10	220±8
	Battery	2/0 AWG X 2	M10	220±8
	PE	3 AWG X 1	M10	220±8

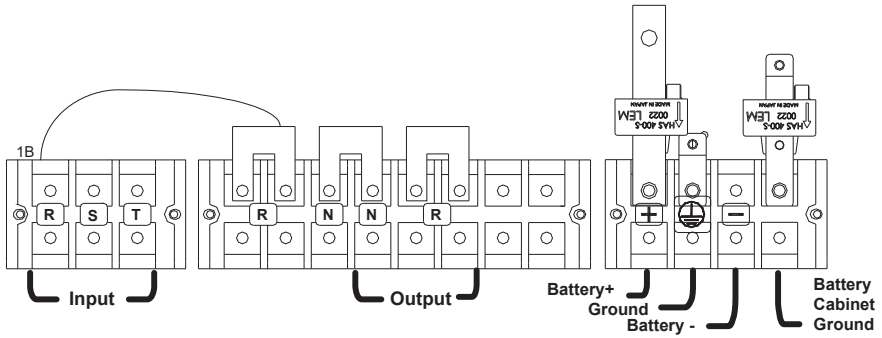
4.9 Electrical Connections

WARNING:

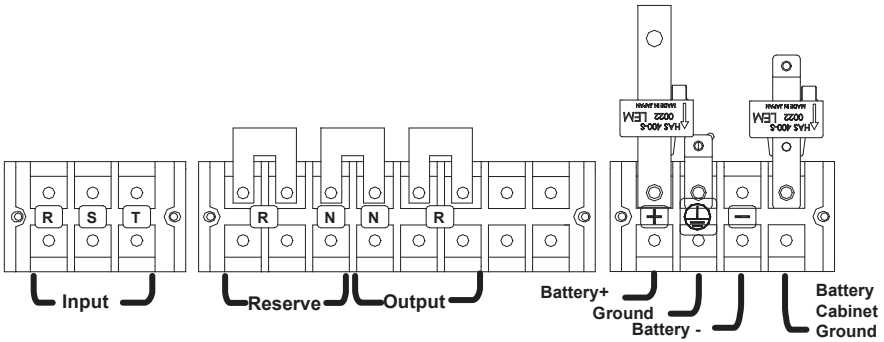
1. AC power source connection: Three-phase (R/ S/ T) of AC power source must be in positive phase sequence and the R/ S/ T/ N cables must be connected to the terminals 'R' 'S' 'T' 'N' shown in the following figures.
2. Battery source connection: The positive and negative poles of the battery cabinet must be connected to the terminal poles '+' and '-' shown in the following figures.
3. The external battery cabinet must be grounded and connected to the UPS's 'Battery Cabinet Ground' terminal. Do not connect the external battery cabinet to any other grounding system.
4. Wrong wiring will cause damage to the UPS and electric shock.

4.9.1 10~30kVA Output 220Vac Terminal Wiring Diagram

Single input: When there is only one input source, the wiring diagram is as follows.

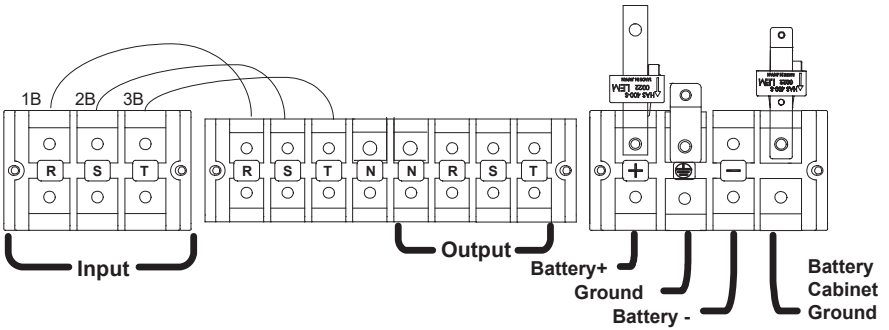


Dual input: When there are two input (mains and reserve) sources, remove the cable (wire number 1B) from the input terminal. Please see the wiring diagram as follows.

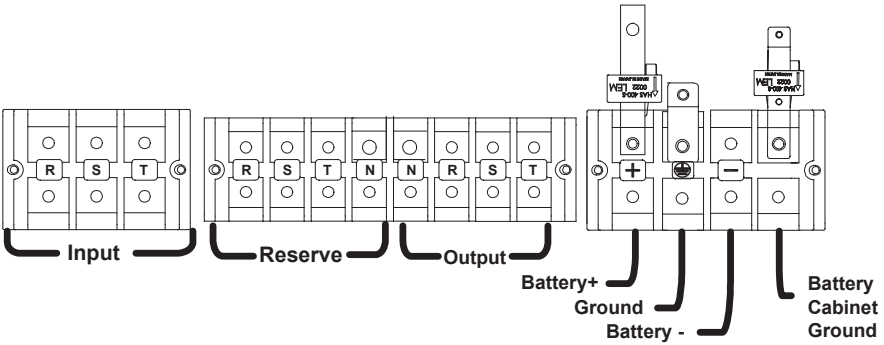


4.9.2 10~60kVA Output 220/ 380Vac Terminal Wiring Diagram

Single input: When there is only one input source, the wiring diagram is as follows.

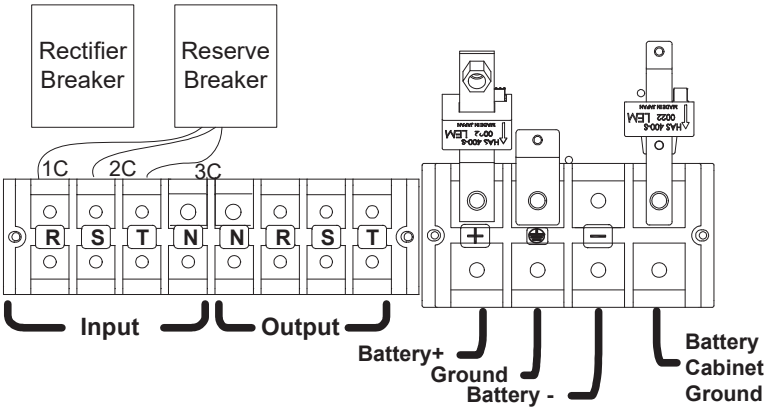


Dual input: When there are two input (mains and reserve) sources, remove the cables (wire number 1B, 2B and 3B) from the input terminals. The wiring diagram is as follows.

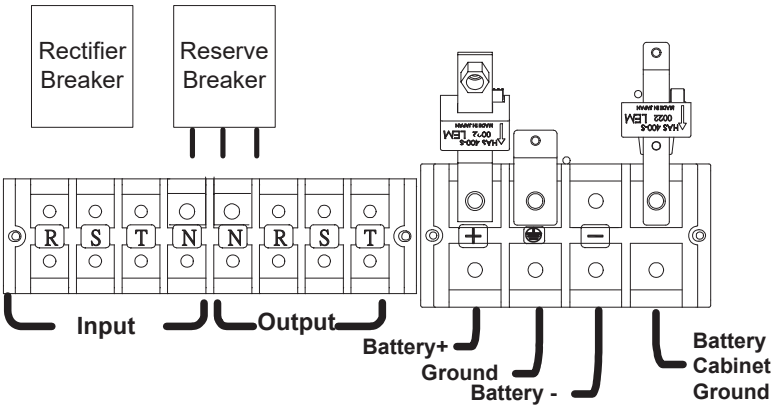


4.9.3 80kVA Output 220/ 380Vac Terminal Wiring Diagram

Single input: When there is only one input source, the wiring diagram is as follows.

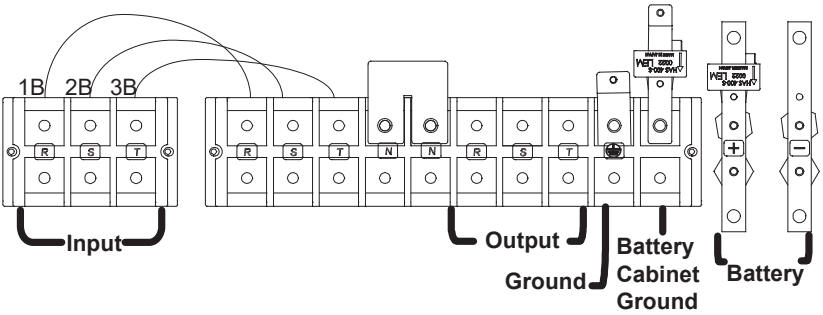


Dual input: When there are two input (mains and reserve) sources, remove the cables (wire number 1C, 2C and 3C) that are connected to the “Reserve Breaker”, connect the mains source to the input terminals (R/ S/ T/ N) and connect the reserve source to the “Reserve Breaker”. The wiring diagram is as follows.

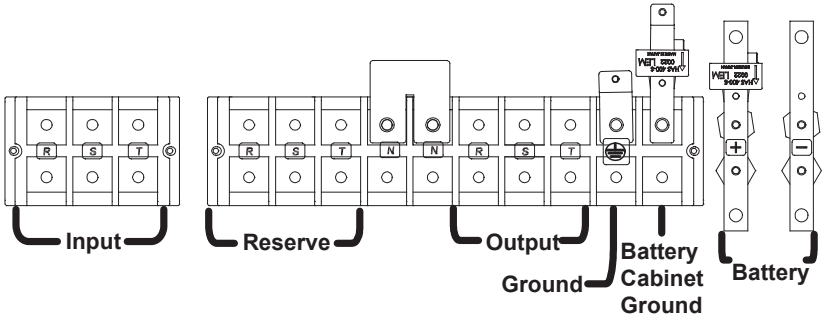


4.9.4 100kVA Output 220/ 380Vac Terminal Wiring Diagram

Single input: When there is only one input source, the wiring diagram is as follows.

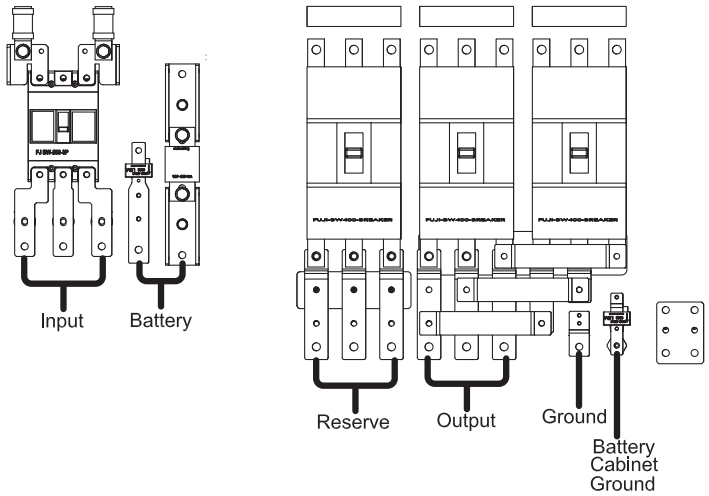


Dual input: When there are two input (mains and reserve) sources, remove the cables (wire number 1B, 2B and 3B) from the input terminals. The wiring diagram is as follows.



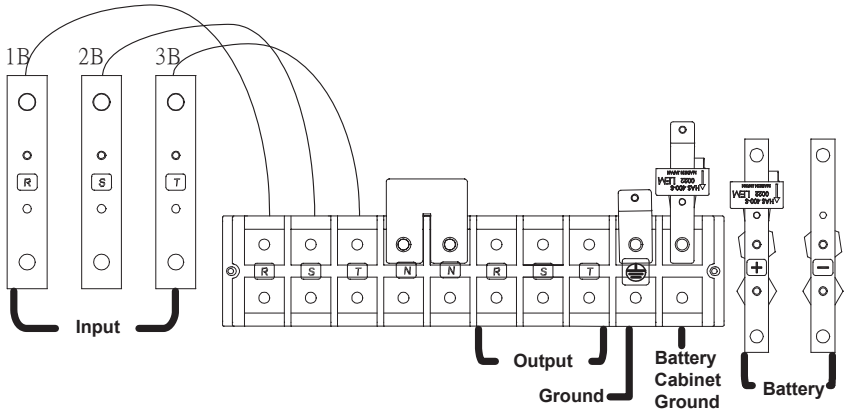
4.9.5 100kVA Output 208/ 120Vac Terminal Wiring Diagram (Only for Dual Input Application)

The 100kVA (input voltage: Δ480V (3Φ3W)/ output voltage: 208/120V (3Φ4W)) UPS is only for dual input application. The wiring diagram is as follows.

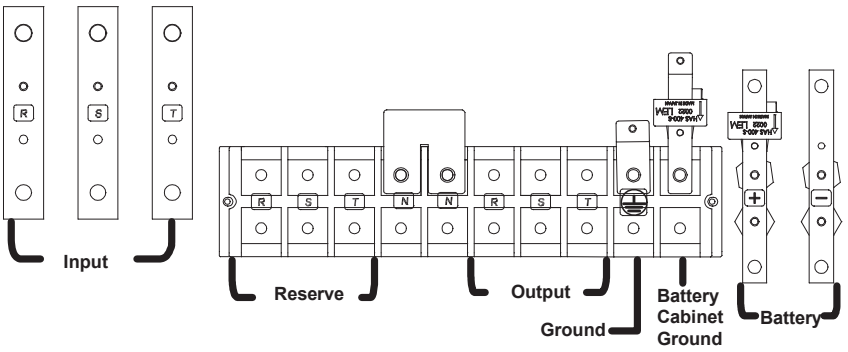


4.9.6 120kVA Output 220/ 380Vac Terminal Wiring Diagram

Single input: When there is only one input source, the wiring diagram is as follows.

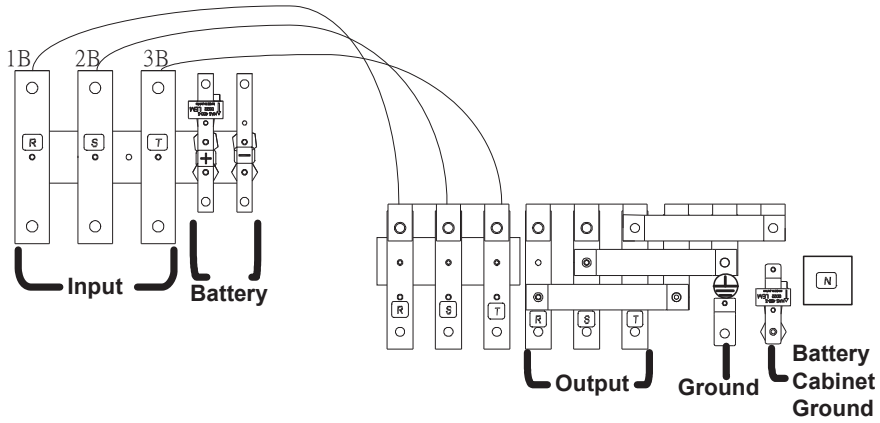


Dual input: When there are two input (mains and reserve) sources, remove the cables (wire number 1B, 2B and 3B) from the input terminals. The wiring diagram is as follows.

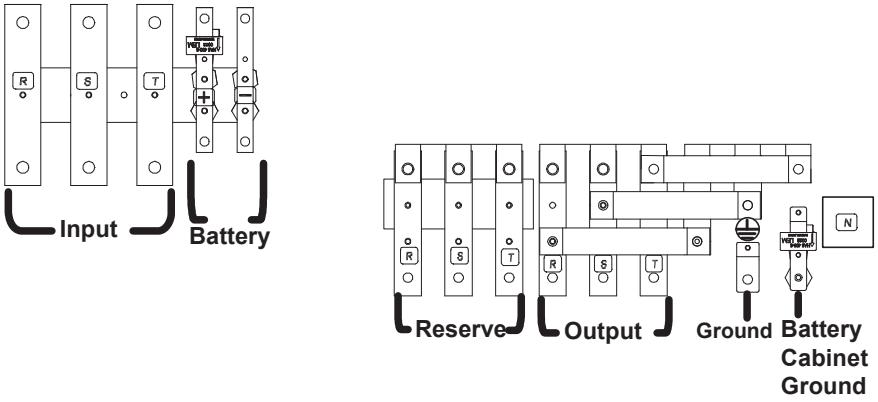


4.9.7 160/ 200kVA Output 220/ 380Vac Terminal Wiring Diagram

Single input: When there is only one input source, the wiring diagram is as follows.

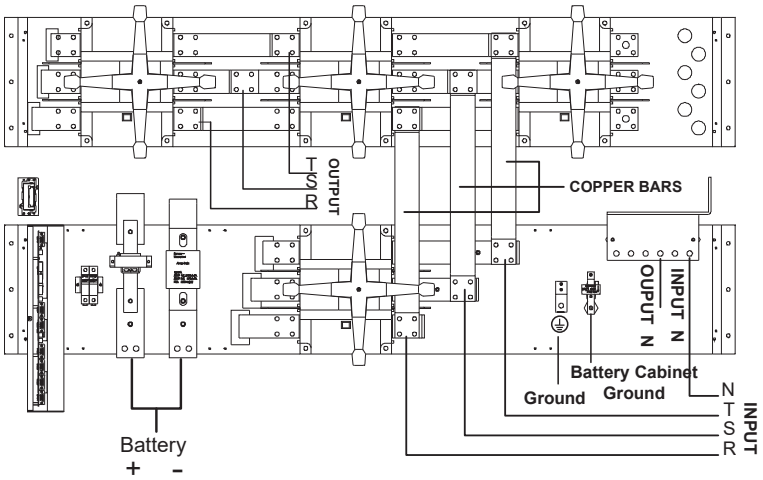


Dual input: When there are two input (mains and reserve) sources, remove the cables (wire number 1B, 2B and 3B) from the input terminals. The wiring diagram is as follows.

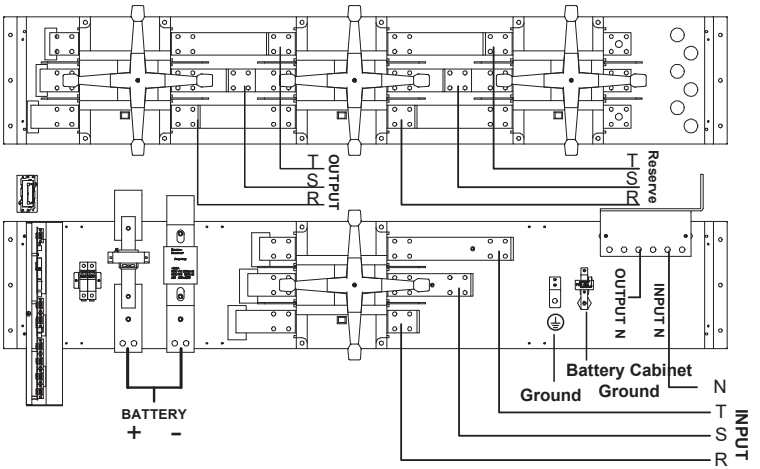


4.9.8 260/ 400kVA Output 220/ 380Vac Terminal Wiring Diagram

Single input: When there is only one input source, the wiring diagram is as follows.

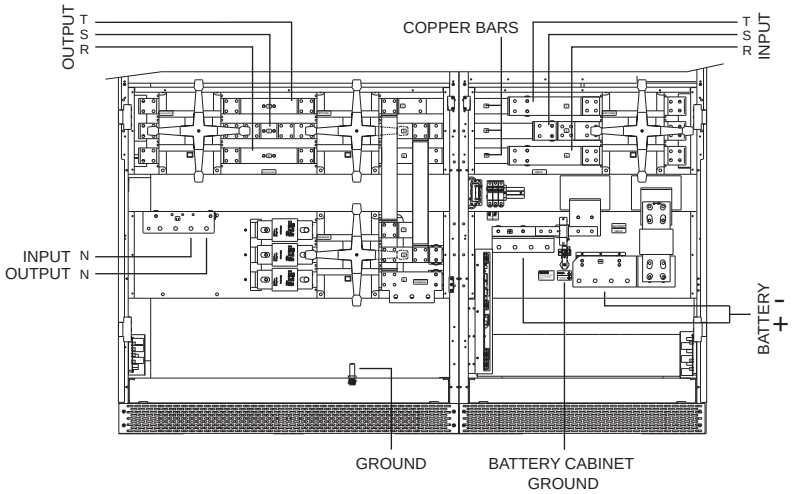


Dual input: When there are two input (mains and reserve) sources, remove the cooper bars connected between the INPUT and RESERVE terminals, connect the mains source to the INPUT terminals (R/ S/ T/ N) and connect the reserve source to the RESERVE terminals (R/ S/ T/ N). The wiring diagram is as follows.

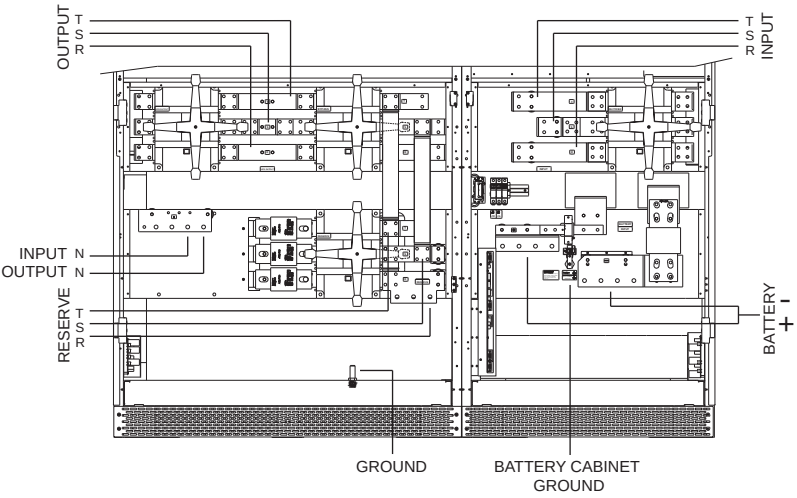


4.9.9 500kVA Output 220/ 380Vac Terminal Wiring Diagram

Single input: When there is only one input source, the wiring diagram is as follows.

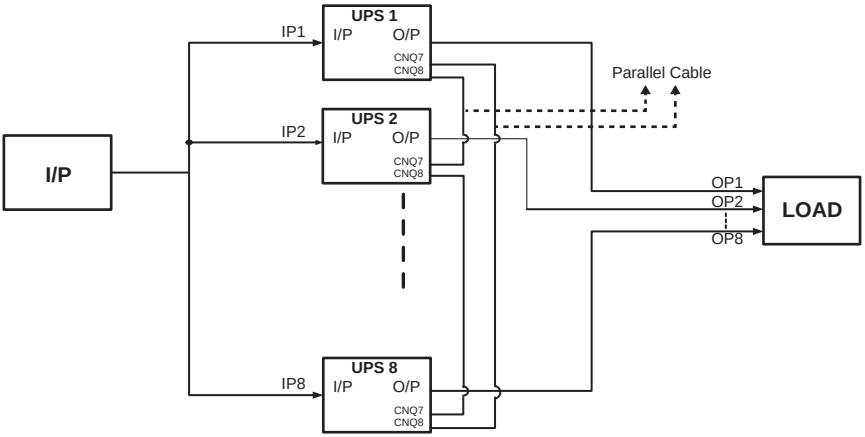


Dual input: When there are two input (mains and reserve) sources, remove the cooper bars connected between the INPUT and RESERVE terminals, connect the mains source to the INPUT terminals (R/ S/ T/ N) and connect the reserve source to the RESERVE terminals (R/ S/ T/ N). The wiring diagram is as follows.



4.9.10 UPS Parallel Wiring Diagram (Single Input)

When UPSs are paralleled, the length of each unit's input cables (mains source) plus output cables must be the same. This ensures that the parallel UPSs can equally share the critical loads in reserve AC supply mode.



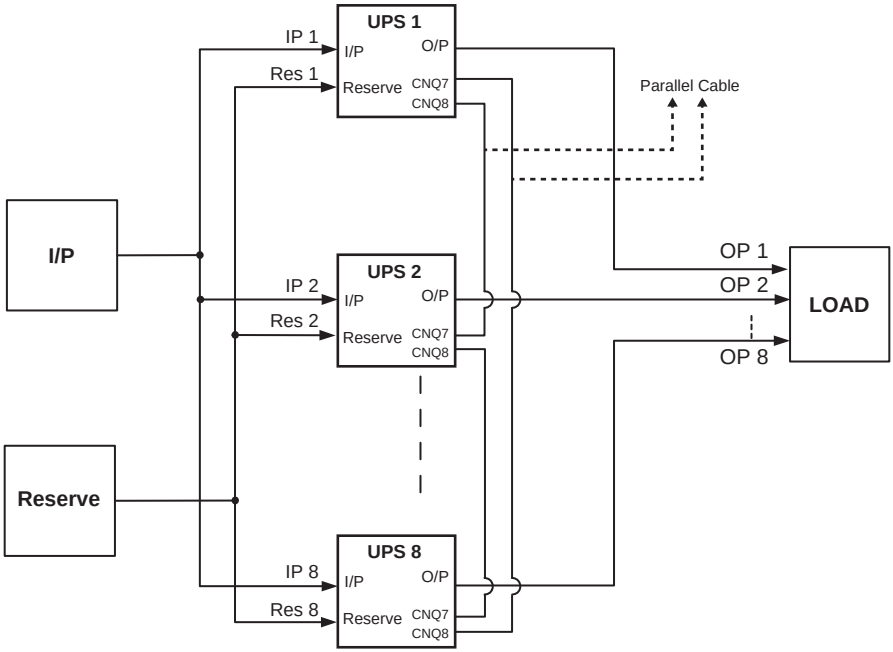
IP1+OP1=IP2+OP2=……..=IP8+OP8

NOTE:

When the total number of the parallel UPS units is more than four, please install a load sharing choke between each parallel UPS and its connected bypass input power to ensure that each bypass input power's current is even. For more information, please contact your local dealer, sales representative or Delta customer service.

4.9.11 UPS Parallel Wiring Diagram (Dual Input)

When UPSs are paralleled, the length of each unit's input cables (reserve source) plus output cables must be the same. This ensures that the parallel UPSs can equally share the critical loads in reserve AC supply mode.

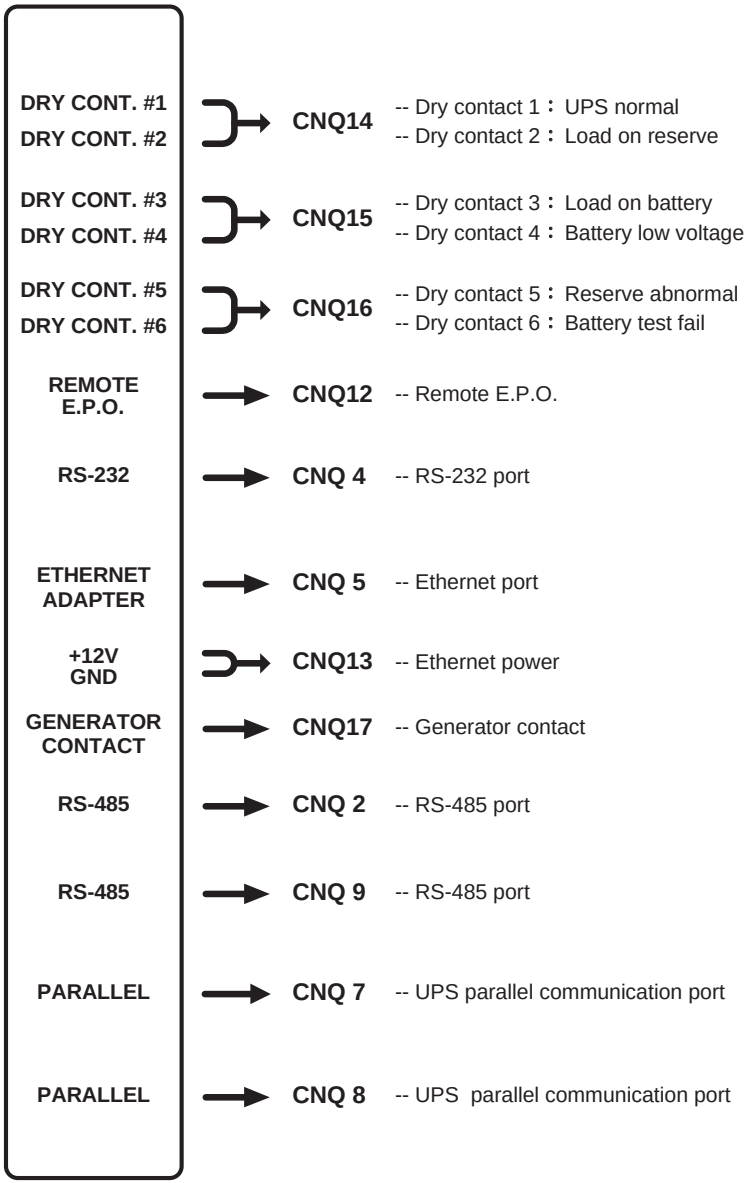


Res1+OP1=Res2+OP2=……..=Res8+OP8

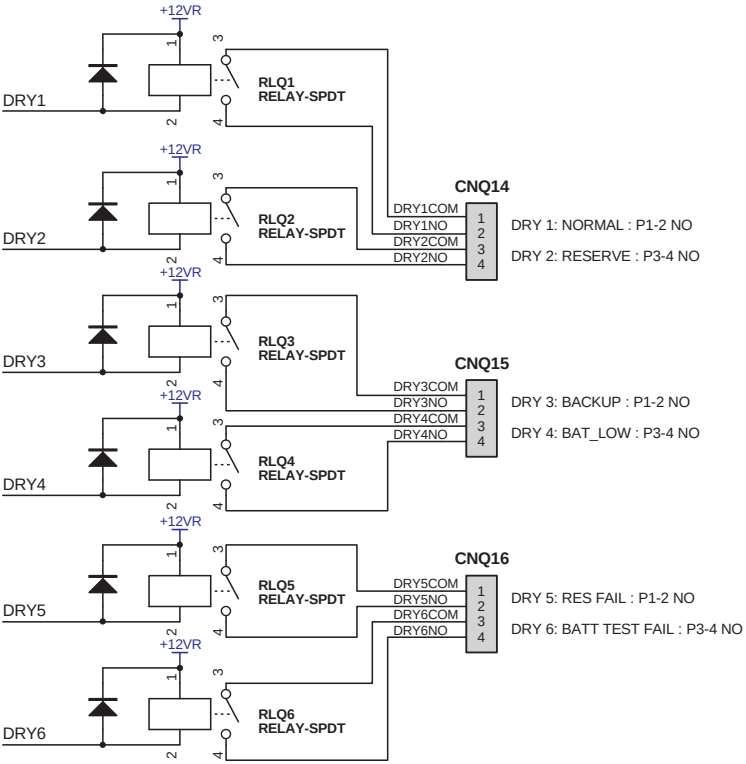
NOTE:

When the total number of the parallel UPS units is more than four, please install a load sharing choke between each parallel UPS and its connected bypass input power to ensure that each bypass input power's current is even. For more information, please contact your local dealer, sales representative or Delta customer service.

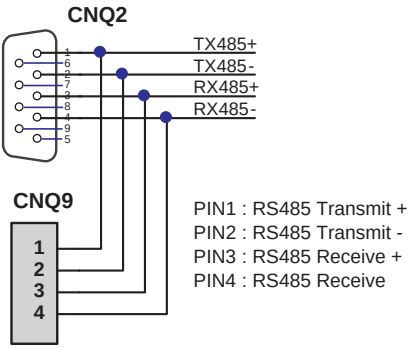
4.10 Communication Interfaces (NT-Q Board)



4.11 Dry Contact Wiring Diagram (Default Value)



4.12 RS-485 Pin Assignment



Chapter 5 : External Battery Cabinet

The NT series UPS must be connected to at least one external battery cabinet to ensure that the critical loads connected are protected when a power failure occurs.

5.1 External Battery Cabinet Usage Warnings

To ensure that the batteries are fully charged, please charge the batteries at least 8 hours before initial use of the UPS. The charging procedures are as follows.

1. Connect the UPS to an AC power source and the external battery cabinet. Please refer to ***Chapter 4: Installation and Wiring***.
2. Turn on the UPS and the external battery cabinet. After the UPS is turned on, the unit will automatically charge the batteries.

WARNING:
You can connect the critical loads to the UPS only after the batteries are fully charged. This guarantees that the UPS can provide sufficient backup power to the critical loads connected when a power failure occurs.

- **Battery**
  1. Charge Voltage:
     1) Float charge voltage: 393Vdc (default)
     2) Boost charge voltage: 405Vdc (default)
  2. Charge Current:

Capacity (kVA)	10~20	30	40	50	60	80	100	120	160	200	260	320	400~500
Charge Current (A)	4	5	7	9	11	14	18	22	29	36	30	35	40

NOTE : If you want to modify the default charge current setting, please contact your local dealer or customer service.

3. Low Battery Shutdown: 290~310Vdc (default: 300Vdc)

NOTE : If you want to modify the default low battery shutdown setting, please contact your local dealer or customer service.

- Battery number for each string: 12V × 29 PCS.

NOTE : You can also choose 12V × 28 PCS or 12V × 30 PCS batteries. Please contact your local dealer or customer service for battery selection, installation and replacement.

- Only use the same type of batteries from the same supplier. Never use old, new and different Ah batteries at the same time.
- The number of batteries must meet UPS requirements.
- Do not connect the batteries in reverse.
- Use a voltage meter to measure whether the total voltage, after battery connection, is around 12.5 Vdc × the total number of batteries.

NOTE :

1. Turn off the UPS and cut off the AC power source before performing battery/ battery cabinet replacement.
2. A battery can present a risk of electric shock and high short-circuit current. Servicing of batteries and battery cabinets must be performed or supervised by qualified personnel knowledgeable in the batteries, battery cabinets and required precautions. Keep unauthorized personnel away from the batteries and battery cabinets.

Chapter 6 : UPS Display and Settings

6.1 Control Panel

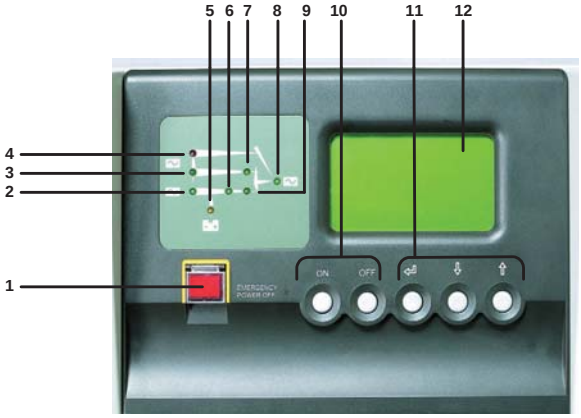


Figure 6-1: Control Panel

1. EPO switch: When an emergency event occurs, press the EPO switch to turn off the rectifier, inverter, and output of the UPS.
2. Rectifier LED (green): When the rectifier works normally.
3. Reserve power LED (green): When the reserve source is normal.
4. Maintenance bypass power LED (red): When the manual bypass breaker or switch is turned on.
5. Battery LED (orange): When the mains source is abnormal and the loads are supplied by battery power.
6. Inverter LED (green): When the inverter works normally.
7. Reserve power static switch LED (green): When the loads are supplied by the reserve AC power.
8. AC output LED (green): When the UPS has normal output.
9. Inverter M.C. LED (green): When the loads are supplied by the inverter.
10. Inverter control buttons: Press “ON” and “⏎” simultaneously for 3 seconds to turn on the inverter and press “OFF” and “⏎” simultaneously for 3 seconds to turn off the inverter.
11. “⏎” “⇩” “⇧” buttons: Control the LCD display and set up parameters.
12. LCD display.

6.2 LCD Display Screen

1. Button functions:

   (A) "⏎" "⇩" and "⇧" buttons:

   a. Use the "⇩" and "⇧" buttons to choose different functions, and then press the "⏎" button to enter the choice.

   b. Press the "⇩" and "⇧" buttons simultaneously to go back to the previous display screen.

   (B) "**ON**" and "**OFF**" buttons:

   a. Press the "**ON**" and "⏎" simultaneously for 3 seconds to turn on the inverter.

   b. Press the "**OFF**" and "⏎" simultaneously for 3 seconds to turn off the inverter.

2. When the UPS is normal, the LCD screen will stay in the start display as follows.

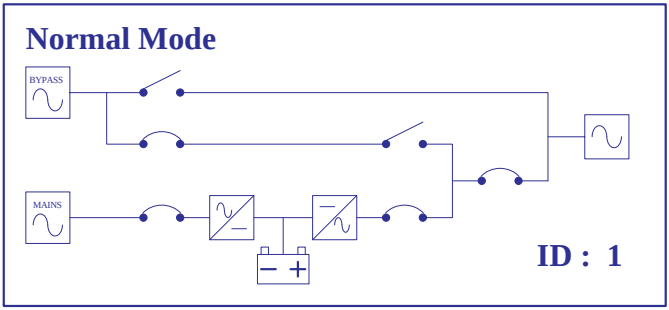
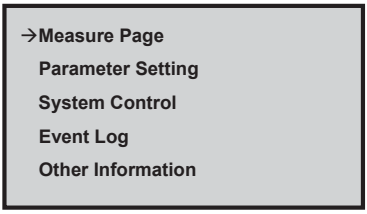


Figure 6-2: LCD Start Display

3. Press the "⏎" button to enter the "**Main Menu**" as follows.

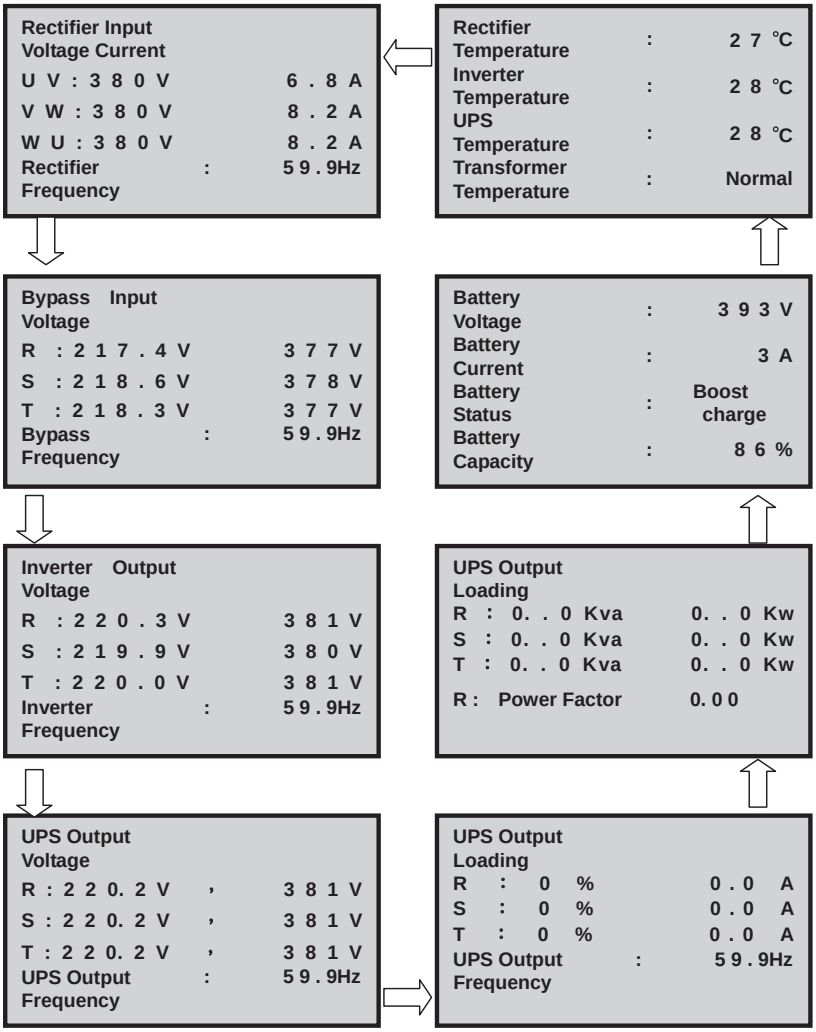
   Use the "⇩" and "⇧" buttons to choose the functions.



4. Press the "⇩" or "⇧" button to choose "**Measure Page**", and then press the "⏎" button to enter the "**Measure Page**".

After entering the "**Measure Page**", press the "⇩" or "⇧" button to monitor the present status and parameters of the UPS.

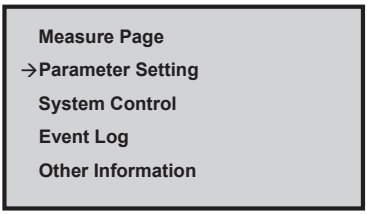
The display order is as follows:



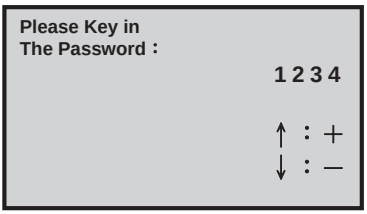
To leave the **"Measure Page"**, press the "⇩" and "⇧" buttons simultaneously to return to the **"Main Menu"**.

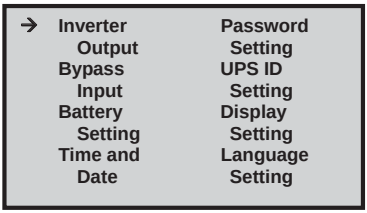
5. In "**Main Menu**", press the "⇩" or "⇧" button to choose "**Parameter Setting**" and press the "⏎" button to enter the "**Parameter Setting**" menu. Before entering the "**Parameter Setting**" menu, password needs to be keyed in.

Use the "⇩" and "⇧" buttons to choose the functions.



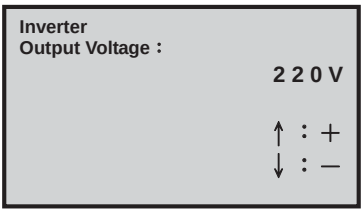
- If the password is wrong, parameters can not be set.
- If the password is correct, the LCD will enter the "**Parameter Setting**" menu.





5-1. Press the "⇩" or "⇧" button to choose "**Inverter Output**" and press the "⏎" button to enter the "**Inverter Output Voltage**" setting page.

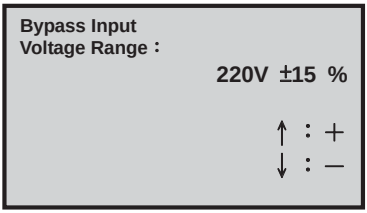
- Press the "⇩" or "⇧" button to set up the inverter output voltage and press the "⏎" button to confirm the setting.



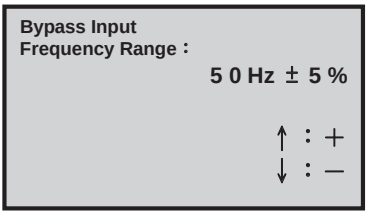
To leave the **"Inverter Output Voltage"** setting page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Parameter Setting"** menu.

5-2. Press the "⇩" or "⇧" button to choose "**Bypass Input**" and press the "↵" button to enter the "**Bypass Input Voltage/ Frequency**" setting page.

- Press the "⇩" or "⇧" button to set up the bypass input voltage range and press the "↵" button to confirm the setting.

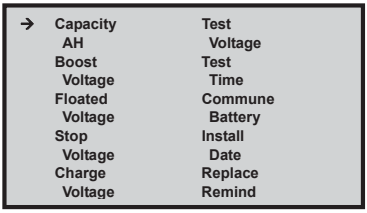


- Press the "⇩" or "⇧" button to set up the bypass input frequency range and press the "↵" button to confirm the setting.



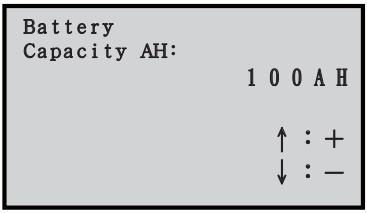
To leave the **"Bypass Input"** setting page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Parameter Setting"** menu.

5-3. Press the "⇩" or "⇧" button to choose "**Battery Setting**" and press the "↵" button to enter the "**Battery setting**" menu.



5-3.1. Press the "⇩" or "⇧" button to choose "**Capacity AH**" and press the "↵" button to enter the "**Battery Capacity AH**" setting page.

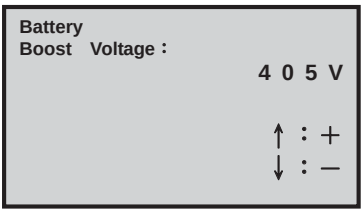
- Press the "⇩" or "⇧" button to set up the battery capacity AH and press the "⏎" button to confirm the setting.



To leave the **"Battery Capacity AH"** setting page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Battery Setting"** menu.

5-3.2. Press the "⇩" or "⇧" button to choose "**Boost Voltage**" and press the "⏎" button to enter the "**Battery Boost Voltage**" setting page.

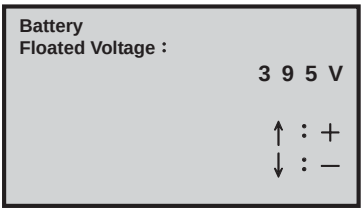
- Press the "⇩" or "⇧" button to set up the battery boost voltage and press the "⏎" button to confirm the setting.



To leave the **"Battery Boost Voltage"** setting page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Battery Setting"** menu.

5-3.3. Press the "⇩" or "⇧" button to choose "**Floated Voltage**" and press the "⏎" button to enter the "**Battery Floated Voltage**" setting page.

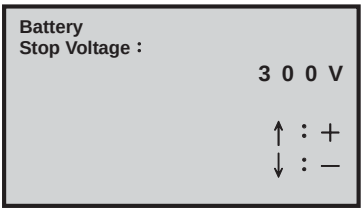
- Press "⇩" or "⇧" button to set up the battery floated voltage and press the "⏎" button to confirm the setting.



To leave the **"Battery Floated Voltage"** setting page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Battery Setting"** menu.

5-3.4. Press the "⇩" or "⇧" button to choose "**Stop Voltage**" and press the "↵" button to enter the "**Battery Stop Voltage**" setting page.

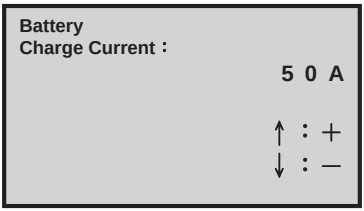
- Press the "⇩" or "⇧" button to set up the battery stop voltage and press the "↵" button to confirm the setting.



To leave the **"Battery Stop Voltage"** setting page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Battery Setting"** menu.

5-3.5. Press the "⇩" or "⇧" button to choose "**Charge Current**" and press the "↵" button to enter the "**Battery Charge Current**" setting page.

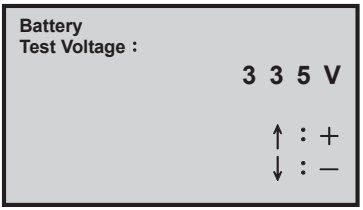
- Press the "⇩" or "⇧" button to set up the battery charge current and press the "↵" button to confirm the setting.



To leave the **"Battery Charge Current"** setting page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Battery Setting"** menu.

5-3.6. Press the "⇩" or "⇧" button to choose "**Test Voltage**" and press the "↵" button to enter the "**Battery Test Voltage**" setting page.

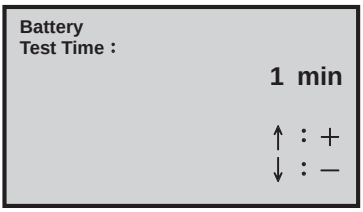
- Press the "⇩" or "⇧" button to set up the battery test voltage and press the "↵" button to confirm the setting.



To leave the **"Battery Test Voltage"** setting page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Battery Setting"** menu.

5-3.7. Press the "⇩" or "⇧" button to choose "**Test Time**" and press the "↵" button to enter the "**Battery Test Time**" setting page.

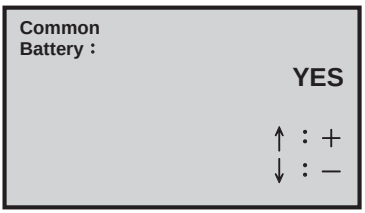
- Press the "⇩" or "⇧" button to set up the battery test time and press the "↵" button to confirm the setting.



To leave the **"Battery Test Time"** setting page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Battery Setting"** menu.

5-3.8. Press the "⇩" or "⇧" button to choose "**Common Battery**" and press the "↵" button to enter the "**Common Battery**" setting page.

- Press the "⇩" or "⇧" button to set up if the UPS shares the common battery or not and press the "↵" button to confirm the setting.

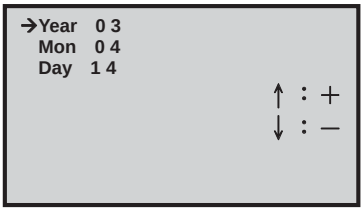


NOTE : When several UPS units share the common battery, the battery test cannot be executed.

To leave the **"Common Battery"** setting page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Battery Setting"** menu.

5-3.9. Press the "⇩" or "⇧" button to choose "**Install Date**" and press the "↵" button to enter the "**Install Date**" setting page.

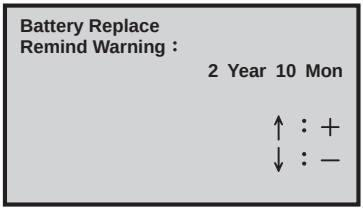
- Press the "⇩" or "⇧" button to set up the UPS installation date and press the "↵" button to confirm the setting.



To leave the **"Install Date"** setting page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Battery Setting"** menu.

5-3.10. Press the "⇩" or "⇧" button to choose "**Replace Remind**" and press the "↵" button to enter the "**Battery Replace Remind Warning**" setting page.

- Press the "⇩" or "⇧" button to set up the battery replacement reminding time and press the "↵" button to confirm the setting.

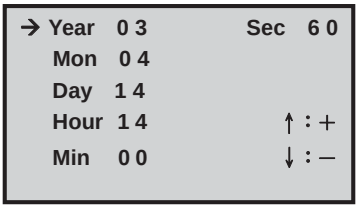


To leave the **"Battery Replace Remind Warning"** setting page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Battery Setting"** menu.

To leave the **"Battery Setting"** menu, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Parameter Setting"** menu.

5-4. Press the "⇩" or "⇧" button to choose "**Time and Date**" and press the "↵" button to enter the "**Time and Date**" setting page.

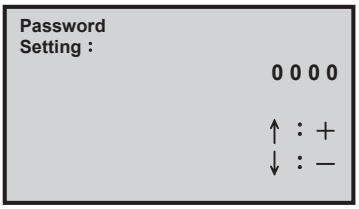
- Press the "⇩" or "⇧" button to set up the time and date, and press the "↵" button to confirm the setting.



To leave the **"Time and Date"** setting page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Parameter Setting"** menu.

5-5. Press the "⇩" or "⇧" button to choose "**Password Setting**" and press the "↵" button to enter the "**Password Setting**" page.

- Press the "⇩" or "⇧" button to set up the password and press the "↵" button to confirm the setting.

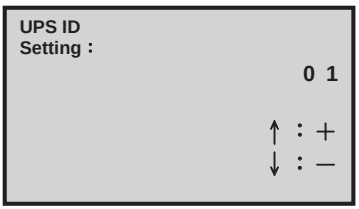


To leave the **"Password Setting"** page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Parameter Setting"** menu.

5-6. Press the "⇩" or "⇧" button to choose "**UPS ID Setting**" and press the "↵" button to enter the "**UPS ID Setting**" page.

- Press the "⇩" or "⇧" button to set up the UPS ID and press the "↵" button to confirm the setting.

NOTE : For parallel application, each UPS ID must be different. Repeated UPS ID is not allowed.

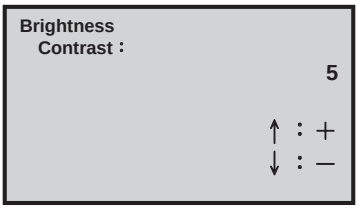


- The UPS ID shown on the Start Display (see ***Figure 6-2***) is for application of the RS-485 interface and monitoring software (UPSentry 2012). It can be set up right from the LCD control panel.

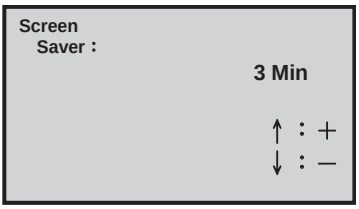
To leave the **"UPS ID Setting"** page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Parameter Setting"** menu.

5-7. Press the "⇩" or "⇧" button to choose "**Display Setting**" and press the "⏎" button to enter the "**Display Setting**" page.

- Press the "⇩" or "⇧" button to set up the brightness and contrast of the LCD and press the "⏎" button to confirm the setting.



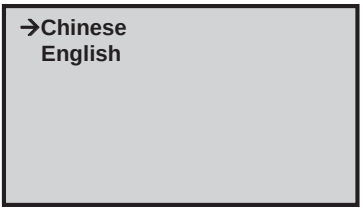
- In order to extend the LCD lifetime, press the "⇩" or "⇧" button to set up the screen saver and press the "⏎" button to confirm the setting.



To leave the **"Display Setting"** page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Parameter Setting"** menu.

5-8. Press the "⇩" or "⇧" button to choose "**Language Setting**" and press the "⏎" button to enter the "**Language Setting**" page.

- Press the "⇩" or "⇧" button to choose "**Chinese**" or "**English**" and press the "⏎" button to confirm the setting.

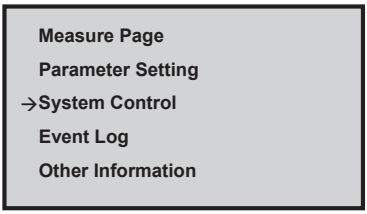


To leave the **"Language Setting"** page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Parameter Setting"** menu.

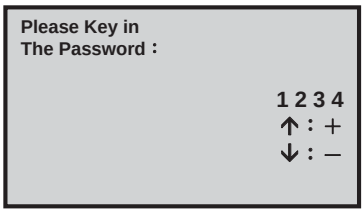
To leave the **"Parameter Setting"** menu, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Main Menu"**.

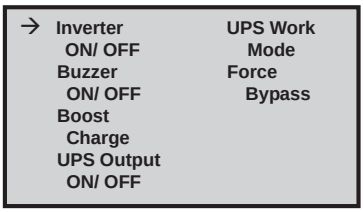
6. In **"Main Menu"**, press the "⇩" or "⇧" to choose "**System Control**" and press the "↵" button to enter the "**System Control**" menu. Before enter the "**System Control**" menu, you have to key in the password.

   Use the "⇩" and "⇧" buttons to choose the functions.



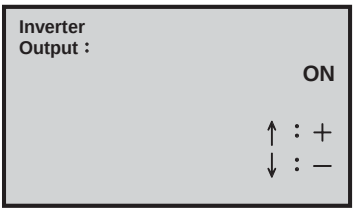
- If the password is wrong, you cannot set up the parameter.
- If the password is true, the LCD will enter the "**System Control**" menu.





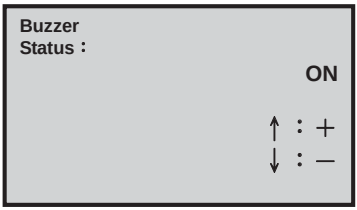
6-1. Press the "⇩" or "⇧" button to choose "**Inverter ON/ OFF**" and press the "↵" button to enter the "**Inverter Output**" setting page.

- Choose ON: turn on the inverter.
- Choose OFF: turn off the inverter
- Press the "⇩" and "⇧" buttons simultaneously to go back to the "**System Control**" menu.



6-2. Press the "⇩" or "⇧" button to choose "**Buzzer ON/ OFF**" and press the "↵" button to enter the "**Buzzer Status**" setting page.

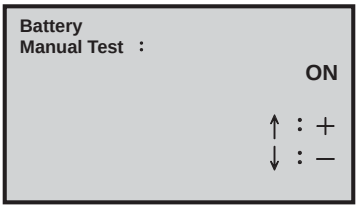
- Choose ON: when the UPS has "**WARNING**" or "**FAULT**" status, the buzzer will sound.
- Choose OFF: when the UPS has "**WARNING**" or "**FAULT**" status, the buzzer will not sound.



- Choose SILENT: a. In "**WARNING**" status, the buzzer will sound.
  b. In "**FAULT**" status, the buzzer will not sound.
- Press the "⇩" and "⇧" buttons simultaneously to go back to the "**System Control**" menu.

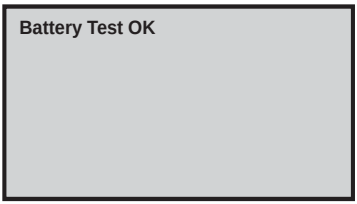
6-3. Press the "⇩" and "⇧" button to choose "**Battery Test**" and press the "↵" button to enter the "**Battery Manual Test**" setting page.

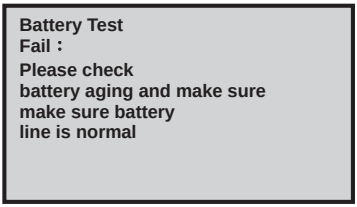
- Choose ON: Execute the battery test. When the batteries are normal, the LCD screen will show "**Battery Test OK**". When the batteries are abnormal, the LCD screen will show "**Battery Test Fail**".
- Choose OFF: You can't execute the battery test.



NOTE: When several UPS units share the common battery, the battery test cannot be executed.

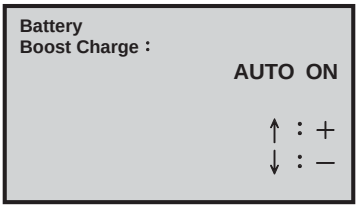
- Press the "⇩" and "⇧" buttons simultaneously to go back to the "**System Control**" menu.

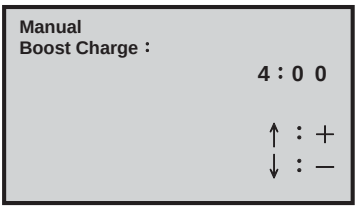




6-4. Press the "⇩" or "⇧" button to choose "**Boost charge**" and press "↵" button to enter the "**Battery Boost charge**" setting page.

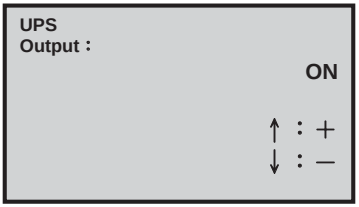
- Choose AUTO ON: The UPS controls itself to execute the boost charge or not. When the battery voltage is less than 348V, the UPS will automatically execute the boost charge.
- Choose AUTO OFF: The UPS disables the boost charge function.
- Press the "⇩" and "⇧" buttons simultaneously to go back to the "**System Control**" menu.





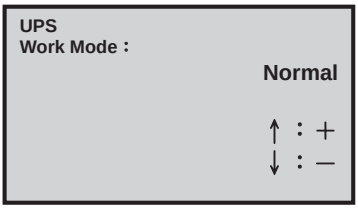
6-5. Press the "⇩" or "⇧" button to choose "**UPS Output ON/ OFF**" and press the "⏎" button to enter the "**UPS Output**" setting page.

- Choose ON: The UPS has normal output.
- Choose OFF: The UPS turns off output.
- Press the "⇩" and "⇧" buttons simultaneously to go back to the "**System Control**" menu.



6-6. Press the "⇩" or "⇧" button to choose "**UPS Work Mode**" and press the "⏎" button to enter the "**UPS Work Mode**" setting page.

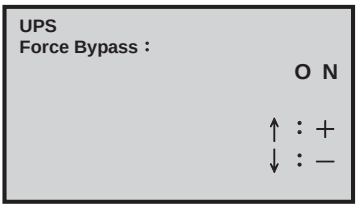
- Choose Normal: The UPS has normal output (it is the inverter to supply power to the loads).
- Choose ECO: The UPS supplies power to the loads by the reserve AC power. When the reserve AC power is abnormal, the loads will be power-supplied by the inverter. Only in reserve AC supply mode can the ECO function be activated manually.



- Press the "⇩" and "⇧" buttons simultaneously to go back to the "**System Control**" menu.

6-7. Press the "⇩" or "⇧" button to choose "**Force Bypass**" and press the "⏎" button to enter the "**UPS Force Bypass**" setting page.

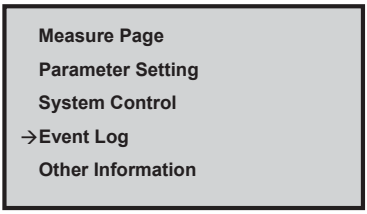
- Choose ON: It is the reserve AC power to supply power to the connected loads in any status.
- Choose OFF: The UPS has normal output. Only when the inverter is abnormal can the reserve AC power supply power to the connected loads.



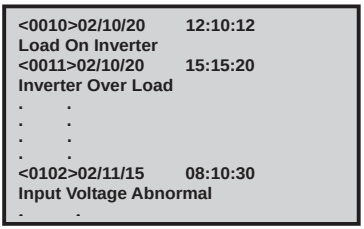
- Press the "⇩" and "⇧" buttons simultaneously to go back to the "**System Control**" menu.

To leave the **"System Control"** menu, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Main Menu"**.

7. In "**Main Menu**", press the "⇩" or "⇧" button to choose "**Event Log**" and press the "↵" button to enter the "**Event Log**" page.



In the "**Event Log**" page, press the "⇩" or "⇧" button to check the UPS present status. The event log is helpful for analysis of UPS malfunction. The event log can record up to 500 records. When the total number of records exceeds 500, the old records will be overwritten.



To leave the **"Event Log"** menu, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Main Menu"**.

7-1. Inverter Shutdown Event Code

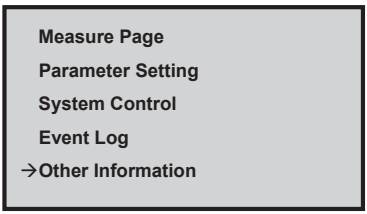
Event code	UPS Status
80	Inverter o/p voltage abnormal. (Inverter voltage high) (R phase)
82	Inverter o/p voltage abnormal. (Inverter voltage high) (S phase)
84	Inverter o/p voltage abnormal. (Inverter voltage high) (T phase)
86	Inverter o/p voltage abnormal. (Inverter voltage low) (R phase)
88	Inverter o/p voltage abnormal. (Inverter voltage low) (S phase)
90	Inverter o/p voltage abnormal. (Inverter voltage low) (T phase)
92	Inverter o/p voltage abnormal. (Inverter voltage too low) (R phase)
94	Inverter o/p voltage abnormal. (Inverter voltage too low) (S phase)
96	Inverter o/p voltage abnormal. (Inverter voltage too low) (T phase)
98	Inverter short circuit. (Inverter voltage too low) (R phase)
100	Inverter short circuit. (Inverter voltage too Low) (S phase)
102	Inverter short circuit. (Inverter voltage too Low) (T phase)
104	Inverter short circuit. (Peak current protect)
106	Inverter o/p voltage abnormal. (316J or 332J protect)

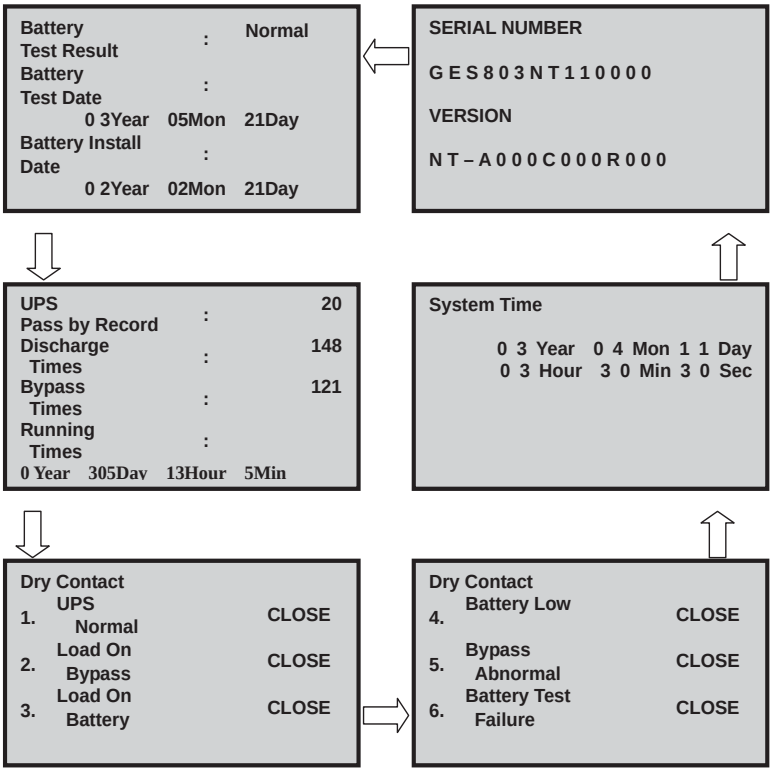
7-2. Rectifier / Static Switch Fail Event code

Event code	UPS Status
81	ECO to Inverter. (Bypass voltage abnormal) (R phase)
83	ECO to Inverter. (Bypass voltage abnormal) (S phase)
85	ECO to Inverter. (Bypass voltage abnormal) (T phase)
87	ECO to Inverter. (Inverter - Bypass voltage abnormal) (3 phase)
89	ECO to Inverter. (Bypass - Output voltage abnormal) (R phase)
91	ECO to Inverter. (Bypass - Output voltage abnormal) (S phase)
93	ECO to Inverter. (Bypass - Output voltage abnormal) (T phase)
95	Inverter to Bypass. (Inverter - Output voltage abnormal) (R phase)
97	Inverter to Bypass. (Inverter - Output voltage abnormal) (S phase)
99	Inverter to Bypass. (Inverter - Output voltage abnormal) (T phase)

8. In **"Main Menu"**, press the "⇩" or "⇧" button to choose "**Other Information**" and press the "⏎" button to enter the other information page.

Use the "⇩" and "⇧" buttons to choose the functions.

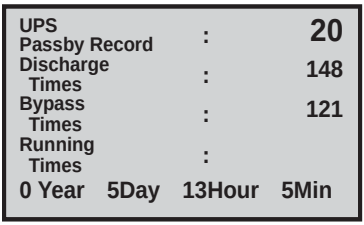




To leave the **"Other Information"** menu, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Main Menu"**.

9. UPS Status Code

The number of "**UPS record**" shown on the LCD indicates the code of UPS status. Please refer to the following table.



Code	UPS Status
0	Inhibit bypass output
2	Load on reserve
10	Rectifier AC soft-start
18	Do inverter test
20	Load on inverter
22	Load on inverter at backup mode
24	Low battery
26	Low battery shutdown
28	UPS shutdown due to short-circuit
30、58	Manual bypass on
32	Parallel communication cable abnormal
34	UPS shutdown due to inverter fault
36	UPS shutdown due to inverter overload
38	Over load under parallel (N-1)
40、42、44	Inverter output voltage abnormal
46	Shutdown due to EPO event
50	Shutdown due to DC-BUS over-voltage protect
52、54、56	Inverter fuse open (R/ S/ T phase)
60、62、64	Inverter over-temperature shutdown (R/ S/ T phase)
68、70	Auxiliary power abnormal (PCB-C/A)

Chapter 7 : UPS Operation

7.1 Pre Start-up & Pre Turn-off Warnings

- Please check the following items before start-up of the UPS.
  1. All circuit breakers or switches are in the **OFF** position.
  2. Each external battery cabinet's battery breaker is in the **OFF** status.
  3. Ensure that neutral line and grounding have the same voltage.
  4. Before supplying power to the UPS, check that input voltage, frequency and phase sequence are met with UPS specifications.
  5. Ensure that every fuse is in the '**CONNECTION**' status.
- Please read the following before turning off the UPS.

  If you perform turn-off procedures, all power supplying to the UPS will be completely cut off. Please make sure the critical loads connected to the UPS have already been safely shut down before you perform the turn-off procedures.

7.2 Start-up Procedures

7.2.1 Normal Mode Start-up Procedures (Single)

NOTE : Before executing the following start-up procedures, please refer to ***7.1 Pre Start-up & Pre Turn-off Warnings*** first.

1. Turn on the **Reserve Input** breaker or switch, and the LCD will display '**Bypass Mode**'.
2. Turn on the **Rectifier Input** breaker or switch and wait about 30 seconds. After that, the DC BUS voltage will be established to 393V.
3. Turn on each external battery cabinet's **Battery** breaker.
4. Press the '**ON**' and '⏎' buttons simultaneously for 3 seconds. After that, the inverter will start up. Once the inverter voltage is established, the power will be switched from bypass to inverter. At this moment, it will be the inverter to supply power to the connected loads, and the LCD will display '**Normal Mode**'. After 30 seconds, the UPS will automatically execute a battery test to check if the connected batteries are normal or not.

5. If the battery test is normal, use a voltage meter to measure the UPS's output voltage (per phase). If normal, turn on the **UPS Output** breaker or switch.

7.2.2 Battery Mode Start-up Procedures (Single)

NOTE:

1. Before executing the following start-up procedures, please refer to ***7.1 Pre Start-up & Pre Turn-off Warnings*** first.
2. Battery start function is customized and only applicable to the model that has the built-in battery contactor.

1. Turn on each external battery cabinet's **Battery** breaker.
2. Press the battery start-up switch once.
3. After the DC BUS voltage reaches around 330V, the UPS's battery contactor will start up.
4. Press the '**ON**' and '⏎' buttons simultaneously for 3 seconds. After that, the inverter will start up, the inverter voltage will be established and the LCD will display '**Backup Mode**'.
5. Measure the voltage of the **UPS Output** breaker or switch. If normal, turn on the **UPS Output** breaker or switch.

7.2.3 Manual Bypass Mode Start-up Procedures (Single)

NOTE:

1. Regular UPS maintenance at a frequency of every half year is suggested.
2. Before executing the following procedures, please refer to ***7.1 Pre Start-up & Pre Turn-off Warnings*** first.

The **Manual Bypass** breaker or switch can only be turned **ON** for UPS maintenance, which ensures that the power supplying to the connected loads won't be interrupted during maintenance process.

If the **Manual Bypass** breaker or switch is turned **ON** in **Normal Mode**, the inverter will be turned **OFF**, the connected critical loads will be power-supplied by the manual bypass and the output won't be protected. Please ensure that the reserve AC power is normal.

7.2.3.1 From Normal Mode to Manual Bypass Mode (Single)

WARNING:

If you perform the following turn-off procedures, all power supplying to the UPS will be completely cut off. Please make sure the critical loads connected to the UPS have already been safely shut down before you perform the turn-off procedures.

1. Press the '**OFF**' and '⏎' buttons simultaneously for 3 seconds. After the reserve AC power is normal (the voltage and frequency of the reserve AC power is within the setup range), the inverter will be turned off immediately and it will be the reserve AC power to supply power to the connected loads. At the same time, the LCD will display '**Bypass Mode**'.
2. Turn off each external battery cabinet's **Battery** breaker.
3. Turn off the **Rectifier Input** breaker or switch.
4. (1) Wait about 5 minutes for the DC CAP to discharge, and ensure that the LCD shows the battery voltage lower than 5V.

   Or, (2) Press the '**ON**' and '**OFF**' buttons simultaneously for 3 seconds to let the DC CAP to discharge, and ensure that the LCD shows the battery voltage lower than 5V. After confirmation, press the '**OFF**' and '⏎' buttons simultaneously for 3 seconds to finish the discharge process.
5. Turn on the **Manual Bypass** breaker or switch. The connected loads will be power-supplied by the manual bypass and the LCD will display '**Manual Bypass ON**'.
6. Turn off the **UPS Output** breaker or switch and **Reserve Input** breaker or switch.
7. Disconnect all fuses. After that, the LCD will be **OFF**.
8. When the UPS is running in **Manual Bypass Mode**, there is no high voltage inside the UPS except the wiring terminals and **Manual Bypass** breaker or switch. Do not touch the UPS's wiring terminals and **Manual Bypass** breaker or switch during UPS maintenance process to avoid electric shock.

7.2.3.2 From Manual Bypass Mode to Normal Mode (Single)

NOTE: Before executing the following start-up procedures, please refer to ***7.1 Pre Start-up & Pre Turn-off Warnings*** first.

1. Connect all fuses.
2. Turn on the **Reserve Input** breaker or switch and **UPS Output** breaker or switch.
3. After that, the connected loads will be power-supplied by the manual bypass and the LCD will display '**Manual Bypass ON**'.
4. Turn off the **Manual Bypass** breaker or switch. After that, the reserve AC power will supply power to the connected loads and the LCD will display '**Bypass Mode**'.
5. Turn on the **Rectifier Input** breaker or switch and wait about 30 seconds. After that, the DC BUS voltage will be established.
6. Turn on each external battery cabinet's **Battery** breaker.
7. Press the '**ON**' and '⏎' buttons simultaneously for 3 seconds. After that, the inverter will start up. Once the inverter voltage is established, the power will be switched from bypass to inverter. At this moment, it will be the inverter to supply power to the connected loads, and the LCD will display '**Normal Mode**'. After 30 seconds, the UPS will automatically execute a battery test to check if the connected batteries are normal or not.

7.2.4 ECO Mode Start-up Procedures (Single)_ only Applicable to Single Unit with Capacity above 260kVA (Included)

NOTE:

1. ECO mode is only applicable to single unit but not parallel units.
2. ECO mode is only applicable to the UPS with capacity above 260kVA (included). For the capacity below 200kVA (included), the function of ECO mode is optional.
3. Before executing the following start-up procedures, please refer to ***7.1 Pre Start-up & Pre Turn-off Warnings*** first.

1. Turn on the **Reserve Input** switch, and the LCD will display '**Bypass Mode**'.
2. Turn on the **Rectifier Input** switch and wait about 30 seconds. After that, the DC BUS voltage will be established.

3. Turn on each external battery cabinet's **Battery** breaker.
4. Press the '**ON**' and '⏎' buttons simultaneously for 3 seconds. After that, the inverter will start up. Once the inverter voltage is established, the power will be switched from bypass to inverter. At this moment, it will be the inverter to supply power to the connected loads, and the LCD will display '**Normal Mode**'. After 30 seconds, the UPS will automatically execute a battery test to check if the connected batteries are normal or not.
5. About 40 seconds after the UPS turns on normally, it will be the bypass to supply power to the connected loads, and the LCD will display '**Bypass Mode ECO**'.
6. If the battery test is normal, use a voltage meter to measure the UPS's output voltage (per phase). If normal, turn on the **UPS Output** switch.

7.2.5 Normal Mode Start-up Procedures (Parallel)

NOTE: Before executing the following start-up procedures, please refer to ***7.1 Pre Start-up & Pre Turn-off Warnings*** first.

1. Before paralleling UPSs, please confirm that each unit's capacity, voltage and frequency are the same.
2. Turn on each UPS's **Reserve Input** breaker or switch, and each LCD will display '**Bypass Mode**'.
3. Use the provided parallel cables to connect the parallel UPSs (at maximum 8 units) and make sure that each parallel cable is firmly fixed.
4. Use the RS-232 and UPS parameter setting software (please contact service personnel) to set up each parallel UPS's parallel ID No. The parallel ID No. is different from the ID No. shown on the LCD. Please refer to the table below for the parallel ID No.

UPS (At Max. 8 Units)	1st	2nd	3rd	4th	5th	6th	7th	8th
Parallel ID No.	12	23	34	45	56	67	78	81

5. Turn on each UPS's **Rectifier Input** breaker or switch and wait about 30 seconds. After that, the DC BUS voltage will be established.
6. Turn on each external battery cabinet's **Battery** breaker.

7. Press one of the parallel UPSs' '**ON**' and '⏎' buttons simultaneously for 3 seconds, and its inverter will start up. Once the inverter voltage is established, the LCD will display '**Bypass Mode**'.
8. Repeat the above-mentioned ***Step 7*** to the rest of the parallel UPSs. After the last parallel UPS's inverter voltage is established, each parallel UPS's contactor will activate and each LCD will display '**Normal Mode**'.
9. Use a voltage meter to measure each parallel UPS's output voltage (per phase). The output voltage difference must be lower than 5V. If normal, turn on each unit's **UPS Output** breaker or switch.
10. Now, the total loads will be equally shared by the parallel UPSs.

7.2.6 Battery Mode Start-up Procedures (Parallel)

NOTE:

1. Before executing the following start-up procedures, please refer to ***7.1 Pre Start-up & Pre Turn-off Warnings*** first.
2. Battery start function is customized and only applicable to the model that has the built-in battery contactor.

1. Before paralleling UPSs, please confirm that each unit's capacity, voltage and frequency are the same.
2. Turn on each external battery cabinet's **Battery** breaker.
3. Press each parallel UPS's battery start-up switch once.
4. Use the provided parallel cables to connect the parallel UPSs (at maximum 8 units) and make sure that each parallel cable is firmly fixed.
5. Use the RS-232 and UPS parameter setting software (please contact service personnel) to set up each parallel UPS's parallel ID No. The parallel ID No. is different from the ID No. shown on the LCD. Please refer to the table below for the parallel ID No.

UPS (At Max. 8 Units)	1st	2nd	3rd	4th	5th	6th	7th	8th
Parallel ID No.	12	23	34	45	56	67	78	81

6. After each UPS's DC BUS voltage reaches around 330V, each UPS's battery contactor will start up.

7. Press one of the parallel UPSs' '**ON**' and '⏎' buttons simultaneously for 3 seconds. After that, its inverter will start up and its inverter voltage will be established.
8. Repeat ***Step 7*** to the rest of the parallel UPSs. After the last parallel UPS's inverter voltage is established, each parallel UPS's contactor will activate.
9. Use a voltage meter to measure each parallel UPS's output voltage (per phase). The output voltage difference must be lower than 5V. If normal, turn on each unit's **UPS Output** breaker or switch.
10. Now, the total loads will be equally shared by the parallel UPSs and each LCD will display '**Backup Mode**'.

7.2.7 Manual Bypass Mode Start-up Procedures (Parallel)

NOTE:

1. Regular UPS maintenance at a frequency of every half year is suggested.
2. Before executing the following procedures, please refer to ***7.1 Pre Start-up & Pre Turn-off Warnings*** first.

For parallel application, each parallel UPS's **Manual Bypass** breaker or switch can only be turned **ON** for UPS maintenance, which ensures that the power supplying to the connected loads won't be interrupted during maintenance process.

If each parallel UPS's **Manual Bypass** breaker or switch is turned **ON** in **Normal Mode**, each parallel UPS's inverter will be turned **OFF**, the connected critical loads will be power-supplied by the manual bypass and the output won't be protected. Please ensure that the reserve AC power is normal.

7.2.7.1 From Normal Mode to Manual Bypass Mode (Parallel)

WARNING:

If you perform the following turn-off procedures to each parallel UPS, all power supplying to the UPS will be completely cut off. Please make sure the critical loads connected to the UPS have already been safely shut down before you perform the turn-off procedures.

1. Press one of the parallel UPSs' '**OFF**' and '⏎' buttons simultaneously for 3 seconds. If the total connected loads are less than the total capacity of the rest of the parallel UPSs, the UPS that you just turned off will shut down and its LCD will display '**Inhibit Output**'. Now, the total loads will be equally shared by the rest of the parallel UPSs.

   If the total loads are greater than the total capacity of the rest of the parallel UPSs, each UPS's inverter will be turned off immediately after the reserve AC power is normal (the voltage and frequency of the reserve AC power is within the setup range). After that, it will be the reserve AC power to supply power to the connected loads and each UPS's LCD will display '**Bypass Mode**'.

2. Repeat the above-mentioned ***Step 1*** to the rest of the parallel UPSs in order to let all parallel UPSs run in '**Bypass Mode**'.

3. Turn off each external battery cabinet's **Battery** breaker.

4. Turn off each parallel UPS's **Rectifier Input** breaker or switch.

5. (1) Wait about 5 minutes for each DC CAP to discharge, and ensure that each LCD shows the battery voltage lower than 5V.

   Or, (2) Press each UPS's '**ON**' and '**OFF**' buttons simultaneously for 3 seconds to let its DC CAP to discharge, and ensure that each LCD shows the battery voltage lower than 5V. After confirmation, press each UPS's '**OFF**' and '⏎' buttons simultaneously for 3 seconds to finish the discharge process.

6. Turn on each parallel UPS's **Manual Bypass** breaker or switch. The connected loads will be power-supplied by the manual bypass and each LCD will display '**Manual Bypass ON**'.

7. Turn off each parallel UPS's **UPS Output** breaker or switch and **Reserve Input** breaker or switch.

8. Disconnect all fuses. After that, each LCD will be **OFF**.

9. When each UPS is running in **Manual Bypass Mode**, there is no high voltage inside any UPS except the wiring terminals and **Manual Bypass** breaker or switch. Do not touch any UPS's wiring terminals and **Manual Bypass** breaker or switch during UPS maintenance process to avoid electric shock.

7.2.7.2 From Manual Bypass Mode to Normal Mode (Parallel)

NOTE : Before executing the following start-up procedures to each parallel UPS, please refer to ***7.1 Pre Start-up & Pre Turn-off Warnings*** first.

1. Connect all fuses.
2. Turn on each parallel UPS's **Reserve Input** breaker or switch and **UPS Output** breaker or switch.
3. After that, each parallel UPS's connected loads will be power-supplied by the manual bypass and each LCD will display '**Manual Bypass ON**'.
4. Turn off each parallel UPS's **Manual Bypass** breaker or switch. After that, the reserve AC power will supply power to each parallel UPS's connected loads and each LCD will display '**Bypass Mode**'.
5. Ensure that each parallel cable is firmly fixed and each parallel UPS's parallel ID No. is correct. Please refer to the table below.

UPS (At Max. 8 Units)	1st	2nd	3rd	4th	5th	6th	7th	8th
Parallel ID No.	12	23	34	45	56	67	78	81

6. Turn on each UPS's **Rectifier Input** breaker or switch and wait about 30 seconds. After that, each unit's DC BUS voltage will be established.
7. Turn on each external battery cabinet's **Battery** breaker.
8. Press one of the parallel UPSs' '**ON**' and '⏎' buttons simultaneously for 3 seconds, and its inverter will start up. Once the inverter voltage is established, the LCD will display '**Bypass Mode**'.
9. Repeat the above-mentioned ***Step 8*** to the rest of the parallel UPSs. After the last parallel UPS's inverter voltage is established, each parallel UPS's contactor will activate and each LCD will display '**Normal Mode**'.
10. Now, the total loads will be equally shared by the parallel UPSs.

7.3 Turn-off Procedures

7.3.1 Normal Mode Turn-off Procedures (Single)

WARNING:

If you perform the following turn-off procedures, all power supplying to the UPS will be completely cut off. Please make sure the critical loads connected to the UPS have already been safely shut down before you perform the turn-off procedures.

1. Turn off the **UPS Output** breaker or switch.
2. Press the '**OFF**' and '⏎' buttons simultaneously for 3 seconds. When the reserve AC power is normal, the power will be switched from inverter to bypass, and the LCD will display '**Bypass Mode**'.
3. Turn off each external battery cabinet's **Battery** breaker.
4. Turn off the **Rectifier Input** breaker or switch.
5. (1) Wait about 5 minutes for the DC CAP to discharge, and ensure that the LCD shows the battery voltage lower than 5V.

   Or, (2) Press the '**ON**' and '**OFF**' buttons simultaneously for 3 seconds to let the DC CAP to discharge, and ensure that the LCD shows the battery voltage lower than 5V. After confirmation, press the '**OFF**' and '⏎' buttons simultaneously for 3 seconds to finish the discharge process.
6. Turn off the **Reserve Input** breaker or switch.

7.3.2 Battery Mode Turn-off Procedures (Single)

WARNING:

If you perform the following turn-off procedures, all power supplying to the UPS will be completely cut off. Please make sure the critical loads connected to the UPS have already been safely shut down before you perform the turn-off procedures.

1. Press the '**EPO**' button. After that, the LCD will display '**Inhibit Output**'.
2. Turn off each external battery cabinet's **Battery** breaker.
3. Turn off the **UPS Output** breaker or switch.

4. Turn off the **Rectifier Input** breaker or switch and **Reserve Input** breaker or switch.

WARNING:

In battery mode, even if you follow the above-mentioned turn-off procedures to turn off the UPS, there is still voltage existing inside the UPS. Do not touch the UPS to avoid eclectic shock.

7.3.3 Manual Bypass Mode Turn-off Procedures (Single)

WARNING:

If you perform the following turn-off procedures, all power supplying to the UPS will be completely cut off. Please make sure the critical loads connected to the UPS have already been safely shut down before you perform the turn-off procedures.

In manual bypass mode, the LCD is in the **OFF** status. To completely shut down the UPS, turn off the **Manual Bypass** breaker or switch.

7.3.4 ECO Mode Turn-off Procedures (Single)_ only Applicable to Single Unit with Capacity above 260kVA (Included)

NOTE:

1. ECO mode is only applicable to single unit but not parallel units.
2. ECO mode is only applicable to the UPS with capacity above 260kVA (included). For the capacity below 200kVA (included), the function of ECO mode is optional.
3. If you perform the following turn-off procedures, all power supplying to the UPS will be completely cut off. Please make sure the critical loads connected to the UPS have already been safely shut down before you perform the turn-off procedures.

1. Turn off the **UPS Output** switch.
2. Press the '**OFF**' and '⏎' buttons simultaneously for 3 seconds. After that, the inverter will be off, and the LCD will display '**Bypass Mode**'.
3. Turn off each external battery cabinet's **Battery** breaker.
4. Turn off the **Rectifier Input** switch.

5. (1) Wait about 5 minutes for the DC CAP to discharge, and ensure that the LCD shows the battery voltage lower than 5V.

   Or, (2) Press the '**ON**' and '**OFF**' buttons simultaneously for 3 seconds to let the DC CAP to discharge, and ensure that the LCD shows the battery voltage lower than 5V. After confirmation, press the '**OFF**' and '⏎' buttons simultaneously for 3 seconds to finish the discharge process.

6. Turn off the **Reserve Input** switch.

7.3.5 Normal Mode Turn-off Procedures (Parallel)

WARNING:

If you perform the following turn-off procedures to each parallel UPS, all power supplying to the UPS will be completely cut off. Please make sure the critical loads connected to the UPS have already been safely shut down before you perform the turn-off procedures.

1. Press one of the parallel UPSs' '**OFF**' and '⏎' buttons simultaneously for 3 seconds. If the total connected loads are less than the total capacity of the rest of the parallel UPSs, the UPS that you just turned off will shut down and its LCD will display '**Inhibit Output**'. Now, the total loads will be equally shared by the rest of the parallel UPSs.

   If the total loads are greater than the total capacity of the rest of the parallel UPSs, each UPS's inverter will be turned off immediately after the reserve AC power is normal (the voltage and frequency of the reserve AC power is within the setup range). After that, it will be the reserve AC power to supply power to the connected loads and each UPS's LCD will display '**Bypass Mode**'.

2. Repeat the above-mentioned ***Step 1*** to the rest of the parallel UPSs in order to let all parallel UPSs run in '**Bypass Mode**'.

3. Turn off each external battery cabinet's **Battery** breaker.

4. Turn off each parallel UPS's **Rectifier Input** breaker or switch.

5. (1) Wait about 5 minutes for each DC CAP to discharge, and ensure that each LCD shows the battery voltage lower than 5V.

   Or, (2) Press each UPS's '**ON**' and '**OFF**' buttons simultaneously for 3 seconds to let its DC CAP to discharge, and ensure that each LCD shows the battery voltage lower than 5V. After confirmation, press each UPS's '**OFF**' and '⏎' buttons simultaneously for 3 seconds to finish the discharge process.

6. Turn off each unit's **UPS Output** breaker or switch and **Reserve Input** breaker or switch.

7.3.6 Battery Mode Turn-off Procedures (Parallel)

WARNING:

If you perform the following turn-off procedures to each parallel UPS, all power supplying to the UPS will be completely cut off. Please make sure the critical loads connected to the UPS have already been safely shut down before you perform the turn-off procedures.

1. Press each parallel UPS's '**EPO**' button. After that, each LCD will display 'I**nhibit Output**'.
2. Turn off each external battery cabinet's **Battery** breaker.
3. Turn off each unit's **UPS Output** breaker or switch.
4. Turn off each unit's **Rectifier Input** breaker or switch and **Reserve Input** breaker or switch.

WARNING:

In battery mode, even if you follow the above-mentioned turn-off procedures to turn off each parallel UPS, there is still voltage existing inside every UPS. Do not touch any UPS to avoid eclectic shock.

7.3.7 Manual Bypass Mode Turn-off Procedures (Parallel)

WARNING:

If you perform the following turn-off procedures to each parallel UPS, all power supplying to the UPS will be completely cut off. Please make sure the critical loads connected to the UPS have already been safely shut down before you perform the turn-off procedures.

In manual bypass mode, each parallel UPS's LCD is in the **OFF** status. To completely shut down every parallel UPS, turn off each unit's **Manual Bypass** breaker or switch.

Chapter 8 : Optional Accessories

8.1 12-pulse Rectifier

To reduce input current harmonic distortion, the installation of a 12-pluse rectifier is suggested.

The 12-pluse rectifier is composed of one transformer and two rectifiers. After receiving the AC input power, the transformer will (1) transfer the input voltage into two different-voltage power sources with 30° phase difference and (2) send the two power sources to the two rectifiers, which can reduce the input side's 5th and 7th input current harmonic distortion in order to meet the requirement of reducing the total input current harmonic distortion considerably.

In general, the total input current harmonic distortion is about 32~38% with use of a 6-pluse rectifier, but the 12-pluse rectifier could reduce the total input current harmonic distortion to 10~18%.

The 12-pulse rectifier's structure diagram is shown in ***Figure 8-1***.

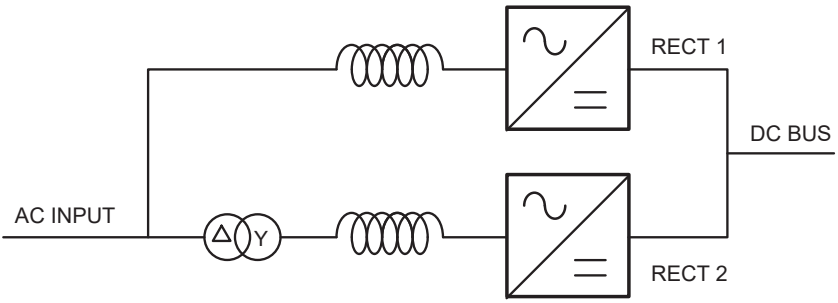


Figure 8-1: 12-pulse Rectifier's Structure Diagram

8.2 Input Harmonic Filter

Besides the 12-pluse rectifier, the passive-type input harmonic filter (L-C filter) is another solution to reducing the total input current harmonic distortion. Moreover, it is also a means to improve the input power factor of the UPS.

For the UPS that is installed the 6-pluse rectifier, the installation of the 5th passive-type input harmonic filter (L-C filter) is suggested.

8.3 Remote Monitor

The optional remote monitor can be connected to the UPS via the built-in RS-485 interface, and the UPS operating status can be transmitted to the remote control room via the RS-485 interface for users to realize centralized monitoring.

8.4 Monitoring Software

Via the built-in RS-232 port and UPSentry 2012 software (http://www.deltapowersolutions.com/en/mcis/software-center.php), users can monitor and manage the UPS remotely.

8.5 Battery Start-up

When there is no AC power and you wish to start up the UPS, please refer to ***Chapter 7.2.2*** and ***Chapter 7.2.6***. If the AC power is still not recovered, the UPS will shut down after the batteries are fully discharged.

8.6 ECO Mode

Choose ECO mode from the LCD to let the UPS work in ECO Mode. When the UPS is running in ECO mode, it is the reserve AC power to supply power to the connected loads. If the reserve AC power is abnormal, the connected loads will be power-supplied by the inverter. ECO mode is only applicable to the UPS with capacity above 260kVA (included). For the capacity below 200kVA (included), the function of ECO mode is optional.

Appendix 1 : Technical Specifications

Power rating kVA (P.F.=0.9)			10	15	20	30	40	50	60	80	100	120	160	200	260	320	400	500
Input	Nominal voltage	V	380 / 220, 400 / 230, 415 / 240 or 480/ 277, 208/ 120 (3Ø4W+G) 380, 400, 415 or 480 , 208 , 220 (3Ø3W+G)															
	Voltage range	%	±20															
	Nominal frequency	Hz	50 / 60															
	Frequency range	%	±5															
	Nominal current (480/277Vac)	A	18	27	34	51	67	83	100	132	160	193	257	321	413	508	635	793
	Nominal current (400/230Vac)	A	21	31	40	59	79	98	117	155	194	232	309	386	502	618	773	966
	Nominal current (208/120Vac)	A	42	63	79	118	154	192	231	304	381	457	--	--	--	--	--	--
Output	Nominal voltage	V	220, 230, 240 (1Ø2W +G) ; *1 380 / 220, 400 / 230, 415 / 240 or 480/277, 208/120 (3Ø4W+G)															
	T.H.D.(with linear load)	%	≦ 3															
	Voltage regulation:																	
	static	%	±1															
	dynamic	%	±5															
	Nominal frequency	Hz	50 / 60															
	Frequency regulation:																	
	with internal oscillator	%	±0.01															
	with mains synchronize	%	±1															
Alarm	Load on battery	Discontinuous alarm																
	UPS abnormal	Continuous alarm																
Indication	LED status indication	UPS status indication: AC mains normal, reserve source normal, rectifier, inverter, static switch, and battery status indication.																
	LCD display	UPS abnormal status display and self-diagnosis wisely. Input, bypass, inverter, output & battery voltage, current and frequency, load level display.																
Remote	Monitor	Multi-unit monitor, graphic display, and history data statistics.																
	Control	Inverter/horns remote control, password setting, fault information reading, and remote alarm.																
Function	Communication interface	Standard: RS232, RS485, Status Dry Contact																
		Option: SNMP, Ethernet Port																
	Parallel redundant	Yes (up to 8 UPS units)																
	Emergency Power Off	Yes (Local and Remote)																
	Multi-speed fan speed control	Yes																
	SRAM fault sequence memory	Yes																
	Programmable parameter setting	Yes																
	Battery start function	Yes (option)																
	Input Harmonic improvement	Harmonic filter and 12-pulse rectifier (option)																

Power rating kVA (P.F.=0.9)		10	15	20	30	40	50	60	80	100	120	160	200	260	320	400	500
Complete system	Overall efficiency:																
	Normal mode (400/230V) %	88	89	90	91	91	91.5	91.5	92	92	92.5	92.5	92.5	92.5	92.5	92.5	93
	Inverter overload	110% : 60min 125% : 10min 150% : 1min															
	Static switch overload current:																
	30 minutes %	120															
	30 milliseconds %	1000															
	Transfer time msec	0															
	Ambient temperature °C	0~40															
	Relative humidity (no condensate) %	90															
	Operating elevation m	0~2000 (0~6060 ft)															
	Audible noise (at a distance of 1.5m)	≤ 60				≤ 65						≤ 68		≤ 72			≤ 77
	Dimensions : (Model 400/230Vac only)																
	width mm	600								800		1200		1600			800 +1100
	depth mm	800								830		830		995			995
	height mm	1400								1700		1700		1950			1950
	Weight kg	335	335	365	365	425	460	506	525	700	745	1050	1085	1680	1720	1920	2410

NOTE :

1. *1 : 220, 230, 240 (1⌀2W +G) single phase output voltage for model 20kVA~60kVA only.
2. All the weight and dimensions listed in the above specifications are for models with the 6-pulse rectifier. For models that install the 12-pulse rectifier and any other customized models, please contact your local dealer, sales representative or Delta customer service for their weight and dimensions.
3. Please refer to the rating label for the safety rating.
4. All specifications are subject to change without prior notice.

Appendix 2 : Warranty

Seller warrants this product, if used in accordance with all applicable instructions, to be free from original defects in material and workmanship within the warranty period. If the product has any failure problem within the warranty period, Seller will repair or replace the product at its sole discretion according to the failure situation.

This warranty does not apply to normal wear or to damage resulting from improper installation, operation, usage, maintenance or irresistible force (i.e. war, fire, natural disaster, etc.), and this warranty also expressly excludes all incidental and consequential damages.

Maintenance service for a fee is provided for any damage out of the warranty period. If any maintenance is required, please directly contact the supplier or Seller.

WARNING!

The individual user should take care to determine prior to use whether the environment and the load characteristic are suitable, adequate or safe for the installation and the usage of this product. The User Manual must be carefully followed. Seller makes no representation or warranty as to the suitability or fitness of this product for any specific application.

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