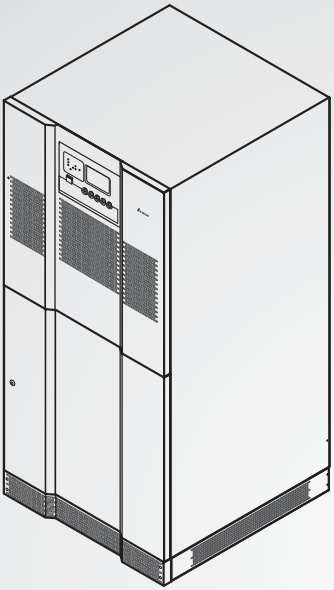


The power behind competitiveness

Delta UPS - Ultron Family

NT Series, Three Phase
15/ 30/ 60/ 100 kVA

User Manual

www.deltapowersolutions.com

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.
- Do not use the UPS in a computer room as defined in the Standard for the Protection of Electronic Computer/ Data Processing Equipment, ANSI/ NFPA 75.
- Install the UPS in a well-ventilated indoor area where is free of conductive contaminants and 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. Do not place it outdoors. Please refer to ***Chapter 4.6*** for more information
- The ambient operating temperature should be kept between 32°F ~ 104°F (0°C ~ 40°C).
- For each operation mode's block diagram, please refer to ***Chapter 3***.
- For PERMANENTLY CONNECTED EQUIPMENT application, a readily accessible disconnected device shall be incorporated in the building's wiring system for AC Input, AC Output and DC Input. Please refer to ***Chapter 4.8*** for relevant specifications.
- For the external terminals that need to connect to the UPS, please refer to ***Chapter 4.8*** for more information.
- The conduit size shall be 6 inches or other equivalent size. Wiring method shall be in accordance with the National Electric Code, ANSI/ NFPA 70. When connecting to AC and DC wiring terminals, use adequate wire gauge, copper wires with temperature resistance up to 194°F (90°C) and lb-in torque force. For more information, please refer to ***Chapter 4.8***.
- 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(s) 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 every 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 disconnected 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.
- Battery installation and maintenance instructions shall be provided by the battery manufacturer.
- Before battery installation and maintenance, ensure that the instructions written in the battery manufacturer's installation and maintenance manuals are thoroughly followed.
- For information about the maximum battery fault current, please refer to ***Chapter 5***.
- For information about the battery usage, connection, replacement, etc., please refer to ***Chapter 5***.
- 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 battery 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:**

  - UL 1778

  - FCC47 CFR Part 15, Subpart B, Class A

- **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 UPSentry 2012 software (https://datacenter-softwarecenter.deltaww.com.cn), 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)

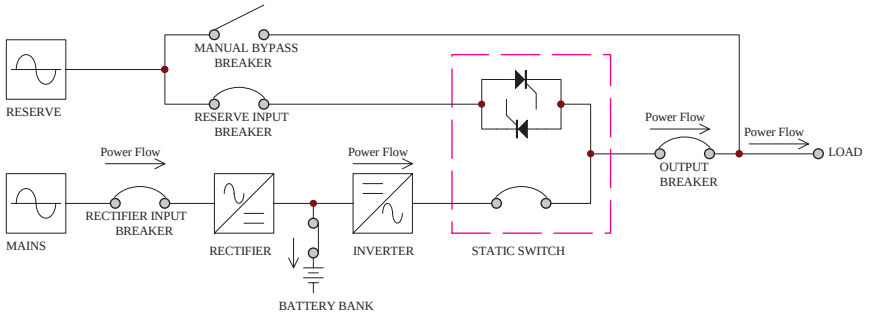


Figure 3-1: Normal Mode Block Diagram_ Single Unit

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***).

3.2 Back-up Mode (Single)

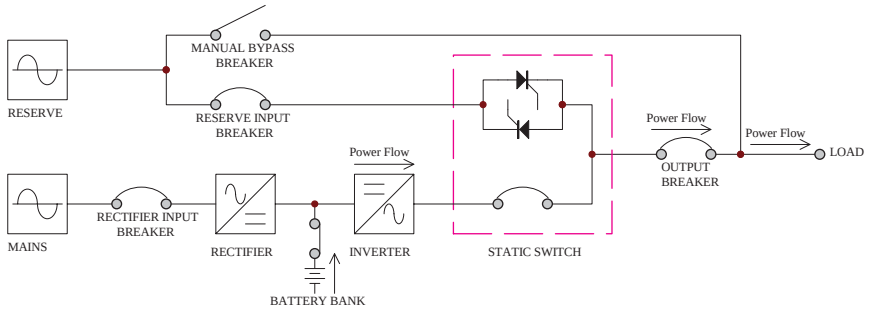


Figure 3-2: Back-up Mode Block Diagram_ Single Unit

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)

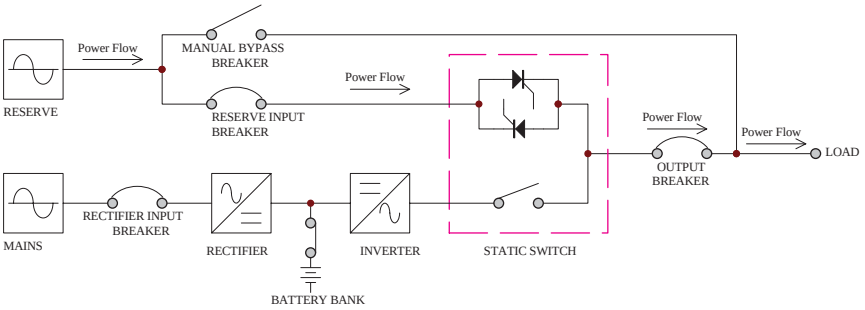


Figure 3-3: Reserve AC Power Supply Mode Block Diagram_ Single Unit

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***).

3.4 Maintenance Bypass Mode (Single)

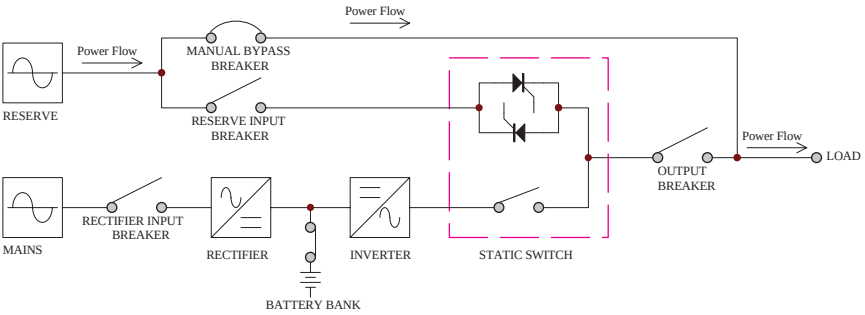


Figure 3-4: Maintenance Bypass Mode Block Diagram_ Single Unit

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 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***).

3.5 Normal Mode (Parallel)

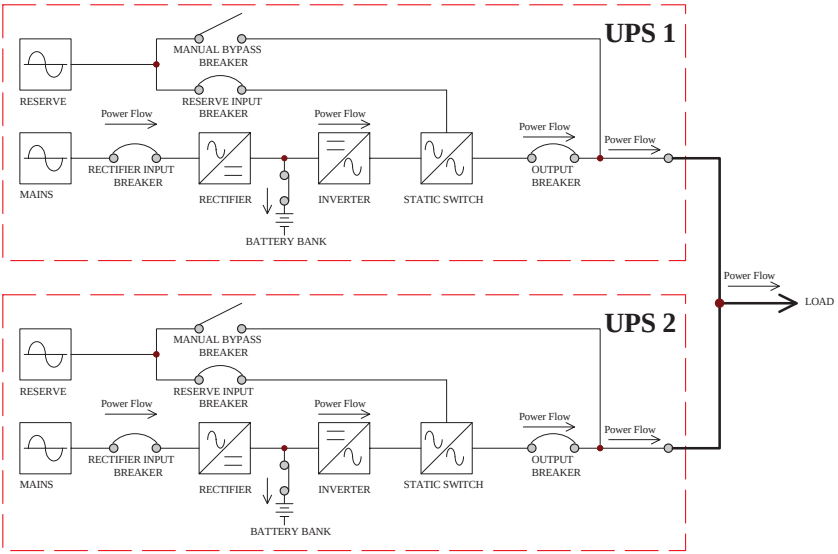


Figure 3-5: Normal Mode Block Diagram_ Parallel Units

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 3-5***).

3.6 Back-up Mode (Parallel)

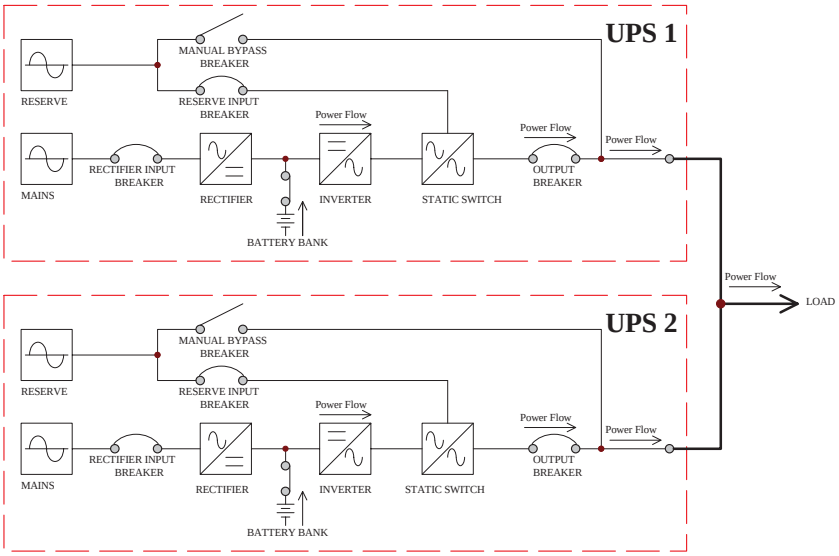


Figure 3-6: Back-up Mode Block Diagram_ Parallel Units

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 3-6***).

3.7 Reserve AC Supply Mode (Parallel)

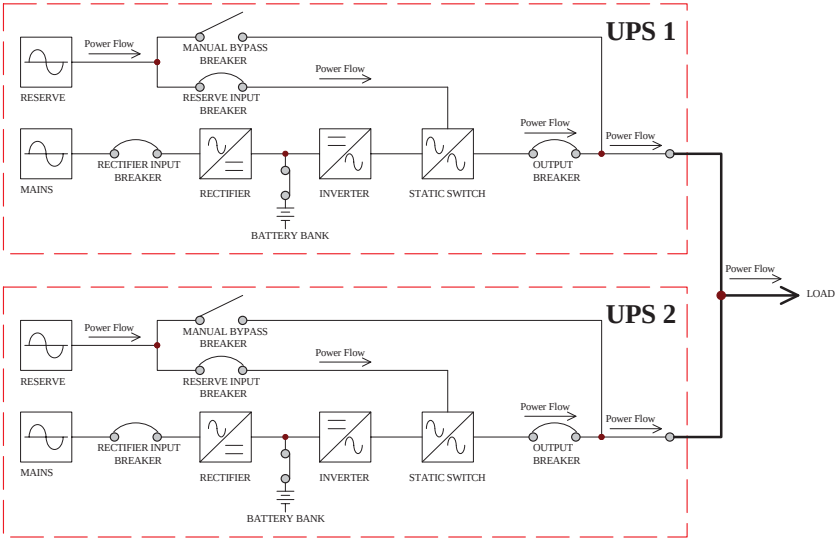


Figure 3-7: Reserve AC Power Supply Mode Block Diagram_ Parallel Units

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 3-7***).

3.8 Maintenance Bypass Mode (Parallel)

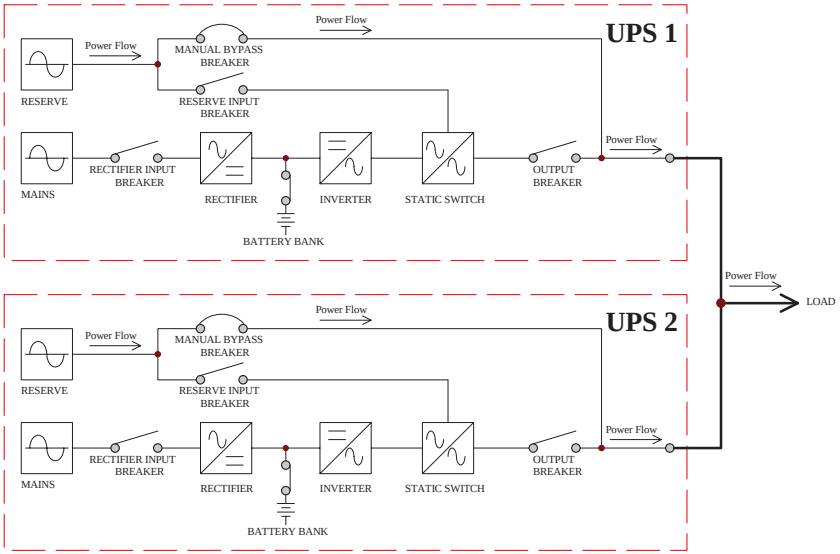


Figure 3-8: Maintenance Bypass Mode Block Diagram_ Parallel Units

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 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 3-8***).

3.9 Hot Standby Redundancy

For hot standby redundancy configurations, UPS1 O/P is connected to the reserve AC power of UPS2 (see ***Figure 3-9***). Such configurations could reduce the probability of power cut-off and improve the quality of power supply.

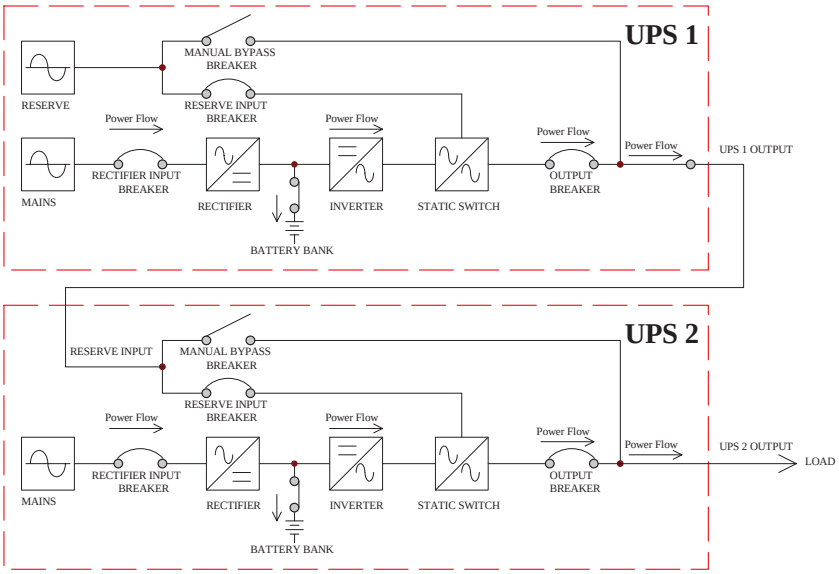


Figure 3-9: Hot-standby Redundancy Block Diagram

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.

3.10 Common Battery

To save on costs and installation space, the parallel UPS units can share the same external battery cabinet(s). Please see ***Figure 3-10***.

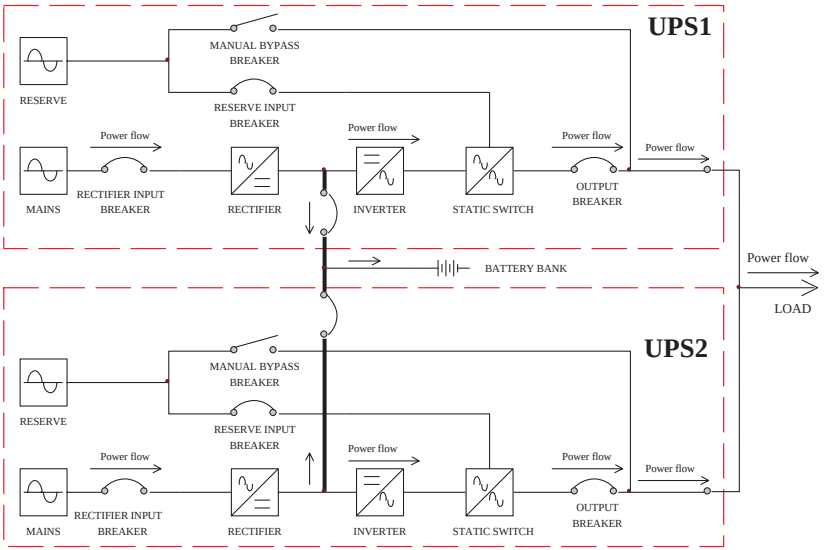


Figure 3-10: Common Battery Block Diagram

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.

3.11 Dry Contacts

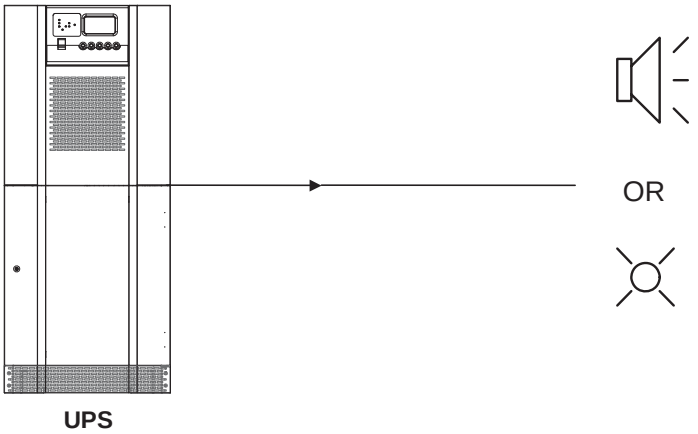


Figure 3-11

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

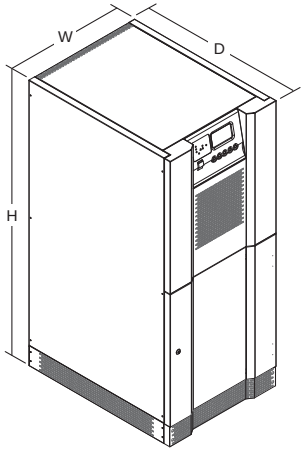
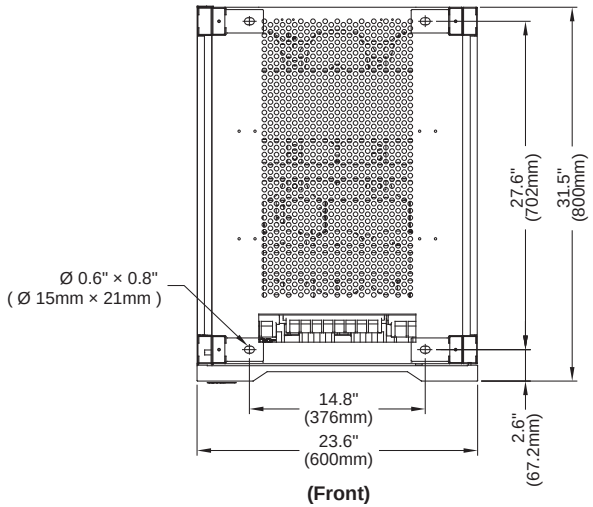


Figure 4-1

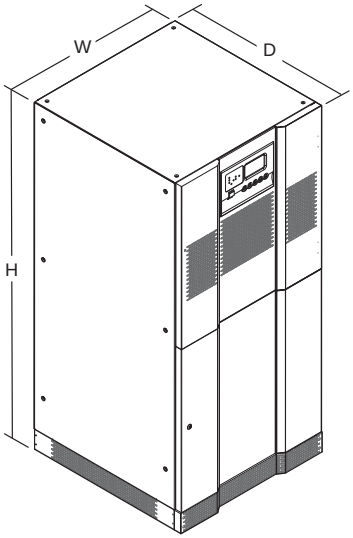
UPS unit profile dimensions table (Input: 480Vac; Reserve I/P: 208/ 120Vac; Output: 208/ 120Vac)			
Figure 4-1			
Rating (kVA)	Width	Depth	Height
15	23.6" (600 mm)	31.5" (800 mm)	55.1" (1400 mm)
30	23.6" (600 mm)	31.5" (800 mm)	55.1" (1400 mm)

Bottom View



(Front)

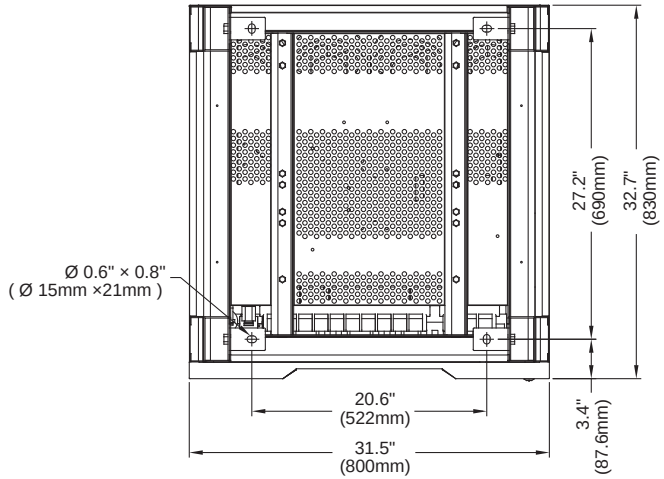
Figure 4-2



UPS unit profile dimensions table (Input: 480Vac; Reserve I/P: 208/ 120Vac; Output: 208/ 120Vac)			
Figure 4-3			
Rating (kVA)	Width	Depth	Height
60	31.5" (800 mm)	32.7" (830 mm)	66.9" (1700 mm)

Figure 4-3

Bottom View



(Front)

Figure 4-4

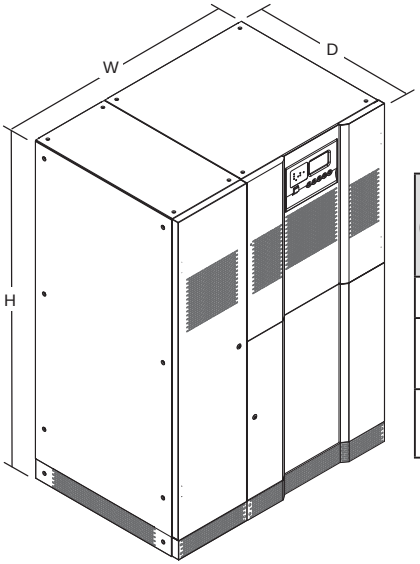


Figure 4-5

UPS unit profile dimensions table (Input: 480Vac; Reserve I/P: 208/ 120Vac; Output: 208/ 120Vac)			
Figure 4-5			
Rating (kVA)	Width	Depth	Height
100	47.2" (1200 mm)	32.7" (830 mm)	66.9" (1700 mm)

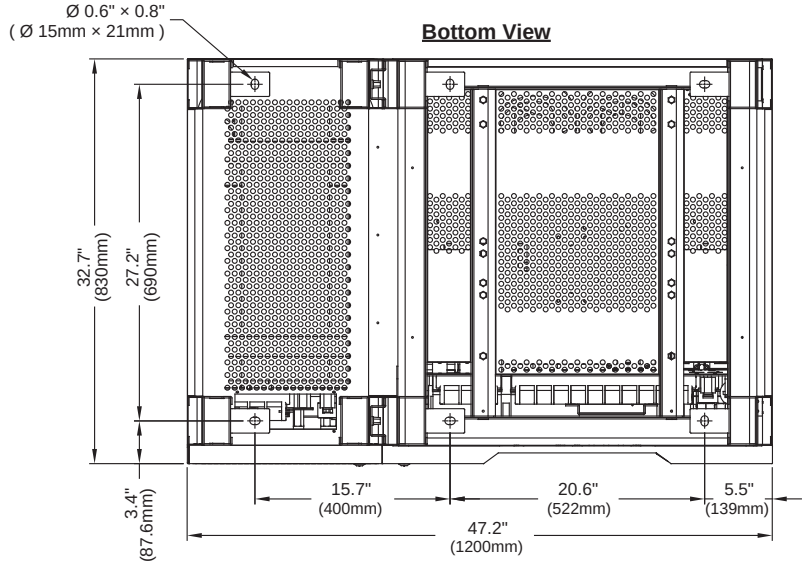


Figure 4-6

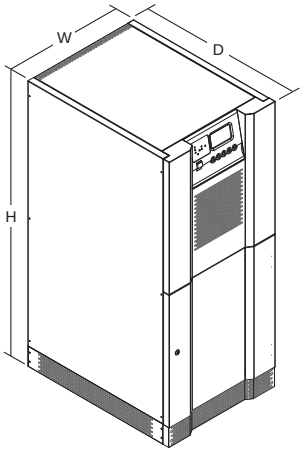
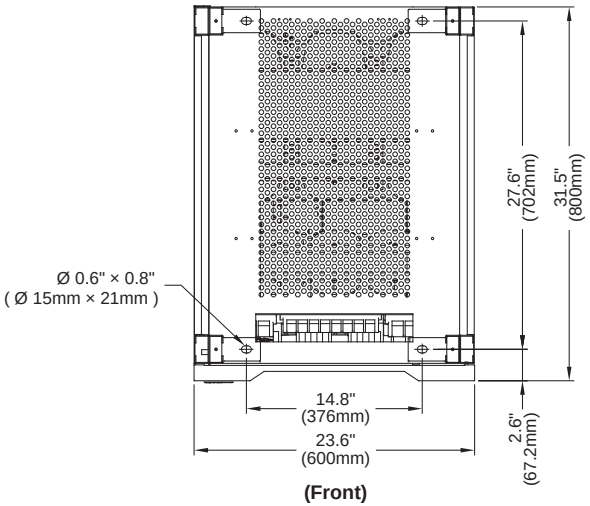


Figure 4-7

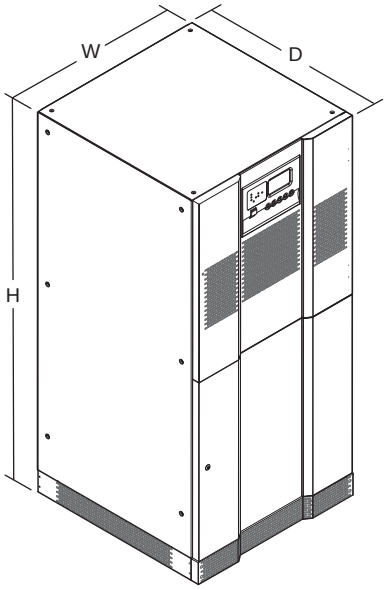
UPS unit profile dimensions table (Input: 480Vac; Reserve I/P: 480/ 277Vac; Output: 480/ 277Vac)			
Figure 4-7			
Rating (kVA)	Width	Depth	Height
15	23.6" (600 mm)	31.5" (800 mm)	55.1" (1400 mm)
30	23.6" (600 mm)	31.5" (800 mm)	55.1" (1400 mm)

Bottom View



(Front)

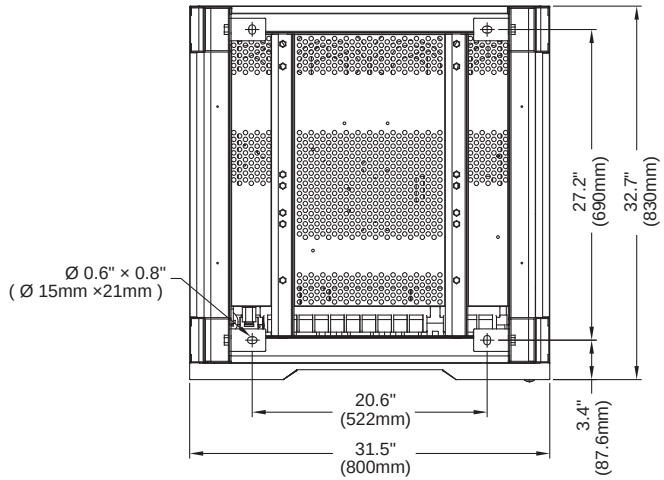
Figure 4-8



UPS unit profile dimensions table (Input: 480Vac; Reserve I/P: 480/ 277Vac; Output: 480/ 277Vac)			
Figure 4-9			
Rating (kVA)	Width	Depth	Height
60	31.5" (800 mm)	32.7" (830 mm)	66.9" (1700 mm)

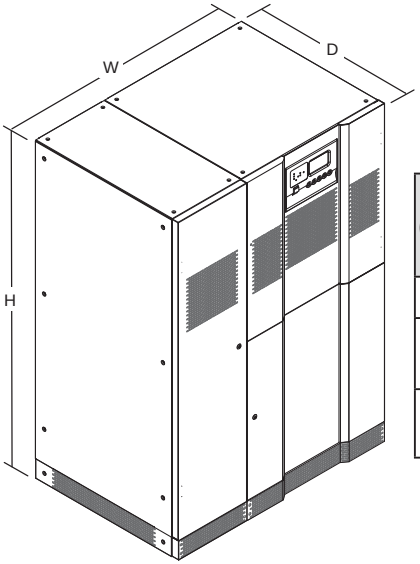
Figure 4-9

Bottom View



(Front)

Figure 4-10



UPS unit profile dimensions table (Input: 480Vac; Reserve I/P: 480/ 277Vac; Output: 480/ 277Vac)			
Figure 4-11			
Rating (kVA)	Width	Depth	Height
100	47.2" (1200 mm)	32.7" (830 mm)	66.9" (1700 mm)

Figure 4-11

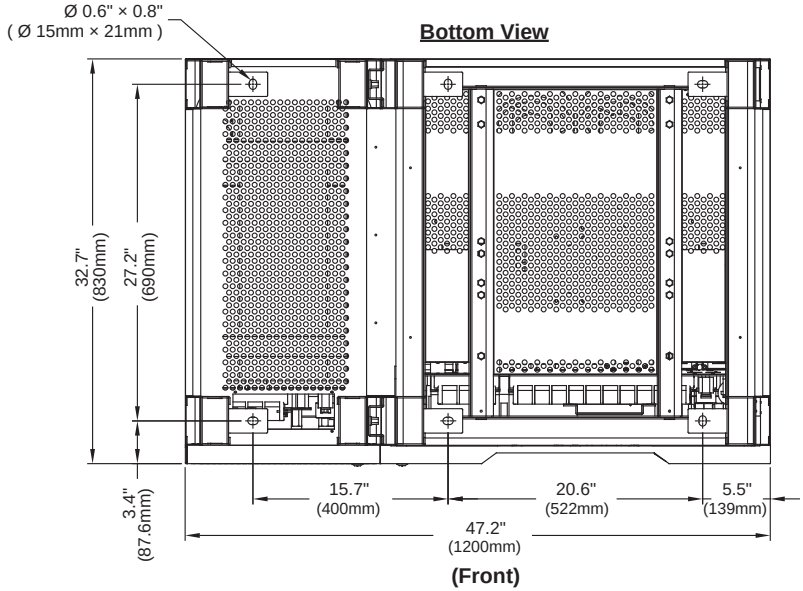


Figure 4-12

4.2 External Battery Cabinet

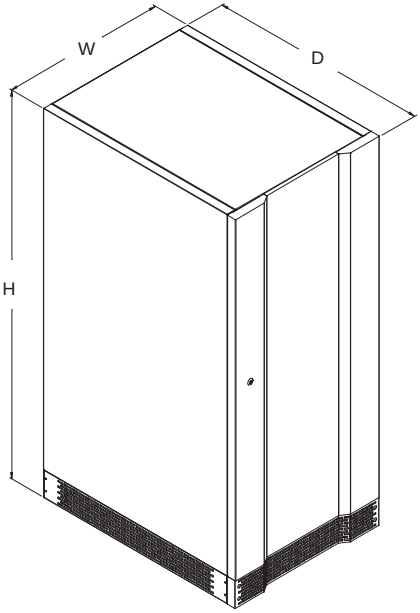


Figure 4-13

External Battery Cabinet Dimensions Table (*Figure 4-9)*			
Battery Type	Width	Depth	Height
12V/ 26AH × 29PCS	23.6" (600 mm)	31.5" (800 mm)	55.1" (1400 mm)
12V/ 40AH × 29PCS	23.6" (600 mm)	31.5" (800 mm)	55.1" (1400 mm)
12V/ 26AH × 58PCS	35.4" (900 mm)	32.7" (830 mm)	66.9" (1700 mm)
12V/ 40AH × 58PCS	35.4" (900 mm)	32.7" (830 mm)	66.9" (1700 mm)
12V/ 100AH × 29PCS	38.2" (970 mm)	32.7" (830 mm)	66.9" (1700 mm)

4.3 External & Internal Views

4.3.1 15~30kVA (Input: 480Vac; Reserve I/P: 208/ 120Vac; Output: 208/ 120Vac)

Figure 4-14 Front view: LCD control panel

Figure 4-15 Lateral view: open the front door

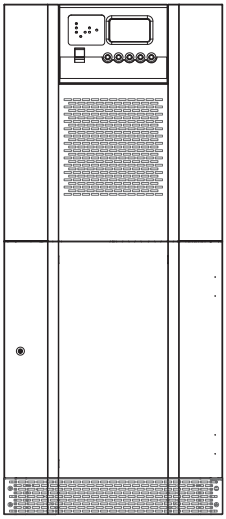


Figure 4-14

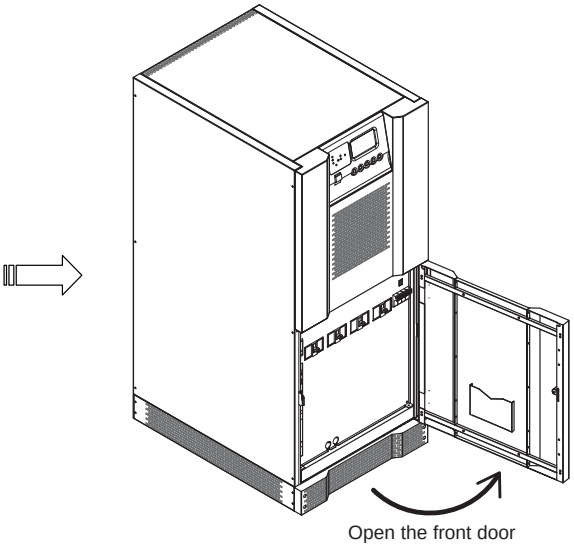


Figure 4-15

Figure 4-16 Front view with door open & front panel removal: one battery start-up switch, four fuses, four breakers, one SMART slot, and communication interfaces (NT-Q board).

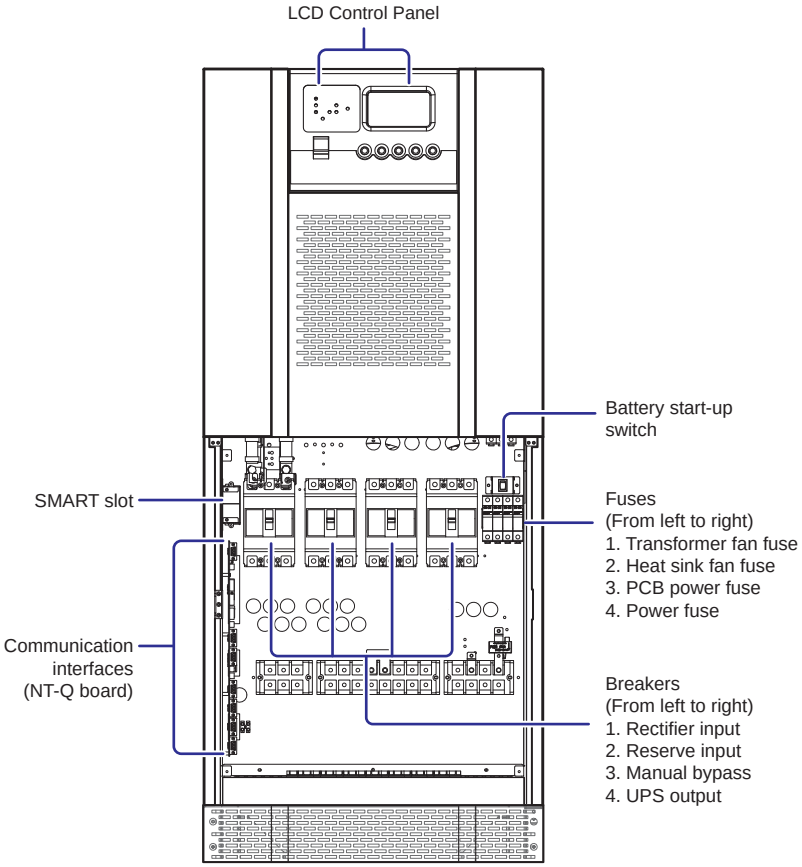


Figure 4-16

4.3.2 60kVA (Input: 480Vac; Reserve I/P: 208/ 120Vac; Output: 208/ 120Vac)

Figure 4-17 Front view: LCD control panel.

Figure 4-18 Lateral view: open the front door.

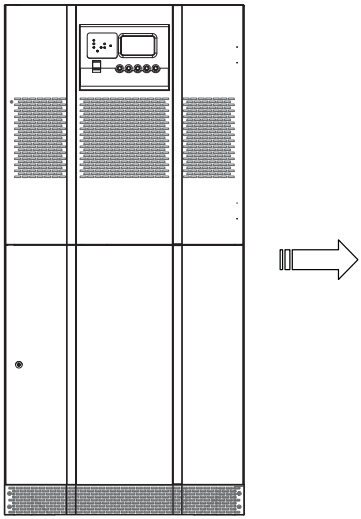


Figure 4-17

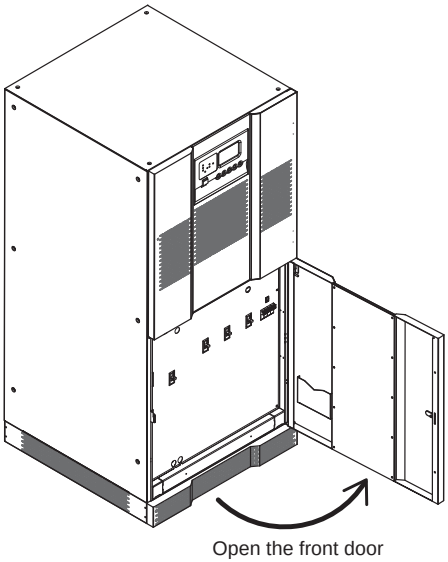


Figure 4-18

Figure 4-19 Front view with door open & front panel removal: one battery start-up switch, four fuses, four breakers, one SMART slot, and communication interfaces (NT-Q board).

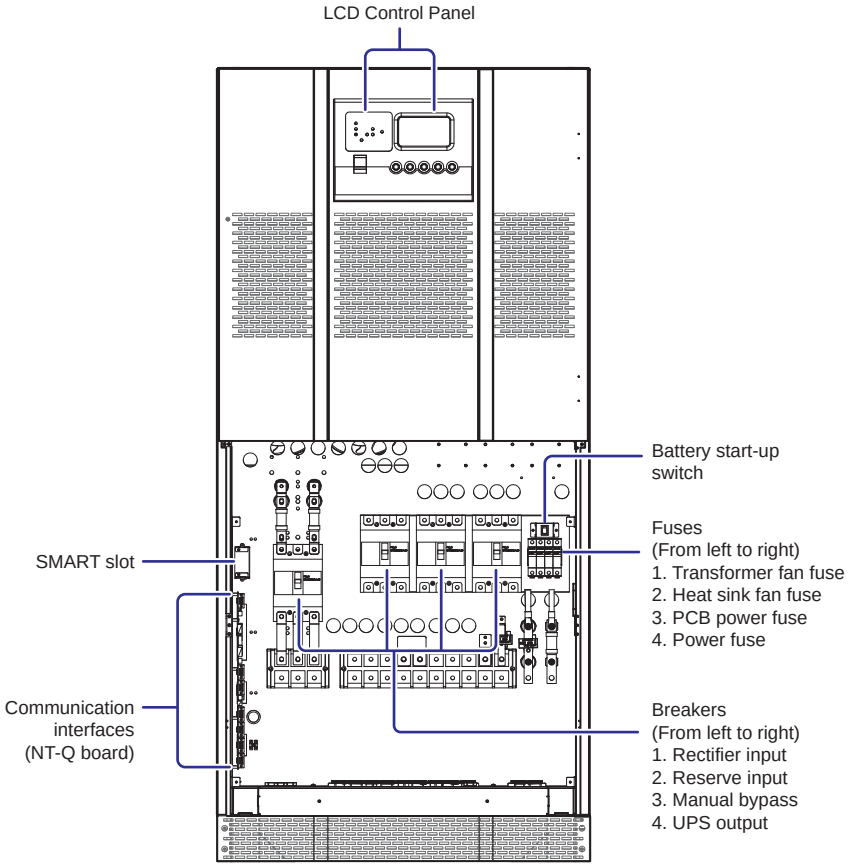


Figure 4-19

4.3.3 100kVA (Input: 480Vac; Reserve I/P: 208/ 120Vac; Output: 208/ 120Vac)

Figure 4-20 Front view: LCD control Panel.

Figure 4-21 Lateral view: open the front doors.

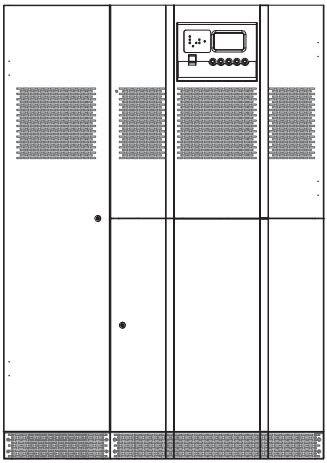


Figure 4-20

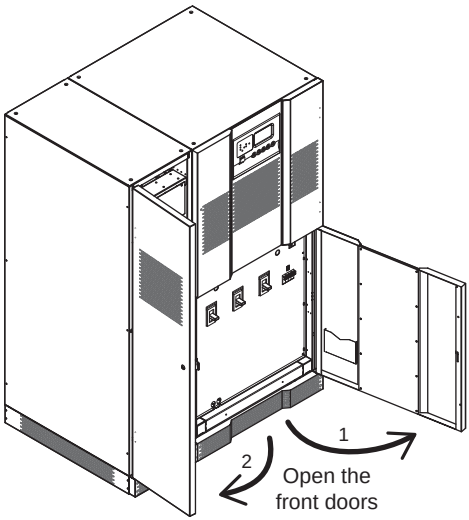


Figure 4-21

Figure 4-22 Front view with door open & front panel removal: one battery start-up switch, four fuses, four breakers, one SMART slot, and communication interfaces (NT-Q board).

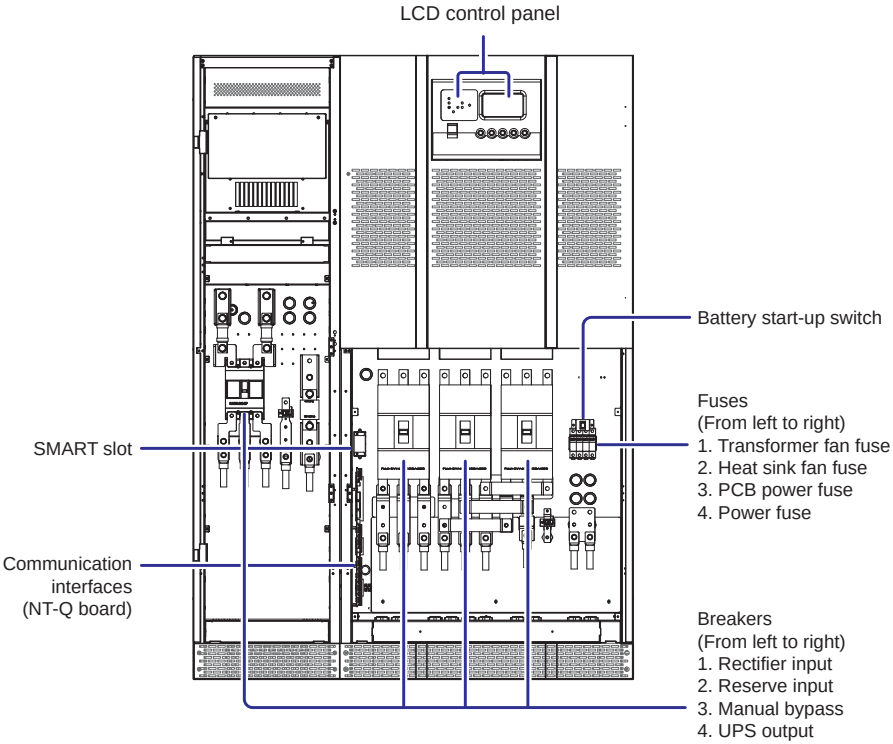


Figure 4-22

4.3.4 15-30kVA (Input: 480Vac; Reserve I/P: 480/ 277Vac; Output: 480/ 277Vac)

Figure 4-23 Front view: LCD control panel.

Figure 4-24 Lateral view: open the front door.

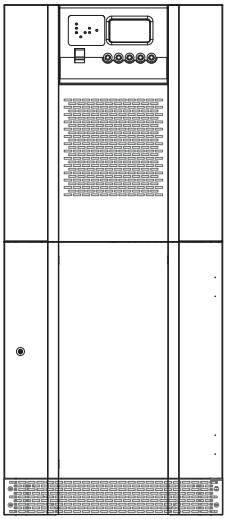


Figure 4-23

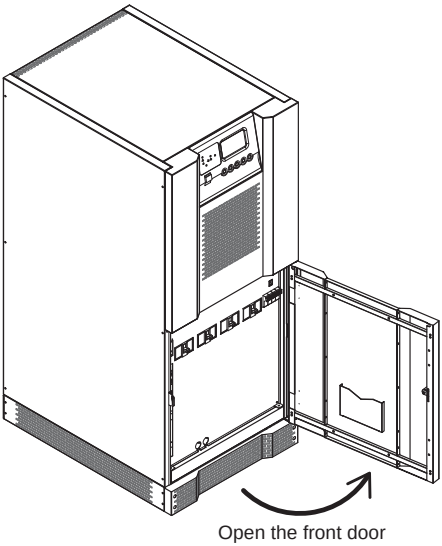


Figure 4-24

Figure 4-25 Front view with door open & front panel removal: one battery start-up switch, four fuses, four breakers, one SMART slot, and communication interfaces (NT-Q board).

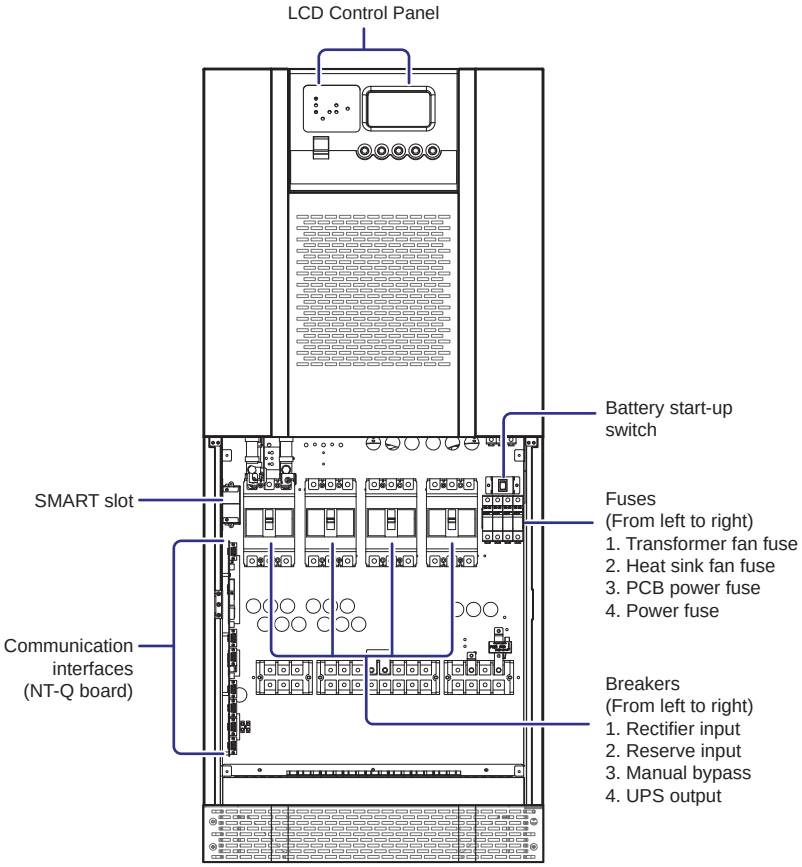


Figure 4-25

4.3.5 60kVA (Input: 480Vac; Reserve I/P: 480/ 277Vac; Output: 480/ 277Vac)

Figure 4-26 Front view: LCD control panel.

Figure 4-27 Lateral view: open the front door.

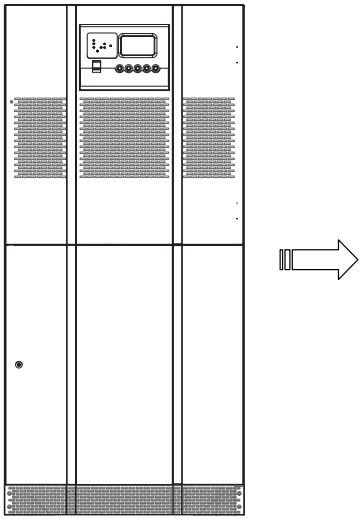


Figure 4-26

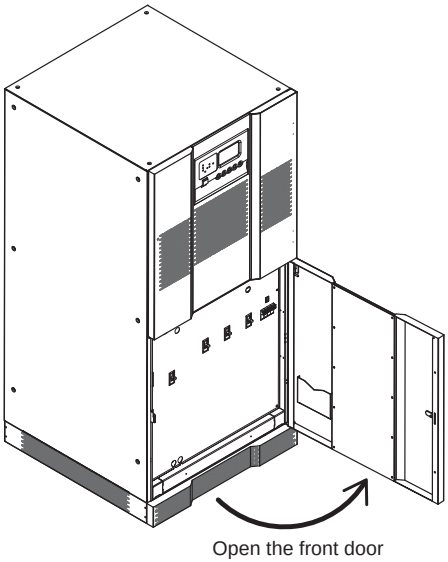


Figure 4-27

Figure 4-28 Front view with door open & front panel removal: one battery start-up switch, four fuses, four breakers, one SMART slot, and communication interfaces (NT-Q board).

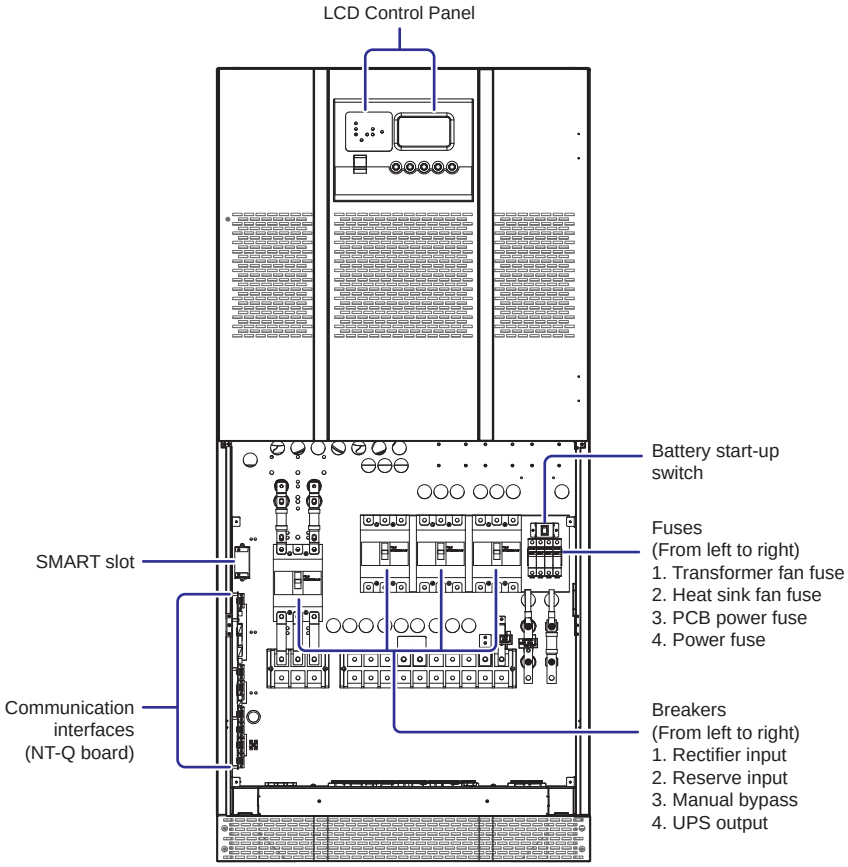
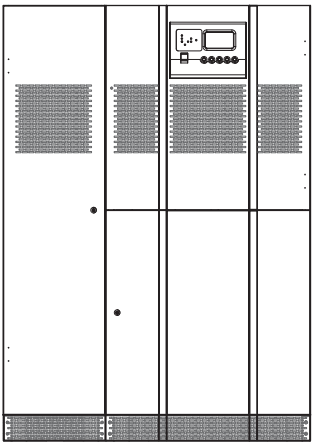


Figure 4-28

4.3.6 100kVA (Input: 480Vac; Reserve I/P: 480/ 277Vac; Output: 480/ 277Vac)

Figure 4-29 Front view: LCD control panel.

Figure 4-30 Lateral view: open the front door.



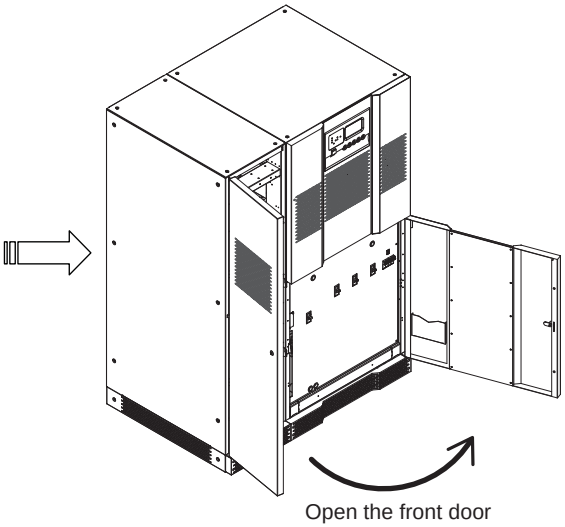


Figure 4-29 ***Figure 4-30***

Figure 4-31 Front view with door open & front panel removal: one battery start-up switch, four fuses, four breakers, one SMART slot, and communication interfaces (NT-Q board).

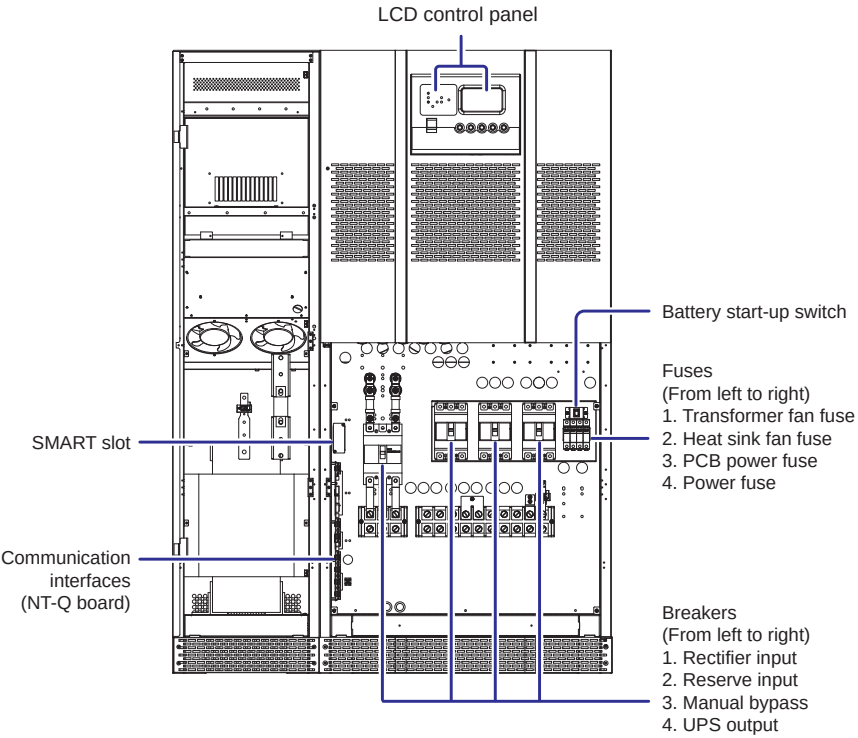


Figure 4-31

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 19.7" (50 cm).

   The front of the UPS should be kept at least 39.4" (100cm).

   The top of the UPS should be kept at least 19.7" (50 cm).
4. For optimum performance and reliability to prolong UPS lifetime, the temperature should be kept below 77°F (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.
8. If the UPS is supplied by a power source whose neutral is grounded, the backfeed protective device installed as UPS input protection must be a 3-pole type. If the UPS is supplied by a power source whose neutral is not grounded, the backfeed protective device installed as UPS input protection must be a 4-pole type. The recommended electrical rating of the backfeed protective device is as follows.

UPS Capacity (VA)	15K	30K	60K	100K
Main Input (△480V)	690 Vac/ 30A	690 Vac/ 75A	690 Vac/ 125A	690 Vac/ 225A
Reserve Input (208/ 120V)	690 Vac/ 75A	690 Vac/ 125A	690 Vac/ 225A	690 Vac/ 350A

UPS Capacity (VA)	15K	30K	60K	100K
Main Input (△480V)	690 Vac/ 30A	690 Vac/ 75A	690 Vac/ 125A	690 Vac/ 225A
Reserve Input (480/ 277V)	690 Vac/ 30A	690 Vac/ 50A	690 Vac/ 100A	690 Vac/ 175A

4.5 Electrical Connection 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 must be 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.

4.6 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 77°F (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 : Δ480V (3Φ3W) Output voltage : 208/ 120V (3Φ4W)				
UPS rating (kVA)	15	30	60	100
Weight	886 lb (402 kg)	1107 lb (502 kg)	1680 lb (762 kg)	2480 lb (1125 kg)
Weight loading	172 lb/ft^2 (838 kg/m^2)	214 lb/ft^2 (1046 kg/m^2)	235 lb/ft^2 (1148 kg/m^2)	231 lb/ft^2 (1130 kg/m^2)

Input voltage : Δ480V (3Φ3W) Output voltage : 480/ 277V (3Φ4W)				
UPS rating (kVA)	15	30	60	100
Weight	886 lb (402 kg)	1107 lb (502 kg)	1680 lb (762 kg)	2480 lb (1125 kg)
Weight loading	172 lb/ft^2 (838 kg/m^2)	214 lb/ft^2 (1046 kg/m^2)	235 lb/ft^2 (1148 kg/m^2)	231 lb/ft^2 (1130 kg/m^2)

External Battery Cabinet

Battery Type (AH)	12V/ 26AH × 29PCS	12V/ 40AH × 29PCS	12V/ 26AH × 58PCS	12V/ 40AH × 58PCS	12V/ 100AH × 29PCS
Weight	794 lb (360 kg)	1146 lb (520 kg)	1755 lb (796 kg)	2465 lb (1118 kg)	3131 lb (1420 kg)
Weight loading	154 lb/ft^2 (750 kg/m^2)	222 lb/ft^2 (1084 kg/m^2)	218 lb/ft^2 (1066 kg/m^2)	307 lb/ft^2 (1497 kg/m^2)	361 lb/ft^2 (1764 kg/m^2)

4.8 Cable and Protective Device Selection

- **Wiring Information:**

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

Input voltage : Δ480V (3Φ3W) Output voltage : 208/ 120V (3Φ4W)				
Model	**Wiring Location**	**Wire Gauge (*1)**	**Bolt Type**	**Torque (*2)**
NT- 15K	Main Input	10 AWG × 1 (4 mm^2 × 1)	M8	53.1 lb-in (61.2 kgf-cm)
	Reserve Input	6 AWG × 1 (10 mm^2 × 1)	M8	53.1 lb-in (61.2 kgf-cm)
	Output	6 AWG × 1 (10 mm^2 × 1)	M8	53.1 lb-in (61.2 kgf-cm)
	Battery	6 AWG × 1 (10 mm^2 × 1)	M8	53.1 lb-in (61.2 kgf-cm)
	PE	10 AWG × 1 (4 mm^2 × 1)	M8	53.1 lb-in (61.2 kgf-cm)
NT- 30K	Main Input	6 AWG × 1 (10 mm^2 × 1)	M8	53.1 lb-in (61.2 kgf-cm)
	Reserve Input	3 AWG × 1 (25 mm^2 × 1)	M8	53.1 lb-in (61.2 kgf-cm)
	Output	3 AWG × 1 (25 mm^2 × 1)	M8	53.1 lb-in (61.2 kgf-cm)
	Battery	2 AWG × 1 (25 mm^2 × 1)	M8	53.1 lb-in (61.2 kgf-cm)
	PE	8 AWG × 1 (6 mm^2 × 1)	M8	53.1 lb-in (61.2 kgf-cm)
NT- 60K	Main Input	1 AWG × 1 (35 mm^2 × 1)	M10	88.5 lb-in (102 kgf-cm)
	Reserve Input	4/0 AWG × 1 (95 mm^2 × 1)	M10	88.5 lb-in (102 kgf-cm)
	Output	4/0 AWG × 1 (95 mm^2 × 1)	M10	88.5 lb-in (102 kgf-cm)

Input voltage : Δ480V (3Φ3W) Output voltage : 208/ 120V (3Φ4W)				
Model	**Wiring Location**	**Wire Gauge (*1)**	**Bolt Type**	**Torque (*2)**
NT- 60K	Battery	4/0 AWG × 1 (95 mm^2 × 1)	M8	130 lb-in (150 kgf-cm)
	PE	6 AWG × 1 (10 mm^2 × 1)	M10	88.5 lb-in (102 kgf-cm)
NT- 100K	Main Input	4/0 AWG × 1 (95 mm^2 × 1)	M10	217 lb-in (250 kgf-cm)
	Reserve Input	2/0 AWG × 2 (70 mm^2 × 2)	M10	217 lb-in (250 kgf-cm)
	Output	2/0 AWG × 2 (70 mm^2 × 2)	M10	217 lb-in (250 kgf-cm)
	Battery	2/0 AWG × 2 (70 mm^2 × 2)	M10	217 lb-in (250 kgf-cm)
	PE	3 AWG × 1 (25 mm^2 × 1)	M10	217 lb-in (250 kgf-cm)

Input voltage : Δ480V (3Φ3W) Output voltage : 480/ 277V (3Φ4W)				
Model	**Wiring Location**	**Wire Gauge (*1)**	**Bolt Type**	**Torque (*2)**
NT- 15K	Main Input	10 AWG × 1 (4 mm^2 × 1)	M8	53.1 lb-in (61.2 kgf-cm)
	Reserve Input	14 AWG x 1 (2.5 mm^2 x 1)	M8	53.1 lb-in (61.2 kgf-cm)
	Output	14 AWG x 1 (2.5 mm^2 x 1)	M8	53.1 lb-in (61.2 kgf-cm)
	Battery	6 AWG × 1 (10 mm^2 × 1)	M8	53.1 lb-in (61.2 kgf-cm)
	PE	10 AWG × 1 (4 mm^2 × 1)	M8	53.1 lb-in (61.2 kgf-cm)

Input voltage : Δ480V (3Φ3W) Output voltage : 480/ 277V (3Φ4W)				
Model	**Wiring Location**	**Wire Gauge (*1)**	**Bolt Type**	**Torque (*2)**
NT- 30K	Main Input	6 AWG × 1 (10 mm^2 × 1)	M8	53.1 lb-in (61.2 kgf-cm)
	Reserve Input	8 AWG x 1 (6 mm^2 x 1)	M8	53.1 lb-in (61.2 kgf-cm)
	Output	8 AWG x 1 (6 mm^2 x 1)	M8	53.1 lb-in (61.2 kgf-cm)
	Battery	2 AWG × 1 (25 mm^2 × 1)	M8	53.1 lb-in (61.2 kgf-cm)
	PE	8 AWG × 1 (6 mm^2 × 1)	M8	53.1 lb-in (61.2 kgf-cm)
NT- 60K	Main Input	1 AWG × 1 (35 mm^2 × 1)	M10	88.5 lb-in (102 kgf-cm)
	Reserve Input	3 AWG x 1 (25 mm^2 x 1)	M10	88.5 lb-in (102 kgf-cm)
	Output	3 AWG x 1 (25 mm^2 x 1)	M10	88.5 lb-in (102 kgf-cm)
	Battery	4/0 AWG × 1 (95 mm^2 × 1)	M8	130 lb-in (150 kgf-cm)
	PE	6 AWG × 1 (10 mm^2 × 1)	M10	88.5 lb-in (102 kgf-cm)
NT- 100K	Main Input	4/0 AWG × 1 (95 mm^2 × 1)	M10	217 lb-in (250 kgf-cm)
	Reserve Input	1/0 AWG x 1 (50 mm^2 x 1)	M10	217 lb-in (250 kgf-cm)
	Output	1/0 AWG x 1 (50 mm^2 x 1)	M10	217 lb-in (250 kgf-cm)
	Battery	2/0 AWG × 2 (70 mm^2 × 2)	M10	217 lb-in (250 kgf-cm)
	PE	4 AWG × 1 (16 mm^2 × 1)	M10	217 lb-in (250 kgf-cm)

NOTE:

1. The above mentioned cable size is based on (1) cable type THHN, THWN & THWN-2 with temperature resistance up to 194°F (90°C) at ambient temperature 86°F (30°C), and (2) NEC specifications for 104°F (40°C) ambient rated conductors.
2. Please follow the local regulations to install suitable cables and circuit breakers.
3. Wiring method shall be in accordance with the National Electric Code, ANSI/ NFPA 70.
4. Do not use the UPS in a computer room as defined in the Standard for the Protection of Electronic Computer/ Data Processing Equipment, ANSI/ NFPA 75.

- **External Terminal Selection:**

  For the external terminals that need to connect to the UPS, please refer to the table below. The suggested manufacturer is K.S. TERMINALS INC. Other equivalent manufacturers or terminals are also fine.

Input voltage : Δ480V (3Φ3W) Output voltage : 208/ 120V (3Φ4W)				
UPS Capacity (VA)	**15K**	**30K**	**60K**	**100K**
Main Input	TLK6-8 (TLK4-8)	TLK16-8 (TLK10-8)	TLK50-10 (TLK35-10)	TLK120-10 (TLK95-10)
Reserve Input	TLK16-8 (TLK10-8)	TLK35-8 (TLK25-8)	TLK120-10 (TLK95-10)	TLK70-10 (TLK70-10)
Output	TLK16-8 (TLK10-8)	TLK35-8 (TLK25-8)	TLK120-10 (TLK95-10)	TLK70-10 (TLK70-10)
Battery	TLK16-8 (TLK10-8)	TLK35-8 (TLK25-8)	TLK120-8 (TLK95-8)	TLK70-10 (TLK70-10)
PE	TLK6-8 (TLK4-8)	TLK10-8 (TLK6-8)	TLK16-10 (TLK10-10)	TLK35-10 (TLK25-10)

Input voltage : Δ480V (3Φ3W) Output voltage : 480/ 277V (3Φ4W)				
UPS Capacity (VA)	**15K**	**30K**	**60K**	**100K**
Main Input	TLK6-8 (TLK4-8)	TLK16-8 (TLK10-8)	TLK50-10 (TLK35-10)	TLK120-10 (TLK95-10)
Reserve Input	TLH2.5-8 (TLK2.5-8)	TLK10-8 (TLK6-8)	TLK35-10 (TLK25-10)	TLK50-10 (TLK50-10)
Output	TLH2.5-8 (TLK2.5-8)	TLK10-8 (TLK6-8)	TLK35-10 (TLK25-10)	TLK50-10 (TLK50-10)
Battery	TLK16-8 (TLK10-8)	TLK35-8 (TLK25-8)	TLK120-8 (TLK95-8)	TLK70-10 (TLK70-10)
PE	TLK6-8 (TLK4-8)	TLK10-8 (TLK6-8)	TLK16-10 (TLK10-10)	TLK25-10 (TLK16-10)

- **Protective Device**

  If the UPS is supplied by a power source whose neutral is grounded, the protective device installed as UPS input protection must be a 3-pole type. If the UPS is supplied by a power source whose neutral is not grounded, the protective device installed as UPS input protection must be a 4-pole type. The recommended electrical rating of the protective device is as follows.

UPS Capacity (VA)	15K	30K	60K	100K
Main Input (△480V)	690 Vac/ 30A	690 Vac/ 75A	690 Vac/ 125A	690 Vac/ 225A
Reserve Input (208/ 120V)	690 Vac/ 75A	690 Vac/ 125A	690 Vac/ 225A	690 Vac/ 350A
Output (280/ 120V)	690 Vac/ 75A	690 Vac/ 125A	690 Vac/ 225A	690 Vac/ 350A
Battery	500 Vdc/ 63A	500 Vdc/ 125A	500 Vdc/ 200A	500 Vdc/ 400A

UPS Capacity (VA)	15K	30K	60K	100K
Main Input (△480V)	690 Vac/ 30A	690 Vac/ 75A	690 Vac/ 125A	690 Vac/ 225A
Reserve Input (480/ 227V)	690 Vac/ 30A	690 Vac/ 50A	690 Vac/ 100A	690 Vac/ 175A
Output (480/ 227V)	690 Vac/ 30A	690 Vac/ 50A	690 Vac/ 100A	690 Vac/ 175A
Battery	500 Vdc/ 63A	500 Vdc/ 125A	500 Vdc/ 200A	500 Vdc/ 400A

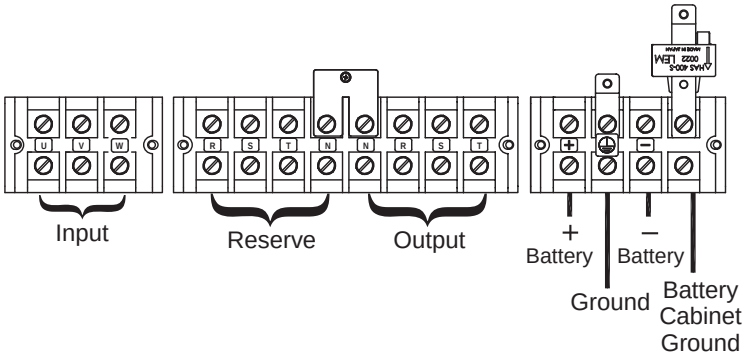
4.9 Electrical Connections

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.

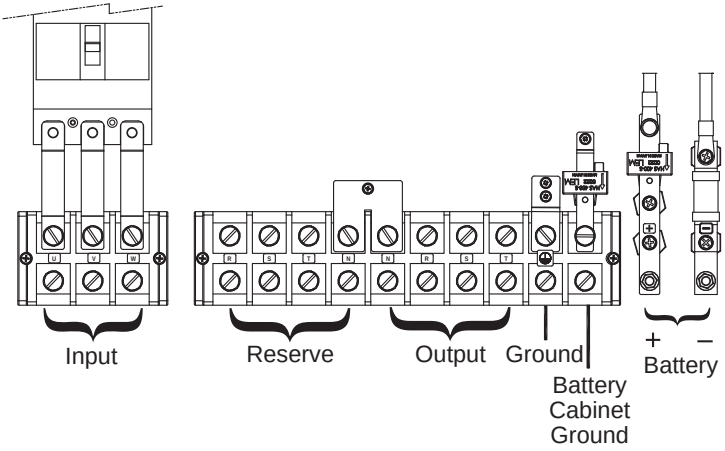
4.9.1 A: 15~30kVA Output 208/ 120Vac Wiring Terminal Diagram (Only for Dual Input Application)

B: 15~30kVA Output 480/ 277Vac Wiring Terminal Diagram (Only for Dual Input Application)

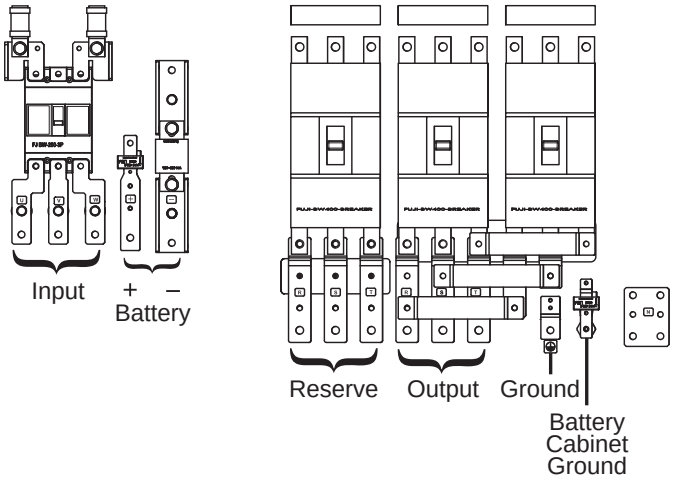


4.9.2 A: 60kVA Output 208/ 120Vac Wiring Terminal Diagram (Only for Dual Input Application)

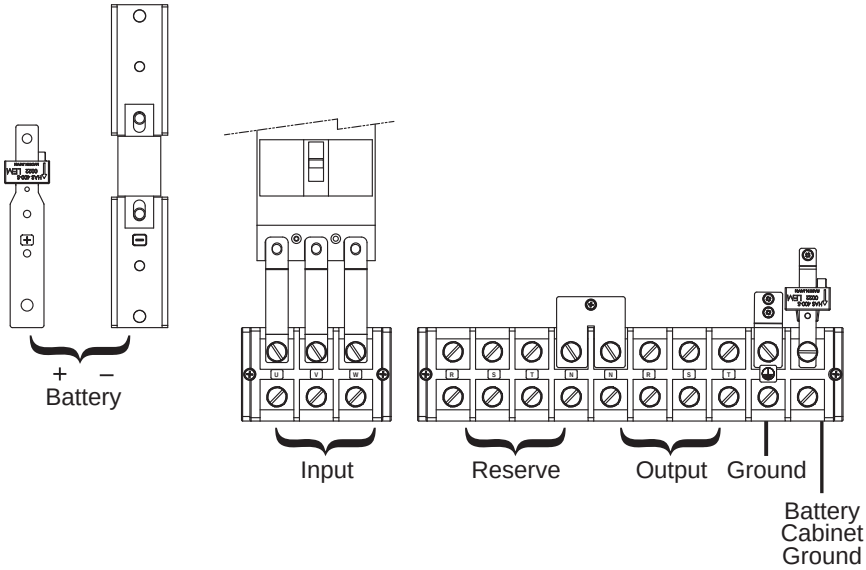
B: 60kVA Output 480/ 277Vac Wiring Terminal Diagram (Only for Dual Input Application)



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

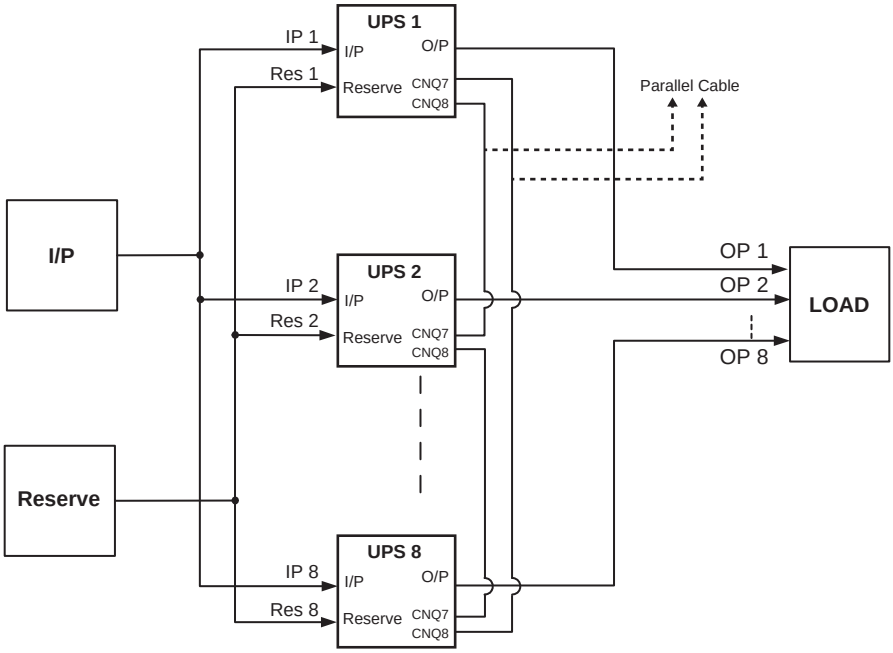


B: 100kVA Output 480/ 277Vac Wiring Terminal Diagram (Only for Dual Input Application)



4.9.4 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.

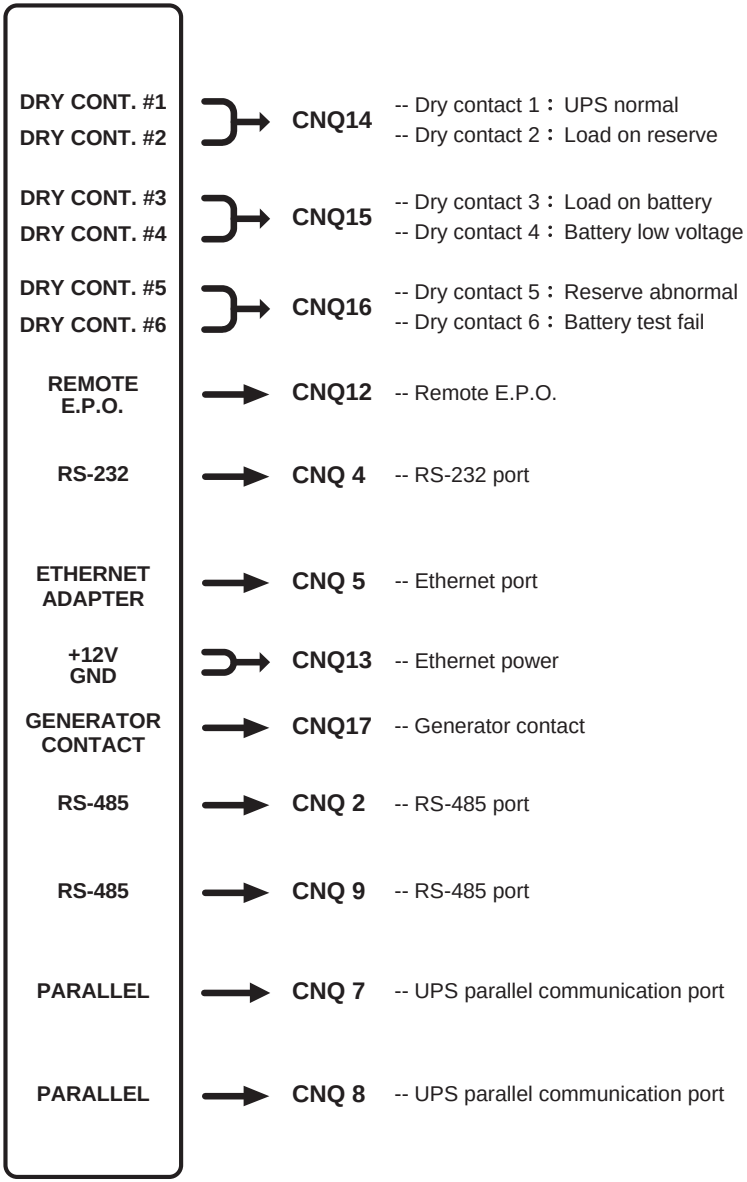


Res1+OP1=Res2+OP2=……..=Res8+OP8

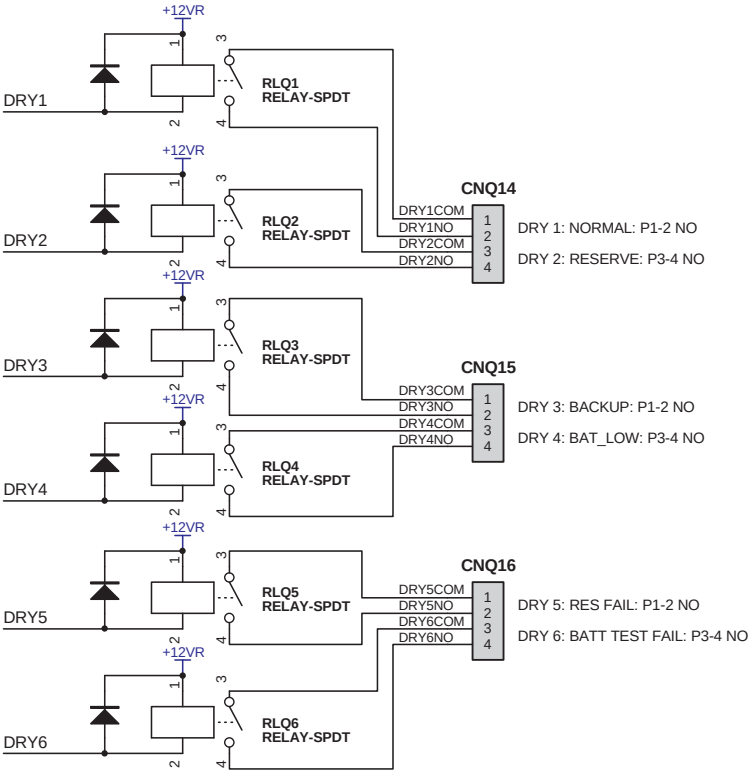
NOTE:

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.

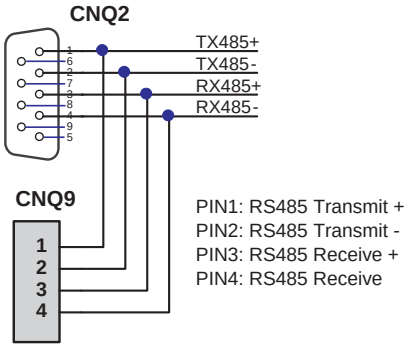
4.10 Communication Interfaces (NT-Q Board)



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:

UPS Capacity (VA)	15K	30K	60K	100K
Charge Current (A)	2	4	8	12

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.
3. The maximum battery fault current is 2.8kA.
4. The table below shows each model's battery fault current.

UPS Capacity (VA)	15K	30K	60K	100K
Battery Fault Current (kA) (Discharge time: 30 minutes)	1.0	1.5	2.2	2.8

5. The DC voltage of the overcurrent protective device that needs to be installed near the external battery cabinet must be 500Vdc.

WARNING:

A battery leak can short-circuit the batteries and lead to serious accidents. For safety's sake, you must insulate the batteries from their touched metal cabinets by installing insulated devices (e.g. insulated trays or boxes) in between. For relevant information about the insulated materials for such application, please contact Delta customer service.

Chapter 6 : UPS Display and Settings

6.1 Control Panel

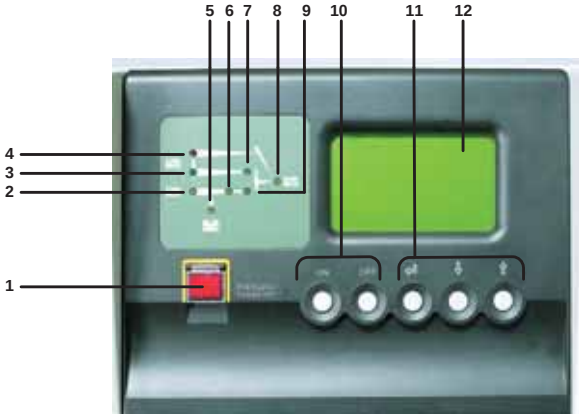


Figure 6-1: Control Panel

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 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.

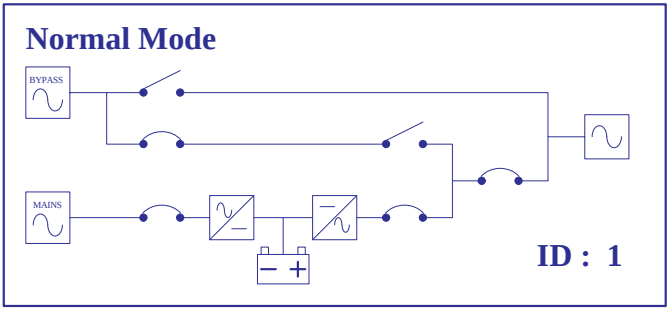
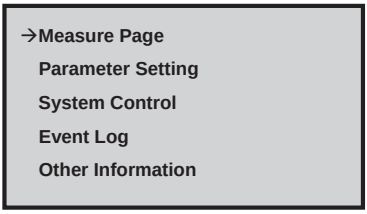


Figure 6-2: LCD Start Display

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

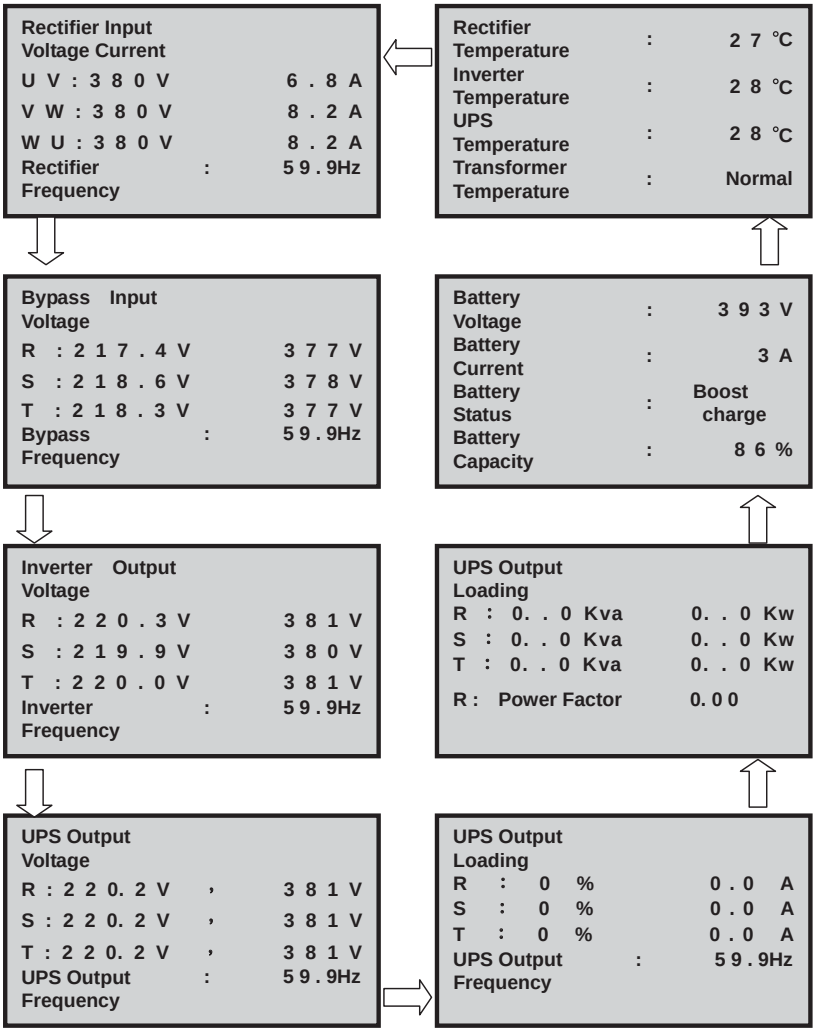
   Use the "⇩" and "⇧" buttons to choose the functions.



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.

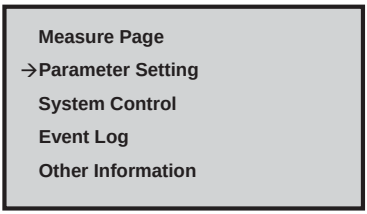
The display order is as follows:



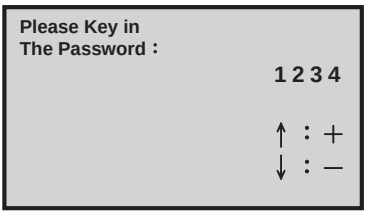
To leave the **"Measure Page"**, press the "⇩" and "⇧" buttons simultaneously to return to the **"Main Menu"**.

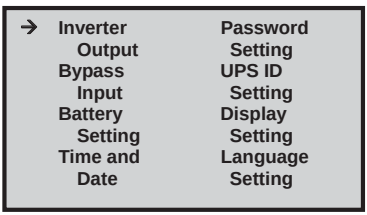
5. In "**Main Menu**", press the "⇩" or "⇧" button to choose "**Parameter Setting**" and press the "⏎" button to enter the "**Parameter Setting**" menu. Before entering the "**Parameter Setting**" menu, password needs to be keyed in.

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



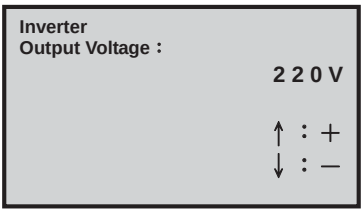
- If the password is wrong, parameters can not be set.
- If the password is correct, the LCD will enter the "**Parameter Setting**" menu.





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

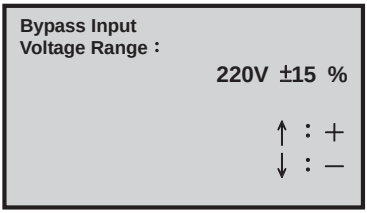
- Press the "⇩" or "⇧" button to set up the inverter output voltage and press the "⏎" button to confirm the setting.



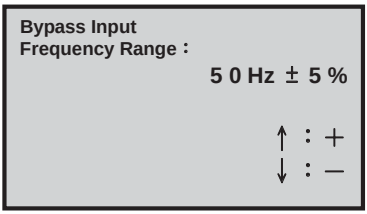
To leave the **"Inverter Output Voltage"** setting page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Parameter Setting"** menu.

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.

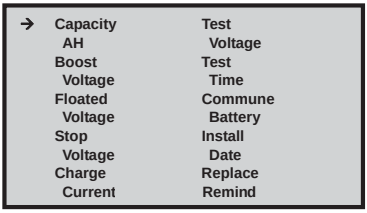


- Press the "⇩" or "⇧" button to set up the bypass input frequency range and press the "↵" button to confirm the setting.



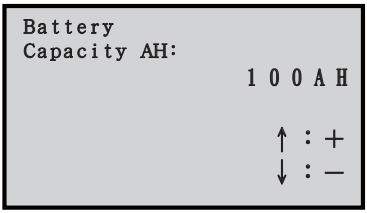
To leave the **"Bypass Input"** setting page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Parameter Setting"** menu.

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.

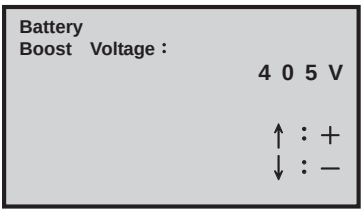
- Press the "⇩" or "⇧" button to set up the battery capacity AH and press the "⏎" button to confirm the setting.



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.

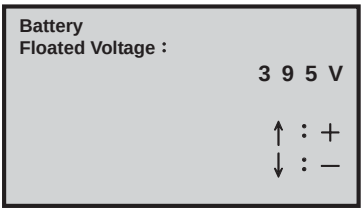
- Press the "⇩" or "⇧" button to set up the battery boost voltage and press the "⏎" button to confirm the setting.



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.

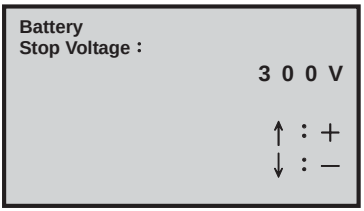
- Press "⇩" or "⇧" button to set up the battery floated voltage and press the "⏎" button to confirm the setting.



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.

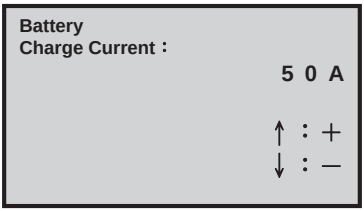
- Press the "⇩" or "⇧" button to set up the battery stop voltage and press the "↵" button to confirm the setting.



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.

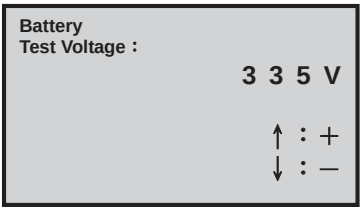
- Press the "⇩" or "⇧" button to set up the battery charge current and press the "↵" button to confirm the setting.



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.

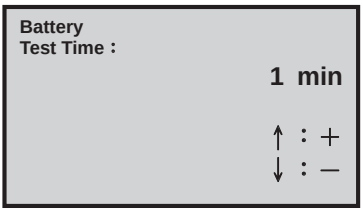
- Press the "⇩" or "⇧" button to set up the battery test voltage and press the "↵" button to confirm the setting.



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.

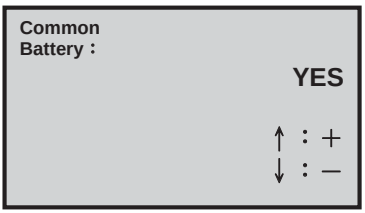
- Press the "⇩" or "⇧" button to set up the battery test time and press the "↵" button to confirm the setting.



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.

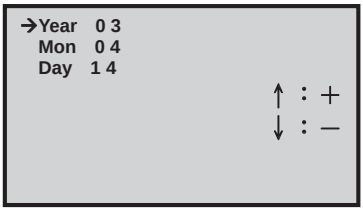


NOTE: When several UPS units share the common battery, the battery test cannot be executed.

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.

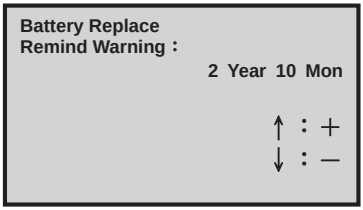
- Press the "⇩" or "⇧" button to set up the UPS installation date and press the "⏎" button to confirm the setting.



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.

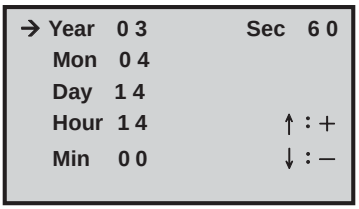


To leave the **"Battery Replace Remind Warning"** setting page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Battery Setting"** menu.

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.

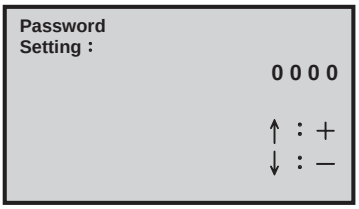
- Press the "⇩" or "⇧" button to set up the time and date, and press the "⏎" button to confirm the setting.



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.

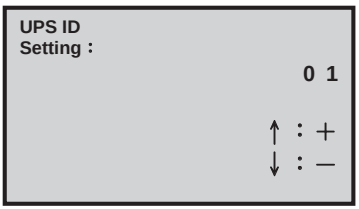


To leave the **"Password Setting"** page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Parameter Setting"** menu.

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.

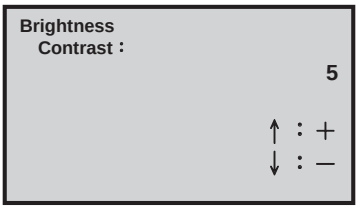


- The UPS ID shown on the Start Display (see ***Figure 6-2***) is for application of the RS-485 interface and monitoring software (UPSentry 2012). It can be set up right from the LCD control panel.

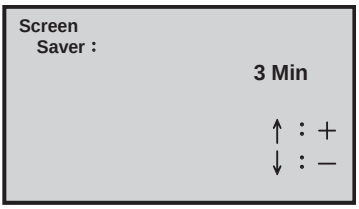
To leave the **"UPS ID Setting"** page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Parameter Setting"** menu.

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.



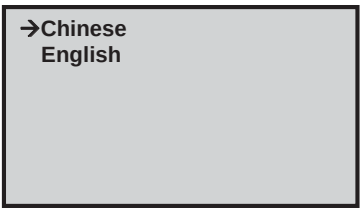
- In order to extend the LCD lifetime, press the "⇩" or "⇧" button to set up the screen saver and press the "⏎" button to confirm the setting.



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.

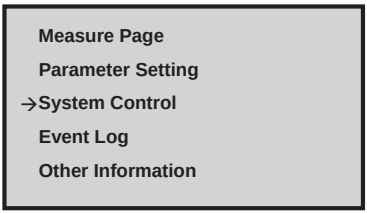


To leave the **"Language Setting"** page, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Parameter Setting"** menu.

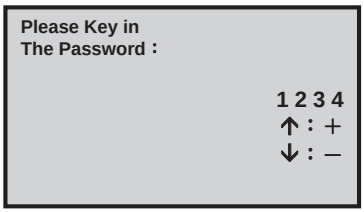
To leave the **"Parameter Setting"** menu, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Main Menu"**.

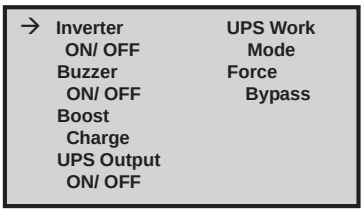
6. In **"Main Menu"**, press the "⇩" or "⇧" to choose "**System Control**" and press the "↵" button to enter the "**System Control**" menu. Before enter the "**System Control**" menu, you have to key in the password.

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



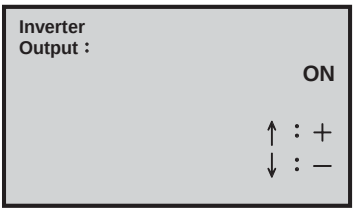
- If the password is wrong, you cannot set up the parameter.
- If the password is true, the LCD will enter the "**System Control**" menu.





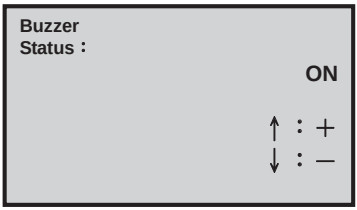
6-1. Press the "⇩" or "⇧" button to choose "**Inverter ON/ OFF**" and press the "↵" button to enter the "**Inverter Output**" setting page.

- 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.

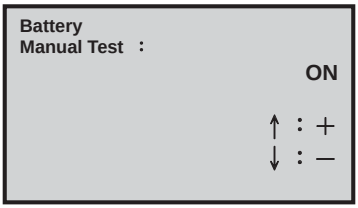
- Choose ON: when the UPS has "**WARNING**" or "**FAULT**" status, the buzzer will sound.
- Choose OFF: when the UPS has "**WARNING**" or "**FAULT**" status, the buzzer will not sound.



- 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.

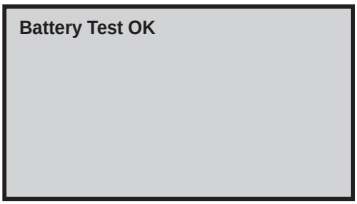
6-3. Press the "⇩" and "⇧" button to choose "**Battery Test**" and press the "↵" button to enter the "**Battery Manual Test**" setting page.

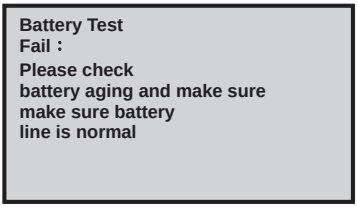
- Choose ON: Execute the battery test. When the batteries are normal, the LCD screen will show "**Battery Test OK**". When the batteries are abnormal, the LCD screen will show "**Battery Test Fail**".
- Choose OFF: You can't execute the battery test.



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

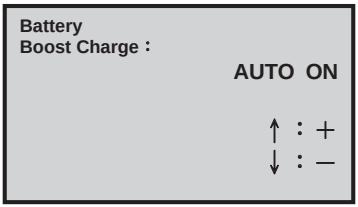
- Press the "⇩" and "⇧" buttons simultaneously to go back to the "**System Control**" menu.

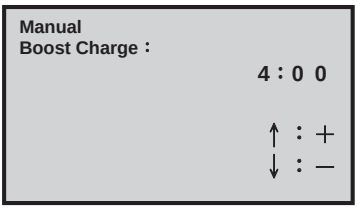




6-4. Press the "⇩" or "⇧" button to choose "**Boost charge**" and press "↵" button to enter the "**Battery Boost charge**" setting page.

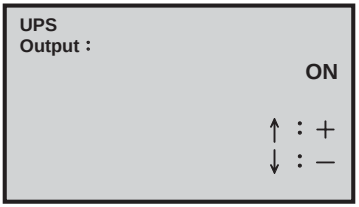
- Choose AUTO ON: The UPS controls itself to execute the boost charge or not. When the battery voltage is less than 348V, the UPS will automatically execute the boost charge.
- Choose AUTO OFF: The UPS disables the boost charge function.
- Press the "⇩" and "⇧" buttons simultaneously to go back to the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





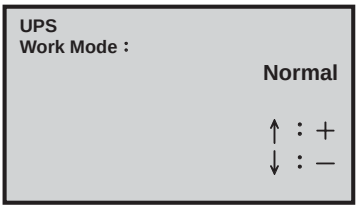
6-5. Press the "⇩" or "⇧" button to choose "**UPS Output ON/ OFF**" and press the "⏎" button to enter the "**UPS Output**" setting page.

- 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.

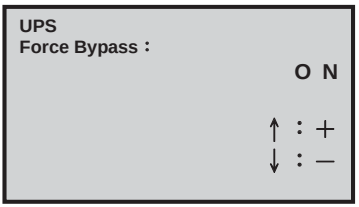
- Choose Normal: The UPS has normal output (it is the inverter to supply power to the loads).
- Choose ECO: The UPS supplies power to the loads by the reserve AC power. When the reserve AC power is abnormal, the loads will be power-supplied by the inverter. Only in reserve AC supply mode can the ECO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

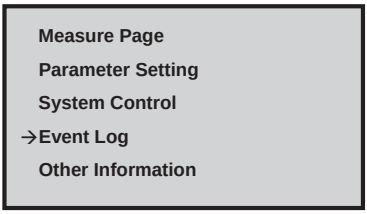
- Choose ON: It is the reserve AC power to supply power to the connected loads in any status.
- Choose OFF: The UPS has normal output. Only when the inverter is abnormal can the reserve AC power supply power to the connected loads.



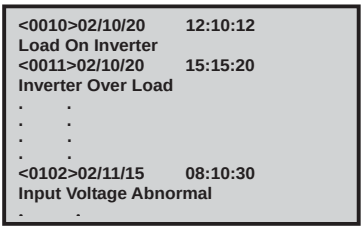
- Press the "⇩" and "⇧" buttons simultaneously to go back to the "**System Control**" menu.

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

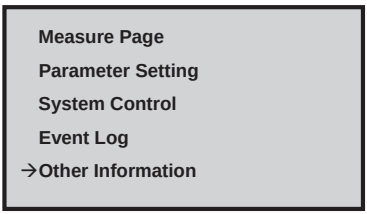
Event code	UPS Status
80	Inverter o/p voltage abnormal. (Inverter voltage high) (R phase)
82	Inverter o/p voltage abnormal. (Inverter voltage high) (S phase)
84	Inverter o/p voltage abnormal. (Inverter voltage high) (T phase)
86	Inverter o/p voltage abnormal. (Inverter voltage low) (R phase)
88	Inverter 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)

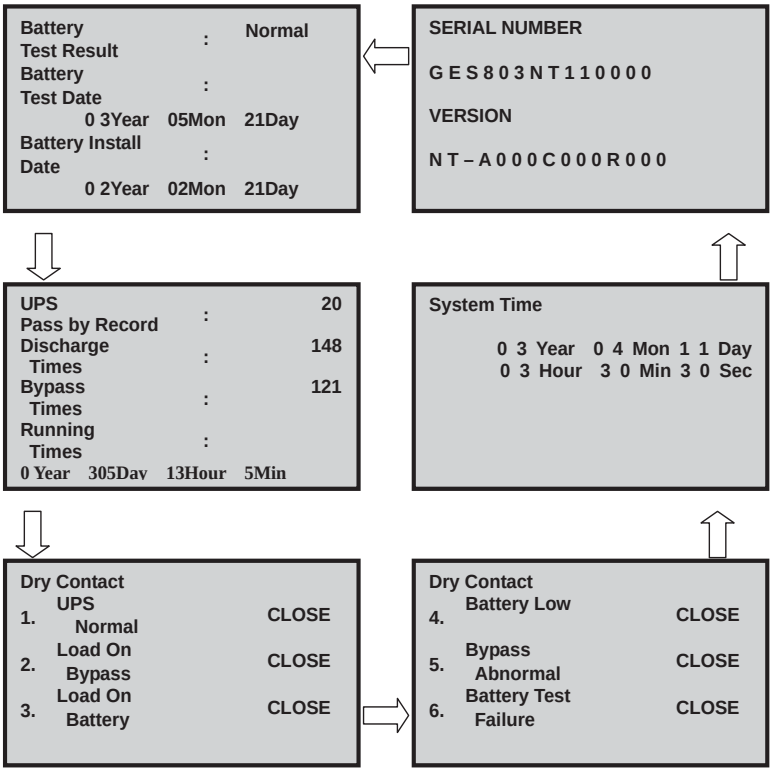
7-2. Rectifier / Static Switch Fail Event code

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.

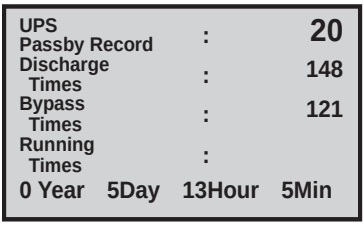




To leave the **"Other Information"** menu, press the "⇩" and "⇧" buttons simultaneously to go back to the **"Main Menu"**.

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, and the LCD will display '**Bypass Mode**'.
2. Turn on the **Rectifier Input** breaker 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.

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. If normal, turn on the **UPS Output** breaker.

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 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 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.
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. 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 and **Reserve Input** breaker.
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. Do not touch the UPS's wiring terminals and **Manual Bypass** breaker 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 and **UPS Output** breaker.
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. 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 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 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, 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 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.
10. Now, the total loads will be equally shared by the parallel UPSs.

7.2.5 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.
10. Now, the total loads will be equally shared by the parallel UPSs and each LCD will display '**Backup Mode**'.

7.2.6 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 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 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.

7.2.6.1 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.

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. 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 and **Reserve Input** breaker.

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. Do not touch any UPS's wiring terminals and **Manual Bypass** breaker during UPS maintenance process to avoid electric shock.

7.2.6.2 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 and **UPS Output** breaker.
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. 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 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.
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.
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.

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

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.

7.3.4 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.

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 and **Reserve Input** breaker.

7.3.5 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.
4. Turn off each unit's **Rectifier Input** breaker and **Reserve Input** breaker.

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.

7.3.6 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.

Chapter 8 : Optional Accessories

8.1 Input Harmonic Filter

Besides the built-in 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.

8.2 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.

8.3 Monitoring Software

Via the built-in RS-232 port and UPSentry 2012 software (https://datacenter-softwarecenter.deltaww.com.cn), users can monitor and manage the UPS remotely.

Appendix 1 : Technical Specifications

Input voltage : Δ480V (3Φ3W), Output voltage : 208/ 120V (3Φ4W).						
Power Rating kVA (PF=0.9)			**15**	**30**	**60**	**100**
Input	Nominal Voltage	V	480V (3Ø3W+G)			
	Voltage Range	%	±20			
	Nominal Frequency	Hz	60			
	Frequency Range	%	±5			
	Maximum Current	A	30	60	117	175
Output	Nominal Voltage	V	208/120 (3Ø4W+G)			
	THDv% (With Linear Load)	%	≦ 3			
	Voltage Regulation:					
	Static	%	±1			
	Dynamic	%	±5			
	Nominal Frequency	Hz	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		AC mains, reserve source, rectifier, inverter, static switch, battery and output.			
	LCD Display		UPS abnormal status display and self-diagnosis.			
			Input, bypass, inverter, output, battery voltage, current, frequency, and load level display.			
Remote	Monitor		Multi-unit monitor, graphic display, and history data statistics.			
	Control		Inverter and alarm remote control, password setting, fault information reading, and remote alarm.			
	Communication Interfaces		Standard: RS-232, RS-485 & status dry contact			
			Option: SNMP & Ethernet port			

Power Rating kVA (PF=0.9)			15	30	60	100
Others	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			
	Input Harmonic Improvement (12-pulse rectifier)		Yes			
Complete System	**Overall Efficiency:**					
	Normal Mode	%	86	87	89	90
	Inverter Overload		110% : 60 minutes ; 125% : 10 minutes ; 150% : 1 minute			
	Static Switch Overload Current:					
	30 minutes	%	120			
	30 milliseconds	%	1000			
	Transfer Time	ms	0			
	Ambient Temperature		0 ~ 104 °F (0 ~ 40 °C)			
	Relative Humidity (non-condensing)	%	90			
	Operating Altitude		0 ~ 6560 ft (0 ~ 2000 m)			
	Audible Noise (at a distance of 4.9 ft (1.5 m))	dBA	≦ 60		≦ 65	
	Dimensions:					
	Width		23.6'' (600 mm)		31.5'' (800 mm)	47.2'' (1200 mm)
	Depth		31.5'' (800 mm)		32.7'' (830 mm)	32.7'' (830 mm)
	Height		55.1'' (1400 mm)		66.9'' (1700 mm)	66.9'' (1700 mm)
	Weight		886 lb (402 kg)	1107 lb (502 kg)	1680 lb (762 kg)	2480 lb (1125 kg)

Input voltage : Δ480V (3Φ3W), Output voltage : 480/ 277V (3Φ4W).						
Power Rating kVA (PF=0.9)			**15**	**30**	**60**	**100**
Input	Nominal Voltage	V	480V (3Ø3W+G)			
	Voltage Range	%	±20			
	Nominal Frequency	Hz	60			
	Frequency Range	%	±5			
	Maximum Current	A	30	60	117	175
Output	Nominal Voltage	V	480/ 277 (3Ø4W+G)			
	THDv% (With Linear Load)	%	≦3			
	Voltage Regulation:					
	Static	%	±1			
	Dynamic	%	±5			
	Nominal Frequency	Hz	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		AC mains, reserve source, rectifier, inverter, static switch, battery and output.			
	LCD Display		UPS abnormal status display and self-diagnosis.			
			Input, bypass, inverter, output, battery voltage, current, frequency, and load level display.			
Remote	Monitor		Multi-unit monitor, graphic display, and history data statistics.			
	Control		Inverter and alarm remote control, password setting, fault information reading, and remote alarm.			
	Communication Interfaces		Standard: RS-232, RS-485 & status dry contact			
			Option: SNMP & Ethernet port			

Power Rating kVA (PF=0.9)			15	30	60	100
Others	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			
	Input Harmonic Improvement (12-pulse rectifier)		Yes			
Complete System	**Overall Efficiency:**					
	Normal Mode	%	86	87	89	90
	Inverter Overload		110% : 60 minutes ; 125% : 10 minutes ; 150% : 1 minute			
	Static Switch Overload Current:					
	30 minutes	%	120			
	30 milliseconds	%	1000			
	Transfer Time	ms	0			
	Ambient Temperature		0 ~ 104 °F (0 ~ 40 °C)			
	Relative Humidity (non-condensing)	%	90			
	Operating Altitude		0 ~ 6560 ft (0 ~ 2000 m)			
	Audible Noise (at a distance of 4.9 ft (1.5 m))	dBA	≦ 60		≦ 65	
	Dimensions:					
	Width		23.6'' (600 mm)		31.5'' (800 mm)	47.2'' (1200 mm)
	Depth		31.5'' (800 mm)		32.7'' (830 mm)	32.7'' (830 mm)
	Height		55.1'' (1400 mm)		66.9'' (1700 mm)	66.9'' (1700 mm)
	Weight		886 lb (402 kg)	1107 lb (502 kg)	1680 lb (762 kg)	2480 lb (1125 kg)

NOTE:

1. Please refer to the rating label for the safety rating.
2. 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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