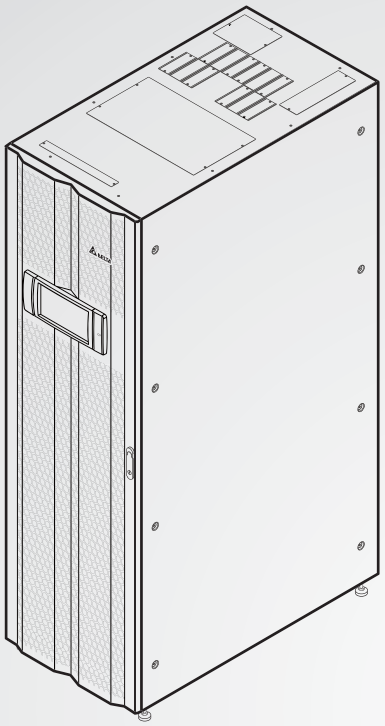

The power behind competitiveness

Delta UPS - Modulon Family

DPH Series, Three Phase
200-500 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.

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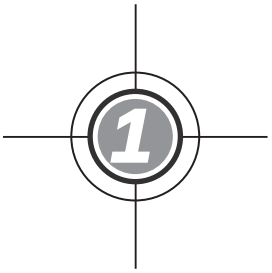


Important Safety Instructions

1.1 Installation Warnings

1.2 Connection Warnings

1.3 Usage Warnings

1.4 Storage Warnings

1.5 Standard Compliance

1.1 Installation Warnings

- This is a three-phase four-wire on-line uninterruptible power supply (hereafter referred to as 'UPS'). It can be used for commercial and industrial applications.
- Install the UPS in a well-ventilated indoor area, away from excess moisture, heat, dust, flammable gas or explosives. To avoid fire accidents and electric shock, the indoor area must be free of conductive contaminants. For the temperature and humidity specifications, please refer to ***Appendix 1: Technical Specifications***.
- Leave adequate space around all sides of the UPS for proper ventilation and maintenance. Please refer to ***5.2 Installation Environment***.
- Only authorized Delta engineers or service personnel can perform installation and maintenance. If you want to install the UPS by yourself, please install it under the supervision of authorized Delta engineers or service personnel.
- Follow the IEC 60364-4-42 standard to install the UPS.

1.2 Connection Warnings

- Before applying electrical power to the UPS, make sure the UPS is grounded to avoid a possible risk of current leakage.
- You can parallel up to eight UPS units.
- The UPS must be connected with an external battery cabinet (user-supplied, handled and configured by Delta service personnel). Please refer to ***5.6 External Battery Cabinet Connection Warnings*** for relevant information.
- The UPS must be connected with a Delta or non-Delta external maintenance bypass cabinet. The Delta external maintenance bypass cabinet is optional, and the non-Delta external maintenance bypass cabinet is user-supplied and should be handled and configured by Delta service personnel. For information regarding the Delta or non-Delta external maintenance bypass cabinet, please refer to the table below.

<table>
<tr>
<td>Delta External Maintenance Bypass Cabinet
(Optional)</td>
<td>There are two models for selection. Please refer to the table below.
<table>
<tr><th colspan="3">Delta External Maintenance Bypass Cabinet (Optional)</th></tr>
<tr><td>Model</td><td>3915101965-S</td><td>3915101964-S</td></tr>
<tr><td>Switch Q'ty</td><td>3 Switches
(Input Switch/ Manual Bypass Switch/ Output Switch)</td><td>4 Switches
(Input Switch/ Bypass Switch/ Manual Bypass Switch/ Output Switch)</td></tr>
<tr><td>Wiring Type</td><td>Top & Bottom Wiring</td><td>Top & Bottom Wiring</td></tr>
</table>
NOTE:
For more information about the Delta external maintenance bypass cabinet (optional), please refer to its user manual.</td>
</tr>
</table>

Non-Delta External Maintenance Bypass Cabinet (User-supplied, handled and configured by Delta service personnel)	For configurations of the non-Delta external maintenance bypass cabinet, please refer to the following. a. Selection of three or four breakers (switches): (1) Three breakers (switches): An input breaker (switch), a manual bypass breaker (switch) and an output breaker (switch) should be installed. (2) Four breakers (switches): An input breaker (switch), a bypass breaker (switch), a manual bypass breaker (switch) and an output breaker (switch) should be installed. b. Each breaker (switch) mentioned above must be a 3-pole (R/ S/ T) device and meets the specifications defined in ***Table 5-2***. c. It is suggested that each breaker (switch) should be configured with an auxiliary contactor. For relevant information, please refer to ***4.1.4 External Switch/ Breaker Status Dry Contacts***. d. Install the non-Delta external maintenance bypass cabinet next to the UPS or align it with the UPS for convenient operation.

NOTE:
If there are switches but not breakers installed in the external maintenance bypass cabinet, please install (1) an additional protective device between the input power and the external maintenance bypass cabinet and (2) an additional protective device between the connected critical loads and the external maintenance bypass cabinet. The protective device could be a breaker or a fuse. For the protective device's rating current, please refer to the table below.

200kVA	300kVA	400kVA	500kVA
400A	600A	800A	1000A

- In this user manual, the meaning of Q0, Q1, Q2, Q3, Q4 and Q5 is shown as follows.

Code	Meaning
Q0	UPS's Bypass Switch
Q1	Delta or non-Delta External Maintenance Bypass Cabinet's Input Breaker or Switch
Q2	Delta or non-Delta External Maintenance Bypass Cabinet's Bypass Breaker or Switch
Q3	Delta or non-Delta External Maintenance Bypass Cabinet's Manual Bypass Breaker or Switch
Q4	Delta or non-Delta External Maintenance Bypass Cabinet's Output Breaker or Switch
Q5	External Battery Cabinet's Breaker

- The installation of protective devices is highly recommended when the UPS is connected to power sources.
- The protective devices connected to the UPS must be installed near the UPS and easily accessible for operation.
- Protective Devices:

  1. It is suggested that you install appropriate protective devices between the UPS and input AC power. The protective devices should have the functions of over current protection, short circuit protection, insulating protection and shunt trip feature. Please refer to the table below for the UPS rated short-time withstand current (Icw).

200kVA	300kVA	400kVA	500kVA
10kA	10kA	12.12kA	15.15kA

  2. For selection of the protective devices, please take each power cable's current capacity and the system's overload capacity (please refer to ***Appendix 1: Technical Specifications***) into consideration. Besides, the short-circuit capacity of the upstream protective devices must be equal to or higher than the capacity of the UPS's protective devices.
  3. For single input, you must install (1) a protective device between the main AC source and the UPS and (2) a protective device between the connected critical loads and the UPS.
  4. For dual input, you must install (1) a protective device between the main AC source and the UPS, (2) a protective device between the bypass source and the UPS and (3) a protective device between the connected critical loads and the UPS.
  5. For grounding information, please refer to ***Figure 5-16*** and ***Figure 5-19***.
  6. Due to abnormalities in the UPS, the fault current may reach 20kA. At the time, the UPS's internal semi-conductor fuses will take 8 ~ 10 ms to open. Thus, the reaction time of the upstream*[1] protective devices must be more than 10 ms so that the fuses would have sufficient time to interrupt the fault current, and the UPS's bypass will be able to keep supplying power to the loads.

     NOTE:

     *[1] For dual input application, this refers to the bypass upstream.

  7. If the UPS is supplied by a power source whose neutral is grounded, each protective device must be a 3-pole type. If the UPS is supplied by a power source whose neutral is not grounded, each protective device must be a 4-pole type.
  8. The recommended electrical rating of the input, output and backfeed protective devices are as follows. Application of the protective devices shall be in accordance with local installation codes

200kVA	300kVA	400kVA	500kVA
690V/ 400A	690V/ 600A	690V/ 800A	690V/ 1000A

1.3 Usage Warnings

- Before installation, wiring and working on the UPS's internal circuits, please completely cut off all power supplying to the UPS, including the input power and battery power.
- The UPS is specifically designed for information technology equipment and used to power computers, servers, and associated peripheral devices. If you want to connect any capacitive loads or non-linear loads (that have serious surge current) to the UPS, it needs to be de-rated according to on-site applications. For such special applications, please contact Delta service personnel for the accurate UPS sizing. The UPS is not suitable for connecting with any asymmetrical loads. For the load suitability, please contact Delta customer service before purchasing.
- 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.
- Before applying electrical power to the UPS, you must allow the UPS to adjust to room temperature (20°C ~ 25°C (68°F ~ 77°F)) for at least one hour and ensure that there is no moisture condensing inside the unit.
- Do not put beverages on the UPS, external battery cabinet, Delta or non-Delta external maintenance bypass cabinet or any other accessory associated with the UPS.
- Do not open or remove the covers or panels of the UPS to avoid high voltage electric shock. Only authorized Delta engineers or service personnel can do so for installation or maintenance. If you want to open or remove the covers or panels, do it only under the supervision of authorized Delta engineers or service personnel.
- It is not recommended to connect the UPS to any regenerative loads. For the load suitability, please contact Delta customer service before purchasing.
- The risk of dangerous high voltage is possible when batteries are still connected to the UPS even though the UPS is disconnected from the power sources. Before maintenance, turn off the external battery cabinet's circuit breaker to completely cut off the battery power from the UPS.
- 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.
- The UPS is electronic equipment that runs 24 hours continuously. To ensure its normal lifetime, regular maintenance of the UPS and batteries is of vital importance and necessary.
- Some components like batteries, power capacitors, and fans will become worn-out due to long-term usage, and this will increase the risk of UPS failure. To replace and maintain the components, please contact Delta service personnel.

- A battery can present a risk of electrical shock and high short-circuit current. Contact with any part of a grounded battery can result in electrical shock. The following precautions should be observed when working on batteries:

  1. Remove watches, rings, or other metal objects.
  2. Use tools with insulated handles.
  3. Wear rubber gloves and boots.
  4. Do not lay tools or metal parts on top of the batteries.
  5. Disconnect charging source and loads prior to installing or maintaining the batteries.
  6. Remove battery grounds during installation and maintenance to reduce likelihood of shock. Remove the connection from ground if any part of the battery is determined to be grounded. Please note that the battery grounds mean any battery pole (+/ -) connecting to the ground.

- You must contact Delta customer service if any of the following events occur:

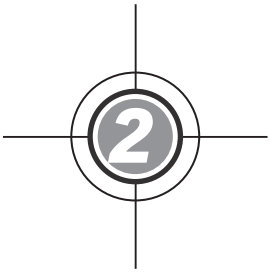
  1. Liquid is poured or splashed on the UPS.
  2. The UPS is deformed.
  3. Any conductive powders or metals enter into the UPS.
  4. The UPS does not run normally after carefully following the instructions in this ***User Manual***.

1.4 Storage Warnings

- Use the original packing material to pack the UPS to prevent any possible damage from rodents.
- If the UPS needs to be stored prior to installation, it should be placed in a dry indoor area. The allowable storage temperature is below 70°C (158°F) and relative humidity is below 95%.

1.5 Standard Compliance

- EN 62040-1
- EN 61000-6-4
- EN 62040-2 Category C3
- EN 61000-4-2
- EN 61000-4-3
- EN 61000-4-4
- EN 61000-4-5
- EN 61000-4-6
- EN 61000-4-8
- EN 61000-2-2
- YD/ T 2165-2010
- YD 5083-2005
- YD/ T 5096-2016



Introduction

2.1 General Overview

2.2 Package Inspection

2.3 Functions & Features

2.4 Exterior and Dimensions

2.5 Front View

2.6 Internal View

2.7 Rear View

2.8 Tri-color LED Indicator & Buzzers

2.1 General Overview

The DPH series UPS, a three-phase four-wire online uninterruptible power supply, is a dedicated design for data centers, factory facilities and large scale power systems. The unit not only adopts advanced IGBT technology to provide high quality, low noise, pure and uninterruptible output power to the connected loads, but also applies the latest design of DSP digital control technology and highest quality components.

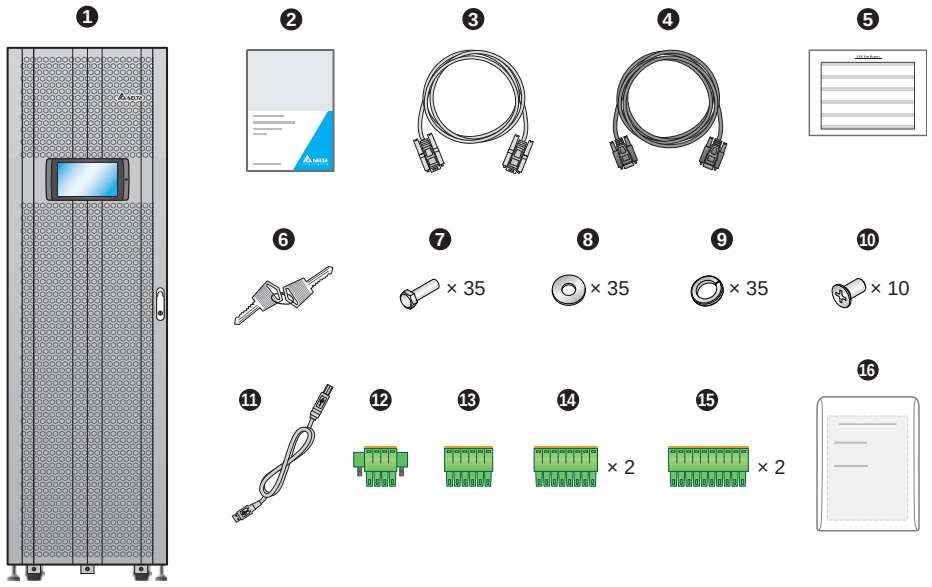
2.2 Package Inspection

- External

  During UPS transportation, some unpredictable situations might occur. It is recommended that you inspect the UPS exterior packaging. If you notice any damage, please immediately contact the dealer from whom you purchased the unit.

- Internal

  1. Check the rating label attached to the UPS and make sure the device No. and capacity match what you ordered.
  2. Examine if any parts are loose or damaged.
  3. The UPS package contains the following items. Please check if any items are missing.



No.	Item	Q'ty
❶	UPS (two pieces of 50ppi dust filters have been installed on the inner side of the UPS front door before shipment)	1 PC
❷	User Manual	1 PC

No.	Item	Q'ty
❸	RS-232 Cable	1 PC
❹	Parallel Cable	1 PC
❺	Test Report	1 PC
❻	Key	2 PCS
❼	M12 Screw (used for input/ output/ battery/ grounding wiring)	35 PCS
❽	Washer (used for input/ output/ battery/ grounding wiring)	35 PCS
❾	Washer Spring (used for input/ output/ battery/ grounding wiring)	35 PCS
❿	M4 Screw (used to fix the parallel fasteners)	10 PCS
⓫	USB Cable	1 PC
⓬	4-Pin Dry Contact Terminal Block (used for REPO dry contacts; please refer to ***Figure 4-3***)	1 PC
⓭	6-Pin Dry Contact Terminal Block (used for MODBUS and BMS ports located at the rear of the touch panel; please refer to ***Figure 4-15***)	1 PC
⓮	8-Pin Dry Contact Terminal Block (used for (1) external battery temperature detection and (2) external switch/ breaker status dry contacts; please refer to ***Figure 4-3***)	2 PCS
⓯	10-Pin Dry Contact Terminal Block (used for input and output dry contacts; please refer to ***Figure 4-3***)	2 PCS
⓰	Protection Dustproof Cover*[1]	1 Set

NOTE:

*[1] The protection dustproof cover is a standard accessory provided in the UPS's carton. For how to install the protection dustproof cover, please refer to the ***Quick Guide*** placed in the dustproof cover's package.

4. If there is any damage or anything missing, please immediately contact the dealer from whom you purchased the unit.
5. If the UPS needs to be returned, carefully repack the UPS and all of the accessories using the original packing material that came with the unit.

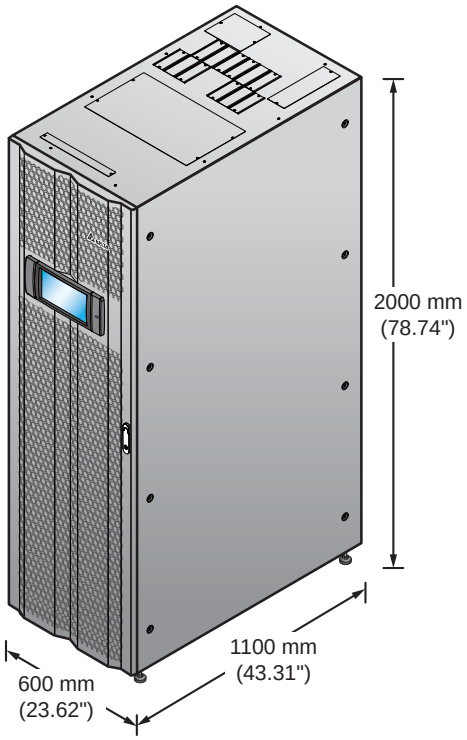
2.3 Functions & Features

- Hot swappable STS module, communication interfaces and power modules (optional) realize on-line maintenance, reduce the MTTR (Mean Time to Repair) and expand system capacity flexibly (200 ~ 500kVA).
- Input power factor > 0.99 and input THDi < 3% save on installation cost and diminish power contamination.
- Output power factor= 1 (for 500kVA, output power factor is 0.9).
- Efficiency > 96% saves on operation cost.
- Automatic input frequency detection enables operation at 50Hz or 60Hz.
- Automatic restart:
  1. The UPS will restart in normal mode automatically right after the AC line resumes following a low battery shutdown.
  2. The UPS returns automatically to normal mode from bypass mode after an overload condition is cleared.
- Supports ECO mode: when input voltage and frequency are within the range of rating voltage ±10% and rating frequency ±3Hz, the UPS will transfer to bypass mode; otherwise, the UPS will transfer to normal mode to reach higher efficiency.
- Both auxiliary power and control circuit adopt redundancy design, which doubly enhances UPS reliability.
- Suitable for top and bottom wiring by use of the Delta external maintenance bypass cabinet (optional).
- Generator compatible
- Surge protection and EMI filter functions.
- Remote emergency power off.
- Single input and dual input functions.
- Supports external switch/ breaker status detection.
- Wide AC input voltage range (140Vac~276Vac) reduces frequent transfer from normal mode to battery mode to save battery consumption and prolong battery life.
- AC start-up function even when the UPS is not connected to the batteries.

WARNING:
Please note that when the UPS is not connected to the batteries, it will not protect your equipment if the utility power is lost.

- Connects to four external battery cabinets at maximum to extend the backup time.
- Provides setting options such as battery test (schedulable) and battery replacement alarm.
- Battery temperature monitoring and compensation.
- Battery monitoring system allows measurement of per battery cell's voltage and current.
- Smart battery charger design allows auto-charging or manual charging to shorten the charging time.
- Provides communication interfaces and a smart slot (where you can install the optional Relay I/O card for dry contact expansion). Please refer to ***4. Communication Interfaces***.
- Fan speed auto adjustment prolongs fan life and reduces noise when the critical loads decrease. Moreover, fan failure detection circuit is established.
- State-of-the-art microprocessor technology performs self-detection and monitors fan speed in real time, which provides complete and detailed operating status of the UPS.

2.4 Exterior and Dimensions

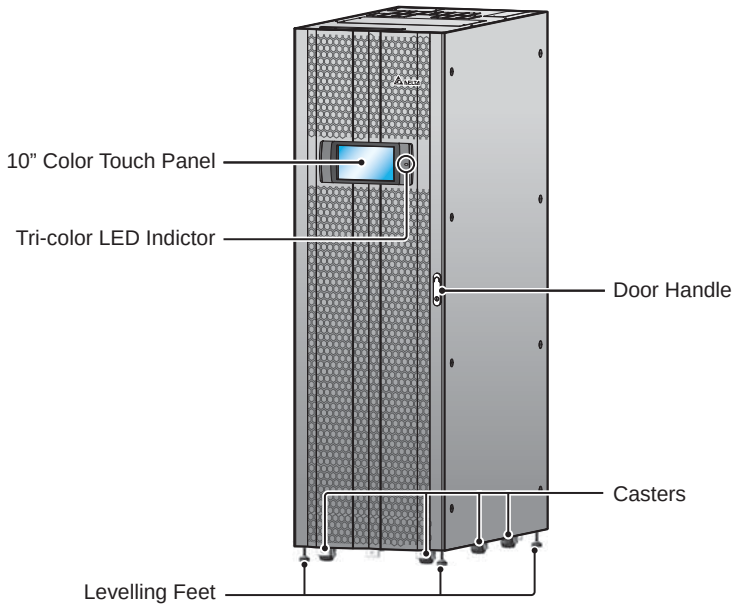


(Figure 2-1: Exterior & Dimensions)

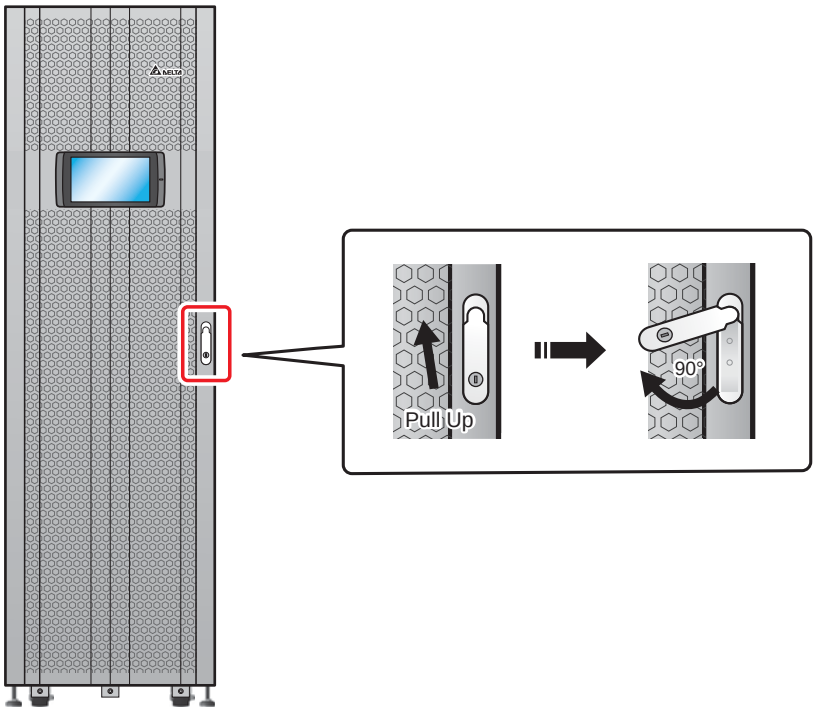
2.5 Front View

On the front of the UPS, there are a 10” color touch panel, a tri-color LED indictor, a door handle, six casters and four leveling feet. Please see ***Figure 2-2***.

1. For information about the 10” color touch panel, please refer to ***7. LCD Display & Settings***.
2. For information about the tri-color LED indicator, please refer to ***2.8 Tri-color LED Indicator & Buzzers***.
3. The casters at the bottom of the UPS can be used to move over short distances, and the leveling feet fix and stabilize the UPS on the ground. Please refer to ***5.3 UPS Transportation*** for relevant information.
4. Please refer to ***Figure 2-3*** for how to open the UPS front door.



(Figure 2-2: UPS Front View)

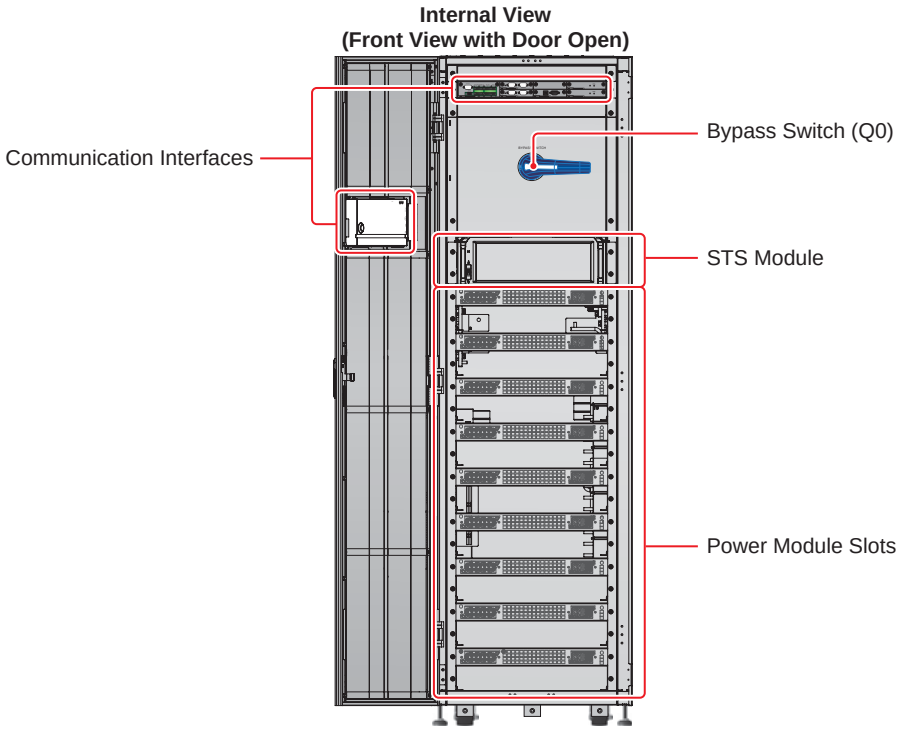


(Figure 2-3: How to Open the UPS Front Door)

2.6 Internal View

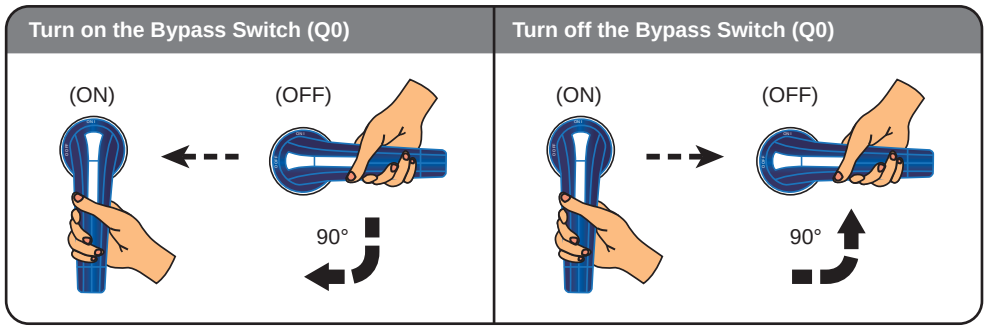
WARNING:
Only authorized Delta engineers or service personnel can perform installation, wiring, panel & cover removal, maintenance and operation. If you want to execute any action mentioned above by yourself, the action must be under the supervision of authorized Delta engineers or service personnel.

After you open the UPS's front door, you will see the internal mechanisms, including communication interfaces, a bypass switch (Q0), an STS module and nine power module slots. Please refer to ***Figure 2-4***.



(Figure 2-4: UPS Internal View (Front View with Door Open))

1. For information about the communication interfaces, please refer to ***4. Communication Interfaces***.
2. For how to turn on/ off the bypass switch (Q0), please refer to ***Figure 2-5***.



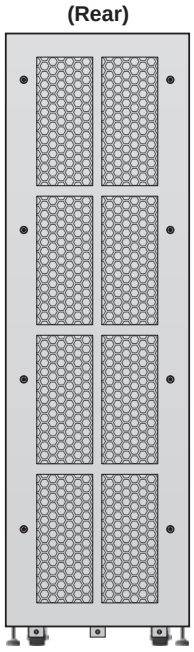
(Figure 2-5: Turn On/ Off the Bypass Switch (Q0))

3. For STS module information, please refer to ***5.7 STS Module***.
4. For the power module slots, please follow on-site requirements to install appropriate number of power modules (optional) into the slots. Please refer to ***5.8 Power Module (Optional)*** for relevant information.

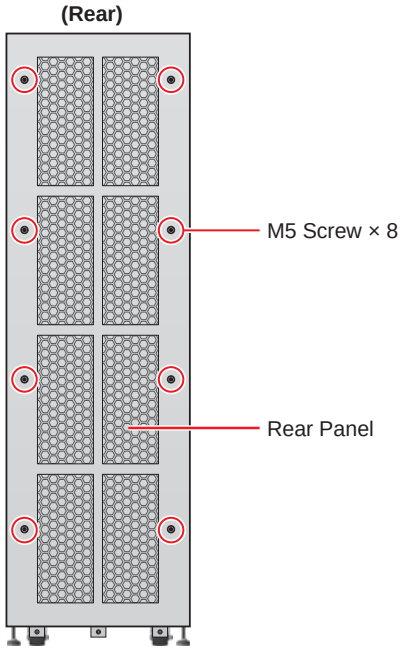
2.7 Rear View

WARNING:
Only authorized Delta engineers or service personnel can perform installation, wiring, panel & cover removal, maintenance and operation. If you want to execute any action mentioned above by yourself, the action must be under the supervision of authorized Delta engineers or service personnel.

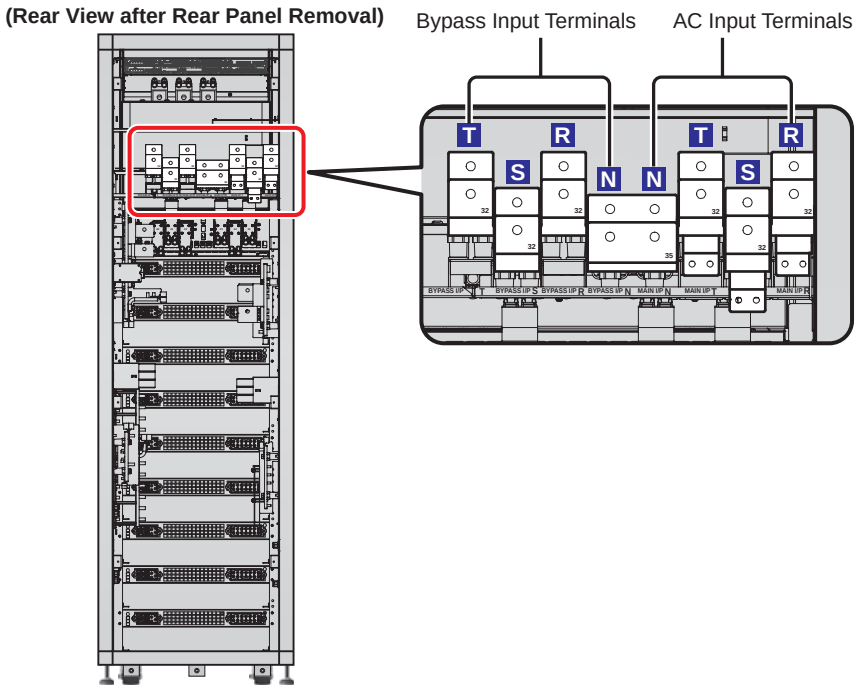
The rear view of the UPS is shown in ***Figure 2-6***. Please remove the rear panel (there are eight screws (see ***Figure 2-7***) to see the wiring terminals shown in ***Figure 2-8*** ~ ***Figure 2-10***.



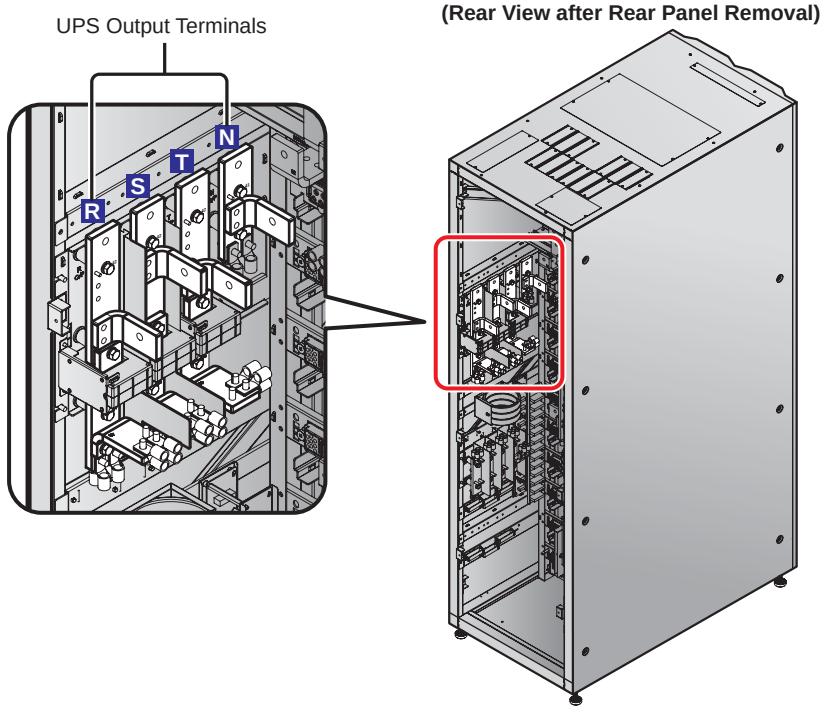
(Figure 2-6: UPS Rear View)



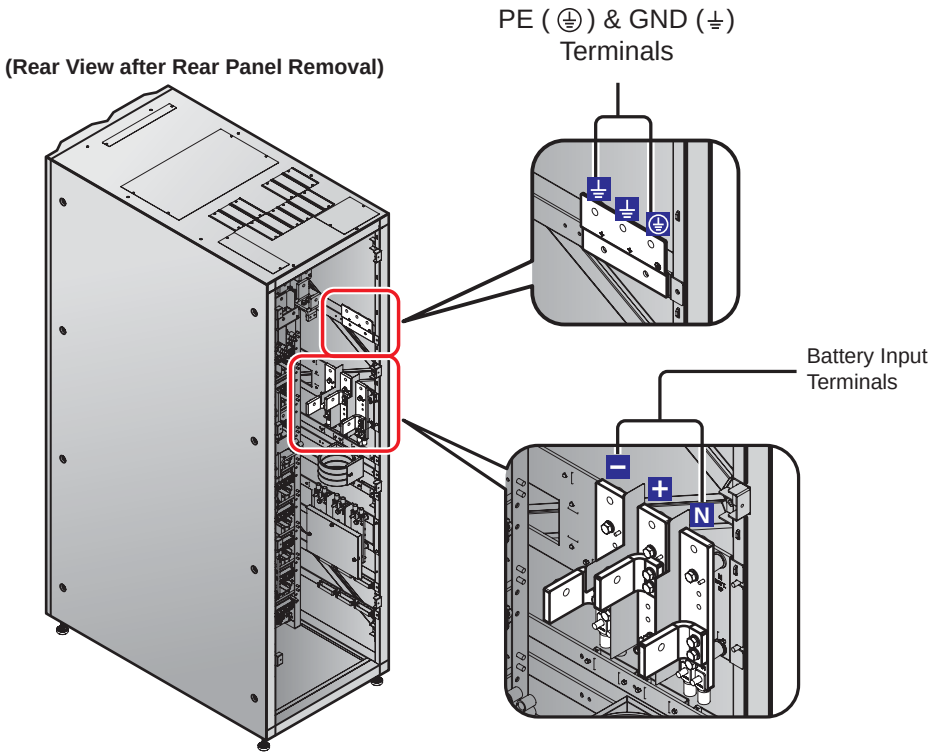
(Figure 2-7: UPS Rear Panel and Screw Location)



(Figure 2-8: Wiring Terminals_ AC Input & Bypass Input)



(Figure 2-9: Wiring Terminals_ UPS Output)



(Figure 2-10: Wiring Terminals_ Battery Input & Grounding)

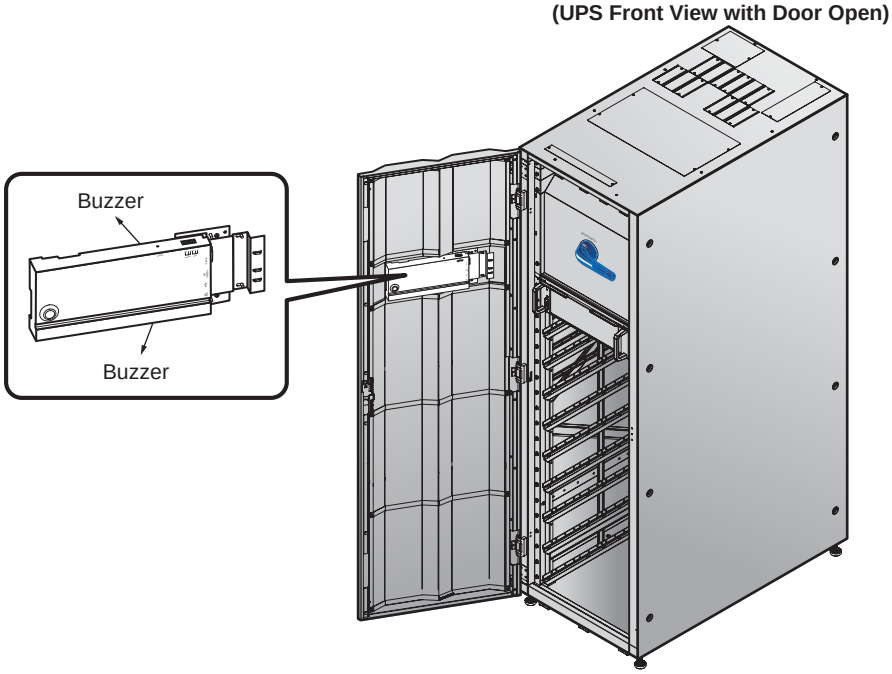
2.8 Tri-color LED Indicator & Buzzers

Please see ***Figure 2-11*** for the location of the tri-color LED indicator. For information about the tri-color LED indicator, please refer to ***Table 2-1***. For information about the 10” color touch panel, please refer to ***7. LCD Display and Settings***.

(Figure 2-11: Tri-color LED Indictor Location)

Open the UPS front door and find the buzzers at the rear of the UPS front door. Please see ***Figure 2-12***.

(UPS Front View with Door Open)



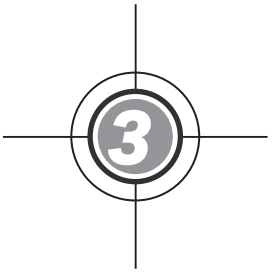
(Figure 2-12: Buzzers Location)

Please refer to the table below for the status of the tri-color LED indicator and buzzers.

Table 2-1: Tri-color LED Indicator & Buzzers

Tri-color LED Indicator	Status	Meaning
Green	ON	1. The UPS is running in online mode and the text **'On-Line'** appears in the upper right corner of the screen. 2. The UPS is running in ECO mode and the text **'ECO'** appears in the upper right corner of the screen. 3. The UPS is running in frequency conversion mode and the text **'Frequency Conversion'** appears in the upper right corner of the screen. 4. The UPS is running in green mode and the text **'Green'** appears in the upper right corner of the screen.

<table>
<tr><th>Tri-color LED Indicator</th><th>Status</th><th>Meaning</th></tr>
<tr><td>Yellow</td><td>ON</td><td>1. The UPS is running in bypass mode and the text ‘Bypass’ appears in the upper right corner of the screen.
2. The UPS is running in battery mode and the text ‘Battery’ appears in the upper right corner of the screen.
3. The UPS is running in standby mode and the text ‘Standby’ appears in the upper right corner of the screen.
4. The UPS is in the soft start status and the text ‘Softstart’ appears in the upper right corner of the screen.
5. The UPS is in the energy recycle status and the text ‘Energy Recycle’ appears in the upper right corner of the screen.
6. There is a minor or medium warning and the buzzers sound.
<table>
<tr><th>Warning Level</th><th>Buzzer Frequency</th></tr>
<tr><td>Minor</td><td>The buzzers beep 0.5 second for every three seconds.</td></tr>
<tr><td>Medium</td><td>The buzzers beep 0.5 second for every second.</td></tr>
</table>
</td></tr>
<tr><td>Red</td><td>ON</td><td>There is a major warning and the buzzers sound.
<table>
<tr><th>Warning Level</th><th>Buzzer Frequency</th></tr>
<tr><td>Major</td><td>Long beep</td></tr>
</table>
</td></tr>
</table>



Operation Modes

3.1 Single Input

3.2 Dual Input

3.3 Hot Standby Redundancy (Only For Dual Input & At Least Two UPSs)

3.4 Common Battery (Only For At Least Two Parallel UPSs)

The UPS runs in eight basic operation modes, which are online mode, battery mode, bypass mode, manual bypass mode, ECO mode, frequency conversion mode, green mode and energy recycle mode. Besides these eight operation modes, the UPS is also designed for common battery application and hot standby redundancy. Please see the following sections for relevant information.

NOTE:

1. The UPS must be connected with a Delta or non-Delta external maintenance bypass cabinet. The Delta external maintenance bypass cabinet is optional, and the non-Delta external maintenance bypass cabinet is user-supplied and should be handled and configured by Delta service personnel. For information regarding the Delta or non-Delta external maintenance bypass cabinet, please refer to the table below.

<table>
<tr>
<td>Delta External Maintenance Bypass Cabinet (Optional)</td>
<td>There are two models for selection. Please refer to the table below.
<table>
<tr><th colspan="3">Delta External Maintenance Bypass Cabinet (Optional)</th></tr>
<tr><td>Model</td><td>3915101965-S</td><td>3915101964-S</td></tr>
<tr><td>Switch Q’ty</td><td>3 Switches (Input Switch/ Manual Bypass Switch/ Output Switch)</td><td>4 Switches (Input Switch/ Bypass Switch/ Manual Bypass Switch/ Output Switch)</td></tr>
<tr><td>Wiring Type</td><td>Top & Bottom Wiring</td><td>Top & Bottom Wiring</td></tr>
</table>
NOTE:
For more information about the Delta external maintenance bypass cabinet (optional), please refer to its user manual.</td>
</tr>
<tr>
<td>Non-Delta External Maintenance Bypass Cabinet (User-supplied, handled and configured by Delta service personnel)</td>
<td>For configurations of the non-Delta external maintenance bypass cabinet, please refer to the following.
a. Selection of three or four breakers (switches):
(1) Three breakers (switches):
An input breaker (switch), a manual bypass breaker (switch) and an output breaker (switch) should be installed.
(2) Four breakers (switches):
An input breaker (switch), a bypass breaker (switch), a manual bypass breaker (switch) and an output breaker (switch) should be installed.
c. Each breaker (switch) mentioned above must be a 3-pole (R/ S/ T) device and meets the specifications defined in Table 5-3.
d. It is suggested that each breaker (switch) should be configured with an auxiliary contactor. For relevant information, please refer to 4.1.4 External Switch/ Breaker Status Dry Contacts.
e. Install the non-Delta external maintenance bypass cabinet next to the UPS or align it with the UPS for convenient operation.</td>
</tr>
</table>

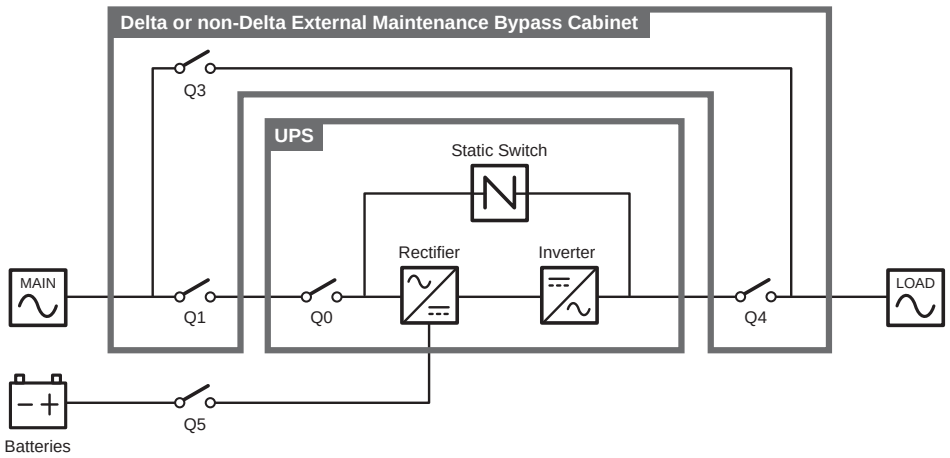
NOTE:
If there are switches but not breakers installed in the external maintenance bypass cabinet, please install (1) an additional protective device between the input power and the external maintenance bypass cabinet and (2) an additional protective device between the connected critical loads and the external maintenance bypass cabinet. The protective device could be a breaker or a fuse. For the protective device's rating current, please refer to the table below.

200kVA	300kVA	400kVA	500kVA
400A	600A	800A	1000A

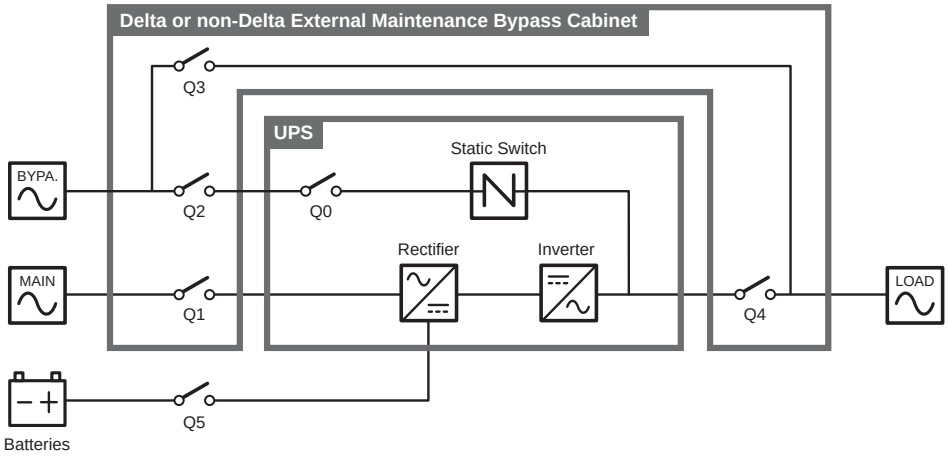
2. In this user manual, the meaning of Q0, Q1, Q2, Q3, Q4 and Q5 represents the following.

Code	Meaning
Q0	UPS's Bypass Switch
Q1	Delta or non-Delta External Maintenance Bypass Cabinet's Input Breaker or Switch
Q2	Delta or non-Delta External Maintenance Bypass Cabinet's Bypass Breaker or Switch
Q3	Delta or non-Delta External Maintenance Bypass Cabinet's Manual Bypass Breaker or Switch
Q4	Delta or non-Delta External Maintenance Bypass Cabinet's Output Breaker or Switch
Q5	External Battery Cabinet's Breaker

3. The structure of the UPS and the Delta or non-Delta external maintenance bypass cabinet is shown in ***Figure 3-1*** (single input application) and ***Figure 3-2*** (dual input application).



(Figure 3-1: Single Input Application_ UPS and Delta or Non-Delta External Maintenance Bypass Cabinet Structure)

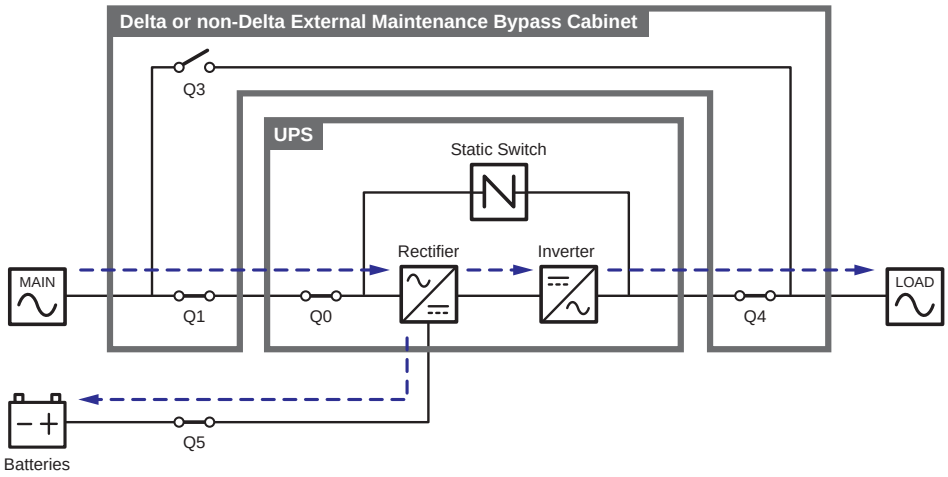


(Figure 3-2: Dual Input Application_ UPS and Delta or Non-Delta External Maintenance Bypass Cabinet Structure)

3.1 Single Input

3.1.1 Online Mode_ Single Input_ Single Unit

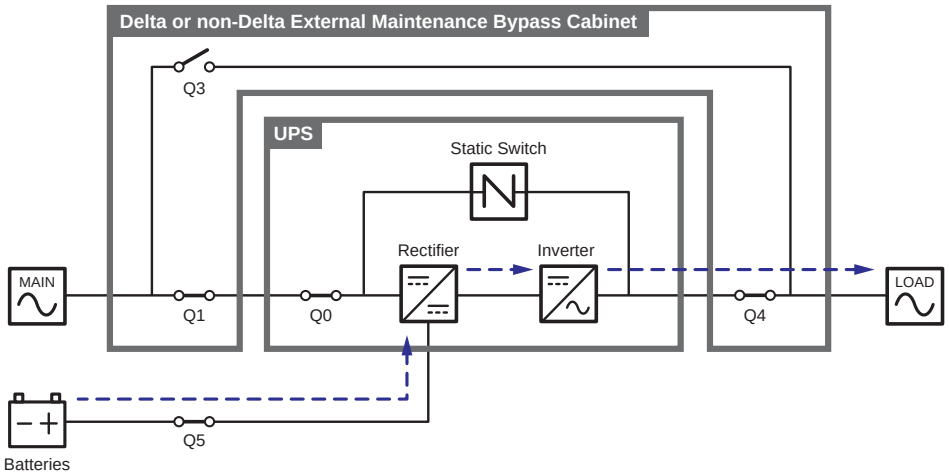
In online mode, the main AC source supplies AC power via the Delta or non-Delta external maintenance bypass cabinet's Input Breaker or Switch (Q1) and the UPS's Bypass Switch (Q0) to the rectifier, and the rectifier converts the AC power to DC power and supplies the DC power to the inverter. In the meantime, the rectifier provides charging power to the batteries. After receiving the DC power, the inverter converts it into clean and stable AC power to the connected critical loads via the Delta or non-Delta external maintenance bypass cabinet's Output Breaker or Switch (Q4). Please refer to ***Figure 3-3***. During online mode, the UPS's tri-color LED illuminates green and the text **'On-Line'** appears in the upper right corner of the screen.



(Figure 3-3: Online Mode Diagram_ Single Input Single Unit)

3.1.2 Battery Mode_ Single Input_ Single Unit

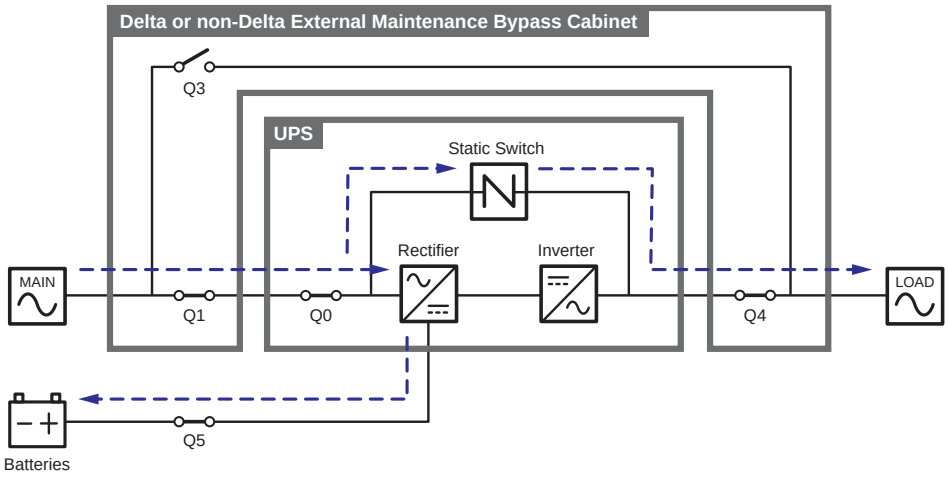
The UPS transfers to battery mode automatically if the main AC source cannot supply power, for example, when unstable voltage or a power outage occurs. In battery mode, the batteries provide DC power and the UPS converts it into AC power and supplies it to the connected critical loads via the Delta or non-Delta external maintenance bypass cabinet's Output Breaker or Switch (Q4). During the conversion process, output voltage remains the same. Please see ***Figure 3-4***. During battery mode, the UPS's tri-color LED illuminates yellow and the text **'Battery'** appears in the upper right corner of the screen.



(Figure 3-4: Battery Mode Diagram_ Single Input Single Unit)

3.1.3 Bypass Mode_ Single Input_ Single Unit

When the inverter encounters abnormal situations such as over temperature, overload, short circuit, abnormal output voltage or low battery, it will automatically shut down. If the UPS detects the bypass AC source is normal, it will automatically switch to bypass mode to protect the connected critical loads from power interruption. Please refer to ***Figure 3-5***. After the above-mentioned abnormalities are eliminated, the UPS will switch back to online mode from bypass mode. During bypass mode, the UPS's tri-color LED illuminates yellow and the text **'Bypass'** appears in the upper right corner of the screen.



(Figure 3-5: Bypass Mode Diagram_ Single Input Single Unit)

3.1.4 Manual Bypass Mode_ Single Input_ Single Unit

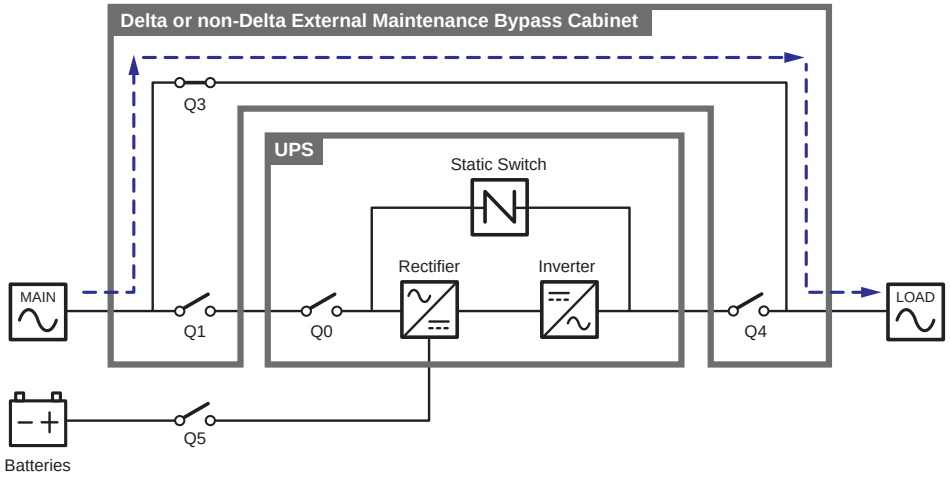
When the UPS needs maintenance, you can manually switch the UPS to manual bypass mode. To let the UPS run in manual bypass mode, please follow the procedures below:

1. Confirm that the bypass AC source and the STS module are normal.
2. Press the LCD's ON/ OFF button (⏻) once and the **'POWER OFF?'** screen will pop up to ask you if you want to power off the inverter. Please select **'YES'**.
3. Turn on the Delta or non-Delta external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3).
4. Turn off the UPS's Bypass Switch (Q0).
5. Turn off the Delta or non-Delta external maintenance bypass cabinet's Input Breaker or Switch (Q1) and Output Breaker or Switch (Q4).
6. Turn off each external battery cabinet's breaker (Q5).

In manual bypass mode, all power inside the UPS is completely cut off and maintenance personnel can perform maintenance safely. For the manual bypass mode diagram, please see ***Figure 3-6***. During manual bypass mode, the UPS's tri-color LED and LCD are both off.

WARNING:

1. In manual bypass mode, make sure that all of the breakers or switches (except the Delta or non-Delta external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3)) are in the **OFF** position before working on the UPS's internal circuits. This avoids electric shock.
2. After the power inside the UPS is completely cut off, there is no high voltage in the UPS but in the Delta or non-Delta external maintenance bypass cabinet. Do not touch the Delta or non-Delta external maintenance bypass cabinet during UPS maintenance process to avoid electric shock.
3. During manual bypass mode, the UPS's input power is completely cut off and the connected critical loads are not protected.

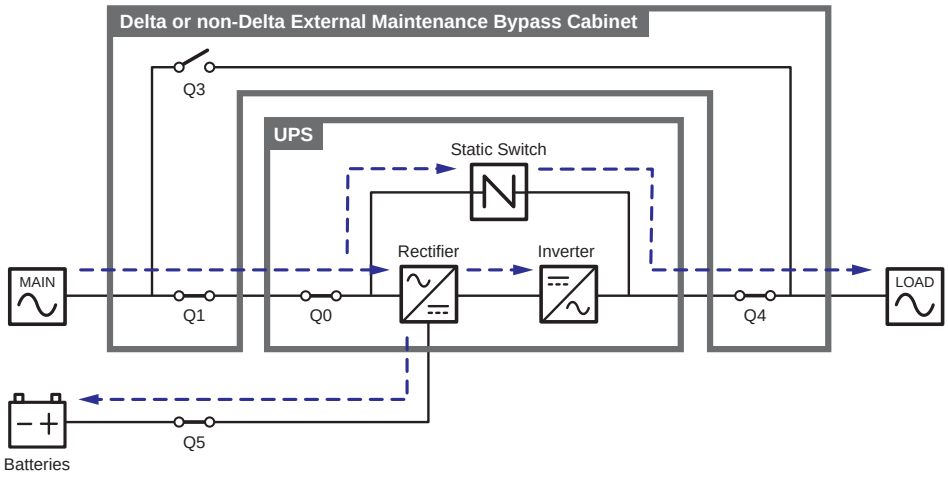


(Figure 3-6: Manual Bypass Mode Diagram_ Single Input Single Unit)

3.1.5 ECO Mode_ Single Input_ Single Unit

To activate ECO mode, please refer to ***6.2.5 ECO Mode Start-up Procedures***, ***7.6 Main Screen*** and ***7.10.2 Mode Setting***.

In ECO mode, when bypass AC source's input voltage and frequency are within the range of rating voltage 10% and rating frequency ±3Hz, the UPS works in bypass mode; otherwise, the UPS runs in online mode. For ECO mode diagram, please see ***Figure 3-7***. During ECO mode, the UPS's tri-color LED illuminates green and the text **'ECO'** appears in the upper right corner of the screen.



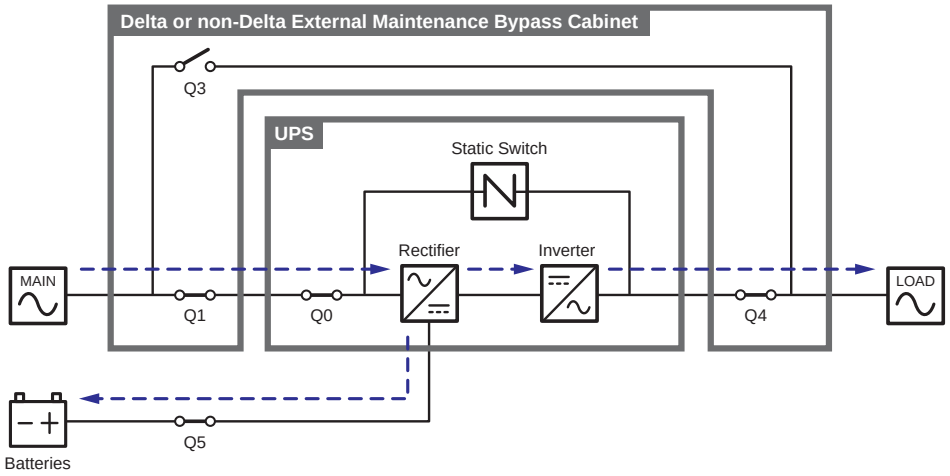
(Figure 3-7: ECO Mode Diagram_ Single Input Single Unit)

3.1.6 Frequency Conversion Mode_ Single Input_ Single Unit

To activate frequency conversion mode, please refer to ***6.2.6 Frequency Conversion Mode Start-up Procedures***, ***7.6 Main Screen*** and ***7.10.2 Mode Setting***.

After the UPS is manually set in frequency conversion mode, the inverter will automatically select 50Hz or 60Hz as the fixed output frequency. After the output frequency is determined, the system will automatically disable the bypass function. Please note that, once the inverter shuts down, there is no bypass output. For the diagram of frequency conversion mode, please see ***Figure 3-8***. During frequency conversion mode, the UPS's tri-color LED illuminates green and the text **'Frequency Conversion'** appears in the upper right corner of the screen.

NOTE:
During frequency conversion mode, once the inverter shuts down, there is no bypass output.

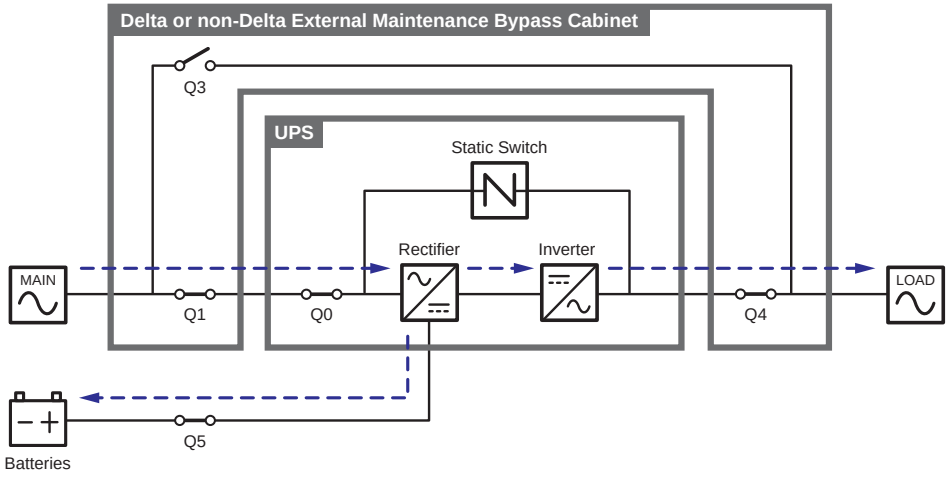


(Figure 3-8: Frequency Conversion Mode Diagram_ Single Input Single Unit)

3.1.7 Green Mode _ Single Input_ Single Unit

To activate green mode, please refer to ***6.2.7 Green Mode Start-up Procedures***, ***7.6 Main Screen*** and ***7.10.2 Mode Setting***.

Green mode is the same as online mode, but the difference is that the system will automatically detect the output status (i.e. total load capacity %) to decide which specific power modules should be fully powered on or idle in order to achieve higher efficiency of the UPS. For the green mode diagram, please see ***Figure 3-9***. During green mode, the UPS's tri-color LED illuminates green and the text **'Green'** appears in the upper right corner of the screen.



(Figure 3-9: Green Mode Diagram_ Single Input Single Unit)

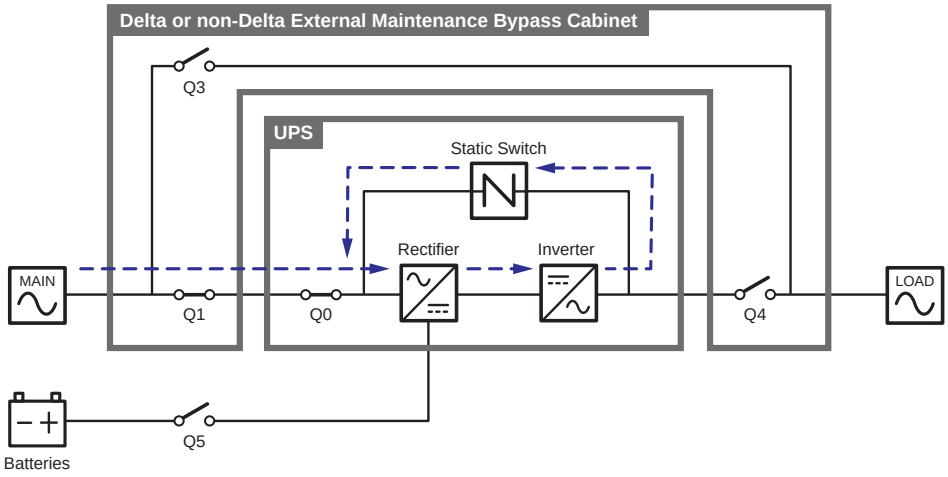
3.1.8 Energy Recycle Mode _ Single Input_ Single Unit

NOTE:
Energy recycle mode is only applicable to single input and single unit application.

Energy recycle mode is only applicable to UPS self-test only. Without connection of any critical loads, the UPS can execute current test under full load condition. Before you activate energy recycle mode, please make sure that the Delta or non-Delta external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3), Output Breaker or Switch (Q4) and each external battery cabinet's battery breaker (Q5) are in the **OFF** status.

To activate energy recycle mode (only qualified service personnel can do so), please refer to ***6.2.8 Energy Recycle Mode Start-up Procedures***, ***7.6 Main Screen*** and ***7.10.2 Mode Setting***.

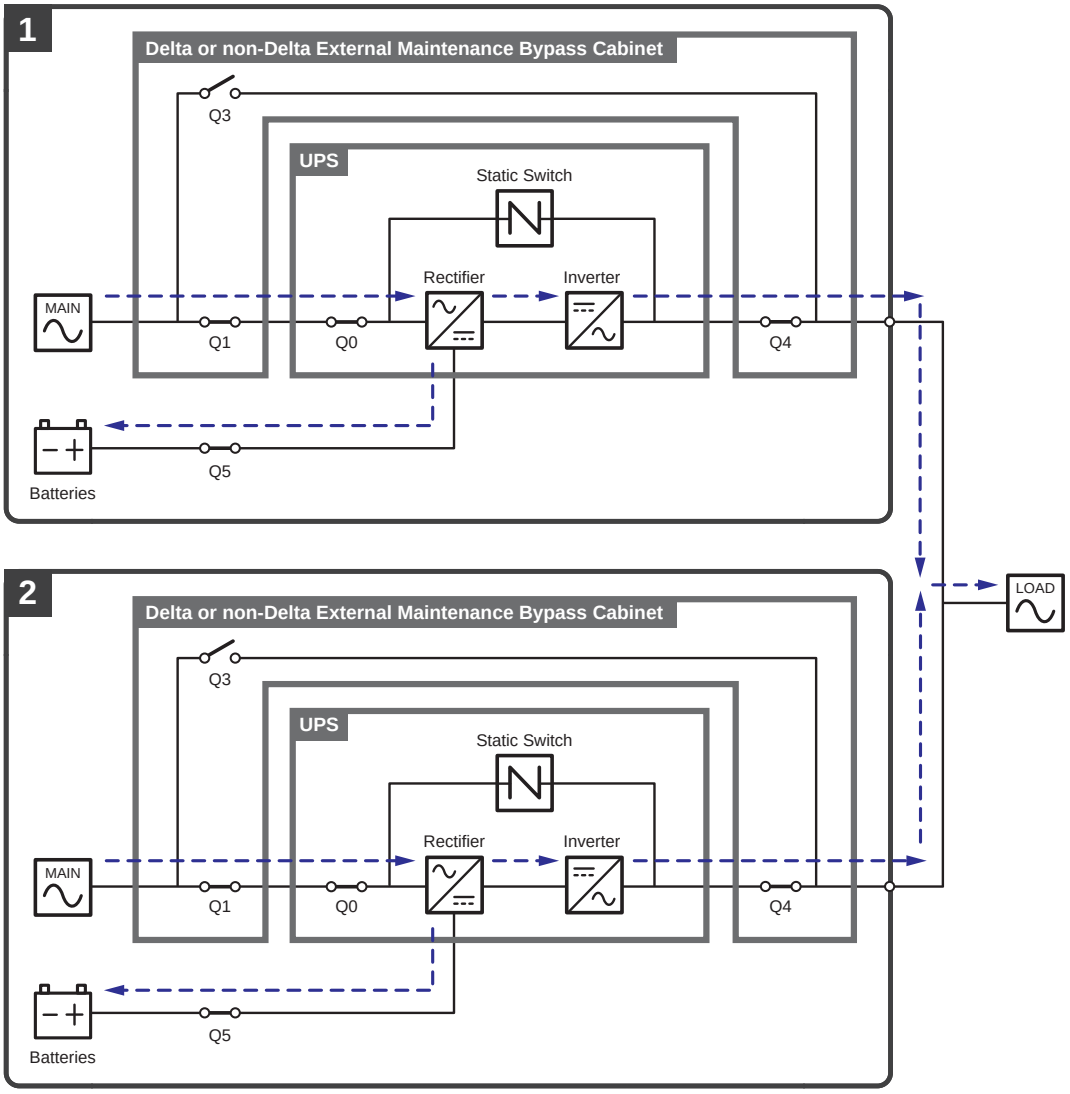
For the diagram of energy recycle mode, please see ***Figure 3-10***. During energy recycle mode, the UPS's tri-color LED illuminates yellow and the text **'Energy Recycle'** appears in the upper right corner of the screen.



(Figure 3-10: Energy Recycle Mode Diagram_ Single Input Single Unit)

3.1.9 Online Mode_ Single Input_ Parallel Units

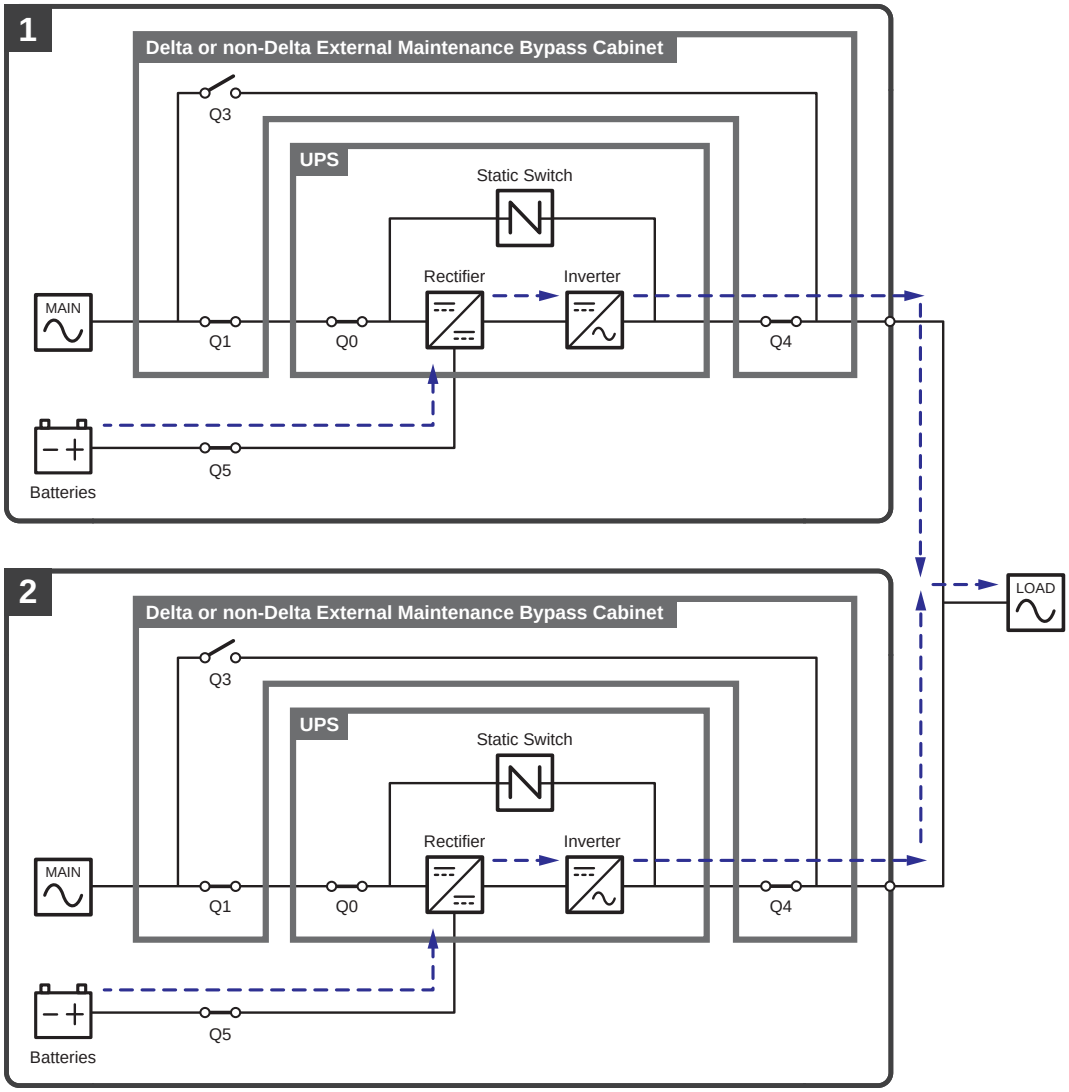
In online mode (parallel), the total loads will be equally shared by the parallel UPSs. If one of the parallel units fails and its load is less than the total capacity of the remaining parallel units, the failing UPS's output will be switched off and its load will be equally shared by the remaining parallel units. If the failing UPS's load is larger than the total capacity of the remaining parallel units, all UPSs' inverters will turn off and the total loads will be supplied by bypass power. During online mode, each UPS's tri-color LED illuminates green and each UPS's LCD shows the text **'On-Line'** in the upper right corner. Please refer to ***Figure 3-11*** for the path of electrical power through the parallel UPSs in online mode.



(Figure 3-11: Online Mode Diagram_ Single Input Parallel Units)

3.1.10 Battery Mode _ Single Input_ Parallel Units

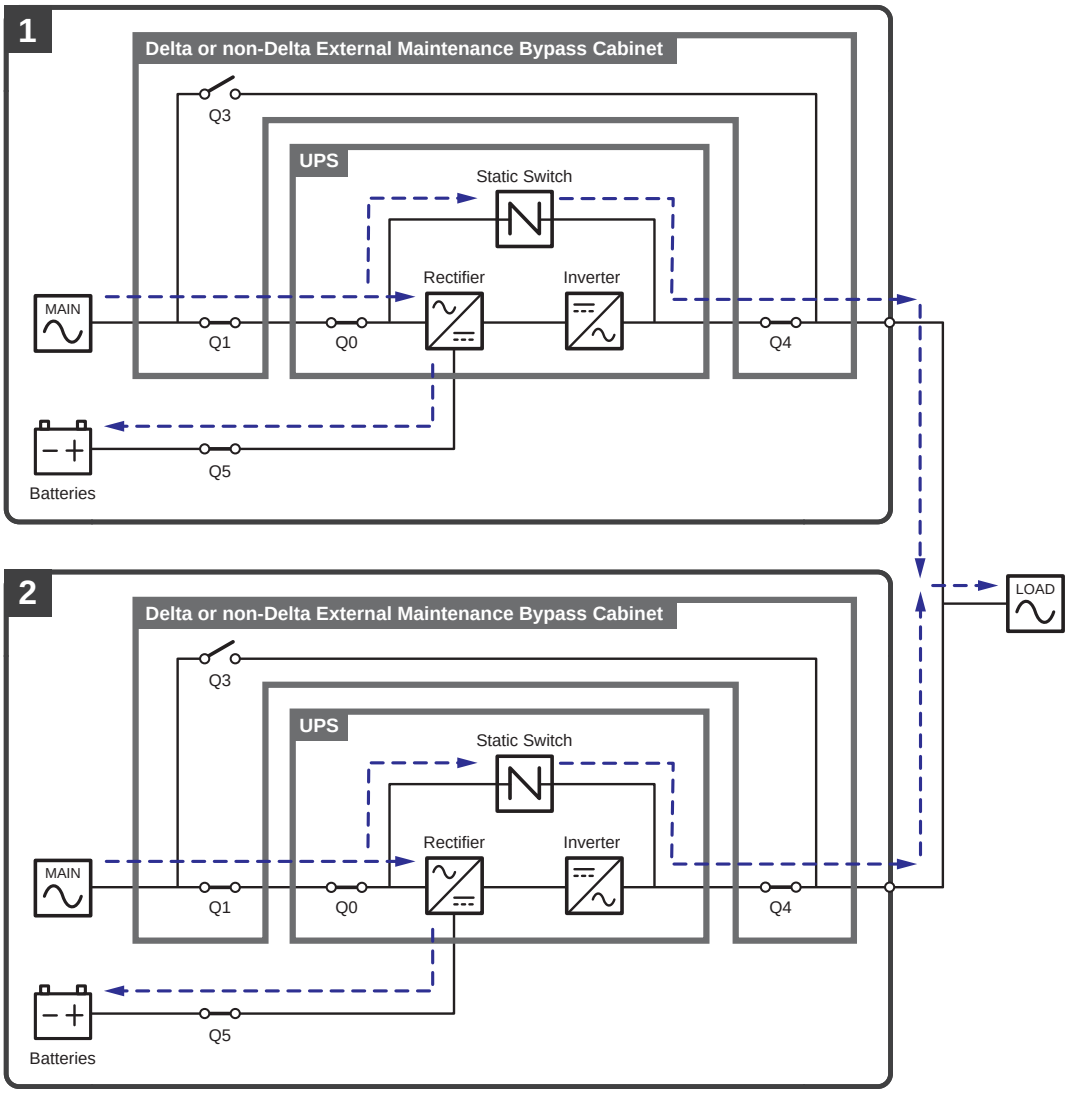
If the main AC source cannot supply power, for example, when unstable voltage or a power outage occurs, all parallel UPSs will automatically transfer from online mode to battery mode. During the conversion process, output voltage remains the same, and during battery mode, each UPS's tri-color LED illuminates yellow and each UPS's LCD shows the text **'Battery'** in the upper right corner. Please refer to ***Figure 3-12*** for the path of electrical power through the parallel UPSs in battery mode.



(Figure 3-12: Battery Mode Diagram_ Single Input Parallel Units)

3.1.11 Bypass Mode_ Single Input_ Parallel Units

In parallel mode, when all inverters encounter abnormal situations such as overload, short circuit, abnormal output voltage or low battery, they will automatically shut down. Meanwhile, if all UPSs detect the bypass AC source is normal, they will automatically switch to bypass mode to protect the connected critical loads from power interruption. The critical loads will be equally shared by all parallel units. After the abnormalities mentioned above are eliminated, the UPSs will switch back to online mode from bypass mode. During bypass mode, each UPS's tri-color LED illuminates yellow and each UPS's LCD shows the text **'Bypass'** in the upper right corner. Please see ***Figure 3-13*** for the path of electrical power through the parallel UPSs in bypass mode.



(Figure 3-13: Bypass Mode Diagram_ Single Input Parallel Units)

3.1.12 Manual Bypass Mode_ Single Input_ Parallel Units

In parallel mode, if one of the parallel UPSs needs maintenance, please first confirm that the bypass AC source and each parallel UPS's STS module are normal. After confirmation, please follow the procedures below to manually switch each of the parallel UPSs to manual bypass mode.

1. Press each LCD's ON/ OFF button ( ) once and the **'POWER OFF?'** screen will pop up to ask you if you want to power off the inverter. Please select **'YES'**.
2. Turn on each Delta or non-Delta external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3).
3. Turn off each UPS's Bypass Switch (Q0).
4. Turn off each Delta or non-Delta external maintenance bypass cabinet's Input Breaker or Switch (Q1) and Output Breaker or Switch (Q4).
5. Turn off each external battery cabinet's breaker (Q5).

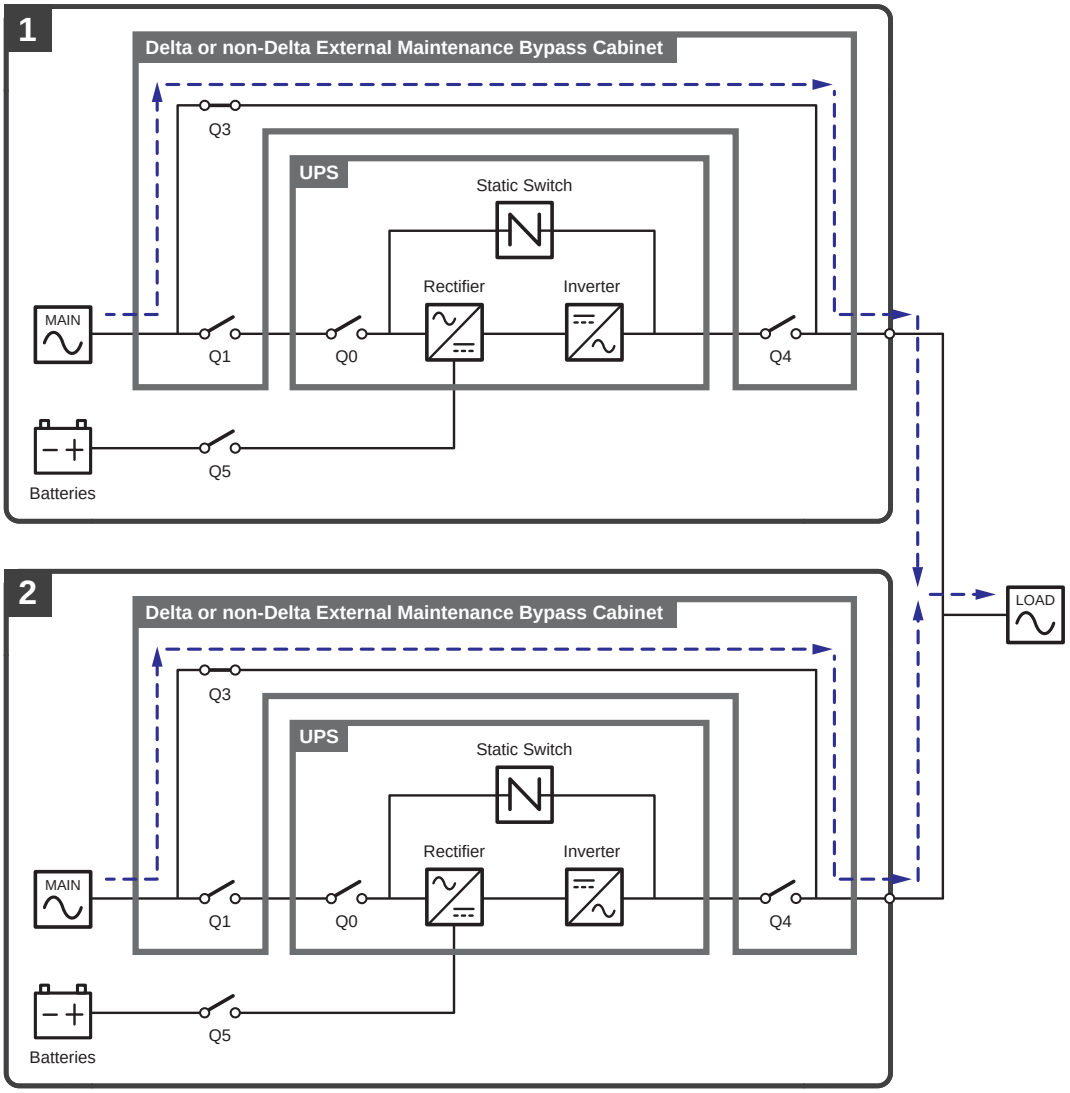
In manual bypass mode, all power inside the parallel UPSs is completely cut off and maintenance personnel can perform maintenance safely. The connected critical loads will be supplied by the manual bypass source. During manual bypass mode, all parallel UPSs' tri-color LEDs and LCDs are off. Please see ***Figure 3-14*** for the path of electrical power through the parallel UPSs in manual bypass mode.

WARNING:

1. In manual bypass mode, make sure that all of the breakers or switches (except the Delta or non-Delta external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3)) are in the **OFF** position before working on any of the parallel UPSs' internal circuits. This avoids electric shock.
2. After the power inside all parallel UPSs is completely cut off, there is no high voltage in the parallel UPSs but in every Delta or non-Delta external maintenance bypass cabinet. Do not touch any Delta or non-Delta external maintenance bypass cabinet during UPS maintenance process to avoid electric shock.
3. During manual bypass mode, each parallel UPS's input power is completely cut off and the connected critical loads are not protected.

NOTE:

For parallel UPSs, if you want to turn off one of the parallel UPSs for maintenance, please make sure the total connected critical loads will not exceed the remaining parallel units' total capacity.

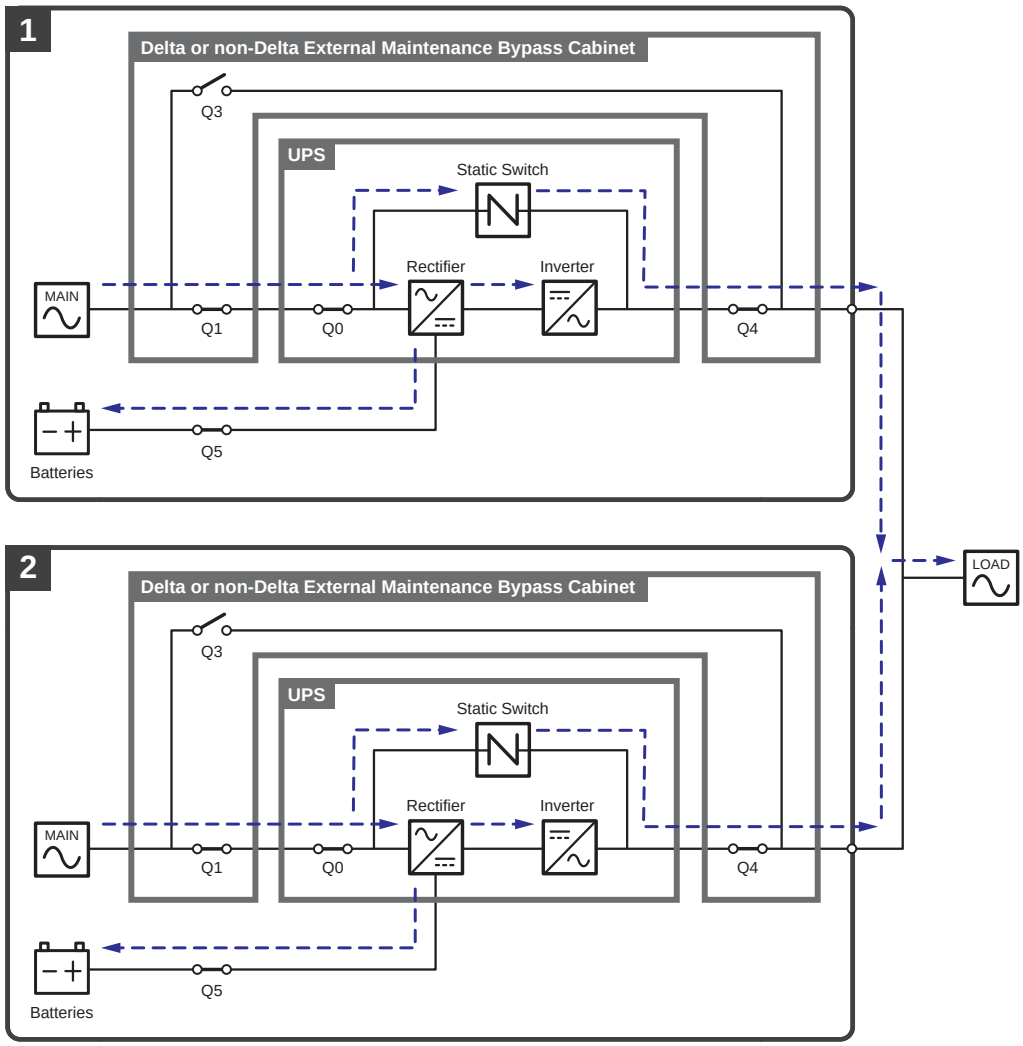


(Figure 3-14: Manual Bypass Mode Diagram_ Single Input Parallel Units)

3.1.13 ECO Mode_ Single Input_ Parallel Units

To activate ECO mode, please refer to ***6.2.5 ECO Mode Start-up Procedures***, ***7.6 Main Screen*** and ***7.10.2 Mode Setting***.

In ECO mode (parallel), when each UPS's bypass input voltage and frequency are within the range of rating voltage ±10% and rating frequency ±3Hz, each UPS works in bypass mode; otherwise, each UPS runs in online mode. During ECO mode, each UPS's tri-color LED illuminates green and each UPS's LCD shows the text **'ECO'** in the upper right corner. Please see ***Figure 3-15*** for the path of electrical power through the parallel UPSs in ECO mode.



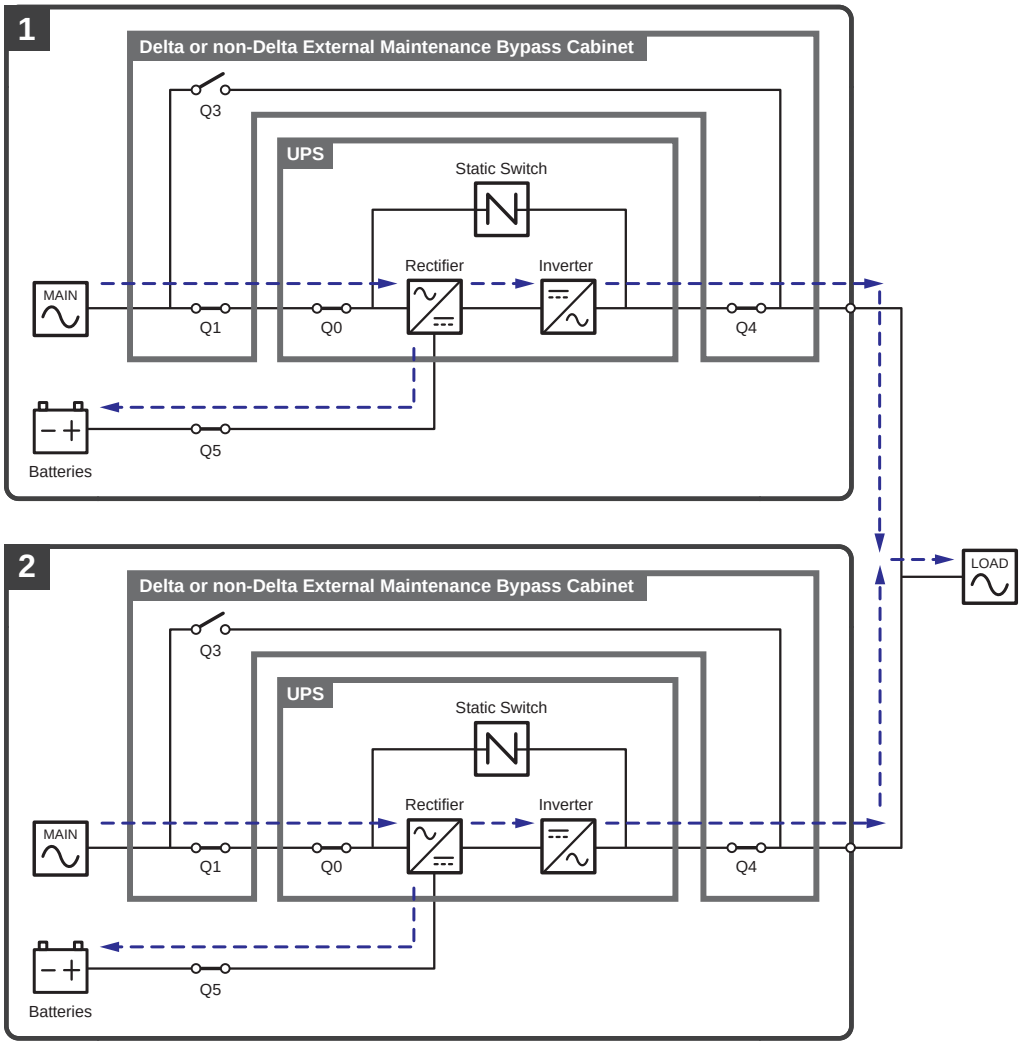
(Figure 3-15: ECO Mode Diagram_ Single Input Parallel Units)

3.1.14 Frequency Conversion Mode_ Single Input_ Parallel Units

To activate frequency conversion mode, please refer to ***6.2.6 Frequency Conversion Mode Start-up Procedures***, ***7.6 Main Screen*** and ***7.10.2 Mode Setting***.

For parallel application, after each of the parallel UPSs is manually set in frequency conversion mode, each inverter will automatically select 50Hz or 60Hz as the fixed output frequency. After the output frequency is determined, each system will automatically disable the bypass function. Please note that, once each inverter shuts down, there is no bypass output. During frequency conversion mode, each UPS's tri-color LED illuminates green and each UPS's LCD shows the text **'Frequency Conversion'** in the upper right corner. Please see ***Figure 3-16*** for the path of electrical power through the parallel UPSs in frequency conversion mode.

NOTE:
During frequency conversion mode (parallel), once all of the UPSs' inverters shut down, there is no bypass output.

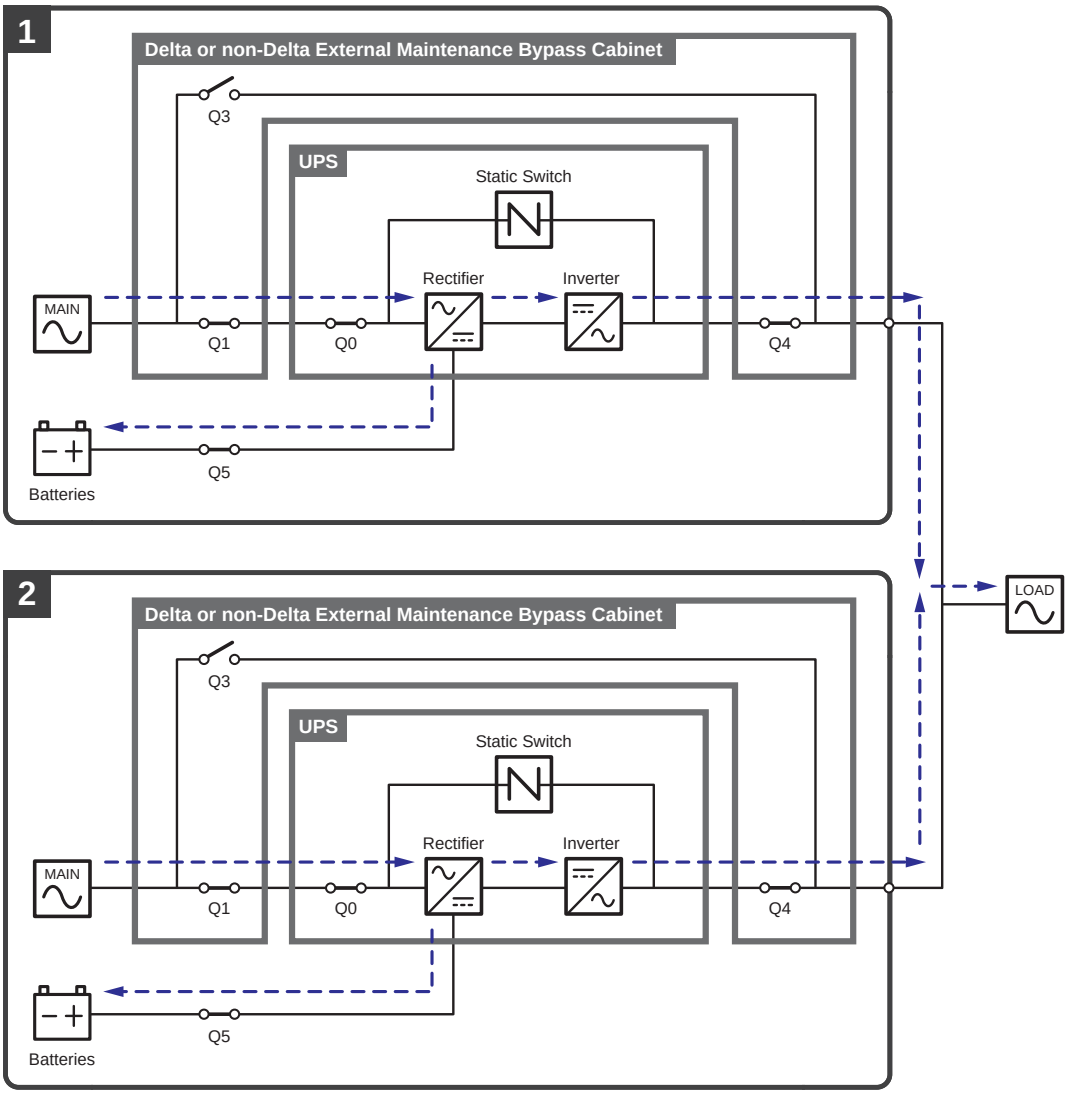


(Figure 3-16: Frequency Conversion Mode Diagram_ Single Input Parallel Units)

3.1.15 Green Mode_ Single Input_ Parallel Units

To activate green mode, please refer to ***6.2.7 Green Mode Start-up Procedures***, ***7.6 Main Screen*** and ***7.10.2 Mode Setting***.

For parallel application, green mode is the same as online mode, but the difference is that each system will automatically detect its UPS's output status (i.e. total load capacity %) to decide which specific power modules should be fully powered on or idle in order to achieve higher efficiency of the UPS. During green mode, each UPS's tri-color LED illuminates green and each UPS's LCD shows the text **'Green'** in the upper right corner. Please see ***Figure 3-17*** for the path of electrical power through the parallel UPSs in green mode.

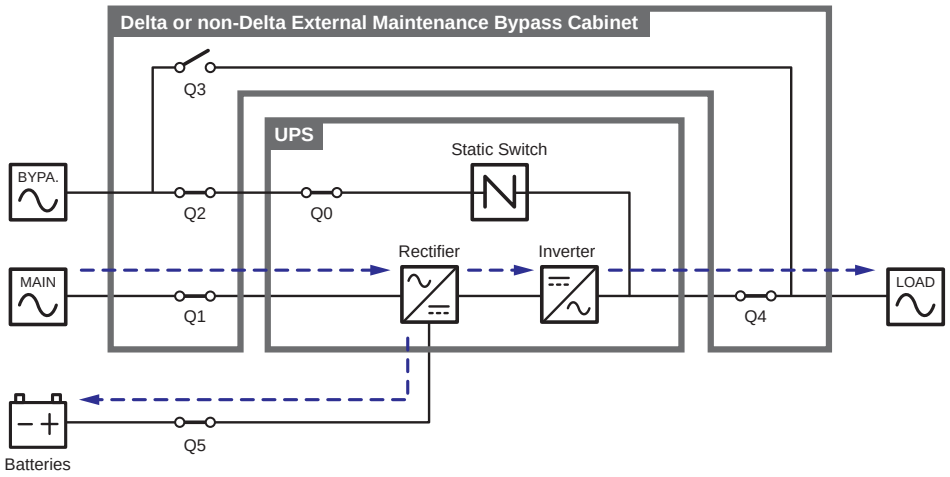


(Figure 3-17: Green Mode Diagram_ Single Input Parallel Units)

3.2 Dual Input

3.2.1 Online Mode_ Dual Input_ Single Unit

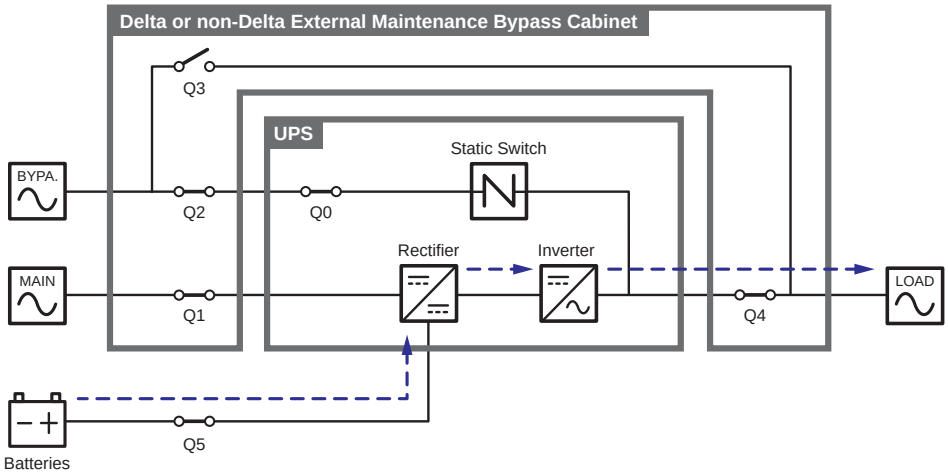
In online mode, the main AC source supplies AC power via the Delta or non-Delta external maintenance bypass cabinet's Input Breaker or Switch (Q1) to the rectifier and the rectifier converts the AC power to DC power and supplies the DC power to the inverter. In the meantime, the rectifier provides charging power to the batteries. After receiving the DC power, the inverter converts it into clean and stable AC power to the connected critical loads via the Delta or non-Delta external maintenance bypass cabinet's Output Breaker or Switch (Q4). Please see ***Figure 3-18*** for online mode diagram. During online mode, the UPS's tri-color LED illuminates green and the text **'On-Line'** appears in the upper right corner of the screen.



(Figure 3-18: Online Mode Diagram_ Dual Input Single Unit)

3.2.2 Battery Mode_ Dual Input_ Single Unit

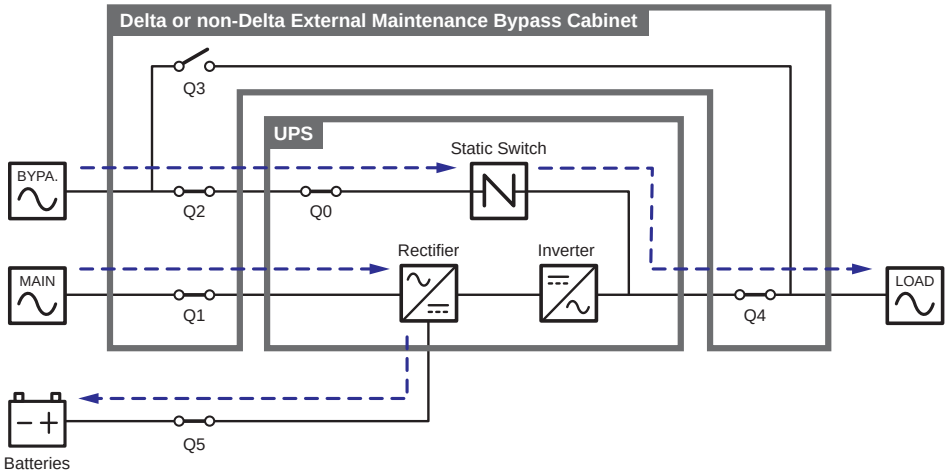
The UPS transfers to battery mode automatically if the main AC source cannot supply power, for example, when unstable voltage or a power outage occurs. In battery mode, the batteries provide DC power and the UPS converts it into AC power and supplies it to the connected critical loads via the Delta or non-Delta external maintenance bypass cabinet's Output Breaker or Switch (Q4). During the conversion process, output voltage remains the same. Please see ***Figure 3-19*** for battery mode diagram. During battery mode, the UPS's tri-color LED illuminates yellow and the text **'Battery'** appears in the upper right corner of the screen.



(Figure 3-19: Battery Mode Diagram_ Dual Input Single Unit)

3.2.3 Bypass Mode_ Dual Input_ Single Unit

When the inverter encounters abnormal situations such as over temperature, overload, short circuit, abnormal output voltage or low battery, it will automatically shut down. If the UPS detects the bypass AC source is normal, it will automatically switch to bypass mode to protect the connected critical loads from power interruption. Please refer to ***Figure 3-20***. After the above-mentioned abnormalities are eliminated, the UPS will switch back to online mode from bypass mode. During bypass mode, the UPS's tri-color LED illuminates yellow and the text **'Bypass'** appears in the upper right corner of the screen.



(Figure 3-20: Bypass Mode Diagram_ Dual Input Single Unit)

3.2.4 Manual Bypass Mode_ Dual Input_ Single Unit

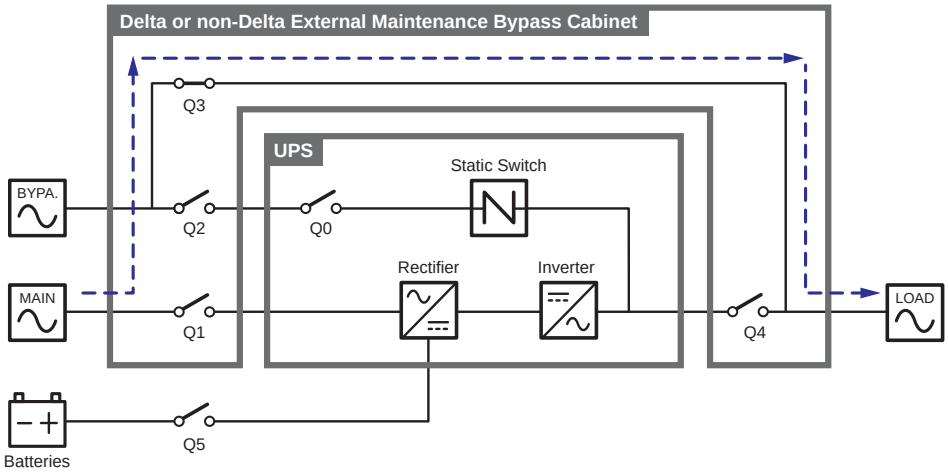
When the UPS needs maintenance, you can manually switch the UPS to manual bypass mode. To let the UPS run in manual bypass mode, please follow the procedures below:

1. Confirm that the bypass AC source and the STS module are normal.
2. Press the LCD's ON/ OFF button ( ) once and the **'POWER OFF?'** screen will pop up to ask you if you want to power off the inverter. Please select **'YES'**.
3. Turn on the Delta or non-Delta external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3).
4. Turn off the UPS's Bypass Switch (Q0).
5. Turn off the Delta or non-Delta external maintenance bypass cabinet's Input Breaker or Switch (Q1), Bypass Breaker or Switch (Q2) and Output Breaker or Switch (Q4).
6. Turn off each external battery cabinet's breaker (Q5).

In manual bypass mode, all power inside the UPS is completely cut off and maintenance personnel can perform maintenance safely. For manual bypass mode diagram, please see ***Figure 3-21***. During manual bypass mode, the UPS's tri-color LED and LCD are both off.

WARNING:

1. In manual bypass mode, make sure that all of the breakers or switches (except the Delta or non-Delta external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3)) are in the **OFF** position before working on the UPS's internal circuits. This avoids electric shock.
2. After the power inside the UPS is completely cut off, there is no high voltage in the UPS but in the Delta or non-Delta external maintenance bypass cabinet. Do not touch the Delta or non-Delta external maintenance bypass cabinet during UPS maintenance process to avoid electric shock.
3. During manual bypass mode, the UPS's input power is completely cut off and the connected critical loads are not protected.

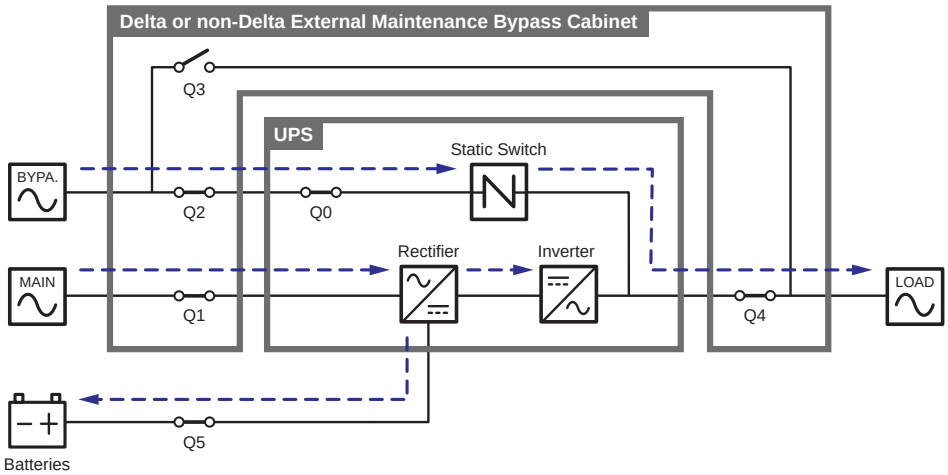


(Figure 3-21: Manual Bypass Mode Diagram_ Dual Input Single Unit)

3.2.5 ECO Mode_ Dual Input_ Single Unit

To activate ECO mode, please refer to ***6.2.5 ECO Mode Start-up Procedures***, ***7.6 Main Screen*** and ***7.10.2 Mode Setting***.

In ECO mode, when the bypass AC source's input voltage and frequency are within the range of rating voltage ±10% and rating frequency ±3Hz, the UPS works in bypass mode; otherwise, the UPS runs in online mode. For ECO mode diagram, please see ***Figure 3-22***. During ECO mode, the UPS's tri-color LED illuminates green and the text **'ECO'** appears in the upper right corner of the screen.



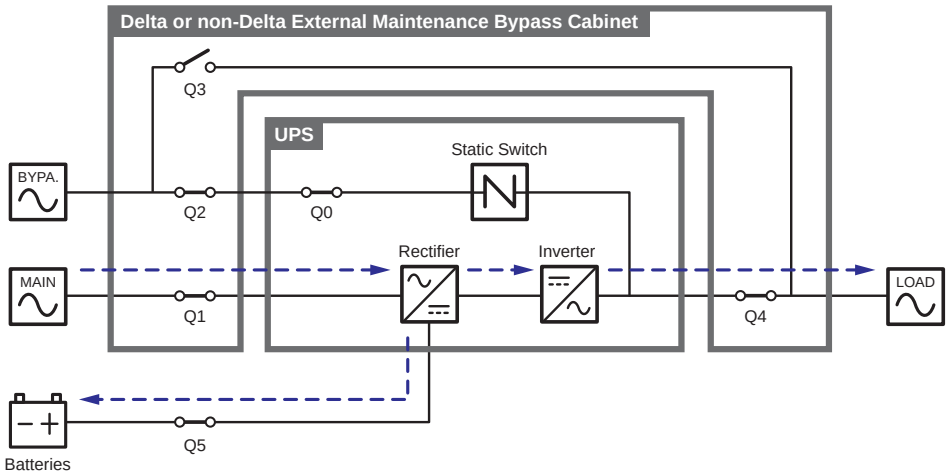
(Figure 3-22: ECO Mode Diagram_ Dual Input Single Unit)

3.2.6 Frequency Conversion Mode_ Dual Input_ Single Unit

To activate frequency conversion mode, please refer to ***6.2.6 Frequency Conversion Mode Start-up Procedures***, ***7.6 Main Screen*** and ***7.10.2 Mode Setting***.

After the UPS is manually set in frequency conversion mode, the inverter will automatically select 50Hz or 60Hz as the fixed output frequency. After the output frequency is determined, the system will automatically disable the bypass function. Please note that, once the inverter shuts down, there is no bypass output. For the diagram of frequency conversion mode, please see ***Figure 3-23***. During frequency conversion mode, the UPS's tri-color LED illuminates green and the text **'Frequency Conversion'** appears in the upper right corner of the screen.

NOTE:
During frequency conversion mode, once the inverter shuts down, there is no bypass output.

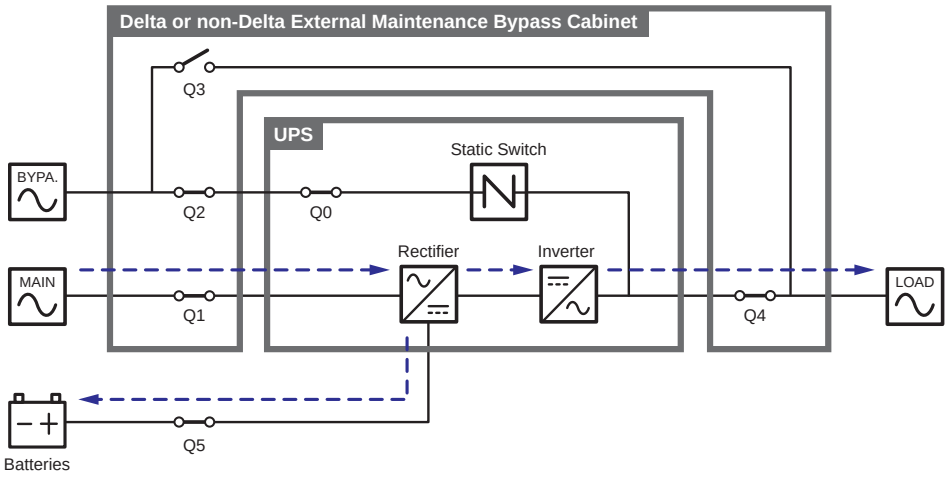


(Figure 3-23: Frequency Conversion Mode Diagram_ Dual Input Single Unit)

3.2.7 Green Mode _ Dual Input_ Single Unit

To activate green mode, please refer to ***6.2.7 Green Mode Start-up Procedures***, ***7.6 Main Screen*** and ***7.10.2 Mode Setting***.

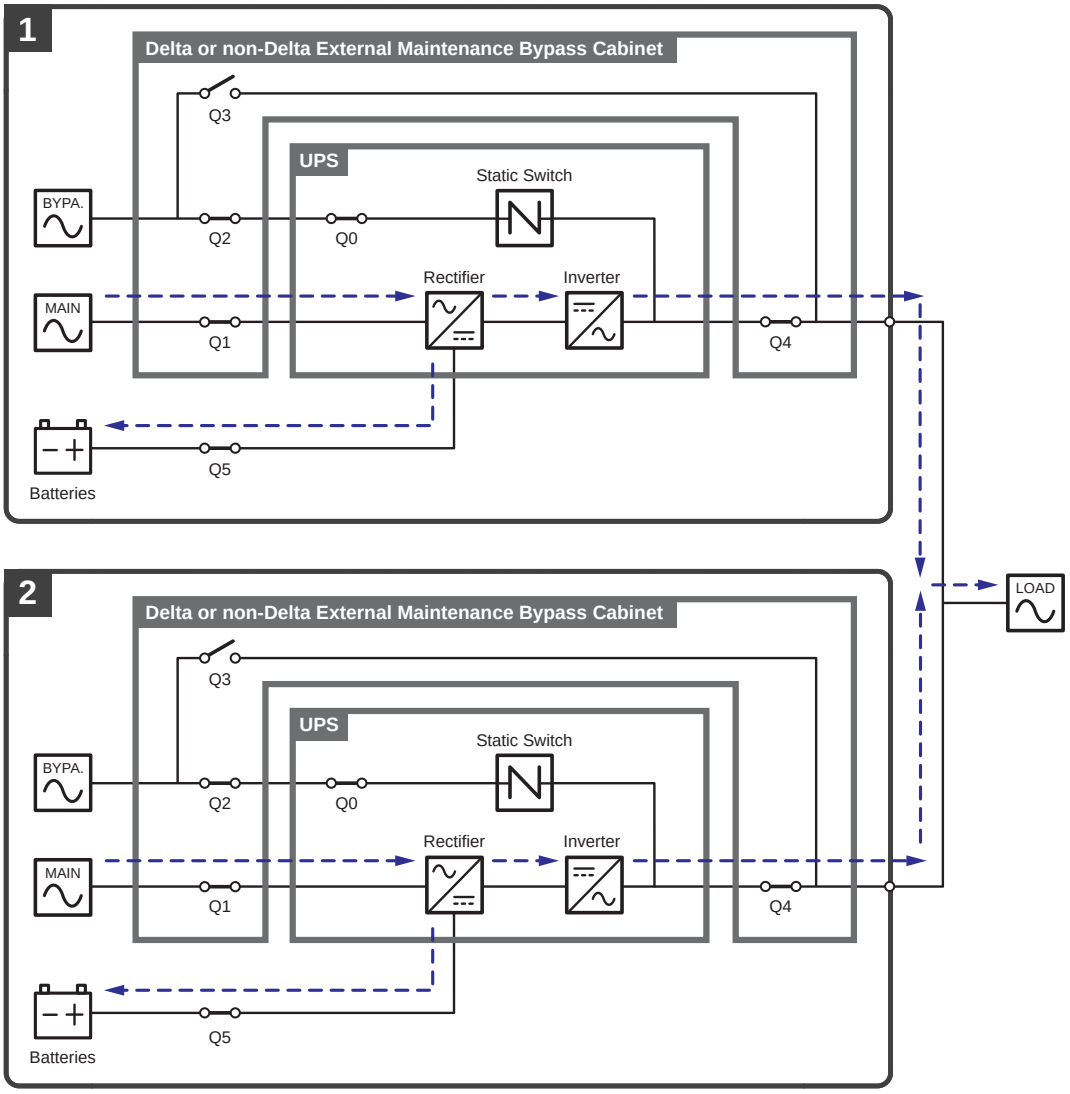
Green mode is the same as online mode, but the difference is that the system will automatically detect the output status (i.e. total load capacity %) to decide which specific power modules should be fully powered on or idle in order to achieve higher efficiency of the UPS. For the green mode diagram, please see ***Figure 3-24***. During green mode, the UPS's tri-color LED illuminates green and the text **'Green'** appears in the upper right corner of the screen.



(Figure 3-24: Green Mode Diagram_ Dual Input Single Unit)

3.2.8 Online Mode_ Dual Input_ Parallel Units

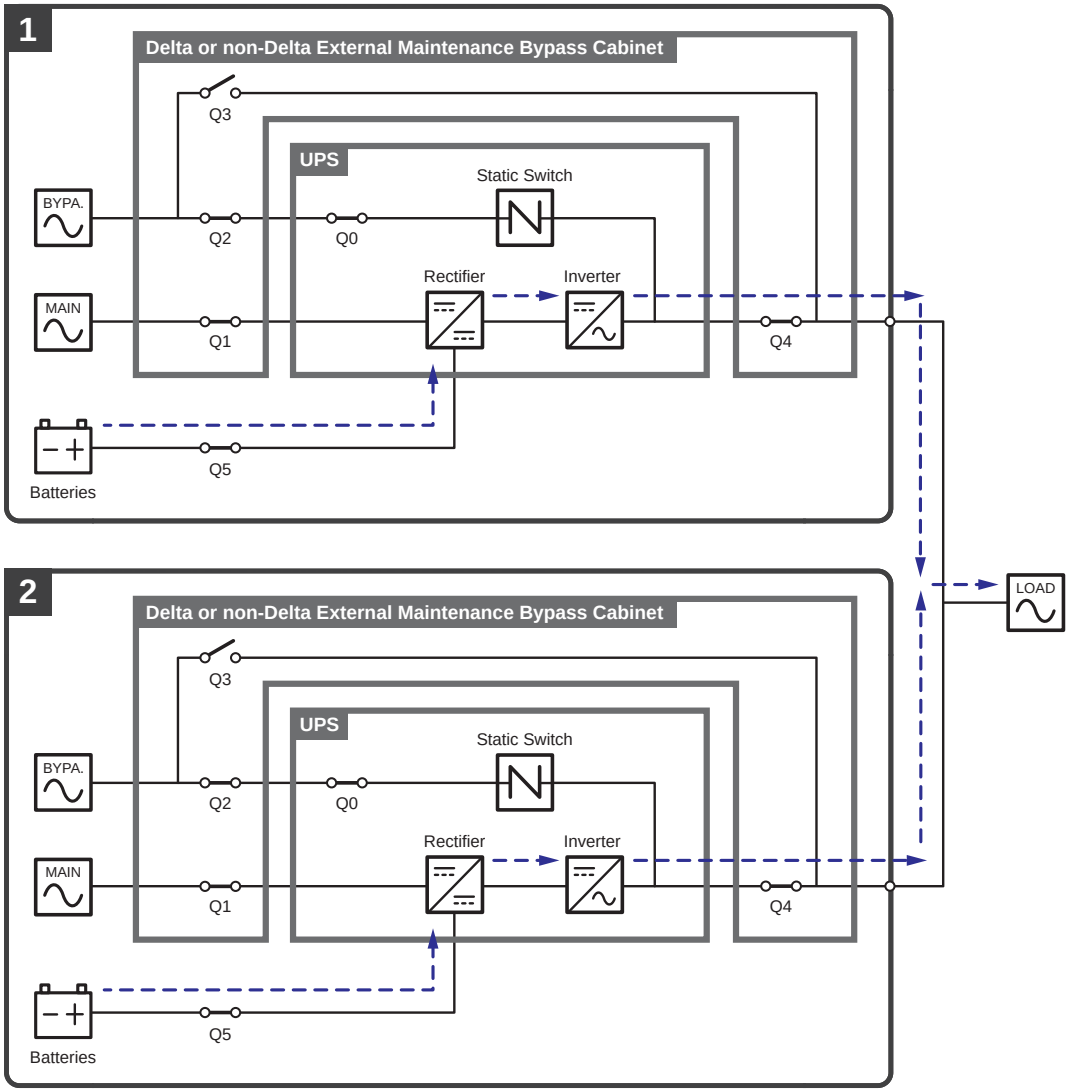
In online mode (parallel), the total loads will be equally shared by the parallel UPSs. If one of the parallel units fails and its load is less than the total capacity of the remaining parallel units, the failing UPS's output will be switched off and its load will be equally shared by the remaining parallel units. If the failing UPS's load is larger than the total capacity of the remaining parallel units, all UPSs' inverters will turn off and the total loads will be supplied by bypass power. During online mode, each UPS's tri-color LED illuminates green and each UPS's LCD shows the text **'On-Line'** in the upper right corner. Please refer to ***Figure 3-25*** for the path of electrical power through the parallel UPSs in online mode.



(Figure 3-25: Online Mode Diagram_ Dual Input Parallel Units)

3.2.9 Battery Mode _ Dual Input_ Parallel Units

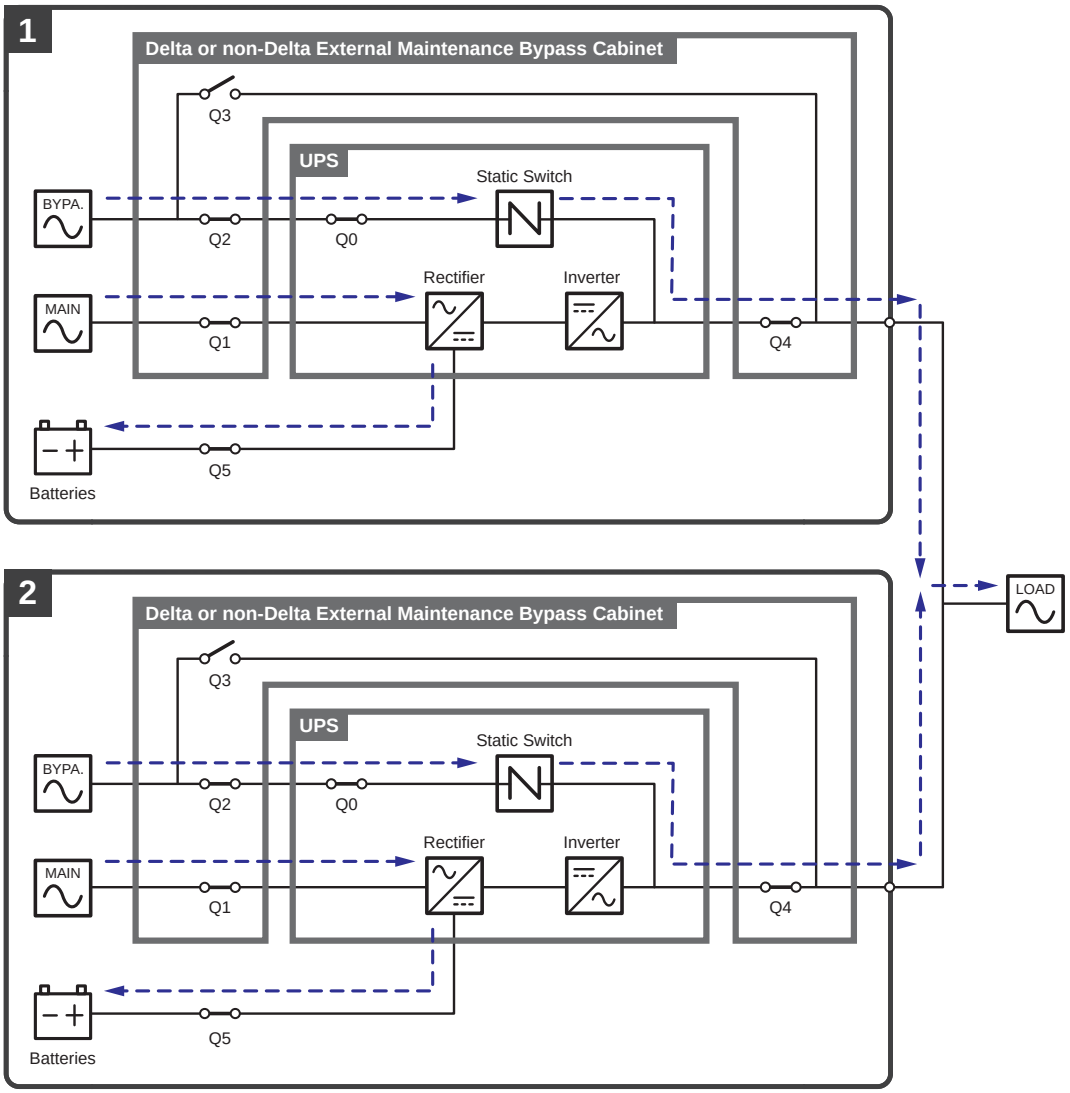
If the main AC source cannot supply power, for example, when unstable voltage or a power outage occurs, all parallel UPSs will automatically transfer from online mode to battery mode. During the conversion process, output voltage remains the same, and during battery mode, each UPS's tri-color LED illuminates yellow and each UPS's LCD shows the text **'Battery'** in the upper right corner. Please refer to ***Figure 3-26*** for the path of electrical power through the parallel UPSs in battery mode.



(Figure 3-26: Battery Mode Diagram_ Dual Input Parallel Units)

3.2.10 Bypass Mode_ Dual Input_ Parallel Units

In parallel mode, when all inverters encounter abnormal situations such as overload, short circuit, abnormal output voltage or low battery, they will automatically shut down. Meanwhile, if all UPSs detect the bypass AC source is normal, they will automatically switch to bypass mode to protect the connected critical loads from power interruption. The critical loads will be equally shared by all parallel units. After the abnormalities mentioned above are eliminated, the UPSs will switch back to online mode from bypass mode. During bypass mode, each UPS's tri-color LED illuminates yellow and each UPS's LCD shows the text **'Bypass'** in the upper right corner. Please see ***Figure 3-27*** for the path of electrical power through the parallel UPSs in bypass mode.



(Figure 3-27: Bypass Mode Diagram_ Dual Input Parallel Units)

3.2.11 Manual Bypass Mode_ Dual Input_ Parallel Units

In parallel mode, if one of the parallel UPSs needs maintenance, please first confirm that the bypass AC source and each parallel UPS's STS module are normal. After confirmation, please follow the procedures below to manually switch each of the parallel UPSs to manual bypass mode.

1. Press each LCD's ON/ OFF button ( ) once and the **'POWER OFF?'** screen will pop up to ask you if you want to power off the inverter. Please select **'YES'**.
2. Turn on each Delta or non-Delta external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3).
3. Turn off each UPS's Bypass Switch (Q0).
4. Turn off each Delta or non-Delta external maintenance bypass cabinet's Input Breaker or Switch (Q1), Bypass Breaker or Switch (Q2) and Output Breaker or Switch (Q4).
5. Turn off each external battery cabinet's breaker (Q5).

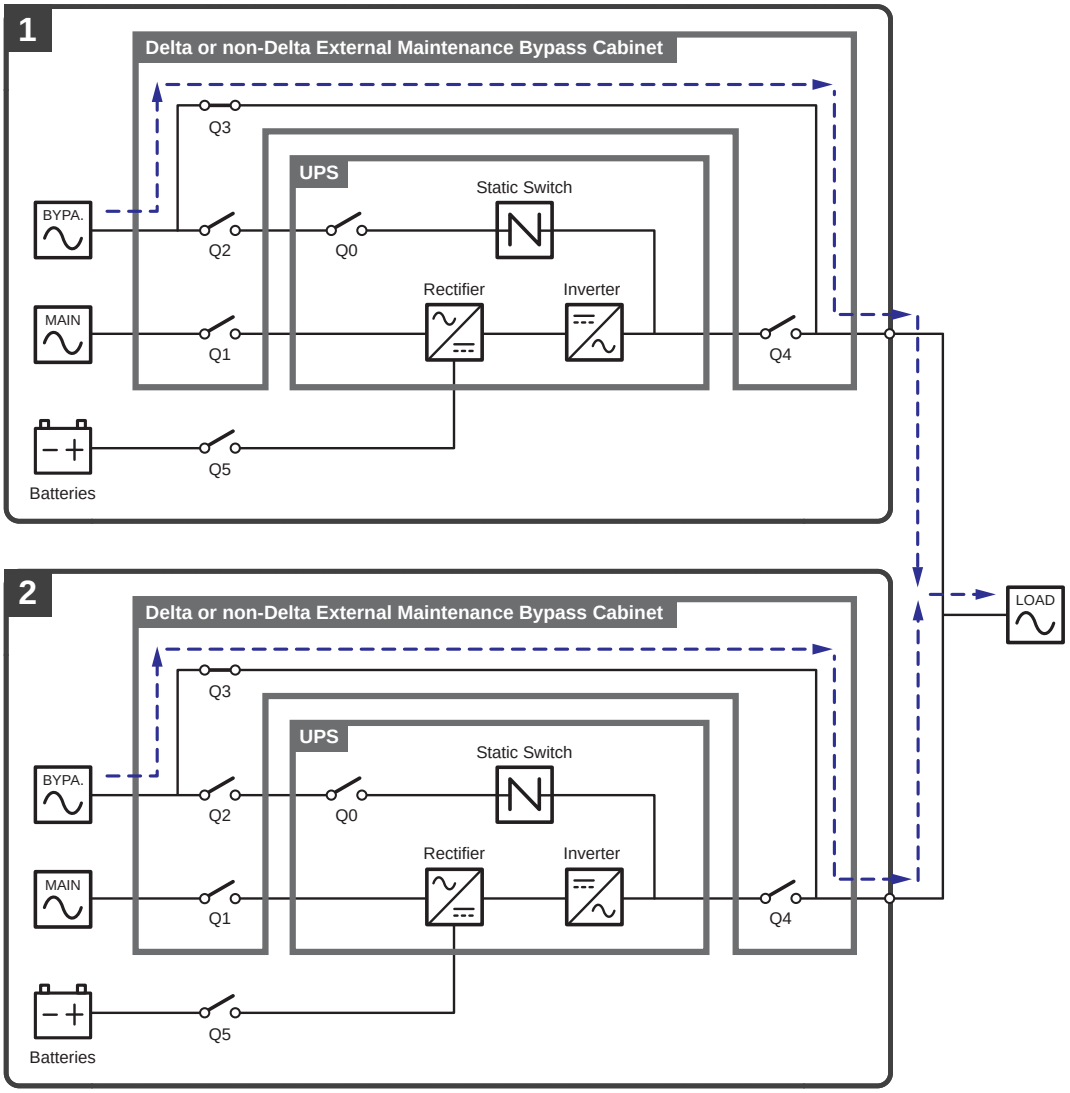
In manual bypass mode, all power inside the parallel UPSs is completely cut off and maintenance personnel can perform maintenance safely. The connected critical loads will be supplied by the manual bypass. During manual bypass mode, all parallel UPSs' tri-color LEDs and LCDs are off. Please see ***Figure 3-28*** for the path of electrical power through the parallel UPSs in manual bypass mode.

WARNING:

1. In manual bypass mode, make sure that all of the breakers or switches (except the Delta or non-Delta external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3)) are in the **OFF** position before working on any of the parallel UPSs' internal circuits. This avoids electric shock.
2. After the power inside all parallel UPSs is completely cut off, there is no high voltage in the parallel UPSs but in every Delta or non-Delta external maintenance bypass cabinet. Do not touch any Delta or non-Delta external maintenance bypass cabinet during UPS maintenance process to avoid electric shock.
3. During manual bypass mode, each parallel UPS's input power is completely cut off and the connected critical loads are not protected.

NOTE:

For parallel UPSs, if you want to turn off one of the parallel UPSs for maintenance, please make sure the total connected critical loads will not exceed the remaining parallel units' total capacity.

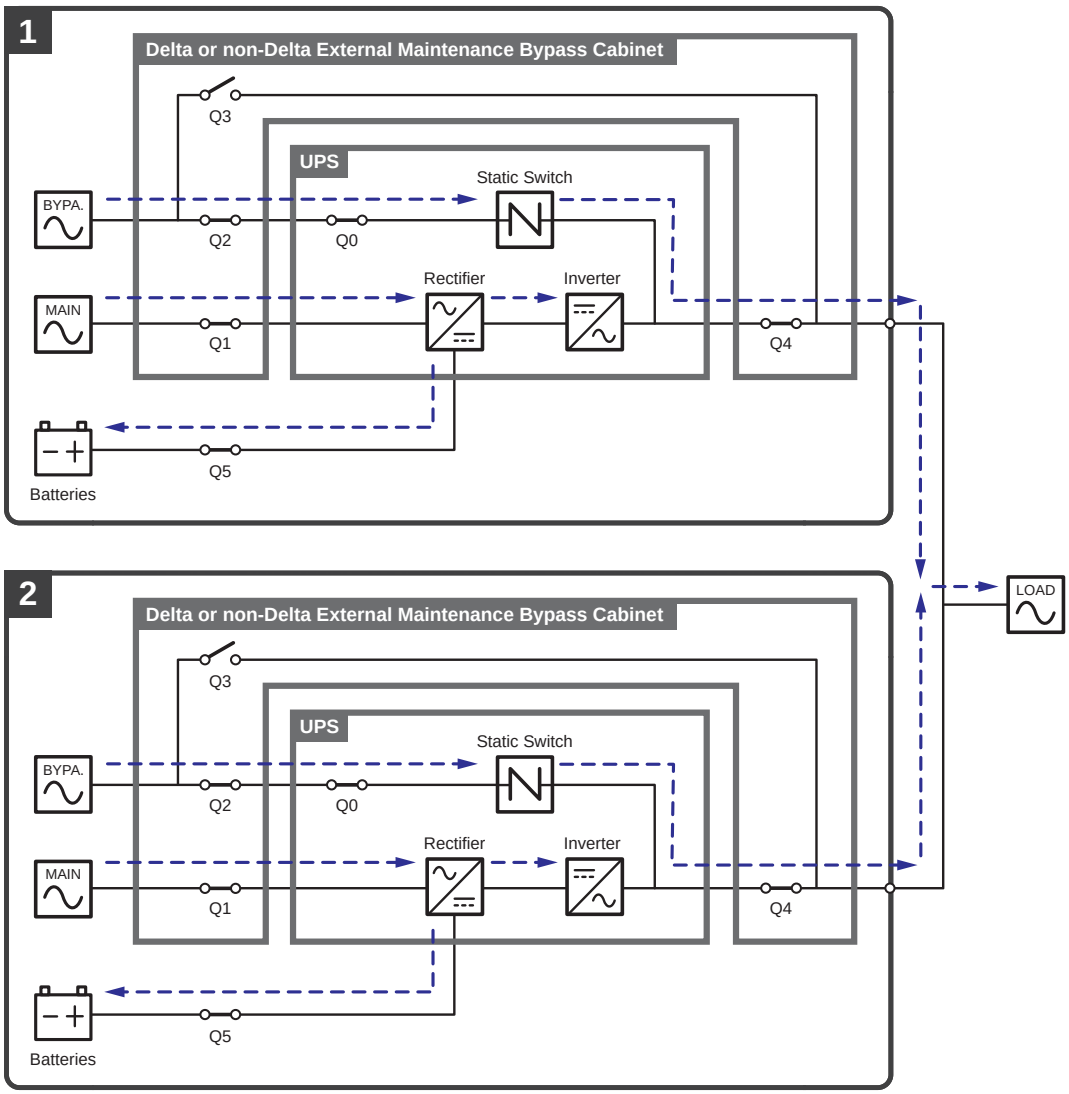


(Figure 3-28: Manual Bypass Mode Diagram_ Dual Input Parallel Units)

3.2.12 ECO Mode_ Dual Input_ Parallel Units

To activate ECO mode, please refer to ***6.2.5 ECO Mode Start-up Procedures***, ***7.6 Main Screen*** and ***7.10.2 Mode Setting***.

In ECO mode (parallel), when each UPS's bypass input voltage and frequency are within the range of rating voltage ±10% and rating frequency ±3Hz, each UPS works in bypass mode; otherwise, each UPS runs in online mode. During ECO mode, each UPS's tri-color LED illuminates green and each UPS's LCD shows the text **'ECO'** in the upper right corner. Please see ***Figure 3-29*** for the path of electrical power through the parallel UPSs in ECO mode.



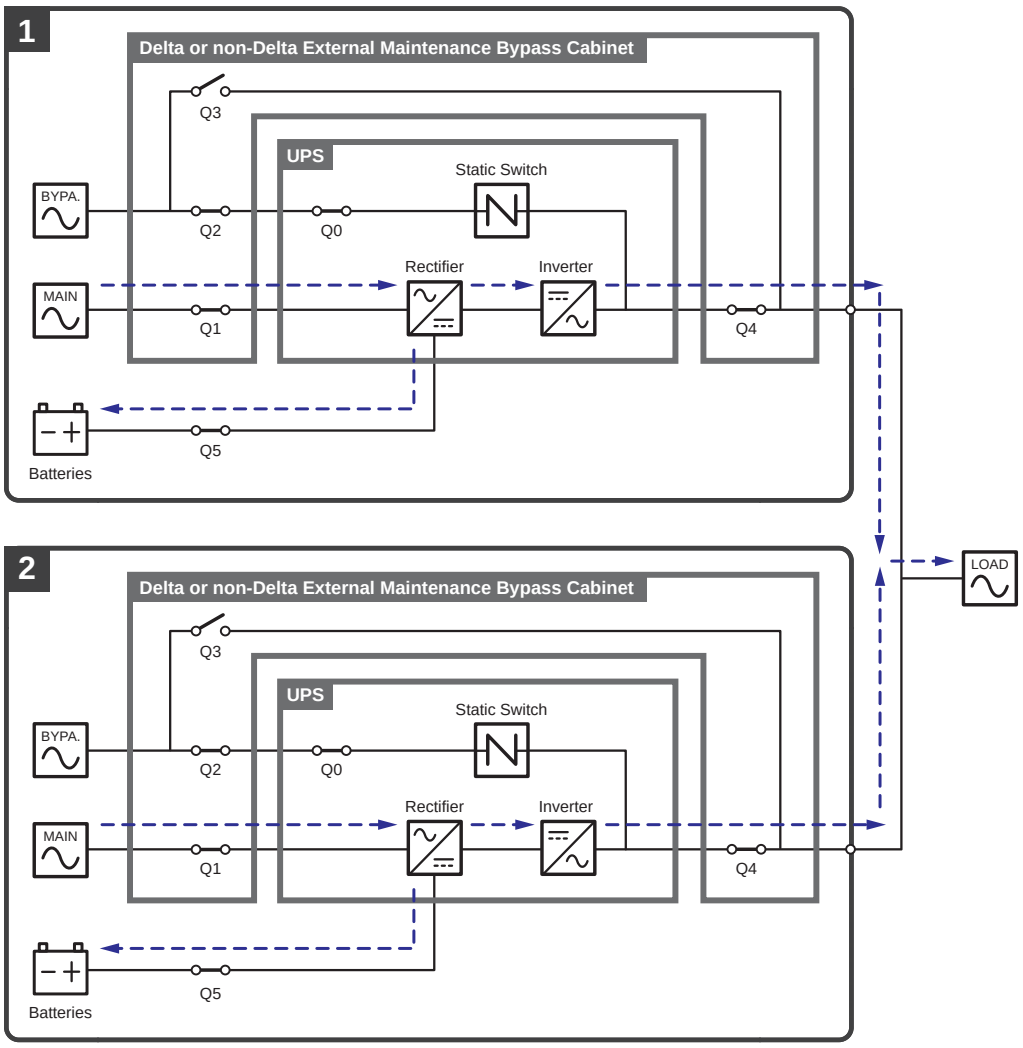
(Figure 3-29: ECO Mode Diagram_ Dual Input Parallel Units)

3.2.13 Frequency Conversion Mode_ Single Input_ Parallel Units

To activate frequency conversion mode, please refer to ***6.2.6 Frequency Conversion Mode Start-up Procedures***, ***7.6 Main Screen*** and ***7.10.2 Mode Setting***.

For parallel application, after each of the parallel UPSs is manually set in frequency conversion mode, each inverter will automatically select 50Hz or 60Hz as the fixed output frequency. After the output frequency is determined, each system will automatically disable the bypass function. Please note that, once each inverter shuts down, there is no bypass output. During frequency conversion mode, each UPS's tri-color LED illuminates green and each UPS's LCD shows the text **'Frequency Conversion'** in the upper right corner. Please see ***Figure 3-30*** for the path of electrical power through the parallel UPSs in frequency conversion mode.

NOTE:
During frequency conversion mode (parallel), once all of the UPSs' inverters shut down, there is no bypass output.

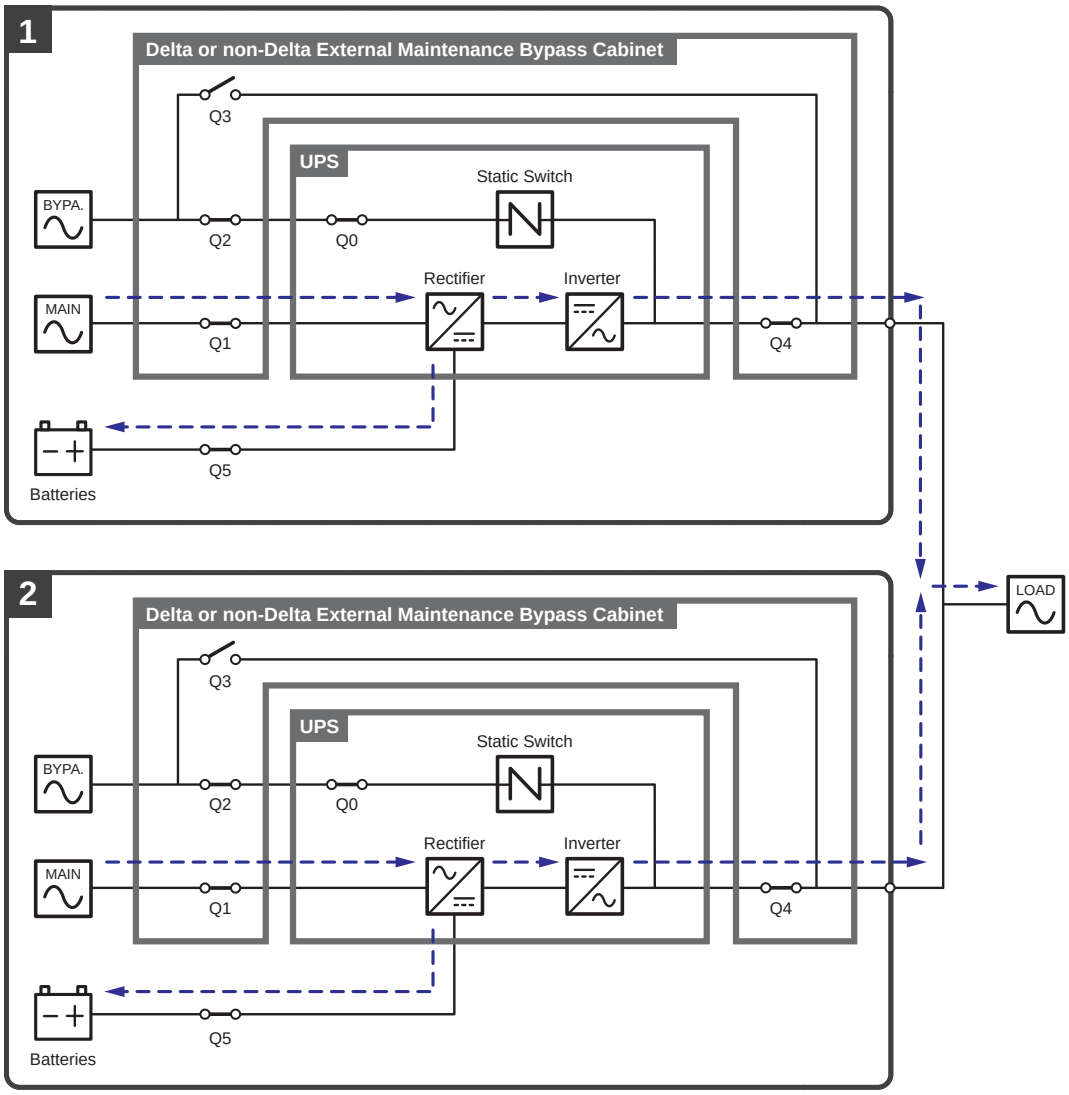


(Figure 3-30: Frequency Conversion Mode Diagram_ Dual Input Parallel Units)

3.2.14 Green Mode_ Dual Input_ Parallel Units

To activate green mode, please refer to ***6.2.7 Green Mode Start-up Procedures***, ***7.6 Main Screen*** and ***7.10.2 Mode Setting***.

For parallel application, green mode is the same as online mode, but the difference is that each system will automatically detect its UPS's output status (i.e. total load capacity %) to decide which specific power modules should be fully powered on or idle in order to achieve higher efficiency of the UPS. During green mode, each UPS's tri-color LED illuminates green and each UPS's LCD shows the text **'Green'** in the upper right corner. Please see ***Figure 3-31*** for the path of electrical power through the parallel UPSs in green mode.



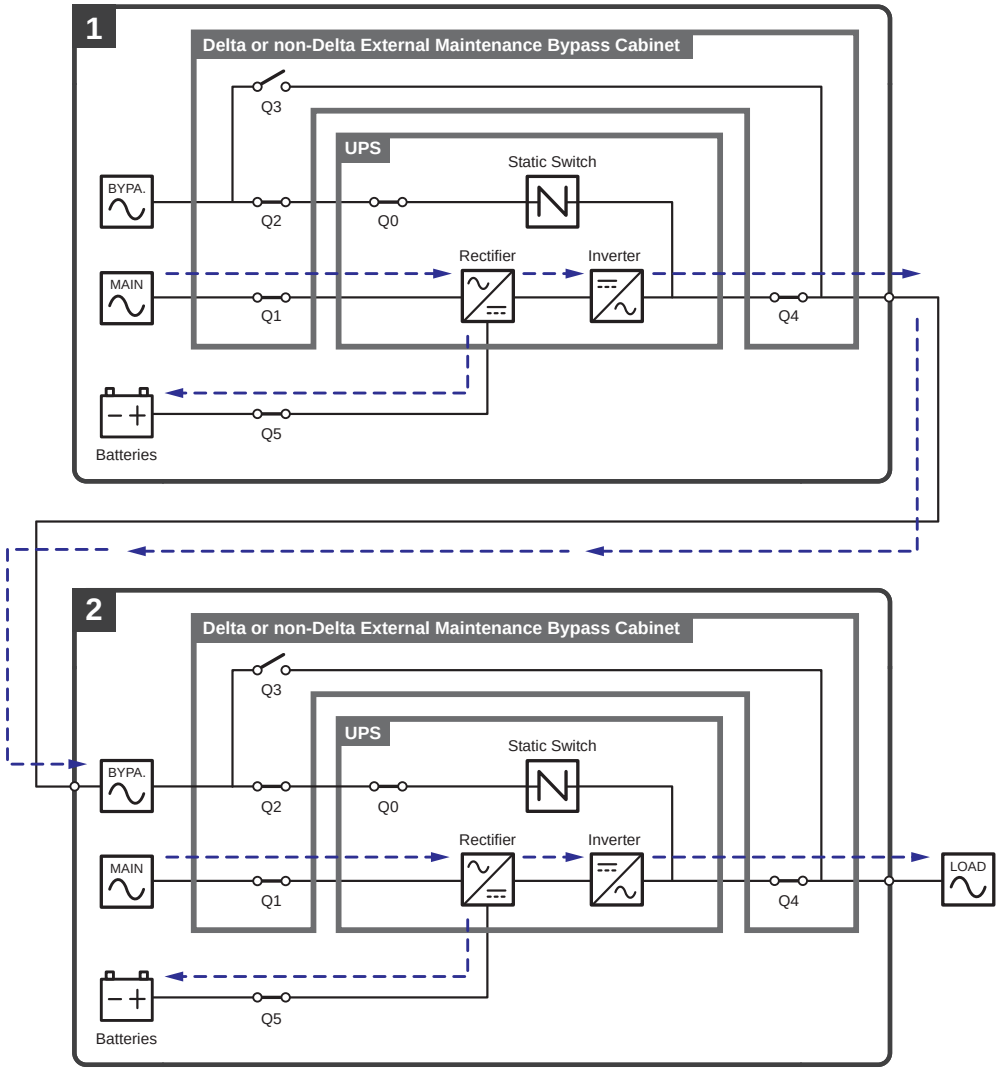
(Figure 3-31: Green Mode Diagram_ Dual Input Parallel Units)

3.3 Hot Standby Redundancy (Only For Dual Input & At Least Two UPSs)

To provide customers more application choices, the UPS with a dual-input configuration can have a hot standby redundancy function. If you use two UPSs and wish them to work in hot standby redundancy mode, please connect the output of UPS1 to the bypass AC source of UPS 2. Please see ***Figure 3-23***. For more information about the hot standby redundancy application, please contact service personnel.

In normal condition, it is the UPS 2 inverter that supplies power to the critical loads. Both UPS 1 & UPS 2 tri-color LEDs illuminate green.

When the UPS 2 inverter becomes abnormal, the UPS 2 will automatically transfer to bypass mode and the UPS 1 inverter will supply power to the critical loads. Under such circumstances, the UPS 1 tri-color LED illuminates green and the UPS 2 tri-color LED illuminates yellow.



(Figure 3-32: Hot Standby Redundancy Diagram (only for Dual Input & at Least Two UPSs))

3.4 Common Battery (Only for Parallel UPSs connecting to the Same External Battery Cabinet(s))

To save on your costs and installation space, the parallel UPSs can share their connected external battery cabinet(s). For common battery application, please install an isolated switch between each parallel UPS and its connected external battery cabinet(s). Please see ***Figure 3-33*** for two parallel UPSs sharing one external battery cabinet as an example.

If the parallel UPSs share the external battery cabinet(s), you should use the LCD to set up relevant parameters such as **'Battery Type'**, **'Capacity'**, **'Battery Strings'**, **'Float Charge Voltage'**, **'Equalized Charge Voltage'**, **'Charge Current (Max)'**, etc. For more information, please refer to ***7.10.4 Battery & Charging Setting***.

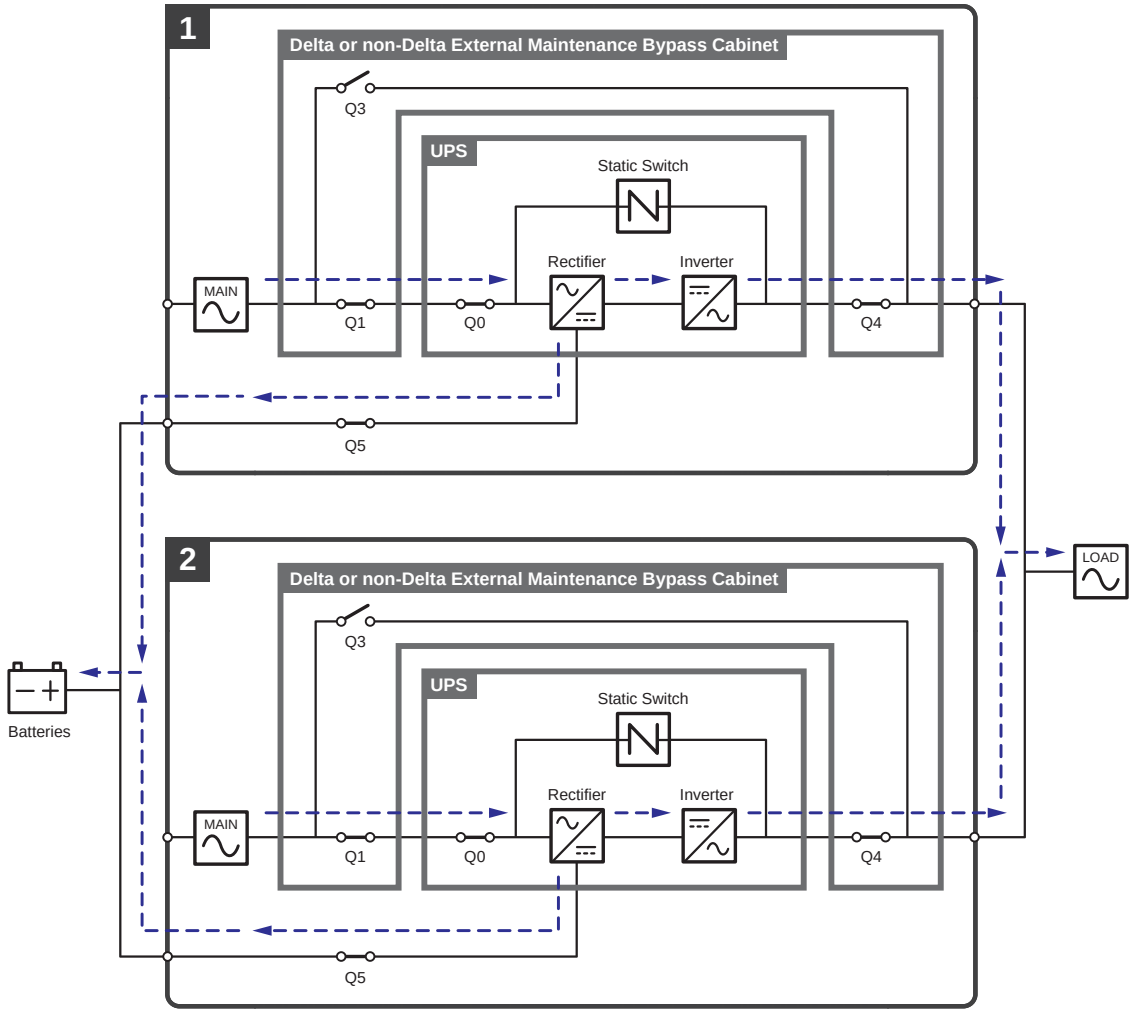
NOTE:

For common battery application, please use the LCD to set each UPS's float charge voltage (default: 272V) the same, each UPS's equalized charge voltage (default: 280V) the same, and each UPS's charge current even.

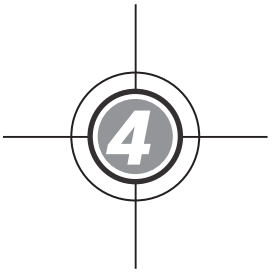
For example:

A. When (1) two UPSs are paralleled, (2) they share one external battery cabinet, (3) the battery type is 200AH, (4) there are a total of 4 battery strings, and (5) the charge current is 80A, please use the LCD to set each UPS's **'Battery Type'** the same, **'Capacity'** as 200AH, **'Battery Strings'** as 2, and **'Charge Current (Max)'** as 40A.

B. When (1) three UPSs are paralleled, (2) they share one external battery cabinet, (3) the battery type is 300AH, (4) there are a total of 3 battery strings, and (5) the charge current is 90A, please use the LCD to set each UPS's **'Battery Type'** the same, **'Capacity'** as 300AH, **'Battery Strings'** as 1, and **'Charge Current (Max)'** as 30A.



(Figure 3-33: Common Battery Diagram_ only for Parallel UPSs Connecting to the Same External Battery Cabinet(s))

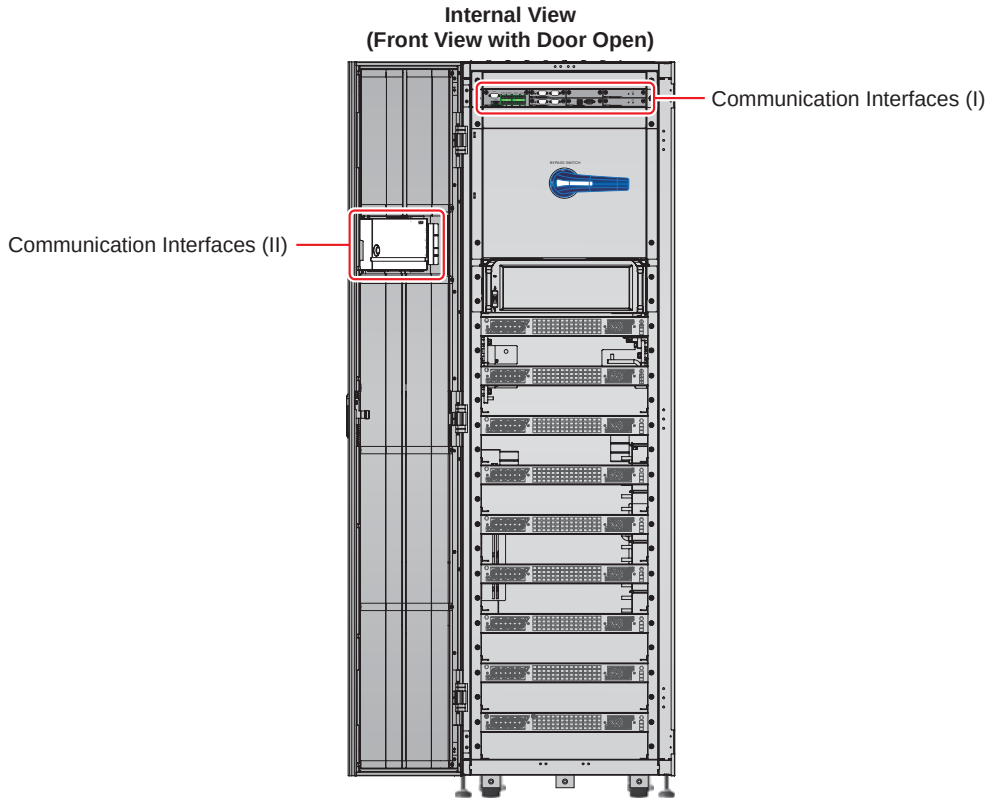


Communication Interfaces

4.1 Communication Interfaces (I): on the Front of the UPS with Front Door Open

4.2 Communication Interfaces (II): at the Rear of the Touch Panel

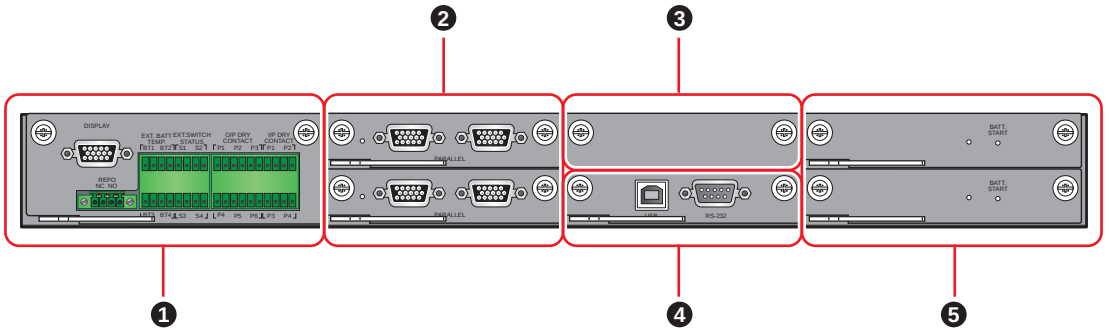
The communication interfaces are hot swappable and located at two different places. One is on the front of the UPS with front door open and the other is at the rear of the touch panel. Please see ***Figure 4-1***.



(Figure 4-1: Location of the Communication Interfaces)

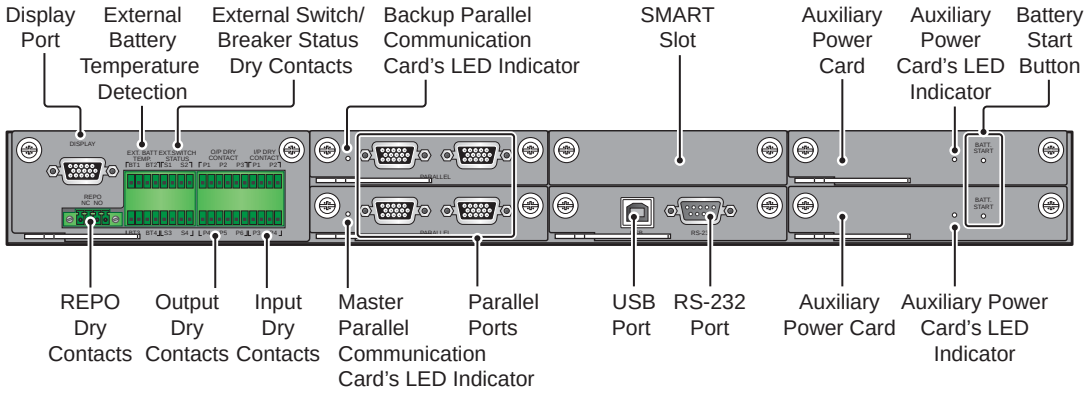
4.1 Communication Interface (I): on the Front of the UPS with Front Door Open

The following communication interfaces are located on the front of the UPS with front door open. Please see the description below.



(Figure 4-2: Communication Interfaces (I)_ on the Front of the UPS with Front Door Open)

No.	Item	Q'ty	Description
❶	Dry Contact Card	1 PC	Includes a display port, REPO dry contacts, external battery temperature detection, external switch/ breaker status dry contacts, output dry contacts and input dry contacts.
❷	Parallel Communication Card	2 PCS	Each card includes two parallel ports and one LED indicator.
❸	SMART Slot	1 PC	You can install the optional Relay I/O card for dry contact expansion.
❹	System Control Card	1 PC	Includes a USB port and an RS-232 port.
❺	Auxiliary Power Card	2 PCS	Each card includes a LED indicator and a battery start button.



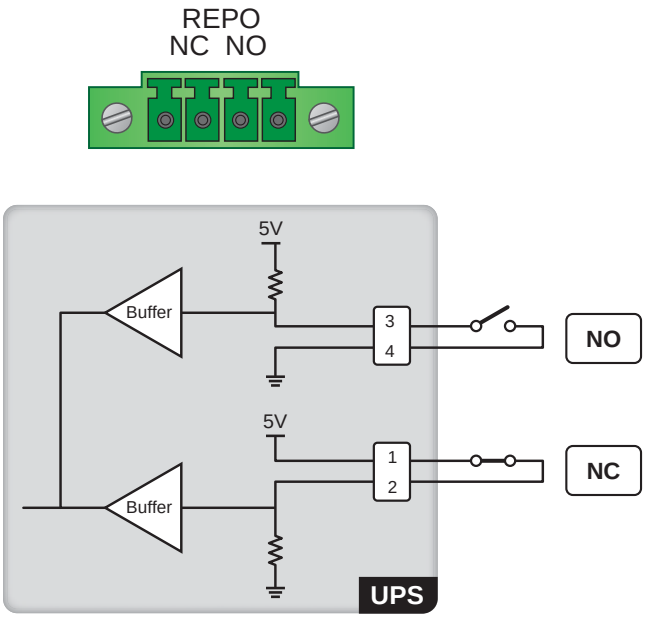
(Figure 4-3: Functions of the Communication Interfaces)

4.1.1 Display Port

Before shipment, the display port has been connected to the 10" touch panel with the designated cable in Delta factory.

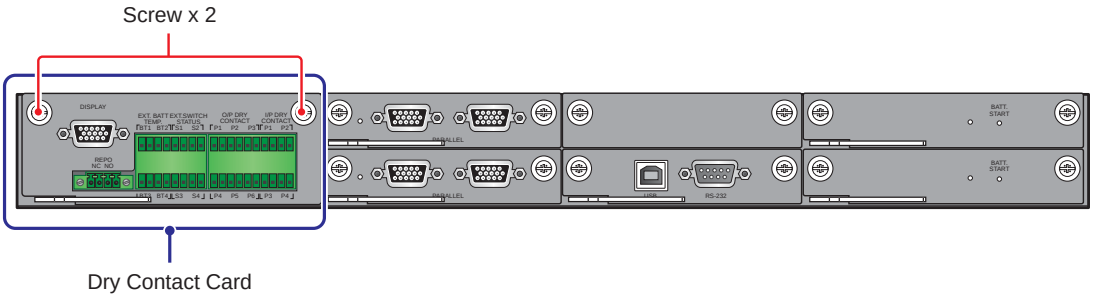
4.1.2 REPO Dry Contacts

The REPO dry contacts provide you with quick and convenient interfaces to shut down the UPS safely when an emergency occurs. Connect the REPO dry contacts to a user-supplied switch and you can remotely shut down the UPS. The REPO dry contacts provide normally open (NO) and normally closed (NC) these two options for use.

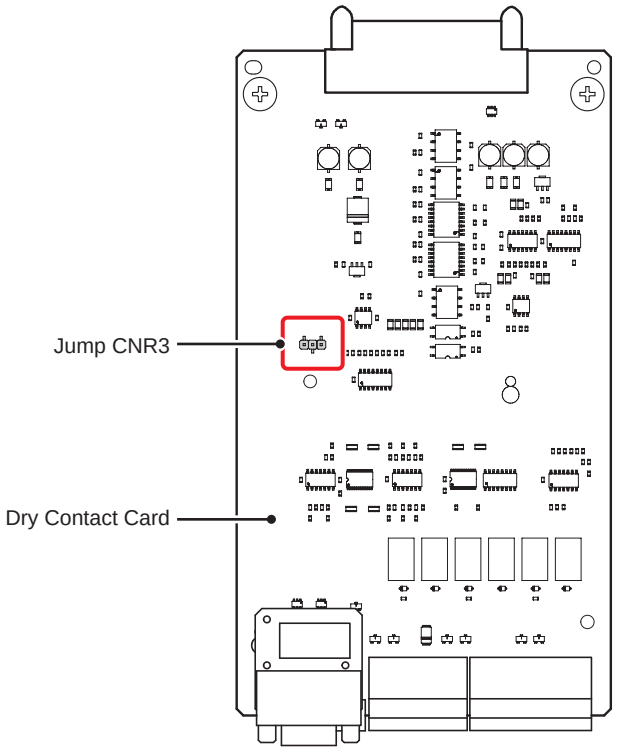


(Figure 4-4: REPO Dry Contacts & Schematic)

NOTE:
If you want to enable the normally closed (NC) function, please take out the dry contact card (see ***Figure 4-5***) and remove its Jump CNR3 (see ***Figure 4-6***) before you turn on the UPS.



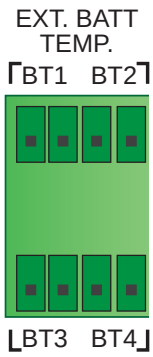
(Figure 4-5: Location of the Dry Contact Card)



(Figure 4-6: Location of the Jump CNR3)

4.1.3 External Battery Temperature Detection

You can use the external battery temperature detection (BT1, BT2, BT3 and BT4) to detect a maximum of four external battery cabinets' temperature. You need to purchase the battery cabinet temperature sensor cable (optional).

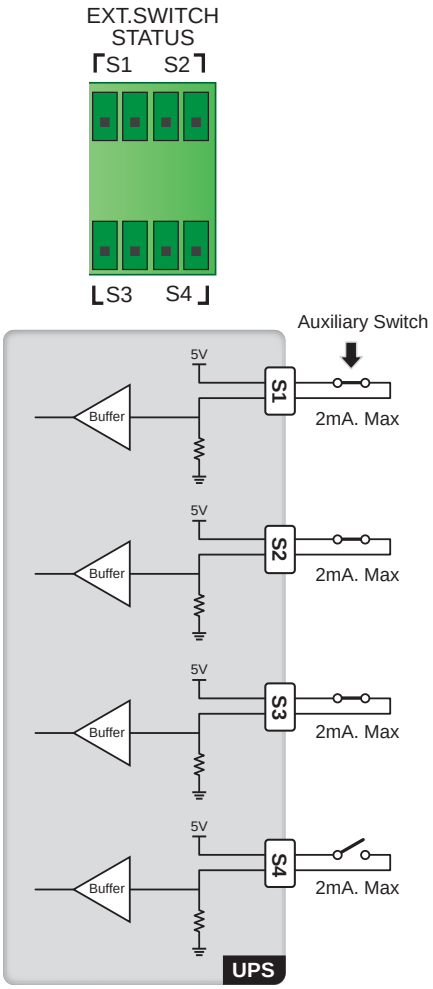


(Figure 4-7: External Battery Temperature Detection & Schematic)

4.1.4 External Switch/ Breaker Status Dry Contacts

There are four sets of external switch/ breaker status dry contacts (S1, S2, S3 and S4), which can be used to detect the status of input, bypass, manual bypass and output switches or breakers. Please follow the table below to connect the dry contacts to normally open (NO) or normally closed (NC) devices.

Type	Connection
Dry Contact_ S1	Normally closed (NC) device
Dry Contact_ S2	Normally closed (NC) device
Dry Contact_ S3	Normally closed (NC) device
Dry Contact_ S4	Normally open (NO) device



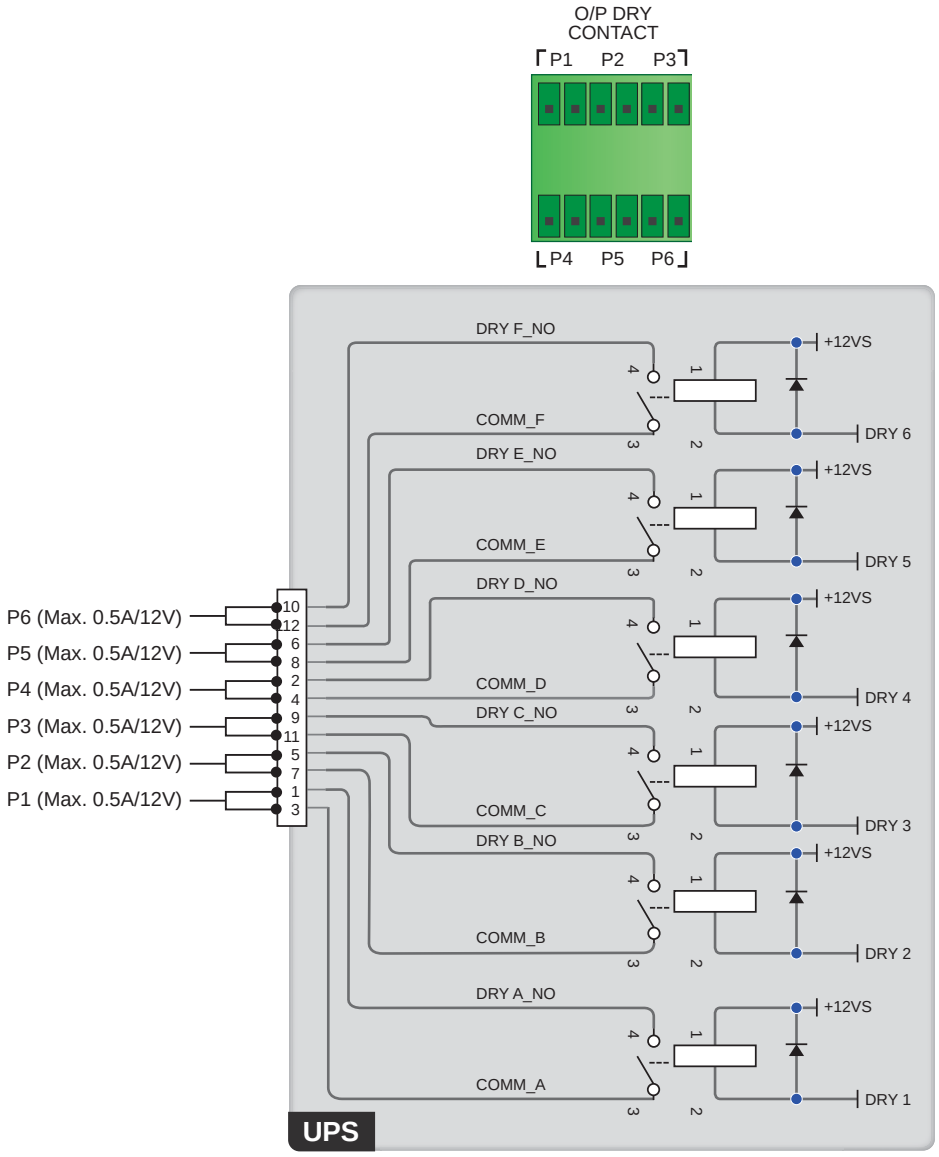
(Figure 4-8: External Switch/ Breaker Status Dry Contacts & Schematic)

No.	Event	Description
1	External input switch or breaker detection.	Detect the external input switch or breaker's status (default: S1).
2	External bypass switch or breaker detection.	Detect the external bypass switch or breaker's status (default: S2).
3	External output switch or breaker detection.	Detect the external output switch or breaker's status (default: S3).
4	External manual bypass switch or breaker detection.	Detect the external manual bypass switch or breaker's status (default: S4).

4.1.5 Output Dry Contacts

There are six sets of programmable output dry contacts (see ***Figure 4-9***). Please use the touch panel to set each dry contact as normally open (NO) or normally closed (NC). Each dry contact can be assigned with a specific event. Six out of twenty-one events can be assigned according to your applications. To learn how to set up, please contact your local dealer and refer to ***7.10.6 Dry Contact Setting***. For the twenty-one events, please refer to the table below.

NOTE:
Since the output dry contacts belong to the secondary circuit, the voltage of each dry contact's connected device should not exceed 60Vdc/ Vac to avoid electric shock and insufficient insulation.

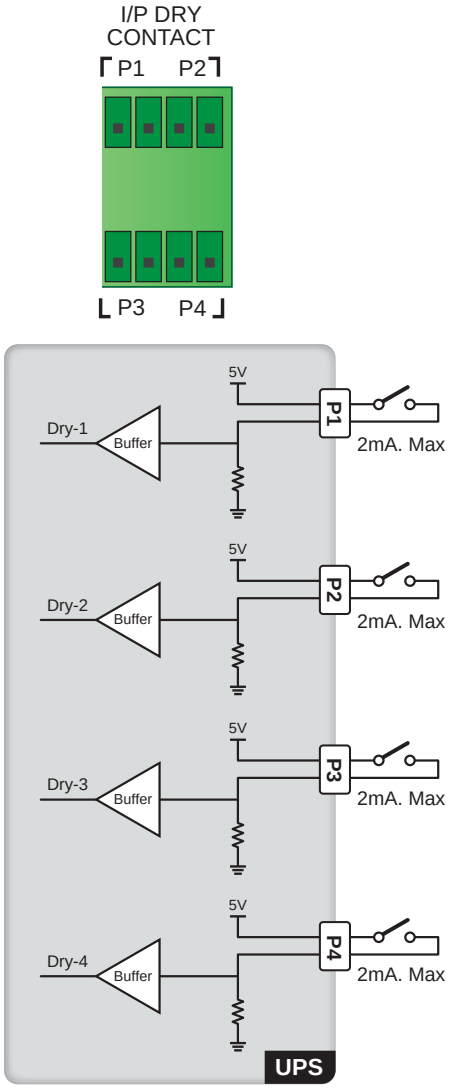


(Figure 4-9: Output Dry Contacts & Schematic)

No.	Event	Description
1	None	No set-up.
2	Load On Inverter	The UPS works in online mode.
3	Load On Bypass	The UPS works in bypass mode.
4	Load On Battery	When the main AC source fails, the batteries supply power to the critical loads.
5	Battery Low	When the UPS runs in battery mode, battery voltage is lower than the setup limit (default: 220Vdc).
6	Bypass Input Abnormal	The bypass voltage, frequency or phase sequence is abnormal.
7	Battery Test Fail	During the battery test, the battery voltage is out of the setup limit.
8	Internal Comm. Fail	The #n power module's internal communication is abnormal.
9	External Parallel Comm. Fail	In parallel mode, parallel communication is abnormal.
10	Output Overload	The UPS is overloaded or the UPS shuts down to let the bypass supply power to the critical loads.
11	EPO Activated	The EPO button is pressed to urgently power off the UPS.
12	Load On Manual Bypass	The Manual Bypass Breaker or Switch (Q3) is turned on and the UPS transfers to manual bypass mode.
13	Battery Over Temperature	The external battery cabinet's temperature is too high.
14	Output Voltage Abnormal	The output voltage is too high or too low.
15	Battery Need Replacement	The battery replacement date is due.
16	Bypass Over Temperature	The bypass static switch temperature is too high.
17	Bypass Static Switch Fault	The bypass static switch has an open/ short issue.
18	UPS Over Temperature	The UPS temperature is too high.
19	Battery Breaker Shunt Trip	When the EPO button is pressed, the UPS will send a signal to the connected external shunt trip device to cut off the battery power.
20	Backfeed Protection	When the UPS's bypass SCR has an open/ short issue, the UPS will send a signal to the connected external shunt trip device to cut off the backfeed voltage.
21	General Alarm	When any UPS alarm occurs, the UPS will send an I/O signal.

4.1.6 Input Dry Contacts

There are four sets of programmable input dry contacts (see ***Figure 4-10***). Please use the touch panel to set each dry contact as normally open (NO) or normally closed (NC). The input dry contacts allow the UPS to receive external signals from peripheral devices and let the UPS response accordingly. Each input dry contact can be assigned with a specific event. There are four events can be assigned according to your applications. To learn how to set up, please contact your local dealer and refer to ***7.10.6 Dry Contact Setting***. For information about the four events, please refer to the table below.



(Figure 4-10: Input Dry Contacts & Schematic)

No.	Event	Description
1	None	No set-up.
2	Generator Status	Generator status detection.
3	Battery Ground Fail	Battery leakage detection.
4	External Battery Breaker Detection	Status detection of the external battery cabinet's breaker or switch.

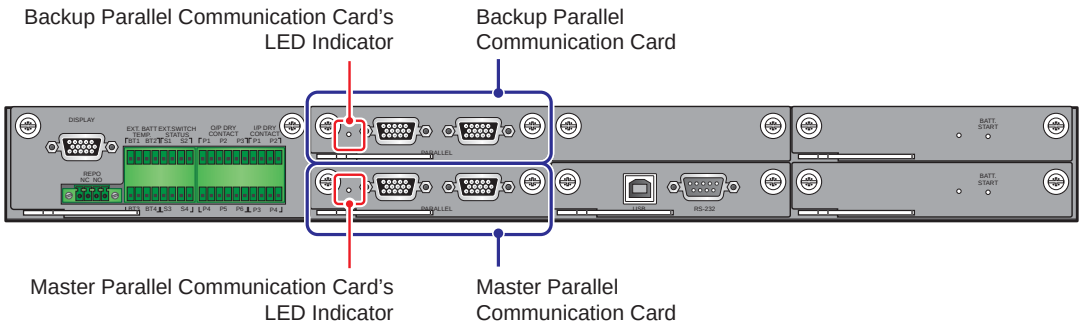
4.1.7 Parallel Communication Cards

The UPS has two parallel communication cards, which are master parallel communication card and backup parallel communication card. Each card has one LED indicator. Please see ***Figure 4-11*** for their location.

If both cards work normally, the master parallel communication card's LED indicator will illuminate green and the backup parallel communication card's LED indicator will illuminate yellow.

If one card works normally and the other works abnormally, the normal card's LED indicator will illuminate green and the abnormal card's LED indicator will illuminate red.

During initialization process, both cards' LED indicators flash yellow.

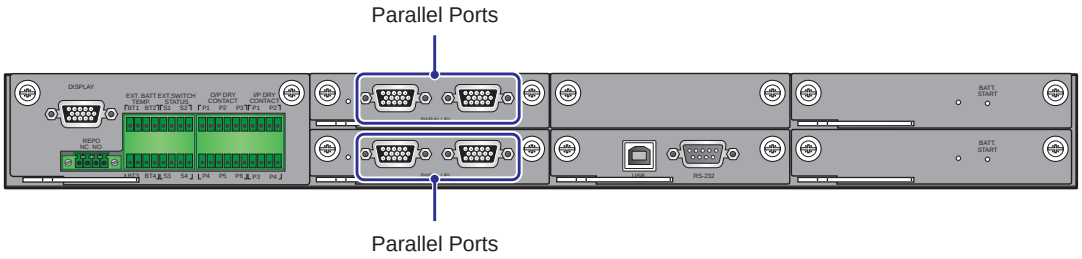


(Figure 4-11: Location of the Parallel Communication Cards)

4.1.8 Parallel Ports

The parallel ports are used to connect parallel UPSs to increase the system capacity and redundancy. With the provided parallel cable, up to eight UPS units with the same capacity, voltage and frequency can be paralleled. To enhance parallel reliability, please adopt Daisy Chain method (see ***Figure 5-41*** & ***Figure 5-43***) to execute parallel configuration.

WARNING:
One parallel cable is provided in each UPS's accessory package. Using non-Delta parallel cables to parallel the UPSs may cause failure, malfunctions and accidents.



(Figure 4-12: Location of the Parallel Ports)

4.1.9 SMART Slot

1. You can install the optional Relay I/O card (for dry contact expansion) into the SMART slot shown in ***Figure 4-13***. For relevant installation and application information, please contact Delta customer service.

2. If you use the Delta lithium-ion batteries (please refer to the Delta P/N shown below), you must purchase the optional multifunctional communication card (MFC) and install it in the SMART slot shown in ***Figure 4-13*** to monitor the status and information of the Delta lithium-ion batteries. For relevant information, please refer to ***7.9.6 Battery Status***, ***7.10.4 Battery & Charging Setting*** and ***7.10.7 General Setting***. If you have any questions, please contact Delta customer service.

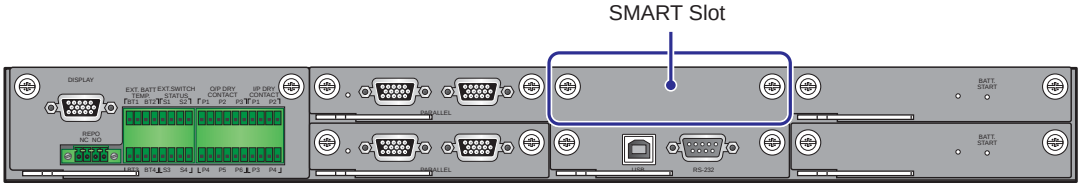
Delta Lithium-ion Batteries	Delta P/N
UPS BTY RACK 31.0KWH, Master (60Ah)	UBR120B14001A00
UPS BTY RACK 31.0KWH, Slave (60Ah)	UBR120B14001A01
UPS BTY RACK 62.1KWH, Master (60Ah)	UBR240B14002A00
UPS BTY RACK 62.1KWH, Slave (60Ah)	UBR240B14002A01

Delta Lithium-ion Batteries

Please use the Ethernet cable*1 to connect the MFC's parallel ports. The Ethernet cable routing is the same as the UPS parallel cable routing (see ***Figure 5-18-1***).

NOTE:

*1 One Ethernet cable is provided in each package of the optional multi-functional communication card (MFC).



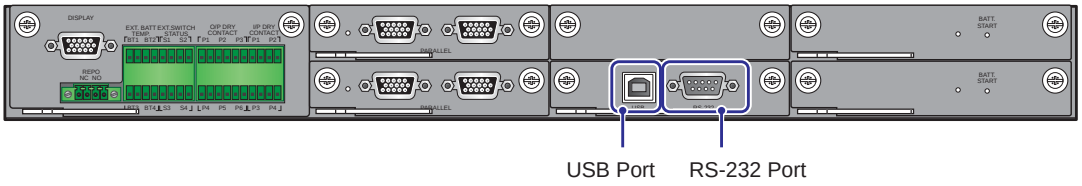
(Figure 4-13: Location of the SMART Slot)

4.1.10 USB Port & RS-232 Port

Only service personnel can use an RS-232 cable (provided) or a USB cable (not provided) to connect a computer to the UPS's RS-232 port or USB port to (1) upgrade the firmware of the UPS, power modules, system control card, parallel communication cards and optional multifunctional communication card (MFC) and (2) download event logs.

NOTE:

Do not use the RS-232 port and the USB port at the same time.



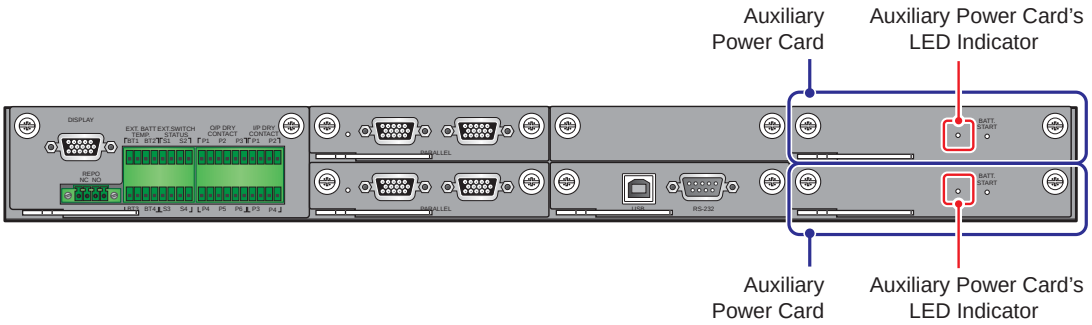
(Figure 4-14: Location of the USB Port & RS-232 Port)

4.1.11 Auxiliary Power Cards

The UPS has two auxiliary power cards. Each card has one LED indicator. Please see ***Figure 4-15*** for their location.

If the auxiliary power card works normally, its LED indicator will illuminate green. If the auxiliary power card is off or abnormal, its LED indicator will be off.

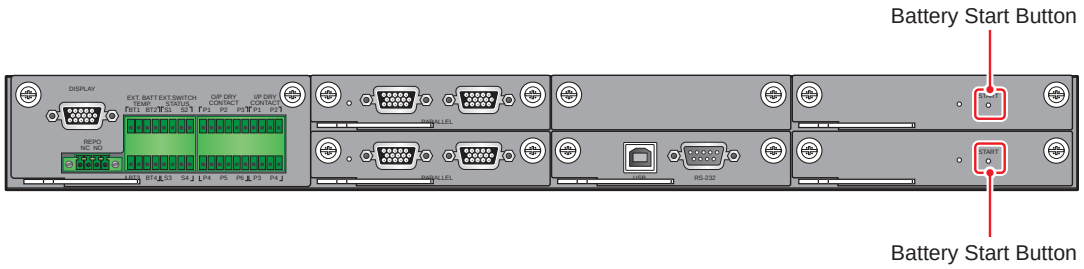
WARNING:
When replacing, remove only one auxiliary power card at a time to avoid power interruption.



(Figure 4-15: Location of the Auxiliary Power Cards)

4.1.12 Battery Start Buttons

Please refer to ***6.2.2 Battery Mode Start-up Procedures*** for relevant information.

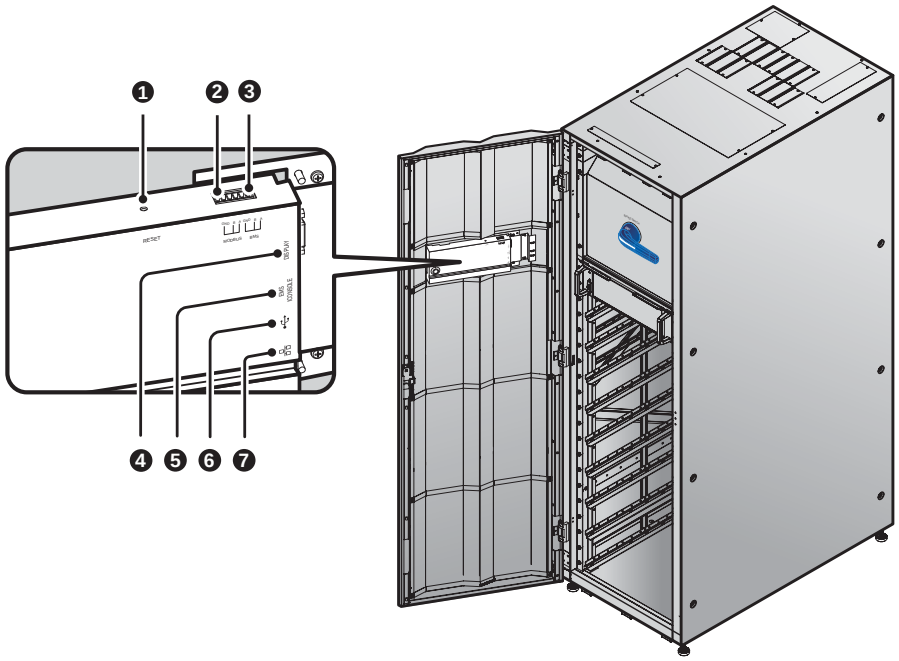


(Figure 4-16: Location of the Battery Start Buttons)

4.2 Communication Interfaces (II): at the Rear of the Touch Panel

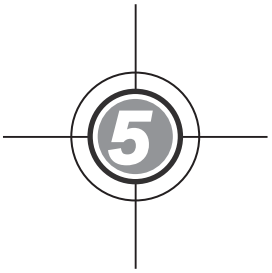
The following communication interfaces are located at the rear of the touch panel. Please see the description below.

(Front View with Door Open)



(Figure 4-17: Communication Interfaces (II)_ at the Rear of the Touch Panel)

No.	Item	Function
❶	RESET	Press the **RESET** button once to restart the LCD.
❷	MODBUS (RS-485 Port)	1. Provides MODBUS RTU communication service. 2. Connects to a user-supplied monitoring system.
❸	BMS	Connects to the Delta battery management system (optional). The BMS function is only applicable to lead-acid batteries.
❹	DISPLAY	1. Connects to the display port shown in ***Figure 4-3***. 2. Before shipment, the display port has been connected.
❺	EMS/ CONSOLE	Connects to a user-supplied environmental monitoring system or Delta EnviroProbe 1000 (optional).
❻	(USB Port × 2)	There are two USB ports. Connects a user-supplied USB flash drive to any of the USB ports to (1) upgrade the UPS and LCD's firmware and (2) download event logs.
❼	(Network Port)	1. Provides network communication service (including SNMP, MODBUS TCP, HTTP, HTTPS, etc.). 2. Connects to a user-supplied monitoring system.



Installation and Wiring

5.1 Before Installation and Wiring

5.2 Installation Environment

5.3 UPS Transportation

5.4 UPS Installation

5.5 Wiring

5.6 External Battery Cabinet Connection Warnings

5.7 STS Module

5.8 Power Module (Optional)

5.1 Before Installation and Wiring

1. Please read this user manual thoroughly before installation, wiring and usage. Only authorized Delta engineers or service personnel can perform installation, wiring, panel & cover removal, maintenance and operation. If you want to execute any action mentioned above by yourself, the action must be under the supervision of authorized Delta engineers or service personnel. If you use a forklift or other equipment to move the UPS, please make sure its load bearing is sufficient. Please refer to ***Table 5-1***.
2. The UPS must be connected with an external battery cabinet (user-supplied, handled and configured by Delta service personnel). Please refer to ***5.6 External Battery Cabinet Connection Warnings*** for relevant information.
3. The UPS must be connected with a Delta or non-Delta external maintenance bypass cabinet. The Delta external maintenance bypass cabinet is optional, and the non-Delta external maintenance bypass cabinet is user-supplied and should be handled and configured by Delta service personnel. For the Delta or non-Delta external maintenance bypass cabinet's information, please refer to the table below.

<table>
<tr>
<td>Delta External Maintenance Bypass Cabinet
(Optional)</td>
<td>There are two models for selection. Please refer to the table below.
<table>
<tr><th colspan="3">Delta External Maintenance Bypass Cabinet (Optional)</th></tr>
<tr><td>Model</td><td>3915101965-S</td><td>3915101964-S</td></tr>
<tr><td>Switch Q'ty</td><td>3 Switches (Input Switch/ Manual Bypass Switch/ Output Switch)</td><td>4 Switches (Input Switch/ Bypass Switch/ Manual Bypass Switch/ Output Switch)</td></tr>
<tr><td>Wiring Type</td><td>Top & Bottom Wiring</td><td>Top & Bottom Wiring</td></tr>
</table>
NOTE:
For more information about the Delta external maintenance bypass cabinet (optional), please refer to its user manual.</td>
</tr>
<tr>
<td>Non-Delta External Maintenance Bypass Cabinet
(User-supplied, handled and configured by Delta service personnel)</td>
<td>For configurations of the non-Delta external maintenance bypass cabinet, please refer to the following.
a. Selection of three or four breakers (switches):
(1) Three breakers (switches):
An input breaker (switch), a manual bypass breaker (switch) and an output breaker (switch) should be installed.
(2) Four breakers (switches):
An input breaker (switch), a bypass breaker (switch), a manual bypass breaker (switch) and an output breaker (switch) should be installed.
b. Each breaker (switch) mentioned above must be a 3-pole (R/ S/ T) device and meets the specifications defined in ***Table 5-3***.
c. It is suggested that each breaker (switch) should be configured with an auxiliary contactor. For relevant information, please refer to ***4.1.4 External Switch/ Breaker Status Dry Contacts***.
d. Install the non-Delta external maintenance bypass cabinet next to the UPS or align it with the UPS for convenient operation.</td>
</tr>
</table>

NOTE:
If there are switches but not breakers installed in the external maintenance bypass cabinet, please install (1) an additional protective device between the input power and the external maintenance bypass cabinet and (2) an additional protective device between the connected critical loads and the external maintenance bypass cabinet. The protective device could be a breaker or a fuse. For the protective device's rating current, please refer to the table below.

200kVA	300kVA	400kVA	500kVA
400A	600A	800A	1000A

5.2 Installation Environment

- Install the UPS indoors. Do not place it outdoors.
- Make sure that transportation routes (e.g. corridors, door gates, elevators, etc.) and installation area can accommodate and bear the weight of the UPS, external battery cabinet, Delta or non-Delta external maintenance bypass cabinet (refer to ***5.1 Before Installation and Wiring*** for relevant information) and handling equipment. Please refer to ***Table 5-1*** for floor weight loading information.

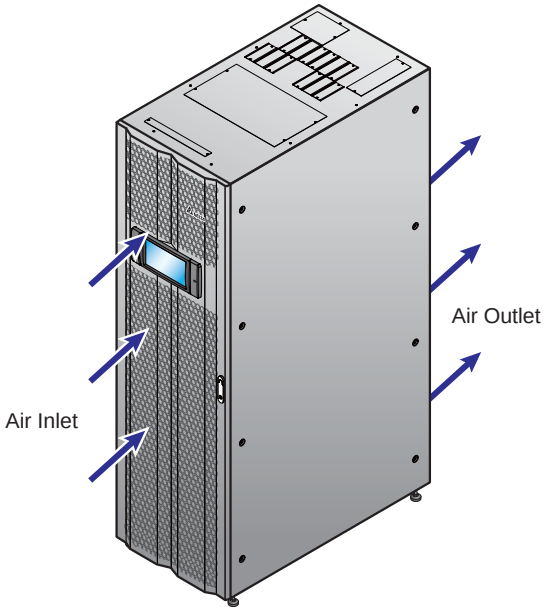
Table 5-1: UPS Floor Weight Loading Table

DPH Series UPS				
UPS Capacity	**200kVA/ 200kW**	**300kVA/ 300kW**	**400kVA/ 400kW**	**500kVA/ 500kW**
Power Module Q'ty	4	6	8	9
UPS Weight	461 kg (1016.3 lb)	533 kg (1175.1 lb)	605 kg (1333.8 lb)	641 kg (1413.2 lb)
Weight Loading	698.5 kg/m^2 (143.1 lb/ft^2)	807.6 kg/m^2 (165.4 lb/ft^2)	916.7 kg/m^2 (187.8 lb/ft^2)	971.2 kg/m^2 (198.9 lb/ft^2)

- The UPS adopts top wiring. Please leave adequate space on the top of the UPS to allow cable entry. If you use the Delta external maintenance bypass cabinet (optional), top wiring and bottom wiring are both applicable.
- Ensure that the installation area is big enough for maintenance and ventilation. Since the UPS adopts the design of air inlet at the front and air outlet at the rear and that external battery cabinets must be placed next to the UPS, we suggest that you:

  1. Keep a distance of 1000 mm (39.37") from the front of the UPS for maintenance and ventilation.

2. Keep a distance of at least 350 mm (13.78”) from the back of the UPS for ventilation, or at least 500 mm (19.69”) for maintenance.
3. Keep a distance of 500 mm (19.69”) from the top of the UPS for maintenance, wiring and ventilation.



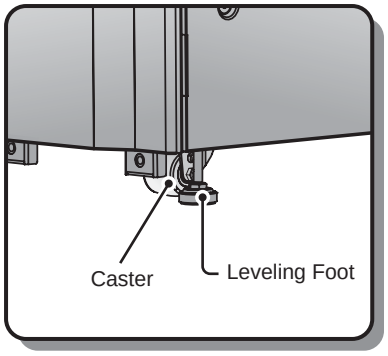
(Figure 5-1: UPS Air Inlet & Outlet Direction)

- Keep the installation area clean. Please note that wiring routes must be hermetic to prevent possible damage from rodents.
- Keep the installation area’s temperature around 25°C (77°F) and humidity within 95%. The highest operating altitude is 1000 meters (3280 ft) above sea level.
- For safety concerns, we suggest that you:
  1. Equip surroundings of the installation area with CO_2 or dry powder fire extinguishers.
  2. Install the UPS in an environment where fireproof materials are used to construct the walls, floors and ceilings.
  3. Install the UPS on a floor that is made of noncombustible materials.
- Do not allow unauthorized personnel to enter the installation area and assign specified personnel to keep the UPS key.

WARNING:
Do not use air conditioners or similar equipment to blow into the rear of the UPS and hinder ventilation.

5.3 UPS Transportation

- At the bottom of the UPS, there are six casters to help you to move the UPS to a designated area. Before you move the UPS, please turn the four leveling feet counterclockwise to raise them off the ground. This protects the leveling feet from damage when moving the UPS. Please use sufficient manpower (at least six people) and equipment (e.g. forklift) to carefully move the UPS from its pallet to ground. Please pay attention to the movement of the casters to avoid accidents.



(Figure 5-2: UPS Leveling Foot and Caster)

WARNING:

1. The UPS is fixed on the pallet with two balance brackets. When taking apart the two balance brackets from the UPS, please pay attention to the movement of the casters to avoid accidents.
2. Please refer to the ***Unpacking Guide*** attached to the UPS external wooden box for location of the balance brackets.

- The casters are designed to move on level ground. Do not move the UPS on an uneven surface. This might cause damage to the casters or tip the UPS which could damage the unit.
- After the UPS has been removed from the pallet to ground, we suggest that at least three people move the UPS to the installation area. One person use their hands to hold a lateral side of the UPS, one person hold the other lateral side of the UPS with their hands, and one person use their hands to push the UPS either from the front side or from the backside to move the unit to the installation area and avoid tipping the UPS.
- If you need to move the UPS over a long distance, please use appropriate equipment like a forklift. Do not use the UPS casters to move the unit over a long distance.

5.4 UPS Installation

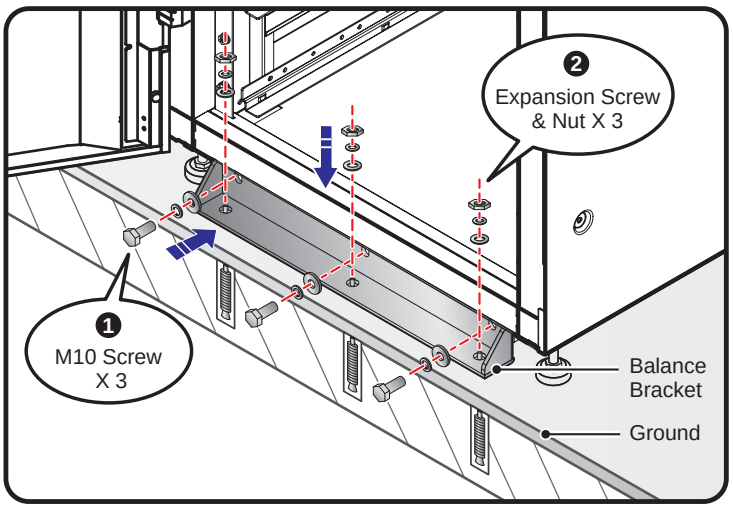
Please follow the steps below:

1 Before installing the UPS in a designated installation area, please double check whether the area's floor weight loading is sufficient to bear the UPS, external battery cabinet, Delta or non-Delta external maintenance bypass cabinet and handling equipment (i.e. forklift) to avoid accidents. For UPS floor weight loading information, please refer to ***Table 5-1***.

2 After the UPS is moved to the designated installation area, use a #17 wrench to stabilize four leveling feet of the UPS on the floor. Please note that the UPS must stand on the floor stably and levelly without any tipping.

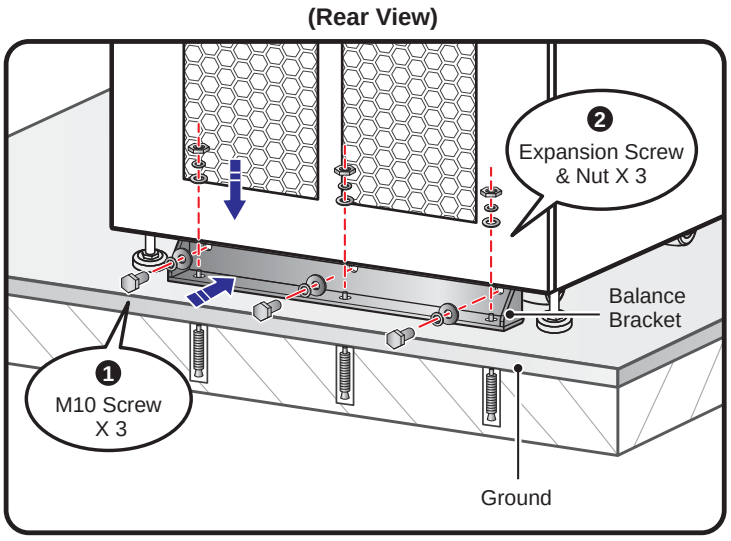
3 Use a 17mm socket wrench and three M10 screws ❶ (originally used to fix the front balance bracket on the pallet) to install the front balance bracket (removed during the unpacking process) at the front of the UPS. Use the three expansion screws ❷ (provided by qualified service personnel) to fix the front balance bracket on the ground to avoid UPS movement. Please see ***Figure 5-3***.

(Front View)



(Figure 5-3: Install the Balance Bracket at the Front of UPS)

4 Use a 17mm socket wrench and three M10 screws ❶ (originally used to fix the rear balance bracket on the pallet) to install the rear balance bracket (removed during the unpacking process) at the rear of the UPS. Use the three expansion screws ❷ (provided by qualified service personnel) to fix the rear balance bracket on the ground to avoid UPS movement. Please see ***Figure 5-4***.



(Figure 5-4: Install the Balance Bracket at the Rear of UPS)

WARNING:
If you don't use the balance bracket to fix the UPS on the ground, the unit might topple over. For safety concerns, please use the balance bracket to fix the UPS to the floor.

5 Follow ***5.5 Wiring*** to perform wiring procedures.

6 Follow ***5.6 External Battery Cabinet Connection Warnings*** to connect the external battery cabinet(s).

7 Follow ***5.8 Power Module (Optional)*** to install the power modules.

8 After finishing the procedures above, close the UPS front door. Make sure to seal or cover the gaps between the cables and the cabinet to avoid foreign materials falling into the UPS.

5.5 Wiring

5.5.1 Pre-wring Warnings

NOTE:

1. Before wiring, please ensure that you have followed ***5.4 UPS Installation*** to fix the UPS in the designated installation area firmly.
2. Before wiring, please read ***5.5 Wiring*** thoroughly.
3. Only authorized Delta engineers or service personnel can perform installation, wiring, panel & cover removal, maintenance and operation. If you want to execute any action mentioned above by yourself, the action must be under the supervision of authorized Delta engineers or service personnel.
4. The UPS must be connected with a Delta or non-Delta external maintenance bypass cabinet. The Delta external maintenance bypass cabinet is optional, and the non-Delta external maintenance bypass cabinet is user-supplied and should be handled and configured by Delta service personnel. For the Delta or non-Delta external maintenance bypass cabinet's information, please refer to ***1.2 Connection Warnings***.
5. During wiring procedures, please protect the UPS from foreign materials falling into the cabinet.

- Before wiring or making any electrical connection, make sure that the power supplied to the input and output of the UPS is completely cut off.
- The UPS adopts top wiring. Please leave adequate space on the top of the UPS to allow cable entry. If you use the Delta external maintenance bypass cabinet (optional), top wiring and bottom wiring are both applicable.
- Check that the size, diameter, phase, polarity are correct for each cable that needs connecting to the UPS, external battery cabinet and external maintenance bypass cabinet. Please refer to ***Table 5-2*** for the specifications of input/ output/ battery cables, switches and breakers.

NOTE:

Table 5-2 is based on (1) default input/ output voltage: 220V, (2) default battery Q'ty: 40PCS and (3) default charge current per power module: 5A. For other conditions different from ***Table 5-2***, please contact service personnel for relevant values.

Table 5-2: Specifications of Input/ Output/ Battery Cables, Switches and Breakers

DPH 200~500kVA					
Capacity		**200kVA/ 200kW**	**300kVA/ 300kW**	**400kVA/ 400kW**	**500kVA/ 450kW**
Input	Rated current at input voltage 220V (in the status of battery charging)	340A	510A	680A	765A

DPH 200~500kVA					
Capacity		200kVA/ 200kW	300kVA/ 300kW	400kVA/ 400kW	500kVA/ 450kW
Input	Recommended cable size (R/ S/ T/ N)	95 mm^2 × 2 PCS (4/0 AWG × 2 PCS)	150 mm^2 × 2 PCS (300 kcmil × 2 PCS)	240 mm^2 × 2 PCS (500 kcmil × 2 PCS)	18 5mm^2 × 3 PCS (400 kcmil × 3 PCS)
	Maximum cable size (R/ S/ T/ N)	300 mm^2 × 3 PCS (600 kcmil × 3 PCS)			
	Maximum cable lug width	50 mm (1.97”)			
	Screw size/ Cable lug inner diameter	M12/ 13 mm (0.51”)			
	Terminal type*1	K.S. TLK300-12			
Bypass & Output	Rated current at input voltage 220V (in the status of battery charging)	340A	510A	680A	765A
	Recommended cable size (R/ S/ T/ N)	95 mm^2 × 2 PCS (4/0 AWG × 2 PCS)	150 mm^2 × 2 PCS (300 kcmil × 2 PCS)	240 mm^2 × 2 PCS (500 kcmil × 2 PCS)	185 mm^2 × 3 PCS (400 kcmil × 3 PCS)
	Maximum cable size (R/ S/ T/ N)	300 mm^2 × 3 PCS (600 kcmil × 3 PCS)			
	Maximum cable lug width	50 mm (1.97”)			
	Screw size/ Cable lug inner diameter	M12/ 13 mm (0.51”)			
	Terminal type*1	K.S. TLK300-12			
Battery	Nominal discharge current (condition: 2V per cell)	439A	658A	878A	987A
	Maximum discharge current (condition: 1.75V per cell)	502A	752A	1003A	1128A
	Recommended cable size (+/ -/ N)	120 mm^2 × 2 PCS (250 kcmil × 2 PCS)	240 mm^2 × 2 PCS (500 kcmil × 2 PCS)	185 mm^2 × 3 PCS (400 kcmil × 3 PCS)	240 mm^2 × 3 PCS (500 kcmil × 3 PCS)
	Maximum cable size (+/ -/ N)	24 0mm^2 × 4 PCS (500 kcmil × 4 PCS)			

DPH 200~500kVA					
Capacity		**200kVA/ 200kW**	**300kVA/ 300kW**	**400kVA/ 400kW**	**500kVA/ 450kW**
Battery	Maximum cable lug width	50 mm (1.97”)			
	Screw size/ Cable lug inner diameter	M12/ 13 mm (0.51”)			
	Terminal type*[1]	K.S. TLK300-12			
Tightening Torque		M12 = 500 ± 20 Kgf-cm (434.0 ± 17.4 lb-in)			
UPS’s Bypass Switch (Q0)		1000A			
Delta or non-Delta External Maintenance Bypass Cabinet’s Input Breaker or Switch (Q1)		400A	600A	800A	1000A
Delta or non-Delta External Maintenance Bypass Cabinet’s Bypass Breaker or Switch (Q2)		400A	600A	800A	1000A
Delta or non-Delta External Maintenance Bypass Cabinet’s Manual Bypass Breaker or Switch (Q3)		400A	600A	800A	1000A
Delta or non-Delta External Maintenance Bypass Cabinet’s Output Breaker or Switch (Q4)		400A	600A	800A	1000A
External Battery Cabinet’s Breaker (Q5)		500A	800A	1000A	1200A

NOTE:

1. Please follow local regulations to install a suitable conduit and bushing for cable protection.
2. Please refer to national and local electrical codes for acceptable protective devices and cable sizes.
3. For the cables mentioned in ***Table 5-2***, copper wires with PVC material and temperature resistance up to 105°C (221°F) are suggested.
4. *[1] The suggested manufacturer is K.S. TERMINALS INC. You may use equivalent terminals provided by other manufacturers.

- If there is a floating voltage between the input power’s neutral (N) and the PE (protective earth) (⏚), 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 side of the UPS, and connect the isolation transformer’s secondary neutral (N) to the PE (protective earth) (⏚) at the proximal end of the isolation transformer.

- The (main/ bypass) AC source must be a three-phase four-wire system (Y configuration) and meets the specifications specified on the UPS rating label. Make sure the connection is in the positive phase sequence.
- For external battery cabinet connection, please check the battery polarity. Do not connect the batteries in reverse. Please refer to ***5.6 External Battery Cabinet Connection Warnings***.
- The UPS's PE terminal (⏚) must be grounded. Please use ring-type terminals when wiring.

WARNING:

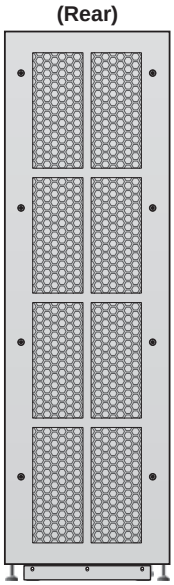
1. Wrong wiring will cause damage to the UPS and electric shock.
2. The UPS will not work normally if the main AC source's neutral (N) is not firmly connected or not connected to the Delta or non-Delta external maintenance bypass cabinet's AC Input neutral (N) terminal.
3. If the UPS is not grounded, the power boards and components might be damaged after the UPS is powered on.

5.5.2 Single Input to Dual Input Modification

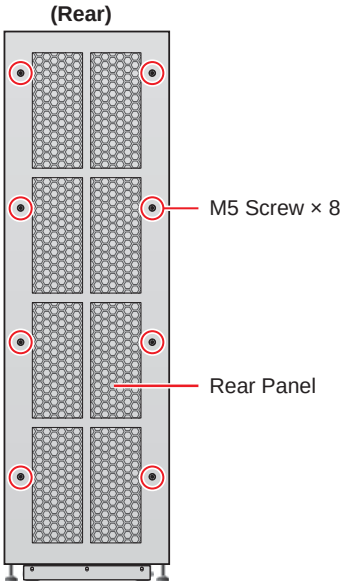
WARNING:
Only authorized Delta engineers or service personnel can modify single input/ dual input setup.

The UPS default setting is single input. If you want to modify it into dual input, please follow the procedures below.

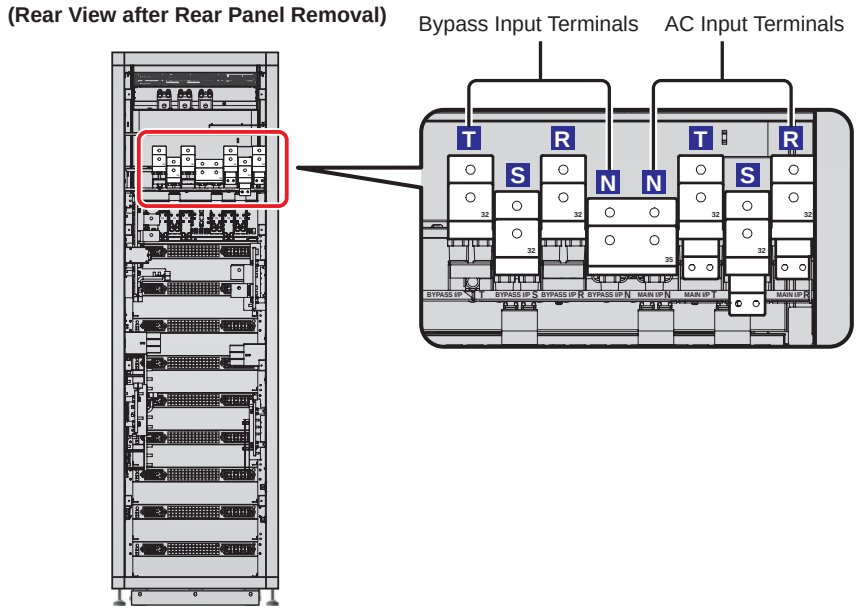
1 Unscrew the eight M5 screws to remove the rear panel (see ***Figure 5-5*** and ***Figure 5-6***). After removing the rear panel, you will see the AC Input terminals and Bypass Input terminals shown in ***Figure 5-7***.



(Figure 5-5: UPS Rear View)

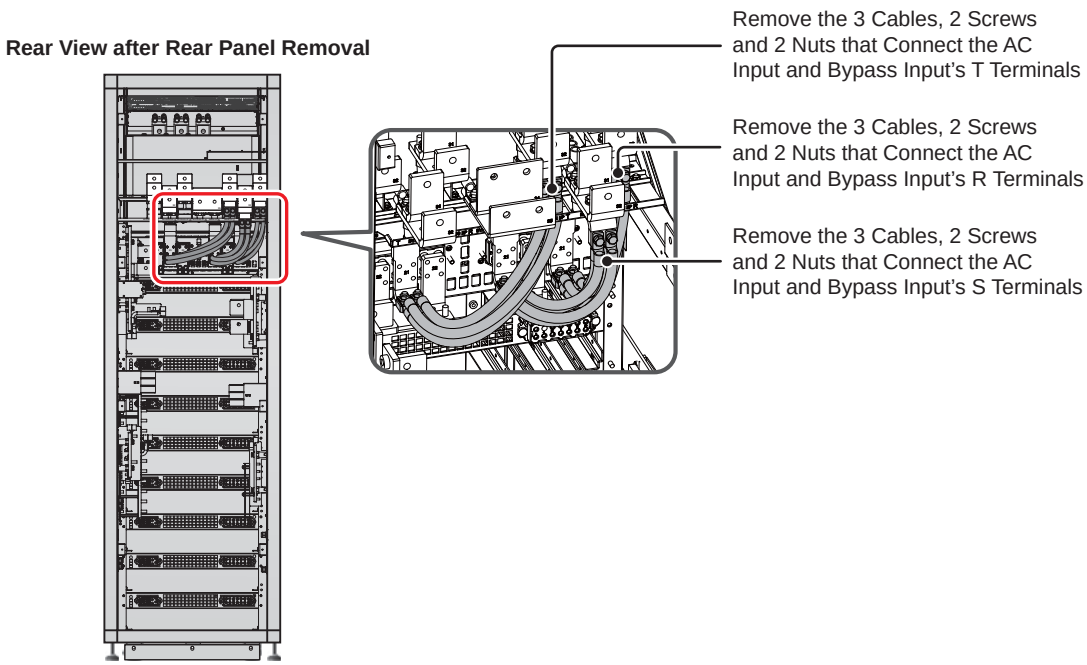


(Figure 5-6: Location of the Rear Panel & Screws)



(Figure 5-7: Wiring Terminals_ AC Input & Bypass Input)

2 Unscrew the six screws and six nuts to remove the nine cables connected between the AC Input Terminals (R/ S/ T) and the Bypass Input terminals (R/ S/ T) in order to modify the UPS from single input into dual input. Please refer to ***Figure 5-8***.



(Figure 5-8: Remove the Nine Cables that Connect the AC Input Terminals (R/ S/ T) and the Bypass Input Terminals (R/ S/ T))

NOTE:

1. Please keep the six screws, six nuts and the nine cables well for future use.
2. If you want to modify the UPS from dual input into single input, please use the removed six screws and six nuts to reinstall the removed nine cables.

5.5.3 Single Unit Wiring

NOTE:

1. Only authorized Delta engineers or service personnel can perform installation, wiring, panel & cover removal, maintenance and operation. If you want to execute any action mentioned above by yourself, the action must be under the supervision of authorized Delta engineers or service personnel.
2. The UPS rating voltage is 220/ 380Vac, 230/ 400Vac or 240/ 415Vac.
3. The external battery cabinet's rating voltage is ±240Vdc.
4. Before wiring, please read ***5.5 Wiring*** thoroughly.

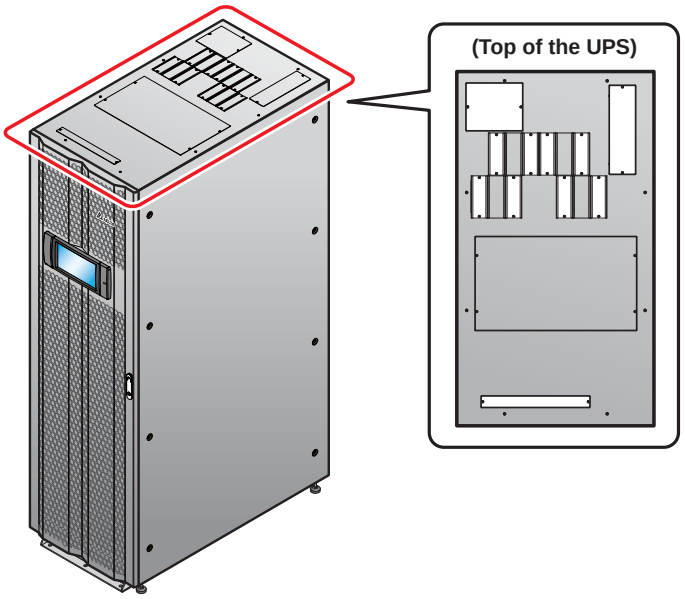
- **Single Input (Single Unit)**

  When there is only one AC power source, single unit wiring procedures are as follows.

  1 The UPS adopts top wiring. Please leave adequate space on the top of the UPS to allow cable entry.

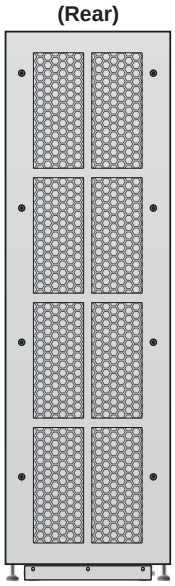
  NOTE:
  If you use the Delta external maintenance bypass cabinet (optional), top wiring and bottom wiring are both applicable. For relevant information, please refer to ***Delta External Maintenance Bypass Cabinet User Manual***.

  2 Remove the eleven covers on the top of the UPS for cable entry. Each top cover has two #6-32 screws. For the location of top covers, please refer to the white areas shown in ***Figure 5-9***.

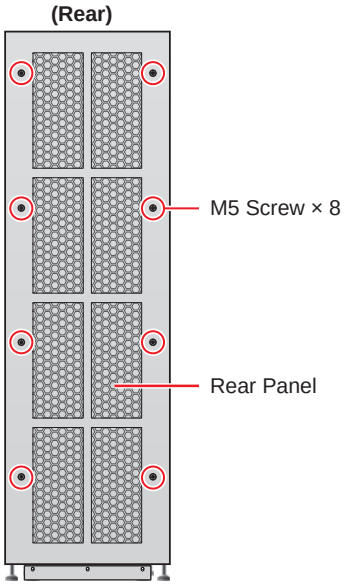


(Figure 5-9: Location of Top Covers)

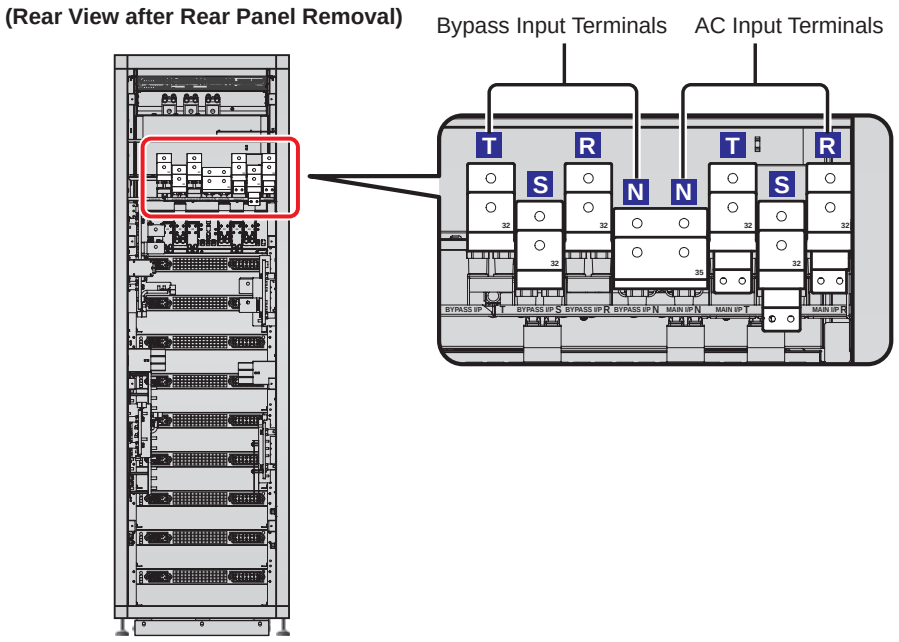
3 Unscrew the eight M5 screws to remove the rear panel (see ***Figure 5-10*** and ***Figure 5-11***). After removing the real panel, you will see the wiring terminals shown in ***Figure 5-12*** ~ ***Figure 5-14***.



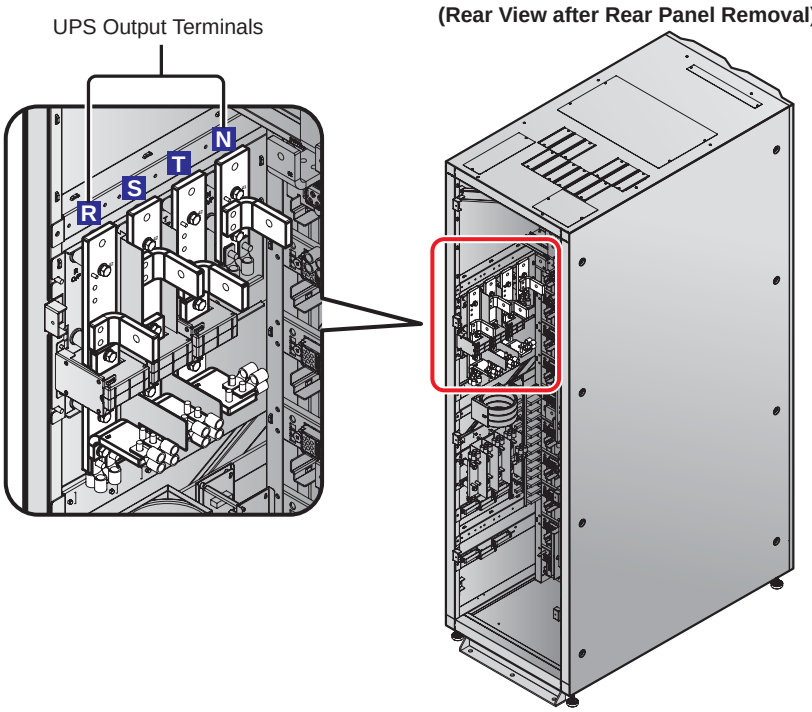
(Figure 5-10: UPS Rear View)



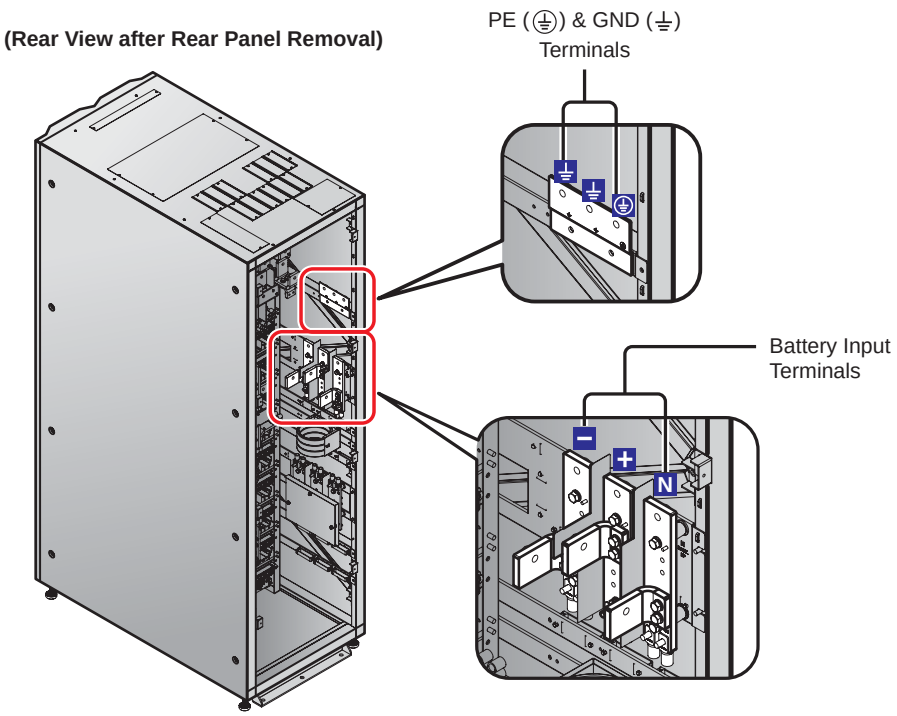
(Figure 5-11: Location of the Rear Panel & Screws)



(Figure 5-12: Wiring Terminals_ AC Input & Bypass Input)



(Figure 5-13: Wiring Terminals_ UPS Output)



(Figure 5-14: Wiring Terminals_ Battery Input & Grounding)

4 For how to perform wiring between the UPS and the Delta or non-Delta external maintenance bypass cabinet, please refer to ***Table 5-3***. For the detailed information about the Delta or non-Delta external maintenance bypass cabinet, please refer to ***5.1 Before Installation and Wiring***.

Table 5-3: UPS's Wiring Terminals & Wiring Information

No.	Item	Function
1	AC Input Terminals (R/ S/ T/ N)	• **Single Input:** There is no need to connect these AC Input Terminals. • **Dual Input:** The terminals connect to the Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1).
2	Bypass Input Terminals (R/ S/ T/ N)	• **Single Input:** The terminals connect to the Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1). • **Dual Input:** The terminals connect to the Delta or non-Delta external maintenance bypass cabinet's bypass breaker or switch (Q2.
3	UPS Output Terminals (R/ S/ T/ N)	Connect to the Delta or non-Delta external maintenance bypass cabinet's output breaker or switch (Q4).
4	Battery Input Terminals (+/ -/ N)	• If you choose to use the Delta external maintenance bypass cabinet (optional), please connect these terminals to the Delta external maintenance bypass cabinet's Battery Input Terminals. • If you choose to use the non-Delta external maintenance bypass cabinet, please contact service personnel for battery configurations.
5	⏚ PE (protective earth) Terminal	Connects to the Delta or non-Delta external maintenance bypass cabinet's GND terminal (⏚).

NOTE:

*1 The items listed in the above **'Item'** column are all located at the rear of the UPS. Please refer to ***Figure 5-12 ~ Figure 5-14***.

5 For how to perform wiring for the Delta or non-Delta external maintenance bypass cabinet, please refer to ***Table 5-4***. For the detailed information about the Delta or non-Delta external maintenance bypass cabinet, please refer to ***5.1 Before Installation and Wiring***.

Table 5-4: External Maintenance Bypass Cabinet's Breakers, Switches & Wiring Information

No.	Item	Function
1	Input Breaker or Switch (Q1) including R/ S/ T/ N terminals*2	The breaker or switch (Q1) connects to the main AC source.
2	Bypass Breaker or Switch (Q2) including R/ S/ T/ N terminals (Only for dual input application)*2	The breaker or switch (Q2) connects to the bypass AC source
3	Manual Bypass Breaker or Switch (Q3) including R/ S/ T/ N terminals*2	• **Single Input:** The breaker or switch (Q3) connects to the main AC source. • **Dual Input:** The breaker or switch (Q3) connects to the bypass AC source.
4	Output Breaker or Switch (Q4) including R/ S/ T/ N terminals*2	The breaker or switch (Q4) connects to the critical loads.
5	⏚ PE (protective earth) Terminal	Protective earthing for protection against electrical shock in case of fault*3. The terminal must be connected to the main earth.
6	⏚ GND (ground) Terminals	The terminals are used to ground the devices, which are associated with UPS operation.

NOTE:

1. *1 All breakers, switches and terminals listed in the above '**Item**' column must be installed in the external maintenance bypass cabinet (user-supplied). Refer to ***1.2 Connection Warnings*** for relevant information.
2. *2 If you choose to use the Delta external maintenance bypass cabinet (optional), please note that each switch only has R/ S/ T terminals. The N terminals are located on the cabinet's bus bars. For relevant information, please refer to ***Delta External Maintenance Bypass Cabinet User Manual***.
3. *3 The PE (protective earth) connection ensures that all exposed conductive surfaces are at the same electric potential as the Earth to avoid the risk of electrical shock due to leakage current or an insulation fault.

6 Confirm that the UPS's Bypass Switch (Q0) is in the **OFF** position.

7 Confirm that the Delta or non-Delta external maintenance bypass cabinet's Input Breaker or Switch (Q1), Manual Bypass Breaker or Switch (Q3) and the Output Breaker or Switch (Q4) are in the **OFF** position.

8 Follow ***Table 5-2*** to select proper input, output and battery cables.

9 Connect the main AC source/ output/ external battery cabinet's cables to the UPS and the Delta or non-Delta external maintenance bypass cabinet. For wiring, please refer to the following.

Figure 3-1: Single Input Application_ UPS and Delta or non-Delta External Maintenance Bypass Cabinet Structure

Figure 5-12: Wiring Terminals_ AC Input & Bypass Input

Figure 5-13: Wiring Terminals_ UPS Output

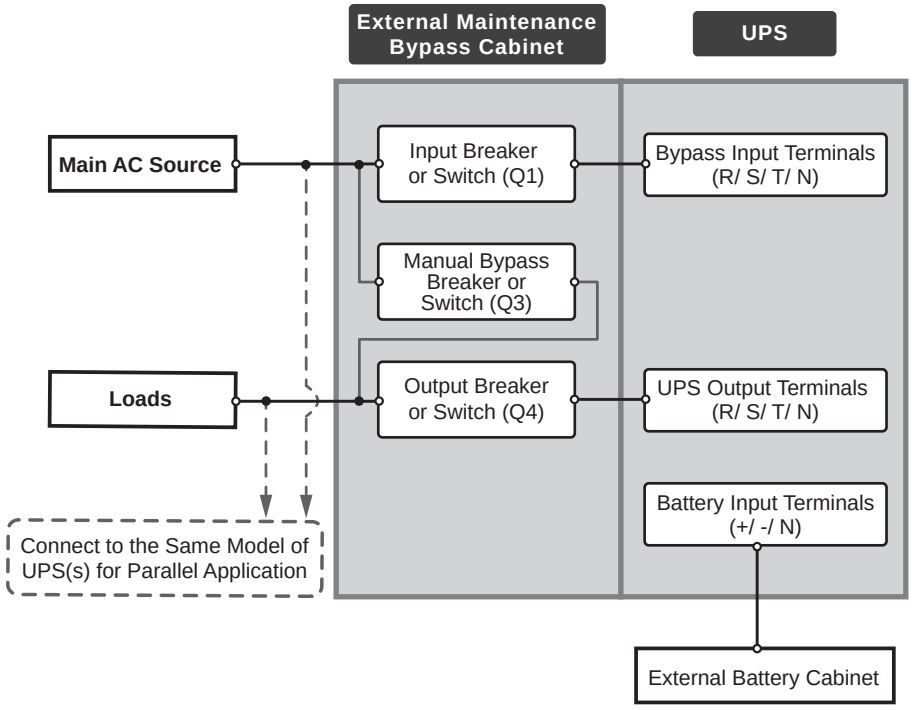
Figure 5-14: Wiring Terminals_ Battery Input & Grounding

Table 5-3: Wiring between the UPS and the Delta or non-Delta External Maintenance Bypass Cabinet

Table 5-4: Delta or non-Delta External Maintenance Bypass Cabinet Wiring Information

Figure 5-15: Single Unit Single Input Wiring Diagram

5.6 External Battery Cabinet Connection Warnings



(Figure 5-15: Single Unit Single Input Wiring Diagram)

NOTE:

The UPS will not work normally if the main AC source's neutral (N) is not firmly connected or not connected to the Delta or non-Delta External Maintenance Bypass Cabinet's AC Input neutral (N) terminal.

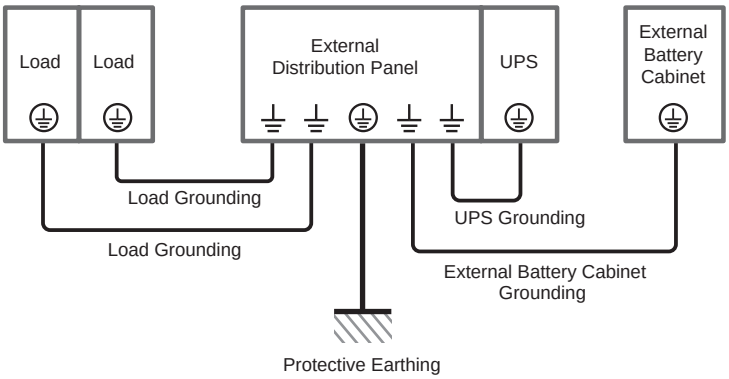
8 Follow the table below to select proper Protective Earth (PE) cables to ground the UPS, external battery cabinet(s) and connected critical loads. The table is in accordance with **IEC 60364-5-54** (***Article 543*** and ***Table 54.2***). The grounding diagram below is for reference.

Capacity		DPH 200kVA	DPH 300kVA	DPH 400kVA	DPH 500kVA
Suggested PE Cable Size	Input	25 mm^2 × 1 PC (2 AWG × 1 PC)	50 mm^2 × 1 PC (1/0 AWG × 1 PC)	67 mm^2 × 1 PC (2/0 AWG × 1 PC)	70 mm^2 × 1 PC (3/0 AWG × 1 PC)
	Bypass	25 mm^2 × 1 PC (2 AWG × 1 PC)	50 mm^2 × 1 PC (1/0 AWG × 1 PC)	67 mm^2 × 1 PC (2/0 AWG × 1 PC)	70 mm^2 × 1 PC (3/0 AWG × 1 PC)

Capacity		DPH 200kVA	DPH 300kVA	DPH 400kVA	DPH 500kVA
Suggested PE Cable Size	Output	25 mm^2 × 1 PC (2 AWG × 1 PC)	50 mm^2 × 1 PC (1/0 AWG × 1 PC)	67 mm^2 × 1 PC (2/0 AWG × 1 PC)	70 mm^2 × 1PC (3/0 AWG × 1 PC)
	Battery	35 mm^2 × 1 PC (1 AWG × 1 PC)	67 mm^2 × 1 PC (2/0 AWG × 1 PC)	70 mm^2 × 1 PC (3/0 AWG × 1 PC)	95 mm^2 × 1 PC (4/0 AWG × 1 PC)
Maximum Cable Lug Width		50 mm (1.97”)			
Screw Size/ Cable Lug Inner Diameter		M12/ 13 mm (0.51”)			
Tightening Torque		M12 = 500 ± 20 Kgf-cm (434 ± 17.4 lb-in)			
Terminal Type*1		K.S. TLK300-12			

NOTE:

*1 The suggested manufacturer is K.S. TERMINALS INC. You may use equivalent terminals provided by other manufacturers.



(Figure 5-16: Grounding Diagram_ Single Unit)

- **Dual Input (Single Unit)**

  When there are two AC power sources, single unit wiring procedures are as follows.

  〔1〉 Follow ***5.5.2 Single Input to Dual Input Modification*** to modify the UPS from single input into dual input.

  〔2〉 Follow the procedures 〔1〉 ~ 〔5〉 stated in the section of ***Single Input (Single Unit)***.

  〔3〉 Confirm that the UPS’s Bypass Switch (Q0) is in the **OFF** position.

4 Confirm that the Delta or non-Delta external maintenance bypass cabinet's Input Breaker or Switch (Q1), Bypass Breaker or Switch (Q2), Manual Bypass Breaker or Switch (Q3) and the Output Breaker or Switch (Q4) are in the **OFF** position.

5 Follow ***Table 5-2*** to select proper input, output and battery cables.

6 Connect the main AC source/ bypass AC source/ output/ external battery cabinet's cables to the UPS and the Delta or non-Delta external maintenance bypass cabinet. For wiring, please refer to the following.

Figure 3-2: Dual Input Application_ UPS and Delta or non-Delta External Maintenance Bypass Cabinet Structure

Figure 5-12: Wiring Terminals_ AC Input & Bypass Input

Figure 5-13: Wiring Terminals_ UPS Output

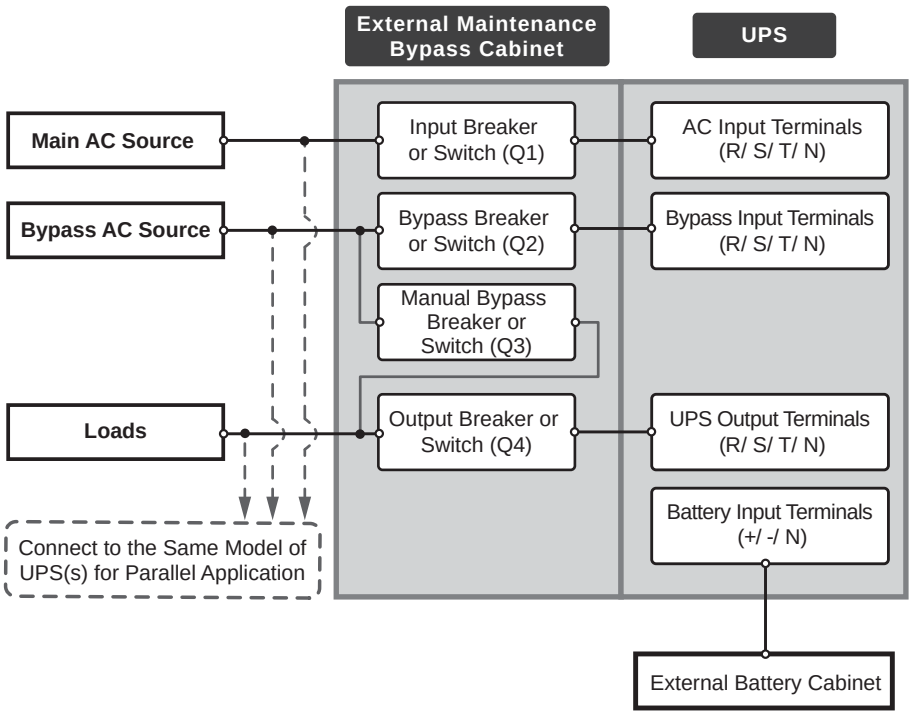
Figure 5-14: Wiring Terminals_ Battery Input & Grounding

Table 5-3: Wiring between the UPS and the Delta or non-Delta External Maintenance Bypass Cabinet

Table 5-4: Delta or non-Delta External Maintenance Bypass Cabinet Wiring Information

Figure 5-17: Single Unit Dual Input Wiring Diagram

5.6 External Battery Cabinet Connection Warnings



(Figure 5-17: Single Unit Dual Input Wiring Diagram)

NOTE:

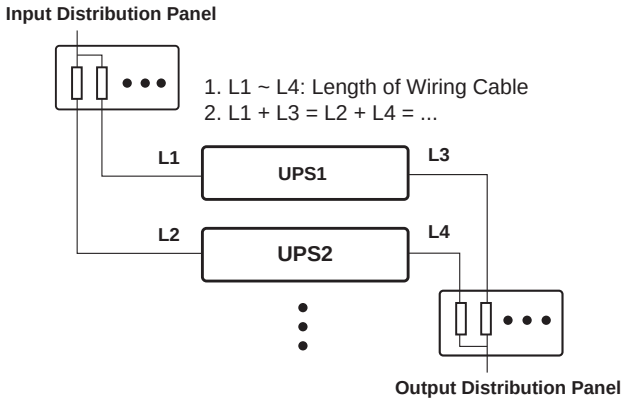
The UPS will not work normally if the main AC source's neutral (N) is not firmly connected or not connected to the Delta or non-Delta External Maintenance Bypass Cabinet's AC Input neutral (N) terminal.

〔7〕 Follow ***Figure 5-16*** to ground the UPS, external battery cabinet(s), Delta or non-Delta external maintenance bypass cabinet and connected critical loads.

5.5.4 Parallel Units Wiring

NOTE:

1. Only authorized Delta engineers or service personnel can perform installation, wiring, panel & cover removal, maintenance and operation. If you want to execute any action mentioned above by yourself, the action must be under the supervision of authorized Delta engineers or service personnel.
2. Up to eight UPS units can be paralleled for redundancy and capacity expansion. Only UPSs with the same capacity, voltage and frequency can be paralleled. Please only use the provided parallel cable to parallel the UPS units. Otherwise, parallel functions will fail.
3. When UPSs are paralleled, the length of each unit's bypass input cables plus output cables must be the same. This ensures that the parallel UPSs can equally share the critical loads in bypass mode.



4. The UPS rating voltage is 220/ 380Vac, 230/ 400Vac or 240/ 415Vac.
5. The external battery cabinet's rating voltage is ±240Vdc.
6. Before wiring, please read ***5.5 Wiring*** thoroughly.

- **Single Input (Parallel Units)**

When there is only one AC power source, parallel units' wiring procedures are as follows.

〔1〕 Follow the procedures 〔1〕~〔5〕 stated in the section of ***Single Input (Single Unit)***.

〔2〕 Confirm that each UPS's Bypass Switch (Q0) is in the **OFF** position.

3 Confirm that each Delta or non-Delta external maintenance bypass cabinet's Input Breaker or Switch (Q1), Manual Bypass Breaker or Switch (Q3) and the Output Breaker or Switch (Q4) are in the **OFF** position.

4 Follow ***Table 5-2*** to select proper input, output and battery cables.

5 Connect the main AC source/ output/ external battery cabinet's cables to each UPS and each Delta or non-Delta external maintenance bypass cabinet. For wiring, please refer to the following.

Figure 3-1: Single Input Application_ UPS and Delta or non-Delta External Maintenance Bypass Cabinet Structure

Figure 5-12: Wiring Terminals_ AC Input & Bypass Input

Figure 5-13: Wiring Terminals_ UPS Output

Figure 5-14: Wiring Terminals_ Battery Input & Grounding

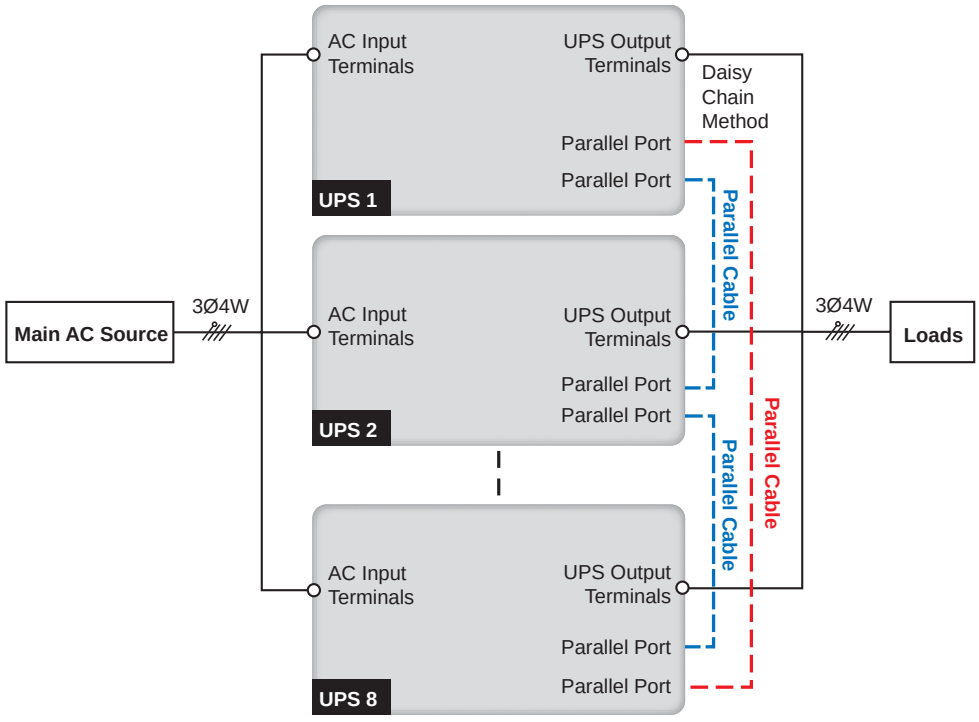
Table 5-3: Wiring between the UPS and the Delta or non-Delta External Maintenance Bypass Cabinet

Table 5-4: Delta or non-Delta External Maintenance Bypass Cabinet Wiring Information

Figure 5-15: Single Unit Single Input Wiring Diagram

Figure 5-18: Parallel Units Single Input Wiring Diagram

5.6 External Battery Cabinet Connection Warnings



(Figure 5-18: Parallel Units Single Input Wiring Diagram)

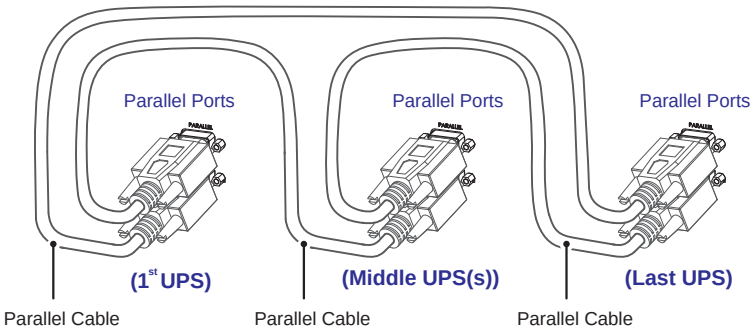
NOTE:

The UPS will not work normally if the main AC source's neutral (N) is not firmly connected or not connected to the Delta or non-Delta External Maintenance Bypass Cabinet's AC Input neutral (N) terminal.

6 Use the provided parallel cables*[1] to connect the parallel ports of the parallel units. Please adopt the Daisy Chain method shown in the figure below. For the parallel port location, refer to ***Figure 4-3***.

NOTE:

*[1] One parallel cable is provided in each UPS's accessory package.



(Figure 5-18-1: Parallel Port Connection_ Daisy Chain Method)

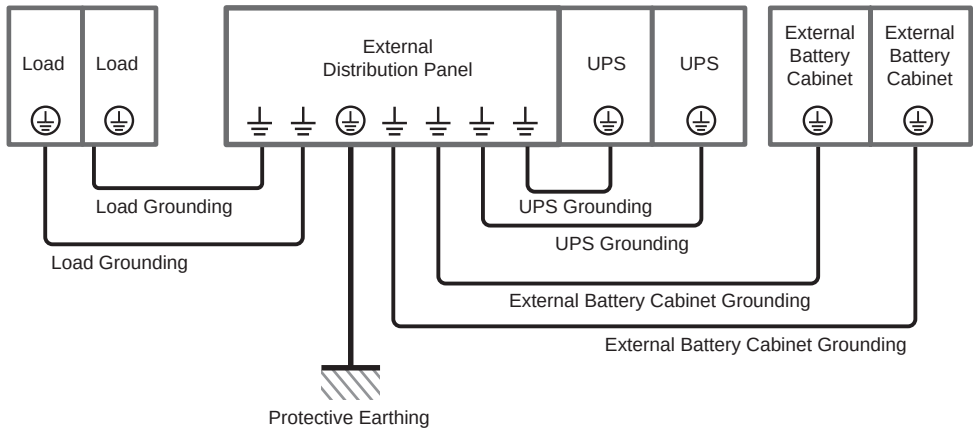
7 Follow the table below to select proper Protective Earth (PE) cables to ground the UPS, external battery cabinet(s) and connected critical loads. The table is in accordance with **IEC 60364-5-54** (***Article 543*** and ***Table 54.2***). The grounding diagram below is for reference.

Capacity		DPH 200kVA	DPH 300kVA	DPH 400kVA	DPH 500kVA
Suggested PE Cable Size	Input	25 mm² × 1 PC (2 AWG × 1 PC)	50 mm² × 1 PC (1/0 AWG × 1 PC)	67 mm² × 1 PC (2/0 AWG × 1 PC)	70 mm² × 1 PC (3/0 AWG × 1 PC)
	Bypass	25 mm² × 1 PC (2 AWG × 1 PC)	50 mm² × 1 PC (1/0 AWG × 1 PC)	67 mm² × 1 PC (2/0 AWG × 1 PC)	70 mm² × 1 PC (3/0 AWG × 1 PC)
	Output	25 mm² × 1 PC (2 AWG × 1 PC)	50 mm² × 1 PC (1/0 AWG × 1 PC)	67 mm² × 1 PC (2/0 AWG × 1 PC)	70 mm² × 1PC (3/0 AWG × 1 PC)
	Battery	35 mm² × 1 PC (1 AWG × 1 PC)	67 mm² × 1 PC (2/0 AWG × 1 PC)	70 mm² × 1 PC (3/0 AWG × 1 PC)	95 mm² × 1 PC (4/0 AWG × 1 PC)

Capacity	DPH 200kVA	DPH 300kVA	DPH 400kVA	DPH 500kVA
Maximum Cable Lug Width	50 mm (1.97”)			
Screw Size/ Cable Lug Inner Diameter	M12/ 13 mm (0.51”)			
Tightening Torque	M12 = 500 ± 20 Kgf-cm (434 ± 17.4 lb-in)			
Terminal Type*[1]	K.S. TLK300-12			

NOTE:

*[1] The suggested manufacturer is K.S. TERMINALS INC. You may use equivalent terminals provided by other manufacturers.



(Figure 5-19: Grounding Diagram_ Parallel Units)

WARNING:
Before start-up of the parallel units, qualified service personnel must set each UPS’s **‘Parallel Group ID’** (1 or 2) and **‘Parallel ID’** (1~8) through the LCD. Otherwise, the parallel UPSs cannot be started. Please refer to ***7.10.5 Parallel Setting***.

- **Dual Input (Parallel Units)**

When there are two AC power sources, parallel units’ wiring procedures are as follows.

〔1〉 Follow ***5.5.2 Single Input to Dual Input Modification*** to modify the UPS from single input to dual input.

〔2〉 Follow the procedures 〔1〉 ~ 〔2〉 stated in the section of ***Single Input (Single Unit)***.

〔3〉 Confirm that each UPS’s Bypass Switch (Q0) is in the **OFF** position.

4 Confirm that each Delta or non-Delta external maintenance bypass cabinet's Input Breaker or Switch (Q1), Bypass Breaker or Switch (Q2), Manual Bypass Breaker or Switch (Q3) and the Output Breaker or Switch (Q4) are in the **OFF** position.

5 Follow ***Table 5-2*** to select proper input, output and battery cables.

6 Connect the main AC source/ bypass AC source/ output/ external battery cabinet's cables to each UPS and each Delta or non-Delta external maintenance bypass cabinet. For wiring, please refer to the following.

Figure 3-2: Dual Input Application_ UPS and Delta or non-Delta External Maintenance Bypass Cabinet Structure

Figure 5-12: Wiring Terminals_ AC Input & Bypass Input

Figure 5-13: Wiring Terminals_ UPS Output

Figure 5-14: Wiring Terminals_ Battery Input & Grounding

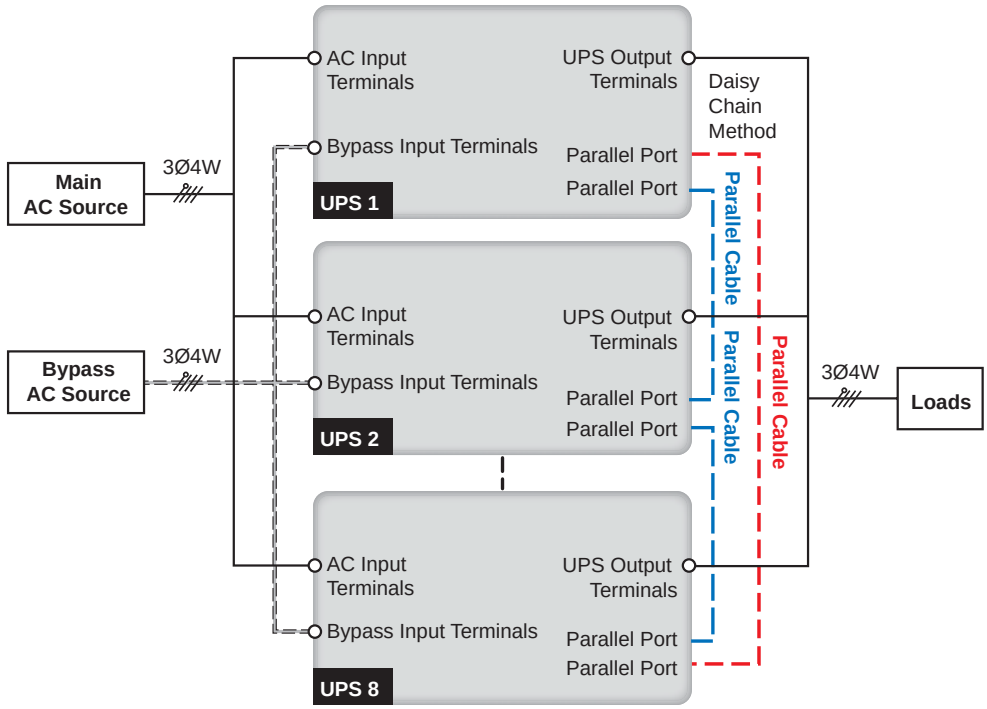
Table 5-3: Wiring between the UPS and the Delta or non-Delta External Maintenance Bypass Cabinet

Table 5-4: Delta or non-Delta External Maintenance Bypass Cabinet Wiring Information

Figure 5-17: Single Unit Dual Input Wiring Diagram

Figure 5-20: Parallel Units Dual Input Wiring Diagram

5.6 External Battery Cabinet Connection Warnings



(Figure 5-20: Parallel Units Dual Input Wiring Diagram)

NOTE:
The UPS will not work normally if the main AC source's neutral (N) is not firmly connected or not connected to the Delta or non-Delta External Maintenance Bypass Cabinet's AC Input neutral (N) terminal.

7 Use the provided parallel cables*[1] to connect the parallel ports of the parallel units. Please adopt the Daisy Chain method shown in ***Figure 5-18-1***. For the parallel port location, refer to ***Figure 4-3***.

NOTE:
*[1] One parallel cable is provided in each UPS's accessory package.

8 Follow ***Figure 5-19*** to ground the parallel UPSs, external battery cabinet(s), Delta or non-Delta external maintenance bypass cabinets and connected critical loads.

WARNING:
Before start-up of the parallel units, qualified service personnel must set each UPS's **'Parallel Group ID'** (1 or 2) and **'Parallel ID'** (1~8) through the LCD. Otherwise, the parallel UPSs cannot be started. Please refer to ***7.10.5 Parallel Setting***.

5.6 External Battery Cabinet Connection Warnings

NOTE:
1. The information of the battery parameters in this chapter may not be applicable to the lithium-ion batteries. For relevant information, please refer to the manual of the lithium-ion batteries.
2. Whether you use the lead-acid batteries or the lithium-ion batteries, please contact Delta service personnel for any battery/ battery cabinet's setup and configurations.

You should connect the UPS with at least one external battery cabinet to ensure that the connected critical loads are protected when a power failure occurs. You can connect up to four units of external battery cabinets to the UPS.

- 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. (A) Connect the UPS to the Delta external maintenance bypass cabinet (optional) and (B) connect the Delta external maintenance bypass cabinet (optional) to the main AC source, bypass AC source (for dual input only) and external battery cabinet. Please refer to ***5. Installation and Wiring***. If you choose to use the non-Delta external maintenance bypass cabinet rather than the Delta external maintenance bypass cabinet (optional), please contact service personnel.
  2. Follow ***6. UPS Operation*** to turn on the Delta or non-Delta external maintenance bypass cabinet, UPS and external battery cabinet. After the UPS is powered on, the UPS will automatically charge the batteries.

WARNING:
You can connect the critical loads to the Delta or non-Delta external maintenance bypass cabinet only after the batteries are fully charged. This guarantees that the Delta or non-Delta external maintenance bypass cabinet can provide sufficient backup power to the critical loads connected when a power failure occurs.

- **Battery Parameters**

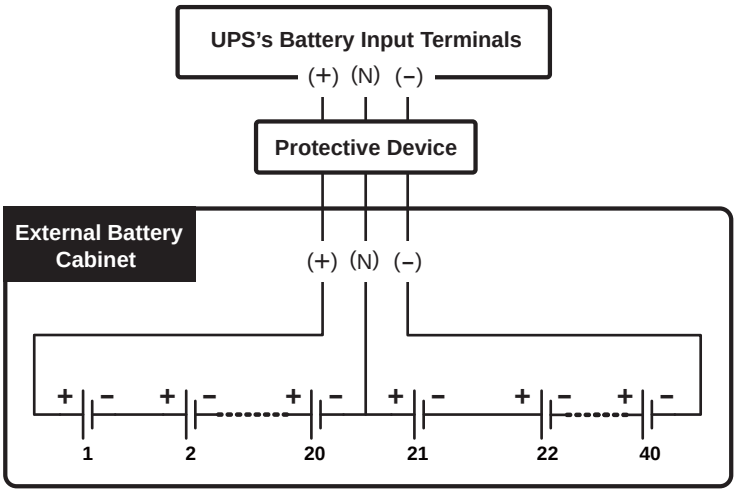
No.	Item	Description
1	Charge Voltage	Float charge voltage: ± 272Vdc (default)
		Equalized charge voltage: ±280Vdc (default)
2	Charge Current	Default: ± 5A (per power module)
		Maximum: ± 15A (per power module)
3	Low Battery Shutdown Voltage	± 200 ~ ± 220Vdc (default: 210Vdc)
4	The Number of Batteries	12V × 40 PCS (default)

NOTE:

1. The charge current is adjustable from 6A to the maximum in increments of 1A.
2. If you need to modify the default charge current setting and default low battery shutdown setting, please contact your local dealer or service personnel.
3. Follow on-site requirements to choose 12V × 30/ 32/ 34/ 36/ 38/ 40/ 42/ 44/ or 46 PCS of batteries. Changing the battery quantity will influence specifications to be applied. For battery selection, installation and replacement, please contact your local dealer or customer service.
4. You must set up the '**Battery Rating Voltage**', '**Battery Strings**' and '**Capacity**' on the LCD according to on-site conditions; otherwise, batteries will be over-charged, not fully charged or seriously damaged.

- 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 the external battery cabinet connection, is around 12.5Vdc × the total number of batteries.

- The default number of batteries is 40 PCS of 12Vdc batteries connected in string, and you should connect the external battery cabinet's neutral to the middle 20th and 21st batteries. You should use battery cables to connect the external battery cabinet with the '+', '-' and 'N' terminals marked on the Delta external maintenance bypass cabinet (optional). If you choose to use the non-Delta external maintenance bypass cabinet, please contact service personnel for battery configurations. For more information, please refer to ***Table 5-3 ~ Table 5-4*** and ***Figure 5-21***.



(Figure 5-21: External Battery Cabinet Connection)

WARNING:

The electrolyte leakage of the batteries can lead to serious accidents. For safety concerns, you must insulate the batteries properly (using insulated trays or boxes) from the metal cabinets and racks.

- Please follow your UPS rating to install an appropriate protective device for the external battery cabinet. You can choose to install either (1) a DC circuit breaker or DC isolated switch connected in series with a DC fuse or (2) a DC circuit breaker. Please refer to ***Table 5-5***.

- The capacity of the protective device must be consistent with the current shown in ***Table 5-5***. If the type of the protective device is a fuse, it must be a fast-acting fuse with melting current 5 ~ 6 times of the rating current.

Table 5-5: External Battery Cabinet's Protective Device (Battery Default Q'ty: 12Vdc x 40 PCS)

UPS Capacity	Power Module Q'ty	Protective Device's Current	Protective Device's Voltage
200kVA/ 200kW	4	500A	1. 4-pole DC circuit breaker or DC isolated switch (per pole voltage ≥ 250Vdc) 2. 3-pole DC circuit breaker or DC isolated switch (per pole voltage ≥ 500Vdc) 3. DC fuse (voltage ≥ 500Vdc)
300kVA/ 300kW	6	800A	
400kVA/ 400kW	8	1000A	
500kVA/ 450kW	9	1200A	

NOTE:

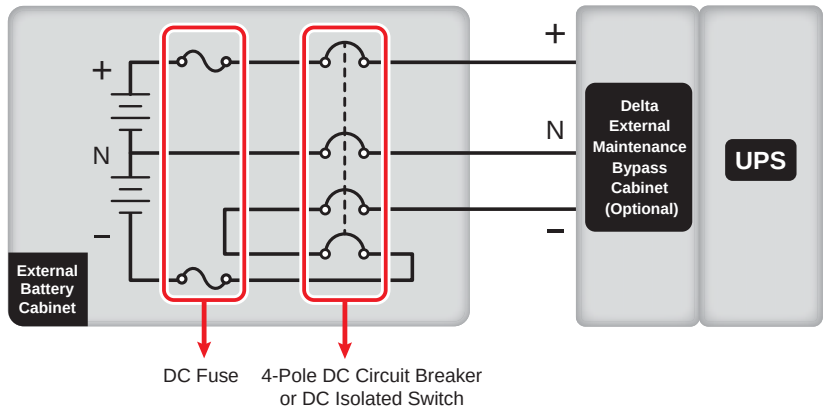
1. ***Table 5-5*** is based on 12Vdc x 40 PCS batteries (default). If you install different number of batteries, please contact Delta service personnel for protective device's current and voltage.
2. The above-mentioned DC fuse and DC circuit breaker are optional. If you want to buy any of them, please contact Delta service personnel.
3. If you need to parallel multiple units of external battery cabinets, please contact Delta service personnel for relevant information.
4. To extend backup time, you can parallel up to four units of external battery cabinets to the UPS. Please note that (1) the number of batteries in each parallel external battery cabinet shall be the same and that (2) the cable length of each battery string shall be the same.
5. If the number of batteries is lower than 36, the UPS capacity should be de-rated to 80%; otherwise, it will trigger power module over temperature protection and the UPS will run in bypass mode.

- For information about the external battery cabinet connection and wiring, please refer to ***Table 5-3***, ***Table 5-4*** and ***Table 5-5***. For the external battery cabinet's grounding information, please refer to ***Figure 5-16*** and ***Figure 5-19***. Only qualified service personnel can perform wiring or you can perform wiring only under the supervision of qualified service personnel.
- The external battery cabinet's protective device must be planned and designed by qualified service personnel. There are three types of protective devices, which are (1) DC circuit breaker, (2) DC isolated switch, and (3) DC fuse (please refer to ***Table 5-5***). When choosing the external battery cabinet's protective device, please take the following factors into consideration: (1) over current between the UPS and battery circuit, (2) short circuit, (3) wire/ cable materials, and (4) local electrical regulations. If you have any questions about the external battery cabinet's protective device, please contact Delta service personnel. Please refer to ***Figure 5-22 ~ 5-25*** for the installation of the external battery cabinet's protective device.

- A battery can present a risk of electric shock and high short-circuit current. Please handle it carefully. For selection of the protective device for the external battery cabinet, a DC circuit breaker or DC isolated switch connected in series with a DC fuse is strongly suggested. Please refer to ***Figure 5-22 ~ 5-23***.
- If you only use a DC circuit breaker as the external battery cabinet's protective device, it is suggested that you parallel several units of external battery cabinets and separately install an independent DC circuit breaker for each of the parallel external battery cabinets in order to enhance the sensitivity of current protection.

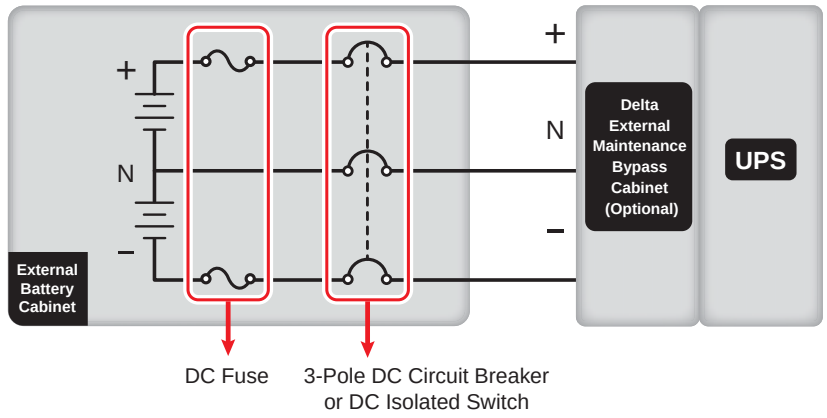
1. Option 1: A DC circuit breaker or DC isolated switch connected in series with a DC fuse (for safety reasons, this option is suggested).

1) A 4-pole DC circuit breaker or DC isolated switch (per pole voltage ≥ 250Vdc) connected in series with a DC fuse (voltage ≥ 500Vdc)



(Figure 5-22: Installation of a 4-Pole DC Circuit Breaker or DC Isolated Switch Connected in Series with a DC Fuse)

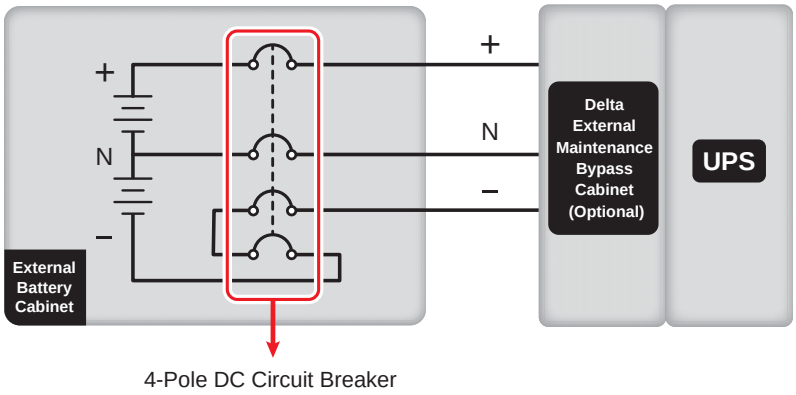
2) A 3-pole DC circuit breaker or DC isolated switch (per pole voltage ≥ 500Vdc) connected in series with a DC fuse (voltage ≥ 500Vdc)



(Figure 5-23: Installation of a 3-Pole DC Circuit Breaker or DC Isolated Switch Connected in Series with a DC Fuse)

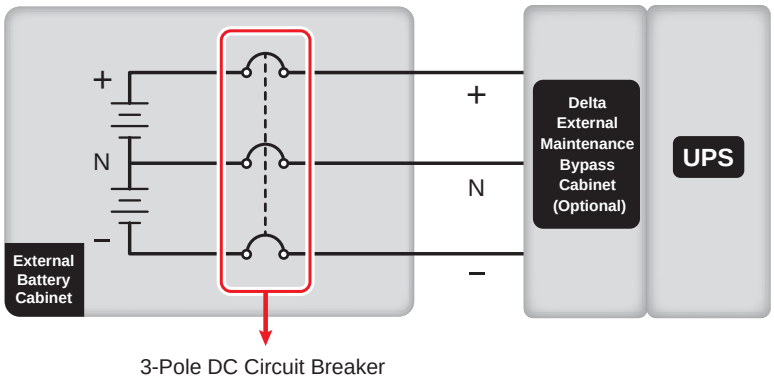
2. **Option 2: A DC circuit breaker.**

1) A 4-pole DC circuit breaker (per pole voltage ≥ 250Vdc)



(Figure 5-24: Installation of a 4-Pole DC Circuit Breaker)

2) A 3-pole DC circuit breaker (per pole voltage ≥ 500Vdc)



(Figure 5-25: Installation of a 3-Pole DC Circuit Breaker)

NOTE:

Figure 5-22 ~ 5-24 show the connections between the UPS, Delta external maintenance bypass cabinet (optional) and external battery cabinet. If you choose to use the non-Delta external maintenance bypass cabinet (user-supplied), please contact service personnel for battery wiring and configurations.

- To save on your costs and installation space, parallel UPSs (8 units at maximum) can share external battery cabinet(s). For relevant information, please refer to ***3.4 Common Battery (Only for Parallel UPSs connecting to the Same External Battery Cabinet(s))***.

WARNING:

1. Before performing battery/ battery cabinet replacement, please turn off the external battery cabinet's breaker (Q5) to isolate the battery power from the UPS completely.
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 service personnel knowledgeable in batteries, battery cabinets and the required precautions. Keep unauthorized personnel away from batteries and battery cabinets.

- **External Battery Cabinet Alarm**

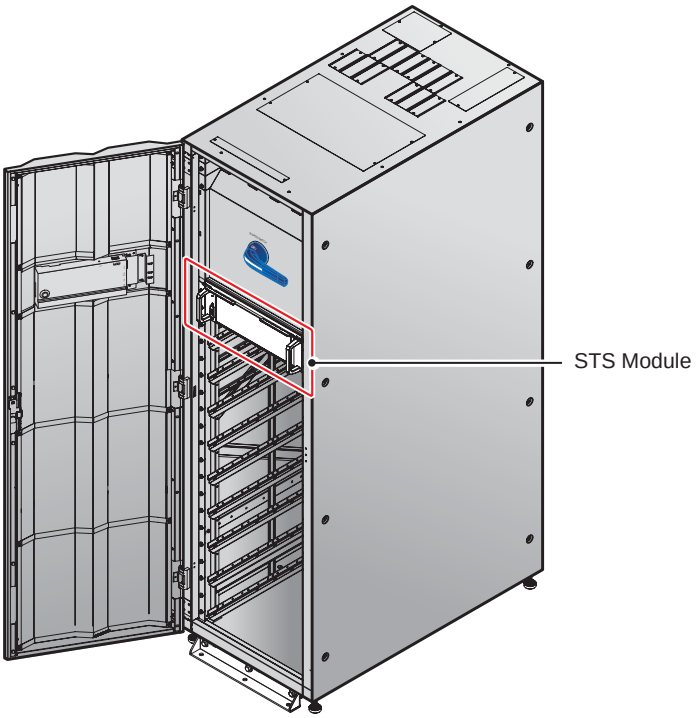
When any external battery cabinet connected to the UPS has the following problems, the UPS system will sound an alarm. Please see the table below.

No.	External Battery Cabinet Status	Alarm
1	Battery Abnormal - Reversed	Sounds 50 ms every second.
2	Battery Ground Fault	Sounds 50 ms every second.
3	Battery Over Temperature	Sounds 50 ms every second.
4	Battery Under Temperature	Sounds 50 ms every second.
5	Battery Breaker Off	Sounds 50 ms every 3 seconds.
6	Battery Disconnected (Missing)	Sounds once every second.
7	Battery Over Charged	Long beep
8	Battery Test Fail	Sounds 50 ms every second.
9	Battery End of Discharge Imminent	Sounds 50 ms every second.
10	Battery End of Discharge	Long beep.
11	Battery Lifetime Expired	Sounds 50 ms every 3 seconds.

5.7 STS Module

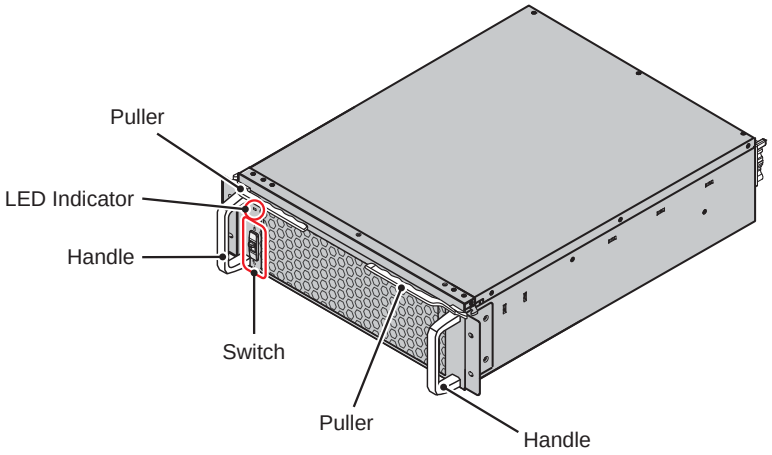
The hot swappable STS module has been installed inside the UPS in the Delta factory before shipment. Please see ***Figure 5-26*** for its location.

(UPS Front View with Door Open)



(Figure 5-26: STS Module Location)

For STS module illustration, please refer to ***Figure 5-27***.



(Figure 5-27: STS Module)

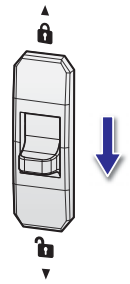
5.7.1 STS Module Installation

The hot swappable STS module has been installed inside the UPS in the Delta factory before shipment. If the STS module is removed for some reasons and you want to re-install it, please follow the steps below.

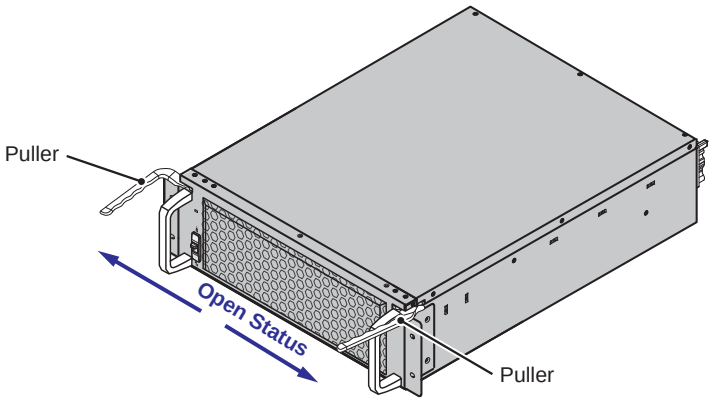
WARNING:

1. Only qualified service personnel can perform the following installation procedures.
2. The STS module is heavy (> 28 kg (61.7 lb)). At least two people are required for handling.

1 Confirm that the STS module's switch is in the lower position ( ) and the pullers are in the open status. Please refer to ***Figure 5-28*** and ***5-29***.

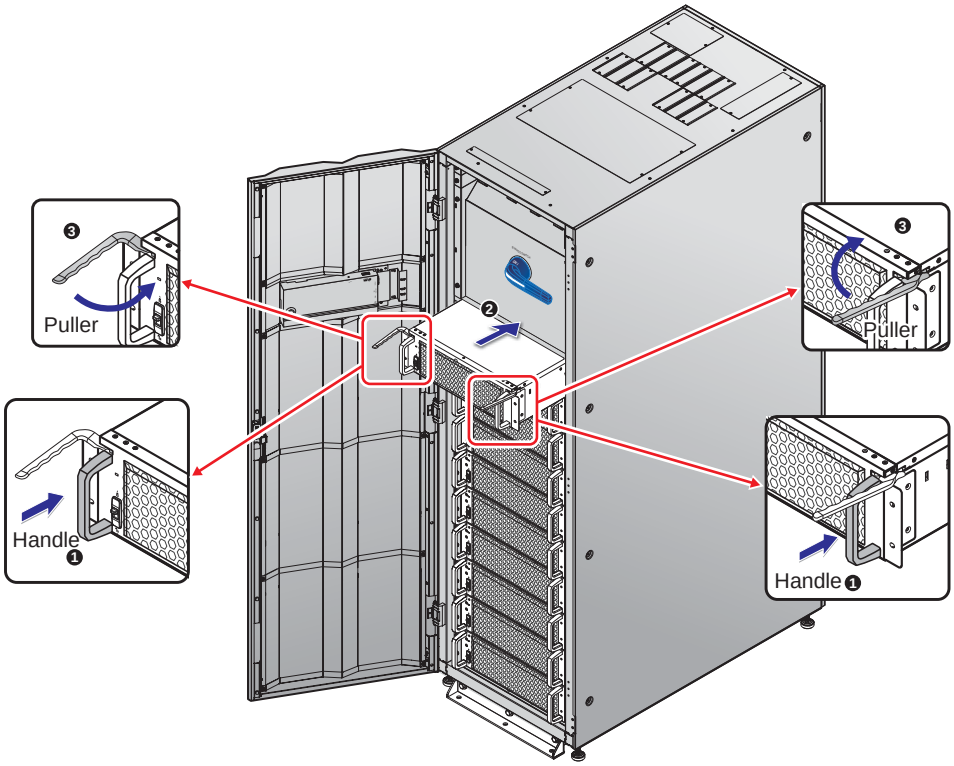


(Figure 5-28: Turn the STS Module's Switch to the Lower Position)



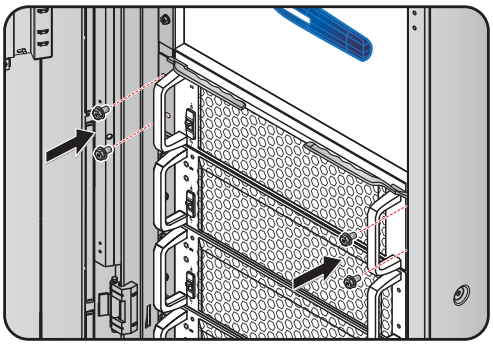
(Figure 5-29: Confirm the Pullers are in the Open Status)

2 Two people are required. Each person holds each handle of the STS module ❶ and two people work together to insert the module into the designated slot ❷. After that, one person holds the two pullers and push the two pullers inward ❸ in order to push the module into the end of the UPS cabinet until it snaps into place. After that, the two pullers will be in the closed status.



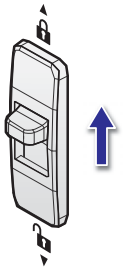
(Figure 5-30: Insert the STS Module into the UPS)

3 Re-install the four screws (removed during the STS module removal process) to firmly fix the STS module's bracket ears on the UPS cabinet.



(Figure 5-31: Fix the STS Module on the UPS)

4 Turn the STS module's switch to the upper position ( ).



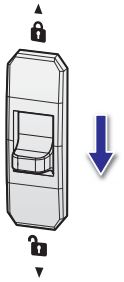
(Figure 5-32: Turn the STS Module's Switch to the Upper Position)

5.7.2 STS Module Removal

WARNING:

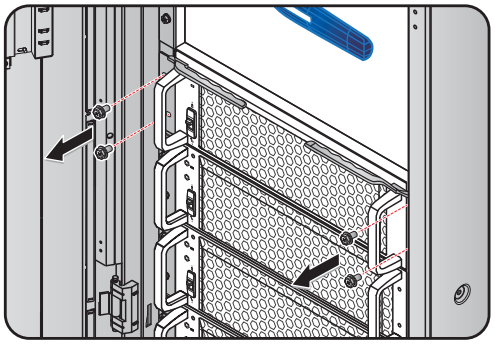
1. Only qualified service personnel can perform the following removal procedures.
2. The STS module is heavy (> 28 kg (61.7 lb)). At least two people are required for handling.

1 Turn the STS module's switch to the lower position ( ) and wait until the STS module's LED indicator becomes off.



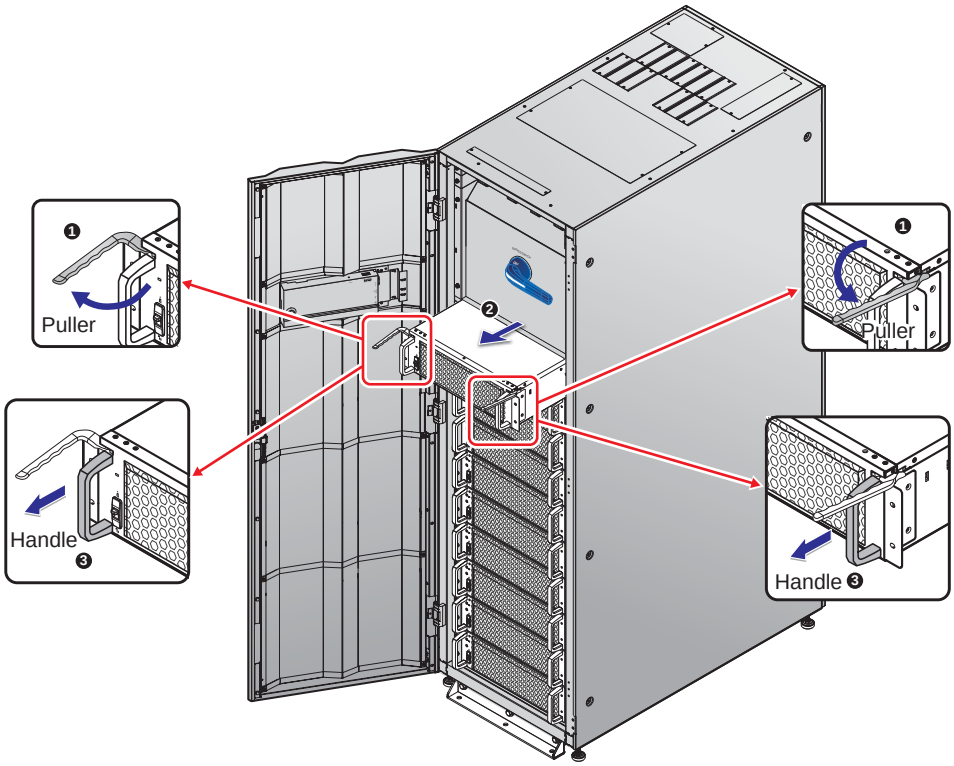
(Figure 5-33: Turn the STS Module's Switch to the Lower Position)

2 Unscrew the four screws shown in ***Figure 5-34***.

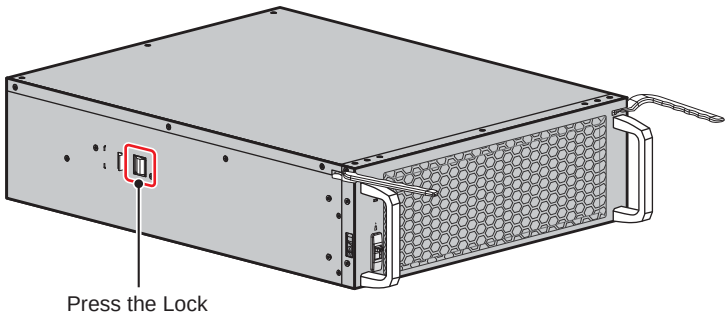


(Figure 5-34: Remove the Four Screws)

3 Two people are required. One person holds the STS module's two pullers and opens the two pullers outward ❶. After that, the STS module can be pulled out ❷ from the UPS cabinet. Another person holds the two handles ❸ and two people work together to pull out the STS module from the UPS cabinet. When the STS module cannot be pulled out any more, press the lock (see ***Figure 5-36***) on the left side of the STS module in order to continuously pull out the module from the UPS cabinet.



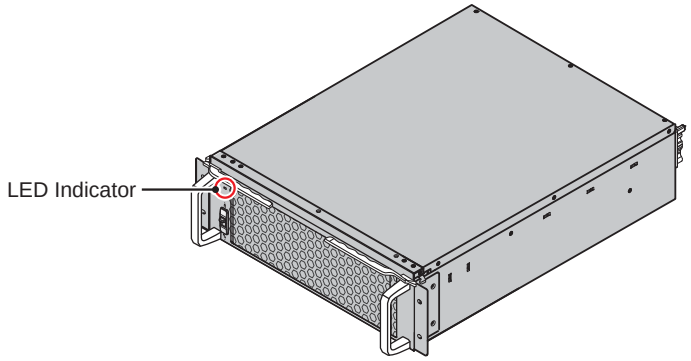
(Figure 5-35: Remove the STS Module from the UPS)



(Figure 5-36: Press the Lock of the STS Module)

5.7.3 STS Module's LED Indicator

The STS module's LED indicator shows its operation status. Please refer to the following table.



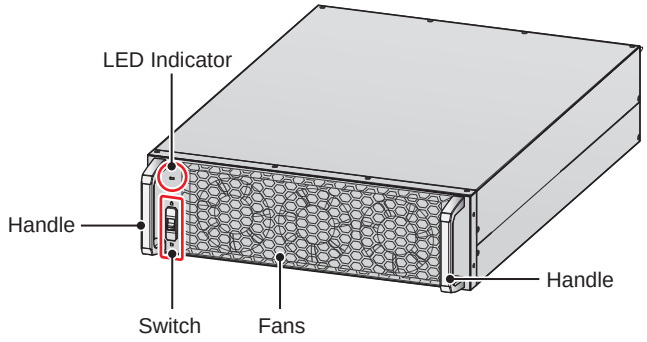
(Figure 5-37: STS Module's LED Indictor)

LED Indicator	Description
OFF	The STS module is OFF.
ON (yellow)	The STS module is working in bypass mode, ECO mode, or energy recycle mode.
Flashing (yellow)_ on for 0.3 second and off for 3 seconds	The STS module is abnormal.

NOTE:
In bypass mode, if you turn the STS module's switch to the lower position ( ), the STS module will shut down its output and its LED indicator will be off.

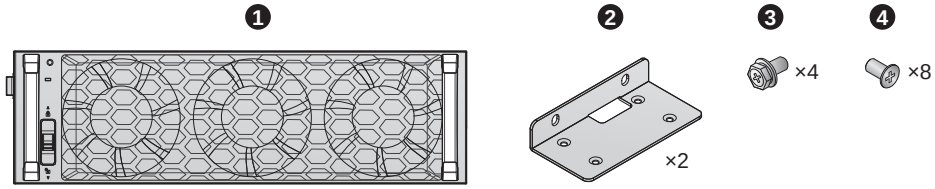
5.8 Power Module (Optional)

The power module is optional (not included in the package of the UPS). It is hot swappable and each capacity is 55.6kVA/ 50kW. Please follow UPS capacity to install appropriate number of power modules.



(Figure 5-38: Power Module (Optional))

Please see the table below for the power module's packing list.



No.	Item	Q'ty
❶	Power Module	1 PC
❷	Bracket Ear	2 PCS
❸	M6 Screw	4 PCS
❹	M4 Screw	8 PCS

5.8.1 Power Module Installation

After following ***5.4 UPS Installation*** to firmly fix the UPS in the designated installation area, follow the following steps to install the power module into the UPS.

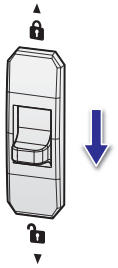
WARNING:

1. Only qualified service personnel can perform the following installation procedures.
2. The power module is heavy (> 36 kg (79.4 lb)). At least two people are required for handling.
3. Please follow UPS capacity to install appropriate number of power modules.

DPH 200 ~ 500kVA				
Capacity	200kVA/ 200kW	300kVA/ 300kW	400kVA/ 400kW	500kVA/ 450kW
Power Module Q'ty	4	6	8	9

4. Please install the power modules from the top layer of the power module slot to the bottom layer of the power module slot in sequence.

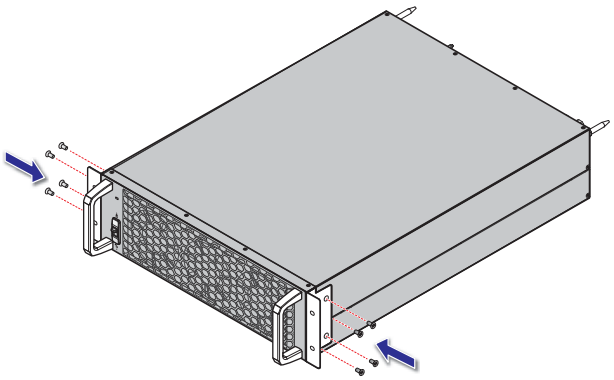
〔1〕 Confirm the power module's switch is in the lower position ( ).



(Figure 5-39: Turn the Power Module's Switch to the Lower Position)

2 Take out the two bracket ears, four M6 screws and eight M4 screws from the power module's package.

3 Use the provided eight M4 screws to fix the provided two bracket ears on the two sides of the power module. Please refer to ***Figure 5-40***.



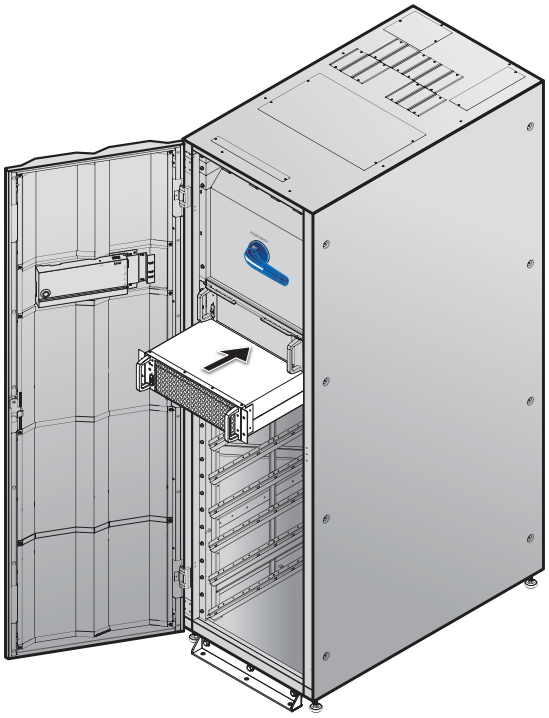
(Figure 5-40: Install the Two Bracket Ears)

4 Insert the power module into the power module slot until it snaps into place. Two people are required.

NOTE:

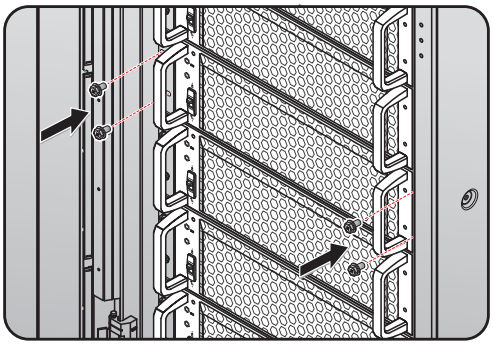
Please install the power modules from the top layer of the power module slot to the bottom layer of the power module slot in sequence.

(UPS Front View with Door Open)



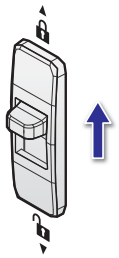
(Figure 5-41: Insert the Power Module into the UPS)

5 Use the provided four M6 screws to firmly fix the power module on the UPS.



(Figure 5-42: Fix the Power Module on the UPS)

6 Turn the power module's switch to the upper position ( ).



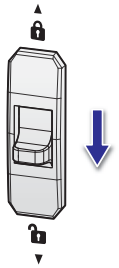
(Figure 5-43: Turn the Power Module's Switch to the Upper Position)

5.8.2 Power Module Removal

WARNING:

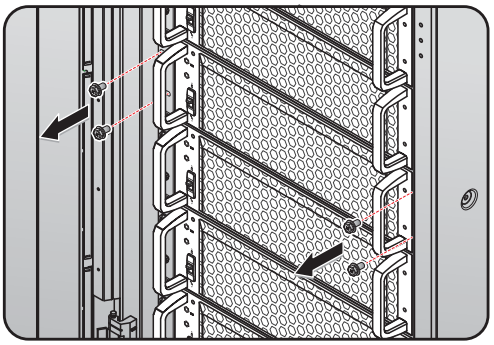
1. Before removing any power module, make sure that the remaining power modules can support the connected critical loads.
2. Only qualified service personnel can perform the following removal procedures.
3. The power module is heavy (> 36 kg (79.4 lb)). At least two people are required for handling.

1 Turn the power module's switch to the lower position ( ). After that, the power module will start discharging. After discharging, the power module's LED indicator will be off.



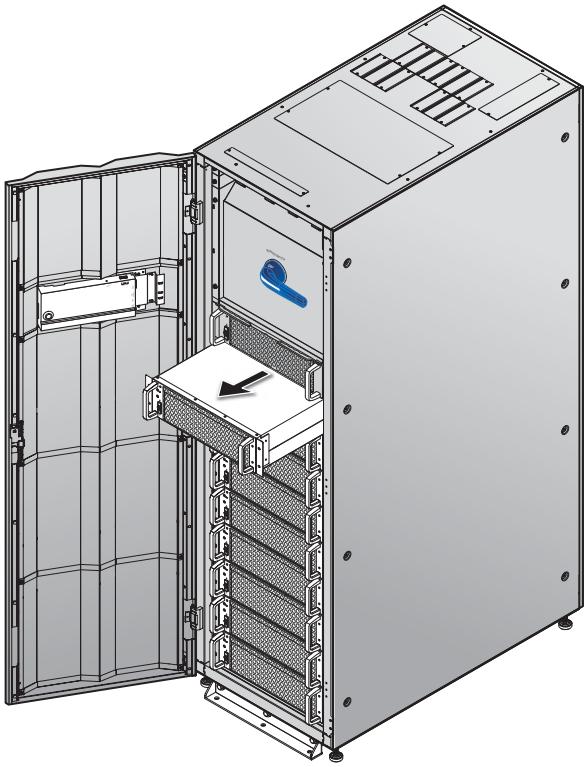
(Figure 5-44: Turn the Power Module's Switch to the Lower Position)

2 Use a screwdriver to remove the four screws shown in ***Figure 5-45***.

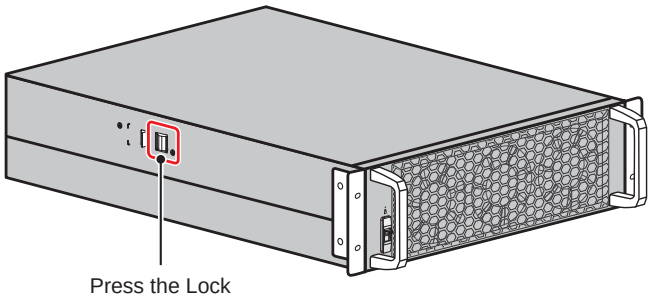


(Figure 5-45: Remove the Four Screws)

3 Pull out the power module from the slot (two people are required) (see ***Figure 5-46***). When the power module cannot be pulled out any more, press the lock (see ***Figure 5-47***) on the left side of the power module in order to continuously pull out the module from the UPS cabinet.



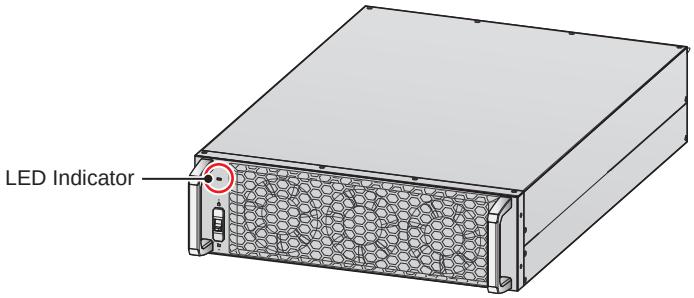
(Figure 5-46: Remove the Power Module)



(Figure 5-47: Press the Lock of the Power Module)

5.8.3 Power Module's LED Indicator

The power module's LED indicator shows its operation status. Please refer to the following table.

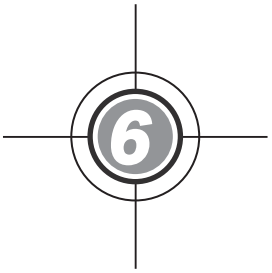


(Figure 5-48: Power Module's LED Indicator)

LED Indicator	Description
OFF	The power module is OFF.
ON (green)	1. The power module is running in online mode or in battery mode. 2. The power module's inverter starts up. 3. The power module's PFC starts up.
Flashing (green)_ on for 2 seconds and off for 1 second	The power module is under discharging process.
Flashing (green)_ on for 0.3 second and off for 3 seconds	The power module is abnormal.

NOTE:

In online mode, if you turn the power module's switch to the lower position ( ), the power module will shut down its output and discharge the DC BUS voltage until the voltage reaches to a safety level. After that, the power module's LED indicator will be off.



UPS Operation

6.1 Pre Start-up & Pre Turn-off Warnings for Single Unit and Parallel Units

6.2 Start-up Procedures

6.3 Turn-off Procedures

6.1 Pre Start-up & Pre Turn-off Warnings for Single Unit and Parallel Units

NOTE:

1. The information on the LCD screen presented in this chapter, including the UPS operation mode, machine number, date, time, total number of alarms, load%, battery remaining time, user login or administrator login, are for reference only. The actual screen displayed will depend on the actual operation situation.
2. The meaning of Q0, Q1, Q2, Q3, Q4 and Q5 in this user manual is described in the table below.

Code	Meaning
Q0	UPS bypass switch.
Q1	The input breaker or switch of the Delta or non-Delta external maintenance bypass cabinet.
Q2	The bypass breaker or switch of the Delta or non-Delta external maintenance bypass cabinet.
Q3	The manual bypass breaker or switch of the Delta or non-Delta external maintenance bypass cabinet.
Q4	The output breaker or switch of the Delta or non-Delta external maintenance bypass cabinet.
Q5	External battery cabinet's breaker.

3. Before operation, please make sure that ***5. Installation and Wiring*** has been completed in compliance with relevant instructions.
4. Before operation, please refer to ***2.8 Tri-color LED Indicator & Buzzers*** and ***7. LCD Display & Settings***.

Single Unit

- **Pre Start-up Warnings for Single Unit**

1. Make sure that all of switches and breakers, including every external battery cabinet's breaker, are turned to the **OFF** position.
2. Make sure that the UPS and Delta or non-Delta External Maintenance Bypass Cabinet's voltage difference between the Neutral (N) and PE (⏚) is below 3V.
3. Check if the wiring is correct. Ensure that the AC power's voltage, frequency, phase and battery type meet the UPS's requirements.
4. Check if all power modules are properly installed and every power module's switch is in the upper position ( ). Please refer to ***5.8 Power Module (Optional)*** for more information.

- **Pre Turn-off Warnings for Single Unit**

  If you perform turn-off procedures for single unit, all power 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.

Parallel Units

- **Pre Start-up Warnings for Parallel Units**

  1. You can parallel eight UPS units at maximum.
  2. For parallel units, ensure that each parallel cable (provided) is connected well.
  3. Make sure that all switches and breakers, including individual breakers of the external battery cabinet, are turned to the **OFF** position.
  4. Make sure that each UPS and Delta or non-Delta External Maintenance Bypass Cabinet's voltage difference between the Neutral (N) and PE (⏚) is below 3V.
  5. Check if the wiring is correct. Ensure that the AC power's voltage, frequency, phase and battery type meet the UPS's requirements.
  6. Check if all power modules are properly installed and every power module's switch is in the upper position (). Please refer to ***5.8 Power Module (Optional)*** for more information.
  7. For parallel units, ensure that every operation procedure mentioned below is synchronized to all parallel UPSs.
  8. For parallel application, if you just want to operate a specific UPS but not all parallel ones, please contact service personnel.

- **Pre Turn-off Warnings for Parallel Units**

  1. If you want to turn off one of the parallel UPSs, please check whether the remaining parallel units' total capacity exceeds the total critical loads. If the remaining parallel units' total capacity is less than the total critical loads, all parallel units will shut down due to overload.
  2. If you perform turn-off procedures for all parallel UPSs, all power will be completely cut off. Please make sure that the critical loads connected to the parallel UPSs have already been safely shut down before you perform the turn-off procedures.

6.2 Start-up Procedures

6.2.1 Online Mode Start-up Procedures

WARNING:

1. For parallel units, please follow ***6.2.3 Bypass Mode Start-up Procedures*** to turn on each parallel UPS. After confirming that parallel operation can be normally run, follow the following procedures step by step.
2. For parallel units, ensure that every operation procedure mentioned below is synchronized to all parallel UPSs.
3. For parallel application, if you just want to operate a specific UPS but not all parallel ones, please contact service personnel.

1 Ensure that the manual bypass breaker or switch (Q3) of the Delta or non-Delta external maintenance bypass cabinet is in the **OFF** position.

2 Switch **ON** each external battery cabinet's breaker (Q5).

3 **Single Input:**

Switch **ON** the bypass switch (Q0) of the UPS, the input breaker or switch (Q1) and the output breaker or switch (Q4) of the Delta or non-Delta external maintenance bypass cabinet.

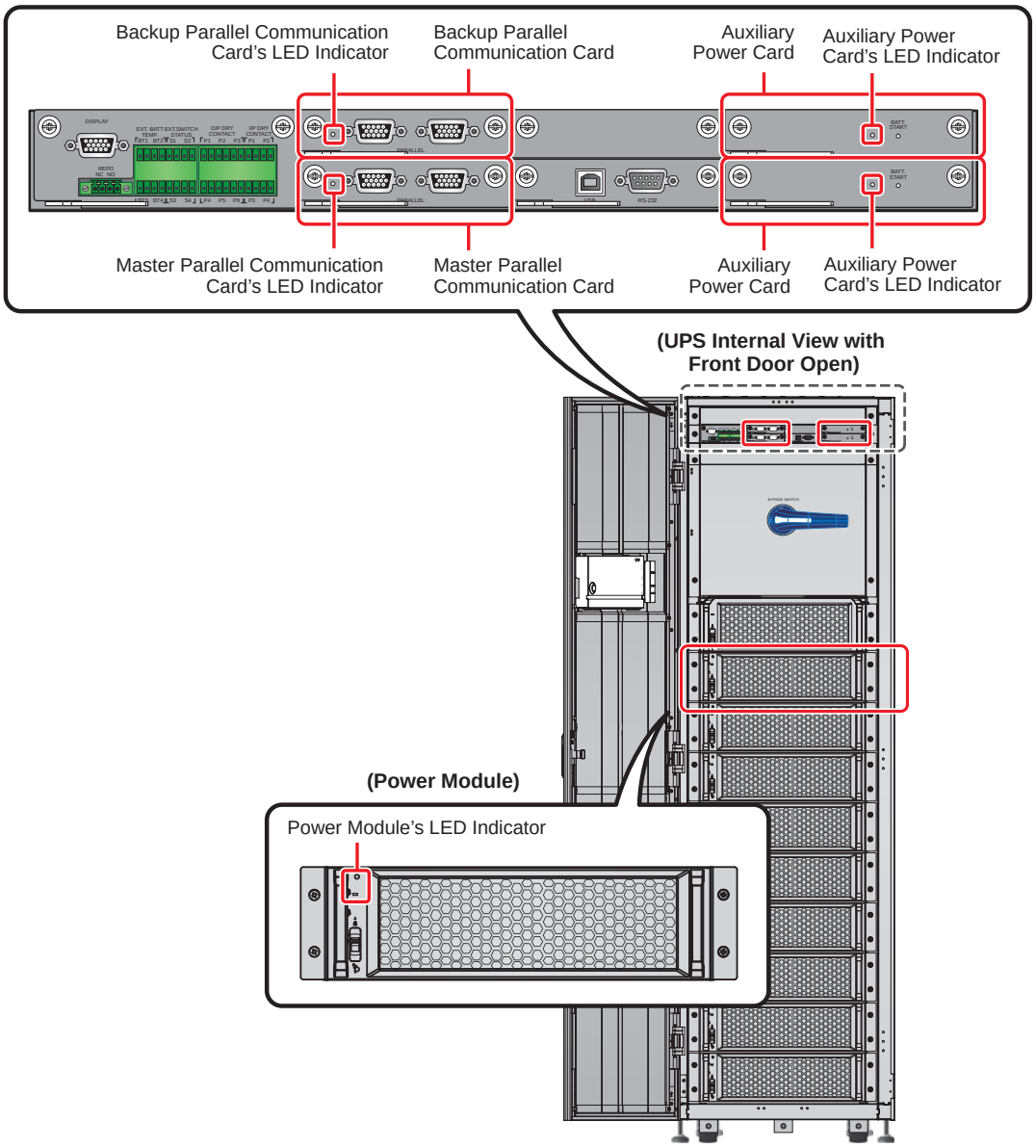
Dual Input:

Switch **ON** the bypass switch (Q0) of the UPS, the input breaker or switch (Q1), the bypass breaker or switch (Q2) and the output breaker or switch (Q4) of the Delta or non-Delta external maintenance bypass cabinet.

4 After you switch **ON** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and bypass breaker or switch (Q2), each auxiliary power card's LED indicator will illuminate green and the following status will occur simultaneously.

1. The system and each power module will start initialization. After each power module finishes initialization, each power module's fans will start running, each power module will start establishing DC BUS voltage and each power module's LED indicator will illuminate green.
2. Each parallel communication card's LED indicator will illuminate red first and then each parallel communication card will start initialization. After initialization, the master parallel communication card's LED indicator will illuminate green and the backup communication card's LED indicator will illuminate yellow.

For the locations of parallel communication cards, auxiliary power cards, power modules and associated LED indicators, please refer to ***Figure 6-1***.



(Figure 6-1: The Locations of Parallel Communication Cards, Auxiliary Power Cards, Power Modules and Associated LED Indicators)

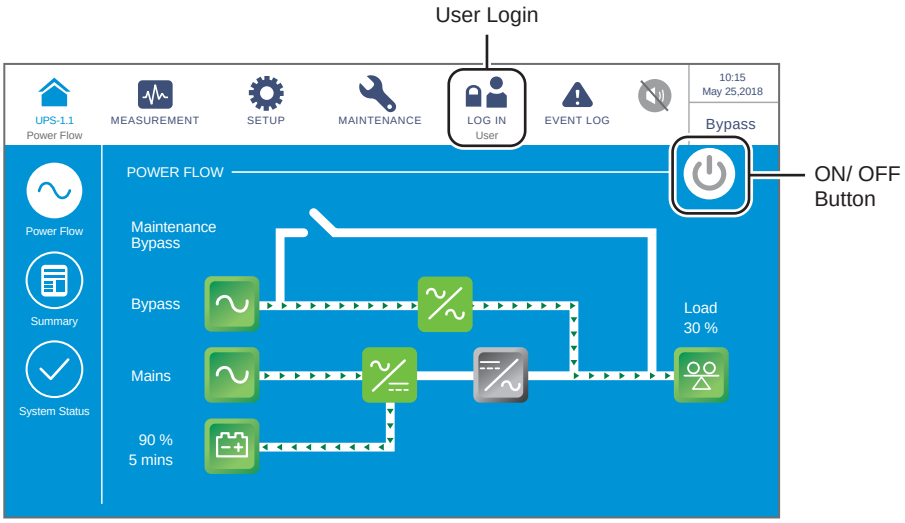
5 The LCD initial screen (see ***Figure 6-2***) will appear within 40 seconds after the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and bypass breaker or switch (Q2) are turned on.

(Figure 6-2 : LCD Initial Screen)

6 After 20 seconds of LCD initialization, the LCD will enter the **Main Screen**. For the **Main Screen** information, please refer to ***7.6 Main Screen***.

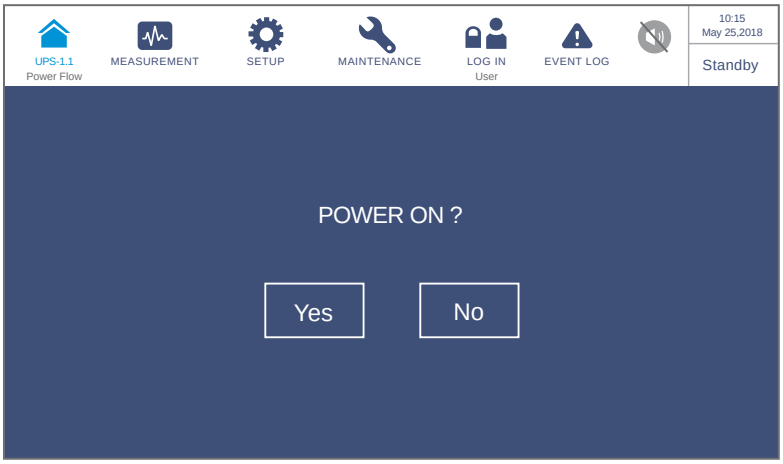
Now, each power module keeps running and its LED indicator remains green. After the power module finishes establishing DC BUS voltage, the charger will start to charge the batteries.

If the bypass AC source is within the normal range, the UPS will transfer to run in bypass mode, the LCD screen will show as ***Figure 6-3*** and the tri-color LED indicator will illuminate yellow.



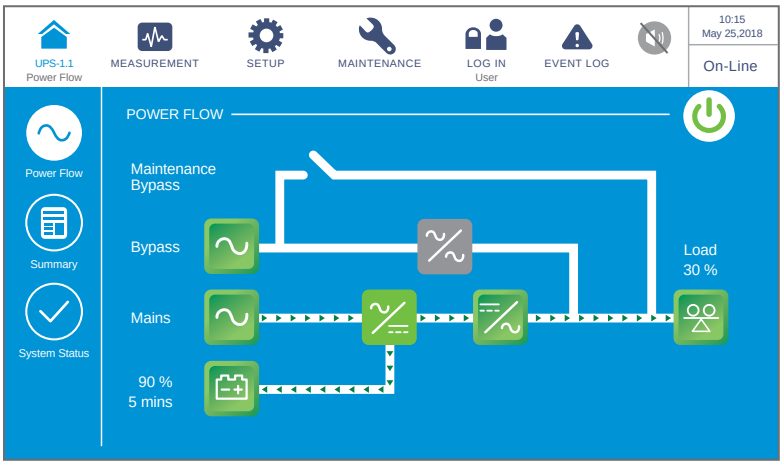
(Figure 6-3 : Main Screen_ User Login & ON/ OFF Button Location)

7 Press the ON/ OFF button ( ) once and the following screen will pop up to ask you if you want to power on the UPS's inverter. Please select '**YES**'.



(Figure 6-4: Power on Reminder Screen)

8 After selection of '**YES**' to start up the UPS's inverter, each power module will start up and perform self-inspection. At the same time, the system begins synchronization with the bypass AC source. After the self-inspection is completed, the UPS will automatically transfer to run in online mode, the tri-color LED indicator will illuminate green and the following screen will appear.



(Figure 6-5 : Online Mode Screen)

6.2.2 Battery Mode Start-up Procedures

WARNING:

1. For parallel units, please follow ***6.2.3 Bypass Mode Start-up Procedures*** to turn on each parallel UPS. After confirming that parallel operation can be normally run, follow the following procedures step by step.
2. For parallel units, ensure that every operation procedure mentioned below is synchronized to all parallel UPSs.
3. For parallel application, if you just want to operate a specific UPS but not all parallel ones, please contact service personnel.

1 Ensure that the manual bypass breaker or switch (Q3) of the Delta or non-Delta external maintenance bypass cabinet is in the **OFF** position.

2 Switch **ON** each external battery cabinet's breaker (Q5).

3 Switch **ON** the Delta or non-Delta external maintenance bypass cabinet's output breaker or switch (Q4).

4 Press any of the **BATT. START** buttons (see ***Figure 7-2***) for one second and release it. After that, each auxiliary power card's LED indicator will illuminate green and the following status will occur simultaneously.

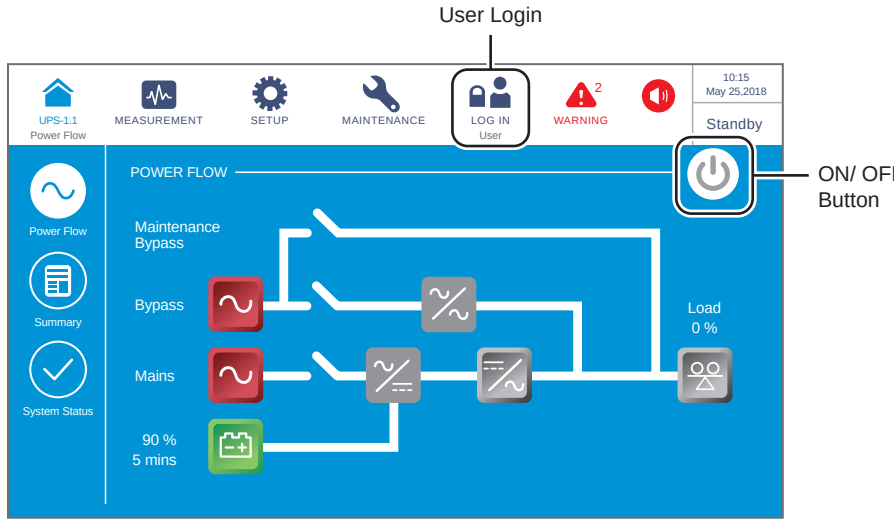
1. The system and each power module will start initialization. After each power module finishes initialization, each power module's fans will start running.
2. Each parallel communication card's LED indicator will illuminate red first and then each parallel communication card will start initialization. After initialization, the master parallel communication card's LED indicator will illuminate green and the backup communication card's LED indicator will illuminate yellow.

For the locations of parallel communication cards, auxiliary power cards, power modules and associated LED indicators, please refer to ***Figure 6-1***.

5 The LCD initial screen (see ***Figure 6-6***) will appear within 40 seconds after each auxiliary power card's LED indicator illuminates green.

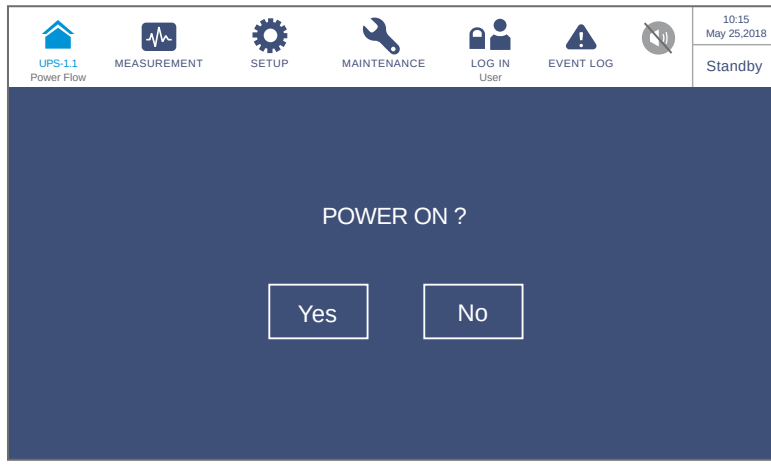
(Figure 6-6 : LCD Initial Screen)

6 After 20 seconds of LCD initialization, the LCD will enter the **Main Screen** shown in ***Figure 6-7*** and the tri-color LED indicator will illuminate yellow.



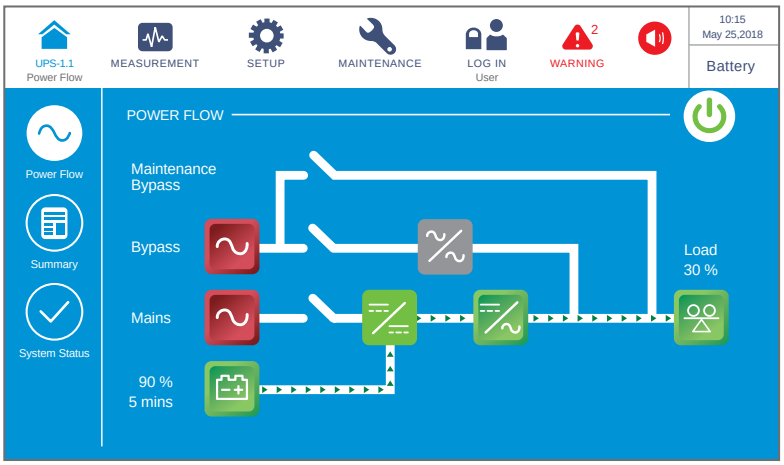
(Figure 6-7 : Main Screen_ User Login & ON/ OFF Button Location)

7 Press the ON/ OFF button (⏻) once and the following screen will pop up to ask you if you want to power on the UPS's inverter. Please select '**YES**'.



(Figure 6-8: Power On Reminder Screen)

8 After selection of '**YES**' to start up the UPS's inverter, the power module will start up and perform self-inspection and the LED indicator of the power module will illuminate green. After the self-inspection is completed, the UPS will automatically transfer to run in battery mode. At this moment, the tri-color LED indicator illuminates yellow and the following screen appears.



(Figure 6-9 : Battery Mode Screen)

6.2.3 Bypass Mode Start-up Procedures

WARNING:

1. For parallel units, ensure that every operation procedure mentioned below is synchronized to all parallel UPSs.
2. For parallel application, if you just want to operate a specific UPS but not all parallel ones, please contact service personnel.

1 Ensure that the manual bypass breaker or switch (Q3) of the Delta or non-Delta external maintenance bypass cabinet is in the **OFF** position.

2 Switch **ON** each external battery cabinet's breaker (Q5).

3 **Single Input:**

Switch **ON** the bypass switch (Q0) of the UPS and the input breaker or switch (Q1) of the Delta or non-Delta external maintenance bypass cabinet.

Dual Input:

Switch **ON** the bypass switch (Q0) of the UPS, the input breaker or switch (Q1) and the bypass breaker or switch (Q2) of the Delta or non-Delta external maintenance bypass cabinet.

4 After you switch **ON** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and bypass breaker or switch (Q2), each auxiliary power card's LED indicator will illuminate green and the following status will occur simultaneously.

1. The system and each power module will start initialization. After each power module finishes initialization, each power module's fans will start running, each power module will start establishing DC BUS voltage and each power module's LED indicator will illuminate green.
2. Each parallel communication card's LED indicator will illuminate red first and then each parallel communication card will start initialization. After initialization, the master parallel communication card's LED indicator will illuminate green and the backup communication card's LED indicator will illuminate yellow.

For the locations of parallel communication cards, auxiliary power cards, power modules and associated LED indicators, please refer to ***Figure 6-1***.

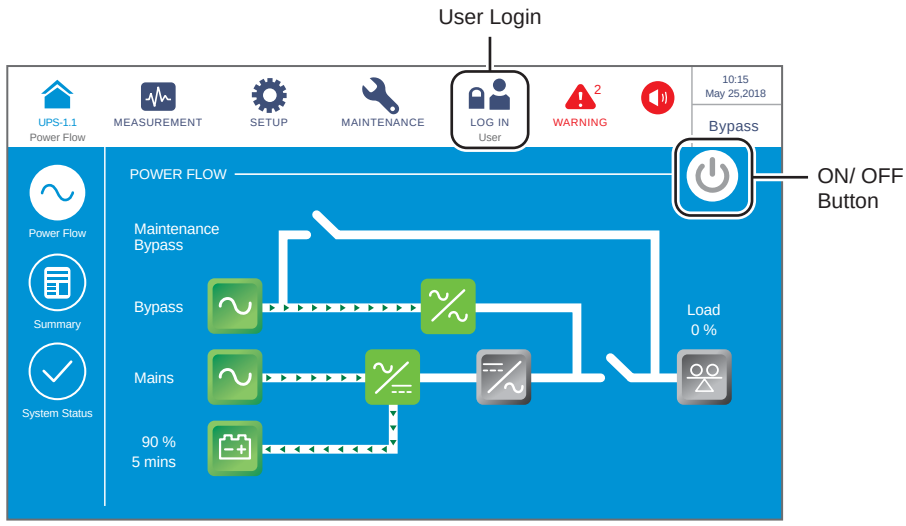
5 The LCD initial screen (see ***Figure 6-10***) will appear within 40 seconds after the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and bypass breaker or switch (Q2) are turned on.

(Figure 6-10 : LCD Initial Screen)

6 After 20 seconds of LCD initialization, the LCD will enter the **Main Screen**. For the **Main Screen** information, please refer to ***7.6 Main Screen***.

Now, each power module keeps running and its LED indicator remains green. After each power module finishes establishing DC BUS voltage, the charger will start to charge the batteries.

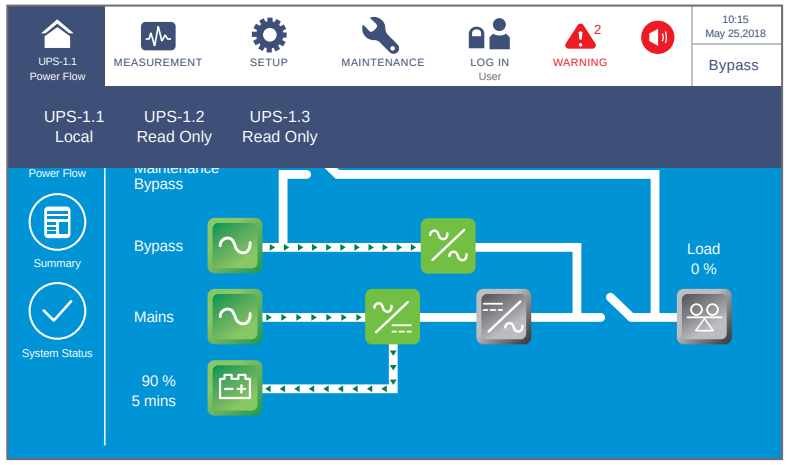
If the bypass AC source is within the normal range, the UPS will transfer to run in bypass mode, the LCD screen will show as ***Figure 6-11*** and the tri-color LED indicator will illuminate yellow.



(Figure 6-11 : Main Screen_ User Login & ON/ OFF Button Location)

7 For parallel application, please check each parallel UPS's parallel settings. Please note that each parallel UPS's parallel ID No. must be different, and parallel group No., input, output and battery settings must be the same.

8 For parallel application, press the icon (UPS-1.1) located in the upper left corner of the screen and check if the total number of the parallel UPSs is correct. The UPS with the smallest parallel ID No. is defined as the master unit. Please refer to ***Figure 6-12***.

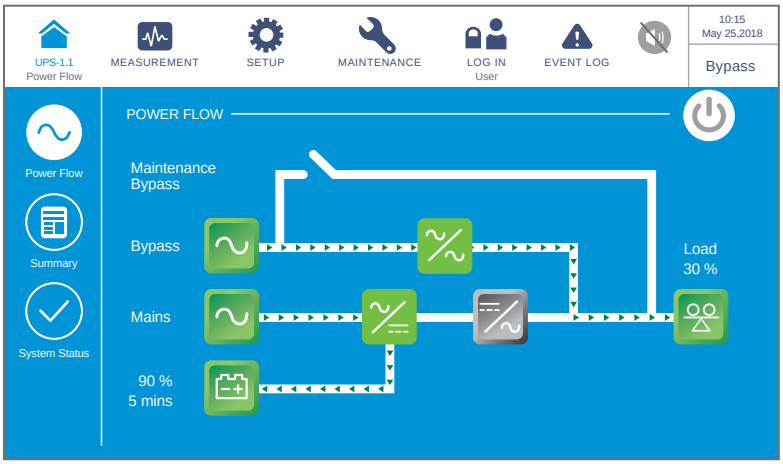


(Figure 6-12: Parallel ID No. Inquiry Screen)

9 For single unit, turn on the Delta or non-Delta external maintenance bypass cabinet's output breaker or switch (Q4).

For parallel units, ensure that the output voltage difference between each parallel UPS is below 3V. If larger than 3V, it means abnormal and please contact service personnel immediately. If below 3V, turn on each Delta or non-Delta external maintenance bypass cabinet's output breaker or switch (Q4).

Now, the tri-color LED indicator illuminates yellow and the LCD shows the following screen (see ***Figure 6-13***).



(Figure 6-13: Bypass Mode Screen)

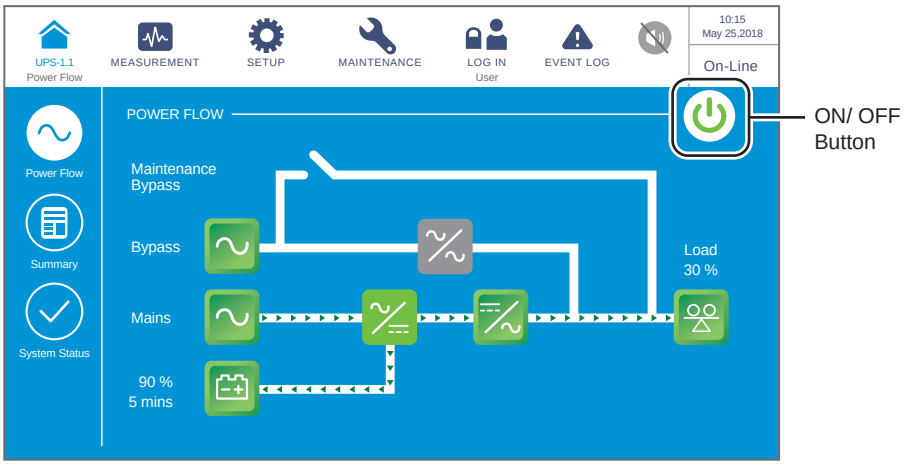
6.2.4 Manual Bypass Mode Start-up Procedures

WARNING:

1. For parallel units, ensure that every operation procedure mentioned below is synchronized to all parallel UPSs.
2. For parallel application, if you just want to operate a specific UPS but not all parallel ones, please contact service personnel.
3. Please note that you can turn on the Delta or non-Delta external maintenance bypass cabinet's manual bypass breaker or switch (Q3) only when the UPS needs maintenance. In manual bypass mode, the connected critical loads will be supplied by the manual bypass and the output won't be protected. Please ensure that the bypass AC source is normal.
4. In manual bypass mode, the connected critical loads will be supplied by the manual bypass; thus, maintenance personnel can perform maintenance without interrupting the power supplying to the critical loads.
5. Ensure that all of the breakers and switches (except the Delta or non-Delta external maintenance bypass cabinet's manual bypass breaker or switch (Q3)) are in the **OFF** position, and use a voltmeter to check there is no high voltage inside the UPS. Only after confirmation can service personnel perform UPS maintenance.
6. Please note that, during UPS maintenance process, the Delta or non-Delta external maintenance bypass cabinet has high voltage. Do not touch the Delta or non-Delta external maintenance bypass cabinet to avoid electric shock.

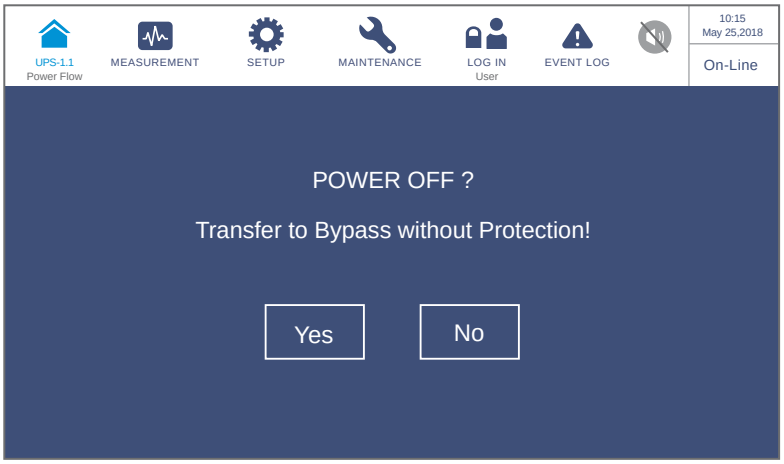
- **Switching from online mode to manual bypass mode**

1 When the UPS is in online mode, the main screen will appear shown in the figure below. At this time, the tri-color LED indicator will illuminate green.



(Figure 6-14: Online Mode Screen_ User Login & ON/ OFF Button Location)

2 Press the ON/ OFF button (⏻) once and the following screen will pop up to ask you if you want to power off the UPS's inverter.



(Figure 6-15: Power Off Reminder Screen)

3 Check if the bypass voltage and STS module are normal or not. If normal, please select '**YES**'. After that, the UPS will shut down the inverter and transfer to run in bypass mode.

4 Ensure that the UPS runs in bypass mode. After confirmation, turn on the Delta or non-Delta external maintenance bypass cabinet's manual bypass breaker or switch (Q3).

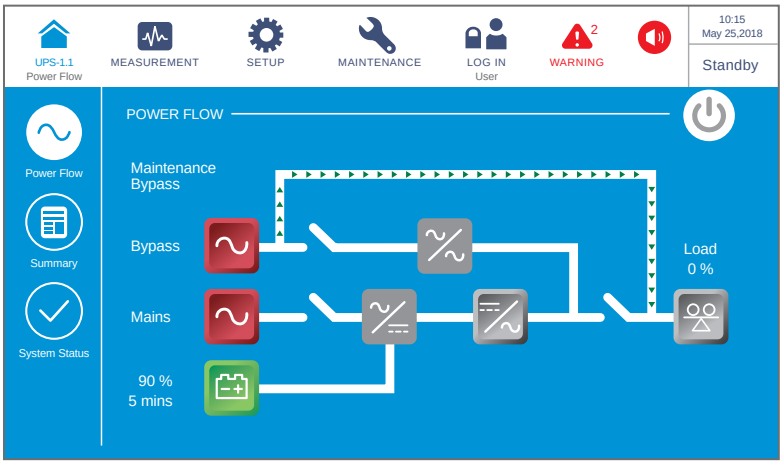
5 **Single Input:**

Switch **OFF** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and output breaker or switch (Q4).

Dual Input:

Switch **OFF** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1), bypass breaker or switch (Q2) and output breaker or switch (Q4).

After that, the screen shows as follows.



(Figure 6-16 : Manual Bypass Mode Screen)

6 When the UPS is discharging DC bus voltage, the LED indicator on each power module will flash green. After discharging is completed, the LED indicator of each power module will be off.

7 After three minutes, the UPS will shut down, and the LCD and the tri-color LED indicator will be off.

8 Switch **OFF** each external battery cabinet's breaker (Q5).

- **Switching from manual bypass mode to online mode**

WARNING:

1. For parallel units, ensure that every operation procedure mentioned below is synchronized to all parallel UPSs.
2. For parallel application, if you just want to operate a specific UPS but not all parallel ones, please contact service personnel.

1 Switch **ON** each external battery cabinet's breaker (Q5).

2 **Single Input:**

Switch **ON** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and output breaker or switch (Q4).

Dual Input:

Switch **ON** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1), bypass breaker or switch (Q2) and output breaker or switch (Q4).

3 After you switch **ON** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and bypass breaker or switch (Q2), each auxiliary power card's LED indicator will illuminate green and the following status will occur simultaneously.

1. The system and each power module will start initialization. After each power module finishes initialization, each power module's fans will start running, each power module will start establishing DC BUS voltage and each power module's LED indicator will illuminate green.
2. Each parallel communication card's LED indicator will illuminate red first and then each parallel communication card will start initialization. After initialization, the master parallel communication card's LED indicator will illuminate green and the backup communication card's LED indicator will illuminate yellow.

For the locations of parallel communication cards, auxiliary power cards, power modules and associated LED indicators, please refer to ***Figure 6-1***.

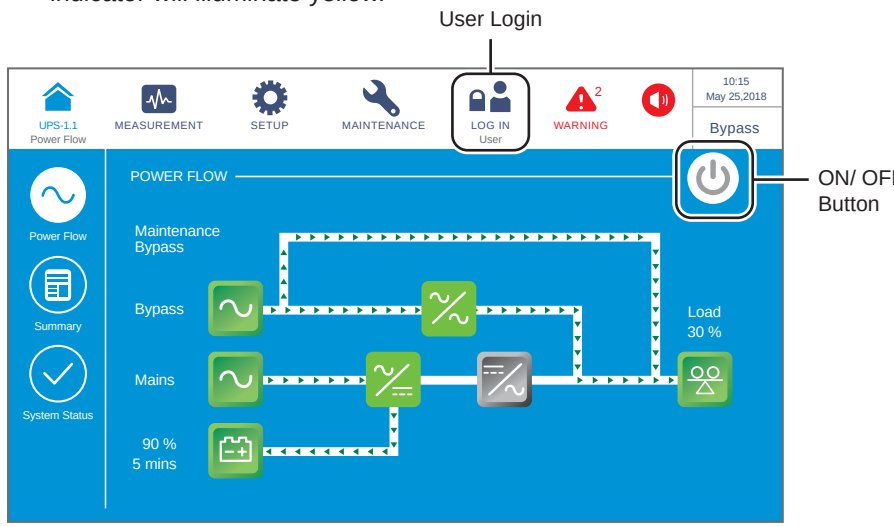
4 The LCD initial screen (see ***Figure 6-17***) will appear within 40 seconds after the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and bypass breaker or switch (Q2) are turned on.

(Figure 6-17 : LCD Initial Screen)

5 After 20 seconds of LCD initialization, the LCD will enter the **Main Screen**. For the **Main Screen** information, please refer to ***7.6 Main Screen***.

Now, each power module keeps running and its LED indicator remains green. After each power module finishes establishing DC BUS voltage, the charger will start to charge the batteries.

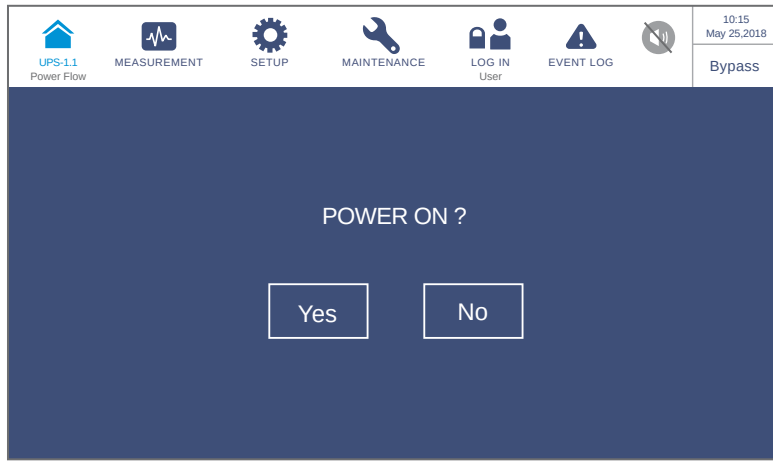
If the bypass AC source is within the normal range, the UPS will transfer to run in bypass mode, the LCD screen will show as ***Figure 6-18*** and the tri-color LED indicator will illuminate yellow.



(Figure 6-18 : Manual Bypass Mode Screen_ User Login & ON/ OFF Button Location)

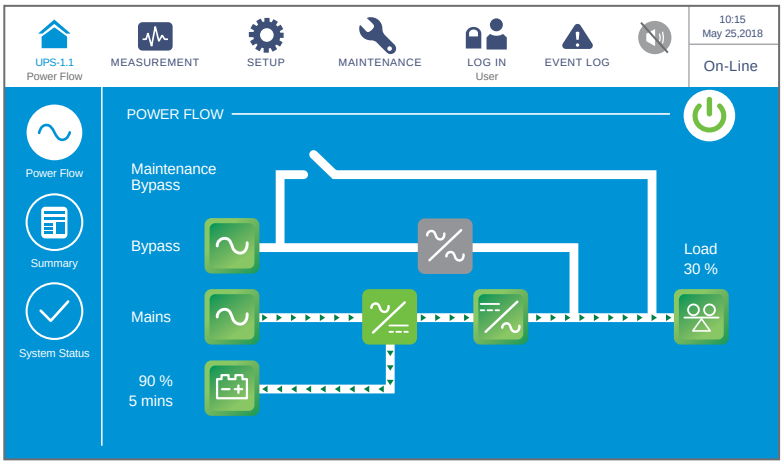
6 Switch **OFF** the Delta or non-Delta external maintenance bypass cabinet's manual bypass breaker or switch (Q3).

7 Press the ON/ OFF button (⏻) once and the following screen will pop up to ask you if you want to power on the UPS's inverter. Please select '**YES**'.



(Figure 6-19: Power On Reminder Screen)

8 After selection of '**YES**' to start up the inverter, each power module will start up and perform self-inspection. At the same time, the system begins synchronization with the bypass AC source. After the self-inspection is completed, the UPS will automatically transfer to run in online mode, the tri-color LED indicator will illuminate green and the following screen will appear.



(Figure 6-20: Online Mode Screen)

6.2.5 ECO Mode Start-up Procedures

WARNING:

1. For parallel units, please follow ***6.2.3 Bypass Mode Start-up Procedures*** to turn on each parallel UPS. After confirming that parallel operation can be normally run, follow the following procedures step by step.
2. For parallel units, ensure that every operation procedure mentioned below is synchronized to all parallel UPSs.
3. For parallel application, if you just want to operate a specific UPS but not all parallel ones, please contact service personnel.

1 Ensure that the manual bypass breaker or switch (Q3) of the Delta or non-Delta external maintenance bypass cabinet is in the **OFF** position.

2 Switch **ON** each external battery cabinet's breaker (Q5).

3 **Single Input:**

Switch **ON** the bypass switch (Q0) of the UPS, the input breaker or switch (Q1) and the output breaker or switch (Q4) of the Delta or non-Delta external maintenance bypass cabinet.

Dual Input:

Switch **ON** the bypass switch (Q0) of the UPS, the input breaker or switch (Q1), the bypass breaker or switch (Q2) and the output breaker or switch (Q4) of the Delta or non-Delta external maintenance bypass cabinet.

4 After you switch **ON** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and bypass breaker or switch (Q2), each auxiliary power card's LED indicator will illuminate green and the following status will occur simultaneously.

1. The system and each power module will start initialization. After each power module finishes initialization, each power module's fans will start running, each power module will start establishing DC BUS voltage and each power module's LED indicator will illuminate green.
2. Each parallel communication card's LED indicator will illuminate red first and then each parallel communication card will start initialization. After initialization, the master parallel communication card's LED indicator will illuminate green and the backup communication card's LED indicator will illuminate yellow.

For the locations of parallel communication cards, auxiliary power cards, power modules and associated LED indicators, please refer to ***Figure 6-1***.

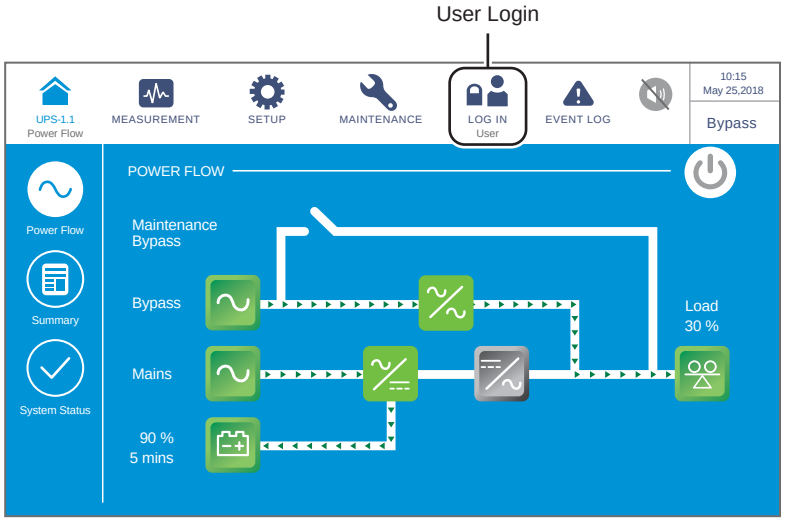
5 The LCD initial screen (see ***Figure 6-21***) will appear within 40 seconds after the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and bypass breaker or switch (Q2) are turned on.

(Figure 6-21 : LCD Initial Screen)

6 After 20 seconds of LCD initialization, the LCD will enter the **Main Screen**. For the **Main Screen** information, please refer to ***7.6 Main Screen***.

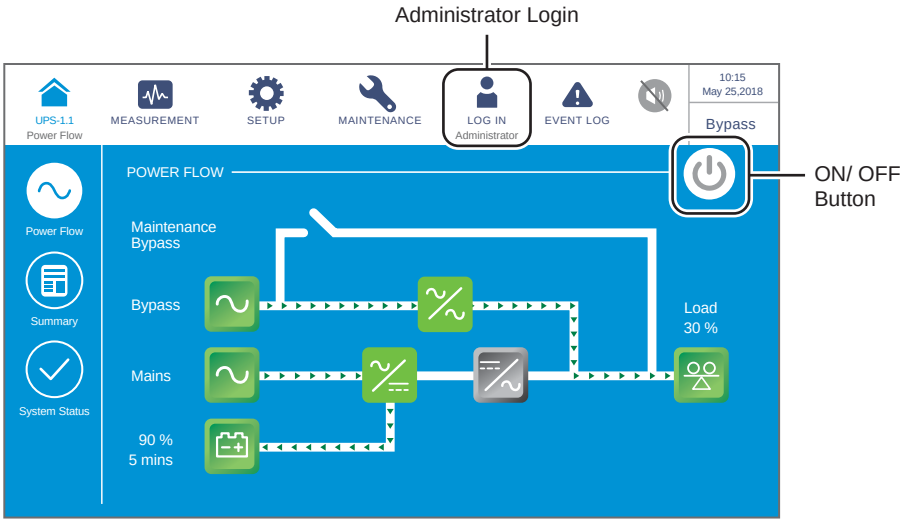
Now, each power module keeps running and its LED indicator remains green. After each power module finishes establishing DC BUS voltage, the charger will start to charge the batteries.

If the bypass AC source is within the normal range, the UPS will transfer to run in bypass mode, the LCD screen will show as ***Figure 6-22*** and the tri-color LED indicator will illuminate yellow.



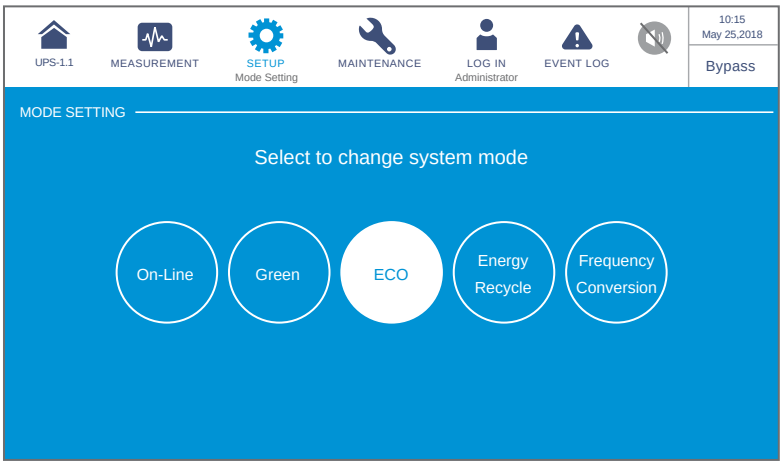
(Figure 6-22 : Main Screen_ User Login)

7 Please log in as an **Administrator**. For the **Administrator** password, please contact service personnel. After login, ensure that you are in the **Administrator** login status (see ***Figure 6-23***).



(Figure 6-23 : Main Screen_ Administrator Login & ON/ OFF Button Location)

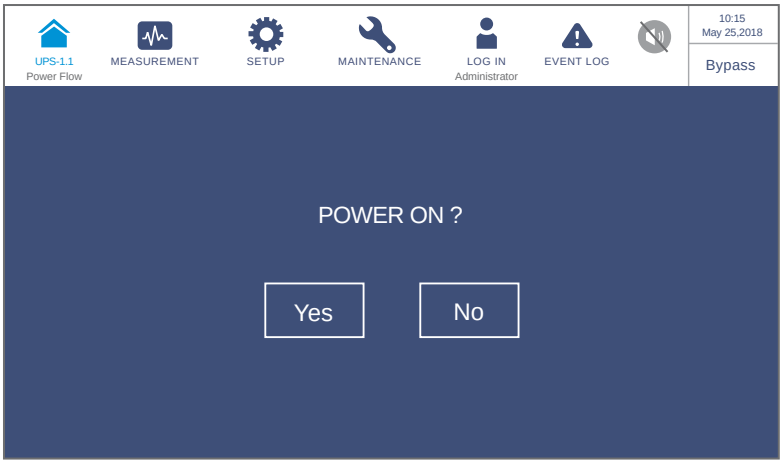
8 Click **SETUP** → **Mode Setting** → **ECO**.



(Figure 6-24: Select ECO Mode)

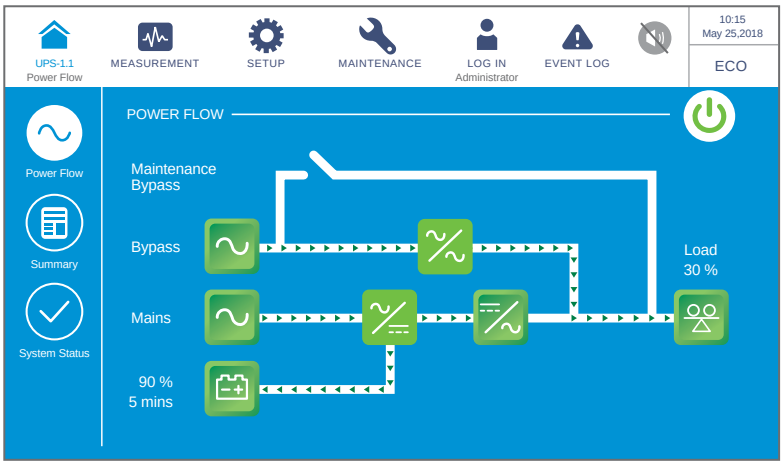
9 After manually selecting **ECO** mode via the LCD, press the icon (UPS-1.1) located in the upper left corner of the screen to go back to the **Main Screen**.

10 Press the ON/ OFF button ( ) once and the following screen will pop up to ask you if you want to power on the UPS's inverter. Please select '**YES**'.



(Figure 6-25: Power On Reminder Screen)

11 After selection of '**YES**' to start up the UPS's inverter, each power module will start up and perform self-inspection. At the same time, the system begins synchronization with the bypass AC source. After the self-inspection is completed, the UPS will automatically transfer to run in online mode. After the system confirms that the bypass voltage is normal, the UPS will automatically switch to run in ECO mode to let the bypass AC source supply power (see ***Figure 6-26***). Now, the tri-color LED indicator illuminates green and the following screen appears.



(Figure 6-26: ECO Mode Screen)

6.2.6 Frequency Conversion Mode Start-up Procedures

WARNING:

1. For parallel units, please follow ***6.2.3 Bypass Mode Start-up Procedures*** to turn on each parallel UPS. After confirming that parallel operation can be normally run, follow the following procedures step by step.
2. For parallel units, ensure that every operation procedure mentioned below is synchronized to all parallel UPSs.
3. For parallel application, if you just want to operate a specific UPS but not all parallel ones, please contact service personnel.

1 Ensure that the manual bypass breaker or switch (Q3) of the Delta or non-Delta external maintenance bypass cabinet is in the **OFF** position.

2 Switch **ON** each external battery cabinet's breaker (Q5).

3 **Single Input:**

Switch **ON** the bypass switch (Q0) of the UPS, the input breaker or switch (Q1) and the output breaker or switch (Q4) of the Delta or non-Delta external maintenance bypass cabinet.

Dual Input:

Switch **ON** the bypass switch (Q0) of the UPS, the input breaker or switch (Q1), the bypass breaker or switch (Q2) and the output breaker or switch (Q4) of the Delta or non-Delta external maintenance bypass cabinet.

4 After you switch **ON** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and bypass breaker or switch (Q2), each auxiliary power card's LED indicator will illuminate green and the following status will occur simultaneously.

1. The system and each power module will start initialization. After each power module finishes initialization, each power module's fans will start running, each power module will start establishing DC BUS voltage and each power module's LED indicator will illuminate green.
2. Each parallel communication card's LED indicator will illuminate red first and then each parallel communication card will start initialization. After initialization, the master parallel communication card's LED indicator will illuminate green and the backup communication card's LED indicator will illuminate yellow.

For the locations of parallel communication cards, auxiliary power cards, power modules and associated LED indicators, please refer to ***Figure 6-1***.

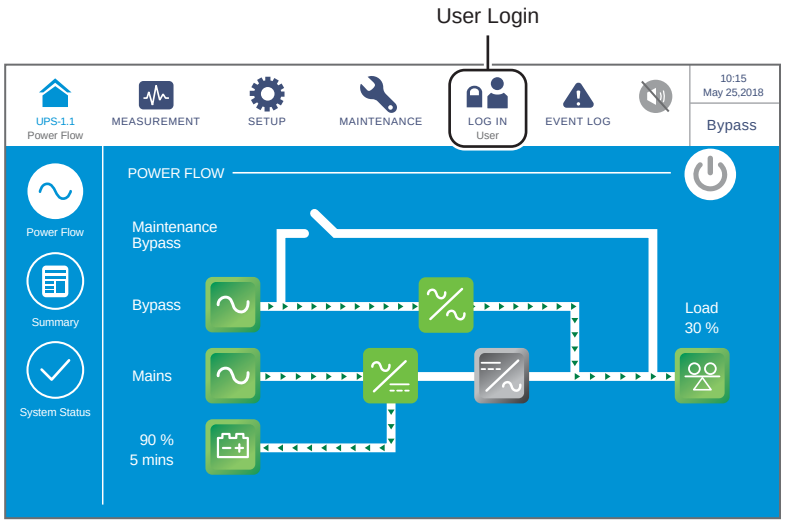
5 The LCD initial screen (see ***Figure 6-27***) will appear within 40 seconds after the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and bypass breaker or switch (Q2) are turned on.

(Figure 6-27 : LCD Initial Screen)

6 After 20 seconds of LCD initialization, the LCD will enter the ***Main Screen***. For the **Main Screen** information, please refer to ***7.6 Main Screen***.

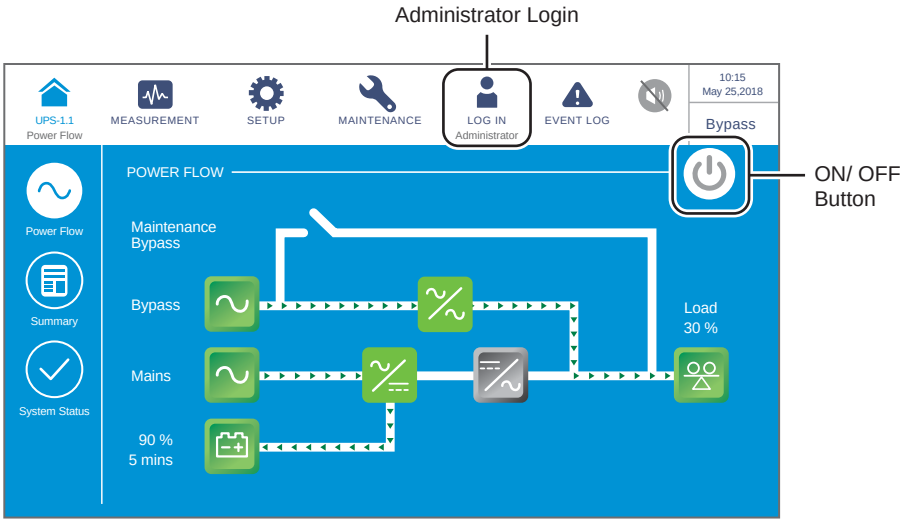
Now, each power module keeps running and its LED indicator remains green. After each power module finishes establishing DC BUS voltage, the charger will start to charge the batteries.

If the bypass AC source is within the normal range, the UPS will transfer to run in bypass mode, the LCD screen will show as ***Figure 6-28*** and the tri-color LED indicator will illuminate yellow.



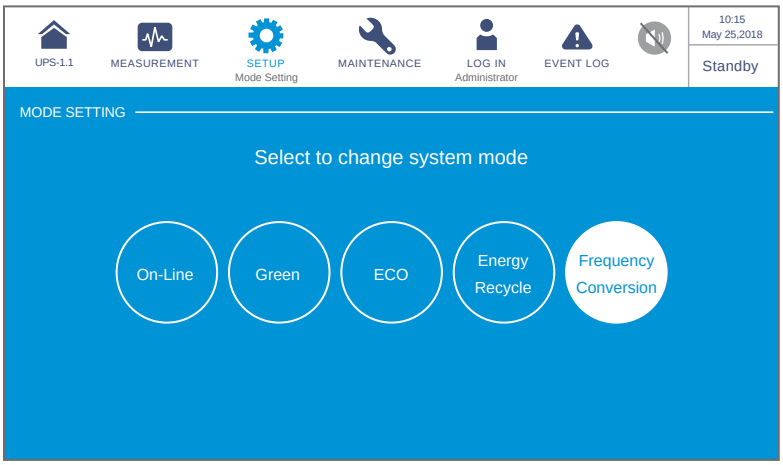
(Figure 6-28 : Main Screen_ User Login)

7 Please log in as an **Administrator**. For the **Administrator** password, please contact service personnel. After login, ensure that you are in the **Administrator** login status (see ***Figure 6-29***).



(Figure 6-29 : Main Screen_ Administrator Login & ON/ OFF Button Location)

8 Click **SETUP** → **Mode Setting** → **Frequency Conversion**.

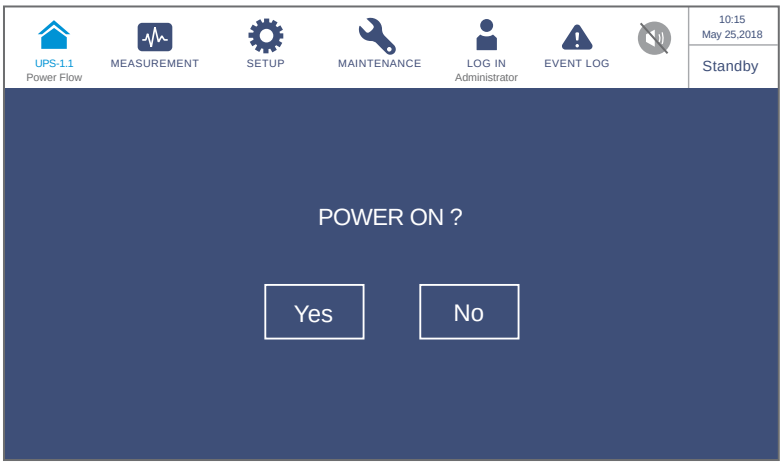


(Figure 6-30: Select Frequency Conversion Mode)

9 After manually selecting **Frequency Conversion** mode via the LCD, the UPS will run in standby mode and the output will be terminated.

10 Press the icon (UPS-1.1) located in the upper left corner of the screen to go back to the **Main Screen**.

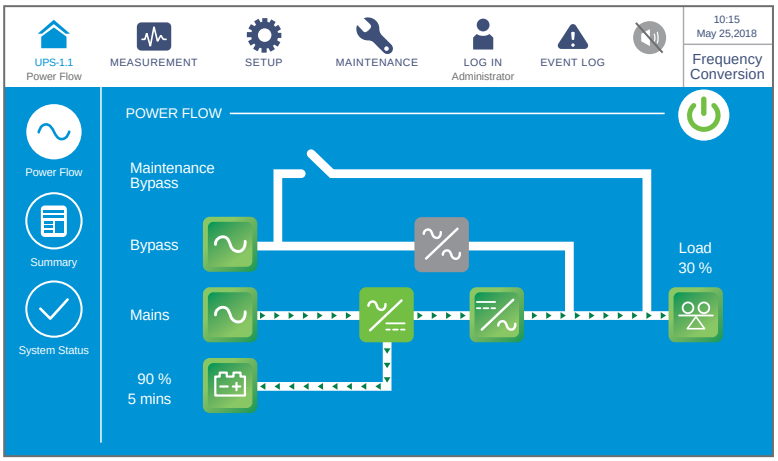
11 Press the ON/ OFF button ( ) once and the following screen will pop up to ask you if you want to power on the UPS's inverter. Please select '**YES**'.



(Figure 6-31: Power On Reminder Screen)

12 After selection of '**YES**' to start up the UPS's inverter, each power module will start up and perform self-inspection.

After the self-inspection is completed, the UPS will automatically transfer to run in frequency conversion mode and the output frequency will be the same as setup value. Now, the tri-color LED indicator illuminates green and the following screen appears.



(Figure 6-32: Frequency Conversion Mode)

6.2.7 Green Mode Start-up Procedures

WARNING:

1. For parallel units, please follow ***6.2.3 Bypass Mode Start-up Procedures*** to turn on each parallel UPS. After confirming that parallel operation can be normally run, follow the following procedures step by step.
2. For parallel units, ensure that every operation procedure mentioned below is synchronized to all parallel UPSs.
3. For parallel application, if you just want to operate a specific UPS but not all parallel ones, please contact service personnel.

1 Ensure that the manual bypass breaker or switch (Q3) of the Delta or non-Delta external maintenance bypass cabinet is in the **OFF** position.

2 Switch **ON** each external battery cabinet's breaker (Q5).

3 **Single Input:**

Switch **ON** the bypass switch (Q0) of the UPS, the input breaker or switch (Q1) and the output breaker or switch (Q4) of the Delta or non-Delta external maintenance bypass cabinet.

Dual Input:

Switch **ON** the bypass switch (Q0) of the UPS, the input breaker or switch (Q1), the bypass breaker or switch (Q2) and the output breaker or switch (Q4) of the Delta or non-Delta external maintenance bypass cabinet.

4 After you switch **ON** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and bypass breaker or switch (Q2), each auxiliary power card's LED indicator will illuminate green and the following status will occur simultaneously.

1. The system and each power module will start initialization. After each power module finishes initialization, each power module's fans will start running, each power module will start establishing DC BUS voltage and each power module's LED indicator will illuminate green.
2. Each parallel communication card's LED indicator will illuminate red first and then each parallel communication card will start initialization. After initialization, the master parallel communication card's LED indicator will illuminate green and the backup communication card's LED indicator will illuminate yellow.

For the locations of parallel communication cards, auxiliary power cards, power modules and associated LED indicators, please refer to ***Figure 6-1***.

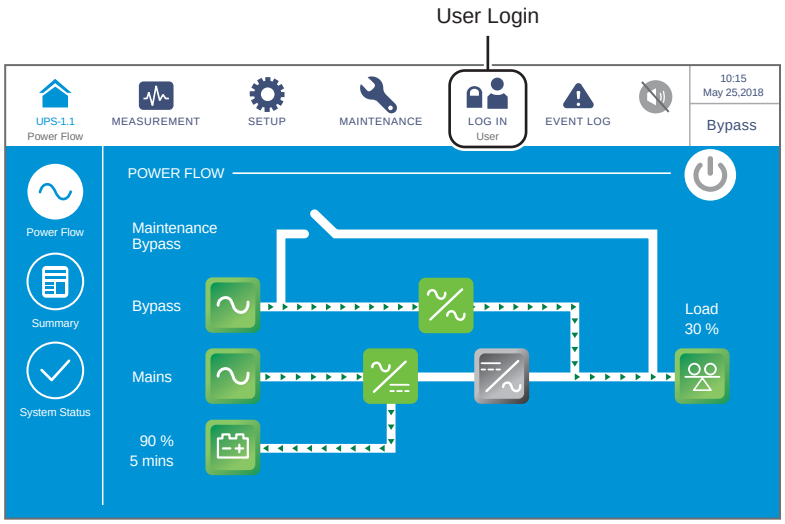
5 The LCD initial screen (see ***Figure 6-33***) will appear within 40 seconds after the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and bypass breaker or switch (Q2) are turned on.

(Figure 6-33 : LCD Initial Screen)

6 After 20 seconds of LCD initialization, the LCD will enter the **Main Screen**. For the **Main Screen** information, please refer to ***7.6 Main Screen***.

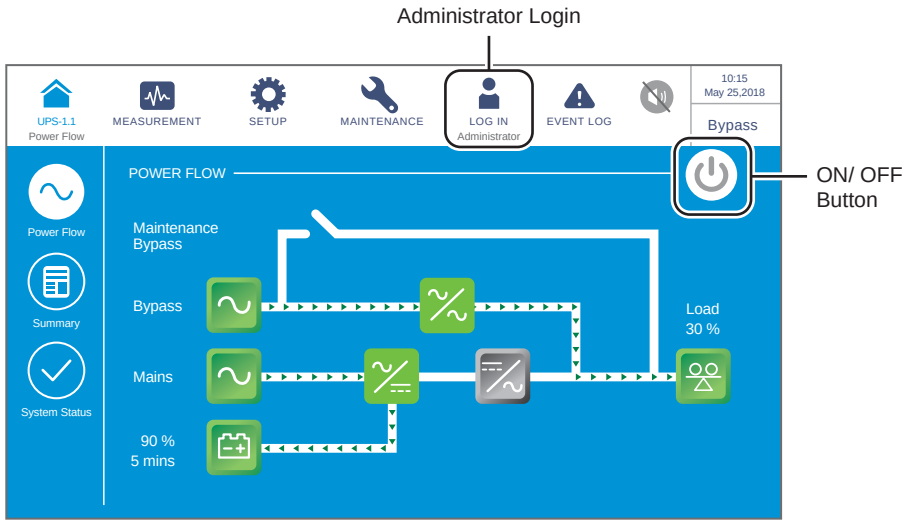
Now, each power module keeps running and its LED indicator remains green. After each power module finishes establishing DC BUS voltage, the charger will start to charge the batteries.

If the bypass AC source is within the normal range, the UPS will transfer to run in bypass mode, the LCD screen will show as ***Figure 6-34*** and the tri-color LED indicator will illuminate yellow.



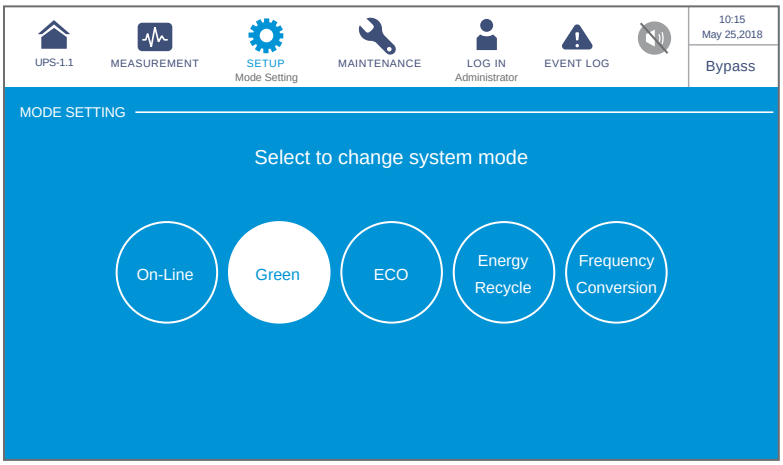
(Figure 6-34 : Main Screen_ User Login)

7 Please log in as an **Administrator**. For the **Administrator** password, please contact service personnel. After login, ensure that you are in the **Administrator** login status (see ***Figure 6-35***).



(Figure 6-35 : Main Screen_ Administrator Login & ON/ OFF Button Location)

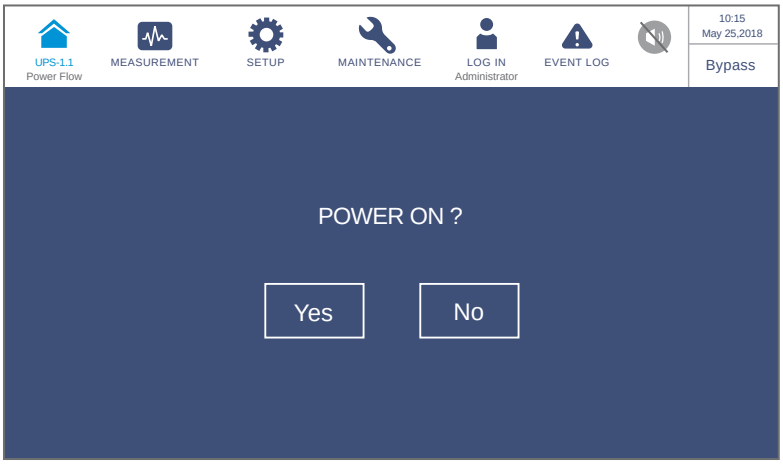
8 Click **SETUP** → **Mode Setting** → **Green**.



(Figure 6-36: Select Green Mode)

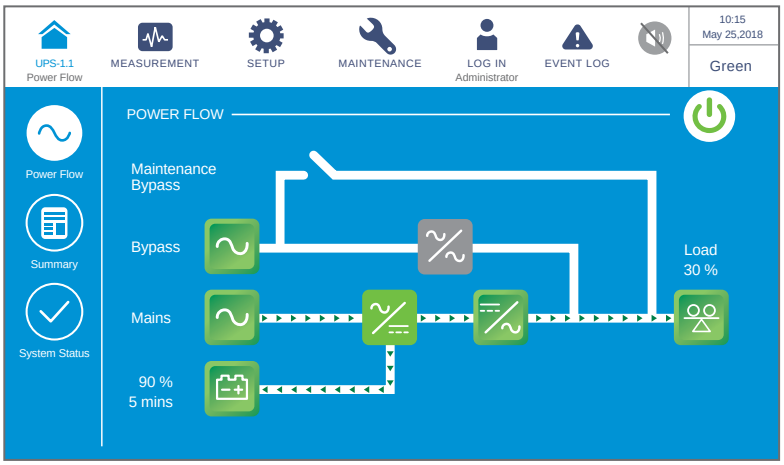
9 After manually selecting **Green** mode via the LCD, press the icon (UPS-1.1) located in the upper left corner of the screen to go back to the **Main Screen**.

10 Press the ON/ OFF button ( ) once and the following screen will pop up to ask you if you want to power on the UPS's inverter. Please select '**YES**'.



(Figure 6-37: Power On Reminder Screen)

11 After selection of '**YES**' to start up the UPS's inverter, each power module will start up and perform self-inspection. At the same time, the system begins synchronization with the bypass AC source. After the self-inspection is completed, the UPS will automatically transfer to run in green mode and the system will automatically detect the output status (i.e. total load capacity %) to decide which specific power modules should be fully powered on or idle in order to achieve higher efficiency of the UPS. Now, the tri-color LED indicator illuminates green and the following screen appears.



(Figure 6-38: Green Mode Screen)

6.2.8 Energy Recycle Mode Start-up Procedures

WARNING: Energy recycle mode is only applicable to single input and single unit application.

1. Ensure that the Delta or non-Delta external maintenance bypass cabinet's manual bypass breaker or switch (Q3), output breaker or switch (Q4) and every external battery cabinet's breaker (Q5) are in the **OFF** position.

2. Switch **ON** the bypass switch (Q0) of the UPS and the input breaker or switch (Q1) of the Delta or non-Delta external maintenance bypass cabinet.

3. After you switch **ON** the UPS's bypass switch (Q0) and the Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1), each auxiliary power card's LED indicator will illuminate green and the following status will occur simultaneously.

   1. The system and each power module will start initialization. After each power module finishes initialization, each power module's fans will start running, each power module will start establishing DC BUS voltage and each power module's LED indicator will illuminate green.
   2. Each parallel communication card's LED indicator will illuminate red first and then each parallel communication card will start initialization. After initialization, the master parallel communication card's LED indicator will illuminate green and the backup communication card's LED indicator will illuminate yellow.

   For the locations of parallel communication cards, auxiliary power cards, power modules and associated LED indicators, please refer to ***Figure 6-1***.

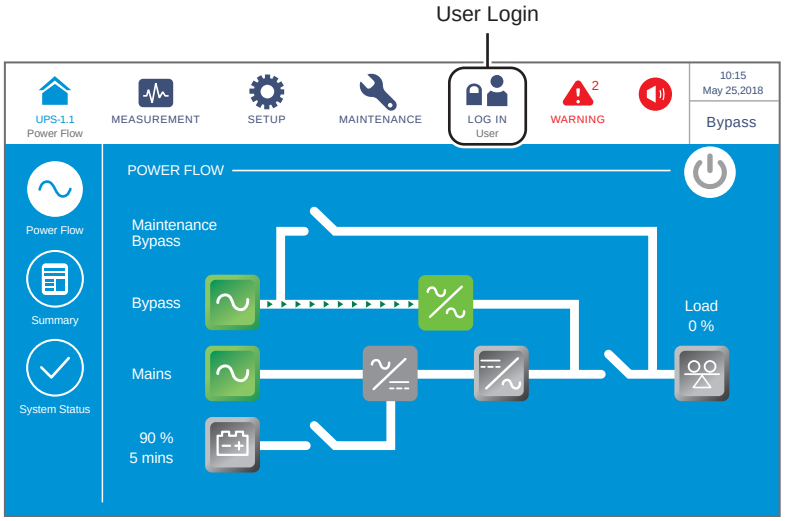
4. The LCD initial screen (see ***Figure 6-39***) will appear within 40 seconds after the UPS's bypass switch (Q0) and the Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) are turned on.

(Figure 6-39 : LCD Initial Screen)

5 After 20 seconds of LCD initialization, the LCD will enter the **Main Screen**. For the **Main Screen** information, please refer to ***7.6 Main Screen***.

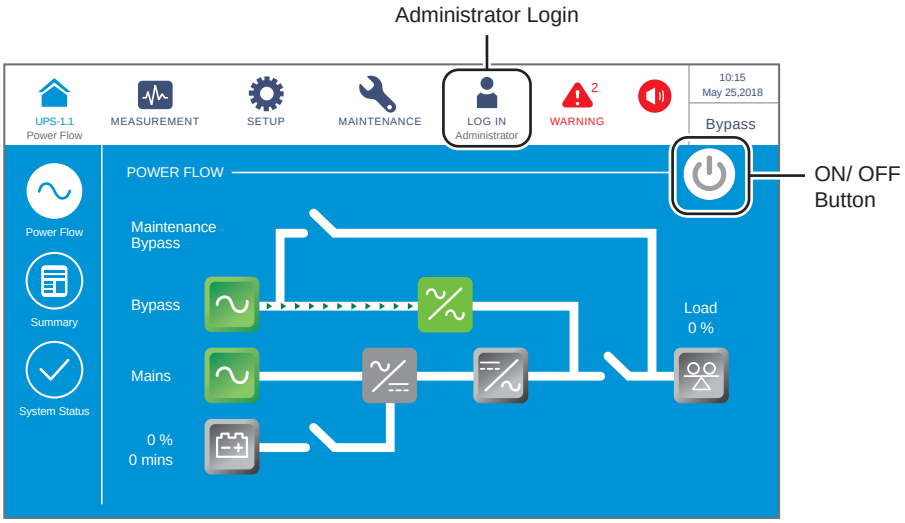
Now, each power module keeps running and its LED indicator remains green. After each power module finishes establishing DC BUS voltage, the charger will start to charge the batteries.

If the bypass AC source is within the normal range, the UPS will transfer to run in bypass mode, the LCD screen will show as ***Figure 6-40*** and the tri-color LED indicator will illuminate yellow.



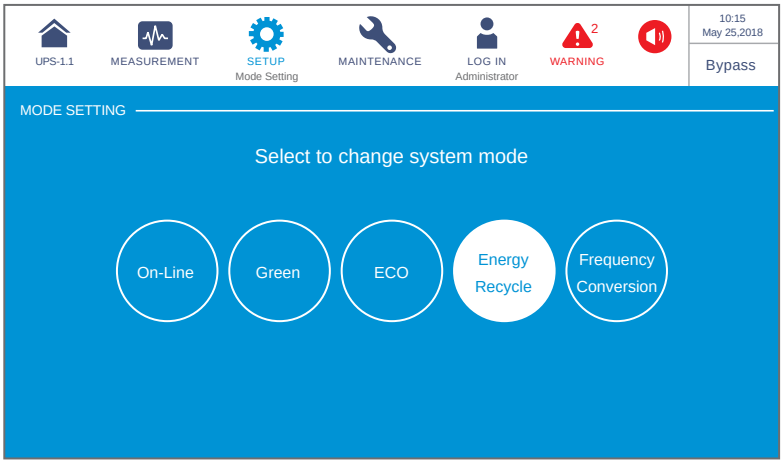
(Figure 6-40: Main Screen_ User Login)

6 Please log in as an **Administrator**. For the **Administrator** password, please contact service personnel. After login, ensure that you are in the **Administrator** login status (see ***Figure 6-41***).



(Figure 6-41 : Main Screen_ Administrator Login & ON/ OFF Button Location)

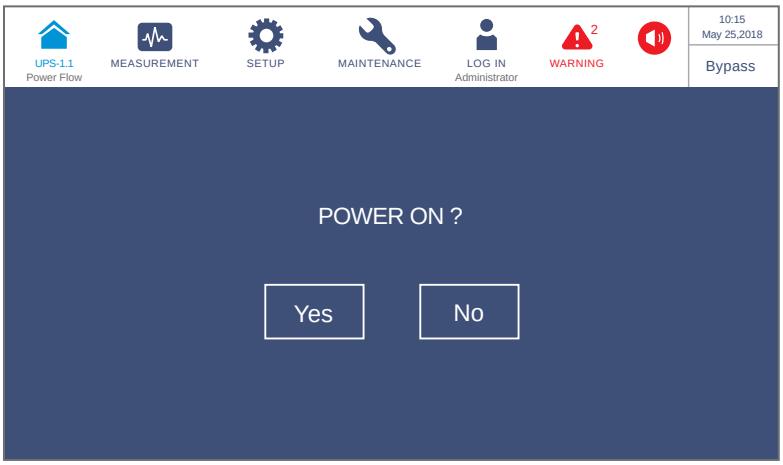
7 Click **SETUP → Mode Setting → Energy Recycle**.



(Figure 6-42: Select Energy Recycle Mode)

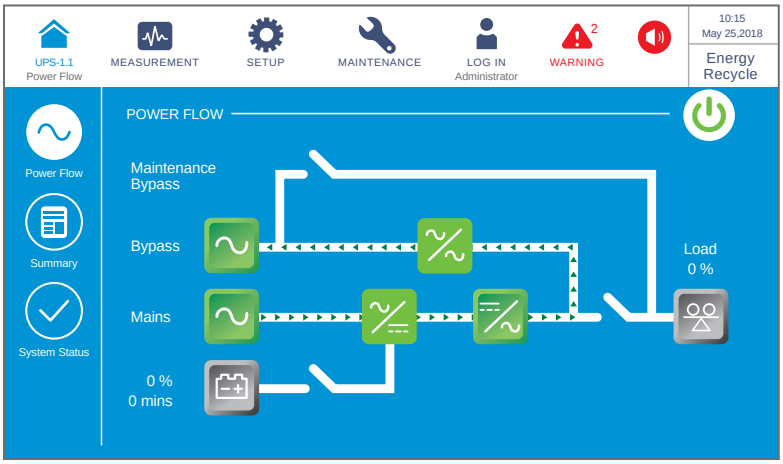
8 After manually selecting **Energy Recycle** mode via the LCD, press the icon (UPS-1.1) located in the upper left corner of the screen to go back to the **Main Screen**.

9 Press the ON/ OFF button ( ) once and the following screen will pop up to ask you if you want to power on the UPS's inverter. Please select '**YES**'.



(Figure 6-43: Power On Reminder Screen)

10 After selection of '**YES**' to start up the UPS's inverter, each power module will start up and perform self-inspection. At the same time, the system begins synchronization with the bypass AC source. After the self-inspection is completed, the UPS will automatically transfer to run in energy recycle mode and perform self-aging test. Now, the tri-color LED indicator illuminates yellow and the following screen appears.



(Figure 6-44: Energy Recycle Mode Screen)

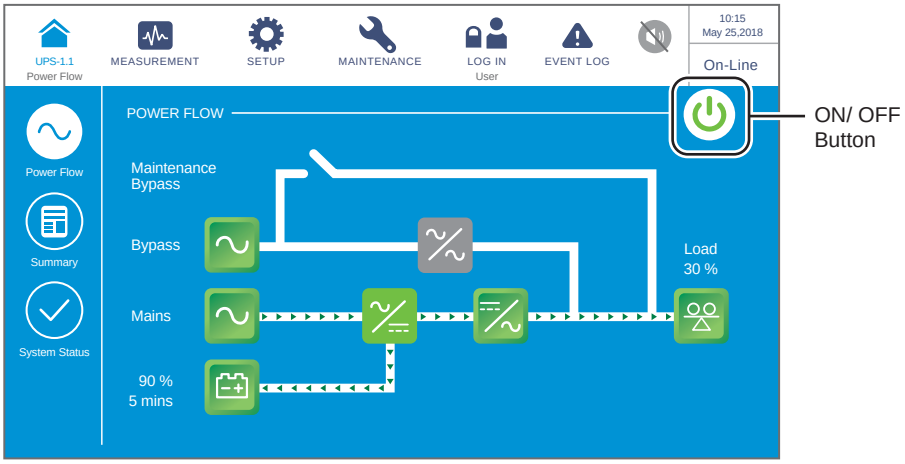
6.3 Turn-off Procedures

6.3.1 Online Mode Turn-off Procedures

WARNING:

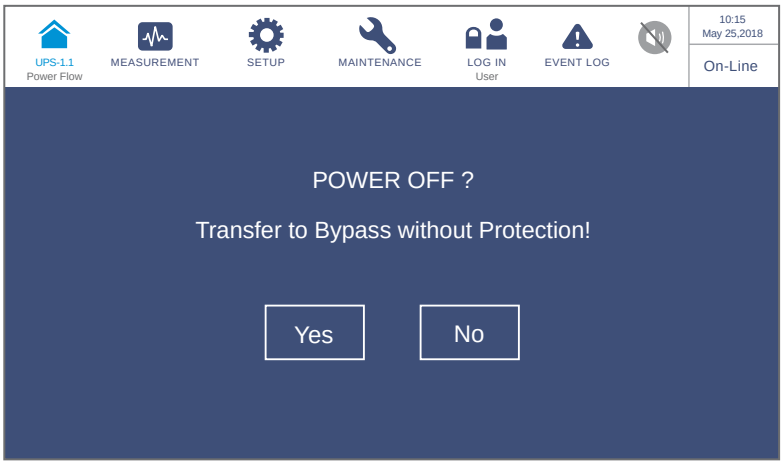
1. For parallel units, ensure that every operation procedure mentioned below is synchronized to all parallel UPSs.
2. For parallel application, if you just want to operate a specific UPS but not all parallel ones, please contact service personnel.

1 In online mode, the LCD shows the following screen (***Figure 6-45***) and the tri-color LED indicator illuminates green.



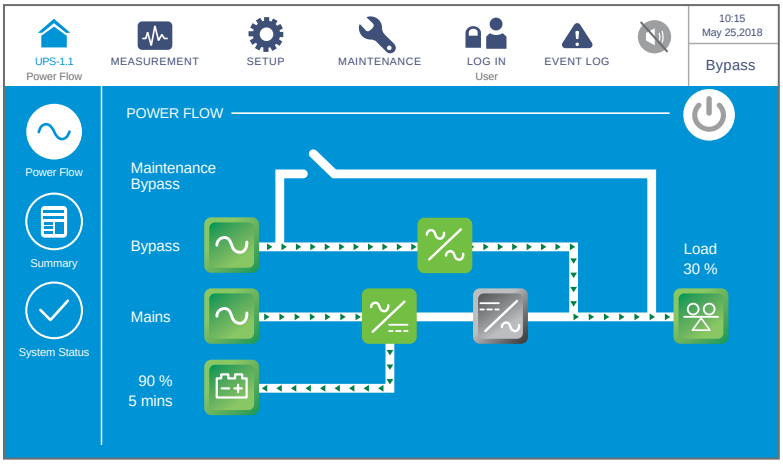
(Figure 6-45: Online Mode Screen_ User Login & ON/ OFF Button Location)

2 Press the ON/ OFF button ( ) once and the following screen will pop up to ask you if you want to power off the UPS's inverter. Please select '**YES**'.



(Figure 6-46: Power Off Reminder Screen)

3 After selection of '**YES**', the UPS will shut down the inverter, terminate each power module's output and let the bypass AC source supply power. If the bypass AC source is abnormal, there is a risk of output interruption and the connected critical loads won't be protected. At this moment, each power module keeps charging the batteries, the tri-color LED indicator illuminates yellow and the following screen appears (***Figure 6-47***). For the tricolor LED indicator location, please refer to ***Figure 2-11***.



(Figure 6-47: Bypass Mode Screen)

4 **Single Input:**

Switch **OFF** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and output breaker or switch (Q4).

Dual Input:

Switch **OFF** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1), bypass breaker or switch (Q2) and output breaker or switch (Q4).

5 Now, each power module performs DC BUS discharging and its LED indicator flashes green. After discharging, each power module's LED indicator will be off.

6 About 3 minutes later, the UPS will shut down. After that, the LCD and the tricolor LED indicator will be off.

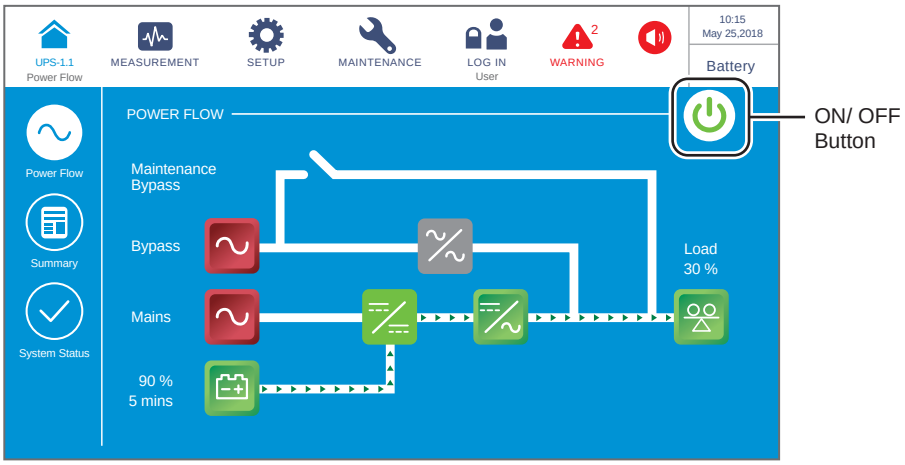
7 Switch **OFF** every external battery cabinet's breaker (Q5).

6.3.2 Battery Mode Turn-off Procedures

WARNING:

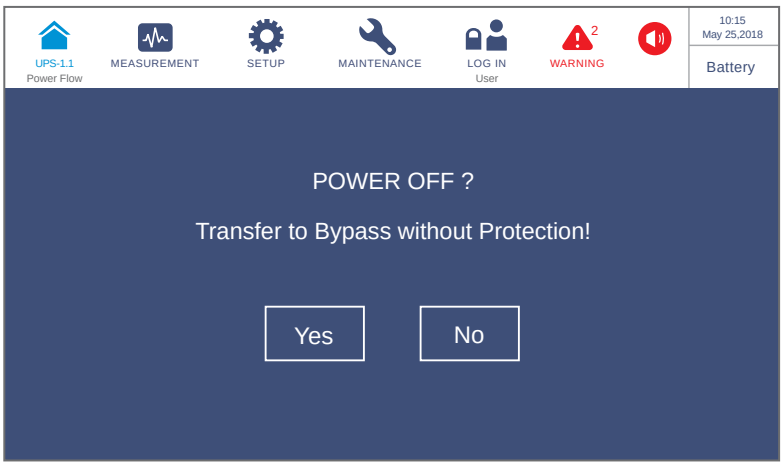
1. For parallel units, ensure that every operation procedure mentioned below is synchronized to all parallel UPSs.
2. For parallel application, if you just want to operate a specific UPS but not all parallel ones, please contact service personnel.

1 In battery mode, the LCD shows the following screen (***Figure 6-48***) and the tri-color LED indicator illuminates yellow.



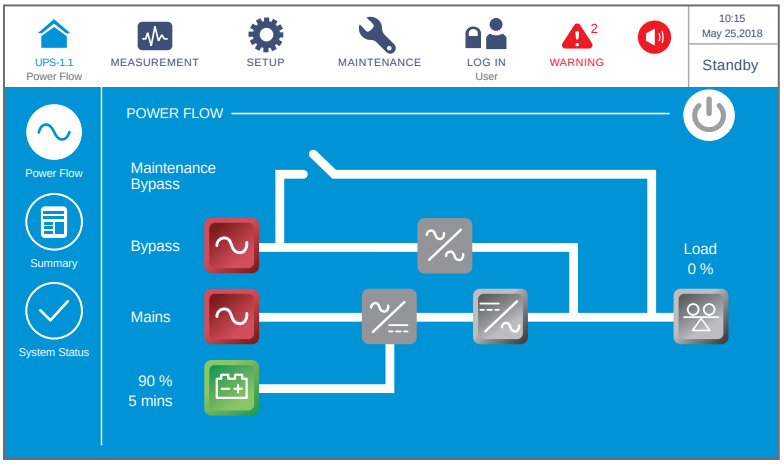
(Figure 6-48: Battery Mode Screen & ON/ OFF Button Location)

2 Press the ON/ OFF button ( ) once and the following screen will pop up to ask you if you want to power off the UPS's inverter. Please select '**YES**'.



(Figure 6-49: Power Off Reminder Screen)

3 After selection of '**YES**', the UPS will shut down the inverter, terminate each power module's output and transfer to run in standby mode. At this moment, the tri-color LED indicator illuminates yellow and the following screen appears (***Figure 6-50***).



(Figure 6-50: Standby Mode Screen)

4 **Single Input:**

Switch **OFF** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and output breaker or switch (Q4).

Dual Input:

Switch **OFF** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1), bypass breaker or switch (Q2) and output breaker or switch (Q4).

5 Now, each power module performs DC BUS discharging and its LED indicator flashes green. After discharging, each power module's LED indicator will be off.

6 About 3 minutes later, the UPS will shut down. After that, the LCD and the tricolor LED indicator will be off.

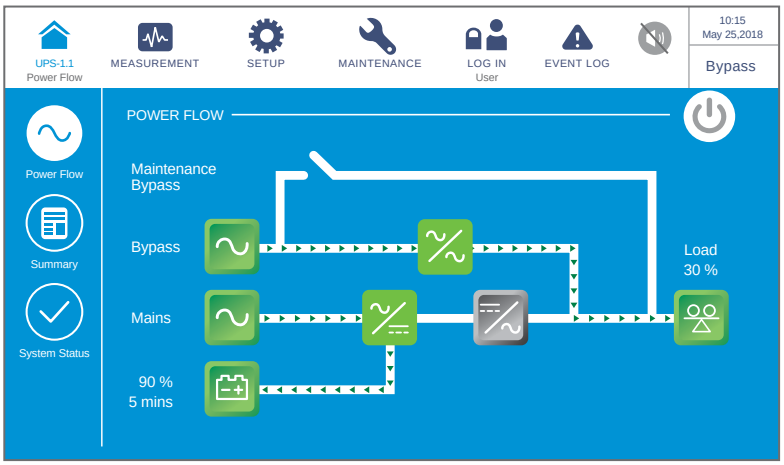
7 Switch **OFF** every external battery cabinet's breaker (Q5).

6.3.3 Bypass Mode Turn-off Procedures

WARNING:

1. For parallel units, ensure that every operation procedure mentioned below is synchronized to all parallel UPSs.
2. For parallel application, if you just want to operate a specific UPS but not all parallel ones, please contact service personnel.

1 In bypass mode, the LCD shows the following screen (***Figure 6-51***) and the tri-color LED indicator illuminates yellow.



(Figure 6-51: Bypass Mode Screen)

2 **Single Input:**

Switch **OFF** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and output breaker or switch (Q4).

Dual Input:

Switch **OFF** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1), bypass breaker or switch (Q2) and output breaker or switch (Q4).

3 Now, each power module performs DC BUS discharging and its LED indicator flashes green. After discharging, each power module's LED indicator will be off.

4 About 3 minutes later, the UPS will shut down. After that, the LCD and the tricolor LED indicator will be off.

5 Switch **OFF** every external battery cabinet's breaker (Q5).

6.3.4 Manual Bypass Mode Turn-off Procedures

WARNING:

1. For parallel units, ensure that every operation procedure mentioned below is synchronized to all parallel UPSs.
2. For parallel application, if you just want to operate a specific UPS but not all parallel ones, please contact service personnel.

In manual bypass mode, the LCD and the tri-color LED indicator are both **OFF**. In either single input or dual input, please directly switch **OFF** the manual bypass breaker or switch (Q3) of the Delta or non-Delta external maintenance bypass cabinet to completely shut down the UPS.

NOTE:

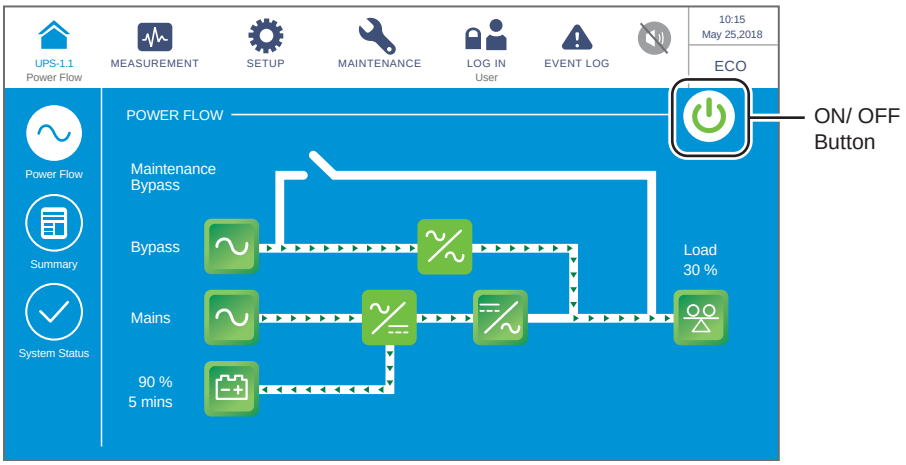
1. Please make sure that the LCD, all LED indicators and fans are **OFF**.
2. Please make sure that all switches, breakers, and power are **OFF**.

6.3.5 ECO Mode Turn-off Procedures

WARNING:

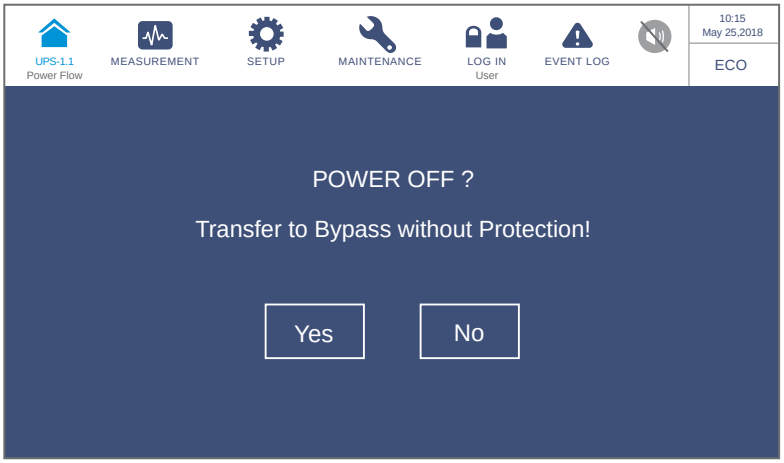
1. For parallel units, ensure that every operation procedure mentioned below is synchronized to all parallel UPSs.
2. For parallel application, if you just want to operate a specific UPS but not all parallel ones, please contact service personnel.

1 In ECO mode, the LCD shows the following screen (***Figure 6-52***) and the tri-color LED indicator illuminates green.



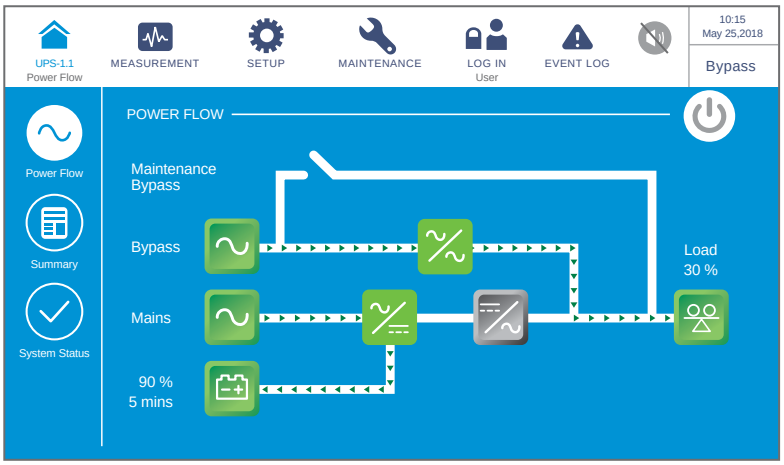
(Figure 6-52: ECO Mode Screen & ON/ OFF Button Location)

2 Press the ON/ OFF button ( ) once and the following screen will pop up to ask you if you want to power off the UPS's inverter. Please select '**YES**'.



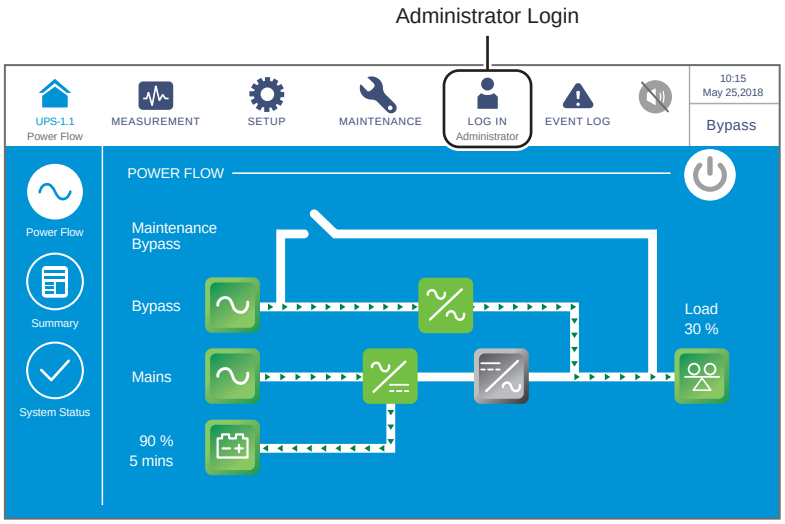
(Figure 6-53: Power Off Reminder Screen)

3 After selection of '**YES**', the UPS will shut down the inverter, terminate each power module's output and let the bypass AC source supply power. If the bypass AC source is abnormal, there is a risk of output interruption and the connected critical loads won't be protected. At this moment, each power module keeps charging the batteries, the tri-color LED indicator illuminates yellow and the following screen appears (***Figure 6-54***).



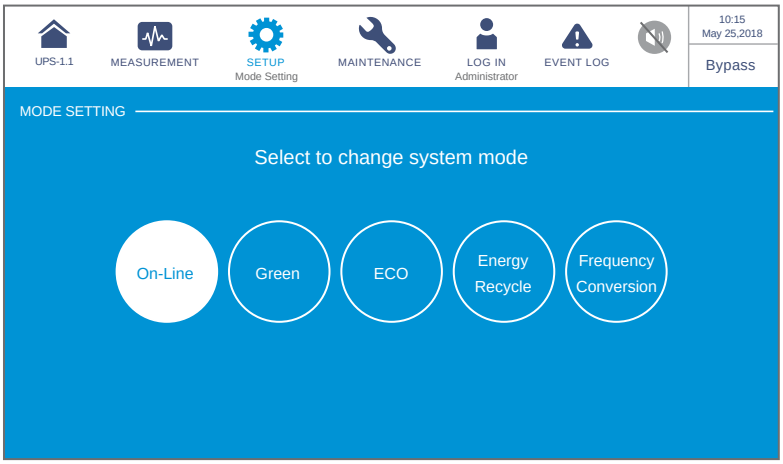
(Figure 6-54: Bypass Mode Screen)

4 Please log in as an **Administrator**. For the **Administrator** password, please contact service personnel. After login, ensure that you are in the **Administrator** login status (see ***Figure 6-55***).



(Figure 6-55 : Bypass Mode Screen_ Administrator Login)

5 Click **SETUP → Mode Setting → On-Line**.



(Figure 6-56 : Select On-Line Mode)

6 **Single Input:**

Switch **OFF** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and output breaker or switch (Q4).

Dual Input:

Switch **OFF** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1), bypass breaker or switch (Q2) and output breaker or switch (Q4).

7 Now, each power module performs DC BUS discharging and its LED indicator flashes green. After discharging, each power module's LED indicator will be off.

8 About 3 minutes later, the UPS will shut down. After that, the LCD and the tricolor LED indicator will be off.

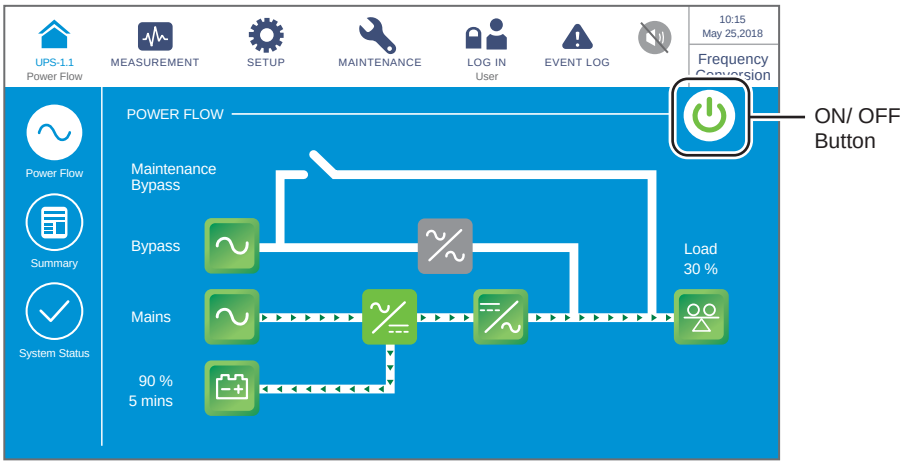
9 Switch **OFF** every external battery cabinet's breaker (Q5).

6.3.6 Frequency Conversion Mode Turn-off Procedures

WARNING:

1. For parallel units, ensure that every operation procedure mentioned below is synchronized to all parallel UPSs.
2. For parallel application, if you just want to operate a specific UPS but not all parallel ones, please contact service personnel.

1 In frequency conversion mode, the LCD shows the following screen (***Figure 6-57***) and the tri-color LED indicator illuminates green.

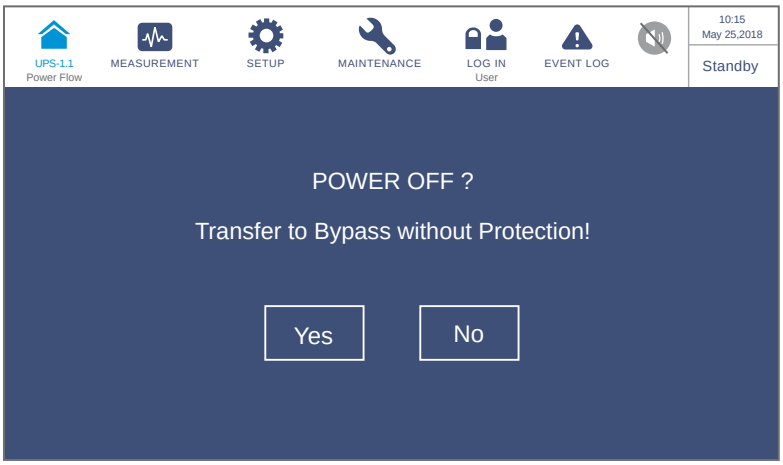


(Figure 6-57: Frequency Conversion Mode Screen & ON/ OFF Button Location)

2 Press the ON/ OFF button (⏻) once and the following screen will pop up to ask you if you want to power off the UPS's inverter. Please select '**YES**'.

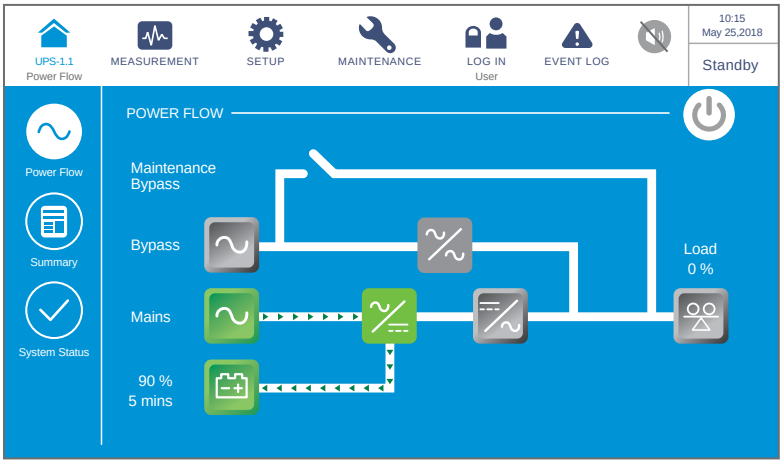
WARNING:

Please note that, once you select '**YES**', all power will be completely cut off. Please make sure that the critical loads connected to the UPS have already been safely shut down before you perform the turn-off procedures.



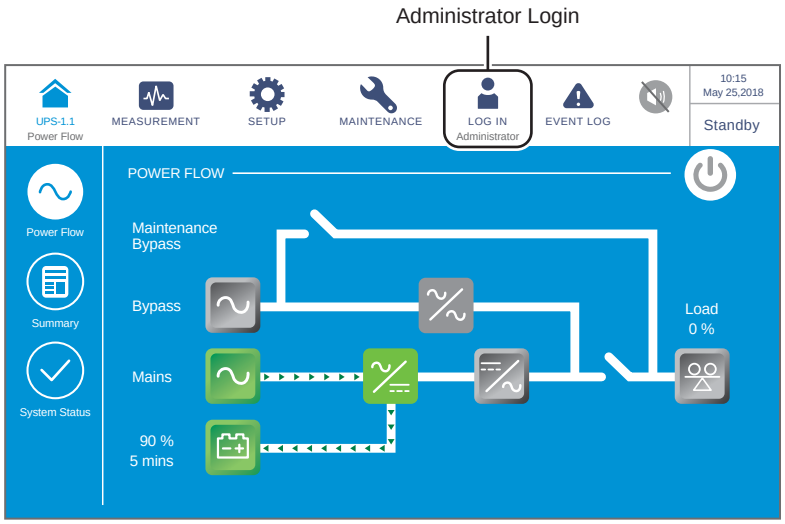
(Figure 6-58: Power Off Reminder Screen)

3 After selection of '**YES**', the UPS will shut down the inverter and terminate each power module's output. As there is no bypass output in frequency conversion mode, all output will be terminated right after the inverter is shut down. Now, each power module keeps charging the batteries, the tri-color LED indicator illuminates yellow and the following screen appears (***Figure 6-59***).



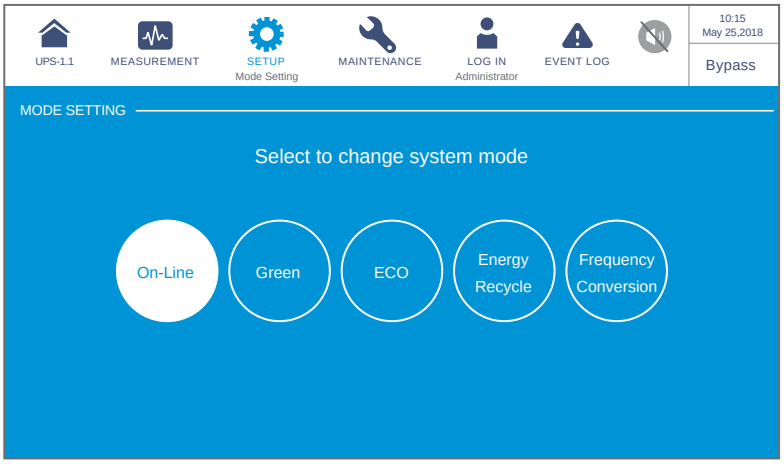
(Figure 6-59: Standby Mode Screen)

4 Switch **OFF** the Delta or non-Delta external maintenance bypass cabinet's output breaker or switch (Q4) and log in as an **Administrator**. For the **Administrator** password, please contact service personnel. After login, ensure that you are in the **Administrator** login status (see ***Figure 6-60***).



(Figure 6-60 : Standby Mode Screen_ Administrator Login)

5 Click **SETUP → Mode Setting → On-Line**. If the bypass voltage is in the normal range, the UPS will run in bypass mode to let the bypass AC source supply power to the output.



(Figure 6-61: Select On-Line Mode)

6 **Single Input:**

Switch **OFF** the UPS's bypass switch (Q0) and Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1).

Dual Input:

Switch **OFF** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and bypass breaker or switch (Q2).

7 Now, each power module performs DC BUS discharging and its LED indicator flashes green. After discharging, each power module's LED indicator will be off.

8 About 3 minutes later, the UPS will shut down. After that, the LCD and the tricolor LED indicator will be off.

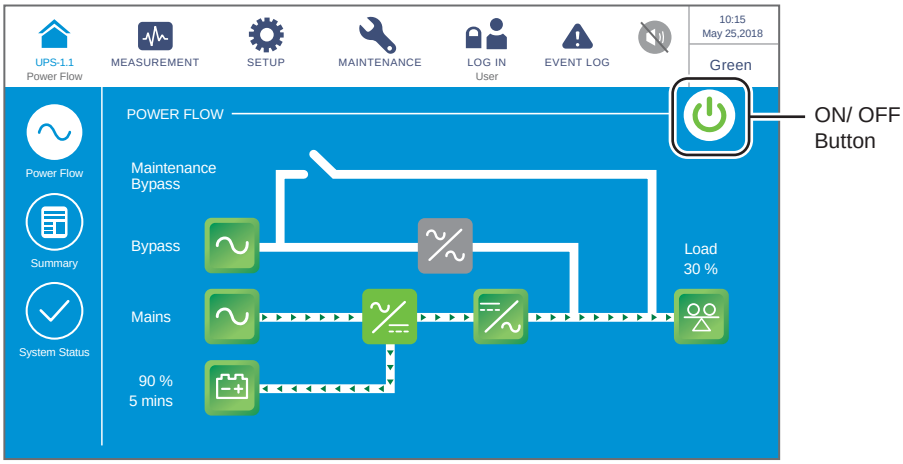
9 Switch **OFF** every external battery cabinet's breaker (Q5).

6.3.7 Green Mode Turn-off Procedures

WARNING:

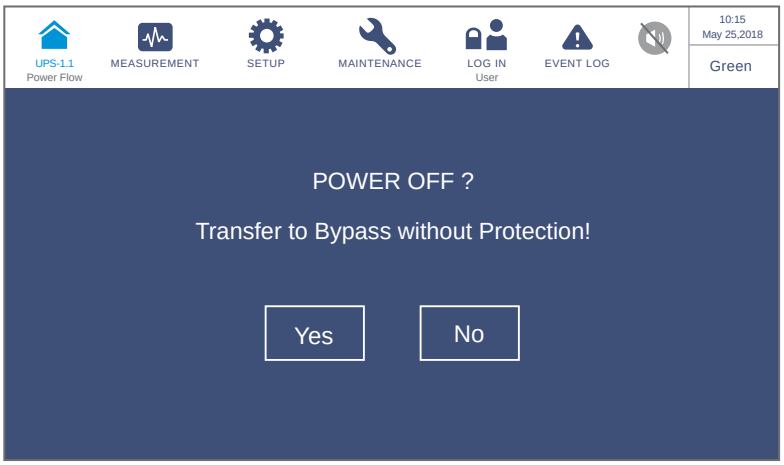
1. For parallel units, ensure that every operation procedure mentioned below is synchronized to all parallel UPSs.
2. For parallel application, if you just want to operate a specific UPS but not all parallel ones, please contact service personnel.

1 In green mode, the LCD shows the following screen ***(Figure 6-62***) and the tri-color LED indicator illuminates green.



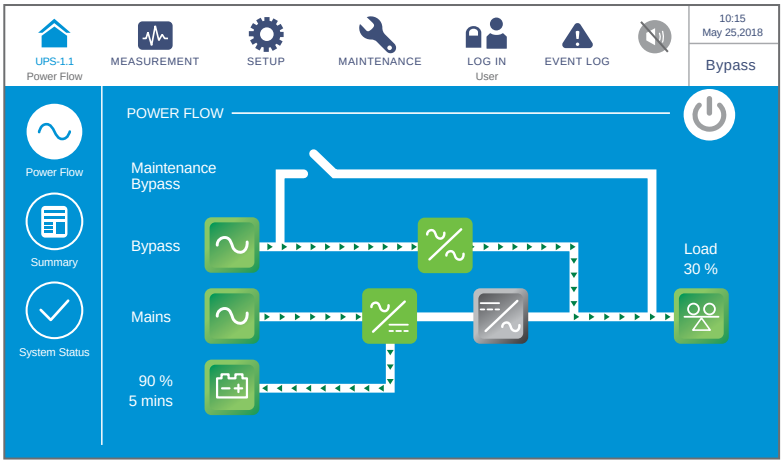
(Figure 6-62: Green Mode Screen & ON/ OFF Button Location)

2 Press the ON/ OFF button ( ) once and the following screen will pop up to ask you if you want to power off the UPS's inverter. Please select '**YES**'.



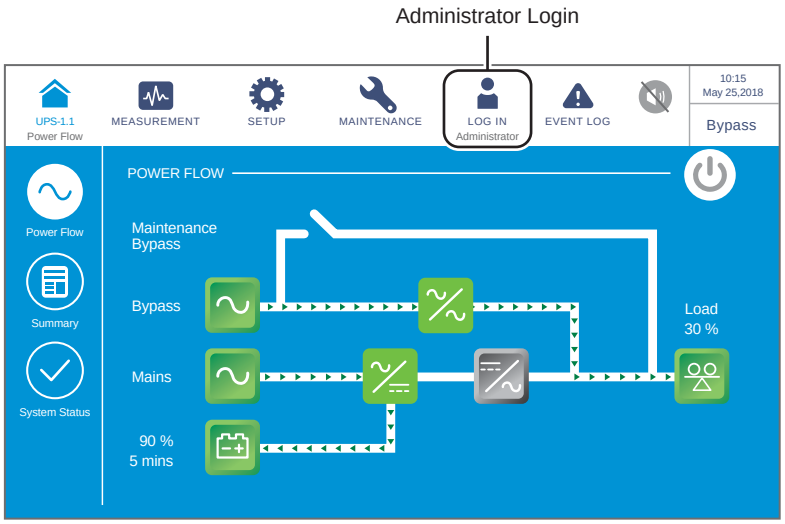
(Figure 6-63: Power Off Reminder Screen)

3 After selection of '**YES**', the UPS will shut down each power module's output and let the bypass AC source supply power. If the bypass AC source is abnormal, there is a risk of output interruption and the connected critical loads won't be protected. At this moment, each power module keeps charging the batteries, the tri-color LED indicator illuminates yellow and the following screen appears (***Figure 6-64***).



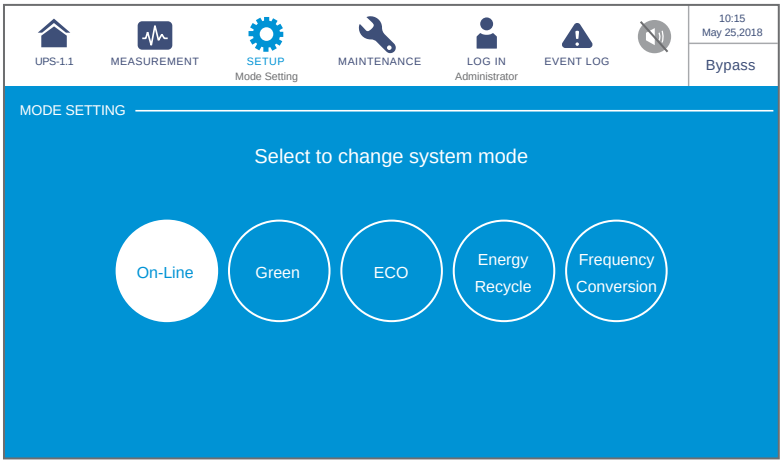
(Figure 6-64: Bypass Mode Screen)

4 Please log in as an **Administrator**. For the **Administrator** password, please contact service personnel. After login, ensure that you are in the **Administrator** login status (see ***Figure 6-65***).



(Figure 6-65 : Bypass Mode Screen_ Administrator Login)

5 Click **SETUP → Mode Setting → On-Line**. If the bypass voltage is in the normal range, the UPS will run in bypass mode to let the bypass AC source supply power to the output.



(Figure 6-66: Select On-Line Mode)

6 **Single Input:**

Switch **OFF** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1) and output breaker or switch (Q4).

Dual Input:

Switch **OFF** the UPS's bypass switch (Q0), Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1), bypass breaker or switch (Q2) and output breaker or switch (Q4).

7 Now, each power module performs DC BUS discharging and its LED indicator flashes green. After discharging, each power module's LED indicator will be off.

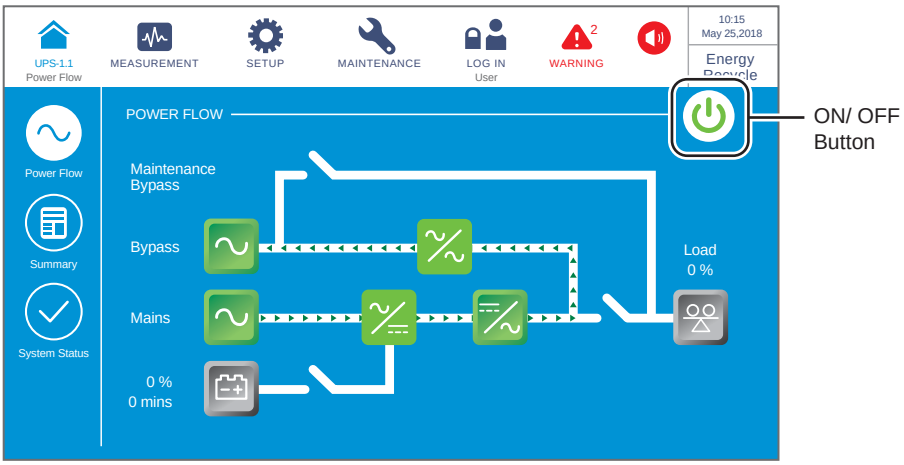
8 About 3 minutes later, the UPS will shut down. After that, the LCD and the tricolor LED indicator will be off.

9 Switch **OFF** every external battery cabinet's breaker (Q5).

6.3.8 Energy Recycle Mode Turn-off Procedures

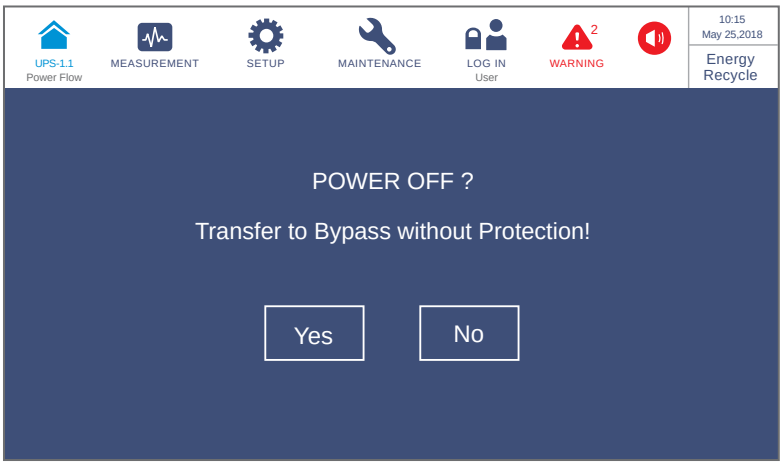
WARNING: Energy recycle mode is only applicable to single input and single unit application.

1 In energy recycle mode, the LCD shows the following screen (***Figure 6-67***) and the tri-color LED indicator illuminates yellow.



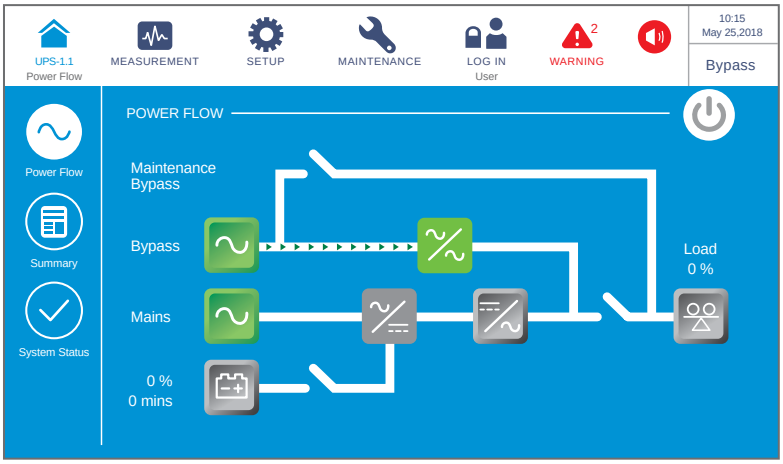
(Figure 6-67: Energy Recycle Mode Screen & ON/ OFF Button Location)

2 Press the ON/ OFF button (⏻) once and the following screen will pop up to ask you if you want to power off the UPS's inverter. Please select '**YES**'.



(Figure 6-68: Power off Reminder Screen)

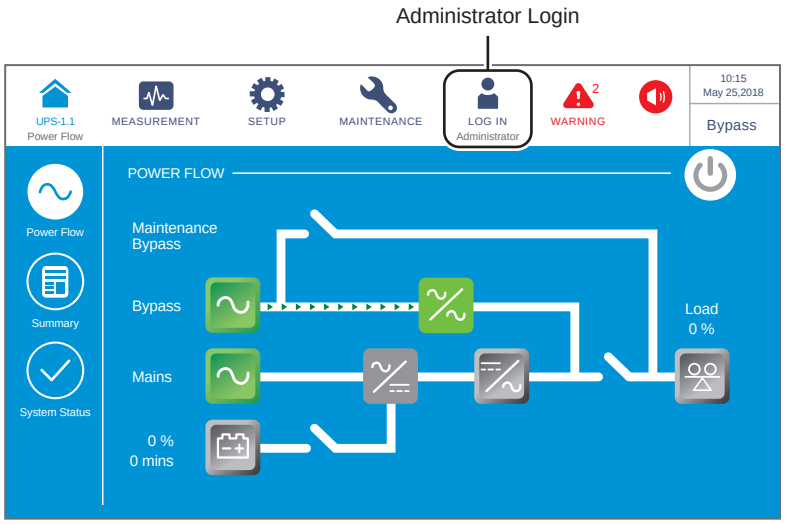
3 After selection of '**YES**', the UPS will stop self-aging test and transfer to run in bypass mode. At this moment, the tri-color LED indicator illuminates yellow and the following screen appears (***Figure 6-69***).



(Figure 6-69: Bypass Mode Screen)

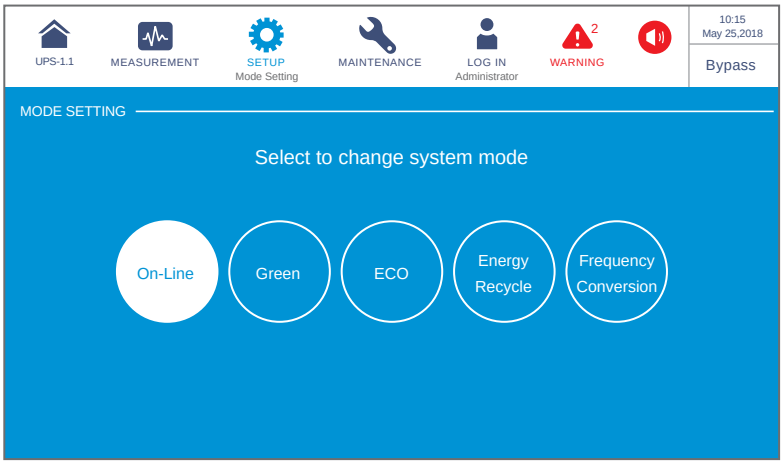
Now, each power module performs DC BUS discharging and its LED indicator flashes green. After discharging, each power module's LED indicator will be off.

4 Please log in as an **Administrator.** For the **Administrator** password, please contact service personnel. After login, ensure that you are in the **Administrator** login status (see ***Figure 6-70***).



(Figure 6-70 : Bypass Mode Screen_ Administrator Login)

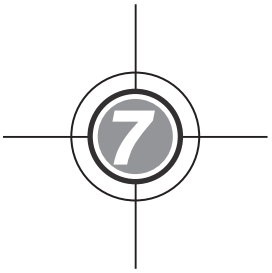
5 Click **SETUP → Mode Setting → On-Line**.



(Figure 6-71: Select On-Line Mode)

6 Switch **OFF** the UPS's bypass switch (Q0) and Delta or non-Delta external maintenance bypass cabinet's input breaker or switch (Q1).

7 The UPS will shut down, and then, the LCD and the tri-color LED indicator will be off.



LCD Display & Settings

7.1 LCD Display Hierarchy

7.2 Turning on the Touch Panel

7.3 ON/ OFF Button

7.4 Introduction of Touch Panel and Function Keys

7.5 Password Entry

7.6 Main Screen

7.7 Main Menu

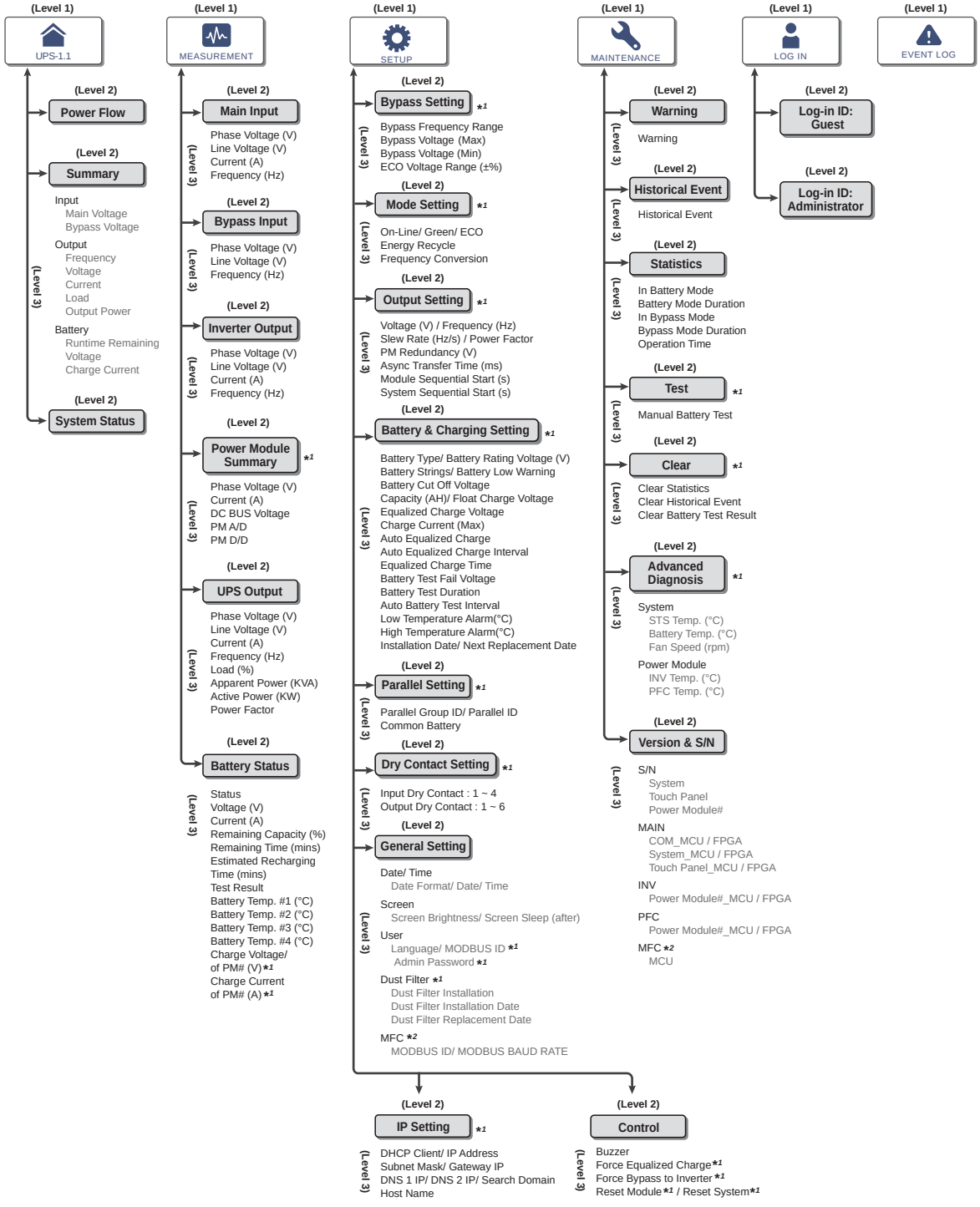
7.8 Power Flow & Summary & System Status

7.9 Check System Readings

7.10 UPS Settings

7.11 System Maintenance

7.1 LCD Display Hierarchy



(Figure 7-1: LCD Display Hierarchy)

NOTE:

1. *1 indicates that the **ADMINISTRATOR** password is needed. For password information, please refer to ***7.5 Password Entry***.
2. *2 means that the item will only appear on the LCD if you use the Delta lithium-ion batteries with the optional multifunctional communication card (MFC) being installed in the smart slot shown in ***Figure 4-13***. Please contact Delta customer service if you need more information.
3. The information on the LCD screen presented in ***7. LCD Display & Settings***, including UPS operation mode, machine number, date, time, total number of alarms, load %, battery remaining time, user login or administrator login, are for reference only. The actual screen of display depends on operation situation.
4. For how to turn on the touch panel, please refer to ***7.2 Turning on the Touch Panel*** and ***7.3 ON/ OFF Button***.

7.2 Turning on the Touch Panel

NOTE: The UPS must be connected with a Delta or non-Delta external maintenance bypass cabinet. The Delta external maintenance bypass cabinet is optional, and the non-Delta external maintenance bypass cabinet is user-supplied and should be handled and configured by Delta service personnel. For the Delta or non-Delta external maintenance bypass cabinet's information, please refer to ***1.2 Connection Warnings***.

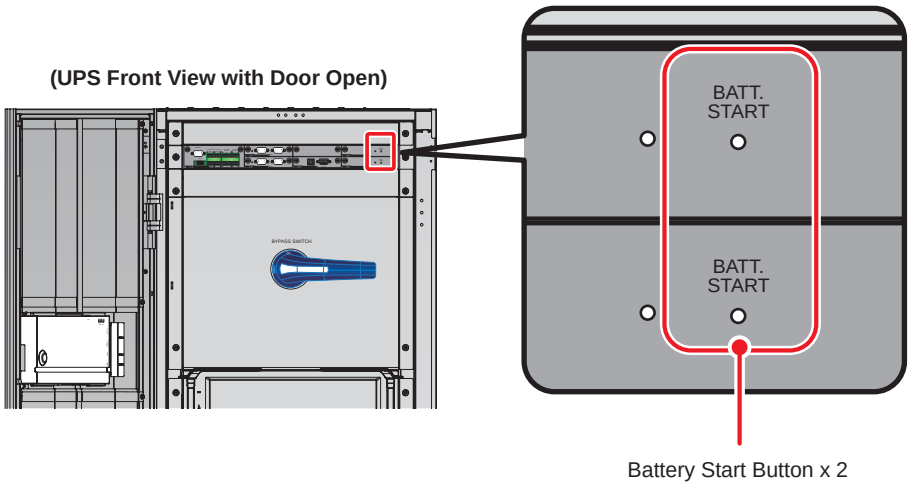
1 Please refer to the following steps to turn on the touch panel.

a. Switch the bypass switch (Q0) of the UPS to the open (**ON**) position; the touch panel will then light up and the initialization screen will appear; or

b. Turn the input breaker or switch (Q1) of the Delta or non-Delta external maintenance bypass cabinet to the open (**ON**) position; the touch panel will then light up and the initialization screen will appear; or

c. Turn the input breaker or switch (Q1) of the Delta or non-Delta external maintenance bypass cabinet and the bypass switch (Q0) of the UPS to the open (**ON**) position; the touch panel will then light up and the initialization screen will appear; or

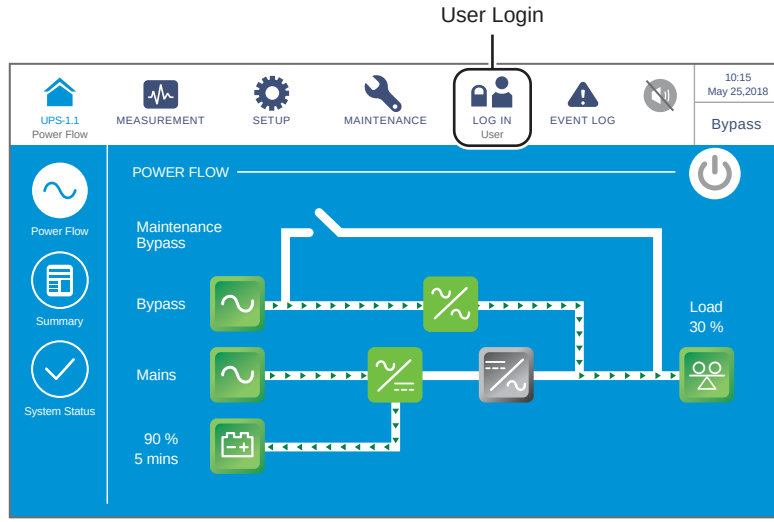
d. Turn the external battery cabinet's breaker (Q5) to the open (**ON**) position, open the front door of the UPS, and press any of the battery start buttons on the communication interfaces for 1 second and release it; the touch panel will then light up and the initialization screen will appear. For the location of the battery start buttons, please refer to ***Figure 7-2***; for the touch panel initialization screen, please refer to ***Figure 7-3***.



(Figure 7-2: The Position of Battery Start Buttons)

(Figure 7-3: Initialization Screen of Touch Panel)

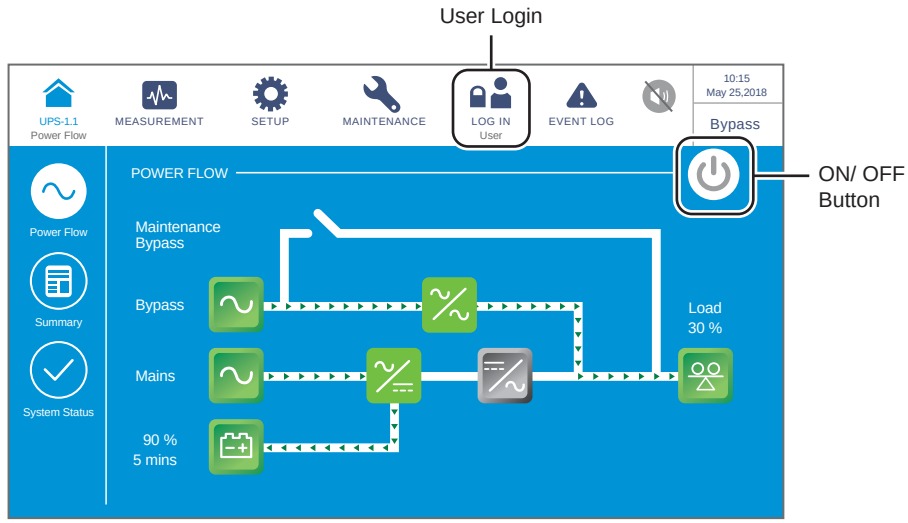
2 About 20 seconds after the touch panel lights up, the main screen will appear (shown in ***Figure 7-4***). After the main screen appears, the touch panel could be used. Please note that when the main screen is shown, the login status is **User**.



(Figure 7-4: Main Screen_ User Login)

7.3 ON/ OFF Button

After the touch panel is turned on in accordance with the steps stated in ***7.2 Turning on the Touch Panel***, the main screen will appear in the **User** login status and the ON/ OFF Button ( ) will appear shown in ***Figure 7-5***.

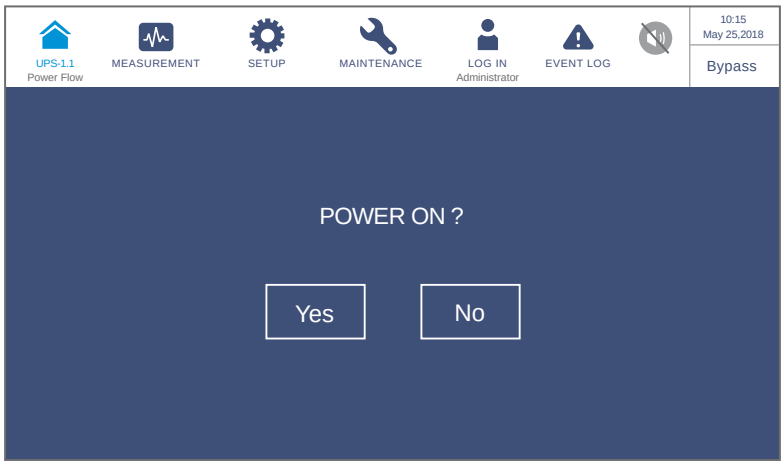


(Figure 7-5: Main Screen_ User Login & ON/ OFF Button Location)

- **Power On**

  When the ON/ OFF button is gray ( ), it indicates that the UPS's inverter is in the **OFF** status. Press the button once and a reminder window will pop up shown below asking for confirmation of '**POWER ON**'.

  After selecting '**Yes**', the ON/ OFF button will turn green ( ), indicating that the power-on process is completed.

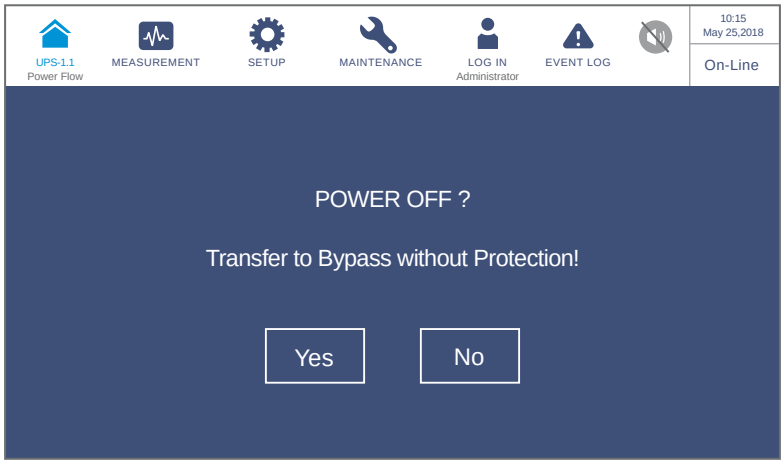


(Figure 7-6: Power On Reminder Window)

- **Power Off**

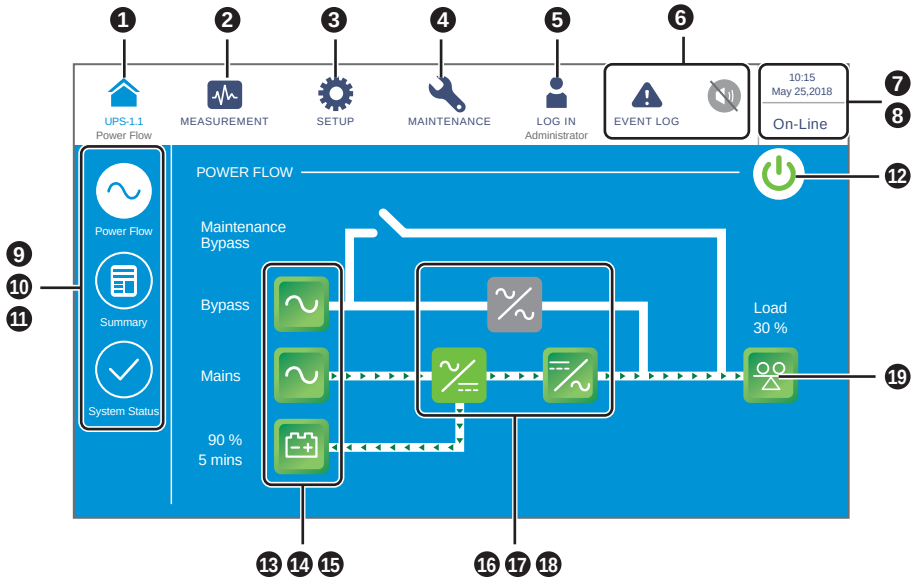
  When the ON/ OFF button is green ( ), it indicates that the UPS's inverter is in the **ON** status. Press the button once and a reminder window will pop up shown below asking for confirmation of '**POWER OFF**'.

  After selecting '**Yes**', the ON/ OFF button will turn gray ( ), indicating that the power-off process is completed.



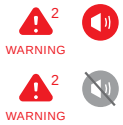
(Figure 7-7: Power Off Reminder Window)

7.4 Introduction of Touch Panel and Function Keys

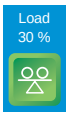


(Figure 7-8: Introduction of Touch Panel and Function Keys)

No.	Icon/ Text	Button Function (Yes or No)	Text/ Digital Display (Yes or No)	Symbol Display (Yes or No)	Description
1	UPS-1.1	✓	✓		Tap the button to go back to the **Main Screen**. The figure UPS-1.1 below the icon indicates the parallel group ID no. (former) and the parallel ID no. (latter). **NOTE:** On the master UPS's screen, you can check its status and readings as well as the slave UPS's partial status and readings. On a salve UPS's screen, you can only check its own status and readings.
2	MEASUREMENT	✓			Shortcut button for the measurement menu. For more information, please refer to ***7.9 Check System Readings***.

No.	Icon/ Text	Button Function (Yes or No)	Text/ Digital Display (Yes or No)	Symbol Display (Yes or No)	Description
❸	 SETUP	✓			Shortcut button for the setup menu. For more information, please refer to ***7.10 UPS Settings***.
❹	 MAINTENANCE	✓			Shortcut button for the maintenance menu. For more information, please refer to ***7.11 System Maintenance***.
❺	 LOG IN User	✓		✓	Indicates login by **User**. The button can be pressed to change the login permission. For more information, please refer to ***7.5 Password Entry***.
	 LOG IN Administrator	✓		✓	Indicates login by **Administrator**. The button can be pressed to change the login permission. For more information, please refer to ***7.5 Password Entry***.
❻	 EVENT LOG	✓		✓	1. Event log shortcut button (). Press the button to check the total event logs. 2. When the warning symbol () is blue, it indicates that there is no warning.
	 WARNING WARNING	✓	✓	✓	1. Warning event shortcut button (). 2. Buzzer button (). 3. When the warning symbol () is red, it indicates that there is a warning. At this time, the buzzer will sound and the buzzer symbol () will appear and light up. The numerical value at the right of the red warning symbol indicates the total number of warning events. By clicking the buzzer button (), the buzzer will be muted. At this time, the buzzer disabled symbol () will appear.
❼	10:15 May 25,2018		✓		Indicates the time and date.

No.	Icon/ Text	Button Function (Yes or No)	Text/ Digital Display (Yes or No)	Symbol Display (Yes or No)	Description
❽	On-Line ECO Frequency Conversion Green Energy Recycle Bypass Battery Standby Softstart		✓		Indicates the UPS operation status (the actual display will depend on the actual operation status).
❾		✓			Shortcut button for power flow diagram. Press the button to check the operation mode and status of the UPS. For more information, please refer to ***7.8 Power Flow & Summary & System Status***.
❿		✓			Shortcut button for summary information. Press the button to check the input, output, and battery status of the UPS. For more information, please refer to ***7.8 Power Flow & Summary & System Status***.
⓫		✓			Shortcut button for system status. Press the button to check the status of each power module, parallel communication card, system control card, and auxiliary power card. For more information, please refer to ***7.8 Power Flow & Summary & System Status***.
⓬		✓		✓	ON/ OFF button. For more information, please refer to ***7.3 ON/ OFF Button***.
⓭		✓		✓	1. Bypass input status (green: normal; red: abnormal). 2. Bypass input screen shortcut button.
⓮		✓		✓	1. Main input status (green: normal; red: abnormal). 2. Main input screen shortcut button.

No.	Icon/ Text	Button Function (Yes or No)	Text/ Digital Display (Yes or No)	Symbol Display (Yes or No)	Description
⓯		✓	✓	✓	1. Battery status (green: normal; red: abnormal). 2. Battery remaining capacity (%). 3. Battery remaining time (minutes). 4. Battery status screen shortcut button.
⓰				✓	Bypass static switch status (green: **ON**; gray: **OFF**).
⓱				✓	Rectifier status (green: normal; gray: waiting or **OFF**).
⓲		✓		✓	1. Inverter status (green: normal; gray: wait or **OFF**). 2. Inverter output screen shortcut button.
⓳		✓	✓	✓	1. Output status (green: normal; gray: no output). 2. Load capacity (%). 3. Output screen shortcut button.

Other symbols which will appear during the operation of the touch panel are shown in the table below.

No.	Symbol	Function
1	 	First Page
2		Last Page
3	 	Up
4	 	Down
5		Add

No.	Symbol	Function
6		Subtract
7		Enter page number
8	 	Delete
9		Capital letter
10		Blank

NOTE:

1. After the back light is turned off, the user can gently touch the LCD to return to the **Main Screen**. For information about the **Main Screen**, please refer to ***7.6 Main Screen***.
2. The sleep time for the back light can be adjusted. Please refer to ***7.10.7 General Setting***.
3. If you are logged in as an **Administrator** (the **Administrator** password is required; please refer to ***7.5 Password Entry***), you will be logged out when the backlight is off. After you touch the screen to wake it up, the LCD will go back to the **Main Screen** in the **User** login status. Even if you set up the backlight in '**Never Sleep**' mode, you will still be logged out after the screen is idle for 5 minutes.
4. The default language is English. If the language needs to be changed, please click SETUP → **General Setting**→ **User**→ **Language** to change the displayed language of the screen. The default language will be different in different countries.

7.5 Password Entry

1. Password entry is only required for login as an **Administrator**. **User** login does not require a password.
2. Click LOG IN User → enter the **Administrator** password (please contact service personnel for the default password) → the icon LOG IN Administrator appears, indicating **Administrator** login is successful.
3. To change the **Administrator** password, click SETUP → **General Setting** → **User** → **Administrator Password** (4 digits).

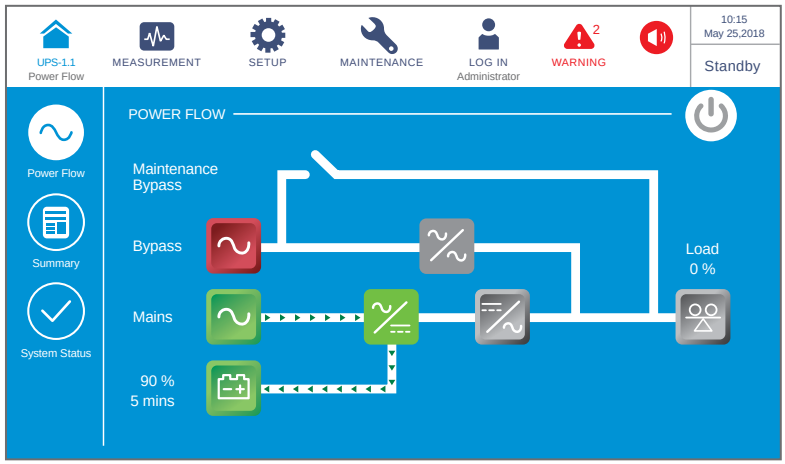
NOTE:

Different login IDs (Administrator/ User) have different access to different screens, inspection items and setup items. Please refer to ***7.1 LCD Display Hierarchy***.

7.6 Main Screen

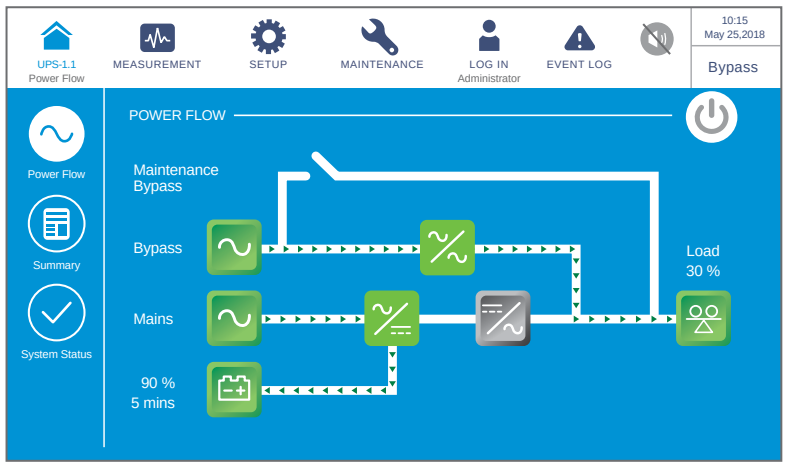
1. Please refer to ***7.2 Turning on the Touch Panel*** and ***7.3 ON/ OFF Button*** for starting up the **Main Screen**.
2. The system shows different power flow screens depending on the status of the UPS. Each power flow screen is a **Main Screen**. See the examples below.

❶



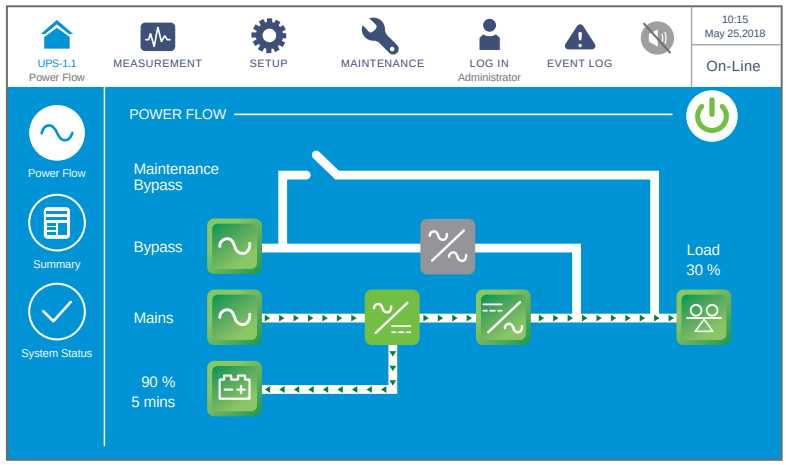
The screen above indicates that the UPS is in standby mode. The inverter is not turned on and the bypass is out of the range.

❷



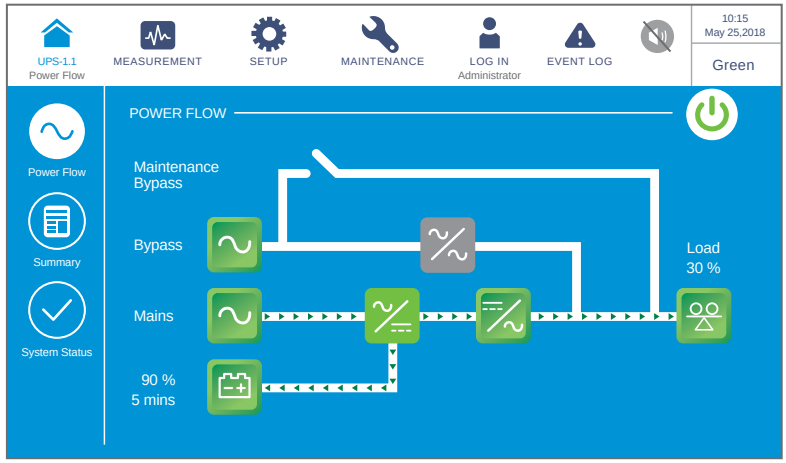
The screen above indicates that the UPS is in bypass mode and the inverter is not turned on.

❸



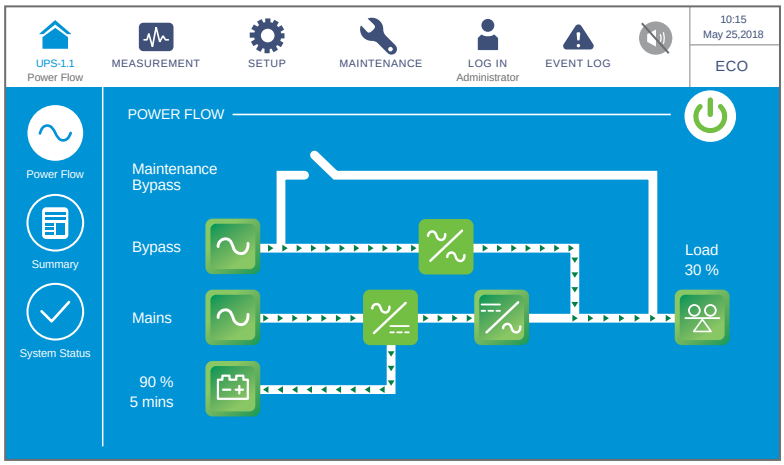
The screen above indicates that the UPS is in online mode and the loads are supplied by the inverter. Please refer to ***7.10.2 Mode Setting*** and ***6.2.1 Online Mode Start-up Procedures***.

❹



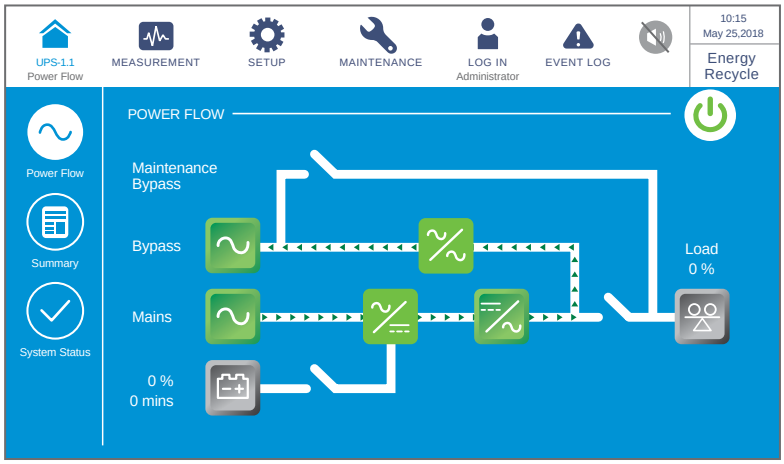
The screen above indicates that the UPS is in green mode. The loads are supplied by the inverter, and alternating power modules will turn off in accordance with the total load situation. For green mode settings, please refer to ***7.10.2 Mode Setting*** and ***6.2.7 Green Mode Start-up Procedures***.

❺



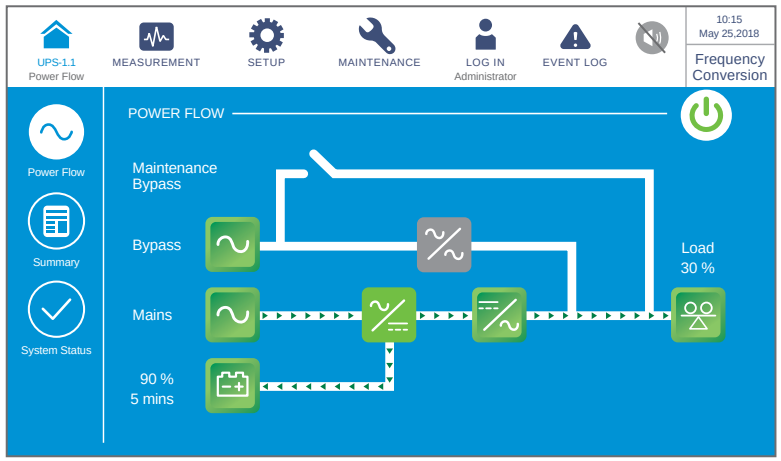
The screen above indicates that the UPS is in ECO mode. The inverter is in the ready-to-power-on status, and the loads are supplied by the bypass. For ECO mode settings, please refer to ***7.10.2 Mode Setting*** and ***6.2.5 ECO Mode Start-up Procedures***.

❻



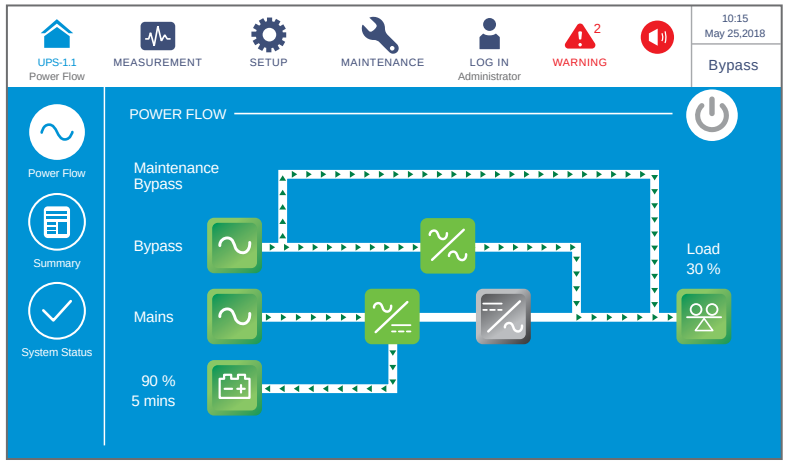
The screen above indicates that the UPS is in energy recycle mode. The output power will be recycled to the input without being sent to the loads and the aging test could be conducted. For energy recycle mode settings, please refer to ***7.10.2 Mode Setting*** and ***6.2.8 Energy Recycle Mode Start-up Procedures***.

❼



The screen above indicates that the UPS is in frequency conversion mode and the bypass output is restricted. For frequency conversion mode settings, please refer to ***7.10.2 Mode Setting*** and ***6.2.6 Frequency Conversion Mode Start-up Procedures***.

❽



After the Delta or non-Delta external maintenance bypass cabinet's manual bypass breaker or switch (Q3) is turned on, the UPS will be switched to manual bypass mode, and the screen above will appear. Before maintenance personnel perform maintenance, the UPS must be switched to this mode and it must be ensured that all input power and battery power are disconnected. After power disconnection, the LCD will be off. If there is any sudden malfunction in the bypass, the loads will lose power and become unprotected. Please refer to ***6.2.4 Manual Bypass Mode Start-up Procedures***.

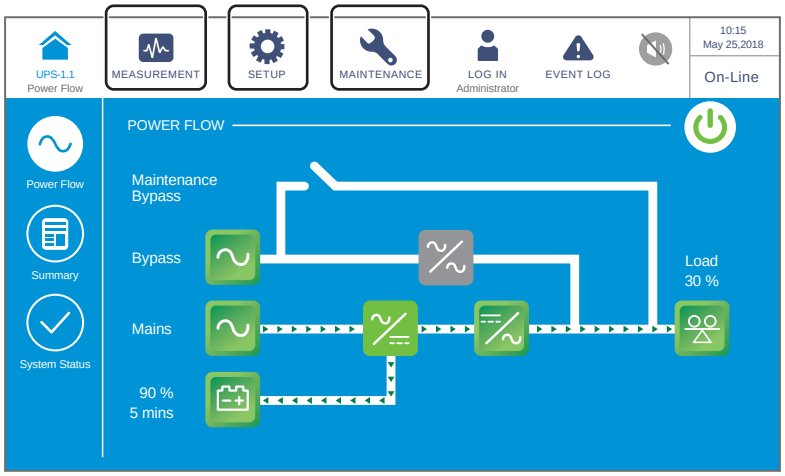
7.7 Main Menu

There are three main menu buttons 

, 

, 

; positions are shown in the figure below.



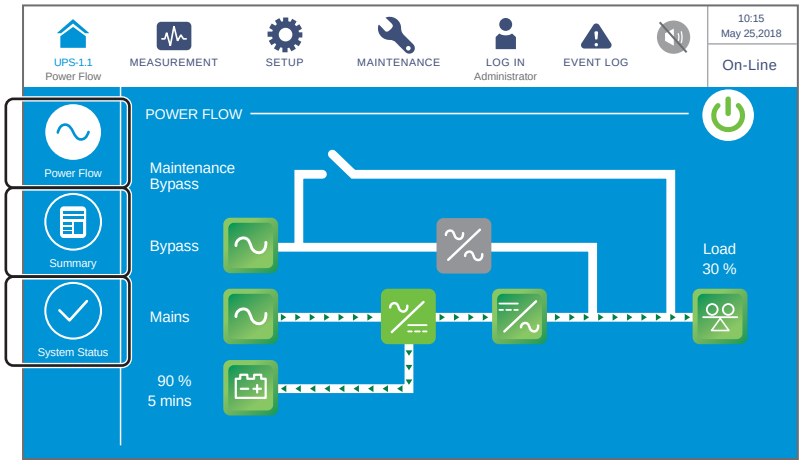
Main Menu Button	Description
 MEASUREMENT	Press the button to go to the **Measurement Menu**. In the menu, you can check the UPS's readings including the following: **1. Main Input** **2. Bypass Input** **3. Inverter Output** **4. Power Module Summary** **5. UPS Output** **6. Battery Status** For more information, please refer to ***7.9 Check System Readings***.
 SETUP	Press the button to go to the **Setup Menu**. In the menu, you can set up the following settings. **1. Bypass Setting** **2. Mode Setting** **3. Output Setting** **4. Battery & Charging Setting** **5. Parallel Setting** **6. Dry Contact Setting** **7. General Setting** **8. IP Setting** **9. Control** For more information, please refer to ***7.10 UPS Settings***.

Main Menu Button	Description
MAINTENANCE	Press the button to go to the **Maintenance Menu**. In the menu, you can (1) check the warning events/ historical events/ statistics/ relevant temperature readings/ firmware version, (2) execute the manual battery test, (3) clear the statistics/ historical event/ battery test result, and (4) upgrade firmware. In the **Maintenance Menu**, it includes the following items. **1. Warning** **2. Historical Event** **3. Statistics** **4. Test** **5. Clear** **6. Advanced Diagnosis** **7. Version & S/N** For more information, please refer to ***7.11 System Maintenance***.

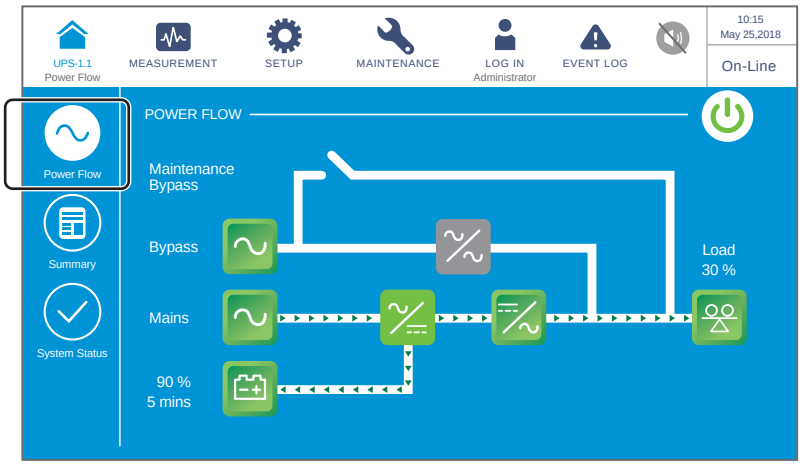
NOTE: Different login IDs (Administrator/ User) have different access to different screens, inspection items and setup items. Please refer to ***7.1 LCD Display Hierarchy***.

7.8 Power Flow & Summary & System Status

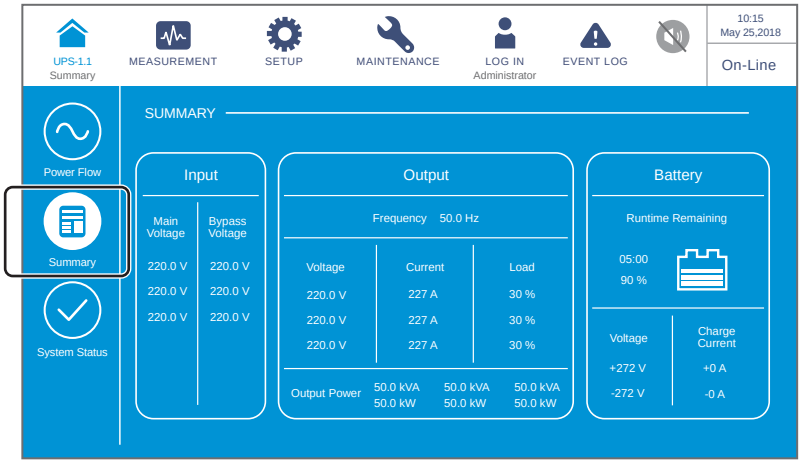
There are three shortcut buttons for you to check the **Power Flow**, **Summary**, and **System Status** respectively. Please see the figure below.



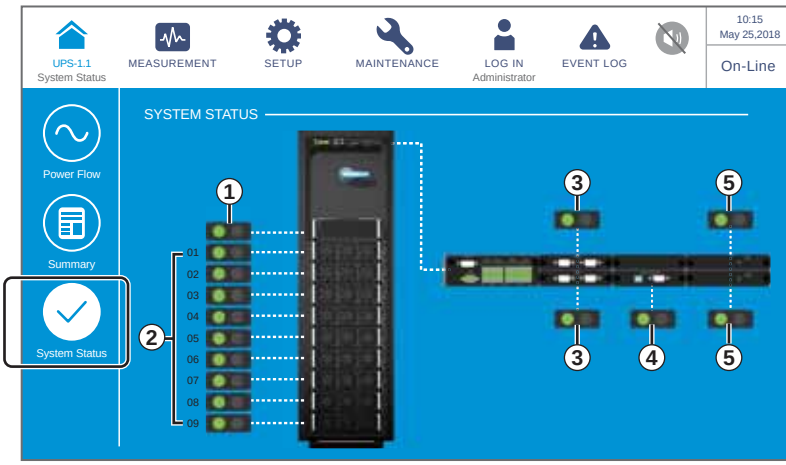
Press the Power Flow button to check the UPS's power flow diagram, shown in the figure below.



Press the Summary button to check information related to input, output and battery, shown in the figure below.



Press the System Status button to check the status of the STS module, power module, parallel communication card, system control card and auxiliary power card, shown in the figure below.



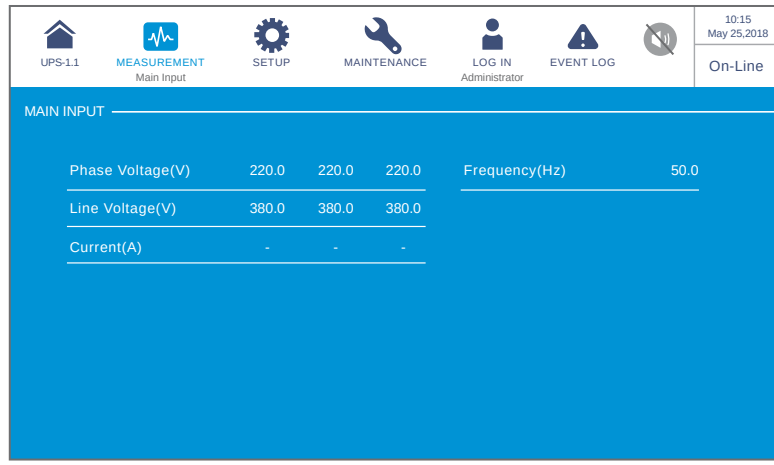
① STS Module Status
② Power Module Status
③ Parallel Communication Card Status
④ System Control Card Status
⑤ Auxiliary Power Card Status

7.9 Check System Readings

7.9.1 Main Input

Path: MEASUREMENT → **Main Input**

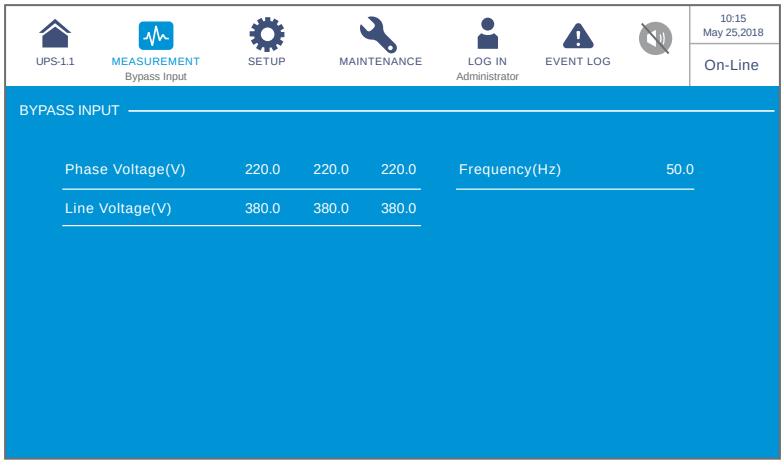
After entering the **MAIN INPUT** screen (shown in the figure below), the user can inquire about the **Phase Voltage**, **Line Voltage**, **Current** and **Frequency** readings.



7.9.2 Bypass Input

Path: MEASUREMENT → **Bypass Input**

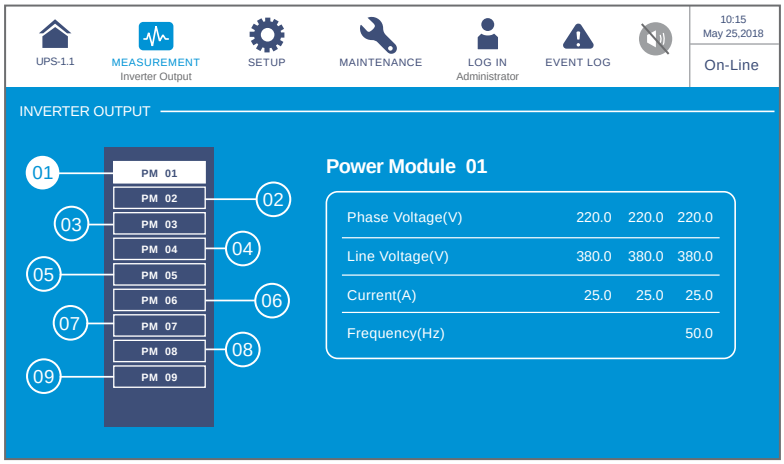
After entering the **BYPASS INPUT** screen (shown in the figure below), the user can inquire about the **Phase Voltage**, **Line Voltage** and **Frequency** readings.



7.9.3 Inverter Output

Path: MEASUREMENT → **Inverter Output**

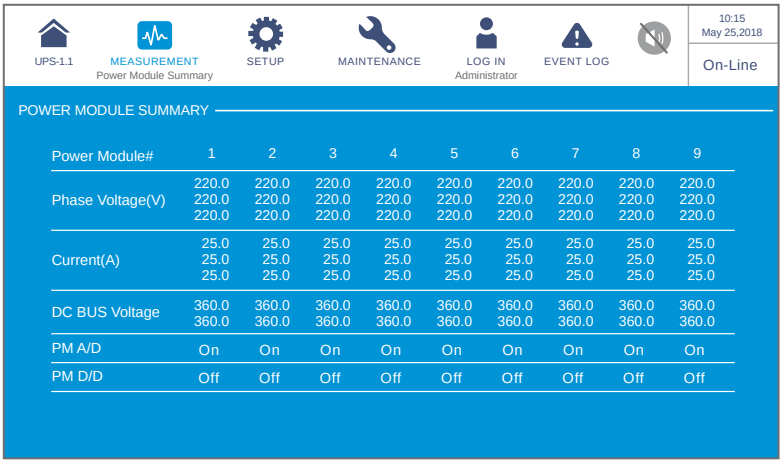
After entering the **INVERTER OUTPUT** screen (shown in the figure below), the user can inquire about each power module's **Phase Voltage**, **Line Voltage**, **Current** and **Frequency** readings.



7.9.4 Power Module Summary

Path: MEASUREMENT → **Power Module Summary**

After entering the **POWER MODULE SUMMARY** screen (shown in the figure below), the user can inquire about each power module's **Phase Voltage**, **Current**, **DC BUS Voltage**, **PM A/D** and **PM D/D** readings.

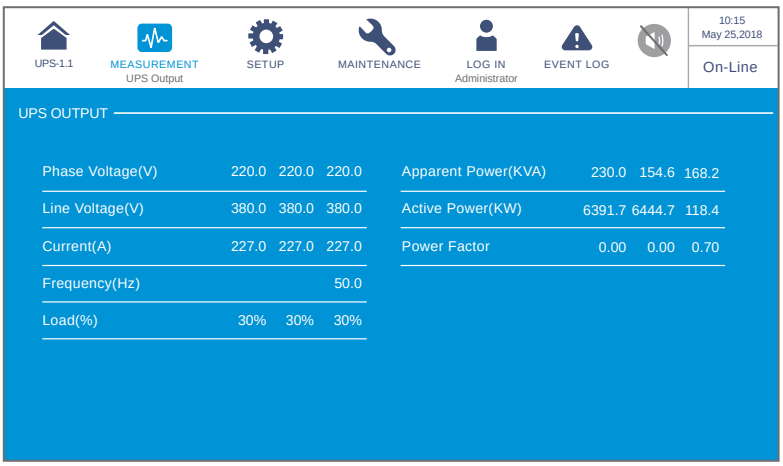


Power Module#	1	2	3	4	5	6	7	8	9
Phase Voltage(V)	220.0 220.0 220.0	220.0 220.0 220.0	220.0 220.0 220.0	220.0 220.0 220.0	220.0 220.0 220.0	220.0 220.0 220.0	220.0 220.0 220.0	220.0 220.0 220.0	220.0 220.0 220.0
Current(A)	25.0 25.0 25.0	25.0 25.0 25.0	25.0 25.0 25.0	25.0 25.0 25.0	25.0 25.0 25.0	25.0 25.0 25.0	25.0 25.0 25.0	25.0 25.0 25.0	25.0 25.0 25.0
DC BUS Voltage	360.0 360.0	360.0 360.0	360.0 360.0	360.0 360.0	360.0 360.0	360.0 360.0	360.0 360.0	360.0 360.0	360.0 360.0
PM A/D	On	On	On	On	On	On	On	On	On
PM D/D	Off	Off	Off	Off	Off	Off	Off	Off	Off

7.9.5 UPS Output

Path: MEASUREMENT → **UPS Output**

After entering the **UPS OUTPUT** screen (shown in the figure below), the user can inquire about **Phase Voltage**, **Line Voltage**, **Current**, **Frequency**, **Load**, **Apparent Power, Active Power** and **Power Factor** readings.

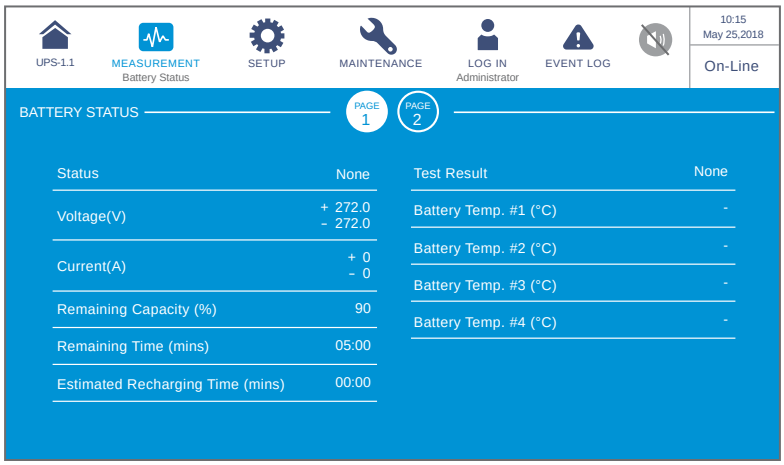


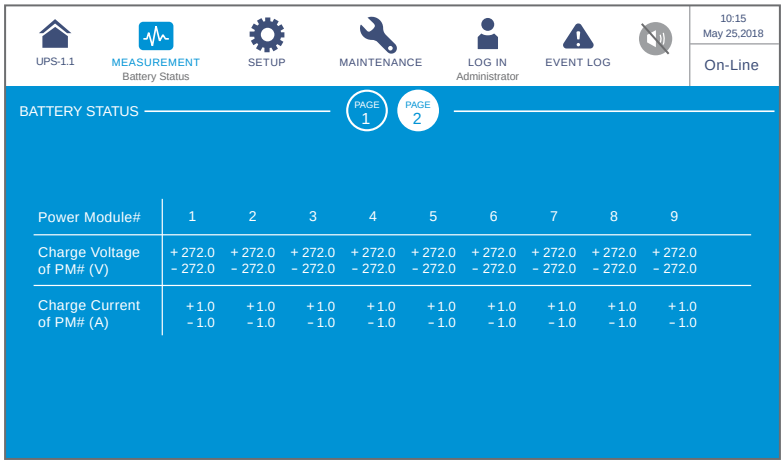
Phase Voltage(V)	220.0	220.0	220.0	Apparent Power(KVA)	230.0	154.6	168.2
Line Voltage(V)	380.0	380.0	380.0	Active Power(KW)	6391.7	6444.7	118.4
Current(A)	227.0	227.0	227.0	Power Factor	0.00	0.00	0.70
Frequency(Hz)			50.0				
Load(%)	30%	30%	30%				

7.9.6 Battery Status

Path: MEASUREMENT → **Battery Status**

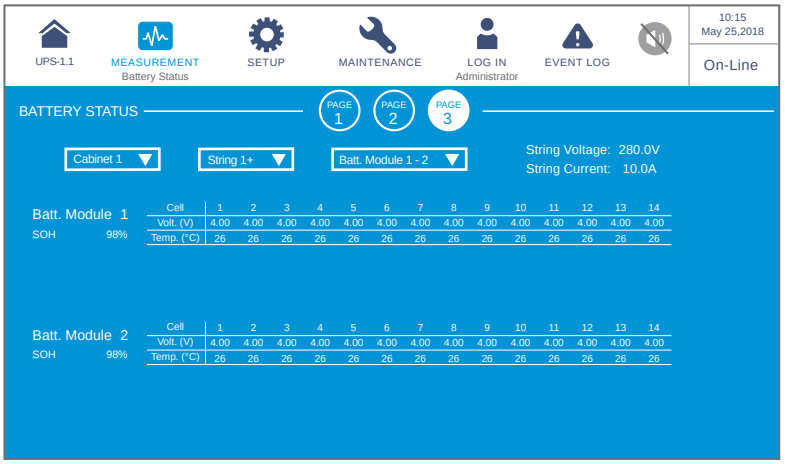
After entering the **BATTERY STATUS** screen (shown in the figure below), the user can inquire about **Status**, **Voltage**, **Current**, **Remaining Capacity**, **Remaining Time**, **Estimated Recharging Time**, **Test Result**, **Battery Temperature (#1~#4)**, and each power module's **Charge Voltage** and **Charge Current**.





NOTE:

The screen (PAGE 3) shown in the following figure will only appear on the LCD if you use the Delta lithium-ion batteries with the optional multifunctional communication card (MFC) being installed in the smart slot shown in ***Figure 4-13***. Please contact Delta customer service if you need more information.



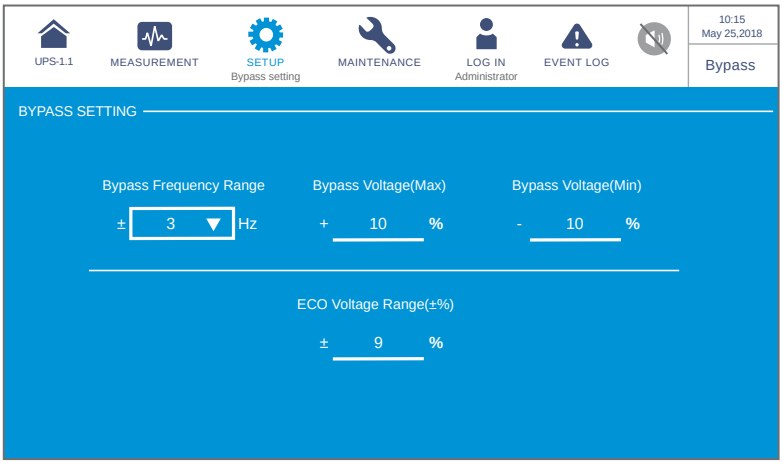
After entering the screen shown above, you can use the three drop-down lists in the upper left corner to choose the **Cabinet, String**, and **Battery Module** to view the corresponding **String Voltage**, **String Current**, battery module's **SOH** (State of Health) and battery cell's **Voltage** and **Temperature**.

7.10 UPS Settings

7.10.1 Bypass Setting

Path: SETUP → **Bypass Setting**

After entering the **BYPASS SETTING** screen (shown in the figure below), the user can set up the **Bypass Frequency Range**, **Bypass Voltage (Max.)**, **Bypass Voltage (Min.)** and **ECO Voltage Range**. If the range is exceeded, the system will issue an alarm. Only qualified service personnel can perform the above-mentioned setup items. Please contact Delta customer service for assistance.

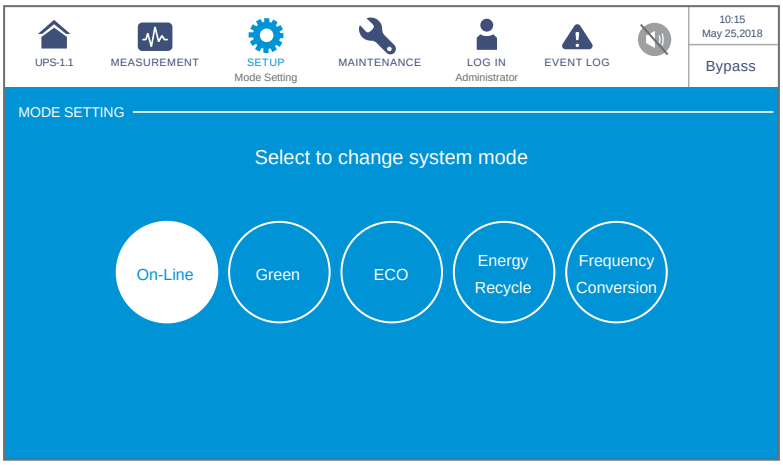


Item	Description
Bypass Frequency Range	Set up the bypass output's frequency range.
Bypass Voltage (Max.)	Set up the bypass output's maximum voltage.
Bypass Voltage (Min.)	Set up the bypass output's minimum voltage.
ECO Voltage Range	Set up the bypass output's voltage range in ECO mode.

7.10.2 Mode Setting

Path: SETUP → **Mode Setting**

After entering the **MODE SETTING** screen (shown in figure below), the user can set up the UPS system mode, of which there are 5 options: **On-Line Mode, Green Mode, ECO Mode, Energy Recycle Mode** and **Frequency Conversion Mode**. These settings must be performed by qualified service personnel. Please contact Delta customer service for assistance.



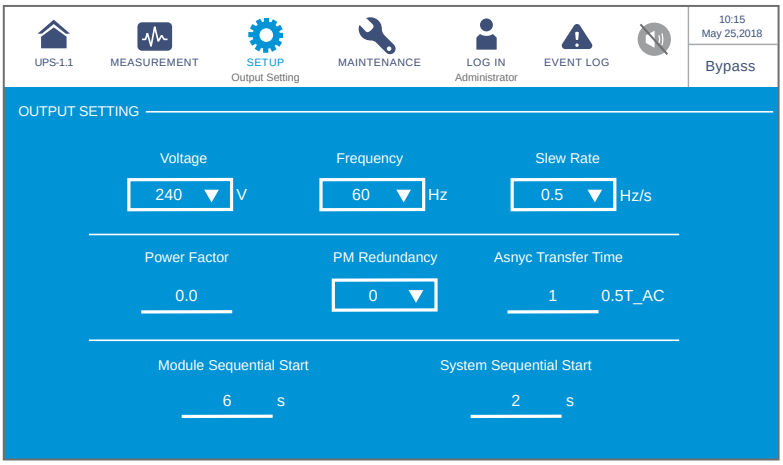
Item	Description
On-Line Mode	Set up the UPS in on-line mode. In on-line mode, it is the inverter to supply power to the connected loads.
Green Mode	Set up the UPS in green mode. In green mode, it is the inverter to supply power to the connected loads and the power modules take turn to rest according to the situation of total load capacity.
ECO Mode	Set up the UPS in ECO mode. In ECO mode, it is the bypass to supply power to the connected loads. It is suggested that you set the UPS in ECO mode only when there is stable main AC power. Otherwise, power supply quality will be compromised.

Item	Description
Energy Recycle Mode	Set up the UPS in energy recycle mode. In energy recycle mode, the full load output can be simulated for the aging test without real output to the loads.
Frequency Conversation Mode	Set up the UPS in frequency conversation mode. In frequency conversation mode, it is the inverter to supply power to the connected loads with a fixed output frequency. Please note that the output will be terminated once the inverter is turned off.

7.10.3 Output Setting

Path: SETUP → **Output Setting**

After entering the **OUTPUT SETTING** screen (shown in the figure below), the user can set up the following items. These settings must be carried out by qualified service personnel. Please contact Delta customer service for assistance.



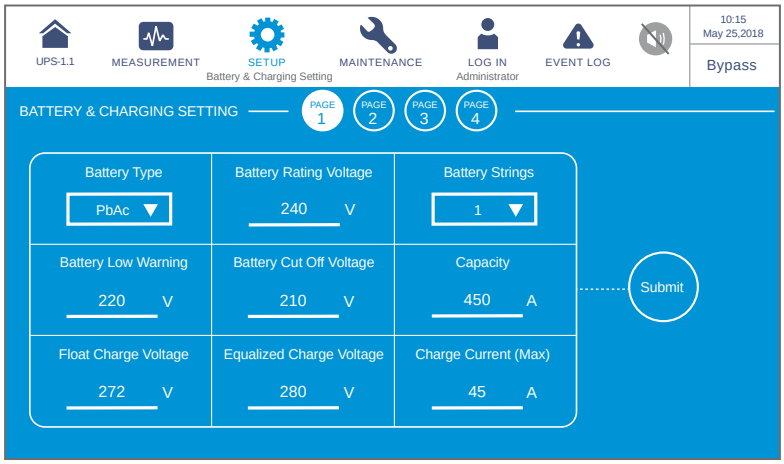
Item	Description
Voltage	Set up the output voltage.
Frequency	Set up the output frequency as 50Hz (default) or 60Hz. The system will automatically select the output frequency in accordance with the bypass power.
Slew Rate	Set up the maximum permissible speed for the system output frequency to catch up the bypass frequency variation.
Power Factor	Set up the output power factor (range: 0.9~1.0).

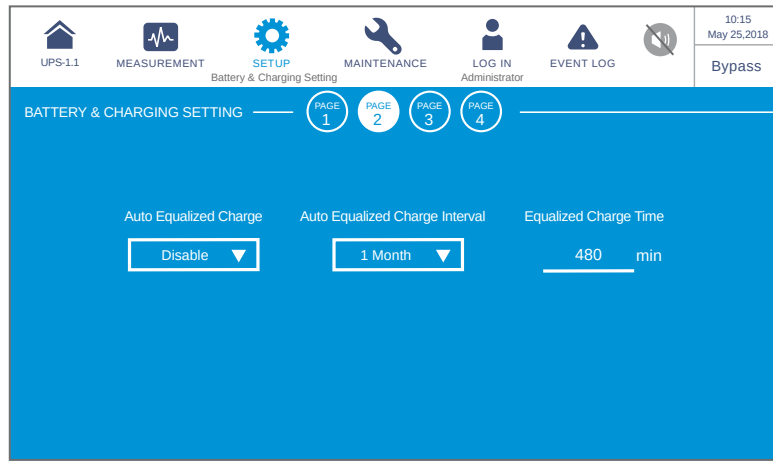
Item	Description
Power Module Redundancy	Set up how many power modules that need to be preserved for redundancy.
Asynchronous Transfer Time	When (1) the inverter is not synchronized with the bypass and (2) the loads need to be transferred to the bypass source, there will be an interrupted transfer time according to this setup value.
Module Sequential Start	Set up the time interval for every power module to be transferred from Battery mode to On-Line mode. The setup will help the generator to handle the whole loads in a sequential manner to avoid generator shutdown due to sudden inrush current.
System Sequential Start	Set up the time interval for the system to be transferred from Battery mode to On-Line mode. The setup will help the generator to handle the whole loads in a sequential manner to avoid generator shutdown due to sudden inrush current.

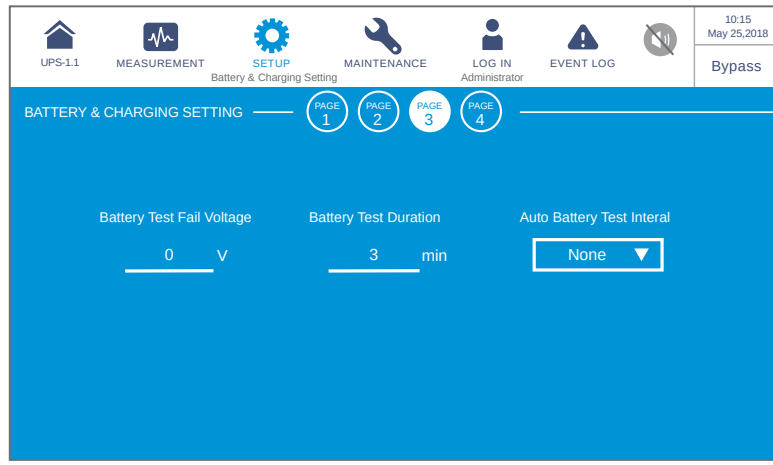
7.10.4 Battery & Charging Setting

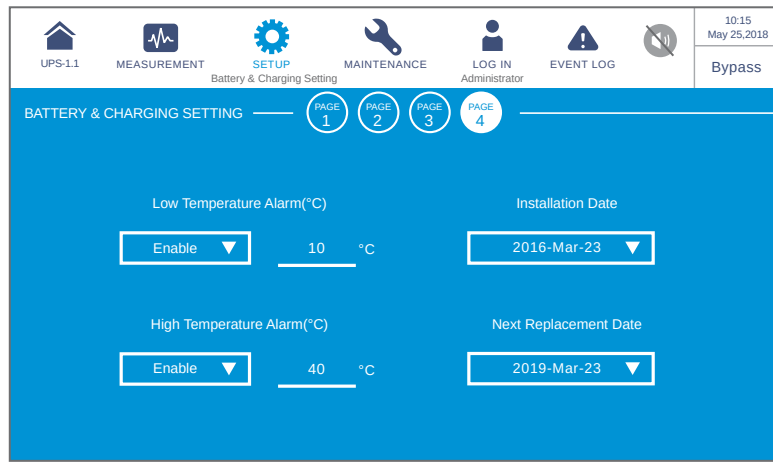
Path: SETUP → **Battery & Charging Setting**

In the **BATTERY & CHARGING SETTING** screen (shown in the figure below), the user can set up the following items. These settings must be carried out by qualified service personnel. Please contact Delta customer service for assistance.




UPS-1.1
MEASUREMENT
SETUP
Battery & Charging Setting
MAINTENANCE
LOG IN
Administrator
EVENT LOG
10:15
May 25,2018
Bypass
BATTERY & CHARGING SETTING
PAGE 1
PAGE 2
PAGE 3
PAGE 4
Auto Equalized Charge
Disable
Auto Equalized Charge Interval
1 Month
Equalized Charge Time
480
min


UPS-1.1
MEASUREMENT
SETUP
Battery & Charging Setting
MAINTENANCE
LOG IN
Administrator
EVENT LOG
10:15
May 25,2018
Bypass
BATTERY & CHARGING SETTING
PAGE 1
PAGE 2
PAGE 3
PAGE 4
Battery Test Fail Voltage
0
V
Battery Test Duration
3
min
Auto Battery Test Interal
None


UPS-1.1
MEASUREMENT
SETUP
Battery & Charging Setting
MAINTENANCE
LOG IN
Administrator
EVENT LOG
10:15
May 25,2018
Bypass
BATTERY & CHARGING SETTING
PAGE 1
PAGE 2
PAGE 3
PAGE 4
Low Temperature Alarm(°C)
Enable
10
°C
Installation Date
2016-Mar-23
High Temperature Alarm(°C)
Enable
40
°C
Next Replacement Date
2019-Mar-23

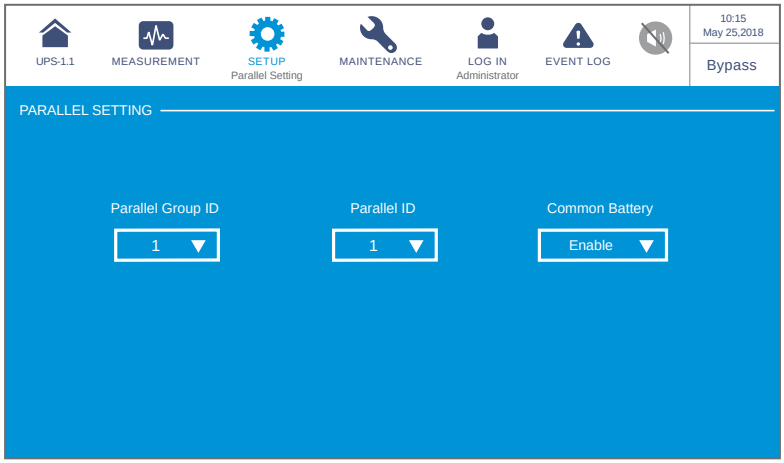
Item	Description
Battery Type	Set up the battery type as **VRLA**/ **LiB (Dry Contact)*[1]**/ **LiB (Integration)*[2]**. **NOTE:** 1. ***[1]** If you use non-Delta lithium-ion batteries, please set up the battery type as '**LiB (Dry Contact)**'. For relevant settings, please refer to ***4.1.6 Input Dry Contacts*** and ***7.10.6 Dry Contact Setting***. For more information about the configuration of lithium-ion batteries, please contact Delta customer service.
Battery Type	2. ***[2]** If you use the Delta lithium-ion batteries, please set up the battery type as '**LiB (Integration)**'. The item '**LiB (Integration)**' will only appear on the LCD if you use the Delta lithium-ion batteries with the optional multifunctional communication card (MFC) being installed in the smart slot shown in ***Figure 4-13***. Please contact Delta customer service if you need more information.
Battery Rating Voltage	Set up the battery rating voltage.
Battery Strings	Set up how many battery strings that are used on site.
Battery Low Warning	Set up the battery low warning voltage.
Battery Cut Off Voltage	Set up the battery low voltage. In Battery mode, when the battery low voltage is reached, the battery power will be cut off, and inverter of the UPS will shut down. The loads will then be transferred to bypass if the bypass is available; otherwise, the UPS will shut down.
Capacity	Set up the battery capacity.
Float Charge Voltage	Set up the float charge voltage.
Equalized Charge Voltage	Set up the equalized charge voltage. **NOTE:** The item will only show up if the **Battery Type** is set as '**VRLA**'.

Item	Description
Restored Voltage	Set up the restored voltage. **NOTE:** 1. The item will only show up if the **Battery Type** is set as '**LiB (Integration)**'. When the remaining battery voltage reaches the setup restored voltage, the UPS will automatically activate the charger to re-charge the batteries. 2. If the **Battery Type** is set as '**LiB (Dry Contact)**', the item will not show up.
Charge Current (Max)	Set up the maximum charge current.
Auto Equalized Charge	Enable or disable the auto-equalized charge.
Auto Equalized Charge Interval	Set up the auto equalized charge interval.
Equalized Charge Time	Set up the equalized charge time.
Battery Test Fail Voltage	Set up the battery test fail voltage. When the battery voltage is under the test fail voltage, it means battery fail.
Battery Test Duration	Set up how long the battery test should last.
Auto Battery Test Interval	Set up the battery test interval.
Low Temperature Alarm	Enable or disable the low temperature alarm. If enabled, set up the temperature.
High Temperature Alarm	Enable or disable the high temperature alarm. If enabled, set up the temperature.
Installation Date	Record the battery installation date.
Next Replacement Date	Set up the battery replacement date.

7.10.5 Parallel Setting

Path: SETUP → **Parallel Setting**

After entering the **PARALLEL SETTING** screen (shown in the figure below), the following items can be set up. These settings must be carried out by qualified service personnel. Please contact Delta customer service for assistance.

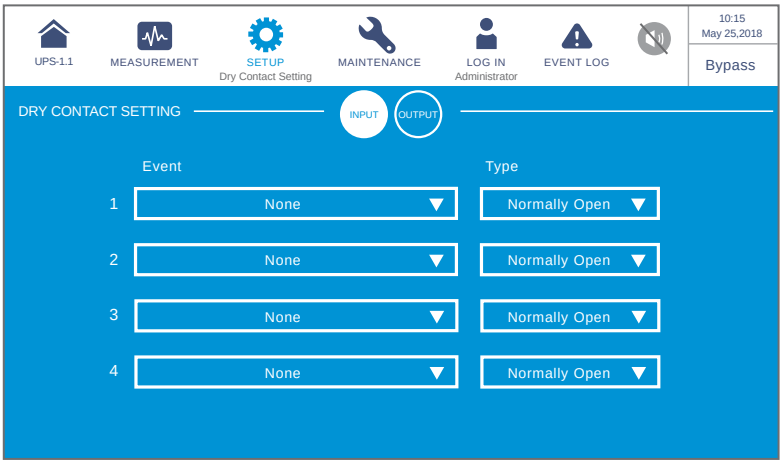


Item	Description
Parallel Group ID	The UPSs in parallel connection must be assigned the same parallel group ID No. in order to let the outputs of the parallel UPSs be put in parallel connection and let the loads be evenly distributed among the parallel units. If the parallel UPSs have different parallel group ID No., their output signals might be synchronized but their outputs cannot be connected in parallel.
Parallel ID	The UPSs that need to be paralleled must be assigned the same parallel group ID No. and different parallel ID No. in order to let the parallel function work.
Common Battery	If the parallel UPSs that have the same parallel group ID No. need to share common batteries, please select '**Enable**' for the '**Common Battery**' setup item. Otherwise, the function of battery abnormality detection will fail.

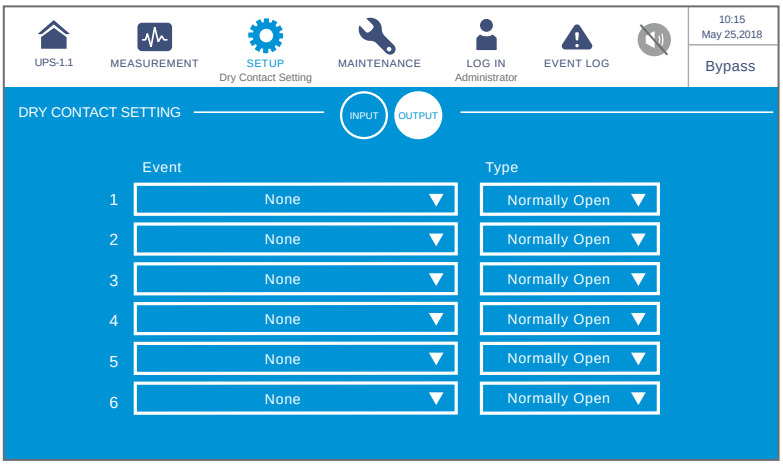
7.10.6 Dry Contact Setting

Path: SETUP → **Dry Contact Setting**

In the **DRY CONTACT SETTING** screen (shown in the figure below), the event, NO (normally open) or NC (normally closed) for each of the input and output dry contacts can be set up. These settings must be carried out by qualified service personnel. Please contact Delta customer service for assistance.



Input Dry Contact No.	Event Selection	Type
Input Dry Contact 1 **Input Dry Contact 2** **Input Dry Contact 3** **Input Dry Contact 4**	Select one of the following events as the setting for each input dry contact. 1. None 2. Generator status 3. Battery ground fail 4. External battery breaker detection	Set up NO (normally open) or NC (normally closed) for each input dry contact.

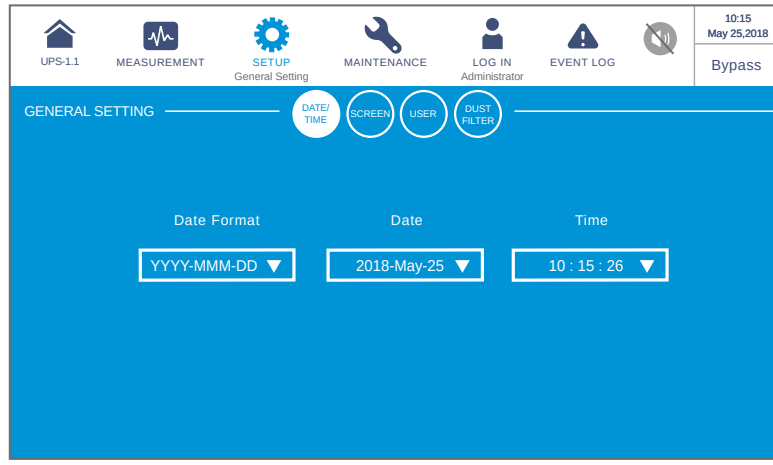


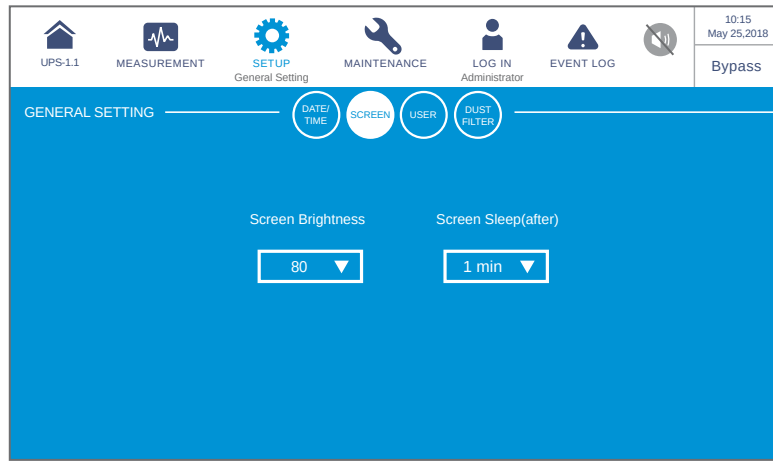
Output Dry Contact No.	Event Selection	Type
Output Dry Contact 1 **Output Dry Contact 2** **Output Dry Contact 3** **Output Dry Contact 4** **Output Dry Contact 5** **Output Dry Contact 6**	Select one of the following events as the setting for each output dry contact. 1. None 2. Load on inverter 3. Load on bypass 4. Load on battery 5. Battery low 6. Battery input abnormal 7. Battery test fail 8. Internal comm. fail 9. External parallel comm. fail (only applicable to parallel application) 10. Output overload 11. EPO activated 12. Load on manual bypass 13. Battery over temperature 14. Output voltage abnormal 15. Battery need replacement 16. Bypass over temperature 17. Bypass static switch fault 18. UPS over temperature 19. Battery breaker shunt trip 20. Backfeed protection 21. UPS general alarm	Set up NO (normally open) or NC (normally closed) for each output dry contact.

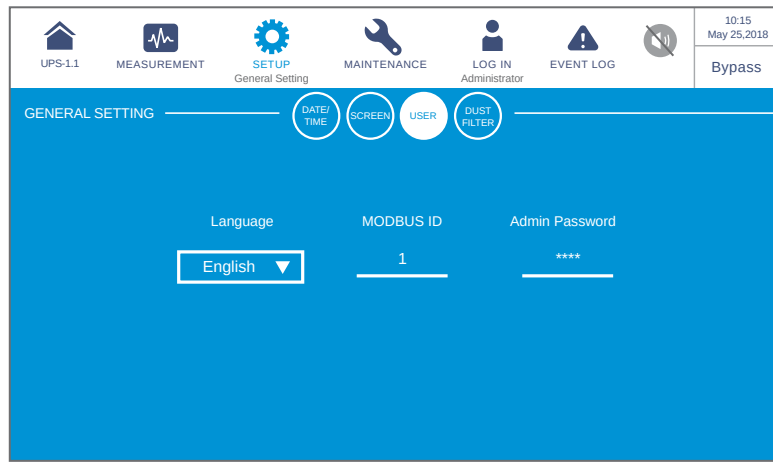
7.10.7 General Setting

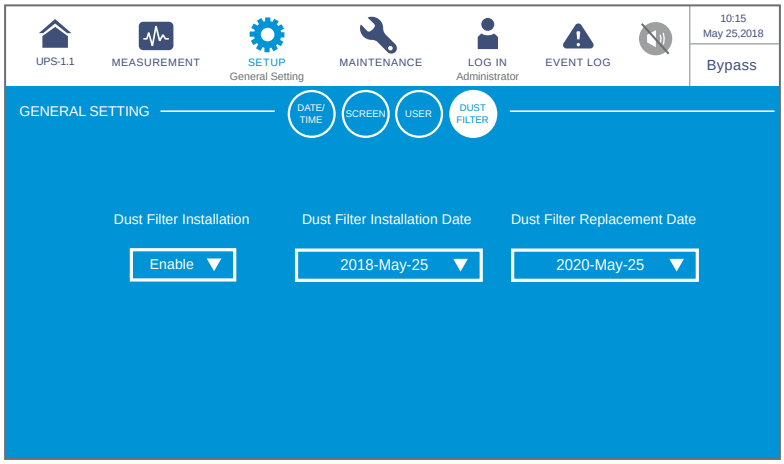
Path: SETUP **→ General Setting**

After entering the **GENERAL SETTING** screen (shown in the figure below), the following items can be set up.


UPS-1.1
MEASUREMENT
SETUP
General Setting
MAINTENANCE
LOG IN
Administrator
EVENT LOG
10:15
May 25,2018
Bypass
GENERAL SETTING
DATE/ TIME
SCREEN
USER
DUST FILTER
Date Format
Date
Time
YYYY-MMM-DD
2018-May-25
10 : 15 : 26


UPS-1.1
MEASUREMENT
SETUP
General Setting
MAINTENANCE
LOG IN
Administrator
EVENT LOG
10:15
May 25,2018
Bypass
GENERAL SETTING
DATE/ TIME
SCREEN
USER
DUST FILTER
Screen Brightness
Screen Sleep(after)
80
1 min

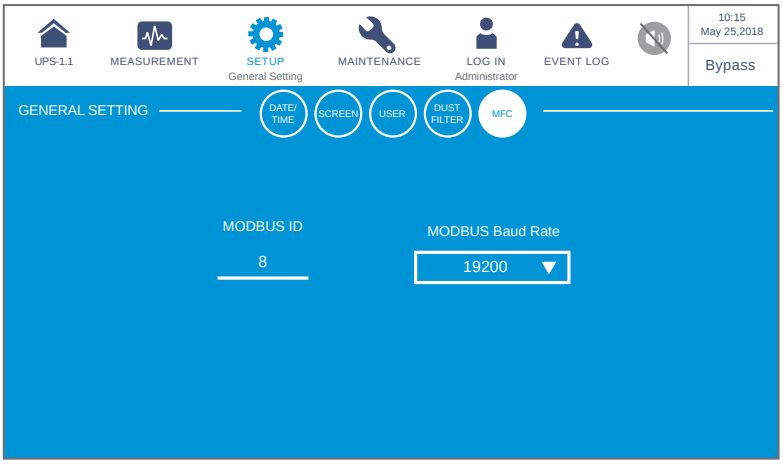

UPS-1.1
MEASUREMENT
SETUP
General Setting
MAINTENANCE
LOG IN
Administrator
EVENT LOG
10:15
May 25,2018
Bypass
GENERAL SETTING
DATE/ TIME
SCREEN
USER
DUST FILTER
Language
MODBUS ID
Admin Password
English
1
****



Item	Sub Item	Description
DATE/ TIME	Date Format	Select the date format.
	Date	Set up the date.
	Time	Set up the time.
SCREEN	Screen Brightness	Adjust the LCD display brightness (default: 80).
	Screen Sleep (after)	Set up the LCD backlight sleep time (default: 1 minute).
USER	Language	Set up the display language (default: English).
	MODBUS ID	Set up the MODBUS ID.
	Admin Password	Set up the administrator password (4 digits).
DUST FILTER	Dust Filter Installation	If you have installed any dust filter, please select '**Enable**'; if not, please select '**Disable**'.
	Dust Filter Installation Date	Set up the dust filter installation date. **NOTE:** Only when you select '**Enable**' for '**Dust Filter Installation**' can you set up the '**Dust Filter Installation Date**'.
	Dust Filter Replacement Date	Set up the dust filter replacement date. When the date is due, the red warning icon (⚠) will automatically appear in the upper right corner of the LCD, and the alarm message '**Replace Dust Filter**' will be displayed. **NOTE:** Only when you select '**Enable**' for '**Dust Filter Installation**' can you set up the '**Dust Filter Replacement Date**'.

NOTE:

1. The screen (MFC) shown in the following figure will only appear on the LCD if you use the Delta lithium-ion batteries with the optional multifunctional communication (MFC) card being installed in the smart slot shown in ***Figure 4-13***. Please contact Delta customer service if you need more information.

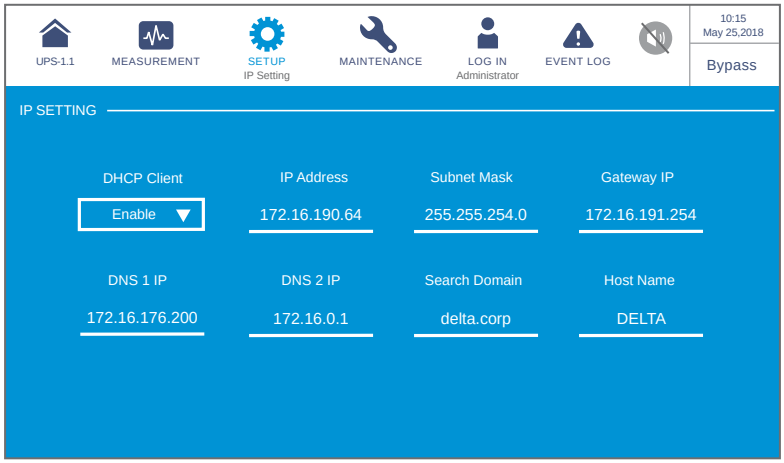


Item	Sub Item	Description
MFC	MODBUS ID	Set up the MODBUS ID for the optional multifunctional communication card (MFC).
	MODBUS Baud Rate	Set up the MODBUS baud rate for the optional multifunctional communication card (MFC).

7.10.8 IP Setting

Path: SETUP → **IP Setting**

After entering the **IP SETTING** screen (shown in the figure below), the following items can be set up. These settings must be carried out by qualified service personnel. Please contact Delta customer service for assistance.

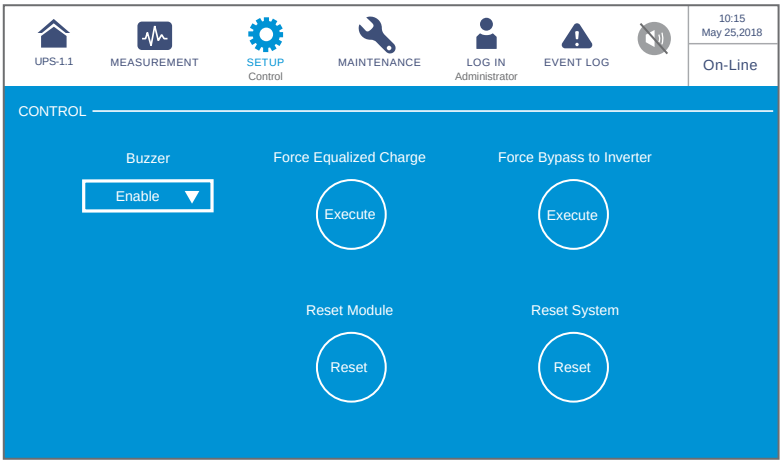


Item	Description
DHCP Client	Enable or disable the DHCP client.
IP Address	Set up the IP address.
Subnet Mask	Set up the subnet mask.
Gateway IP	Set up the gateway IP address.
DNS 1 IP	Set up the DNS server 1 IP address.
DNS 2 IP	Set up the DNS server 2 IP address.
Search Domain	Set up the search domain.
Host Name	Set up the host name.

7.10.9 Control

Path: SETUP → **Control**

After entering the **CONTROL** screen (shown in the figure below), the following items can be set up. These settings must be carried out by qualified service personnel. Please contact Delta customer service for assistance.



Item	Description
Buzzer	Enable or disable the buzzer.
Force Equalized Charge	Manually force the UPS to run in auto equalized charge mode to charge the batteries.
Force Bypass to Inverter	Manually force the UPS to switch from bypass to inverter when the inverter keeps staying in the soft-start status and is unable to transfer to on-line mode successfully.
Reset Module	Reset the power modules or not. In bypass mode, when you press the ON/ OFF button (⏻) to start up the UPS but the UPS does not respond, please select '**Reset**' to reset the power modules. After the power modules are reset, please press the ON/ OFF button (⏻) to start up the UPS.
Reset System	Reset the system or not. In bypass mode, when you press the ON/ OFF button (⏻) to start up the UPS but the UPS does not respond, please select '**Reset**' to reset the system. After the system is reset, please press the ON/ OFF button (⏻) to start up the UPS.

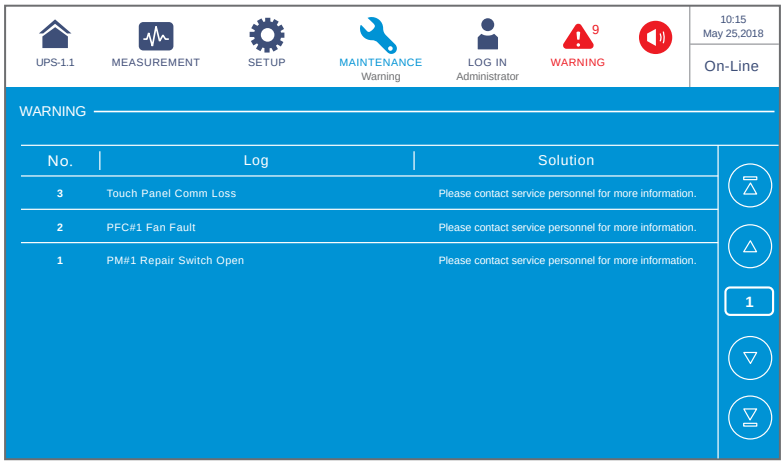
7.11 System Maintenance

7.11.1 Alarm Warning

Path 1: MAINTENANCE → **Warning**

Path 2: When there is a warning, the buzzer icon ( ) will light up in red, and the buzzer will make an alarm sound. click the warning icon (2 WARNING) to enter the **WARNING** screen.

After entering the **WARNING** screen (shown in figure below), you may use the ( ) buttons to inquire about warning logs or use the function key (1) to enter a specific page No. to check the warning logs. The system can store up to 200 warning logs.



7.11.2 Historical Event

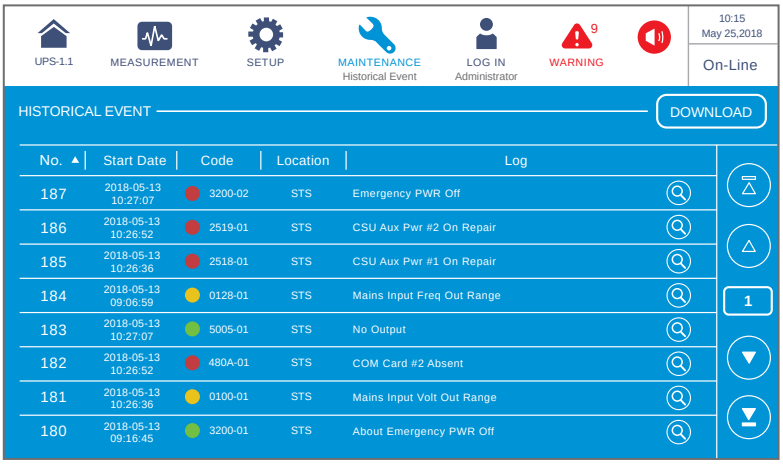
Path: MAINTENANCE → **Historical Event**

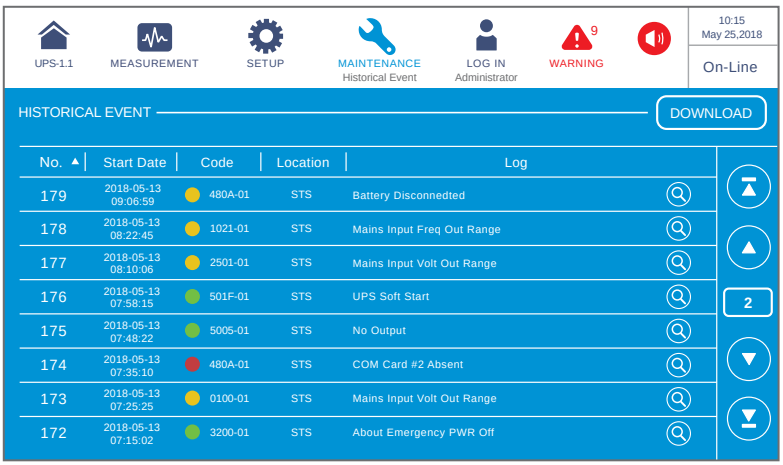
The **HISTORICAL EVENT** screen shown below provides each historical event's No., start date and time, code (red: serious; orange: minor; green: normal), location, and log description. You can click the icon ( ) to magnify the entire historical event description.

You can use the buttons ( ) to check the historical event logs or use the function key (1) to enter a specific page No. to view the historical event logs.

The system can save up to 10000 historical event logs. The greater the event number is, the newer the event is. When the total number of historical event logs exceeds the storage capacity (up to 10000 entries), the oldest 500 historical event logs will be overwritten.

You can click the download button (DOWNLOAD) to download the historical event logs. To clear the historical event logs, please refer to ***7.11.5 Clear***.

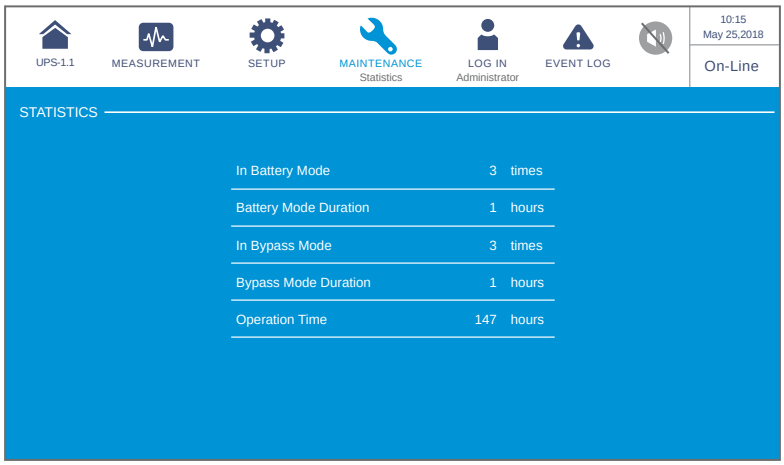




7.11.3 Statistics

Path: MAINTENANCE → **Statistics**

After entering the **STATISTICS** screen (shown in the figure below), you may inquire about the following statistics.



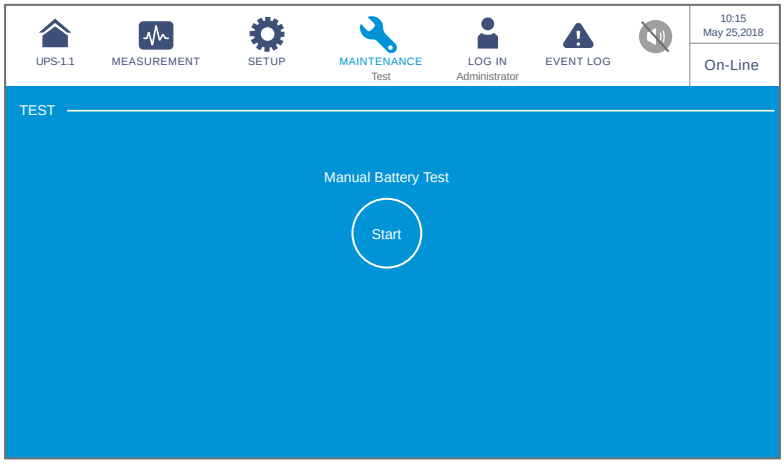
Item	Description
In Battery Mode	Means how many times that the UPS runs in battery mode.
Battery Mode Duration	Means how long the UPS runs in battery mode.
In Bypass Mode	Means how many times that the UPS runs in bypass mode.
Bypass Mode Duration	Means how long the UPS runs in bypass mode.
Operation Time	Means how long the UPS has operated.

To clear the statistics, please refer to ***7.11.5 Clear***.

7.11.4 Test

Path: MAINTENANCE → **Test**

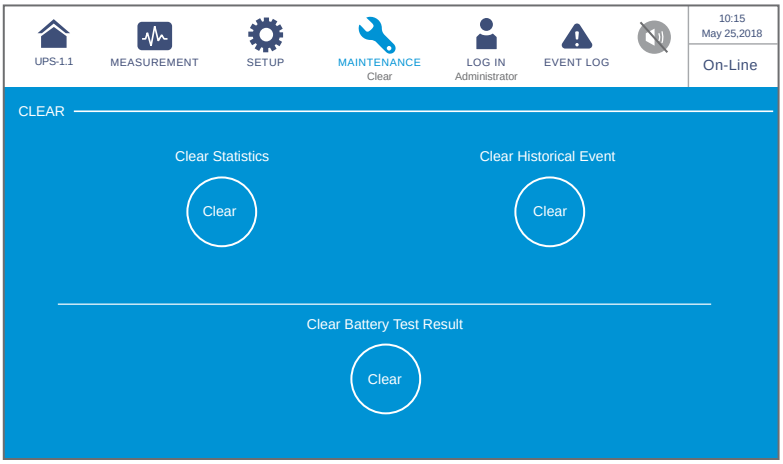
After entering the **TEST** screen (shown in the figure below), you can perform a manual battery test.



7.11.5 Clear

Path: MAINTENANCE → **Clear**

After entering the **CLEAR** screen (shown in the figure below), you can clear the records of statistics, historical event and battery test result.



Item	Description
Clear Statistics	After selecting **'Clear'** and confirming clearance of statistics, all records of the statistics will be cleared. The clear action requires the **Administrator** password.
Clear Historical Event	After selecting **'Clear'** and confirming clearance of historical event logs, all historical event logs will be cleared. The clear action requires the **Administrator** password.
Clear Battery Test Result	After selecting **'Clear'** and confirming clearance of battery test result, the battery test result will be cleared. The clear action requires the **Administrator** password.

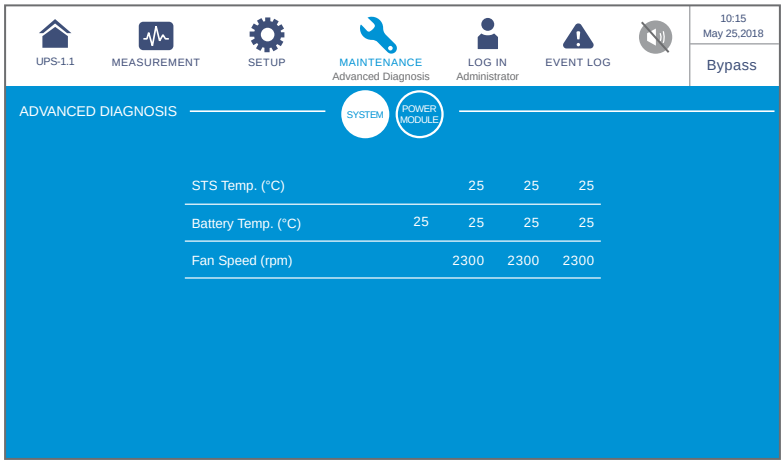
NOTE: The records of (1) statistics, (2) historical event and (3) battery test result provide important information for system analysis and maintenance. Do not clear any of them without the consent of qualified service personnel.

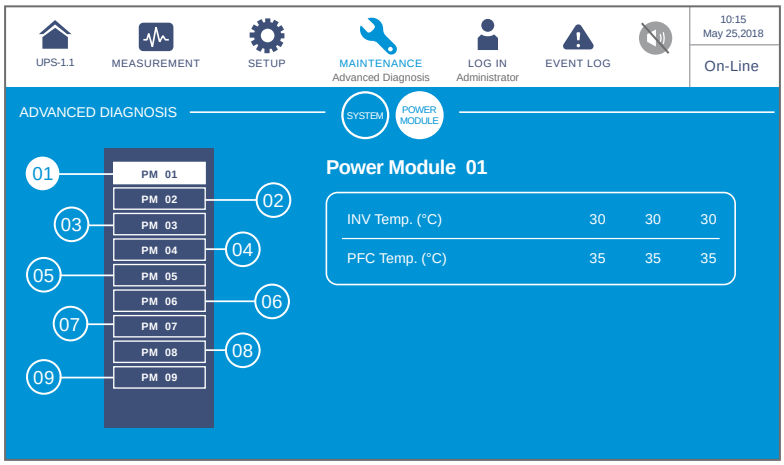
7.11.6 Advanced Diagnosis

Path: MAINTENANCE → **Advanced Diagnosis**

After entering the **ADVANCED DIAGNOSIS** screen (shown in the figure below), you may check:

1. STS temperature, battery temperature, and fan speed of the system.
2. INV temperature and PFC temperature of a specific battery module.





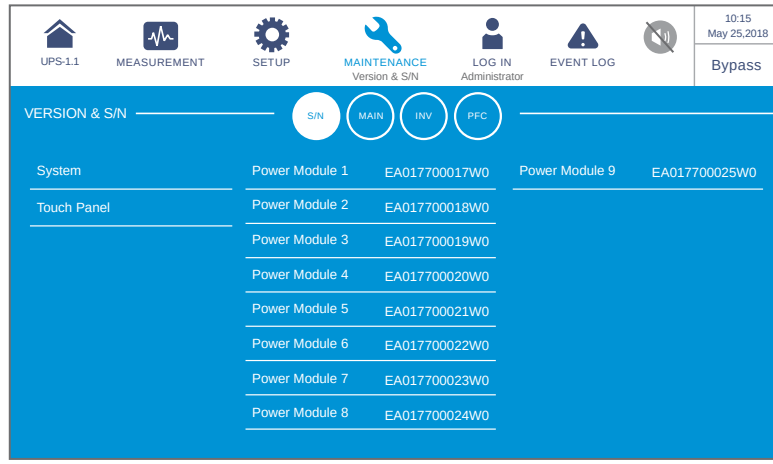
7.11.7 Version & S/N

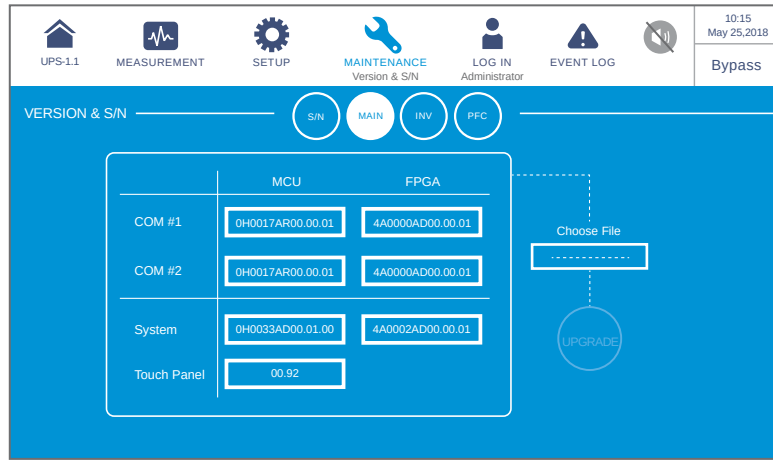
NOTE:

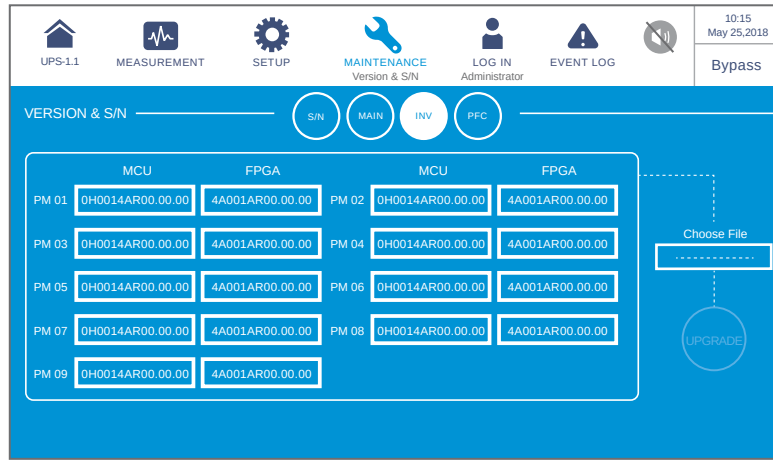
1. To operate the UPS in parallel, please make sure the version and serial No. of each following item is the same for each parallel unit.
2. The **Administrator** password is needed for the icon (UPGRADE). For password information, please refer to ***7.5 Password Entry***.

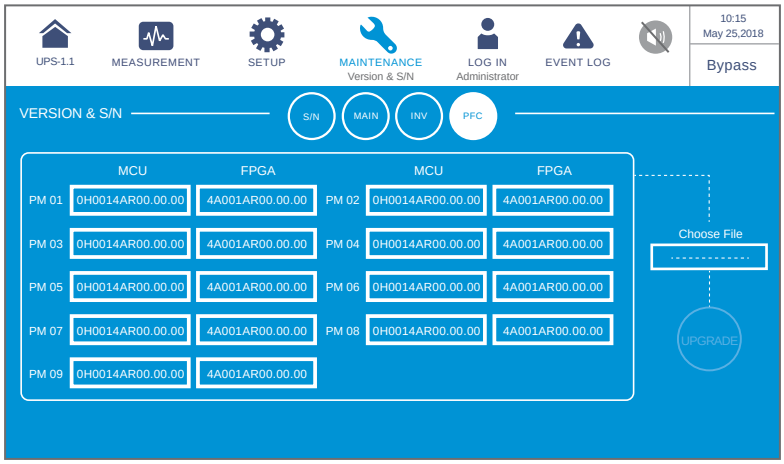
Path: MAINTENANCE → **Version & S/N**

After entering the **VERSION & S/N** screen (shown in the figure below), you may check and update the software version and serial number. For detailed information please refer to the table below.


UPS-1.1
MEASUREMENT
SETUP
MAINTENANCE
Version & S/N
LOG IN
Administrator
EVENT LOG
10:15
May 25,2018
Bypass
VERSION & S/N
S/N
MAIN
INV
PFC
System
Touch Panel
Power Module 1 EA017700017W0
Power Module 2 EA017700018W0
Power Module 3 EA017700019W0
Power Module 4 EA017700020W0
Power Module 5 EA017700021W0
Power Module 6 EA017700022W0
Power Module 7 EA017700023W0
Power Module 8 EA017700024W0
Power Module 9 EA017700025W0


UPS-1.1
MEASUREMENT
SETUP
MAINTENANCE
Version & S/N
LOG IN
Administrator
EVENT LOG
10:15
May 25,2018
Bypass
VERSION & S/N
S/N
MAIN
INV
PFC
MCU
FPGA
COM #1 0H0017AR00.00.01 4A0000AD00.00.01
COM #2 0H0017AR00.00.01 4A0000AD00.00.01
System 0H0033AD00.01.00 4A0002AD00.00.01
Touch Panel 00.92
Choose File
UPGRADE

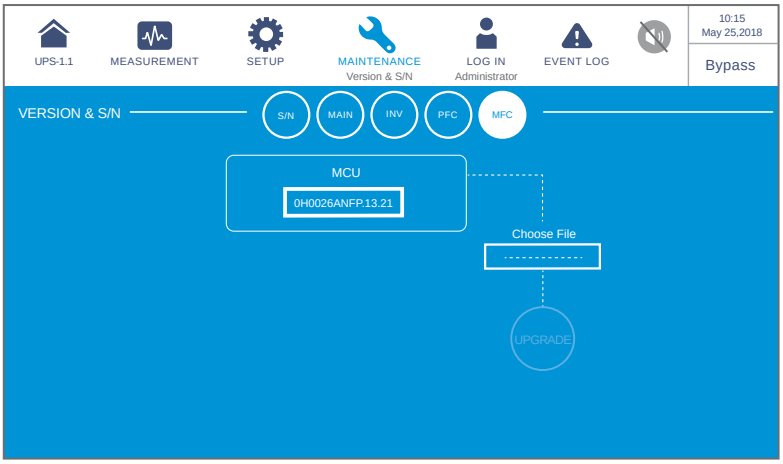

UPS-1.1
MEASUREMENT
SETUP
MAINTENANCE
Version & S/N
LOG IN
Administrator
EVENT LOG
10:15
May 25,2018
Bypass
VERSION & S/N
S/N
MAIN
INV
PFC
MCU
FPGA
PM 01 0H0014AR00.00.00 4A001AR00.00.00
PM 02 0H0014AR00.00.00 4A001AR00.00.00
PM 03 0H0014AR00.00.00 4A001AR00.00.00
PM 04 0H0014AR00.00.00 4A001AR00.00.00
PM 05 0H0014AR00.00.00 4A001AR00.00.00
PM 06 0H0014AR00.00.00 4A001AR00.00.00
PM 07 0H0014AR00.00.00 4A001AR00.00.00
PM 08 0H0014AR00.00.00 4A001AR00.00.00
PM 09 0H0014AR00.00.00 4A001AR00.00.00
Choose File
UPGRADE



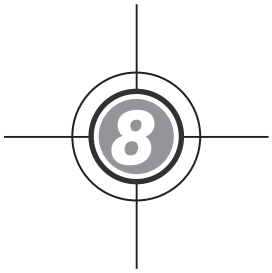
Item	Sub Item	Description
S/N	System	Check the system's serial No.
	Touch Panel	Check the touch panel's serial No.
	Power Module#	Check a specific power module's serial No.
MAIN	COM#_ MCU/ FPGA	Check and update a specific COM's MCU or FPGA firmware version.
	System _ MCU/ FPGA	Check and update the system's MCU or FPGA firmware version.
	Touch Panel _ MCU/ FPGA	Check and update the touch panel's MCU or FPGA firmware version.
INV	PM #_ MCU/ FPGA	Check and update the MCU or FPGA firmware version of a specific power module's inverter.
PFC	PM #_ MCU/ FPGA	Check and update the MCU or FPGA firmware version of a specific power module's PFC.

NOTE:

The screen (MFC) shown in the following figure will only appear on the LCD if you use the Delta lithium-ion batteries with the optional multifunctional communication card (MFC) being installed in the smart slot shown in ***Figure 4-13***. Please contact Delta customer service if you need more information.



Item	Sub Item	Description
MFC	MCU	Check and update the MCU firmware version of the optional multifunctional communication card (MFC).



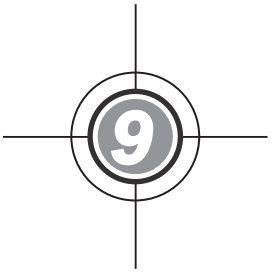
Optional Accessories

No.	Item	Function
1	60 ppi Dust Filter	Prevents dust from entering into the UPS to ensure UPS reliability and to prolong product life.
2	Relay I/O Card	Increases the quantity of dry contacts.
3	EnviroProbe 1000/ EnviroProbe 1100/ EnviroProbe 1200	Monitors temperature, humidity and other connected monitoring devices in a room environment. The EnvioProbe 1000/ 1100/ 1200 should work with either an SNMP card or an EMS2000.
4	Battery Cabinet Temperature Sensor Cable	Detects the temperature of an external battery cabinet connected to the UPS.
5	Parallel Cable (Length: 5 m (196.85"))	Connects the parallel UPSs.
6	Parallel Cable (Length: 10 m (393.7"))	Connects the parallel UPSs.
7	Battery Management System (BMS)	If you use the lead-acid batteries, it is recommended to install the BMS to monitor (1) each battery's voltage, (2) each battery string's voltage and charging/ discharging current, and (3) battery environment temperature. The BMS should be connected to the UPS's BMS port located at the rear of the touch panel (see ***Figure 4-17***). For details, please refer to ***7.9.6 Battery Status*** and ***7.10.4 Battery & Charging Setting***. **NOTE:** The quantity of BMS to be installed depends on how many external battery cabinets (lead-acid batteries) are connected to the UPS. For BMS installation, please contact Delta customer service.
8	Multifunctional Communication Card (MFC)	If you use the Delta lithium-ion batteries, you must purchase and install the multifunctional communication card (MFC) in the SMART slot shown in ***Figure 4-13*** to monitor the battery status via the UPS's LCD. For relevant information, please refer to ***7.9.6 Battery Status***, ***7.10.4 Battery & Charging Setting***, ***7.10.7 General Setting*** and ***7.11.7 Version & S/N***. Please contact Delta customer service if you need more information. **NOTE:** For parallel UPSs, you must install one multifunctional com-munication card (MFC) in each parallel UPS if you use the Delta lithium-ion batteries.

No.	Item	Function
9	Delta Maintenance Bypass Cabinet	Two options: 1. Equipped with an input switch, a manual bypass switch and an output switch. 2. Equipped with an input switch, a bypass switch, a manual bypass switch and an output switch.
10	Fuse Box for External Battery	When the UPS has a DC short circuit issue, the Fuse Box's internal fuses will automatically fuse to cut off the power connection between the UPS and the external battery cabinet, which achieves the function of power protection, avoids possible influence on other circuits, and decreases the possibility of other damages.

NOTE:

1. For detailed installation and operation of any accessory mentioned above, please refer to the ***Quick Guide***, ***User Guide***, or ***Installation & Operation Guide*** included in the package of the relevant optional accessory.
2. If you want to buy any accessory mentioned above, please contact your local dealer or customer service.



Maintenance

- **UPS**

  1. UPS Cleaning:

     Regularly clean the UPS, especially the slits, openings and filters, to ensure that the air flows into the UPS freely to avoid overheating. If necessary, use an air blower to clean the slits and openings and replace the filters regularly to prevent any object from blocking or covering these areas.

  2. UPS Regular Inspection:

     a. Check the filters monthly and replace them annually.

     b. Check the UPS biannually and inspect:

        1) Whether the UPS, LED indicators, and alarm function normally.

        2) Whether the UPS works in bypass mode (normally, the UPS will work in normal mode). If yes, check if any error, overload, internal fault, etc. occur.

        3) Whether the battery voltage is normal. If the battery voltage is too high or too low, find the root cause.

- **Batteries**

  The DPH series UPS uses lead-acid batteries or the lithium-ion batteries. Make sure to replace batteries according to the battery life. However, the actual battery life depends on the environment temperature, usage, and charging/ discharging frequency. High temperature environment and high charging/ discharging frequency will quickly shorten the battery life; thus, battery inspection and maintenance are required periodically. Please follow the suggestions below to ensure normal battery life.

  1. Keep usage temperature between 15°C ~ 25°C (59°F~77°F).

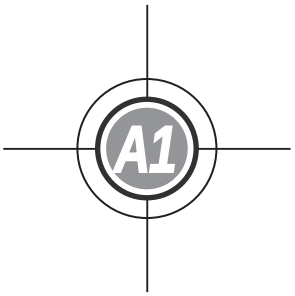
  2. When the UPS needs to be stored for an extended period of time, the lead-acid batteries must be recharged once every three months and the charging time must not be less than 24 hours each time. As for the lithium-ion batteries, please contact your battery supplier for the charging frequency and charging duration.

- **Fans**

  Higher temperature will shorten the life span of the fan. When the UPS is running, please check if all fans work normally and make sure if air can move freely around and through the UPS. If not, please replace the fan.

NOTE:

Please ask your local dealer or customer service for more maintenance information. Do not perform maintenance if you are not trained for it.



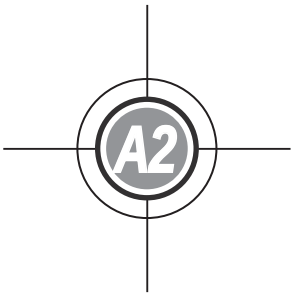
Technical Specifications

Model		DPH-500K			
UPS Capacity		200kVA/ 200kW	300kVA/ 300kW	400kVA/ 400kW	500kVA/ 450kW
Power Module Q'ty		4	6	8	9
Input	Nominal Voltage	220/380 Vac, 230/400 Vac, 240/ 415 Vac (3Φ4W + G)			
	Voltage Range	176 ~ 276Vac (full load)			
	Current Harmonic Distortion	≦ 3% *1			
	Power Factor	> 0.99			
	Frequency Range	40 ~ 70 Hz			
Output	Voltage	220/380 Vac, 230/400 Vac, 240/ 415 Vac (3Φ4W + G)			
	Voltage Harmonic Distortion	≦ 0.5% (linear load)			
	Power Factor	1/0.9 (adjustable)			
	Frequency	50/60 Hz			
	Overload Capability	≦ 125% : 10 minutes ; ≦ 150% : 1 minute; > 150%: 1 second			
Display		10" Touch Panel			
Interface	Standard	External battery temperature detection × 4, External switch/ breaker status dry contact × 4, Output dry contact × 6, Input dry contact × 4, Parallel port × 4, USB type A × 2, USB type B × 1, RS-232 port × 1, MODBUS port × 1, BMS (RJ45) × 1, Ethernet × 1, SMART slot × 1, REPO × 1			
Efficiency	Online Mode	up to 96.5%			
	ECO Mode	99%			
Battery	Nominal Voltage	±240 Vdc			
	Charge Voltage	±272 Vdc (adjustable from 204 Vdc to 312 Vdc)			
	Protection of Battery Deep Discharge	Yes			

Model		DPH-500K			
UPS Capacity		200kVA/ 200kW	300kVA/ 300kW	400kVA/ 400kW	500kVA/ 450kW
Environment	Operating Altitude	1000 meters (3280 ft) (without derating)			
	Operating Temperature	0 ~ 40°C (32 ~ 104°F)			
	Relative Humidity	95% (non-condensing)			
	Audible Noise	<65 dBA*2	<75 dBA*2	<80 dBA*2	<85 dBA*2
	IP Degree of Protection	IP 20			
Others	Parallel Redundancy	Yes (up to 8 units)			
	Emergency Power Off	Yes (remote as default; local as optional)			
	Battery-start	Yes			
Physical	Dimensions (W × D × H)	600 × 1100 × 2000 mm (23.62 × 43.31 × 78.74")			
	Weight	UPS: 317 kg (698.9 lb) (without power modules)			
		Power module (optional): 36 kg (79.4 lb)			
		461 kg (1016.3 lb)	533 kg (1175.1 lb)	605 kg (1333.8 lb)	641 kg (1413.2 lb)

NOTE:

1. *1 : When input vTHD is <1%.
2. *2 : At a distance of 1 m (3.28 ft) in front of the UPS.
3. Please refer to the rating label for the safety certification.
4. All specifications are subject to change without prior notice.



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.

No. 501325560203
Version : V 2.3
UM Date : 2021_10_14

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