The power behind competitiveness

Delta UPS - Modulon Family

DPH Series, Three Phase
480V 200-500 kVA

User Manual

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Smarter. Greener. Together.

SAVE THIS MANUAL

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

Table of Contents

Chapter 1 : Important Safety Instructions

1.1 Installation Warnings

- This is a three-phase three-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 National Electrical Code (ANSI/ NFPA 70) standard to install the UPS.

1.2 Connection Warnings

- Before applying electrical power to the UPS, make sure that the UPS is grounded to avoid a possible risk of current leakage.
- You can parallel a maximum of three UPS units.
- The UPS must be connected with an external battery cabinet (user-supplied, handled and configured by Delta service personnel). Please refer to ***5.5 External Battery Cabinet Connection Warnings*** for relevant information.
- The UPS must be connected with an external maintenance bypass cabinet (user-supplied, handled and configured by Delta service personnel). For the external maintenance bypass cabinet's information, please refer to the table below.

External Maintenance Bypass Cabinet (user-supplied, handled and configured by Delta service personnel)	For configurations of the external maintenance bypass cabinet, please refer to the following. a. Selection of three or four breakers (switches): (1) Three breakers (switches) for single input: An input breaker (switch), a manual bypass breaker (switch) and an output breaker (switch) must be installed. (2) Four breakers (switches) for dual input: An input breaker (switch), a bypass breaker (switch), a manual bypass breaker (switch) and an output breaker (switch) must be installed.

External Maintenance Bypass Cabinet (user-supplied, handled and configured by Delta service personnel)	b. Each breaker (switch) mentioned above must be a 3-pole (L1/ L2/ L3) device and meets the specifications defined in ***Table 5-2*** and ***Table 5-4***. c. It is suggested that each breaker (switch) should be configured with an auxiliary switch. For relevant information, please refer to ***4.1.4 External Switch/ Breaker Status Dry Contacts***. d. Install the 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, you must 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	250kVA	300kVA	350kVA	400kVA	450kVA	500kVA
400A	500A	600A	700A	800A	900A	1000A

- It is necessary to connect the protective devices with the UPS when the UPS is connected to power sources and critical loads.
- The protective devices connected to the UPS must be installed near the UPS and easily accessible for operation.
- Protective Devices:

  1. 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.
  2. 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.
  3. For grounding information, please refer to ***Figure 5-19*** and ***Figure 5-22***.
  4. 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	250kVA	300kVA	350kVA	400kVA	450kVA	500kVA
690V/ 400A	690V/ 500A	690V/ 600A	690V/ 700A	690V/ 800A	690V/ 900A	690V/ 1000A

5. Each protective device should have the functions of overcurrent protection, short circuit protection, insulating protection and shunt trip feature.
6. When selecting 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 larger than the capacity of the UPS's input protective devices.
7. 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.

8. The UPS's protective device must be a 3-pole type.

1.3 Usage Warnings

- Only when (1) the UPS runs in manual bypass mode, (2) the capacitors are completely discharged and (3) the battery power is completely cut off can qualified service personnel perform maintenance. Otherwise, there will be a risk of injury or death.
- Before working on the UPS system, check for hazardous voltage between all terminals including the protective earth (PE).
- 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 68°F ~ 77°F (20°C ~ 25°C) 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(s) 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 of the UPS, turn off each 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 occurs:
  1. Any 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 you carefully followed the instructions in this ***User Manual***.

1.4 Storage Warnings

- Use the original packing materials 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 158°F (70°C) and relative humidity is below 95%.

1.5 Standard Compliance

- UL 1778

Chapter 2 : Introduction

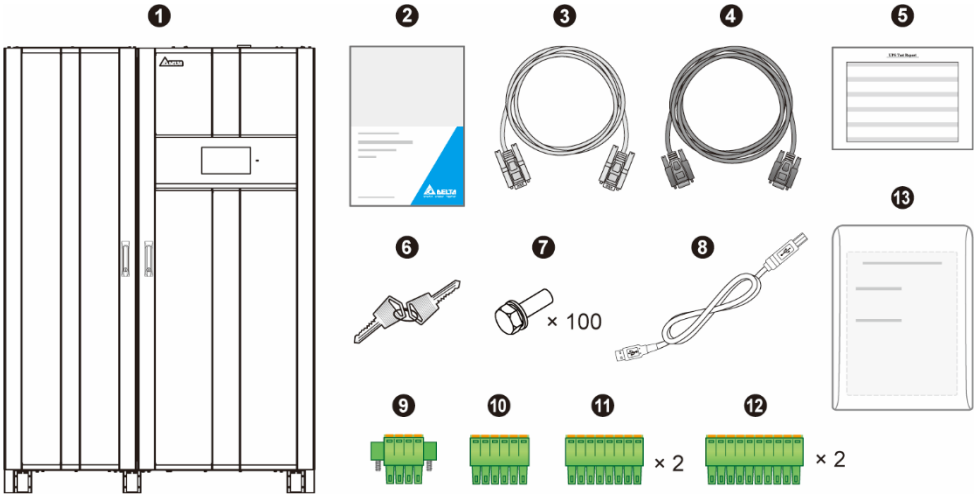
2.1 General Overview

The DPH series UPS, a three-phase three-wire online modular uninterruptible power supply (hereafter referred to as 'UPS'), 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

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.

Please check if any items are missing according to the following package list. If the UPS needs to be returned, carefully repack the UPS and all of the accessories using the original packing materials that came with the unit.



No.	Item	Q'ty
❶	UPS	1 PC
❷	User Manual	1 PC
❸	RS-232 Cable	1 PC
❹	Parallel Cable	1 PC
❺	Test Report	1 PC
❻	Key (placed inside the UPS cabinet)	2 PCS
❼	M10 Screw (used for input/ output/ battery/ grounding wiring)	100 PCS
❽	USB Cable	1 PC
❾	4-Pin Dry Contact Terminal Block (used for REPO dry contacts)	1 PC
❿	6-Pin Dry Contact Terminal Block (used for MODBUS port)	1 PC
⓫	8-Pin Dry Contact Terminal Block (used for (1) external battery temperature dry contacts and (2) external switch/ breaker status dry contacts)	2 PCS
⓬	10-Pin Dry Contact Terminal Block (used for input/ output dry contacts)	2 PCS
⓭	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.

2.3 Functions & Features

- Automatic input frequency detection enables operation at 50Hz or 60Hz.
- Automatic restart:
  1. After a low battery shutdown, the UPS inverter will restart in On-Line mode automatically right after the AC input resumes.
  2. The UPS returns automatically to On-Line mode from Bypass mode after an overload condition is cleared.
- Supports ECO mode.
- Both auxiliary power and control circuit adopt redundancy design, which doubly enhances UPS reliability.

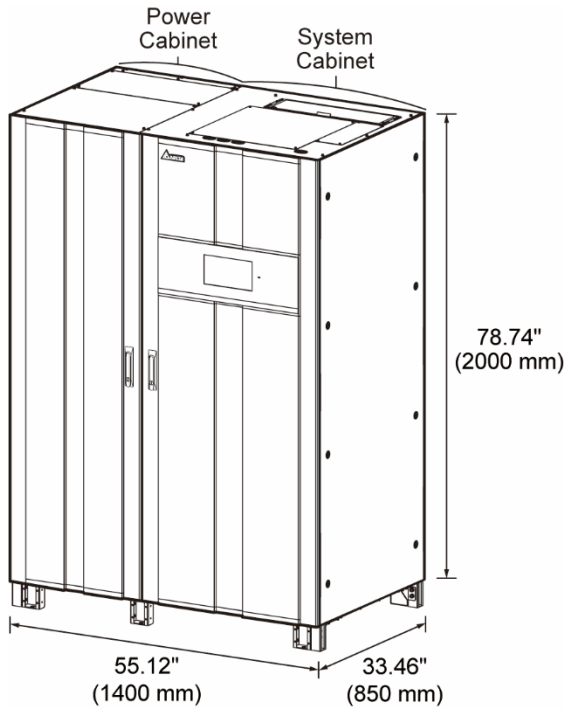
- Allows maintenance of the power modules and system components from the top and front of the unit.
- Generator compatible.
- Surge protection and EMI filter functions.
- Remote emergency power off.
- Single input and dual input functions.
- Supports external switch/ breaker status detection.
- Wide AC input voltage range (286Vac ~ 552Vac) reduces frequent transfer from On-Line mode to Battery mode to save battery consumption and prolong battery life.
- Battery start-up function even when there is no AC input.
- 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.

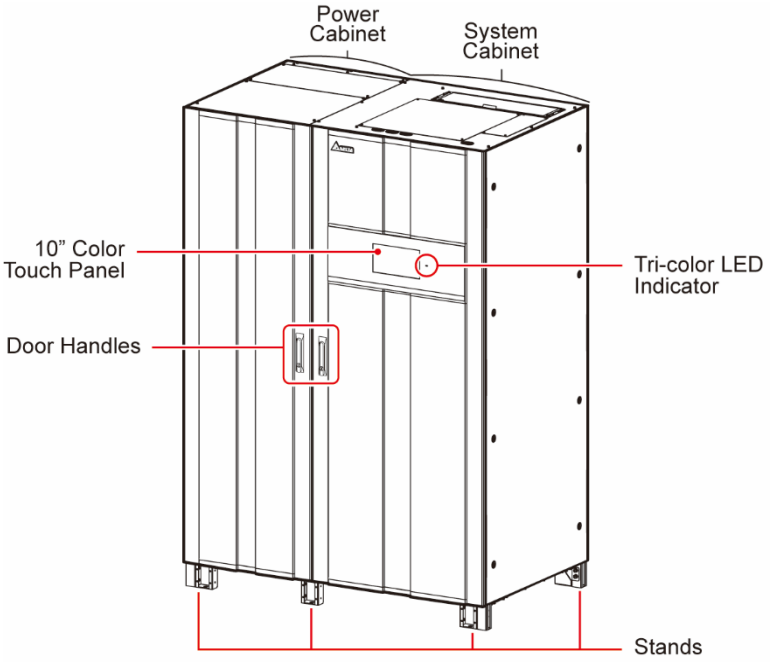
- Connects up to eight external battery cabinets to extend backup time.
- Provides setting options such as battery test (schedulable) and battery replacement alarm.
- Battery temperature monitoring and compensation.
- Smart battery charger design allows auto-charging or manual charging to shorten charging time.
- Provides diversified communication interfaces and a SMART slot. Please refer to ***4. Communication Interfaces***.
- Built-in memory stores a maximum of 10,000 event logs.
- 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 & Dimensions

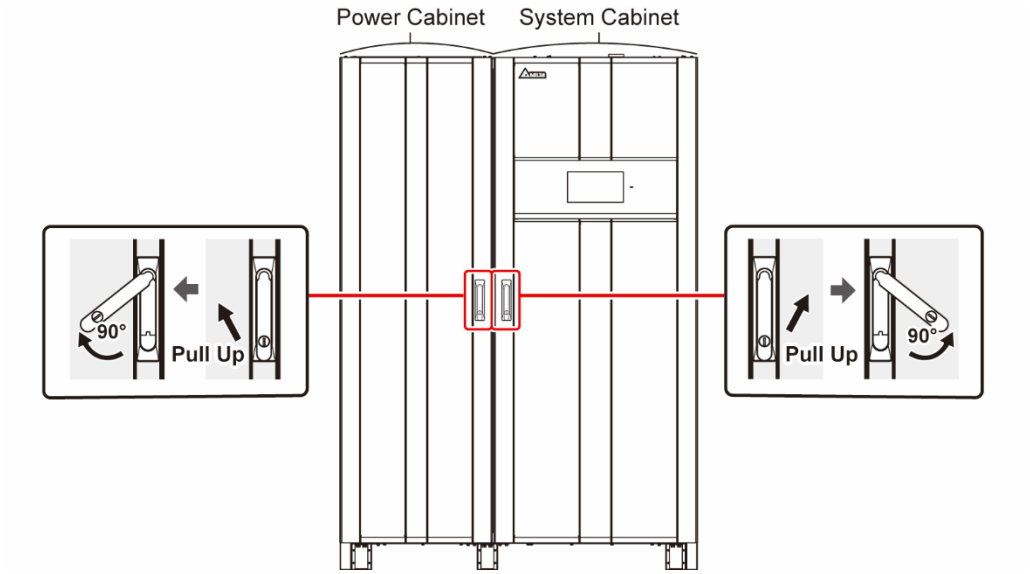


(Figure 2-1: UPS Exterior & Dimensions)

2.5 Front View



(Figure 2-2: Front View)

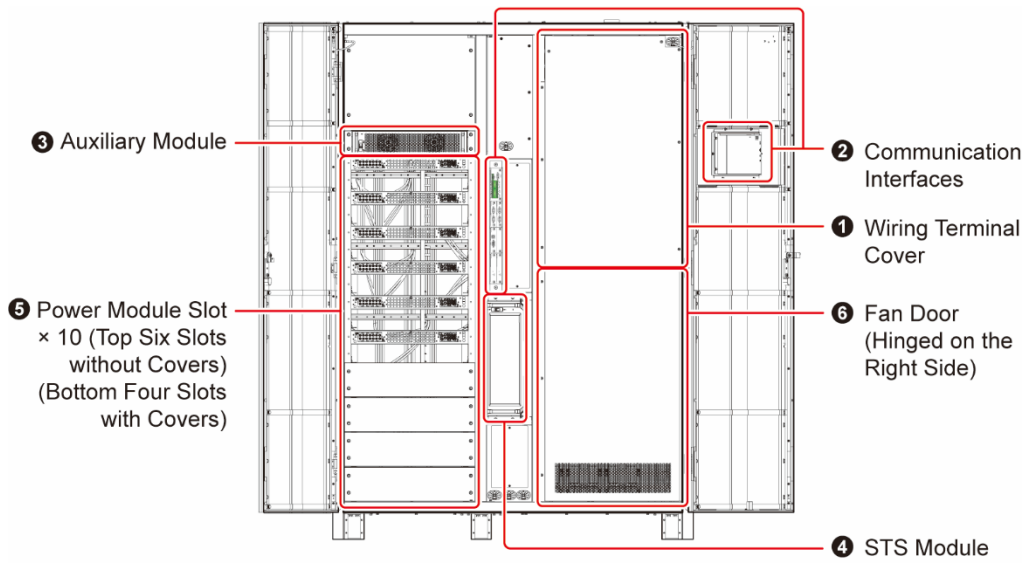


(Figure 2-3: How to Open the Front Doors)

2.6 Internal View

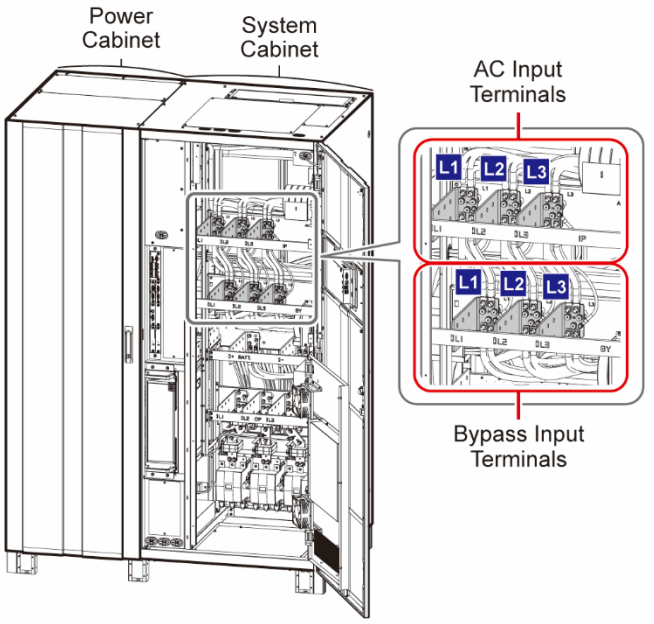
WARNING:

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.

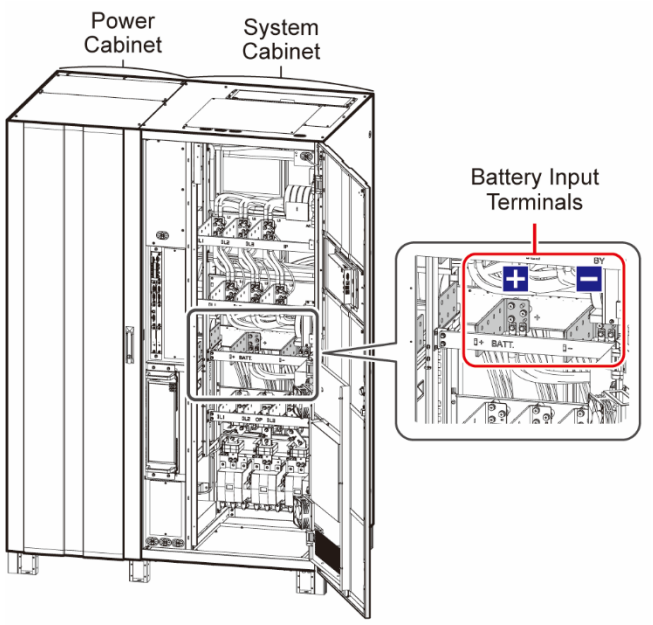


(Figure 2-4: Internal View with the Front Doors Open)

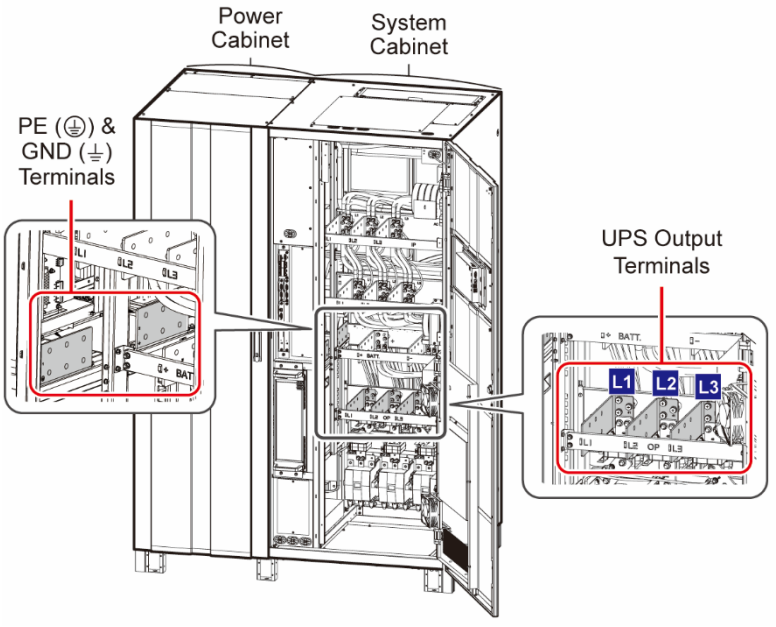
No.	Item
❶/❻	After removing the wiring cover and opening the fan door (hinged on the right side), you will see the wiring terminals shown in ***Figure 2-5 ~ Figure 2-7***.
❷	For detailed information about the communication interfaces, please refer to ***4. Communication Interfaces***.
❸	For detailed information about the auxiliary module, please refer to ***5.8 Auxiliary Module***.
❹	For detailed information about the STS module, please refer to ***5.6 STS Module***.
❺	Please follow on-site requirements to install the correct number of power modules (optional). Please refer to ***5.7 Power Module (Optional)*** for more information.



(Figure 2-5: AC Input Terminals & Bypass Input Terminals)



(Figure 2-6: Battery Input Terminals)



(Figure 2-7: UPS Output, PE (⏚) & GND (⏚) Terminals)

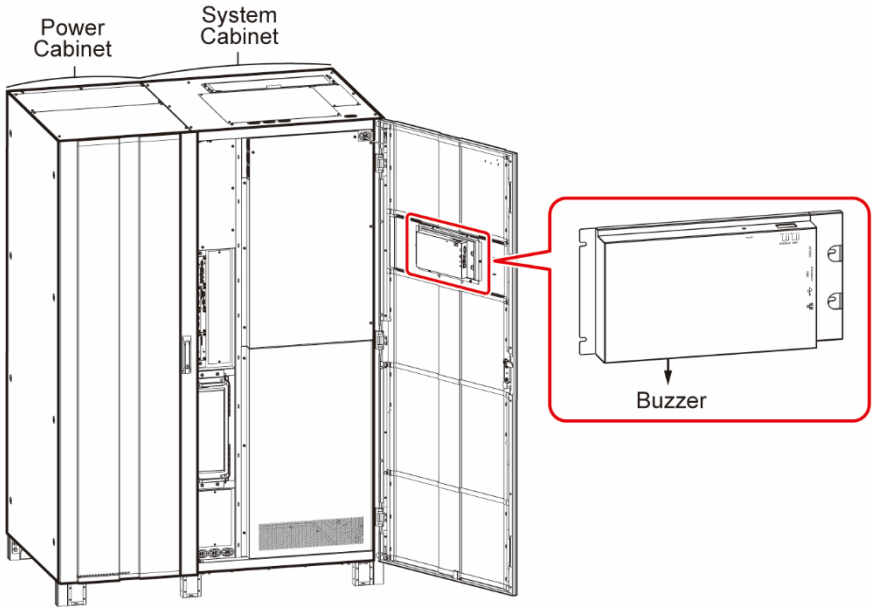
2.7 Tri-color LED Indicator & Buzzer

(Figure 2-8: Tri-color LED Indicator Location)

NOTE:

For information about the 10” color touch panel, please refer to ***7. LCD Display & Settings***.

The buzzer is located at the rear of the system cabinet’s front door.



(Figure 2-9: Buzzer Location)

Table 2-1: Tri-color LED Indicator, UPS Operation Mode & Buzzer

<table>
<tr><th>Tri-color LED Indicator</th><th>Status</th><th>Meaning</th></tr>
<tr><td>Green</td><td>ON</td><td>• Indicates the UPS is operating in one of the following modes.
<table>
<tr><th>UPS Operation Mode</th><th>Text on the LCD Screen (upper-right corner)</th></tr>
<tr><td>On-Line Mode</td><td>‘On-Line’</td></tr>
<tr><td>ECO Mode</td><td>‘ECO’</td></tr>
<tr><td>Frequency Conversion Mode</td><td>‘Frequency Conversion’</td></tr>
<tr><td>Green Mode</td><td>‘Green’</td></tr>
</table></td></tr>
<tr><td>Yellow</td><td>ON</td><td>• Indicates the UPS is operating in one of the following modes.
<table>
<tr><th>UPS Operation Mode</th><th>Text on the LCD Screen (upper-right corner)</th></tr>
<tr><td>Bypass Mode</td><td>‘Bypass’</td></tr>
<tr><td>Battery Mode</td><td>‘Battery’</td></tr>
<tr><td>Standby Mode</td><td>‘Standby’</td></tr>
<tr><td>Softstart Mode</td><td>‘Softstart’</td></tr>
</table>
• Indicates a warning message.
<table>
<tr><th>Warning Level</th><th>Buzzer Frequency</th></tr>
<tr><td>Minor</td><td>Sounds for 0.5 second every 3 seconds.</td></tr>
<tr><td>Medium</td><td>Sounds for 0.5 second every second.</td></tr>
</table></td></tr>
<tr><td>Red</td><td>ON</td><td>• Indicates a warning message.
<table>
<tr><th>Warning Level</th><th>Buzzer Frequency</th></tr>
<tr><td>Major</td><td>Long beep.</td></tr>
</table></td></tr>
</table>

Chapter 3 : Operation Modes

The UPS runs in seven basic operation modes, which are **On-Line** mode, **Battery** mode, **Bypass** mode, **Manual Bypass** mode, **ECO** mode, **Frequency Conversion** mode and **Green** mode.

NOTE:

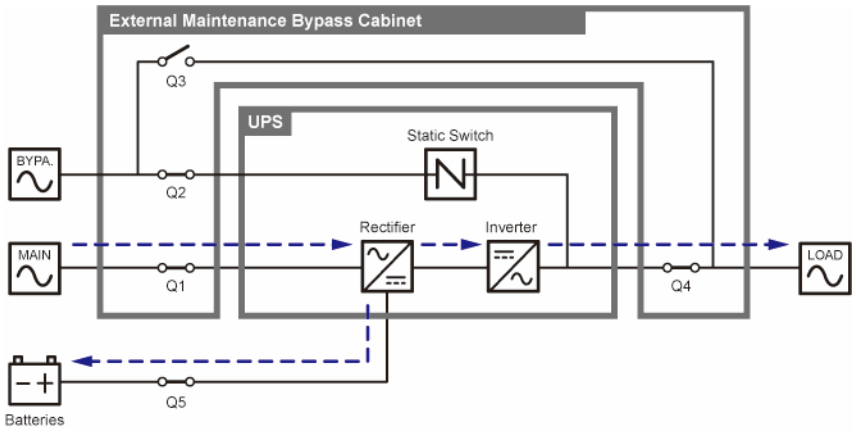
1. The UPS must be connected with an external maintenance bypass cabinet (user-supplied, handled and configured by Delta service personnel). For the external maintenance bypass cabinet's information, please refer to ***1.2 Connection Warnings***.
2. In this user manual, Q1, Q2, Q3, Q4 and Q5 represent the following.

Code	Meaning
Q1	External Maintenance Bypass Cabinet's Input Breaker or Switch.
Q2	External Maintenance Bypass Cabinet's Bypass Breaker or Switch.
Q3	External Maintenance Bypass Cabinet's Manual Bypass Breaker or Switch.
Q4	External Maintenance Bypass Cabinet's Output Breaker or Switch.
Q5	External Battery Cabinet's Breaker.

3. To enable the following operation modes, please refer to ***6. UPS Operation*** & ***7. LCD Display & Settings***.

3.1 On-Line Mode

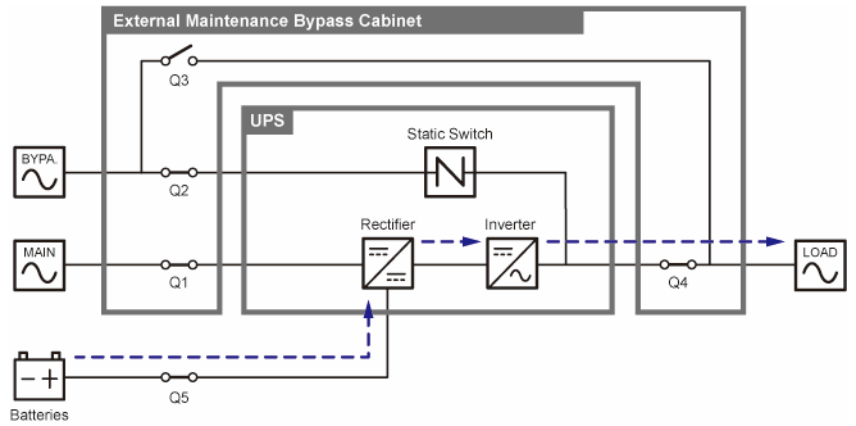
In On-Line mode, the main AC source supplies AC power via the external maintenance bypass cabinet's Input Breaker or Switch (Q1) to the rectifier, and the rectifier converts the AC power to DC power and supplies the DC power to the inverter. In the meantime, the rectifier provides charging power to the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



(Figure 3-1: On-Line Mode Diagram)

3.2 Battery Mode

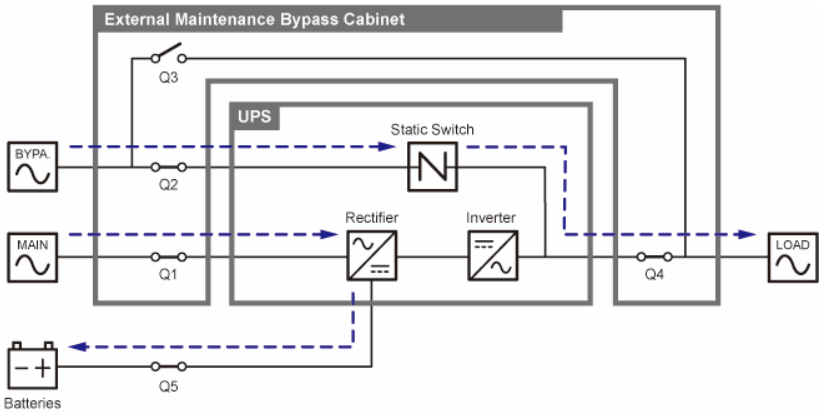
The UPS transfers to Battery mode automatically if the main AC source is abnormal, for example, when unstable voltage or a power outage occurs. In Battery mode, the batteries provide DC power and the UPS converts it into AC power and supplies it to the connected critical loads via the external maintenance bypass cabinet's Output Breaker or Switch (Q4). During the conversion process, output voltage remains the same. During Battery mode, the UPS's tri-color LED illuminates yellow and the text '**Battery**' appears in the upper right corner of the LCD screen.



(Figure 3-2: Battery Mode Diagram)

3.3 Bypass Mode

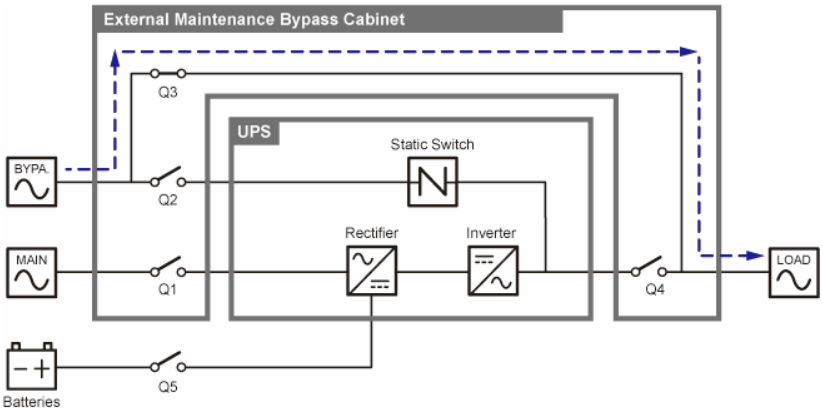
When the inverter encounters abnormal situations such as over temperature, overload, short circuit, abnormal output voltage or low battery, it will automatically shut itself down. If the UPS detects the bypass input is normal, it will automatically switch to Bypass mode to protect the connected critical loads from power interruption. After the above-mentioned abnormalities are eliminated, the UPS will switch back to On-Line 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 LCD screen



(Figure 3-3: Bypass Mode Diagram)

3.4 Manual Bypass Mode

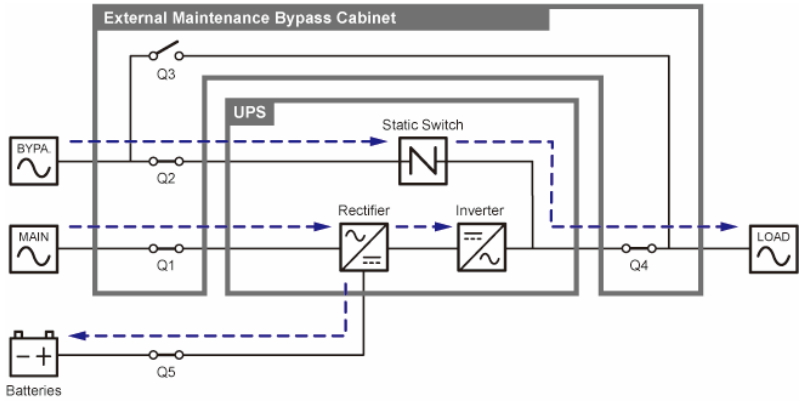
When the UPS runs in Manual Bypass mode, the current only flows through the maintenance bypass so that the maintenance personnel can maintain the circuit inside the UPS. However, DO NOT touch any external maintenance bypass cabinet's terminal and bus bar which may carry high-voltage electricity. During Manual Bypass mode, the UPS's input power is completely cut off, and the critical loads are not protected. At the moment, the UPS's tri-color LED and LCD screen are both off.



(Figure 3-4: Manual Bypass Mode Diagram)

3.5 ECO Mode

After the UPS is manually set as ECO mode via the LCD, the UPS will work in Bypass mode if bypass input voltage and frequency are within ±10% of the rated voltage and ±3Hz of the rated frequency respectively. Otherwise, the UPS will run in On-Line mode. During ECO mode, the UPS's tri-color LED illuminates green and the text '**ECO**' appears in the upper right corner of the LCD screen.



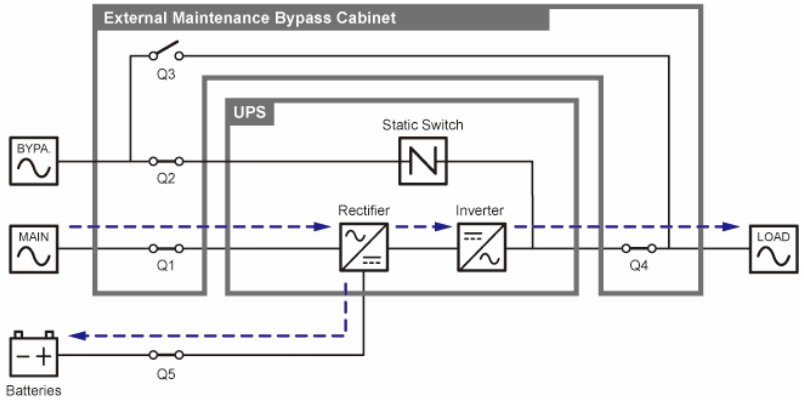
(Figure 3-5: ECO Mode Diagram)

3.6 Frequency Conversion Mode

NOTE:

Frequency Conversion mode is only applicable to single UPS but not to parallel UPSs.

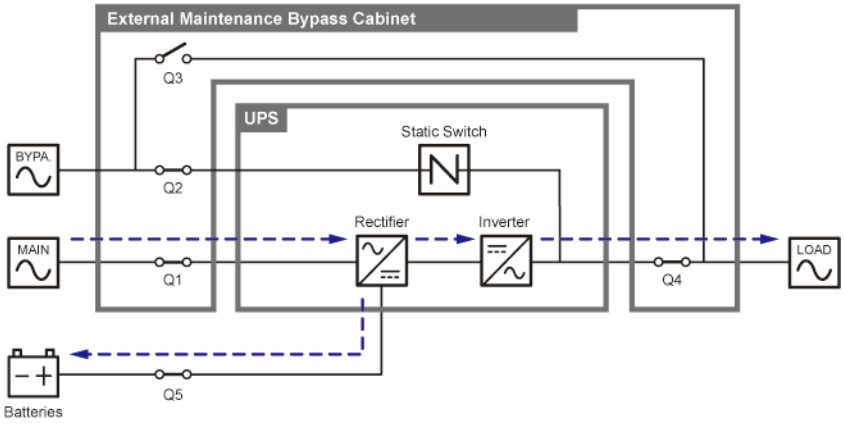
After the UPS is manually set as Frequency Conversion mode via the LCD, the inverter will automatically select 50Hz or 60Hz as the fixed output frequency. After the output frequency is determined, the system will automatically disable the bypass function. Please note that, once the inverter shuts down, there is no bypass output. 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 LCD screen.



(Figure 3-6: Frequency Conversion Mode Diagram)

3.7 Green Mode

After the UPS is manually set as Green mode via the LCD, the system will automatically detect the output status (i.e. total load capacity %) to decide which specific power module(s) should be fully powered on or idle in order to achieve higher efficiency of the UPS. During Green mode, the UPS's tri-color LED illuminates green and the text '**Green**' appears in the upper right corner of the LCD screen.

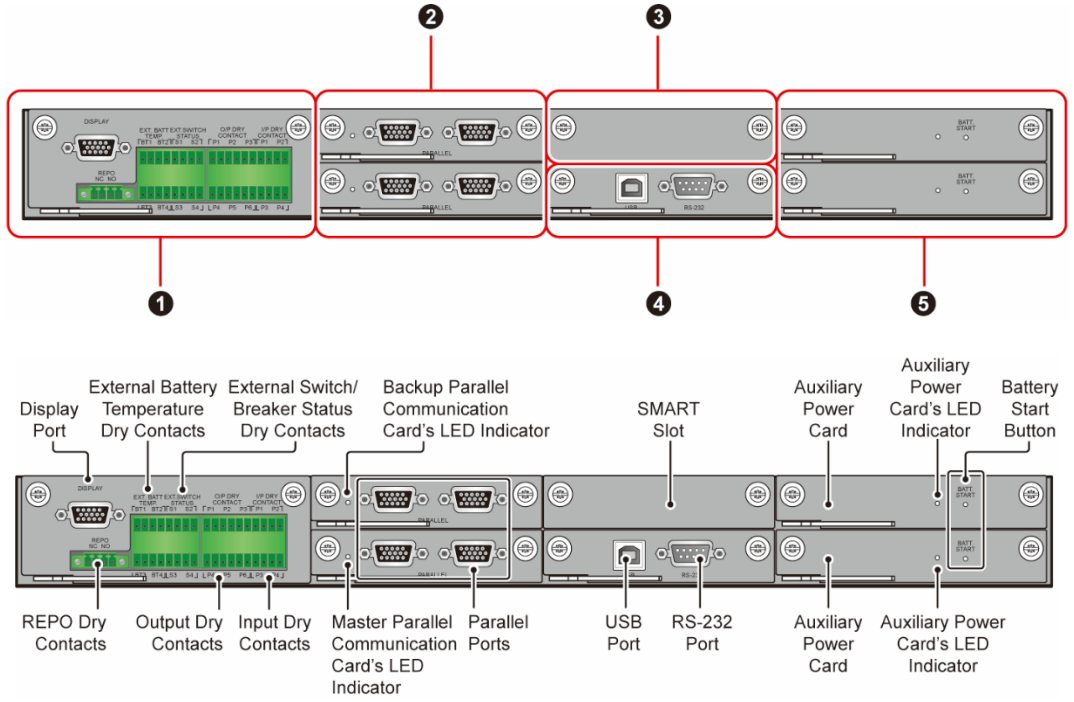


(Figure 3-7: Green Mode Diagram)

Chapter 4 : Communication Interfaces

The communication interfaces are located at two different places. One is on the front of the system cabinet with its front door open and the other is at the rear of the touch panel. See ***Figure 2-4*** for their positions.

4.1 Communication Interfaces I: on the Front of the System Cabinet with Its Front Door Open



(Figure 4-1: Communication Interfaces I)

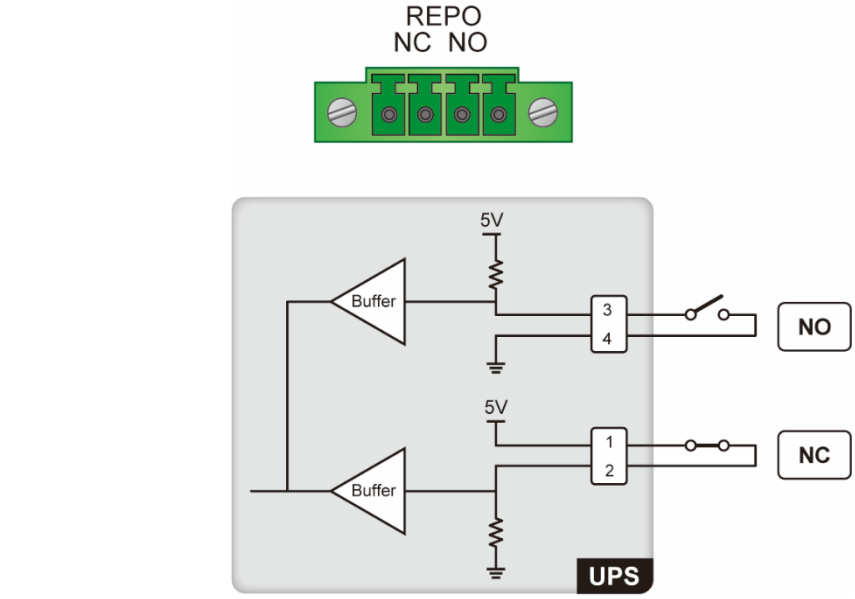
No.	Item	Q'ty
❶	Dry Contact Card	1 PC
❷	Parallel Communication Card	2 PCS
❸	SMART Slot	1 PC
❹	System Control Card	1 PC
❺	Auxiliary Power Card	2 PCS

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

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

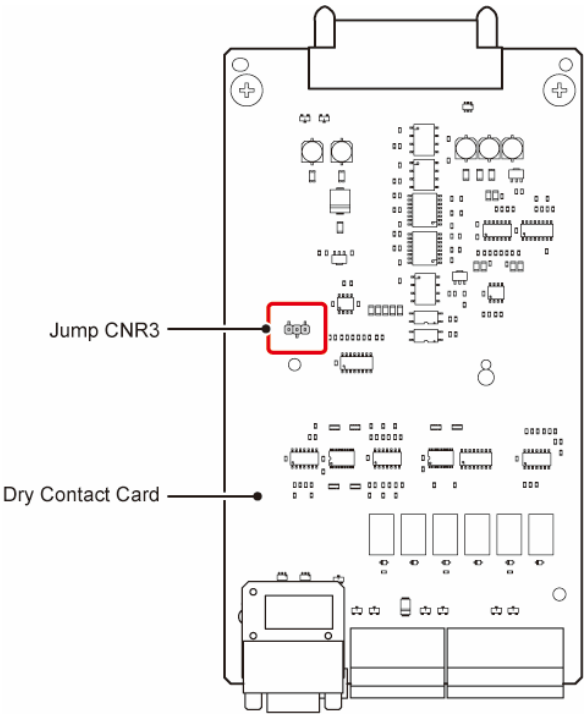


(Figure 4-2: REPO Dry Contacts & Schematic)

NOTE:

To enable the normally closed (NC) function, please take out the dry contact card and remove its Jump CNR3 before you turn on the UPS.

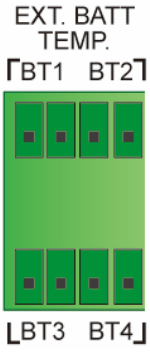
(Figure 4-3: Location of the Dry Contact Card)



(Figure 4-4: 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).

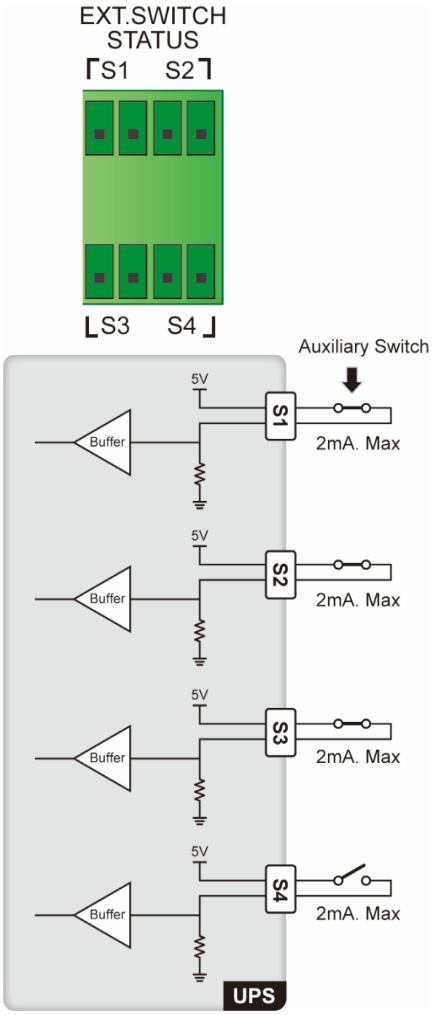


(Figure 4-5: External Battery Temperature Detection)

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 respectively detect the status of input, bypass, output and manual bypass 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 4-6: External Switch/ Breaker Status Dry Contacts & Schematic)

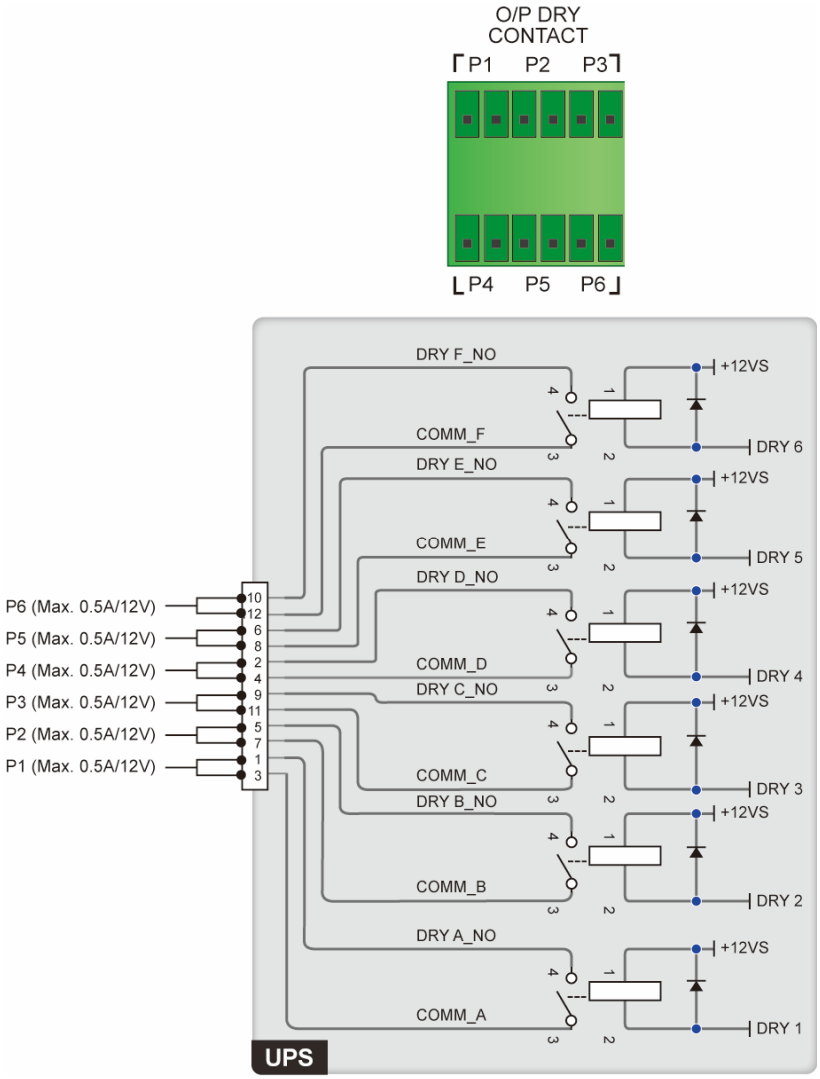
No.	Event	Description
1	External input switch or breaker detection.	Detect the external input switch or breaker's status (default: S1).
2	External bypass switch or breaker detection.	Detect the external bypass switch or breaker's status (default: S2).
3	External output switch or breaker detection.	Detect 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. Please use the touch panel to set each dry contact as normally open (NO) or normally closed (NC). Each dry contact can be assigned a specific event. Six out of twenty-one events can be assigned according to your applications. Please refer to the table below and ***7.6.6 Dry Contact Setting***.

NOTE:

Since the output dry contacts belong to the secondary circuit, the voltage of each dry contact's connected device should not exceed 60Vdc/ 42Vac to avoid electric shock or insufficient insulation.



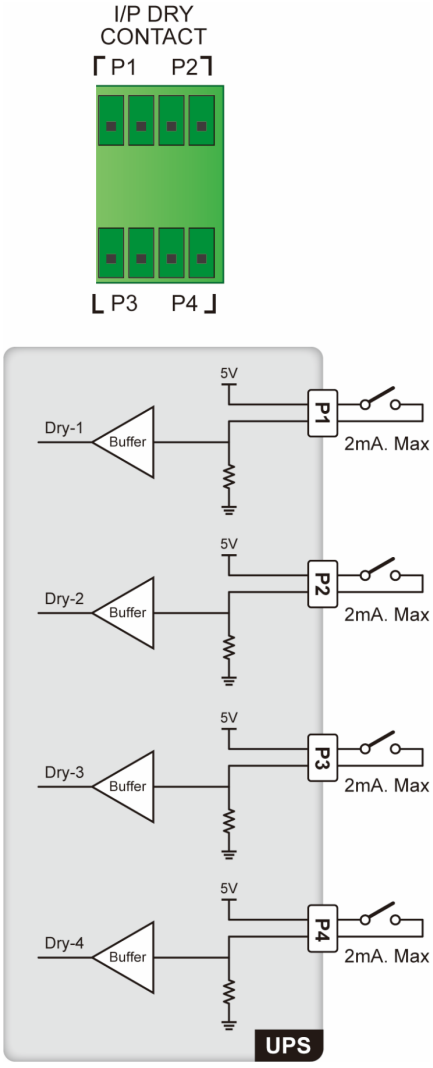
(Figure 4-7: Output Dry Contacts & Schematic)

No.	Event	Description
1	None	No set-up.
2	Load On Inverter	The UPS works in On-Line 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).

No.	Event	Description
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 (For parallel application only)	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 external maintenance bypass cabinet's 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 abnormal.
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 a short-circuit 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 a signal.

4.1.6 Input Dry Contacts

There are four sets of programmable input dry contacts. The input dry contacts allow the UPS to receive external signals from peripheral devices and let the UPS response accordingly. Please use the touch panel to set each dry contact as normally open (NO) or normally closed (NC). Each input dry contact can be assigned a specific event. Four out of ten events can be assigned according to your applications. Please refer to the table below and ***7.6.6 Dry Contact Setting***.



(Figure 4-8: 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.
5	Active Standby	In Bypass mode: the UPS will remain to run in Bypass mode. In On-Line mode: the UPS will transfer to Bypass mode immediately. In ECO mode: the UPS will transfer to Bypass mode immediately. In Battery mode: the UPS will transfer to Standby mode immediately.
6	Battery Abnormal Shutdown	In On-Line mode: the UPS will issue a battery abnormal warning. In Battery mode: the UPS will transfer to Bypass or Standby mode immediately.
7	Input Transformer OTW	Input transformer over temperature warning.
8	Output Transformer OTW	Output transformer over temperature warning.
9	Battery Fuse Open	The battery fuse is blown.
10	Charger Off *[1]	Turn off the charger.

NOTE:

*[1] If you use non-Delta lithium-ion batteries, you must set up **Charger Off**. Please refer to ***7.6.6 Dry Contact Setting***. For settings relevant to the non-Delta lithium-ion batteries, please refer to ***7.6.4 Battery & Charging Setting***. For more information, please contact Delta customer service.

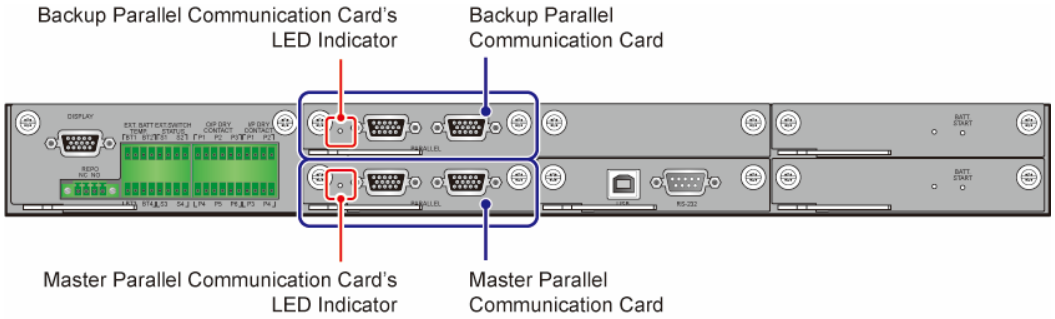
4.1.7 Parallel Communication Cards

The UPS has two parallel communication cards, which are master parallel communication card and backup parallel communication card. Each card has one LED indicator and two parallel ports.

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



(Figure 4-9: Location of the Parallel Communication Cards)

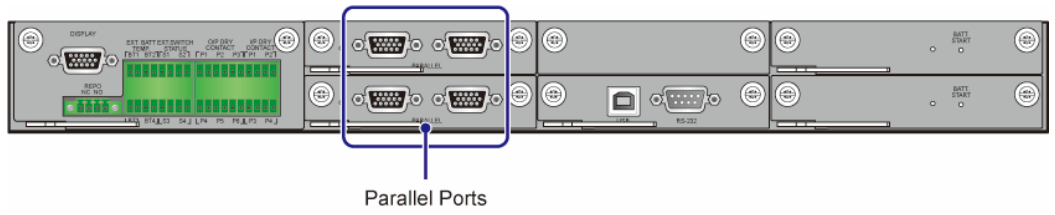
4.1.8 Parallel Ports

The parallel ports are used to connect parallel UPSs to increase system capacity and redundancy. Up to three UPS units with the same capacity, voltage, frequency and version can be paralleled. Please daisy-chain the parallel UPSs with the provided parallel cables only.

Please refer to ***5.4.4 Parallel Units Wiring*** to route the parallel cables.

WARNING:

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



(Figure 4-10: 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. For installation and application, please contact Delta customer service.

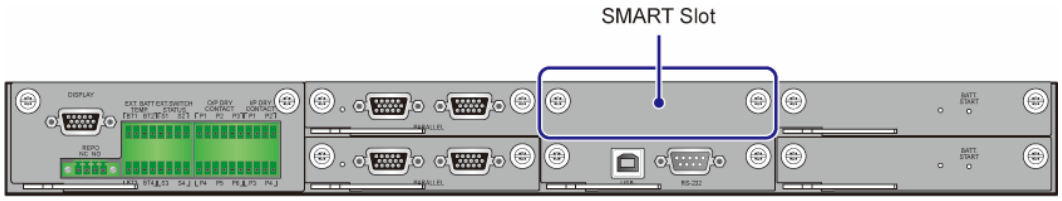
   Regarding cable routing for the Relay I/O card's dry contacts, it is the same as the communication interfaces. Please refer to ***4.3 Cable Routing for the Communication Interfaces***.

2. If you use the Delta lithium-ion batteries, you must install the optional multifunctional communication card (MFC) into the SMART slot to monitor the battery status. For settings and information relevant to the Delta lithium-ion batteries, please refer to ***7.6.4 Battery & Charging Setting*** and ***8. Optional Accessories***. For more information, please contact Delta customer service.

   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 5-21***).

NOTE:

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



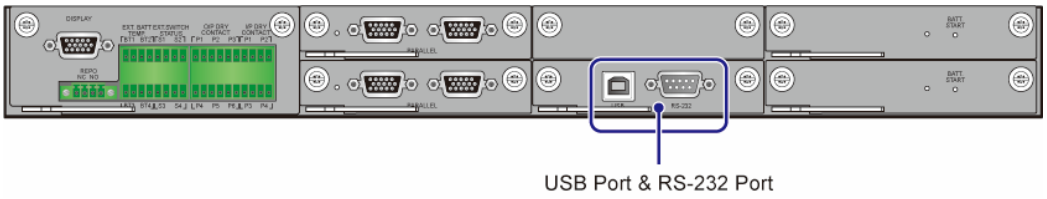
(Figure 4-11: Location of the SMART Slot)

4.1.10 USB Port & RS-232 Port

Only service personnel can use the RS-232 cable (provided) or the USB cable (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.



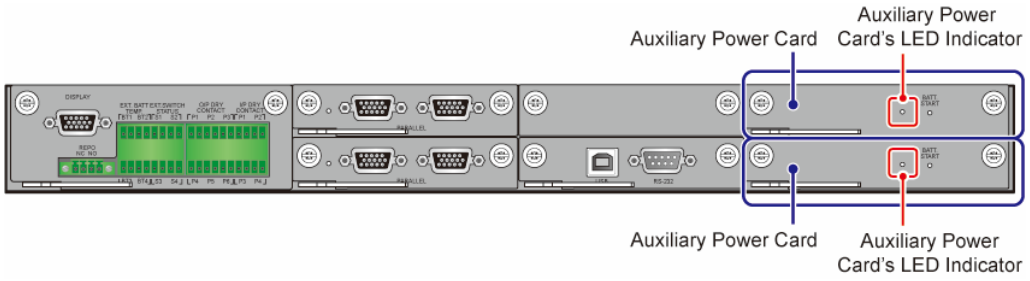
(Figure 4-12: Location of the USB Port & RS-232 Port)

4.1.11 Auxiliary Power Cards

The UPS has two auxiliary power cards. Each card has one LED indicator. 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:

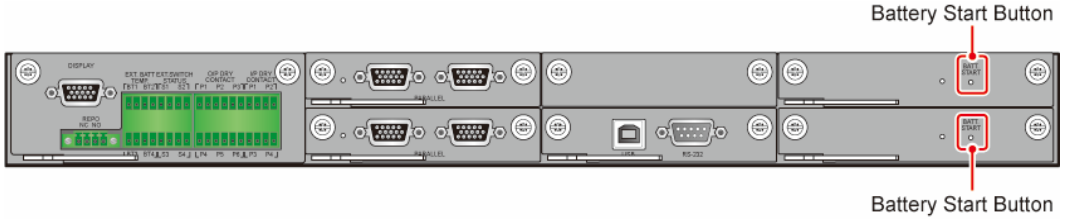
When replacing, remove only one auxiliary power card at a time to avoid power interruption.



(Figure 4-13: Location of the Auxiliary Power Cards)

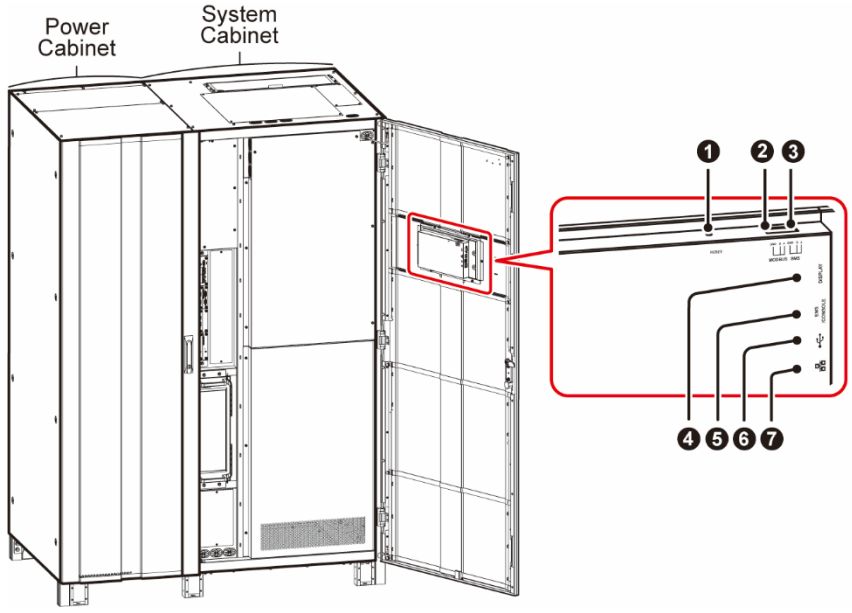
4.1.12 Battery Start Buttons

For the battery start buttons' operation information, please refer to ***6.2.2 Battery Mode Start-up Procedures***.



(Figure 4-14: Location of the Battery Start Buttons)

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



(Figure 4-15: Communication Interfaces II)

No.	Item	Description
❶	RESET	Press the **RESET** button 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	Reserved.
❹	DISPLAY	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. Connect 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.

4.3 Cable Routing for the Communication Interfaces

Regarding cable routing for the communication interfaces, follow ***Step 1 ~ Step 5*** stated in ***5.4.3.1 Single Input (Single Unit)***.

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 cable sizes.
3. Only when ***5.3 UPS Installation*** is completed can you perform wiring.
4. Cable ties are user-supplied and the quantity depends on on-site requirements.

Chapter 5 : Installation and Wiring

5.1 Before Installation and Wiring

- Please read this user manual thoroughly before installation, wiring and operation. 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***.
- The UPS must be connected to at least one external battery cabinet (user-supplied, handled and configured by Delta service personnel). Please refer to ***5.5 External Battery Cabinet Connection Warnings*** for relevant information.
- The UPS must be connected with an external maintenance bypass cabinet (user-supplied, handled and configured by Delta service personnel). For the external maintenance bypass cabinet's information, please refer to ***1.2 Connection Warnings***.

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 maintenance bypass cabinet, external battery cabinet(s) and handling equipment. Please refer to ***Table 5-1*** for floor weight loading information.

Table 5-1: UPS Floor Weight Loading Table

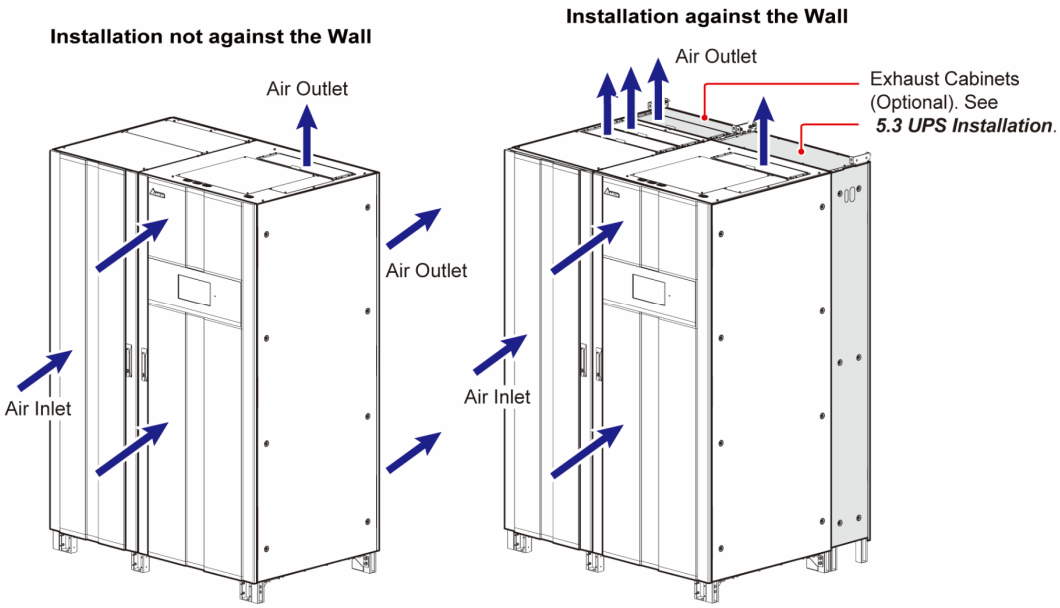
DPH Series UPS							
UPS Net Weight (without power modules): 1162.3 lb (527.2 kg)							
UPS Weight Loading (without power modules): 90.7 lb/ft^2 (443.0 kg/m^2)							
UPS Capacity	200kVA/ 200kW	250kVA/ 250kW	300kVA/ 300kW	350kVA/ 350kW	400kVA/ 400kW	450kVA/ 450kW	500kVA/ 500kW
Power Module Q'ty	4	5	6	7	8	9	10
UPS Net Weight	1475.2 lb (669.1 kg)	1553.4 lb (704.6 kg)	1631.6 lb (740.1 kg)	1709.8 lb (775.6 kg)	1788.0 lb (811.0 kg)	1866.3 lb (846.5 kg)	1944.5 lb (882.0 kg)
Floor Weight Loading	115.2 lb/ft^2 (562.3 kg/m^2)	121.3 lb/ft^2 (592.1 kg/m^2)	127.4 lb/ft^2 (621.9 kg/m^2)	133.5 lb/ft^2 (651.7 kg/m^2)	139.6 lb/ft^2 (681.5 kg/m^2)	145.7 lb/ft^2 (711.4 kg/m^2)	151.8 lb/ft^2 (741.2 kg/m^2)

- The UPS allows cable entry from the top or bottom. Please leave adequate space on the top or at the bottom of the UPS to allow cable entry.
- Ensure that the installation area is spacious enough for ventilation, wiring and maintenance. Install the external battery cabinet next to the UPS. For the UPS clearance, we suggest that you:

  1. Keep a distance of 39.4" (1000 mm) from the front of the UPS for maintenance and ventilation.
  2. Keep a distance of 19.69" (500 mm) from the top of the UPS for maintenance, wiring and ventilation.
  3. Keep a distance of 19.69" (500 mm) from the rear of the UPS for ventilation (only applicable to installation not against the wall). For details, please refer to ***Figure 5-1*** and ***5.3 UPS Installation***.

NOTE:

Dust filters have been installed on the inner side of the UPS's front doors before shipment.



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

WARNING:

1. For installation against the wall, do not use air conditioners or similar equipment to blow into the top of the UPS; for installation not against the wall, do not blow into the rear and top of the UPS.
2. Do not hinder ventilation of the UPS.

- 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 77°F (25°C) and humidity within 95%. The highest operating altitude is 3280ft (1000 meters) 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 keys.

5.3 UPS Installation

NOTE:

Please use appropriate equipment (e.g. forklift) to move the UPS.

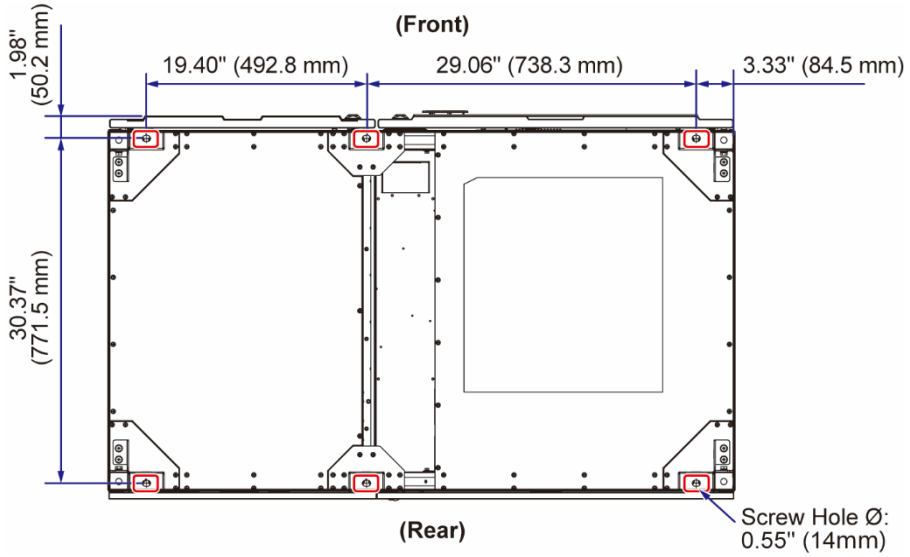
Please follow the steps below:

Step 1

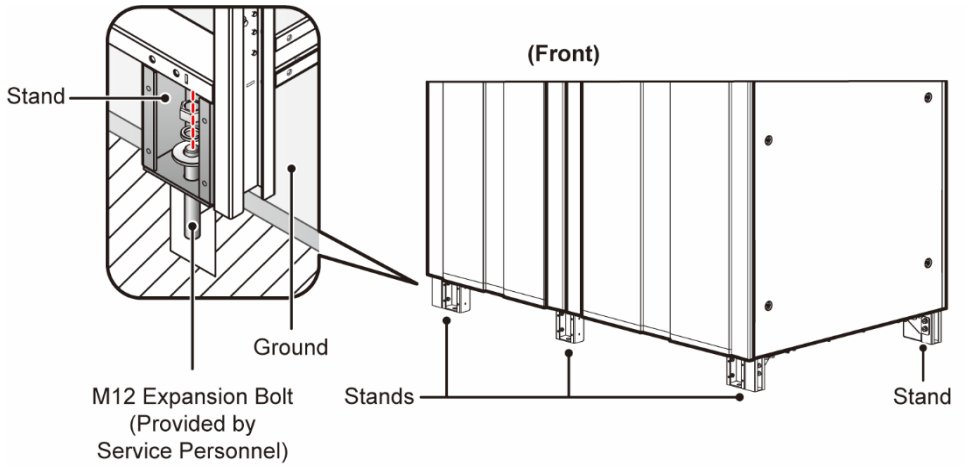
Before installing the UPS in a designated installation area, please double-check whether the area's floor weight loading is sufficient to bear the UPS, external battery cabinet(s), external maintenance bypass cabinet and handling equipment (e.g. forklift) to avoid accidents.

Step 2

- For installation not against the wall, fix the six stands at the bottom of the UPS on the ground to avoid UPS movement. Each stand requires a M12 expansion bolt (provided by qualified service personnel).



(Figure 5-2: Cabinet Floor Fixing Points)



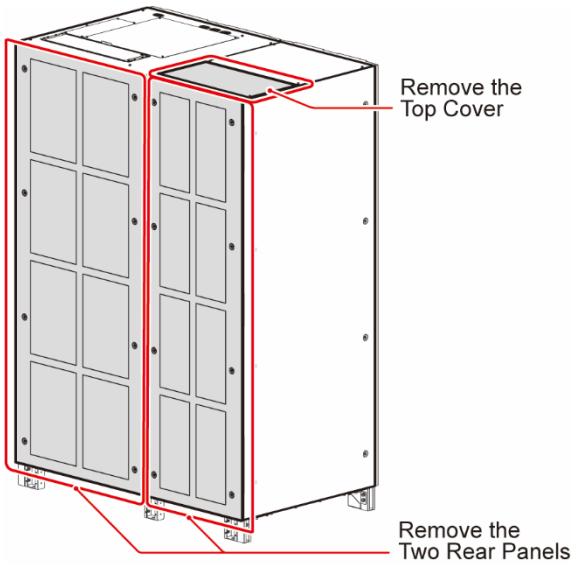
(Figure 5-3: Fix the Stands on the Ground)

WARNING:

If you don't fix the UPS's stands on the ground, the UPS might topple over. For safety concerns, please fix the UPS's stands on the ground firmly.

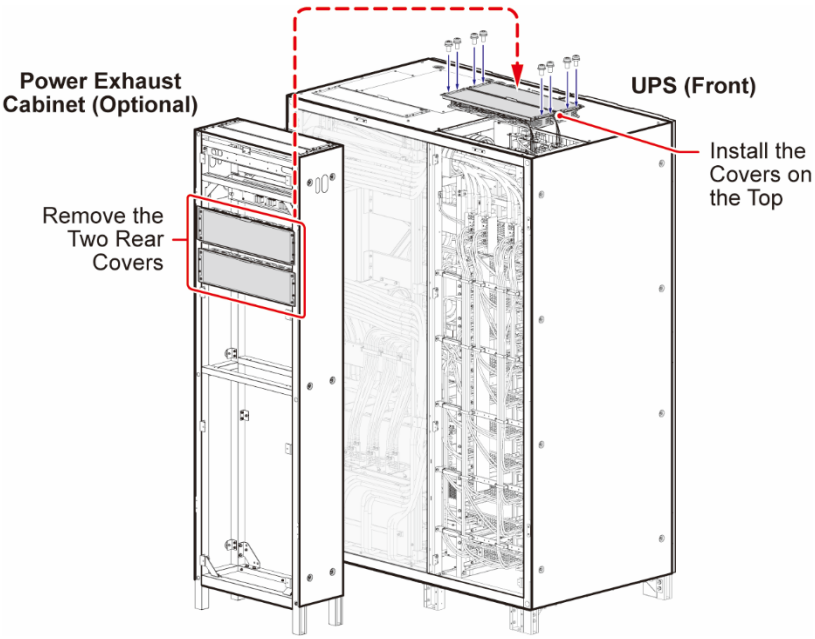
- For installation against the wall, you must purchase a system exhaust cabinet and a power exhaust cabinet (optional), and install them at the rear of the UPS. Please follow the procedures below.

  ❶ Remove the UPS's top cover and two rear panels. Keep the removed twenty M5 screws well for later use.



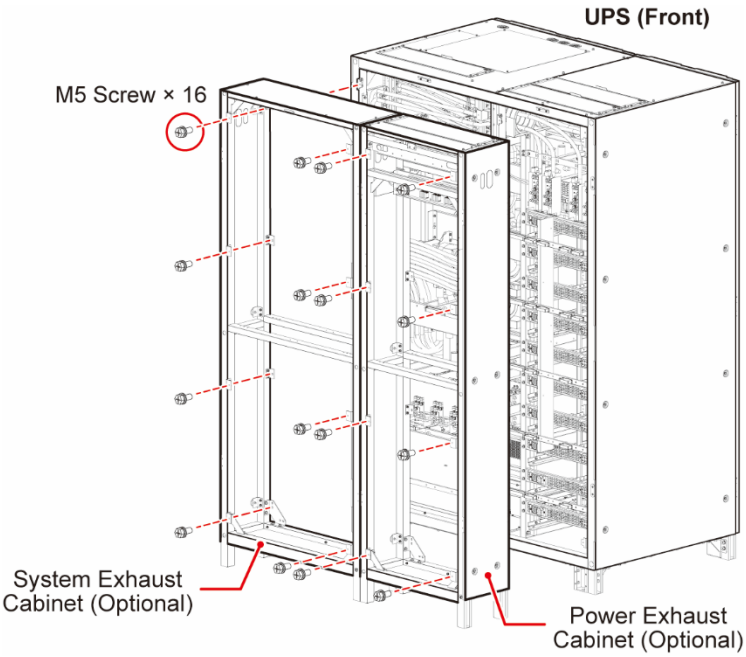
(Figure 5-4: Remove the Top Cover and Two Rear Panels)

❷ Remove the optional power exhaust cabinet's two rear covers (including eight M4 screws) and install the covers on the top of the UPS. The tightening torque for M4 screws should be 17.4 ± 1.7 lb-in (20 ± 2 kgf-cm).



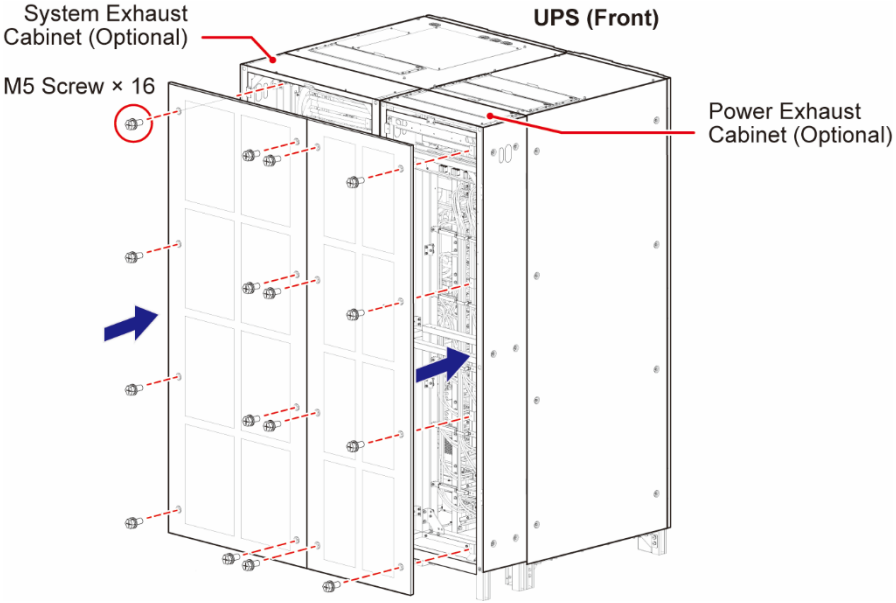
(Figure 5-5: Install the Optional Power Exhaust Cabinet's Two Rear Covers on the Top of the UPS)

❸ Connect the optional power exhaust cabinet and system exhaust cabinet to the rear of the UPS with the provided sixteen M5 screws packed in the two exhaust cabinets' cartons. The tightening torque for M5 screws should be 30.4 ± 1.7 lb-in (35 ± 2 kgf-cm).



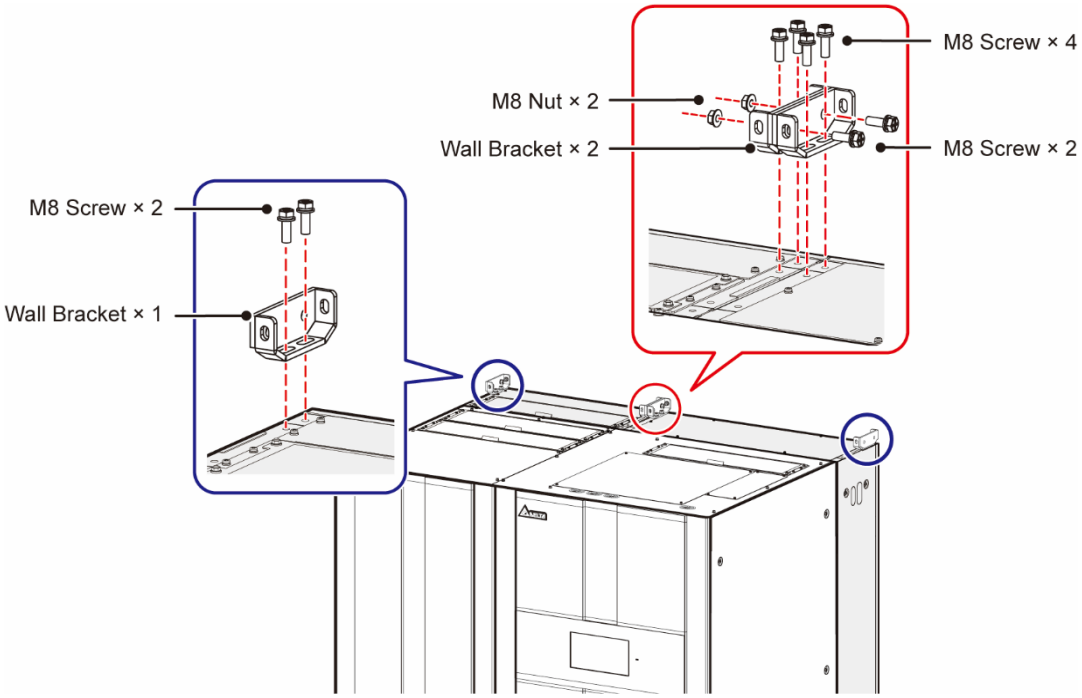
(Figure 5-6: Connect the Exhaust Cabinets to the Rear of the UPS)

❹ Install the two rear panels that you removed from the UPS to the rear of the power and system exhaust cabinets. The tightening torque for M5 screws should be 30.4 ± 1.7 lb-in (35 ± 2 kgf-cm).



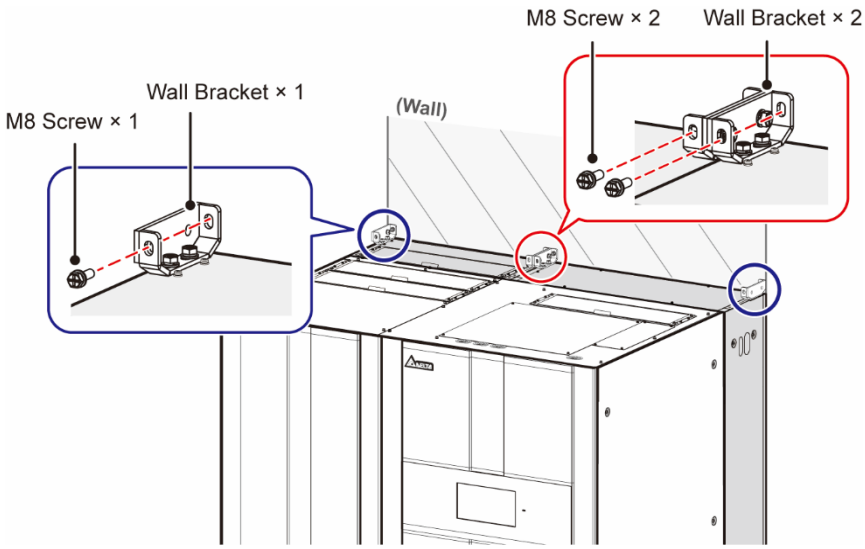
(Figure 5-7: Install the Two Rear Panels)

❺ Install the seismic kits (including wall brackets, M8 screws and M8 nuts) packed in the two optional exhaust cabinets' cartons on the top of the cabinets. The tightening torque for M8 screws should be 130 ± 4.4 lb-in (150 ± 5 kgf-cm).



(Figure 5-8: Install the Seismic Kits on the Top)

❻ Follow the figure below to fix the UPS against the wall.



(Figure 5-9: Fix the UPS against the Wall)

❼ Fix the three stands at the front bottom of the UPS on the ground. Each stand requires a M12 expansion bolt (provided by qualified service personnel). Refer to ***Figure 5-2*** and ***Figure 5-3***.

Step 3

Follow ***5.4 Wiring*** to perform UPS wiring. When connecting the external battery cabinet(s), please refer to ***5.5 External Battery Cabinet Connection Warnings*** to perform external battery cabinet wiring. After routing the cables and verifying cable connections, seal or cover the gaps between the cables and the cabinets to avoid foreign materials falling into the UPS.

Step 4

Follow ***5.7 Power Module (Optional)*** to install the power modules.

Step 5

After finishing the procedures above, reinstall the removed covers or panels (if necessary) and close the UPS's front doors.

5.4 Wiring

5.4.1 Pre-wiring Warnings

NOTE:

1. Before wiring, please ensure that you have followed ***5.3 UPS Installation*** to fix the UPS in the designated installation area firmly.
2. Before wiring, please read ***5.4 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 an external maintenance bypass cabinet (user-supplied, handled and configured by Delta service personnel). For the 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 cabinets.

- 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.
- Check if the size, diameter, phase and polarity are correct for each cable connecting to the UPS, external battery cabinet(s) or external maintenance bypass cabinet. Please refer to ***Table 5-2***.

NOTE:

Table 5-2 is based on (1) default input/ output voltage: 480V, (2) default battery Q'ty: 40 PCS and (3) default charge current per power module: 5A. For other conditions different from ***Table 5-2***, please contact Delta service personnel for relevant values.

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

- **200kVA/ 200kW ~ 350kVA/ 350kW**

DPH Series					
UPS Capacity		**200kVA/ 200kW**	**250kVA/ 250kW**	**300kVA/ 300kW**	**350kVA/ 350kW**
Power Module Q'ty		4	5	6	7
Input & Bypass	Rated current at 480V with battery charging	295A	368A	442A	516A

DPH Series						
UPS Capacity			200kVA/ 200kW	250kVA/ 250kW	300kVA/ 300kW	350kVA/ 350kW
Input & Bypass (Continued)	Recommended cable size	(L1/ L2/ L3)	3/0 AWG × 2 PCS (70 mm^2 × 2 PCS)	4/0 AWG × 2 PCS (95 mm^2 × 2 PCS)	300 kcmil × 2 PCS (150 mm^2 × 2 PCS)	4/0 AWG × 3 PCS (95 mm^2 × 3 PCS)
		(PE)	2 AWG × 1 PC (25 mm^2 × 1 PC)	1 AWG × 1 PC (34 mm^2 × 1 PC)	1/0 AWG × 1 PC (50 mm^2 × 1 PC)	1/0 AWG × 1 PC (50 mm^2 × 1 PC)
	Maximum cable size	(L1/ L2/ L3)	400 kcmil × 3 PCS (185 mm^2 × 3 PCS)	400 kcmil × 3 PCS (185 mm^2 × 3 PCS)	400 kcmil × 3 PCS (185 mm^2 × 3 PCS)	400 kcmil × 3 PCS (185 mm^2 × 3 PCS)
		(PE)	400 kcmil × 1 PC (185 mm^2 × 1 PC)	400 kcmil × 1 PC (185 mm^2 × 1 PC)	400 kcmil × 1 PC (185 mm^2 × 1 PC)	400 kcmil × 1 PC (185 mm^2 × 1 PC)
	Maximum cable lug width		(1.97") 50 mm	(1.97") 50 mm	(1.97") 50 mm	(1.97") 50 mm
	Screw size/ Cable lug inner diameter		M12/ 0.51" (13 mm)	M12/ 0.51" (13 mm)	M12/ 0.51" (13 mm)	M12/ 0.51" (13 mm)
	Terminal type*1		TLAPH180-2A12	TLAPH180-2A12	TLAPH180-2A12	TLAPH180-2A12
Output	Rated current at 480V		241A	301A	361A	422A
	Recommended cable size	(L1/ L2/ L3)	350 kcmil × 1 PC (177 mm^2 × 1 PC)	3/0 AWG × 2 PCS (70 mm^2 × 2 PCS)	4/0 AWG × 2 PCS (95 mm^2 × 2 PCS)	250 kcmil × 2 PCS (120 mm^2 × 2 PCS)
		(PE)	2 AWG × 1 PC (25 mm^2 × 1 PC)	2 AWG × 1 PC (25 mm^2 × 1 PC)	2 AWG × 1 PC (25 mm^2 × 1 PC)	1 AWG × 1 PC (35 mm^2 × 1 PC)

DPH Series						
UPS Capacity			200kVA/ 200kW	250kVA/ 250kW	300kVA/ 300kW	350kVA/ 350kW
Output (Continued)	Maximum cable size	(L1/ L2/ L3)	400 kcmil × 3 PCS (185 mm^2 × 3 PCS)	400 kcmil × 3 PCS (185 mm^2 × 3 PCS)	400 kcmil × 3 PCS (185 mm^2 × 3 PCS)	400 kcmil × 3 PCS (185 mm^2 × 3 PCS)
		(PE)	400 kcmil × 1 PC (185 mm^2 × 1 PC)	400 kcmil × 1 PC (185 mm^2 × 1 PC)	400 kcmil × 1 PC (185 mm^2 × 1 PC)	400 kcmil × 1 PC (185 mm^2 × 1 PC)
	Maximum cable lug width		(1.97") 50 mm	(1.97") 50 mm	(1.97") 50 mm	(1.97") 50 mm
	Screw size/ Cable lug inner diameter		M12/ 0.51" (13 mm)	M12/ 0.51" (13 mm)	M12/ 0.51" (13 mm)	M12/ 0.51" (13 mm)
	Terminal type*1		TLAPH180-2A12	TLAPH180-2A12	TLAPH180-2A12	TLAPH180-2A12
Battery	Nominal discharge current (condition: 2V per cell)		440A	550A	660A	770A
	Recommended cable size	(+/ -)	4/0 AWG × 2 PCS (95 mm^2 × 2 PCS)	300 kcmil × 2 PCS (150 mm^2 × 2 PCS)	400 kcmil × 2 PCS (185 mm^2 × 2 PCS)	250 kcmil × 3 PCS (120 mm^2 × 3 PCS)
		(PE)	2 AWG × 1 PC (25 mm^2 × 1 PC)	1/0 AWG × 1 PC (50 mm^2 × 1 PC)	1/0 AWG × 1 PC (50 mm^2 × 1 PC)	2/0 AWG × 1 PC (67 mm^2 × 1 PC)
	Maximum cable size	(+/ -)	400 kcmil × 4 PCS (185 mm^2 × 4 PCS)	400 kcmil × 4 PCS (185 mm^2 × 4 PCS)	400 kcmil × 4 PCS (185 mm^2 × 4 PCS)	400 kcmil × 4 PCS (185 mm^2 × 4 PCS)

DPH Series						
UPS Capacity			**200kVA/ 200kW**	**250kVA/ 250kW**	**300kVA/ 300kW**	**350kVA/ 350kW**
Battery (Continued)	Maximum cable size	(PE)	400 kcmil × 1 PC (185 mm^2 × 1 PC)	400 kcmil × 1 PC (185 mm^2 × 1 PC)	400 kcmil × 1 PC (185 mm^2 × 1 PC)	400 kcmil × 1 PC (185 mm^2 × 1 PC)
	Maximum cable lug width		(1.97") 50 mm	(1.97") 50 mm	(1.97") 50 mm	(1.97") 50 mm
	Screw size/ Cable lug inner diameter		M12/ 0.51" (13 mm)	M12/ 0.51" (13 mm)	M12/ 0.51" (13 mm)	M12/ 0.51" (13 mm)
	Terminal type*1		TLAPH180-2A12	TLAPH180-2A12	TLAPH180-2A12	TLAPH180-2A12
Conduit Size			3" (76.2 mm)	3" (76.2 mm)	3" (76.2 mm)	3" (76.2 mm)
Cable Q'ty			3 PCS per conduit	3 PCS per conduit	3 PCS per conduit	3 PCS per conduit
Tightening Torque			M12=434 ± 8.7 lb-in (500 ± 20 kgf-cm)			
External Maintenance Bypass Cabinet's Input Breaker or Switch (Q1)			400A	500A	600A	700A
External Maintenance Bypass Cabinet's Bypass Breaker or Switch (Q2)			400A	500A	600A	700A
External Maintenance Bypass Cabinet's Manual Bypass Breaker or Switch (Q3)			400A	500A	600A	700A
External Maintenance Bypass Cabinet's Output Breaker or Switch (Q4)			400A	500A	600A	700A
External Battery Cabinet's Breaker (Q5)			500A	630A	800A	900A

- **400kVA/ 400kW ~ 500kVA/ 500kW**

DPH Series					
UPS Capacity			**400kVA/ 400kW**	**450kVA/ 450kW**	**500kVA/ 500kW**
Power Module Q'ty			8	9	10
Input & Bypass	Rated current at 480V with battery charging		590A	663A	737A
	Recommended cable size	(L1/ L2/ L3)	250 kcmil × 3 PCS (120 mm^2 × 3 PCS)	300 kcmil × 3 PCS (150 mm^2 × 3 PCS)	350 kcmil × 3 PCS (177 mm^2 × 3 PCS)
		(PE)	2/0 AWG × 1 PC (67 mm^2 × 1 PC)	2/0 AWG × 1 PC (67 mm^2 × 1 PC)	3/0 AWG × 1 PC (70 mm^2 × 1 PC)
	Maximum cable size	(L1/ L2/ L3)	400 kcmil × 3 PCS (185 mm^2 × 3 PCS)	400 kcmil × 3 PCS (185 mm^2 × 3 PCS)	400 kcmil × 3 PCS (185 mm^2 × 3 PCS)
		(PE)	400 kcmil × 1 PC (185 mm^2 × 1 PC)	400 kcmil × 1 PC (185 mm^2 × 1 PC)	400 kcmil × 1 PC (185 mm^2 × 1 PC)
	Maximum cable lug width		(1.97") 50 mm	(1.97") 50 mm	(1.97") 50 mm
	Screw size/ Cable lug inner diameter		M12/ 0.51" (13 mm)	M12/ 0.51" (13 mm)	M12/ 0.51" (13 mm)
	Terminal type*[1]		TLAPH180-2A12	TLAPH180-2A12	TLAPH180-2A12
Output	Rated current at 480V		482A	542A	602A
	Recommended cable size	(L1/ L2/ L3)	350 kcmil × 2 PCS (177 mm^2 × 2 PCS)	4/0 AWG × 3 PCS (95 mm^2 × 3 PCS)	250 kcmil × 3 PCS (120 mm^2 × 3 PCS)

DPH Series					
UPS Capacity			400kVA/ 400kW	450kVA/ 450kW	500kVA/ 500kW
Output (Continued)	Recommended cable size	(PE)	1/0 AWG × 1 PC (50 mm^2 × 1 PC)	1/0 AWG × 1 PC (50 mm^2 × 1 PC)	2/0 AWG × 1 PC (67 mm^2 × 1 PC)
	Maximum cable size	(L1/ L2/ L3)	400 kcmil × 3 PCS (185 mm^2 × 3 PCS)	400 kcmil × 3 PCS (185 mm^2 × 3 PCS)	400 kcmil × 3 PCS (185 mm^2 × 3 PCS)
		(PE)	400 kcmil × 1 PC (185 mm^2 × 1 PC)	400 kcmil × 1 PC (185 mm^2 × 1 PC)	400 kcmil × 1 PC (185 mm^2 × 1 PC)
	Maximum cable lug width		(1.97") 50 mm	(1.97") 50 mm	(1.97") 50 mm
	Screw size/ Cable lug inner diameter		M12/ 0.51" (13 mm)	M12/ 0.51" (13 mm)	M12/ 0.51" (13 mm)
	Terminal type*1		TLAPH180-2A12	TLAPH180-2A12	TLAPH180-2A12
Battery	Nominal discharge current (condition: 2V per cell)		880A	990A	1100A
	Recommended cable size	(+/ -)	350 kcmil × 3 PCS (177 mm^2 × 3 PCS)	250 kcmil × 4 PCS (120 mm^2 × 4 PCS)	300 kcmil × 4 PCS (150 mm^2 × 4 PCS)
	Recommended cable size	(PE)	2/0 AWG × 1 PC (67 mm^2 × 1 PC)	3/0 AWG × 1 PC (70 mm^2 × 1 PC)	4/0 AWG × 1 PC (95 mm^2 × 1 PC)

DPH Series					
UPS Capacity			**400kVA/ 400kW**	**450kVA/ 450kW**	**500kVA/ 500kW**
Battery (Continued)	Maximum cable size	(+/ -)	400 kcmil × 4 PCS (185 mm^2 × 4 PCS)	400 kcmil × 4 PCS (185 mm^2 × 4 PCS)	400 kcmil × 4 PCS (185 mm^2 × 4 PCS)
		(PE)	400 kcmil × 1 PC (185 mm^2 × 1 PC)	400 kcmil × 1 PC (185 mm^2 × 1 PC)	400 kcmil × 1 PC (185 mm^2 × 1 PC)
	Maximum cable lug width		(1.97") 50 mm	(1.97") 50 mm	(1.97") 50 mm
	Screw size/ Cable lug inner diameter		M12/ 0.51" (13 mm)	M12/ 0.51" (13 mm)	M12/ 0.51" (13 mm)
	Terminal type*[1]		TLAPH180-2A12	TLAPH180-2A12	TLAPH180-2A12
Conduit Size			3” (76.2 mm)	3” (76.2 mm)	3” (76.2 mm)
Cable Q’ty			3 PCS per conduit	4 PCS per conduit	4 PCS per conduit
Tightening Torque			M12=434 ± 8.7 lb-in (500 ± 20 kgf-cm)		
External Maintenance Bypass Cabinet’s Input Breaker or Switch (Q1)			800A	900A	1000A
External Maintenance Bypass Cabinet’s Bypass Breaker or Switch (Q2)			800A	900A	1000A
External Maintenance Bypass Cabinet’s Manual Bypass Breaker or Switch (Q3)			800A	900A	1000A
External Maintenance Bypass Cabinet’s Output Breaker or Switch (Q4)			800A	900A	1000A
External Battery Cabinet’s Breaker (Q5)			1000A	1200A	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. The cables mentioned in ***Table 5-2*** are copper wires, and each cable size is based on (1) cable type THHN & THWN-2 with temperature resistance up to 194°F (90°C) at ambient temperature 86°F (30°C), and (2) NEC specifications for 104°F (40°C) ambient rated conductors.
4. *[1] The suggested manufacturer is K.S. TERMINALS INC. You may use equivalent terminals provided by other manufacturers.

- The UPS is designed to connect with a power source that has 3-phase 3-wire output configurations. Neutral does not need to connect with the UPS; however, the neutral of the source (AC utility transformer) must be solidly grounded according to local electrical codes for the smooth operation of the UPS.

  NOTE:

  The input of the UPS must be connected to the WYE source.

- 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 system and meets the specifications specified on the UPS rating label. Make sure that the connection is in positive phase sequence.
- Check the battery polarity when connecting the external battery cabinet(s) to the UPS. Do not connect the battery polarity in reverse. For relevant information, please refer to ***5.5 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. If the UPS is not grounded, the power boards and components might be damaged after the UPS is powered on.

5.4.2 Single Input to Dual Input Modification

WARNING:

Only authorized Delta engineers or service personnel can modify single input to dual input setup.

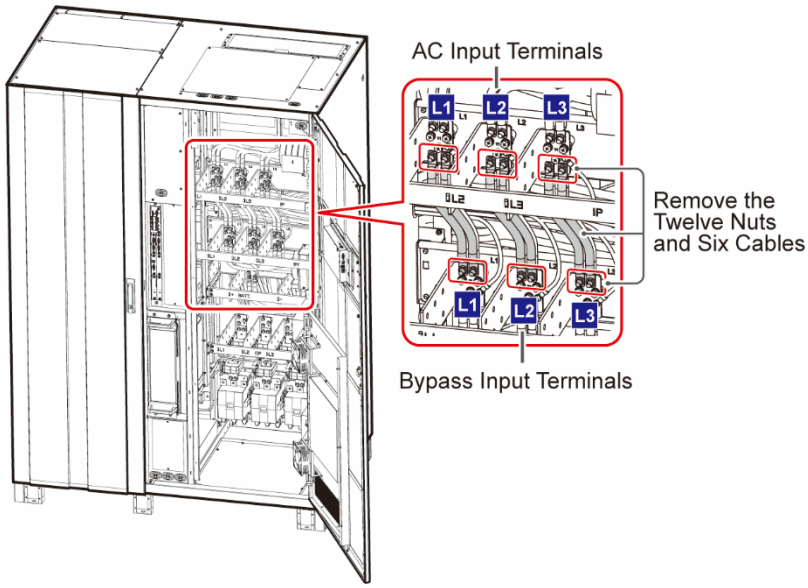
The UPS default setting is single input. If you want to modify it into dual input, please follow the steps below.

Step 1

Open the UPS's right front door, remove the wiring terminal cover, open the fan door (hinged on the right side), and you will see the AC Input terminals and Bypass Input terminals shown in the figure below. For location of the wiring terminal cover and fan door, please refer to ***Figure 2-4***.

Step 2

Remove the twelve nuts and six cables connected between the AC Input terminals (L1/ L2/ L3) and the Bypass Input terminals (L1/ L2/ L3).



(Figure 5-10: Remove the Twelve Nuts and Six Cables Connected between the AC Input Terminals and Bypass Input Terminals)

NOTE:

Please keep the removed nuts and cables properly for future use. If you want to modify the UPS from dual input into single input, please use the removed twelve nuts and six cables to connect the AC Input terminals (L1/ L2/ L3) and Bypass Input terminals (L1/ L2/ L3).

5.4.3 Single Unit Wiring

NOTE:

Before wiring, please read ***5.4 Wiring*** thoroughly and make sure that relevant conditions have been met.

Refer to ***Table 5-3*** and ***Table 5-4*** for information about the wiring terminals, breakers, switches and wiring. For the wiring diagrams and instructions, please refer to the following sections.

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

No.	Item	Function
1	AC Input Terminals (L1/ L2/ L3)	● **Single Input**: Connect to the external maintenance bypass cabinet's input breaker or switch (Q1). ● **Dual Input**: Connect to the external maintenance bypass cabinet's input breaker or switch (Q1).
2	Bypass Input Terminals (L1/ L2/ L3)	● **Single Input**: There is no need to connect the Bypass Input Terminals. ● **Dual Input**: Connect to the external maintenance bypass cabinet's bypass breaker or switch (Q2).
3	UPS Output Terminals (L1/ L2/ L3)	Connect to the external maintenance bypass cabinet's output breaker or switch (Q4).
4	Battery Input Terminals (+/ -)	Connect to the external battery cabinet(s). Please contact Delta service personnel for battery configurations.
5	⏚ PE (protective earth) Terminal	Connects to the external maintenance bypass cabinet's GND terminal (⏚).
6	⏚ GND (ground) Terminals	The terminals are used to ground the devices which are associated with UPS operation.

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

No.	Item*1	Function
1	Input Breaker or Switch (Q1) including L1/ L2/ L3 terminals	Connects to the main AC source.
2	Bypass Breaker or Switch (Q2) including L1/ L2/ L3 terminals (Only for dual input application)	Connects to the bypass AC source.
3	Manual Bypass Breaker or Switch (Q3) including L1/ L2/ L3 terminals	● **Single Input**: Connects to the main AC source. ● **Dual Input**: Connects to the bypass AC source.
4	Output Breaker or Switch (Q4) including L1/ L2/ L3 terminals	Connects to the critical loads.
5	⏚ PE (protective earth) Terminal	Protective earthing for protection against electrical shock in case of fault*2. 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 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.

5.4.3.1 Single Input (Single Unit)

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

Step 1

Make sure that the 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.

Step 2

Make sure that each external battery cabinet's breaker (Q5) is in the **OFF** position.

Step 3

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

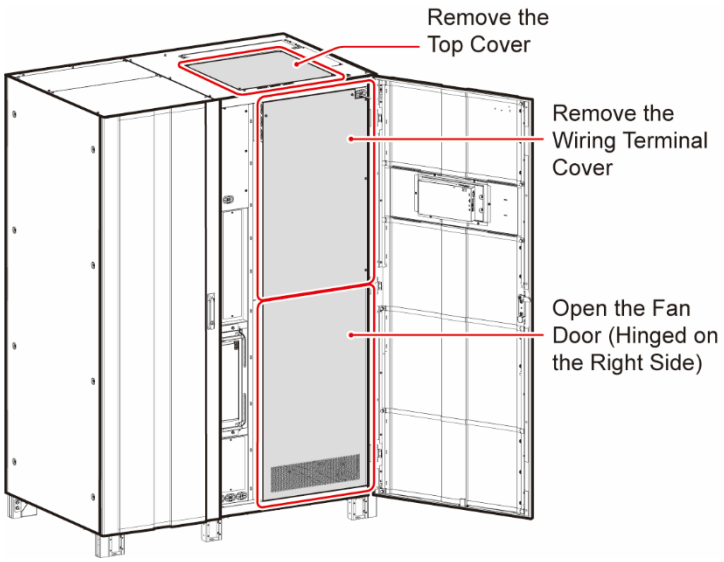
Step 4

The UPS allows cable routing from the top or bottom. Please leave adequate space above or below the UPS.

Step 5

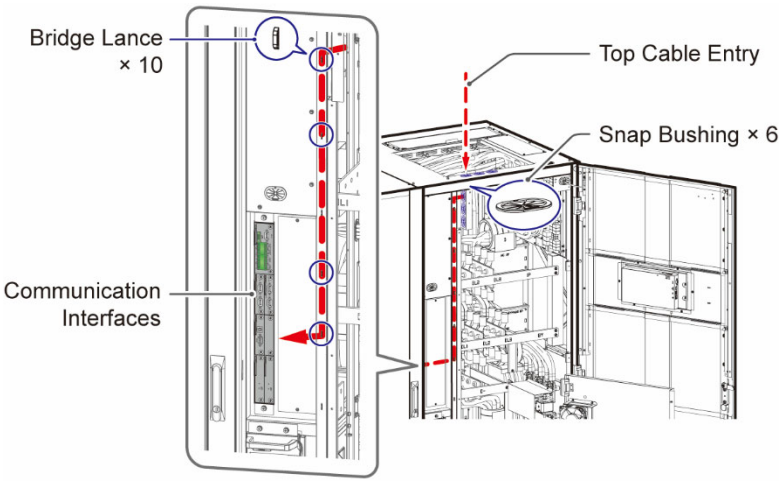
- **Top Wiring**:

A. For top wiring, open the UPS's right front door, remove the top cover and wiring terminal cover, and open the fan door (hinged on the right side).



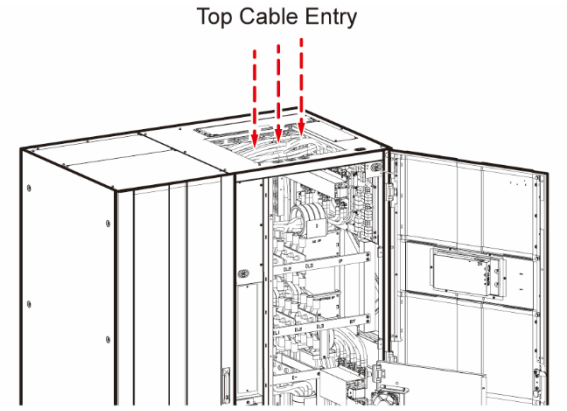
(Figure 5-11: Remove the Top Cover & Wiring Terminal Cover, and Open the Fan Door)

B. For cables that need connecting to the communication interfaces, route the cables through the snap bushings, use cable ties (user-supplied) to secure the cables in the bridge lances and connect the cables to the communication interfaces as shown in the figure below.



(Figure 5-12: Top Cable Entry for the Communication Interfaces)

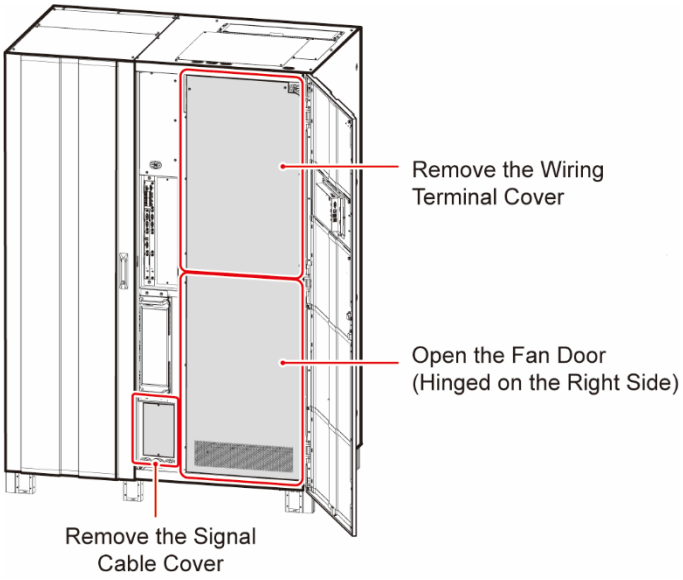
C. For cables that need connecting to the wiring terminals shown in ***Figure 2-5*** ~ ***Figure 2-7***, route the cables from the top of the cabinet and connect the cables to the wiring terminals.



(Figure 5-13: Top Cable Entry for the Wiring Terminals)

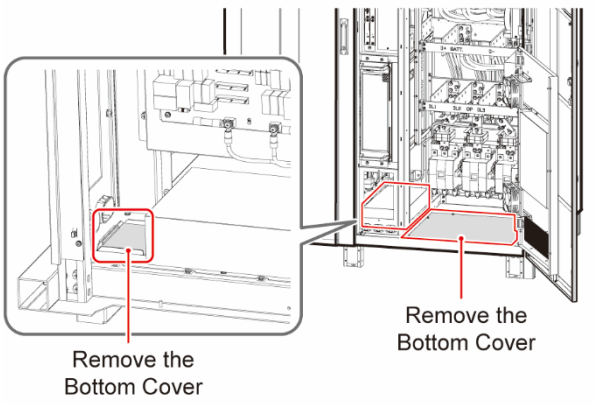
- **Bottom Wiring**:

A. Open the UPS's right front door, remove the wiring terminal cover and signal cable cover, and open the fan door (hinged on the right side).



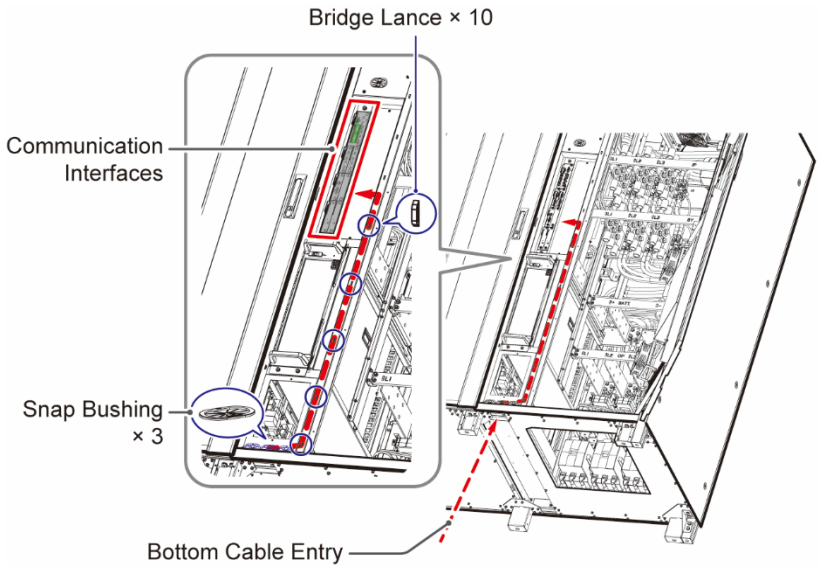
(Figure 5-14: Remove the Wiring Terminal Cover & Signal Cable Cover, and Open the Fan Door)

B. Remove the two bottom covers shown below.



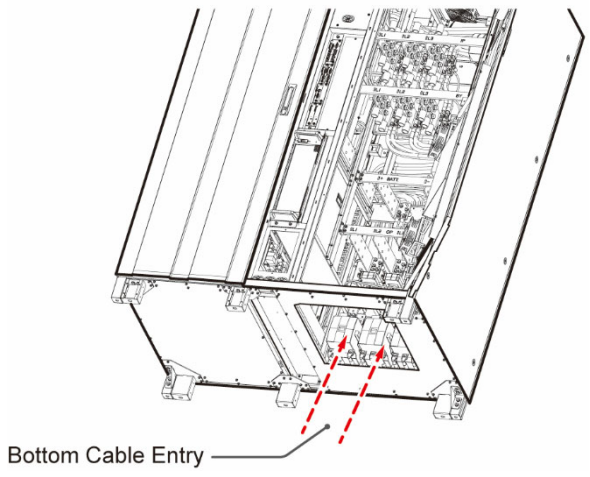
(Figure 5-15: Remove the Two Bottom Covers)

C. For cables that need connecting to the communication interfaces, route the cables from the bottom of the cabinet and through the snap bushings, use cable ties (user-supplied) to secure the cables in the bridge lances and connect the cables to the communication interfaces as shown in the figure below.



(Figure 5-16: Bottom Cable Entry for the Communication Interfaces)

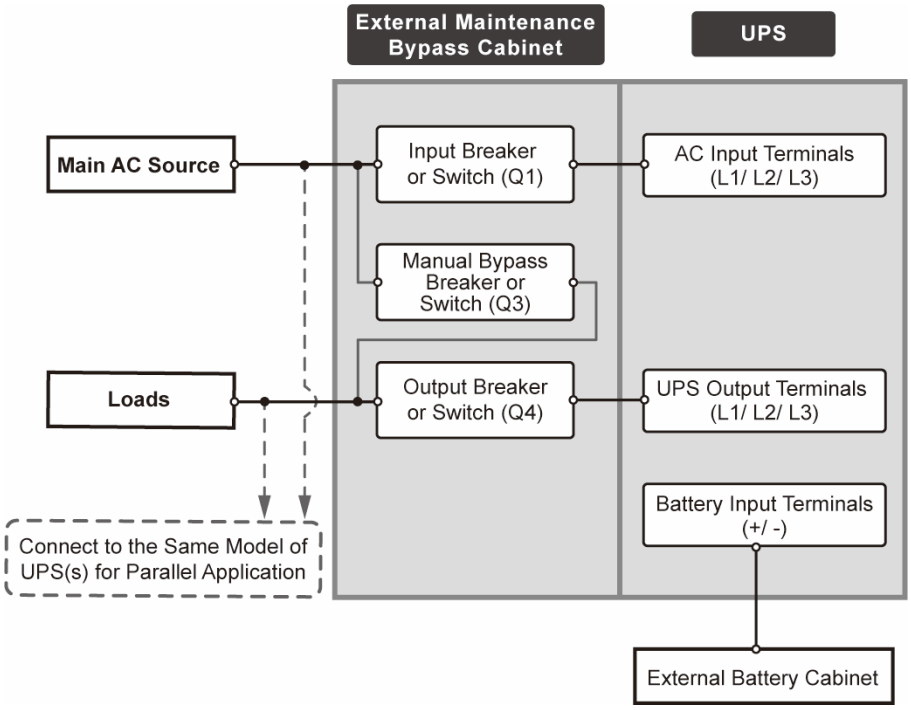
D. For cables that need connecting to the wiring terminals shown in ***Figure 2-5 ~ Figure 2-7***, route the cables from the bottom of the cabinet and connect the cables to the wiring terminals.



(Figure 5-17: Bottom Cable Entry for the Wiring Terminals)

Step 6

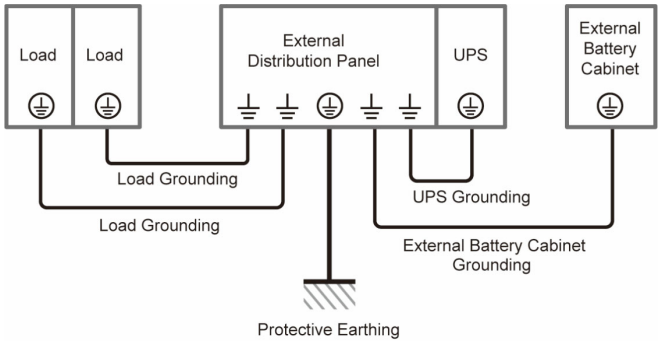
Connect the cables of the main AC source, output and external battery cabinet(s) to the UPS and the external maintenance bypass cabinet. Please refer to ***Table 5-3***, ***Table 5-4***, ***5.5 External Battery Cabinet Connection Warnings*** and the following diagram to perform wiring.



(Figure 5-18: Single Unit Single Input Wiring Diagram)

Step 7

Ground the UPS, external battery cabinet(s) and connected critical loads. The grounding diagram below is for reference.



(Figure 5-19: Grounding Diagram_ Single Unit)

5.4.3.2 Dual Input (Single Unit)

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

Step 1

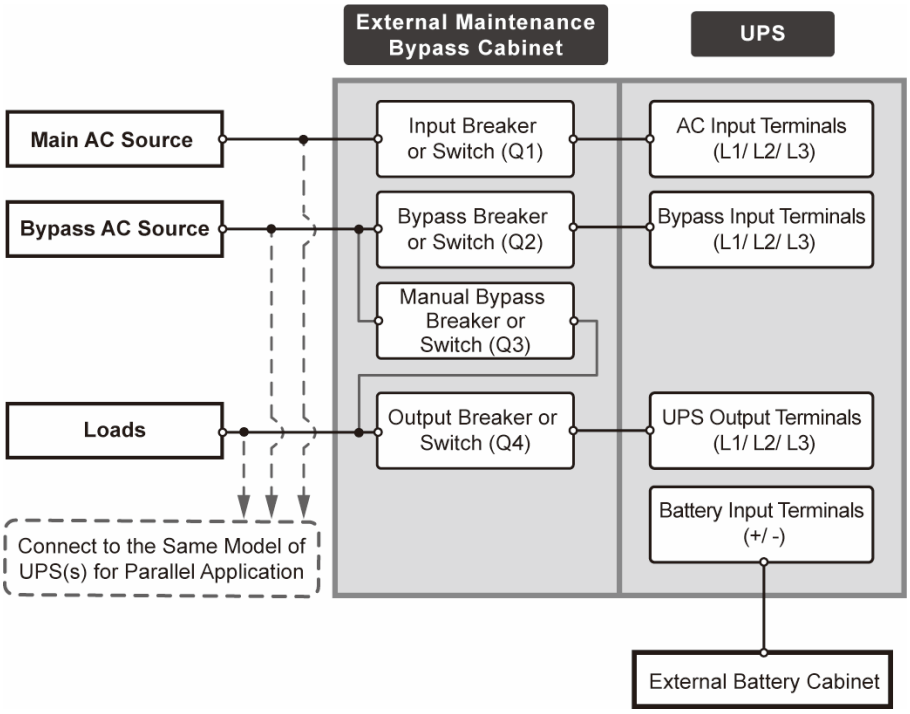
Follow ***5.4.2 Single Input to Dual Input Modification*** to modify the UPS from single input to dual input.

Step 2

Follow **Step 1 ~ Step 5** mentioned in ***5.4.3.1 Single Input (Single Unit)***.

Step 3

Connect the cables of the main AC source, bypass source, output and external battery cabinet(s) to the UPS and the external maintenance bypass cabinet. Please refer to ***Table 5-3***, ***Table 5-4***, ***5.5 External Battery Cabinet Connection Warnings*** and the following diagram to perform wiring.



(Figure 5-20: Single Unit Dual Input Wiring Diagram)

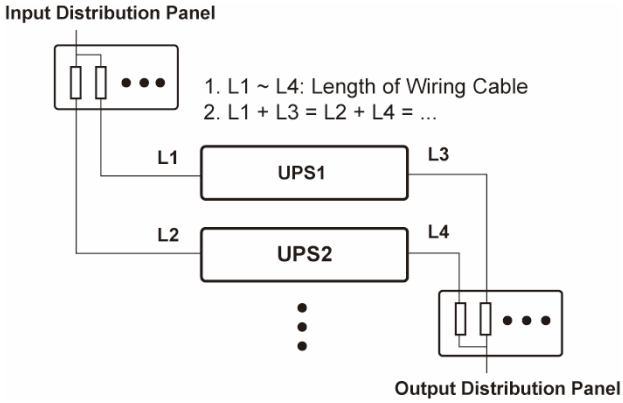
Step 4

Refer to ***Figure 5-19*** to ground the UPS, external battery cabinet(s) and connected critical loads.

5.4.4 Parallel Units Wiring

NOTE:

1. Up to three UPS units can be paralleled for redundancy and capacity expansion. Only the UPSs with the same capacity, voltage, frequency and version can be paralleled. Please only use the provided parallel cable to parallel the UPS units. Otherwise, parallel functions will fail.
2. When the 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.



3. Before wiring, please read ***5.4 Wiring*** thoroughly and make sure that relevant conditions have been met.

Step 1

For single input, follow **Step 1 ~ Step 6** mentioned in ***5.4.3.1 Single Input (Single Unit)***.

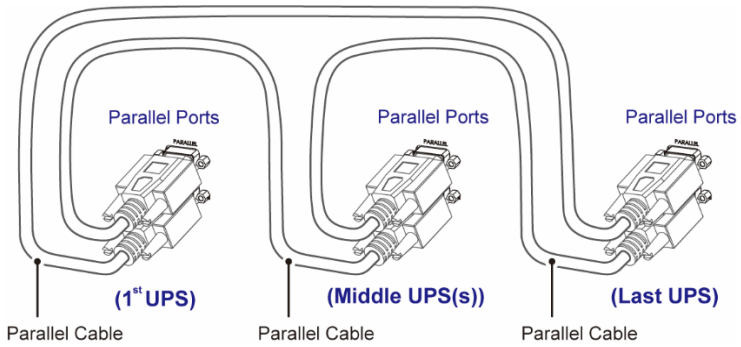
For dual input, follow **Step 1 ~ Step 3** mentioned in ***5.4.3.2 Dual Input (Single Unit)***.

Step 2

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 4-1***.

NOTE:

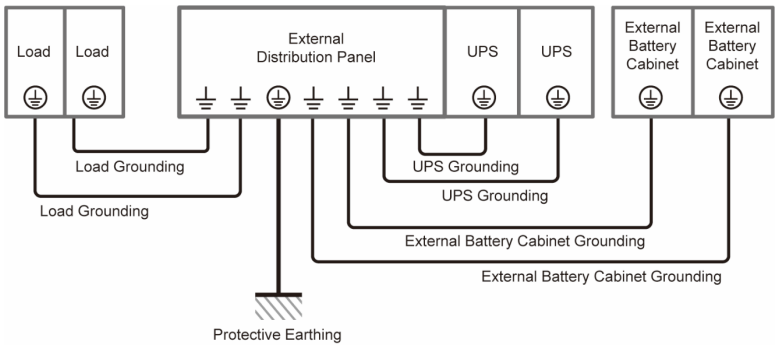
*[1] One parallel cable is provided in each UPS's accessory package.



(Figure 5-21: Parallel Port Connection_ Daisy Chain Method)

Step 3

Ground the parallel UPS units, external battery cabinet(s) and connected critical loads. The grounding diagram below is for reference.



(Figure 5-22: 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 ***7.6.5 Parallel Setting***.

5.5 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.

WARNING:

1. Before performing battery/ battery cabinet installation, wiring and replacement, please turn off each external battery cabinet's breaker (Q5) to completely disconnect the battery power from the UPS.
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.

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 eight units of external battery cabinets to the UPS.

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

  1. (A) Connect the UPS to the external maintenance bypass cabinet (user-supplied) and external battery cabinet(s), and (B) connect the main AC source and bypass AC source (for dual input application only) to the external maintenance bypass cabinet. Please refer to ***5.4 Wiring***.
  2. Follow ***6. UPS Operation*** to turn on the external maintenance bypass cabinet, UPS and the external battery cabinet(s). After that, the batteries will be automatically charged.

     WARNING:

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

- To connect the external battery cabinet(s) to the UPS, please refer to ***5.4 Wiring***.
- For the external battery cabinet's grounding information, please refer to ***Figure 5-19*** and ***Figure 5-22***.

- **Battery Parameters**

No.	Item	Description
1	Charge Voltage	Float charge voltage: 544Vdc (default)
		Equalized charge voltage: 560Vdc (default)
2	Charge Current	Default: 5A (per power module)
		Maximum: 15A (per power module)
3	Low Battery Shutdown Voltage	400 ~ 440Vdc (default: 400Vdc)
4	Battery Quantity	12V × 40 PCS (default)

NOTE:

1. The charge current is adjustable from 3A to the maximum, 1A per step.
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/ 31/ 32/ 33/ 34/ 35/ 36/ 37/ 38/ 39/ 40/ 41/ 42/ 43/ 44/ 45/ or 46 PCS of batteries. Change of the battery quantity will influence the applied specifications. 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 application. Otherwise, the batteries will be over-charged, not fully charged or even 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 the UPS requirements.
- Do not connect the batteries in reverse.
- Use a voltage meter to measure whether the total voltage is around 12.5Vdc × the total number of batteries after the batteries are connected in series.

WARNING:

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

- **Installation of the External Battery Cabinet's Protective Device**

Please follow your UPS's rating to install an appropriate protective device for each external battery cabinet. There are four installation methods for selection.

(1) A 3-pole DC circuit breaker or DC isolated switch connected in series with DC fuses

(2) A 2-pole DC circuit breaker or DC isolated switch connected in series with DC fuses

(3) A 3-pole DC circuit breaker

(4) A 2-pole DC circuit breaker

For relevant values, please refer to ***Table 5-5***; for installation diagrams, please refer to ***Figure 5-23 ~ Figure 5-26***.

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

UPS Rating	Power Module Q'ty	3-Pole DC Circuit Breaker/ DC Isolated Switch (Voltage Per Pole ≥ 250Vdc)	2-Pole DC Circuit Breaker/ DC Isolated Switch (Voltage Per Pole ≥ 500Vdc)	DC Fuse (Voltage ≥ 500Vdc)
200kVA/ 200kW	4	500A	500A	500A
250kVA/ 250kW	5	630A	630A	650A
300kVA/ 300kW	6	800A	800A	800A
350kVA/ 350kW	7	900A	900A	900A
400kVA/ 400kW	8	1000A	1000A	1000A
450kVA/ 450kW	9	1200A	1200A	1200A
500kVA/ 500kW	10	1200A	1200A	1200A

NOTE:

1. ***Table 5-5*** is for 12Vdc × 40 PCS of batteries (default). If you install a different number of batteries, please contact Delta service personnel for the protective device's current and voltage.
2. If you need to parallel multiple units of external battery cabinets, please contact Delta service personnel for relevant information.
3. To extend backup time, you can parallel up to eight units of external battery cabinets to the UPS. Please note that (1) the number of the batteries in each paralleled external battery cabinet and (2) the cable length of each battery string must be the same.
4. If the battery quantity is lower than 36, the UPS capacity should be de-rated to 80%; otherwise, it will trigger power modules' over temperature protection and the UPS will run in bypass mode.

- When choosing the external battery cabinet's protective device, please take the following factors into consideration: (1) overcurrent between the UPS and battery circuit, (2) short circuit current of the batteries, (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.

- The protective device is optional, and its type must be fast-acting DC circuit breaker and/ or fast-acting DC fuse. If you want to buy any of them, please contact Delta service personnel. When choosing the protective device, please follow the instructions below.

  (1) The protective device's rated current must comply with the current values shown in ***Table 5-5***.

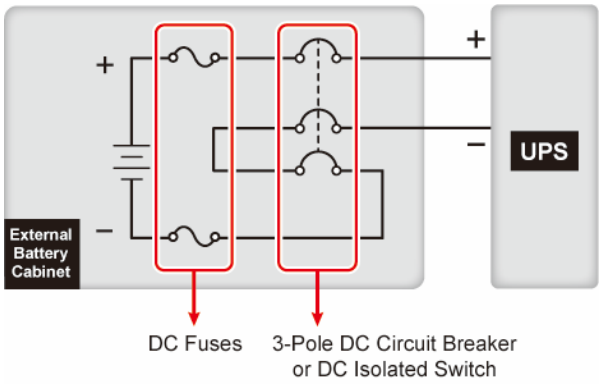
  (2) The specifications of the protective device's short-circuit protection (i.e. the tripping current of the fast-acting DC circuit breaker and/ or the melting current of the fast-acting DC fuse) must be 4 ~ 6 times the values shown in ***Table 5-5***. Besides, the response time of the protective device must be less than 20ms.

  (3) For the choice of the fast-acting DC fuse mentioned above, the A50QS series from the supplier ***Ferraz Shawmut*** is suggested. Please contact Delta customer service for relevant information.

  (4) The maximum tripping current of the fast-acting DC circuit breaker and/ or the maximum melting current of the fast-acting DC fuse mentioned above are 6 times as much as the values shown in ***Table 5-5***. These maximum values are suggested for general applications only. For the actual maximum values, the maximum short-circuit capacity of the on-site batteries must be taken into consideration. Please contact Delta customer service for relevant information.

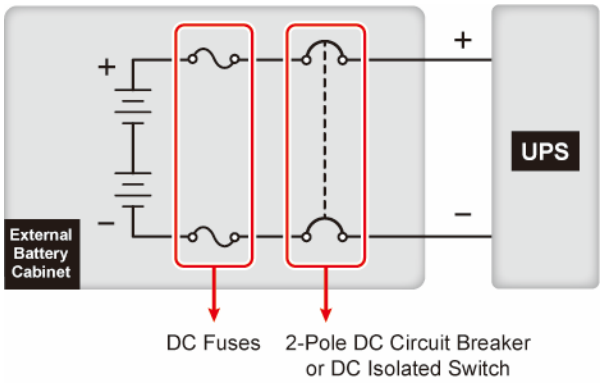
  (5) The maximum allowable fault current is 15kA. Please confirm that the interrupting rating of your chosen protective device is sufficient.

External Battery Cabinet's Protective Device (Option 1)



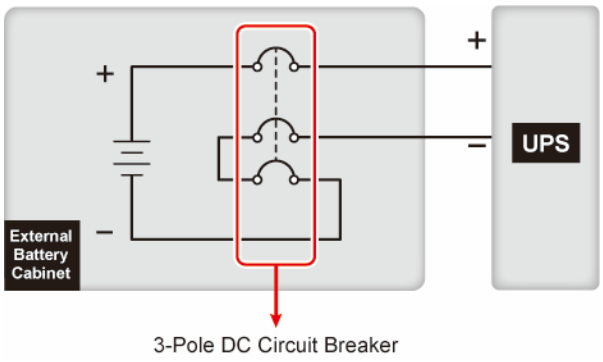
(Figure 5-23: Installation of a 3-pole DC Circuit Breaker or DC Isolated Switch Connected in Series with DC Fuses)

External Battery Cabinet's Protective Device (Option 2)



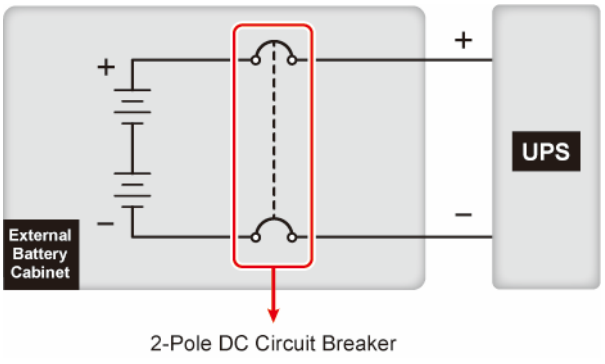
(Figure 5-24: Installation of a 2-pole DC Circuit Breaker or DC Isolated Switch Connected in Series with DC Fuses)

External Battery Cabinet's Protective Device (Option 3)



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

External Battery Cabinet's Protective Device (Option 4)



(Figure 5-26: Installation of a 2-pole DC Circuit Breaker)

- **Common Battery (Only for Parallel UPSs Sharing 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). See ***Figure 5-27*** for two parallel UPSs sharing one external battery cabinet as an example.

NOTE:

The following 'common battery' information is not applicable to the UPS using lithium-ion batteries. For relevant information, please refer to the user manual of the lithium-ion batteries. 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.

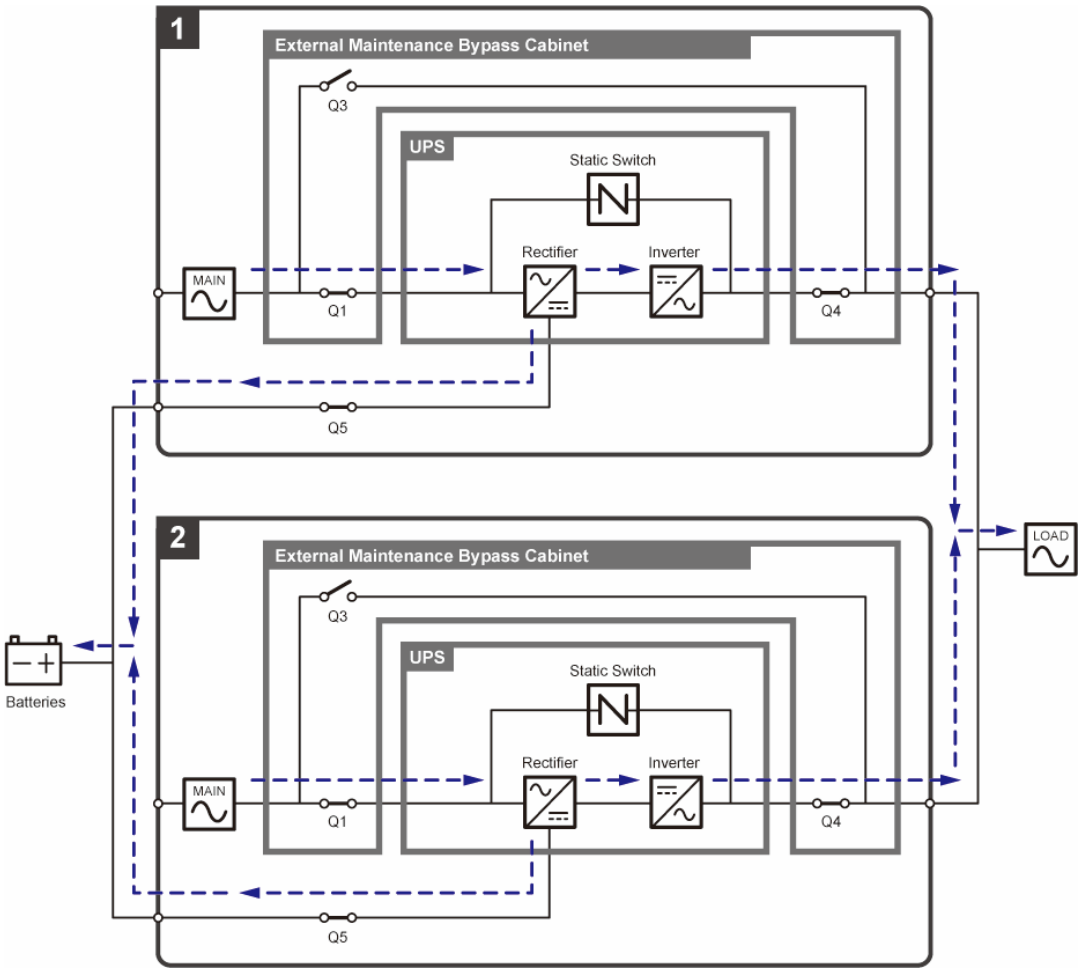
For common battery application, please install a protective device between each parallel UPS and its connected external battery cabinet(s). You have to use the LCD to set each UPS's '**Float Charge Voltage**' (default: 544V) the same, '**Equalized Charge Voltage**' (default: 560V) the same, '**Battery Strings**' even and '**Charge Current (Max)**' even. Please refer to the examples below and ***7. LCD Display & Settings***.

Example I

When (1) two UPSs are paralleled and share one external battery cabinet, (2) lead-acid batteries are used, (3) the battery capacity 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**' as '**VRLA**', '**Capacity**' as 200AH, '**Battery Strings**' as 2, and '**Charge Current (Max)**' as 40A.

Example II

When (1) three UPSs are paralleled and share one external battery cabinet, (2) lead-acid batteries are used, (3) the battery capacity 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**' as '**VRLA**', '**Capacity**' as 300AH, '**Battery Strings**' as 1, and '**Charge Current (Max)**' as 30A.



(Figure 5-27: Common Battery Diagram)

- **External Battery Cabinet Alarm**

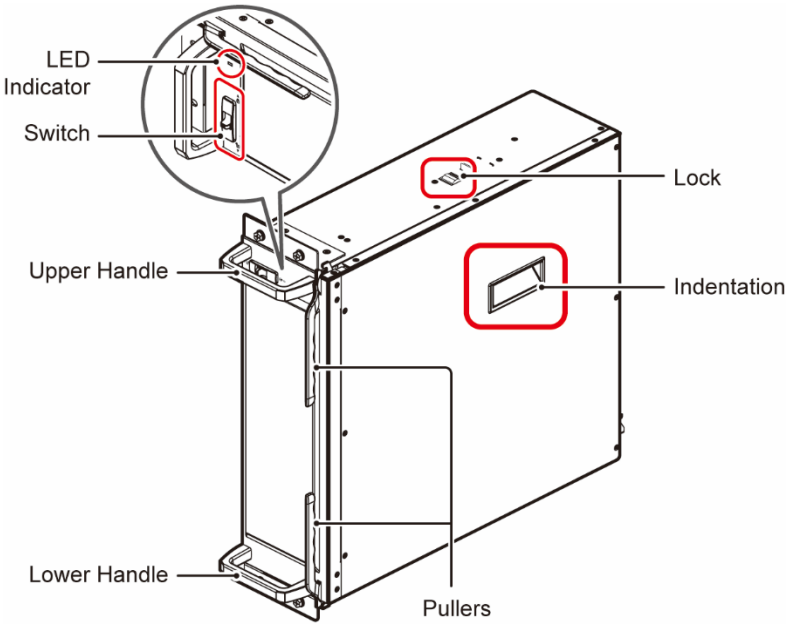
When any external battery cabinet connected to the UPS has the following problems, the UPS system will sound an alarm. Please see the table below.

No.	External Battery Cabinet Status	Alarm
1	Battery Abnormal - Reversed	Sounds for 0.5 second every second.
2	Battery Ground Fault	Sounds for 0.5 second every second.
3	Battery Over Temperature	Sounds for 0.5 second every second.
4	Battery Under Temperature	Sounds for 0.5 second every second.
5	Battery Breaker Off	Sounds for 0.5 second every 3 seconds.
6	Battery Disconnected (Missing)	Sounds once every second.

No.	External Battery Cabinet Status	Alarm
7	Battery Over Charged	Long beep.
8	Battery Test Fail	Sounds for 0.5 second every second.
9	Battery End of Discharge Imminent	Sounds for 0.5 second every second.
10	Battery End of Discharge	Long beep.
11	Battery Life Time Expired	Sounds for 0.5 second every 3 seconds.

5.6 STS Module

The STS module has been installed in the UPS by default. Please refer to ***Figure 2-4*** for its location.



(Figure 5-28: STS Module)

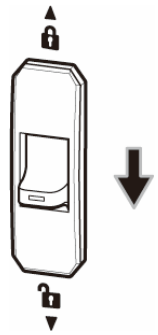
5.6.1 STS Module Installation

WARNING:

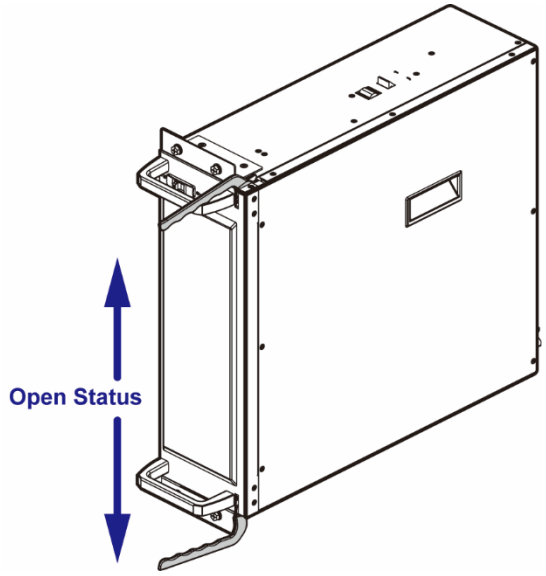
1. Only when (1) the UPS runs in manual bypass mode, (2) the capacitors are completely discharged and (3) the battery power is completely cut off can qualified service personnel perform the following installation procedures.
2. The STS module is heavy (54.2 lb (24.6 kg)). At least two people are required for handling.

Step 1

Confirm that the STS module's switch is in the lower position ( ) and the pullers are in the open status.



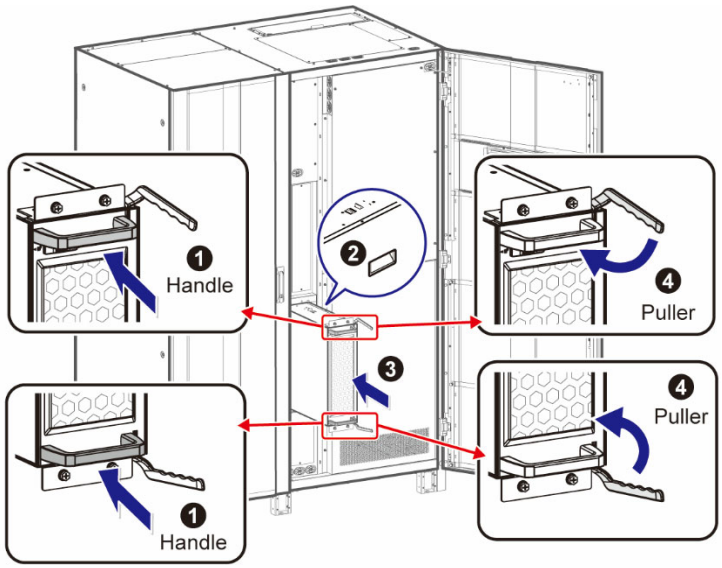
(Figure 5-29: Confirm the STS Module's Switch in the Lower Position)



(Figure 5-30: Confirm the Pullers in the Open Status)

Step 2

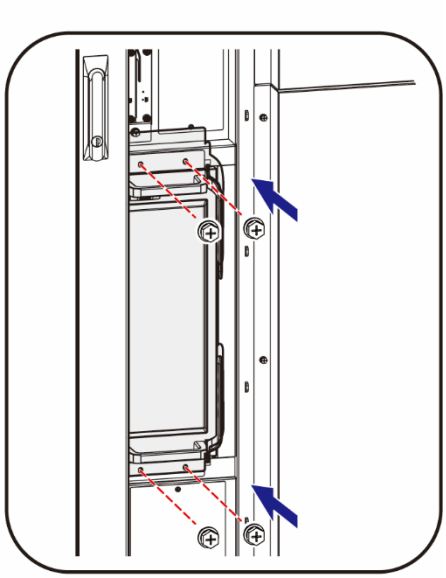
Arrange two persons to install the STS module. One person holds the upper handle and the other holds the lower one (❶). Any person holds the indentation (❷) and two persons work together to insert the STS module into the designated slot (❸). Then, one person holds the two pullers (❹) and push them inwards in order to push the module into the slot. Once the module snaps into place, the pullers are in the closed status.



(Figure 5-31: Insert the STS Module into the Slot)

Step 3

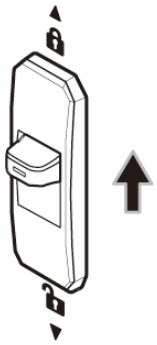
Re-install the four screws (removed during the STS module removal process) to firmly fix the STS module's ear brackets on the UPS cabinet.



(Figure 5-32: Fix the STS Module on the UPS Cabinet)

Step 4

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



(Figure 5-33: Turn the STS Module’s Switch to the Upper Position)

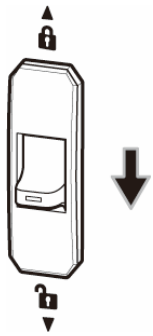
5.6.2 STS Module Removal

WARNING:

1. Only when (1) the UPS runs in manual bypass mode, (2) the capacitors are completely discharged and (3) the battery power is completely cut off can qualified service personnel perform the following removal procedures.
2. The STS module is heavy (54.2 lb (24.6 kg)). At least two people are required for handling.

Step 1

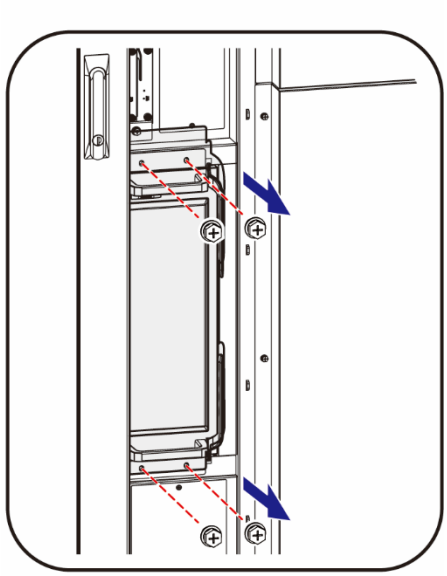
Turn the STS module's switch to the lower position ( ) and wait until the STS module's LED indicator becomes off.



(Figure 5-34: Turn the STS Module's Switch to the Lower Position)

Step 2

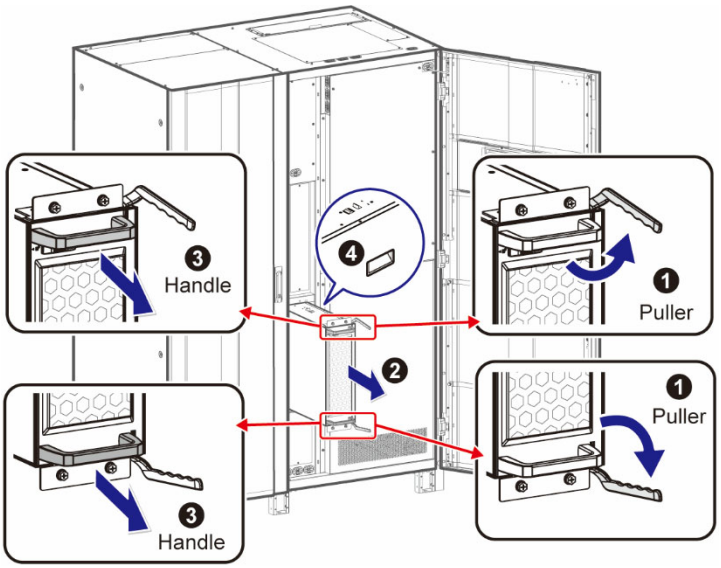
Remove the four screws from the STS module.



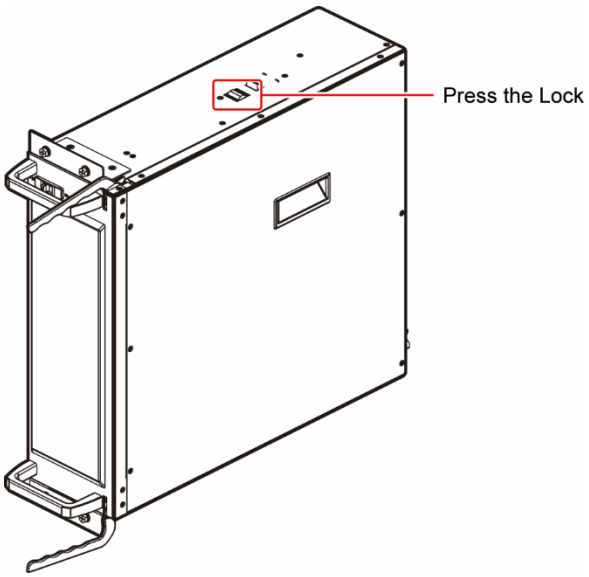
(Figure 5-35: Remove the Four Screws)

Step 3

Arrange two persons to remove the STS module. One person holds the STS module's two pullers and opens them outward (❶); at this moment, the STS module should come out from the slot a little bit (❷). Next, one person holds the upper handle and the other holds the lower one (❸) and two persons work together to pull out the STS module from the slot. When the STS module cannot be pulled out any more, press the lock on the top of the STS module. After that, two persons can continuously pull out the module from the UPS cabinet; if needed, hold the indentation (❹) for easy handling.



(Figure 5-36: Remove the STS Module from the Slot)



(Figure 5-37: Press the Lock on the STS Module)

5.6.3 STS Module's LED Indicator

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

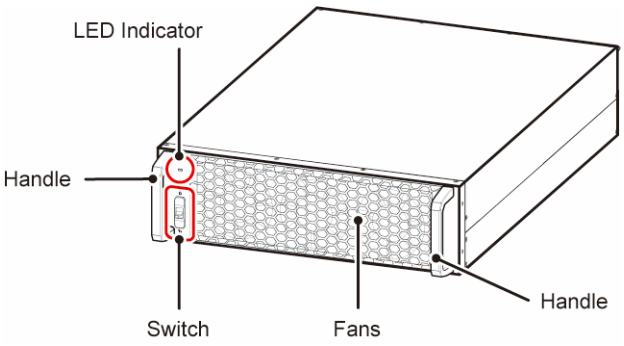
LED Indicator	Description
OFF	The STS module is **OFF**.
ON (yellow)	The STS module is working in Bypass mode or ECO mode.
Flashing (yellow)_ on for 0.3 second and off for 3 seconds	The STS module is abnormal.

NOTE:

Under STS module running conditions, if you turn the STS module's switch to the lower position ( ), the STS module will shut down, and its output and LED indicator will be off.

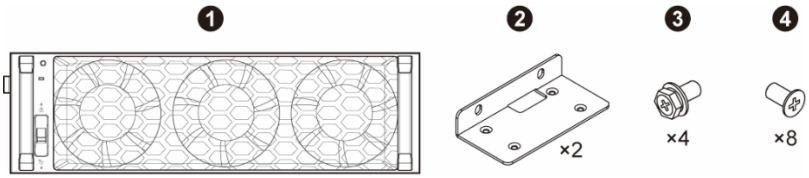
5.7 Power Module (Optional)

The power module is optional. Each capacity is 50kVA/ 50kW.



(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	Ear Bracket	2 PCS
❸	M6 Screw	4 PCS
❹	M4 Screw	8 PCS

5.7.1 Power Module Installation

WARNING:

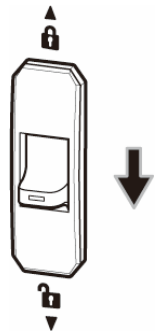
1. Only when (1) the UPS runs in manual bypass mode, (2) the capacitors are completely discharged and (3) the battery power is completely cut off can qualified service personnel perform the following installation procedures.
2. The power module is heavy (78.3 lb (35.5 kg)). At least two people are required for handling.
3. Please follow your UPS capacity to install the correct number of power modules.

DPH Series							
UPS Capacity	200kVA/ 200kW	250kVA/ 250kW	300kVA/ 300kW	350kVA/ 350kW	400kVA/ 400kW	450kVA/ 400kW	500kVA/ 500kW
Power Module Q'ty	4	5	6	7	8	9	10

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. Before installation, remove the power module slot's cover if there is any. For the location of the power module slots, please refer to ***Figure 2-4***.

Step 1

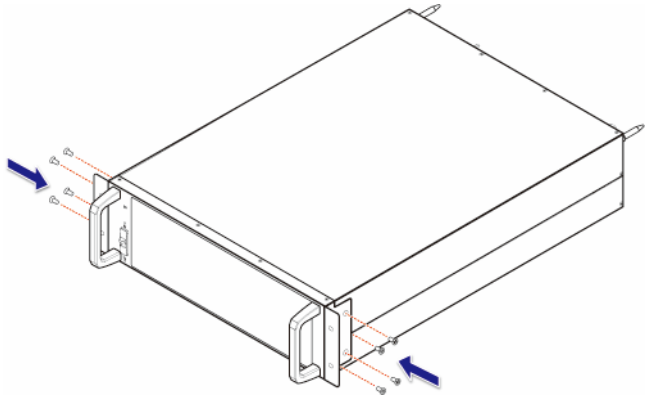
Confirm that the power module's switch is in the lower position ( ).



(Figure 5-39: Confirm the Power Module's Switch in the Lower Position)

Step 2

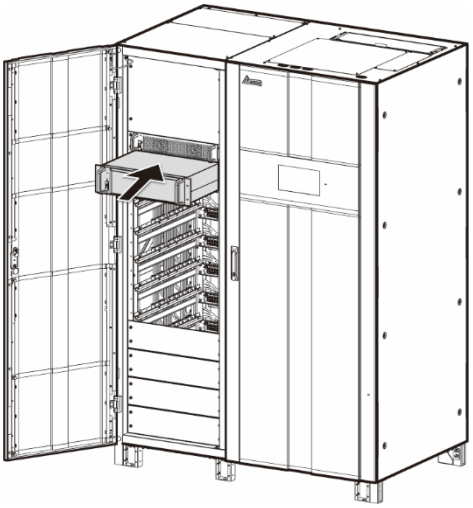
Use the eight M4 screws to fix the two ear brackets on the two sides of the power module.



(Figure 5-40: Install the Two Ear Brackets)

Step 3

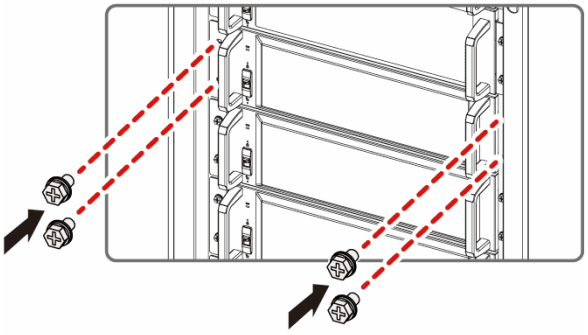
Insert the power module into the power module slot until it snaps into place.



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

Step 4

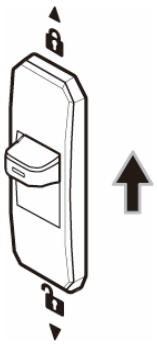
Use the four M6 screws to firmly fix the power module on the UPS cabinet.



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

Step 5

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



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

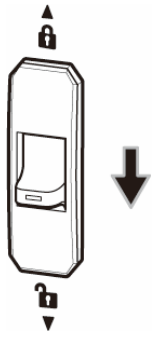
5.7.2 Power Module Removal

WARNING:

1. Only when (1) the UPS runs in manual bypass mode, (2) the capacitors are completely discharged and (3) the battery power is completely cut off can qualified service personnel perform the following removal procedures.
2. Before removing any power module, make sure that the remaining power module(s) can support the connected critical loads.
3. The power module is heavy (78.3 lb (35.5 kg)). At least two people are required for handling.

Step 1

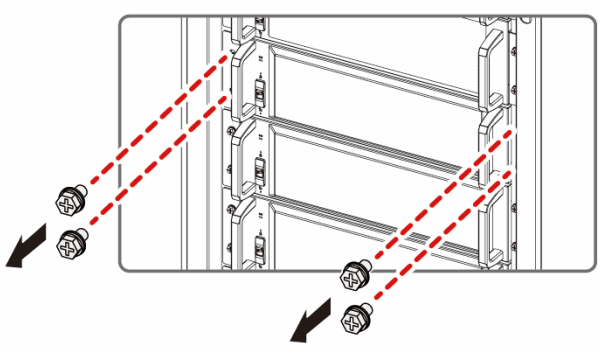
Turn the power module's switch to the lower position ( ) and wait until the power module's LED indicator becomes off.



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

Step 2

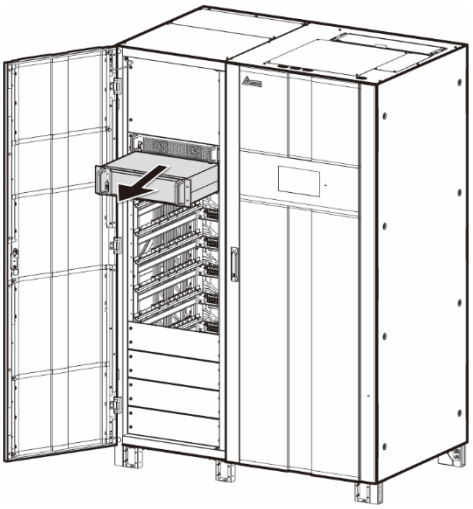
Remove the four screws from the power module.



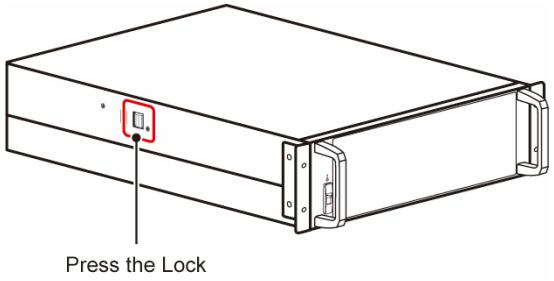
(Figure 5-45: Remove the Four Screws)

Step 3

Pull out the power module from the slot. When the power module cannot be pulled out any more, press the lock on the left side of the power module 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)

5.7.3 Power Module's LED Indicator

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

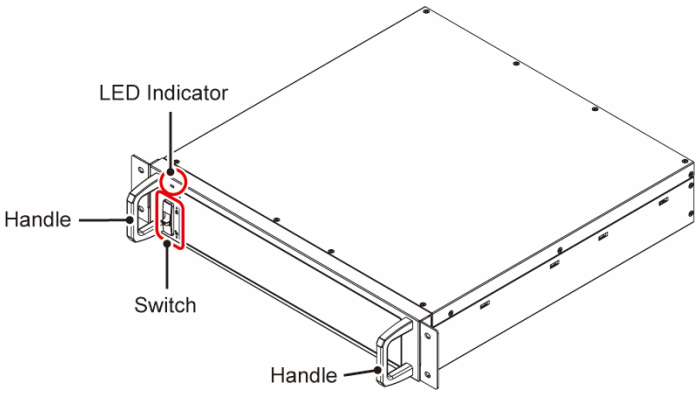
LED Indicator	Description
OFF	The power module is **OFF**.
ON (green)	1. The power module is running in On-Line mode or Battery mode. 2. The power module's inverter starts up. 3. The power module's PFC starts up.
Flashing (green)_ on for 2 seconds and off for 1 second	The power module is under discharging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

NOTE:

Under power module running conditions, 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.

5.8 Auxiliary Module

The auxiliary module has been installed in the UPS by default. Please refer to ***Figure 2-4*** for its location.



(Figure 5-48: Auxiliary Module)

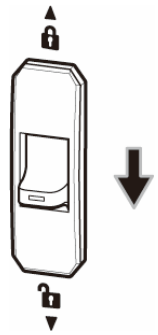
5.8.1 Auxiliary Module Installation

WARNING:

Only when (1) the UPS runs in manual bypass mode, (2) the capacitors are completely discharged and (3) the battery power is completely cut off can qualified service personnel perform the following installation procedures.

Step 1

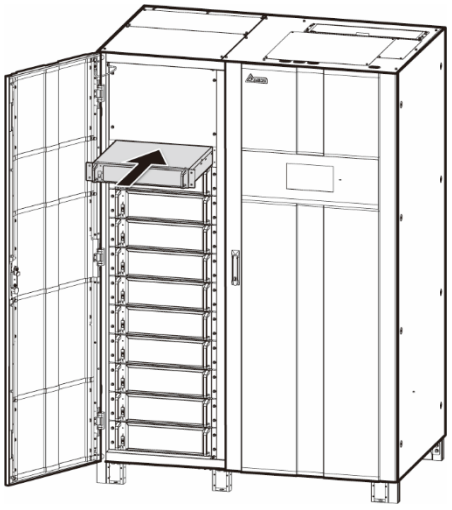
Confirm that the auxiliary module's switch is in the lower position ( ).



(Figure 5-49: Confirm the Auxiliary Module's Switch in the Lower Position)

Step 2

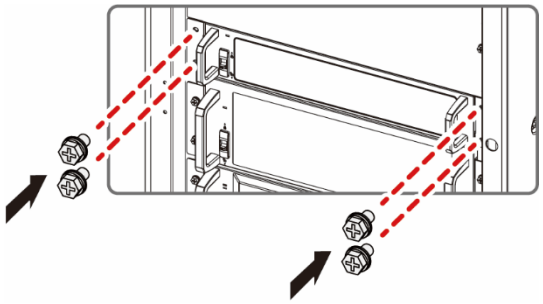
Insert the auxiliary module into the unoccupied auxiliary module slot until it snaps into place.



(Figure 5-50: Insert the Auxiliary Module into the Slot)

Step 3

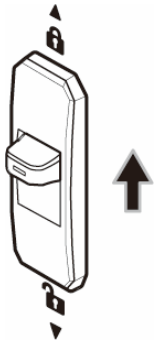
Re-install the four screws (removed during the auxiliary module removal process) to firmly fix the auxiliary module's ear brackets on the UPS cabinet.



(Figure 5-51: Fix the Auxiliary Module on the UPS Cabinet)

Step 4

Turn the auxiliary module’s switch to the upper position ( ).



(Figure 5-52: Turn the Auxiliary Module’s Switch to the Upper Position)

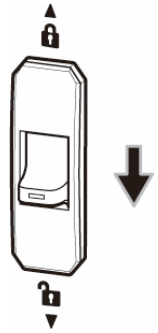
5.8.2 Auxiliary Module Removal

WARNING:

Only when (1) the UPS runs in manual bypass mode, (2) the capacitors are completely discharged and (3) the battery power is completely cut off can qualified service personnel perform the following removal procedures.

Step 1

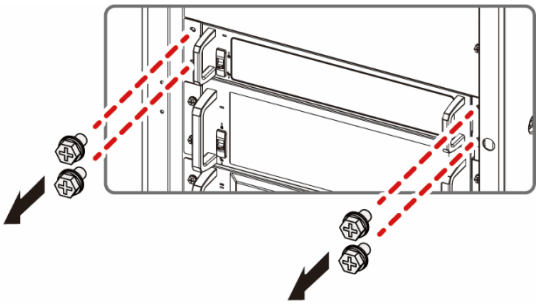
Turn the auxiliary module's switch to the lower position ( ) and wait until the auxiliary module's LED indicator becomes off.



(Figure 5-53: Turn the Auxiliary Module's Switch to the Lower Position)

Step 2

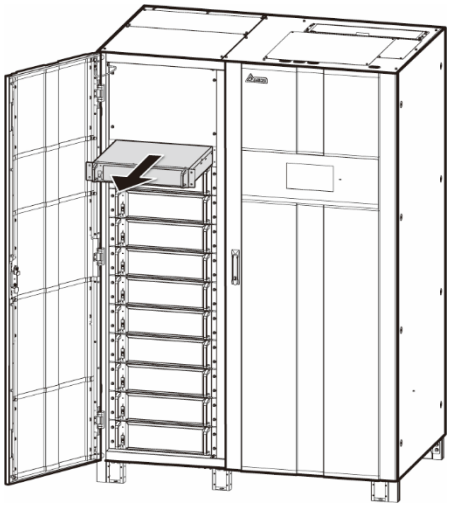
Remove the four screws from the auxiliary module.



(Figure 5-54: Remove the Four Screws)

Step 3

Pull out the auxiliary module from the slot.



(Figure 5-55: Remove the Auxiliary Module)

5.8.3 Auxiliary Module's LED Indicator

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

LED Indicator	Description
OFF	The auxiliary module is **OFF**.
ON (green)	The auxiliary module is running.
Flashing (green)_ on for 0.3 second and off for 3 seconds	The auxiliary module is abnormal.

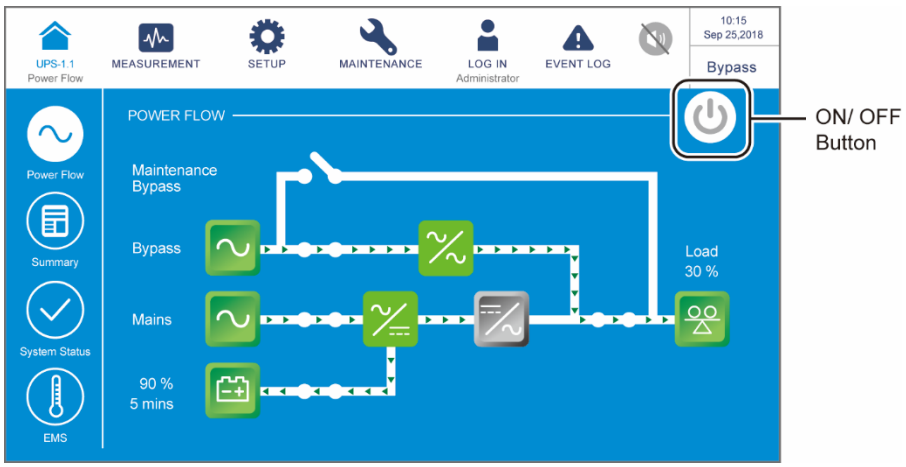
NOTE:

If you turn the auxiliary module's switch to the lower position ( ), the bypass magnetic contactor will be tripped off and the auxiliary module's LED indicator will be off. At the same time, the STS module will shut down its output.

6.1 Pre Start-up & Pre Turn-off Warnings

NOTE:

1. All LCD diagrams in the user manual are for reference only. The display is subject to the actual status of the UPS.
2. For information about the LCD touch panel and tri-color LED indicator, please refer to ***2.7 Tri-color LED Indicator & Buzzer*** and ***7. LCD Display & Settings***.
3. If the **ON/ OFF Button** ( ) does not appear on the screen, please log in as **Administrator** first, and then go to SETUP → **General Setting** → **User** → **On/ Off Button Access** to change the setting.



4. The external battery cabinet's breaker (Q5) shown on the LCD is always **ON** by default. To enable the detection of the Q5 status via the LCD, please contact Delta customer service for additional configurations.

- **Pre Start-up Warnings**

1. Before UPS operation, ensure that installation and wiring have been completely done according to ***5. Installation and Wiring***, and relevant precautions and instructions have been followed. Make sure that the AC power's voltage, frequency, phase sequence and battery type meet the UPS's requirements.
2. Make sure that all the switches and breakers, including every external battery cabinet's breaker (Q5), are in the **OFF** position.
3. Do not turn off the external maintenance bypass cabinet's Output Breaker or Switch (Q4) while the UPS is operating in any mode except for the Manual Bypass mode. Otherwise, it may cause abnormalities or damage to the unit.

- **Pre Turn-off Warnings**

    1. Before you perform the turn-off procedures, please make sure the critical loads connected to the UPS have already been safely shut down.
    2. Please follow the turn-off procedures for each of the operation modes to shut down the UPS and make sure the external maintenance bypass cabinet's Output Breaker or Switch (Q4) is the last one to be turned off. Otherwise, it may cause abnormalities or damage to the unit.

6.2 Start-up Procedures

6.2.1 On-Line Mode Start-up Procedures

WARNING:

Before turning on the UPS, please read ***6.1 Pre Start-up & Pre Turn-off Warnings*** thoroughly and ensure that the precautions and instructions have been followed.

Step 1

Ensure that the external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3) is in the **OFF** position.

Step 2

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

Step 3

Switch **ON** the external maintenance bypass cabinet's Output Breaker or Switch (Q4).

Step 4

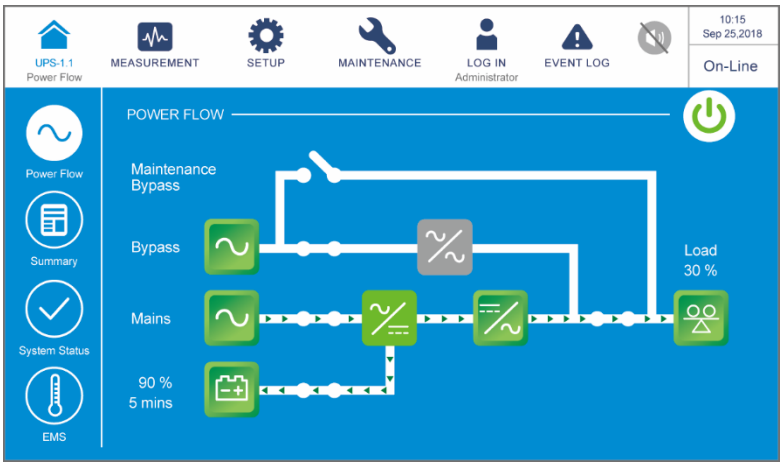
Switch **ON** the external maintenance bypass cabinet's Bypass Breaker or Switch (Q2), wait for the LCD initial screen, and switch **ON** the external maintenance bypass cabinet's Input Breaker or Switch (Q1).

Step 5

Tap the **ON/ OFF Button** () on the LCD screen.

Step 6

After the inverter turns on, the UPS will run in On-Line mode, the LCD screen will show as below, and the tri-color LED indicator will illuminate green.



6.2.2 Battery Mode Start-up Procedures

WARNING:

Before turning on the UPS, please read ***6.1 Pre Start-up & Pre Turn-off Warnings*** thoroughly and ensure that the precautions and instructions have been followed.

Step 1

Ensure that the external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3) is in the **OFF** position.

Step 2

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

Step 3

Switch **ON** the external maintenance bypass cabinet's Output Breaker or Switch (Q4).

Step 4

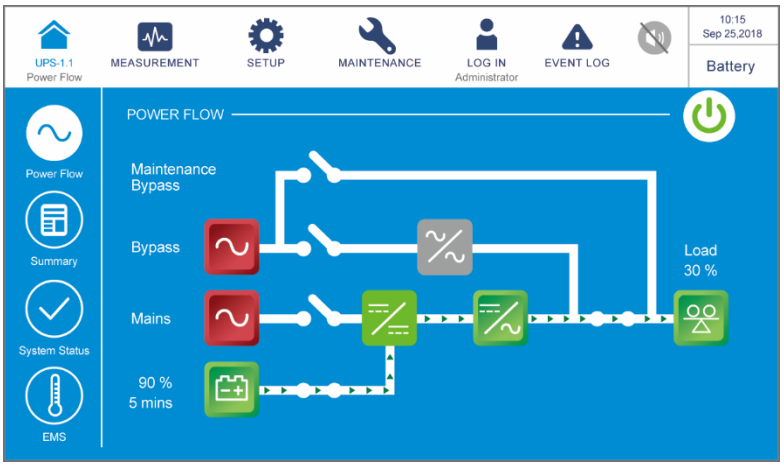
Press any of the **BATT. START** buttons on the **Communication Interfaces I** for one second.

Step 5

Tap the **ON/ OFF Button** ( ) on the LCD screen.

Step 6

After the inverter turns on, the UPS will run in Battery mode, the LCD screen will show as below, and the tri-color LED indicator will illuminate yellow.



6.2.3 Bypass Mode Start-up Procedures

WARNING:

Before turning on the UPS, please read ***6.1 Pre Start-up & Pre Turn-off Warnings*** thoroughly and ensure that the precautions and instructions have been followed.

Step 1

Ensure that the external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3) is in the **OFF** position.

Step 2

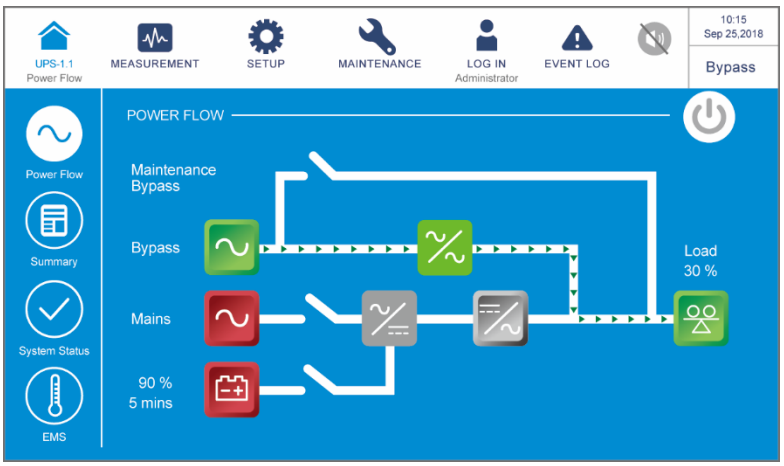
Switch **ON** the external maintenance bypass cabinet's Output Breaker or Switch (Q4).

Step 3

Switch **ON** the external maintenance bypass cabinet's Bypass Breaker or Switch (Q2).

Step 4

Now, the UPS runs in Bypass mode, the LCD screen shows as below, and the tri-color LED indicator illuminates yellow.



6.2.4 Manual Bypass Mode Start-up Procedures

WARNING:

1. Before turning on/ off the UPS, please read ***6.1 Pre Start-up & Pre Turn-off Warnings*** thoroughly and ensure that the precautions and instructions have been followed.
2. In Manual Bypass Mode, make sure that all of the switches/ breakers (except for the external maintenance bypass cabinet's Manual Bypass Breaker/ Switch (Q3)) are in the **OFF** position before working on the UPS's internal circuits to prevent electric shock. DO NOT touch any external maintenance bypass cabinet's terminal and bus bar which may carry high-voltage electricity.

- **From On-Line Mode to Manual Bypass Mode**

Step 1

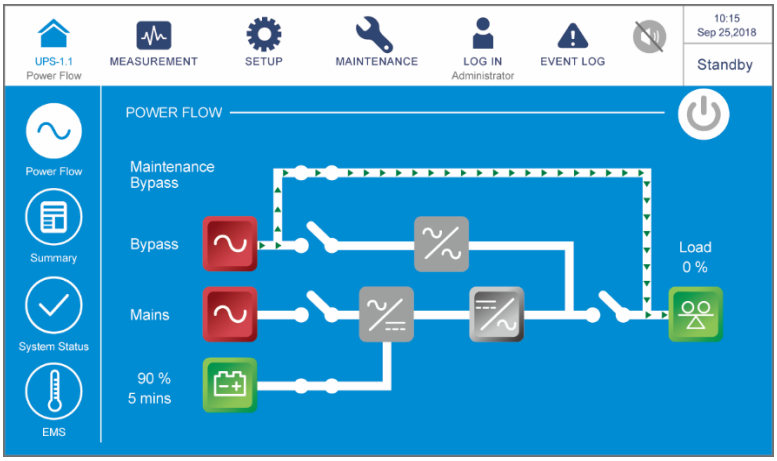
Tap the **ON/ OFF Button** ( ) on the LCD screen to shut down the inverter.

Step 2

Ensure that the UPS runs in Bypass mode. After confirmation, turn **ON** the external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3).

Step 3

Switch **OFF** the external maintenance bypass cabinet's Input Breaker or Switch (Q1) and Bypass Breaker or Switch (Q2). After that, the LCD screen shows as follows.



Step 4

Wait for the UPS to complete DC BUS discharging. After discharging, switch **OFF** every external battery cabinet's breaker (Q5), and the LCD and tri-color LED indicator will be off.

Step 5

Switch **OFF** the external maintenance bypass cabinet's Output Breaker or Switch (Q4).

- **From Manual Bypass Mode to On-Line Mode**

Step 1

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

Step 2

Switch **ON** the external maintenance bypass cabinet's Output Breaker or Switch (Q4).

Step 3

Switch **ON** the external maintenance bypass cabinet's Bypass Breaker or Switch (Q2), wait for the LCD initial screen, and switch **ON** the external maintenance bypass cabinet's Input Breaker or Switch (Q1). After that, ensure that the bypass SCR is active.

Step 4

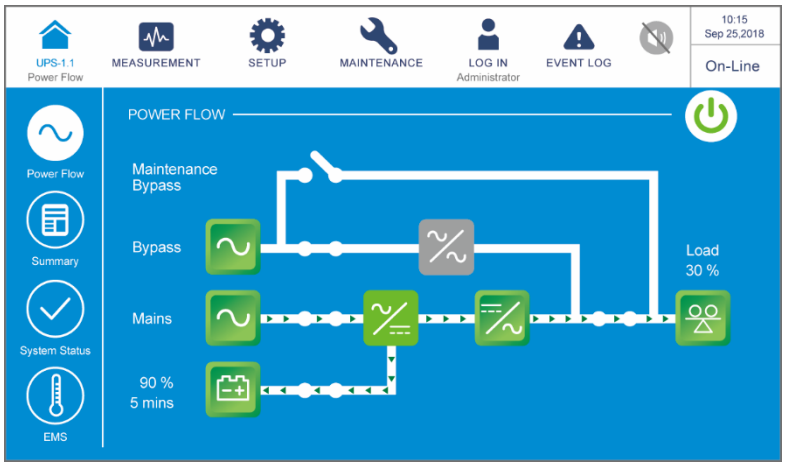
Switch **OFF** the external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3).

Step 5

Tap the **ON/ OFF Button** ( ) on the LCD screen.

Step 6

After the inverter turns on, the UPS will run in On-Line mode, the LCD screen will show as below, and the tri-color LED indicator will illuminate green.



6.2.5 ECO Mode Start-up Procedures

WARNING:

Before turning on the UPS, please read ***6.1 Pre Start-up & Pre Turn-off Warnings*** thoroughly and ensure that the precautions and instructions have been followed.

Step 1

Ensure that the external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3) is in the **OFF** position.

Step 2

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

Step 3

Switch **ON** the external maintenance bypass cabinet's Output Breaker or Switch (Q4).

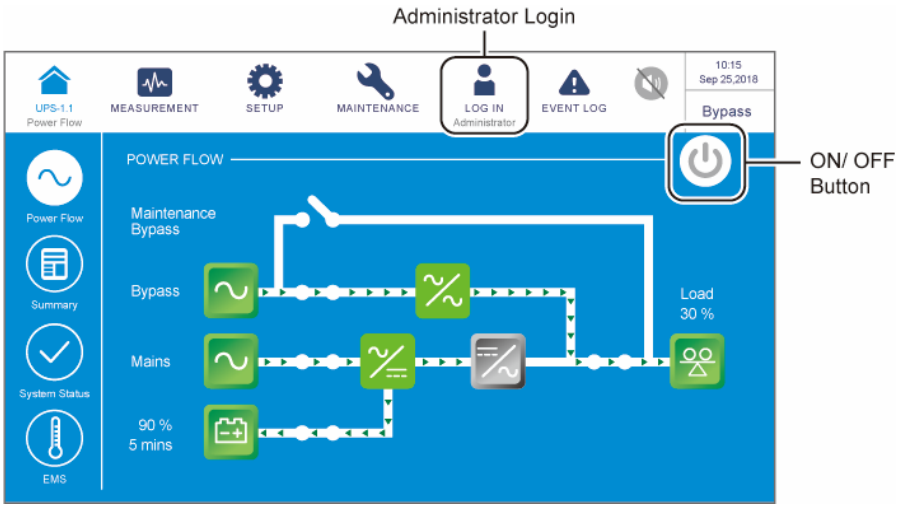
Step 4

Switch **ON** the external maintenance bypass cabinet's Bypass Breaker or Switch (Q2), wait for the LCD initial screen, and switch **ON** the external maintenance bypass cabinet's Input Breaker or Switch (Q1).

If the bypass input is within the normal range, the UPS will run in Bypass mode.

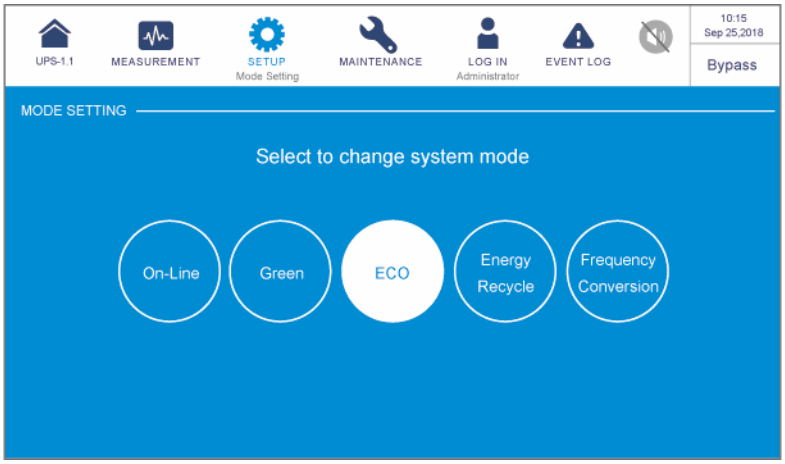
Step 5

Log in as **Administrator**. For the **Administrator** password, please contact service personnel.



Step 6

Go to **SETUP** → **Mode Setting** → Select **ECO**.

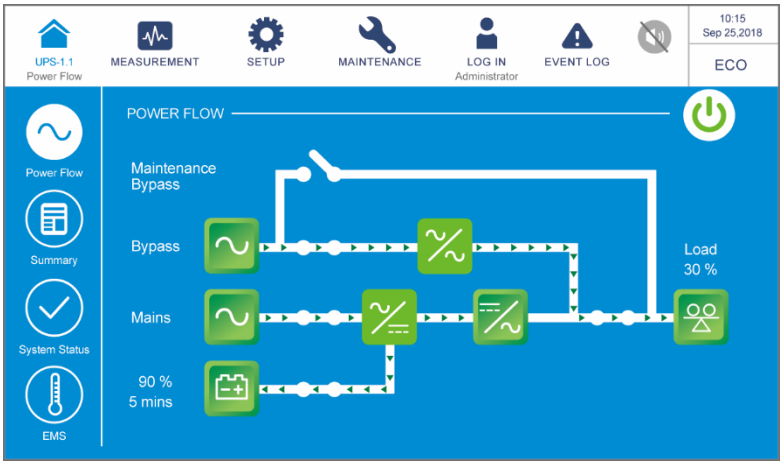


Step 7

Tap the icon (UPS-1.1) to go back to the **Main Screen** and tap the **ON/ OFF Button** ( ).

Step 8

After the inverter turns on and the system confirms that the bypass voltage is normal, the UPS will automatically transfer to ECO mode to let the bypass supply power, the LCD screen will show as below, and the tri-color LED indicator will illuminate green.



6.2.6 Frequency Conversion Mode Start-up Procedures

WARNING:

1. Before turning on the UPS, please read ***6.1 Pre Start-up & Pre Turn-off Warnings*** thoroughly and ensure that the precautions and instructions have been followed.
2. Frequency Conversion mode is only applicable to single UPS but not to parallel UPSs.
3. When the UPS runs in Frequency Conversion mode, once the inverter becomes off, there is no bypass power supplying to the loads.

Step 1

Ensure that the external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3) is in the **OFF** position.

Step 2

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

Step 3

Keep the connected loads **OFF** to avoid wrong frequency damaging the loads. After that, switch **ON** the external maintenance bypass cabinet's Output Breaker or Switch (Q4).

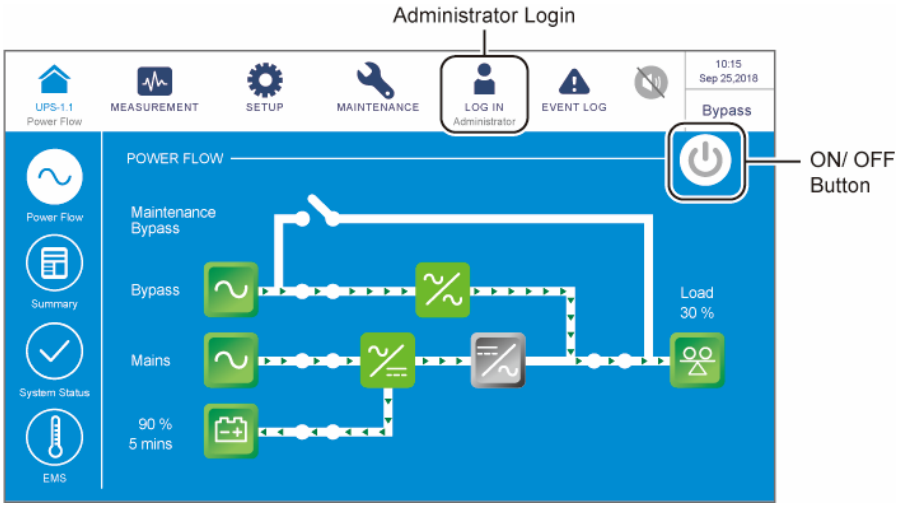
Step 4

Switch **ON** the external maintenance bypass cabinet's Bypass Breaker or Switch (Q2), wait for the LCD initial screen, and switch **ON** the external maintenance bypass cabinet's Input Breaker or Switch (Q1).

If the bypass input is within the normal range, the UPS will run in Bypass mode.

Step 5

Log in as **Administrator**. For the **Administrator** password, please contact service personnel.

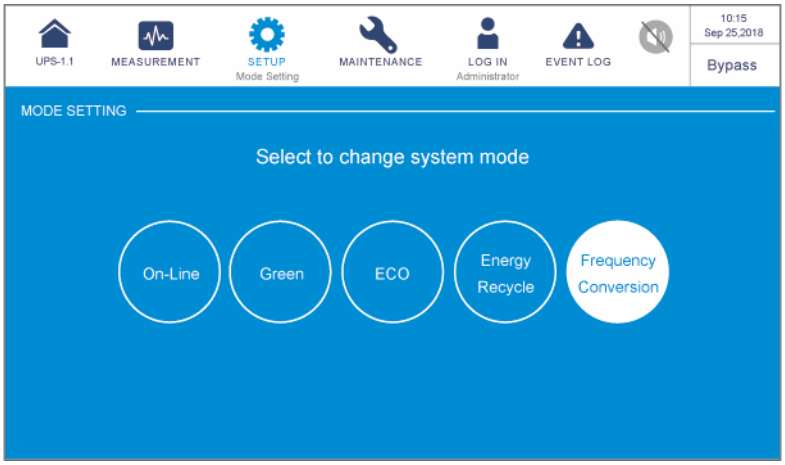


Step 6

Go to **SETUP** → **Mode Setting** → Select **Frequency Conversion**.

WARNING:

Once you select '**Frequency Conversion**' mode, the UPS will run in Standby mode and the output will be terminated.

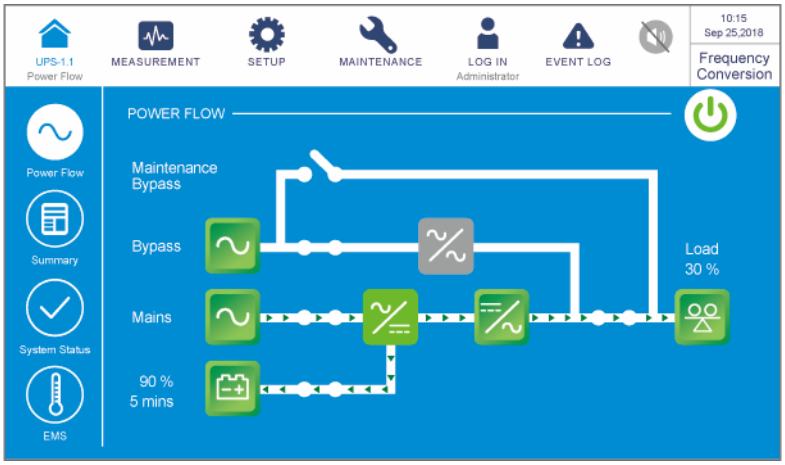


Step 7

Tap the icon (UPS-1.1) to go back to the **Main Screen** and tap the **ON/ OFF Button** ( ).

Step 8

After the inverter turns on, the UPS will run in Frequency Conversion mode, the output frequency will be the same as the setup value, the LCD screen will show as below, and the tri-color LED indicator will illuminate green.



6.2.7 Green Mode Start-up Procedures

WARNING:

Before turning on the UPS, please read ***6.1 Pre Start-up & Pre Turn-off Warnings*** thoroughly and ensure that the precautions and instructions have been followed.

Step 1

Ensure that the external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3) is in the **OFF** position.

Step 2

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

Step 3

Switch **ON** the external maintenance bypass cabinet's Output Breaker or Switch (Q4).

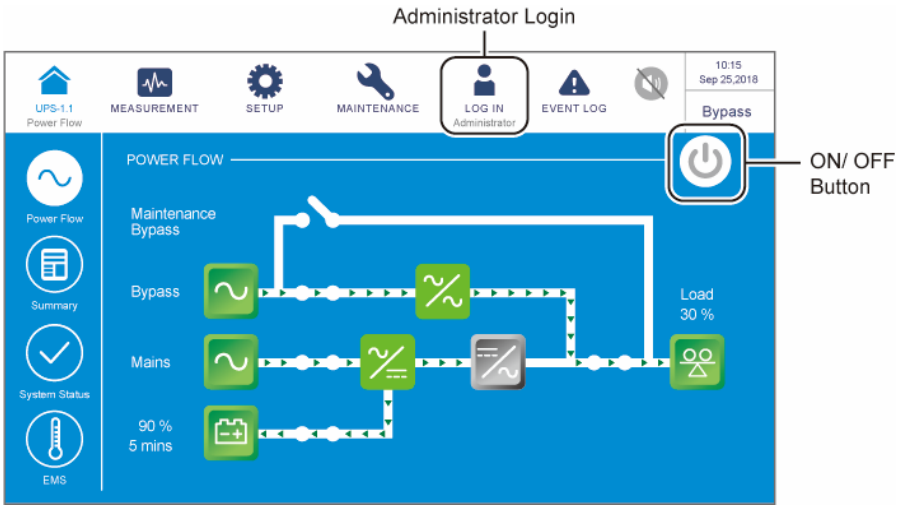
Step 4

Switch **ON** the external maintenance bypass cabinet's Bypass Breaker or Switch (Q2), wait for the LCD initial screen, and switch **ON** the external maintenance bypass cabinet's Input Breaker or Switch (Q1).

If the bypass input is within the normal range, the UPS will run in Bypass mode.

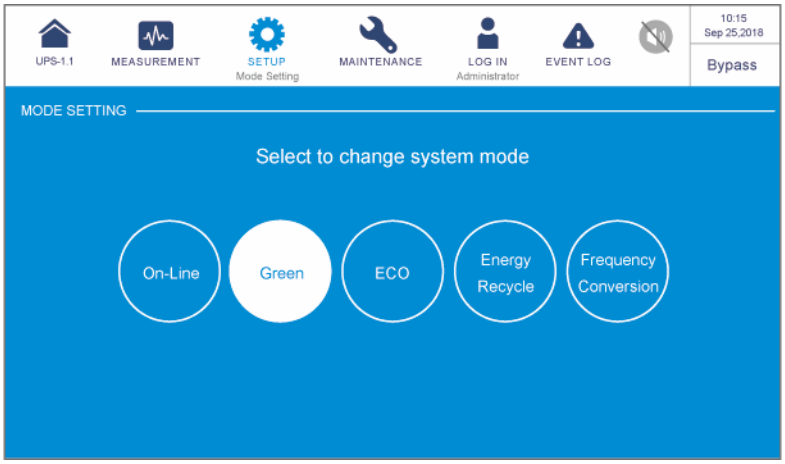
Step 5

Log in as **Administrator**. For the **Administrator** password, please contact service personnel.



Step 6

Go to **SETUP** → **Mode Setting** → Select **Green**.

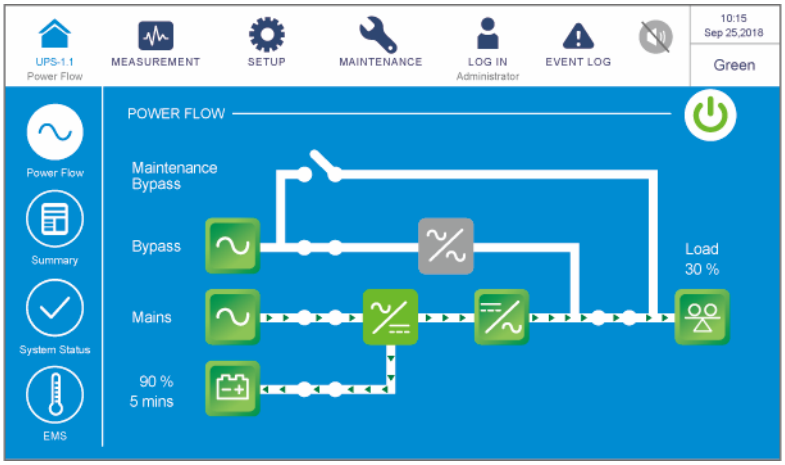


Step 7

Tap the icon (UPS-1.1) to go back to the **Main Screen** and tap the **ON/ OFF Button** ( ).

Step 8

Now, the UPS automatically transfers to run in Green mode and the system automatically detects the output status (i.e. total load capacity %) to decide which specific power module(s) should be fully powered on or idle in order to achieve higher efficiency of the UPS. The LCD screen shows as below, and the tri-color LED indicator illuminates green.



6.3 Turn-off Procedures

6.3.1 On-Line Mode Turn-off Procedures

WARNING:

Before turning off the UPS, please read ***6.1 Pre Start-up & Pre Turn-off Warnings*** thoroughly and ensure that the precautions and instructions have been followed.

Step 1

Tap the **ON/ OFF Button** ( ) to shut down the UPS's inverter. After that, the UPS will let the bypass AC source supply power. At the moment, if the bypass is abnormal, there is a risk of output interruption.

Step 2

Switch **OFF** the external maintenance bypass cabinet's Input Breaker or Switch (Q1) and Bypass Breaker or Switch (Q2). After that, the UPS will transfer to Standby mode.

Step 3

Wait for the UPS to complete the DC BUS discharging. After that, switch **OFF** each external battery cabinet's breaker (Q5), and the LCD screen and tri-color LED indicator will be off.

Step 4

Switch **OFF** the external maintenance bypass cabinet's Output Breaker or Switch (Q4).

6.3.2 Battery Mode Turn-off Procedures

WARNING:

Before turning off the UPS, please read ***6.1 Pre Start-up & Pre Turn-off Warnings*** thoroughly and ensure that the precautions and instructions have been followed.

Step 1

Please make sure that the critical loads connected to the UPS have already been safely shut down. After confirmation, tap the **ON/ OFF Button** ( ) to shut down the UPS's inverter. Note that once you turn off the inverter, all the output power will be completely cut off, and the UPS will transfer to Standby mode.

Step 2

Switch **OFF** the external maintenance bypass cabinet's Input Breaker or Switch (Q1) and Bypass Breaker or Switch (Q2).

Step 3

Wait for the UPS to complete the DC BUS discharging. After that, switch **OFF** each external battery cabinet's breaker (Q5), and the LCD and tri-color LED indicator will be off.

Step 4

Switch **OFF** the external maintenance bypass cabinet's Output Breaker or Switch (Q4).

6.3.3 Bypass Mode Turn-off Procedures

WARNING:

Before turning off the UPS, please read ***6.1 Pre Start-up & Pre Turn-off Warnings*** thoroughly and ensure that the precautions and instructions have been followed.

Step 1

Switch **OFF** the external maintenance bypass cabinet's Input Breaker or Switch (Q1) and Bypass Breaker or Switch (Q2). After that, the UPS will transfer to Standby mode.

Step 2

Wait for the UPS to complete the DC BUS discharging. After that, switch **OFF** each external battery cabinet's breaker (Q5), and the LCD and tri-color LED indicator will be off.

Step 3

Switch **OFF** the external maintenance bypass cabinet's Output Breaker or Switch (Q4).

6.3.4 Manual Bypass Mode Turn-off Procedures

WARNING:

1. Ensure that the LCD, all LED indicators and fans are **OFF**.
2. Check that all the switches, breakers and power are **OFF**.

In Manual Bypass mode, the LCD and tri-color LED indicator are both **OFF**. To completely shut down the UPS, switch **OFF** the external maintenance bypass cabinet's Manual Bypass Breaker or Switch (Q3).

6.3.5 ECO Mode Turn-off Procedures

WARNING:

Before turning off the UPS, please read ***6.1 Pre Start-up & Pre Turn-off Warnings*** thoroughly and ensure that the precautions and instructions have been followed.

Step 1

Tap the **ON/ OFF Button** ( ) to shut down the UPS's inverter. After that, the UPS will let the bypass AC source supply power. At the moment, if the bypass is abnormal, there is a risk of output interruption.

Step 2

Switch **OFF** the external maintenance bypass cabinet's Input Breaker or Switch (Q1) and Bypass Breaker or Switch (Q2). After that, the UPS will transfer to Standby mode.

Step 3

Wait for the UPS to complete the DC BUS discharging. After that, switch **OFF** each external battery cabinet's breaker (Q5), and the LCD and tri-color LED indicator will be off.

Step 4

Switch **OFF** the external maintenance bypass cabinet's Output Breaker or Switch (Q4).

6.3.6 Frequency Conversion Mode Turn-off Procedures

WARNING:

Before turning off the UPS, please read ***6.1 Pre Start-up & Pre Turn-off Warnings*** thoroughly and ensure that the precautions and instructions have been followed.

Step 1

Please make sure that the critical loads connected to the UPS have already been safely shut down. After confirmation, tap the **ON/ OFF Button** ( ) to shut down the UPS's inverter. Note that once you turn off the inverter, all the output power will be completely cut off, and the UPS will transfer to Standby mode. Now, the power modules keep charging the batteries.

Step 2

Switch **OFF** the external maintenance bypass cabinet's Input Breaker or Switch (Q1) and Bypass Breaker or Switch (Q2). After that, the UPS will transfer to Standby mode.

Step 3

Wait for the UPS to complete the DC BUS discharging. After that, switch **OFF** each external battery cabinet's breaker (Q5), and the LCD and tri-color LED indicator will be off.

Step 4

Switch **OFF** the external maintenance bypass cabinet's Output Breaker or Switch (Q4).

6.3.7 Green Mode Turn-off Procedures

WARNING:

Before turning off the UPS, please read ***6.1 Pre Start-up & Pre Turn-off Warnings*** thoroughly and ensure that the precautions and instructions have been followed.

Step 1

Tap the **ON/ OFF Button** ( ) to shut down the UPS's inverter. After that, the UPS will let the bypass AC source supply power. At the moment, if the bypass is abnormal, three is a risk of output interruption.

Step 2

Switch **OFF** the external maintenance bypass cabinet's Input Breaker or Switch (Q1), and the UPS will transfer to Standby mode.

Step 3

Wait for the UPS to complete the DC BUS discharging. After that, switch **OFF** each external battery cabinet's breaker (Q5), and the LCD and tri-color LED indicator will be off.

Step 4

Switch **OFF** the external maintenance bypass cabinet's Output Breaker or Switch (Q4).

6.4 Start-up & Turn off Procedures for Parallel Units

WARNING:

1. Before turning on the UPS, please read ***6.1 Pre Start-up & Pre Turn-off Warnings*** thoroughly and ensure that the precautions and instructions have been followed.
2. Ensure that every operation procedure is synchronized to all parallel UPSs. If you just want to operate a specific UPS but not all the parallel ones, please contact service personnel.

- **Start-up Procedures (Parallel Units)**

Step 1

Ensure that each parallel cable (provided) is connected well.

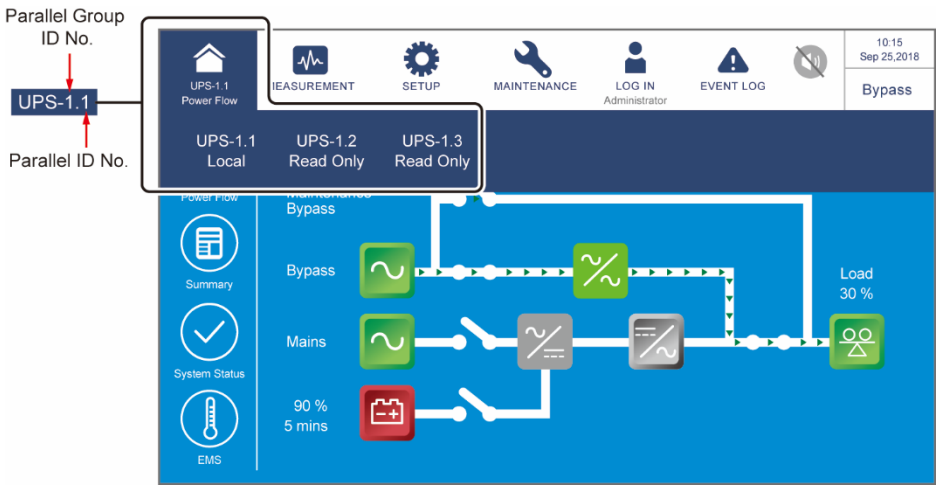
Step 2

Perform the first few steps following your chosen mode's section in ***6.2 Start-up Procedures*** until there is power supplying to the UPS (after switching **ON** Q1/ Q2 or pressing the **BATT. START** button).

At this moment, please perform the following parallel settings on the LCD.

a. Assign a different **Parallel ID** no.to each parallel UPS. For all the parallel UPSs, please set the same **Parallel Group ID** no. and the same parameters for the input, output and battery settings.

b. Tap the icon (UPS-1.1) to check if the **Parallel Group ID** no. and **Parallel ID** no. are set properly. The UPS with the smallest **Parallel ID** no. is the master UPS.



Step 3

Complete the rest of the steps in ***6.2 Start-up Procedures*** according to your chosen mode.

Step 4

Ensure that the output voltage difference between each parallel UPS is below 3V. Only authorized Delta engineers or service personnel can check the output voltage difference, or it must be done under the supervision of authorized Delta engineers or service personnel.

Step 5

Now, the UPSs are ready to operate in parallel.

- **Turn-off Procedures (Parallel Units)**

WARNING:

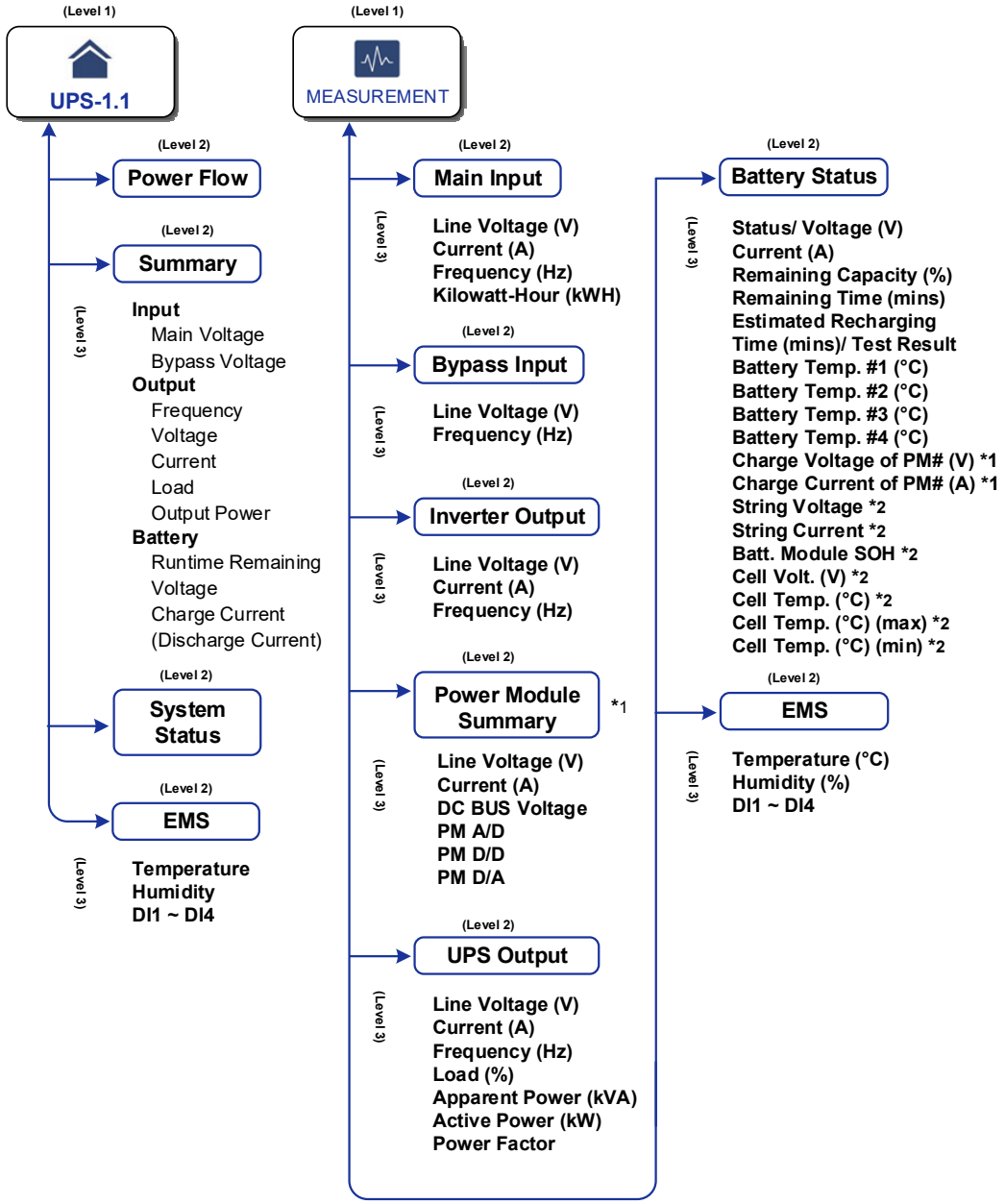
To turn off one of the parallel UPSs, please check whether the remaining parallel units' total capacity exceeds the total critical loads. Otherwise, all parallel units will shut down due to overload. Before doing this, please contact service personnel.

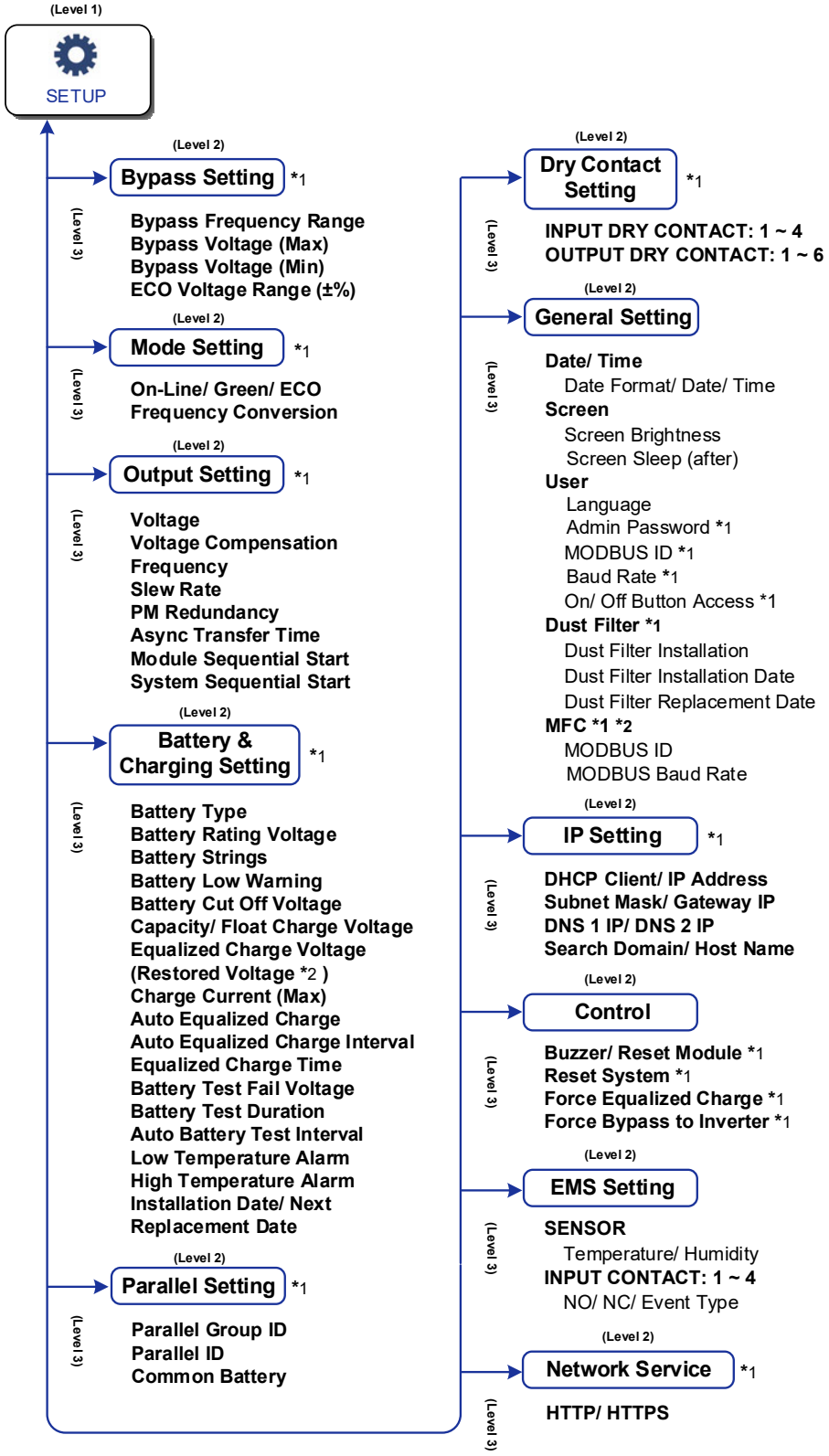
Perform the steps following your chosen mode's section in ***6.3 Turn-off Procedures***. Make sure to synchronize each step to all the parallel UPSs.

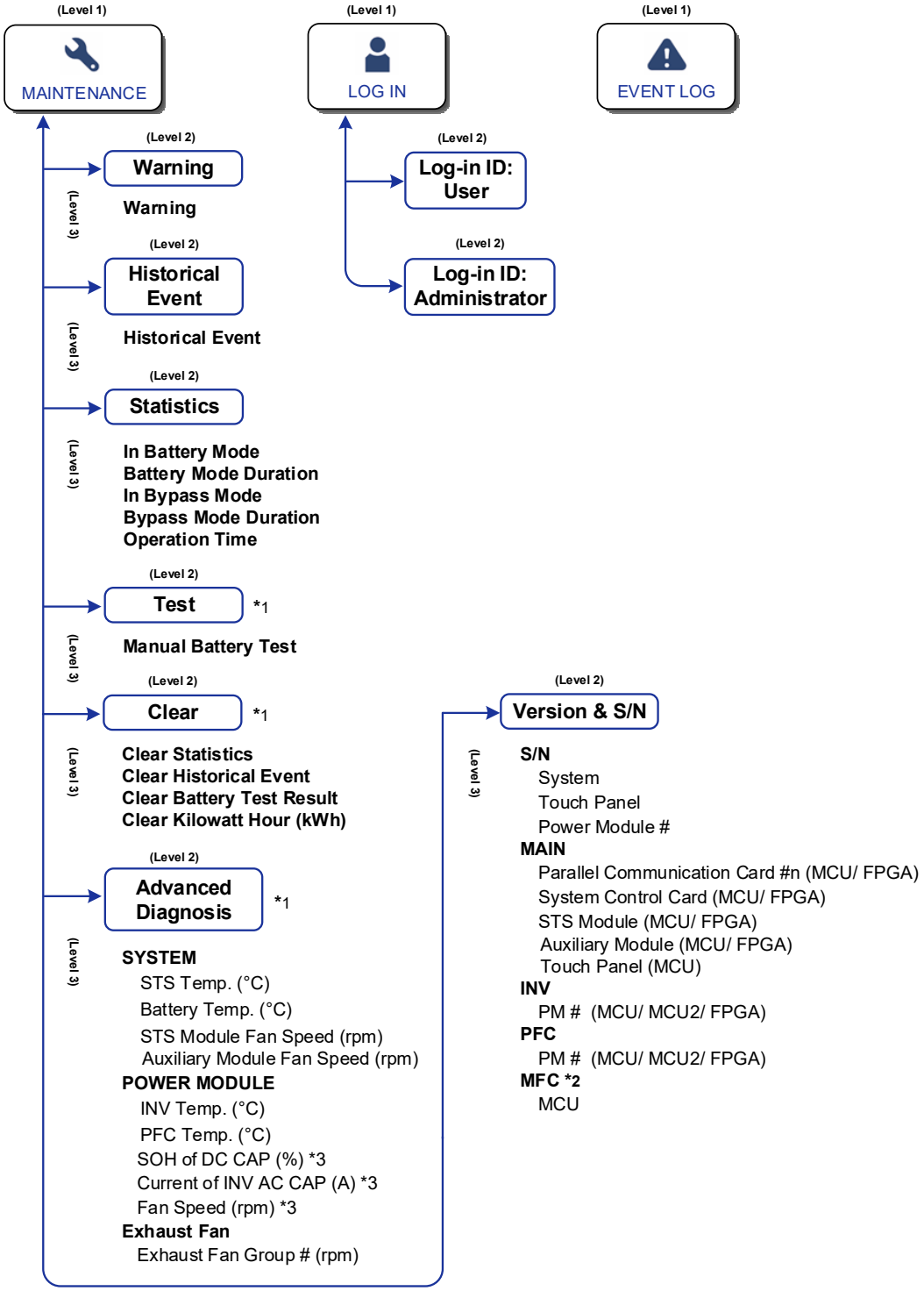
Chapter 7 : LCD Display & Settings

7.1 LCD Display Hierarchy

Please refer to ***Figure 7-1*** for an overview of all the LCD items. For some of the items marked with an asterisk, they will show up only under certain conditions. Please refer to the note below for details.




(Level 1)
SETUP
(Level 2)
Bypass Setting *1
(Level 3)
Bypass Frequency Range
Bypass Voltage (Max)
Bypass Voltage (Min)
ECO Voltage Range (±%)
(Level 2)
Mode Setting *1
(Level 3)
On-Line/ Green/ ECO
Frequency Conversion
(Level 2)
Output Setting *1
(Level 3)
Voltage
Voltage Compensation
Frequency
Slew Rate
PM Redundancy
Async Transfer Time
Module Sequential Start
System Sequential Start
(Level 2)
Battery & Charging Setting *1
(Level 3)
Battery Type
Battery Rating Voltage
Battery Strings
Battery Low Warning
Battery Cut Off Voltage
Capacity/ Float Charge Voltage
Equalized Charge Voltage
(Restored Voltage *2)
Charge Current (Max)
Auto Equalized Charge
Auto Equalized Charge Interval
Equalized Charge Time
Battery Test Fail Voltage
Battery Test Duration
Auto Battery Test Interval
Low Temperature Alarm
High Temperature Alarm
Installation Date/ Next
Replacement Date
(Level 2)
Parallel Setting *1
(Level 3)
Parallel Group ID
Parallel ID
Common Battery
(Level 2)
Dry Contact Setting *1
(Level 3)
INPUT DRY CONTACT: 1 ~ 4
OUTPUT DRY CONTACT: 1 ~ 6
(Level 2)
General Setting
(Level 3)
Date/ Time
Date Format/ Date/ Time
Screen
Screen Brightness
Screen Sleep (after)
User
Language
Admin Password *1
MODBUS ID *1
Baud Rate *1
On/ Off Button Access *1
Dust Filter *1
Dust Filter Installation
Dust Filter Installation Date
Dust Filter Replacement Date
MFC *1 *2
MODBUS ID
MODBUS Baud Rate
(Level 2)
IP Setting *1
(Level 3)
DHCP Client/ IP Address
Subnet Mask/ Gateway IP
DNS 1 IP/ DNS 2 IP
Search Domain/ Host Name
(Level 2)
Control
(Level 3)
Buzzer/ Reset Module *1
Reset System *1
Force Equalized Charge *1
Force Bypass to Inverter *1
(Level 2)
EMS Setting
(Level 3)
SENSOR
Temperature/ Humidity
INPUT CONTACT: 1 ~ 4
NO/ NC/ Event Type
(Level 2)
Network Service *1
(Level 3)
HTTP/ HTTPS



(Figure 7-1: LCD Display Hierarchy)

NOTE:

1. For **EMS/ EMS Setting**, the functions will be activated only after proper installation and settings of the optional accessories have been completed. For details, refer to ***8. Optional Accessories***.
2. *1 To display the item(s), you have to log in as **Administrator**. Please refer to ***7.4 Password Entry***.

   *2 The item(s) will show up only when you use the Delta lithium-ion batteries and have installed the optional multifunctional communication card (MFC) in the SMART slot.

   *3 The function is optional. If you need to activate it, please contact Delta customer service.
3. The LCD screen diagrams in the user manual are for reference only. The actual display depends on the operation situation.

7.2 How to Turn on the LCD

Step 1

Perform one of the options (a ~ d) below; after that, the LCD will be on.

a*1. Turn on the external maintenance bypass cabinet's Input Breaker or Switch (Q1); or

b*1. Turn on the external maintenance bypass cabinet's Bypass Breaker or Switch (Q2); or

c*1. Turn on the external maintenance bypass cabinet's Input Breaker or Switch (Q1) and Bypass Breaker or Switch (Q2); or

d. Turn on any external battery cabinet's breaker (Q5) and press any of the battery start buttons (see ***Figure 4-1***) for 1 second.

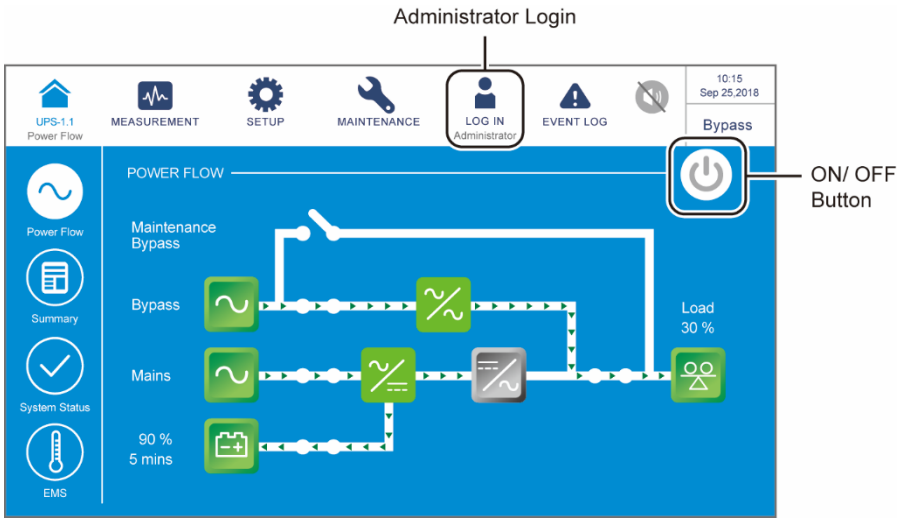
NOTE:

*1 Before turning on (Q1) or (Q2) or (Q1) and (Q2), please confirmed that the STS module has been installed properly; otherwise, the LCD won't be turned on even if you follow the procedures mentioned in a, b or c.

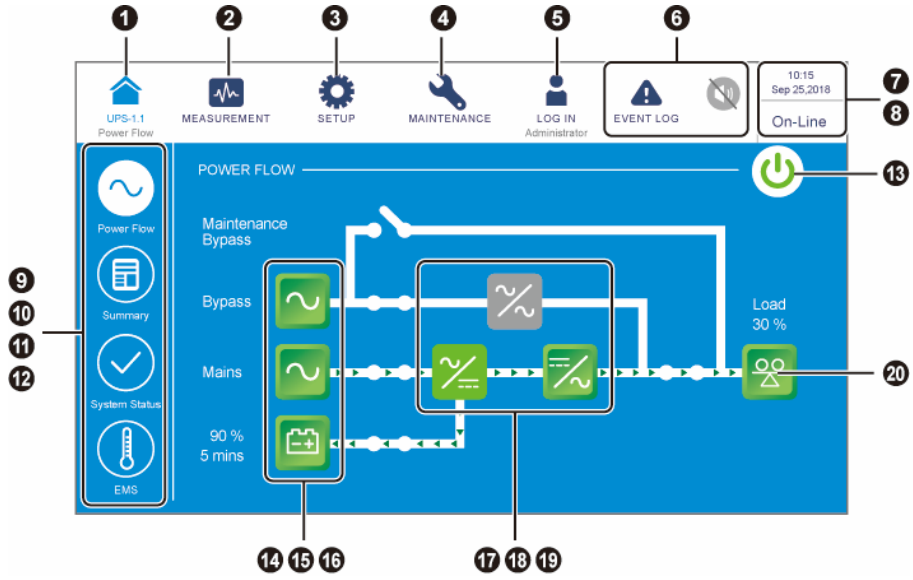
Step 2

A short while later, the **Main Screen** will appear with **User Login** status and the **ON/ OFF Button** ( ).

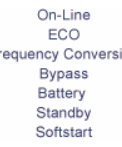
If the **ON/ OFF Button** ( ) does not appear on the screen, please log in as **Administrator** first, and then go to SETUP → **General Setting** → **User** → **On/ Off Button Access** to change the setting.



7.3 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		✓	✓		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		✓			Tap the button to open the measurement menu. For the menu items, refer to ***Figure 7-1***.
3		✓			Tap the button to open the setup menu. For the menu items, refer to ***Figure 7-1***. For details, refer to ***7.6 UPS Settings***.
4		✓			Tap the button to open the maintenance menu. For the menu items, refer to ***Figure 7-1***. For details, refer to ***7.7 System Maintenance***.
5		✓		✓	Indicates **User** login status. Tap the icon to change the login permission. Please refer to ***7.4 Password Entry***.
		✓		✓	Indicates **Administrator** login status. Tap the icon to change the login permission. Please refer to ***7.4 Password Entry***.

No.	Icon/ Text	Button Function (Yes or No)	Text/ Digital Display (Yes or No)	Symbol Display (Yes or No)	Description
6		✓		✓	1. Historical event screen shortcut button (). 2. When the icon is blue (), it means there is no warning event.
		✓	✓	✓	1. Warning screen shortcut button () & buzzer icon (). 2. When the icon is red (), it indicates that there is a warning event. At this time, the buzzer will sound and the buzzer icon will appear in red (). The numerical value at the upper right of the icon () indicates the total number of the warning events. To mute the buzzer, tap the icon (), and the icon will become gray (). If there is any new warning event happening afterwards, the buzzer will sound and the icon () will appear and light up again.
7			✓		Indicates the time and date.
8			✓		Indicates the UPS's current operation mode.
9		✓			Tap the button to check the power flow diagram and the operation status of the UPS.
10		✓			Tap the button to check the **Input**, **Output**, and **Battery** summary status of the UPS.

No.	Icon/ Text	Button Function (Yes or No)	Text/ Digital Display (Yes or No)	Symbol Display (Yes or No)	Description
11		✓			Tap the button to check the auxiliary module status, STS module status, power module status, auxiliary power card status, system control card status and parallel communication card status.
12		✓			Tap the button to check the EMS status. To enable the function, you have to connect an optional EMS 1000 (EnviroProbe) to the UPS and complete relevant settings. For details, refer to ***8. Optional Accessories***.
13		✓		✓	ON/ OFF Button. The gray icon () indicates that the inverter is OFF. The green icon () indicates that the power-on process is completed and the inverter is ON.
14		✓		✓	1. Indicates bypass input status (Green: Normal/ Red: Abnormal or OFF). 2. Bypass input screen shortcut button.
15		✓		✓	1. Indicates main input status (Green: Normal/ Red: Abnormal or OFF). 2. Main input screen shortcut button.
16		✓	✓	✓	1. Indicates battery status (Green: Normal/ Flashing Green & Gray: Battery Mode/ Flashing Red & Gray: Battery Not Connected). 2. Shows battery remaining capacity (%) and battery remaining time (minutes). 3. Battery status screen shortcut button.

No.	Icon/ Text	Button Function (Yes or No)	Text/ Digital Display (Yes or No)	Symbol Display (Yes or No)	Description
17				✓	Indicates bypass static switch status (Green: ON/ Gray: Abnormal or OFF).
18				✓	Indicates rectifier status (Green: Normal/ Gray: Waiting or OFF).
19		✓		✓	1. Indicates inverter status (Green: Normal/ Gray: Waiting or OFF). 2. Inverter output screen shortcut button.
20		✓	✓	✓	1. Indicates output status (Green: Normal/ Gray: No Output). 2. Shows load capacity (%). 3. UPS output screen shortcut button.

Other icons on the touch panel are shown in the table below.

No.	Icon	Function
1		Goes to the top page.
2		Goes to the last page.
3	 	Moves up.
4	 	Moves down.
5	 	Goes to the previous page.
6	 	Goes to the next page.

No.	Icon	Function
7		Increase.
8		Decrease.
9		1. Indicates the page no. 2. Choose to go to a specific page no.
10	 	Delete.
11		Capital.
12		Space.

NOTE:

1. After the backlight is turned off, you can tap the LCD to return to the **Main Screen**.
2. The sleep time for the backlight can be adjusted. Please go to SETUP → **General Setting** → **Screen** → **Screen Sleep (after)**.
3. If you are logged in as **Administrator**, you will be logged out when the backlight is off. Tap to wake up the LCD screen, and it 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 (which differs according to countries). To change the display language, please go to SETUP → **General Setting** → **User** → **Language**.

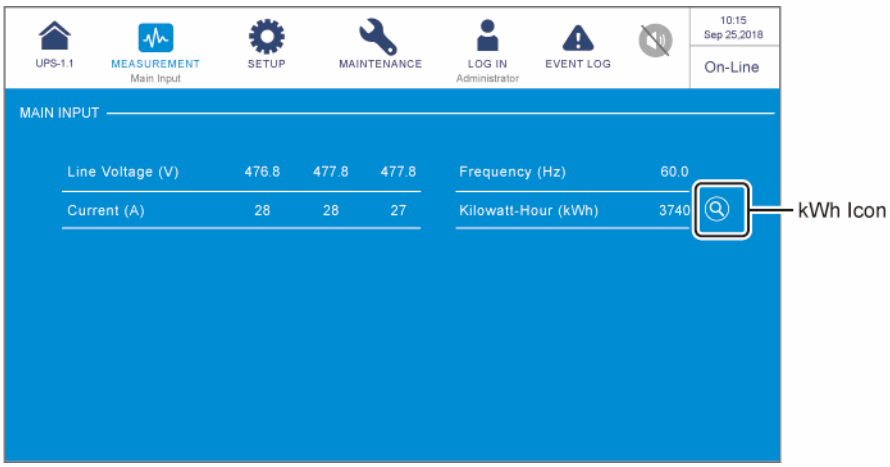
7.4 Password Entry

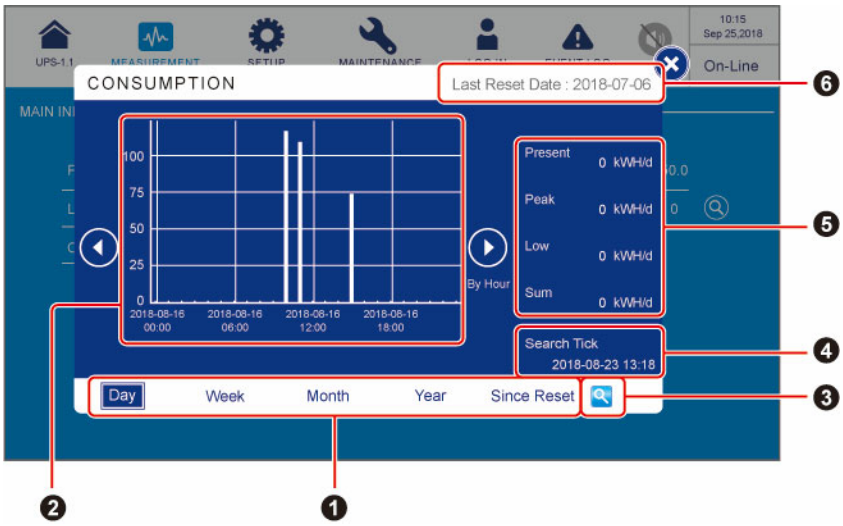
1. **Administrator** login requires a password while **User** login does not.
2. Tap LOG IN User → enter the **Administrator** password (contact service personnel for the default password) → the icon LOG IN Administrator appears, indicating the **Administrator** login is successful.
3. To change the **Administrator** password, please go to SETUP → **General Setting** → **User** → **Admin Password** (4 digits).

7.5 Check Kilowatt-Hour

Path: MEASUREMENT → **Main Input** → **kWh Icon ( )**

Tap the kWh icon ( ), and you can check the **kWh statistics** of the UPS main input in the following window.





No.	Item	Description
1	**Sheet Tabs (Day/ Week/ Month/ Year/ Since Reset)**	Tap the sheet tabs to view the kWh statistics and column charts of different time scales.
2	**Column Chart**	1. Shows the UPS's main input kWh statistics, with time on X-axis and kWh on Y-axis. 2. Tap the column on the chart, and the corresponding piece of data will appear below the chart.
3	**Search Tick Setup Icon (🔍)**	Tap (🔍), and you can set the date and time for the '**Search Tick**' to view the corresponding column chart.
4	**Search Tick**	Shows the date and time that has been set via (🔍).
5	**Present/ Peak/ Low/ Sum (kWh/d)**	Regardless of different kWh statistics sheets, these four items only indicate today's statistics: the present value/ the highest value (so far)/ the lowest value (so far)/ the sum (so far).
6	**Last Reset Date**	The last date when '**Clear Kilowatt Hour**' was executed.

7.6 UPS Settings

This chapter lists all the UPS setting items for your reference (not including the setting items for the optional accessories). Some items will show up only under certain conditions. Please refer to ***7.1 LCD Display Hierarchy*** for details.

7.6.1 Bypass Setting

Path: SETUP **→ Bypass Setting**

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.

7.6.2 Mode Setting

Path: SETUP **→ Mode Setting**

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.
Frequency Conversion Mode	Set up the UPS in Frequency Conversion mode. In Frequency Conversion 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. **NOTE:** Frequency Conversion mode is only applicable to single UPS but not to parallel UPSs.

7.6.3 Output Setting

Path: SETUP **→ Output Setting**

Item	Description
Voltage	Set up the output voltage.
Voltage Compensation	When the UPS is distant from the loads and there is a voltage drop in the output, you can adjust the INV output voltage amplitude for voltage compensation.
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 with the bypass frequency variation.
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.

7.6.4 Battery & Charging Setting

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

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)**'. Please refer to ***4.1.6 Input Dry Contacts*** and ***7.6.6 Dry Contact Setting***. For more information about configurations of the lithium-ion batteries, please contact Delta customer service. 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. 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.

7.6.5 Parallel Setting

Path: SETUP **→ Parallel Setting**

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. For more information about common battery, please refer to ***5.5 External Battery Cabinet Connection Warnings***.

7.6.6 Dry Contact Setting

Path: SETUP **→ Dry Contact Setting**

Input Dry Contact No.	Event Selection	Type
Input Dry Contact 1 **Input Dry Contact 2** **Input Dry Contact 3** **Input Dry Contact 4**	1. None 2. Generator Status 3. Battery Ground Fail 4. External Battery Breaker Detection 5. Active Standby 6. Battery Abnormal Shutdown 7. Input Transformer OTW 8. Output Transformer OTW 9. Battery Fuse Open 10. Charge Off	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**	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. General Alarm	Set up NO (normally open) or NC (normally closed) for each output dry contact.

7.6.7 General Setting

Path: SETUP **→ General Setting**

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).
	Admin Password	Set up the administrator password (4 digits).
	MODBUS ID	Set up the MODBUS ID for the MODBUS port located at the rear of the touch panel.
	Baud Rate	Set up the baud rate for the MODBUS port located at the rear of the touch panel.
	On/ Off Button Access	Set up the access for the **ON/ OFF Button** ( ) as '**Any User**' or '**Administrator Only**'.
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 item.
	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 item.

7.6.8 IP Setting

Path: SETUP **→ IP Setting**

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.

7.6.9 Control

Path: SETUP **→ Control**

Item	Description
Buzzer	Enable or disable the buzzer.
Reset Module	Reset the power modules or not. In Bypass mode, when you tap 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 tap the **ON/ OFF Button** ( ) to start up the UPS.
Reset System	Reset the system or not. In Bypass mode, when you tap 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 tap the **ON/ OFF Button** ( ) to start up the UPS.
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.

7.6.10 Network Service

Path: SETUP **→ Network Service**

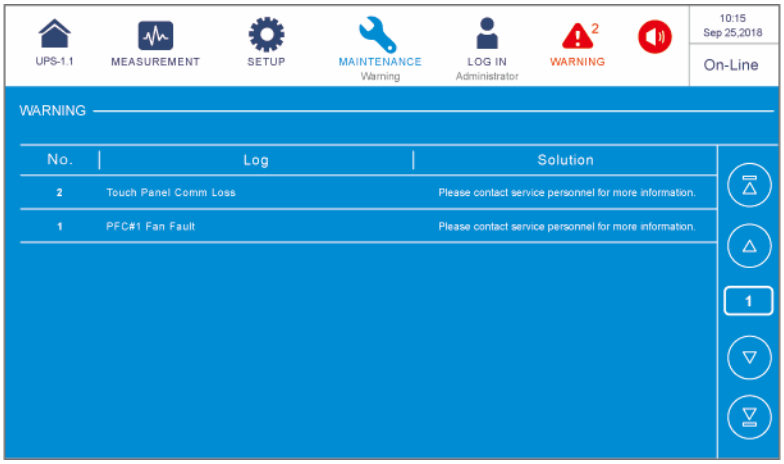
Item	Description
HTTP	Enable or disable HTTP service.
HTTPS	Enable or disable HTTPS service.

7.7 System Maintenance

7.7.1 Warning

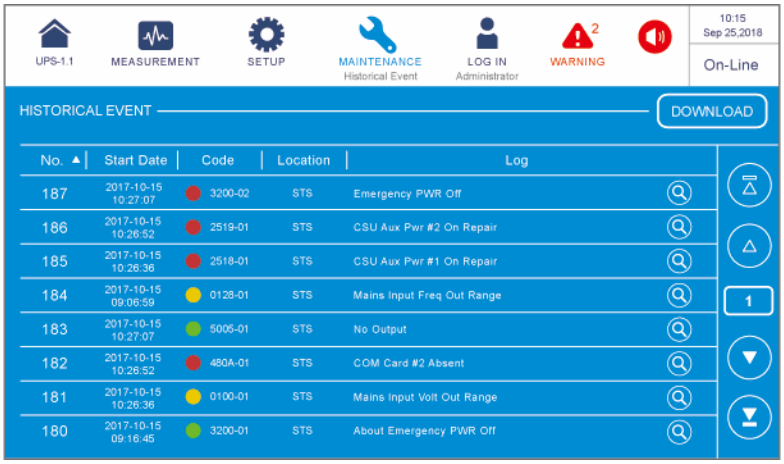
Path 1: MAINTENANCE **→ Warning**

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



7.7.2 Historical Event

Path: MAINTENANCE → **Historical Event**



7.7.3 Statistics

Path: MAINTENANCE → **Statistics**

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

To clear the statistics, please refer to ***7.7.5 Clear***.

7.7.4 Test

Path: MAINTENANCE → **Test**

You can perform a manual battery test via the LCD screen.

7.7.5 Clear

Path: MAINTENANCE → **Clear**

Item	Description
Clear Statistics	After you select '**Clear**' and confirm clearance of statistics, all records of the statistics will be cleared.
Clear Historical Event	After you select '**Clear**' and confirm clearance of historical event logs, all historical event logs will be cleared.
Clear Battery Test Result	After you select '**Clear**' and confirm clearance of battery test result, the battery test result will be cleared.
Clear Kilowatt Hour (kWh)	After you select '**Clear**' and confirm clearance of kilowatt hour records, the kilowatt hour statistics will be cleared.

NOTE:

The records mentioned above are important information for system analysis and maintenance. Do not clear any of them without the consent of qualified service personnel.

7.7.6 Advanced Diagnosis

Path: MAINTENANCE → **Advanced Diagnosis**

Item	Sub Item	Description
System	STS Temp. (°C)	Shows the STS module's SCR temperature.
	Battery Temp. (°C)	Shows the batteries' temperature.
	STS Module Fan Speed (rpm)	Shows the STS module's fan speed.
	Auxiliary Module Fan Speed (rpm)	Shows the auxiliary module's fan speed.
Power Module	INV Temp. (°C)	Shows a specific power module's inverter temperature.
	PFC Temp. (°C)	Shows a specific power module's PFC temperature.
	SOH of DC CAP (%)*[1]	Shows the DC CAP's state of health of a specific power module.
	Current of INV AC CAP (A) *[1]	Shows the INV AC CAP's current of a specific power module.
	Fan Speed (rpm) *[1]	Shows a specific power module's fan speed.

Item	Sub Item	Description
Exhaust Fan	Exhaust Fan Group # (rpm)	Shows a specific exhaust fan speed.

NOTE:

*1 This function is optional. If you need to activate it, please contact Delta customer service.

7.7.7 Version & S/N

NOTE:

To operate the UPSs in parallel, please make sure all the versions below are the same for each parallel unit.

Path: MAINTENANCE → **Version & S/N**

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	Parallel Communication Card #_ MCU/ FPGA	Check and update the MCU or FPGA firmware version of a specific parallel communication card.
	System Control Card_ MCU/ FPGA	Check and update the MCU or FPGA firmware version of the system control card.
	STS Module_ MCU/ FPGA	Check and update the MCU or FPGA firmware version of the STS module.
	Auxiliary Module_ MCU/ FPGA	Check and update the MCU or FPGA firmware version of the auxiliary module.
	Touch Panel _ MCU	Check and update the touch panel's MCU firmware version.
INV	PM #_ MCU1/ MCU2/ FPGA	Check and update the MCU1, MCU2 or FPGA firmware version of a specific power module's inverter.
PFC	PM #_ MCU1/ MCU2/ FPGA	Check and update the MCU1, MCU2 or FPGA firmware version of a specific power module's PFC.

Chapter 8 : Optional Accessories

No.	Item	Function
1	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	EMS 1000 (EnviroProbe)	Monitors temperature, humidity and other connected monitoring devices in a room environment. Connect the EMS 1000 (EnviroProbe) to the UPS's EMS port located at the rear of the touch panel, and the UPS will integrate the detected information from the EMS 1000 (EnviroProbe) and display relevant data on the LCD. See ***Figure 4-15*** for the location of the EMS port. For details, please refer to ***8.1 EMS Function on the LCD Screen***.
4	Battery Cabinet Temperature Sensor Cable	Detects the temperature of an external battery cabinet connected to the UPS.
5	Parallel Cable (10-meter long)	Connects the parallel UPSs.
6	Parallel Cable (20-meter long)	Connects the parallel UPSs.
7	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 4-1*** to monitor the battery status via the UPS's LCD. For relevant information, please refer to ***8.2 MFC Function on the LCD Screen***. Please contact Delta customer service if you need more information. **NOTE:** For parallel UPSs, you must install one multifunctional communication card (MFC) in each parallel UPS if you use the Delta lithium-ion batteries.
8	System Exhaust Cabinet	Helps to exhaust the air from the top of the UPS when the UPS is installed against the wall. It should be used together with the optional power exhaust cabinet, and installed at the rear of the UPS. For relevant information, please refer to ***5.3 UPS Installation***.

No.	Item	Function
9	Power Exhaust Cabinet	Helps to exhaust the air from the top of the UPS when the UPS is installed against the wall. It should be used together with the optional system exhaust cabinet, and installed at the rear of the UPS. For relevant information, please refer to ***5.3 UPS Installation***.

NOTE:

For installation and operation details, please refer to the ***Quick Guide*** or ***User Manual*** included in the package of the optional accessory. To purchase any accessory mentioned above, please contact your local dealer or customer service.

8.1 EMS Function on the LCD Screen

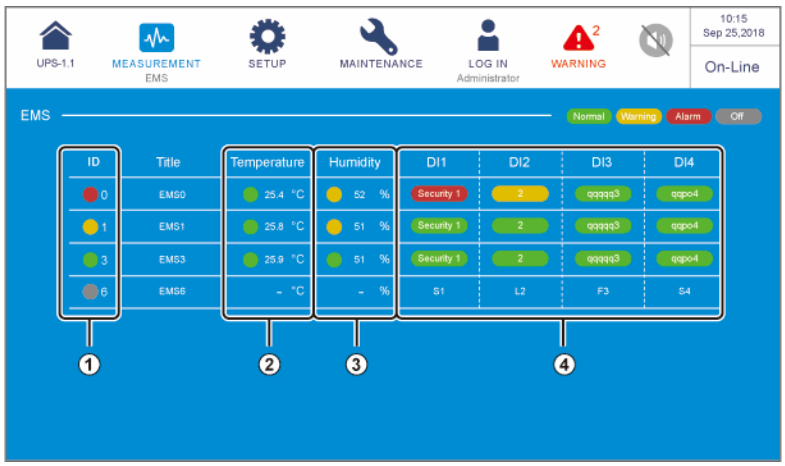
- **Path 1:** Tap the shortcut button ( ) on the **Main Screen**.

  Path 2: MEASUREMENT → **EMS**

The UPS can display the information of the optional EMS 1000 (EnviroProbe) on the **EMS** screen. To activate it, please connect the EMS 1000 (EnviroProbe) with the UPS and complete relevant settings.

NOTE:

1. The **EMS** screen is related to the settings shown in SETUP → **EMS Setting**. The settings can be adjusted according to your needs.
2. For installation of the optional EMS 1000 (EnviroProbe), please refer to the instructions below and the ***EnviroProbe 1000 Quick Guide*** included in its package.



<table>
<tr><th>No.</th><th>Item</th><th>Color (Status)</th><th>Descriptions</th></tr>
<tr><td>①</td><td>ID</td><td>Green (Normal)
Yellow (Warning)
Red (Alarm)
Gray (Off)</td><td>1. ID # represents each EMS 1000 (EnviroProbe) device which is connected and set as 'Enable'.
2. Shows the integrated status of each EMS 1000 (EnviroProbe) device. The integrated status is determined by the most severe status among Temperature (°C), Humidity (%) and DI1 ~ DI4.</td></tr>
<tr><td>②</td><td>Temperature</td><td>Green (Normal)
Yellow (Warning)
Red (Alarm)</td><td rowspan="2">Shows the statuses of Temperature/ Humidity based on the EMS settings.
● Green (Normal): lower than the set Warning value.
● Yellow (Warning): higher than the set Warning value, but lower than the set Alarm value.
● Red (Alarm): higher than the set Alarm value.
If Red (Alarm)/ Yellow (Warning) is triggered, the status will recover only when the detected value is lower than the Recovery value.</td></tr>
<tr><td>③</td><td>Humidity</td><td>Green (Normal)
Yellow (Warning)
Red (Alarm)</td></tr>
<tr><td rowspan="4">④</td><td>DI1</td><td rowspan="4">Green (None/ Information)
Yellow (Warning)
Red (Alarm)</td><td rowspan="4">1. Shows the statuses of the input contacts.
2. The Title, NO/ NC, and Event Type can be adjusted according to your needs.</td></tr>
<tr><td>DI2</td></tr>
<tr><td>DI3</td></tr>
<tr><td>DI4</td></tr>
</table>

- **Connecting the Optional EMS 1000 (EnviroProbe)**

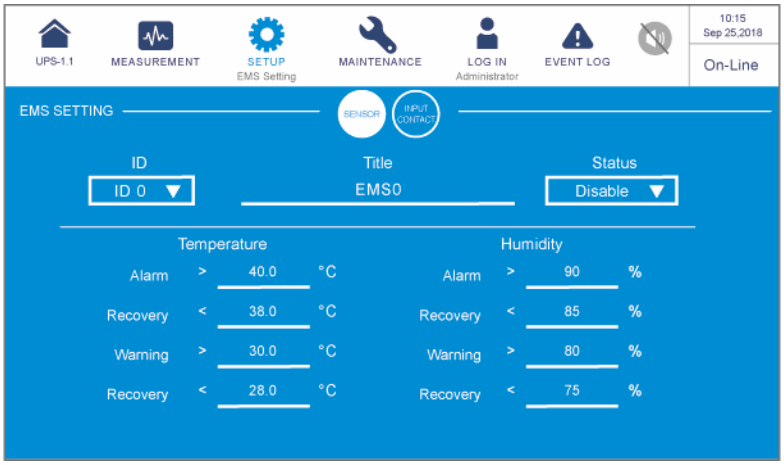
1. Each UPS can be connected with a maximum of 16 EMS 1000 (EnviroProbe) devices in string to expand the environment monitoring range. A maximum of three UPS units can be paralleled. Please use a CAT-5 cable (user-supplied & the cable length depends on the on-site application and environment) to connect the EMS 1000 (EnviroProbe) to the EMS port on the UPS. For the location of the EMS port, please see ***Figure 4-15***.
2. The UPS only supports RS485 communication. When installing the EMS 1000 (EnviroProbe), please set the device's communication mode as RS485 following ***3-1 Comm DIP Switch Settings*** of the ***EnviroProbe 1000 Quick Guide***.
3. When installing, please set the ID # by the four ID DIP switches on the left of the device following ***3-2 ID DIP Switch Settings*** of the ***EnviroProbe 1000 Quick Guide***.

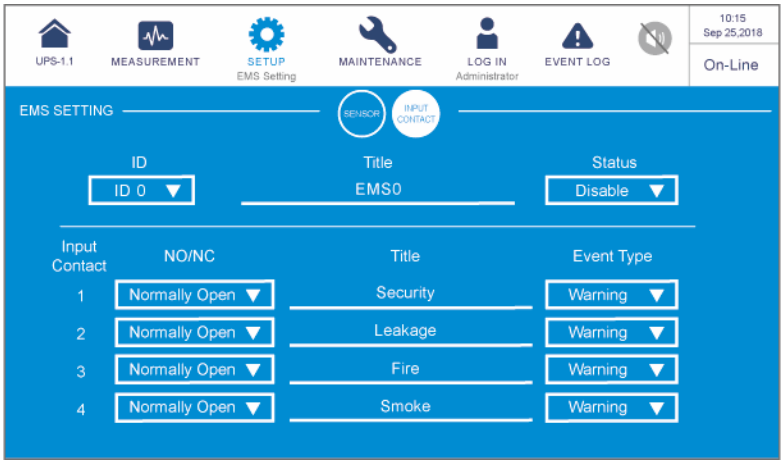
NOTE:

The ID # of each EMS 1000 (EnviroProbe) device connected to the UPS must be different so that the UPS can identify each device.

4. To enable the EMS function, you have to set up relevant items on the LCD after connecting the optional EMS 1000 (EnviroProbe) to the UPS.

- **Path:** SETUP → **EMS Setting** (**Administrator** login required)





NOTE:

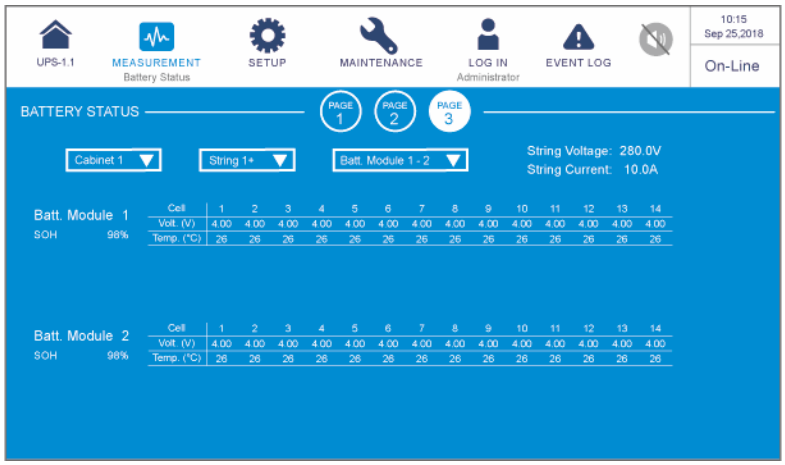
The default values are shown in the figures above.

Item	Sub Item	Description
SENSOR	ID	Set the ID # (ID 0/ ID 1/ …/ ID 15) according to the ID DIP switch setting of the EMS 1000 (EnviroProbe) device.  **NOTE:** If the ID # setting is wrong, the warning message '**The EMS 1000 ID # Communication Fail**' will appear.
	Title	Set the title for each EMS 1000 (EnviroProbe) device.
	Status	The status '**Enable/ Disable**' determines whether or not the LCD shows the information of the EMS 1000 (EnviroProbe) device (ID #) on the screen.
	Temperature	Set the temperature (°C) values for Alarm/ Warning/ Recovery.
	Humidity	Set the humidity (%) values for Alarm/ Warning/ Recovery.
INPUT CONTACT	Input Contact 1	1. Set each input contact as Normally Open (NO)/ Normally Closed (NC). 2. Set the title for each input contact. 3. Set the event type as None/ Information/ Warning/ Alarm.
	Input Contact 2	
	Input Contact 3	
	Input Contact 4	

8.2 MFC Function on the LCD Screen

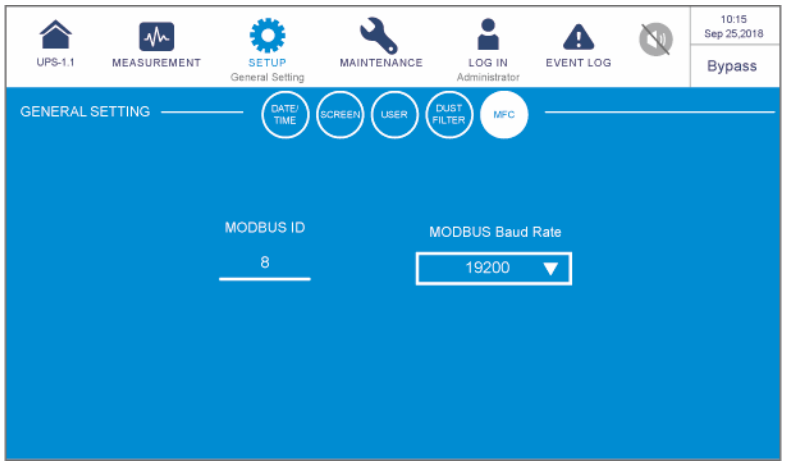
The **PAGE 3** & **MFC** screens (see the figures below) will only appear on the LCD if you use the Delta lithium-ion batteries with the optional multifunctional communication (MFC) card being installed in the SMART slot (see ***Figure 4-1***). Please contact Delta customer service if you need more information.

- **Path:** MEASUREMENT → **Battery Status**



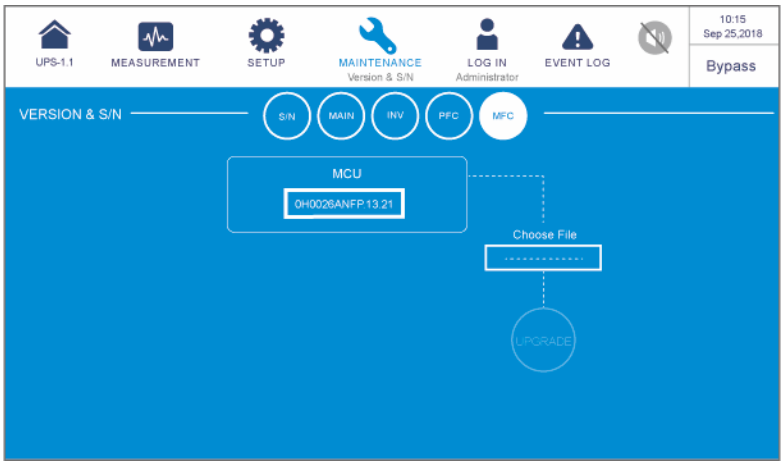
In the screen shown above, you can use the three drop-down lists in the upper left corner to choose the **Cabinet**, **String**, and **Battery Module** to view the corresponding **String Voltage**, **String Current**, battery module's **SOH** (State of Health) and the battery cell's **Voltage** and **Temperature**.

- **Path:** SETUP → **General Setting** (**Administrator** login required)



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).

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



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

Chapter 9 : Maintenance

- **UPS**

1. UPS Cleaning:

   Regularly clean the UPS, especially the slits, openings and filters, to ensure that the air freely flows into the UPS 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. Monthly check the filters and regularly replace them.

   b. Regularly check the UPS every half year and inspect:

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

      2) Whether the UPS works in bypass mode (normally, the UPS works 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 the lead-acid batteries or the lithium-ion batteries. Make sure to replace the batteries according to battery life. However, the actual battery life depends on the environment temperature, usage, and charging/ discharging frequency. High temperature environments 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 59°F ~ 77°F (15°C ~ 25°C).
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 temperatures shorten fan life. When the UPS is running, please check if all of the fans work normally and make sure if the air can move freely around and through the UPS. If not, replace the fans.

NOTE:

Please ask your local dealer or customer service for more maintenance information. Do not perform maintenance if you are not trained for it.

Appendix 1 : Technical Specifications

- **200kVA/ 200kW ~ 350kVA/ 350kW**

Model		**DPH**			
UPS Capacity		**200kVA/ 200kW**	**250kVA/ 250kW**	**300kVA/ 300kW**	**350kVA/ 350kW**
Power Module Q'ty		4	5	6	7
Input	Nominal Voltage	480 Vac (3Φ3W + G)			
	Voltage Range	408 ~ 552 Vac (full load)			
	Current Harmonic Distortion	≤ 3% *1			
	Power Factor	> 0.99			
	Frequency Range	40 ~ 70 Hz			
Output	Voltage	480 Vac (3Φ3W + G)			
	Voltage Harmonic Distortion	≤ 1% (linear load)			
	Power Factor	1			
	Frequency	50/60 Hz			
	Overload Capability	≤ 105%: continuous > 105% ~ 110%: 60 minutes, > 110% ~ 125%: 10 minutes; > 125% ~ 150%: 1 minute; > 150%: 1 second			
Display		10" Touch Panel			

Model		DPH			
UPS Capacity		200kVA/ 200kW	250kVA/ 250kW	300kVA/ 300kW	350kVA/ 350kW
Interface	Standard	External battery temperature dry contact × 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 (reserved) × 1, Ethernet × 1, SMART slot × 1, REPO × 1			
Efficiency	Online Mode	up to 97%			
	ECO Mode	99%			
Battery	Nominal Voltage	480 Vdc (default; adjustable from 360 Vdc to 552 Vdc)			
	Charge Voltage	544 Vdc (default; adjustable from 408 Vdc to 624 Vdc)			
	Protection of Battery Deep Discharge	Yes			
Environment	Operating Altitude	3280 ft (without derating) 1000 meters (without derating)			
	Operating Temperature	32 ~ 104°F (0 ~ 40°C)			
	Relative Humidity	95% (non-condensing)			
	Audible Noise	< 70 dBA *2			
Others	Parallel Redundancy	Yes (up to 3 units)			
	Maximum Input & Bypass Short Circuit Withstand	65kA			

Model		DPH			
UPS Capacity		200kVA/ 200kW	250kVA/ 250kW	300kVA/ 300kW	350kVA/ 350kW
Physical	Dimensions (W × D × H)	55.12" × 33.46" × 78.74" (1400 × 850 × 2000 mm)			
	Weight	UPS: 1162.3 lb (527.2 kg) (without power modules)			
		Power module (optional): 78.3 lb (35.5 kg)			
		1475.2 lb (669.1 kg)	1553.4 lb (704.6 kg)	1631.6 lb (740.1 kg)	1709.8 lb (775.6 kg)

- **400kVA/ 400kW ~ 500kVA/ 500kW**

Model		DPH		
UPS Capacity		400kVA/ 400kW	450kVA/ 450kW	500kVA/ 500kW
Power Module Q'ty		8	9	10
Input	Nominal Voltage	480 Vac (3Φ3W + G)		
	Voltage Range	408 ~ 552 Vac (full load)		
	Current Harmonic Distortion	≤ 3% *1		
	Power Factor	> 0.99		
	Frequency Range	40 ~ 70 Hz		
Output	Voltage	480 Vac (3Φ3W + G)		
	Voltage Harmonic Distortion	≤ 1% (linear load)		

Model		DPH		
UPS Capacity		400kVA/ 400kW	450kVA/ 450kW	500kVA/ 500kW
Output (Continued)	Power Factor	1		
	Frequency	50/60 Hz		
	Overload Capability	≤ 105%: continuous > 105% ~ 110%: 60 minutes, > 110% ~ 125%: 10 minutes; > 125% ~ 150%: 1 minute; > 150%: 1 second		
Display		10” Touch Panel		
Interface	Standard	External battery temperature dry contact × 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 (reserved) × 1, Ethernet × 1, SMART slot × 1, REPO × 1		
Efficiency	Online Mode	up to 97%		
	ECO Mode	99%		
Battery	Nominal Voltage	480 Vdc (default; adjustable from 360 Vdc to 552 Vdc)		
	Charge Voltage	544 Vdc (default; adjustable from 408 Vdc to 624 Vdc)		
	Protection of Battery Deep Discharge	Yes		
Environment	Operating Altitude	3280 ft (without derating) 1000 meters (without derating)		
	Operating Temperature	32 ~ 104°F (0 ~ 40°C)		

Model		DPH		
UPS Capacity		400kVA/ 400kW	450kVA/ 450kW	500kVA/ 500kW
Environment (Continued)	Relative Humidity	95% (non-condensing)		
	Audible Noise	< 70 dBA *2		
Others	Parallel Redundancy	Yes (up to 3 units)		
	Maximum Input & Bypass Short Circuit Withstand	65kA		
Physical	Dimensions (W × D × H)	55.12" × 33.46" × 78.74" (1400 × 850 × 2000 mm)		
	Weight	UPS: 1162.3 lb (527.2 kg) (without power modules)		
		Power module (optional): 78.3 lb (35.5 kg)		
		1788.0 lb (811.0 kg)	1866.3 lb (846.5 kg)	1944.5 lb (882.0 kg)

NOTE:

1. *1 When input vTHD is < 1%.
2. *2 At a distance of 3.28 ft (1 meter) of the UPS.
3. Please refer to the rating label for the safety certification.
4. All specifications are subject to change without prior notice.

Appendix 2 : Warranty

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

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

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

WARNING:

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

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- Global Headquarter

Taiwan

Delta Electronics Inc.
39 Section 2, Huandong Road, Shanhua District,
Tainan City 74144, Taiwan
T +886 6 505 6565
E ups.taiwan@deltaww.com

- Regional Office

The United States

Delta Electronics (Americas) Ltd.
46101 Fremont Blvd. Fremont, CA 94538
T +1 510 344 2157
E ups.na@deltaww.com

Australia

Delta Energy Systems Australia Pty Ltd.
Unit 20-21, 45 Normanby Road, Notting Hill VIC 3168, Australia
T +61 3 9543 3720
E ups.australia@deltaww.com

South America

Delta Electronics Brasil Ltda.
Estrada Velha Rio São Paulo, 5300 Bairro Eugenio de Melo
12247-001 - São José dos Campos - SP - Brasil
T +55 12 3935-2300
E ups.brazil@deltaww.com

Thailand

Delta Electronics (Thailand) Public Co.,Ltd.
909 Soi 9, Moo 4, E.P.Z., Bangpoo Industrial Estate, Tambon Prakasa,
Amphur Muang-samutprakarn, Samutprakarn Province 10280, Thailand
T +662 709-2800
E ups.thailand@deltaww.com

China

Delta GreenTech (China) Co., Ltd.
238 Minxia Road, Pudong, Shanghai, 201209 P.R.C
T +86 21 5863 5678
+86 21 5863 9595
E ups.china@deltaww.com

South Korea

Delta Electronics (Korea), Inc.
1511, Byucksan Digital Valley 6-cha, Gasan-dong, Geumcheon-gu,
Seoul, Korea, 153-704
T +82-2-515-5303
E ups.south.korea@deltaww.com

Singapore

Delta Electronics Int'l (Singapore) Pte Ltd.
4 Kaki Bukit Ave 1, #05-04, Singapore 417939
T +65 6747 5155
E ups.singapore@deltaww.com

India

Delta Power Solutions (India) Pvt. Ltd.
Plot No. 43, Sector-35, HSIIDC, Gurgaon-122001, Haryana, India
T +91 124 4874 900
E ups.india@deltaww.com

EMEA

Delta Electronics (Netherlands) BV
Zandsteen 15, 2132MZ Hoofddorp, The Netherlands
T +31 20 655 09 00
E ups.netherlands@deltaww.com

Japan

Delta Electronics (Japan), Inc.
2-1-14 Shibadaimon, Minato-Ku, Tokyo, 105-0012, Japan
T +81-3-5733-1111
E jpstps@deltaww.com

UK

Delta Electronics Europe Limited
1 Redwood Court, Peel Park, East Kilbride,G74 5PF,
Scotland, United Kingdom
T +44 1355 588 888
E sales.gb@eltek.com

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