The power behind competitiveness

Delta UPS Ultron Family

DPM Gen2 Series, Three-Phase, 380/ 400/ 415 Vac
1000/ 1250 kVA

User Manual

www.deltaww.com

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

1.2 Connection Warnings

- Before applying electrical power to the UPS, make sure that the UPS is grounded to avoid a possible risk of current leakage.
- The UPS is a completely integrated system that incorporates one UPS system cabinet and several power modules.
- For 1000kVA UPS, you can parallel a maximum of 8 UPS system cabinets, and each UPS system cabinet can connect to up to 4 power modules for redundancy and capacity expansion.
- For 1250 kVA UPS, you can parallel a maximum of 8 UPS system cabinets, and each UPS system cabinet can connect to up to 5 power modules for redundancy and capacity expansion.
- 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 information regarding the external maintenance bypass cabinet, 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. For single input, you must install an input breaker, a manual bypass breaker and an output breaker. b. For dual input, you must install an input breaker, a bypass breaker, a manual bypass breaker and an output breaker. c. Each breaker mentioned above must meet the specifications defined in *Table 5-2* and *Table 5-3*. d. Each breaker mentioned above should be configured with an auxiliary switch. The auxiliary switch must have a normally open (NO) contact and a normally closed (NC) contact connected to the UPS system cabinet's dry contacts to detect each breaker's ON/ OFF status. Please refer to *4.1.8 External Breaker Status Dry Contacts*. e. Install the external maintenance bypass cabinet next to the UPS or align it with the UPS for convenient operation.

- 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 5-22* and *Figure 5-25*.
  4. The recommended electrical rating of the input, output and backfeed protection devices are as follows. Application of the protective devices shall be in accordance with local installation codes.

1000kVA/ 1000kW	1250kVA/ 1250kW
690V/ 2000A	690V/ 2500A

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 20 kA. 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. If the UPS is supplied by a power source whose neutral is grounded, each protective device must be a 3-pole type. If the UPS is supplied by a power source whose neutral is not grounded, each protective device must be a 4-pole type.

1.3 Usage Warnings

- Only qualified service personnel can upgrade the UPS's firmware.
- Before installation, wiring and working on the UPS's internal circuits, please completely cut off all power supplying to the UPS, including the input power and battery power.
- The UPS is specifically designed for information technology equipment and used to power computers, servers, and associated peripheral devices. If you want to connect any capacitive loads or non-linear loads (that have serious surge current) to the UPS, it needs to be de-rated according to on-site applications. For such special applications, please contact Delta service personnel for the accurate UPS sizing. The UPS is not suitable for connecting with any asymmetrical loads. For the load suitability, please contact Delta customer service before purchasing.
- The external slits and openings in the UPS are provided for ventilation. To ensure reliable operation of the UPS and to protect the UPS from overheating, these slits and openings must not be blocked or covered. Do not insert any object into the slits and openings that may hinder ventilation.
- Before applying electrical power to the UPS, you must allow the UPS to adjust to room temperature 20 ~ 25°C (68 ~ 77°F) for at least one hour and ensure that there is no moisture condensing inside the unit.

- Do not put beverages on the UPS, external battery cabinet(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 that you 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. Please observe the following precautions 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 before 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 spilled 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 70°C (158°F) and relative humidity is below 95%.

1.5 Standard Compliance

- EN 62040-1
- EN 62040-2 Category C3
- EN 61000-4-2
- EN 61000-4-3
- EN 61000-4-4
- EN 61000-4-5
- EN 61000-4-6

Chapter 2 : Introduction

2.1 General Overview

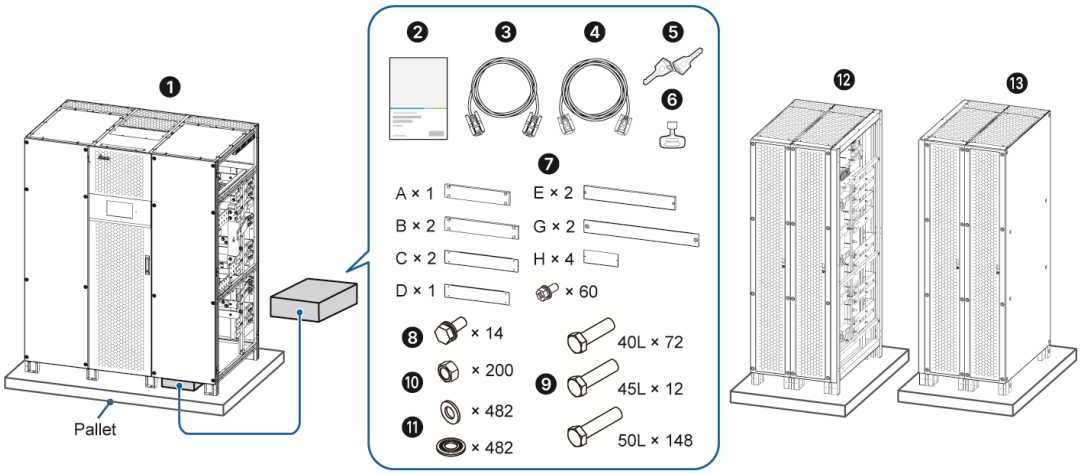
The DPM Gen2 series UPS, a three-phase on-line uninterruptible power supply (hereafter referred to as 'UPS'), is a dedicated design for large scale power systems such as data centers, communication systems, satellite systems, network rooms, medical systems, emergency systems, monitoring systems and factory facilities. 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.

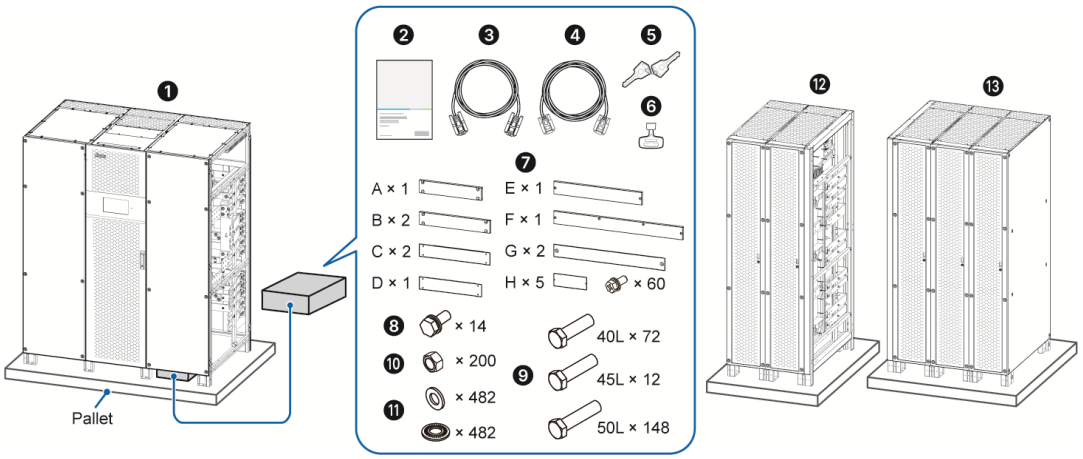
Please check if any item is missing according to the following package list. If the UPS needs to be returned, carefully repack the UPS and all of the accessories using the original packing materials that came with the unit.

1000kVA UPS



No.	Item	Q'ty
❶	UPS System Cabinet	1 PC
❷	User Manual	1 PC
❸	RS-232 Cable	1 PC
❹	Parallel Cable	1 PC
❺	Key (for the UPS system cabinet)	2 PCS
❻	Key (for the power modules)	4 PCS
❼	Rodent Shield (seven types A, B, C, D, E, G and H)	14 PCS (including 60 M5 screws)
❽	M10 Screw	14 PCS
❾	M12 Screw_ 40L	72 PCS
	M12 Screw_ 45L	12 PCS
	M12 Screw_ 50L	148 PCS
❿	M12 Nut	200 PCS
⓫	Flat Washer	482 PCS
	Belleville Washer	482 PCS
⓬	Power Module	2 PCS
⓭	Power Module	2 PCS

1250kVA UPS



No.	Item	Q'ty
❶	UPS System Cabinet	1 PC
❷	User Manual	1 PC
❸	RS-232 Cable	1 PC
❹	Parallel Cable	1 PC
❺	Key (for the UPS system cabinet)	2 PCS
❻	Key (for the power modules)	5 PCS
❼	Rodent Shield (eight types A, B, C, D, E, F, G and H)	15 PCS (including 60 M5 screws)
❽	M10 Screw	14 PCS
❾	M12 Screw_ 40L	72 PCS
	M12 Screw_ 45L	12 PCS
	M12 Screw_ 50L	148 PCS
❿	M12 Nut	200 PCS
⓫	Flat Washer	482 PCS
	Belleville Washer	482 PCS
⓬	Power Module	2 PCS
⓭	Power Module	3 PCS

2.3 Functions & Features

- True on-line double-conversion UPS adopts DSP chip and IGBT technology to protect your sensitive electronic equipment from power interruption.
- Wide AC input voltage range (165/ 286 Vac ~ 276/ 478 Vac) reduces frequent transfer from On-Line mode to Battery mode to save battery consumption and prolong battery life.
- Automatic input frequency detection enables operation at 50 Hz or 60 Hz.
- 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.

- Dual-input design features an independent rectifier and a bypass static switch.
- Automatic restart:
  1. After a low battery shutdown, the UPS's 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.
- Surge protection and EMI filter functions.
- Both auxiliary power and control circuit adopt redundancy design, which doubly enhances UPS reliability.
- Provision of setting options such as battery test (schedulable) and battery replacement alarm.
- Smart battery charger design allows auto-charging or manual charging to shorten the charging time.
- Generator compatible.
- 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.
- 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.

2.4 Exterior & Dimensions

Please follow ***5.3 UPS Installation*** to assemble the UPS system cabinet and power modules. After assembly, the UPS exterior and dimensions are as follows.

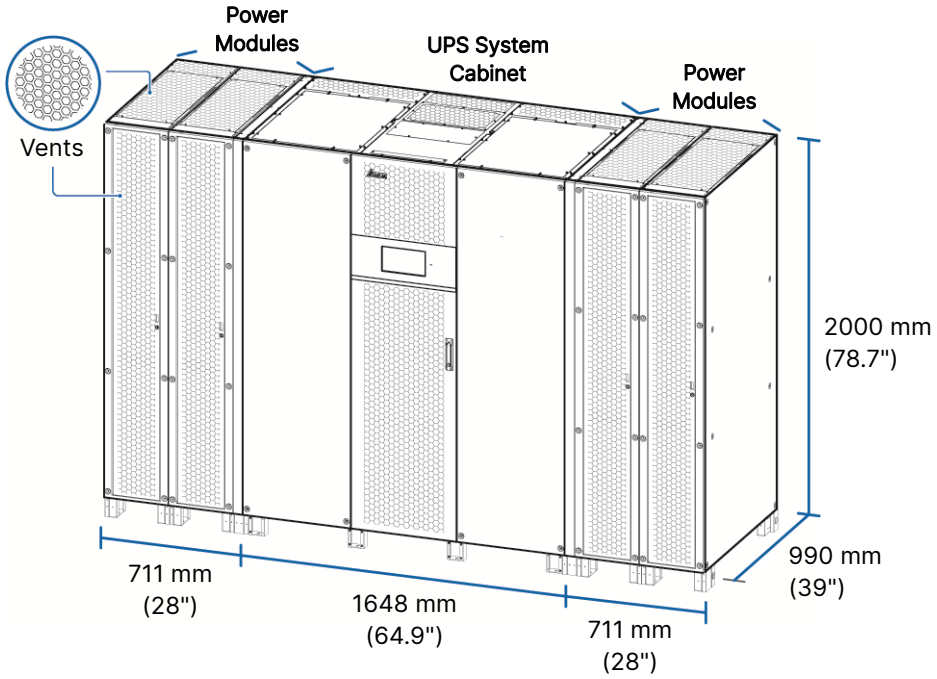


Figure 2-1: 1000kVA UPS_ Exterior & Dimensions

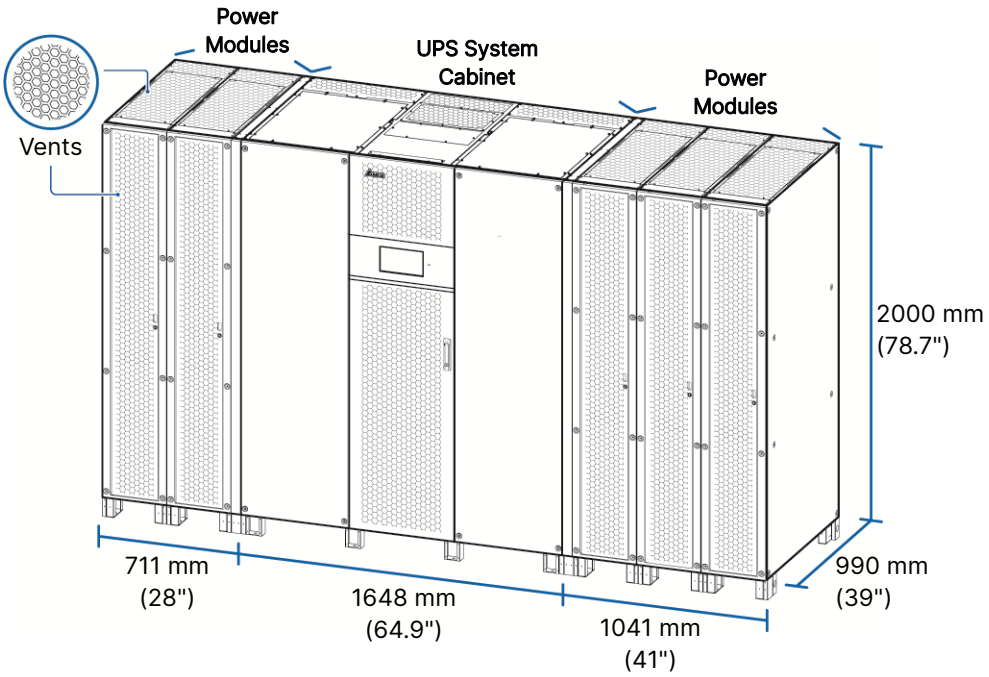


Figure 2-2: 1250kVA UPS_ Exterior & Dimensions

2.5 UPS System Cabinet

2.5.1 Front View

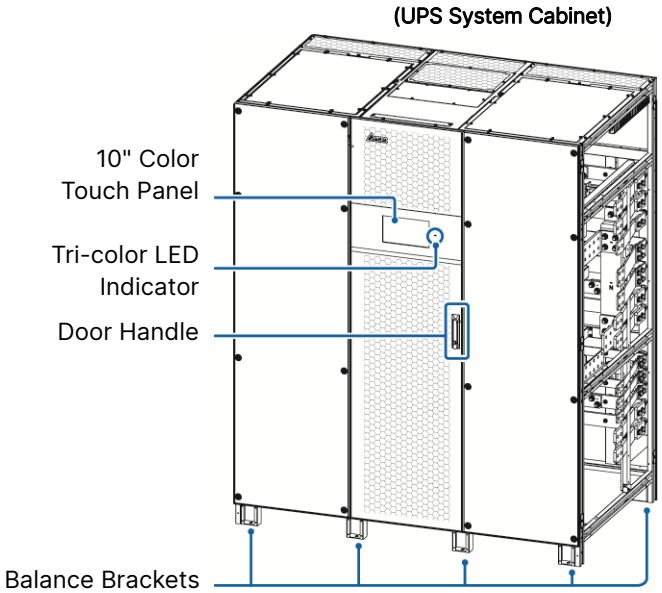


Figure 2-3: 1000/ 1250kVA UPS_ Front View of the UPS System Cabinet

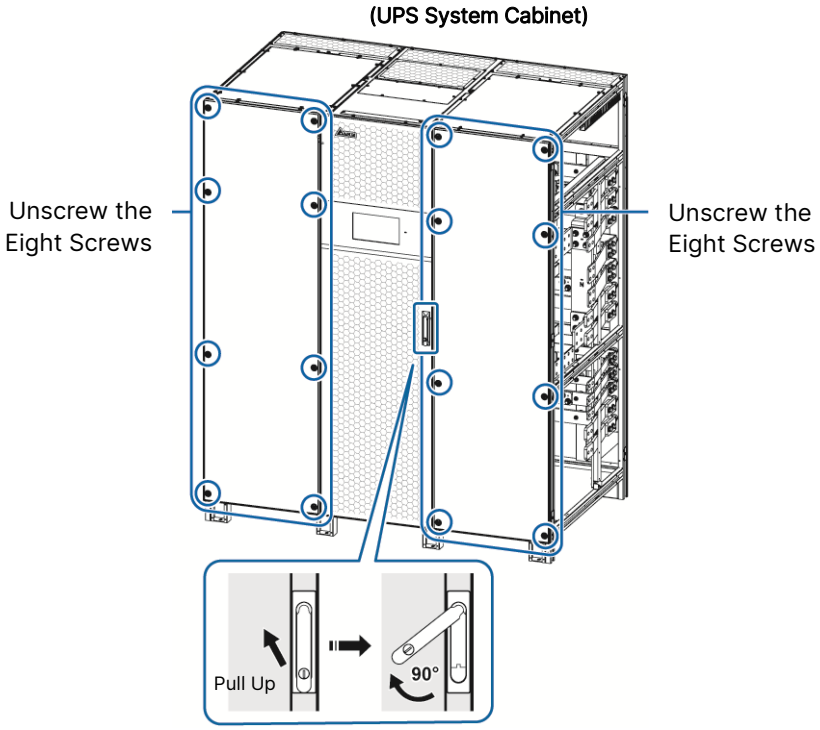


Figure 2-4: 1000/ 1250kVA UPS_ How to Open the UPS System Cabinet's Three Front Doors

2.5.2 Side View

WARNING:

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

After you remove the UPS system cabinet's right and left front doors, you will see the wiring terminals that need to connect to the power modules.

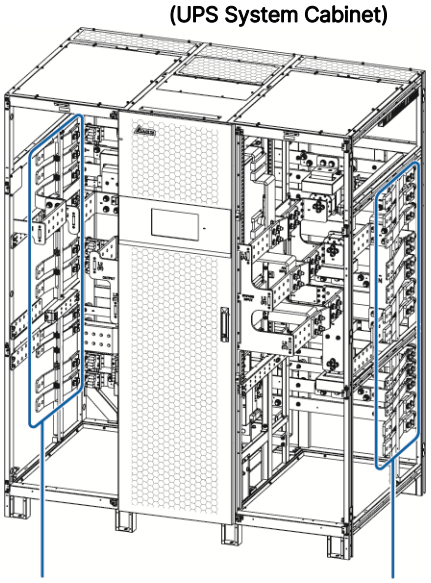


Figure 2-5: 1000/ 1250kVA UPS_ Wiring Terminals that Need to Connect to the Power Modules

For wiring terminals that need to connect to the input power, external battery cabinet and critical loads, please refer to ***Figure 2-6***.

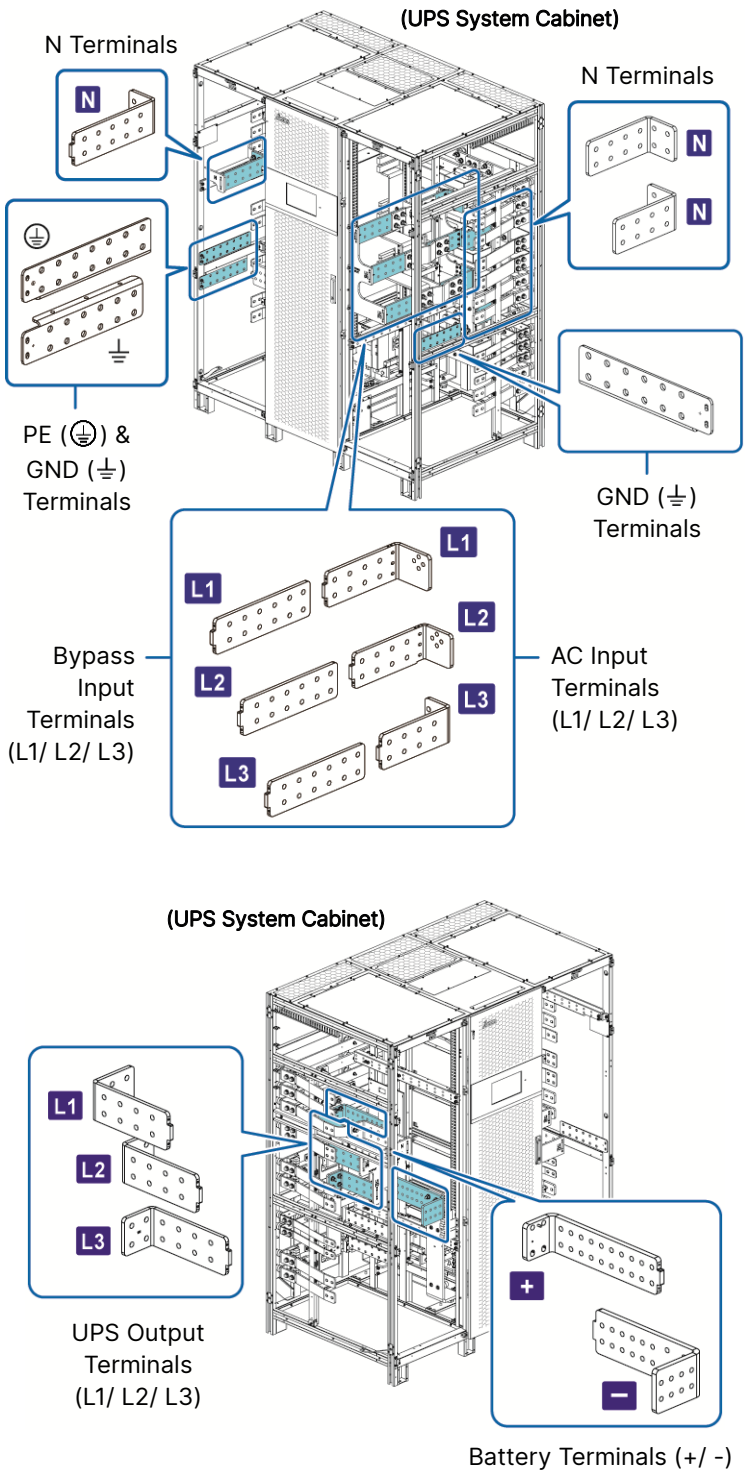


Figure 2-6: 1000/ 1250kVA UPS_ Wiring Terminals that Need to Connect to the Input Power, External Battery Cabinet and Critical Loads

2.6 Power Modules

2.6.1 Front View

For 1000kVA UPS, there are four power modules, two of which must be installed at the right-hand side of the UPS system cabinet and the remaining two at the left-hand side of the UPS system cabinet.

For 1250kVA UPS, there are five power modules, three of which must be installed at the right-hand side of the UPS system cabinet and the remaining two at the left-hand side of the UPS system cabinet.

Each power module's capacity is 250kVA/ 250kW.

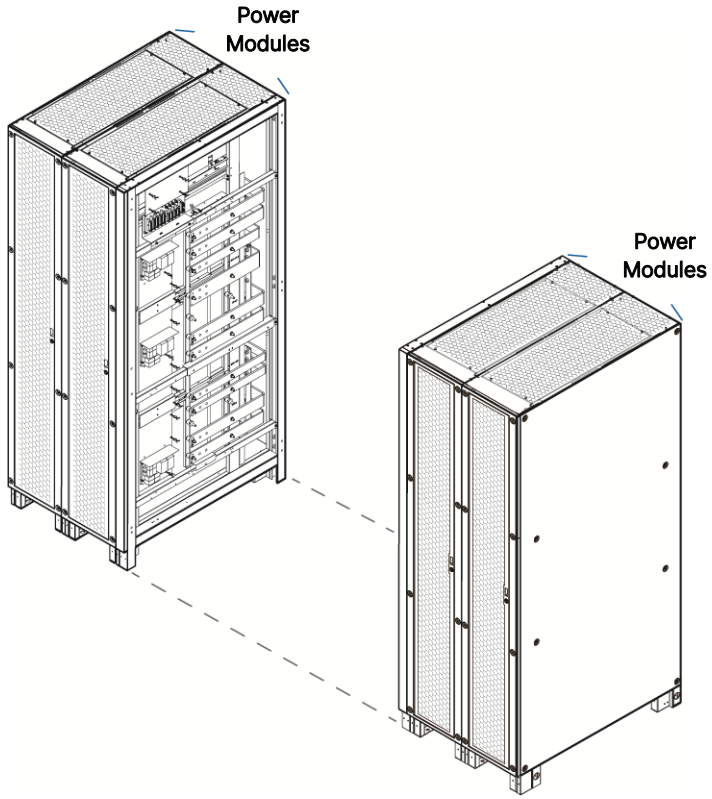


Figure 2-7: 1000kVA UPS_ Front View of the Power Modules

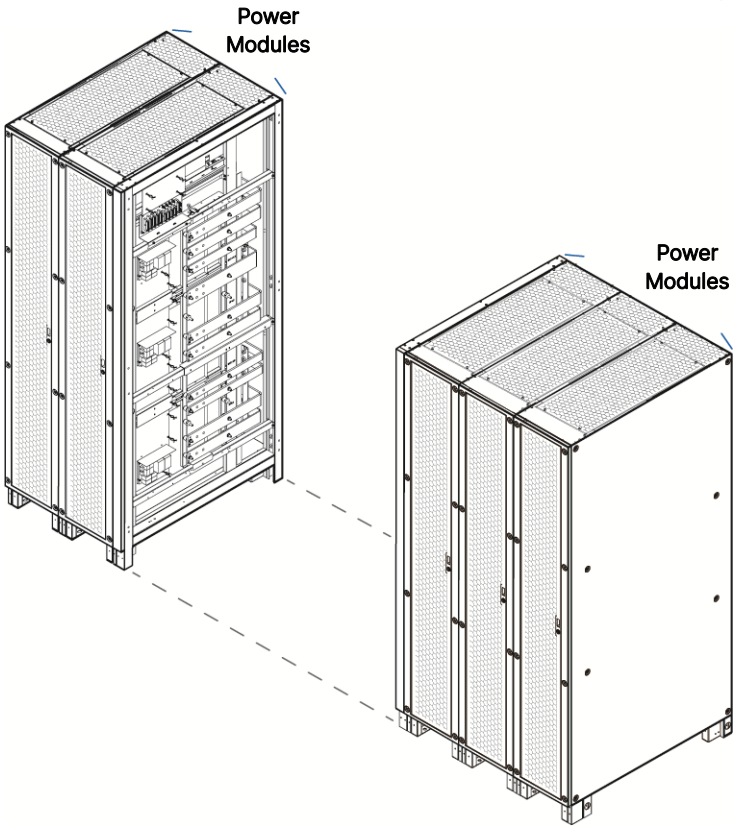


Figure 2-8: 1250kVA UPS_ Front View of the Power Modules

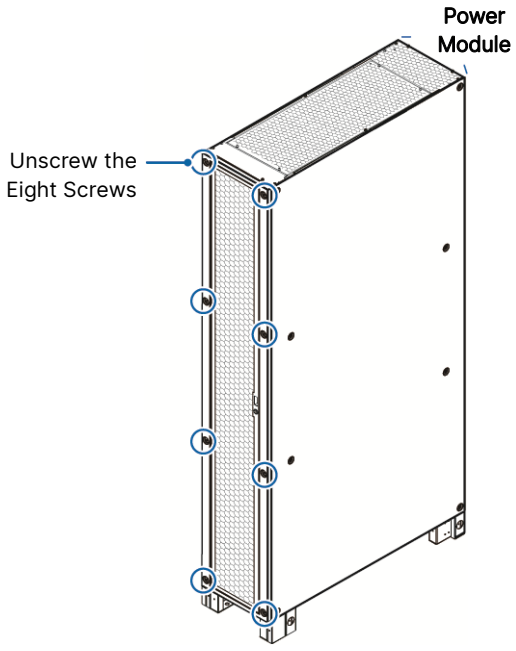


Figure 2-9: How to Remove the Power Module's Front Door

2.6.2 Side View

WARNING:

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

The power modules must be connected with the UPS system cabinets. Please refer to the following figures for details.

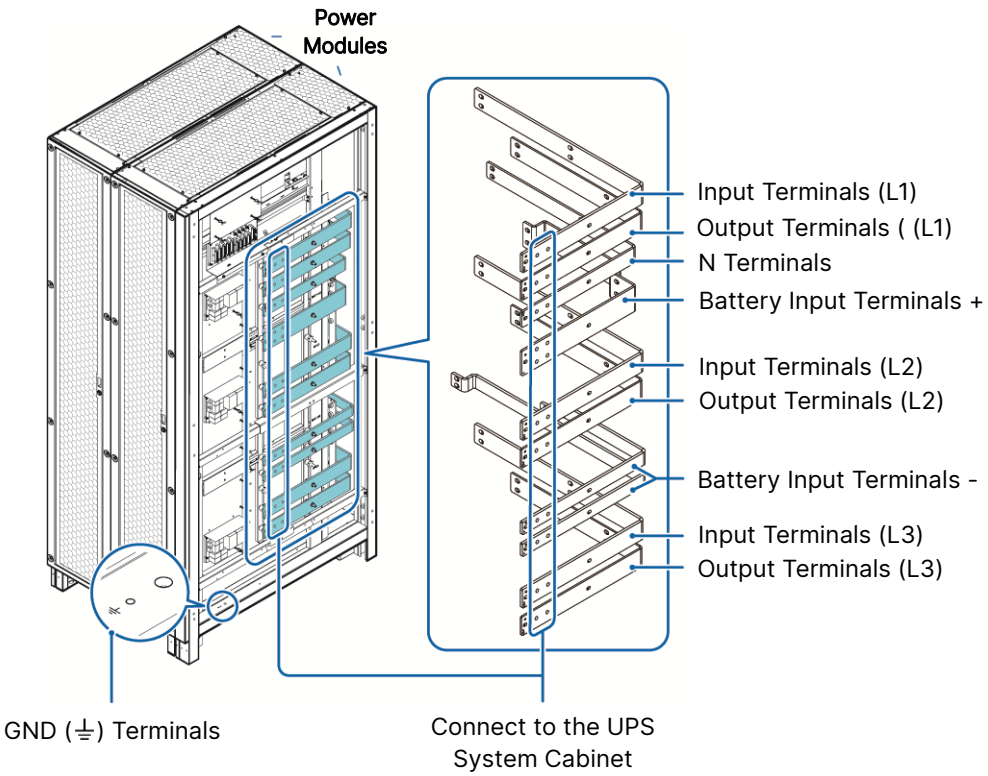


Figure 2-10: 1000/ 1250kVA UPS_ Wiring Terminals that Need to Connect to the Left-hand Side of the UPS System Cabinet

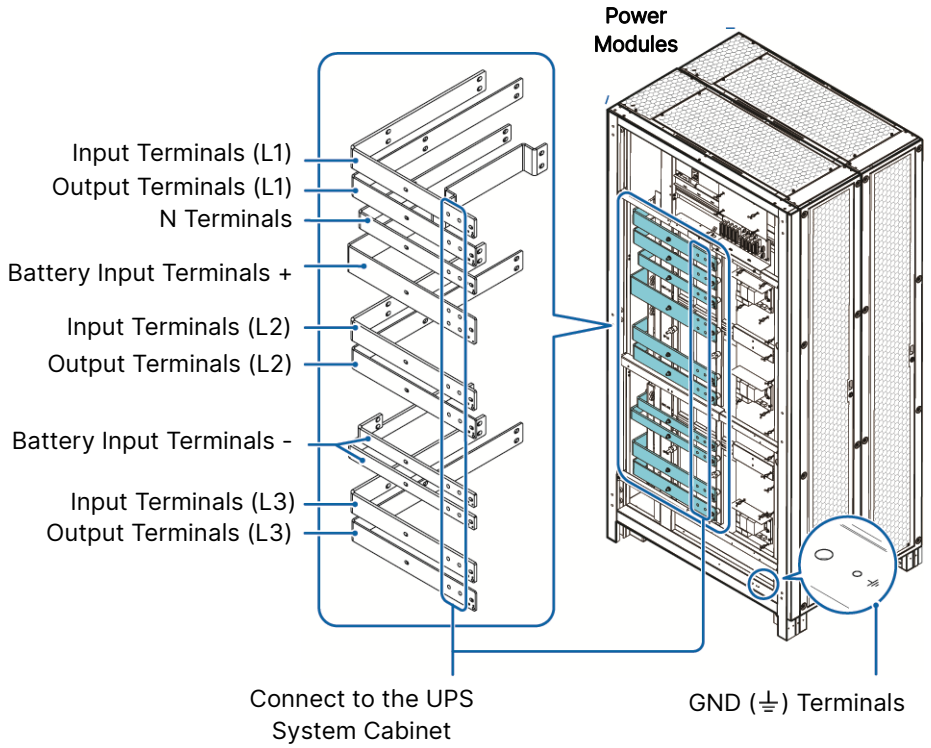


Figure 2-11: 1000kVA UPS_ Wiring Terminals that Need to Connect to the Right-hand Side of the UPS System Cabinet

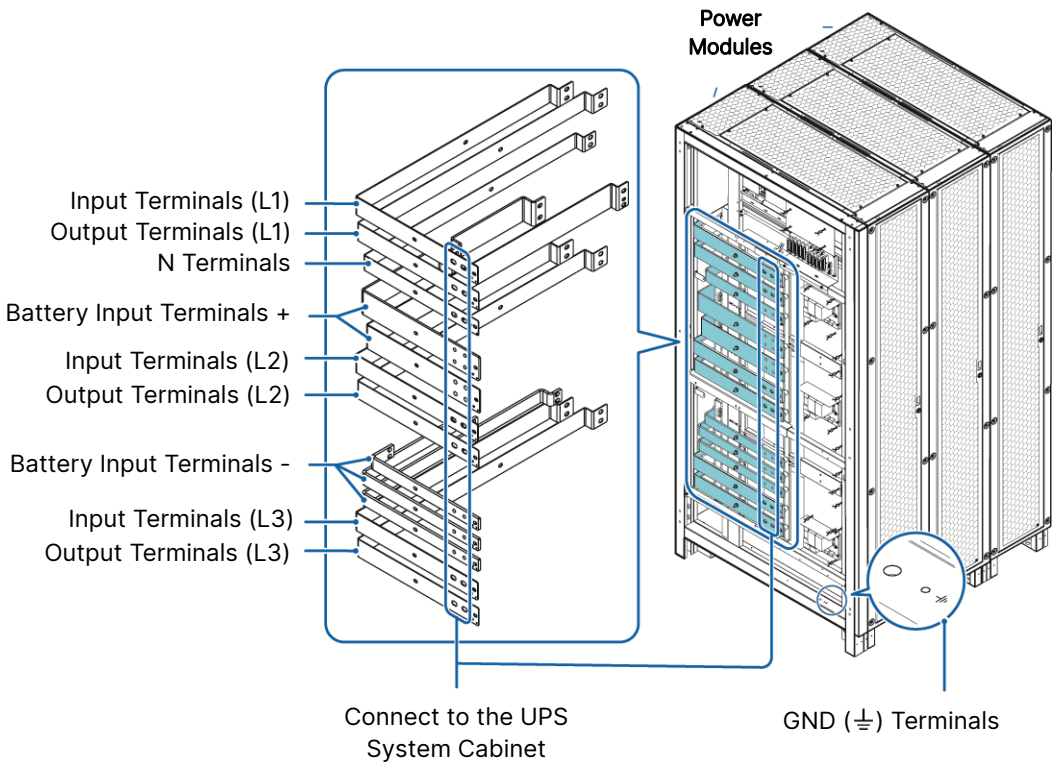


Figure 2-12: 1250kVA UPS_ Wiring Terminals that Need to Connect to the Right-hand Side of the UPS System Cabinet

2.7 Tri-color LED Indicator & Buzzer

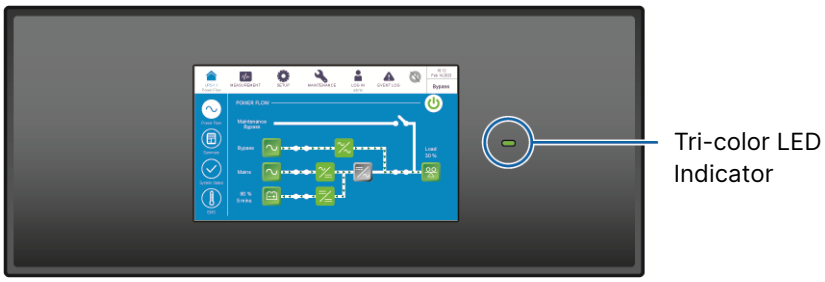


Figure 2-13: Tri-color LED Indicator Location

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 UPS system cabinet's middle front door. Please refer to the figure below.

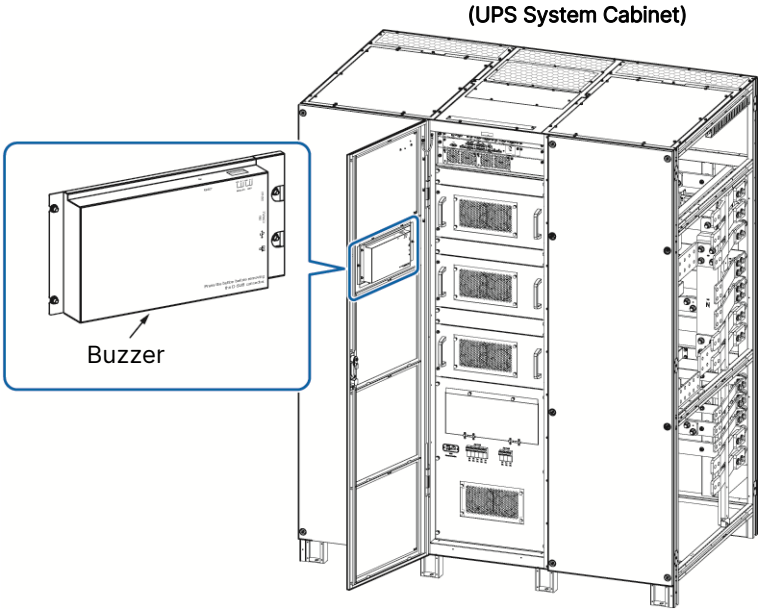


Figure 2-14: Buzzer Location

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>• It indicates that 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>Green Mode</td><td>'Green'</td></tr>
<tr><td>Clean Mode</td><td>'Clean'</td></tr>
<tr><td>Frequency Conversion Mode</td><td>'Frequency Conversion'</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Tri-color LED Indicator</th><th>Status</th><th>Meaning</th></tr>
<tr><td>Yellow</td><td>ON</td><td>
• It indicates that 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>
<tr><td>Energy Recycle Mode</td><td>‘Energy Recycle’</td></tr>
</table>
• It indicates a minor or medium warning message.
<table>
<tr><th>Warning Level</th><th>Buzzer Frequency</th></tr>
<tr><td>Minor</td><td>It sounds 0.5 seconds every 3 seconds.</td></tr>
<tr><td>Medium</td><td>It sounds 0.5 seconds every second.</td></tr>
</table>
</td></tr>
<tr><td>Red</td><td>ON</td><td>
• It indicates a major 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 nine basic operation modes, which are **On-Line** mode, **Battery** mode, **Bypass** mode, **Manual Bypass** mode, **ECO** mode, **Green** mode, **Clean** mode, **Frequency Conversion** mode and **Energy Recycle** mode.

NOTE:

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

Code	Meaning
Q1	External Maintenance Bypass Cabinet's Input Breaker
Q2	External Maintenance Bypass Cabinet's Bypass Breaker
Q3	External Maintenance Bypass Cabinet's Manual Bypass Breaker
Q4	External Maintenance Bypass Cabinet's Output Breaker
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 (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 (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.

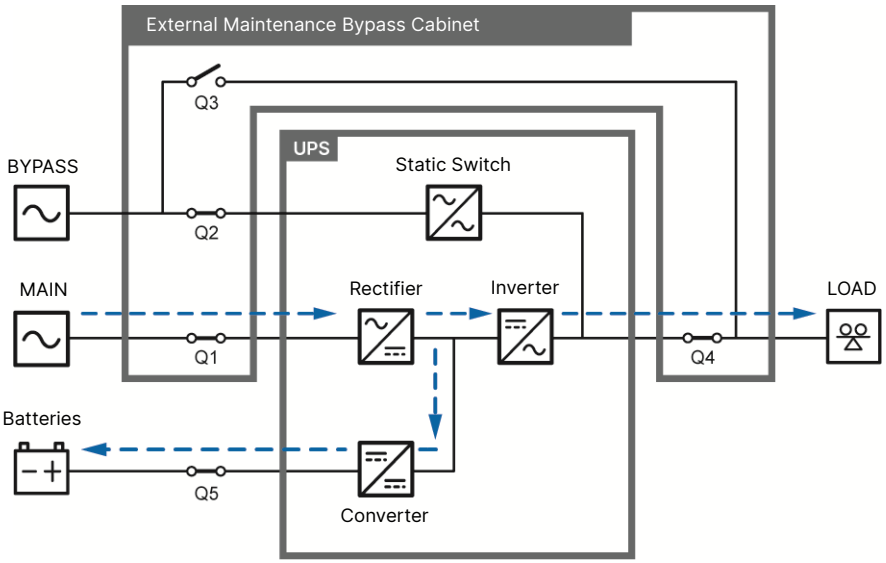


Figure 3-1: On-Line Mode Diagram

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 (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.

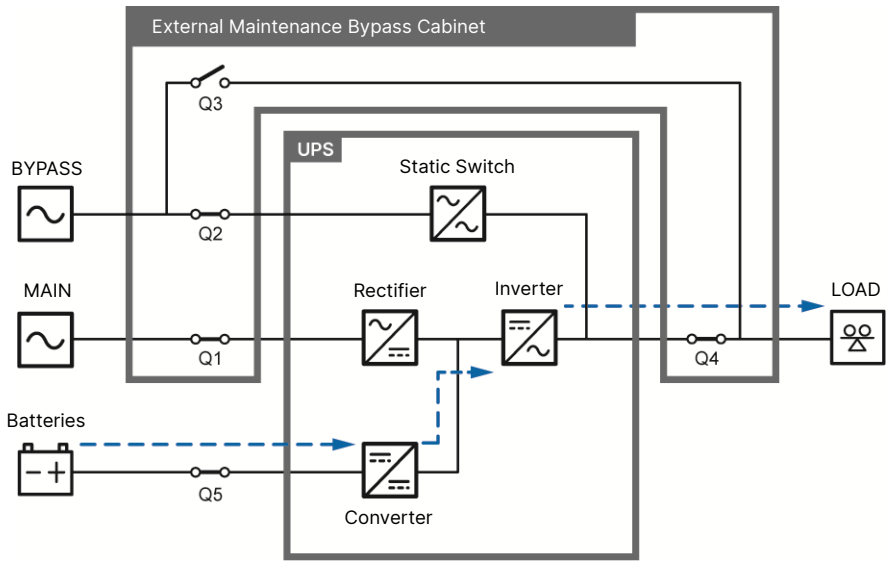


Figure 3-2: Battery Mode Diagram

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.

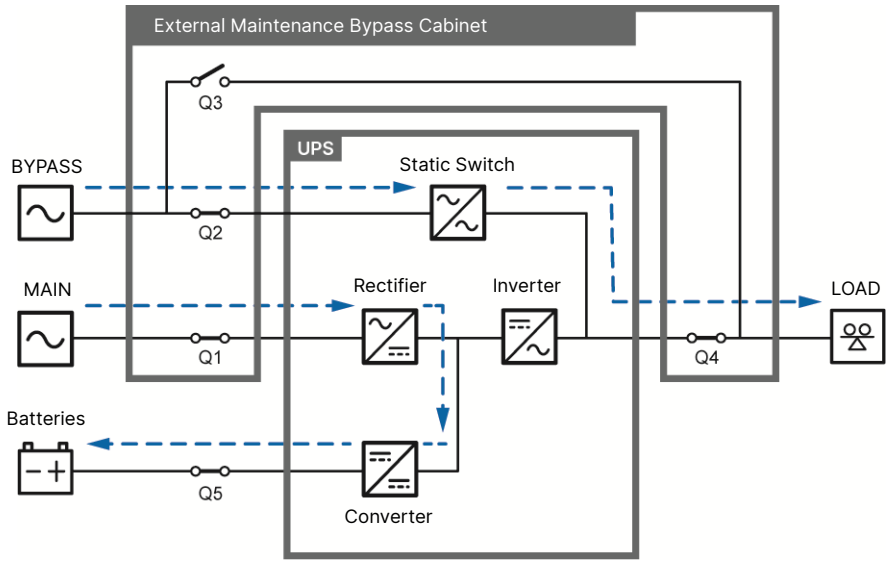


Figure 3-3: Bypass Mode Diagram

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.

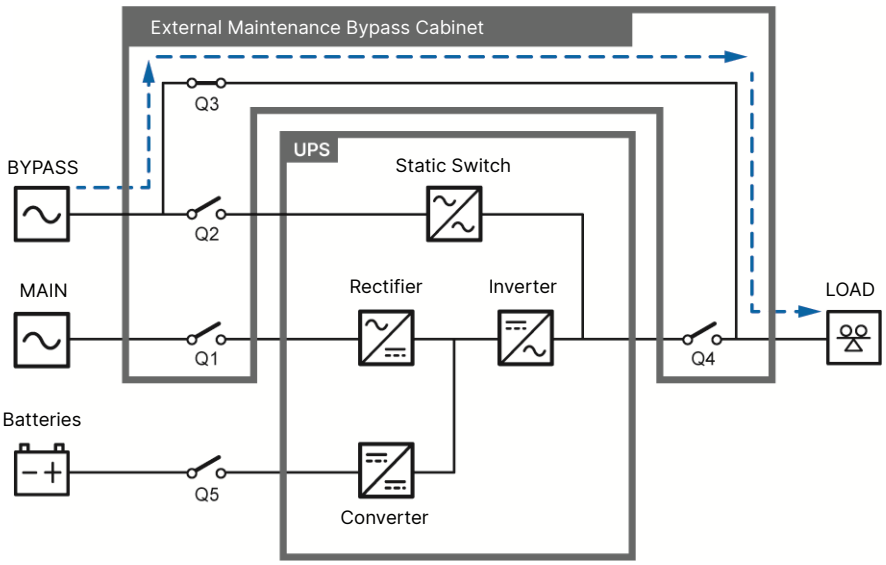


Figure 3-4: Manual Bypass Mode Diagram

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 ± 5 Hz 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.

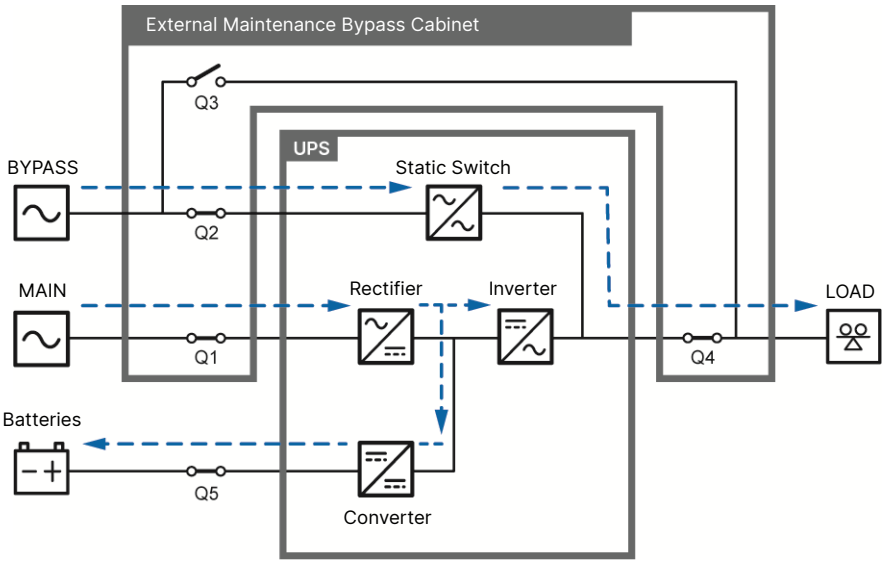


Figure 3-5: ECO Mode Diagram

3.6 Green Mode

Green mode is the same as On-Line mode, but the difference is that 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 screen.

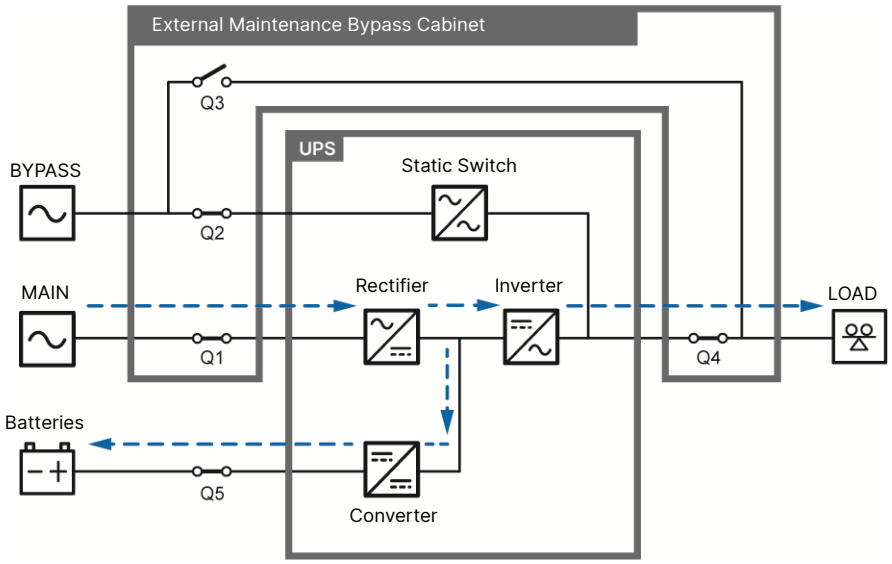


Figure 3-6: Green Mode

3.7 Clean Mode

After the UPS is manually set as Clean mode via the LCD, the system will automatically detect the output status to let the inverter provide active filter function to compensate harmonics, correct power factor and reduce bypass reactive current to improve overall power quality. During Clean mode, the UPS's tri-color LED illuminates green and the text '**Clean**' appears in the upper right corner of the LCD screen.

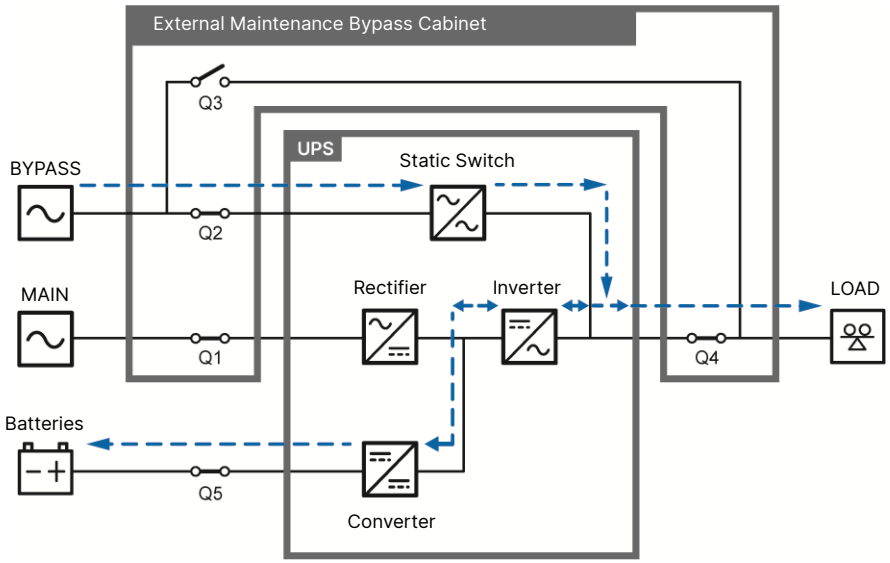


Figure 3-7: Clean Mode

3.8 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 screen.

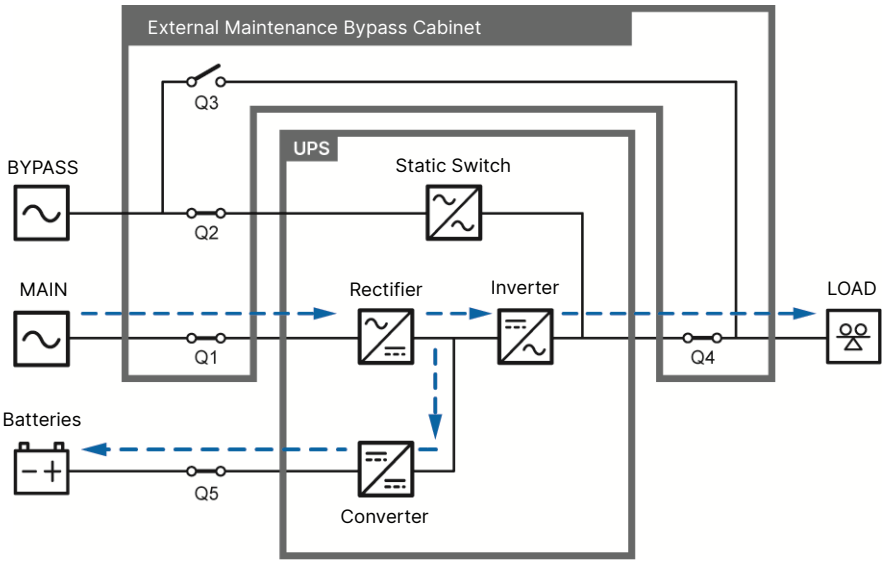


Figure 3-8: Frequency Conversion Mode

3.9 Energy Recycle Mode

NOTE:

1. Energy Recycle mode is only applicable to single unit application.
2. Only qualified personnel can perform the following operation.

Energy Recycle mode is only applicable to UPS self-test only. Without connection to any critical loads, the UPS can execute current test under full load condition. Before you activate Energy Recycle mode, please make sure that the external maintenance bypass cabinet's Manual Bypass Breaker (Q3) and Output Breaker (Q4) as well as each external battery cabinet's battery breaker (Q5) are in the **OFF** status. During Energy Recycle mode, the UPS's tri-color LED illuminates yellow and the text '**Energy Recycle**' appears in the upper right corner of the screen.

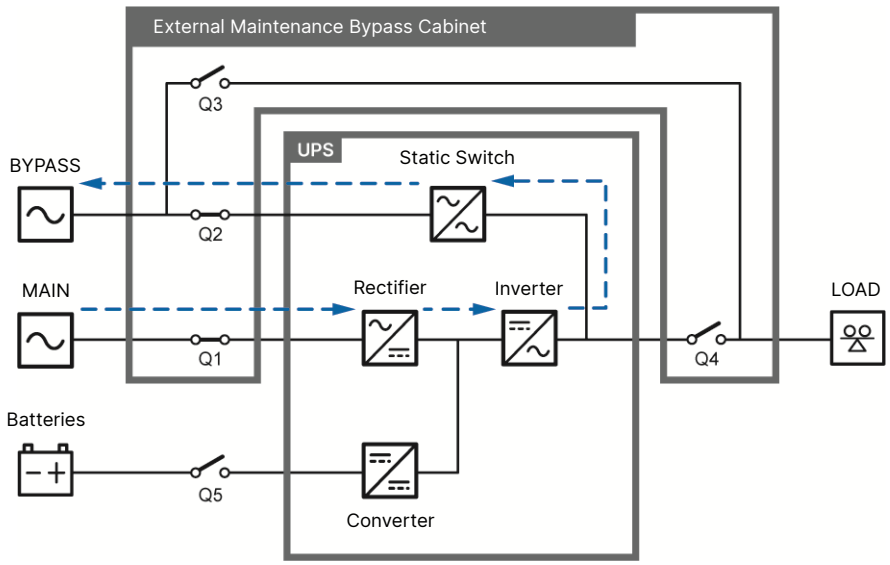


Figure 3-9: Energy Recycle Mode

Chapter 4 : Communication Interfaces

The communication interfaces are located at two different places. One is on the front of the UPS system cabinet with its middle front door open and the other is at the rear of the touch panel.

NOTE:

It is suggested that the wire size of cable connected to any dry contact should be 0.519 mm^2 (20 AWG) or 0.325 mm^2 (22 AWG).

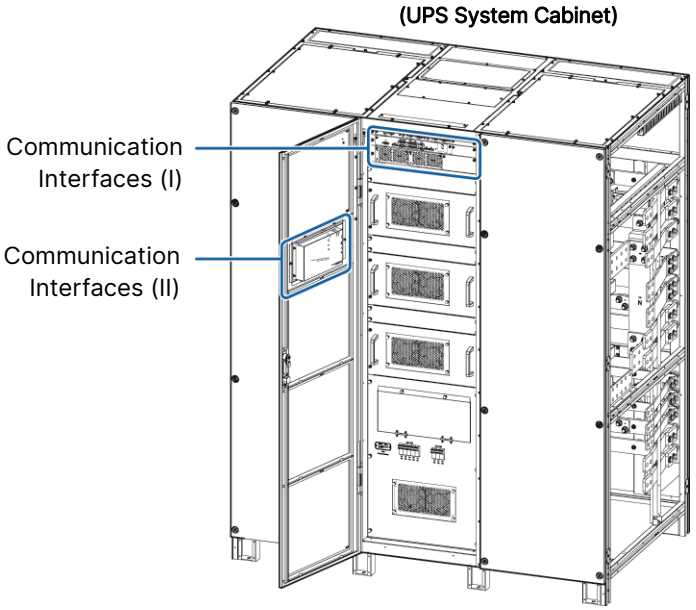
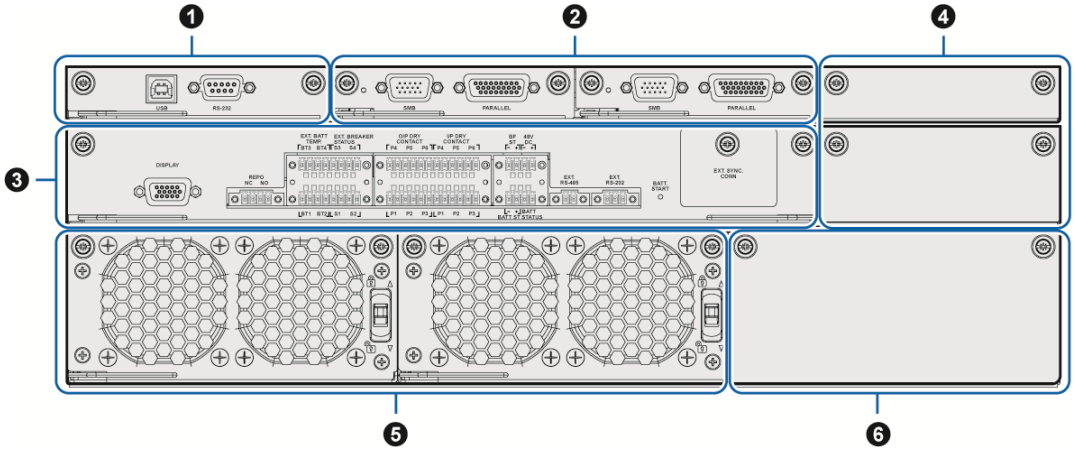


Figure 4-1: Location of the Communication Interfaces

4.1 Communication Interfaces (I): on the Front of the UPS System Cabinet with Its Middle Front Door Open



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

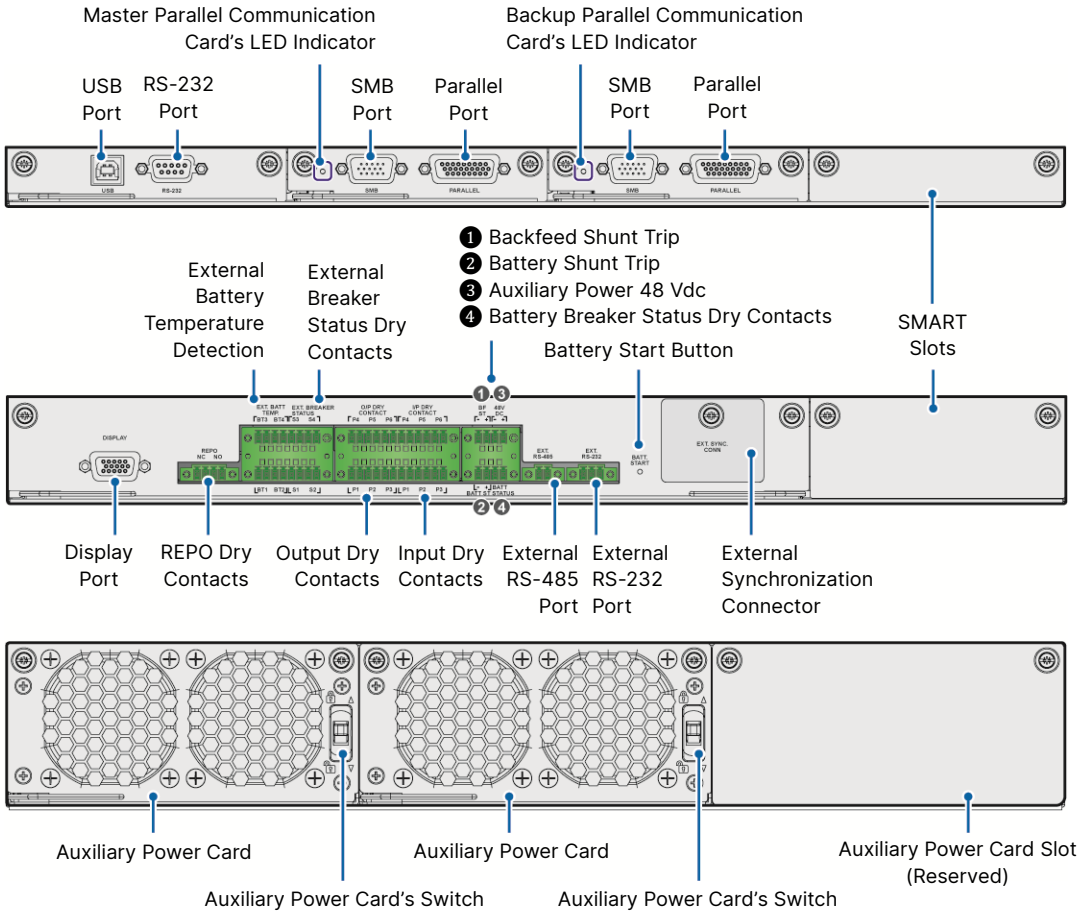


Figure 4-2: Communication Interfaces (I)

4.1.1 USB Port & RS-232 Port

The USB port & RS-232 port are available for authorized service personnel.

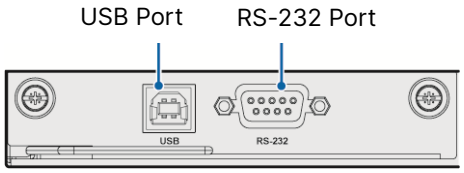


Figure 4-3: USB Port & RS-232 Port

4.1.2 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.

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.

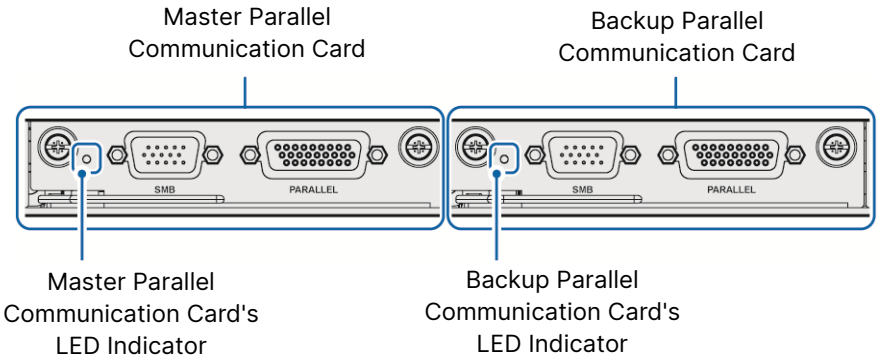


Figure 4-4: Parallel Communication Cards

4.1.3 Parallel Ports

The parallel ports are used to connect parallel UPSs to increase system capacity and redundancy.

For 1000kVA UPS, you can parallel a maximum of 8 UPS system cabinets, and each UPS system cabinet can connect to up to 4 power modules. For 1250kVA UPS, you can parallel a maximum of 8 UPS system cabinets, and each UPS system cabinet can connect to up to 5 power modules.

Only UPSs 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:

1. One parallel cable is provided in each UPS's accessory package. Using non-Delta parallel cables to parallel the UPSs may cause failure, malfunctions and accidents.
2. Please remove the parallel cable and SMB cable before removing the parallel communication card.

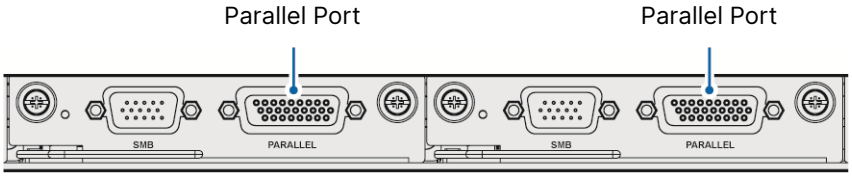


Figure 4-5: Parallel Ports

4.1.4 Synchronized Multiple Bus (SMB) Ports

The synchronized multiple bus (SMB) ports are used to synchronize the output frequency and phase of each multiple-bus system to ensure that two or more systems are switched in synchronization.

NOTE:

1. The SMB cable is optional.
2. Please remove the parallel cable and SMB cable before removing the parallel communication card.

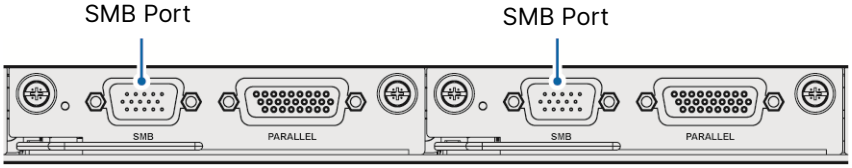


Figure 4-6: SMB Ports

4.1.5 Display Port

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

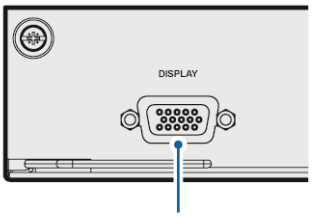


Figure 4-7: Display Port

4.1.6 REPO Dry Contacts

Connect the REPO dry contacts to a user-supplied switch so you can remotely shut down the UPS when an emergency occurs. Both of the normally open (NO) and normally closed (NC) dry contacts shown below must be connected.

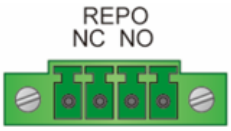


Figure 4-8: REPO Dry Contacts

4.1.7 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).

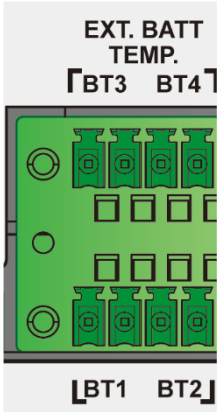


Figure 4-9: External Battery Temperature Detection

4.1.8 External Breaker Status Dry Contacts

There are four sets of external breaker status dry contacts (S1, S2, S3 and S4), which can be used to respectively detect the status of input, bypass, manual bypass and output 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 open (NO) device
Dry Contact_ S4	Normally closed (NC) device

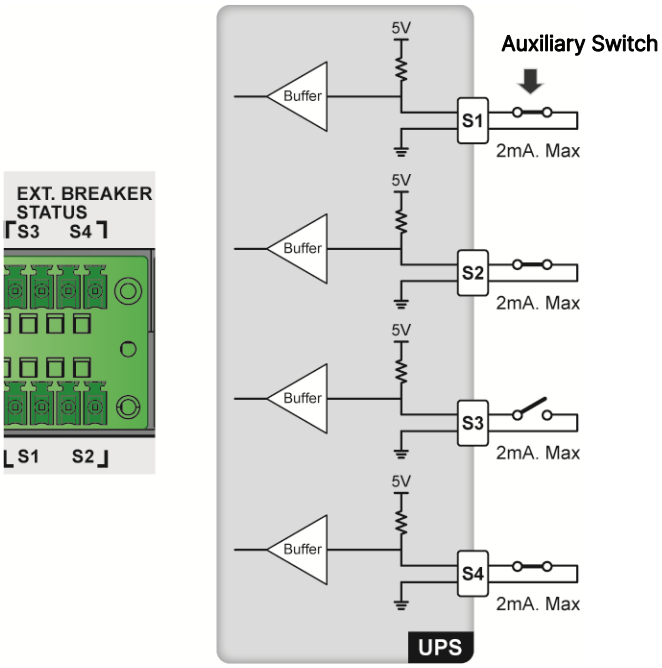


Figure 4-10: External Breaker Status Dry Contacts & Schematic

4.1.9 Output Dry Contacts

There are six sets of programmable output dry contacts (P1 ~ P6). 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-four 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 60 Vdc/ 42 Vac to avoid electric shock or insufficient insulation.

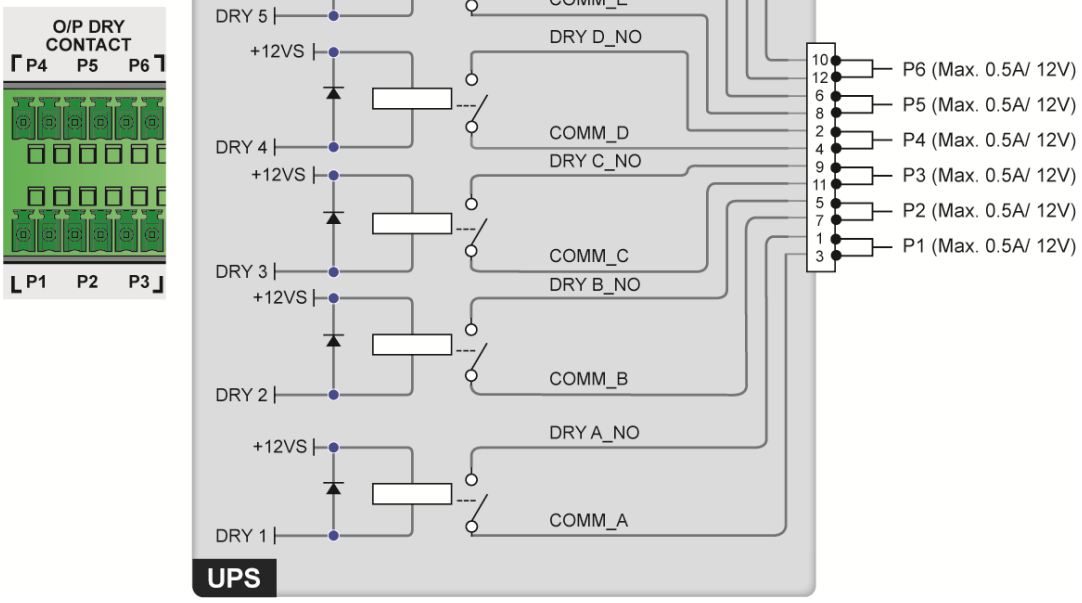


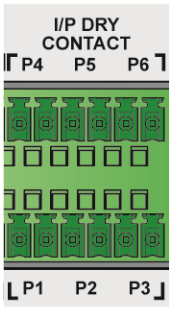
Figure 4-11: Output Dry Contacts & Schematic

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, the battery voltage is lower than the setup limit (default: 440 Vdc).
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 (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.

No.	Event	Description
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 Via EPO	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.
22	Load On ECO	The UPS works in ECO mode.
23	Power Module Fault Shutdown	One or more power modules shut down due to any internal critical failure.
24	Power Module Warning	One or more power modules trigger an alarm due to any internal minor failure.

4.1.10 Input Dry Contacts

There are six sets of programmable input dry contacts (P1 ~ P6). 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. Six out of fourteen events can be assigned according to your applications. Please refer to the table below and *7.6.6 Dry Contact Setting*.



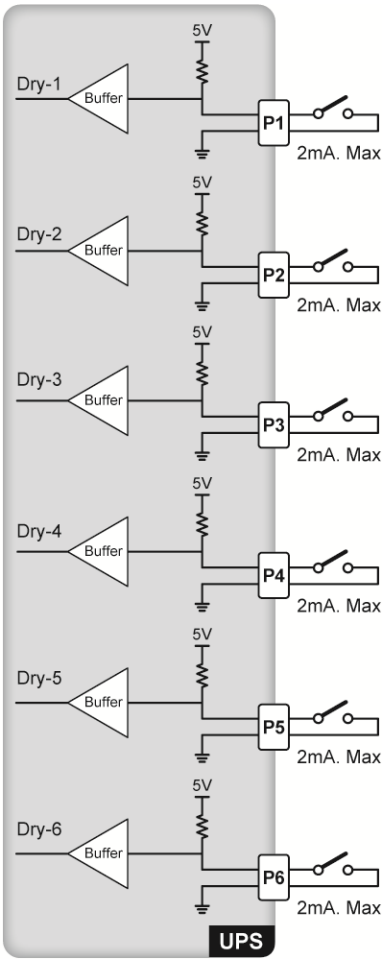


Figure 4-12: Input Dry Contacts & Schematic

No.	Event	Description
1	None	No set-up.
2	Generator Status	Generator status detection.
3	Battery Ground Fail	Battery leakage detection.

No.	Event	Description
4	External Battery Breaker Detection	Status detection of the external battery cabinet's breaker.
5	Charger Off*1	Turn off the charger.
6	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.
7	Battery Abnormal Shutdown	In On-Line mode: the UPS will issue battery abnormal warning. In Battery mode: the UPS will transfer to Bypass or Standby mode immediately.
8	Input Transformer OTW	Input transformer over temperature warning.
9	Output Transformer OTW	Output transformer over temperature warning.
10	Battery Fuse Open	The battery fuse is blown.
11	Force Sync External Source	Force the UPS to synchronize with an external voltage source. Please refer to *4.1.17 External Synchronization Connector*.
12	Input Current Limit Stage Setting	Limit the input current to a specific Ampere (adjustable in a certain range). Please refer to *7.6.3 Input & Output Setting*.
13	Major Battery Abnormal Alarm	Alarm due to detection of major fault from the battery management system.
14	Minor Battery Abnormal Alarm	Alarm due to detection of minor fault from the battery management system.

NOTE:

*1 If you use non-Delta lithium-ion batteries, you must use the LCD to 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.

4.1.11 Backfeed Shunt Trip Function

When the UPS's bypass SCR has a short-circuit issue, the UPS will provide 48 Vdc isolated power to the connected external backfeed contactor to cut off the backfeed voltage.

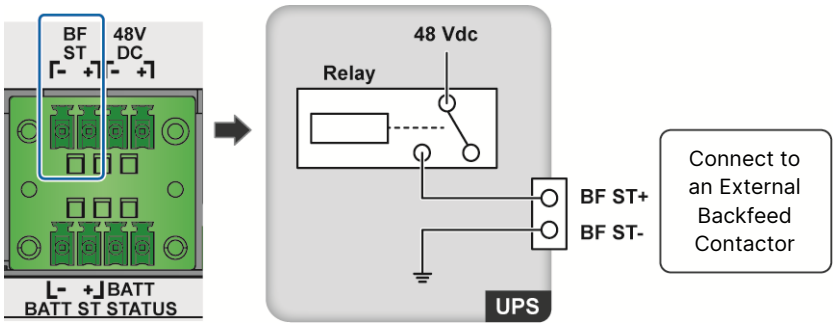


Figure 4-13: Backfeed Shunt Trip & Schematic

4.1.12 Battery Shunt Trip Function

When the external REPO button is pressed, the UPS will provide 48 Vdc isolated power to the connected external shunt trip device to cut off the battery power.

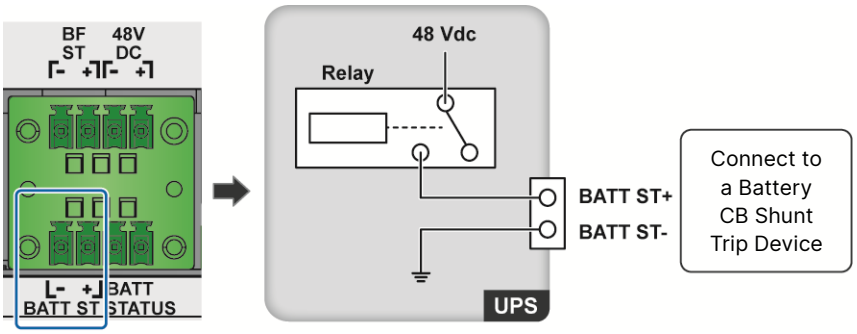


Figure 4-14: Battery Shunt Trip & Schematic

4.1.13 Auxiliary Power 48 Vdc

For application, you can use the interfaces to either provide 48 Vdc isolated power (Max. 2A) for external use or connect an external device to cut off its circuit breaker.

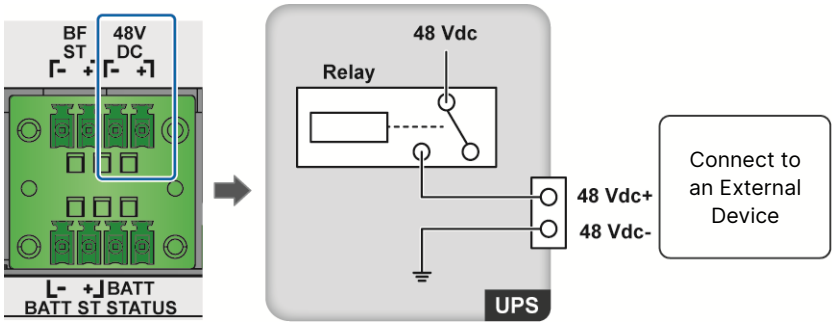


Figure 4-15: Auxiliary Power 48 Vdc Application & Schematic

4.1.14 Battery Breaker Status Dry Contacts

The battery breaker status dry contacts are used to detect the status of the external battery cabinet's breaker (Q5). For detection, please remove the short wire of the dry contacts and connect user-supplied auxiliary switches to the dry contacts (see the figure below). If you don't execute the above-mentioned setup, the default setting of the external battery cabinet's breaker (Q5) shown on the LCD is ON.

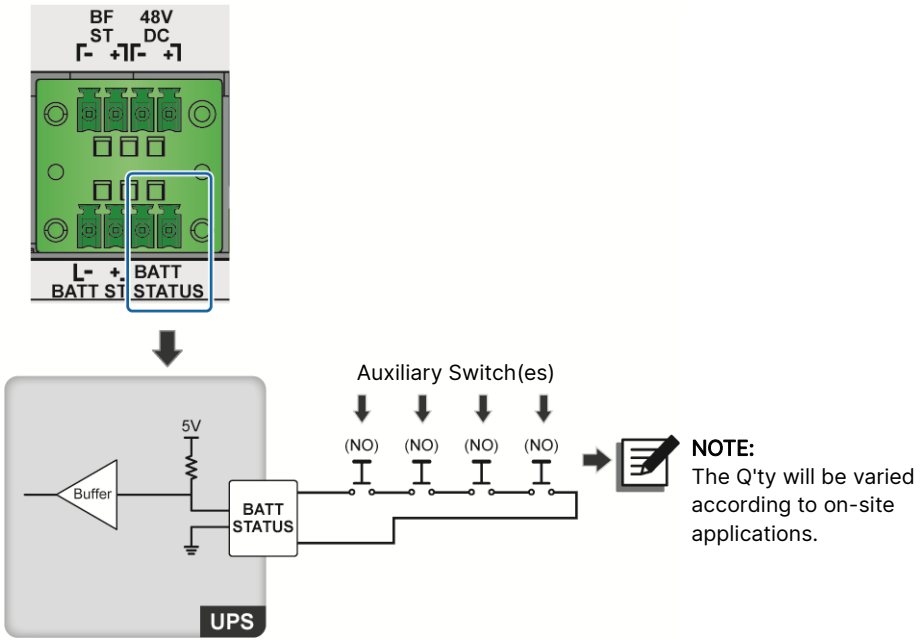


Figure 4-16: Battery Breaker Status Dry Contacts & Schematic

4.1.15 External RS-485 & External RS-232 Ports

The external RS-485 & external RS-232 ports are reserved.

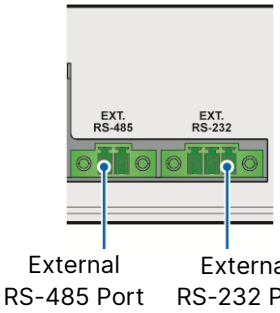


Figure 4-17: External RS-485 & External RS-232 Ports

4.1.16 Battery Start Button

To activate battery mode, you need to press the battery start button shown below. Please refer to *6.2.2 Battery Mode Start-up Procedures*.

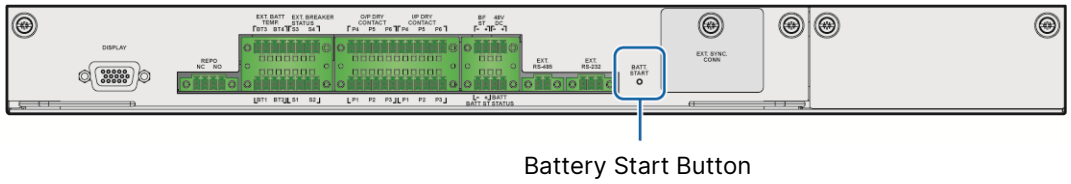


Figure 4-18: Battery Start Button

4.1.17 External Synchronization Connector

The external synchronization connector helps to synchronize the output frequency and phase of an external voltage source (ex. generator, UPS, grid, etc.). The cables used for connection must have a minimum rating of 600V. For three-phase three-wire power system, use the cables to connect (1) L1 phase and red connector and (2) L2 phase and white connector. For three-phase four-wire power system, use the cables to connect (1) L2 phase and white connector and (2) N phase and red connector.

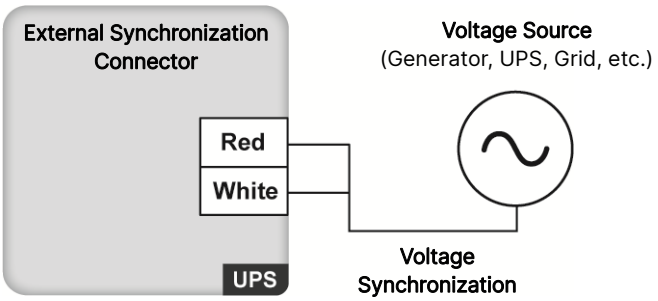


Figure 4-19: External Synchronization Connector Application

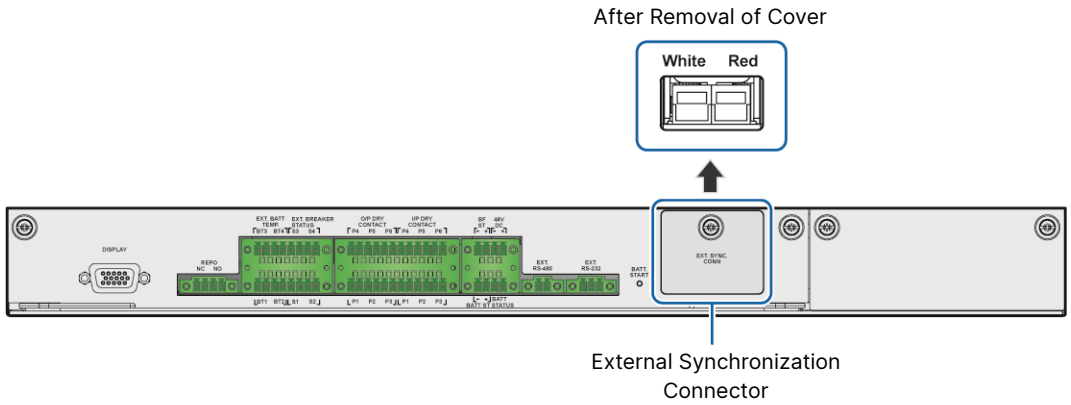


Figure 4-20: External Synchronization Connector

4.1.18 SMART Slots

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 5-23***).

NOTE:

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

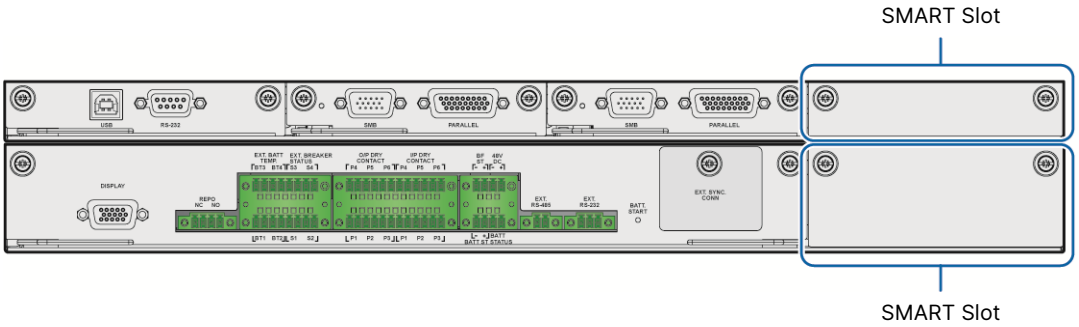


Figure 4-21: SMART Slots

4.1.19 Auxiliary Power Cards

The UPS has two hot-swappable auxiliary power cards. Each card has its own switch. The switch is turned on by default. If the auxiliary power card is damaged and needs replacement, please turn off the switch first.

WARNING:

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

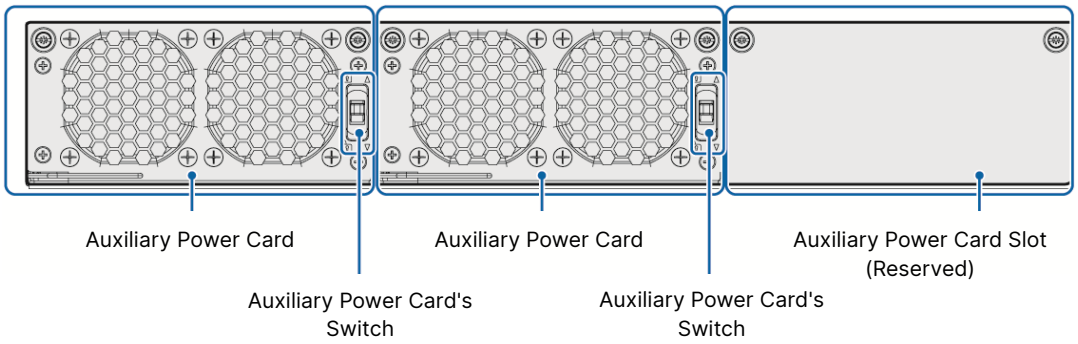


Figure 4-22: Auxiliary Power Cards

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

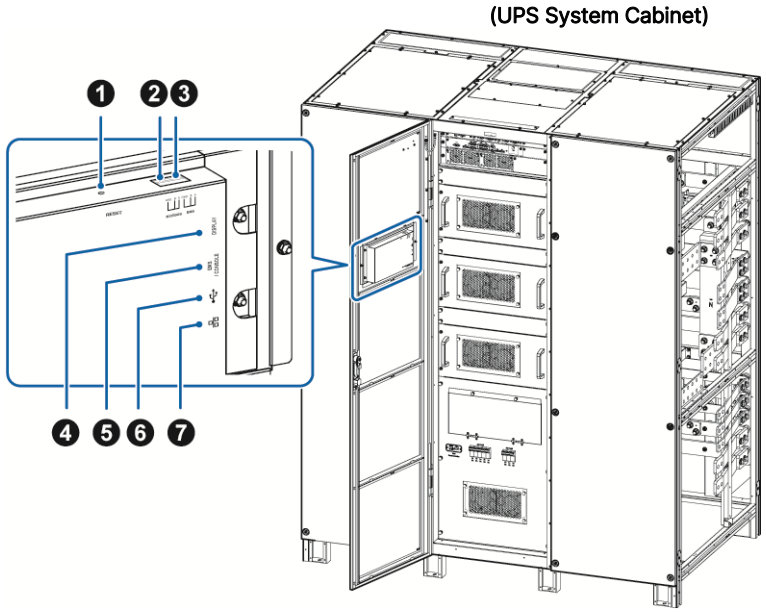


Figure 4-23: Communication Interfaces (II)

No.	Item	Description
1	RESET	Press the **RESET** button to restart the LCD.
2	MODBUS (RS-485 Port)	1. Provision of Modbus RTU communication service. 2. Connect the port to a user-supplied monitoring system.
3	BMS	Connect the port to the Delta battery management system (optional). The BMS function is only applicable to lead-acid batteries.
4	DISPLAY	Before shipment, the DISPLAY port has been connected.
5	EMS/ CONSOLE	Connect the port to a user-supplied environmental monitoring system or Delta EnviroProbe 1000 (optional).
6	(USB Port × 1)	Connect a user-supplied USB flash drive to the port to (1) upgrade the UPS and LCD's firmware and (2) download event logs.

No.	Item	Description
❼	(Network Port)	1. Provision of network communication service (including SNMP, Modbus TCP, HTTP, HTTPS, etc.). 2. Connect the port to a user-supplied monitoring system.

4.3 Cable Routing for the Communication Interfaces

Regarding cable routing for the communication interfaces, follow the instructions below.

Top Cable Entry:

Step 1

❶ Open the UPS system cabinet's middle front door and ❷ remove the top cover shown below.

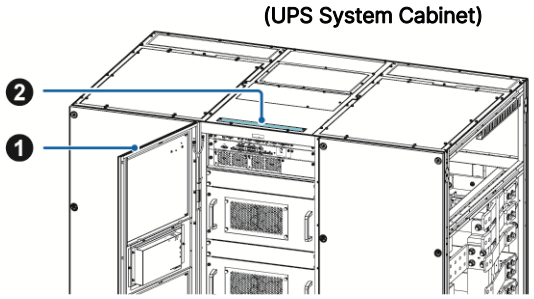


Figure 4-24: Open the Middle Front Door & Remove the Top Cover

Step 2

❶ Connect the cables to the communication interfaces and ❷ route the cables through the snap bushings and the top of the cabinet.

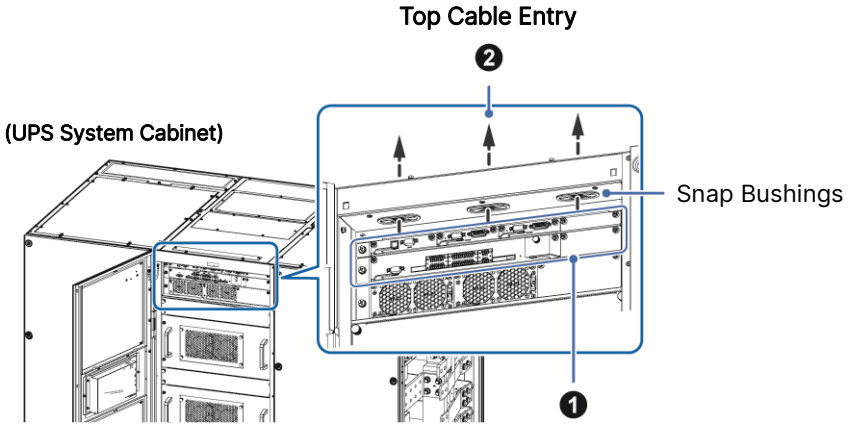


Figure 4-25: Top Cable Entry for the Communication Interfaces

Bottom Cable Entry:

Step 1

❶ Open the UPS system cabinet's middle front door, and ❷ remove the left front door, ❸ top cover and ❹ bottom cover shown below.

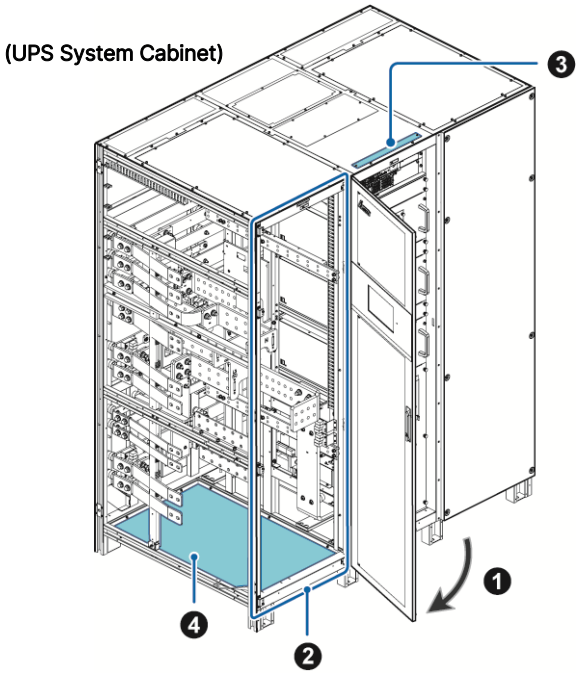


Figure 4-26: Open the Middle Front Door & Remove the Left Front Door, Top Cover and Bottom Cover

Step 2

❶ Route the cables through the top of the cabinet and snap bushing A, ❷ connect the cables to the communication interfaces, ❸ keep routing the cables through the snap bushing B, and ❹ insert the cables into the wire duct and wire mounts located near the cabinet's frame. After that, ❺ route the cables through the bottom of the cabinet.

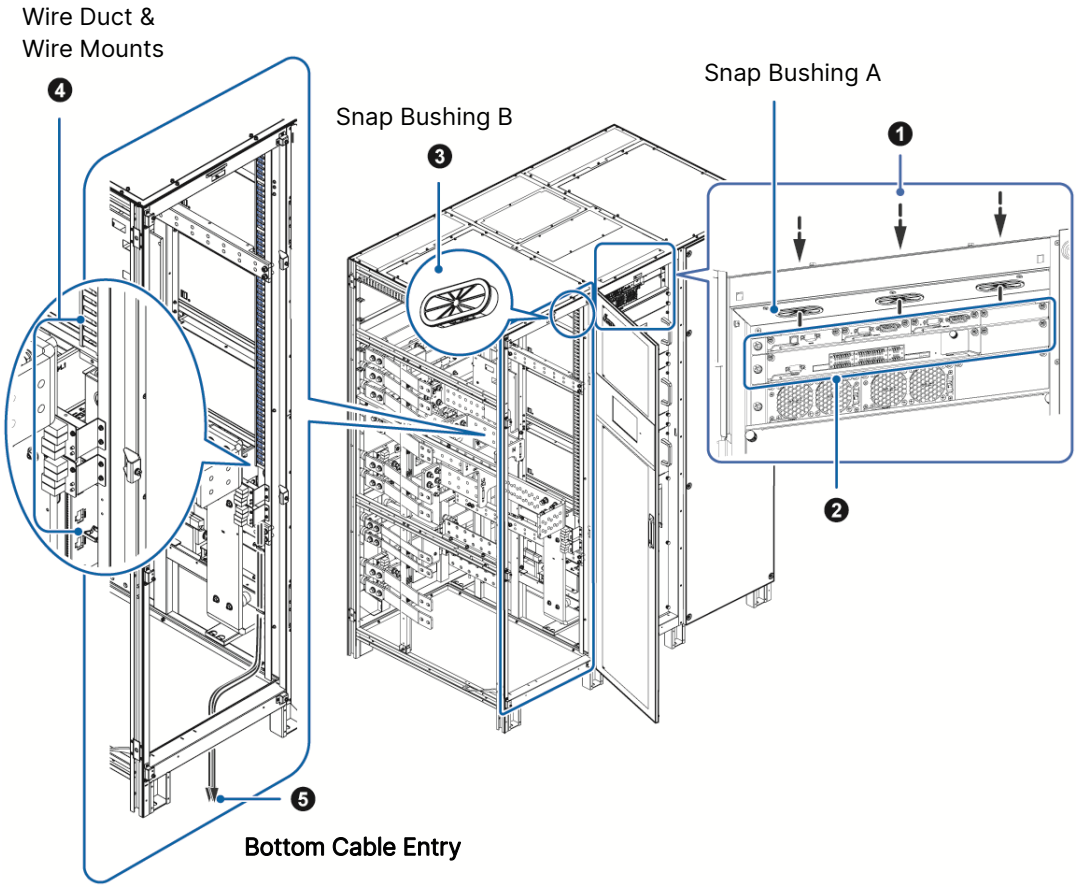


Figure 4-27: Bottom Cable Entry for the Communication Interfaces

NOTE:

1. Please follow local and national electrical codes to select cable sizes and install proper conduits and bushings for cable protection.
2. Only when *5.3 UPS Installation* is completed can you perform wiring.
3. Cable ties are user-supplied and the quantity depends on on-site requirements.

4.4 Thermal Monitor System (TMS) [Optional]

Only qualified service personnel can perform operation of the thermal monitor system (TMS). Please refer to the figure below for the location of the InsightPower G3 TMS card. For detailed information about the card and configurations, please refer to ***8.4 InsightPower G3 TMS card***.

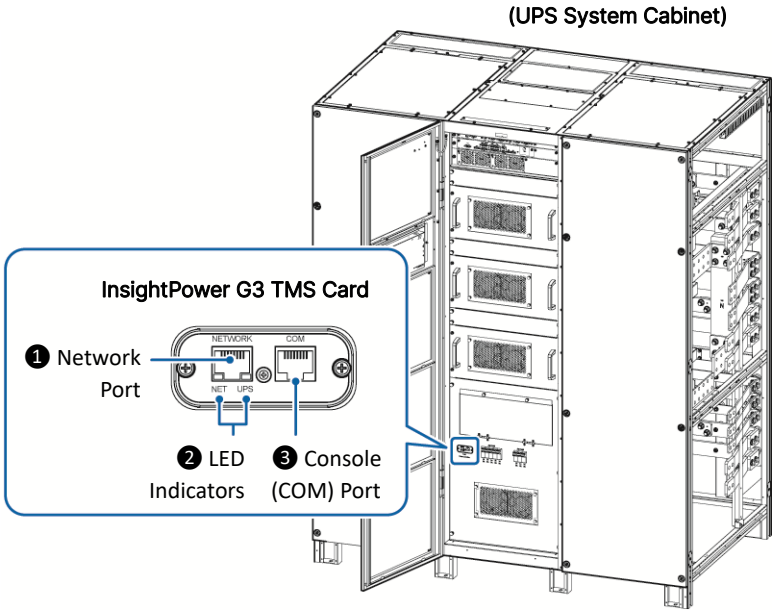


Figure 4-28: InsightPower G3 TMS Card

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 information regarding the external maintenance bypass cabinet, 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 the floor weight loading information.

Table 5-1: UPS Floor Weight Loading Table

UPS Capacity	1000kVA/ 1000kW		1250kVA/ 1250kW	
–	Weight	Weight Loading	Weight	Weight Loading
UPS System Cabinet	900 kg (1984 lb)	551.6 kg/ m^2 (113 lb/ ft^2)	920 kg (2028 lb)	563.9 kg/ m^2 (115.5 lb/ ft^2)
Power Modules	1550 kg (3418 lb)	1101.4 kg/ m^2 (225.6 lb/ ft^2)	1916.3 kg (4224.7 lb)	1174.5 kg/ m^2 (240.6 lb/ ft^2)
UPS System Cabinet & Power Modules	2450 kg (5401.3 lb)	806.1 kg/ m^2 (165.1 lb/ ft^2)	2836.3 kg (6253 lb)	842.6 kg/ m^2 (172.6 lb/ ft^2)

- 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, Delta suggests that you:

  1. Keep a minimum distance of 1000 mm (39.4") from the front of the UPS for maintenance and ventilation.
  2. Keep a minimum distance of 1000 mm (39.4") from the top of the UPS for maintenance and wiring. If you install wind shields on the top of the UPS, please ensure that the openings of the wind shields are sufficient and try to minimize the length of the wind shields.

NOTE:

1. Dust filters have been installed on the inner side of the UPS's front doors before shipment.
2. The air inlet and outlet direction for 1000kVA UPS and 1250kVA UPS is the same. Below, the illustration of 1250kVA UPS will be used as an example.

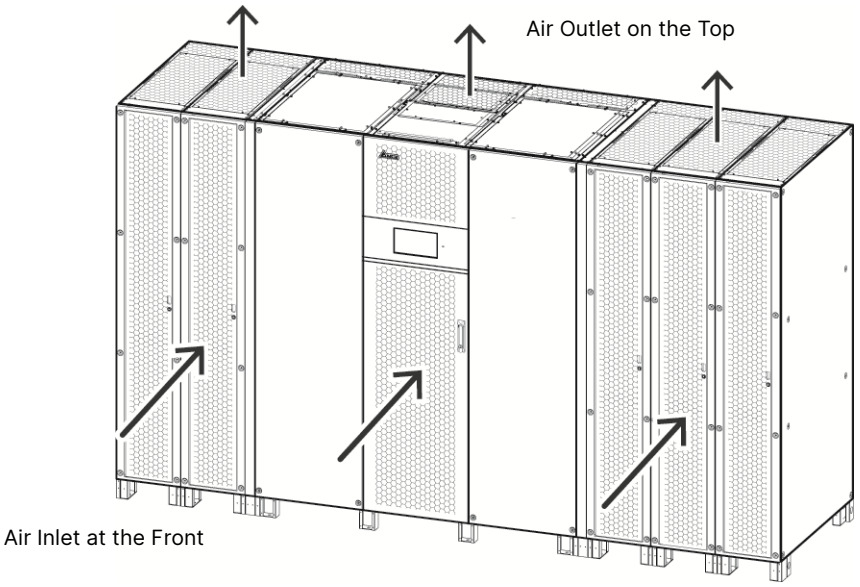


Figure 5-1: 1250kVA UPS_ Air Inlet & Outlet Direction

WARNING:

1. Do not use air conditioners or similar equipment to blow into the 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 25°C (77°F) and humidity within 90%. The highest operating altitude is 1000 m (3280 ft) above sea level.
- For safety concerns, Delta recommends the following:
  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 from noncombustible materials.
- Do not allow unauthorized personnel entering the installation area and assign specified personnel to keep the UPS keys.

5.3 UPS Installation

NOTE:

1. Please use appropriate equipment (e.g. forklift) to move the UPS.
2. The installation procedures for 1000kVA UPS and 1250kVA UPS are the same. For some steps mentioned in this chapter, 1250kVA UPS will be used as an example.

Please follow the steps below:

Step 1

Before installing the UPS in a designated installation area, please confirm whether the area has sufficient floor weight loading to bear the UPS, external battery cabinet(s) and handling equipment (e.g. forklift) to avoid accidents. Please refer to *Table 5-1*.

Step 2

Move the UPS system cabinet and the power modules to the designated installation area.

(UPS System Cabinet)

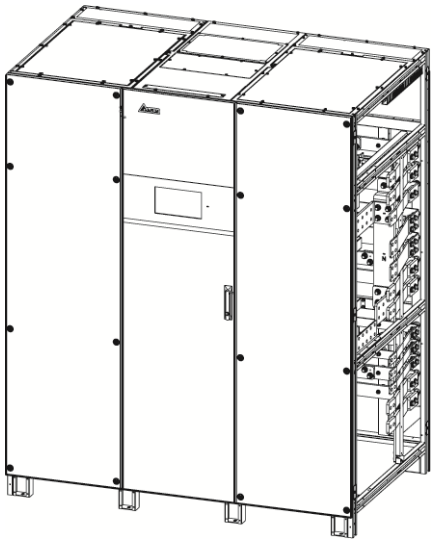


Figure 5-2: 1000/ 1250kVA UPS_ UPS System Cabinet

(Power Modules)

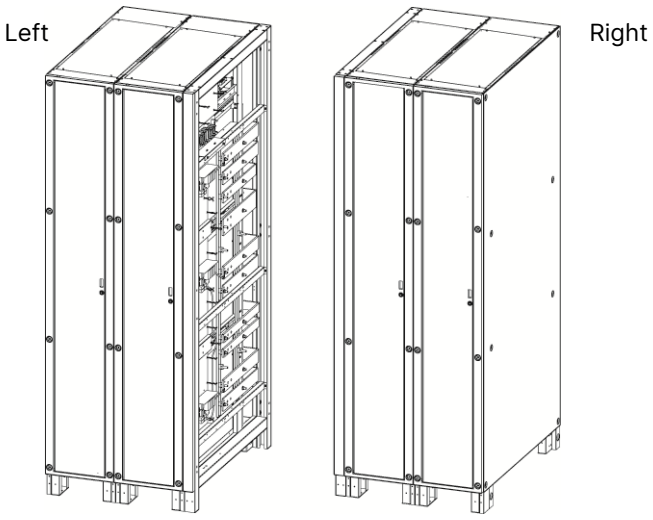


Figure 5-3: 1000kVA UPS_ Power Modules

(Power Modules)

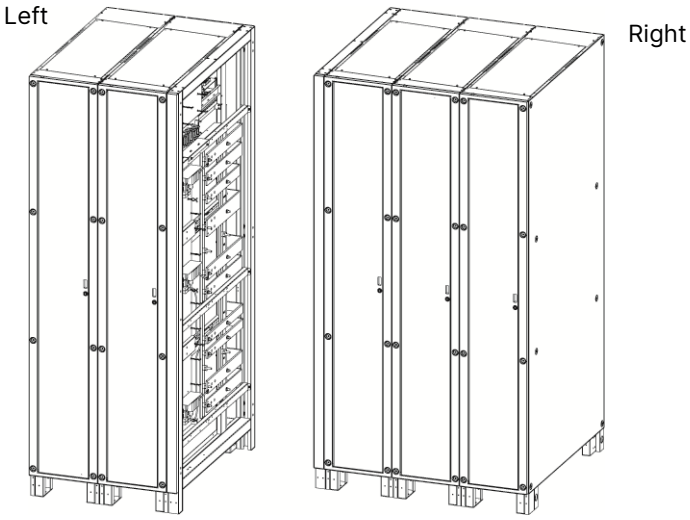


Figure 5-4: 1250kVA UPS_ Power Modules

Step 3

Use the provided M10 screws (tightening torque: 250 ± 10 kgf-cm (217 ± 8 lb-in)) to join the UPS system cabinets and power modules. The joining points are shown in the figure below.

(Joining Points for the UPS System Cabinet & Power Modules)

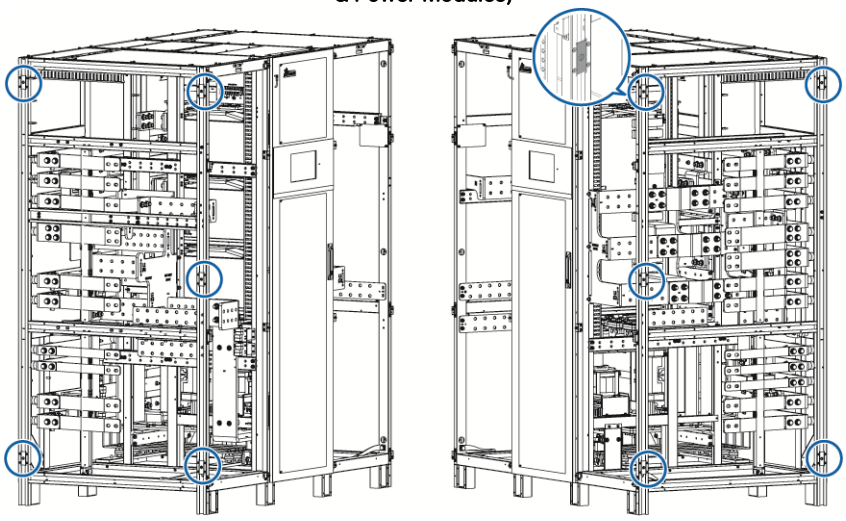


Figure 5-5: 1000/ 1250kVA UPS_ Joining Points for the UPS System Cabinet & Power Modules

Step 4

Fix the balance brackets located at the bottom of the UPS on the ground firmly to avoid UPS movement. Each balance bracket requires a M12 expansion screw (provided by qualified service personnel).

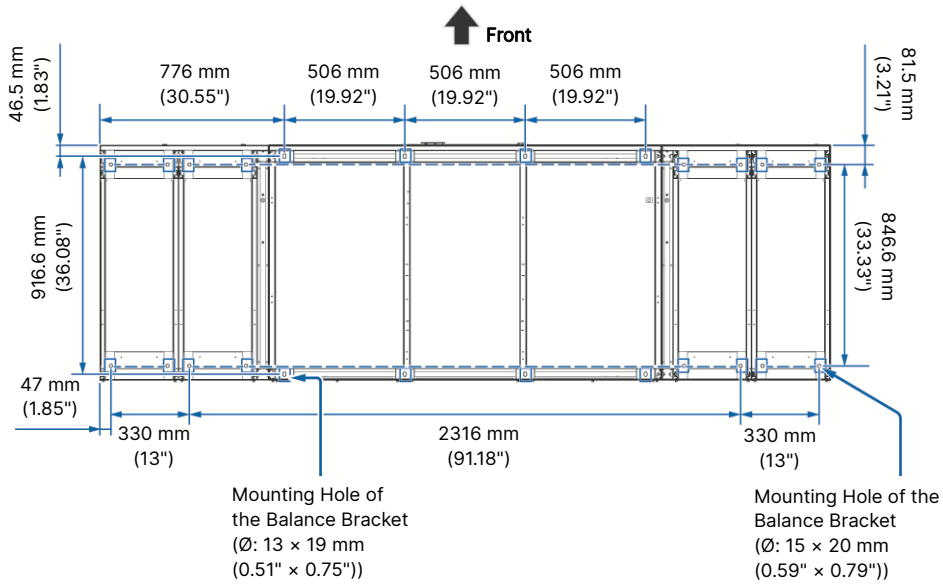


Figure 5-6: 1000kVA UPS_ Cabinet Floor Fixing Points

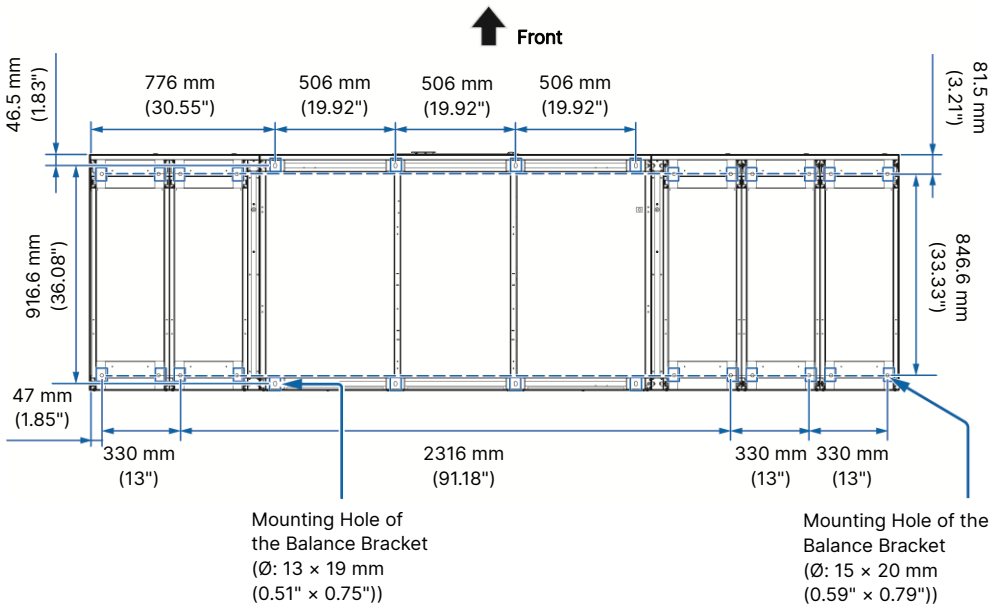


Figure 5-7: 1250kVA UPS_ Cabinet Floor Fixing Points

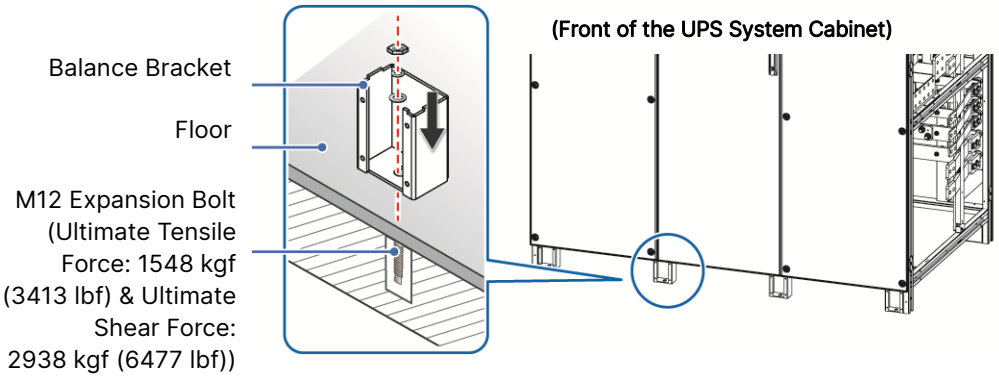


Figure 5-8: Fix the Balance Brackets on the Ground_ UPS System Cabinet

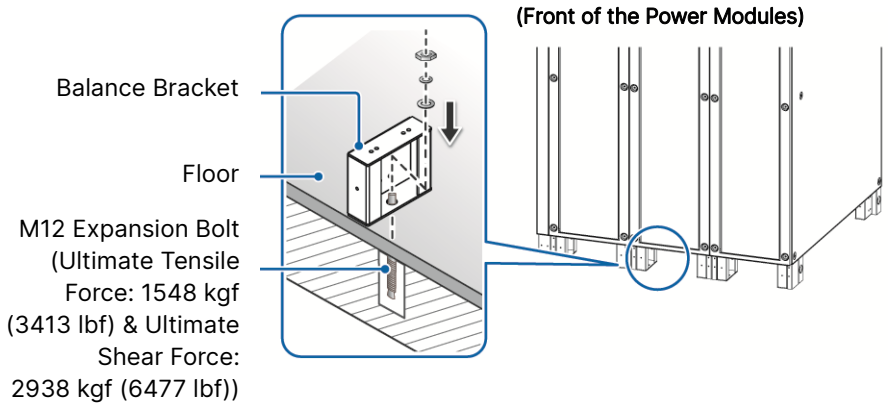


Figure 5-9: Fix the Balance Brackets on the Ground_ Power Modules

WARNING:

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

Step 5

Unscrew the sixteen screws to remove the left and right front doors (❶ & ❷) as shown in ***Figure 5-10***. Use the provided forty-eight M12 screws to connect the provided seventeen bus bars (❸) on the right and left sides (see ***Figure 5-11)***. Twenty screws are used on the left side and twenty-six on the right. After the above connection is completed, fasten two screws on the soft copper bus bars at the right and left corners between the UPS system cabinet and power module as shown in ***Figure 5-12***.

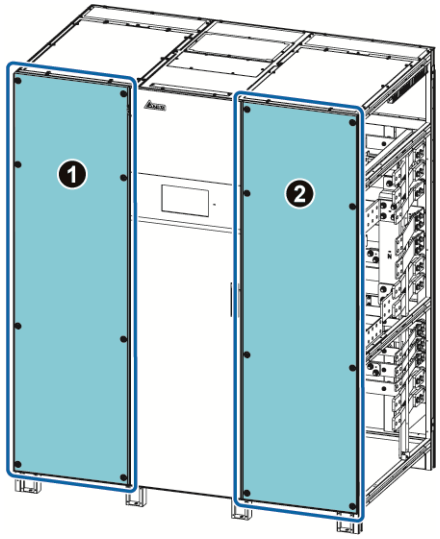


Figure 5-10: 1250kVA UPS _ Remove the Sixteen Screws to Open the Two Front Doors

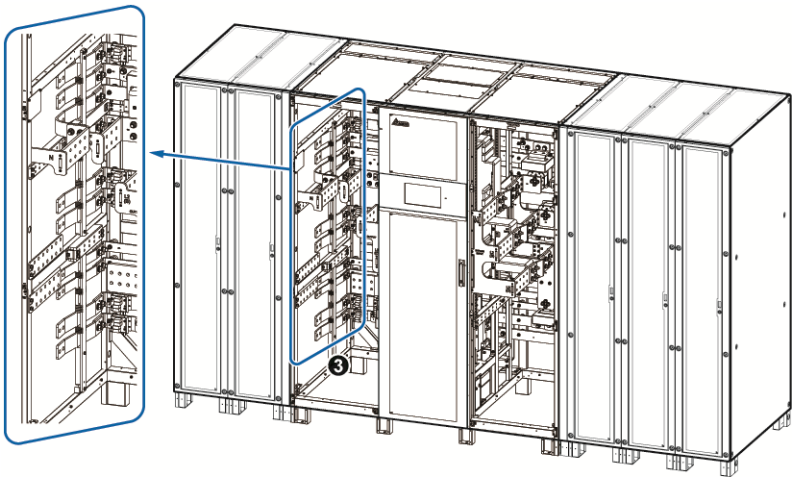


Figure 5-11: 1250kVA UPS_ Fasten the Screws on the Bus Bars

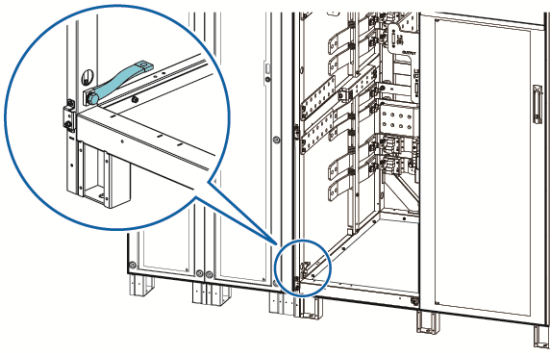
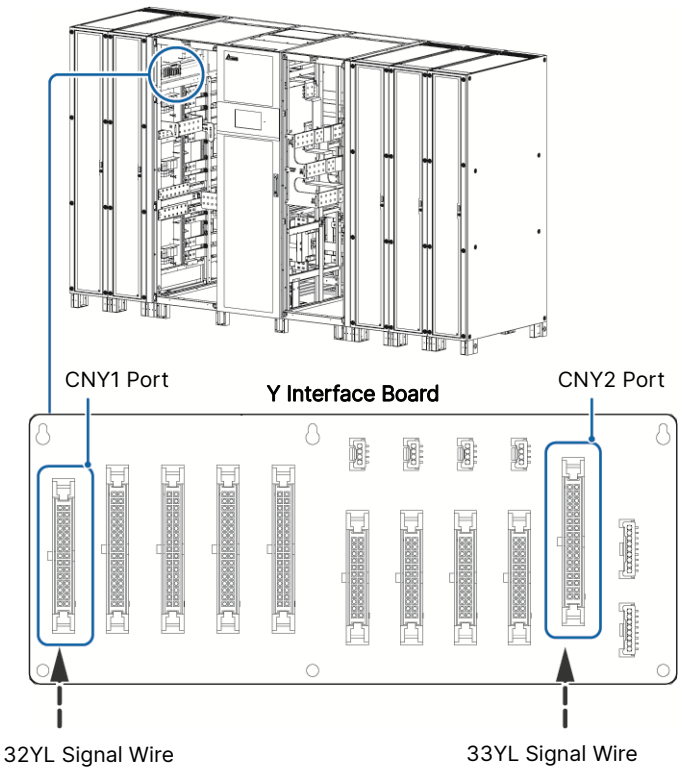


Figure 5-12: 1250kVA UPS_ Fasten A Screw on the Soft Copper Bus Bar

Step 6

Connect the four signal wires located at the upper left and right of the UPS system cabinet to the four CNY ports located at the power modules' Y interface boards. Please refer to the figures below.

1. Connect the 32YL signal wire to the CNY1 port.
2. Connect the 33YL signal wire to the CNY2 port.
3. Connect the 32YR signal wire to the CNY1 port.
4. Connect the 33YR signal wire to the CNY2 port.



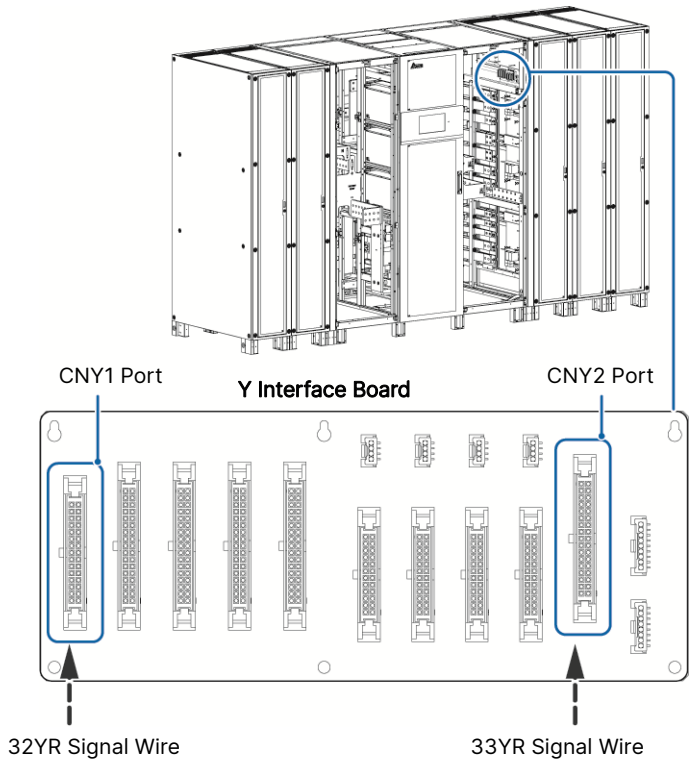


Figure 5-13: 1250kW UPS_ Connect the Four Signal Wires to the Four CNY Ports

Step 7

It is suggested that you install the external maintenance bypass cabinet (user-supplied, handled and configured by Delta service personnel) next to the UPS or align it with the UPS for convenient operation.

Step 8

Follow the instructions in ***4.3 Cable Routing for the Communication Interfaces*** and ***5.4 Wiring*** to perform wiring between the UPS system cabinet and the external maintenance bypass cabinet. 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 cabinet(s) to avoid foreign materials falling into the UPS. After that, reinstall the removed panels and close the front doors if necessary.

Step 9

After completing the above steps, please refer to ***5.6 Installation of Rodent Shields*** to install the rodent shields.

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 information regarding the external maintenance bypass cabinet, please refer to *1.2 Connection Warnings*.
5. During wiring procedures, please protect the UPS from foreign materials falling into the cabinet(s).

- Before wiring or making any electrical connection, make sure that the power supplied to the input and output of the UPS is cut off completely.
- Check if the size, diameter, phase and polarity are correct for each cable connected to the UPS, external battery cabinet(s) or external maintenance bypass cabinet. Please refer to *Table 5-2* and *Table 5-3*.

NOTE:

Table 5-2 and *Table 5-3* is based on (1) default input/ output voltage: 220/ 380V, (2) default battery Q'ty: 40 PCS and (3) maximum charge current. For other conditions different from *Table 5-2* and *Table 5-3*, please contact Delta service personnel for relevant values.

Table 5-2: Specifications of Input/ Output/ Battery Cables (Copper) and Breakers

UPS Capacity			1000kVA/ 1000kW	1250kVA/ 1250kW
Input	Nominal current at 380V		1575A	1968A
	Maximum input current*1		1811A	2263A
	Input current limitation*2		1762A	2203A
	Recommended cable size*3	(L1/ L2/ L3/ N*6)	240 mm^2 × 5 PCS (500 kcmil × 5 PCS)	240 mm^2 × 6 PCS (500 kcmil × 6 PCS)

UPS Capacity			1000kVA/ 1000kW	1250kVA/ 1250kW
Input (continued)	Maximum cable size*3	(L1/ L2/ L3/ N*6)	240 mm² × 8 PCS (500 kcmil × 8 PCS)	240 mm² × 8 PCS (500 kcmil × 8 PCS)
	Maximum cable lug width		55 mm (2.16")	
	Screw size/ Cable lug inner diameter		M12/ 14 mm (0.55")	
	Terminal type*4		TLAPH250-2A12	
Bypass	Rated current at 380V		1535A	1928A
	Recommended cable size*3	(L1/ L2/ L3/ N*6)	240 mm² × 4 PCS (500 kcmil × 4 PCS)	240 mm² × 5 PCS (500 kcmil × 5 PCS)
	Maximum cable size*3	(L1/ L2/ L3/ N*6)	240 mm² × 8 PCS (500 kcmil × 8 PCS)	240 mm² × 8 PCS (500 kcmil × 8 PCS)
	Maximum cable lug width		55 mm (2.16")	
	Screw size/ Cable lug inner diameter		M12/ 14 mm (0.55")	
	Terminal type*4		TLAPH250-2A12	
Output	Rated current at 380V		1519A	1899A
	Recommended cable size*3	(L1/ L2/ L3/ N*6)	240 mm² × 4 PCS (500 kcmil × 4 PCS)	240 mm² × 5 PCS (500 kcmil × 5 PCS)
	Maximum cable size*3	(L1/ L2/ L3/ N*6)	240 mm² × 8 PCS (500 kcmil × 8 PCS)	240 mm² × 8 PCS (500 kcmil × 8 PCS)
	Maximum cable lug width		55 mm (2.16")	
	Screw size/ Cable lug inner diameter		M12/ 14 mm (0.55")	
	Terminal type*4		TLAPH250-2A12	

UPS Capacity			1000kVA/ 1000kW	1250kVA/ 1250kW
Battery	Nominal discharge current (condition: 2V per cell)		2159A	2699A
	Maximum discharge current (condition: 1.75V per cell)		2467A	3084A
	Recommended cable size*3	(+/ -)	70 mm^2 × 16 PCS (3/0 AWG × 16 PCS)	70 mm^2 × 16 PCS (3/0 AWG × 16 PCS)
	Maximum cable size*3	(+/ -)	70 mm^2 × 20 PCS (3/0 AWG × 20 PCS)	70 mm^2 × 20 PCS (3/0 AWG × 20 PCS)
	Maximum cable lug width		36 mm (1.42")	
	Screw size/ Cable lug inner diameter		M12/ 14 mm (0.55")	
	Terminal type*4		TCL70-2A	
Conduit Size			76.2 mm (3”)	
Cable Q’ty			3 PCS per conduit	
Tightening Torque			M12 = 500 ± 20 kgf-cm (434 ± 17.4 lb-in)	
External Maintenance Bypass Cabinet’s Input Breaker (Q1)*5			2000A	2500A
External Maintenance Bypass Cabinet’s Bypass Breaker (Q2)*5			1600A	2000A
External Maintenance Bypass Cabinet’s Manual Bypass Breaker (Q3)*5			1600A	2000A
External Maintenance Bypass Cabinet’s Output Breaker (Q4)*5			1600A	2000A

Table 5-3: Specifications of Input/ Output/ Battery Cables (Aluminum) and Breakers

UPS Capacity			1000kVA/ 1000kW	1250kVA/ 1250kW
Input	Nominal current at 380V		1575A	1968A
	Maximum input current*1		1811A	2263A
	Input current limitation*2		1762A	2203A
	Recommended cable size*3	(L1/ L2/ L3/ N*6)	240 mm^2 × 6 PCS (500 kcmil × 6 PCS)	240 mm^2 × 8 PCS (500 kcmil × 8 PCS)
	Maximum cable size*3	(L1/ L2/ L3/ N*6)	240 mm^2 × 8 PCS (500 kcmil × 8 PCS)	240 mm^2 × 8 PCS (500 kcmil × 8 PCS)
	Maximum cable lug width		55 mm (2.16")	
	Screw size/ Cable lug inner diameter		M12/ 14 mm (0.55")	
	Terminal type*4		TLAPH250-2A12	
Bypass	Rated current at 380V		1535A	1928A
	Recommended cable size*3	(L1/ L2/ L3/ N*6)	240 mm^2 × 5 PCS (500 kcmil × 5 PCS)	240 mm^2 × 7 PCS (500 kcmil × 7 PCS)
	Maximum cable size*3	(L1/ L2/ L3/ N*6)	240 mm^2 × 8 PCS (500 kcmil × 8 PCS)	240 mm^2 × 8 PCS (500 kcmil × 8 PCS)
	Maximum cable lug width		55 mm (2.16")	
	Screw size/ Cable lug inner diameter		M12/ 14 mm (0.55")	
	Terminal type*4		TLAPH250-2A12	

UPS Capacity			1000kVA/ 1000kW	1250kVA/ 1250kW
Output	Rated current at 380V		1519A	1899A
	Recommended cable size*3	(L1/ L2/ L3/ N*6)	240 mm² × 5 PCS (500 kcmil × 5 PCS)	240 mm² × 6 PCS (500 kcmil × 6 PCS)
	Maximum cable size*3	(L1/ L2/ L3/ N*6)	240 mm² × 8 PCS (500 kcmil × 8 PCS)	240 mm² × 8 PCS (500 kcmil × 8 PCS)
	Maximum cable lug width		55 mm (2.16")	
	Screw size/ Cable lug inner diameter		M12/ 14 mm (0.55")	
	Terminal type*4		TLAPH250-2A12	
Battery	Nominal discharge current (condition: 2V per cell)		2159A	2699A
	Maximum discharge current (condition: 1.75V per cell)		2467A	3084A
	Recommended cable size*3	(+/ -)	70 mm² × 16 PCS (3/0 AWG × 16 PCS)	150 mm² × 16 PCS (300 kcmil ×16 PCS)
	Maximum cable size*3	(+/ -)	70 mm² × 20 PCS (3/0 AWG × 20 PCS)	150 mm² × 20 PCS (300 kcmil × 20 PCS)
	Maximum cable lug width		36 mm (1.42")	
	Screw size/ Cable lug inner diameter		M12/ 14 mm (0.55")	
	Terminal type*4		TLC70-2A	TLC150-2A
Conduit Size			76.2 mm (3”)	
Cable Q’ty			3 PCS per conduit	
Tightening Torque			M12 = 500 ± 20 kgf-cm (434 ± 17.4 lb-in)	
External Maintenance Bypass Cabinet’s Input Breaker (Q1)*5			2000A	2500A
External Maintenance Bypass Cabinet’s Bypass Breaker (Q2)*5			1600A	2000A
External Maintenance Bypass Cabinet’s Manual Bypass Breaker (Q3)*5			1600A	2000A

UPS Capacity	1000kVA/ 1000kW	1250kVA/ 1250kW
External Maintenance Bypass Cabinet's Output Breaker (Q4)*5	1600A	2000A

NOTE:

1. Please follow local regulations to install proper conduits and bushings for cable protection.
2. Please refer to national and local electrical codes for acceptable protective devices and cable sizes.
3. *1 At nominal input voltage and full charge.
4. *2 The value listed for input current limitation is 112% of the nominal input current based on limiting the charge power.
5. *3 Each cable size mentioned in *Table 5-2* and *Table 5-3* is based on (1) cable type XLPE with temperature resistance up to 90°C (194°F) at ambient temperature 30°C (86°F), and (2) IEC specifications for 40°C (104°F) ambient rated conductors.
6. *4 The suggested manufacturer is K.S. TERMINAL INC. You may use equivalent terminals provided by other manufacturers.
7. *5 The current is based on using 100% rated breakers.
8. *6 The N terminals are only for 3P4W application.

- 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, Delta suggests 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 and Dual Input Modification

NOTE:

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

Unscrew the eight M5 screws to remove the right front door of the UPS system cabinet. After that, you will see the wiring terminals.

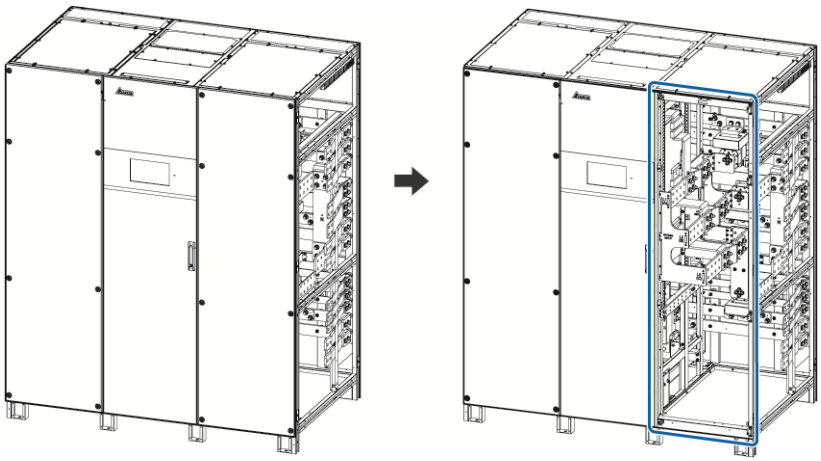


Figure 5-14: 1000/ 1250kVA UPS_ Remove the Right Front Door of the UPS System Cabinet

Step 2

There are three copper bars in total. Each copper bar has 8 M12 screws, 16 Belleville washers, 16 flat washers and 8 M12 nuts. Use a socket wrench to unscrew them in order to remove the three copper bars.

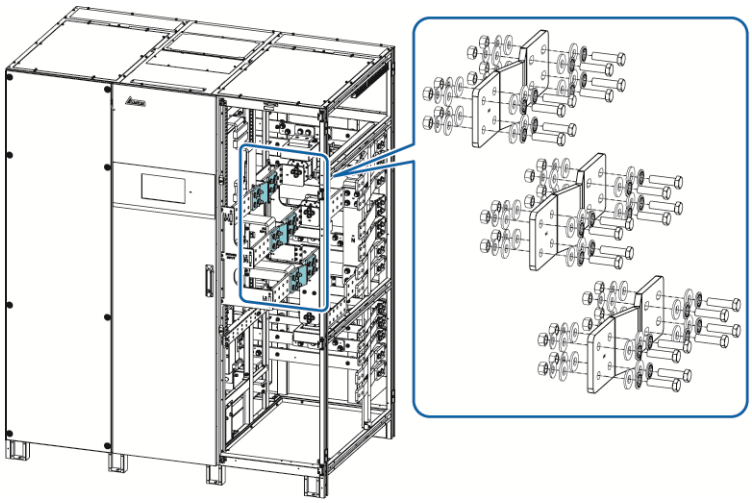


Figure 5-15: 1000/ 1250kVA UPS_ Remove the Three Copper Bars

Step 3

Firmly fix 4 M12 screws, 8 Belleville washers, 8 flat washers and 4 M12 nuts that you just removed to the designated bus bars shown in the figure below. Please note that the tightening torque should be M12= 500 ± 20 kgf-cm (434 ± 17.4 lb-in). After that, the dual input setup is completed.

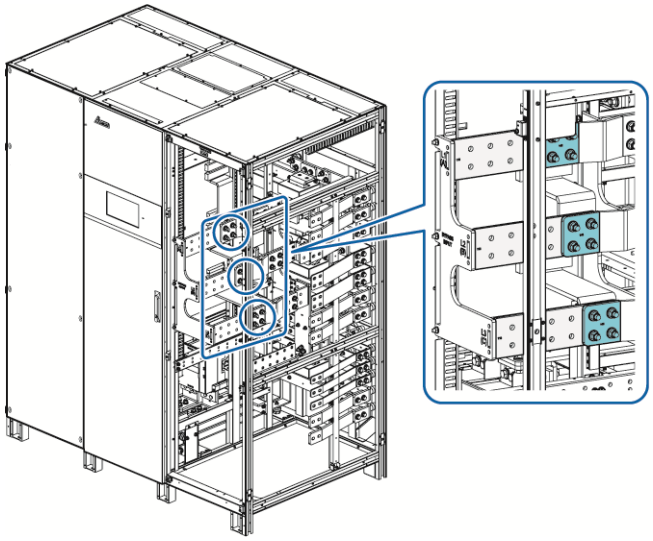


Figure 5-16: 1000/ 1250kVA UPS_ Fix the M12 Screws, Belleville Washers, Flat Washers and M12 Nuts to the Designated Bus Bars

NOTE:

If you want to modify the UPS from dual input into single input, please use the socket wrench to reinstall the three copper bars.

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 5-4*** and ***Table 5-5*** for information about the wiring terminals, breakers and wiring arrangement.

Table 5-4: UPS's Wiring Terminals & Wiring Information

No.	Item*1	Function
1	AC Input Terminals (L1/ L2/ L3/ N*2)	• **Single Input:** Connect the terminals to the external maintenance bypass cabinet's input breaker (Q1). • **Dual Input:** Connect the terminals to the external maintenance bypass cabinet's input breaker (Q1).
2	Bypass Input Terminals (L1/ L2/ L3/ N*2)	• **Single Input:** There is no need to connect to the Bypass Input Terminals. • **Dual Input:** Connect the terminals to the external maintenance bypass cabinet's bypass breaker (Q2).
3	UPS Output Terminals (L1/ L2/ L3/ N*2)	Connect the terminals to the external maintenance bypass cabinet's output breaker (Q4).
4	Battery Input Terminals (+/ -)	Connect the terminals to the external battery cabinet(s). Please contact Delta service personnel for battery configurations.
5	⏚ PE (protective earth) Terminal	Connect the terminal to the external maintenance bypass cabinet's GND terminal (⏚) and the external battery cabinet's PE terminal (⏚).

NOTE:

1. *1 The terminals listed in the above '**Item**' column are all located at the front of the UPS system cabinet. Please refer to *Figure 2-6*.
2. *2 The N terminals are only for 3P4W application

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

No.	Item*1	Function
1	Input Breaker (Q1) including L1/ L2/ L3 terminals	Connect the breaker to the main AC source.
2	Bypass Breaker (Q2) including L1/ L2/ L3 terminals (only for dual input application)	Connect the breaker to the bypass AC source.
3	Manual Bypass Breaker (Q3) including L1/ L2/ L3 terminals	• **Single Input:** Connect the breaker to the main AC source. • **Dual Input:** Connect the breaker to the bypass AC source.
4	Output Breaker (Q4) including L1/ L2/ L3 terminals	Connect the breaker 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 and terminals listed in the above '**Item**' column must be installed in the external maintenance bypass cabinet (user-supplied, handled and configured by Delta service personnel). 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 (Q1), Bypass Breaker (Q2), Manual Bypass Breaker (Q3) and the Output Breaker (Q4) are in the **OFF** position.

Step 2

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

Step 3

Follow **Table 5-2** and **Table 5-3** 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.

- **Top Wiring**

A. For top wiring, remove the UPS system cabinet's right and left front doors and two top covers.

Remove the Two Top Covers

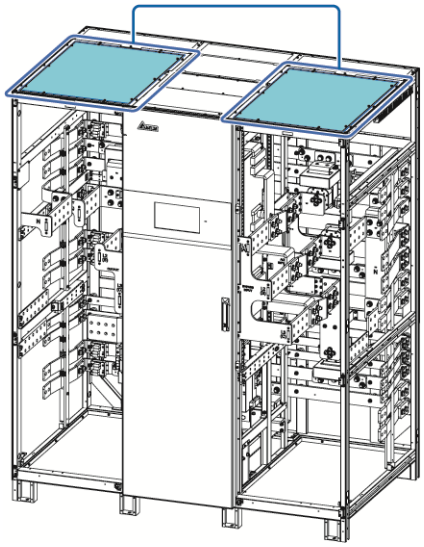


Figure 5-17: 1000/ 1250kVA UPS _ Remove the Right and Left Front Doors & Two Top Covers

B. Route the cables from the top of the cabinet and connect the cables to the wiring terminals.

Top Cable Entry

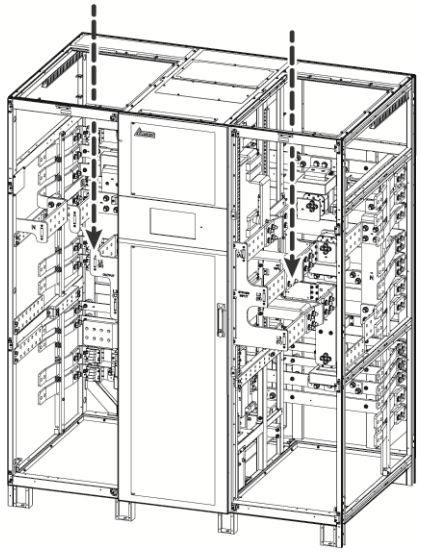
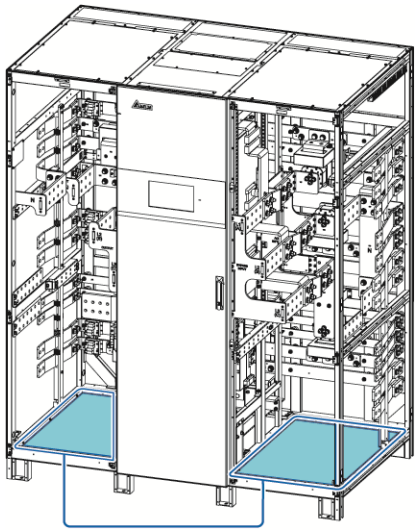


Figure 5-18: 1000/ 1250kVA UPS _ Top Cable Entry for the Wiring Terminals

- **Bottom Wiring**

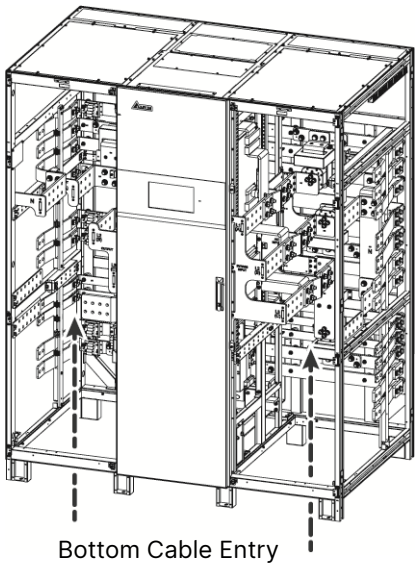
A. For bottom wiring, remove the UPS system cabinet's right and left front doors and two bottom covers.



Remove the Two Bottom Covers

Figure 5-19: 1000/ 1250kVA UPS _ Remove the Right and Left Front Doors & Two Bottom Covers

B. Route the cables from the bottom of the cabinet and connect the cables to the wiring terminals.



Bottom Cable Entry

Figure 5-20: 1000/ 1250kVA UPS _ Bottom Cable Entry for the Wiring Terminals

Step 5

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 5-4***, ***Table 5-5***, ***5.5 External Battery Cabinet Connection Warnings*** and the following diagram to perform wiring

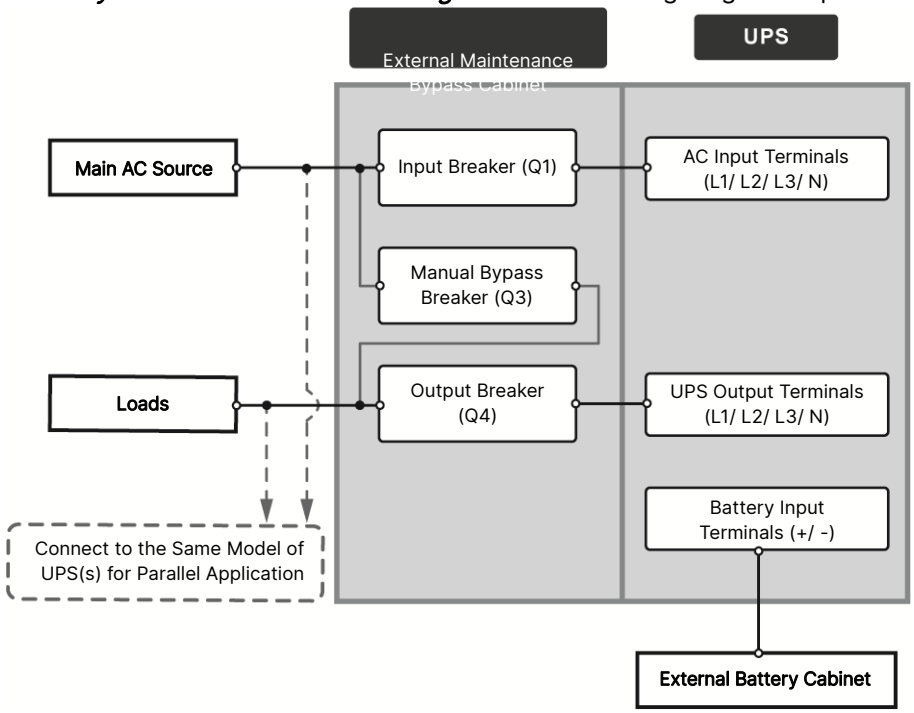


Figure 5-21: Single Unit Single Input Wiring Diagram

Step 6

Follow the table below to select proper Protective Earth (PE) cables to ground the UPS, external battery cabinet(s) and connected critical loads. The table is in accordance with **IEC 62477-1 Table 7**. The grounding diagram below is for reference.

UPS Capacity			1000kVA/ 1000kW	1250kVA/ 1250kW
Suggested PE Cable Size*1	Input	Copper	240 mm² × 3 PCS (500 kcmil ×3 PCS)	240 mm² × 3 PCS (500 kcmil ×3 PCS)
		Aluminum	240 mm² × 3 PCS (500 kcmil ×3 PCS)	240 mm² × 4 PCS (500 kcmil ×4 PCS)
	Bypass	Copper	240 mm² × 2 PCS (500 kcmil × 2 PCS)	240 mm² × 3 PCS (500 kcmil ×3 PCS)
		Aluminum	240 mm² × 3 PCS (500 kcmil ×3 PCS)	240 mm² × 4 PCS (500 kcmil ×4 PCS)

UPS Capacity			1000kVA/ 1000kW	1250kVA/ 1250kW
Suggested PE Cable Size*1 (continued)	Output	Copper	240 mm^2 × 2 PCS (500 kcmil × 2 PCS)	240 mm^2 × 3 PCS (500 kcmil ×3 PCS)
		Aluminum	240 mm^2 × 3 PCS (500 kcmil ×3 PCS)	240 mm^2 × 3 PCS (500 kcmil ×3 PCS)
	Battery	Copper	70 mm^2 × 8 PCS (3/0 kcmil ×8 PCS)	70 mm^2 × 8 PCS (3/0 kcmil ×8 PCS)
		Aluminum	70 mm^2 × 8 PCS (3/0 kcmil ×8 PCS)	150 mm^2 × 8 PCS (300 kcmil ×8 PCS)
Maximum Cable Lug Width			50 mm (1.97")	
Screw Size/ Cable Lug Inner Diameter			M12/ 14 mm (0.55")	
Tightening Torque			M12 = 500 ± 20 kgf-cm (434 ± 17.4 lb-in)	
Terminal Type*2			70 mm^2 (3/0 kcmil): TCL70-2A 150 mm^2 (300 kcmil): TCL150-2A 240 mm^2 (500 kcmil): TLAPH250-2A12	

NOTE:

1. *1 Each cable size mentioned in the table above is based on (1) cable type XLPE with temperature resistance up to 90°C (194°F) at ambient temperature 30°C (86°F) and (2) IEC specifications for 40°C (104°F) ambient rated conductors.
2. *2 The suggested manufacturer is K.S. TERMINAL INC. You may use equivalent terminals provided by other manufacturers.

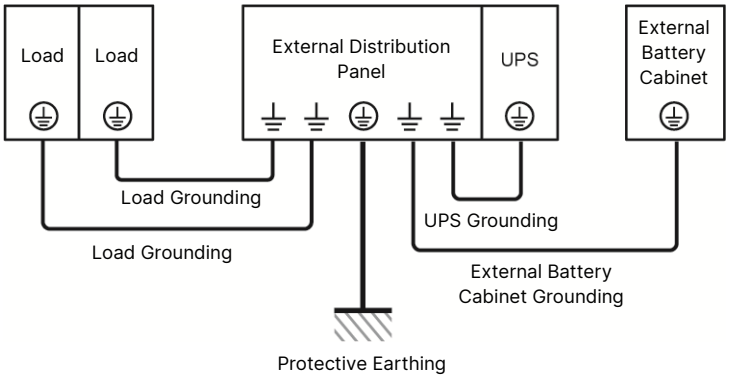


Figure 5-22: Grounding Diagram_ Single Unit

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 and Dual Input Modification* to modify the UPS from single input to dual input.

Step 2

Follow **Step 1 ~ Step 4** 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 5-4, Table 5-5,*, *5.5 External Battery Cabinet Connection Warnings* and the following diagrams to perform wiring.

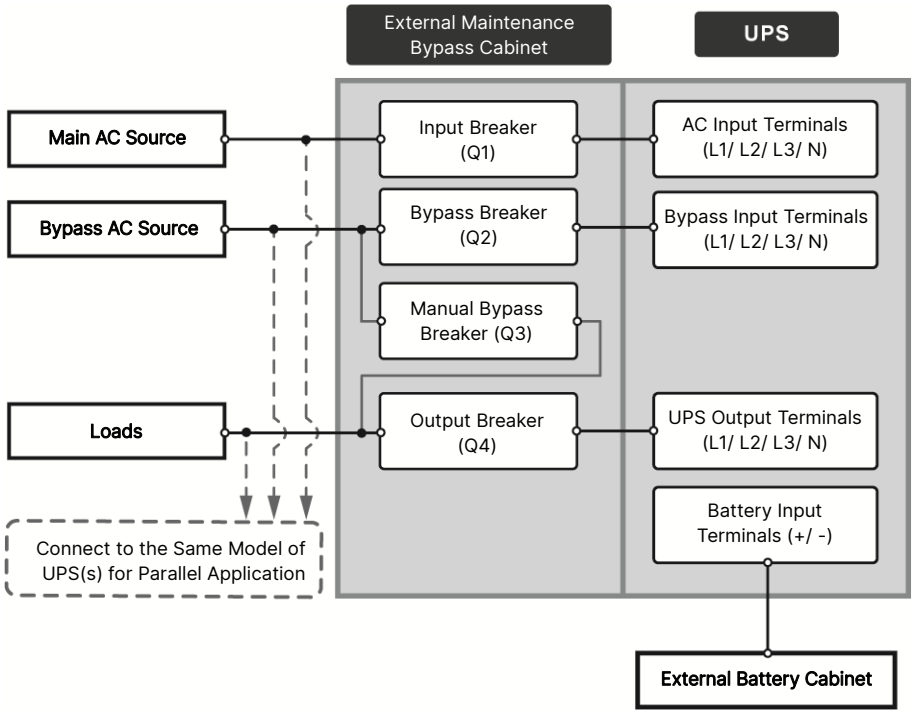


Figure 5-23: Single Unit Dual Input Wiring Diagram

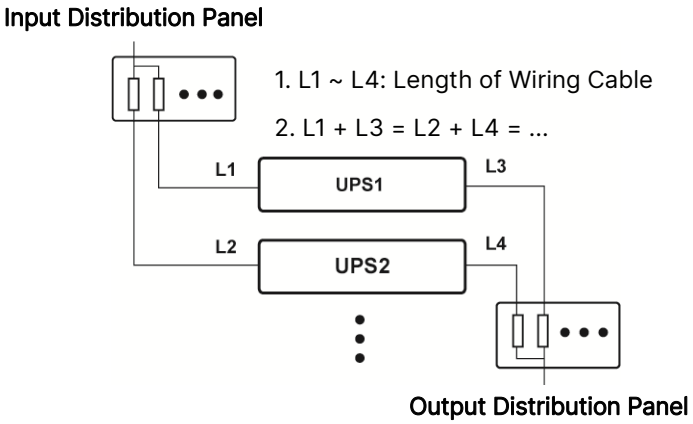
Step 4

Follow **Step 6** mentioned in ***5.4.3.1 Single Input (Single Unit)*** and refer to ***Figure 5-22*** to ground the UPS, external battery cabinet(s) and connected critical loads.

5.4.4 Parallel Units Wiring

NOTE:

1. For 1000kVA UPS, you can parallel up to 8 UPS system cabinets, and each UPS system cabinet can connect to up to 4 power modules for redundancy and capacity expansion. For 1250kVA UPS, you can parallel up to 8 UPS system cabinets, and each UPS system cabinet can connect to up to 5 power modules for redundancy and capacity expansion.
2. Only UPSs with the same capacity, voltage, frequency and version can be paralleled. Please only use the provided parallel cable to parallel UPS units. Otherwise, the parallel function will fail.
3. When the UPSs are paralleled, the length of each unit's bypass input cables and output cables must be the same. This ensures that the parallel UPSs can equally share the critical loads in Bypass mode.



4 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)***. As for the grounding diagram, please refer to ***Figure 5-25*** rather than ***Figure 5-22***.

For dual input, follow ***Step 1 ~ Step 4*** mentioned in ***5.4.3.2 Dual Input (Single Unit)***. As for the grounding diagram, please refer to ***Figure 5-25*** rather than ***Figure 5-22***.

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 4-2***. For top or bottom cable entry, refer to ***4.3 Cable Routing for the Communication Interfaces***.

NOTE:

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

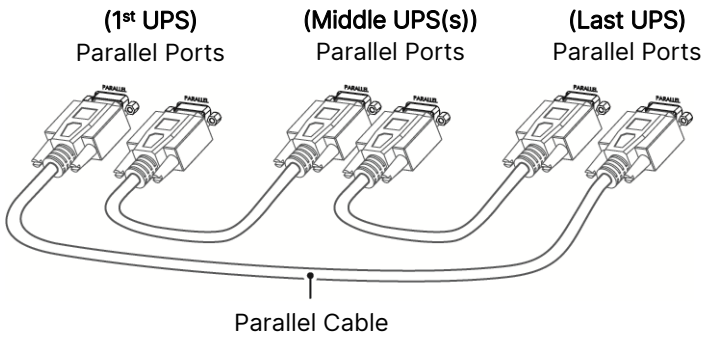


Figure 5-24: Parallel Port Connection_ Daisy Chain Method

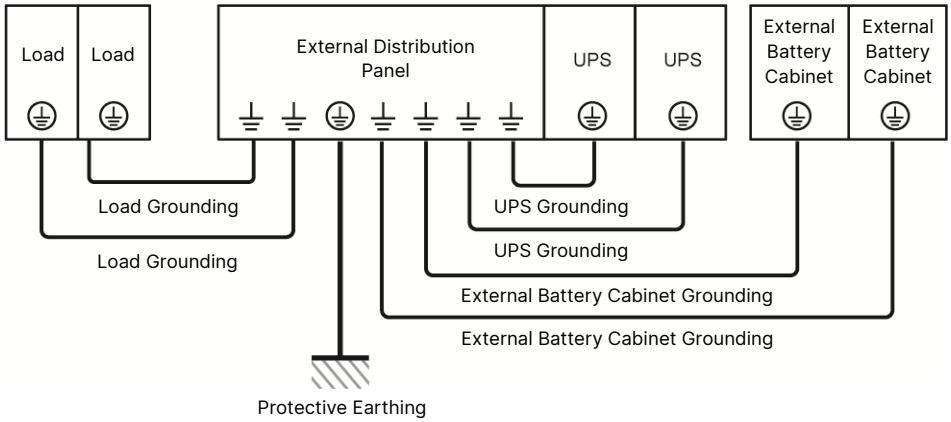


Figure 5-25: Grounding Diagram_ Parallel Units

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 lead-acid batteries or 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 ten 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 the initial use of UPS. The charging procedures are as follows.

  1. (A) Connect the UPS to the external maintenance bypass cabinet (user-supplied, handled and configured by Delta service personnel) 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 charged automatically.

     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*** and ***Figure 5-26.***
- For the external battery cabinet's grounding information, please refer to ***Figure 5-22*** and ***Figure 5-25***.
- **Battery Parameters:**

No.	Item	1000kVA/ 1000kW	1250kVA/ 1250kW
1	Charge Voltage	Float voltage: 544 Vdc (default)	
		Boost voltage: 560 Vdc (default)	
2	Charge Current	Minimum: 10A	
		Maximum: 500A	Maximum: 625A
3	Low Battery Shutdown Voltage	326 ~ 506 Vdc (default: 420 Vdc)	
4	Battery Quantity	12V × 40 PCS (default)	

NOTE:

1. If you need to modify the charge current default setting and low battery shutdown default setting, please contact your local dealer or service personnel.
2. Follow on-site requirements to choose 12V × 34 ~ 46 PCS of batteries. Changing the battery quantity will influence specifications to be applied. For battery selection, installation and replacement, please contact your local dealer or customer service.
3. You must set up the '**Battery Rating Voltage**', '**Battery Strings**' and '**Capacity**' on the LCD according to on-site conditions; otherwise, batteries will be over-charged, not fully charged or 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.
- The default battery quantity is 40 PCS of 12V batteries connected in series. You should use battery cables to connect the external battery cabinet(s) with the '+' and '-' terminals marked on the UPS system cabinet.

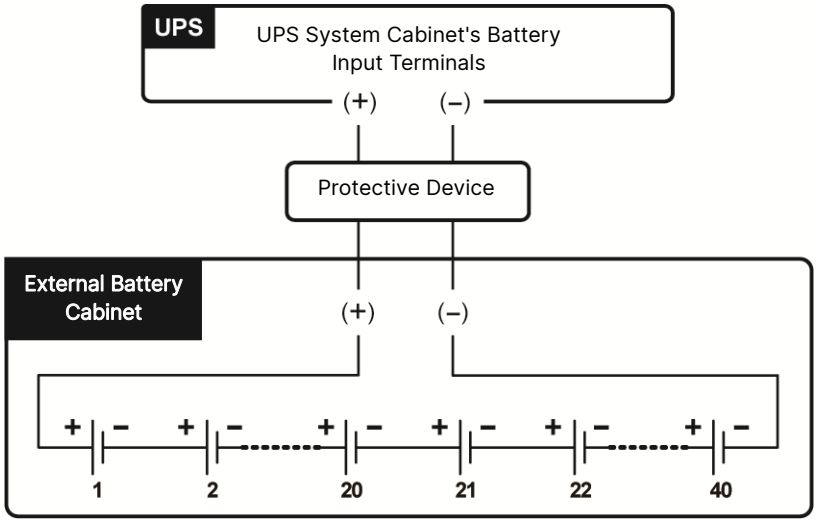


Figure 5-26: External Battery Cabinet Connection

WARNING:

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

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

Please follow your UPS rating to install an appropriate protective device for each external battery cabinet. Please refer to *Table 5-6* and *Figure 5-27~ Figure 5-32*.

Table 5-6: External Battery Cabinet's Protective Device (Default Battery Q'ty: 12 Vdc × 40 PCS)

UPS Capacity	DC Circuit Breaker or DC Isolated Switch (Final Positive and Negative Poles' Voltage ≥ 600 Vdc)	DC Fuse (Voltage ≥ 600 Vdc)
1000kVA/ 1000kW	2500A	2500A × 2 PCS
1250kVA/ 1250kW	3200A	3200A × 2 PCS

NOTE:

1. *Table 5-6* is for 12 Vdc × 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 values.
2. If you need to parallel multiple units of external battery cabinets, please contact Delta service personnel for relevant information.
3. To extend the backup time, you can parallel up to ten units of external battery cabinets to the UPS. Please note that (1) the number of batteries in each paralleled external battery cabinet shall be the same and that (2) the cable length of each battery string shall be the same.

- 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, follow the instructions below.

  (1) The protective device's rated current must comply with the current values shown in *Table 5-6*.

  (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 5-6*. Besides, the response time of the protective device must be less than 20 ms.

  (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 5-6*. 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 50 kA. Please confirm that the interrupting rating of your chosen protective device is sufficient.

External Battery Cabinet's Protective Device (Option 1)

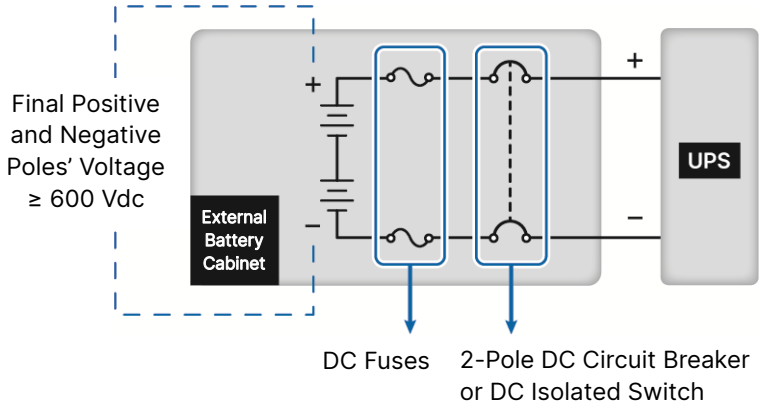


Figure 5-27: Installation of a 2-pole DC Circuit Breaker or DC Isolated Switch Connected in Series with Two DC Fuses

External Battery Cabinet's Protective Device (Option 2)

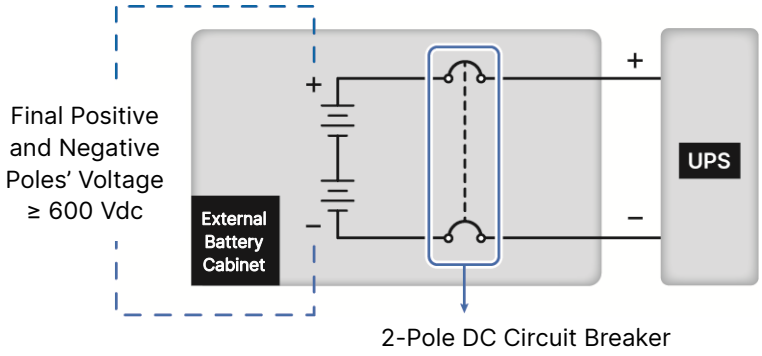


Figure 5-28: Installation of a 2-pole DC Circuit Breaker

External Battery Cabinet's Protective Device (Option 3)

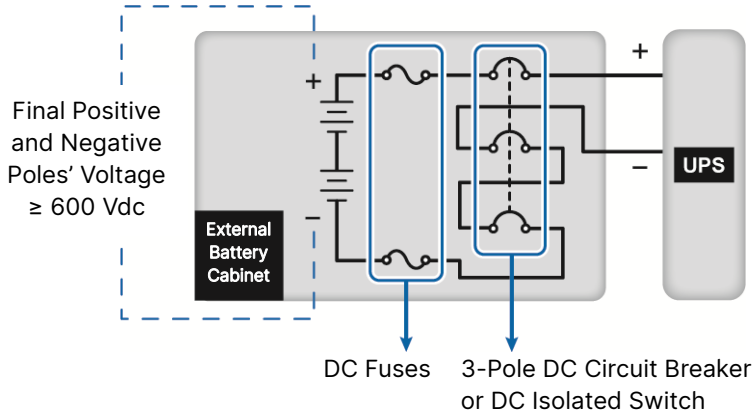


Figure 5-29: Installation of a 3-pole DC Circuit Breaker or DC Isolated Switch Connected in Series with Two DC Fuses

External Battery Cabinet's Protective Device (Option 4)

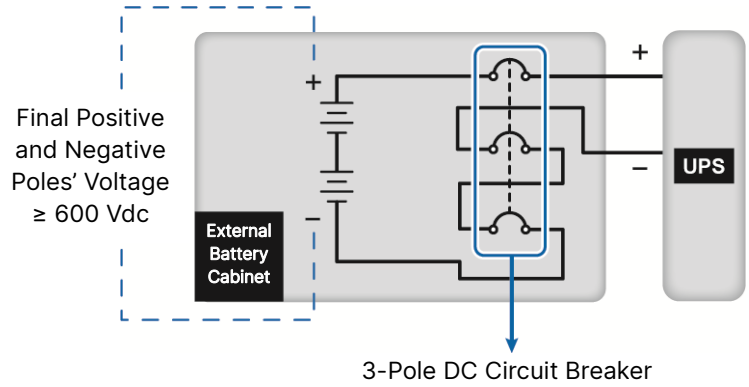


Figure 5-30: Installation of a 3-pole DC Circuit Breaker

External Battery Cabinet's Protective Device (Option 5)

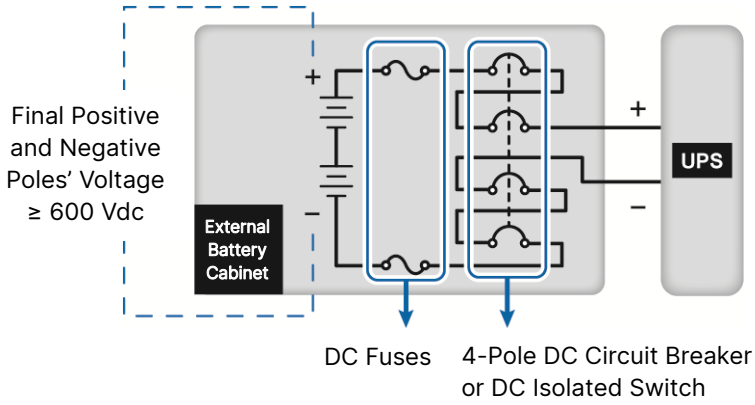


Figure 5-31: Installation of a 4-pole DC Circuit Breaker or DC Isolated Switch Connected in Series with Two DC Fuses

External Battery Cabinet's Protective Device (Option 6)

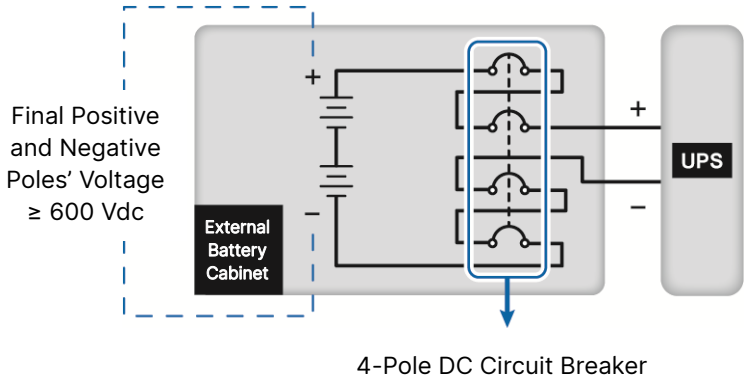


Figure 5-32: Installation of a 4-pole DC Circuit Breaker

- **Common Battery (Only for Parallel UPSs Sharing the Same External Battery Cabinet(s))**

To save on your cost and installation space, the parallel UPSs can share the connected external battery cabinet(s). See ***Figure 5-33*** 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.

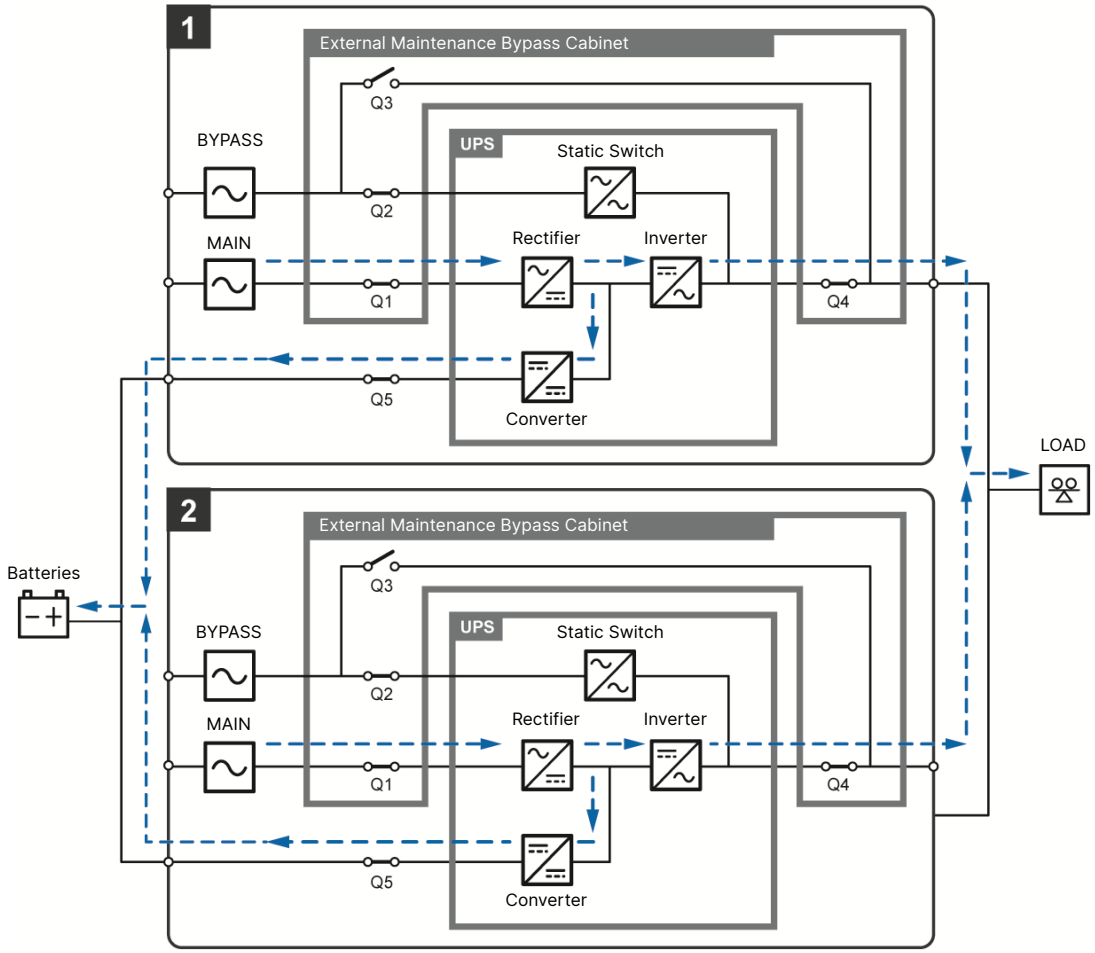


Figure 5-33: Common Battery Diagram

- **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	It sounds 0.5 seconds every second.
2	Battery Ground Fault	It sounds 0.5 seconds every second.
3	Battery Over Temperature	It sounds 0.5 seconds every second.
4	Battery Under Temperature	It sounds 0.5 seconds every second.
5	Battery Breaker Off	It sounds 0.5 seconds every 3 seconds.
6	Battery Disconnected (Missing)	It sounds once every second.

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

5.6 Installation of Rodent Shields

To prevent possible damage from rodents, please install the rodent shields (provided) at the bottom of the UPS.

Table 5-7: 1000kVA UPS_ Quantity of Rodent Shield and M5 Screw

Rodent Shield Type	A	B	C	D	E	G	H
Rodent Shield Quantity	1 PC	2 PCS	2 PCS	1 PC	2 PCS	2 PCS	4 PCS
M5 Screw Quantity	4 PCS	8 PCS	8 PCS	4 PCS	4 PCS	4 PCS	8 PCS

Table 5-8: 1250kVA UPS_ Quantity of Rodent Shield and M5 Screw

Rodent Shield Type	A	B	C	D	E	F	G	H
Rodent Shield Quantity	1 PC	2 PCS	2 PCS	1 PC	1 PC	1 PC	2 PCS	5 PCS
M5 Screw Quantity	4 PCS	8 PCS	8 PCS	4 PCS	2 PCS	4 PCS	4 PCS	10 PCS

NOTE:

The rodent shield installation methods for 1000kVA UPS and 1250kVA UPS are the same. Below, the illustration of 1250kVA UPS will be used as an example.

Step 1

Install the rodent shields at the front bottom of the UPS.

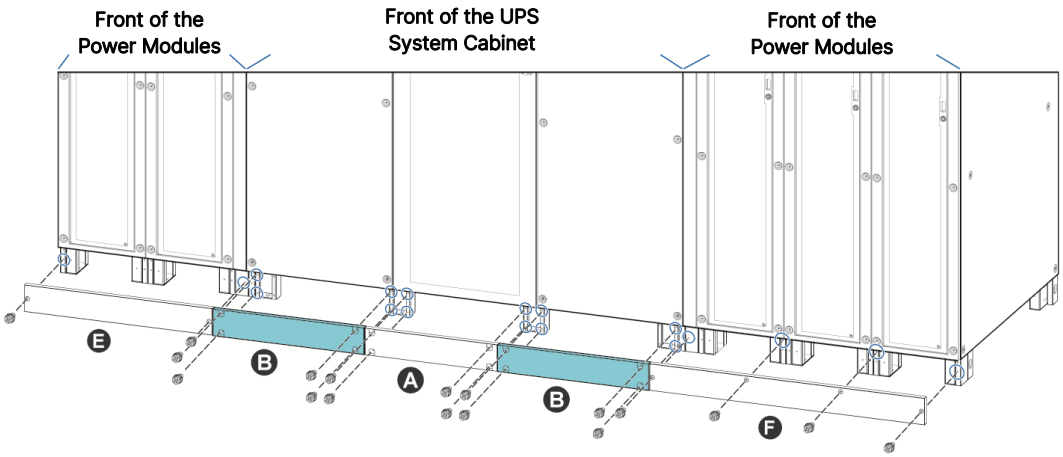
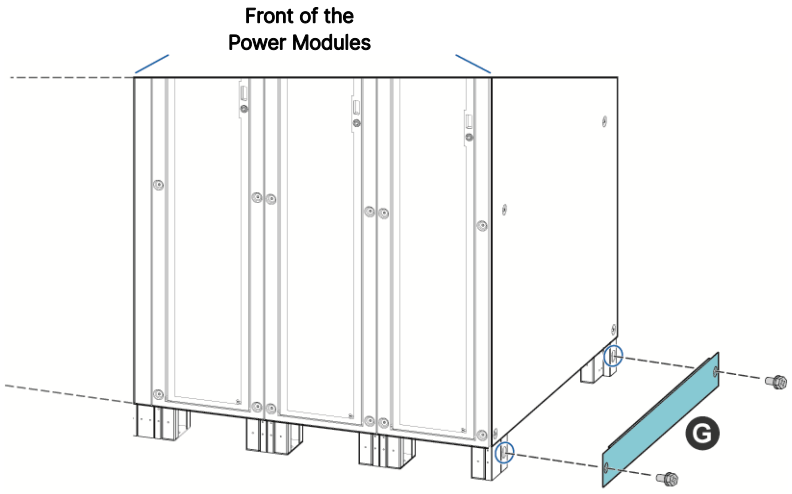


Figure 5-34: 1250kAV UPS _ Install the Rodent Shields at the Front Bottom

Step 2

Install the rodent shields at the bottom of two sides.



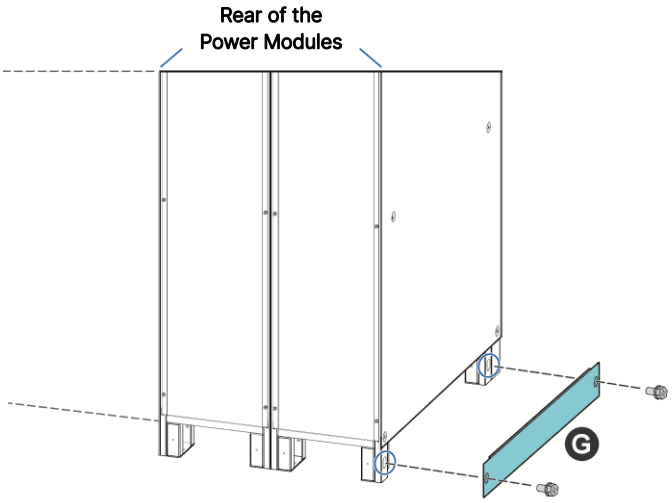


Figure 5-35: 1250kVA UPS _ Install the Rodent Shields at the bottom of Two Sides

Step 3

Install the rodent shields at the rear bottom of the UPS.

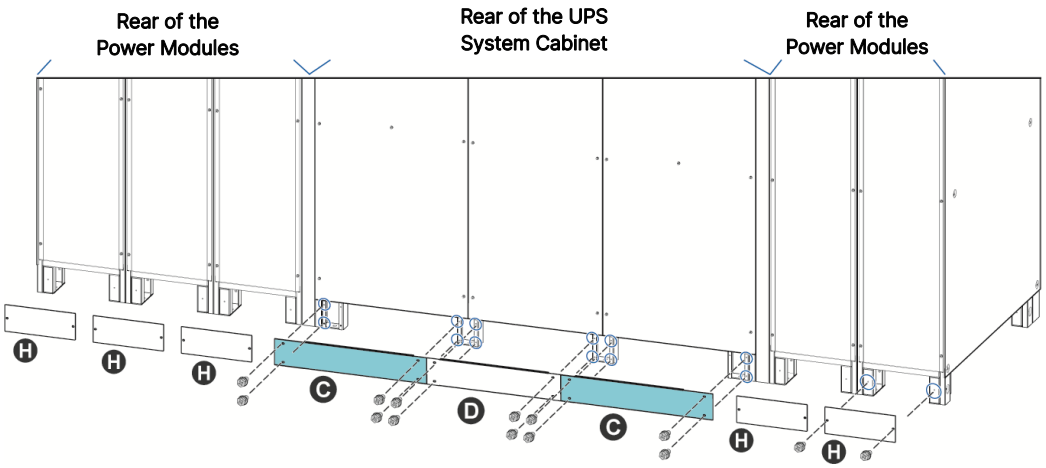


Figure 5-36: 1250kVA UPS _ Install the Rodent Shields at the Rear Bottom

5.7 Single-phase Power Supply for the External Auxiliary Power (Optional)

The power of the UPS INPUT terminals (including one set of L & N) comes from the UPS input. Via a transformer, the 380/ 400/ 415 Vac input power can be transferred to 220/ 230/ 240 Vac and 300 VA single-phase power.

As for the UPS OUTPUT terminals (including one set of L & N and two sets of L, N & G), their power is from the UPS output. Via a transformer, the 380/ 400/ 415 Vac output power can be transferred to 220/ 230/ 240 Vac and 300 VA single-phase power.

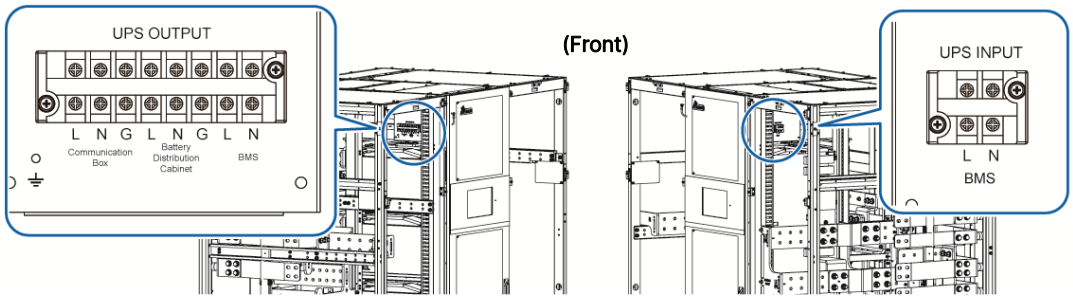


Figure 5-37: Location of the UPS INPUT & UPS OUTPUT Terminals

The protective devices for the above-mentioned UPS INPUT and UPS OUTPUT terminals are AC fuses, which are located at the front of UPS as shown in the figure below.

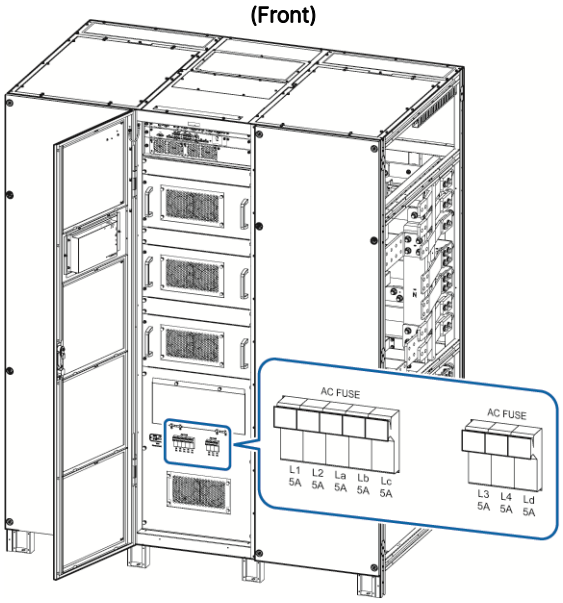


Figure 5-38: Location of the AC Fuses

The L3 and L4 fuses (5A/ 600V) are added between the UPS input and transformer, and the Ld fuse (5A/ 600V) is installed between the transformer and the UPS INPUT terminals (including one set of L & N), which should connect to the BMS.

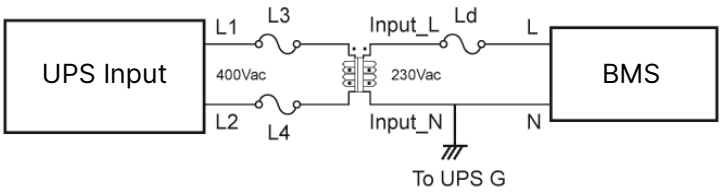


Figure 5-39: Layout of the L3, L4 & Ld Fuses

The L1 and L2 fuses (5A/ 600V) are added between the UPS output and transformer, and the La, Lb and Lc fuses (5A/ 600V) are installed between the transformer and the UPS OUTPUT terminals (including one set of L & N and two sets of L, N & G), which should connect to the BMS, battery distribution cabinet and communication box.

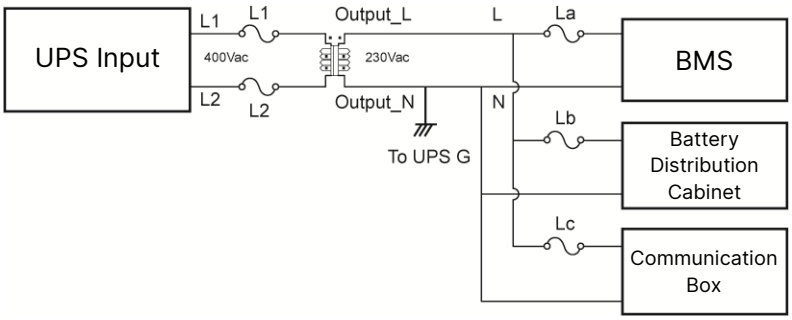


Figure 5-40: Layout of the L1, L2, La, Lb & Lc Fuses

5.8 Installation of TMS Sensor Cables (Optional)

Step 1

There is a total of twenty-six TMS sensor cables placed inside the UPS system cabinet. Please refer to the figure below for the location.

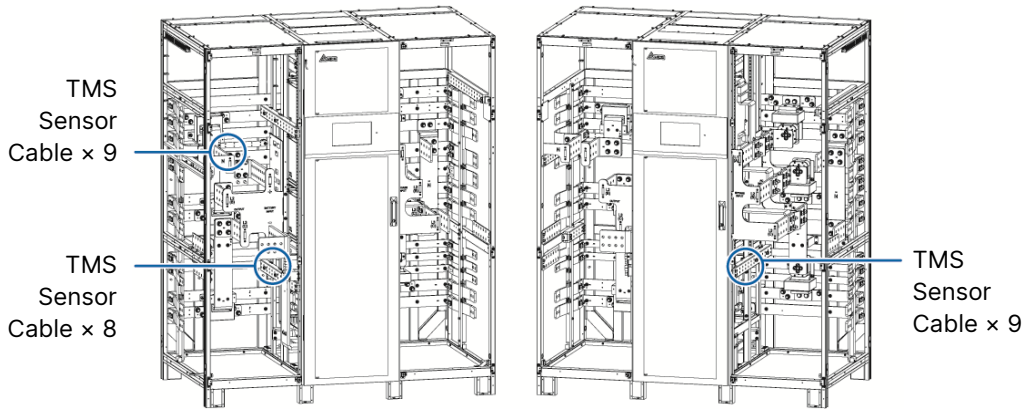


Figure 5-41: Location of the TMS Sensor Cables

Step 2

The TMS sensor cables must be fixed to the main input, output and battery wires. For which TMS sensor cable needs to be fixed to which wire, please refer to the table below.

Wire Name	Mark on the TMS Sensor Cable				TMS Sensor Cable Q'ty
Main Input Wire : L1	45-IP-R1	45-IP-R2	45-IP-R3		3
Main Input Wire : L2	45-IP-S1	46-IP-S2	46-IP-S3		3
Main Input Wire : L3	46-IP-T1	46-IP-T2	47-IP-T3		3
Output Wire : L1	49-OP-R1	49-OP-R2	49-OP-R3		3
Output Wire : L2	49-OP-S1	50-OP-S2	50-OP-S3		3
Output Wire : L3	50-OP-T1	50-OP-T2	51-OP-T3		3
Battery Wire : BAT+	48-BATT+1	48-BATT+2	48-BATT+3	48-BATT+4	4
Battery Wire : BAT-	52-BATT-1	52-BATT-2	52-BATT-3	52-BATT-4	4

Step 3

Please note that you must use three high temperature resistant straps (optional) to fix one TMS sensor cable to the above-mentioned main input, output or battery wire accordingly. The TMS sensor cable includes two parts, sensor probe and sensor cable. Two straps must be used for the sensor probe and one for the sensor cable. This helps to prevent the TMS sensor cable from breaking due to external force. Please refer to the figures below.

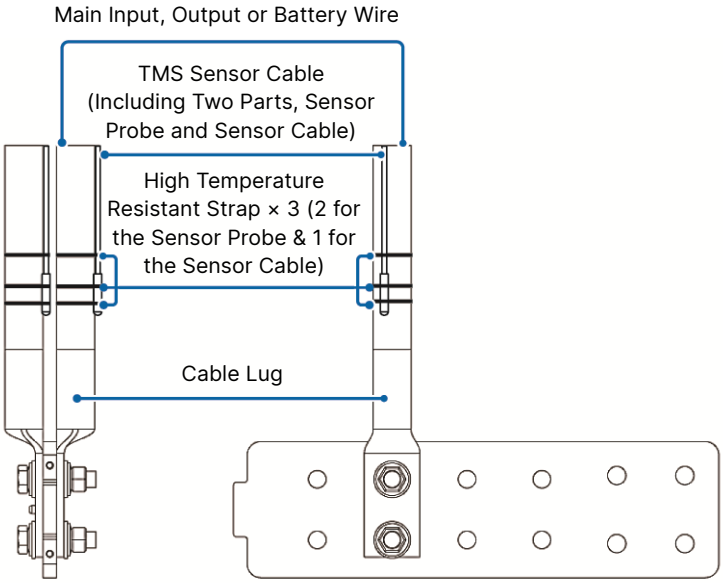


Figure 5-42: TMS Sensor Cable Fixing Method

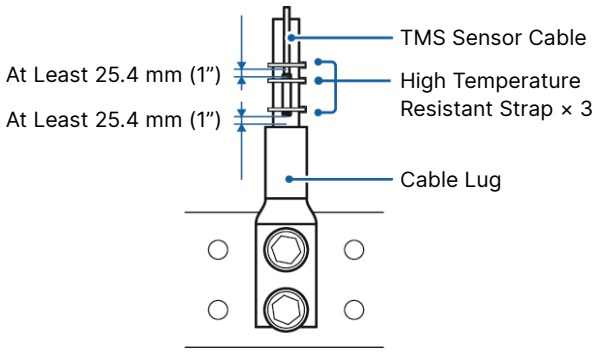


Figure 5-42: Distance between the TMS Sensor Cable and Cable Lug & Distance between the Temperature Resistant Straps

NOTE:

1. The bottom of the TMS sensor cable must be kept at least 25.4 mm (1") away from the top of the corresponding cable lug.
2. The distance between the temperature resistant straps must be kept at least 25.4 mm (1").

Step 4

Follow the instructions below to fix the TMS sensor cables to the corresponding locations of the main input, output and battery wires.

- For main input wires, the TMS sensor cables' installation location is as follows.

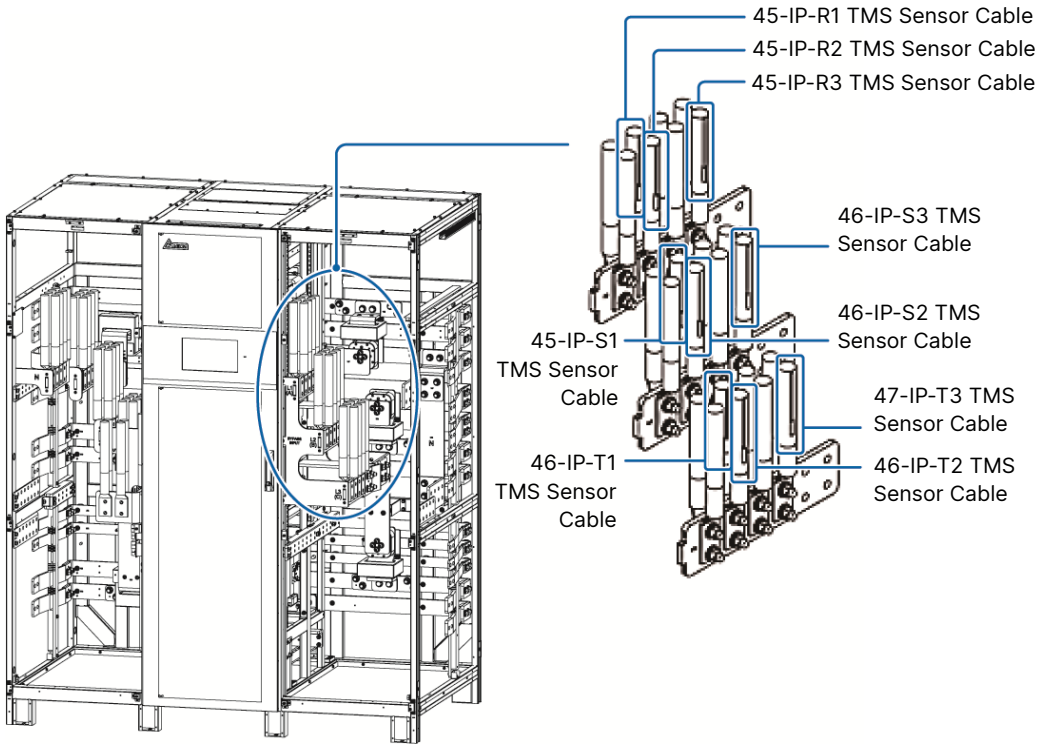


Figure 5-44: Main Input Wires' TMS Sensor Cable Installation Location

- For output wires, the TMS sensor cables' installation location is as follows.

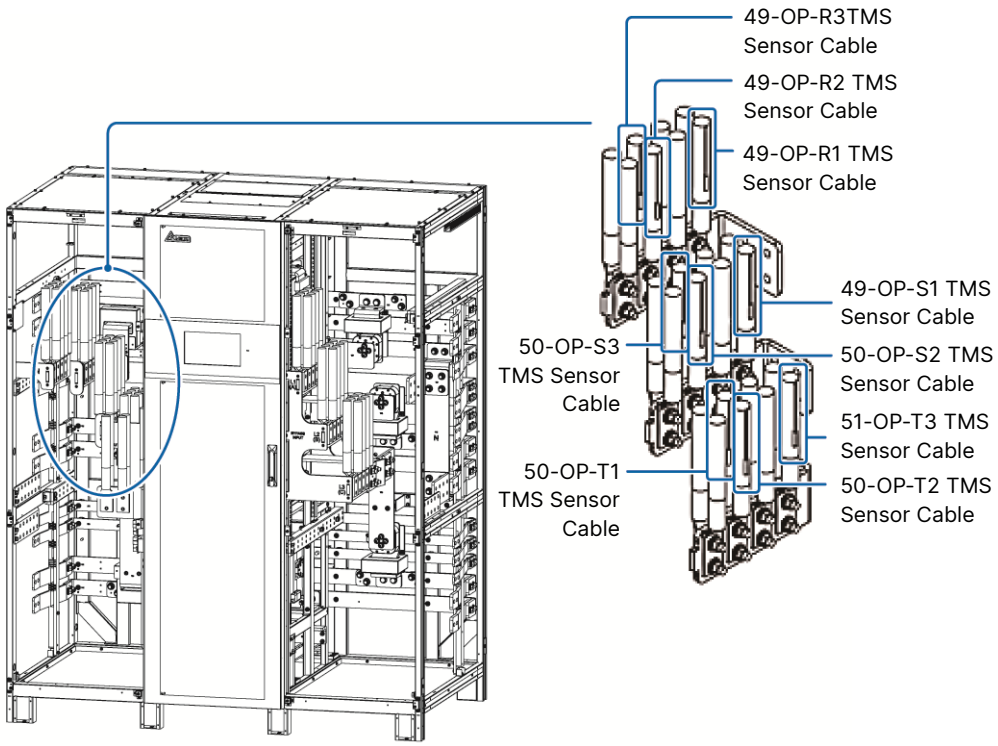


Figure 5-45: Output Wires' TMS Sensor Cable Installation Location

- For battery wires, the TMS sensor cables' installation location is as follows.

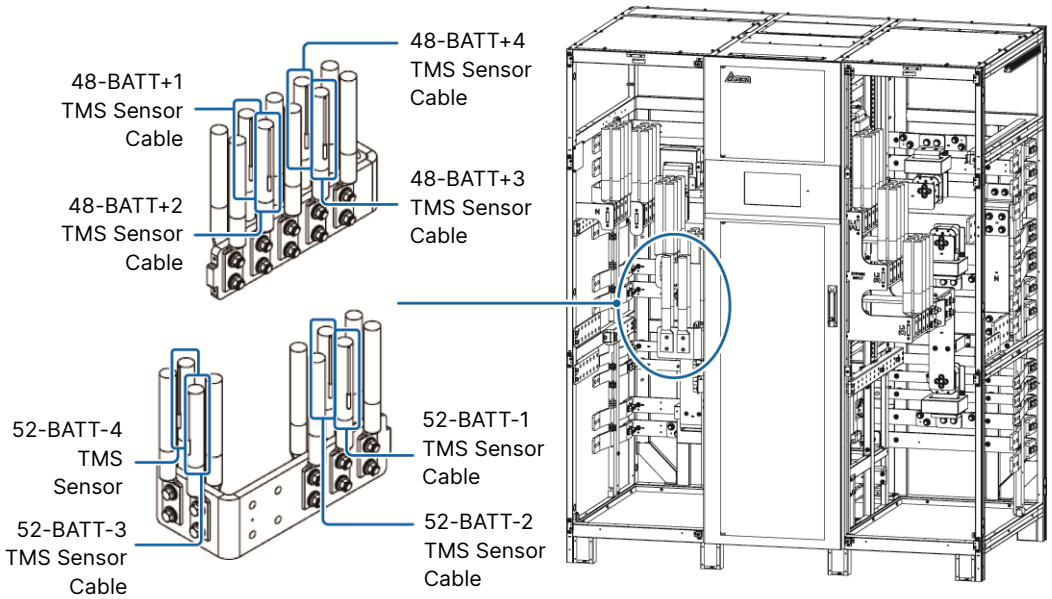


Figure 5-46: Battery Wires' TMS Sensor Cable Installation Location

Step 5

After ensuring that the twenty-six TMS sensor cables are firmly fixed to the main input, output and battery wires, use the cabinet's wire duct and cable ties (optional) to organize the TMS sensor cables. Please refer to the following instructions.

- Route and insert the main input wires' nine TMS sensor cables into the wire duct shown below.

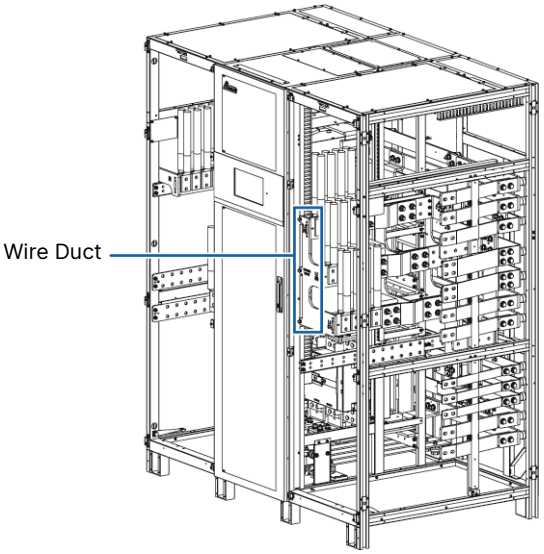


Figure 5-47: Location of the Wire Duct

- Insert the cable ties (optional) to the four designated cable tie fixing holders shown in the figure below and use these cable ties to organize the eight TMS sensor cables (48-BATT+1, 48-BATT+2, 48-BATT+3, 48-BATT+4, 52-BATT-1, 52-BATT-2, 52-BATT-3 and 52-BATT-4).

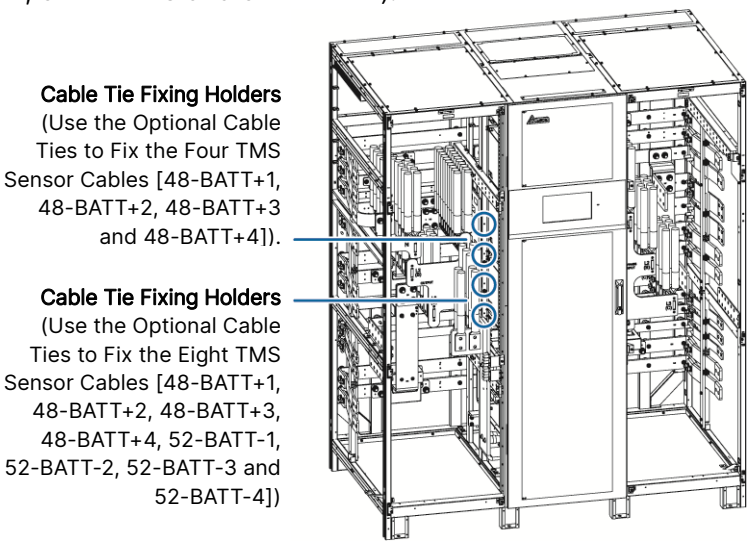


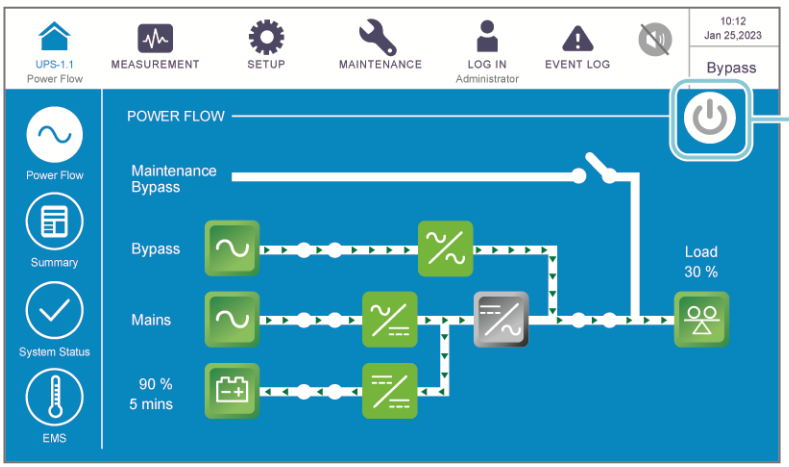
Figure 5-48: Location of the Cable Tie Fixing Holders

Chapter 6 : UPS Operation

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 switches and breakers, including every external battery cabinet's breaker (Q5), are in the **OFF** position.
3. Make sure that the UPS's voltage difference between the Neutral (N) and PE ( ) is below 3V.

- **Pre Turn-off Warnings**

  Before you perform the turn-off procedures, please make sure the critical loads connected to the UPS have already been safely shut down.

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 (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 Input Breaker (Q1) and Bypass Breaker (Q2).

Step 4

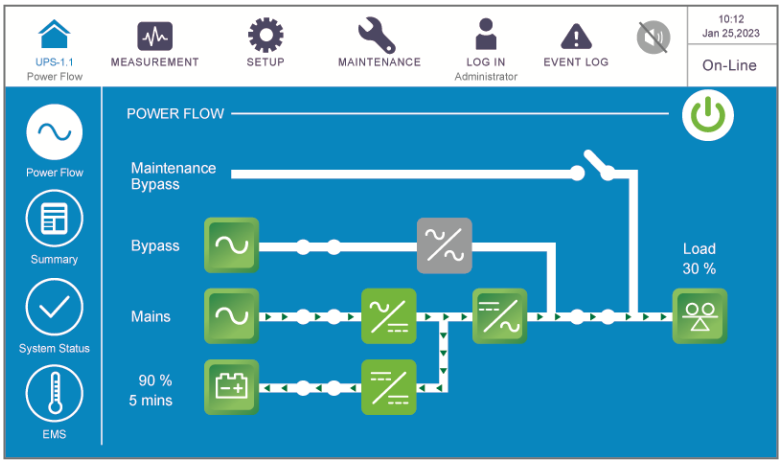
Tap the **ON/ OFF Button** () on the LCD screen.

Step 5

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

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 (Q3) is in the **OFF** position.

Step 2

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

Step 3

Press the **BATT. START** button on the **Communication Interfaces (I)** for one second.

Step 4

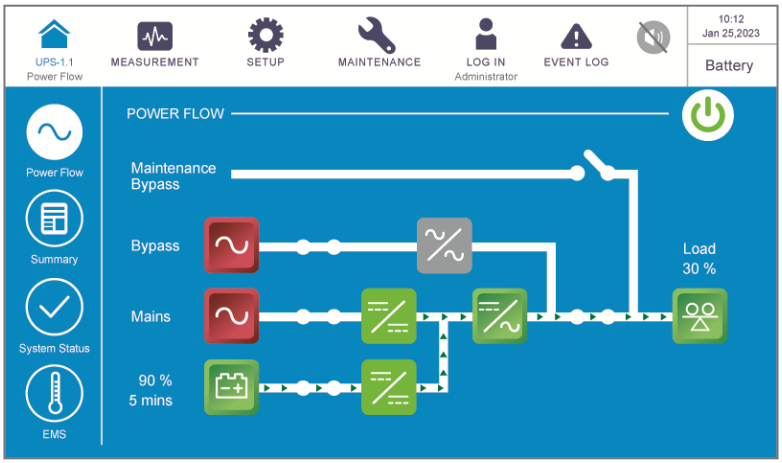
Tap the **ON/ OFF Button** ( ) on the LCD screen.

Step 5

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

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

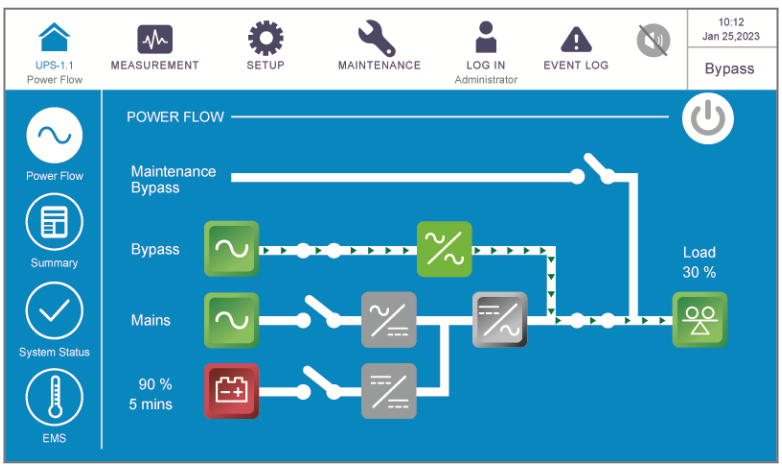
Ensure that the external maintenance bypass cabinet's Manual Bypass Breaker (Q3) is in the **OFF** position.

Step 2

Switch **ON** the external maintenance bypass cabinet's Bypass Breaker (Q2) and Output Breaker (Q4).

Step 3

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 the switches and breakers (except for the external maintenance bypass cabinet's Manual Bypass Breaker (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

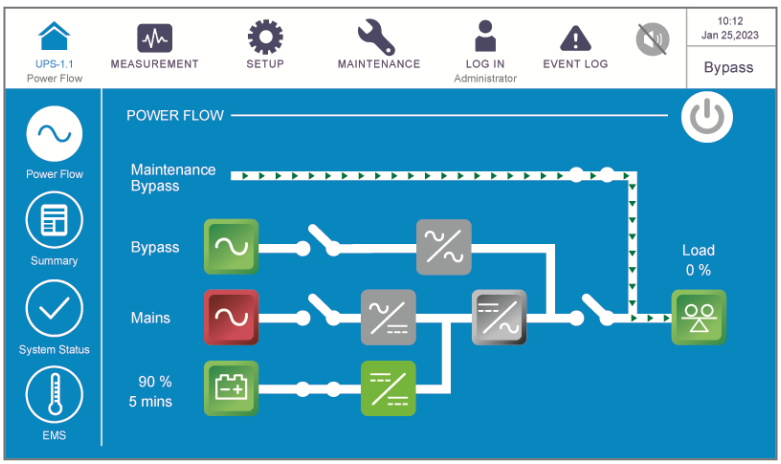
Ensure that the UPS runs in Bypass mode. After confirmation, turn **ON** the external maintenance bypass cabinet's Manual Bypass Breaker (Q3).

Step 3

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

Step 4

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



Step 5

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

- **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 Input Breaker (Q1) and Bypass Breaker (Q2). After that, ensure that the bypass SCR is active.

Step 3

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

Step 4

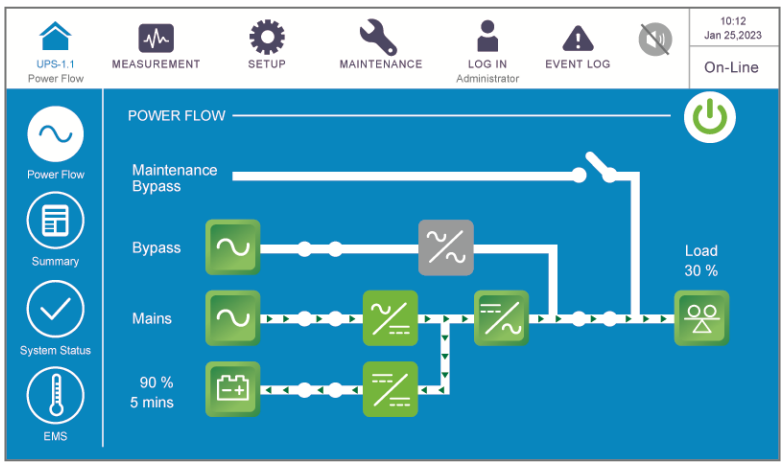
After the UPS runs in Bypass mode, switch **OFF** the external maintenance bypass cabinet's Manual Bypass Breaker (Q3).

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

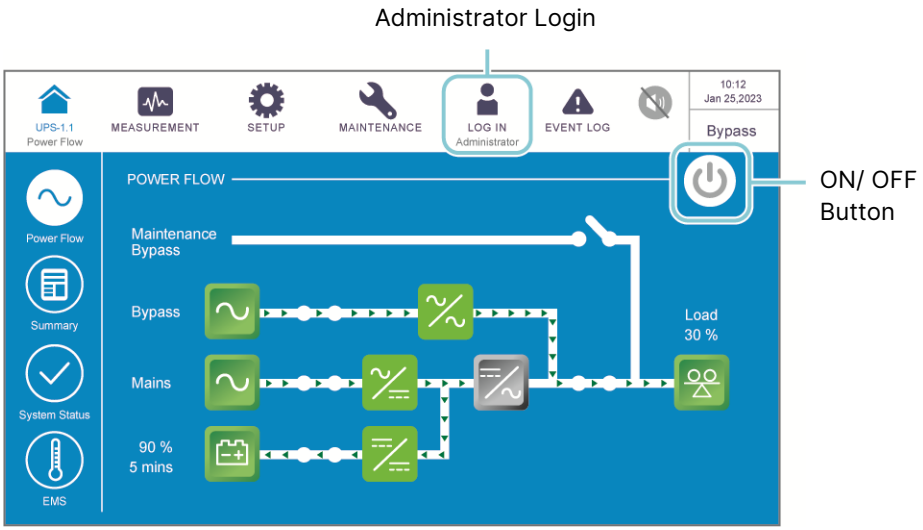
If the bypass input is within the normal range, the UPS will run in Bypass mode.

Step 4

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

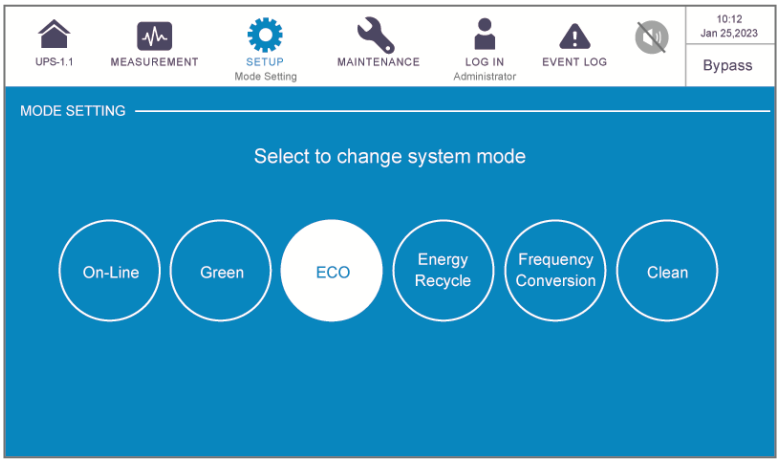
Step 5

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



Step 6

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

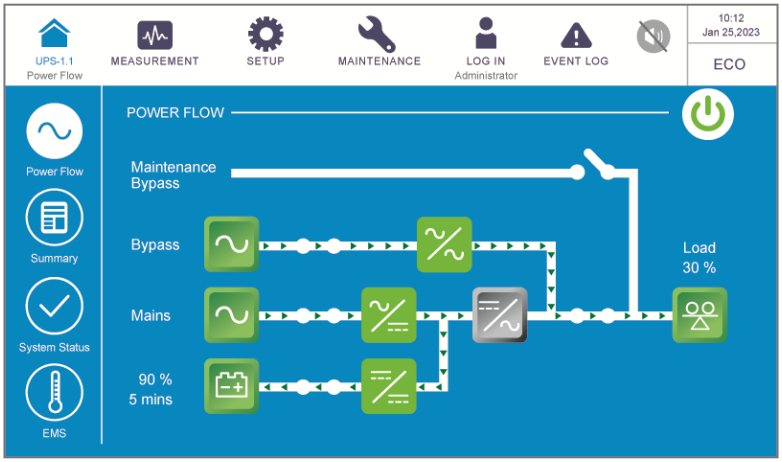


Step 7

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

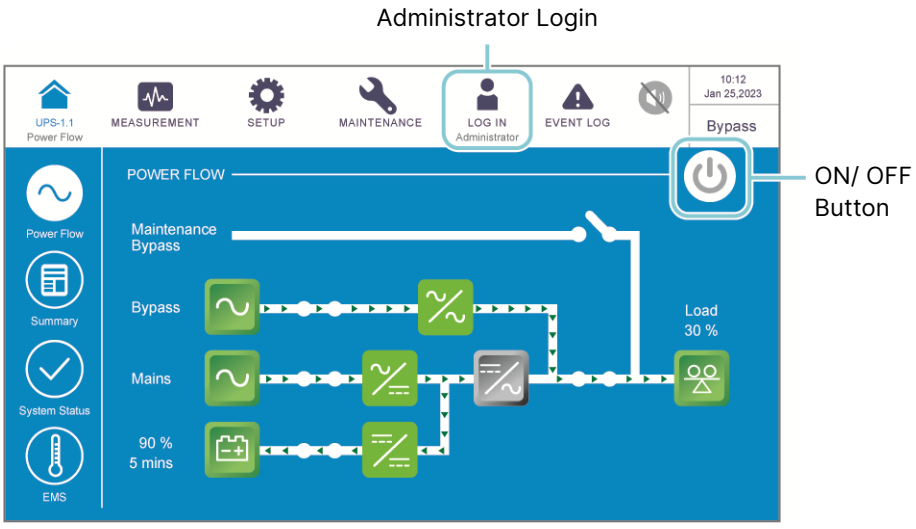
If the bypass input is within the normal range, the UPS will run in Bypass mode.

Step 4

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

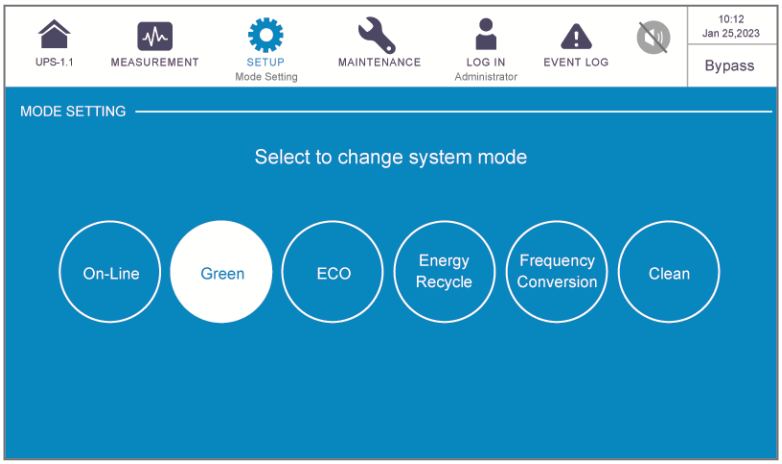
Step 5

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



Step 6

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

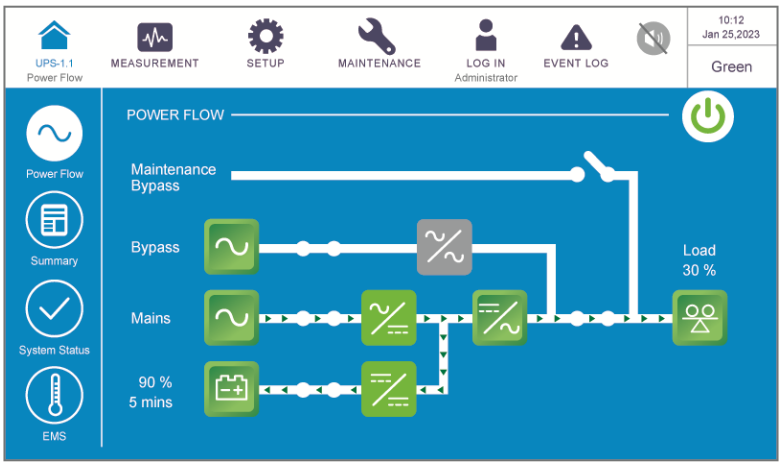


Step 7

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.



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

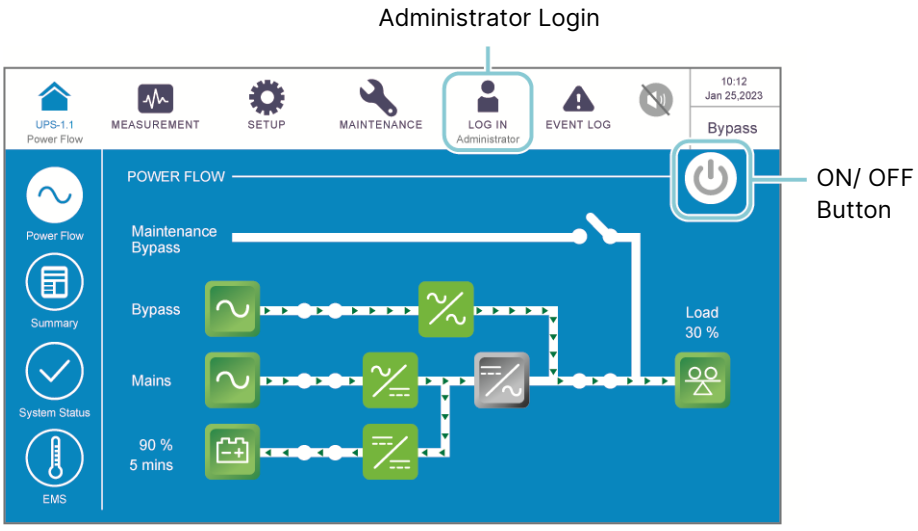
If the bypass input is within the normal range, the UPS will run in Bypass mode.

Step 4

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

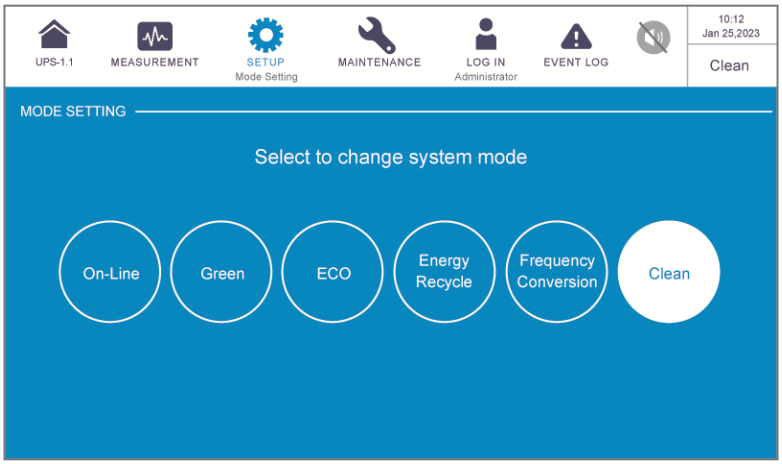
Step 5

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



Step 6

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

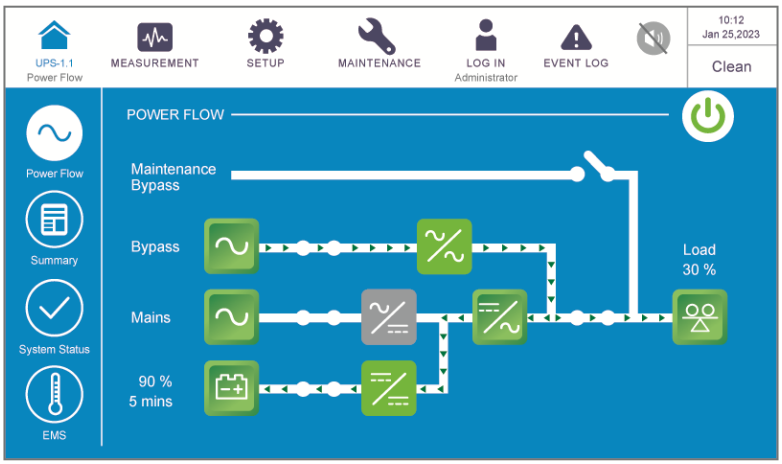


Step 7

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 Clean mode and the system automatically detects the output status to let the inverter provide active filter function to compensate harmonics, correct power factor and reduce bypass reactive current to improve overall power quality. The LCD screen shows as below and the tri-color LED indicator illuminates green.



6.2.8 Frequency Conversion 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 (Q3) is in the **OFF** position.

Step 2

Turn **OFF** the connected loads to prevent wrong frequency from damaging the loads.

Step 3

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

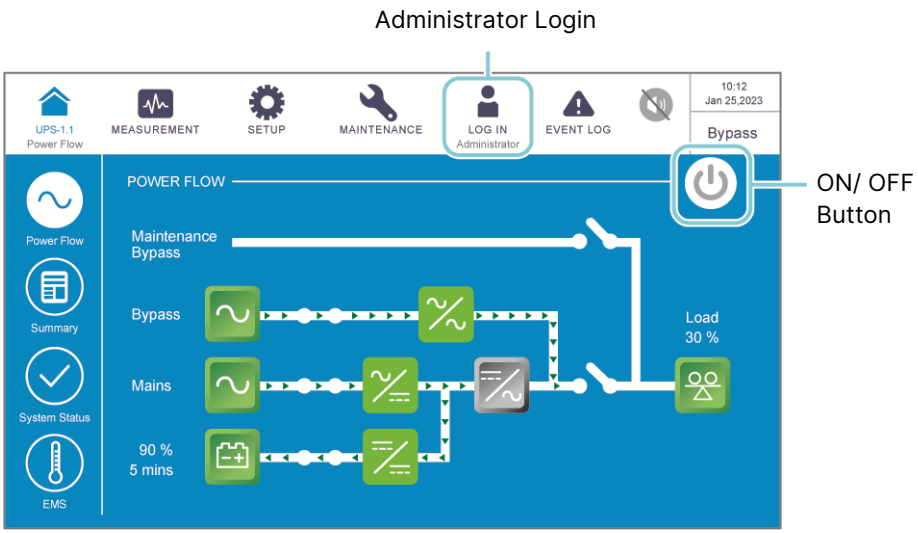
Step 4

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

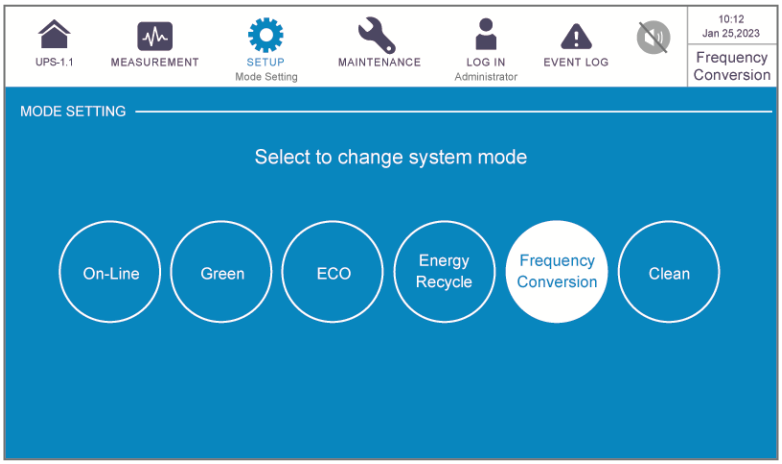


Step 6

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

WARNING:

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



Step 7

Go to **SETUP** → **Input & Output Setting** → **Output** → Set up **Frequency**

Step 8

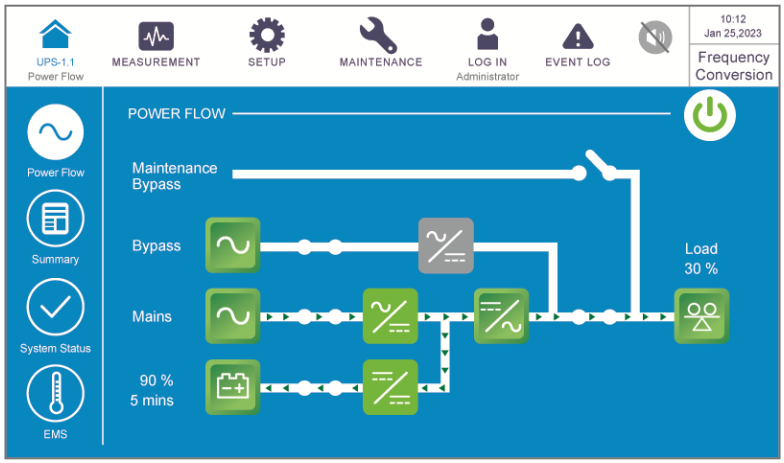
Switch **ON** the external maintenance bypass cabinet's Output Breaker (Q4).

Step 9

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

Step 10

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.



6.2.9 Energy Recycle 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. Energy Recycle mode is only applicable to single unit application.
3. Only qualified personnel can perform the following procedures.

Step 1

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

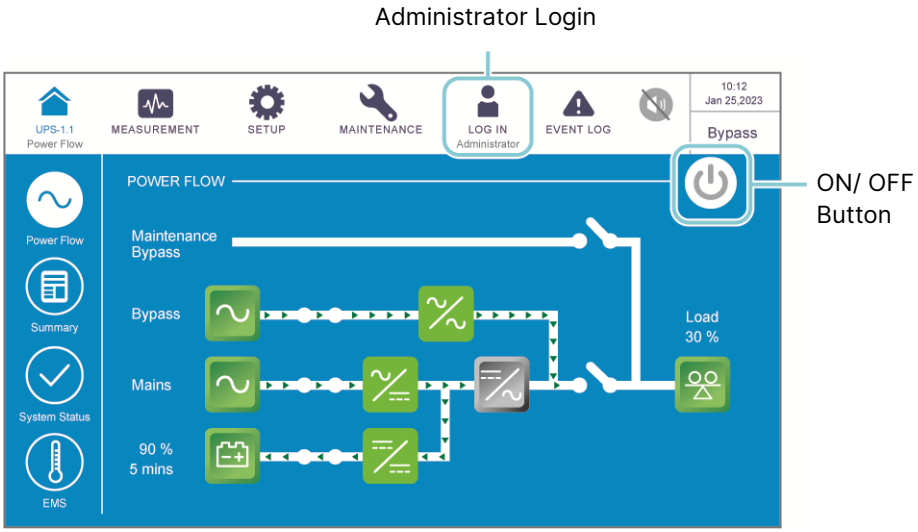
If the bypass input is within the normal range, the UPS will run in Bypass mode.

Step 4

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

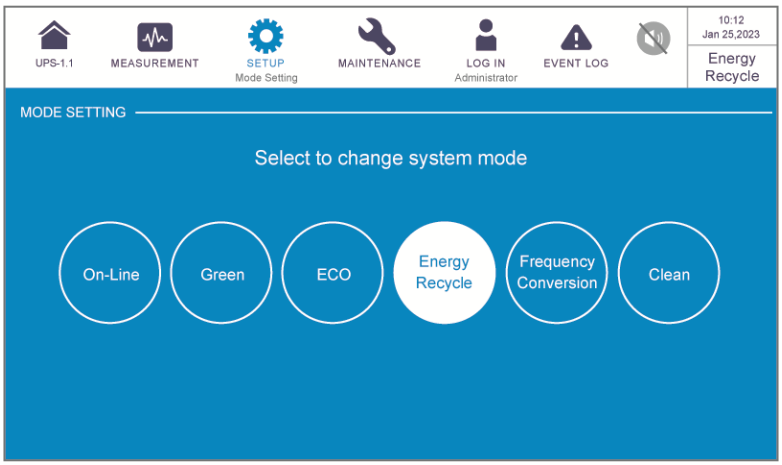
Step 5

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



Step 6

Go to **SETUP** → **Mode Setting** → Select **Energy Recycle**.

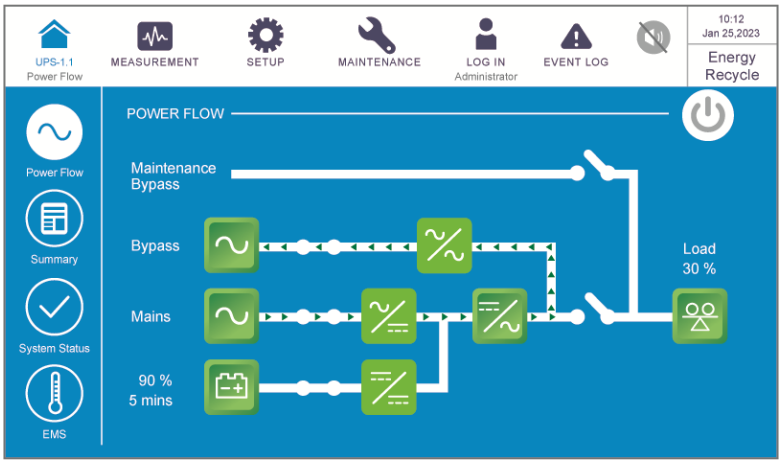


Step 7

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 Energy Recycle mode. The LCD screen shows as below and the tri-color LED indicator illuminates yellow. For Energy Recycle mode application, please contact Delta customer service.



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 (Q1) and Bypass Breaker (Q2). After that, the UPS will transfer to Standby mode.

Step 3

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

Step 4

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

Step 3

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

Step 4

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

Step 2

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

Step 3

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

Step 3

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

Step 4

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

6.3.6 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, there is a risk of output interruption.

Step 2

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

Step 3

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

Step 4

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

6.3.7 Clean 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 (Q1) and Bypass Breaker (Q2). After that, the UPS will transfer to Standby mode.

Step 3

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

Step 4

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

6.3.8 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 (Q1) and Bypass Breaker (Q2). After that, the UPS will transfer to Standby mode.

Step 3

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

Step 4

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

6.3.9 Energy Recycle 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 (Q1) and Bypass Breaker (Q2). After that, the UPS will transfer to Standby mode.

Step 3

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

Step 4

Switch **OFF** the external maintenance bypass cabinet's Output Breaker (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)*[1].

NOTE:

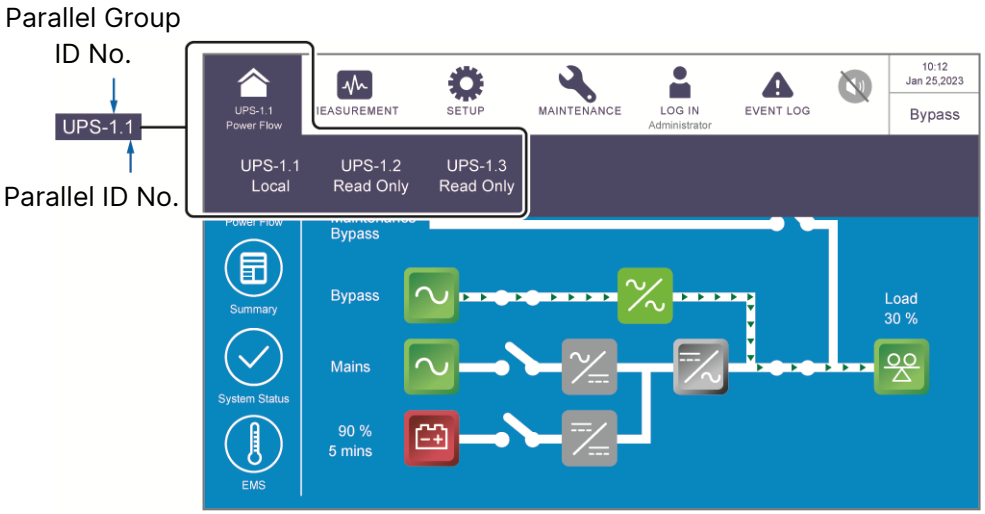
*[1] For common battery configurations, you must switch **ON** each parallel UPS's Input Breaker (Q1), Bypass Breaker (Q2) or Input Breaker (Q1) and Bypass Breaker (Q2) or execute battery start-up to start up the UPS first. After that, you can follow ***6.2 Start-up Procedures*** according to your chosen mode to perform parallel units' start-up procedures.

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 (

) to check if the **Parallel Group ID No.** and **Parallel ID No.** are set correctly. 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:

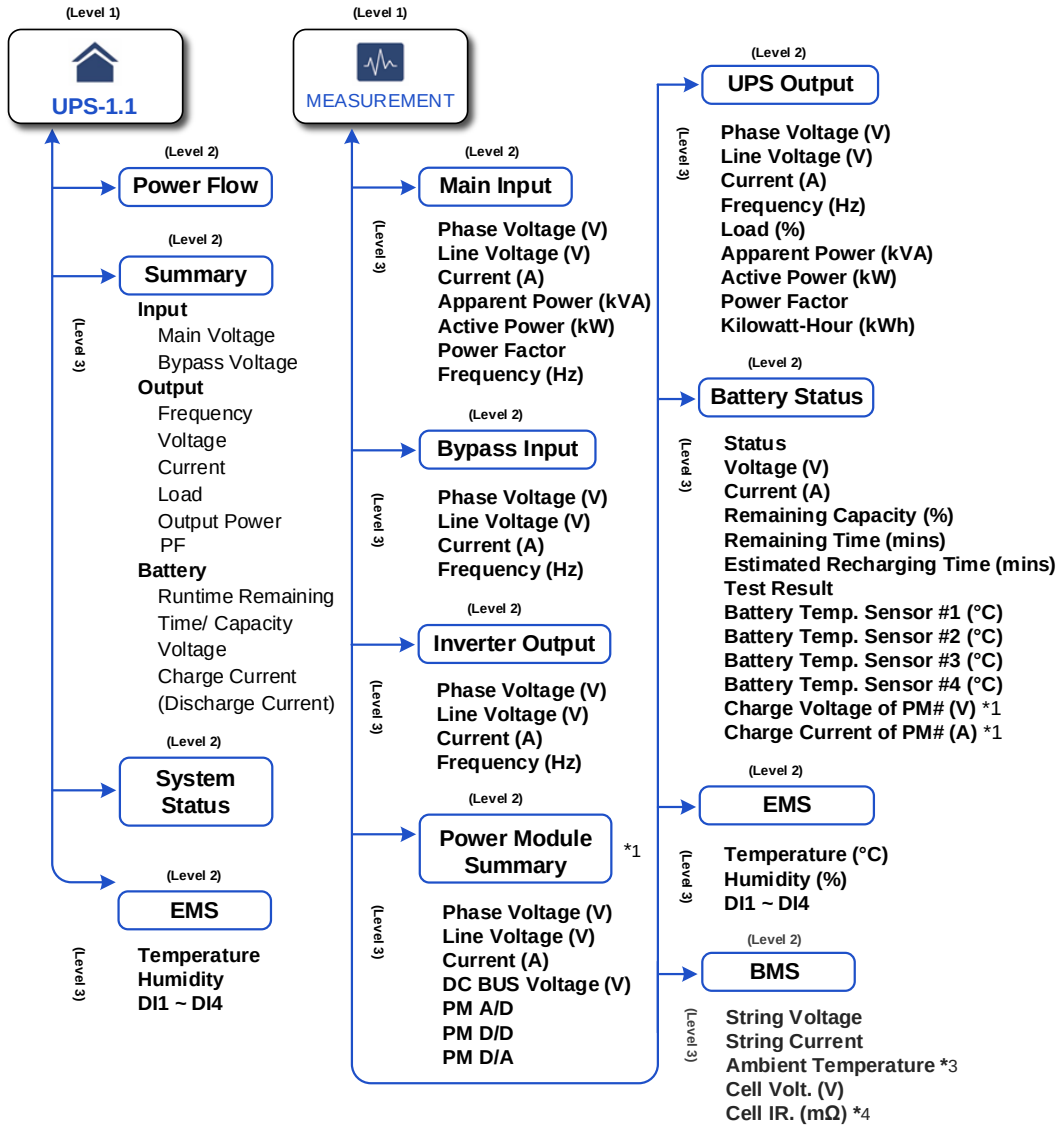
To turn off one of the parallel UPSs, please check whether the remaining parallel units' total capacity exceeds the total critical loads. Otherwise, all parallel units will shut down due to overload. Before doing this, please contact service personnel.

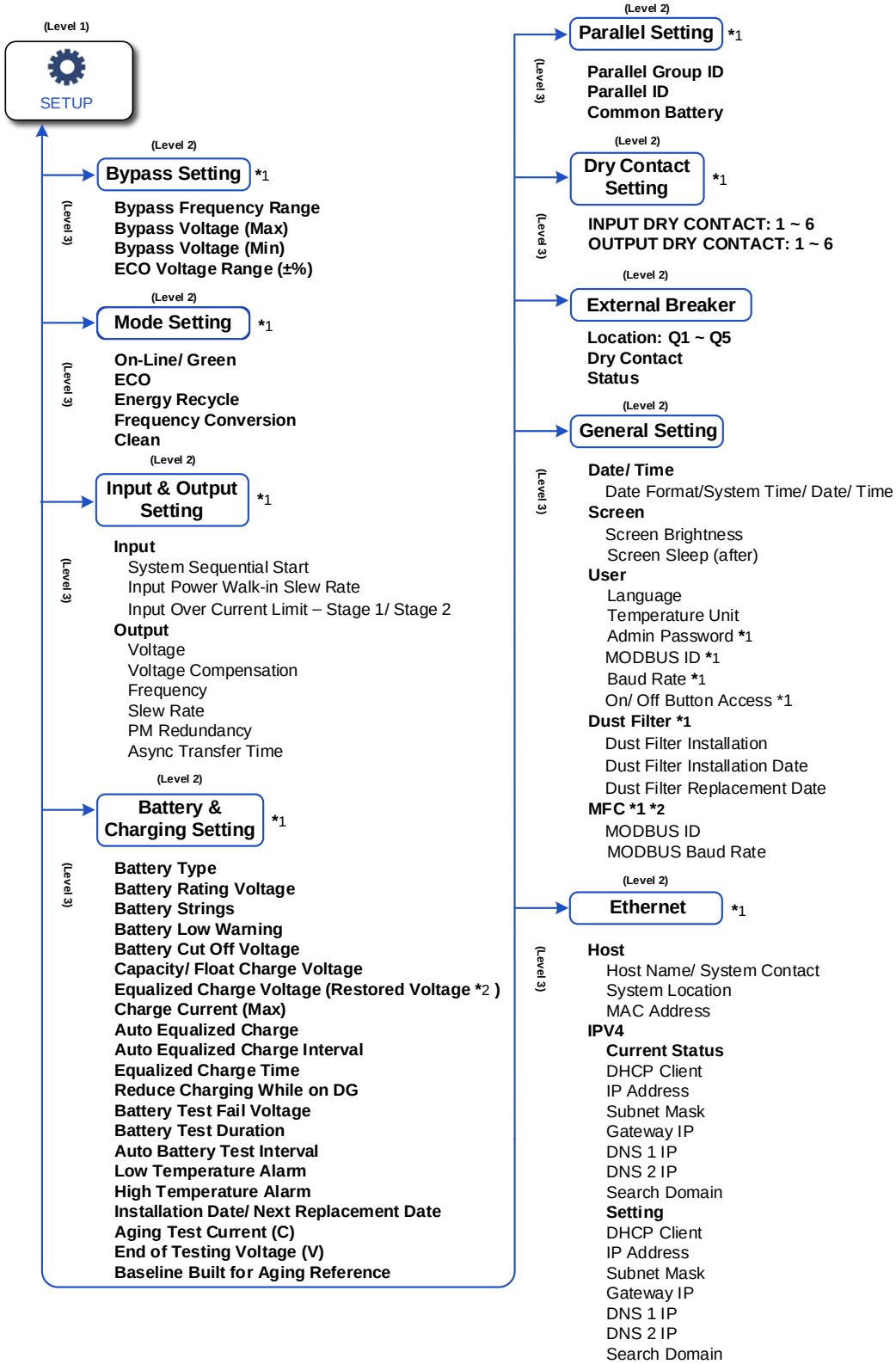
Perform the steps following your chosen mode's section in ***6.3 Turn-off Procedures***. Make sure to synchronize each step to all the parallel UPSs.

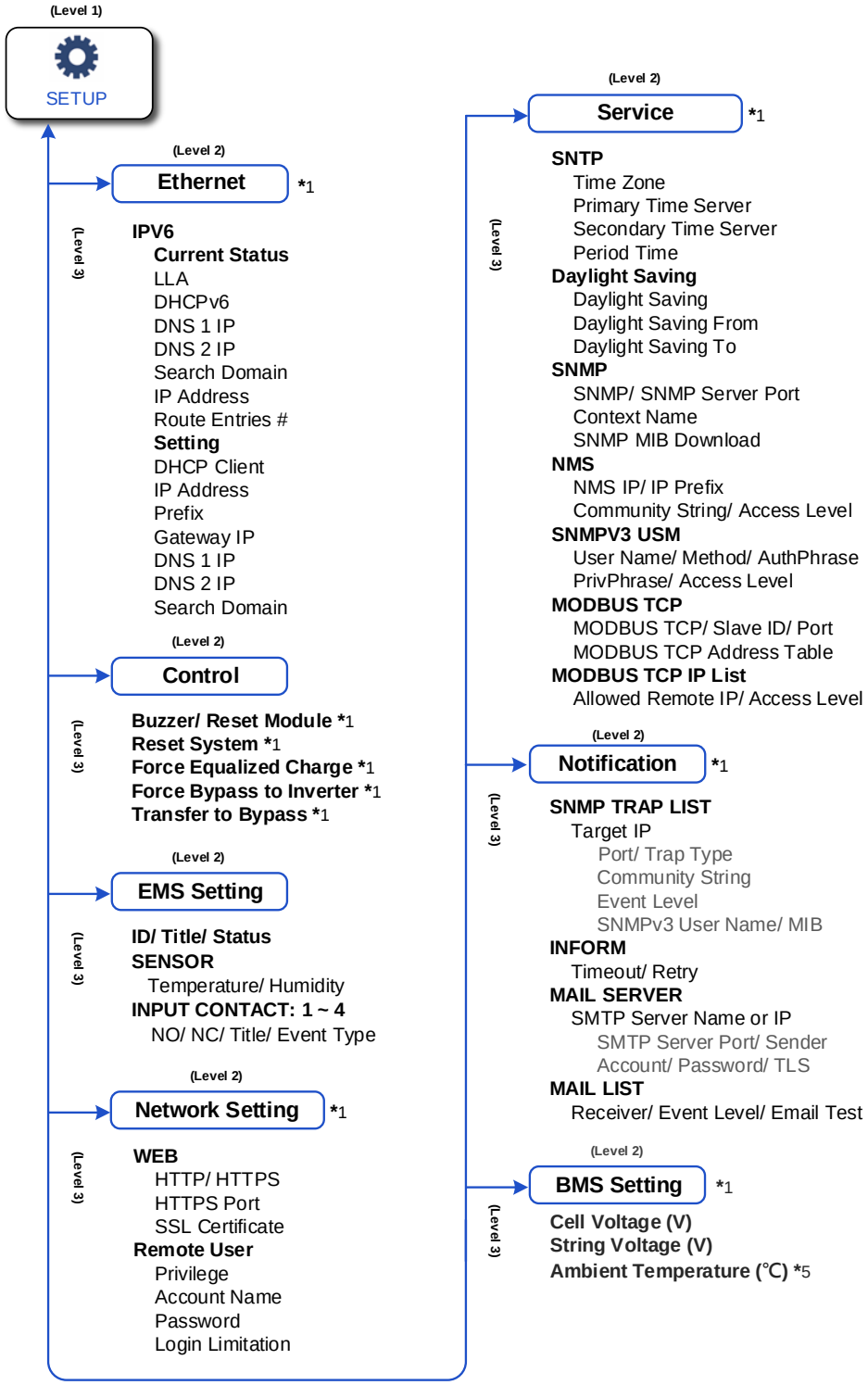
Chapter 7 : LCD Display & Settings

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
Energy Recycle
Frequency Conversion
Clean
(Level 2)
Input & Output Setting *1
(Level 3)
Input
System Sequential Start
Input Power Walk-in Slew Rate
Input Over Current Limit – Stage 1/ Stage 2
Output
Voltage
Voltage Compensation
Frequency
Slew Rate
PM Redundancy
Async Transfer Time
(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
Reduce Charging While on DG
Battery Test Fail Voltage
Battery Test Duration
Auto Battery Test Interval
Low Temperature Alarm
High Temperature Alarm
Installation Date/ Next Replacement Date
Aging Test Current (C)
End of Testing Voltage (V)
Baseline Built for Aging Reference
(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 ~ 6
OUTPUT DRY CONTACT: 1 ~ 6
(Level 2)
External Breaker
Location: Q1 ~ Q5
Dry Contact
Status
(Level 2)
General Setting
(Level 3)
Date/ Time
Date Format/System Time/ Date/ Time
Screen
Screen Brightness
Screen Sleep (after)
User
Language
Temperature Unit
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)
Ethernet *1
(Level 3)
Host
Host Name/ System Contact
System Location
MAC Address
IPV4
Current Status
DHCP Client
IP Address
Subnet Mask
Gateway IP
DNS 1 IP
DNS 2 IP
Search Domain
Setting
DHCP Client
IP Address
Subnet Mask
Gateway IP
DNS 1 IP
DNS 2 IP
Search Domain


(Level 1)
SETUP
(Level 2)
Ethernet *1
(Level 3)
IPV6
Current Status
LLA
DHCPv6
DNS 1 IP
DNS 2 IP
Search Domain
IP Address
Route Entries #
Setting
DHCP Client
IP Address
Prefix
Gateway IP
DNS 1 IP
DNS 2 IP
Search Domain
(Level 2)
Control
(Level 3)
Buzzer/ Reset Module *1
Reset System *1
Force Equalized Charge *1
Force Bypass to Inverter *1
Transfer to Bypass *1
(Level 2)
EMS Setting
(Level 3)
ID/ Title/ Status
SENSOR
Temperature/ Humidity
INPUT CONTACT: 1 ~ 4
NO/ NC/ Title/ Event Type
(Level 2)
Network Setting *1
(Level 3)
WEB
HTTP/ HTTPS
HTTPS Port
SSL Certificate
Remote User
Privilege
Account Name
Password
Login Limitation
(Level 2)
Service *1
(Level 3)
SNTP
Time Zone
Primary Time Server
Secondary Time Server
Period Time
Daylight Saving
Daylight Saving
Daylight Saving From
Daylight Saving To
SNMP
SNMP/ SNMP Server Port
Context Name
SNMP MIB Download
NMS
NMS IP/ IP Prefix
Community String/ Access Level
SNMPV3 USM
User Name/ Method/ AuthPhrase
PrivPhrase/ Access Level
MODBUS TCP
MODBUS TCP/ Slave ID/ Port
MODBUS TCP Address Table
MODBUS TCP IP List
Allowed Remote IP/ Access Level
(Level 2)
Notification *1
(Level 3)
SNMP TRAP LIST
Target IP
Port/ Trap Type
Community String
Event Level
SNMPv3 User Name/ MIB
INFORM
Timeout/ Retry
MAIL SERVER
SMTP Server Name or IP
SMTP Server Port/ Sender
Account/ Password/ TLS
MAIL LIST
Receiver/ Event Level/ Email Test
(Level 2)
BMS Setting *1
(Level 3)
Cell Voltage (V)
String Voltage (V)
Ambient Temperature (℃) *5

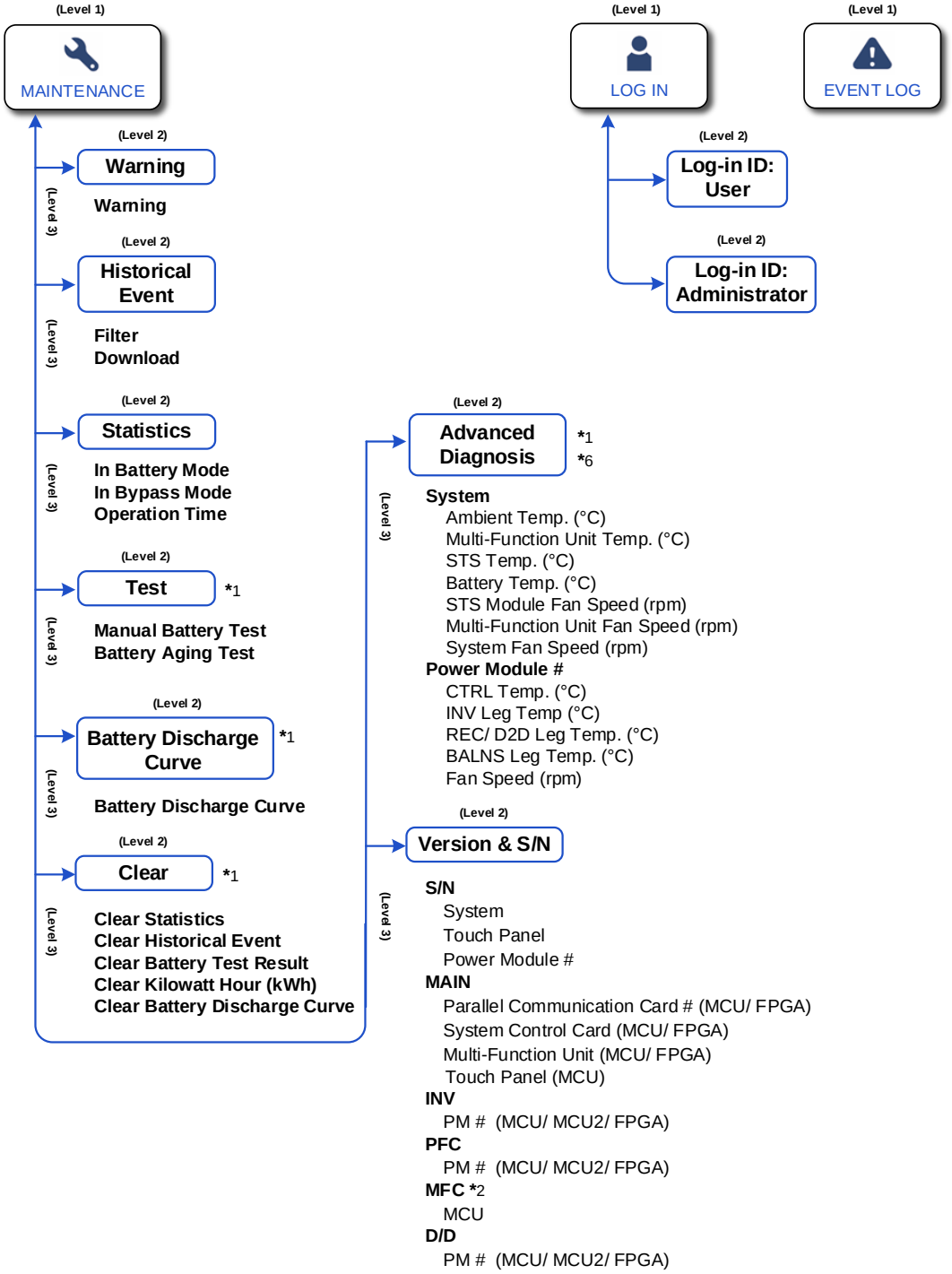


Figure 7-1: LCD Display Hierarchy

NOTE:

1. For **BMS/ BMS Setting** and **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, 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] To display the item, go to MEASUREMENT → **BMS** and select '**Main**' from the list in the upper left corner of the screen.

   *[4] To display the item, go to SETUP → **BMS Setting** and select '**Internal Resistance**' from the **Module Type** list.

   *[5] To display the item, go to SETUP → **BMS Setting** and select '**Main**' from the **Module** list.

   *[6] This 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 ~ c) below; after that, the LCD will be on.

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

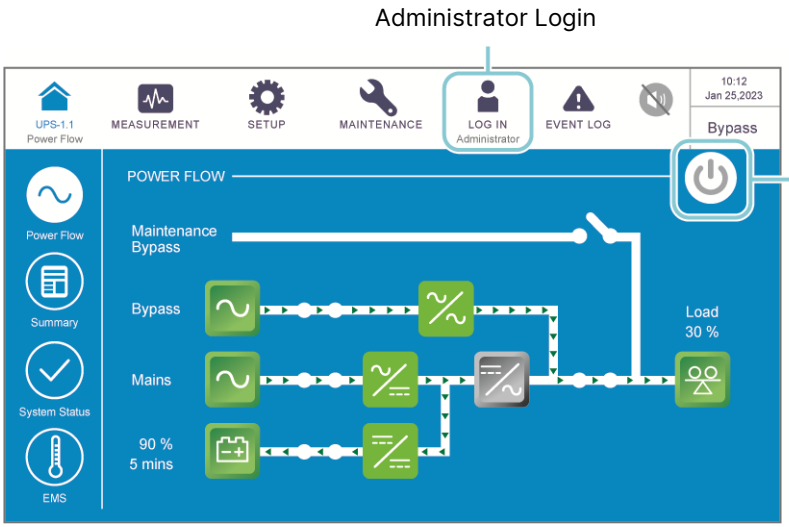
b. Turn on the external maintenance bypass cabinet's Bypass Breaker (Q2); or

c. Turn on any external battery cabinet's breaker (Q5) and press the battery start buttons (see ***Figure 4-2***) for 1 second.

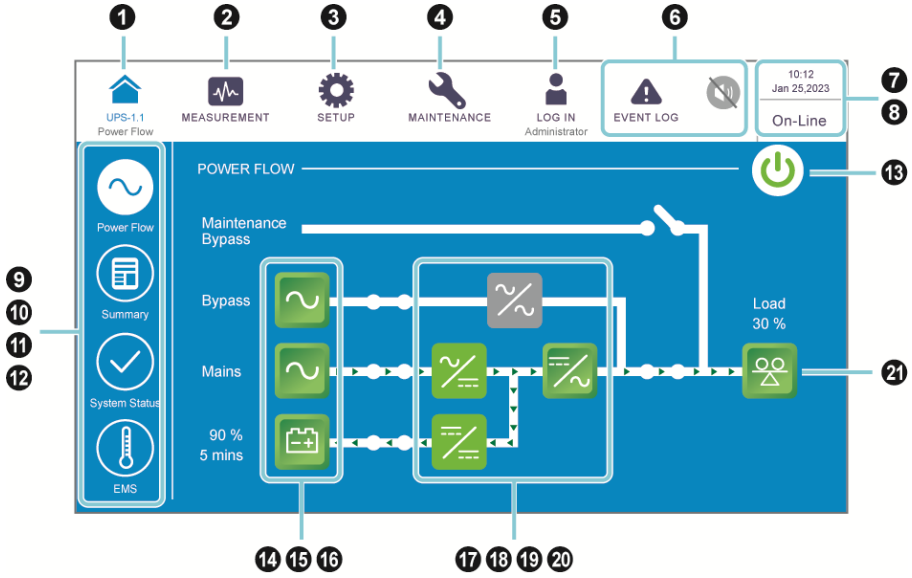
Step 2

A short while later, the **Main Screen** will appear with **User Login** status.

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 UPSs' partial statuses 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		✓		✓	It indicates **User** login status. Tap the icon to change the login permission. Please refer to *7.4 Password Entry*.
		✓		✓	It 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	10:12 Jan 25,2023		✓		It indicates the time and date.
8	On-Line ECO Frequency Conversion Bypass Battery Standby Softstart		✓		It 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 system status, including 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. It indicates bypass input status (Green: Normal/ Red: Abnormal or OFF). 2. Bypass input screen shortcut button.
15		✓		✓	1. It indicates main input status (Green: Normal/ Red: Abnormal or OFF). 2. Main input screen shortcut button.
16		✓	✓	✓	1. It indicates battery status (Green: Normal/ Flashing Green & Gray: Battery Mode/ Flashing Red & Gray: Battery Not Connected). 2. It 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				✓	It indicates bypass static switch status (Green: ON/ Gray: Abnormal or OFF).
18				✓	It indicates rectifier status (Green: Normal/ Gray: Waiting or OFF).
19		✓		✓	1. It indicates inverter status (Green: Normal/ Gray: Waiting or OFF). 2. Inverter output screen shortcut button.
20				✓	DC converter status (Green: Normal; Red: Abnormal; Gray: Waiting or OFF).
21		✓	✓	✓	1. It indicates output status (Green: Normal/ Gray: No Output). 2. It 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		It goes to the top page.
2		It goes to the last page.
3	 	It moves up.
4	 	It moves down.
5	 	It goes to the previous page.

No.	Icon	Function
6	 	It goes to the next page.
7		Increase
8		Decrease
9		1. It indicates the page no. 2. It goes to a specific page according to the no. you key in.
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 

→ **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 

→ **General Setting → User → Language**.

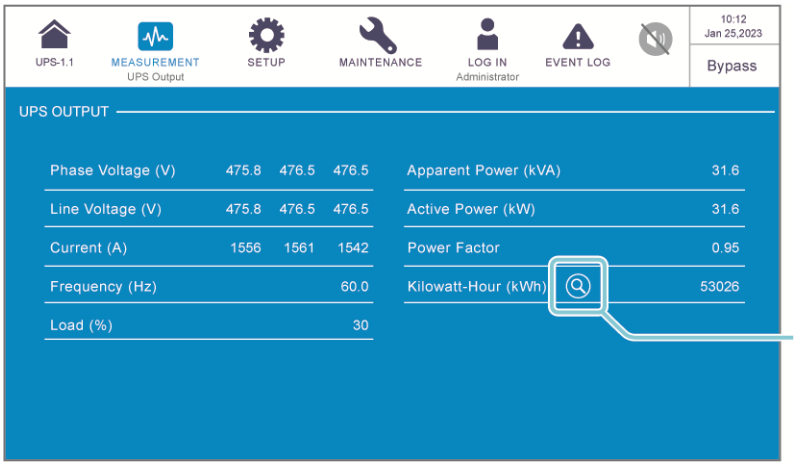
7.4 Password Entry

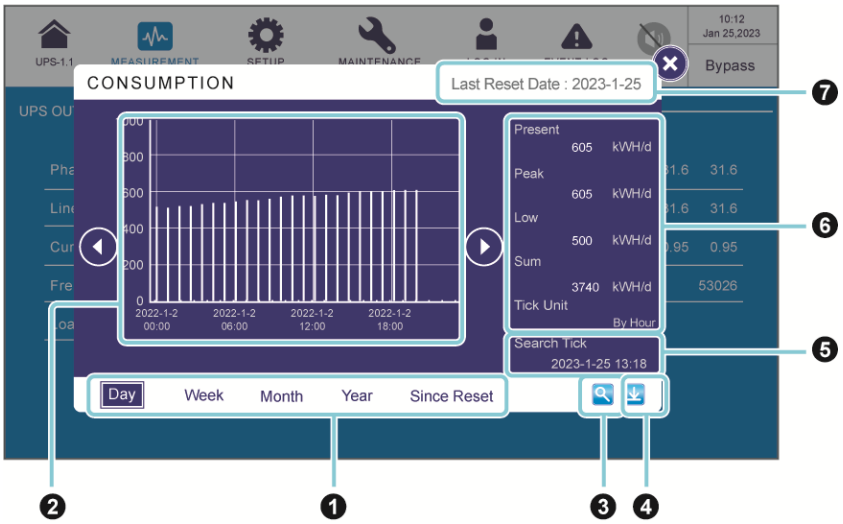
1. **Administrator** login requires a password while **User** login does not.
2. Tap LOG IN User → enter the **Administrator** password (contact service personnel for the default password) → the icon LOG IN Administrator appears, indicating the **Administrator** login is successful.
3. To change the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

7.5 Check Kilowatt-Hour

Path: MEASUREMENT → **UPS Output → kWh icon ( )**

Tap the kWh icon ( ), and you can check the **kWh statistics** of the UPS output 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. It shows the UPS's output 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	Save	Click the icon to download data to your USB drive.
5	Search Tick	It shows the date and time that has been set via (🔍).
6	Present/ Peak/ Low/ Sum (kWh/d)	Regardless of different kWh statistics sheets, these four items indicate today's statistics: the present value/ the highest value (so far)/ the lowest value (so far)/ the sum (so far).
7	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:  **→ 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:  **→ 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.
Energy Recycle Mode	Set up the UPS in Energy Recycle mode. Energy Recycle mode is only applicable to UPS self-test only. Without connection to any critical loads, the UPS can execute current test under full load condition.

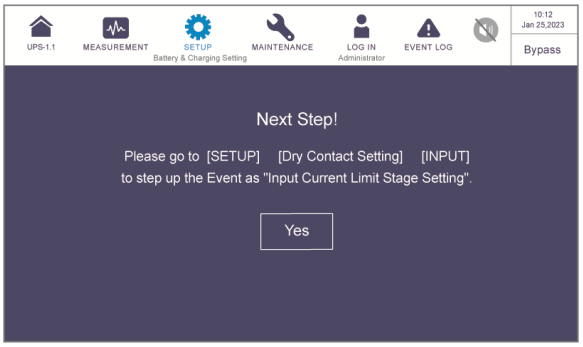
Item	Description
Frequency Conversion Mode	Set up the UPS in Frequency Conversion mode. In Frequency Conversion mode, it is the inverter to supply power to the connected loads with a fixed output frequency. Please note that the output will be terminated once the inverter is turned off.  **NOTE:** Frequency Conversion mode is only applicable to single UPS but not to parallel UPSs.
Clean Mode	Set up the UPS in Clean mode. In Clean mode, it is the bypass to supply power to the connected loads. After the UPS is manually set as Clean mode via the LCD, the system will automatically detect the output status to let the inverter provide active filter function to compensate harmonics and PF as well as reduce reactive current to improve overall power quality.

7.6.3 Input & Output Setting

Path: 

→ Input & Output Setting

Item	Sub Item	Description
Input	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.
	Input Power Walk-in Slew Rate	Set up the power supply of the loads being steadily transferred from the battery power to main AC power with a fixed slew rate.

Item	Sub Item	Description
Input (continued)	Input Over Current Limit-Stage 1/ Stage 2	Set up which stage's current should be applied to the input over current limit. There are two selections, **Default** and **Switch By Dry Contact**. If you choose **Default**, the stage 1's current will be applied. If you choose **Switch By Dry Contact**, the following window will pop up to ask you to set up an input dry contact's event as '**Input Current Limit Stage Setting**'.  After setup, the system will follow the dry contact's status (normally-open or normally-closed) to decide whether stage 1 or stage 2's current should be applied. Please note that the input dry contacts must be connected first (please refer to ***4.1.10 Input Dry Contacts***) before you set up stage 1 and stage 2's current, and only when you choose **Switch By Dry Contact** can the stage 2' current be set up. The current value should be set from 1823 Ampere to 2188 Ampere.
Output	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.

Item	Sub Item	Description
Output (continued)	PM Redundancy	Set up how many power modules that need to be preserved for redundancy.
	Async 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.

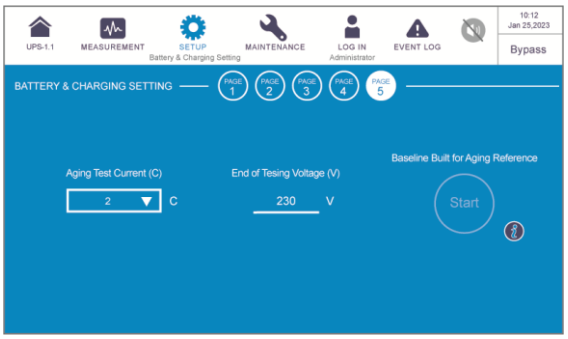
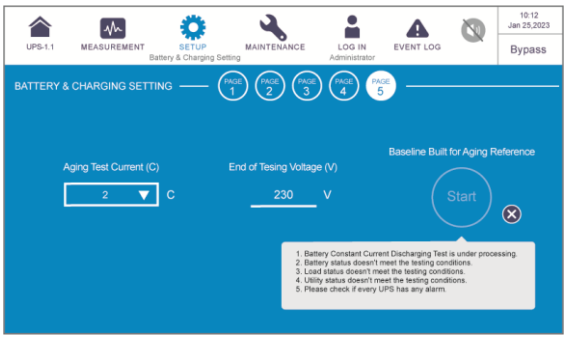
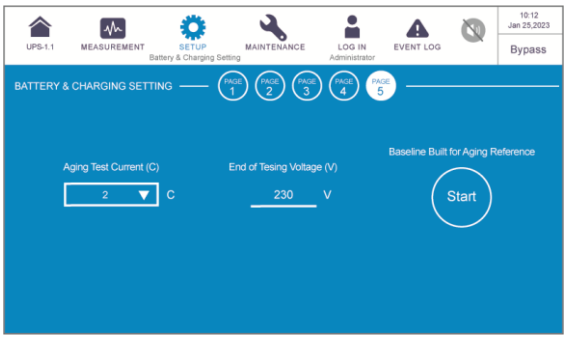
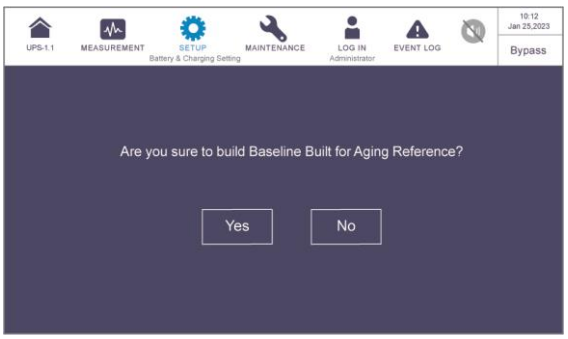
7.6.4 Battery & Charging Setting

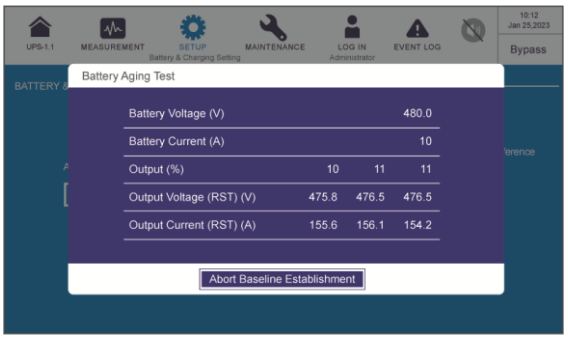
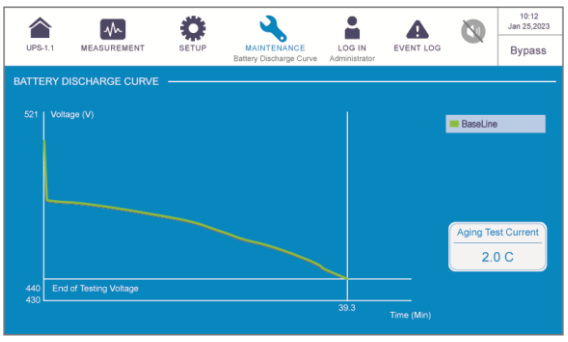
Path:  **→ Battery & Charging Setting**

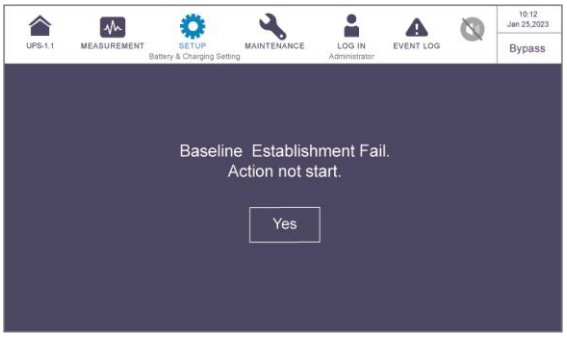
Item	Description
Battery Type	Set up the battery type as **VRLA/ LiB (Dry Contact)**[*1]/ **LiB (Integration)**[*2].  **NOTE:** 1. [*1] If you use non-Delta lithium-ion batteries, please set up the battery type as '**LiB (Dry Contact)**'. Please refer to ***4.1.10 Input Dry Contacts*** and ***7.6.6 Dry 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 appear on the LCD only 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 voltage rating.
Battery Strings	Set up how many battery strings that are used on site.
Battery Low Warning	Set up the battery low warning voltage.

Item	Description
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 the 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**'.
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.
Reduce Charging While on DG	Set up the charging current limit. The charging current will be limited on this value when the generator is turned on.  **NOTE:** This setup item will only appear after you select  → **Dry Contact Setting** → **Input** → **Event** → **Generator Status**.

Item	Description
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.
Aging Test Current	Set up the battery discharge current of the battery aging test.
End of Testing Voltage	Set up the battery end of testing voltage for the battery aging test. When the battery voltage is reached, UPS will stop the battery aging test and establish the battery discharging curve.
Baseline Built for Aging Reference	Establish the battery discharging curve as the benchmark and reference for battery aging test. It is suggested that you establish the reference right after initial installation of batteries. Please refer to below for more information. 1. If you cannot tap the  on the LCD, an information icon will show on the LCD. Tap the icon to learn the possible reasons. Possible reasons include: a. Battery Constant Current Discharging Test is under processing. b. Battery status doesn't meet the testing conditions. c. Load status doesn't meet the testing conditions. d. Utility status doesn't meet the testing conditions. e. Please check if every UPS has any alarm.

Item	Description
Baseline Built for Aging Reference (continued)	  2. After the Aging Test Current and End of Testing Voltage are set, press the start button under Baseline Built for Aging Reference.  

Item	Description
Baseline Built for Aging Reference (continued)	(1) After you tap yes to build the Baseline for Aging Reference, the following screen will pop up and ask you if you want to abort baseline establishment.  (2) Click **Abort Baseline Establishment** and the following screen will pop up to ask if you would like to stop the baseline establishment.  (3) If you select **'NO'**, the test will continue. (4) When the test is successful, the battery discharging curve (baseline) will appear as follows. 

Item	Description
Baseline Built for Aging Reference (continued)	When the test is failed, the following screen will pop up. Click **'YES'** to go back to the original screen and contact service personnel for failure reasons. 

7.6.5 Parallel Setting

Path:  **→ 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 Input Dry Contact 5 Input Dry Contact 6	1. None 2. Generator Status 3. Battery Ground Fail 4. External Battery Breaker Detection 5. Charge Off 6. Active Standby 7. Battery Abnormal Shutdown 8. Input Transformer OTW 9. Output Transformer OTW 10. Battery Fuse Open 11. Force Sync External Source 12. Input Current Limit Stage Setting 13. Major Battery Abnormal Alarm 14. Minor Battery Abnormal Alarm	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	Set up NO (normally open) or NC (normally closed) for each output 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 (continued)	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 Via EPO 20. Backfeed Protection 21. General Alarm 22. Load On ECO 23. Power Module Fault Shutdown 24. Power Module Warning	Set up NO (normally open) or NC (normally closed) for each output dry contact.

7.6.7 External Breaker

Path: SETUP → External Breaker

Item	Description
Location	Shows the location of the breaker. Q1: Input Breaker Q2: Bypass Breaker Q3: Manual Bypass Breaker Q4: Output Breaker Q5: Battery Breaker **NOTE:** Please refer to ***Figure 3-1: On-Line Mode Diagram***.
Dry Contact	Shows the breaker's corresponding dry contact.
Status	Enable or disable the display of the breaker symbol on the LCD.

7.6.8 General Setting

Path: 

→ General Setting

Item	Sub Item	Description
DATE/ TIME	Date Format	Select the date format.
	System Time	Set up the system time manually or automatically. **Manual**: Manually set the time and date by users. **SNTP**: Automatically synchronize with SNTP servers.
	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).
	Temperature Unit	Set up the temperature unit to be displayed in °F or °C.
	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**'.

Item	Sub Item	Description
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.

7.6.9 Ethernet

Path: SETUP **→ Ethernet**

Item	Sub Item	Description
HOST	Host Name	Set up the host name. Length: 16 characters max.
	System Contact	Set up the contact person. Length: 32 characters max.
	System Location	Set up the equipment location. Length: 32 characters max.
	MAC Address	Set up the MAC address of the network interface. It is displayed as six groups of two hexadecimal digits and separated by hyphens.

Item		Sub Item	Description
IPV4	Current Status	DHCP Client	Current DHCP State.
		IP Address	Current IPv4 address.
		Subnet Mask	Current subnet mask address.
		Gateway IP	Current gateway IP address.
		DNS 1 IP	Current DNS server 1's IP address, which can be updated by DHCP.
		DNS 2 IP	Current DNS server 2's IP address, which can be updated by DHCP.
		Search Domain	Current domain. Length: 32 characters max.
	Setting	DHCP Client	Enable or disable DHCP client to obtain the IPv4 address.
		IP Address	Set up the static IPv4 address.
		Subnet Mask	Set up the static IPv4 subnet mask.
		Gateway IP	Set up the IPv4 gateway IP address.
		DNS 1 IP	Set up the DNS server 1's IP address.
		DNS 2 IP	Set up the DNS server 2's IP address.
		Search Domain	Set up the search domain. Length: 32 characters max.
IPV6	Current Status	LLA	Current link local address.
		DHCPv6	Current DHCPv6 state.
		DNS 1 IP	Current DNS server 1's IP address, which can be updated by DHCP.
		DNS 2 IP	Current DNS server 2's IP address, which can be updated by DHCP.
		Search Domain	Current IPv6 domain address. Length: 32 characters max.
		IP Address	Current IPv6 address.
		Route Entries #	Current route's destination and gateway.

Item		Sub Item	Description
IPV6 (continued)	Setting	DHCP Client	Enable or disable DHCP client to obtain the IPv6 address.
		IP Address	Set up the static IPv6 address.
		Prefix	Set up the static IPv6 prefix length. Length: 1 ~ 128 bits.
		Gateway IP	Set up the IPv6 gateway IP address.
		DNS 1 IP	Set up the DNS server 1's IP address.
		DNS 2 IP	Set up the DNS server 2's IP address.
		Search Domain	Set up the search domain. Length: 32 characters max.

7.6.10 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.

Item	Description
Transfer to Bypass	Execute 'Transfer to Bypass' to let each UPS in the same parallel group simultaneously shut down its inverter and transfer to run in bypass mode.

7.6.11 Network Setting

Path: SETUP → Network Setting

Item	Sub Item	Description
WEB	HTTP	Enable or disable HTTP.
	HTTPS	Enable or disable HTTPS.
	HTTPS Port	Set up the HTTPS port No.
	SSL Certificate	Upload the SSL certification.
REMOTE USER	Privilege	There are three levels, Administrator, Device Manager and User.
	Account Name	Set up the Administrator, Device Manager or User's account name.
	Password	Set up the Administrator, Device Manager or User's password.
	Login Limitation	Set up the Administrator, Device Manager or User's login limitation.

7.6.12 Service

Path: SETUP → Service

Item	Sub Item	Description
SNTP	Time Zone	Select the time zone.
	Primary Time Server	Set up the primary NTP server.
	Secondary Time Server	Set up the secondary NTP server.
	Period Time	Set up how long the system will automatically synchronize the time with servers.

Item	Sub Item	Description
DAYLIGHT SAVING	Daylight Saving	Enable or disable the daylight saving function.
	Daylight Saving From	Set up the daylight saving beginning time.
	Daylight Saving To	Set up the daylight saving ending time.
SNMP	SNMP	Enable or disable the SNMP function.
	SNMP Server Port	Set up the SNMP server port No.
	Context Name	Define the context name.
	SNMP MIB Download	Download MIB files.
NMS	NMS IP	Set up the NMS IP address that allows connection.
	IP Prefix	Set up the NMS IP mask address that allows connection.
	Community String	Set up the community string.
	Access Level	Set up the access level for each source IP.
SNMPV3 USM	User Name	Set up the SNMPv3 user name.
	Method	Select the encryption method.
	AuthPhrase	Set up the authentication password.
	PrivPhrase	Set up the privacy password.
	Access Level	Set up the access level for each SNMPv3 user.
MODBUS TCP	MODBUS TCP	Enable or disable the MODBUS TCP function.
	Slave ID	Set up the salve ID No.
	Port	Set up the MODBUS TCP port No.
	MODBUS TCP Address Table	Download the MODBUS TCP address table.

Item	Sub Item	Description
MODBUS TCP IP LIST	Allowed Remote IP	Set up the allowed remote IP.
	Access Level	Set up the access level for each remote IP.

7.6.13 Notification

Path: SETUP → Notification

Item	Sub Item	Description
SNMP TRAP LIST	Target IP	Set up the target IP.
	Port	Set up the target IP's port No.
	Trap Type	Select the trap type.
	Community String	Set up the community string.
	Event Level	Select the event level.
	SNMPv3 User Name	Select the SNMPv3 user name.
	MIB	Select the MIB type.
INFORM	Timeout	Set up the timeout for SNMP INFORM.
	Retry	Set up the retry times for SNMP INFORM.
MAIL SERVER	SMTP Server Name or IP	Set up the SMTP server's DNS IP.
	SMTP Server Port	Set up the SMTP server's port No.
	Sender	Set up the sender's email address.
	Account	Set up the sender's email login account.
	Password	Set up the sender's email login password.
	TLS	Enable or disable the TLS function.

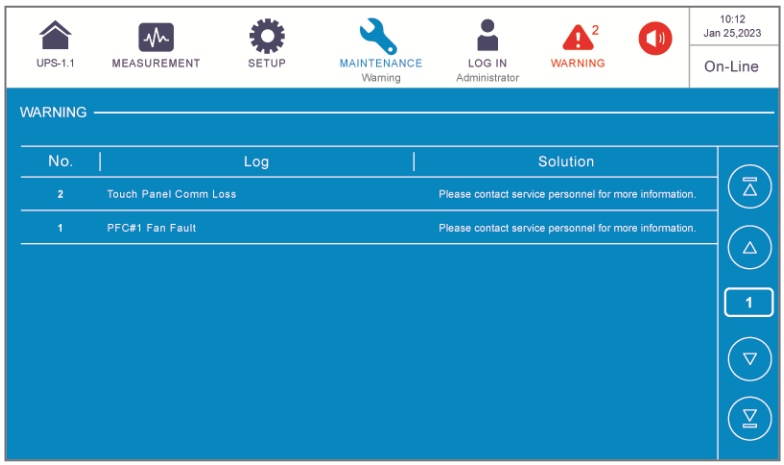
Item	Sub Item	Description
MAIL LIST	Receiver	Set up the receivers' email address.
	Event Level	Select the event level. If the event's level is higher than this setting, this event log will be sent.
	Email Test	Test if the sample event log will be sent or not.

7.7 System Maintenance

7.7.1 Warning

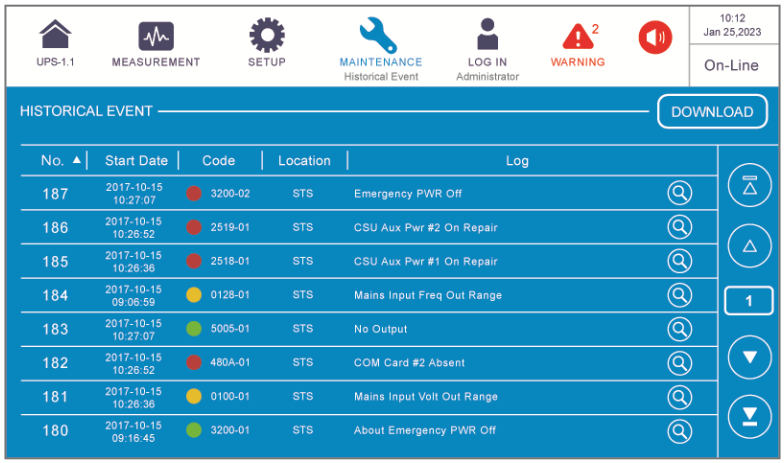
Path 1: MAINTENANCE → **Warning**

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	It shows how long and how many times the UPS runs in Battery mode.
In Bypass Mode	It shows how long and how many times the UPS runs in Bypass mode.
Operation Time	It shows how long the UPS has operated.

To clear the statistics, please refer to *7.7.6 Clear*.

7.7.4 Test

Path: MAINTENANCE → **Test**

You can perform the manual battery test and battery aging test via the LCD screen.

7.7.5 Battery Discharge Curve

Path: MAINTENANCE → **Battery Discharge Curve**

For relevant information, please refer to **Baseline Built for Aging Reference** stated in *7.6.4 Battery & Charging Setting*.

7.7.6 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.
Clear Battery Discharge Curve	After you select '**Clear**' and confirm clearance of battery discharge curve, the battery discharge curve 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.

7.7.7 Advanced Diagnosis

Path: MAINTENANCE → Advanced Diagnosis

This is an optional function. Please contact Delta customer service for more information. If you are able to access to the **Advanced Diagnosis** screen, you can obtain the system and the specific power module's relevant readings of the following items.

System	Power Module #
Ambient Temp. (°C)	CTRL Temp. (°C)
Multi-Function Unit Temp. (°C)	INV Leg Temp (°C)
STS Temp. (°C)	REC/ D2D Leg Temp. (°C)
Battery Temp. (°C)	BALNS Leg Temp. (°C)
STS Module Fan Speed (rpm)	Fan Speed (rpm)
Multi-Function Unit Fan Speed (rpm)	-

System	Power Module #
System Fan Speed (rpm)	-

7.7.8 Version & S/N

NOTE:

To operate the UPSs in parallel, please make sure all the versions below are the same for each parallel unit. If you have any questions about parallel operation, please contact Delta customer service.

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 the 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.
	Multi-Function Unit_ MCU/ FPGA	Check and update the MCU or FPGA firmware version of the multi-function unit.
	Touch Panel _ MCU	Check and update the touch panel's MCU firmware version.
INV	PM #_ MCU/ MCU2/ FPGA	Check and update the MCU, MCU2 or FPGA firmware version of a specific power module's inverter.
PFC	PM #_ MCU/ MCU2/ FPGA	Check and update the MCU, MCU2 or FPGA firmware version of a specific power module's PFC.
D/D	PM #_ MCU/ MCU2/ FPGA	Check and update the MCU, MCU2 or FPGA firmware version of a specific power module's DD.

Chapter 8 : Optional Accessories

No.	Item	Function
1	Dust Filter	It prevents dust from entering into the UPS to ensure UPS reliability and to prolong product life.
2	EMS 1000 (EnviroProbe)	It 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 4-23* for the location of the EMS port. For details, please refer to *8.1 EMS Function on the LCD Screen*.
3	Battery Cabinet Temperature Sensor Cable	It detects the temperature of an external battery cabinet connected to the UPS.
4	Parallel Cable (Length: 50 m (1968.5"))	It connects to the parallel UPSs.
5	Battery Management System (BMS)	If you use the lead-acid batteries, it is recommended to install the BMS to monitor (1) each battery's voltage, (2) each battery string's voltage and charging/ discharging current, and (3) battery environment temperature. The BMS should be connected to the UPS's BMS port located at the rear of the touch panel (see *Figure 4-23*). For details, please refer to *8.2 BMS Function on the LCD Screen* and *7.6.4 Battery & Charging Setting*. NOTE: The quantity of BMS to be installed depends on how many external battery cabinets (lead-acid batteries) are connected to the UPS. For BMS installation, please contact Delta customer service.

No.	Item	Function
6	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 4-2* to monitor the battery status via the UPS's LCD. For relevant information, please refer to *8.3 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.
7	Synchronized Multiple Bus (SMB) Cable (Length: 20 m (787.4"))	It connects to the UPS's SMB port.
8	Thermal Monitor System (TMS) Sensor Cables	The TMS sensor cables monitor the thermal status of the UPS's input, output and battery cables.
9	Cable Ties	The cable ties help to organize the TMS sensor cables. Please refer to *5.8 Installation of TMS Sensor Cables (Optional)*.
10	High Temperature Resistant Straps	The straps help to fix the TMS sensor cables to the main input, output and battery wires. Please refer to *5.8 Installation of TMS Sensor Cables (Optional)*.

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

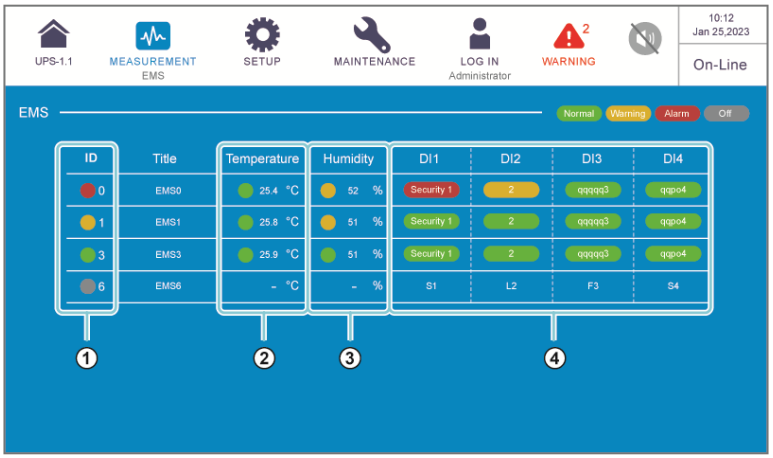
- **Path 1: Tap the shortcut button (**  **) on the** Main Screen**.**

  Path 2:  **→ 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  **→ 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.



No.	Item	Color (Status)	Descriptions
1	ID	Green (Normal) Yellow (Warning) Red (Alarm) Gray (Off)	1. ID # represents each EMS 1000 (EnviroProbe) device which is connected and set as '**Enable**'. 2. It 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**.

<table>
<tr><th>No.</th><th>Item</th><th>Color (Status)</th><th>Descriptions</th></tr>
<tr><td>2</td><td>Temperature</td><td>Green (Normal)
Yellow (Warning)
Red (Alarm)</td><td rowspan="2">It 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. It 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)

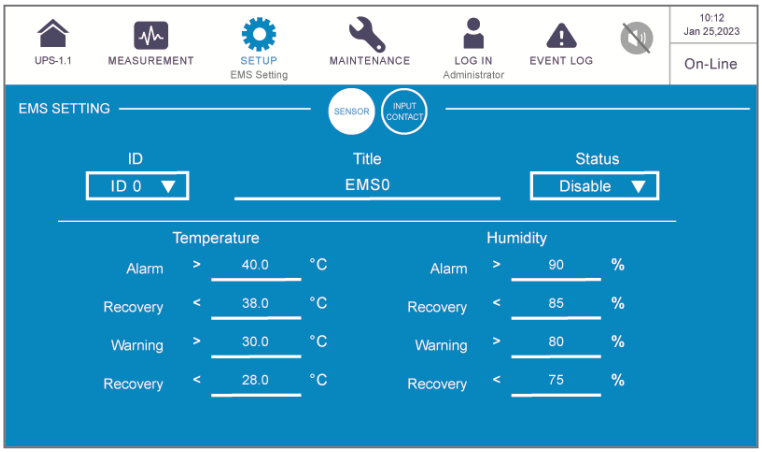
  1. Each UPS can be connected with a maximum of 16 EMS 1000 (EnviroProbe) devices in string to expand the environment monitoring range. A maximum of 8 UPS units can be paralleled. Please use a CAT-5 cable (user-supplied & the cable length depends on the on-site application and environment) to connect the EMS 1000 (EnviroProbe) to the EMS port on the UPS. For the location of the EMS port, please see ***Figure 4-23***.
  2. The UPS only supports RS-485 communication. When installing the EMS 1000 (EnviroProbe), please set the device's communication mode as RS-485 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***.

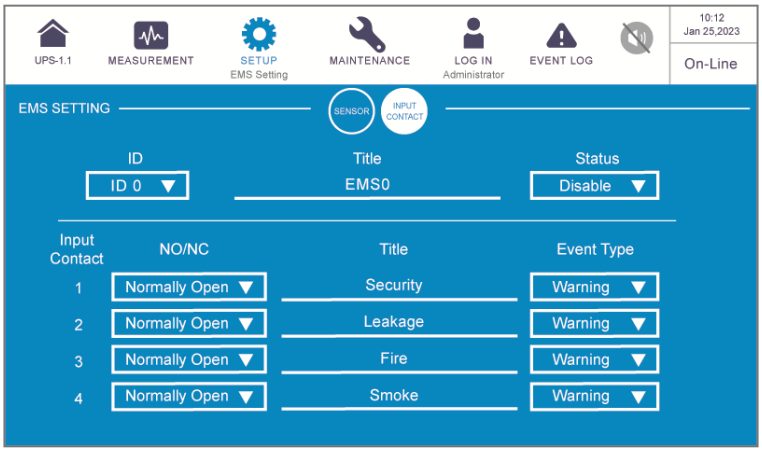
     NOTE:

     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 is 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.

Item	Sub Item	Description
SENSOR (continued)	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 BMS Function on the LCD Screen

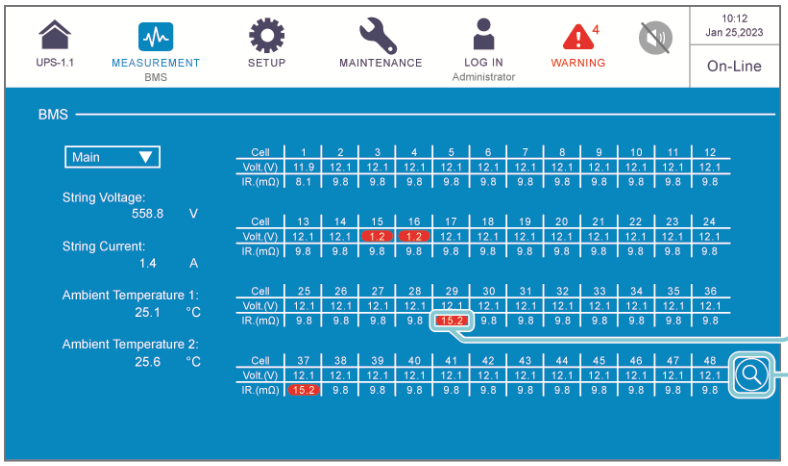
- **Path:** MEASUREMENT → **BMS**

To activate the BMS function (only applicable to the lead-acid batteries), you have to connect the optional battery management system (BMS) to the UPS and complete relevant settings. After that, you can check **String Voltage**, **String Current**, **Ambient Temperature***1, **Cell Volt**. (Voltage) and **Cell IR**.*2 (Internal Resistance) of the **Main Module** and of each **Ext #n Module**.

NOTE:

1. *1 The item will show up only after you select '**Main**' in the select-module list in the upper left corner of the screen.
2. *2 The item will show up only after you go to SETUP → **BMS Setting** and select '**Internal Resistance**' in the **Module Type** list.

Tap the icon ( ), and you can view the **Internal Resistance Alarm Threshold**.



When the Cell IR. Value Exceeds the Internal Resistance Alarm Threshold Value, the Column Will Show the Warning in Red.

Tap the Icon to View the Internal Resistance Alarm Threshold Values.

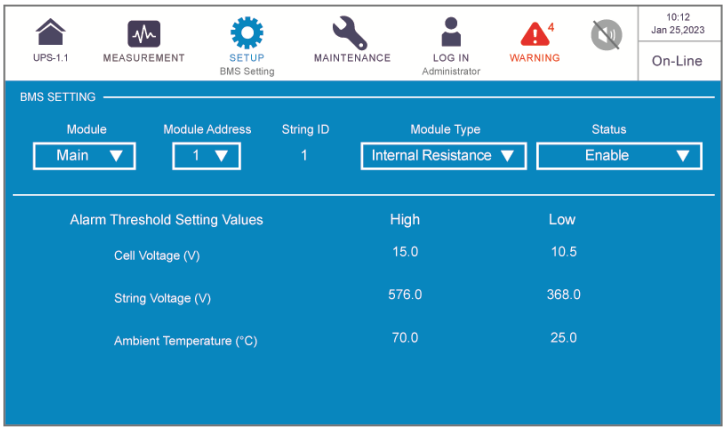
- **Path:** SETUP **→ BMS Setting (Administrator login is required)**

After entering the **BMS SETTING** screen, you can view the **Alarm Threshold Values (High & Low)***1 of **Cell Voltage***2, **String Voltage***2 and **Ambient Temperature***2.

You can also set up the following items. These settings must be carried out by qualified service personnel. Please contact Delta customer service for assistance.

NOTE:

1. *1 The **Alarm Threshold Values (High & Low)** are defined by the service personnel during the installation process of the optional battery management system (BMS).
2. *2 The item will show up only after you select '**Main**' in the **Module** list.



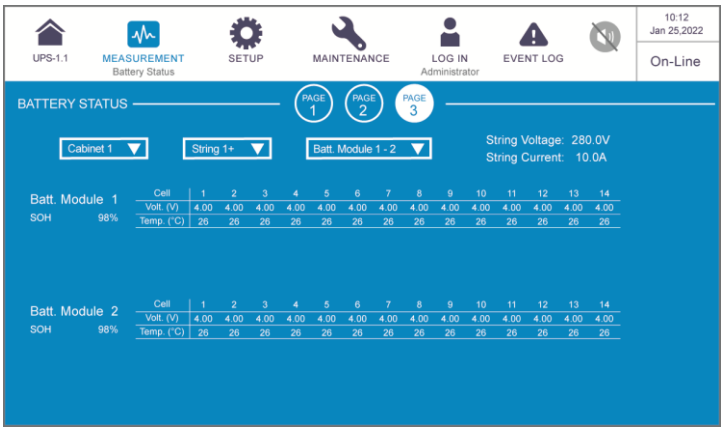
Item	Description
Module	Select Main/ Ext #n module.
Module Address	Set the module address.
Module Type	Set the module type as Voltage Type/ Internal Resistance.
Status	Enable or disable the display of the Main and Ext #n modules' information on the BMS screen.

8.3 MFC Function on the LCD Screen

The **PAGE 3** & **MFC** screens (see the figures below) will appear on the LCD only if you use the Delta lithium-ion batteries with the optional multifunctional communication (MFC) card being installed in the SMART slot (see ***Figure 4-2***). Please contact Delta customer service if you need more information.

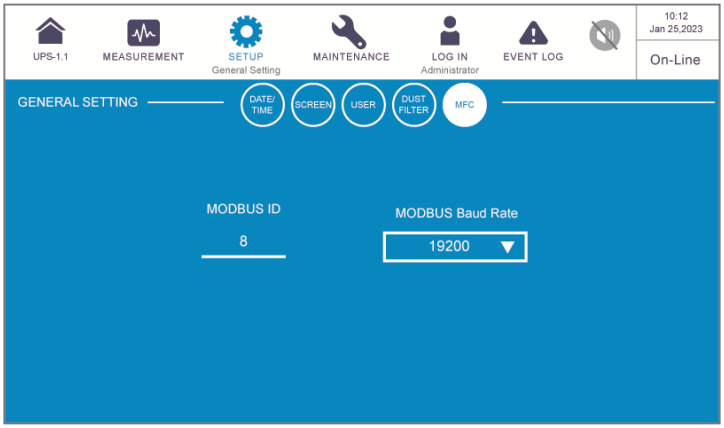
- **Path:** 

→ Battery Status



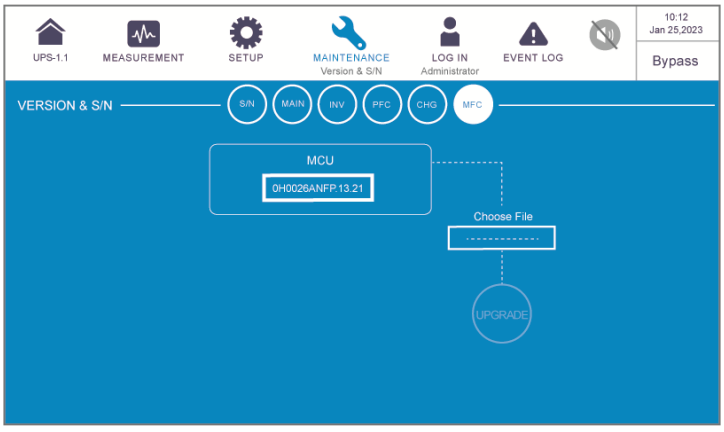
In the screen shown above, you can use the three drop-down lists in the upper left corner to choose the **Cabinet**, **String**, and **Battery Module** to view the corresponding **String Voltage**, **String Current**, battery module's **SOH** (State of Health) and the battery cell's **Voltage** and **Temperature**.

- Path: SETUP → General Setting (Administrator login is 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).

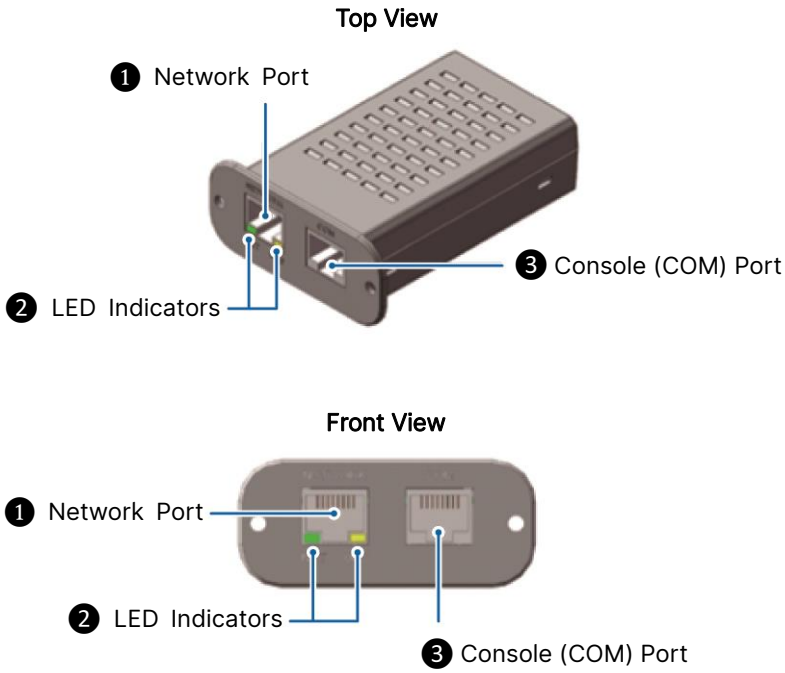
8.4 InsightPower G3 TMS Card

8.4.1 General Overview

The InsightPower G3 TMS card acquires the TMS sensors' information and remotely monitors the sensors via a network system. The card supports public protocols including HTTP, HTTPS and MODBUS TCP. You can effortlessly configure the card using a network system and easily obtain the temperature of each TMS sensor.

8.4.2 Interfaces

The interfaces include a Network port, two LED indicators and a COM port. Please refer to ***Figure 4-28: InsightPower G3 TMS Card*** for the location.



No.	Item	Description
❶	Network Port	Connect the port to the Ethernet Network.
❷	LED Indicators	When the InsightPower G3 TMS card is initializing or upgrading firmware, the two LED indicators flash simultaneously to show its status. Please refer to the following. • **Rapid simultaneous flashing** (every 50 ms): Initialization or firmware upgrade is in progress. • **Slow simultaneous flashing** (every 500 ms): Initialization is failed. **WARNING:** Do **NOT** remove the InsightPower G3 TMS card or disconnect the UPS's input power during initialization or firmware upgrade! This could result in data loss or damage to the InsightPower G3 TMS card.
❷	LED Indicators (continued)	The green LED indicator shows the network connection status. • **ON**: Network connection is established and the IPv4 address is useable. • **OFF**: It is not connected to a network. • **Slow flashing** (every 500 ms): Faulty IP address. The yellow LED indicator shows the linking status between the InsightPower G3 TMS card and the UPS. • **Rapid flashing** (every 50 ms): the UPS is linked. • **Slow flashing** (every 500 ms): the UPS is not linked.
❸	Console (COM) Port	Connect the port to a workstation with the RJ45 to DB9 cable to configure the system.

8.4.3 Configuring the InsightPower G3 TMS Card via Web

To connect to the InsightPower G3 TMS card via your web browser, please follow the steps below.

Step 1

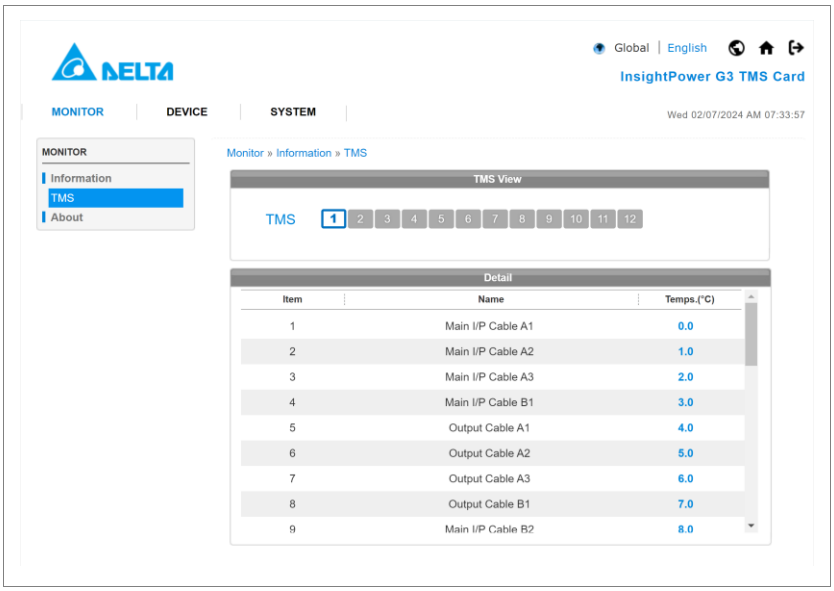
Use a CAT5 network cable to connect the InsightPower G3 TMS card's network port and your computer. Then, launch your web browser. In the address bar, enter the InsightPower G3 TMS card's default **Host Name** (**InsightPower)** or default **IP Address** (192.168.1.101).

NOTE:

If you have previously changed the InsightPower G3 TMS card's **Host Name** or **IP Address**, please enter the new one.

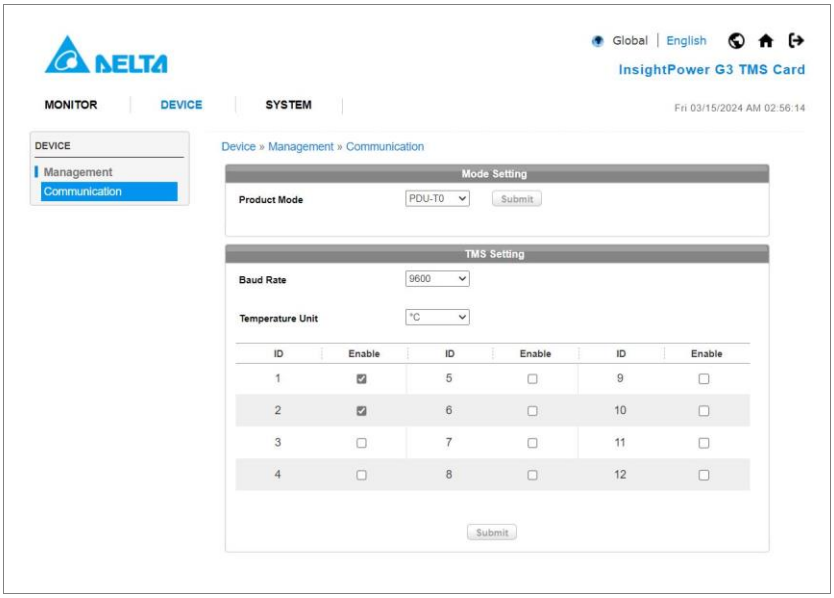
Step 2

Log in as **Administrator** (default account/ password: admin/ password, case sensitive). After login, the homepage displays the temperature value of each TMS sensor.



Step 3

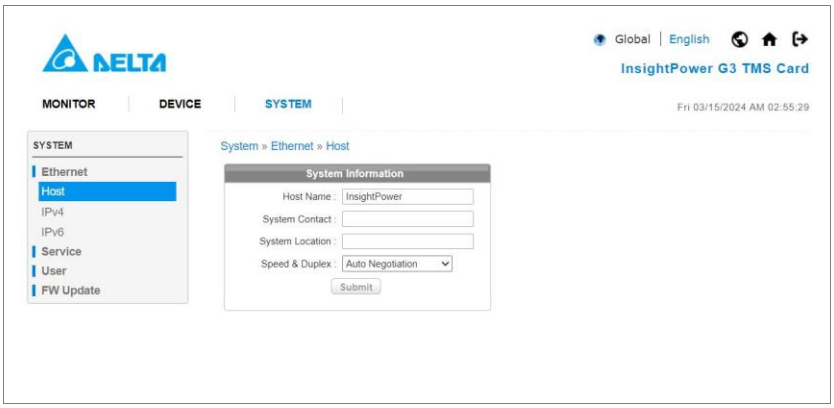
Click **Device** → **Communication** to select the product mode.



Step 4

Click **System** → **Ethernet** to set up the **Host**, **IPv4** and **IPv6** for the InsightPower G3 TMS card.

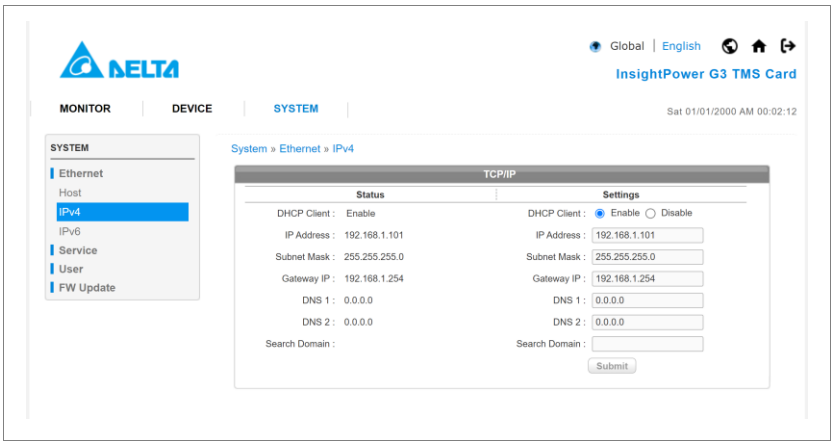
- Host



Item	Description
Host Name	The InsightPower G3 TMS card's host name on the network.
System Contact	The system's contact information.

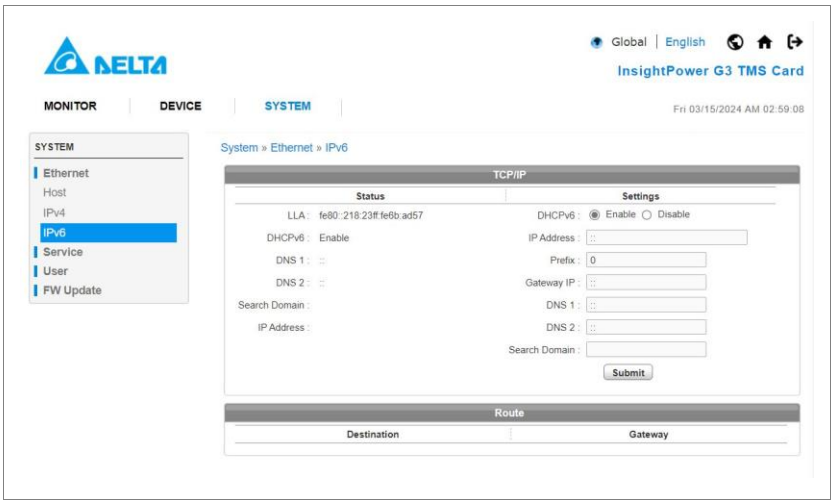
Item	Description
System Location	The system's location information.
Speed & Duplex	Select the speed and duplex mode of the InsightPower G3 TMS card.

- IPv4



Item	Description
DHCP Client	Enable or disable the DHCP. If you select 'Enable', the DHCP server will automatically assign an IP address to the InsightPower G3 TMS card (default: Enable).
IP Address	The IP address of the InsightPower G3 TMS card (default: 192.168.1.101).
Subnet Mask	The subnet mask of your network.
Gateway IP	The IP address of the network gateway.
DNS 1	The IP address of the domain name server 1.
DNS 2	The IP address of the domain name server 2.
Search Domain	If the host name that you provided cannot be found, the system will automatically append the search domain to your host name.

- IPv6



Item	Description
DHCPv6	Enable or disable the DHCPv6. If you select 'Enable', the DHCPv6 server will automatically assign an IPv6 address to the InsightPower G3 TMS card (default: Enable).
IP Address	The IP address of the InsightPower G3 TMS card.
Prefix	The prefix length of your network.
Gateway IP	The IPv6 address of the network gateway.
DNS 1	The IPv6 address of the domain name server 1.
DNS 2	The IPv6 address of the domain name server 2.
Search Domain	If the host name that you provided cannot be found, the system will automatically append the search domain to your host name.

8.4.4 Configuring the InsightPower G3 TMS Card via COM port

If network connection is not available at your location, you can set up the InsightPower G3 TMS card via COM port. Please follow the steps below.

NOTE:

If you use non-Windows-based operating system, please refer to your system's user manual for Telnet clients.

Step 1

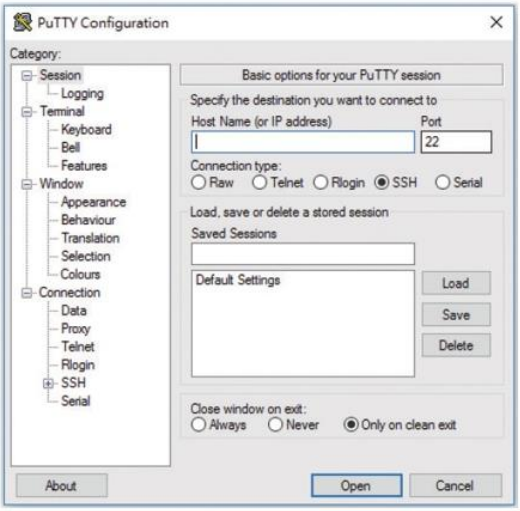
Use the Delta model #3081370000 RJ45 to DB9 serial cable to connect the InsightPower G3 TMS card's COM port to the workstation's COM port.

Step 2

Download the free Telnet/ SSH client program named PuTTY from http://www.putty.org.

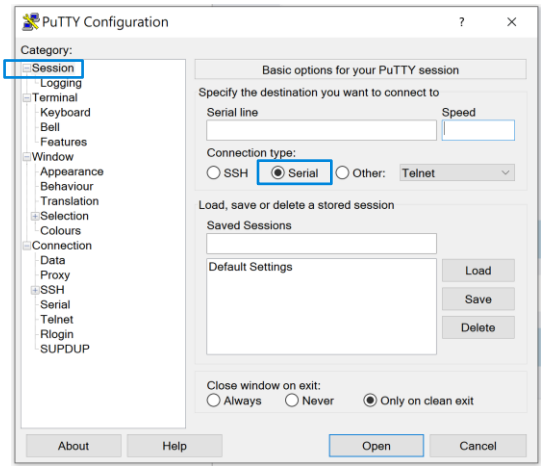
Step 3

Lunch PuTTY as shown below.



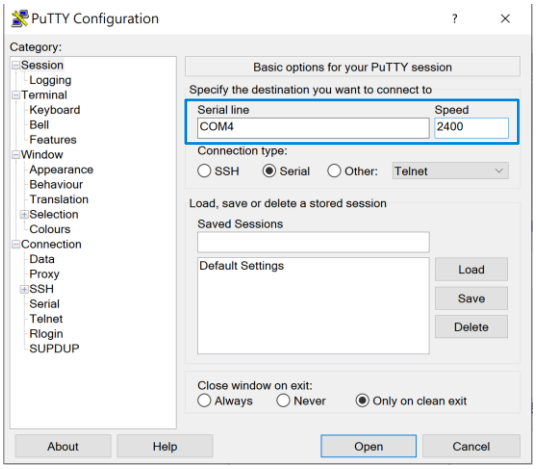
Step 4

Click **Category** → **Session** → **Connection type** → **Serial**



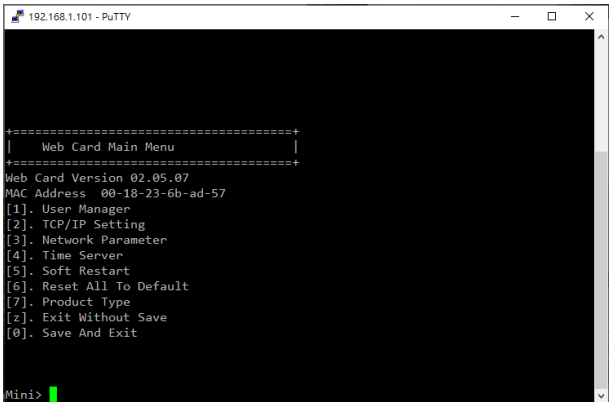
Step 5

In the **Serial line** bar, enter your workstation's COM port number, which is connected to the InsightPower G3 TMS card's COM port. In the **Speed** bar, enter the baud rate **2400**.



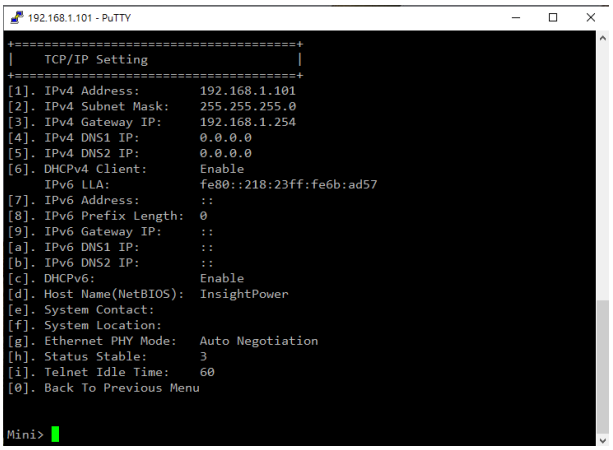
Step 6

Click **Open** to continue. The PuTTY will automatically connect to the InsightPower G3 TMS card. When connection is established, log in as **Administrator** (default account/ password: admin/ password, case sensitive). Once you are logged in, the **Main Menu** will appear on the screen.



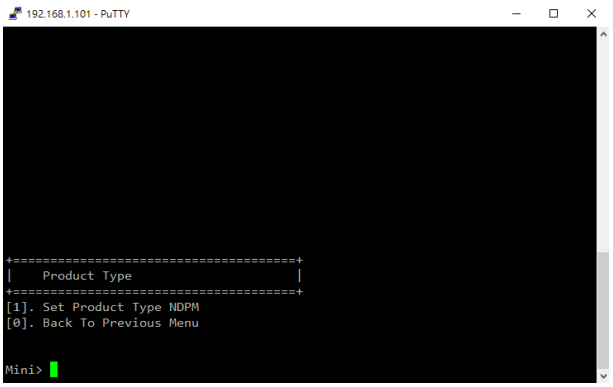
Step 7

Select **TCP/ IP Setting** to set up the **Host**, **IPv4** and **IPv6** for the InsightPower G3 TMS card.



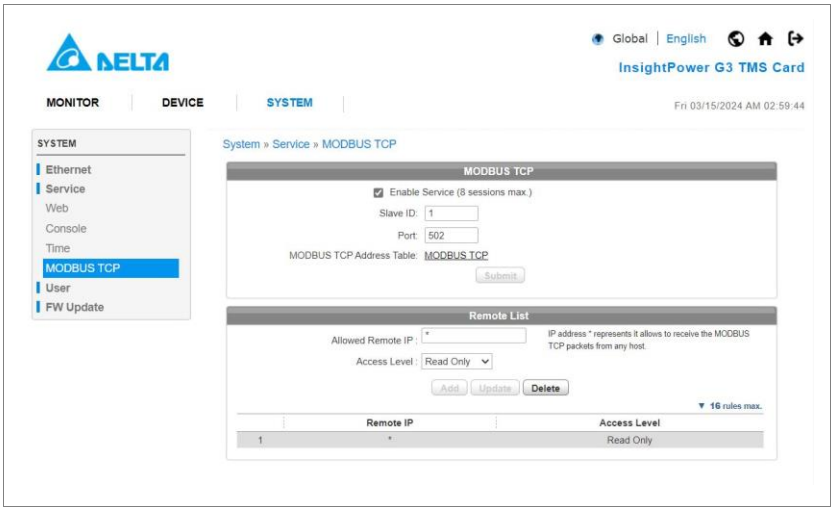
Step 8

Select **Product Type** to change product type.



8.4.5 Configuring MODBUS TCP for Monitoring

The InsightPower G3 TMS card provides MODBUS TCP service for monitoring. Users can enable or disable the MODBUS TCP service from **System** → **Service** → **MODBUS TCP**. Please set the slave ID and port according to the monitoring requirements. For cyber security, users can create a white list in the **Remote List** column.



Item	Description
Enable Service (8 sessions max.)	You can enable or disable the MODBUS TCP service. The maximum number of the sessions is eight (default: Enable).
Slave ID	The MODBUS slave ID (1 ~254).
Port	The MODBUS TCP port (default: 502).
MODBUS TCP Address Table	Users can download the table to obtain the MODBUS TCP addresses. With these addresses, users can use the MODBUS TCP protocol to monitor the TMS sensors.
Remote List (16 rules max.)	Users can allow remote IP addresses with different permission levels to access the InsightPower G3 TMS card through the MODBUS TCP by creating a white list for cyber security. The option of access level includes **Disable**, **Read Only** and **Read/ Write**.

Chapter 9 : Maintenance

NOTE:

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

- **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. Biannually check the UPS and inspect:

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

      2) Whether the UPS works in Bypass mode (normally, the UPS works in On-Line 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 UPS uses the lead-acid batteries or lithium-ion batteries. Make sure to replace the batteries according to the battery life. 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 the normal battery life.

1. Keep usage temperature at 15 ~ 25°C (59 ~ 77°F).
2. When the UPS needs to be stored for an extended period of time, the lead-acid batteries must be recharged once every three months and the charging time must not be less than 24 hours each time. As for the lithium-ion batteries, please contact your battery supplier for the charging frequency and charging duration.

- **Fans**

Higher temperature will shorten fan life. When the UPS is running, please check if all fans work normally and make sure if air can move freely around and through the UPS. If not, please replace abnormal fans.

- **10" Color Touch Panel LCD**

The LCD replacement procedures are as follows.

Step 1

❶ Open the UPS system cabinet's middle front door, ❷ press the power button once to let it in the **OFF** status and ❸ disconnect the LCD cable connected the LCD and the display port.

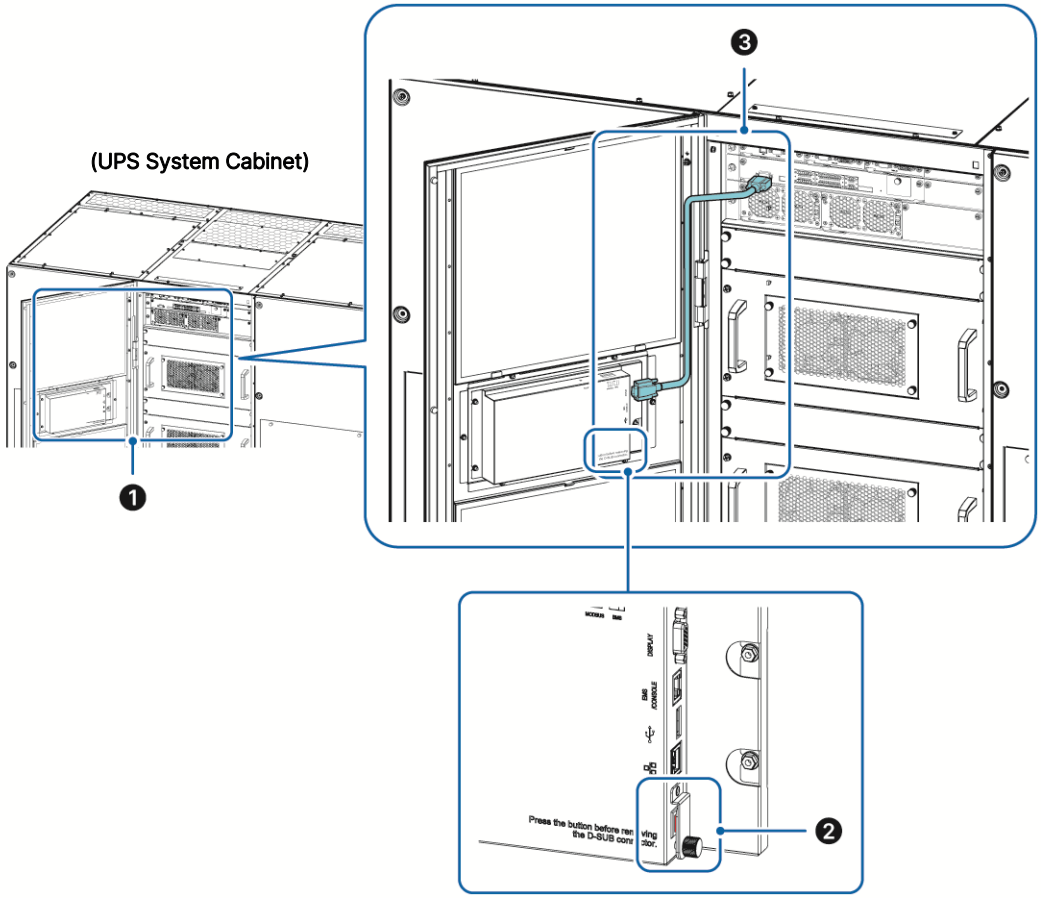


Figure 9-1: Open the Middle Front Door, Press the Power Button Off & Disconnect the LCD Cable

Step 2

Unscrew the six screws to remove the LCD, check if the new LCD's power button is in the **OFF** status and install the new LCD. After that, use the LCD cable to connect the new LCD and the display port and press the power button once to let it in the **ON** status.

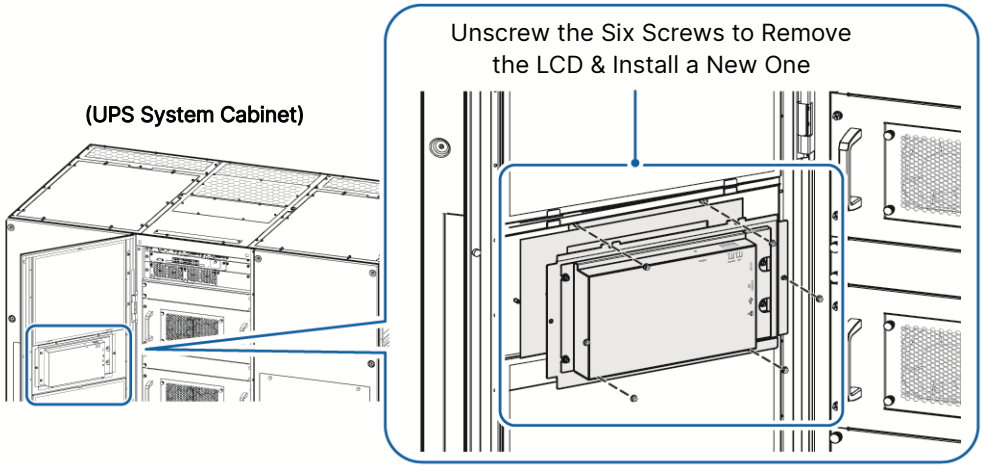


Figure 9-2: Unscrew the Six Screws to Remove the LCD & Install a New One

- **Dust Filters**

To replace the UPS system cabinet's dust filters, open its middle front door, remove the four dust filters located at the rear of the door and install new ones.

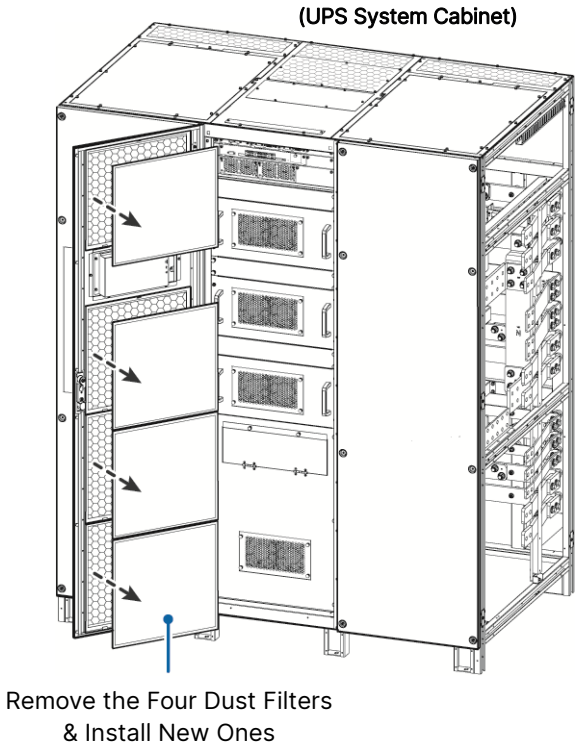


Figure 9-3: Remove the Four Dust Filters & Install New Ones

To replace the power module's dust filters, open its front door and remove the two dust filters located at the rear of the door and install new ones.

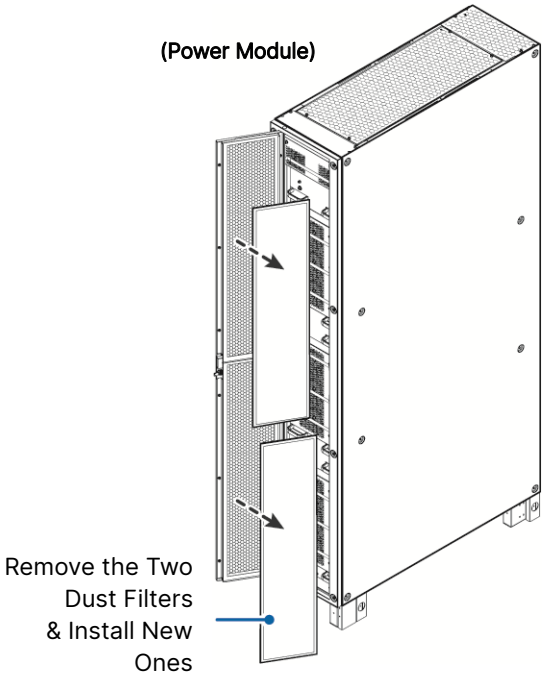


Figure 9-4: Remove the Two Dust Filters & Install New Ones

Appendix 1 : Technical Specifications

Model		DPM G2-1000K	DPM G2-1250K
UPS Capacity		1000kVA/ 1000kW	1250kVA/ 1250kW
Input	Nominal Voltage	220/380, 230/400, 240/415 Vac (3P4W+PE) 380/400/415 Vac (3P3W+PE)	
	Voltage Range	187/324 Vac ~ 276/478 Vac (100% load); 165/286 Vac ~ 187/324 Vac (70% ~ 100% load)	
	Frequency	45 ~ 65 Hz	
Output	Nominal Voltage	220/380, 230/400, 240/415 Vac (3P4W+PE) 380/400/415 Vac (3P3W+PE)	
	Voltage Harmonic Distortion	< 1 % (linear load)	
	Frequency	50/60 Hz	
	Overload Capability	<110% : continuous ; 110% ~ ≤ 125% : 10 minutes ; 126% ~ ≤ 150% : 1 minute ; > 150% : 1 second	
	Short-circuit Current	3040A, 200 ms	3800A, 200ms
Short Circuit Withstand Current		100 kA	
Display		10” touch panel	
Interface	Standard	USB type B ×1, RS-232 port × 1, Synchronized Multiple Bus (SMB) × 2, Parallel port × 2, REPO × 1, External battery temperature detection × 4, External breaker status dry contact × 4, Output dry contact × 6, Input dry contact × 6, Backfeed shunt trip × 1, Battery shunt trip × 1, Auxiliary power 48 Vdc × 1, Battery breaker status dry contact × 1 External RS-232 port (reserved) × 1, External RS-485 port (reserved) × 1,	

Model		DPM G2-1000K				DPM G2-1250K			
UPS Capacity		1000kVA/ 1000kW				1250kVA/ 1250kW			
Interface (continued)	Standard	SMART slot × 2, Modbus (RS-485) port × 1, BMS × 1, EMS/ Console port × 1, USB type A × 1, Ethernet × 1							
Efficiency	Loading	25 %	50 %	75 %	100 %	25 %	50 %	75 %	100 %
	Online Mode	96.5 %	97.5 %	97.5 %	97.0 %	97.0 %	97.6 %	97.3 %	96.8 %
	ECO Mode	98.0 %	98.6 %	99.1 %	99.2 %	98.2 %	98.7 %	99.0 %	99.2 %
Battery	Nominal Voltage	480 Vdc (default)							
	Charge Voltage_ Float Charge	544V (± 2 Vdc)							
	Charge Voltage_ Boost Charge	560V (± 2 Vdc)							
	Charge Current	500A				625A			
Environment	Operating Altitude	1000 m (3280 ft) (without derating) 2000 m (6562 ft) (maximum) Derating 1% for each additional 100 m (328 ft)							
	Operating Temperature	0 ~ 40°C (32 ~ 104°F)							
	Relative Humidity	< 95% (non-condensing)							
	Audible Noise	< 80 dBA*[1]							
	Ingress Protection (IP) Class	IP20							

Model		DPM G2-1000K	DPM G2-1250K
UPS Capacity		1000kVA/ 1000kW	1250kVA/ 1250kW
Compliance	IEC Pollution Degree (PD)	PD 2	
	Over Voltage Category (OVC)	OVC III	
	Type of System Earthing	TN-S, TN-C, TN-C-S	
Physical_ UPS System Cabinet	Dimensions (W × D × H)	1648 × 990 × 2000 mm (64.9" × 39" × 78.7")	1648 × 990 × 2000 mm (64.9" × 39" × 78.7")
	Weight	900 kg (1984 lb)	920 kg (2028 lb)
Physical_ Power Modules	Dimensions (W × D × H)	1422 × 990 × 2000 mm (56" × 39" × 78.7")	1752 × 990 × 2000 mm (69" × 39" × 78.7")
	Weight	1550 kg (3418 lb)	1916.3 kg (4224.7 lb)

NOTE:

1. *[1] At a distance of 1 m (3.28 ft) in front of the UPS.
2. Please refer to the rating label for the safety certification.
3. 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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Release Date : 2025_03_10

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