TOSHIBA

3000 SP SERIES

INSTALLATION AND OPERATION MANUAL

SINGLE PHASE - 6/12/18/24 KVA

Doc. No.: 206600-000
March 2025

TOSHIBA

IMPORTANT NOTICE

Never attempt to install, operate, maintain or dispose of this equipment until you have first read and understood all of the relevant product warnings and user directions that are contained in this Installation manual.

The installation of this equipment must only be performed by qualified personnel.

The Instructions contained in this manual are not intended to cover all of the details or variations in equipment or to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be required or should particular problems arise which are not covered sufficiently the matter should be referred to the local TOSHIBA sales office.

Nothing in this manual shall alter Toshiba International Corporation's standard terms and conditions or the conditions of any written sales contract.

Any Electrical or mechanical modifications to this equipment without prior written consent of TOSHIBA will void all warranties and may void UL/CUL listing. Unauthorized modifications may also result in personal injury, death, or equipment damage.

UNINTERRUPTIBLE POWER SYSTEM

If additional information or technical assistance is required call TOSHIBA Customer Support Center toll free at 1-877-867-8773, or write to: Toshiba International Corporation, 13131 West Little York Road, Houston, TX 77041-9990 Attn: UPS Product Manager.

Keep this manual with the UPS equipment.

Job Number:_____

Model Number: _____

Serial Number:_____

Application:_____

Shipping Date:_____

Date of Installation:_____

Inspected By:_____

Purpose and Scope of Manual

This manual provides information on how to safely install, operate, and maintain your TOSHIBA power electronics product. This manual includes a section on General Safety Instructions that describes the warning labels and symbols that are used throughout the manual. Read the manual completely before installing, operating, or performing maintenance on this equipment.

This manual and the accompanying drawings should be considered a permanent part of the equipment and should be readily available for reference and review. Dimensions shown in the manual are in metric and/or the English equivalent.

TOSHIBA reserves the right, without prior notice, to update information, make product changes, or to discontinue any product or service identified in this publication.

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TOSHIBA shall not be liable for technical or editorial omissions or mistakes in this manual. Nor shall it be liable for incidental or consequential damages resulting from the use of information contained in this manual.

Printed in Taiwan

Contacting TOSHIBA Customer Support Center

The TOSHIBA Customer Support Center can be contacted to obtain help in resolving any **Uninterruptible Power System** problem that you may experience or to provide application information.

Toshiba Customer Support Center

8 a.m. to 5 p.m. (CST) – Monday through Friday

Tel (877) 867-8773

Fax (713) 896-5212

E-mail – TIC-UPSservice@toshiba.com

You may contact TOSHIBA by writing to:

TOSHIBA INTERNATIONAL CORPORATION.

POWER ELECTRONICS DIVISION

13131 West Little York Rd.

Houston, TX 77041-9990

Attn: UPS Product Manager

For further information on Toshiba products and services, please visit our website at:

http://www.toshibaups.com

TOSHIBA

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1 Introduction

This manual provides information on how to safely install and operate your 3000 SP Series UPS system. This manual includes a section of general safety instructions that describes the warning labels and symbols that are used throughout the manual. **Read the manual completely before installing, operating, or performing maintenance on this equipment.**

Qualified personnel should read this manual carefully before transporting, installing, and wiring the 3000 SP Series UPS System. In addition, they should have a thorough understanding of the information provided in the chapters titled:

- General Safety Instructions
- Import Safety Instructions
- Safety Precautions
- Installation Precautions

Read this 3000 SP Series UPS installation and Operation Manual for important instructions on operating the 3000 SP Series UPS System. This manual and the accompanying drawings should be considered a permanent part of the equipment and should be readily available for reference and review.

Keep this Installation and Operational Manual near the 3000 SP Series UPS for necessary reference.

Dimensions shows in the manual are in metric and/or English customary equivalent.

SAVE THESE INSTRUCTIONS

2 General Safety Instructions

This manual is designed for ease of use, giving the user easy and quick reference to information.
This manual uses notice icons to draw attention to the user important information regarding the safe operation and installation of the UPS. The notice icons used in this manual are explained below and should be taken into account and adhered to whenever they appear in the text of this manual.

Ce manuel est conçu pour être facile à utiliser, offrant à l'utilisateur un accès rapide et simple aux informations. Il utilise des icônes de mise en garde afin d'attirer l'attention de l'utilisateur sur des informations importantes concernant l'installation et le fonctionnement sécuritaire de l'onduleur (UPS). Les icônes utilisées dans ce manuel sont expliquées ci-dessous et doivent être prises en compte et respectées chaque fois qu'elles apparaissent dans le texte.

2.1 Symbols

The symbols listed below are used throughout this manual. When symbols are used in this manual, they will include important safety information that must be carefully followed.

Les symboles listés ci-dessous sont utilisés tout au long de ce manuel. Lorsque des symboles sont utilisés dans ce manuel, ils incluront des informations importantes sur la sécurité qui doivent être scrupuleusement suivies.

Safety Alert Symbol indicates that a potential personal injury hazard exists.
Le symbole d'alerte de sécurité indique qu'il existe un risque potentiel de blessure corporelle.

Prohibited Symbol indicates **DO NOT** take action.
Le symbole d'interdiction indique qu'il NE FAUT PAS agir.

Mandatory Symbol indicates that the following instruction is required.
Le symbole obligatoire indique que l'instruction suivante est requise.

Ground Symbol indicates the location of the equipment grounding conductor.
Le symbole de mise à la terre indique l'emplacement du conducteur de mise à la terre de l'équipement.

Electrical – Voltage & Shock Hazard Symbol indicates parts inside may cause electric shock.
Le symbole de mise à la terre indique l'emplacement du conducteur de mise à la terre de l'équipement.

Explosion Hazard Symbol indicates parts may explode.
Le symbole de risque d'explosion indique que les pièces internes peuvent exploser.

Open Book indicates that this manual must be read.
Le symbole du livre ouvert indique que ce manuel doit être lu.

Lockout/Tagout indicates that the primary power and the control circuit power be turned off and locked out before opening the panel.
Le symbole de verrouillage/étiquetage indique que l'alimentation principale et l'alimentation du circuit de commande doivent être coupées et verrouillées avant d'ouvrir le panneau.

2.2 Signal Words

The signal words listed below are used throughout this manual. When the words DANGER, WARNING, CAUTION and ATTENTION are used in this manual they will include important safety information that must be carefully followed.

The word **DANGER** in capital letters preceded by the safety alert symbol indicates that an **imminently hazardous** situation exists, and if not avoided **will result in loss of life or serious injury to personnel.**

The word **WARNING** in capital letters preceded by the safety alert symbol indicates that a **potentially hazardous** situation exists, and if not avoided **may result in loss of life or serious injury to personnel.**

The word **CAUTION** in capital letters preceded by the safety alert symbol indicates that a **potentially hazardous** situation exists, and if not avoided **may result in minor or moderate injury.**

The word **NOTICE** indicates important information that is not intended to indicate a hazardous condition and disregarding this information may result in various consequences, including but not limited to equipment and property damage

Le mot **DANGER**, en lettres majuscules et précédé du symbole d'alerte de sécurité, signale une situation **dangereuse imminente** qui, si elle n'est pas évitée, **entraînera la mort ou des blessures graves du personnel.**

Le mot **AVERTISSEMENT**, en lettres majuscules et précédé du symbole d'alerte de sécurité, signale une situation **potentiellement dangereuse** qui, si elle n'est pas évitée, **pourrait entraîner la mort ou des blessures graves du personnel.**

Le mot **ATTENTION**, en lettres majuscules et précédé du symbole d'alerte de sécurité, signale une situation **potentiellement dangereuse** qui, si elle n'est pas évitée, **pourrait entraîner des blessures mineures ou modérées**.

Le mot **AVIS** indique une information importante qui n'a pas pour but de signaler une situation dangereuse. Le non-respect de cette information peut entraîner diverses conséquences, notamment, sans s'y limiter, des dommages à l'équipement et aux biens.

2.3 Qualified Personnel

Installation, operation, and maintenance shall be performed by Qualified Personnel Only. A Qualified Person is one that has the skills and knowledge relating to the construction, installation, operation, and maintenance of the electrical equipment described herein and has received safety training on the hazards involved (Refer to the latest edition of NFPA 70E for additional safety requirements).

Qualified Personnel shall:

- Have read the entire operation manual.
- Be familiar with the construction and function of the Uninterruptible Power System, the equipment being driven, and the hazards involved.
- Be trained and authorized to safely energize, de-energize, ground, lockout/tagout circuits and equipment, and clear faults in accordance with established safety practices.
- Be trained in the proper care and use of protective equipment such as safety shoes, rubber gloves, hard hats, safety glasses, face shields, flash clothing, etc., in accordance with established safety practices.
- Be trained in rendering first aid.

For further information on workplace safety visit www.osha.gov.

2.4 Factory Authorized Personnel

Factory authorized personnel have been factory trained and certified to install, service, and repair the 3000 SP Series UPS System. Contact the Toshiba Customer Support Center for assistance in locating the factory-authorized personnel nearest you.

2.5 Important Safety Instructions

The Toshiba Uninterruptible Power Supply System (UPS) is designed to provide many years of reliable protection from power failure, brown-outs, line noise, and voltage transients.

To ensure optimum performance of the equipment, follow the manufacturer's instructions. This manual contains descriptions required to operate the UPS. Please read this manual carefully and retain it for future reference.

Pour garantir des performances optimales de l'équipement, suivez les instructions du fabricant. Ce manuel contient les descriptions nécessaires pour utiliser l'onduleur (UPS). Veuillez lire ce manuel attentivement et le conserver pour une référence ultérieure.

⚠ CAUTION

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions for the 3000 SP SERIES Uninterruptible Power Supply Systems that should be followed during installation and maintenance of the UPS and batteries.

⚠ ATTENTION

Ce manuel contient des instructions importantes pour les systèmes d'Alimentation Sans Interruption (ASI) de la série 3000 SP, qui doivent être suivies lors de l'installation et de la maintenance de l'ASI et des batteries.

⚠ WARNING

WARNING 1

Lethal voltages exist within the equipment during operation. Observe all warnings and cautions in this manual. Failure to comply may result in serious injury or death. Obtain qualified service for this equipment as instructed.

⚠ AVERTISSEMENT

Des tensions mortelles sont présentes dans l'équipement pendant son fonctionnement. Respectez tous les avertissements et mises en garde de ce manuel. Le non-respect de ces consignes peut entraîner des blessures graves ou la mort. Faites appel à un service qualifié pour cet équipement, comme indiqué.

WARNING

WARNING 2

2.5.1 Maximum Operating Temperature

The maximum operating ambient temperature for the UPS system is 104°F (40°C)

AVERTISSEMENT

Température maximale de fonctionnement

La température ambiante maximale de fonctionnement pour le système UPS est de 104°F (40°C).

2.5.2 Proposition 65 Warning

WARNING: This product can expose you to chemicals including Lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

2.5.3 Disclaimer

WARNING

IN NO EVENT WILL TOSHIBA CORPORATION BE RESPONSIBLE OR LIABLE FOR EITHER INDIRECT OR CONSEQUENTIAL DAMAGE OR INJURY THAT MAY COME FROM THE MISUSE OF THIS EQUIPMENT. ANY MODIFICATIONS WITHOUT AUTHORIZATION BY TOSHIBA COULD RESULT IN PERSONAL INJURIES, DEATH OR DESTRUCTION OF THE 3000 SP SERIES UPS.

TOSHIBA RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. TOSHIBA DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR UPS DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

AVERTISSEMENT

EN AUCUN CAS TOSHIBA CORPORATION NE SERA RESPONSABLE OU REDEVABLE DES DOMMAGES INDIRECTS OU CONSÉCUTIFS, OU DES BLESSURES POUVANT RÉSULTER D'UNE MAUVAISE UTILISATION DE CET ÉQUIPEMENT. TOUTE MODIFICATION SANS L'AUTORISATION DE TOSHIBA POURRAIT ENTRAÎNER DES BLESSURES PERSONNELLES, DES DÉCÈS OU LA DESTRUCTION DE L'UPS DE LA SÉRIE 3000 SP.

TOSHIBA SE RÉSERVE LE DROIT D'APPORTER DES CHANGEMENTS SANS AUTRE AVIS À TOUS LES PRODUITS MENTIONNÉS ICI POUR AMÉLIORER LA FIABILITÉ, LA FONCTIONNALITÉ OU LA CONCEPTION. TOSHIBA N'ASSUME AUCUNE RESPONSABILITÉ DÉCOULANT DE L'APPLICATION OU DE L'UTILISATION DE TOUT PRODUIT OU UPS DÉCRIT ICI ; IL NE TRANSMET PAS NON PLUS DE LICENCE AU TITRE DE SES DROITS DE BREVET NI DES DROITS D'AUTRUI.

PROHIBIT
INTERDICTION

Don’t modify the UPS entirely or partially.
Any modifications without authorization by TOSHIBA may result in personal injuries, death or destruction of the UPS.

Ne modifiez pas l'UPS en tout ou en partie. Toute modification sans l'autorisation de TOSHIBA pourrait entraîner des blessures personnelles, des décès ou la destruction de l'UPS.

2.6 SAFETY PRECAUTIONS

UNINTENDED USAGE

DANGER

This UPS shall NOT be used in the following applications. Use of this UPS in any of the below applications will result in serious injury or death:

Cet UPS NE doit PAS être utilisé dans les applications suivantes. L'utilisation de cet UPS dans l'une des applications ci-dessous entraînera des blessures graves ou la mort:

PROHIBIT
INTERDICTION

- Medical operation room equipment
- Life support equipment
- Fire Prevention or Suppression Equipment
- Équipements de salles d'opération médicale
- Équipements de maintien de la vie
- Équipements de prévention ou de suppression des incendies.

Always read all applicable regulations and standards for the application of this UPS. Special considerations are required when using this UPS in the following applications:

Lisez toujours toutes les réglementations et normes applicables à l'utilisation de cet UPS. Des considérations particulières sont nécessaires lorsque cet UPS est utilisé dans les applications suivantes:

NOTE
REMARQUE

- Nuclear Power Plants.
- Control Equipment.
- Transportation Equipment
- Centrales nucléaires
- Équipements de contrôle
- Équipements de transport.

WARNING

WARNING 3

The UPS is to be installed in a controlled environment.
Improper storage and installation environments may deteriorate insulation, shorten component life, and cause malfunctions.
Maintain the installation environment as follows:

AVERTISSEMENT

L'UPS doit être installé dans un environnement contrôlé.

Un entreposage et une installation inappropriés peuvent détériorer l'isolation, réduire la durée de vie des composants et provoquer des dysfonctionnements.

Maintenez l'environnement d'installation comme suit:

Table 2-1 UPS Installation/Storage Environment

No.	Item	Environment standard	
1	Installation location	Indoors	
2	Ambient temperature	Minimum temperature: 32°F (0 °C) Maximum temperature: 104°F (40 °C) The average temperature over any 24-hour period must be in the range 41 °F (5 °C) to 95 °F (35 °C).	
3	Relative humidity	The relative humidity must be held between 30 and 95%. There must be no condensation due to temperature changes.	
4	Altitude	This equipment must not be applied at an altitude that exceeds 2250m (7380ft) above sea level. Operating Altitude 0 to 1000m before derating occurs.	
5	Dust	Dust in the room where the UPS is installed must not exceed normal atmospheric dust levels. In particular, that dust should not include iron particles, oils or fats, or organic materials such as silicone.	
6	Inflammable gas following IEC654-4 Part 4	There should be no inflammable/explosive gas.	
		Hydrogen sulfide (H_2S)	No more than 0.003 PPM
		Sulfurous acid gas (SO_2)	No more than 0.01 PPM
		Chlorine gas (Cl_2)	No more than 0.002 PPM
		Ammonia gas (NH_3)	No more than 1 PPM
		Nitrous oxides (NO_x)	No more than 0.05 PPM
		Ozone (O_3)	No more than 0.002 PPM

3 GENERAL

The Toshiba 3000 SP SERIES UPS is designed to provide continuous and clean electrical power to a critical load. Additionally, the UPS monitors power conditions affecting the load. In the event of an input power failure, the UPS will supply power to the critical load for the specified backup time.

If the input power is not restored promptly, backup power from the UPS DC Energy Storage System permits the orderly shutdown of equipment supported by the UPS. The UPS is simple to start up, operate, and maintain.

The TOSHIBA 3000 SERIES UPS is available in four kVA sizes - 6, 12, 18 and 24 kVA. Specifications for each kVA model are given in Section 3.5. The principles of operation described herein apply to all models.

This manual overviews the TOSHIBA 3000 SP SERIES UPS components and their functions. The appearance and purpose of operator controls and indicators are described with procedures for operation, start-up, shutdown, and basic maintenance included.

3.1 DEFINITIONS

UNINTERRUPTIBLE POWER SUPPLY SYSTEM (UPS) - All components within the UPS Cabinet, ancillary cabinets, and associated batteries that function as a system to provide continuous, conditioned AC power to a load. This is sometimes referred to as the "System".

UPS CABINET – The metal enclosure that houses all components of the Uninterruptible Power Supply System. Composed of power modules, battery modules, controller module, HMI display, backfeed contactor, and terminals for power connection.

POWER MODULE - The metal enclosure which contains the Converter / Inverter, Charger, bypass, and internal control systems required to provide specified AC power to a load.

BATTERY MODULE - The metal enclosure which contains the rechargeable energy storage device (VRLA) which supplies DC power to the inverter to maintain continuous AC power to the load during AC input power failure conditions.

CONVERTER / INVERTER - The UPS components which contain the equipment and controls necessary to convert input AC power to output AC power required by the critical load.

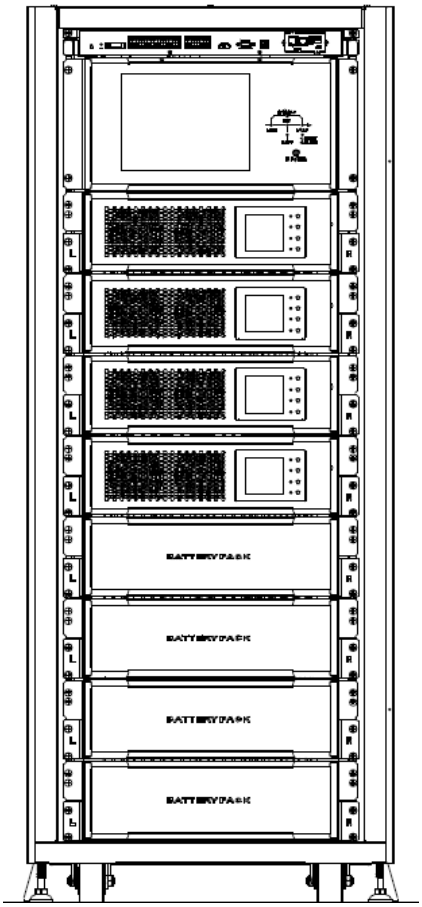
CHARGER - The UPS components which contain the equipment and controls necessary to recharge and maintain the batteries at fully charged condition.

BYPASS LINE - The line which conducts electricity directly from the input power source to the critical load when UPS is in Bypass Mode.

AC INPUT POWER - Power provided by the electrical utility company, or auxiliary generator, which is connected to the UPS Converter & Bypass for supplying the critical load.

3.2 UPS Cabinet

There are four options for UPS Cabinet Configuration.

Item	Configuration			
Photo (24KW reference)				
LCD Panel	10”			
UPS Capacity	6KVA/6KW	12KVA/12KW	18KVA/18KW	24KVA/24KW
UPS Module no.	1	2	3	4
Bat Module no.	1~7	2~6	3~5	4

3.2.1 Exterior

At the front of the cabinet, there is a controller module, an LCD panel, and 8 universal slots. These slots can accommodate either UPS power modules or battery modules. For better stability and center of gravity, it is recommended to install battery modules in the bottom slots and power modules in the top slots.

All wiring terminal blocks are located at the back of the cabinet. The side and rear panels are secured with screws.

The cabinet is equipped with casters at the bottom, allowing it to be moved over short distances. To ensure stability, there are four leveling feet that can be adjusted to fix and stabilize the cabinet on the ground.

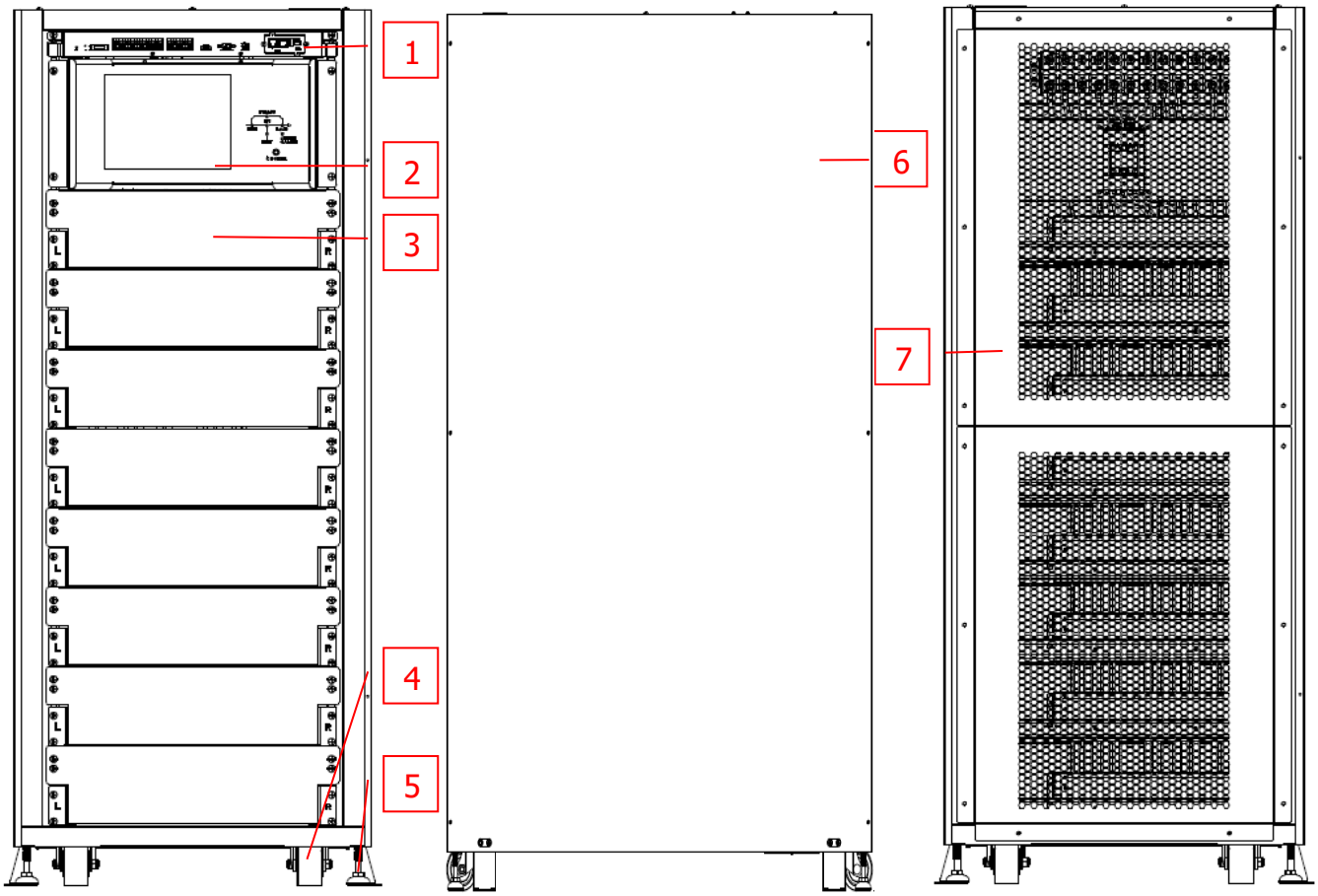


Figure 3-1 Exterior Layout

1. Controller Module
2. HMI Screen
3. Universal Slot with Cover Plate
4. Caster
5. Leveling foot
6. Side panel
7. Rear panel

3.2.2 Controller Module Layout

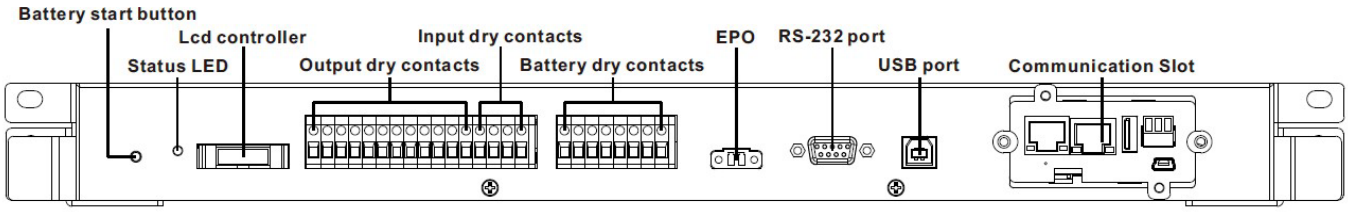


Figure 3-2 Controller Module Layout

3.2.3 Mechanical Data

Dimensions			
UPS Cabinet	**Width**	**Depth**	**Height**
30U Rack	598mm	1046mm	1472mm

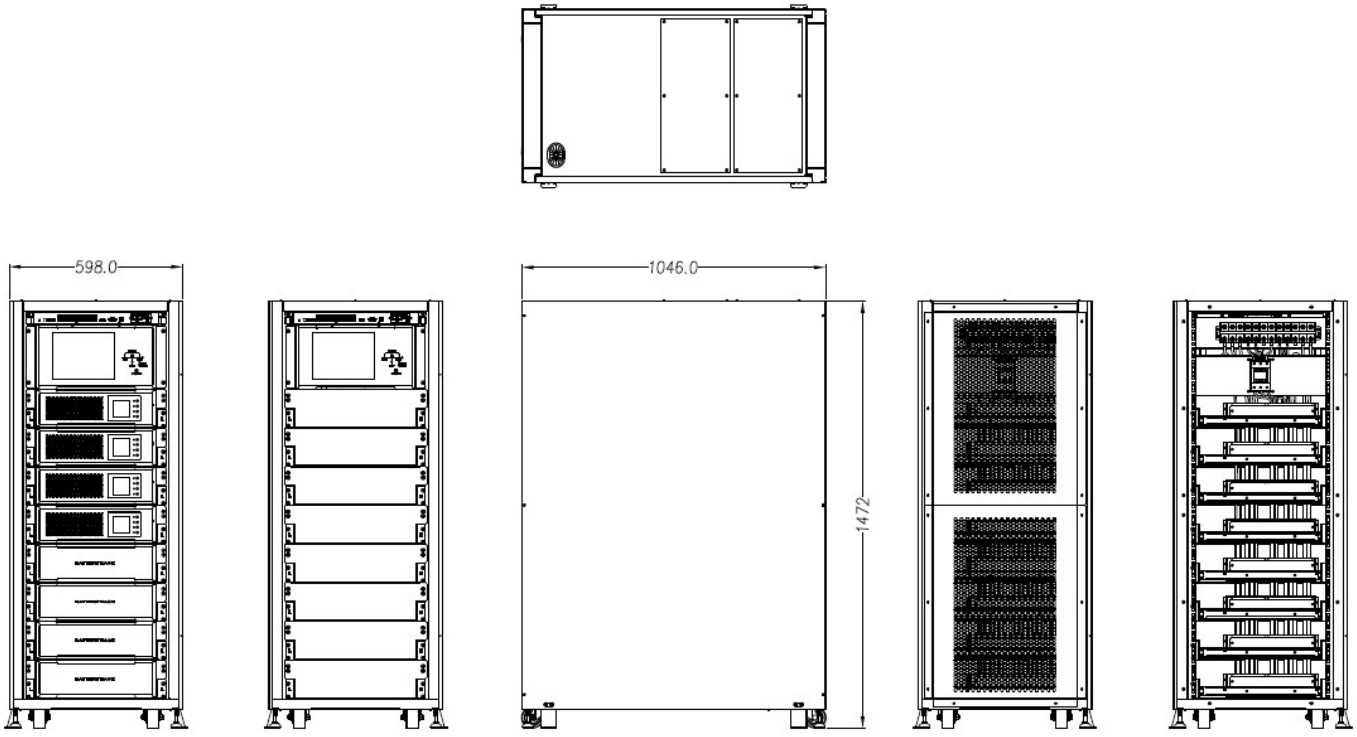
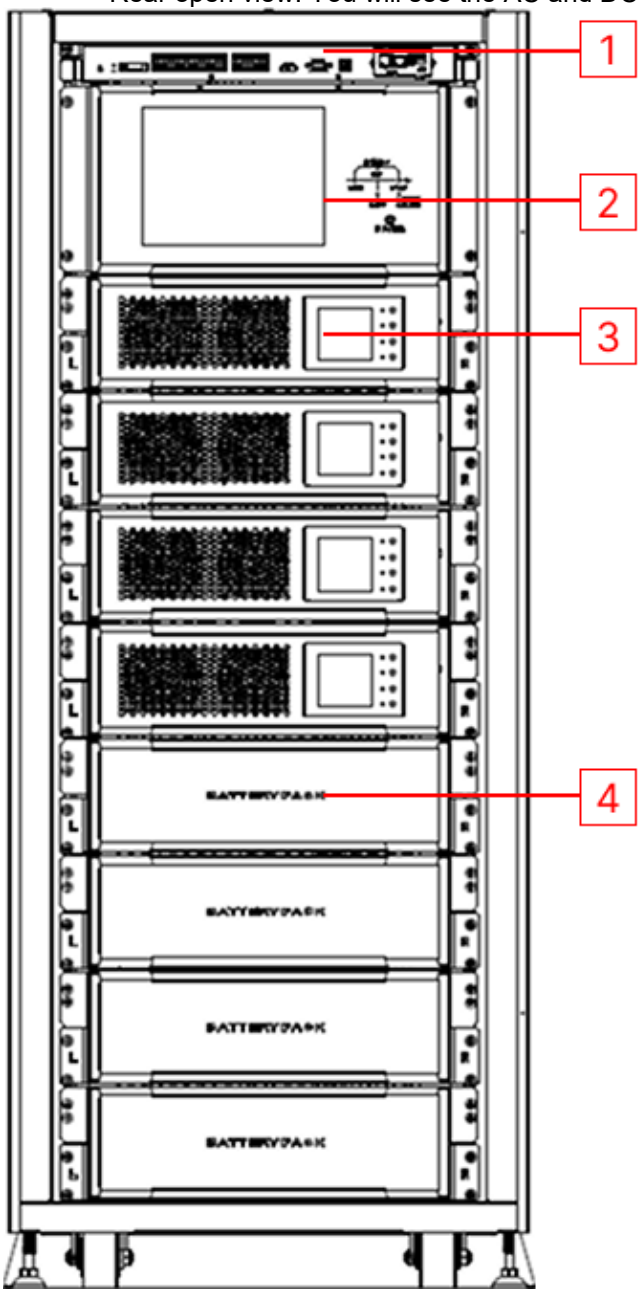


Figure 3-3 Mechanical Data

3.2.4 Front / Rear Open View

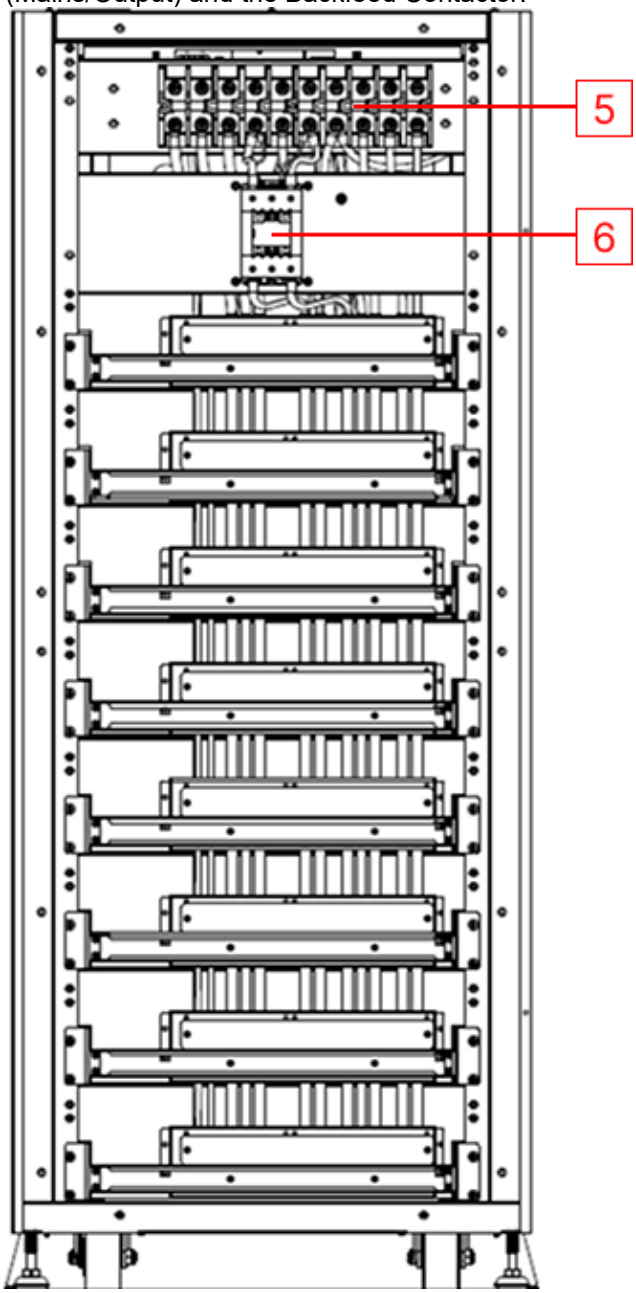
Front open view: After removing the cover plates you will see the module slot.

Rear open view: You will see the AC and DC Terminals (Mains/Output) and the Backfeed Contactor.



Front View

1. Controller Module
2. Control Panel
3. LCD on Power Module



Rear View

4. Battery Module
5. AC and DC Terminals
6. Backfeed Contactor

3.2.5 Introduction to UPS Module

The modular and hot-swappable design of the UPS power modules provides a highly cost-effective solution to meet your power requirements. The 30U cabinet allows you to install UPS power modules based on your initial needs. As your power requirements grow, additional UPS modules can be easily installed without interrupting system operation, supporting up to 24kVA.

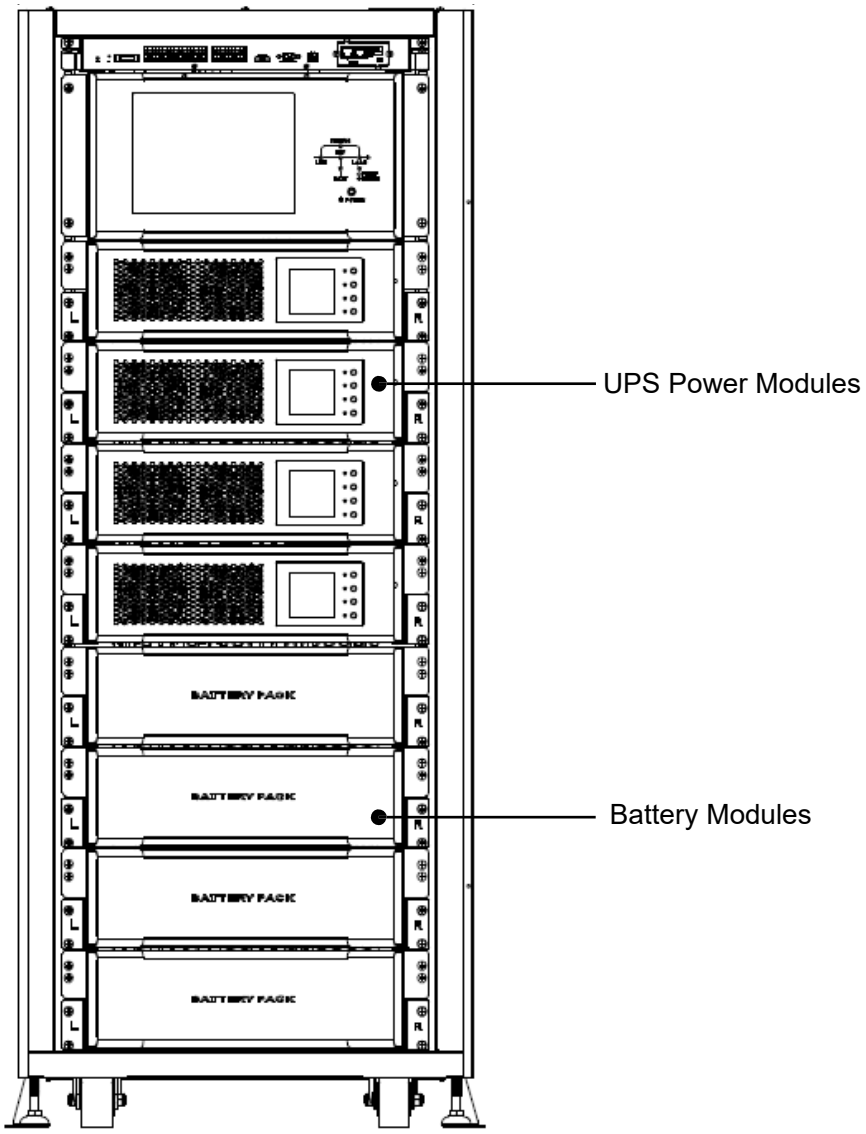


Figure 3-4 UPS Battery and Power Module

3.2.5.1 UPS Power Module

Each UPS power module is shipped in its own package and must be installed during the system installation. The capacity of each UPS power module is 6kVA/6kW. It includes a power factor correction rectifier, a battery charger, an inverter, a bypass circuit, and a control circuit.

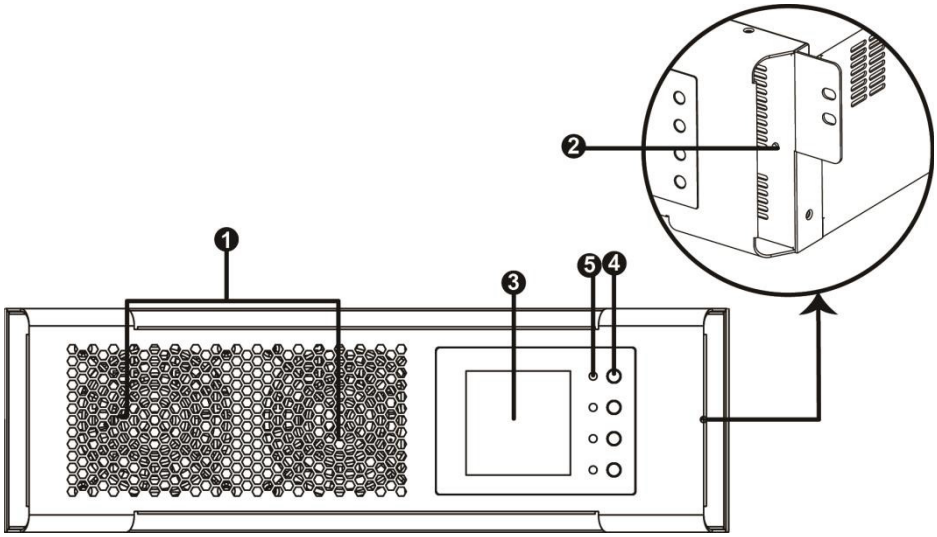


Figure 3-5 Power Module Layout

Table 3-1 Power Module Layout Descriptions

No.	Item	Description
1	Fan	The **UPS power module** uses forced convection cooling through built-in fans. Cooling air enters the module through the ventilation grills and exits through the exhaust grills located at the rear of the module. **Do not block the ventilation areas** to ensure proper airflow and cooling.
2	Battery Start Button	When the AC input is unavailable, use this button to start the battery power for the UPS.
3	LCD display	Each UPS power module is equipped with an LCD display. It shows the UPS status and information, including data from slave UPS modules when operating in parallel.
4	Function Keys	The **UPS power module** includes four function keys used to control and monitor a single module. For detailed descriptions, please refer to the function key table.
5	LED indicators	There are four LED indicators to show UPS working status. Please refer to LED indicator table for the details.

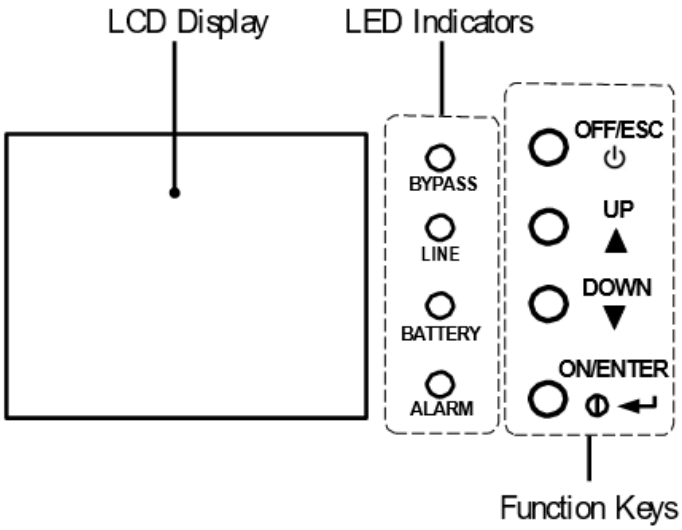


Figure 3-6 Function Keys for UPS Module Layout

Table 3-2 Function Keys for UPS Module

Control Key	Description
ON/ENTER	● Press this button to turn on the UPS. ● Or press it to confirm the selection in the menu.
OFF/ESC	● Press this button to turn off the UPS. ● Or press it to return to the previous menu.
UP	● Press this button to select the previous item in the menu. ● Or press this button to jump to previous page in the screen. ● Or press this button to increase the number in the setting.
DOWN	● Press this button to select the next item in the menu. ● Or press this button to jump to next page in the screen. ● Or press this button to decrease the number in the setting.
UP + DOWN	● To allow the LCD display to rotate 90 automatically, press these two buttons at the same time.

3.3 Operation Overview

This modular UPS is a two-phase, three-wire on-line, double-conversion, and Auto retransfer UPS that allows operation in the following modes:

Figure 3-7 shows the path for Standby Mode, with no load powered.
Figure 3-8 shows the path for On-Line Mode, with the load supplied through the inverter.
Figure 3-9 shows the path for Battery Mode, with the load supplied through the battery.
Figure 3-10 shows the path for Bypass Mode, with the load supplied through the static bypass line.
Figure 3-11 shows the path for ECO Mode, with the load supplied through the static bypass line.
Figure 3-12 shows the path for Shutdown Mode, with no load powered. UPS is powered off.

3.3.1 Standby Mode: No load powered by the UPS system.

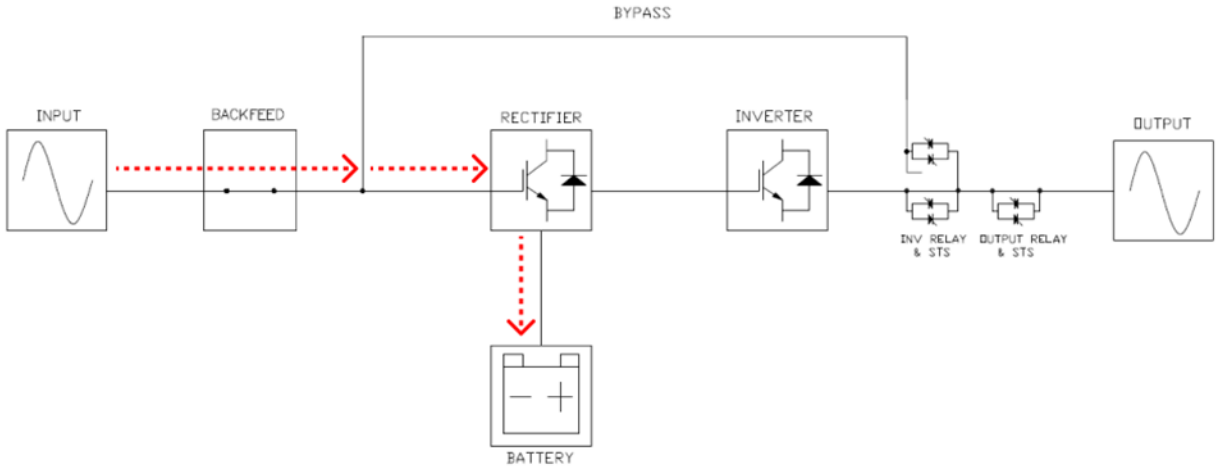


Figure 3-7 Single Line Diagram – Standby Mode: No Load fed by UPS

When the UPS is connected to utility input power, it starts in Standby mode before being turned on (assuming the BYPASS enable setting is disabled). In this mode, the charger function will be activated if a battery is present. However, the load will not receive power during this time.

3.3.2 On-Line Mode, with the load supplied through the inverter.

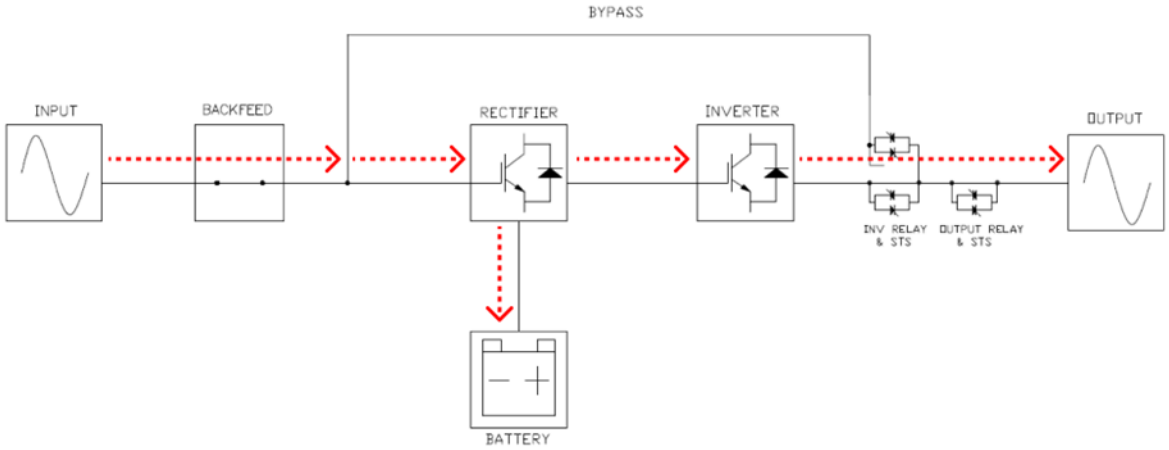


Figure 3-8 Single Line Diagram – On-Line Mode: Load supplied through the inverter.

In Line Mode, the rectifier draws power from the utility supply and provides DC power to the inverter, while the charger charges the battery. The inverter then filters the DC power and converts it into pure, stable AC power for the load.

3.3.3 Battery Mode, with the load supplied through the battery.

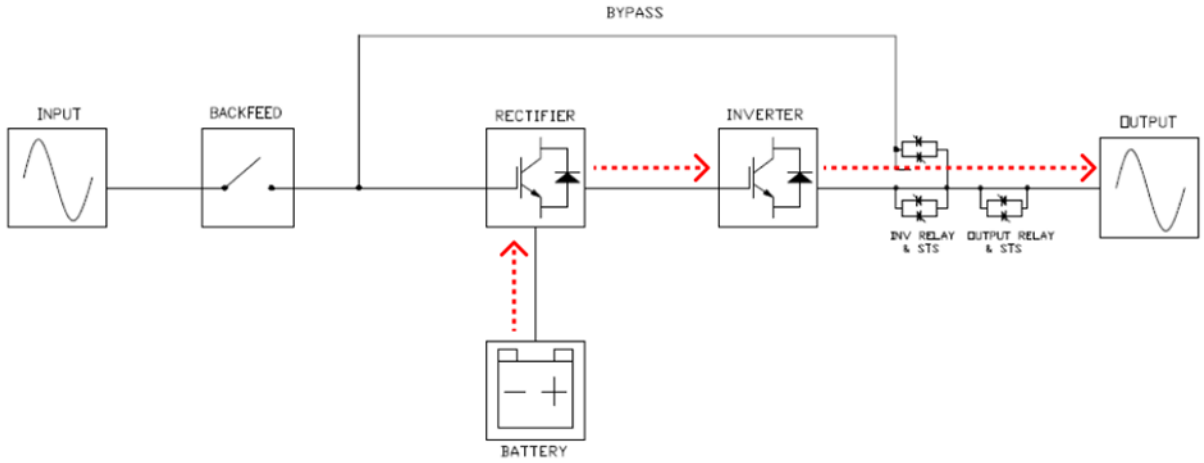


Figure 3-9 Single Line Diagram – Battery Mode: Load supplied through the battery.

The UPS automatically switches to battery mode when utility power fails, ensuring that there is no interruption in power to critical loads. In battery mode, the rectifier draws power from the battery and supplies DC power to the inverter. The inverter then filters this DC power and converts it into pure, stable AC power for the connected load.

3.3.4 Bypass Mode, with the load supplied through the static bypass line.

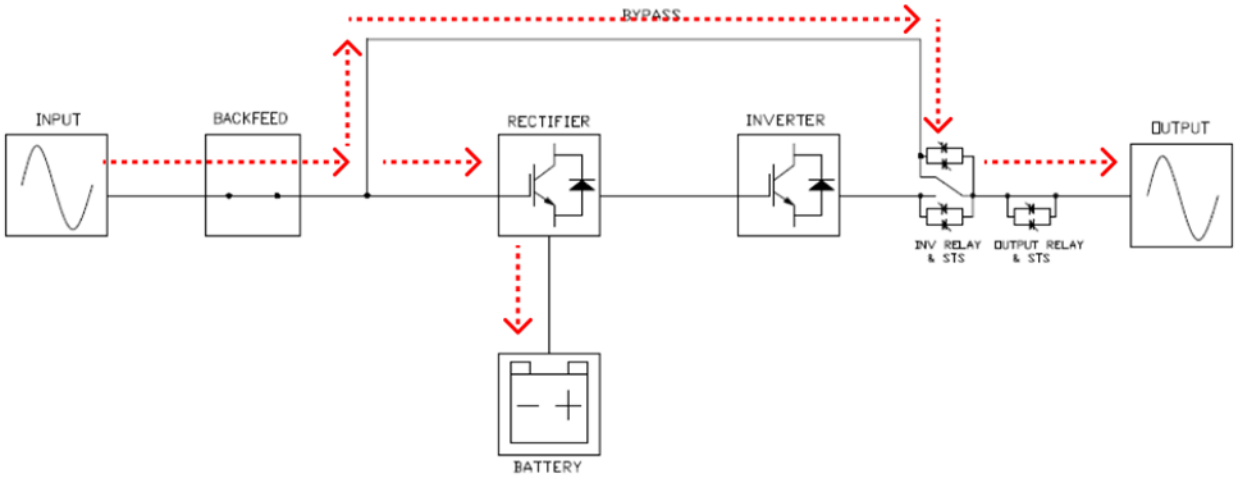


Figure 3-10 Single Line Diagram – Bypass Mode: Load supplied through the static bypass line.

When utility input power is connected, the UPS operates in Bypass mode before being turned on (if the Bypass setting is enabled). In this state, the charger function will activate as long as a battery is present.

Once the UPS is powered on, it will switch the load from the inverter to the bypass source without interruption if it encounters any abnormal conditions (such as over-temperature or overload). If the situation that caused the transfer is recoverable, the UPS will revert to line mode once the issue has been resolved.

3.3.5 ECO Mode, with the load supplied through the static bypass line.

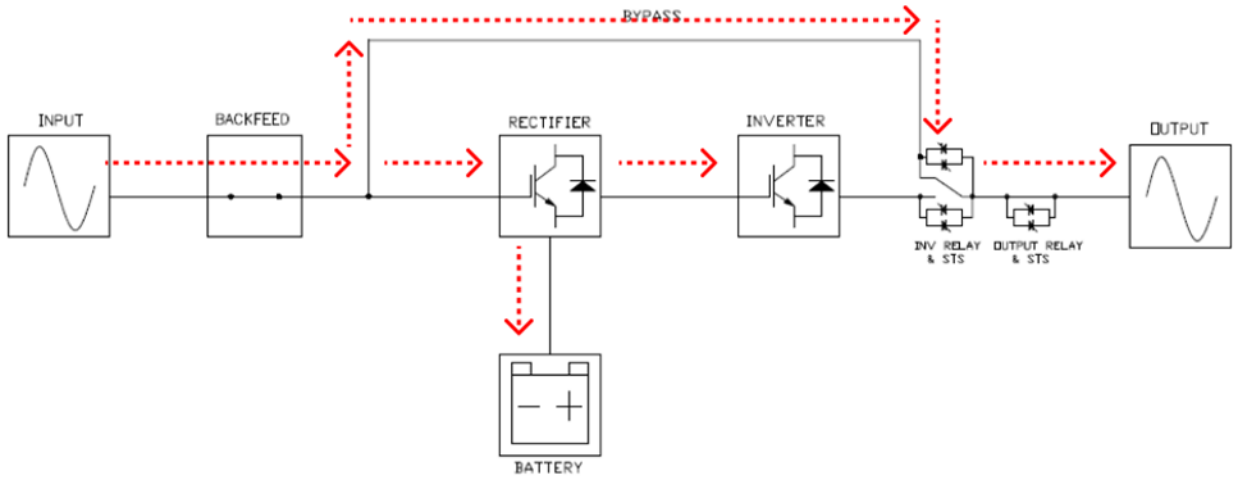


Figure 3-11 Single Line Diagram – ECO Mode: Load supplied through the static bypass line.

ECO Mode can be activated through the LCD settings menu. In ECO mode, the load is powered by bypass when the bypass voltage and frequency are within acceptable ranges. If the bypass voltage or frequency exceeds these ranges, the UPS will switch the power source for the load from bypass to inverter. To minimize transfer time, both the rectifier and inverter operate while the UPS is in ECO mode.

3.3.6 Shutdown Mode, with no load powered. UPS is powered off.

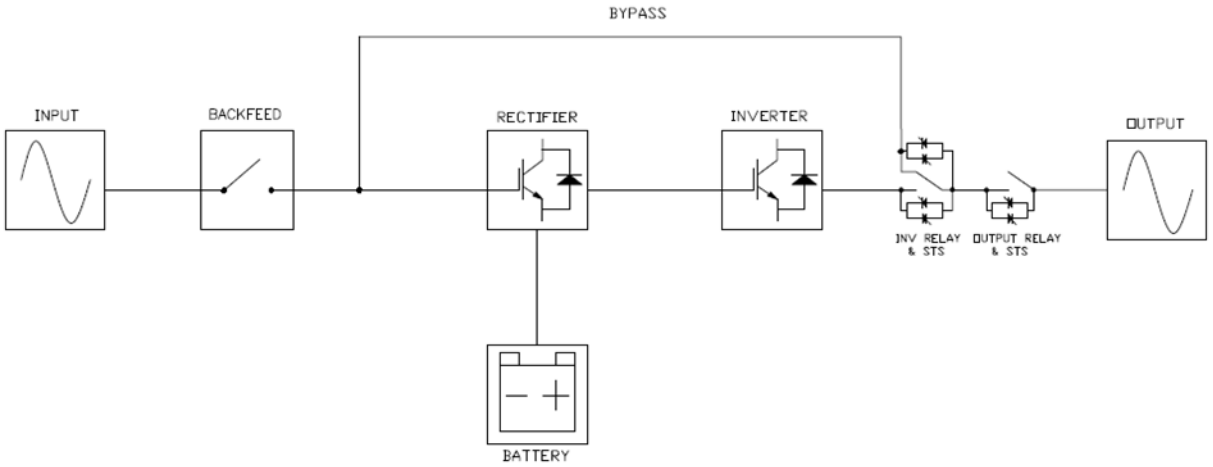


Figure 3-12 Single Line Diagram – Shutdown Mode: No load powered. UPS is powered off.

When the UPS is in the off state and there is no utility power available, it will enter shutdown mode. Additionally, if the UPS battery has discharged to the cut-off level, it will also enter shutdown mode. In this mode, the control power of the UPS will be turned off, resulting in the rectifier, charger, and inverter all being switched off.

3.4 Lead Acid Battery Charging Operation

As shown in **Section 3.3**, when the UPS is in normal operation (On-Line mode), DC power is utilized to charge the UPS batteries. The lead-acid charging characteristics of the 3000 SP Series UPS are shown in **Figure 3-13**, and descriptions of the charging periods are below.

Table 3-3 State Transition Table

CHG	State Change	Condition
A	Utility presents, check battery	Utility source in operational range
B	Start 2-stage CC charging	Vbat < +/-125V
C	2-stage CC to floating charging	Vbat > +/-135V
D	Start 3-stage CC charging	Vbat < +/-125V
E	3-stage CC to CV	Vbat > +/-138V
F	3-stage CV to floating	Time out=10*Time (CC time) or 8hours max or charging current < 0.5A
G	Floating to charge recycle	Battery voltage < +/-120V

Charging Profiles

- Two-stage profile: A, B, C, G, then A in cycles.
- Three-stage profile: A, D, E, F, G then A in cycles.

If the AC is reconnected, the charger will reset the cycle.

Control Stages

Two Stages Boost CC > Float

- **Boost CC Stage:** If AC input is applied, the charger will run at full current in CC mode until it reaches 135V, then transfer to the float stage.
- **Float Stage:** The charging voltage will stay at the float voltage. If the battery voltage drops below 120V, the charger will restart the boost CC stage.

Three Stages Boost CC > Boost CV >Float Stage

- **Boost CC Stage:** If AC input is applied, the battery charger will run at full current in CC mode until it reaches 138V. This time is recorded as T0, and T0 * 10 = T1, with a maximum T1 timer of 8 hours.
- **Boost CV Stage:** Start a T1 timer, maintaining the boost voltage in boost CV mode until the T1 timer runs out. Then, drop the voltage to the float voltage. The timer has a minimum time of 10 minutes and a maximum time of 8 hours.
- **Float Stage:** The charging voltage will stay at the float voltage. If the battery voltage drops below 120V, the charger will restart the boost CC stage.

Voltage Setting

- **Boost CC, CV:** 138VDC
- **Float:** 135VDC

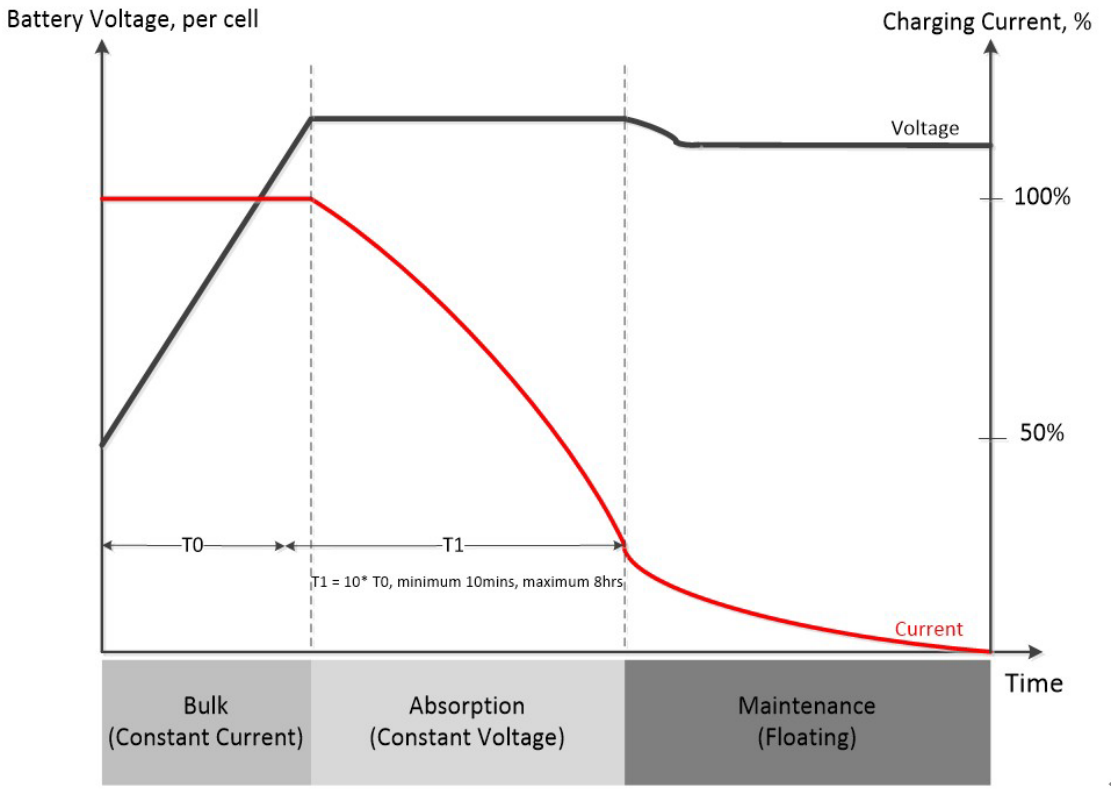


Figure 3-13 Typical Battery Charging Curve

3.5 Specifications

The UPS rating label displays the rated kVA as well as nominal voltages and currents. The rating label is located on the outside of the UPS.

Table 3-4 Power Specifications

Rated output Power	Input voltage 2 phase / 3 wire	Output voltage 2 phase / 3 wire
6kW / 6kVA	120/240V or 208/120V	120/240V or 208/120V
12kW / 12kVA	120/240V or 208/120V	120/240V or 208/120V
18kW / 18kVA	120/240V or 208/120V	120/240V or 208/120V
24kW / 24kVA	120/240V or 208/120V	120/240V or 208/120V

Table 3-5 UPS Cabinet (Overall Dimension)

UPS [kVA]	Width in. (mm)	Depth in. (mm)	Height in. (mm)	Net Weight lbs. (kg)	Cable Knockout
6/12/18/24	23.54 in. (598mm)	41.18 in. (1046mm)	57.95 in. (1472mm)	329 lbs. (149kg)	TOP, BOTTOM

Table 3-6 Power Module Information (Overall Dimension)

UPS [kVA]	Width in. (mm)	Depth in. (mm)	Height in. (mm)	Net Weight lbs. (kg)	Typ. Heating at 100% Load [kBTU/h]
6	16.46 in. (418mm)	26.69 in. (678mm)	5.08 in (129mm)	38.80 lbs. (17.6kg)	175.8

Table 3-7 Battery Module Information (Overall Dimension)

Width in. (mm)	Depth in. (mm)	Height in. (mm)	Net Weight lbs. (kg)
16.46 in. (418mm)	26.69 in. (678mm)	5.08 in (129mm)	134.48 lbs. (61kg)

Table 3-8 UPS Cabinet Information (Packing Dimension)

UPS [kVA]	Width in. (mm)	Depth in. (mm)	Height in. (mm)	Net Weight lbs. (kg)
6/12/18/24	29.5 in. (750mm)	51.2 in. (1300mm)	65 in. (1650mm)	446 lbs. (202.3kg)

Table 3-9 Power Module Information (Packing Dimension)

UPS [kVA]	Width in. (mm)	Depth in. (mm)	Height in. (mm)	Net Weight lbs. (kg)
6	22.8 in. (580mm)	34.2 in. (870mm)	9.8 in. (250mm)	47 lbs. (21.32kg)

Table 3-10 Battery Module Information (Packing Dimension)

Width in. (mm)	Depth in. (mm)	Height in. (mm)	Net Weight lbs. (kg)
22.8 in. (580mm)	34.2 in. (870mm)	9.8 in. (250mm)	142.71 lbs. (64.72kg)

Table 3-11 Specifications

Rated Output	6kVA/kW	12 kVA/kW	18 kVA/kW	24 kVA/kW
AC INPUT				
Configuration	Single Phase, 3W + G (L1, L2, N + Ground)			
Voltage	240/120 V or 208/120 (+10% to -10%) *			
Frequency	60/50 Hz +/-10%			
Power Factor	≥0.99 @ full load			
Max Input Current	32A	64A	96A	128A
BATTERY				
Type	Internal VRLA Batteries			
Runtime	~7mins, one to one ratio@100% load			
Nominal Voltage (Lead Acid)	±120 VDC			
Maximum Charge Current (Adjustable)	4A	8A	12A	16A
AC OUTPUT				
Configuration	Single Phase, 3W + G (L1, L2, N + Ground)			
Voltage	240/120 or 208/120 V			
Voltage Regulation	< ±1% (240/120V); < ±3% (208/120V)			
Rated Output Current (rms) per Phase	25A	50A	75A	100A
Frequency	60/50 Hz Auto Sensing/Selectable			
Crest Factor	3:1 (Typical)			
Voltage THD	< 4% maximum THD at 100% linear load ≤ 5% maximum THD at 100% non-linear load (Typical)			
Voltage Unbalance	1% maximum at 100% unbalanced load			
Inverter Overload	100%-110% for 30 min; 111%-130% for 5 min; 131%-148% for 10 sec; 150% for 6 sec.; 155% for 1 sec.			
ENVIRONMENTAL**				
Cooling	Forced Air			
Operating Temperature	Minimum/Maximum: 32 °F to 104 °F (0 °C to 40 °C)			
Relative Humidity	30% – 95% Non-Condensing			
Altitude	0 to 3280ft (1000m) max without derating***			
Location	Indoor (free from corrosive gases and dust)			

Clearance Required	Top: 20 in.; Front: 40 in.; Rear: 20 in.; Sides: 0 in.
Enclosure	NEMA 1
Audible Noise	72 dB @ 1 m
DIMENSIONS	
System Dimensions WxDxH	23.54 x 41.18 x 57.95 in. (598 x 1046 x1472 mm)
Module Dimensions WxDxH	16.54 x 26.69 x 5.07 in. (418 x 678 x 129 mm)
Chassis Weight	329 lbs. (149 kg)
Module Weight	39 lbs. (17.6 kg)
Battery Weight	134 lbs. (61kg)
MONITORING	
Communication Interface	Dry Contacts, RS232 Port, RemotEye 5, EPO, USB
RS232 Port	Included
Display	HMI LCD Touch Panel for Local Monitoring, Operation, and Control
CERTIFICATIONS	
Listings/Standards	UL; cUL; FCC Class A-Article 47 – Part 15 B; ISO 9001; ISO14001; IEC/EN62040-1; RoHS

*Derating capacity to < 90% of capacity when the input voltage is decreased below rated.

**Indication that the unit is intended for installation in a temperature-regulated, indoor area that is relatively free of conductive contaminants.

***At 3280ft (1000 m) above sea level, output capacity should be derated by 1% per additional hundred feet elevation.

Table 3-12 Typical AC-AC UPS Efficiencies at Various Loads

UNIT	% Full Load			
	25%	50%	75%	100%
6kVA	> 89%	> 89%	> 91%	> 91%
12kVA	> 89%	> 89%	> 91%	> 91%
18kVA	> 89%	> 89%	> 91%	> 91%
24kVA	> 89%	> 89%	> 91%	> 91%

Table 3-13 MTBF and MTTR

Parameter	6-24kVA
MTBF (Mean Time Between Failures): System (With Bypass) Inverter (Without Bypass)	102,899 h 96,061 h
MTTR (Mean Time to Repair) – Excluding Travel and Shipping Time	4 h

4 OPERATOR CONTROLS AND INDICATORS

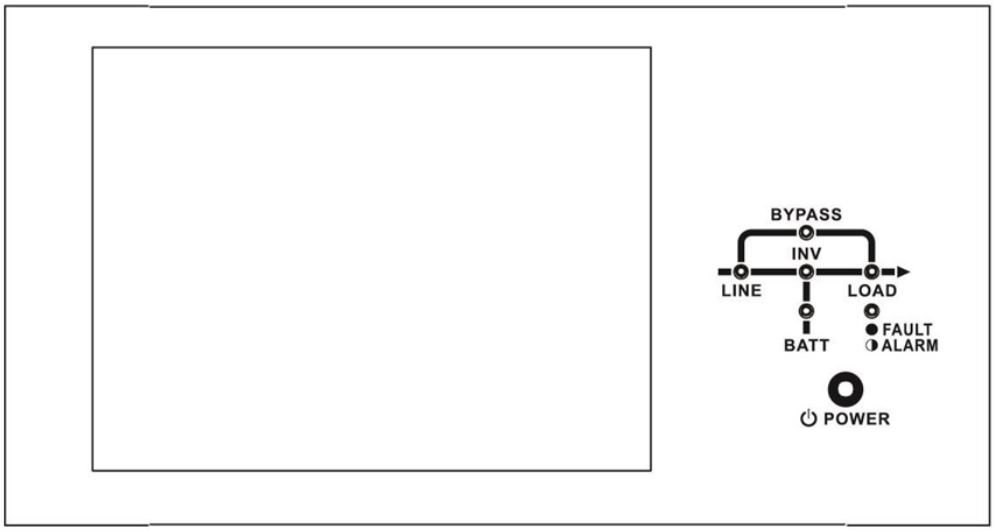


Figure 4-1 Operation/Display Panel (Front panel)

4.1 LED INDICATORS

Table 4-1 Display Panel Descriptions

LED	Color	Status	Definition
LINE	Green	On	Input source is normal.
		Flashing	Input source is abnormal.
		Off	No input source.
BYPASS	Yellow	On	Load on Bypass.
		Flashing	Input source is abnormal.
		Off	Bypass not operating.
LOAD	Green	On	There is power output for the load.
		Off	There is no power output for the load.
INV	Green	On	Load on inverters.
		Off	Inverters not operating.
BATTERY	RED	On	Load on the Battery.
		Off	There is no load on the Battery.
FAULT/ALARM	RED	On	UPS Fault
		Flashing	Low Battery
		Off	Battery converter is normal and battery is charging

4.2 Audible Alarm

Table 4-2 Audible Alarm Description

Audio Type	Description	Muted
Power on/off	Buzzer sounds two seconds	No
Bypass Mode	Beeping once every 2 minutes	Yes
Battery / Battery-Test Mode (Normal Battery Voltage)	Beeping once every 4 seconds	Yes
Battery / Battery-test Mode (Low Battery Voltage)	Beeping once every second	Yes
Fault	Beeping continuously	Yes
Warnings (Except Overload)	Beeping once every second	Yes
Overload	Beeping twice every second	No

4.3 LED Indicator for UPS Module

Table 4-3 LED Indicator Description

MODE	BYPASS	LINE	BATTERY	ALARM
UPS Power On	●	●	●	●
Standby mode	○	○	○	○
Bypass mode	●	○	○	○
Line mode / Converter mode	○	●	○	○
Battery mode	○	○	●	○
Fault mode	○	○	○	●
Battery Test mode	○	●	●	○
ECO mode	●	●	○	○

Note: ● means LED is ON, and ○ means LED is OFF.

4.4 EPO BUTTON (Emergency Power Off button)

WARNING

Activating the Emergency Power Off (EPO) function places the UPS system in Standby Mode. While the UPS stops providing output power, input power remains present at the UPS.
High voltage may still be present at input terminals and internal components. Always verify the UPS is completely de-energized before performing maintenance or service.

AVERTISSEMENT

ATTENTION : L'activation de la fonction d'arrêt d'urgence (EPO) met le système UPS en mode veille. Bien que l'UPS cesse de fournir de l'énergie de sortie, l'alimentation en entrée reste présente à l'UPS. Une haute tension peut toujours être présente aux bornes d'entrée et aux composants internes. Toujours vérifier que l'UPS est complètement hors tension avant d'effectuer une maintenance ou un service.

This UPS is equipped with an Emergency Power off (EPO) port that can be operated by a remote contact assigned by the user. Users can set the logic (N.C or N.O) of this EPO function through LCD panel.

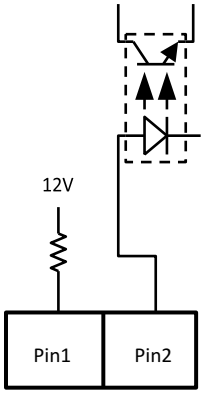


Figure 4-2 EPO Port Schematic

Table 4-4 Description of EPO port

EPO logic setting	Position	Description
N.C (Default)	Pin1 & Pin2	EPO activated when Pin1 & Pin2 is open status.
N.O	Pin1 & Pin2	EPO activated when Pin1 & Pin2 is short circuited.

If EPO logic setting is Normal Closed (N.C), EPO is triggered when pin1 and pin2 is open. Otherwise, EPO logic setting is Normal Opened (N.O). EPO is triggered when pin1 and pin2 is connected.

4.5 LIQUID CRYSTAL DISPLAY

The Liquid Crystal Display (LCD) touch panel provides information about power flow, measured values, operational guidance, data records, and error messages. It features a backlight that enhances visibility in various lighting conditions. If the screen is not activated within a 3-minute period, the LCD will automatically clear and turn off. It can be turned back on with a touch.

4.5.1 Initial Screen

When started, the UPS will perform a self-test. The initial screen displays and remains static for approximately 5 seconds as shown in **Figure 4-3**.

Figure 4-3 Initial Screen

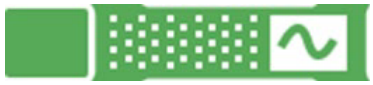
4.5.2 Main Screen

After initialization, the main screen will appear as shown in **Figure 4-5**. The main screen is divided into five sections:

(1) **UPS Mode**: Displays the current operation mode.

(2) **Module Status**: Indicates the active module number. Tap each module icon to access the measurement screen. The meanings of each icon are provided below.

Table 4-5 Module Icon Description

Module Icon	Explanation
	Power module icon with ID no.
	No power module
	UPS operates in Standby mode or Shutdown mode
	UPS operates in Line mode or Converter mode
	UPS operates in Fault mode
	UPS operates in Bypass mode or ECO mode
	UPS operates in Battery mode or Battery Test mode

(3) Main Menu: Touch icon to enter the selected sub menu.

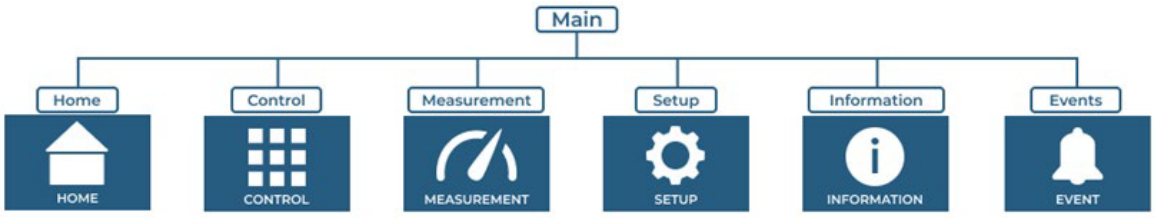


Figure 4-4 Main Menu Sub Tree

(4) UPS Power Flow: Current power flow and measurement data.

(5) UPS model name with power rating. If the power rating followed with (R), it means the UPS system is in redundant configuration.

(6) Date and Time.

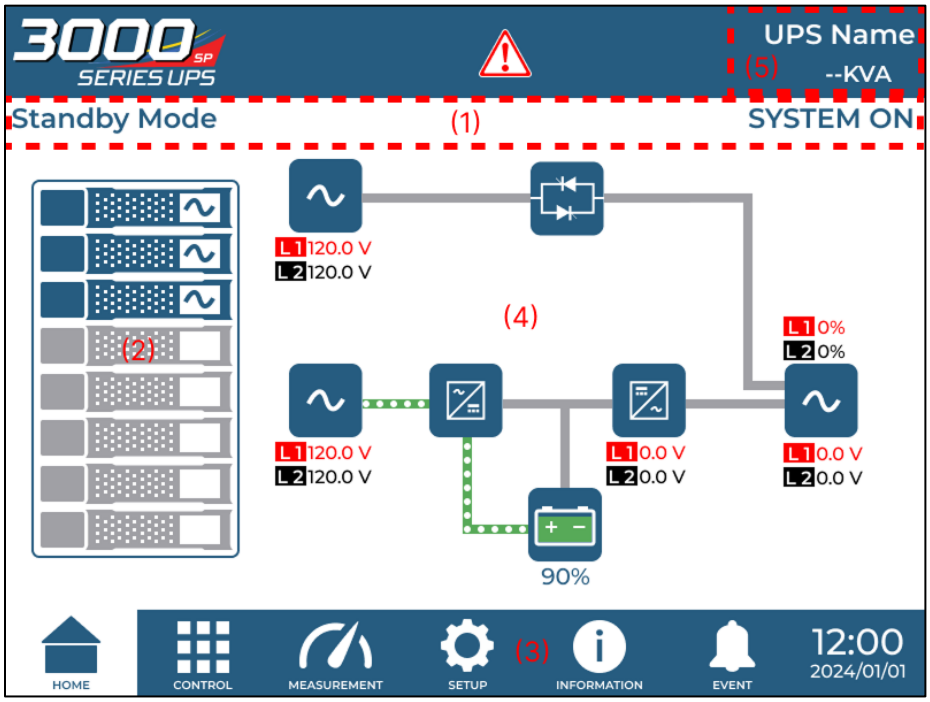


Figure 4-5 Main Screen

4.5.3 Control Screen

Touch the 

icon to go to the Control Screen, as shown in **Figure 4-6** and **Figure 4-7**.

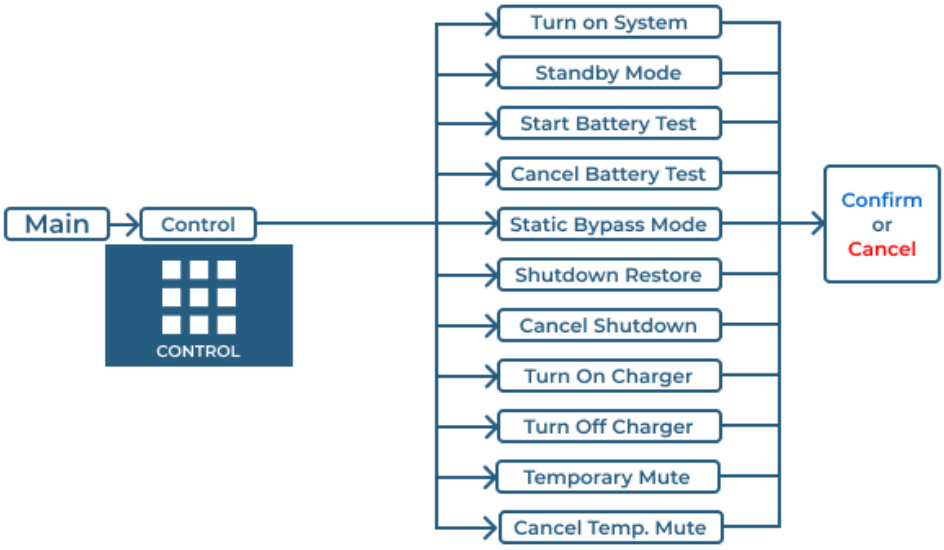


Figure 4-6 Control Menu Sub Tree

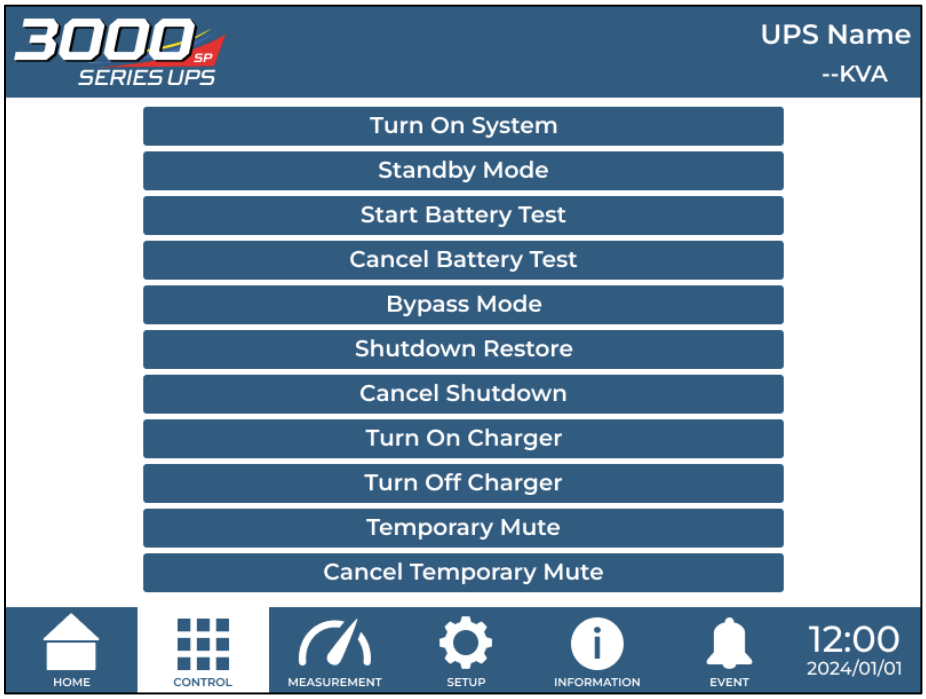


Figure 4-7 Control Screen

Touch any control options directly/ Then, a confirmation screen will pop up. Touch Confirm icon to confirm the command or touch Cancel to cancel command as shown in **Figure 4-8**.

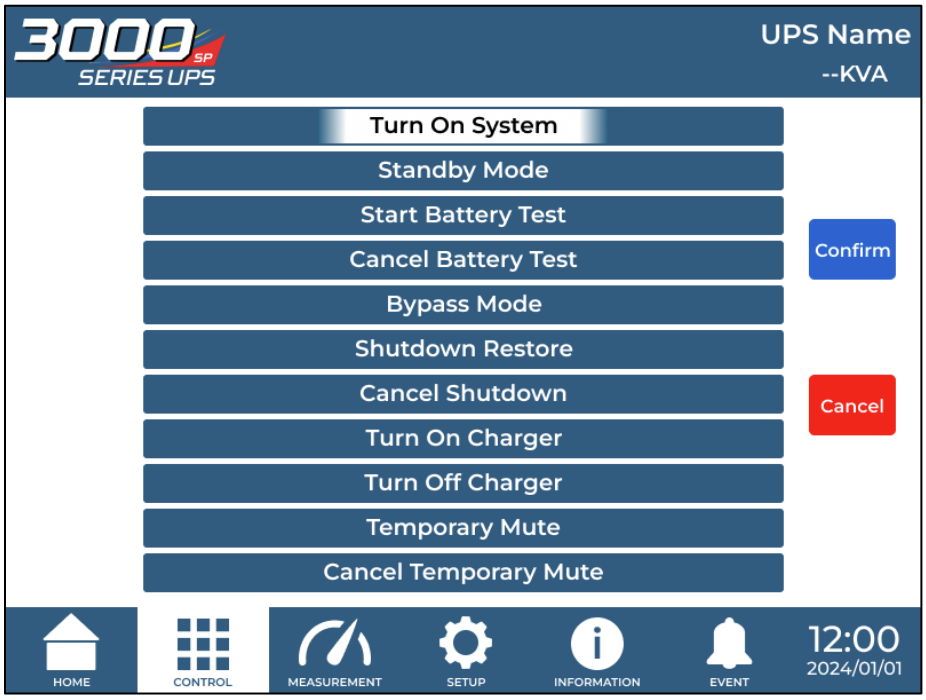


Figure 4-8 Confirmation Screen

4.5.4 Measurement Screen

Touch MEASUREMENT to enter the sub-menu. There are two sub-menus, system measurement and module measurement. Touch SYSTEM icon to monitor system measurement values or MODULE icon to monitor module measurement values. You may choose Input, Output, Bypass, Load or Battery to monitor detailed status under the “System” or “Module” directory. Please refer to all screens in **Figure 4-10** and **Figure 4-11**. All detailed measurement items are listed in **Table 4-6.**

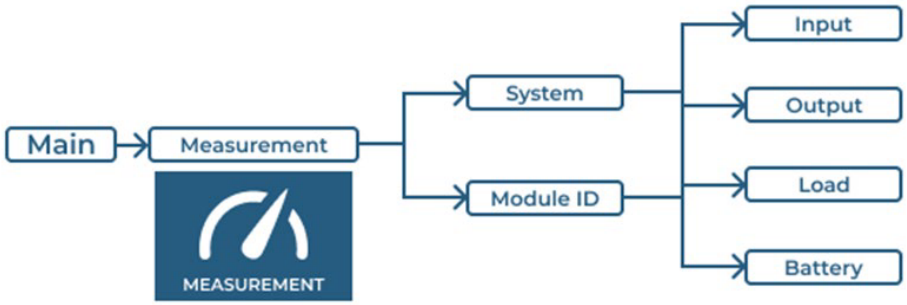
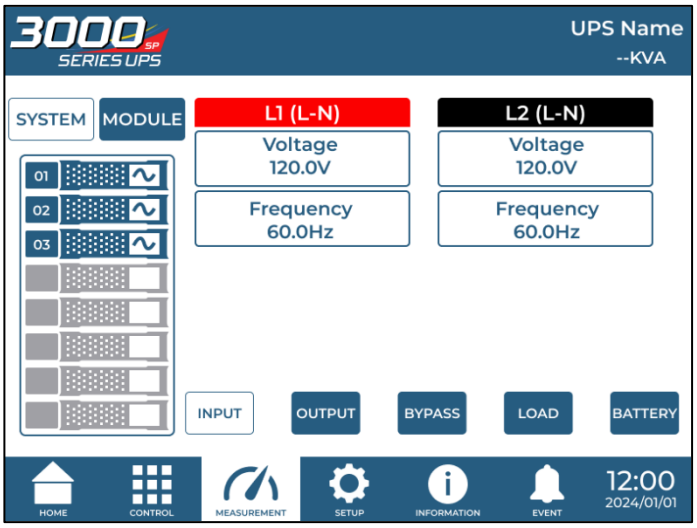
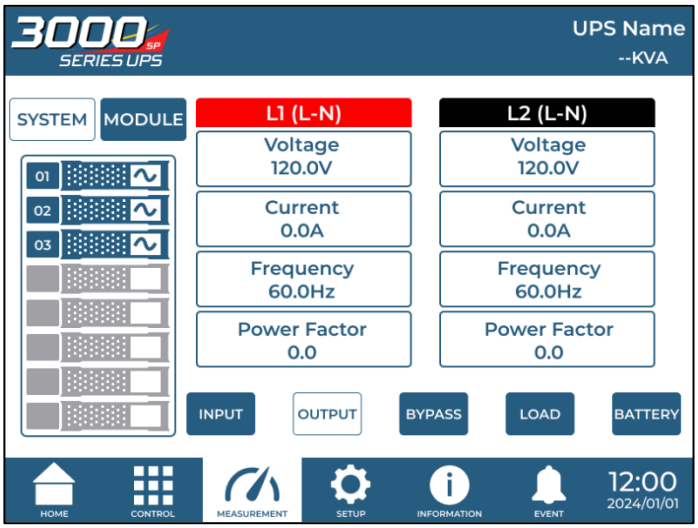


Figure 4-9 Measurement Menu Sub Tree





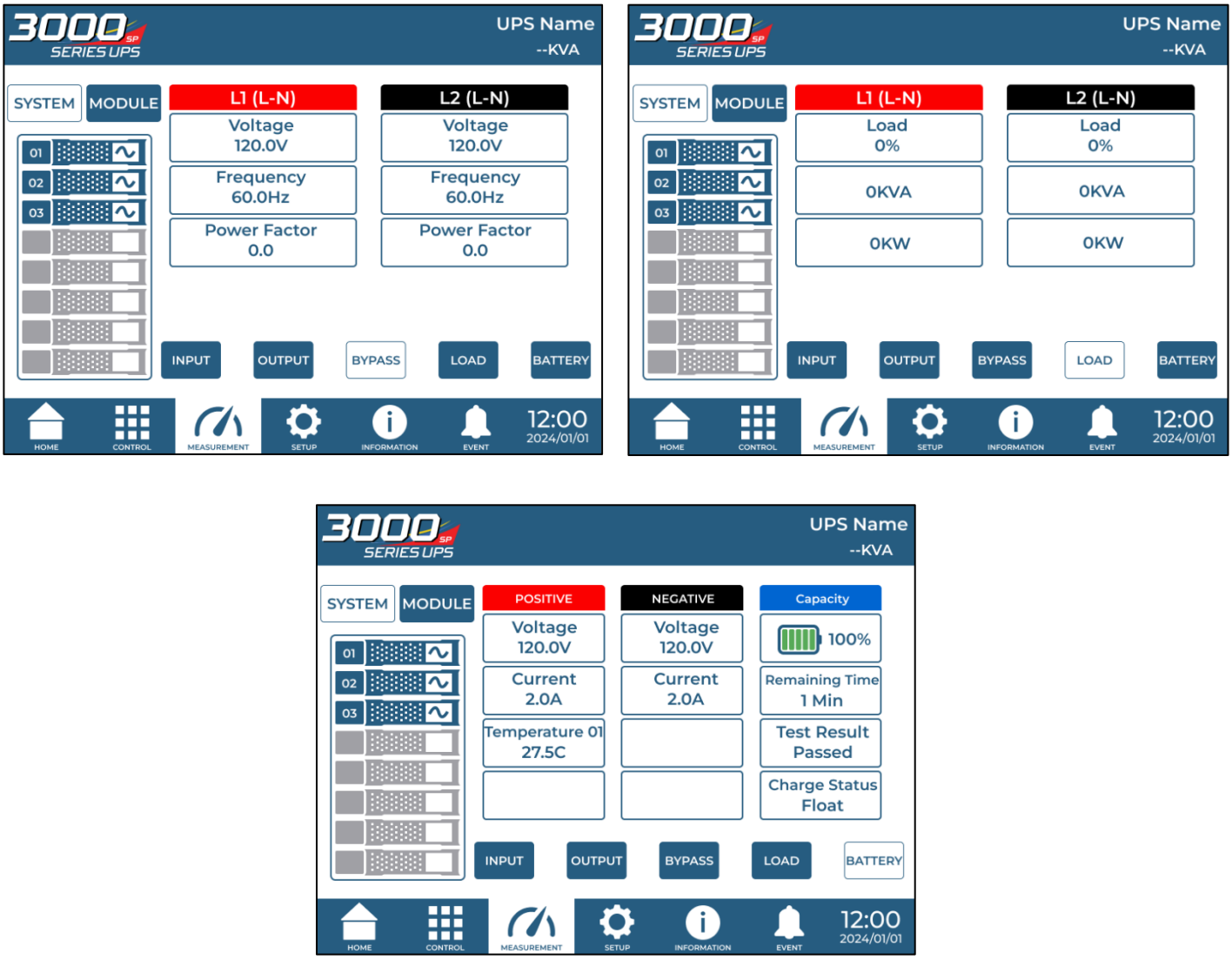


Figure 4-10 System Measurement Screens

Touch MODULE to monitor module measurement values.

Figure 4-11 Module Measurement Screens

The measurement can be listed in the table below.

Table 4-6 Measurement Screen Description

Menu	Item	Description
Input	L-N Voltage (V)	Input phase voltage (L1, L2). Units 0.1V.
	Frequency (Hz)	Input Frequency (L1, L2). Units 0.1Hz.
Output	L-N Voltage (V)	Output phase voltage (L1, L2). Units 0.1V.
	L-N Current (A)	Output phase current (L1, L2). Units 0.1A.
	Frequency (Hz)	Output Frequency (L1, L2). Units 0.1Hz.
	Power Factor	Output Power Factor (L1, L2).
Bypass	L-N Voltage (V)	Bypass phase voltage (L1, L2). Units 0.1V.
	Frequency (Hz)	Bypass Frequency (L1, L2). Units 0.1Hz.
	Power Factor	Bypass Power Factor (L1, L2).
Load	Sout (KVA)	Apparent power (L1, L2). Units 0.01KVA.
	Pout (KW)	Active power (L1, L2). Units 0.01KW.
	Load Level (%)	The percentage of the UPS rating load (L1, L2). Units 1%.
Battery	Positive Voltage (V)	Battery Positive Voltage. Units 0.1V.
	Negative Voltage (V)	Battery Negative Voltage. Units 0.1V.
	Positive Current (A)	Battery Positive Current. Units 0.1A.
	Negative Current (A)	Battery Negative Current. Units 0.1A.
	Remain Time (Sec)	Battery run time remaining. Units 1Min.
	Capacity (%)	The percentage of the capacity of the battery. Units 1%.
	Test Result	Battery test result
	Charging Status	Battery charging status
	Temperature1(°C)	Internal temperature of UPS module. Units 0.1°C.

4.5.5 Setup Screen

Touch the 

to enter the sub-menu. This menu requires you to enter a password to access the settings shown in **Figure 4-13.**

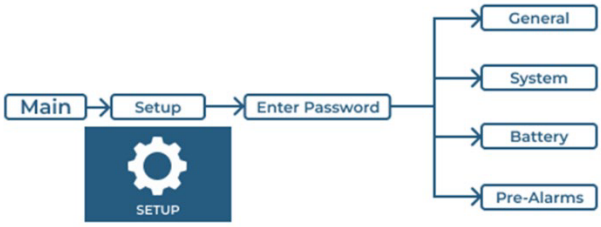


Figure 4-12 Setup Menu Sub Tree

Touch the input field and a number pad will show up. Enter the 4-digit password using the number pad and select 

to enter SETUP sub-menu screen. If incorrect password is entered, the LCD screen will popup with a message ask you to retry.

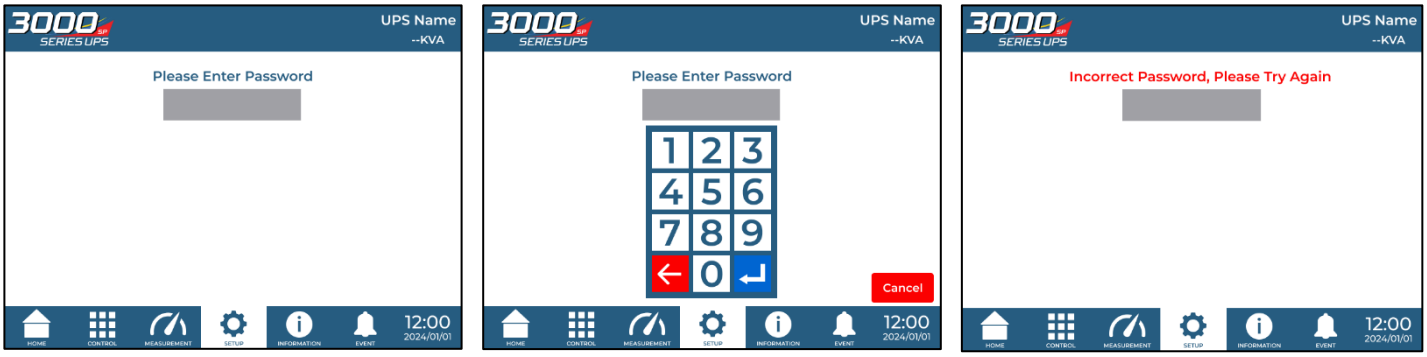


Figure 4-13 Enter Password Screen

There are two levels of access. User Level and Admin Level.

The default password for the user is “0000”. This can be changed by the user.

The admin password is only for authorized service users.

The two different levels of access give access to different settings. Certain settings can only be changed in certain operation modes. Refer to Table 4-7 for list for relevant information.

Table 4-7 Setup Menu Authorization

UPS operation Mode / Setting item		Standby Mode	Bypass Mode	Line Mode	Battery Mode	Battery Test Mode	Fault Mode	Converter Mode	ECO Mode	Authorization	
										User	Admin
General	Model Name	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Language	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	TIME	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Audible Alarm	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Factory Reset	Y	Y								Y
	EPO Function	Y									Y
	Change Password	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Startup screen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
System	Output Voltage	Y	Y								Y
	ECO Voltage Range	Y	Y	Y					Y		Y
	ECO Frequency Range	Y	Y	Y					Y		Y
	Bypass Voltage Range	Y	Y								Y
	Bypass Frequency Range	Y	Y								Y
	ECO Mode	Y	Y	Y					Y		Y
	Bypass Mode	Y	Y								Y
	Converter Mode	Y	Y								Y
	Battery Mode Delay Time	Y	Y	Y			Y	Y	Y		Y
	Cold Start	Y	Y	Y	Y	Y	Y	Y	Y		Y
	System Shutdown Time	Y	Y	Y	Y	Y	Y	Y	Y		Y
	System Restore Time	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Redundancy	Y	Y	Y	Y	Y	Y	Y	Y		Y
Battery	Nominal Battery Voltage	Y	Y								Y
	Battery Capacity in Ah	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Battery Groups	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Maximum Charging Current	Y	Y								Y

	Battery Low/Shutdown Setting	Y	Y	Y			Y	Y	Y		Y
	Battery Age Alert	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Periodic Battery Test	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Battery Test Interval	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Battery Test Type	Y	Y	Y	Y		Y	Y	Y		Y
General	Pre-Alarm Remind	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Line Voltage Range	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Line Frequency Range	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Load	Y	Y	Y	Y	Y	Y	Y	Y		Y

Note: “Y” means that this setting item can be set in this operation mode.

Setting Procedure

Step 1: Choose the setting item from GENERAL, SYSTEM, BATTERY, and PRE-ALARM.

Step 2: Select a setting to modify and it will show the current value of the selected setting. Simply touch the current value and it will list out all the alternatives that the setting can be changed to.

Step 3: Choose Confirm icon to confirm the setting change or choose Cancel to cancel the setting.

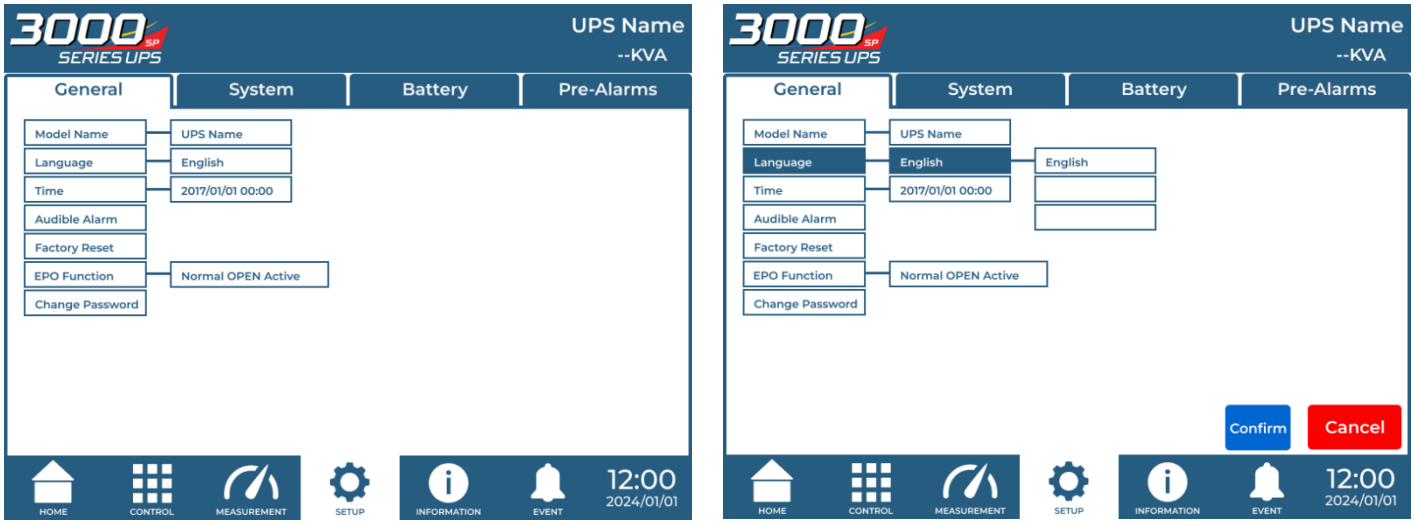


Figure 4-14 Setting Procedure

4.5.5.1 Setup General Screen

The Setup General screen's settings are shown below in **Figure 4-15** and **Table 4-8**. The general settings can be set in any operating mode.

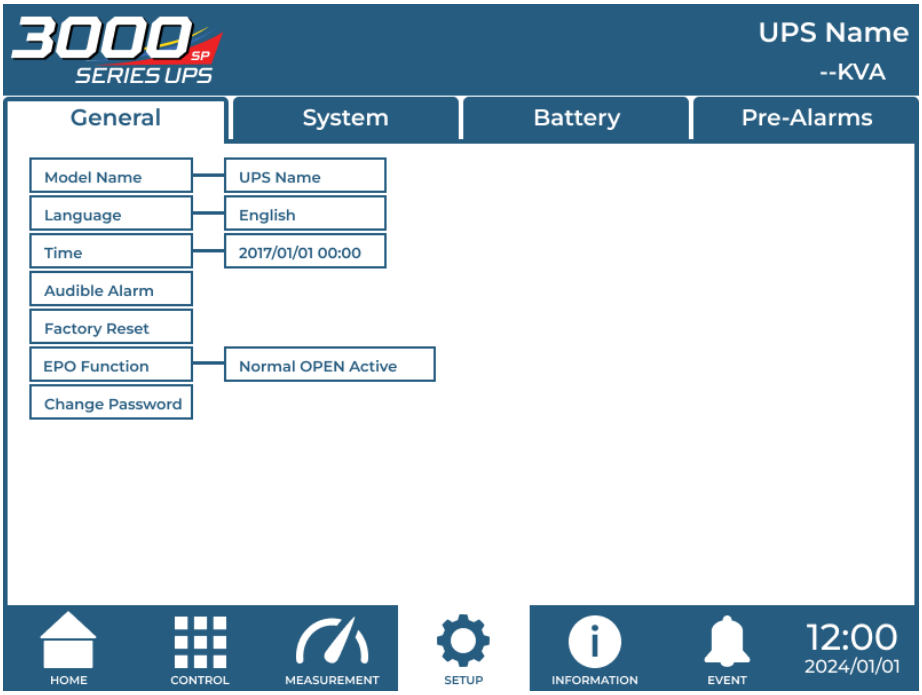


Figure 4-15 Setup-General Screen

Table 4-8 Setup-General Settings Description

Setting Item	Sub Item	Description
Model Name		Enter UPS Name (xxxxxxxxxx). The max. Length is 10 characters.
Language	--	Provides 3 optional LCD languages: ● English (Default)
TIME	Adjust Time	Set current date and time. (yyyy / mm / dd hour: min : sec) **MUST be set after UPS installation**
	System Installed Date	Set system installed date (yyyy / mm / dd) 2017/1/1 (Default) **MUST be set after UPS installation**
	System Last Maintain Date	Set system latest maintenance date (yyyy / mm / dd) 2017/1/1 (Default) **MUST be set after UPS installation**

	Battery Installed Date	Set battery installed date (yyyy / mm / dd) 2017/1/1 (Default) **MUST be set after UPS installation**
	Battery Last Maintain Date	Set battery latest maintenance date (yyyy / mm / dd) 2017/1/1 (Default) **MUST be set after UPS installation**
Change Password	--	Set New Password. 0000 (Default)
Audible Alarm	Audible Mute	It is to mute the buzzer when UPS in any mode. ● Disable (Default) ● Enable
	Battery Mute	It is to mute the buzzer when UPS in Battery mode. ● Disable (Default) ● Enable
	Fault Mute	It is to mute the buzzer when UPS in Fault mode. ● Disable (Default) ● Enable
	Bypass Mute	It is to mute the buzzer when UPS in Bypass mode. ● Disable (Default) ● Enable
Factory Reset	--	Restore to factory default setting
EPO Function	--	Set EPO active status ● Normal Close Active (Default) ● Normal Open Active

4.5.5.2 Setup System Screen

The Setup System screen's settings are shown below in **Figure 4-16** and **Table 4-9**.

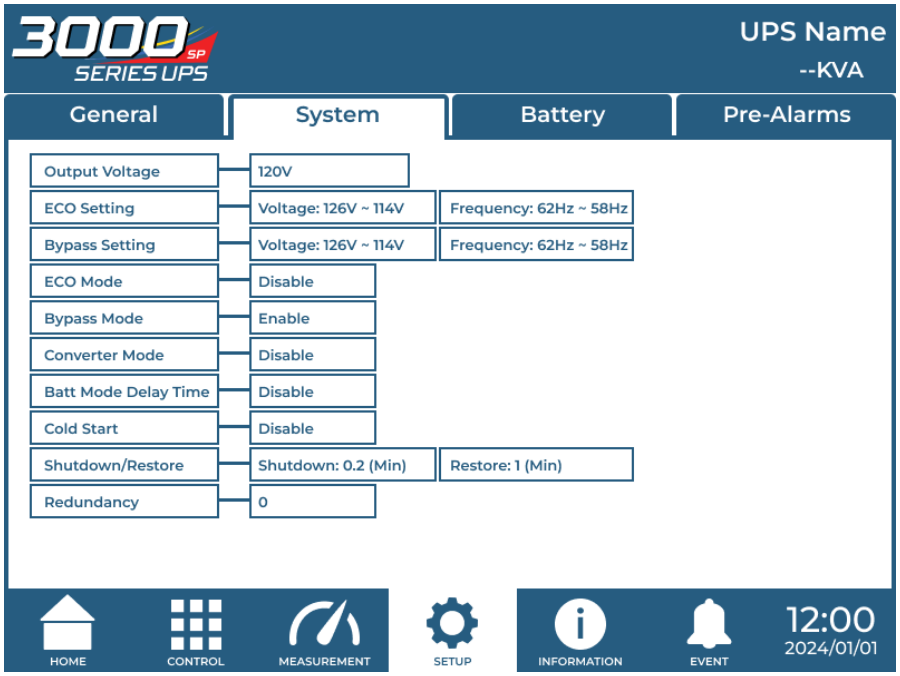


Figure 4-16 Setup System Screen

System settings can only be set in certain UPS operation mode. Please check **Table 4-9** for the available operation modes. If the setting cannot be changed in the current operation mode, a warning message will pop up on the screen, as shown in **Figure 4-17**.

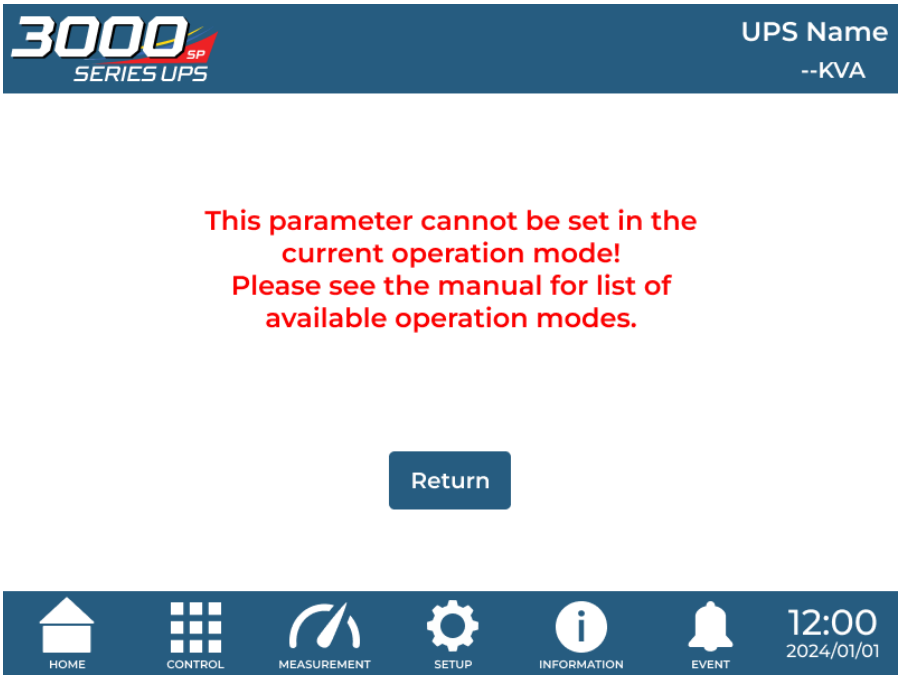


Figure 4-17 Parameter Set Warnings Screen

Table 4-9 Setup-System Settings Description

Setting Item	Sub Item	Description
Output Voltage	--	Set output voltage ● 100Vac ● 110Vac ● 115Vac ● 120Vac (Default) ● 127Vac **MUST be reviewed after UPS installation**
ECO Setting	ECO Voltage Range	Set ECO voltage range: Upper Range ● (Output Setting Voltage +6V) ~ (Output Setting Voltage +12V) ● (Output Setting Voltage +6V) (Default) Lower Range ● (Output Setting Voltage -6V) ~ (Output Setting Voltage -12V)
	ECO Frequency Range	Set bypass Frequency range: Upper/ Lower limit • +/- 2Hz (Default) • +/- 3Hz • +/- 4Hz
BYPASS SETTING	Bypass Voltage Range	Set bypass voltage range: Upper Range ● (Output Setting Voltage +6V) ~ 155V ● 140V (Default) Lower Range ● (Output Setting Voltage -6V) ~ 88V ● 88V (Default)
	Bypass Frequency Range	Set bypass Frequency range: Upper/ Lower limit • +/- 1Hz • +/- 2Hz • +/- 3Hz • +/- 4Hz (Default)
ECO Mode	--	Set ECO mode ● Disable (Default) ● Enable

Bypass Mode	--	Set bypass mode ● Disable ● Enable (Default) MUST be reviewed after UPS installation. If you need the Bypass power when UPS is OFF, please enable it.
Converter Mode	--	Set converter mode ● Disable (Default) ● Enable Set Output Frequency ● 50Hz (Default) ● 60Hz
Battery Mode Delay Time	--	Set system shutdown delay time in battery mode (Disable or 10~990Min). ● Disable (Default) ● Not 0: Enable When this feature is enabled, UPS will shut off output after UPS operates in Battery mode for certain minutes.
Cold Start	--	Set cold start ● Disable (Default) ● Enable After “Enable” is set, the UPS can be turned on without connecting to utility by pressing Battery Start Button. Refer to cold start operation for the details.
System Shutdown Time	--	Set system shutdown time (0.2~99min) ● 0.2 min (Default) This delay time will start counting when the CONTROL-Shutdown Restore command is executed.
System Restore Time	--	Set system restore time (0~9999min) ● 1 min (Default) This delay time will start counting after shutdown time is elapsed when the CONTROL-Shutdown Restore command is executed.
Redundancy	--	Set redundancy Redundancy: the QTY of redundant UPS module (0~9) ● 0(Default) MUST be set after UPS installation

4.5.5.3 Setup Battery Screen

The Setup Battery screen's settings are shown below in **Figure 4-18** and **Table 4-10**.

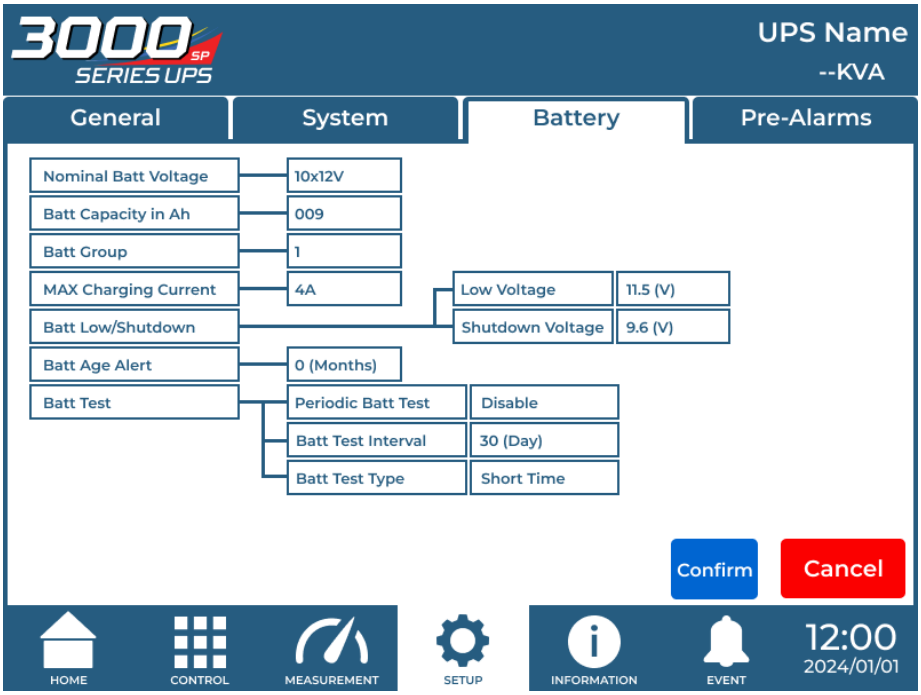


Figure 4-18 Setup Battery Screen

Battery setting can be set ONLY when UPS is operating in standby mode. If it's not in standby mode, the warning screen will appear as shown in **Figure 4-19**. See the Setup-Battery setting list in **Table 4-10**.

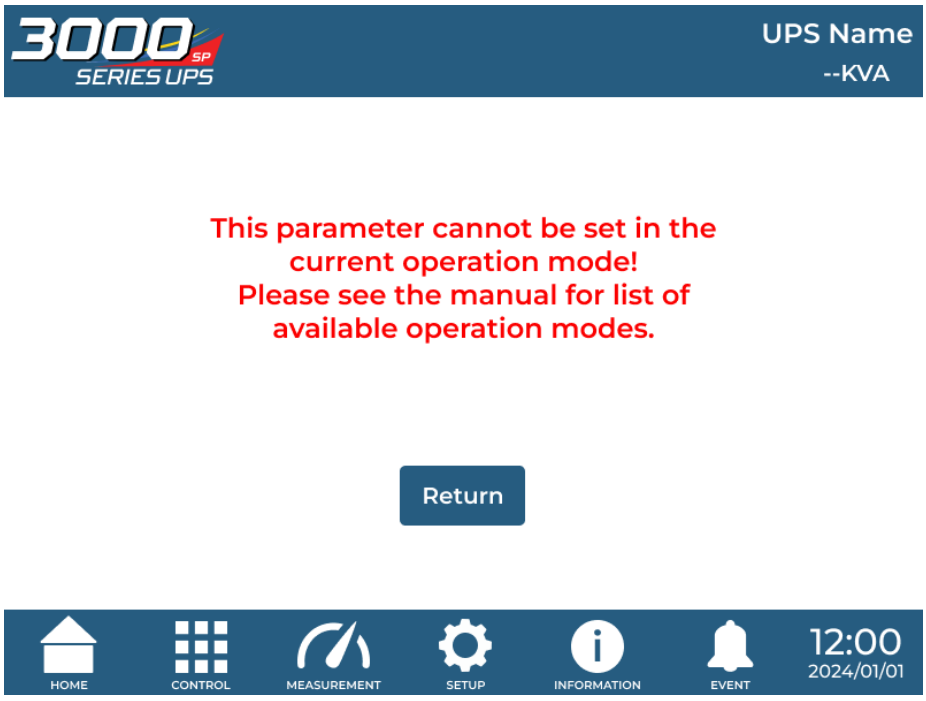


Figure 4-19 Parameter Set Warnings Screen

Table 4-10 Setup-Battery Settings Description

Setting Item	Sub Item	Description
Nominal Battery Voltage	--	Set battery nominal voltage Battery (Two Phase): 8x12V 9x12V 10x12V (Default) **MUST be set after UPS installation**
Battery Capacity in Ah	--	Set battery capacity. • 7, 9 (Default), 10, 12, 17, 26, 40, 65, 100Ah **MUST be set after UPS installation or Battery capacity is changed.**
Battery Groups		Set battery groups (1~10). • 1 (Default)
Maximum Charging Current	--	Set battery maximum charging current (1~4A) • 4A (Default per module) **MUST be set after UPS installation or Battery capacity is changed.**
Battery Low/ Shutdown SETTING	Battery Low Voltage	Set battery low voltage (10.5~11.5V) x (battery Number) • 11.2V x Battery Number (Default)
	Battery Low Capacity	Set battery low capacity (20~50%) • 20% (Default)
	Battery Shutdown Voltage	Set battery voltage point for system shutdown in battery mode (9.6~10.7V) x (battery Number) • 9.6V x Battery Number (Default)
Battery Age Alert	Battery Age Alert (Months)	Set battery age for replacement. (Disable,12~60Months) • Disable (Default) If this feature is enabled and the battery has been installed over this period, there is a warning “Battery Age Alert” to indicate it.
BATTERY TEST	Periodic Battery Test	Set periodic battery test disable or enable • Disable (Default) • Enable
	Battery Test Interval	Set battery test interval (7~99 Days) • 30 Days (Default)
	Battery Test Type	Set testing time for battery test • Short Time(10S) (Default) • Long Time(0.1M~0.9M) • Long Time(1M~99M) • Till Battery Low

4.5.5.4 Pre-Alarm Screen

The Setup Pre-Alarm screen's settings are shown below in **Figure 4-20** and **Table 4-11**.

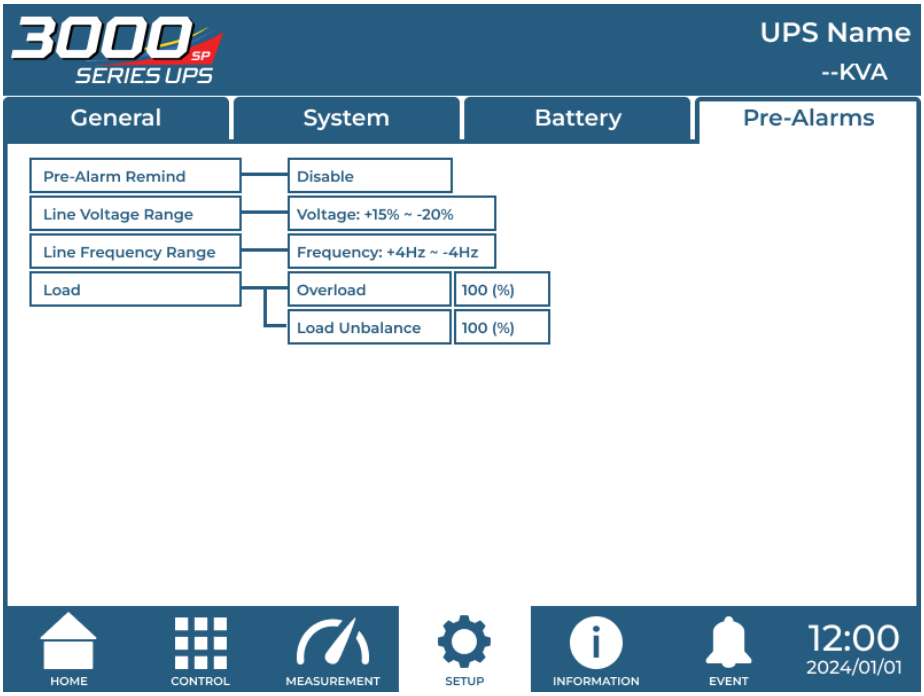


Figure 4-20 Setup-Pre-Alarm Screen

Pre-Alarm settings can be set in any operation mode. See Setup Pre-Alarm settings list in **Table 4-11**.

Table 4-11 Setup-Pre-Alarm Settings Description

Setting Item	Sub Item	Description
Line Voltage Range	--	Set line voltage range: Upper limit • +5% • +10% (Default) Lower limit • -5% • -10% (Default)
Line Frequency Range	--	Set line frequency range: Upper / Lower limit • +/- 1Hz • +/- 2Hz • +/- 3Hz • +/- 4Hz (Default)
Load	--	Set UPS Overload percentage (40~100%) • 100% (Default) Set UPS load unbalance percentage (20~100%) • 100% (Default)

4.5.6 Information Screen

Touch 

to enter the sub-menu. In this Information screen, you can check the UPS configuration of the unit. There are three sub-menus, Identification, System, and Battery.

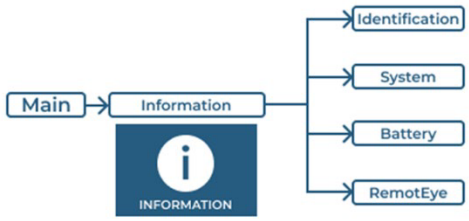


Figure 4-21 Information Menu Sub Tree

4.5.6.1 Information Identification Screen

When the Identification submenu is clicked, the identification screen will show up and display information such as model name and serial no. and firmware versions, as shown in **Figure 4-22**.

Figure 4-22 Information-Identification Screen

4.5.6.2 Information System Screen

When the System submenu is clicked, the information such as system power, nominal voltage, nominal frequency, etc. will be displayed, as shown in **Figure 4-23**. Touch the LEFT and RIGHT arrows to switch between different pages.

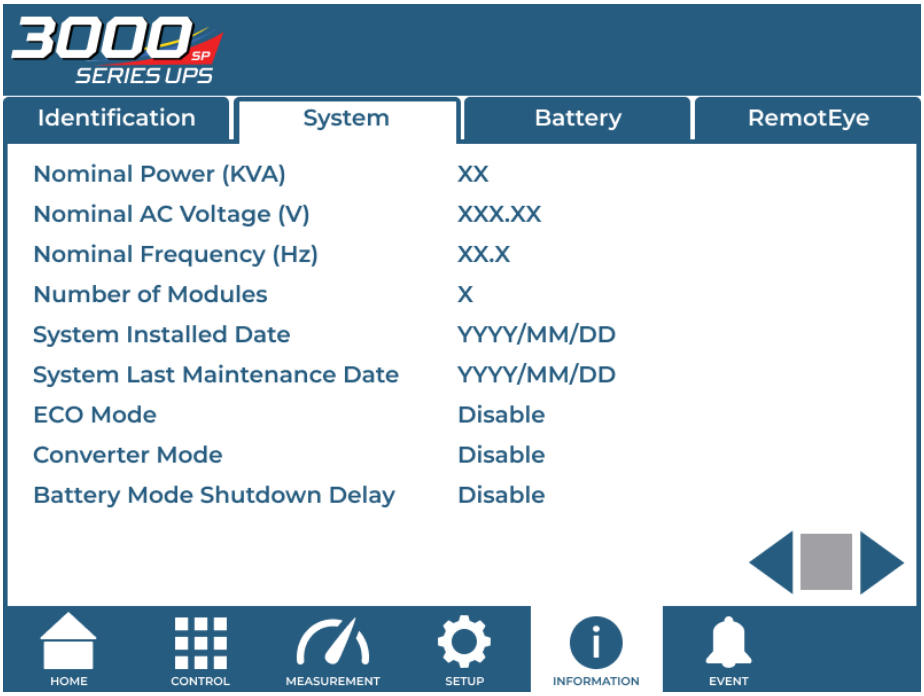


Figure 4-23 Information-System Screen

4.5.6.3 Information Battery Screen

When the Battery submenu is clicked, the battery information such as nominal battery voltage, capacity charging current, etc. Will be displayed, as shown in **Figure 4-24**.

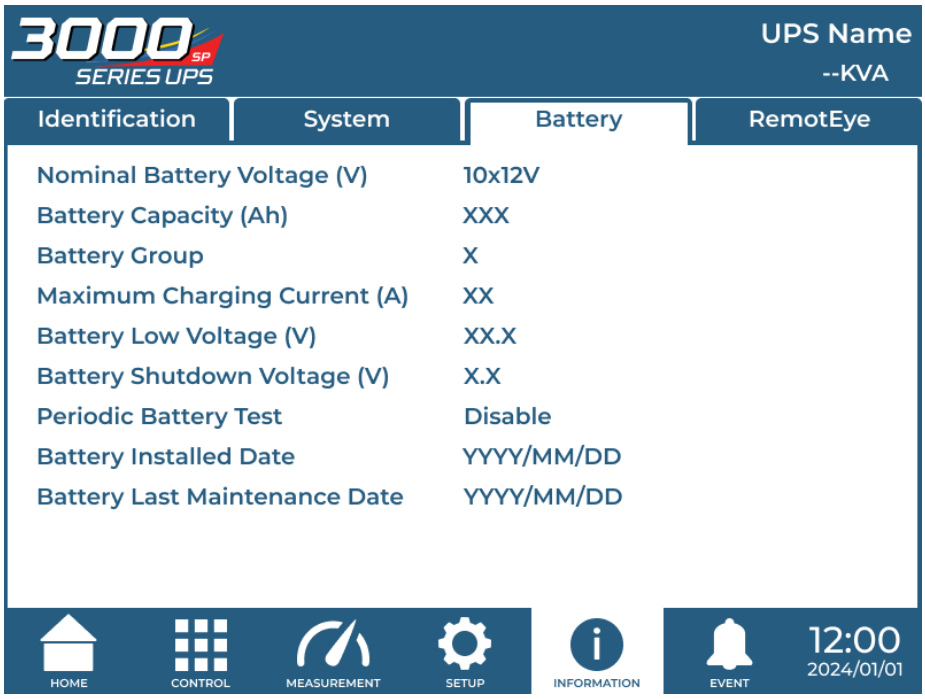


Figure 4-24 Information-Battery Screen

4.5.6.4 Information RemotEye® Screen

When the RemotEye® submenu is clicked, the battery information such as network information, firmware version, and installation date will be displayed as shown in **Figure 4-25**

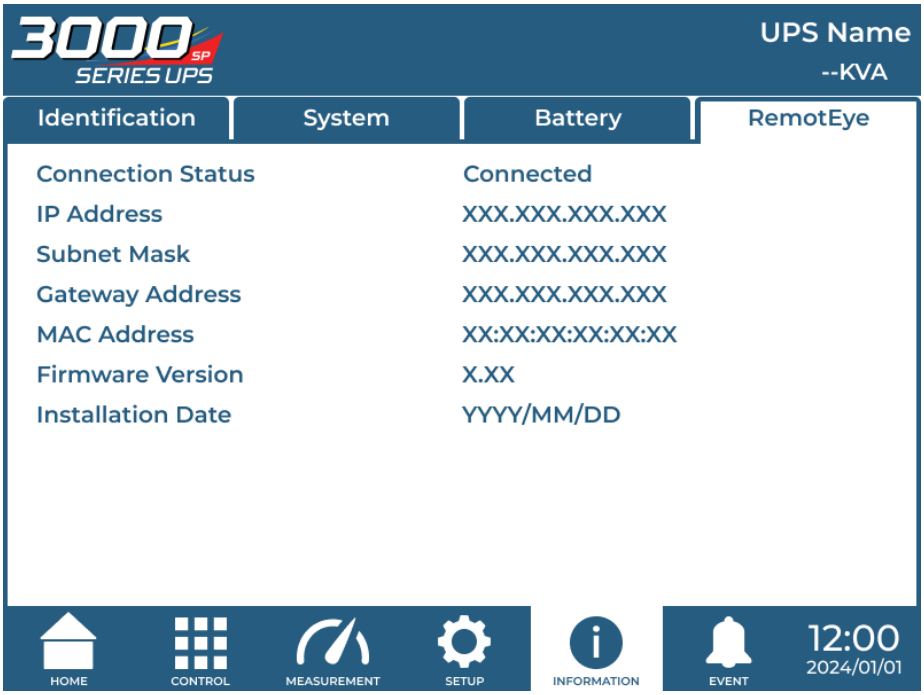


Figure 4-25 Information-RemotEye® Screen

4.5.7 Events Screen

When an event occurs, you will see a flashing  on the Main Screen as shown in **Figure 4-26**. You also can touch the 

icon to check the latest events, history, and history events and reset all events as shown in **Figure 4-27**.

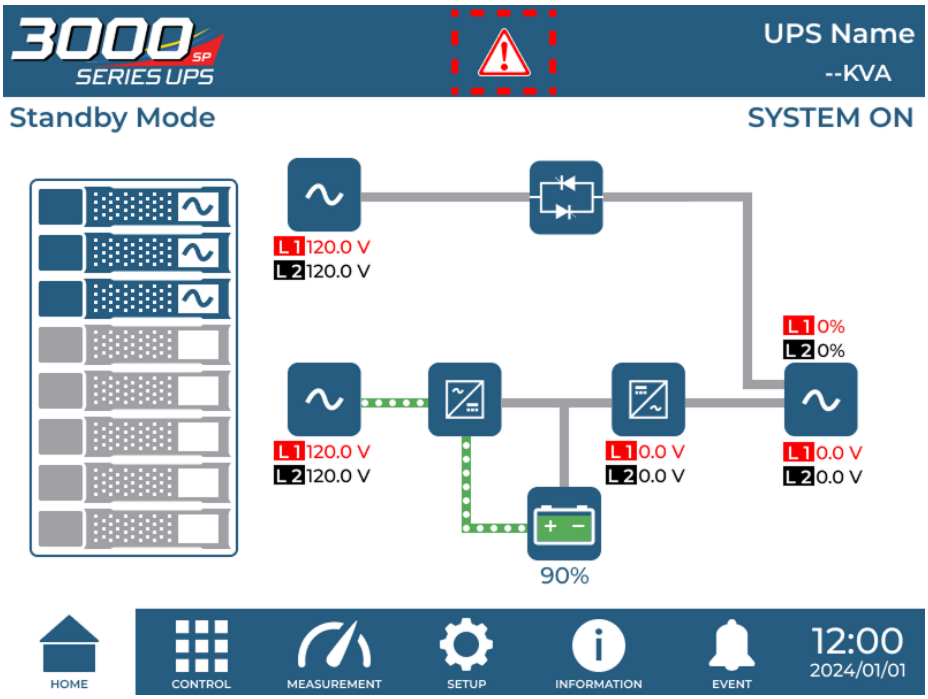


Figure 4-26 Alarm Warning Screen

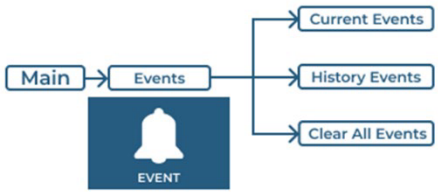


Figure 4-27 Event Menu Sub Tree

4.5.7.1 Current Events

When an event occurs, it will display Module ID and alarm code in the Current Events screen. It can save up to 50 events in the current list. Only 10 events can be listed on one page. Therefore, if it exceeds more than 10, you have to press the  icon to read other events as shown in **Figure 4-28**.

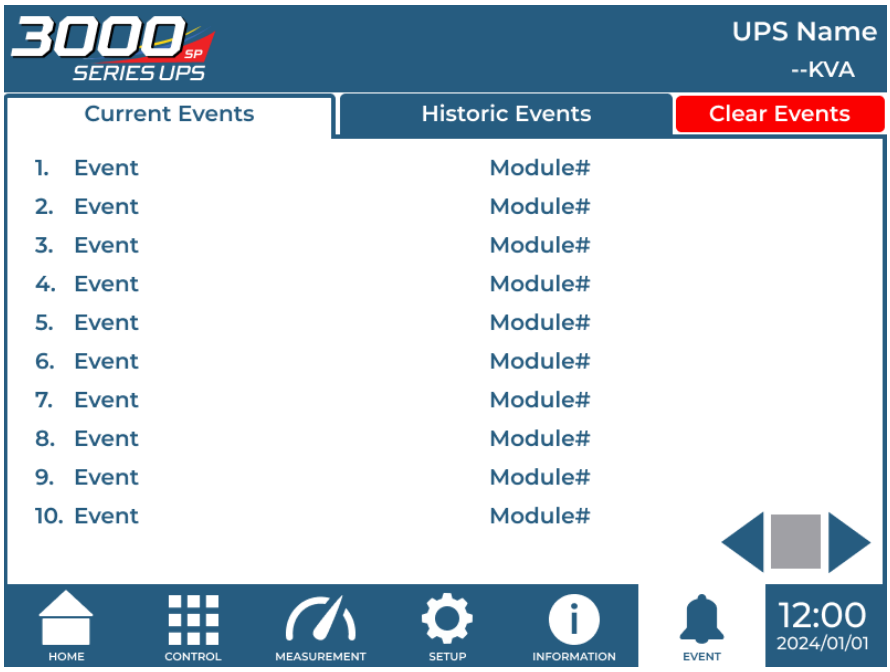


Figure 4-28 Event-Current Events Screen

4.5.7.2 History Events

The detailed event information is saved in history events. It can save up to 500 events in history events. When a warning occurs, it will display the alarm code, alarm time, and Module ID. When a fault event occurs, it will display the alarm code, alarm time, and Module ID. (Refer to **Fault and Warning Codes** for Troubleshooting) To record more historical information about the UPS system, the important setting changed (refer to **Table 4-12** Important setting changed), UPS operation mode changes (refer to **Table 4-13** UPS mode change) and control action executes (refer to **Table 4-14** Control execution) will be saved in History Events.

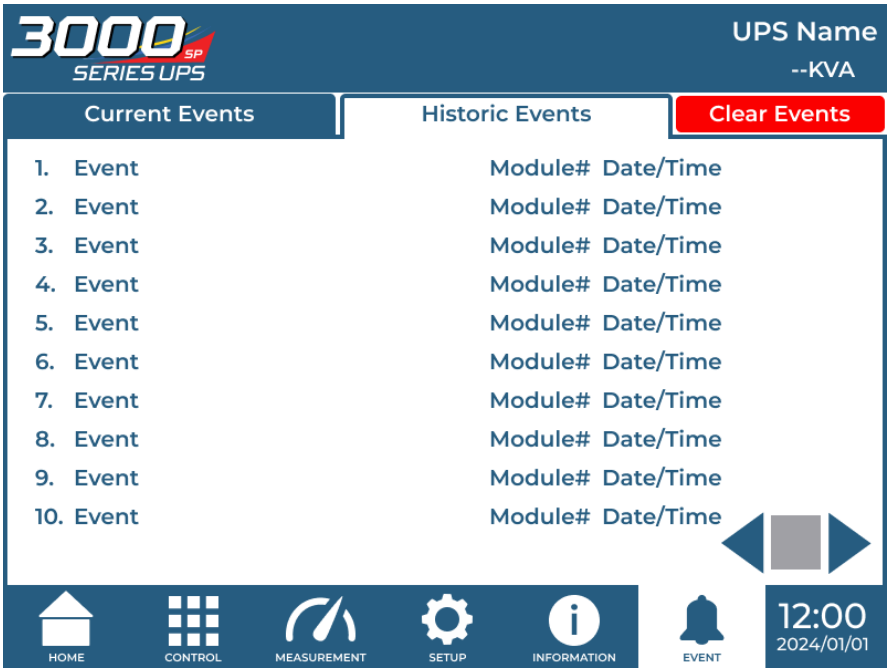


Figure 4-29 Event-History Event Screen

4.5.7.3 Reset All Events

The Maintainer password is required to enter the Rest All Events screen as shown in **Figure 4-30**.

After entering the correct password, it will pop up with a reconfirmation screen. Touch the Confirm to reset all events or touch Cancel icon to cancel this action as shown in **Figure 4-31**.

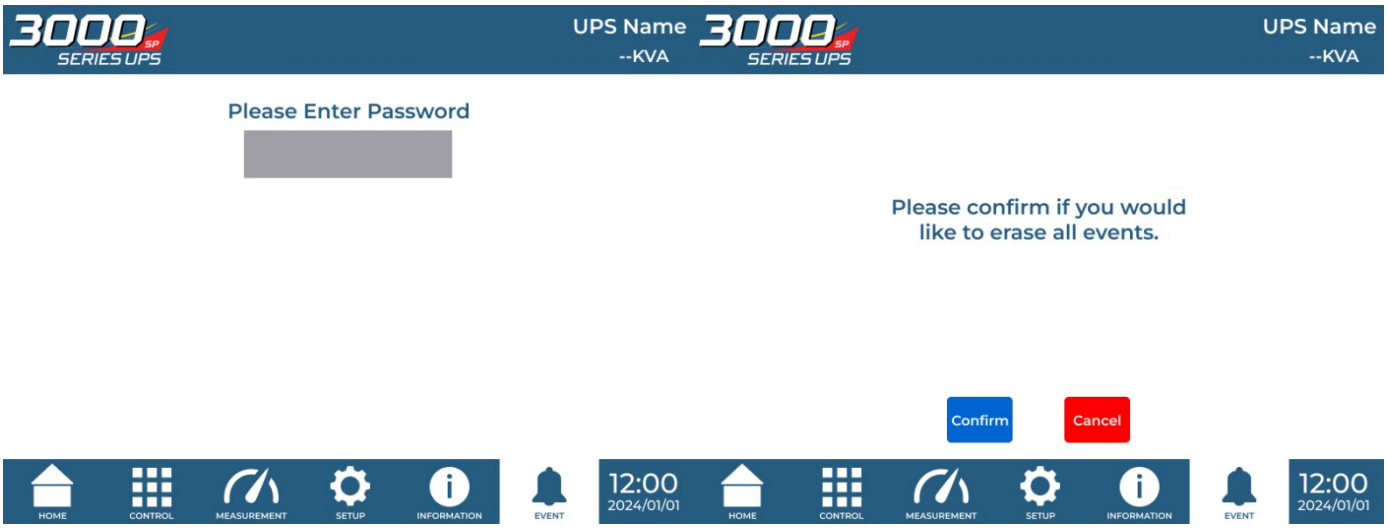


Figure 4-30 Reset All Events Screen Figure

Figure 4-31 Reset All Event Screen Confirmation Screen

4.5.7.4 History Record

Table 4-12 Important Setting Change Logs

Item No.	Description	Item No.	Description
1	Setup! Model Name	2	Setup! Language
3	Setup! Adjust Time	4	Setup! System Installed Date
5	Setup! System Last Maintain Date	6	Setup! Battery Installed Date
7	Setup! Battery Last Maintain Date	8	Setup! Change Password
9	Setup! Audible Alarm	10	Setup! Factory Reset
11	Setup! EPO Function	12	Setup! Output Voltage
13	Setup! ECO Voltage Range	14	Setup! ECO Frequency Range
15	Setup! Bypass Voltage Range	16	Setup! Bypass Frequency Range
19	Setup! ECO Mode	20	Setup! Bypass Mode
21	Setup! Converter Mode	22	Setup! Battery Mode Delay Time
23	Setup! Cold Start	24	Setup! System Shutdown Time
25	Setup! System Restore Time	26	Setup! Redundancy
27	Setup! Charger Test	28	Setup! Nominal Battery Voltage
29	Setup! Battery Capacity in Ah	30	Setup! Battery Group
31	Setup! Maximum Charging Current	32	Setup! Battery Low Voltage
33	Setup! Battery Low Capacity	34	Setup! Battery Shutdown Voltage
35	Setup! Periodic Battery Test	36	Setup! Battery Test Interval
37	Setup! Battery Test Type	38	Setup! BATTERY Age Alert
39	Setup! Line Voltage Range	40	Setup! Line Frequency Range
41	Setup! Load	42	

Table 4-13 UPS Mode Change Logs

Item No.	Description	Item No.	Description
1	UPS Mode! Power On Mode	2	UPS Mode! Standby Mode
3	UPS Mode! Bypass Mode	4	UPS Mode! Line Mode
5	UPS Mode! Battery Mode	6	UPS Mode! Battery Test Mode
7	UPS Mode! Fault Mode	8	UPS Mode! Converter Mode
9	UPS Mode! ECO Mode	10	UPS Mode! Shutdown Mode
11	UPS Mode! Disconnected	12	

Table 4-14 Control Execution Logs

Item No.	Description	Item No.	Description
1	Control! System Turn On	2	Control! System Turn Off
3	Control! Manual Battery Test	4	Control! Cancel Battery Test
5	Control! Turn To Bypass	6	Control! Shutdown Restore
7	Control! Cancel Shutdown	8	Control! Charger Turn On
9	Control! Charger Turn Off	10	

4.6 LCD Screen on UPS Module

4.6.1 LCD Structure

The entire LCD structure is demonstrated in the diagram below.

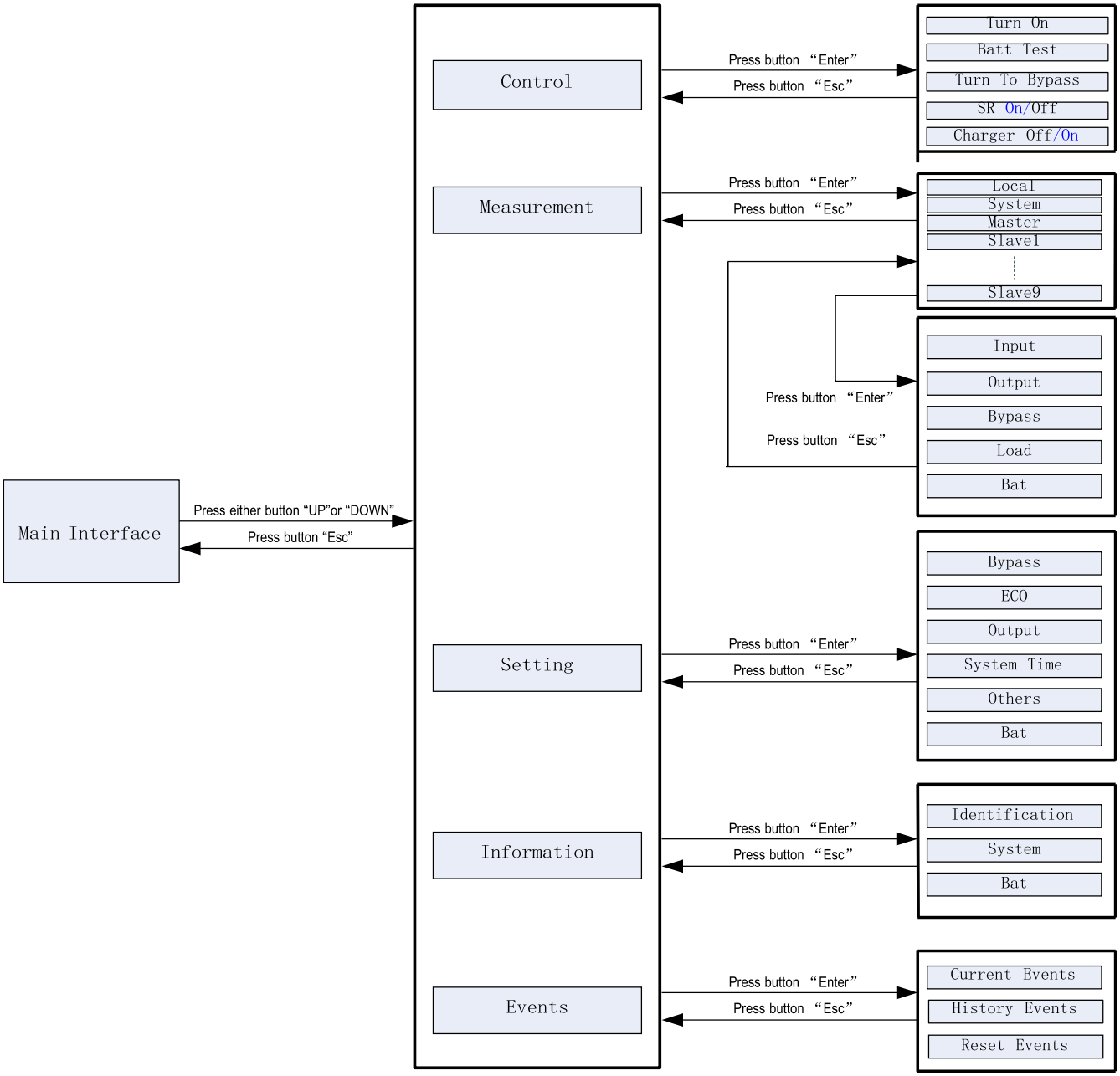


Figure 4-32 Power Module LCD Structure

4.6.2 Main Interface (Home Page)

After initialization, the main screen will display as below.

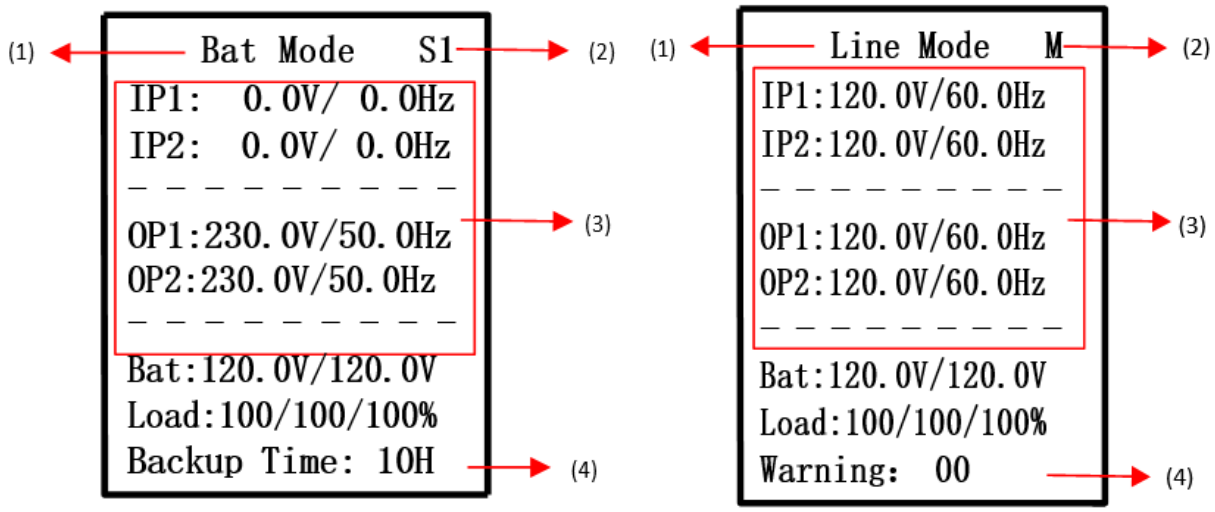


Figure 4-33 Main Screen (Home Page)

1) UPS Mode: Current Operation mode.
2) It will display the UPS current status mode and parallel information as below table.

Short Description	Description
N	New module into parallel system.
M	The master module is stand-alone.
M0	The master module is in parallel.
S<n>	Slave, <n> means the number of slave module.

3) Input and output information.
4) Battery capacity, load level, and backup time will be displayed along with any warning or fault codes. When alarms occur, the relevant information will be displayed. Additionally, when the UPS operates in Battery mode or Battery Test mode, the backup time will be shown.

After two minutes of inactivity on the front panel, the display will return to the home page. To access the operation menu, press the “UP” or “DOWN” button (refer to section 4.6.3).

When the LCD displays the home page, if the UPS is in bypass or standby mode, you can press the “ON/ENTER” button to activate the UPS. It will switch to line, converter, ECO, or battery mode, depending on the settings and input status.

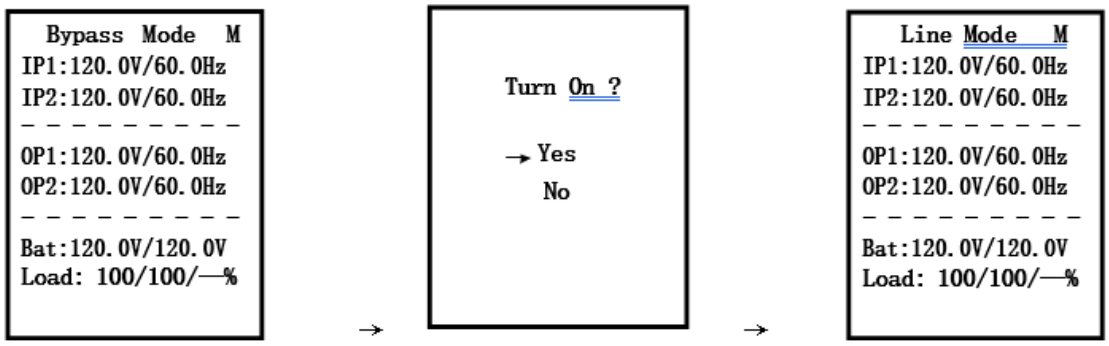


Figure 4-34 Change Mode (Turn On UPS)

When UPS is turned on, you can press the “OFF/ESC” button to change the mode to bypass/standby mode.

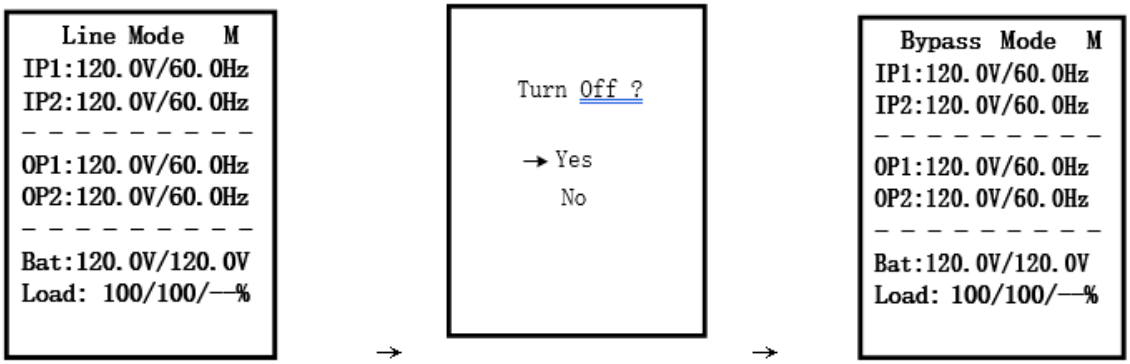


Figure 4-35 Change Mode (Turn Off UPS)

4.6.3 Operation Menu

4.6.3.1 Main Menu

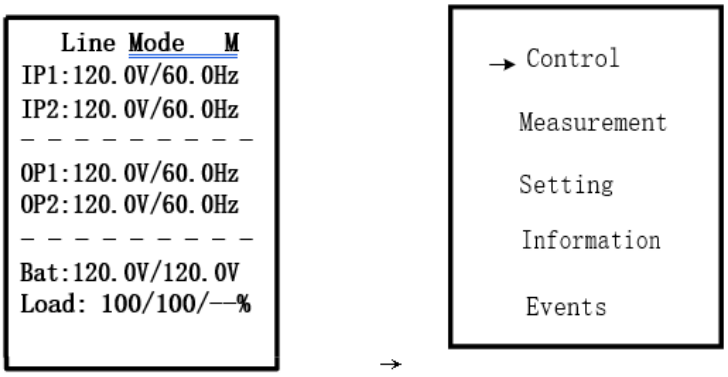


Figure 4-36 Main Menu

1) After pressing the “UP” or “DOWN” button on the main screen (Home page), it will display five items in operation menu: Control / Measurement / Setting / Information / Events.
2) Press “UP” or “DOWN” button to select item.
3) Press “ON/ENTER” button to confirm the selection.
4) Press “OFF/ESC” button to return to main screen (Home page).

4.6.3.2 Control

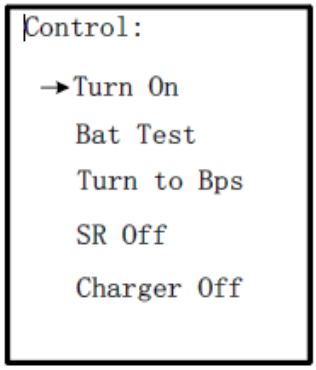


Figure 4-37 Control Menu

Real time commands for UPS controls

- "Turn On" will be displayed if UPS is not turned on. "Turn Off" will be displayed if UPS is turned on.
- "Bat Test" will be displayed if UPS is not Battery Test Mode. "Cancel Test" will be displayed if UPS is in Battery Test Mode.
- "Turn to Bps" will be displayed all the time no matter what status UPS is. But this action is only effective when the input power is available.
- "SR Off" will be displayed if UPS is turned off. "SR On" will be displayed if UPS is turned on.
- "Charger Off" will be displayed if charger is on. "Charger On" will be displayed if charger is turned off.
- Only one selection will be displayed on the screen, and it depends on UPS status.

1) Turn On/Turn Of

This item is for turning on/off the UPS.

a. On bypass mode or standby mode, it will display "Turn On" in control menu. If it is selected and confirmed, the UPS will transfer to line mode, converter mode, ECO mode, or battery mode according to the setting and input status.

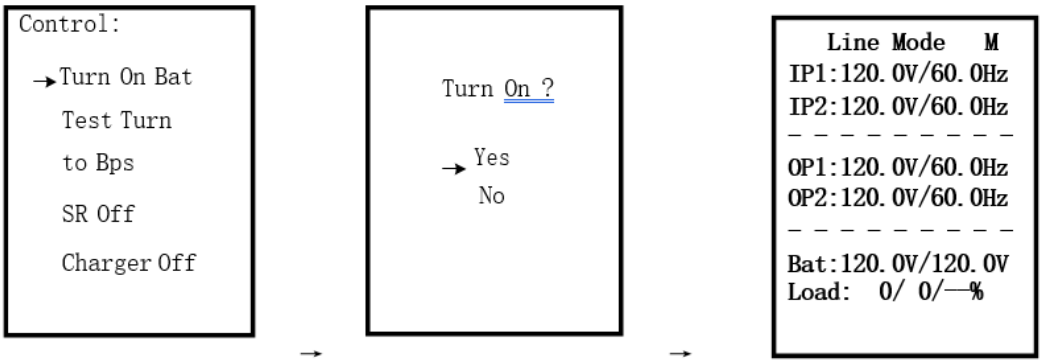


Figure 4-38 Turn On UPS

NOTE: You may simply turn on UPS by pressing "ON/ENTER" button in main screen (Home page). It's not necessary to enter control menu to turn on the UPS.

b. On line mode, converter mode, ECO mode or battery mode, it will display “Turn Off” in control menu. If it is selected and confirmed, the UPS will transfer to bypass mode or standby mode.

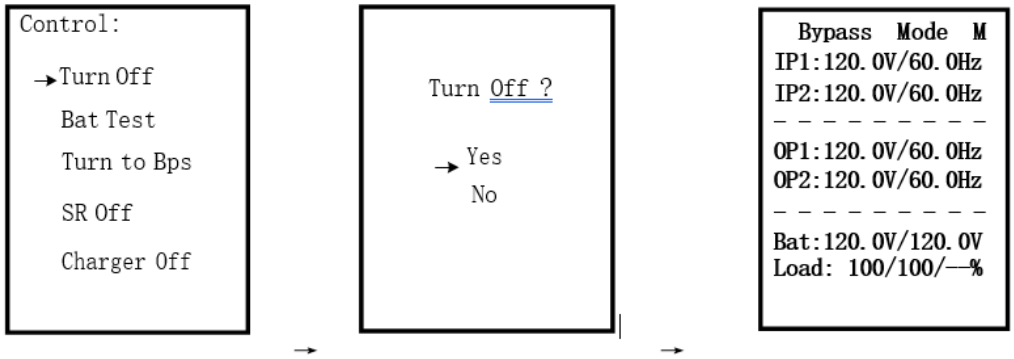


Figure 4-39 Turn Off UPS

NOTE: You may simply turn off UPS by pressing “OFF/ESC” button in main screen (Home page). It’s not necessary to enter the control menu to turn off the UPS.

2) Battery Test/Cancel Test

a. The Battery Test function checks if the UPS will operate effectively in battery mode and test the battery performance. Except if the UPS is already in Battery Test mode, “Bat Test” selection will be displayed under all operation modes.

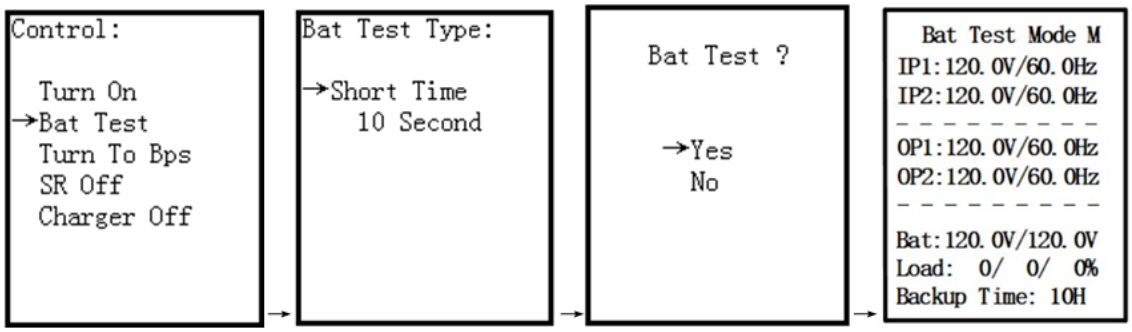


Figure 4-40 Battery Test Menu

The test can be executed in Line/Converter mode, and a reminder will appear on the screen. If “Yes” is selected, the screen will return to the home page with “Battery Test Mode” displayed at the top. Once the test is completed, the status will revert back to the UPS's current mode. There are four types of battery tests to choose from. Please refer to **Table 4-15** for more details.

Table 4-15 Battery Test Type

Setting Item	Sub Item	Description
Bat Test Type	Short Time	10-second test time.
	Long Time 10 Minute	When selected, the duration is able to set up and the time unit is minute. The setting value is from 1 to 99 by pressing “up” and “down” button. 10 min is a default setting.
	Long Time 12 Second	When selected, the time unit is second. The available settings is 12s, 18s, 24s, 30s, 36s, 42s, 48s and 54s. The default setting is 12s.
	Till to Bat Low	Test until the battery is low voltage.

b. On Battery Test mode, it will display “Cancel Test” in control menu. When “Cancel Test” is selected, the screen will change back to UPS current mode.

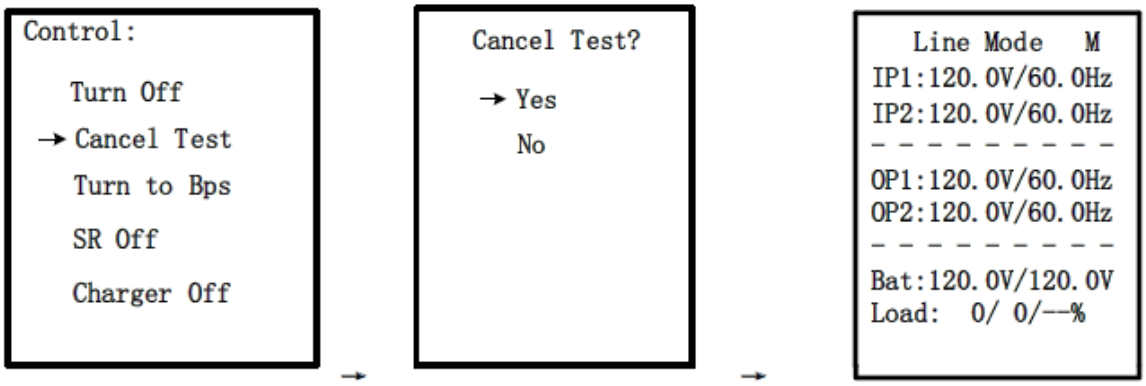


Figure 4-41 Cancel Battery Test

3) Turn to Bypass

If it is selected and confirmed, the UPS will transfer to Bypass mode.

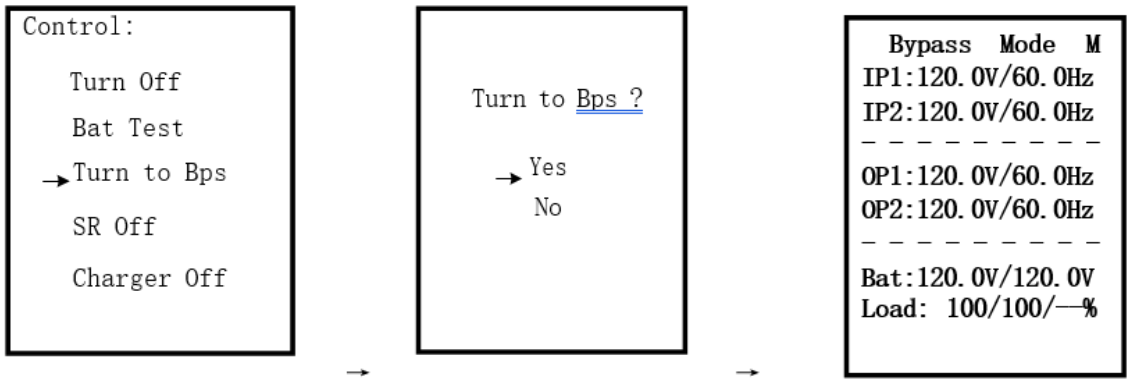


Figure 4-42 Turn to Bypass Menu

4) SR On/SR Off

a. On Line/Battery/Battery Test/Converter/ECO mode, it will display “SR On” in control menu. If it is selected and confirmed, the screen will return to the home page. Shutdown and restore time can be selected as shown in **Table 4-16**. When “Shutdown Time” countdown ends, the UPS will turn off. Then, the “Restore Time” will start to count. When countdown ends, the UPS will be turned on and back to current mode.

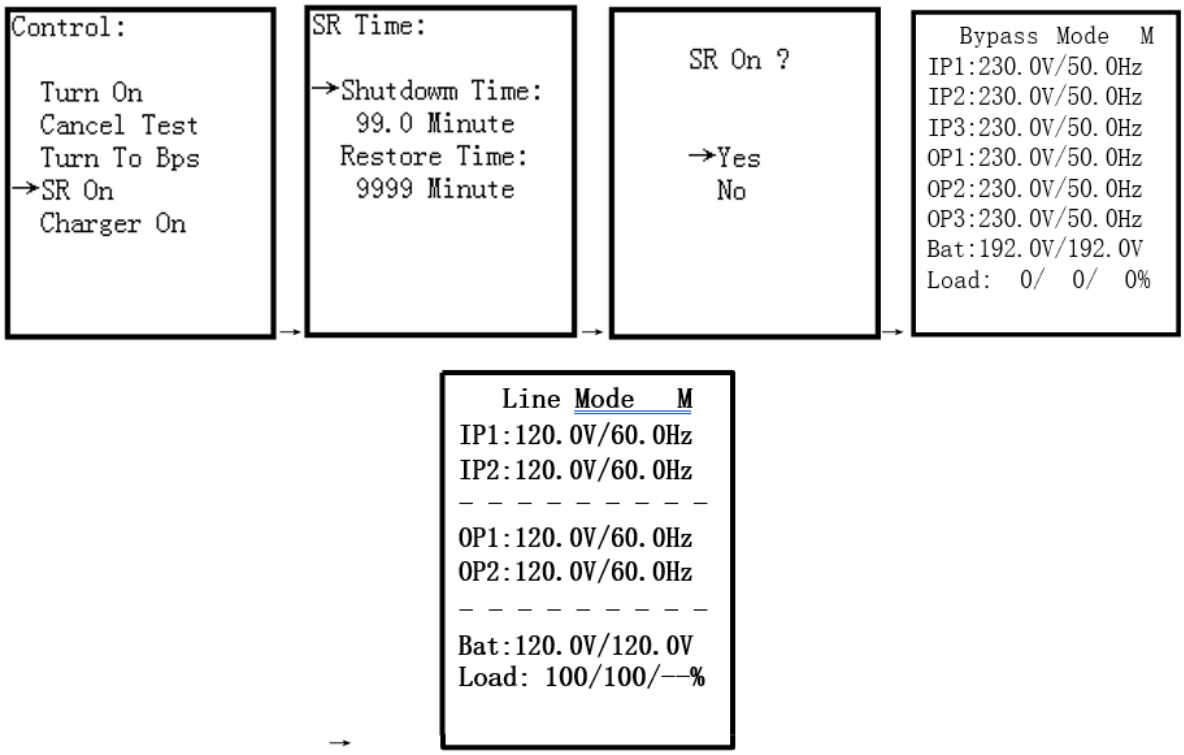


Figure 4-43 SR On Menu

Table 4-16 Shutdown Restore Time

Setting Item	Sub Item	Explanation
SR On	Shutdown Time	Set system shutdown time (0.2~99min) ● 0.2 min (Default)
	Restore Time	Set system restore time (0~9999min) ● 1 min (Default)

a) On Standby/Bypass/Fault mode, it will display “SR Off” in the control menu. If it is selected and confirmed, the screen will return to home page and system will back to current mode.
If “SR On” is selected and confirmed, When UPS in Line/Battery/Battery Test/Converter/ECO mode, it will display “SR Off” in control menu. If it is selected and confirmed, the screen will return to the home page and the system will cancel this function.

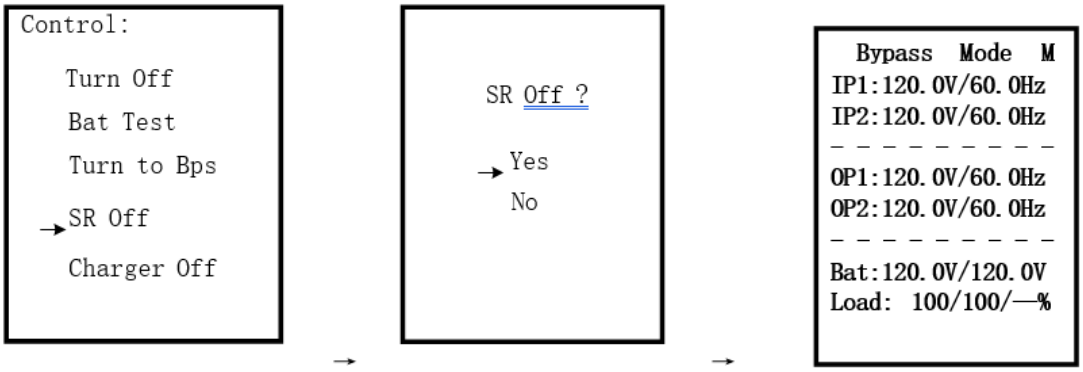


Figure 4-44 SR Off Menu

5) Charger On/Charger Off

a. "Charger Off" will be displayed under all operation modes when charger is working. If it is selected and confirmed, the screen will return to the home page. And charger will stop charging the battery.

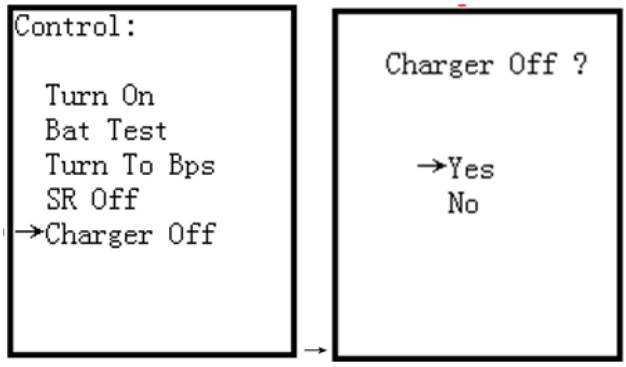


Figure 4-45 Charger Off Menu

b. "Charge On" will be displayed under all operation modes when the charger is turned off. If it is selected and confirmed, the screen will return to home page. And the charger will charge the battery.

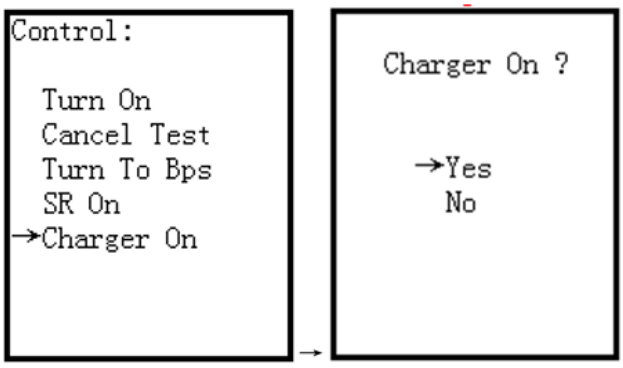


Figure 4-46 Charger On Menu

4.6.3.3 Measurement

Measurement displays the measurement value of the parameters such as voltage / current / frequency / power / capacity / time etc. Every UPS displays the measured value of the whole system. Press "↑" or "↓" button to explore the pages.

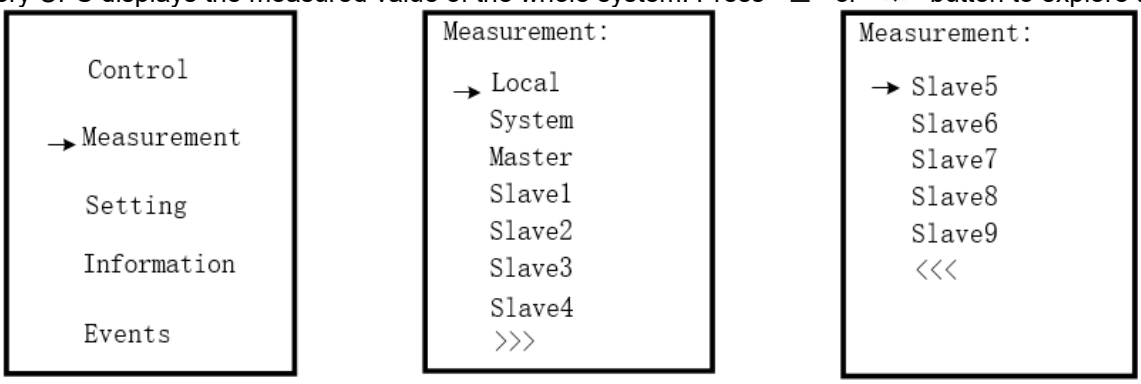


Figure 4-47 Measurement Data Menu

"Local" means the current UPS module. "Master" and "Slave<n>" means the other UPS module in this parallel system.

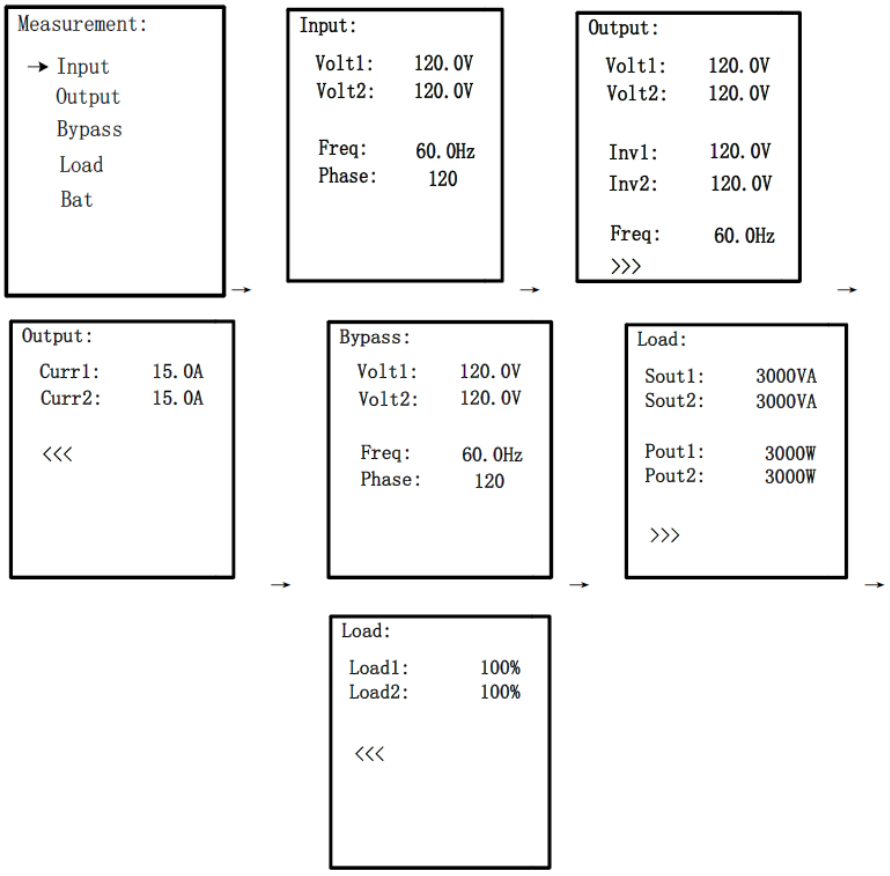


Figure 4-48 Measurement Data Current Module

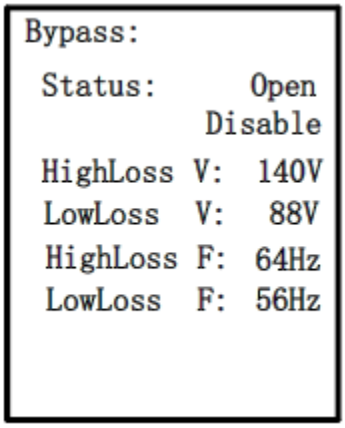
4.6.3.4 Setting

This page is used to configure the parameter settings. It's necessary to enter password to enter submenus. The default password is 0729. There are submenus under the setting, including Bypass, ECO, Output, System Time, Others and Battery, as shown below.

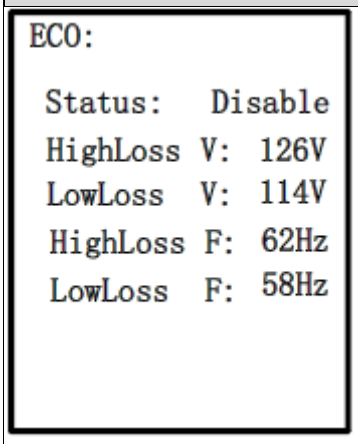
Figure 4-49 Setting Menu

NOTE: Some settings will be only available in some operation modes. If the setting is not available in current mode, the LCD will show prompt message with "Item can't be set in this mode". Press any button or just wait for several seconds until this message fades

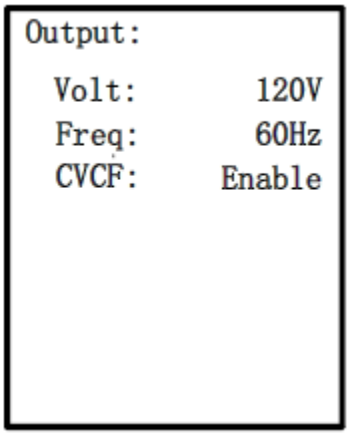
1) **Bypass Setting** (only available or effective on bypass mode and standby mode)

Interface	Description
	**1. Status** **1.1 Open/Forbid:** **Open:** Bypass allowed. When selected, UPS will run at Bypass mode depending on bypass enabled/disabled setting. **Forbid:** Bypass not allowed. When selected, it's not allowed for running in Bypass mode under any situations. The default setting is **Open.** **1.2 Enable/Disable** This option appears only when Bypass status is set to "Open". **Enable:** Bypass enabled. When selected, Bypass mode is activated. **Disable:** Bypass disabled. When selected, automatic bypass is acceptable, but "manual bypass" is not available. "Manual bypass" means users manually operate UPS to Bypass mode (for example, in AC mode turning off the UPS to Bypass mode). Then, the UPS will go to bypass mode but without output if it is turned off in AC mode. The default setting is **Enable.** **NOTE:** The following items are only available in bypass mode: **2. HighLoss V:** Set the acceptable high voltage for bypass. Setting range is from (Rated Output Volt +6V) to 155V and the default value is 140V. **3. LowLoss V:** Set the acceptable low voltage for bypass. Setting range is from 88V to (Rated Output Volt - 6V) and the default value is 88V. **4. HighLoss F:** Set the acceptable high frequency for bypass. 50 Hz system: Setting range is from 51Hz to 54 Hz. 60 Hz system: Setting range is from 61Hz to 64Hz. **5. LowLoss F:** Set the acceptable low frequency for bypass. 50 Hz system: Setting range is from 46.0Hz to 49.0Hz. 60 Hz system: Setting range is from 56.0Hz to 59.0Hz. The default value is 46Hz/56Hz.

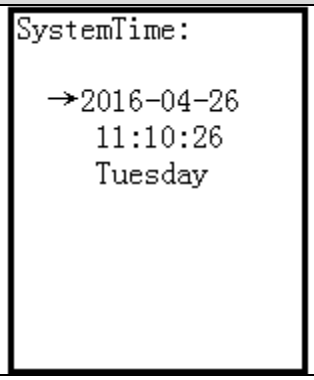
2) **ECO Setting** (only available or effective on bypass mode, standby mode, Line mode and ECO mode)

Interface	Description
	**1.** Status **Enable:** Enable ECO Function **Disable:** Disable ECO Function If ECO function is disabled, voltage range and frequency range for ECO mode still can be set, but it is meaningless unless the ECO function is enabled. The default setting is **Disable.** **2.** **HighLoss V:** High voltage point in ECO mode. The setting range is from (Rated Output Volt +6V) to (Rated Output Volt +12V) and the default setting is **(Rated Output Volt +6V)**. **3.** **LowLoss V:** Low voltage point in ECO mode. The setting range is from (Rated Output Volt -12V) to (Rated Output Volt -6V) and the default setting is **(Rated Output Volt -6V).** **4.** **HighLoss F:** Set High frequency point for ECO mode. 50 Hz system: Setting range is from 52Hz to 54Hz. 60 Hz system: Setting range is from 62Hz to 64Hz. The default value is **52Hz/62Hz.** **5.** **LowLoss F:** Set Low frequency point for ECO mode. 50 Hz system: Setting range is from 46Hz to 48Hz. 60 Hz system: Setting range is from 56Hz to 58Hz. The default value is **48Hz/58Hz.**

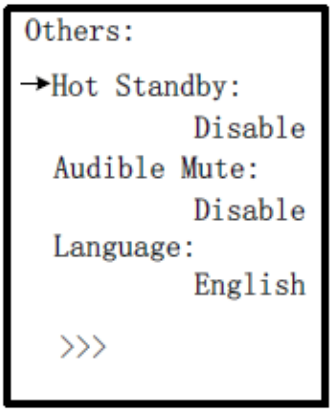
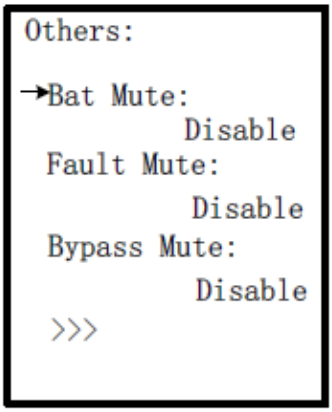
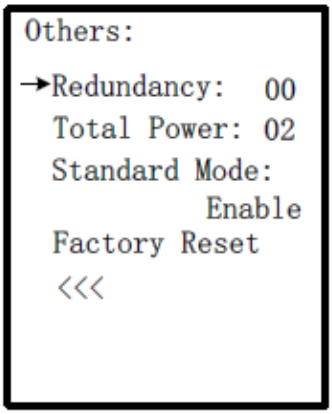
3) Output Setting (only available or effective on bypass mode and standby mode)

Interface	Description
	**1. Volt:** **100:** Presenting the rated output voltage with 100Vac **110:** Presenting the rated output voltage with 110Vac **115:** Presenting the rated output voltage with 115Vac **120:** Presenting the rated output voltage with 120Vac **127:** Presenting the rated output voltage with 127Vac The default value is **120Vac.** **2. Freq:** **50Hz:** The output frequency is set for 50Hz. **60Hz:** The output frequency is set for 60Hz. NOTE: CVCF should be enabled to modify this item. If CVCF is disabled, output frequency will be decided according to the latest normal utility frequency. If it is within 46Hz and 54Hz, the output frequency will be 50.0Hz. If it is within 56Hz and 64Hz, the output frequency will be 60.0Hz. **3. CVCF:** Enable or disable converter mode. **Enable:** The output frequency will be fixed at 50Hz or 60Hz according to setting of "Freq". The input frequency could be from 46Hz to 64Hz. **Disable:** The output frequency will synchronize with the input frequency within 46~54 Hz for 50Hz system or within 56~64 Hz for 60Hz system. NOTE: CVCF means Constant Voltage and Constant Frequency. It represents converter mode. The default setting is **Disable.**

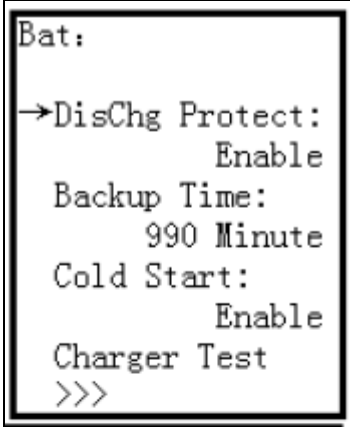
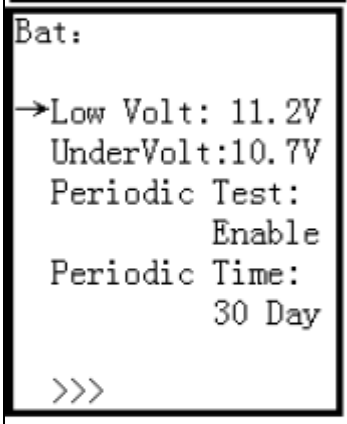
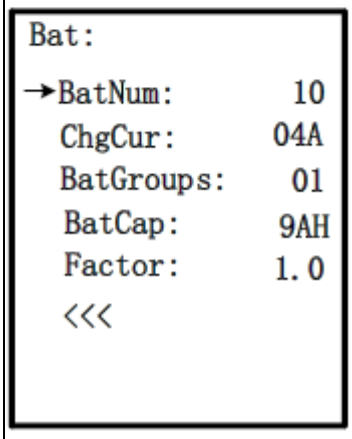
4) System Time Setting (available or effective on all modes)

Interface	Description
	**SystemTime:** Date, Time and Week can be modified via this interface. Input the actual Time, the unit will automatically adjust timer after "↵" button is pressed.

5) Others Setting

Interface	Description
  	**1. Hot standby** (only available or effective on bypass mode and standby mode)**:** **Enable:** Hot standby function is enabled. It means that the current UPS is set to be host of hot standby system, and it will automatically restart after AC recovery even without battery connected. **Disable:** Hot standby function is disabled. The UPS is running at normal mode and can't restart without battery. The default setting is **Disable**. **2. Audible Mute** (available or effective for all modes)**: Enable:** It is to mute the buzzer. **Disable:** It is to enable the buzzer when UPS has alarms or UPS is working in bypass mode or Battery mode. The default setting is **Disable.** **3. Language** (available or effective for all modes): **English, Simplified Chinese and Traditional Chinese.** The default setting is **English.** **4. Bat Mute** (available or effective on all modes)**:** **Enable:** It is to mute the buzzer when UPS is in Battery mode. **Disable:** It is to enable the buzzer in Battery mode. The default setting is **Disable.** **5. Fault Mute** (available or effective in all modes)**:** **Enable:** It is to mute the buzzer when UPS is in Fault mode. **Disable:** It is to enable the buzzer in Fault mode. The default setting is **Disable.** **6. Bypass Mute** (available or effective on all mode)**:** **Enable:** It is to mute the buzzer when UPS is in Bypass mode. **Disable:** It is to enable the buzzer in Bypass mode. The default setting is **Disable.** **7. Redundancy** (available or effective on all modes)**:** The setting is quantity of redundant UPS module. The setting range is 0~9. The setting quantity must be less than the number of UPS modules in the system. The default value is 0. **8. Total Power** (available or effective in all mode): The parallel number we set in system. **9. Standard Mode** (only available or effective on bypass mode and standby mode): **Enable:** It is a compatible mode for generator. **Disable:** It is a normal mode. The default setting is **Enable.** **10. Factory Reset** (only available or effective on bypass mode and standby mode): Restore to factory default setting.

6) Battery

Interface	Description
	**1. Dischg Protect:** Enable or disable battery discharge protection. **Enable:** Battery discharge protection function is enabled. When UPS have been continuously working in "battery/battery test mode", the UPS will automatically shut down when the backup time set next is achieved. **Disable:** Battery discharge protection function is disabled. **Backup Time:** When discharge protection is enabled, this setting time can be counted. **1~990:** The maximum discharge time can be set from 1 to 990 minutes. UPS will shut down to protect battery after backup time arrives when the "Dischg Protect" is enabled. If "Dischg protect" is disabled, then this setting does not make sense whatever the value is. The default value for this setting is 990 minutes. **2. Cold Start:** **Enable:** UPS could be turned on without mains. **Disable:** UPS could not be turned on without mains. **3. Charger Test:** Test the battery charger even without battery. After entering this item, it will pop up a screen showing "Yes" and "No". If selecting "Yes", the UPS will execute charger test. After test, the LCD screen will return to main screen (home page) and show battery voltages on BAT+ and BAT-.
	**4. Low Volt:** Set battery low warning voltage. The setting range is from 10.5~11.5V per piece. The default value is 11.2V. **5. Under Volt:** Set battery low cut off voltage. The setting range is from 9.6~10.7V per piece. The default value is 9.6V. **6. Periodic Test:** **Enable:** UPS will test the battery periodically. **Disable:** UPS will not test the battery periodically. **7. Periodic Time:** When periodic test is enabled, please set up battery test interval. The setting range is from 7 days to 99 days. The default value is 30-day.
	**8. BatNum:** The setting range is from 8 to 10 pieces and the default value is **10**. **9. Chg Curr:** Set maximum charge current. The setting range is from (0~ 4A) x N. N represents the parallel unit number. The default value is 4A. If parallel unit number is 4, the maximum setting value can be 16A. **10. Bat Groups:** Set the number of battery groups ranging from 1 to 10. The default value is 1 group. **11. Bat Cap:** Set the battery capacity such as 7AH, 9AH, 10AH, 12AH, 17AH, 26AH, 40AH, 65AH, 100AH and so on. The default value is 9AH. **12. Factor:** Calibrate the displayed backup time by adjusting this multiplier factor. The formulation is listed below: Displayed backup time=Original calculated backup time×Multiplier factor The value of default factor is 1.0. The setting range is from 0.5 to 2. **Item 10~12 are used for the battery backup time calculation.**

4.6.3.5 Information

In the Information page, you can check the serial number, firmware version, system configuration and settings of the UPS. There are submenus under the Information, including Identification, System and Battery, as shown below. Information displays all parameter setting value and status.

1) Identification shows the UPS Module name, serial no, UPS display version, controller module version, CPU version, and system LCD version.

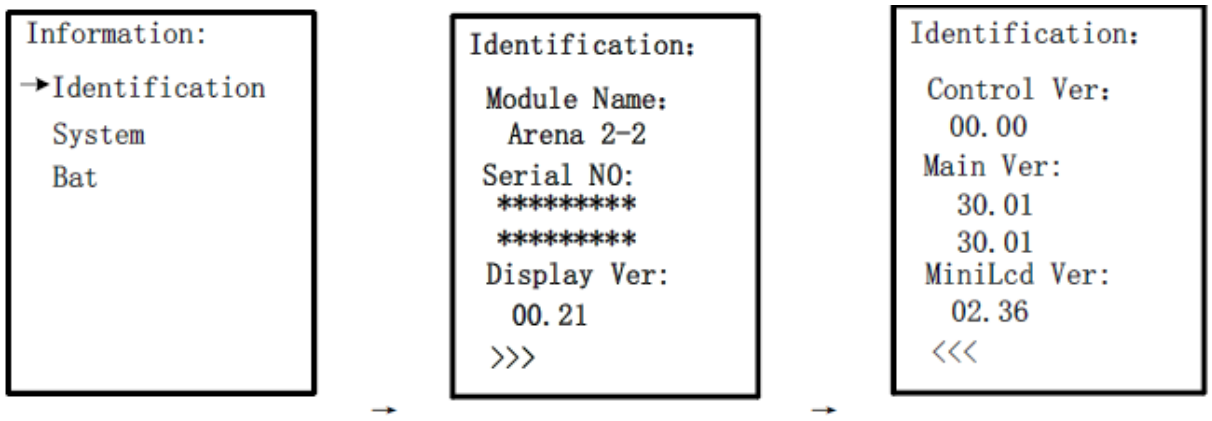
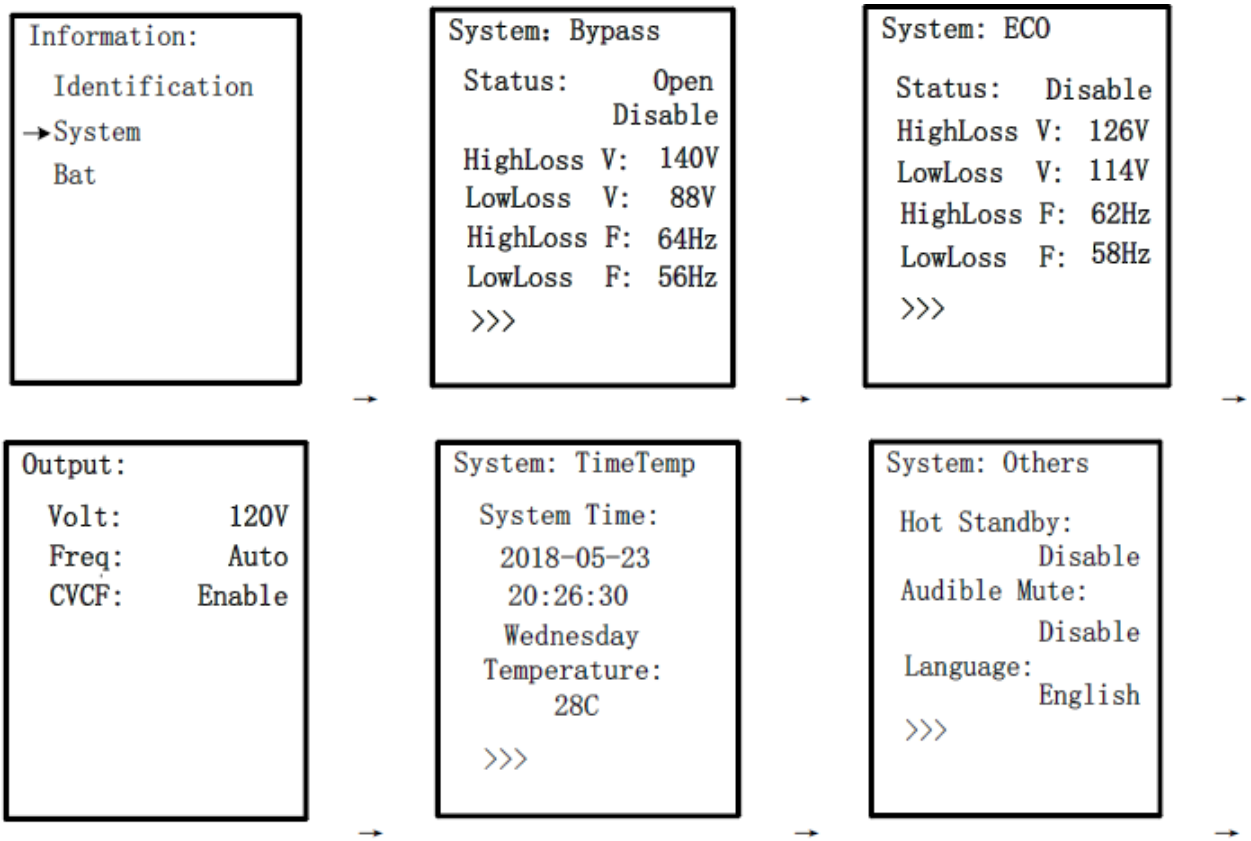


Figure 4-50 Information Identification Menu

2) The system shows the UPS configuration.



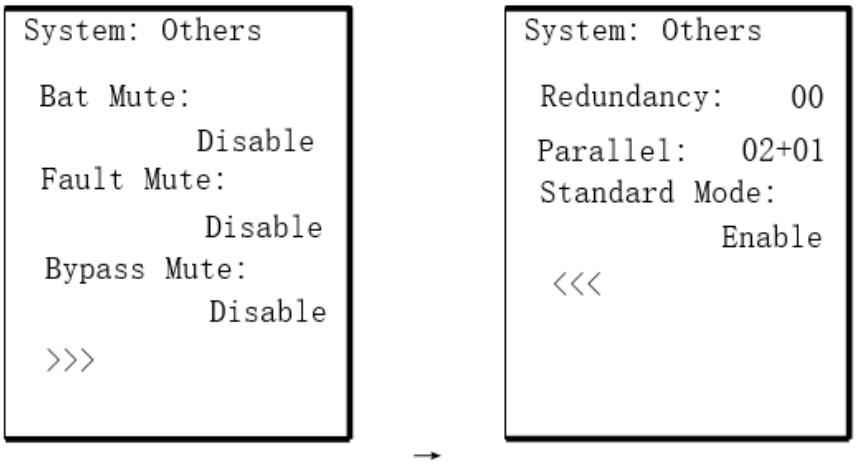


Figure 4-51 Information Identification Screens

3) The Battery submenu shows the battery configuration.

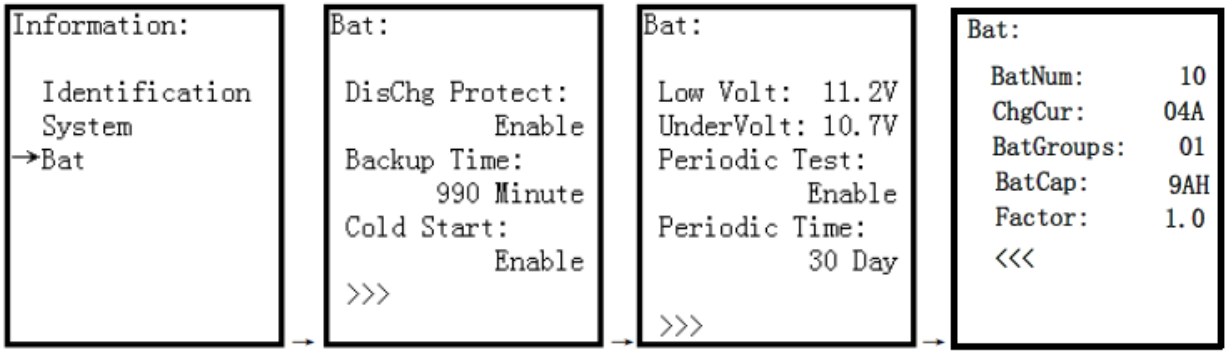


Figure 4-52 Information Battery Screens

4.6.3.6 Events

On the Event page, you can check the current, history, and reset events.

1) Current Events

When an event occurs, it will display alarm code in Current Events page. If events exceed more than one page, press "⬆" or "⬇" button to read other events.

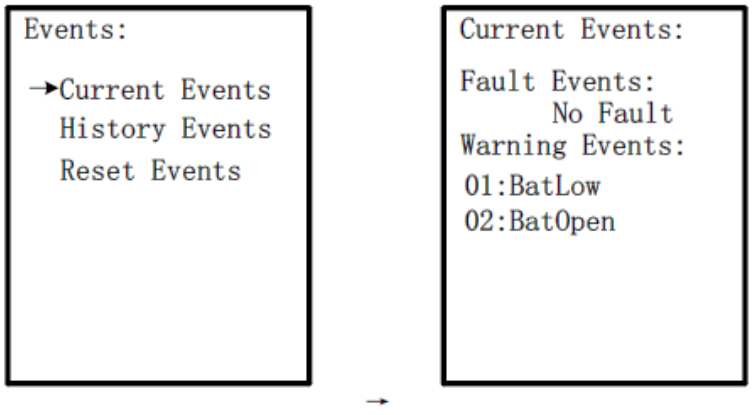


Figure 4-53 Current Events Screen

2) History Events

The detailed event information is saved in history events. It can save up to 160 pages in history events. When a warning occurs, it will display alarm code, alarm time and UPS mode. When a fault event occurs, it will display fault code, alarm time/date and UPS operation mode. (Refer section 5.13 Troubleshooting)

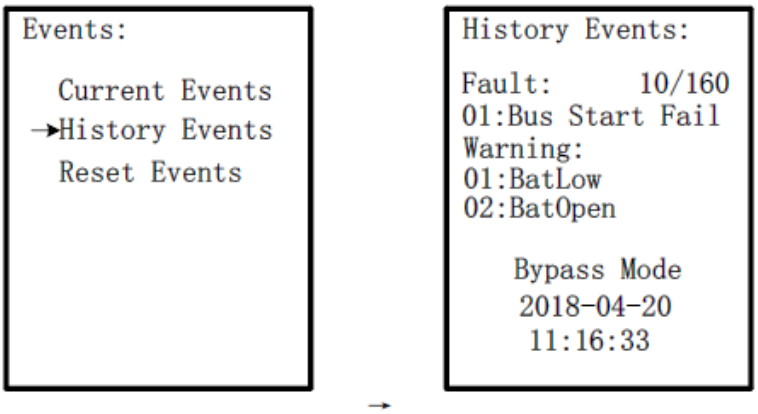


Figure 4-54 History Events Screen

3) Reset Events

It's necessary to enter password to enter Reset Events page as shown below. Then, press "↑" or "↓" button to choose "Yes" to clear all history events or "No" to cancel the reset action. The default password is 0729.

Figure 4-55 Reset Event Screen

4.7 Controller Module External Signals

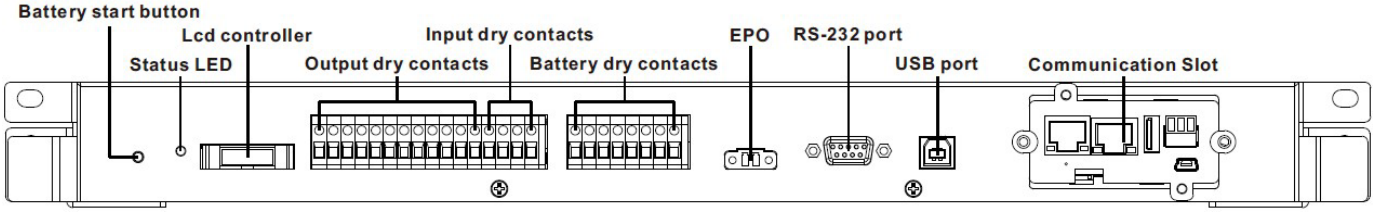


Figure 4-56 Controller Module Front Layout

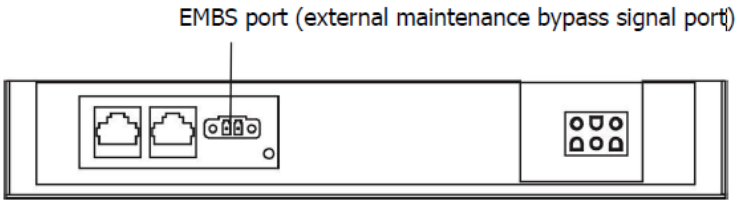


Figure 4-57 Controller Module Back Layout

4.7.1 Battery Start Button

The controller module can be turned on without connecting to the utility by pressing Battery Start Button.

4.7.2 Status LED

The green LED represents the operation status of the controller module.

Table 4-17 Controller Module Status LED Descriptions

Color	Status	Definition
Green	Flashing	Communications: On/0.1s, Off/0.4s. Un-Connection: On/0.1s, Off/0.4s.
	Off	ID conflict or Power off

4.7.3 LCD Controller

The controller connector is used to connect LCD to the controller module using a ribbon cable.

4.7.4 Output Dry Contact Port

These 6 output dry contacts are normally open. It's also able to set the feature for each dry contact port through the Dry Contact Config tool. Please refer to the next section for the detailed installation and configuration.

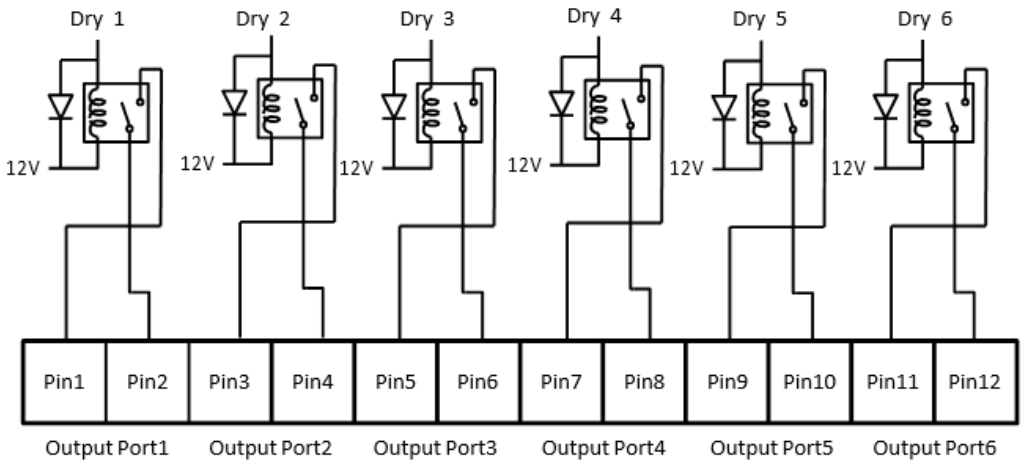


Figure 4-58 Dry Contact Output Port

4.7.4.1 Dry Contact Configuration

Step 1. Please access the https://www.toshiba.com/tic/power-electronics/uninterruptible-power-systems/single-phase/3000-sp-series-ups, select View Technical Downloads, software, and download the Communication Setting Tool icon. Please download and install this tool in your computer. After this tool is installed successfully, it will leave a short icon on the desktop.

Step 2. Start this tool in your computer. Then, it will pop up a screen as below.

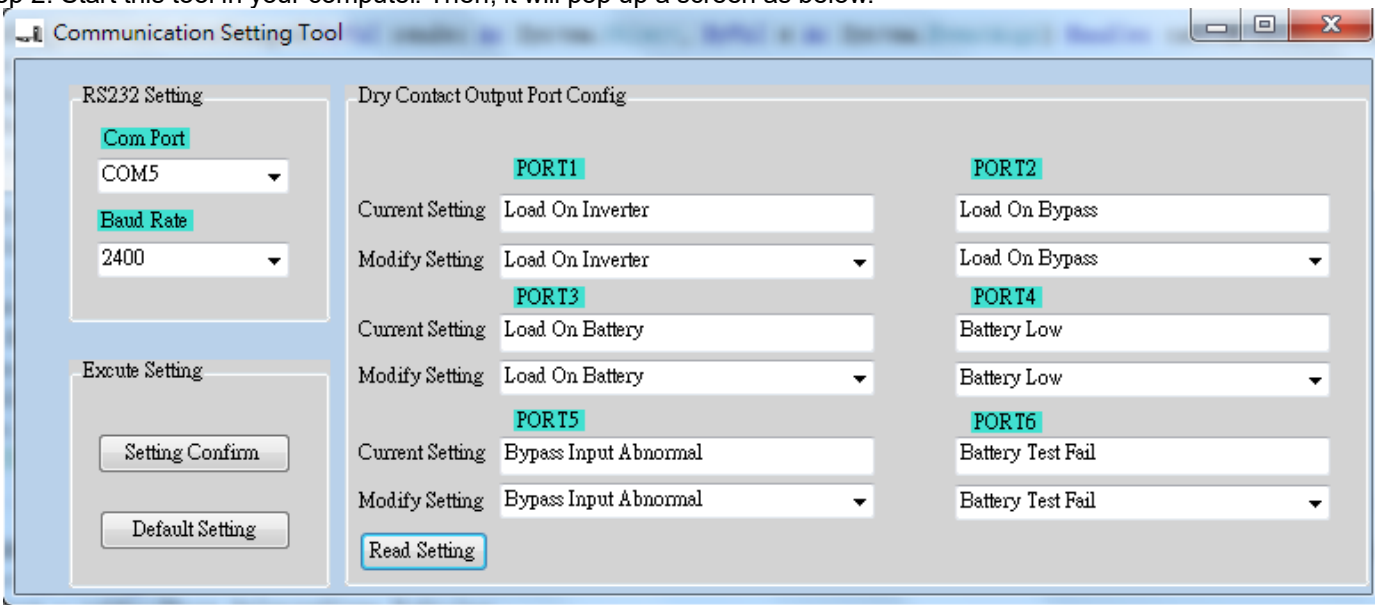


Figure 4-59 Communication Setting Tool Screen

Step 3: Click “Read Setting” button to check the current setting of the output dry contact port.

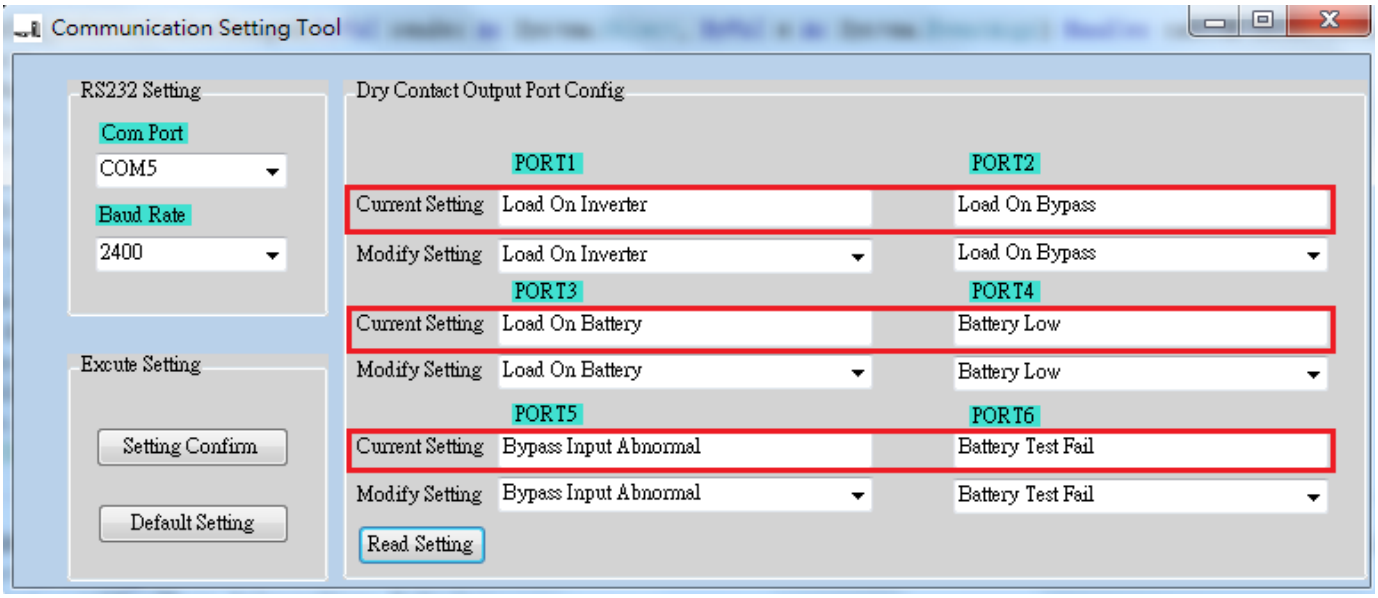


Figure 4-60 Communication Setting Tool - Read Setting

Step 4: Check all settings. There are 18 options to select for contact listed in Table 4-18. Once output dry contact settings are selected, click “Setting Confirm” button.

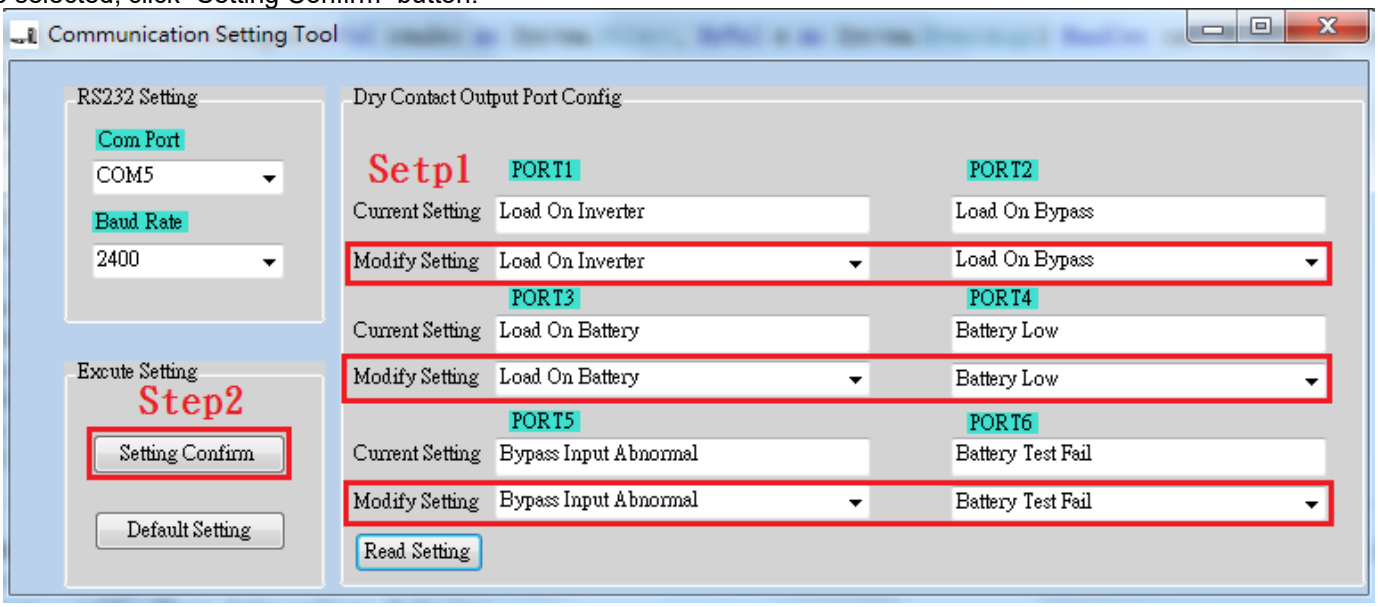


Figure 4-61 Communication Setting Tool - Setting Confirm

Table 4-18 Output Dry Contact Description

Contact	Message	Description
1	Load on inverter	The UPS is working normally.
2	Load on bypass	The UPS is in Bypass mode.
3	Load on Battery	The UPS is in Battery mode.
4	Low battery	The battery voltage is low.
5	Bypass input abnormal	The bypass voltage or frequency is abnormal.

6	Battery test failure	Performs the battery test. The battery test fails.
7	Internal communication failure	DSP and MCU stop communication in UPS module.
8	External parallel communication failure	Communication error between UPS modules.
9	Output overload warning/shutdown	Connected load is over rated output of the UPS.
10	UPS module fault shutdown	The module fails and the UPS shuts down.
11	UPS module warning	The module has errors, but the UPS can still function normally.
12	EPO Active	Urgently power off the UPS.
13	Maintain Bypass	The UPS transfers to Maintain bypass mode.
14	Module over temperature warning/shutdown	The temperature is too high.
15	Battery replacement	Overdue for battery replacement (Compared with system setup.)
16	Bypass static switch fault	The bypass “static transfer switch” is abnormal.
17	Line AC fail	Power failure
18	Redundancy failure	Redundancy setting error.

Step 5: “Default setting” button: It’s to reset all configurations back to default value.

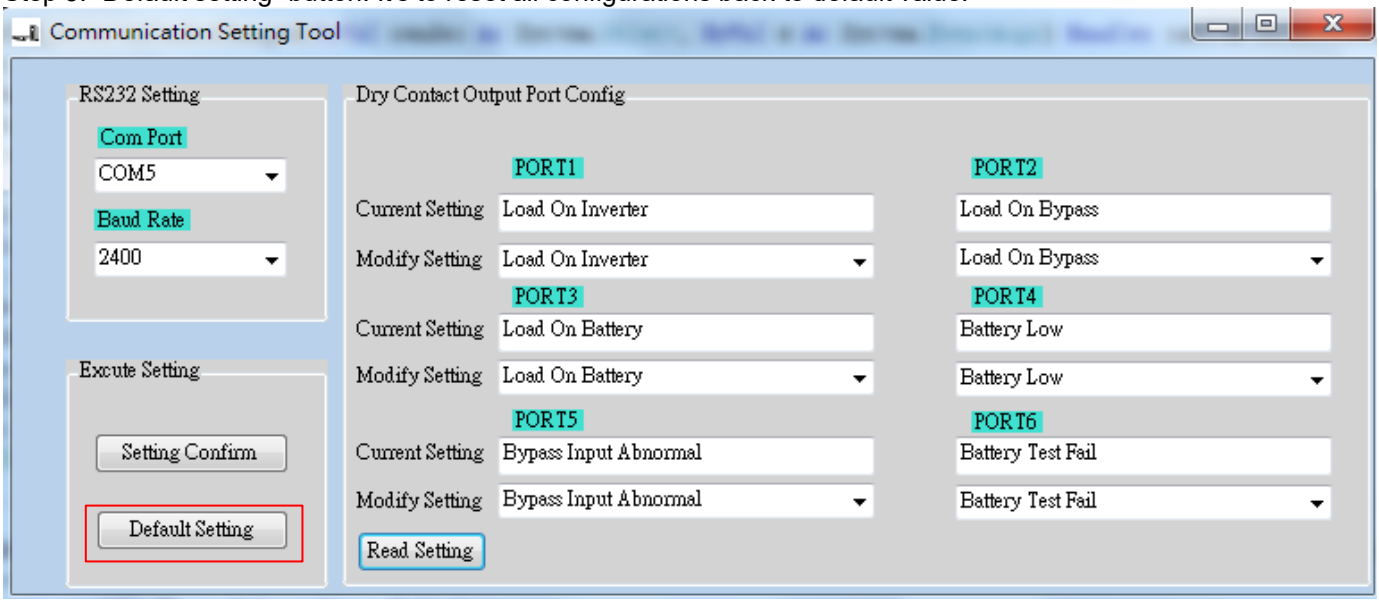


Figure 4-62 Communication Setting Tool – Default Setting

4.7.5 Input Dry Contact Port

There are two sets of input dry contact to receive external signals for UPS to take response.

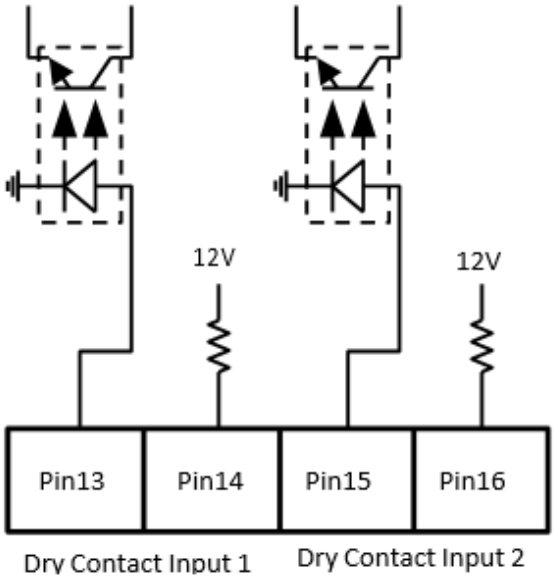


Figure 4-63 Dry Contact Input Ports

4.7.6 (Optional) External Maintenance Bypass Signal Port (EMBS)

On the back panel of controller module, there is an external maintenance bypass signal port. This port can be connected to external maintenance bypass switch. If not in use, please connect the terminal port as below for UPS normal operation.

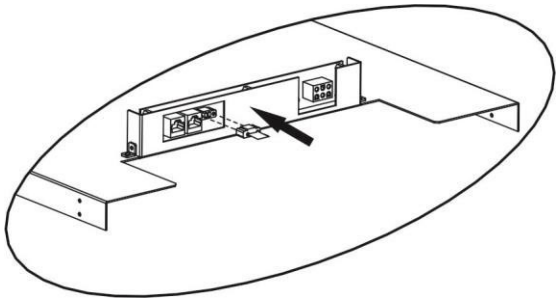


Figure 4-64 External Maintenance Bypass Signal Port

4.7.7 RemotEye® Introduction

The RemotEye is the network communication card for the Toshiba UPS. The RemotEye communication card is pre-installed as a standard with the 3000 Series UPS.

The card slides into a slot located on the front side (see illustration) of the UPS. The card provides an Ethernet/RS-485 communication interface for the UPS. When installed, the UPS can be managed remotely using common protocols such as Modbus, SNMP, BACnet, and HTTP/s.

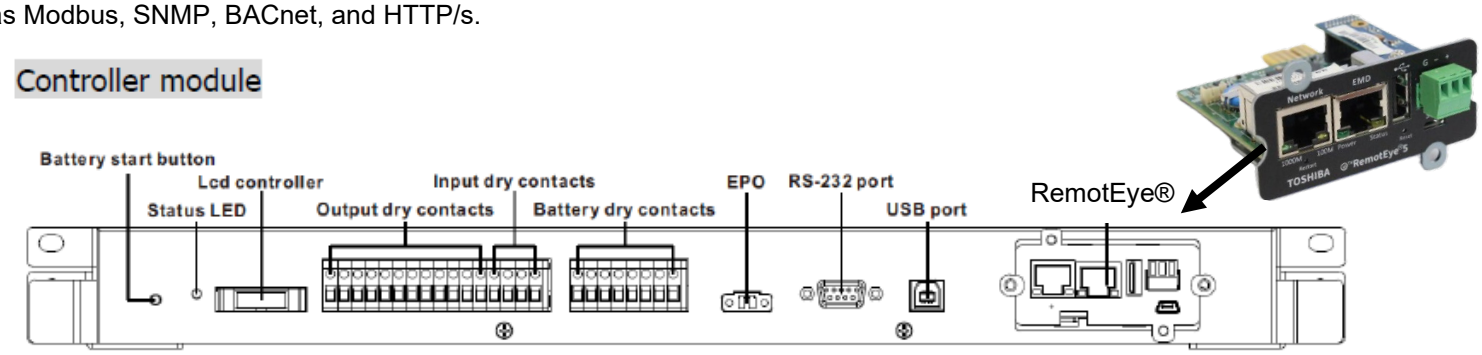


Figure 4-65 Controller Module - RemotEye® Slot

To replace the RemotEye card, follow the steps below:

1) Remove the screws by holding the card in the slot.
2) Slide the RemotEye card out and replace it with another RemotEye card.
3) Secure the card with the supplied screws.
4) See the RemotEye User Manual, RMTI-5 (RemotEye 5), to complete the hardware setup and software setting for the proper RemotEye operation.

See the RemotEye User Manual for additional information regarding RemotEye® hardware and software operation.

5 INSTALLATION AND OPERATION

5.1 Inspection

Inspect for shipping damage upon receipt of the UPS. Use caution when removing the unit from the pallet. Refer to labels or documentation attached to packing material.

5.2 Storage

During periods of non-use, the following guidelines are recommended for storage.

Storage Preparation

- Power up the UPS and allow it to operate with no load for 24 hours to fully charge the batteries.
- Stop the unit. (see 5.10 **Operating Procedures**)

Storing Conditions

  - For best results, store the UPS in the original shipping container and place on a wood or metal pallet.
  - Storage temperature: -4 – 104 °F (-20 – 40 °C).
  - The optimum storage temperature is 70 °F (21 °C). A higher ambient temperature will require recharging more frequently during storage.

Avoid storage locations that:

- Are subject to extreme temperature changes or high humidity.
- Are subject to high levels of dust or metal particles.
- Are subject to excessive vibration.
- Have inclined floor surfaces.

Storage Maintenance

- If stored at an ambient temperature less than 68 °F (20 °C), recharge the batteries every 9 months.
- If stored at an ambient temperature of 68 – 86 °F (20 – 30 °C), recharge the batteries every 6 months.
- If stored at an ambient temperature of 86 – 104 °F (30 – 40 °C), recharge the batteries every 3 months.

5.3 Disposal

Contact your local or state environmental agency for details on disposal of electrical components and packaging in your particular area.

It is illegal to dump lead-acid batteries in landfills or dispose of them improperly.

Please help our Earth by contacting the environmental protection agencies in your area, the battery manufacturer, or call Toshiba toll-free at (877) 867-8773 for more information about recycling

5.4 Unpacking

Check the unit for loose, broken, bent or otherwise damaged parts. If damage has occurred during shipping, keep all original crating and packing materials for return to the shipping agent. The warranty does not apply to damage incurred during shipping. Ensure that the rated capacity and the model number specified on the nameplate conform to the order specifications.

1. Use a forklift to move the product to the installed area. Refer to Figure 5-1 Forklift Operation. Please make sure the bearing capacity of the forklift is sufficient.

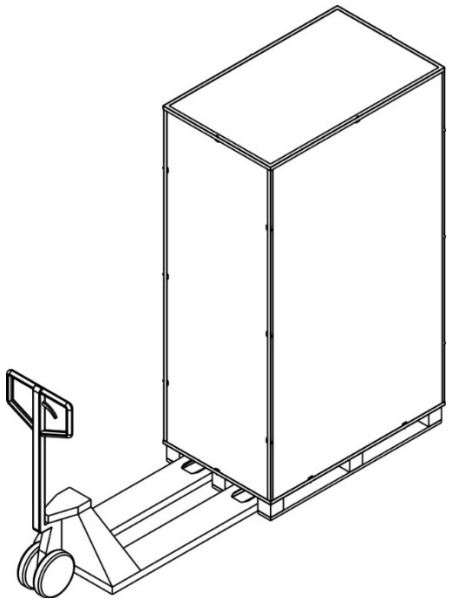


Figure 5-1 Forklift Operation

2. Please follow the order in **Figure 5-2** to open the wooden box.

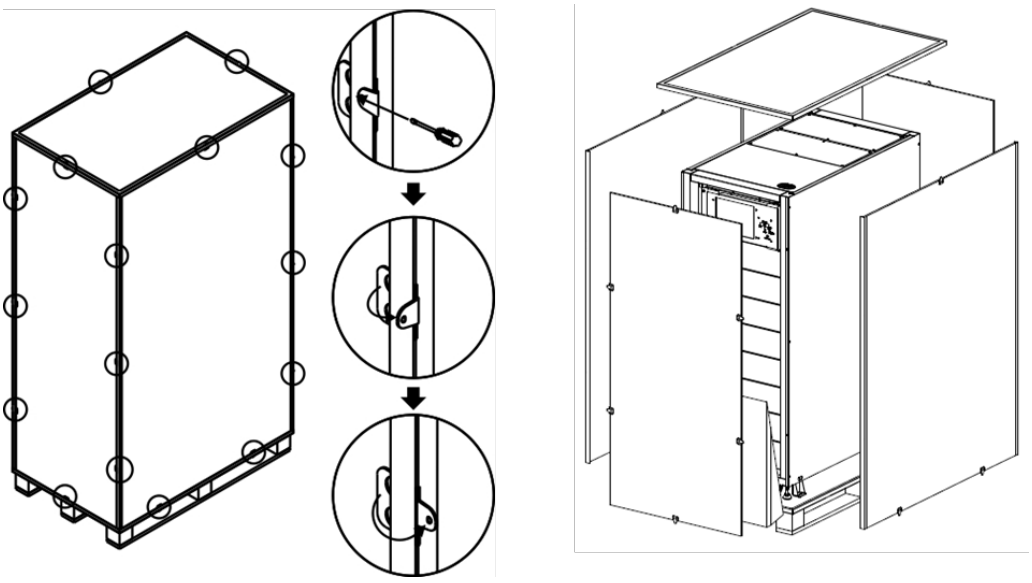


Figure 5-2 Unpacking Carton Instructions

3. Put a ramp in the front of the cabinet and insert small wood into the groove. Then, remove two side panels. Refer to **Figure 5-3**.

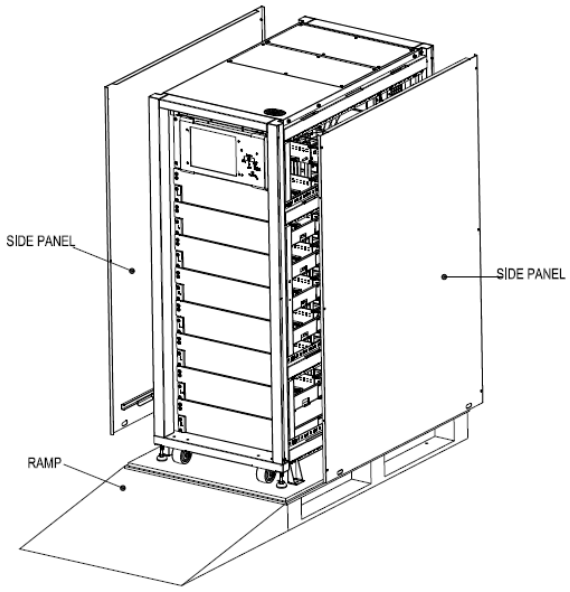


Figure 5-3 Remove Wooden Crate Panels

4. Remove 4 fixing cabinet plates and loosen leveling feet by rotating them counterclockwise. Then, move the cabinet from the pallet. Refer to **Figure 5-4**.

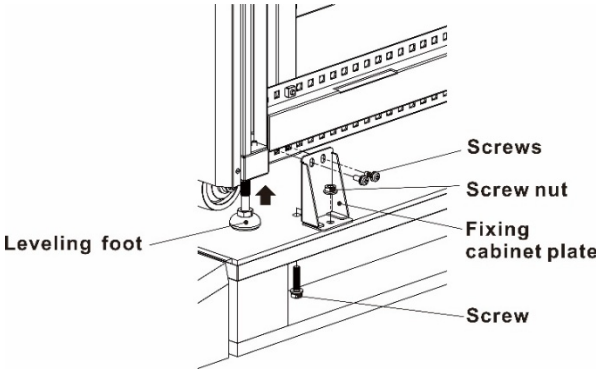


Figure 5-4 Remove Cabinet Plates

5. To fix the cabinet in position, simply rotate leveling feet clockwise

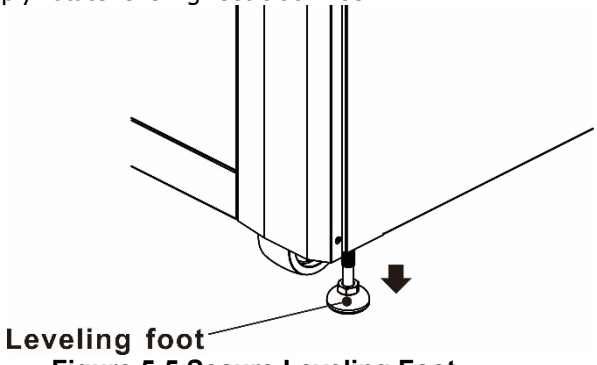


Figure 5-5 Secure Leveling Foot

5.5 Moving the cabinet

PROHIBIT
INTERDICTION

Do not transport UPS cabinet laid horizontally.
Cabinets must be maintained upright within ± 10° of the vertical during handling.

Ne transportez pas l'armoire UPS en position horizontale.
Les armoires doivent être maintenues en position verticale avec une inclinaison maximale de ± 10° lors de la manutention.

WARNING

The UPS is fixed on the pallet with 4 fixing cabinet plates. When removing it, pay attention to the movement of the casters to avoid accidents.
The cabinet can be pushed forward or backward only. Pushing it sideward is not allowed. When pushing the cabinet, pay attention not to overturn it as the gravity center is high.

AVERTISSEMENT

L'UPS est fixé sur la palette avec 4 plaques de fixation du cabinet. Lors de son retrait, faites attention au mouvement des roulettes pour éviter les accidents. Le cabinet peut être poussé uniquement vers l'avant ou l'arrière. Le pousser latéralement n'est pas autorisé. Lors du déplacement du cabinet, faites attention à ne pas le renverser car le centre de gravité est élevé.

1. If you need to move the UPS over a long distance, please use appropriate equipment, such as a forklift. Do not use the UPS casters for long-distance movement.
2. Once the UPS has been removed from the pallet and placed on the ground, we recommend that at least three people move it to the installation area. One person should hold one lateral side of the UPS, another person should hold the opposite lateral side, while the third person pushes the UPS from either the front or back to avoid tipping it.
3. The casters are designed for use on level surfaces only. Do not attempt to move the UPS over uneven ground, as this may damage the casters. Additionally, tipping the UPS could cause significant damage to the unit.
4. Ensure that the weight of the UPS is within the designated bearing capacity of any handling equipment being used.
5. At the bottom of the UPS, there are four casters that assist in moving it to a designated area. Before moving the UPS, please turn the four leveling feet counterclockwise to raise them off the ground. This will protect the leveling feet from damage during the move. Refer to **Figure 5-6** for further guidance.

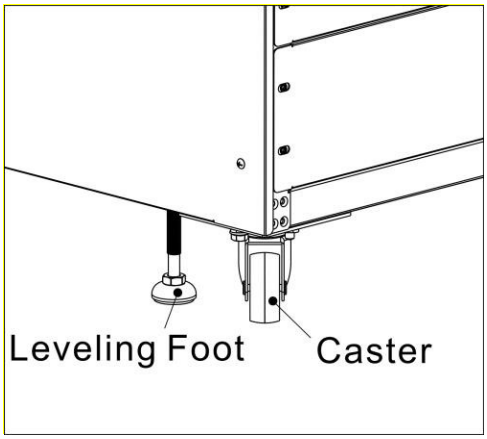


Figure 5-6 Leveling Foot and Caster

5.6 Installation Procedure

A) Note the load tolerance of the floor

Refer to **Table 5-1** for a list of UPS weights.

Table 5-1 List of UPS Weights

UPS Capacity (kVA)	6kVA	12kVA	18kVA	24kVA
Weight lb. (kg)	503lbs. (228kg)	677lbs. (307kg)	851lbs. (385kg)	1025lbs. (465kg)

B) Minimum clearance required for ventilation.

Right side ..... 0 inch (0 mm)

Left side ..... 0 inch (0 mm)

Back side ..... 20 inches (500 mm) (for airflow)

Top side ..... 40 inches (1000 mm) (for airflow)

C) Space requirement for routine maintenance

Allow for the following space at the time of installation.

Front ..... 40 inches (1000 mm)

Sides ..... 0.0 inch (0 mm)

Back side ..... 0.0 inch (0 mm)

Top side ..... 20 inches (500 mm)

5.7 Procedure for cable connection

⚠ WARNING

Follow all local wiring regulations. Follow environmental conditions and refer to IEC60950-1.
Before wiring, make sure the AC input and battery modules are not connected.
Make sure the breakers, including the AC input breaker and AC output breaker, are all in the OFF position.

⚠ AVERTISSEMENT

Suivez toutes les réglementations locales en matière de câblage. Respectez les conditions environnementales et consultez la norme IEC60950-1.
ATTENTION : Avant de procéder au câblage, assurez-vous que l'entrée AC et les modules de batterie ne sont pas connectés. Assurez -vous que tous les disjoncteurs, y compris le disjoncteur d'entrée AC et le disjoncteur de sortie AC, sont en position OFF.

1. Confirm the UPS's capacity being installed. Identify the input/output power terminal block, accordingly, as shown in **Figure 5-7**.
2. Remove all panel covers, and you will see the wiring terminal block. For UPS module wiring, please check the chart and table below.

Table 5-2 AC and DC Terminal Description

	Item	Function	Description
AC Terminal	Output Block (O/P-L1, O/P-L3, O/P-N)	Connects the critical loads	Includes L1, L3, and Neutral terminals.
	AC Input Block (R, T, N)	Connects main AC source	Includes R, T, and Neutral Terminals.
	For UPS Grounding (G)	For UPS grounding	Includes one grounding terminal-G.
DC Terminal	DC Terminal Block (BAT+, BAT-N, BAT-)	Connects an external battery pack	Includes Positive (+), Negative (-), and Neutral (N) terminals.

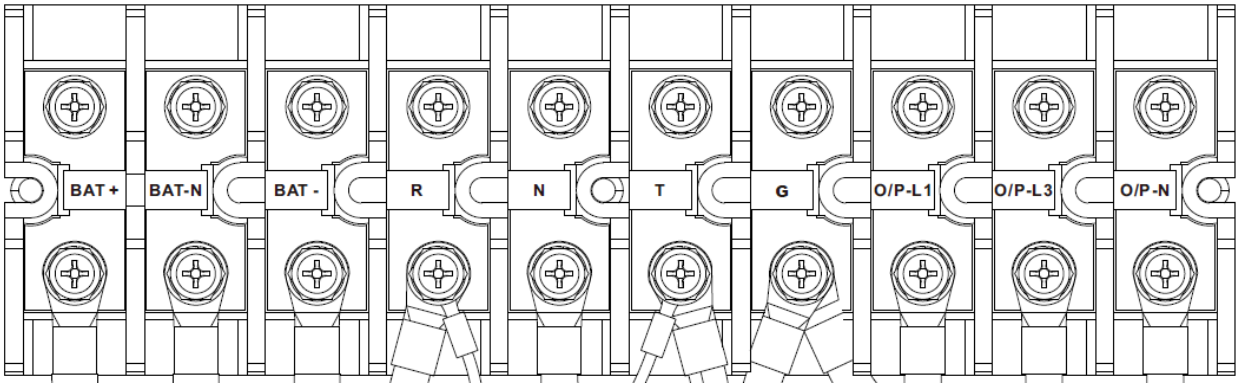


Figure 5-7 AC and DC Terminal Block

1. This UPS is for **Single input** applications. Connect AC input to the AC power source. Please refer to the Installation Drawing for UPS wiring.
2. The sequence of two phases (R phase and T phase) can be connected freely. The wrong sequence will not alarm the 2-phase UPS system when it is powered.
3. The N wire must be connected firmly. A warning message will be indicated if the N wire is not connected well. The UPS will show a warning message as “Warning! Bypass Input N Error”. Then, the UPS will transfer to battery mode if the battery pack is connected or transfer to standby mode and no output if no battery pack is connected.
4. Connect the grounding cable to G on the terminal block.

REQUIRED

5.8 Cable Sizing

Table 5-3 AC Input/AC Output fixation torque force

UPS Capacity	6KVA	12KVA	18KVA	24KVA
Fixation torque force (lb-in)	20	20	20	20

AC input and AC output overcurrent protection and disconnect devices shall be supplied and installed by others.

Table 5-4 AC Input Cable Sizing

Primary AC Input (240/120V or 208/120V 2-Phase / 3-Wire)							
Maximum Input Power Demand Normal Mode (Recharge Mode)			Suggested External Overcurrent protection	Suggested Minimum Feeder Wire Size (COPPER) Per Phase / Neutral			Max Terminal Wire Size
kVA	PF	Amps	Amps	AWG or kcmil at 75° C Temp. Rating	AWG or kcmil at 90° C Temp. Rating	AWG or kcmil at 105° C Temp. Rating	AWG
6	≥0.99	28 (32)	45	(1) x 8 AWG / (1) x 8 AWG	(1) x 8 AWG / (1) x 8 AWG	(1) x 10 AWG / (1) x 10 AWG	2/0 AWG
12	≥0.99	55 (62)	80	(1) x 4 AWG / (1) x 4 AWG	(1) x 4 AWG / (1) x 4 AWG	(1) x 8 AWG / (1) x 8 AWG	
18	≥0.99	83 (96)	125	(1) x 1 AWG / (1) x 1 AWG	(1) x 2 AWG / (1) x 2 AWG	(1) x 4 AWG / (1) x 4 AWG	
24	≥0.99	110 (128)	175	(1) x 2/0 AWG / (1) x 2/0 AWG	(1) x 2/0 AWG / (1) x 2/0 AWG	(1) x 2 AWG / (1) x 2 AWG	

Table 5-5 AC Output

Primary AC Output (240/120V or 208/120V 2-Phase / 3-Wire)							
Rated Output Power			Suggested External Overcurrent protection	Suggested Minimum Feeder Wire Size (COPPER) Per Phase / Neutral			Max Terminal Wire Size
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	AWG or kcmil at 90º C Temp. Rating	AWG or kcmil at 105ºC Temp. Rating	AWG
6	1.0	25	40	(1) x 8 AWG / (1) x 8 AWG	(1) x 10 AWG / (1) x 10 AWG	(1) x 12 AWG / (1) x 12 AWG	2/0 AWG
12	1.0	50	70	(1) x 4 AWG / (1) x 4 AWG	(1) x 6 AWG / (1) x 6 AWG	(1) x 8 AWG / (1) x 8 AWG	
18	1.0	75	100	(1) x 3 AWG / (1) x 3 AWG	(1) x 3 AWG / (1) x 3 AWG	(1) x 4 AWG / (1) x 4 AWG	
24	1.0	100	125	(1) x 1 AWG / (1) x 1 AWG	(1) x 2AWG / (1) x 2 AWG	(1) x 4 AWG / (1) x 4 AWG	

Note: The Installer must consider the max. current and wiring gauge when considering scaling up the UPS in the future.

NOTICE

The standard battery module contains 20 pcs of 12V 7.5Ah battery (10 pcs Pos+/10pcs Neg-).

At minimum, the number of installed battery modules shall be the same quantity as the installed power modules. When adding or updating battery modules confirm all battery types and ratings are the same.

AVIS

Le module de batterie standard contient 20 batteries de 12 V 7.5Ah (10 unités Pos+/10 unités Neg-).
Au minimum, le nombre de modules de batterie installés doit être égal au nombre de modules de puissance installés.

Lors de l'ajout ou de la mise à jour des modules de batterie, confirmez que tous les types et valeurs de batterie sont identiques.

5.9 UPS Module / Battery Installation

⚠ CAUTION

Risk of tipping. Avoid pulling out all power and battery modules simultaneously or halfway, as this may cause the UPS cabinet to become unstable and tip over.

- Each power module weighs **17.6 kg (39 lbs)**.
- Each battery module weighs **61 kg (135 lbs)**.

It is recommended to install the battery modules and power modules from the bottom up and remove them from the top down to lower the center of gravity and avoid the risk of tipping.

⚠ ATTENTION

Risque de basculement. Évitez de retirer simultanément ou à mi-course tous les modules de puissance et de batterie, car cela pourrait rendre l'armoire UPS instable et la faire basculer.

- Chaque module de puissance pèse 17,6 kg (39 lbs).
- Chaque module de batterie pèse 61 kg (135 lbs).

Il est recommandé d'installer les modules de batterie et les modules de puissance du bas vers le haut et de les retirer de haut en bas pour abaisser le centre de gravité et éviter le risque de basculement.

5.9.1 Insert the UPS Module

1) Insert the UPS module into an unoccupied slot.

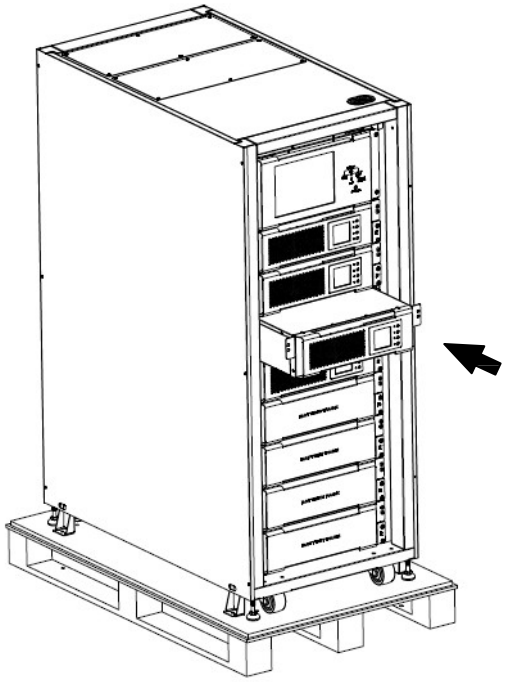


Figure 5-8 Insert Power Module

Secure the UPS module to the cabinet by fixing the screws at the front of the module.

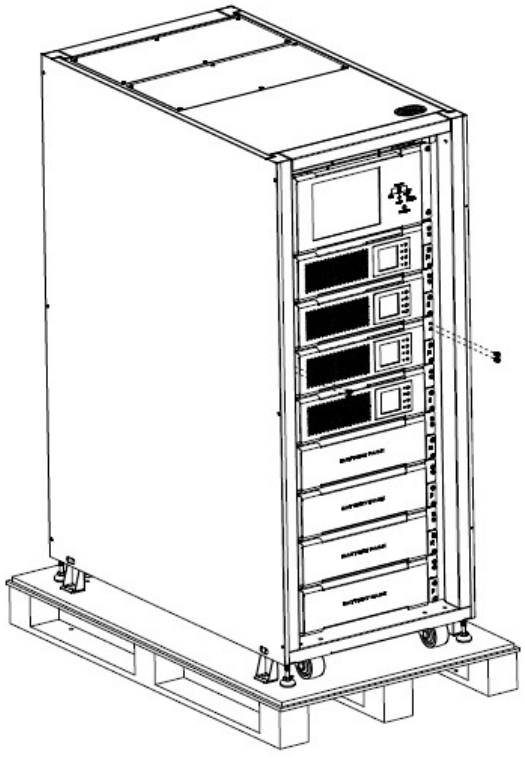


Figure 5-9 Secure Power Module

5.9.2 Removing the UPS Module

⚠ WARNING

- Before removing any UPS module, make sure the remaining UPS modules can support the critical loads.
- At least one UPS module MUST stay in the UPS cabinet in case the UPS system is operating in Maintenance Bypass Mode.

⚠ AVERTISSEMENT

- Avant de retirer un module UPS, assurez-vous que les modules UPS restants peuvent supporter les charges critiques.
- Au moins un module UPS DOIT rester dans l'armoire UPS si le système UPS fonctionne en mode Bypass de maintenance.

1) Use a screwdriver to remove the four screws screw from the mounting bracket.
2) Pull the UPS module out from its slot.

5.9.3 Battery Module Installation

⚠ CAUTION

- LIFTING HAZARD. Battery pack weighs 135lbs. (61kg). Mishandling or improper lifting may result in serious personal injury.
- Dropping or uncontrolled handling of the battery pack may result in personal injury or damage to the UPS or battery pack. Use a two person lift or mechanical lifting device to handle each battery pack. Maintain horizontal orientation of the battery pack with setting it down.

⚠ ATTENTION

- RISQUE DE SOULEVEMENT. Le pack de batteries pèse 61 kg (135 lbs). Une mauvaise manipulation ou un levage incorrect peut entraîner des blessures graves.
- Laisser tomber ou manipuler le pack de batteries de manière incontrôlée peut entraîner des blessures personnelles ou des dommages à l'onduleur ou au pack de batteries. Utilisez une levée à deux personnes ou un dispositif de levage mécanique pour manipuler chaque pack de batteries. Maintenez l'orientation horizontale du pack de batteries lors de sa pose.

WARNING
 **WARNING:** Electrical Shock Hazard. The back of the battery module remains live even when the system is powered off. Avoid touching any exposed connections to prevent the risk of severe electric shock. Only qualified personnel should perform the installation.
AVERTISSEMENT
 **AVERTISSEMENT** : Risque de choc électrique. L'arrière du module de batterie reste sous tension même lorsque le système est éteint. Évitez de toucher les connexions exposées pour prévenir le risque de choc électrique sévère. Seul le personnel qualifié doit effectuer l'installation.

1. When adding or updating battery modules confirm all battery types and ratings are the same.
2. Insert the Battery Pack into an unoccupied slot by two people using the provided lifting straps or mechanical lifting device.
3. Secure the Battery Pack into the cabinet by fixing the screws at the front panel of the Battery Pack.

5.10 Operating Procedures

⚠ WARNING
• Do not start the UPS until the installation is completed. • Make sure the wiring is correct, and the power cables are fixed firmly. • Make sure input and output breakers are switch **OFF**.
⚠ AVERTISSEMENT
• Ne pas démarrez l'UPS tant que l'installation n'est pas terminée. • Assurez-vous que le câblage est correct et que les câbles d'alimentation sont fermement connectés. • Assurez-vous que les disjoncteurs d'entrée et de sortie sont en position OFF.

5.10.1 AC Startup

Ensure to follow this procedure when turning on the UPS from a fully powered-down condition.

The operating procedures are as follows:

Step 1: Refer to **Section 5.8 and 5.9** to connect the power cables and install the UPS modules and the battery packs required for the UPS system.

Step 2: Switch ON the AC input breaker to power the UPS.

Step 3: The UPS will enter into Standby Mode if the setting of Bypass mode is disabled.

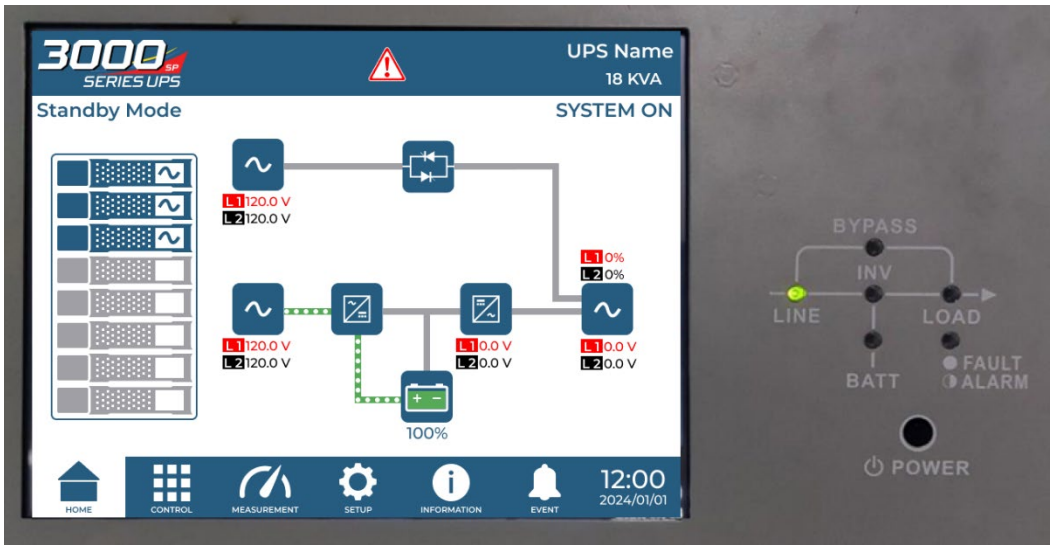


Figure 5-10 AC Startup – Standby Mode

Or the UPS will enter into Bypass Mode, if the setting of Bypass mode is enabled.

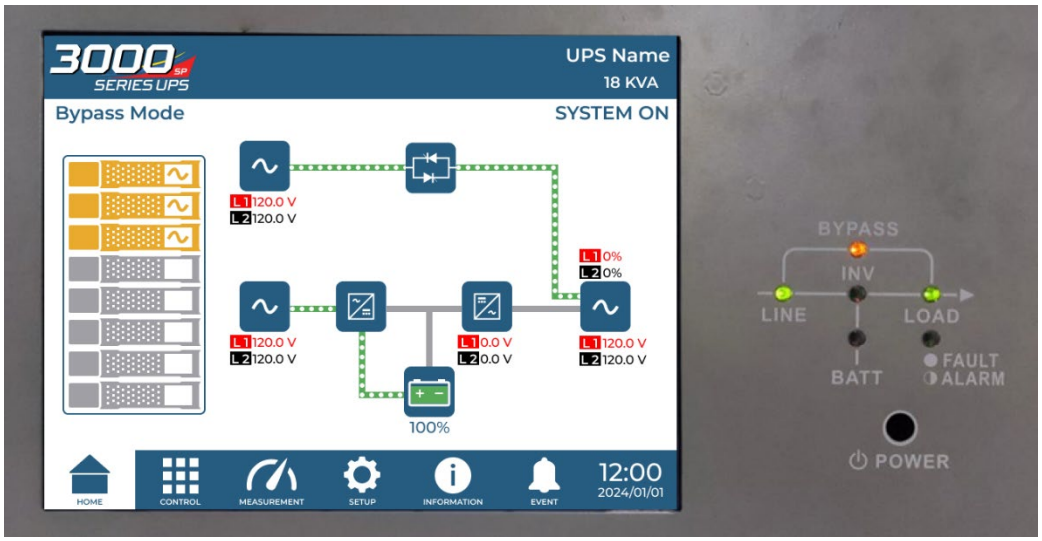


Figure 5-11 AC Startup – Bypass Mode

Step 4: Make sure there is no warning or fault event happening. If any warning or fault occurs, please refer to Section 6 Troubleshooting to solve it.

Step 5: Press Power ON/OFF button for two seconds to enter into Line Mode as shown below.

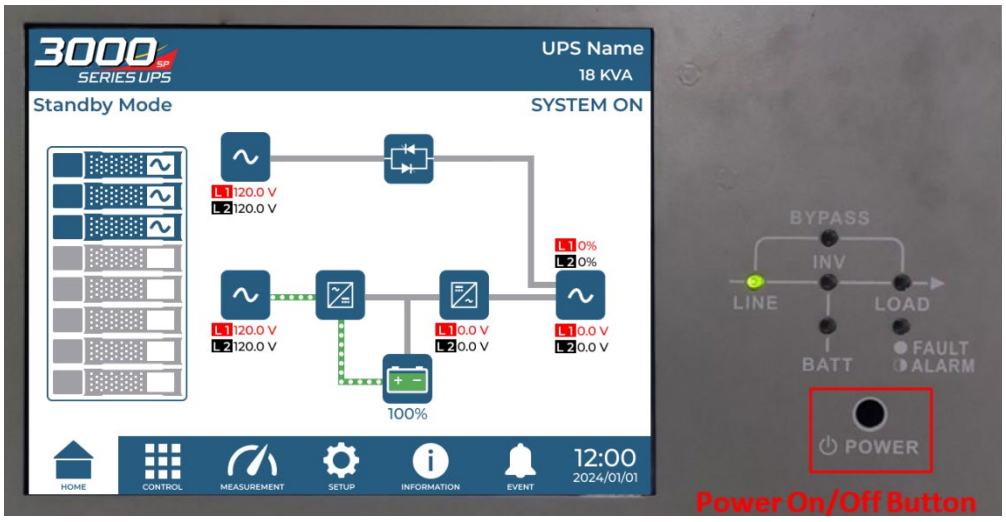


Figure 5-12 AC Startup – Power On

After turning it on, UPS will do a self-test and start up inverter. UPS will be transferred to Line mode when all UPS modules are ready.

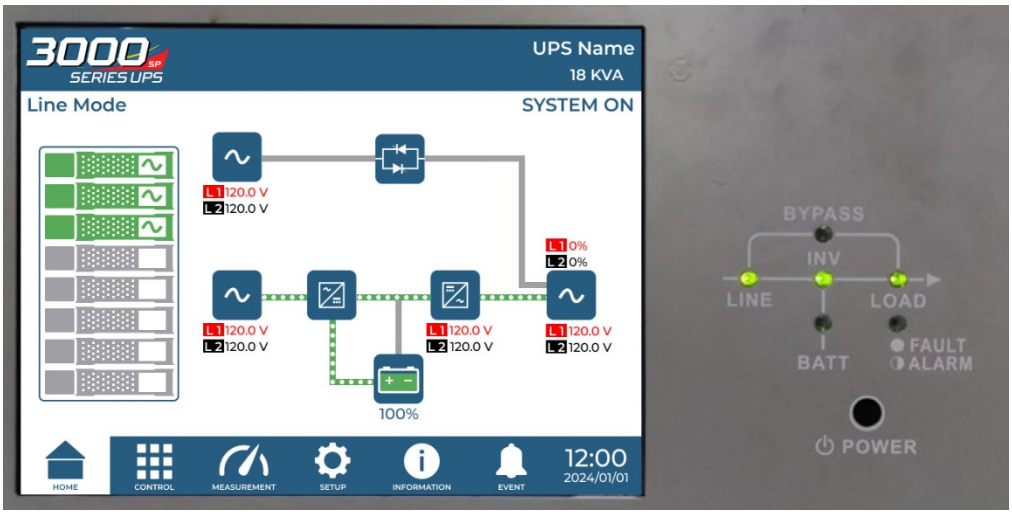


Figure 5-13 AC Startup - On-Line Mode

Step 6: Switch ON the output breaker. AC startup procedure is complete.

5.10.2 Cold Start Startup

Step 1: Insert battery pack to the cabinet.

Step 2: Press the “Battery Start” button on each UPS module to start up the control power of all UPS modules as shown below.

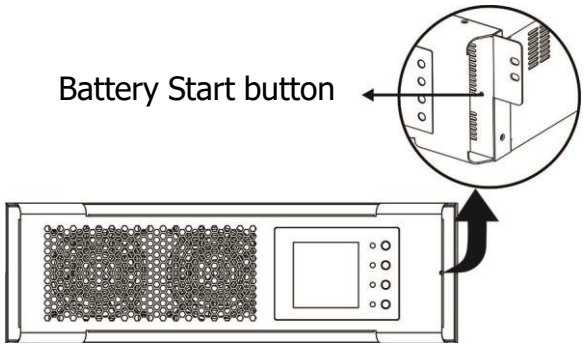


Figure 5-14 Cold Start - Battery Start Button

Step 3: Press the “Battery Start” button on controller module to start up the power as shown below.

Battery start button

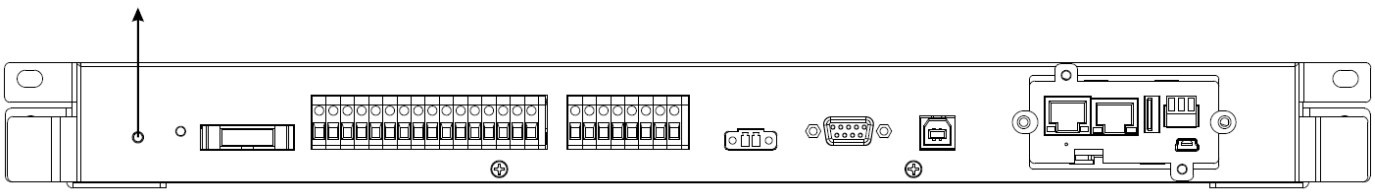


Figure 5-15 Cold Start - Controller Start Button

Step 4: After pressing the “Battery Start” button, UPS will enter into Standby mode. Refer to the diagram below for LCD display.

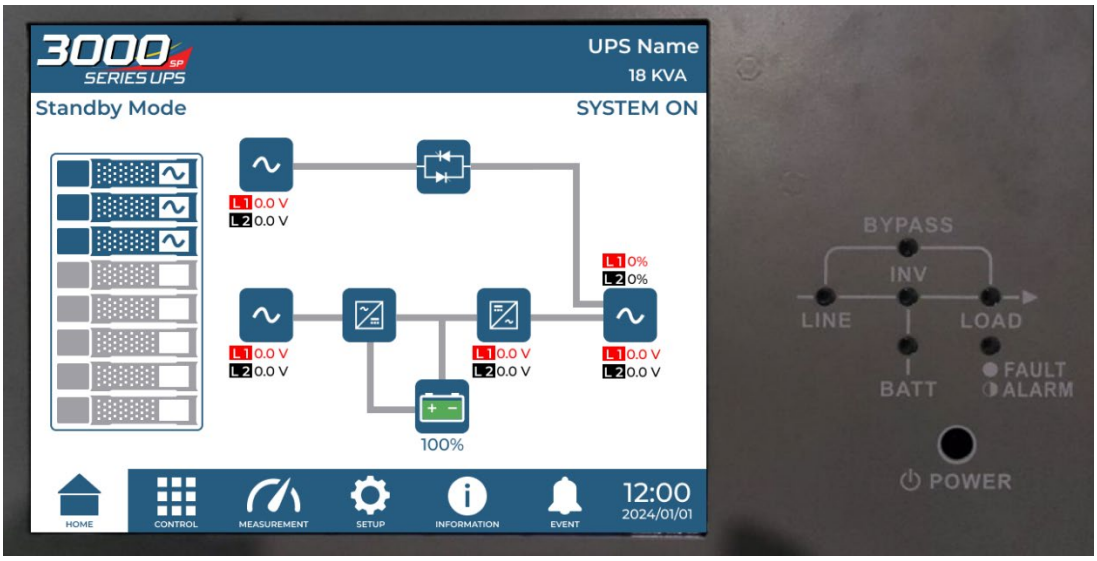


Figure 5-16 Cold Start – Standby Mode

Step 5: Before UPS enters into shutdown mode, please press “Power On/Off” button for 2 seconds immediately as shown in the diagram below.

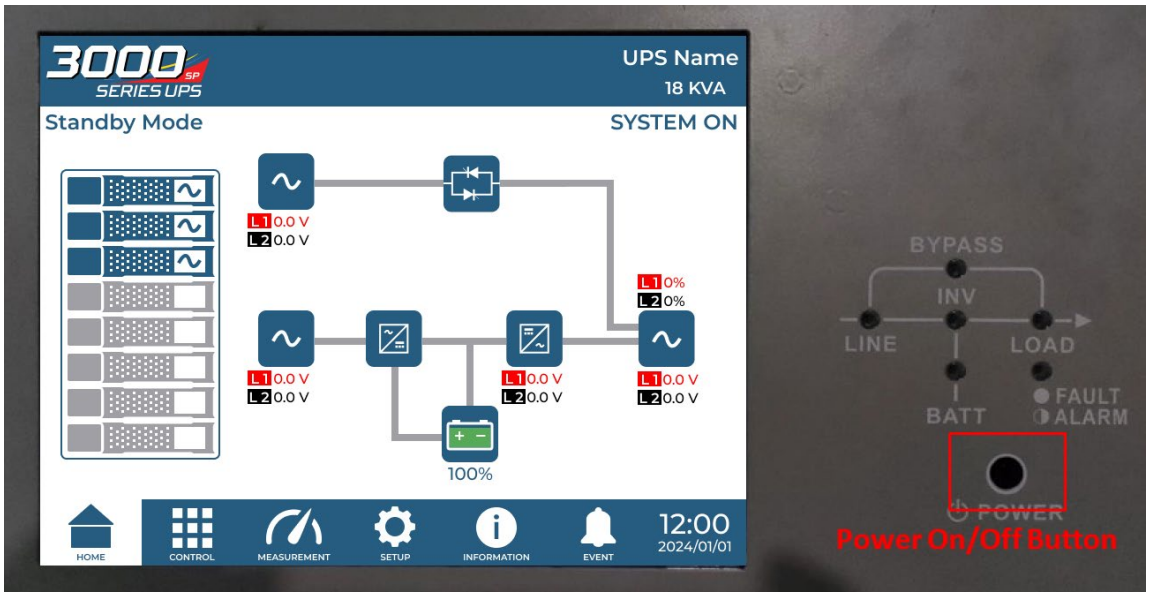


Figure 5-17 Cold Start – Power On

Step 6: Then, UPS will enter Battery Mode as shown in the diagram below.

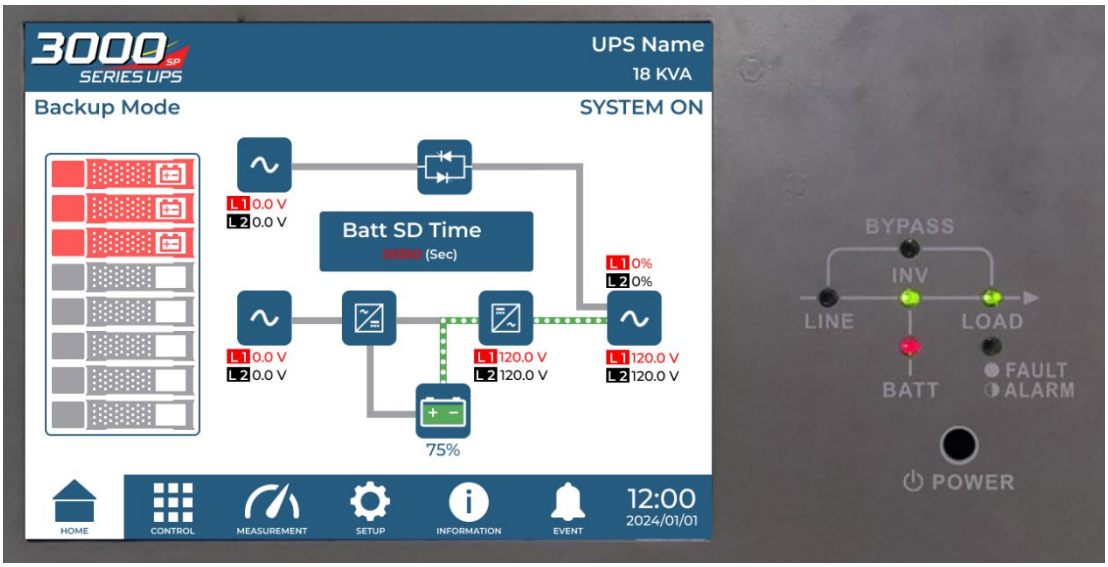


Figure 5-18 Cold Start – Battery Backup

Step 6: Switch ON the output breaker. The cold start startup procedure is complete.

5.10.3 Turn off Operation

5.10.3.1 Bypass Mode / Standby Mode Turn Off Operation

The UPS operates in the Standby Mode or Bypass Mode depending on the “Bypass Mode” Setting.
The LCD diagrams are shown below.

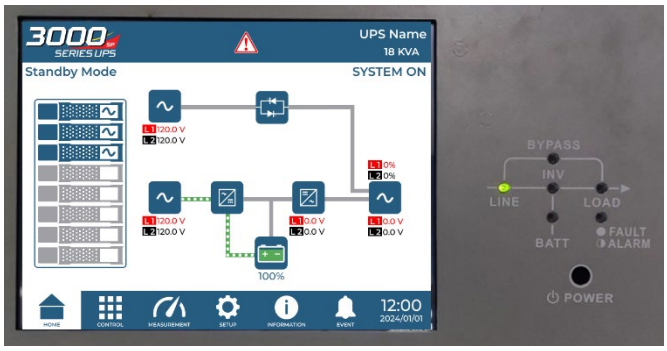


Figure 5-19: Bypass Mode Setting Disabled

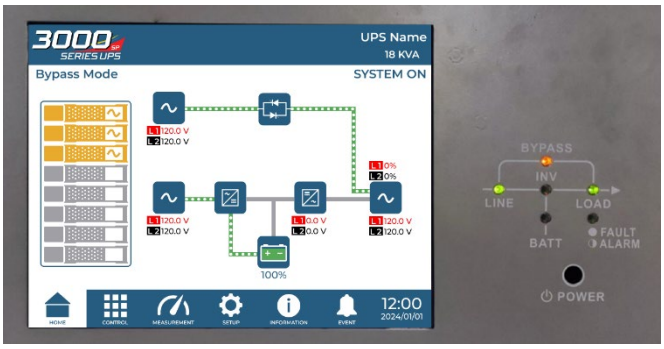
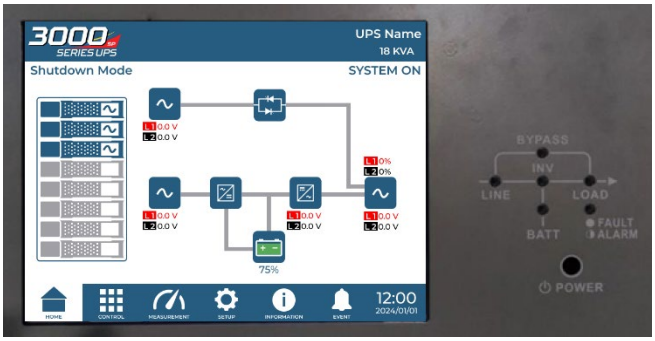
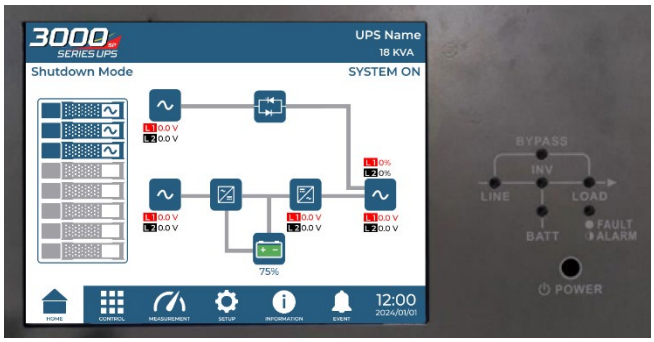
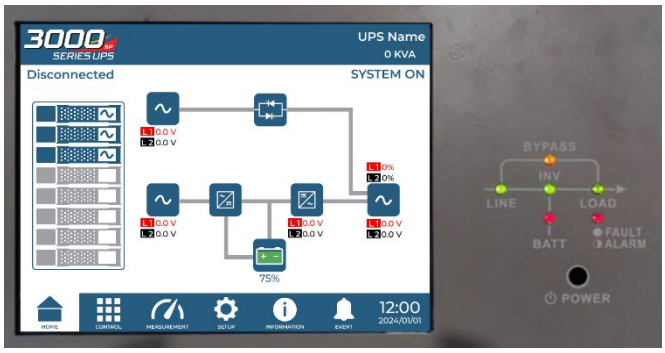
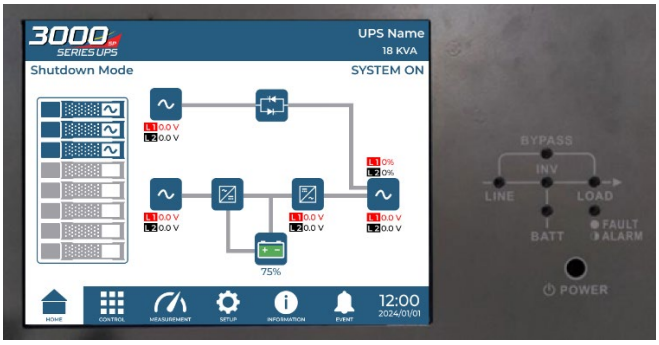
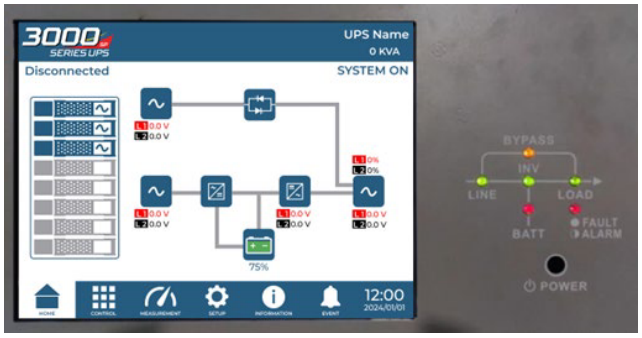


Figure 5-20 Bypass Mode Setting Enabled

Step 1: Switch OFF the AC input breaker. The LCD diagrams are shown below.

Bypass Mode Setting is Disabled	Bypass Mode Setting is Enabled
	
UPS enters Shutdown Mode	**UPS enters Standby Mode**
	
It is normal to show “Disconnected” screen when UPS modules have shut off their control power.	

Step 2: Switch OFF the AC input breaker to disconnect the AC power to the UPS. Wait until the LCD is OFF.

WARNING
WARNING: Electrical Shock Hazard. The back of the battery module remains live even when the system is powered off. Avoid touching any exposed connections to prevent the risk of severe electric shock. Only qualified personnel should perform the installation.
AVERTISSEMENT
ATTENTION : Risque de choc électrique. L'arrière du module de batterie reste sous tension même lorsque le système est éteint. Évitez de toucher les connexions exposées pour prévenir le risque de choc électrique sévère. Seul le personnel qualifié doit effectuer l'installation.

5.10.3.2 Line Mode Turn Off Operation

The LCD diagrams are shown below when the UPS operates in the Line Mode.

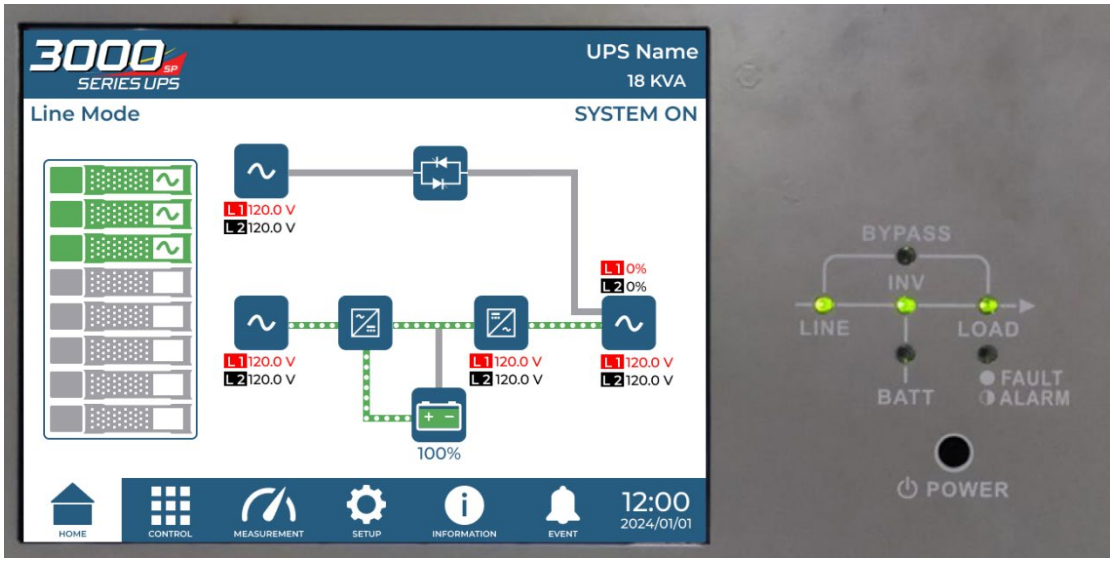


Figure 5-21 Turn Off Operation from On-Line

Press “Power On/Off” button for 2 seconds to turn off the UPS. Or use the Control-System Turn Off to turn off the UPS.

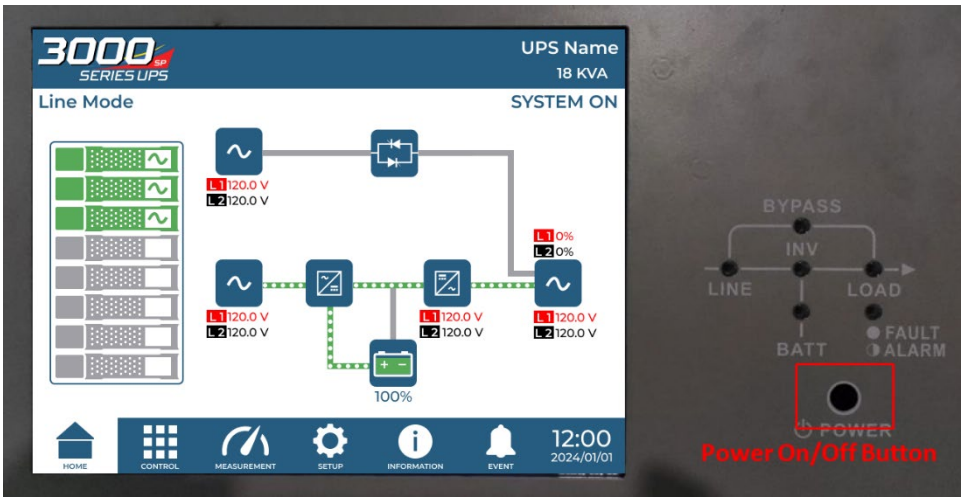


Figure 5-22 Turn Off Operation from On-Line– Power Off Button

After turning off, the UPS will transfer to Standby Mode or Bypass Mode depending on the “Bypass Mode” Setting.

Next, follow the **Bypass Mode/ Standby Mode Turn Off Operation** procedure.

5.10.3.3 Battery Mode Turn Off Operation

The LCD diagram is shown below when the UPS operates in the Battery Mode.

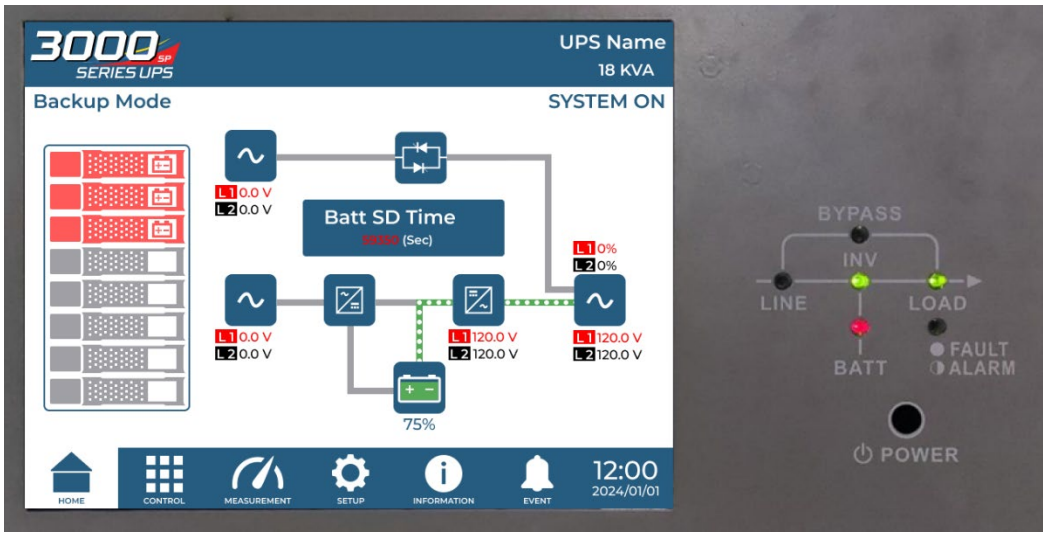


Figure 5-23 Turn Off Operation from Battery Mode

Press “Power On/Off” button for 2 seconds to turn off the UPS. Or use the Control-System Turn Off to turn off the UPS.

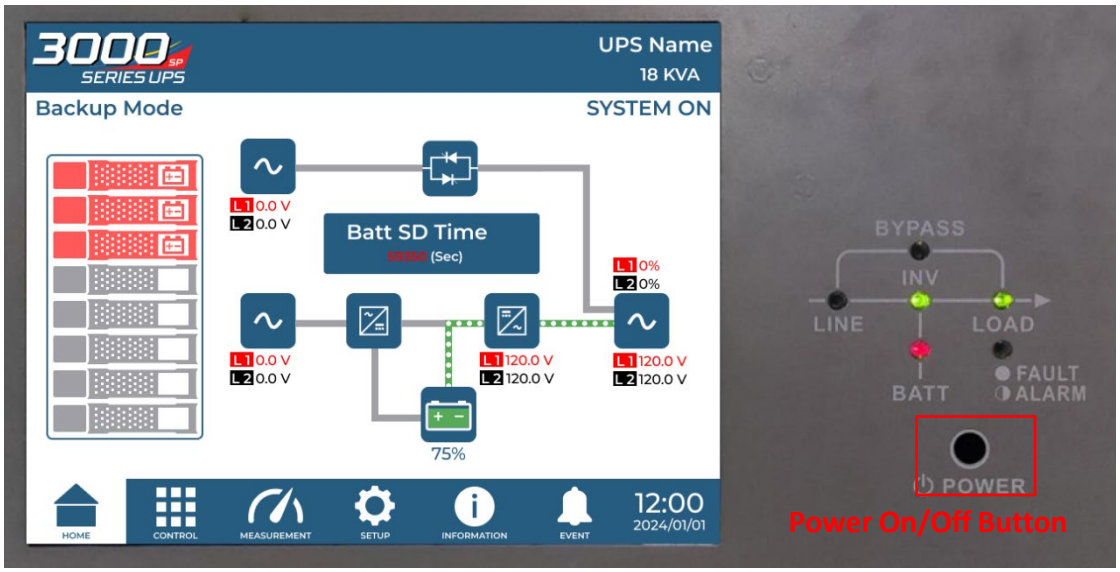
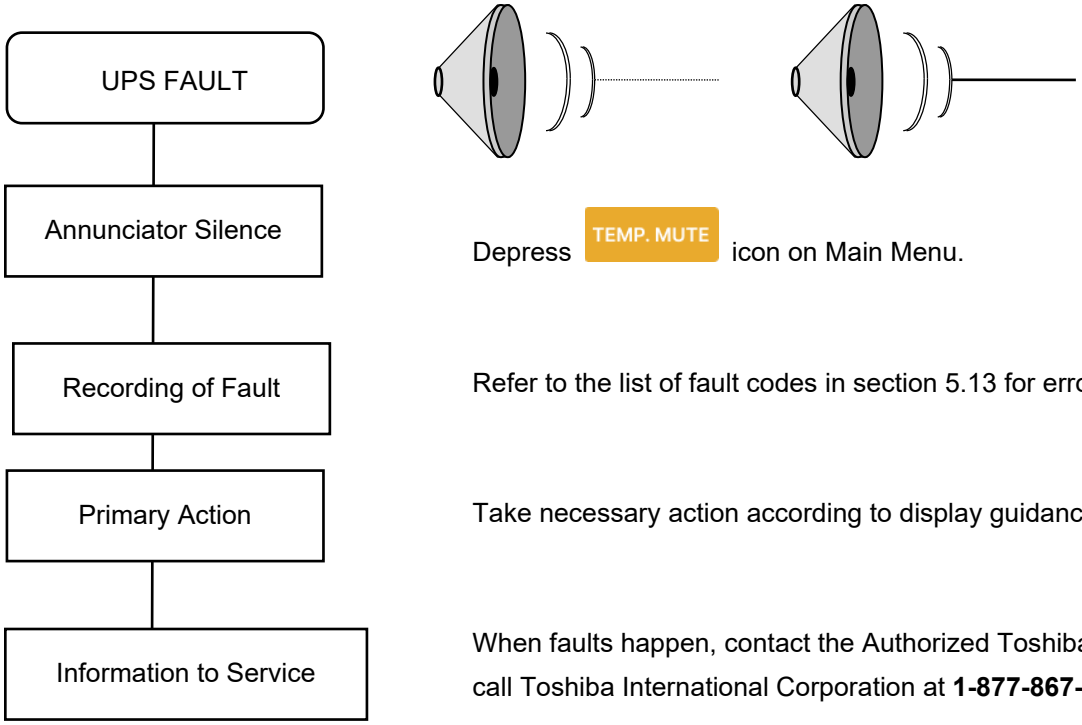


Figure 5-24 Turn Off Operation from Battery Mode – Power Off Button

After turning off, the UPS will transfer to Standby Mode.

Next, follow the **Bypass Mode/ Standby Mode Turn Off Operation** procedure.

5.11 Response to UPS Fault



NOTE

Note

The error code indicated on the LCD display panel when an UPS alarms is very important.
In order to reduce repair time, please include this information, along with the operation and load status for all correspondence to Toshiba field service group.

5.12 Preventive Maintenance/Part Replacement

Contact Toshiba International Corporation on all issues regarding the replacement of parts, preventative maintenance, or repair service on the Toshiba UPS or peripheral equipment.

5.12.1 Recommended Maintenance

The best preventive measure that the UPS user can take is to keep the area around the unit, particularly the air inlet vents clean and free of moisture and dust accumulations. If the atmosphere of the installation site is very dusty, use a vacuum cleaner every 2 to 3 months to remove dust accumulations around and from the unit.

⚠ CAUTION
Only a qualified Toshiba representative should be allowed to perform any routine maintenance or service on this equipment other than those preventive maintenance details which are described directly above this caution.
⚠ ATTENTION
Seul un représentant qualifié de Toshiba doit être autorisé à effectuer un entretien de routine ou un service sur cet équipement autre que les détails d'entretien préventif décrits directement au-dessus de cette mise en garde.

A Major PM includes maintenance of the batteries and an offline inspection of the UPS. Contact Toshiba International Corporation Service Department at 1-877-867-8773 for further details.

5.12.2 UPS Power Module Replacement

⚠ WARNING
• Confirm UPS is in Line mode or Bypass mode. • Confirm that at least one UPS module remains in the UPS cabinet after one UPS module is removed.
⚠ AVERTISSEMENT
• Confirmez que l'onduleur (UPS) est en mode ligne ou en mode bypass. • Confirmez qu'au moins un module d'onduleur reste dans l'armoire UPS après le retrait d'un module UPS.

1. The red ALARM LED on the UPS module indicates that the module's output is off and disconnected from the UPS system.
2. Use a screwdriver to remove the four screws from the mounting bracket.

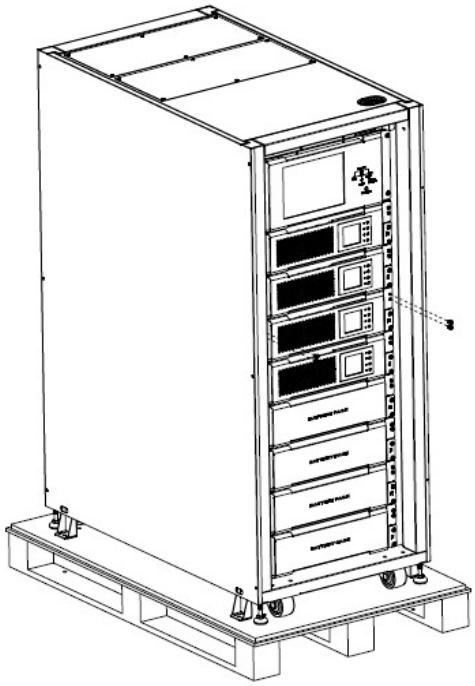


Figure 5-25 Power Module Remove from Mounting Bracket

3. Two people should work together to carefully pull the UPS module out of its slot.
4. After servicing the module, push it back into the cabinet and secure it by tightening the screws on both sides. If you need to reinstall more than one UPS module, please wait 30 seconds before installing each additional module.
5. The reinstalled UPS module will turn on automatically when the UPS is in line mode.

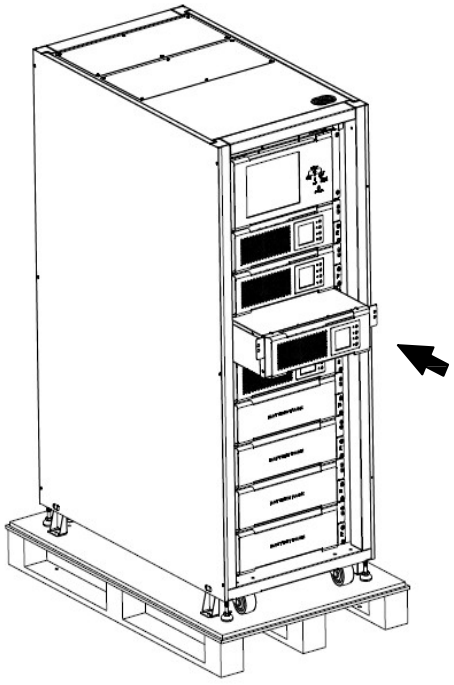


Figure 5-26 Power Module Installation

5.12.3 Battery Module Replacement

HOT SWAPPABLE: The battery module can be replaced while the UPS is in On-Line or Bypass modes without removing power from the critical loads.

⚠ CAUTION
If a power failure occurs as the battery pack is being removed/inserted or occurs during the period batteries are out of the circuit, the unit will try to go to Backup (without battery) and would thus drop the load. It would also arc/spark between the battery and chassis connections if going to Backup as the tray is pulled.
⚠ ATTENTION
En cas de panne de courant lors du retrait/insertion du pack de batteries ou pendant la période où les batteries sont hors circuit, l'UPS essaiera de passer en mode de secours (sans batterie) et entraînera ainsi la chute de la charge. Cela provoquerait également un arc/étincelle entre la batterie et les connexions du châssis si le mode de secours est activé pendant que le tiroir est retiré.

To perform a hot swap for the battery module

1. Use a screwdriver to remove the four screws from fixing holes.
2. Remove the battery module from the slot by two people using the provided lifting straps or mechanical lifting device.

⚠ CAUTION
• LIFTING HAZARD. Battery pack weighs 135lbs. (61kg). Mishandling or improper lifting may result in serious personal injury. Dropping or uncontrolled handling of the battery pack may result in personal injury or damage to the UPS or battery pack. Use a two person lift or mechanical lifting device to handle each battery pack. Maintain horizontal orientation of the battery pack by setting it down.
⚠ ATTENTION
• RISQUE DE SOULEVEMENT. Le pack de batteries pèse 61 kg (135 lbs). Une mauvaise manipulation ou un levage incorrect peut entraîner des blessures graves. Laisser tomber ou manipuler le pack de batteries de manière incontrôlée peut entraîner des blessures personnelles ou des dommages à l'UPS ou au pack de batteries. Utilisez une levée à deux personnes ou un dispositif de levage mécanique pour manipuler chaque pack de batteries. Maintenez l'orientation horizontale du pack de batteries lors de sa pose.

3. When adding or updating battery modules confirm all battery types and ratings are the same. Insert the new Battery Pack into an unoccupied slot by two people using the provided lifting straps or mechanical lifting device.
4. Use a screwdriver to fix the four screws back into the mounting bracket.

WARNING

Any parts replacements (including modification) without authorization by Toshiba may result in personal injuries, death or destruction of the UPS.
AVERTISSEMENT : Tout remplacement de pièces (y compris les modifications) sans autorisation de Toshiba peut entraîner des blessures graves, la mort ou la destruction de l'UPS.

5.13 Fault and Warning Codes

This section covers fault and warning codes, their description and required action at time of error:

A) Verify and record the occurrence of the alarm.

Note details of alarm message displayed on the LCD display panel.

Contact Toshiba International Corporation at 1-877-867-8773.

Table 5-6 Fault Codes Table

LCD Message	Explanation	Solution
Fault 01: DC Bus fail on startup	The rectifiers could not start within a specified time due to low DC-bus voltage.	Turn off UPS and then restart the UPS. If it fails again, contact service personnel.
Fault 02: DC Bus Overvoltage	DC-bus voltage exceeds the maximum voltage	Contact service personnel.
Fault 03: DC Bus Undervoltage	DC-bus voltage is lower than the minimum value.	Contact service personnel.
Fault 04: DC Bus Imbalance	DC-bus voltage is not balanced	Contact service personnel.
Fault 05: DC Bus Voltage fluctuating	DC-bus voltage changes too fast.	Contact service personnel.
Fault 06: Fault, PFC Overcurrent	PFC current is higher than the maximum current.	Contact service personnel.
Fault 07: System Overheat	The temperature in UPS is higher than 85°C. At this time, the UPS is off.	Check if the ambient temperature is over specification.
Fault 08: Battery SCR Short Circuit	Battery SCR is short circuited.	Contact service personnel.
Fault 11: Inverter Start failure	Inverter voltage cannot reach desired voltage within specified time.	Turn off UPS and then restart it. If it fails again, contact service personnel.
Fault 12: Inverter Overvoltage	Inverter voltage is too high.	Contact service personnel.
Fault 13: Inverter Undervoltage	Inverter voltage is too low.	Contact service personnel.
Fault 14: Inverter R Phase shorted	R phase inverter output is short circuited	Contact service personnel.
Fault 16: Inverter T Phase shorted	T phase inverter output is short circuited	Contact service personnel.
Fault 19: Inverter TR Phase shorted	T-R inverter output is short circuited	Contact service personnel.
Fault 1A: Inv. R Phase neg. out	R phase inverter output negative power is beyond the range.	Contact service personnel.

LCD Message	Explanation	Solution
Fault 1C: Inv. T Phase neg. out	T phase inverter Output Negative Power is beyond the range.	Contact service personnel.
Fault 21: Inverter STS is open	Inverter relay or STS is open.	Contact service personnel.
Fault 22: Inverter STS shorted	Inverter relay or STS is short circuited.	Contact service personnel.
Fault 23: Output STS is Open	Output relay or STS is open.	Contact service personnel.
Fault 24: Output STS shorted	Output relay or STS is short circuited.	Contact service personnel.
Fault 25: Incorrect Wiring	The wiring is wrong.	Contact service personnel.
Fault 26: Battery Fuse Open	Battery fuse is broken.	Contact service personnel.
Fault 27: Battery short circuit	The battery is short circuited.	Contact service personnel.
Fault 31: Communication Loss	The communication between UPS modules is interrupted.	Contact service personnel.
Fault 32: Host Communication Fail	The host line between UPS modules fails.	Contact service personnel.
Fault 33: Output Current Imbalance	The load share line between UPS modules fails.	Contact service personnel.
Fault 34: Firmware Ver. Incompatible	The firmware version between UPS modules is incompatible.	Contact service personnel.
Fault 41: DSP Communication Failure	The internal communication in UPS module is interrupted.	Contact service personnel.
Fault 42: Overload	Heavy overload causes UPS fault.	Reduce some load.
Fault 43: Charger Failure	Battery polarity is connected reversely, or charger voltage is abnormal.	Contact service personnel.
Fault 44: UPS Model not detected	UPS model is not able to identify.	Contact service personnel.
Fault 45: MCU Communication Failure	As stated.	Contact service personnel.
Fault 46: Load Curr. sensor Abnormal	Load current sensor is abnormal.	Contact service personnel.
Fault 47: Fan Failure	The two fans are stuck or broken.	Make sure fans work well when UPS is working.

Table 5-7 Warning Codes Table

LCD Message	Explanation	Solution
Warning 01: Battery Low	Battery voltage is low.	Charge the battery when the mains is normal.
Warning 02: Battery Disconnected	Battery is not connected.	1. Check battery breaker status. 2. Check if the battery connection is well connected. 3. Check the setting of Nominal Battery voltage. 4. Contact service personnel if necessary
Warning 03: Battery Phase Loss	The voltage between positive and negative battery is different.	Check the battery connection.
Warning 04: Neutral Connection Loss	Neutral loss	Check if the Neutral connection is well and contact service personnel.
Warning 05: Line Phase Loss	As stated.	Check if the Mains phase sequence is correct and contact service personnel.
Warning 06: Line Voltage Error	As stated.	Check if the input wiring is correct or contact service personnel
Warning 07: Line Phase Failure	As stated.	Contact service personnel
Warning 08: Battery Overcharge	Battery voltage is too high.	Check the setting of Nominal Battery voltage and contact service personnel.
Warning 09: Battery Charger Fail	Battery voltage is detected as low level. However, the charge is able to work.	Contact service personnel.
Warning 0A: System Overheat	The temperature in UPS is higher than 75°C. At this time, the UPS is still running.	Check if the ambient temperature is over specification. Or contact service personnel.
Warning 0B: PFC Current Imbalance	PFC current is unbalance.	Contact service personnel
Warning 0C: Fan Failure	Fan error.	Check if the fan is blocked or contact service personnel.

LCD Message	Explanation	Solution
Warning 0D: Line Fuse Open	Fuse is broken.	Turn off UPS and replace a good one with the broken one. If UPS fails again after you do this, contact the service personnel.
Warning 0E: EEPROM Failure	EEPROM operation error	Contact service personnel.
Warning 11: Bypass Neutral Loss	Neutral loss.	Check if the Neutral connection is well and contact service personnel.
Warning 12: Bypass Phase Error	Bypass phase error.	Check if the Bypass phase sequence is correct and contact service personnel.
Warning 13: Bypass Voltage Error	Bypass voltage error.	Check the wiring or contact service personnel
Warning 14: Bypass Phase Failure	As stated.	Contact service personnel
Warning 15: Overload	In line mode, the connected devices are demanding more power than the UPS can supply.	Reduce some load and check output Load-Capacity in specification.
Warning 16: Overload Lock	The connected devices are demanding more power than the UPS can supply. UPS will transfer to bypass mode from line mode.	Reduce some load and check output Load-Capacity in specification.
Warning 17: EPO Active	Check the EPO connector.	Check if the connector is loose when EPO acts abnormally.
Warning 17: EPO Active	The UPS is in maintenance mode.	Check if EMBS port is not connected to 2-pin EPO port on the controller
Warning 19: Line Voltage Difference	Each module gets different line voltage when they are in parallel.	Contact service personnel.
Warning 1A: Bypass Volt. Difference	Each module gets different bypass voltage when they are in parallel.	Contact service personnel.

LCD Message	Explanation	Solution
Warning 1B: Inv. Current Imbalance	As stated.	Contact service personnel.
Warning 1C: Bypass Unstable	UPS switches between bypass mode and standby mode five times in 30 minutes due to abnormal utility.	Contact service personnel.
Warning 1D: Redundancy Failure	As stated.	Check if redundancy setting is correct or not. Then, contact service personnel.
Warning: Battery End of Life Reached	Battery life is expired.	Check if the battery has been used over its service age. Or contact service personnel.
Warning! Dry Contact Input Alarm 1	As stated.	Remove the node
Warning! Dry Contact Input Alarm 2	As stated.	Remove the node
Warning! COMM Module SPS 1 Fault	As stated.	Contact service personnel.
Warning! COMM Module SPS 2 Fault	As stated.	Contact service personnel.

APPENDIX A Installation Planning Guides (IPG)

Installation Planning Guide for 6-24kVA

UPS kVA/kW Rating	General Mechanical Information								
	Dimensions (W x D X H)	Weight (1:1 config)	Floor Loading	Approximate Full-Load Heat Rejection	Mechanical Clearance (Inches) from UPS for Ventilation and Maintenance Access				
	Inches	Lbs.	Lbs./Ft.^2	kBtu/Hr.	Top	Front	Bottom	Sides**	Back
6kVA/6kW	23.6 x 41.2 x 58	503	74	1.84	20	40	0	0	20
12kVA/12kW		677	99	3.68					
18kVA/18kW		851	124	5.52					
24kVA/24kW		1025	149	7.36					

Primary AC Input (240/120V or 208/120V 2-Phase / 3-Wire)							
Maximum Input Power Demand Normal Mode (Recharge Mode)			Suggested External Overcurrent protection	Suggested Minimum Feeder Wire Size (COPPER) Per Phase / Neutral			Max Terminal Wire Size
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	AWG or kcmil at 90º C Temp. Rating	AWG or kcmil at 105º C Temp. Rating	AWG
6	≥0.99	28 (32)	45	(1) x 8 AWG / (1) x 8 AWG	(1) x 8 AWG / (1) x 8 AWG	(1) x 10 AWG / (1) x 10 AWG	2/0 AWG
12	≥0.99	55 (62)	80	(1) x 4 AWG / (1) x 4 AWG	(1) x 4 AWG / (1) x 4 AWG	(1) x 8 AWG / (1) x 8 AWG	
18	≥0.99	83 (96)	125	(1) x 1 AWG / (1) x 1 AWG	(1) x 2 AWG / (1) x 2 AWG	(1) x 4 AWG / (1) x 4 AWG	
24	≥0.99	110 (128)	175	(1) x 2/0 AWG / (1) x 2/0 AWG	(1) x 2/0 AWG / (1) x 2/0 AWG	(1) x 2 AWG / (1) x 2 AWG	

Primary AC Output (240/120V or 208/120V 2-Phase / 3-Wire)							
Rated Output Power			Suggested External Overcurrent protection	Suggested Minimum Feeder Wire Size (COPPER) Per Phase / Neutral			Max Terminal Wire Size
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	AWG or kcmil at 90º C Temp. Rating	AWG or kcmil at 105ºC Temp. Rating	AWG
6	1.0	25	40	(1) x 8 AWG / (1) x 8 AWG	(1) x 10 AWG / (1) x 10 AWG	(1) x 12 AWG / (1) x 12 AWG	2/0 AWG
12	1.0	50	70	(1) x 4 AWG / (1) x 4 AWG	(1) x 6 AWG / (1) x 6 AWG	(1) x 8 AWG / (1) x 8 AWG	
18	1.0	75	100	(1) x 3 AWG / (1) x 3 AWG	(1) x 3 AWG / (1) x 3 AWG	(1) x 4 AWG / (1) x 4 AWG	
24	1.0	100	125	(1) x 1 AWG / (1) x 1 AWG	(1) x 2AWG / (1) x 2 AWG	(1) x 4 AWG / (1) x 4 AWG	

Installation Planning Guide for 6-24kVA

Important Notes:

1. Maximum Current required at Primary AC Input based on full load output and maximum battery charging current.
2. Output load conductors are to be installed in separate conduit from input conductors.
3. Control wires and power wires are to be installed in separate conduits.
4. Recommended AC input and output overcurrent protection based on continuous full load current per NEC 215.3.
5. Wiring shall comply with all applicable national and local electrical codes.
6. Grounding conductors to be sized per NEC Article 250-122. Neutral conductors are to be sized per NEC Article 310.15.
    a. Primary AC Input: 2ϕ, 3-wire + ground.
    b. AC Output: 2ϕ, 3-wire + ground.
7. Nominal battery voltage based on the use of VRLA type batteries (2.0 volts / cell nominal).
8. Maximum battery discharge current based on lowest permissible discharge voltage of 1.6 VPC.
9. Weights do not include other auxiliary equipment external to the UPS.
10. Sizing calculations based on the following assumptions:
    a. Base cable ampacity is determined by 75°C/90°C/105°C rated copper conductor values in NEC Table 310.16.
    b. Cable ampacity is derated using adjustment factor for 36-40°C Ambient Operating Temperature per NEC Table 310.15(B)(1).
    c. 3-Phase Cable ampacity is derated using correction factor for quantity 4-6 conductors in conduit per NEC Table 310.15(C)(1).
    d. Feeder distance calculations based on NEC Chapter 9, Tables 8 and 9 data, allowing for 2% AC voltage drop

NOTE: Consult the latest edition of applicable national and local codes for possible variations.
Ratings of wires and overcurrent devices are suggested minimums. Local conditions may vary. Consult with a registered Professional Engineer within your local area for proper size selections.

Note: Take proper precautions to ensure that no hardware or any other foreign objects are left within the enclosure after completion of wiring. Confirmation that no foreign objects exist within the enclosure must be completed before energizing the 3000 SP Series. Failure to observe this precaution may cause fire or electric shock hazard.

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