User Manual

MARS-ECO 6 & 10 kVA

120/208/240V Online UPS

SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS. This manual contains important instructions that should be followed during installation and maintenance of the UPS and batteries.

The UPS models that are covered in this manual are intended for installation in an environment within 0 to 50°C, free of conductive contaminant.

WARNING: This is a product for commercial and industrial application in the second environment – installation restrictions or additional measures may be needed to prevent disturbances.

Certification standards

- Safety: EN 62040-1, UL1778
- EMC: IEC/EN 62040-2
- Performance: IEC/EN 62040-3

Special symbols

The following are examples of symbols used on the UPS or accessories to alert you to important information:

RISK OF ELECTRIC SHOCK - Observe the warning associated with the risk of electric shock symbol.

Important instructions that must always be followed.

Do not discard the UPS or the UPS batteries in the trash.
This product contains sealed lead acid batteries and must be disposed as it's explain in this manual. For more information, contact your local recycling/reuse or hazardous waste center.

This symbol indicates that you should not discard waste electrical or electronic equipment (WEEE) in the trash. For proper disposal, contact your local recycling/reuse or hazardous waste center.

Information, advice, help.

Refer to the user manual.

Safety of persons

- RISK OF VOLTAGE BACKFEED. The system has its own power source (the battery). Isolate the UPS and check for hazardous voltage upstream and downstream during lockout-tagout operation. Terminal blocks may be energized even if the system is disconnected from the AC power source.
- Dangerous voltage levels are present within the system. It should be opened exclusively by qualified service personnel.
- The system must be properly grounded.
- The battery supplied with the system contains small amounts of toxic materials. To avoid accidents, the directives listed below must be observed:
  - Servicing of batteries should be performed or supervised by personnel knowledgeable about batteries and the required precautions.
  - When replacing batteries, replace with the same type and number of batteries or battery packs.
  - Do not dispose of batteries in a fire. The batteries may explode.
  - Batteries constitute a danger (electrical shock, burns). The short-circuit current may be very high.
- Precautions must be taken for all handling:
  - Wear rubber gloves and boots.
  - Do not lay tools or metal parts on top of batteries.
  - Disconnect charging source prior to connecting or disconnecting battery terminals.
  - Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote battery supplies not having a grounded supply circuit).

Product safety

- The UPS connection instructions and operation described in the manual must be followed in the indicated order.
- CAUTION - To reduce the risk of fire, the unit connects only to a circuit provided with branch circuit overcurrent protection for:

  63A rating, for 6kVA models,

  100A rating, for 10kVA models
- The upstream circuit breaker for Normal AC/Bypass AC must be easily accessible. The unit can be disconnected from AC power source by opening this circuit breaker.
- An additional AC contactor is used for back feed protection and must comply with IEC/EN 62040-1 (the creepage and clearance distances shall meet the basic insulation requirements for pollution degree 2).

- Disconnection and overcurrent protection devices shall be provided by others for permanently connected AC input (Normal AC/Bypass AC) and AC output circuits.
- A readily accessible disconnect device shall be incorporated external to the equipment
- Check that the indications on the rating plate correspond to your AC powered system and to the actual electrical consumption of all the equipment to be connected to the system.
- Never install the system near liquids or in an excessively damp environment.
- Never let a foreign body penetrate inside the system.
- Never block the ventilation grates of the system.
- Never expose the system to direct sunlight or source of heat.
- If the system must be stored prior to installation, storage must be in a dry place.
- The admissible storage temperature range is -25°C to +60°C without battery (-15°C to +40°C with battery).

Special precautions

- The unit is heavy: wear safety shoes and use vacuum lifter preferentially for handling operations.
- All handling operations will require at least two people (unpacking, lifting, installation).
- Before and after the installation, if the UPS remains de-energized for a long period, the UPS must be energized for a period of 24 hours, at least once every 6 months (for a normal storage temperature less than 25°C). This charges the battery, thus avoiding possible irreversible damage.
- During the replacement of the Battery Module, it is imperative to use the same type and number of elements as the original Battery Module provided with the UPS to maintain an identical level of performance and safety.

Contents

1 Introduction

Thank you for selecting UPS to protect your electrical equipment. The UPS has been designed with the utmost care.
We recommend that you take the time to read this manual to take full advantage of the many features of your UPS (Uninterruptible Power System).

Before installing your UPS, please read the booklet presenting the safety instructions. Then follow the indications in this manual.

1.1 Environmental protection

Products are developed according to an eco-design approach.

Substances

This product does not contain CFCs, HCFCs or asbestos.

Packing

To improve waste treatment and facilitate recycling, separate the various packing components.

- The cardboard we use comprises over 50% of recycled cardboard.
- Sacks and bags are made of polyethylene.
- Packing materials are recyclable.

Follow all local regulations for the disposal of packing materials.

Product

The product is made up of recyclable materials.
Dismantling and destruction must take place in compliance with all local regulations concerning waste. At the end of its service life, the product must be transported to a processing center for electrical and electronic waste.

Battery

The product contains lead-acid batteries that must be processed according to applicable local regulations concerning batteries.
The battery may be removed to comply with regulations and in view of correct disposal.

1.2 Electronic equipment protection

The uninterruptible power system (UPS) protects your sensitive electronic equipment from the most common power problems, including power failures, power sags, power surges, brownouts, line noise, high voltage spikes, frequency variations, switching transients, and harmonic distortion.

Power outages may occur unexpected, and the power quality will be erratic. These power problems have the potential to corrupt critical data, destroy unsaved work sessions, and damage hardware - causing hours of lost productivity and expensive repairs.

With the UPS, you can safely eliminate the effects of power disturbances and guard the

integrity of your equipment. Providing outstanding performance and reliability, UPS's unique benefits include:

- True online double-conversion technology with high power density, utility frequency independence, and generator compatibility.
- Selectable High Efficiency mode of operation.
- Standard communication options: one RS232 communication port, one USB communication port, one dry in port and dry out port.
- Optional connectivity cards with enhanced communication capabilities.
- Firmware that is easily upgradable without a service call.

2 Presentation Product Overview

2.1 Model list

1. 'xxK' model means 'standard model' with batteries.
2. UPS is 16 or 20 batteries selectable; EBM is 16~20*2strings batteries selectable.
3. The weight in the table below is reference only, please see the labels on the carton for details.
4. Dimension 'D' is chassis only, not including panel.

- UPS& EBM model:

Product	Description	Net Weights (kg)	Unit Size(W x H x D)(mm)	Remark
UPS	MS-ECO6000	99.6	300*805.5*633.2	16 batteries 7AH
	MS-ECO10000	122.2		16 batteries 9AH
EBM	Tower EBC 16*2 BAT	94.5	225*589*416	16*2 batteries 9AH

- Optional modular or accessory:

If order other type function modular or accessories, please contact with your local sale center for a consult.

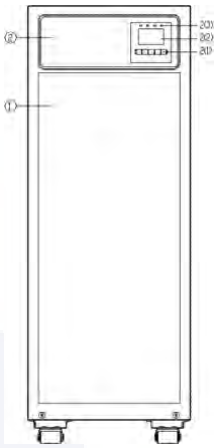
Type	Description	Remark
Intelligent Card	Dry Contact card (AS400)	See in chapter 6.2
	NMC card	
	MODBUS card (CMC)	
EMP	Temperature and humidity sensors	
COMM Cable	RS232 CABLE	For RS232 communication
Parallel Kit	For parallel system installing	See in chapter 4.0
Battery cable	Battery cable (16 batt.) for UPS connect with user's own EBM	1.8M length, see in chapter 3.4.3
	Battery cable (20 batt.) for UPS connect with user's own EBM	

2.2 Presentation

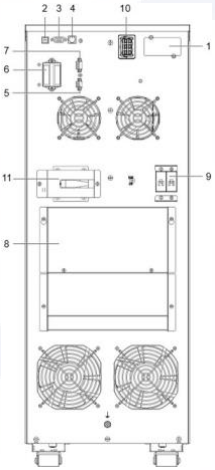
- UPS modular:

Front view

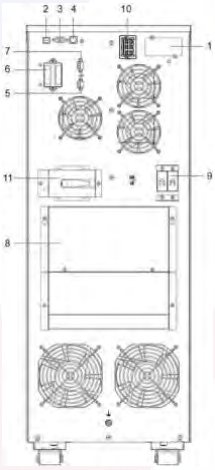
1. Ventilation area
2. LCD Modular, including:
   2(1)---Button,
   2(2)---LCD screen,
   2(3)---LED indicator



Rear view



6K



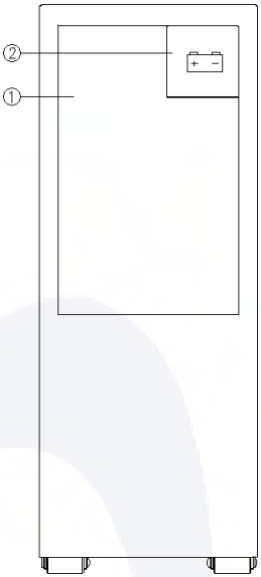
10K

1. Intelligent Slot (optional, default is no card inside, only cover and inside cable)
2. USB
3. RS232
4. RJ11(Not defined, Silkscreen with 'FUN*' means 'Function is not defined')
5. EPO
6. Parallel Port (optional, default is no card inside, only cover and inside cable)
7. DRY IN/OUT
8. Input /Output terminal
9. Input Circuit Breaker
10. External battery connector
11. Maintenance bypass switch (optional, default is Yes)

- EBC (External Battery Cabinets):

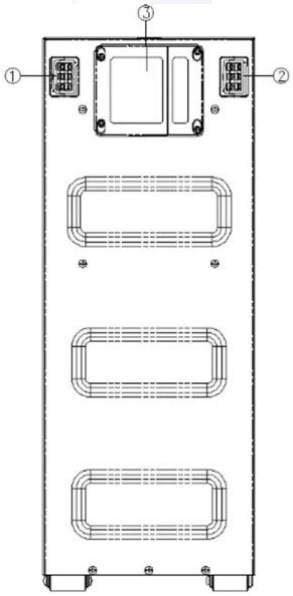
Front view

1. Ventilation area
2. EBC label

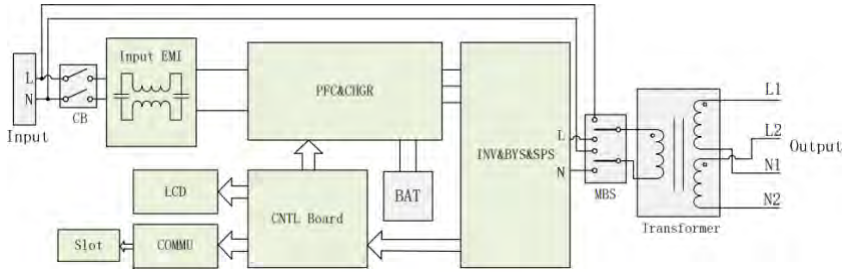


Rear view

1. EBC port 1
2. EBC port 2
3. Fuse board cover (replace EBC fuse)



2.3 Circuit diagram



3 Installation

It is recommended to move the equipment to the installation site by using a pallet jack or a truck before unpacking.

The system may be installed only by qualified electricians in accordance with applicable safety regulations.

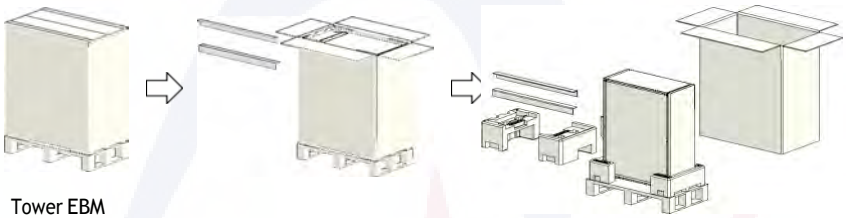
The cabinet is heavy, please install it with at least two peoples.

3.1 Unpacking and Inspecting

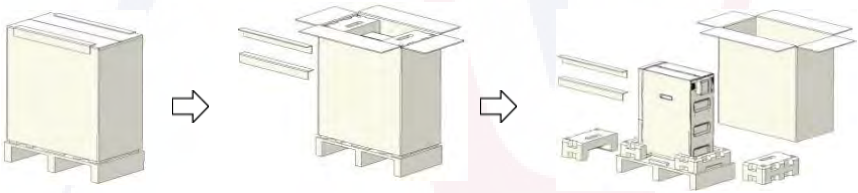
⚠ Unpacking the unit in a low-temperature environment may cause condensation occurred in and on the cabinet. Do not install the unit until the inside and outside of the unit are absolutely dry (hazard of electric shock).

If any equipment has been damaged during shipment, keep the shipping cartons and packing materials for the carrier or place of purchase and file a claim for shipping damage. If you discover damage after acceptance, file a claim for concealed damage.

Tower UPS



Tower EBM



Note:

The cabinet is heavy, please see spec weight provided on the carton/label.

Do not lift the unit's front panel and rear panel.

Discard or recycle the packaging in a responsible manner or store it for future use.

ⓘ Packing materials must be disposed in compliance with all local regulations concerning waste. Recycling symbols are printed on the packing materials to facilitate sorting.

3.2 Checking the accessory kit

Verify that the following additional items are included with the unit.

	UPS		EBM
	6K	10K	
Battery cable	O	O	√
Copper bus-bar	√*	√*	
USB cable	√	√	
RS232 cable	O	O	
Parallel cable	O	O	
Dry contractor	√	√	
RPO contractor	√*	√*	
Tower foot	√	√	√
User manual	√	√	

Note: √---Standard configuration; O---Option, default is Not configured

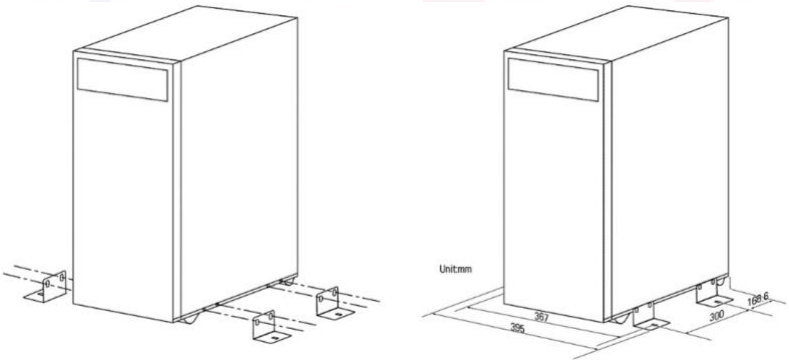
*---Assembled to Unit as accessory

3.3 Mechanical Install

To keep air-flowing freely, it is recommended to keep a clearance with 500mm space both for front and rear side.

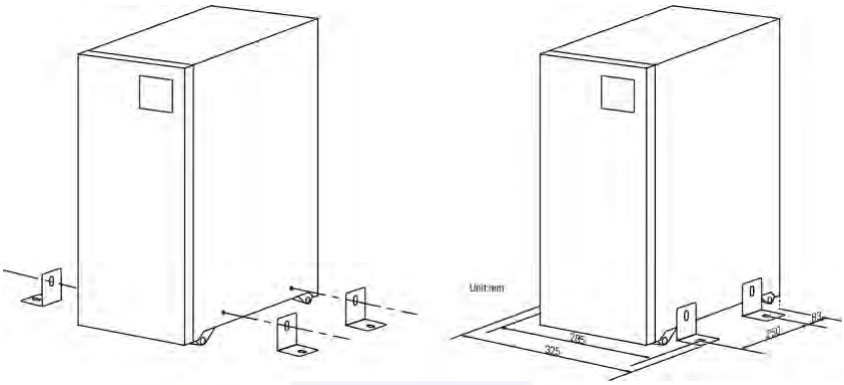
UPS model

1. Place the unit on a flat surface in its final location and install 'Tower foot' for a stability.
2. Install the unit to ground (Option}: place 4pcs bolts (M8 is recommended} to the final location previously, bolt's position please refer to below, then fix the unit to the bolts.



EBC model

EBC installation is similar with UPS, details please refer to below.



It is recommended to place EBCM modular to UPS's left side.

3.4 Power cables connection

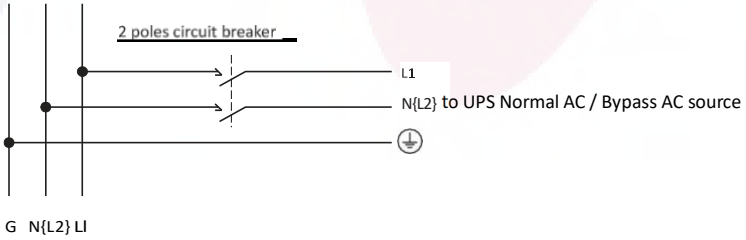
This chapter introduces how to wire AC IN/OUT cable to UPS in difference mode, and UPS connecting with EBM.

3.4.1 Input /Output wiring specifications

Recommended protective devices and cable cross-sections

Recommended upstream protection

UPS power rating	Upstream circuit breaker
6000 VA	D curve - 63A
10000 VA	D curve -100A

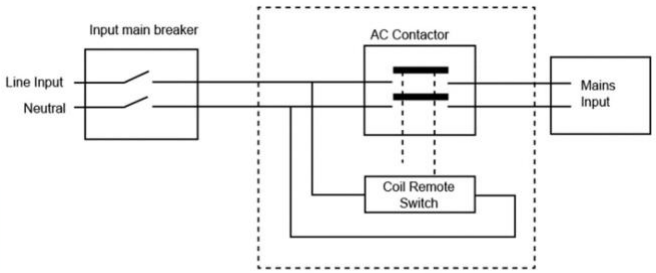


Read the Safety instructions page 3 regarding back feed protection requirements.

Recommended cable cross-sections

Model	6K	IOK
Protective earthing conductor Min cross section	6mmA2 {8AWG} 75°C type	l6mmA2 {4AWG} 75°C type
Input L, N, G Min conductor cross section	6mmA2 {8AWG} 75°C type	l6mmA2{4AWG} 75°C type
Input Breaker	63 A	100 A
Output L,N,（HV mode or LV-2 mode） Min conductor cross section	4mm A2 {10 AWG} 75°C type	10mm A2 {6 AWG} 75°C type
Output L, N,（LV-l mode） Min conductor cross section	lOmmA2 {6 AWG} 75°C type	25mm A2 {2 AWG} 75°C type
Jumper wire（for parallel system）	6mmA2 {8 AWG} 75°C type	l6mm A2 {4 AWG} 75°C type

It is recommended that an external isolating device should be installed between the mains input and UPS as shown in Figure



3.4.2 Wiring for AC Cable (AC source to UPS)

High leakage current:

Earth connection essential before connecting supply.

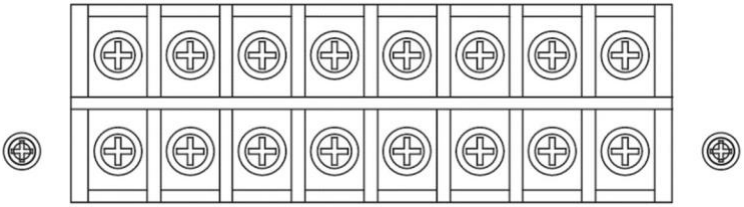
Common input/output sources connection.

This type of connection must be carried out by qualified electrical person.

Before carrying out any connection, check that the upstream protection devices {Normal AC source and Bypass AC source} are open "O" {Off}.

Always connect the ground wire first.

Layout of terminal block{TB} of the UPS:



AC OUTPUT					PARA JUMPER		AC INPUT		
⏚	L1	L2	N1	N2	JP1	JP2	L	N	⏚

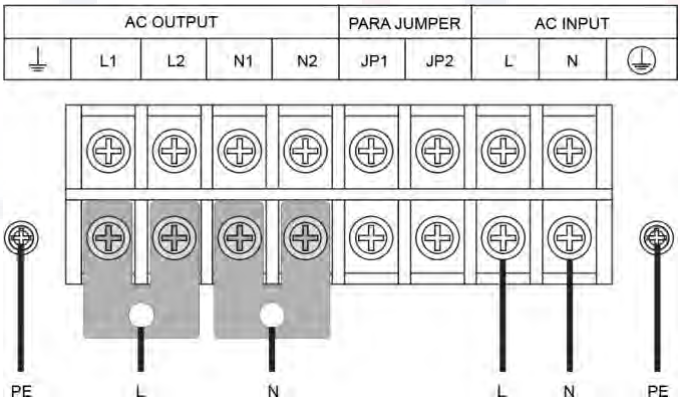
Note:

1. AC INPUT: UPS input TB (L/N, PE is screw & L(L1)/ N(L2), PE is screw}
2. AC OUTPUT: UPS output TB (L1/L2/N1/N2, PE is screw}
3. PARALLEL JUMPER: For UPS's parallel installation (JP1/JP2}

Below will introduce 3 modes (Default is 'LV mode-1'} of wiring application for UPS input/output, please select one mode for your actual application.

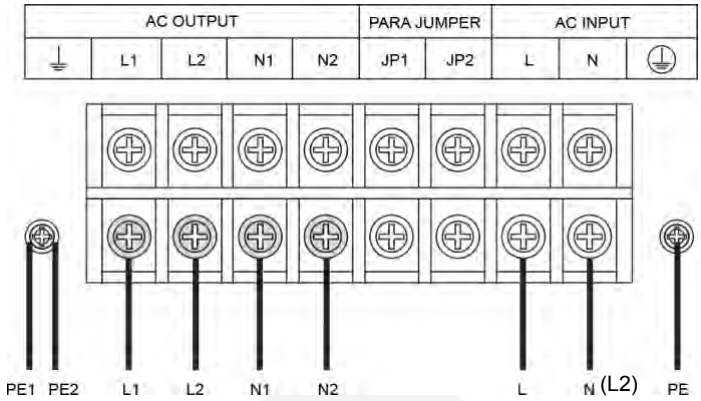
LV mode 1

Short UPS output terminal 'L1/L2' and 'N1/N2' with 'busbar', then connect AC cable.



Output voltage is 110V/115V/120V {According to LCD setting}.

LV mode-2

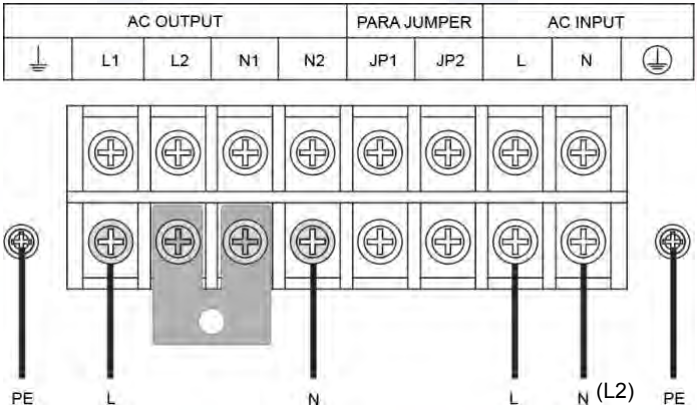


Output voltage is 110V×2/115V×2/120V×2(According to LCD setting).

Each output can only take half of UPS rating in LV mode-2.

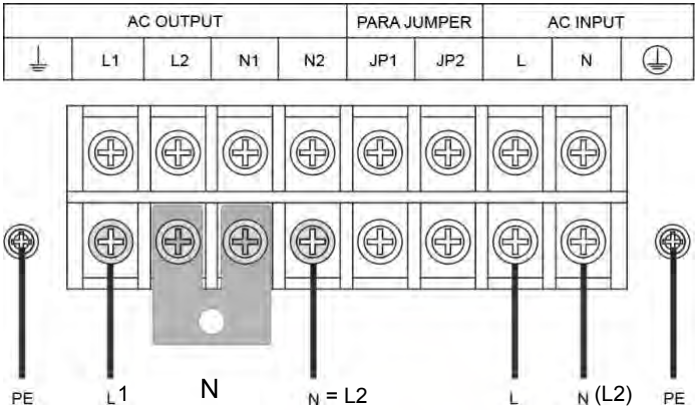
HV mode

Short UPS input terminal 'L2/N1' with 'busbar', then connect AC cable.



Output voltage is 220V/230V/240V (According to LCD setting).

For the cable well fixed, it is recommended to tie these cables to the convex of rear-panel.



Output voltage is L1=120v L2 jump N1 is Neutral, N2= L2 120V. It is very important to tie center tap (Neutral created by jumping L2+N1) to ground to avoid floating voltages making ground reference with new neutral.

Note: Is ok to tie neutral with ground "only" after a isolated transformer output.

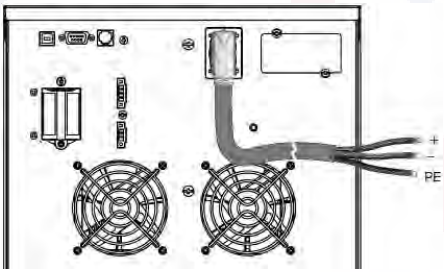
3.4.3 Wiring with external battery modular (EBC) (DC source to UPS)

⚠

1. Be sure to disconnect the battery cable from the EBC before connecting the battery terminals of the UPS.
2. Make sure the UPS is completely off before connecting or disconnecting the EBC.
3. Before connecting the EBC, make sure that the number of battery sections and capacity are the same as LCD setting.
4. Do not reverse the polarity of the external battery.

- Connect with user's own EBM:

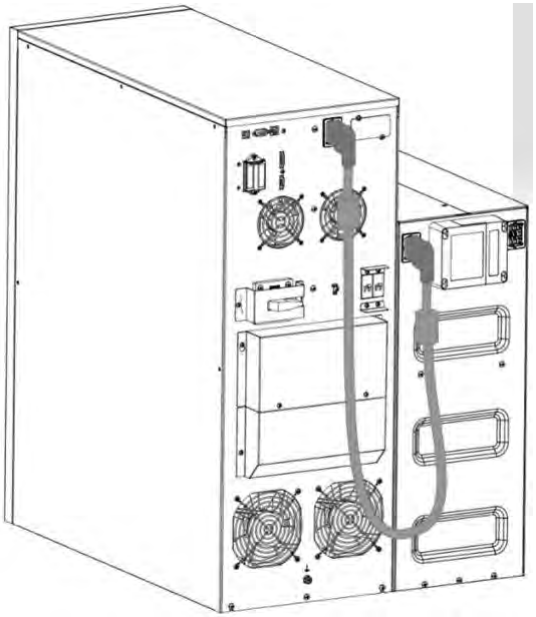
Connect EBM to UPS with 'Battery cable' (optional configured).



Note:

1. If additional battery cable needed for installation, it must follow cable specification and the maximum length of battery cable 10 meters for application.
2. If a length of battery cable over 10 meters requests, please contact distributors/ agents for details.

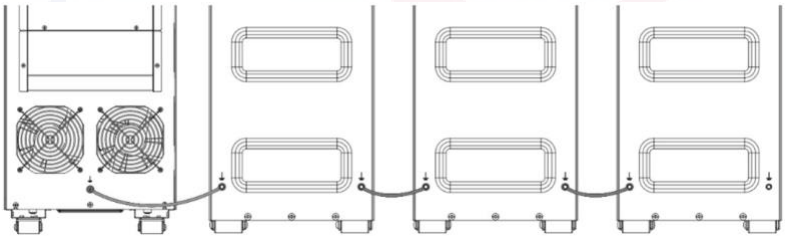
- Connect with the configured EBM:



Note:

l. Extended runtime with up to 6 Extended Battery Modules {EBMs} per UPS.

2. Extend more than 2 EBMs, additional ground wires lOmmA2 cross-sectional area} are require.

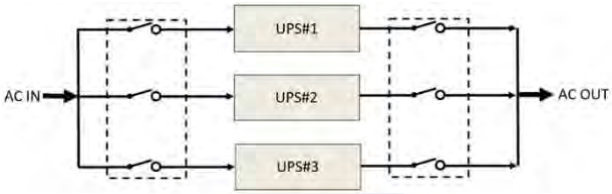


4 Parallel system Installation and Operation(Optional)

If your UPS is configured with parallel function, up to 3 UPSs can be connected in parallel to configure a sharing and redundant output power.

In parallel system, the mechanical installation for each modular is same as the single system. Details please refer to Chapter 3.3.

Parallel system AC cable diagram:



4.1 Wiring for AC Cable

1. Wiring length requirement:

   When the distance between the load and the parallel UPS is less than 10 meters, the length difference between the input/output lines between the UPSs in the parallel system is less than 20%.

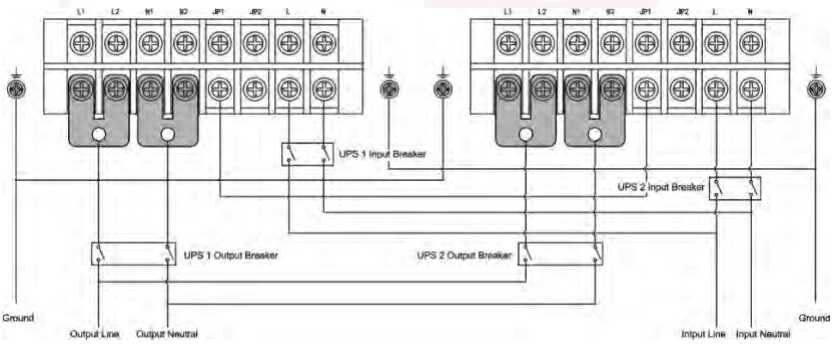
   When the distance between the load and the parallel UPS is greater than 20 meters, the length difference between the input/output lines between the UPSs in the parallel system is less than 5%.

2. In the parallel system, common battery application is not supported. independent EBM connect to each UPS, please refer to chapter 3.4.3.

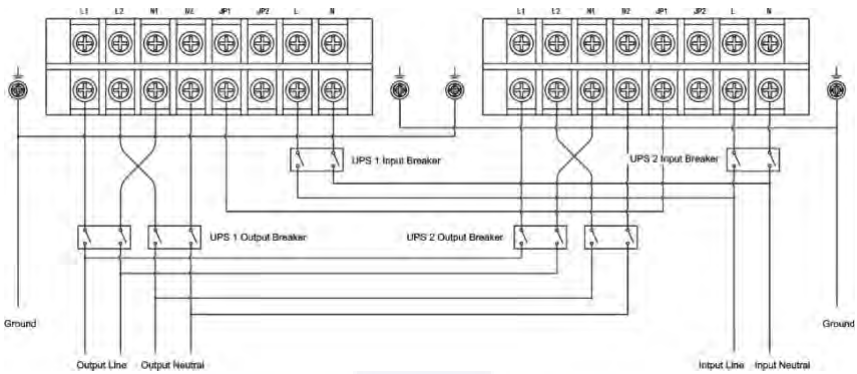
3. Professional installation is required, please set the parallel system in the restricted area!

Parallel system

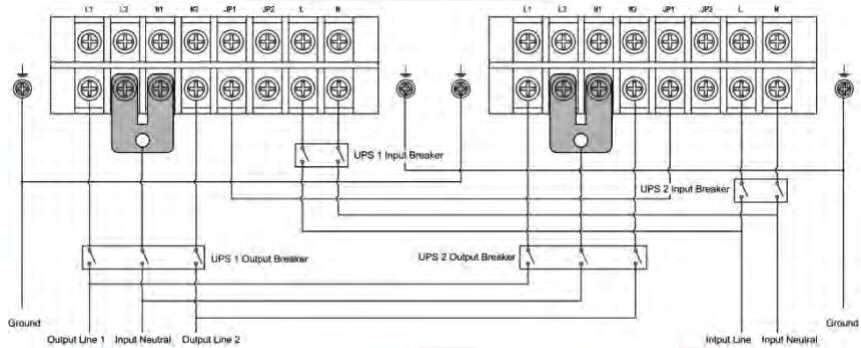
LV mode-I



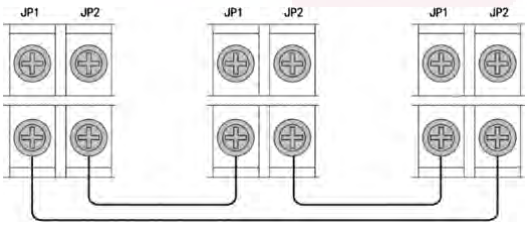
LV mode-2



HV mode

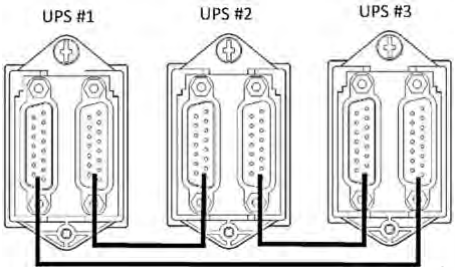


When 3 UPSs in parallel, JPl/JP2 wiring as below.

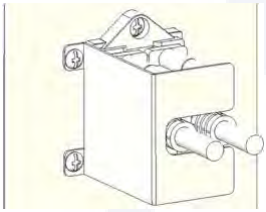


4.2 Wiring for parallel signal cable

Parallel signal cable connection diagram:



It is recommended to lock the 'parallel cable' (as below} for preventing the parallel ports suffering an unexpected pulling-force and causing the parallel system fault.



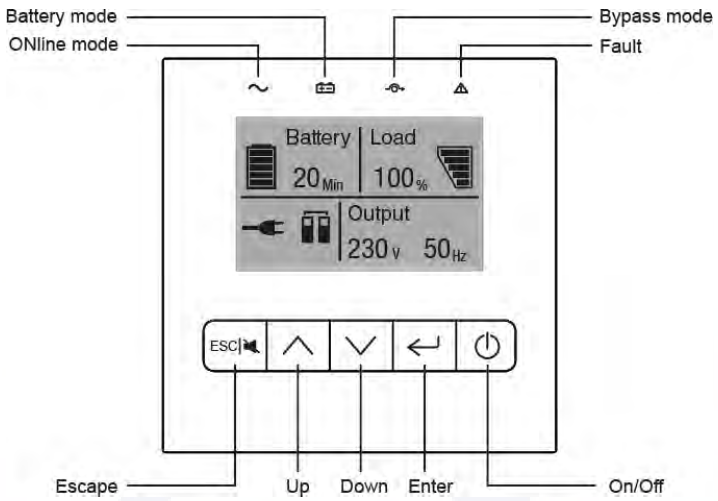
4.3 Parallel system Operation:

1. Turn on the input breakers for the parallel UPS.
2. Pressing ⏻ button continuously for more than 1 second for one UPS of the system, then the system will start to turn on and enter line mode.
3. Regulate the output voltage of each UPS separately, and check if the output voltage difference between the two ups is less than 0.5V. If the difference is more than 0.5V, the UPS need to be regulated.
4. If the difference output voltage is less than 0.5V, turn off the input breakers to let UPS shut down. Then switch on the output breakers for the two UPS.
5. Turn on the input breakers for the parallel UPS. Pressing ⏻ button continuously for more than 1 second for one UPS of the system, then the system will start to turn on and enter line mode and the system will work normally in parallel.

5 Operation

5.1 Control panel

The UPS has a graphical LCD with five-button. It provides useful information about the UPS itself, load status, events, measurements, and settings.



The following table shows the indicator status and description:

Indicator	Status	Description
Normal (Green)	On	The UPS is operating normally on Online or on High Efficiency mode.
Battery (Orange)	On	The UPS is on Battery mode.
Bypass (Orange)	On	The UPS is on Bypass mode.
	Flash	The UPS is on Standby mode.
Fault (Red)	On	The UPS has an active alarm or fault.

The following table shows the Control Button Functions:

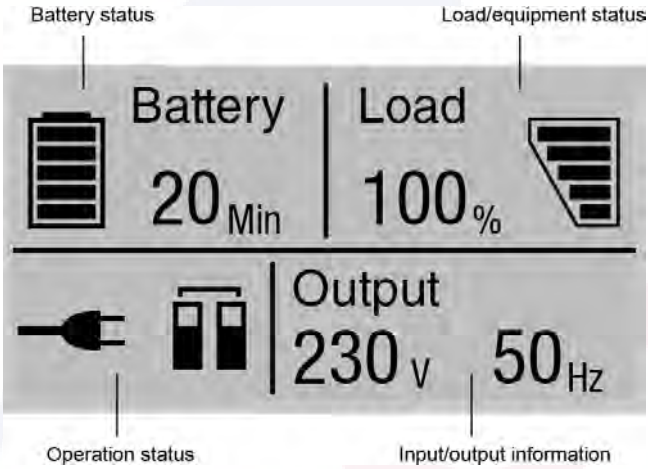
The Button	Function	Illustration
	Power on	Press this button for >100ms&<1s can power on the ups without utility input at the condition of battery connected.
	Turn on	When the unit is powered on and stayed ~~is~~ in Bypass mode, press this button for >1s can turn on the UPS.
	Turn off	Press this button >3s can turn off the UPS.
	Clear fault	When the unit is in fault mode, press this button for >1s to stop alarm and clear fault
	Scroll up	Press this button for >100ms&<1s to scroll up the menu option
	Scroll down	Press this button for >100ms&<1s to scroll down the menu option
	Enter next menu tree	Press this button for >100ms&<1s to select the present menu option, or enter next menu, but do not change any setting
	Select one menu option	Press this button for >100ms&<1s to select the present menu option, or enter next menu, but do not change any setting
	Confirm the present setting	Press this button for >1s to confirm the edited options and change the setting
	Exit main menu	Press this button for > 100ms & < 2s to exit the present menu to default system status display menu or the higher-level menu without executing a command or changing a setting
	Mute buzzer	Press this button for > 2s to mute the buzzer temporarily, once new warning /fault is active or UPS reenters into bypass mode or battery mode, buzzer will work again.

The Buzzer definition as below:

UPS condition	Buzzer status
Fault active	Continuous
Over Load Warning active	2 Beep every second
Other Warning active	Beep every second
Battery output	Beep every 4 seconds, if battery low, buzzer Beep every second
Bypass output	Beep every 2 minutes

5.2 LCD description

The LCD backlight automatically dims after 2 minutes of inactivity (except UPS is fault). Press any button to wake up the screen.



The following table describes the information of ups status.

Note: If other indicator appears, see troubleshooting on chapter 7.2 for more information.

Operation status	Cause	Description
Standby mode 	The UPS is Off.	UPS is operating without output.

Operation status	Cause	Description
Online mode 	The UPS is operating normally.	The UPS is powering and protecting the equipment.
Battery mode  1 beep every 4 seconds	A utility failure has occurred, and the UPS is on Battery mode.	The UPS is powering the equipment with the battery power. Prepare your equipment for shutdown.
End of backup time  1 beep every 1 seconds	The UPS is on Battery mode and the battery is running low.	This warning is approximate, and the actual time to shutdown may vary significantly. Depending on the UPS load and number of Extended Battery Modules (EBMs), the "Battery Low" warning may occur before the battery reaches 20% capacity.
High Efficiency mode 	The UPS is operating on High Efficiency mode.	Once the mains are loss or abnormal, the UPS would transfer to Line mode or Battery mode and the load is supplied continuously. 1. The function could be enabled through the LCD setting or the software (Winpower, etc.) 2. It is reminded that the transfer time of UPS output from HE mode to battery mode is about 10ms. But it is still too long for some sensitive load.
Bypass mode 	Overload or fault has occurred, or a command has been received, and the UPS is in Bypass mode.	Equipment is powered but not protected by the UPS.
Converter mode 	The UPS is operating on converter mode.	In converter mode, the UPS would free run with fixed output frequency (50Hz or 60Hz). Once the mains is loss or abnormal, the UPS would transfer to battery mode and the load is supplied continuously. 1. The function could be enabled through the LCD setting or the software (Winpower, etc.). 2. The load should be derating to 60% in converter mode.

Operation status	Cause	Description
Warning 	There are some abnormal problems during the operation of UPS. Normally the problems are not fatal	The UPS continues working, but please pay attention to the warning, or the UPS may fail.
Fault 	Some fatal problems happened	The UPS will cut off the output or transfer to bypass mode at once, and keep alarming.
Overload 	The load exceeds the capacity of the UPS	Some unnecessary loads should be cut off one by one to reduce the load connected to the UPS.
Battery test 	UPS is executing a battery test	Test the battery
Battery fail 	The UPS detects bad battery or battery disconnected	The symbol of battery failure would be shown and UPS would alarm.
UPS Parallel 	Using two or three UPS for heavy load or redundancy	Two or three UPS operation in parallel

5.3 Display functions

Use the two middle buttons {  and  } to scroll through the menu structure. Press the Enter {} button to select an option. Press the ESC button to cancel or return to the previous menu.

When starting the UPS, the display is in the default UPS status summary screen.

Main menu	Submenu	Display information or Menu function
UPS status		[status summary screen] / [Alarm] / [Battery charging/Volt/level/remaining time] / [mode/ Para Num. /Running time]

Main menu	Submenu	Display information or Menu function
Measurements		[Load] W VA/ [Output/Current] A % / [Output/Voltage] V Hz/ [Input/Voltage] V Hz / [Battery] V % / [DC bus] V V / [temperature] ℃ [Battery remaining time] Min
Control	Single UPS battery test	Starts a manual battery test for single UPS
	Parallel UPS battery test	Starts a manual battery test for parallel UPS
	Single UPS turn off	Turn off one UPS in parallel UPS system
	Reset fault status	Clears active fault
	Clear event log	Clears events
	Restore factory set	Returns all settings to original values
Settings		Sets parameters
Event log		Event list
Identification		[Product type/model] / [Part/Serial number] / [UPS/NMC firmware]

5.4 User settings

The following table displays the options that can be changed by the user.

Submenu	Available settings	Default settings
Password	Key the password	USER
language	[English][Deutsch][Español]	English
User password	[disabled] [Enabled]	[disabled]
Audible alarm	[enabled] [disabled]	[enabled]
Output voltage	[208V] [220V] [230V] [240V] Can be changed in Standby mode and Bypass mode	[240V]
Output	[autosensing] [50HZ] [60HZ]	[autosensing]
Power strategy	[normal] [high efficiency] [converter]	[normal]
Auto bypass	[enabled] [disabled]	[enabled]
Auto restart	[enabled] [disabled] Authorize the product to restart automatically when mains recovers after a complete battery discharge.	[enabled]
Dry in	[Disabled] [SON] [SOFF] [Maintain bypass]	[Disabled]

Submenu	Available settings	Default settings
Dry out	[Load powered] [On battery mode] [Battery low] [Battery disconnected] [Bypass output] [UPS normal]	[Load powered]
Start on battery	[enabled] [disabled]	[enabled]
External battery modules	[0~6]	According to model
External battery AH setting	[0~300]	According to model
Battery remaining time	[enabled] [disabled]	[enabled]
Charger current	[0~4] 0~4A	[1.4A] for 6K default [2A] for 10K default [0~4A] Range
Site wiring fault	[disabled] [enabled]	[disabled]
LCD contrast	[-5 ~ +5]	[+0]
Transformer setting	[enabled] [disabled] Output voltage : [110V] [115V] [120V] setting to [enabled] [208V] [220V] [230V] [240V] setting to [disabled]	[enabled]

5.5 UPS startup and shutdown

Please make sure there is no load connected to the ups before the ups is turned on, and take on the load one by one after the UPS is turned on.
Take off all of the connected loads before turning off the UPS.

Starting the UPS with utility

Verify that the total equipment ratings do not exceed the UPS capacity to prevent an overload alarm.

Start the UPS with utility:
Check all the connection is correct.
Power on the UPS, the fan begins to rotate. After that, the LCD will show the default UPS status summary screen.
Pressing  button continuously for more than l second, the buzzer will beep 3OOms, UPS starts to turn on.
A few seconds later, the UPS turns into Line mode. If the utility power is abnormal, the UPS will transfer to Battery mode without output interruption of the UPS.

Starting the UPS on Battery

Before using this feature, the UPS must have been powered by utility power with output enabled at least once.

After connect the UPS with battery, should wait lOs before pressing the button for pre-charging the auxiliary power supply.

Battery start can be disabled. See "Start on battery" setting in user settings refer to chapter 5.4.

To start the UPS on battery:

Check all the connection is correct.

Pressing button continuously for more than 100ms, the UPS would be powered on. At this time the fan begins to rotate. Then LCD will show the default UPS status summary screen.

Pressing button continuously for more than l second, the buzzer will beep for3OOms, UPS starts to turn on.

A few seconds later, the UPS turns into Battery mode. If the utility power comes back, the UPS will transfer to Line mode without output interruption of the UPS.

UPS shutdown with utility

To shut down the UPS with utility:

Pressing button continuously for more than 3 seconds and the buzzer will beep 3OOms. After that, the UPS will turn into Bypass mode at once.

When completing the above action, UPS output voltage is still present. In order to cut off the UPS output, simply cut off the utility power supply. A few seconds later, the ups will shut down and no output voltage is available from the UPS output terminal.

UPS shutdown without utility

To shut down the UPS without utility:

To power off the UPS by pressing button continuously for more than 3 second, and the buzzer will beep for 300ms. The UPS will cut off the output at once.

A few seconds later, the ups will shut down and no voltage is available from the UPS output.

5.6 LCD operation

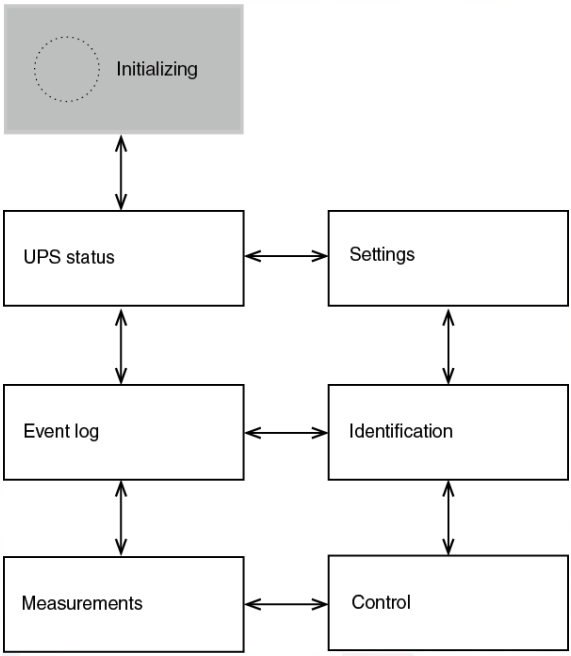
Except the default UPS status summary screen, the user can get more useful information about UPS status, detailed various measurements, previous event records which ever occurred, UPS own identification, and could change the settings to fit the user own requirements, optimize the function of UPS.

The main menu

In the default UPS status summary screen, when pressing ^ or v <3OOms, the detailed information about alarm, battery, the system status would be shown.

In the default UPS status summary screen, when pressing ESC >300ms, the display would enter main menu tree.

The main menu tree includes six branches: UPS status menu, measurement menu, event log menu, control menu, identification menu and settings menu.

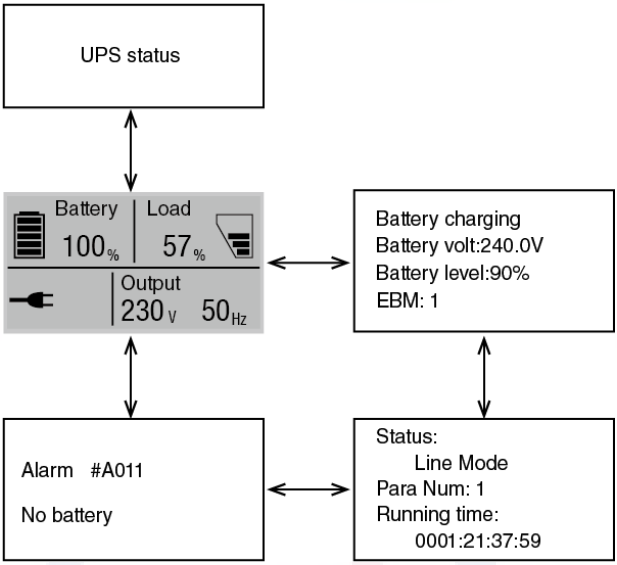


The UPS status menu

By pressing ↵ on the menu of "UPS status", the display would enter the next UPS status menu tree.

The content of UPS status menu tree is same as the default UPS status summary menu.

By pressing ESC >3OOms, the display would return the last main menu tree.

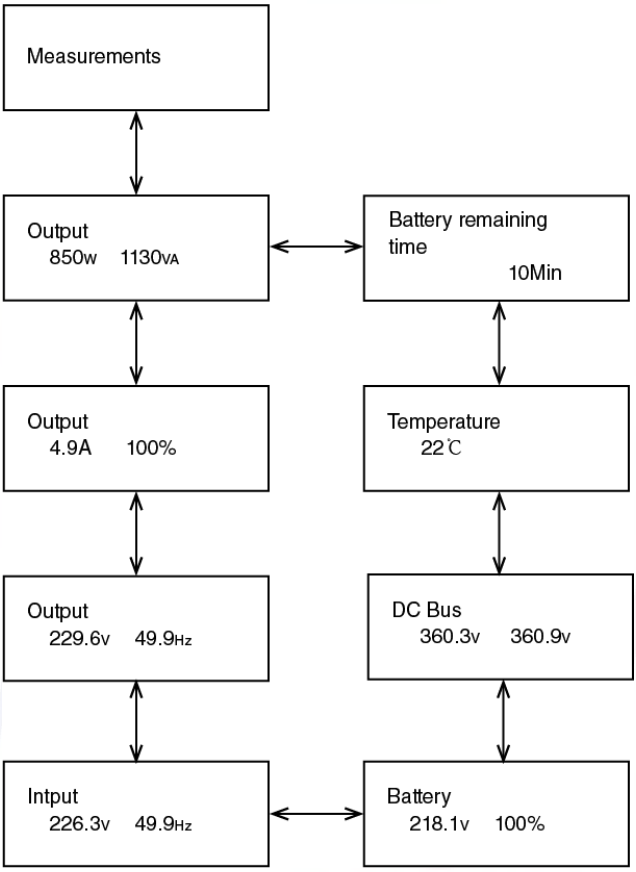


The measurement menu

By pressing ↵ on the menu of "Measurement", the display would enter the next measurement menu tree.

A lot of detailed useful information could be checked here, Ex. the output voltage and frequency, the output current, the load capacity, the input voltage and frequency, etc.

By pressing ESC >3OOms, the display will return to the last main menu tree.

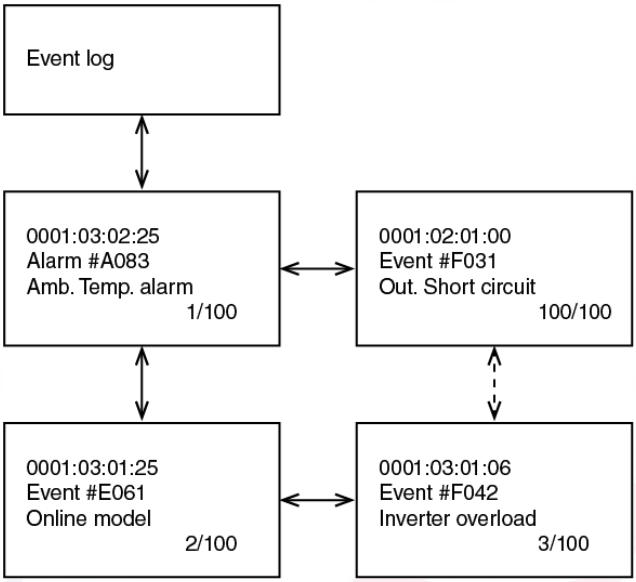


The event log menu

By pressing ↵ on the menu of "Event log", the display would enter the next event menu tree.

All the previous events, alarm and fault have been recorded here. The information includes the illustration, the event code, and the precise time of UPS when the event happened. By press ∧ or ∨ <3OOms, all the events could be displayed one by one. The max number of record is lOO, when the number is larger than lOO, the latest will replace the previous.

By pressing ESC >3OOms, the display would return the last main menu tree.



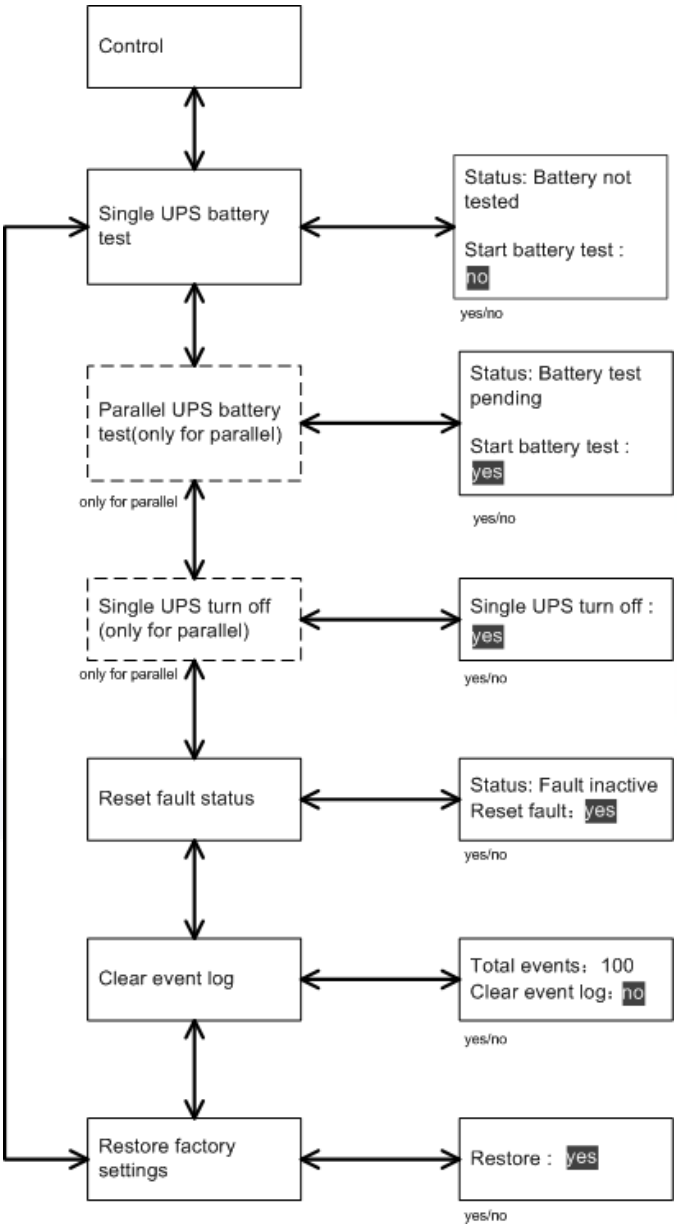
The control menu

By pressing ↵ on the menu of "Control", the display would enter the next control menu tree.

Start Battery Test: this is one command that control the UPS to do the battery test.

Reset Fault status: when fault occurs, UPS would keep in Fault mode and alarm. To recover to normal status, enter this menu to reset error status, then UPS would stop alarm and recover to bypass mode. And the reason of fault should be checked and deleted before UPS is turned on again by manual operation.

Restore factory settings: all the settings would be recover to default factory settings. It could only be done in Bypass mode.

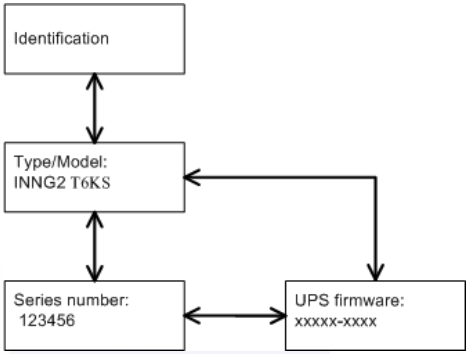

Control
Single UPS battery test
Status: Battery not tested
Start battery test : no
yes/no
Parallel UPS battery test(only for parallel)
only for parallel
Status: Battery test pending
Start battery test : yes
yes/no
Single UPS turn off (only for parallel)
only for parallel
Single UPS turn off : yes
yes/no
Reset fault status
Status: Fault inactive
Reset fault：yes
yes/no
Clear event log
Total events：100
Clear event log：no
yes/no
Restore factory settings
Restore : yes
yes/no

The identification menu

By press ↵ on the menu of "Identification", the display would enter the next identification menu tree.

The identification information includes UPS serial number, firmware serial number, model type, would be shown here.

By press ESC >3OOms, the display would return the last main menu tree.

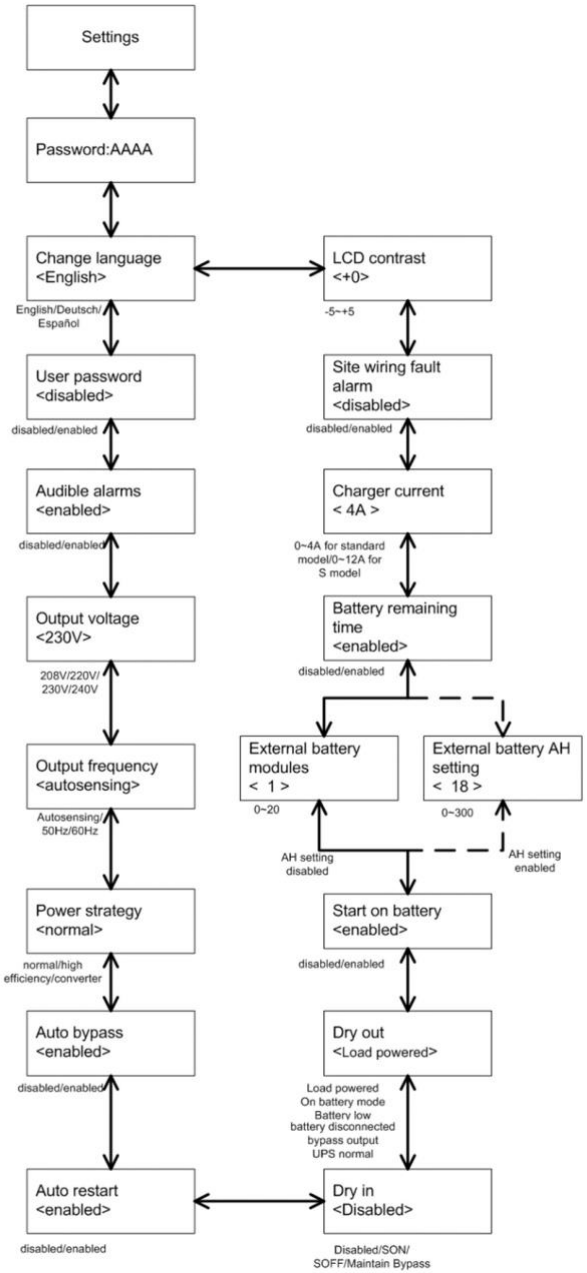


The setting menu

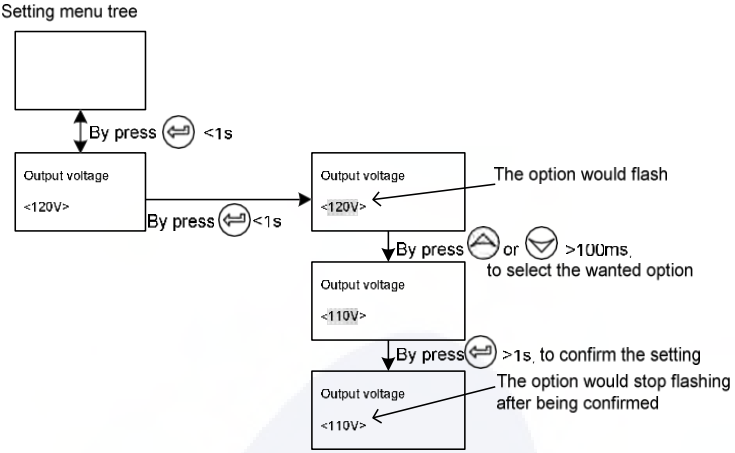
Please contact your local distributor for further information before using the settings. Some settings would be changed the specification, and some settings would enable or disable some functions. The unsuitable option setting by user may result in potential failures or protecting function loss, even directly damage the load, battery or UPS.

AH setting could be set via RS232 or USB communication. Default AH setting is disabled.

Most of settings could only be done while UPS is in Bypass mode.


Settings
Password:AAAA
Change language
<English>
English/Deutsch/
Español
LCD contrast
<+0>
-5~+5
User password
<disabled>
disabled/enabled
Site wiring fault
alarm
<disabled>
disabled/enabled
Audible alarms
<enabled>
disabled/enabled
Charger current
< 4A >
0~4A for standard
model/0~12A for
S model
Output voltage
<230V>
208V/220V/
230V/240V
Battery remaining
time
<enabled>
disabled/enabled
External battery
modules
< 1 >
0~20
External battery AH
setting
< 18 >
0~300
AH setting
disabled
AH setting
enabled
Output frequency
<autosensing>
Autosensing/
50Hz/60Hz
Power strategy
<normal>
normal/high
efficiency/converter
Start on battery
<enabled>
disabled/enabled
Auto bypass
<enabled>
disabled/enabled
Dry out
<Load powered>
Load powered
On battery mode
Battery low
battery disconnected
bypass output
UPS normal
Auto restart
<enabled>
disabled/enabled
Dry in
<Disabled>
Disabled/SON/
SOFF/Maintain Bypass

Example: set rated output voltage value



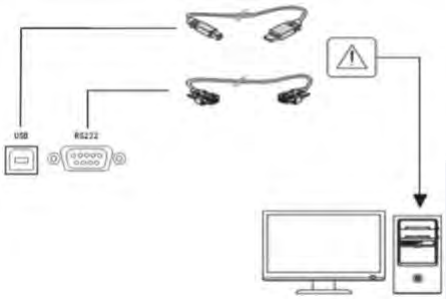
6 Communication

6.1 Communication ports

RS232 or USB communication ports

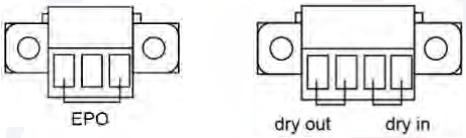
The RS232 and USB communication ports cannot operate simultaneously.

1. Communication cable to the serial or USB port on the computer.
2. Connect the other end of the communication cable to the RS232 or USB communication port on the UPS.



Emergence Power Off

The Emergence Power Off interface provides an emergence power off function. When the EPO function is enabled {default setting}, once the EPO port is pulled out, the UPS would shut off the output and enter into EPO mode, and the UPS would not respond anything ON/OFF request unless the port is plugged back.



Dry in & Dry out

Dry in allows remote action to switch On/ switch Off/ maintain bypass the UPS.
When contact changes from closed to open, the UPS is switch On/ switch Off/ maintain bypass the UPS.

The Dry out port is normally closed, if the Dry out port is open, it indicate that the UPS is Loaded power/ On battery mode /Battery low /Battery disconnected /Bypass output/ups normal.

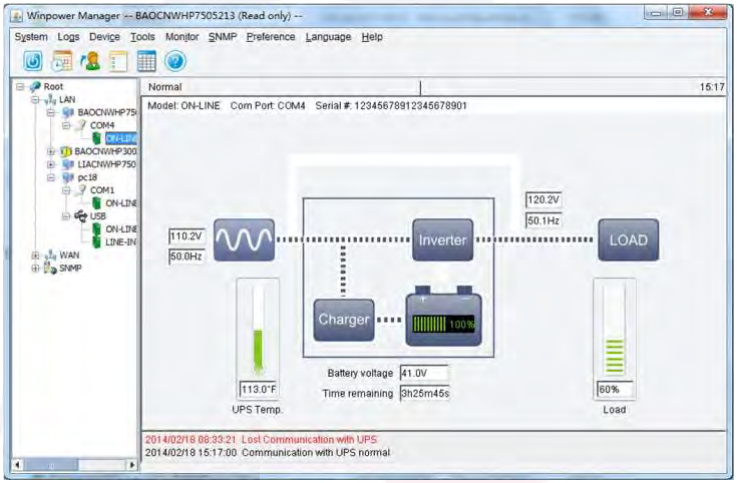
6.2 Intelligent Card (Optional)

Intelligent Card allows the UPS to communicate with different types of devices in variety of networking environments. The Dragon LV series could use the following connectivity cards, please contact your local distributor for details

- NMC Card - Ideal monitoring solution enables user to monitor and control the status of UPS on web browser via internet
- CMC card - provides connection to Modbus protocol with standard RS485 signal.
- AS400 card - Provides voltage-free dry-contact signals for programmable controller and management system
- EMP - Supports temperature and humidity sensors for remote environment monitoring, should work with NMC Card

6.3 UPS Management Software

WinPower is a new software for UPS monitoring, which provides user-friendly interface to monitor and control your UPS. This unique software provides safely auto shutdown for multi-computer systems while power failure. With this software, users can monitor and control any UPS on the same LAN no matter how far from the UPSs.



Installation procedure:

I. Go to the website:
http://www.ups-software-download.com/

2. Choose the operation system you need and follow the instruction described on the website to download the software.

3. When downloading all required files from the internet, enter the serial No: 5IICI-OI22O-OIOO-478DF2A to install the software.

When you finish installation, restart your computer, the WinPower software will appear as a green plug icon located in the system tray, near the clock.

7 UPS maintenance

7.1 Equipment care

For the best preventive maintenance, keep the area around the equipment clean and dust free. If the atmosphere is very dusty, clean the outside of the system with a vacuum cleaner.

For full battery life, keep the equipment at an ambient temperature of 25°C {77°F}.
The batteries are rated for a 3-5 year service life. The length of service life varies, depending on the frequency of usage and ambient temperature. Batteries used beyond expected service life will often have severely reduced runtimes. Replace batteries at least every 4 years to keep units running at peak efficiency.

7.2 Transporting the UPS

Please transport the UPS only in the original packaging. If the UPS requires any type of transportation, verify that the UPS is disconnected and turned off.

7.3 Storing the equipment

If you store the equipment for a long period, recharge the battery every 6 months by connecting the UPS to utility power. Recommends that the batteries charge for 48 hours after long-term storage.

If batteries were never recharged over 6 months, do not use them. Contact your service representative.

7.4 Recycle

Contact your local recycling or hazardous waste center for information on proper disposal of the used equipment.

Do not dispose of the batteries in the fire. Which may cause battery explosion. The batteries must be rightly disposed according to local regulation.

Do not open or destroy the batteries. Escaping electrolyte can cause injury to the skin and eyes. It may be toxic.

Do not discard the UPS or the UPS batteries in the trash.

This product contains sealed lead acid batteries and must be disposed as it's explained in this manual. For more information, contact your local recycling/reuse or hazardous waste center.

The crossed-out wheeled bin symbol indicates that waste electrical and electronic equipment should not be discarded together with unseparated household waste but must be collected separately. The product should be handed in for recycling in accordance with the local environmental regulations for waste disposal.

By separating waste electrical and electronic equipment, you will help reduce the volume of waste sent for incineration or land-fills and minimize any potential negative impact on human health and environment.

8 Troubleshooting

The UPS is designed for durable, automatic operation and also alert you whenever potential operating problems may occur. Usually the alarms shown by the control panel do not mean that the output power is affected. Instead, they are preventive alarms intended to alert the user.

- Events are silent status information that are recorded into the Event log. Example = "Battery charging".
- Alarms are recorded into the Event log and displayed on the LCD status screen with the logo blinking. Some alarms may be announced by a beep every 1 second. Example = "Battery low".
- Faults are announced by a continuous beep and red LED, recorded into the Event log. Example = Out. short circuit.

Use the following troubleshooting chart to determine the UPS alarm condition.

8.1 Typical alarms and faults

To check the Event log:

1. By pressing ↵ on the menu of “Event log”.
2. Scroll through the listed events or faults.
3. The following table describes typical conditions.

Conditions	Possible cause	Action
Battery mode Battery (Orange) LED is On. 1 beep every 4 seconds. Code: E062	A utility failure has occurred and the UPS is in Battery mode.	The UPS is powering the equipment with battery power. Prepare your equipment for shutdown.
Battery low Battery (Orange) LED is On. 1 beep every 1 second. Code: A012	The UPS is in Battery mode and the battery is running low.	This warning is approximate, and the actual time to shutdown may vary significantly. Depending on the UPS load and number of Extended Battery Modules (EBMs), the "Battery Low" warning may occur before the batteries reach 20% capacity.
No battery Fault (Red) LED is Flash 1beep every 1 second Code: A011	The batteries are disconnected.	Verify that all batteries are properly connected. If the condition persists, contact your service representative.

Conditions	Possible cause	Action
Bypass mode Bypass (Orange) LED is on. Code: E060	An overload or a fault has occurred, or a command has been received and the UPS is in Bypass mode	Equipment is powered but not protected by the UPS. Check for one of the following alarms: over temperature, overload or UPS failure.
Power overload Fault (Red) LED is Flash 2beep every 1 second Code: A041	Power requirements exceed the UPS capacity	Remove some of the equipment from the UPS. The UPS continues to operate, but may switch to Bypass mode or shut down if the load increases. The alarm resets when the condition becomes inactive.
UPS over temperature Fault (Red) LED is On. Beep continuous. Code: F081	The UPS internal heat sink temperature is too high or a fan has failed. At the warning level, the UPS generates the alarm but remains in the current operating state. If the temperature rises another 2°C, the UPS transfers to Bypass mode or Standby mode.	Clear vents and remove any heat sources. Allow the UPS to cool. Ensure the airflow around the UPS is not restricted. Restart the UPS. If the condition continues to persist, contact your service representative.
Transformer over temperature Fault (Red) LED is On. Beep continuous. Code: F086	The transformer temperature is too high.	Clear events and remove any heat sources. Allow the UPS to cool. Ensure the airflow around the UPS is not restricted. Restart the UPS. If the condition continues to persist, contact your service representative.
ON Maintenance Bypass Bypass (Orange) LED is on. Code: A072	UPS was manually commanded to switch to bypass and will remain in bypass until commanded out of bypass	Check the maintain bypass switch status
In HE Mode Line (green) LED is on. Code: E063	The UPS is on bypass while operating on the High Efficiency setting.	The equipment transferred to bypass utility power as a normal function of High Efficiency operation. Battery mode is available and your equipment is protected.

Conditions	Possible cause	Action
Site Wiring Fault Fault (Red) LED is flash 1beep every 1 second Code: A004	Site Fault detection is supported on all models anytime there is a Grounding Neutral connection. Alarm triggers when the difference between ground and neutral voltage is > 15v.	Site Fault detection should be enabled by default. It can still be enabled / disabled from the LCD settings menu. Reconnect all input wires.
Back feed Fault (Red) LED is On. Beep continuous. Code: F093	UPS has a unexpected bypass current on battery mode	Transfer to maintenance bypass and call service.
Inv Overload Fault Fault (Red) LED is On Beep continuous. Code: F042	UPS has transferred to bypass or fault mode because of overload in inverter mode	The UPS transfers to Battery mode if supporting the load. Remove some of the equipment from the UPS
Byp Overload Fault Fault (Red) LED is On. Beep continuous. Code: F043	UPS has cut off the output and transferred to fault mode because of overload in bypass mode or HE mode.	Remove some of the equipment from the UPS
Output Short Circuit Fault (Red) LED is On. Beep continuous. Code: F031	Indicates that the UPS has detected abnormally low impedance placed on its output and considers it a short circuit	Remove all the loads. Turn off the UPS. Check if UPS output and loads is short circuit. Ensure short circuit is removed before turning on again.
Fan Failure Fault (Red) LED is flash 1 beep every 1 second Code: A085	Indicates that the fan could not work normally	Check fans of UPS
BUS Over Voltage Fault (Red) LED is On. Beep continuous. Code: F021	Indicates that the UPS get BUS over voltage fault because of BUS.	The UPS transfers to Bypass mode if supporting the load
BUS Under Voltage Fault (Red) LED is On. Beep continuous. Code: F022	Indicates that the UPS get BUS under voltage fault	The UPS transfers to Bypass mode if supporting the load

Conditions	Possible cause	Action
BUS Unbalance Fault (Red) LED is On. Beep continuous. Code: F023	Indicates that the positive BUS voltage and negative BUS voltage are too lopsided to fault	The UPS transfers to Bypass mode if supporting the load
BUS Short Fault (Red) LED is On. Beep continuous. Code: F024	Indicates that the BUS voltage decrease very fast	Contact your service representative
BUS Softstart Fail Fault (Red) LED is On. Beep continuous. Code: F025	Indicates that the BUS could not soft start successfully	Contact your service representative
Inv Over Voltage Fault (Red) LED is On. Beep continuous. Code: F032	Indicates that the UPS get invert over voltage fault	The UPS transfers to Bypass mode if supporting the load
Inv Under Voltage Fault (Red) LED is On. Beep continuous. Code: F033	Indicates that the UPS get inverter under voltage fault	The UPS transfers to Bypass mode if supporting the load
Inv Softstart Fail Fault (Red) LED is On. Beep continuous. Code: F034	Indicates that the inverter could not soft start successfully	Contact your service representative
Charger Fail Fault (Red) LED is flash 1 beep every 1 second Code: A015	Indicates that the UPS has confirmed the charger has failed	The UPS turns off the charger until the next power recycle. Contact your service representative
Battery Over Voltage Fault (Red) LED is On. Beep continuous. Code: F016	Indicates that the battery voltage is too high	The UPS will turn off the charger until the battery voltage is normal
Negative power Fault Fault (Red) LED is On. Beep continuous. Code: F0E1	In parallel system，power of UPS is negative	Redundancy mode，the fault UPS turn to fault mode without output Increase mode，UPS1& UPS2 turn to fault mode

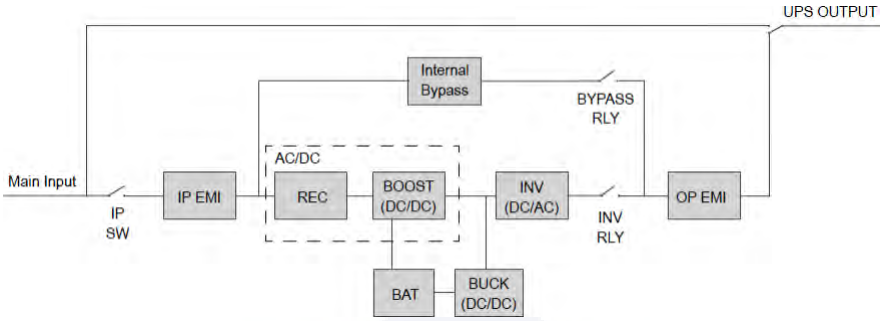
Conditions	Possible cause	Action
Parallel cable loss Fault (Red) LED is On. Beep continuous. Code: F0E2	In parallel system，parallel cable disconnects	Disconnect parallel cable one turn to fault mode
Parallel system battery status Fault (Red) LED is flash 1 beep every 1 second Code: A0E6	UPS1 connect battery，UPS2 without battery	Check battery connect status
Line input different Fault (Red) LED is flash 1 beep every 1 second Code: A0E7	Parallel system，UPS1 line ok，UPS2 line loss	Check the line input
Power strategy different Fault (Red) LED is flash 1 beep every 1 second Code: A0E9	Parallel system，UPS mode（normal，converter，HE）different	Check UPS OP mode, Keep OP mode be the same
Rate power different Fault (Red) LED is flash 1 beep every 1 second Code: A0EA	Parallel system rate power different	Rate power different，not allow turn on UPS. Keep rate power be the same
HE in parallel Fault (Red) LED is flash 1 beep every 1 second Code: A0EB	Parallel system，UPS mode set as HE	HE not allow in parallel system，change UPS mode

8.2 Silencing the alarm

Press the ESC (Escape) button 3s on the front panel display to silence the alarm. Check the alarm condition and perform the applicable action to resolve the condition. If the alarm status changes or press the ESC button 3s on the front panel display, the alarm beeps again, overriding the previous alarm silencing.

9 Specifications

9.1 UPS Block Diagram



9.2 Model specifications

Electrical input

Nominal frequency	50/60Hz auto-sensing
Frequency range	40 Hz– 70 Hz ≤60% rated load 45 Hz– 55 Hz (50Hz system) 54 Hz – 66 Hz (60Hz system) >60% rated load
	45 Hz– 55 Hz 54 Hz – 66 Hz >60% rated load
Bypass voltage range	176~264Vac
Noise filtering	MOV for normal and common mode noise

Model	Default input (Voltage/Current)	Selectable input Voltage range	Voltage at 100% Load
MS-ECO6000	240V / 32.6A	208/220/230/240V	176~276Vac
MS-ECO10000	240V / 51.1A	208/220/230/240V	176~276Vac

Electrical input connections

Model	Input connection	Input cable
MS-ECO6000	Hardwired	Not provided
MS-ECO10000		

Electrical output

All models	Normal mode	Battery mode
Voltage regulation	±2.5%	±2.5%
Efficiency	> 93% (High Efficiency mode) > 92%	> 88%
Frequency regulation	Sync with line ±10% of nominal line frequency (outside this range: ±0.1% of auto-selected nominal frequency)	±0.1% of auto-selected nominal frequency
Nominal output	208V/220V/230V/240V (ISO2 secondary in series) 110V×2/120V×2/115V×2 (ISO2 secondary in Parallel) 6000/10000VA* 6000/10000W*	
Frequency	50 or 60Hz, autosensing or configurable as a frequency converter	
Output overload	100-105% : no alarm 105-125% : load transfers to Bypass mode after 10 minutes 125-150% : load transfers to Bypass mode after 30s	
Output overload (Bypass mode)	100-105% : no alarm 105-125% : UPS shuts down after 10min 125-150% : UPS shuts down after 30s	
Voltage waveform	Sinewave	
Harmonic distortion	< 2% THDV on linear load < 8% THDV on non-linear load	
Transfer time	Online mode: 0 ms (no break) High Efficiency mode: 10ms maximum (due to loss of utility)	
Power factor	1	
Load crest ratio	3 to 1	

* for 208V output, the load level will be derating to 90%.

Electrical output connections

Model	Output connection	Output cable
MS-ECO6000	Hardwired	Not provided
MS-ECO10000		

Environmental and safety

Certifications	UL1778, EN 62040-1 IEC/EN 62040-2: Cat. C3 IEC/EN 62040-3
EMC (Emissions)*	Conduction: C3 IEC/EN 62040-2 Radiation: C3 IEC/EN 62040-2
EMC (Immunity)	IEC 61000-4-2, Level 3 IEC 61000-4-3, Level 3 IEC 61000-4-4, Level 4 (also on signal ports) IEC 61000-4-5, Level 4, Criteria B IEC 61000-4-6, Level 3 IEC 61000-4-8, Level 4

* for output cable < 10m.

Agency markings	cTUVus, CE
Operating temperature	0~40℃ full load no derating 40~50℃ output power derating to 50% load, Charger current derating 50%
Storage temperature	-15 to 40°C (32 to 104°F) with batteries -25 to 60°C (5 to 140°F) without batteries
Transit temperature	-25 to 55°C (-13 to 130°F)
Relative humidity	0 to 95% no condensing
Operating altitude	Up to 3,000 meters (9,843 ft) above sea level with 10% derating per 1000m
Transit altitude	Up to 10,000 meters (32,808 ft) above sea level
Audible noise	< 55 dBA at 1 meter typical

Battery

	EBCs
Tower configuration	192Vdc 16 x 12V, 9Ah
Fuses	100A for 10kVA models and EBC
Type	Sealed, maintenance-free, valve-regulated, lead-acid, with minimum 3-year float service life at 25°C (77°F). Lifetime is reduced above 30 °C.
Monitoring	Advanced monitoring for earlier failure detection and warning
Battery port	External ANEN-SA30 connector on power module for connection to EBC
EBC battery cable length	100 cm for tower models

Communication options

Communication bay	available independent communication bay for connectivity cards
Compatible connectivity cards	MODBUS card NMC card AS400 card
Communication ports	RS-232 (DB9): 2400 bps USB 2.0: full speed
Dry out	2 pins jumper (normally closed)
Dry in	2 pins jumper (normally closed)
Emergency Power Off	3 pins jumper (normally closed)

10 Glossary

Bypass AC source	Source supplying the bypass line. The equipment can be transferred to the bypass line if an overload occurs on the UPS output, for maintenance or in the event of a malfunction.
Frequency converter	Operating mode used to convert the AC-power frequency between the UPS input and output (50Hz -> 60Hz or 60Hz -> 50Hz).
Low-battery warning	This is a battery-voltage level indicating that battery power is low and that the user must take action to prevent the imminent break in the supply of power to the load.
Backup time	Time during which the load can be supplied by the UPS operating on battery power.
Load	Devices or equipment connected to the UPS output.
HE mode	Operating mode by which the load is supplied directly by the AC source if it is within the tolerances defined by the user. This mode reduces the consumption of electrical power
Manual bypass	Rotary switch controlled by the user, used to connect the loads directly to the AC source. Transfer of the load to the manual bypass enables UPS maintenance without interrupting the supply of power to the connected loads.
Normal (double conversion) mode	The normal UPS operating mode in which the AC source supplies the UPS which in turn supplies the connected loads (after electronic double conversion).
Normal AC source	Normal source of power for the UPS.
Relay contacts	Contacts supplying information to the user in the form of signals.
UPS	Uninterruptible Power Supply.