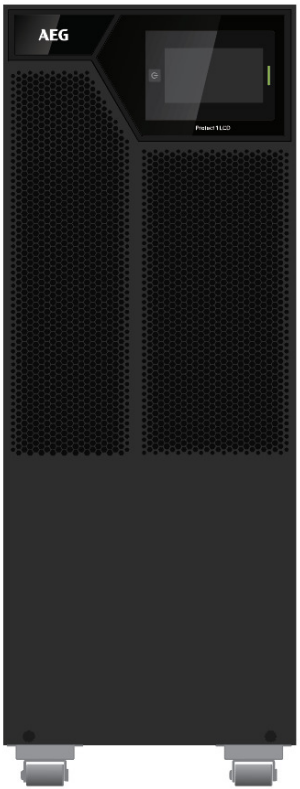
AEG

POWER
SOLUTIONS

PROTECT 1 LCD

User Manual

Protect 1 LCD 10 kVA
Protect 1 LCD 15 kVA
Protect 1 LCD 20 kVA



Thank you for purchasing the AEG UPS PROTECT 1 LCD from AEG Power Solutions. Safety information and operating instructions are included in this manual. To ensure correct use of the UPS, please read this manual thoroughly before operating it. Use this manual properly.

CONTENT

Revision

	Change	Date	Name
00	Created	21.07.2021	AN

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 that are covered in this manual are intended for installation in an environment within 0 to 40°C, free of conductive contaminant.

Special symbols

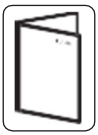
RISK OF ELECTRIC SHOCK - Observe the warning associated with the risk of electric shock symbol.

Important instructions that must always be followed.

EU separate collection and lead content mark for lead acid batteries. Indicates that the battery must not be disposed of to the normal household waste but be separately collected and recycled.

EU separate collection mark for waste electrical and electronic equipment (WEEE). Indicates that the item must not be disposed of to the normal household waste but be separately collected and recycled.

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.
- UPS enclosure IP rating IP20.
- CAUTION - To reduce the risk of fire, the unit connects only to a circuit provided with branch circuit overcurrent protection.
- 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 creep age 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.
- 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.
- For PLUGGABLE EQUIPMENT, the socket-outlet shall be installed near the equipment and shall be easily accessible.
- 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 +55°C without battery (-15°C to +40°C with battery).
- TN-S/IT/TN-C/TT of electrical supply system may be connected by UPS.
- This UPS may be provided with a maximum of 6 extension battery cabinets or equivalent.

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 in rack system).
- 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.
- This is a category C3 UPS product. In a residential environment, this product may cause radio interference, in which case the user may be required to take additional measures.

1 Introduction

Thank you for selecting our UPS to protect your electrical equipment.
We recommend that you take the time to read this manual to take full advantage of the many features of your UPS.
Before installing your UPS, please read the booklet presenting the safety instructions. Then follow the indications in this manual.
EBM stands for External Battery Modules

1.1 Product features

The 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.

Technical data:

- Double conversion with pure sine waveform output
- VFI SS 111 @230V/50Hz according to IEC/EN 62040-3
- Full digital control
- Output PF up to 1
- High charger capability, the charger current is up to 13 A
- Smart charging method to expand battery lifetime
- Auto detection of EBM's connected to the UPS
- Communication ports: RPO, Dry contacts (input and output), intelligent slot (for SNMP card), USB (for Service and Customer use), RS232 (for Service and Customer use)
- Dot-matrix touch-screen LCD, supporting multi-language
- Phases configurations: 3/3 (default); 3/1; 1/1.
- ECO Mode
- Start-able without battery
- "CVCF" mode (Frequency Converter Mode)

1.2 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 mainly made up of recyclable materials.
Dismantling and disassembly must take place in compliance with all local regulations concerning waste. At the end of its service life, the product must be transported to recycling centers, re-use and treatment facilities for waste electrical and electronic equipment (WEEE).

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.

2 Product Overview

2.1 Model list

The weight in this table is reference only, please see the labels on the carton for details.

Product	Description	Net Weights (kg)	Unit Size (W x H x D) (mm)
UPS	10kVA with batteries	107.4	300*805*727
	10kVA w/o batteries	55.4	
	15kVA with batteries	161.6	
	15kVA w/o batteries	59.1	
	20kVA with batteries	161.6	
	20kVA w/o batteries	59.1	
EBM	BP for 10kVA	115.6	225*589*518
	Empty BP for 10kVA	13	
	BP for 15/20kVA	115.6	
	Empty BP for 15/20kVA	13	

Optional modular or accessory:

If order other type function modular or accessories, please contact distributors/agents.

Type	Description	Remark
Intelligent Card	Dry Contact card (AS400)	See in chapter 6.5
	NMC card	
	MODBUS card (CMC)	
EMP	Temperature and humidity sensors	
WLAN module	WLAN module	Wireless connection for IoT
Battery cable	Battery cable for UPS connect with user's own EBM	1.8m length, see in chapter 3.4.3

2.2 Presentation

2.2.1 UPS model:

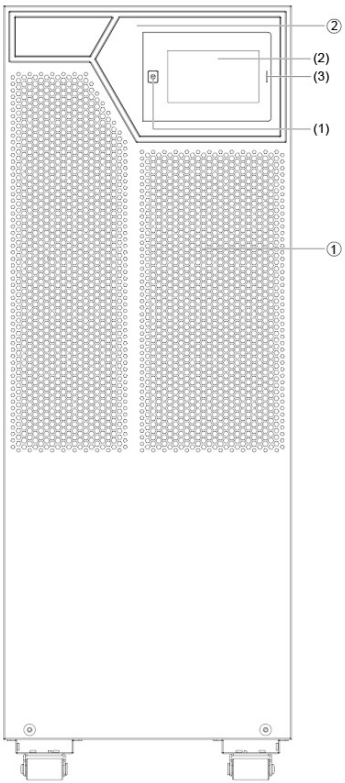
Front view

1. Ventilation area
2. LCD Modular, including:

   (1)---Power button

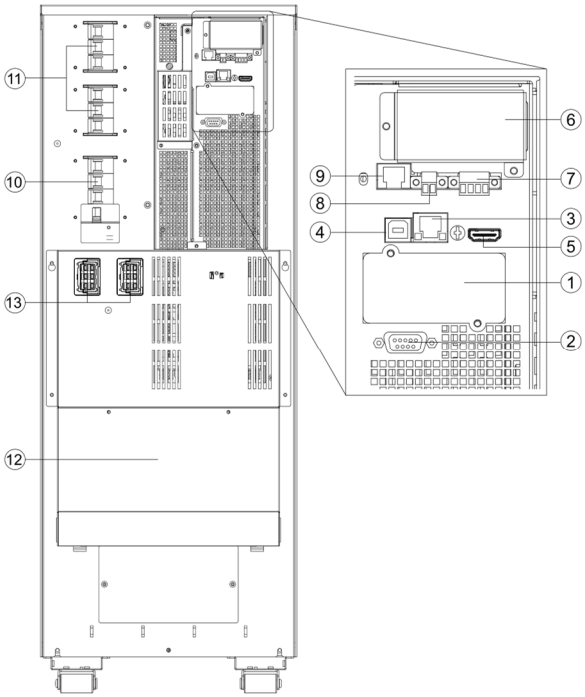
   (2)---Touch screen

   (3)---LED indicator



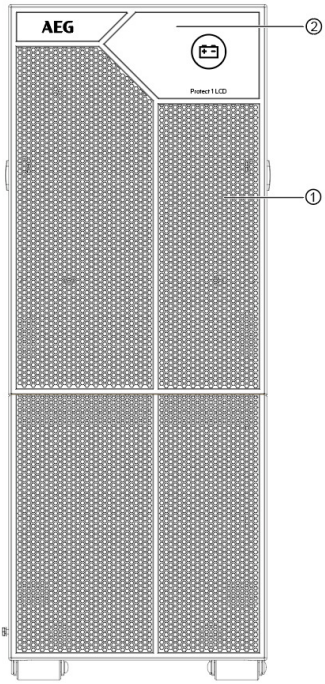
Rear view

1. Intelligent slot
2. RS232
3. Ethernet port (RJ45, for IoT function)
4. USB
5. Disabled
6. Parallel port
7. Dry contacts (input/output)
8. RPO (Remote Power Off) contact
9. RJ45 (for EBM detect)
10. Maintenance bypass switch
11. Main input switch and bypass input switch
12. AC Input /Output terminals
13. External battery port



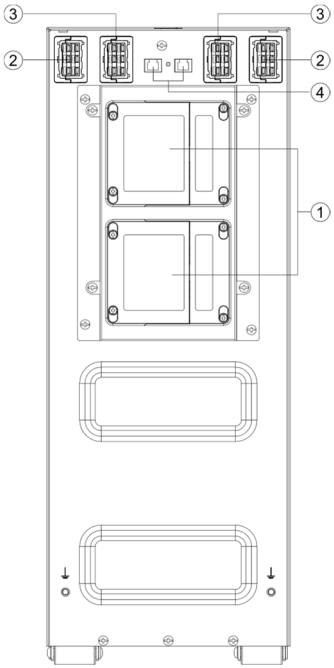
EBM (External Battery Module) - Front view

1. Ventilation area
2. EBM label



EBM (External Battery Module) - Rear view

1. Fuse board cover (replace EBM fuse)
2. EBM port 1
3. EBM port 2
4. EBM detection (RJ45 port)



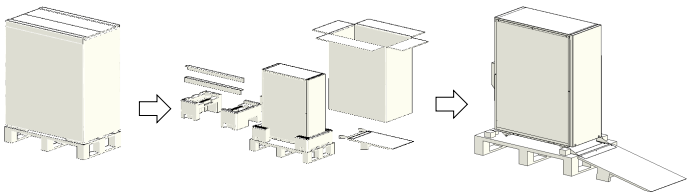
3 Product Overview

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.

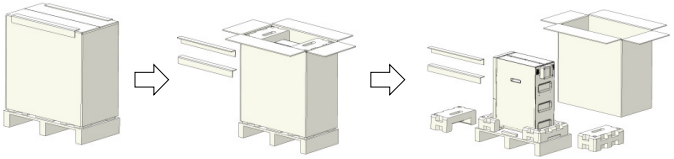
3.1 Unpacking and inspecting

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.

UPS



EBM



Note:
The cabinet is heavy, please see 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.

3.2 Checking the accessory kit

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

	Standard model	EBM
	UPS 10K/15K/20K	
Battery cable		√ (two for every EBM delivered)
EBM detection cable		√ (one for every EBM delivered)
Copper busbar	√	
Gland kit	√	
USB cable	√	
RS232 cable	√	
Parallel cable	√	
Tower foot	√	√
Quick start (EBM)		√
User manual (UPS)	√	

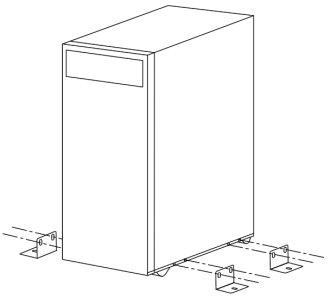
Note: √ --- Standard configuration;

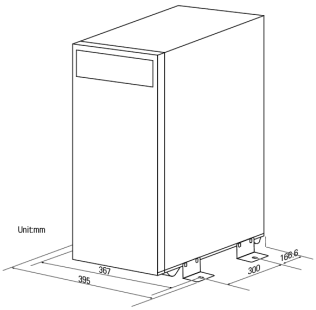
3.3 Mechanical installation

To keep air-flowing freely, it is recommended to keep a clearance with 500 mm 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 stability.
2. Install the unit to ground(optional): 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.

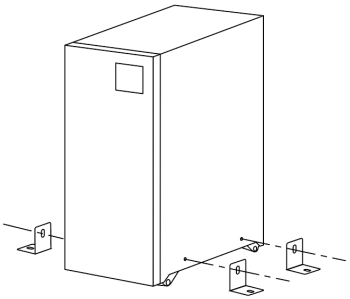


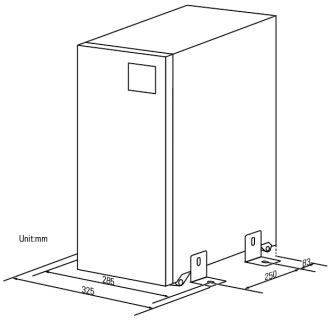


EBM model

It is recommended to place EBM module(s) on the right side of the UPS.

1. Place the unit on a flat surface in its final location and install 'Tower foot' for stability.
2. Install the unit to ground (optional): 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.





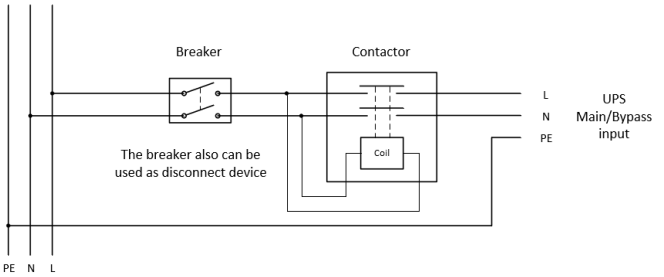
3.4 Power cables connection

This chapter introduces how to wire AC IN/OUT cables to UPS in different modes, and UPS connecting with EBM/MBP.

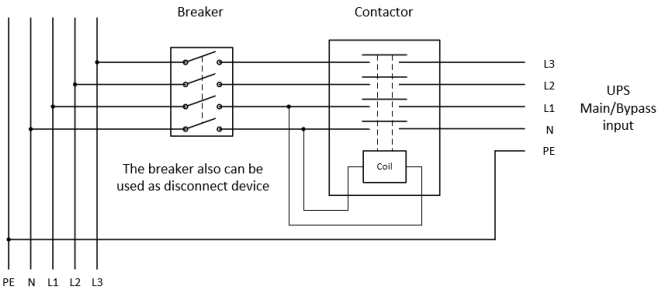
3.4.1 Input /Output wiring specification

Before wring UPS, upstream breaker and backfeed contactor should be configured to avoid power backfeed to unity. And 'backfeed voltage danger' warning label should be added in backfeed contactor or device. Before operating, UPS input should cut off, and check all terminals voltage to avoid voltage dangerous. Backfeed contactor rating current should be larger than UPS rating input current.

Below figures show the wiring system of UPS input.



Single phase input system



Three phase input system

Danger!

The rated current of the utility power switch must be greater than the UPS input current, otherwise the utility power switch may be burnt!

Recommended circuit breaker and contactor current specifications:

UPS power rating	Input mode	Breaker	Contactor
10000VA	1 phase main input	80A	≥80A
	3 phase main input	32A	≥32A
	1 phase bypass input	63A	≥63A
	3 phase bypass input	32A	≥32A
15000VA	1 phase main input	125A	≥125A
	3 phase main input	50A	≥50A
	1 phase bypass input	100A	≥100A
	3 phase bypass input	50A	≥50A
20000VA	1 phase main input	160A	≥160A
	3 phase main input	63A	≥63A
	1 phase bypass input	125A	≥125A
	3 phase bypass input	63A	≥63A

Recommended output circuit breaker current specifications:

UPS power rating	Output mode	Breaker current
10000VA	1 phase output	63A
	3 phase output	32A
15000VA	1 phase output	100A
	3 phase output	50A
20000VA	1 phase output	125A
	3 phase output	63A

Recommended battery circuit breaker current specifications:

UPS power rating	Breaker current
10000VA	80A
15000VA	63A
20000VA	80A

Read the Safety instructions regarding backfeed protection requirements.

Recommended cable minimum cross-sectional area (unit: mm²)

UPS power rating	Input/ Output Mode	Input					Output			Battery	
		Main input		Bypass input		Ground wire					
		L wire	N wire	L wire	N wire		L wire	N wire	Ground wire	+/N/- wire	Ground wire
10000 VA	3-3	4	4	4	4	10	4	4	4	10	10
	3-1	4	4	10	10	10	10	10	10	10	10
	1-1	16	16	10	10	16	10	10	10	10	10
15000 VA	3-3	6	6	6	6	10	6	6	6	10	10
	3-1	6	6	16	16	16	16	16	16	10	10
	1-1	35	35	16	16	35	16	16	16	10	10
20000 VA	3-3	10	10	10	10	10	10	10	10	10	10
	3-1	10	10	25	25	25	25	25	25	10	10
	1-1	50	50	25	25	50	25	25	25	10	10

Note:

1. Please select the larger cross-section conductor for the UPS input cable in the single source application.
2. UPS output cable length is recommended not to exceed 10m.
3. In the three-phase output mode, if the load is an unbalanced load, the L wire of the bypass and output may exceed the rated current, and the maximum rated current will be 1.732 times. The corresponding protection device and wiring cable must be determined according to the standards of the region and the actual situation of the user.

3.4.2 Wiring for AC cable (AC source to UPS)

High leakage current:

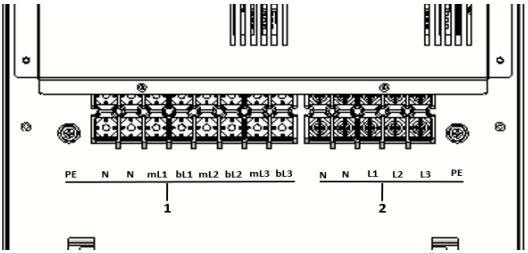
Earth connection essential before connecting supply.

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

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.

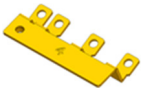
Remove the cover of terminal block, Layout of AC input/output as below:



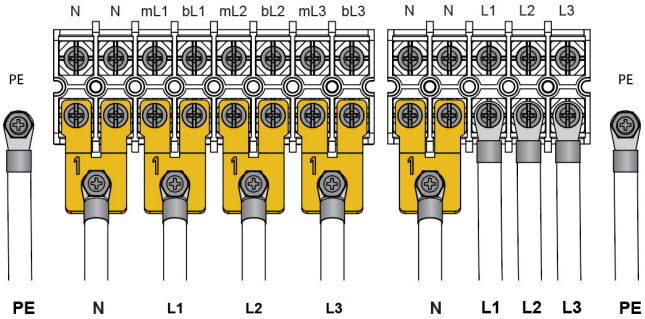
Note:

1. UPS input: PE/N/N/mL1/bL1/mL2/bL2/mL3/bL3('m' is main input, 'b' is bypass input)
2. UPS output: N/N/L1/L2/L3/PE

UPS provide busbars (as below) for 6 modes of wiring application, default is 3-3 mode (single source).

Busbars		Mode					
Item#	Figure	3-3 Single source	3-3 Dual source	3-1 Single source	3-1 Dual source	1-1 Single source	1-1 Dual source
1		5pcs	2pcs	2pcs	2pcs	2pcs	2pcs
3				1pc	1pc	1pc	1pc
4				1pc			
5					1pc		1pc
6						1pc	
7							1pc

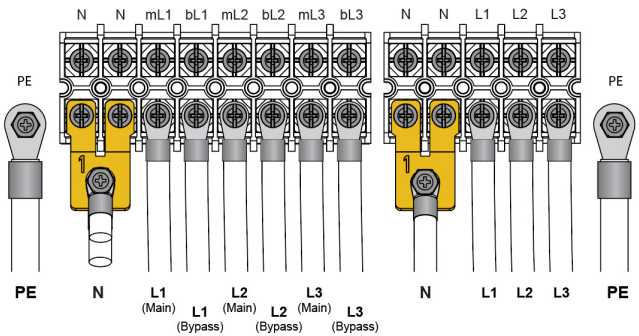
- Mode 3-3(single source)



Input: Connect ground cable (PE) to ground screw of chassis first;
Short terminal N/N with busbar #1, connect AC cable(N);
Short terminal mL1/ bL1 with busbar #1, connect AC cable(L1);
Short terminal mL2/ bL2 with busbar #1, connect AC cable(L2);
Short terminal mL3/ bL3 with busbar #1, connect AC cable(L3).

Output: Connect ground cable (PE) to ground screw of chassis first;
Short terminal N/N with busbar #1, connect AC cable(N);
Connect terminal L1/L2/L3 to AC cable(L1/L2/L3).

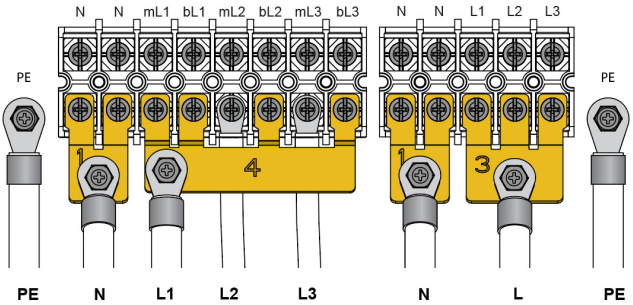
- Mode 3-3(dual source)



Input: Connect ground cable (PE) to ground screw of chassis first;
Short terminal N/N with busbar #1, connect AC main source cable(N) and bypass source cable(N);
Connect input terminal mL1/mL2/mL3 to main source cable(L1/L2/L3);
Connect bypass terminal bL1/bL2/bL3 to bypass source cable(L1/L2/L3).

Output: Connect ground cable (PE) to ground screw of chassis first;
Short terminal N/N with busbar #1, connect AC cable(N);
Connect terminal L1/L2/L3 to AC cable(L1/L2/L3).

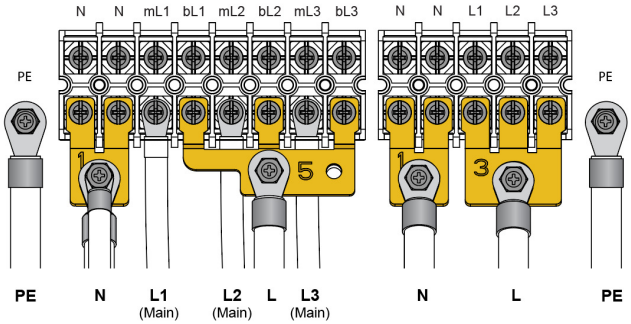
- Mode 3-1(single source)



Input: Connect ground cable (PE) to ground screw of chassis first;
Short terminal N/N with busbar #1, connect AC cable(N);
Short input terminal mL1/bL1/bL2/bL3 with busbar #4, connect to AC cable(L1);
Connect terminal mL2 to AC cable(L2) and terminal mL3 to AC cable(L3).

Output: Connect ground cable (PE) to ground screw of chassis first;
Short terminal N/N with busbar #1, connect AC cable(N);
Short terminal L1/L2/L3 with busbar #3, connect AC cable(L).

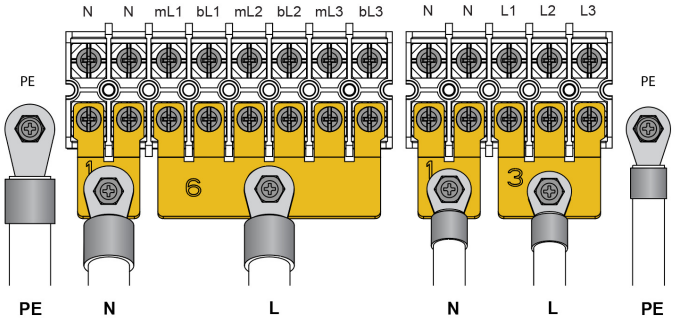
- Mode 3-1(dual source)



Input: Connect ground cable (PE) to ground screw of chassis first;
Short terminal N/N with busbar #1, connect AC main source cable(N) and bypass source cable(N);
Connect input terminal mL1/mL2/mL3 to main source cable(L1/L2/L3);
Short bypass terminal bL1/bL2/bL3 with busbar #5, connect bypass source cable(L).

Output: Connect ground cable (PE) to ground screw of chassis first;
Short terminal N/N with busbar #1, connect AC cable(N);
Short terminal L1/L2/L3 with busbar #3, connect AC cable(L).

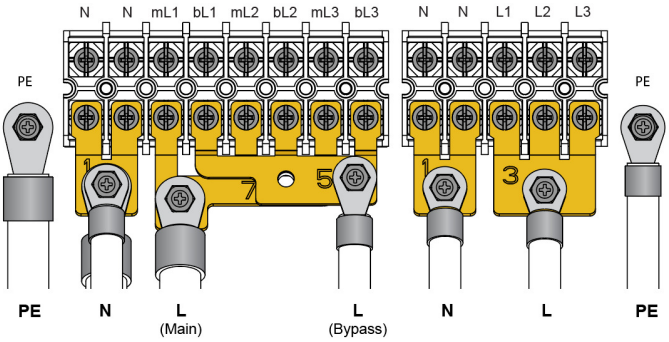
- Mode 1-1(single source)



Input: Connect ground cable (PE) to ground screw of chassis first;
Short terminal N/N with busbar #1, connect AC cable(N);
Short terminal mL1/bL1/mL2/bL2/mL3/bL3 with busbar #6, connect AC cable(L).

Output: Connect ground cable (PE) to ground screw of chassis first;
Short terminal N/N with busbar #1, connect AC cable(N);
Short terminal L1/L2/L3 with busbar #3, connect AC cable(L).

- Mode 1-1(dual source)



Input: Connect ground cable (PE) to ground screw of chassis first;
Short terminal N/N with busbar #1, connect AC main source cable(N) and bypass source cable(N);

Short input terminal mL1/mL2/mL3 with busbar #7, connect main source cable(L);

Short bypass terminal bL1/bL2/bL3 with busbar #5, connect bypass source cable(L).

Output: Connect ground cable (PE) to ground screw of chassis first;

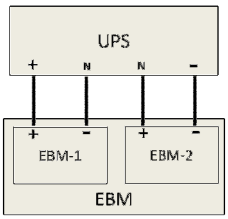
Short terminal N/N with busbar #1, connect AC cable(N);

Short terminal L1/L2/L3 with busbar #3, connect AC cable(L).

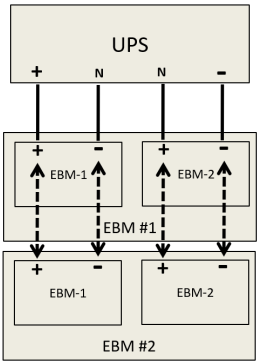
3.4.3 Wiring with external battery modular (EBM) (DC source to UPS)

1. Be sure to disconnect the battery cable from the EBM before connecting the battery terminals of the UPS.
2. Make sure the UPS is completely off before connecting or disconnecting the EBM.
3. Before connecting the EBM, make sure that the EBM specifications is compatible with UPS configuration.
4. Do not reverse the polarity of the external battery.

EBM wiring schematic diagram is shown below:



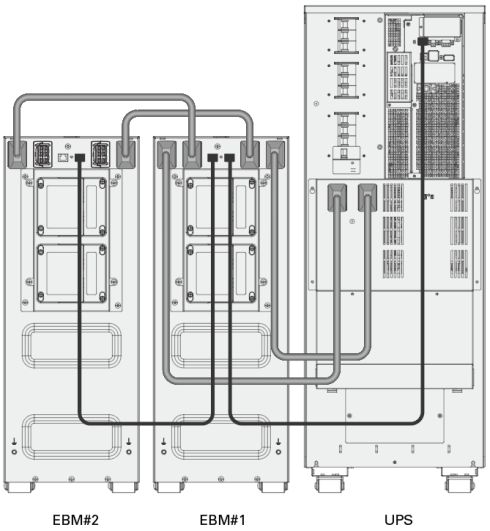
Single set of EBM



Multiple sets of EBM

- Connect with the configured EBM:
  Connect EBM to UPS with 'Battery cable' and 'EBM detect cable'.

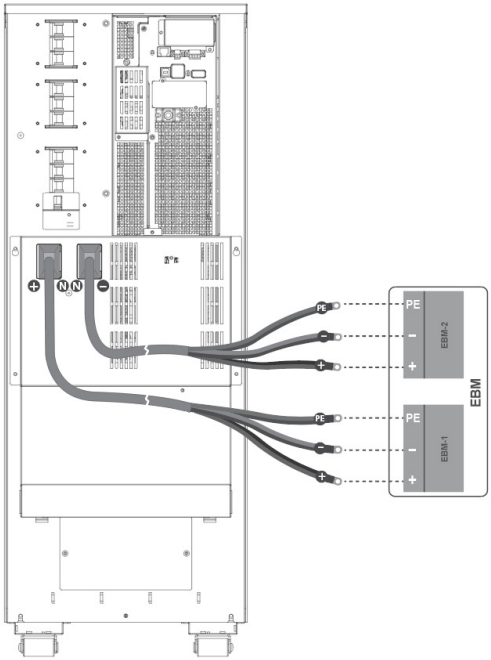
EBM



Note: EBM automatic detection function supports up to 3 EBMs for Tower 10kVA UPS. For more EBM quantity (max to 6), need configure the battery capacity in LCD.
Extended runtime with up to 6 EBMs for each Tower 15/20kVA UPS.

- Connect with user's own EBM:

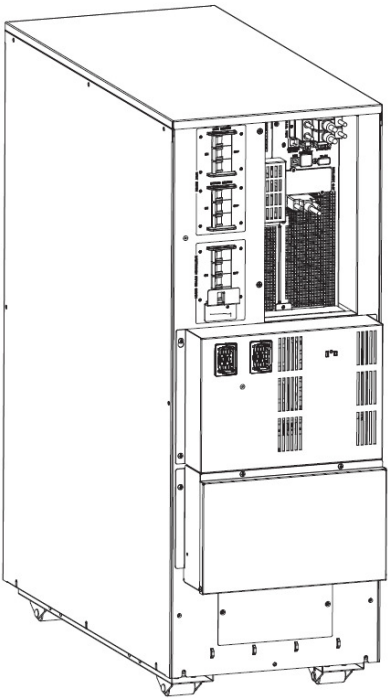
  Connect user's own EBM to UPS with 'Battery cable' (if configured).

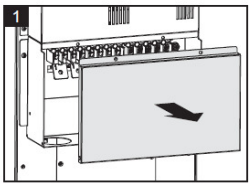


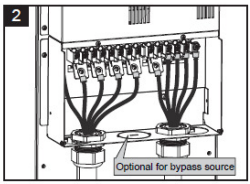
3.5 Gland kit installation

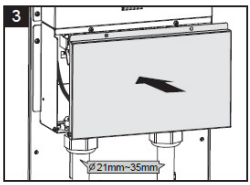
Before Gland kit installation, select the appropriate cables according to the wiring table in section 3.4.2

1. Open the terminal block cover
2. Assemble the glands and cables to the gland bracket according to input/output Mode & Connect the wires of cables to the terminal block/busbar according section 3.4.2.
3. Re-lock the terminal block cover back







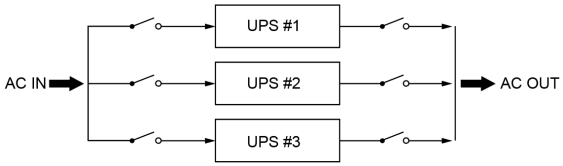


4. Parallel System Installation and Operation (Optional)

If your UPS is configured with parallel function, up to 3 UPS can be connected in parallel for power parallel or N+1 redundancy.

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

   This chapter introduces how to wire AC IN/OUT cable to UPS in parallel system, and UPS connecting with EBM/MBP.

4.1.1 Input /Output wiring specifications

Cable-select table for the parallel system AC IN, AC OUT and Battery wire:

Parallel system installed by 10kVA UPS (conductor cross-section, unit: mm²)											
UPS number	Mode	Main input		Bypass input		Ground wire	Output			Battery wire	Battery ground
		L wire	N wire	L wire	N wire		L wire	N wire	Ground		
2 UPS	3-3	10	10	6	6	10	6	6	6	35	35
	3-1	10	10	25	25	25	25	25	25	35	35
	1-1	50	50	25	25	50	25	25	25	35	35
3 UPS	3-3	16	16	10	10	16	10	10	10	70	70
	3-1	16	16	50	50	50	50	50	50	70	70
	1-1	95	95	50	50	95	50	50	50	70	70
Parallel system installed by 15kVA UPS (conductor cross-section, unit: mm²)											
UPS number	Mode	Main input		Bypass input		Ground wire	Output			Battery wire	Battery ground
		L wire	N wire	L wire	N wire		L wire	N wire	Groun		
2 UPS	3-3	16	16	10	10	16	10	10	10	25	25
	3-1	16	16	50	50	50	50	50	50	25	25
	1-1	95	95	50	50	95	50	50	50	25	25
3 UPS	3-3	35	35	16	16	35	16	16	16	50	50
	3-1	35	35	95	95	95	95	95	95	50	50
	1-1	185	185	95	95	185	95	95	95	50	50
Parallel system installed by 20kVA UPS (conductor cross-section, unit: mm²)											
UPS number	Mode	Main input		Bypass input		Ground wire	Output			Battery wire	Battery Ground
		L wire	N wire	L wire	N wire		L wire	N wire	Ground		
2 UPS	3-3	25	25	16	16	25	16	16	16	35	35
	3-1	25	25	70	70	70	70	70	70	35	35
	1-1	120	120	70	70	120	70	70	70	35	35
3 UPS	3-3	50	50	25	25	50	25	25	25	70	70
	3-1	50	50	150	150	150	150	150	150	70	70
	1-1	240	240	150	150	240	150	150	150	70	70

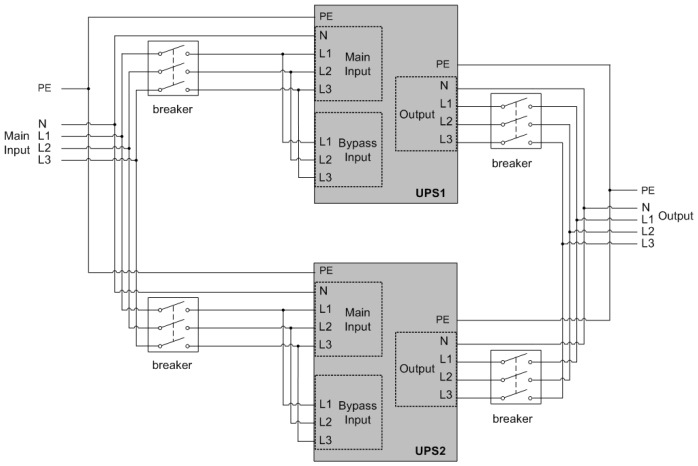
Note:

1. Please select the larger cross-section conductor for the parallel system 'AC IN cable' in the single source application.
2. In the three-phase output mode, if the load is an unbalanced load, the L wire of the bypass and output may exceed the rated current, and the maximum rated current will be 1.732 times. The corresponding protection device and wiring cable must be determined according to the standards of the region and the actual situation of the user.

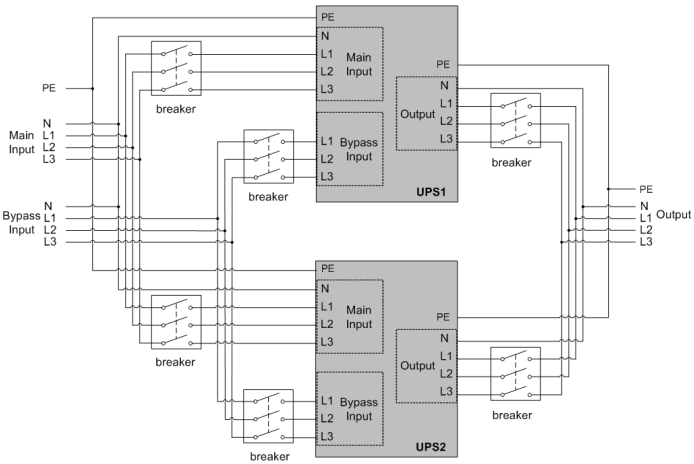
4.1.2 Wiring for AC cable (AC source to UPS)

AC cable wiring are shown in below diagrams for different configuration.

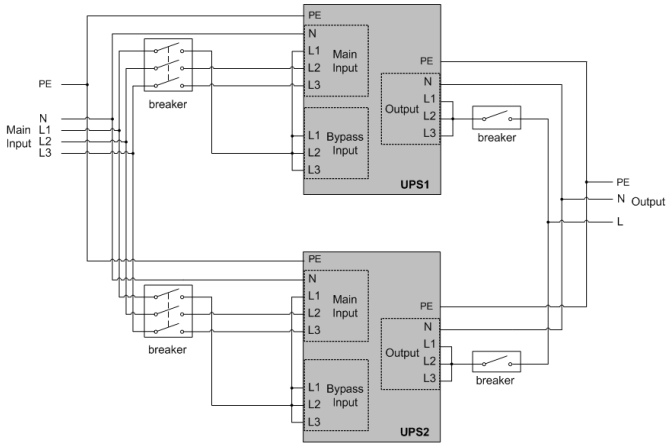
- 3-3 configuration (single source)



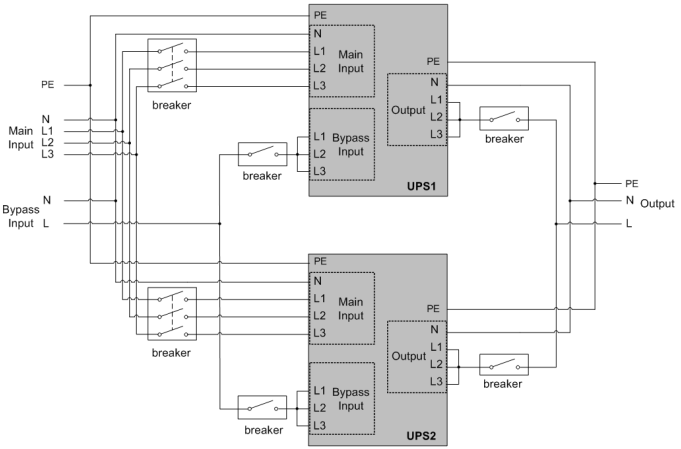
- 3-3 configuration (dual source)



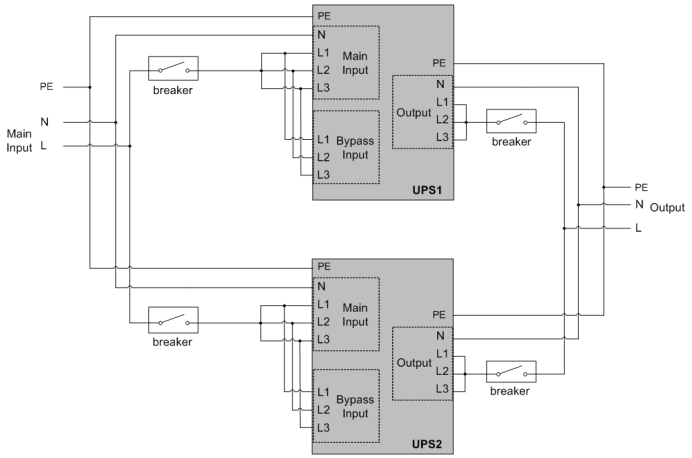
- 3-1 configuration (single source)



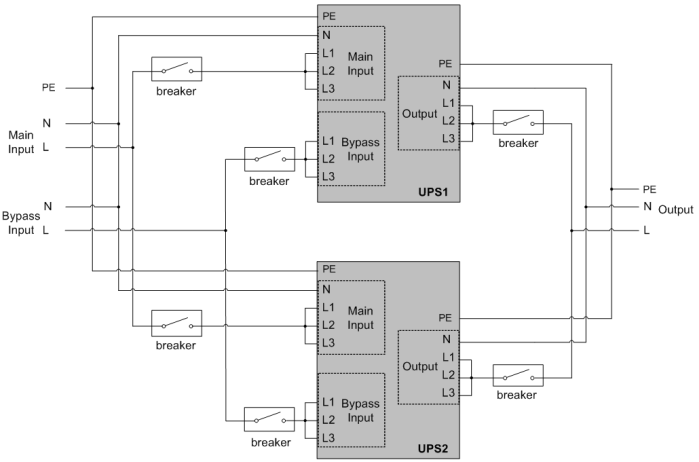
- 3-1 configuration (dual source)



- 1-1 configuration (single source)



- 1-1 configuration (dual source)



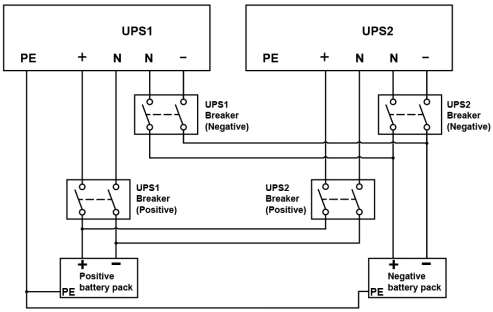
4.1.3 Wiring with external battery modular (EBM) (DC source to UPS)

- **Parallel UPS connection with 'independent battery'**

  In the parallel system, independent EBM connect to each UPS please refer to chapter 3.4.3.

- **Parallel UPS connection with 'common battery'**

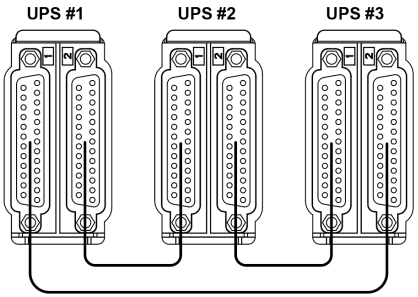
  In the parallel system, you can also set up 'common battery' (user's own battery) for all UPSs. Please refer to below diagram for battery wiring.



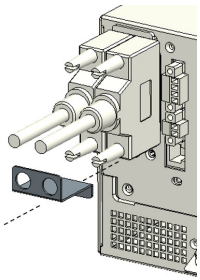
Note: Common battery configuration is not suitable for standard model.

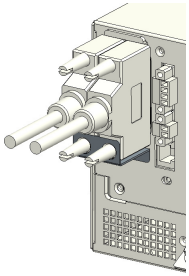
4.2 Wiring for parallel signal cable

Parallel system 'parallel cable' diagram:



Connect each UPS one by one with 'parallel cable', make sure the cable is screwed to parallel port tightly.





It is recommended to lock the 'parallel cable' (as above) 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 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 is less than 0.5V among the parallel system. If the difference is more than 0.5V, the UPS need to be regulated.
4. If the output voltage difference is less than 0.5V, pressing ⏻ button continuously for one UPS of the system to turn off the system. Turn off the input breakers to let UPS shut down. Then switch on the output breakers for all the UPS.
5. Turn on the input breakers for the parallel UPS. Pressing ⏻ button continuously 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 LCD panel

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

The LED:

LED status	description	UPS status
	Red on	Fault mode
	Red flash	General alarm
	Yellow on	Battery mode
	Yellow flash	Bypass mode with output
	Green on	Line mode or HE mode
	off	No output (power on/shutdown/bypass without output)

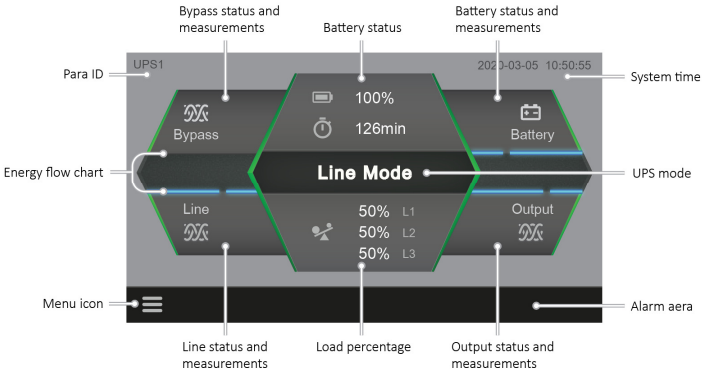
The button:

button	function	description
	On/off	When only battery power is available, press to power on When UPS is not turned on, pressing this key to turn on When working normally, press to pop up the shutdown page When the UPS is in fault mode, press to clear the fault (some faults cannot be cleared directly)

The Buzzer：

The buzzer	General Meaning
1 beep every 2 minutes	Load supplied on bypass
1 beep every 4 seconds	Load supplied on battery If battery low, beep every second
1 beep every second	General warning active
2 beeps every second	Overload warning
Continuous	Fault active
Only beep	Touch screen operation sound

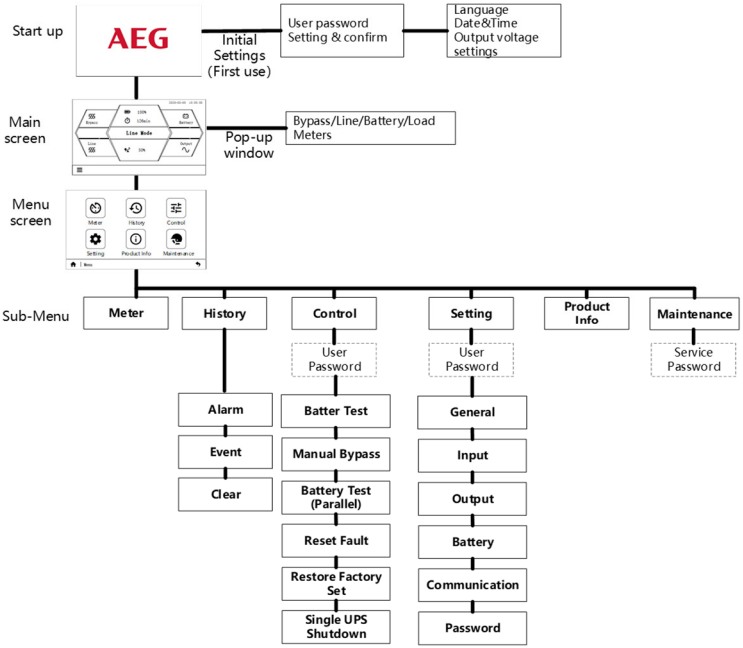
5.2 LCD description



Display Area	Icon	Description
Battery status	100% 126min	Battery capacity Backup time
UPS mode	Line Mode	The work mode of the UPS
Load percentage	50% 50% L1 50% L2 50% L3	When it is 3 phase output, the load for each of the 3 phases is displayed in this area

Display Area	Icon	Description
Bypass status and measurements		Different icon shows the phase number of bypass Click on this icon will bring up a popup of measurements of the bypass
Battery status and measurements		Click on this icon will bring up a popup of measurements of the battery
Line status and measurements		Different icon shows the phase number of Utility Click on this icon will bring up a popup of measurements of the utility
Output status and measurements		Different icon shows the phase number of output Click on this icon will bring up a popup of measurements of the output
Energy flow chart		The sick solid line means there is energy flow, the double thin line means nothing
System time		It can be set in user settings
Menu icon		Click on this icon can entry the menu screen
Alarm area		When UPS enters fault mode, fault ICON and the fault information will be displayed. If alarms exist, alarm information will scroll for up to 4 messages, each for 2 seconds
Para ID		The UPS ID number in parallel system (1-3), keep 1 in single mode

5.3 Menu structure



5.4 Control and product information

Main menu	Submenu	Menu function
Control	Battery test	Starts a manual battery test in stand-alone mode
	Battery test (Parallel)	Starts a single battery test in parallel mode
	Reset fault	Clear active fault
	Reset factory setting	Restore to default factory settings
	Single UPS shutdown	Operate this machine to exit parallel connection
Product Info	UPS model	Model name & input/output phase
	Serial number	Serial number of UPS
	UPS firmware version	Version of UPS firmware
	LCD firmware	Version of UI
	JHD-APP version	Version of LCD driver

5.5 User settings

Setting		Options on the display	Default
General	Audible Alarm	[Enabled], [Disabled]	Enabled
	Date/Time	YYYY-MM-DD HH:MM	2020-1-1
	Language	English, Italiano, Français, Deutsch, Español, Русский, Polski, 简体中文	English
	LCD brightness	[0%-100%]	100%
	LCD saving mode	[Enabled], [Disabled]	Enabled
	Screen rotation	[Auto Rotate], [Horizontal], [Vertical]	Auto Rotate
Input	Site wiring fault (1)	[Enabled], [Disabled]	Disabled
	Bypass voltage low limit	110 ~ (V_inverter - 15V)	187V
	Bypass voltage high limit	(V_inverter + 15V) ~ 276V	264V
	Bypass frequency low limit	-10%~-5%	-10%
	Bypass frequency high limit	5%~10%	10%
	HE voltage low limit	-15%~-5%	10%

	HE voltage high limit	5%~20%	10%
	HE frequency low limit	-10%~-5%	5%
	HE frequency high limit	5%~10%	5%
	Dual input function	[Enabled], [Disabled]	Disabled
Output	UPS Mode	[Normal mode], [HE mode], [CVCF mode]	Normal mode
	Output voltage	[220V], [230V], [240V]	230V
	Output frequency	[Auto detection], [50Hz], [60Hz]	Auto detection
	ESS function	[Enabled], [Disabled]	Disabled
	Auto bypass	[Enabled], [Disabled]	Enabled
	Auto restart	[Enabled], [Disabled]	Enabled
	Short circuit auto clear	[Enabled], [Disabled]	Disabled
	Overload pre-alarm	50%~105%	105%
Battery	DC Start	[Enabled], [Disabled]	Enabled
	Battery Auto Test	[Every cycle] [Disabled]	Every cycle
	Deep discharge protection	[Enabled], [Disabled]	Enabled
	Low bat warning	0%~100%	0%
	Low remaining time warning	0-999min	0min
	Restart battery level	0~100%	0%
	Charger current	[1-13A] for 10-20K	Default 1.8A
	External battery setting	[Auto detection], [Manual AH setting] Manual AH setting: [9-300AH]	[Auto detection] /
Communication	Dry in	[No function] [Start UPS] [Remote shut down] [Maintenance bypass]	No function
	Dry out	[load powered] [on battery] [Low battery] [No Battery] [Bypass] [ups OK]	load powered
Password	Control Menu password	[Enabled], [Disabled]	Enabled
	Setting Menu password	[Enabled], [Disabled]	Enabled
	Change Password	Old password New password Confirm password	[4732]

(1) Site wiring fault function is only for single phase bypass input. If the utility power is IT system, the site wiring fault function should be disabled.

5.6 Starting the UPS with utility

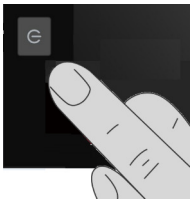
Startup preparation:

Before startup the UPS, please make sure that the wiring is securely connected, otherwise there is a danger of electric shock.

- Verify that the total UPS output load does not exceed the rated capacity of the UPS.
- The wiring of the UPS input and output is correctly connected according to the required mode.
- Confirm that the UPS output device is not started.
- Make sure the UPS is reliably connected to the battery.
- Connect communication interfaces that need to be used.

Startup the UPS with utility power:

1. Turn on input breaker and output breaker.
2. The fan starts to rotate, the LCD displays startup animation, then enters the main page.
3. UPS default Bypass enable, the main page shows UPS working in bypass mode.
4. The default input/output mode is three-input and three-out. If it is inconsistent with the actual wiring, it needs to be changed to the actual wiring mode.
5. Press the button for more than 1 second, the buzzer will beep and the UPS will start up. After a few seconds, the UPS will go to normal mode.



6. If the utility power is abnormal, the UPS will transfer to Battery mode.
7. When the battery is not connected, the UPS can still be startup. After the startup, there is alarm of battery not connected. If the utility power is abnormal, the UPS load will not be protected.

8. The load is powered by the UPS and the LCD shows a charging sign indicating that the battery is charging.
9. Startup the output device.

If you want to cancel the Bypass enable function, please refer to chapter “User setting”.

The input/output mode is modified by the service personnel:

1. Pull out the RPO connector.
2. Turn on input breaker, check the UPS mode in the LCD. If it is different from the actual wiring mode, change to the actual wiring mode.
3. Power off the UPS completely. Then power on, confirm that the mode is set correctly.
4. Power off the UPS again, insert the RPO terminal.

5.7 Starting the UPS on battery

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

Battery start can be disabled. See the "DC start" setting in "Battery/DC Start".

To start the UPS on battery:

1. Press the button for more than 0.1 seconds. The UPS establishes the power, the fan starts to rotate, the LCD displays the startup animation, and then enters the main page to display the standby mode.
2. If there is no operation, the LCD is off out after 10 seconds and the UPS is powered down.
3. Press the button for more than 1 second, the buzzer will beep and the UPS will startup. The UPS will go to battery mode after a few seconds.
4. If the utility power is connected at this time, the UPS will switch to the line mode and the output will be uninterrupted.
5. UPS works in battery mode, and the buzzer beep for 4 seconds to remind that the battery is discharged.
6. Since there is no utility power input, the input abnormal alarm will be displayed on the LCD.

5.8 UPS shutdown

Shutdown the UPS with utility power mode:

1. UPS working with utility power, press the button for more than 3s, the LCD pops up to confirm the shutdown page.
2. After clicking Confirm, the UPS performs shutdown.
3. After shutdown, the UPS works in bypass mode and the output remains powered.
4. If there is no need the UPS output, disconnect the input utility power.

Shutdown the UPS with battery mode:

1. Press the button for more than 3s, the LCD pops up to confirm the shutdown page;
2. After clicking Confirm, the UPS performs shutdown.
3. The UPS output is interrupted and goes into standby mode. After a few seconds, the UPS automatically shuts down.

6 Communication

6.1 RS232 and USB

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.

6.2 UPS remote control functions

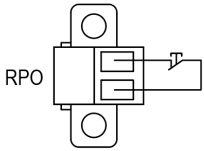
- **Remote Power Off (RPO)**

When RPO is activated, UPS will cut off output immediately, and continues to alarm.

RPO	Comments
Connector type	16 AWG Maximum wires
External breaker specification	60 V DC/30 V AC 20 mA max

Reset:

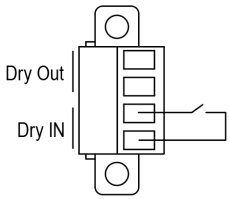
1. Check the RPO connector status;
2. Clear fault state through LCD.



- **Dry in**

Dry in function can be configured. (see Settings > Dry in)

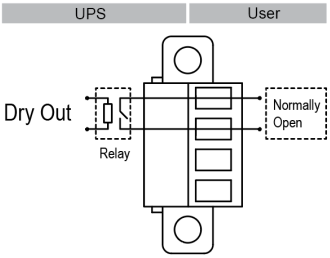
Dry in	Comments
Connector type	16 AWG Maximum wires
External breaker specification	60 V DC/30 V AC 20 mA max



- **Dry out**

Dry out is the relay out, dry out function can be configured. (see Settings > Dry out)

Dry out	Comments
Connector type	16 AWG Maximum wires
Inner Relay specification	24Vdc/1A



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 years expected life. The 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

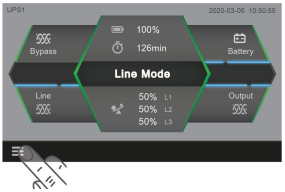
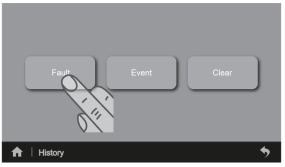
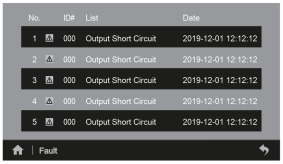
The UPS is designed for durable, automatic operation and also alert you whenever potential operating problems may occur. Usually the alarms shown by the control panel do not mean that the output power is affected. Instead, they are preventive alarms intended to alert the user.

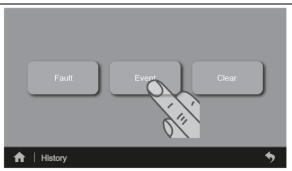
- Events are silent status information that are recorded into the Event log. Example = "Battery charging".
- Alarms are recorded into the Event log and displayed on the LCD status screen with the logo blinking. Some alarms may be announced by a beep every 1 second. Example = "Battery low".
- Faults are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

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

8.1 Typical alarms and faults

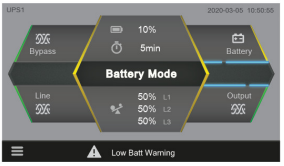
To check the fault log or event log:

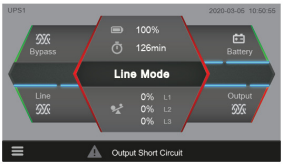
<table>
<tr>
<td> 
</td>
<td> 
</td>
</tr>
<tr>
<td>Click on “Menu” icon</td>
<td>Click on “History” icon</td>
</tr>
<tr>
<td> 
</td>
<td> 
</td>
</tr>
<tr>
<td>Click on “Fault” icon</td>
<td>Last 5 faults, blank list if no fault</td>
</tr>
</table>



Click on **"Event"** icon

Last 100 events





If alarm exists, shows here. 4 messages for high priority alarm

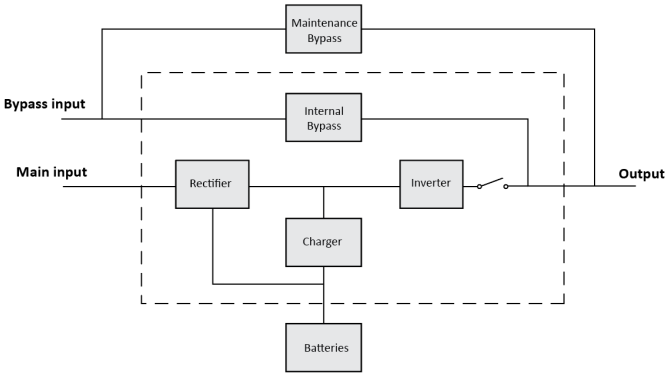
Problem Displayed	Possible cause	Remedy
Site wring fault	Phase and neutral conductor at input of UPS system are reversed	Reverse mains power wiring
Neutral wire missed	Neutral abnormal	Confirm the connection of the input wires
Pos Bat open	Battery pack is not connected correctly	Do the battery test to confirm; Check the battery bank is properly connected to the UPS; Check the battery breaker is turn on or fuse OK
Neg Bat open	Battery pack is not connected correctly	Do the battery test to confirm; Check the battery bank is properly connected to the UPS; Check the battery breaker is turn on or fuse OK.
Pos Bat Low	Battery voltage is low	When audible alarm sounding every second, battery is almost empty
Neg Bat Low	Battery voltage is low	When audible alarm sounding every second, battery is almost empty.
Pos Over Charge	Battery voltage is high	Consult Service
Neg Over Charge	Battery voltage is high	Consult Service
Pos Charger Failure	UPS internal fault	Consult Service

Problem Displayed	Possible cause	Remedy
Neg Charger Failure	UPS internal fault	Consult Service
Bad Battery Count	Unreasonable battery number	Check whether the actual battery cell number is consistent with the set value
Pos Bus Over Volt	UPS internal fault, the + DC BUS voltage is too high	Consult Service
Neg Bus Over Volt	UPS internal fault, the -DC BUS voltage is too high	Consult Service
Pos Bus Under Volt	UPS internal fault, the + DC BUS voltage is too low	Consult Service
Neg Bus Under Volt	UPS internal fault, the -DC BUS voltage is too low	Consult Service
Bus Unbalance	UPS internal fault, the voltage difference between DC Bus+ and DC bus- is too large	Consult Service
Bus Short	UPS internal fault	Consult Service
Bus Soft Start Fail	UPS internal fault	Consult Service
Output Short circuit	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
L1 Output Short circuit		
L2 Output Short circuit		
L3 Output Short circuit		
Inverter Over Volt	UPS internal fault, the inverter voltage is too high	Consult Service
Inverter Under Volt	UPS internal fault, the inverter voltage is too low	Consult Service
Inverter Soft start Fail	UPS internal fault	Consult Service.
Inverter Overload Fault	Overload	Check the loads and remove some noncritical loads; Check if some loads are failed
Output Overload Fault		
Byp Overload Fault		
Inverter Capacity Open	UPS internal fault	Consult Service
Primary SPS Fail	UPS internal fault	Consult Service
Assist SPS Fail		
Emergency Off	Perform emergency shutdown	Check the status of RPO terminal
Internal Over Temp Fault	Inside temperature of UPS is too high	Check the ventilation of UPS and the ambient temperature
Byp SCR Over Temp		
Charger Over Temp Fault		
UPS Ambient Over Temp	The ambient temperature is too high	Check the environment ventilation
Fan Lock	Fan abnormal	Check if the fan is running

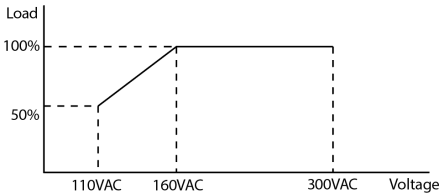
Problem Displayed	Possible cause	Remedy
ESS Fan lock		normally or fan detection cable disconnected
Model Setting Wrong	Wrong work mode	Consult Service
Neg Power Fault	Negative power fault	Consult Service
Para. Cable Lost	The cable is not connected	Please confirm the connection status of the parallel cable
Para. Incompatible	Para setting different	Please check the parallel settings, if it still alarms, please consult Service.

9 Troubleshooting

9.1 UPS block diagram



9.2 UPS specification

Models		10K	15K	20K
Rated power (1)		10kVA/10kW	15kVA/15kW	20kVA/20kW
Rated frequency		50/60Hz		
Input	Voltage range (Phase voltage)	 100~300VAC		
	Rated voltage (Phase voltage)	220/230/240VAC		
	Main input Rated current (2) (3 Phase)	22A	35A	43A
	Main input Rated current (2) (1 Phase)	65A	105A	129A
	Bypass input Rated current (3 Phase)	16A	24A	31A

Models		10K	15K	20K
Input	Bypass input Rated current (1 Phase)	47A	70A	93A
	Main input frequency for 3-3 and 3-1 mode	40-70Hz		
	Main input frequency for 1-1 mode	≤60% rated load: 40-70Hz		
		> 60% rated load [1]: 45-55Hz(50Hz system) / 54-66Hz (60Hz system)		
	Bypass Input frequency	45-55Hz (50Hz system) / 54-66Hz (60Hz system)		
Charging current [1]		1~13A adjustable for 10-20K;		
Charging current (default)		1.8A	1.8A	1.8A
Output	Rated voltage (Phase voltage)	220/230/240VAC		
	Overload	105%-125% Load, 10 minutes transfer to Bypass; 125%-150% Load, 30 seconds transfer to Bypass; >150% Load, 0.5 seconds transfer to Bypass		
	Short-circuit current on normal mode (3 Phase output)	30A for 10±1 cycle	56.8A for 10±1 cycle	74A for 10±1 cycle
	Short-circuit current on normal mode (1 Phase output)	90A for 10±1 cycle	171A for 10±1 cycle	222A for 10±1 cycle
Transfer Time Line<->Battery		0ms		
Transfer Time INV<->Bypass		0ms		
Battery				
Battery Voltage		2*120VDC	2*240VDC	
Battery Number		2*10PCS	2*20PCS	
Environment				
Ambient temperature		0°C ~ 50°C (Derating 50% above 40°C)		
Relative humidity		0 ~ 95% (no condensing)		
Operating altitude		<4000m (Derating use above 1km)		

Models	10K	15K	20K
Storage temperature (with battery)	-15°C ~ 40°C		
Storage temperature (without battery)	-25°C ~ 60°C		
Criterion			
Safety	IEC/EN 62040-1		
EMC	IEC/EN 62040-2		
Performance	IEC/EN 62040-3		

(1) In CVCF mode or dual source input mode, UPS needs to be de-rated to 60% capacity for 1-1 mode (rated output power and maximum charging current).

(2) @ 220VAC input phase voltage, rated output power and maximum charging.

Certificate of guarantee

Model:
Serial number:
Date of purchase:

Trading stamp / Signature

Specifications are subject to change without notice

Operating instructions
BAL 8000071791, EN

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