

Expert Power Backup 8810 Series

Manual

Table of content

1. Important Safety Warning

IMPORTANT: Read this user manual before using the device and keep in a safe place for reference. This manual contains important instructions that should be followed during installation and maintenance of the UPS and batteries. Please comply with all warnings and operating instructions in this manual to ensure safe usage of the device.

1.1. Transportation

Please transport the UPS system only in the original package to protect against shock and impact.

1.2. Preparation

- Condensation may occur if the UPS system is moved directly from cold to warm environment. The UPS system must be absolutely dry before being installed. Please wait at least two hours for the UPS system to adjust to the ambient temperature.
- Do not install the UPS system near water or in moist environments.
- Do not install the UPS system where it would be exposed to direct sunlight or near a heater.
- Do not block the ventilation holes in the UPS housing.

1.3. Installation

CAUTION: The unit is heavy. Lifting the unit requires a minimum of two people.

- The UPS system may only be installed and operated by qualified personnel. The manufacturer accepts no liability for damage or injury caused by improper use of the device.
- The UPS system contains live parts with dangerous voltages and must not be opened or disassembled.
- The power cords, plugs and sockets must be in good condition. Always connect the device to properly grounded power sockets.
- Connect the UPS system only to a grounded and shockproof outlet which must be easily accessible and close to the UPS system.
- Please use only VDE-tested mains cables to connect the UPS system to the building wiring outlet (shockproof outlet).
- Please use only VDE-tested power cables to connect the loads to the UPS system.
- Place cables in such a way that no one can step on or trip over them.
- Do not connect appliances or devices to the UPS outlets which would overload the UPS system.
- Do not connect domestic appliances such as hair dryers to the UPS outlet sockets.
- When installing the equipment, please make sure that the sum of the leakage current of the UPS and the connected devices does not exceed 3.5 mA.
- The UPS system may only be installed in an ambient temperature of max. 40°C (104°F).

- The UPS system is designed for indoor use only. It must not be used in condensing or excessively hot environments.

1.4. Operation

NOTICE - LIFE SUPPORT DEVICES: GUDE Systems advises against the use of its products for the following uses: Use with life support equipment where malfunctions or malfunctions of the product will result in a malfunction or significantor significantly impair the safety or performance of the life support device as well as direct patient care. Examples of life-support devices: The term *life-support device* includes but is not limited to autotransfusion devices, blood pumps, defibrillators, arrhythmia detectors and alarms, pacemakers, hemodialysis systems, peritoneal dialysis systems, neonatal ventilator incubators, neonatal oxygen analyzers, nerve stimulators, ventilators, anesthesia ventilators, infusion pumps and any other devices designated as *critical*.

- Do not disconnect the mains cable on the UPS system or the building wiring outlet (shockproof socket outlet) during operations since this would cancel the protective earthing of the UPS system and of all connected loads.
- The UPS system features its own, internal current source (batteries). The UPS outlet sockets or outlet terminals block may be electrically live even if the UPS system is not connected to the building wiring outlet.
- In order to fully disconnect the UPS system, first press the OFF/Enter button to disconnect the mains.
- Prevent liquids or other foreign objects from entering the UPS system.
- The EPO and USB circuits are an IEC 60950-1 safety extra low voltage (SELV) circuit. This circuit must be separated from any hazardous voltage circuits by reinforced insulation.

1.5. Maintenance, service and faults

- The UPS system operates with hazardous voltages. Repairs may be carried out only by qualified maintenance personnel.
- Only qualified and trained personnel that are familiar with batteries and with the required precautionary measures may replace batteries and supervise operations. Unauthorized personnel must be kept well away from the batteries.
- Before performing any maintenance or service work, disconnect the battery and ensure that there is no current or dangerous voltage at the terminals.
- **Caution** - risk of electric shock. Even after the unit is disconnected from the mains (building wiring outlet), components inside the UPS system are still connected to the battery and electrically live and dangerous. To avoid electrical shock, turn off the unit, unplug it from the AC power source and make sure the battery is disconnected before servicing the battery.

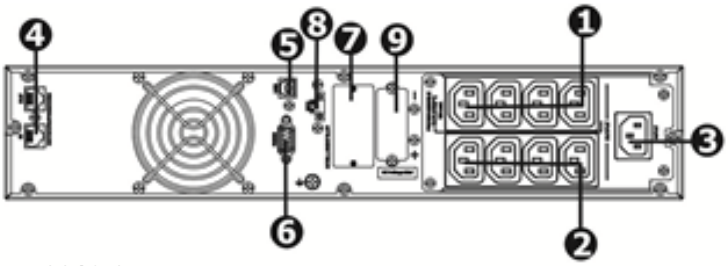
- **Caution** - risk of electric shock. The battery circuit is not isolated from the input voltage. Hazardous voltages may occur between the battery terminals and the ground. Before touching, please verify that no voltage is present!
- **Caution** - Do not dispose of batteries in a fire. The batteries may explode.
- **Caution** - Do not open or destroy the batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.
- Batteries may have a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries:
    - Remove watches, rings, or other metal objects.
    - Use tools with insulated handles.
    - 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 groundshare is removed during installation and maintenance.
- When changing batteries, install the same number and same type of batteries or battery packs (see chapter 6 Specifications for battery types).
- Please replace the fuse only with the same type and amperage to avoid fire hazards.
- Do not dismantle the UPS system.
- **WARNING**: This is a category C2 UPS product. In a residential environment, this product may cause radio interference, in which case the user may be required to take additional measures.
- For UPS with internally mounted battery
- Instructions shall carry sufficient information to enable the replacement of the battery with a suitable manufacturer and catalogue number.
- Safety instructions to allow access by Service Personnel shall be stated in the installation/service handbook.
- If batteries are to be installed by Service Personnel, instructions for interconnections, including terminal torque, shall be provided.
- Please replace the fuse only with the same type and amperage in order to avoid fire hazards.
- Do not dismantle the UPS system.
- **WARNING**: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

2. Installation and setup

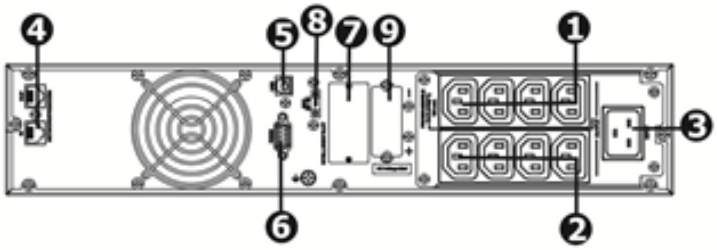
NOTE: Before installation, please inspect the unit. Be sure that nothing inside the package is damaged. Please keep the original package in a safe place for future use.

2.1. Rear panel view

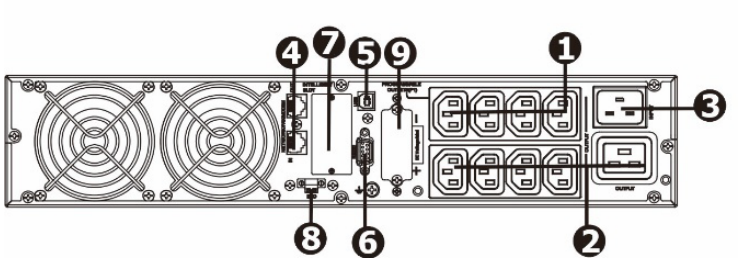
Expert Power Backup 8810-1



Expert Power Backup 8810-2



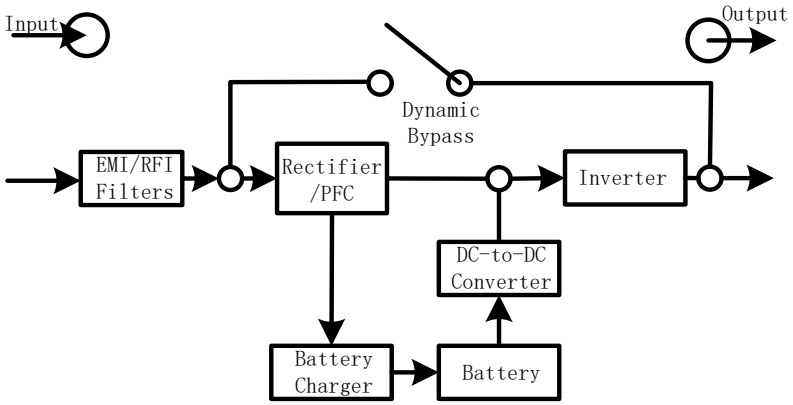
Expert Power Backup 8810-3



1. Programmable outlets: connect to non-critical loads.
2. Non-Programmable outlets: connect to mission-critical loads.
3. AC input
4. Network/Fax/Modem surge protection
5. USB communication port
6. RS-232 communication port
7. SNMP intelligent slot
8. Emergency power off function connector (EPO)
9. External battery connection

2.2. Operating principle

The operating principle of the UPS is shown as below

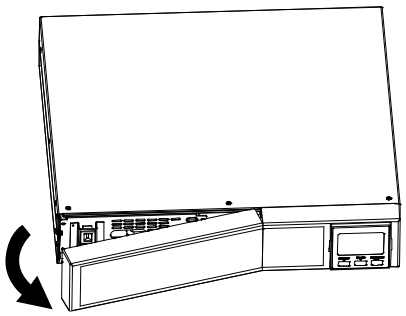


The UPS is composed of mains input, EMI/RFI filters, rectifier/PFC, inverter, battery charger, DC-to-DC converter, battery, dynamic bypass and UPS output.

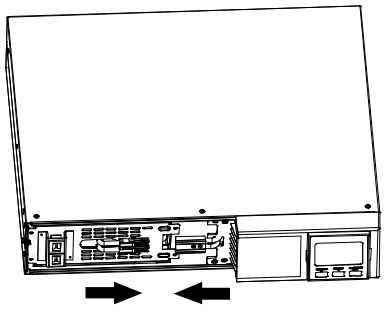
2.3. Installing the UPS

For safety reasons, the UPS is shipped with the battery cables disconnected. Before installing the UPS, please reconnect the battery cables according to the following steps.

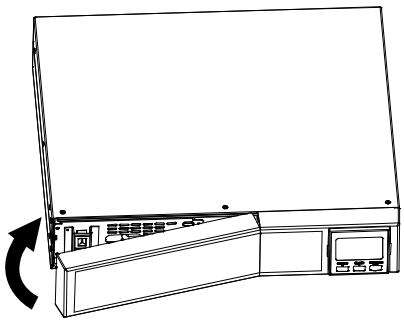
Step 1: Remove front panel.



Step 2: Connect AC input and re.connect battery wires.

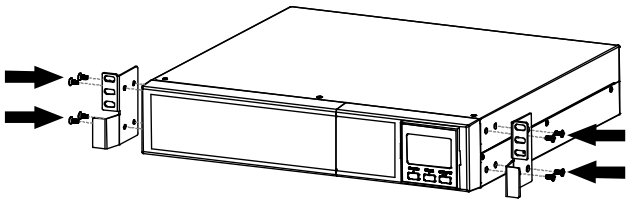


Step 3: Put the front panel back to the unit.

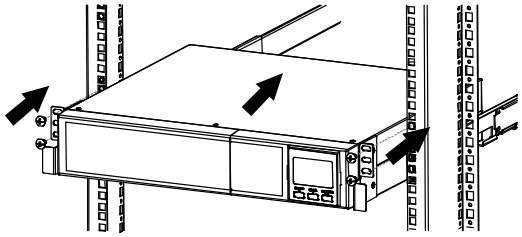


Rack mount installation

Step 1: Screw the rack ears (included in delivery) to the UPS.

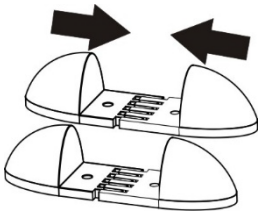


Step 2: Place the UPS on the rack mount kit and screw it to your rack.

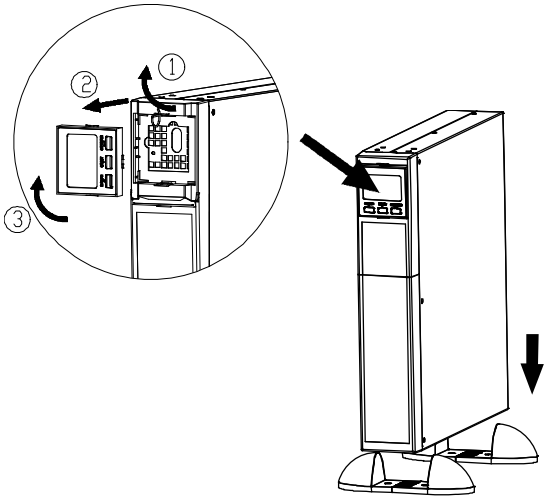


Tower installation

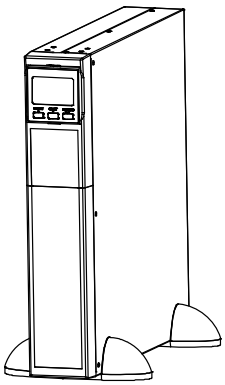
Step 1: Connect the individual parts of the base.



Step 2: Turn the display.



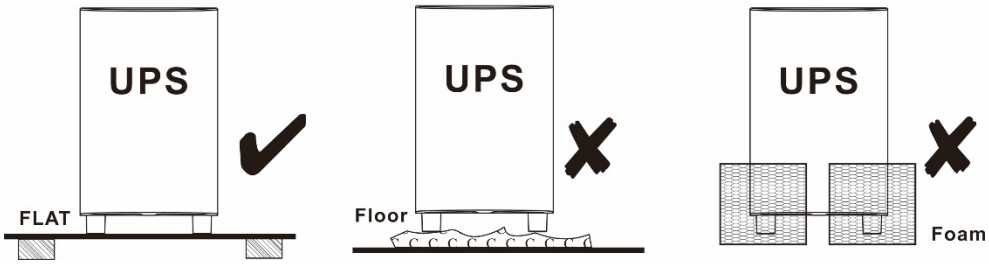
Step 3: Put the UPS onto the bases.



2.4. Setup the UPS

Before installing the UPS system, please follow the instructions below to select a proper location for the UPS.

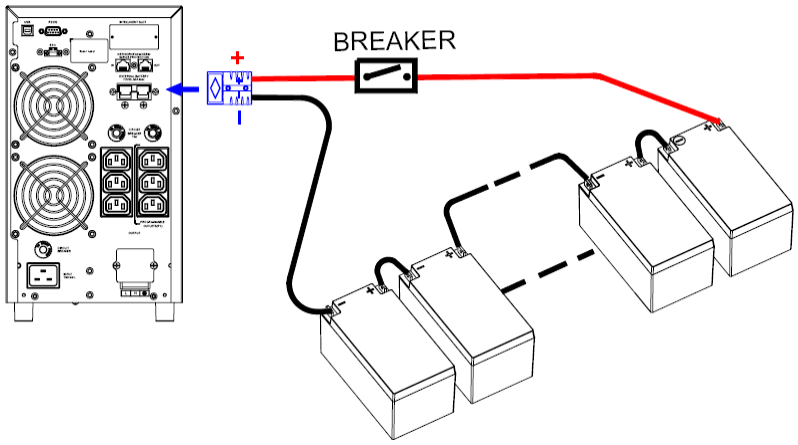
1. The UPS should be placed on a flat and clean surface. Do not place it near areas subject to vibration, dust, moisture, high temperatures, flammable liquids, gases, corrosive or conductive contaminants. Install the UPS system in a clean indoor environment, away from doors and windows. To prevent dust accumulation and the effects of high temperature, maintain a minimum clearance of at least 100 millimeters below the device.



2. Placing the UPS: The UPS system is equipped with fans for cooling. Place the UPS system in a well-ventilated area. Make sure that a minimum clearance of 100 mm is maintained to the bottom and front of the UPS system and 300 mm from the sides and back.
3. To ensure optimal UPS operation, maintain an ambient temperature range between 0°C and 45°C. For every 5°C increase above 45°C, the UPS's rated power at full load decreases by 12%. The maximum operating temperature for the UPS is 50°C.
4. To ensure normal operation of the UPS system, the maximum altitude of 1000 m must not be exceeded. When used at an altitude above 1000 m, please reduce the connected load. Altitude derating power with connected loads for UPS normal operation is listed as below:

Altitude m	Derating factor[1)]
1 000	1.0
1 500	0.95
2 000	0.91
2 500	0.86
3 000	0.82
3 500	0.78
4 000	0.74
4 500	0.7
5 000	0.67
NOTE - Note to table 1	
Based on density of dry air = 1.225 kg/m³ at sea-level, +15 °C.	
[1)] Since fans lose efficiency with altitude, forced air-cooled equipment will have a smaller derating	

5. Connect to External Battery Pack (optional)



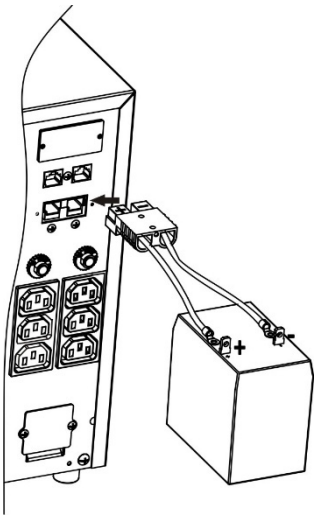
When connecting an external battery pack, ensure correct polarity. Connect the positive pole of the battery pack to the positive pole of the UPS external battery interface and the negative pole of the battery pack to the negative pole of the UPS external battery interface. Connecting to the wrong polarities will cause internal faults within the UPS. It is recommended that a circuit breaker be installed between the positive terminal of the battery pack and the positive terminal of the UPS external battery interface to prevent damage to the battery pack due to internal faults.

Required specification of the circuit breaker: voltage ≧ 1.25 x battery voltage/set; current ≧ 50A

Select the battery size according to the required backup time and UPS specifications. To extend the battery's service life, it is recommended to operate the device in a temperature range of 15°C to 25°C.

Step 1: External battery connection (optional)

Follow the right chart to make external battery connection.



Step 2: UPS input connection

Plug the UPS into a two-pole, three-wire, grounded socket only. Avoid using extension cords.
Note: Check whether the site wiring fault indicator lights up on the LCD panel. This indicator lights up when the UPS system is connected to an incorrectly wired mains outlet (see sections 3-8 Warning indicator and 4 Troubleshooting). For a safer operation, it is recommended that overcurrent and short-circuit protection switches are installed between the UPS main power supply and the AC input connections. The recommended protection values are as follows:

- 10A for Expert Power Backup 8810-1 and 16A for Expert Power Backup 8810-2 and 8810-3.

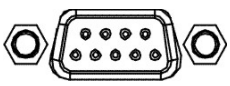
Step 3: UPS outlets

There are two kinds of outlets: programmable outlets and non-programmable outlets. Please connect non-critical devices to the programmable outlets and critical devices to the non-programmable outlets. During a power failure, you may extend the backup time to critical devices by setting up a shorter backup time for non-critical devices on the programmable outlets.

Step 4: Communication connection

USB port

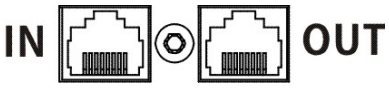
RS-232 port



SNMP Card Slot

To allow for unattended UPS shutdown/start-up and status monitoring, connect the communication cable to the USB/RS-232 port of the UPS and to the communication port of your PC. With the monitoring software installed, you can schedule UPS shutdown/start-up and monitor UPS status through PC. The UPS is equipped with an intelligent slot for an SNMP card. Installing an SNMP Card into the UPS system will give you additional communication and monitoring options.

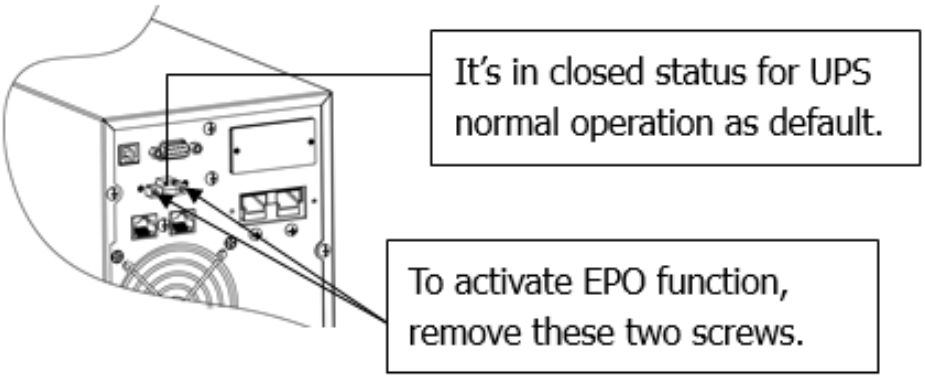
Step 5: Network connection



Connect a single modem/phone/fax line into surge-protected “IN” outlet on the back panel of the UPS unit. Connect from “OUT” outlet to the equipment with another modem/fax/phone line cable.

Step 6: Disable and enable EPO function (Emergency Power Off)

The UPS system is equipped with an EPO function. The EPO is a safety feature that allows immediate and complete shutdown of the UPS output power in case of an emergency. By default, the UPS is delivered from factory with pin 1 and pin 2 closed (a metal plate is connected to pin 1 and pin 2) for UPS normal operation. To activate EPO function, remove two screws on EPO port and metal plate will be removed.
Note: The EPO function logic can be set up via LCD setting. Please refer to program 16 in UPS setting for the details.



Step 7: Turn on the UPS

Press the ON/Mute button on the front panel for two seconds to power on the UPS.
Note: The battery charges fully during the first five hours of normal operation. Do not expect a full battery run capacity during this initial charge period.

2.5. Battery Replacement

The UPS system emits a visual and audible signal when the batteries need to be replaced.

When the icons  and  are flashing on the LCD display and an alarm sounds every two seconds, the batteries need to be replaced.

Do not disconnect the battery terminals while the device is under load. If it is necessary to disconnect the mains power supply to replace the batteries, press and hold the OFF button on the front panel for two seconds to turn off the UPS, then disconnect the mains power supply where the UPS is connected.

NOTE 1: DO NOT DISCONNECT the batteries while the UPS is in Battery mode.

NOTE 2: When connecting the internal batteries, a small arc may occur. This is normal and does not pose a hazard to personnel. Please connect the cables quickly and securely.

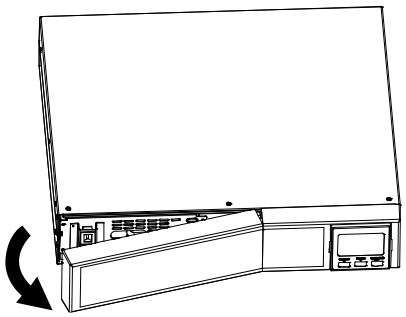
NOTE 3: Replacing the battery must only be done by trained and qualified personnel (see chapter 1 Safety Information for more information).

NOTE 4: Upon battery disconnection, equipment is not protected from power outages.

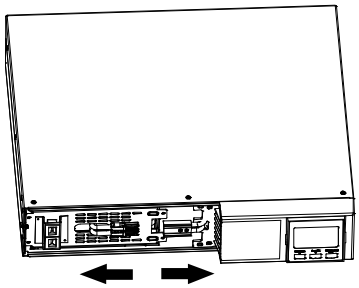
NOTE 5: This UPS is equipped with internal batteries. The batteries can be replaced without shutting down the UPS or connected loads (hot-swappable battery design). Please note that this must only be done by trained and qualified personnel.

CAUTION!! Before replacing the battery, please read all warnings, precautions and instructions carefully.

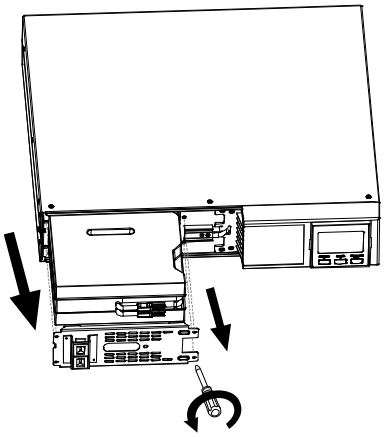
Step 1: Remove front panel.



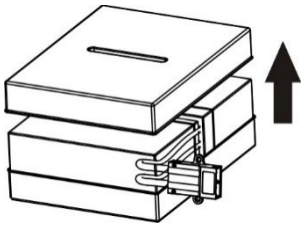
Step 2: Disconnect battery wires.



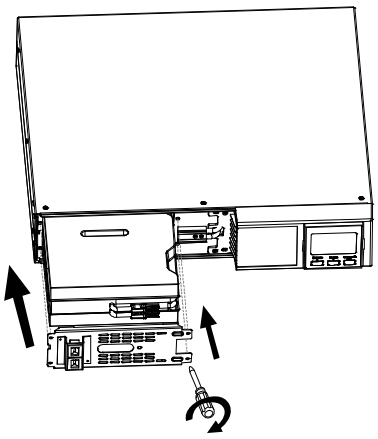
Step 3: Pull out the battery box by removing the screws on the panel



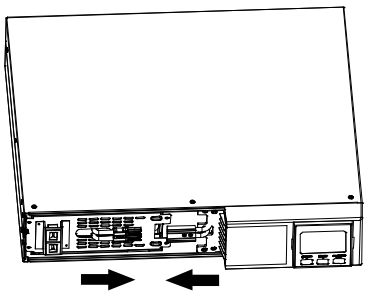
Step 4: Remove the top cover of the battery box and replace the batteries.



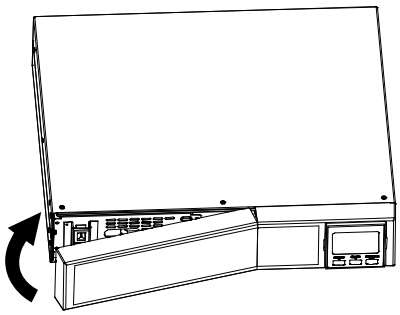
Step 5: After replacing the batteries, put the battery box back to its original location and screw the panel tightly.



Step 6: Re-connect the battery wires.



Step 7: Attach the front panel back to the unit.

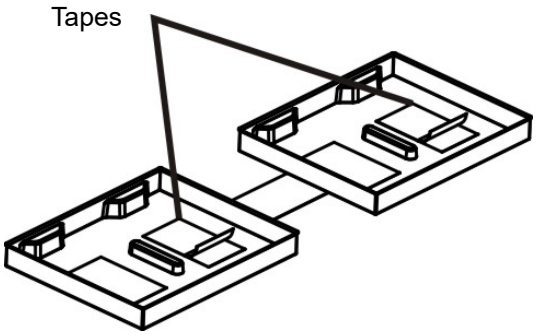


2.6. Battery Kit Assembly

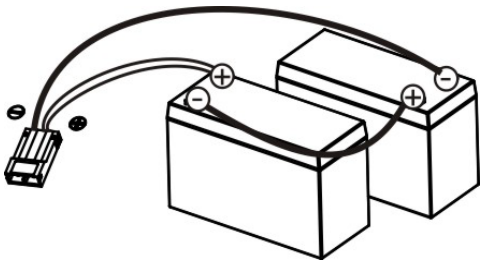
NOTICE: Please assemble the battery kit first before installing it inside of the UPS. Please select the correct battery kit procedure below to assemble it.

2-battery Kit

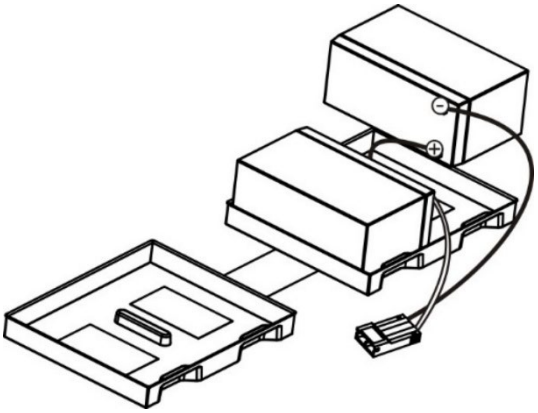
Step 1: Remove the adhesive tapes.

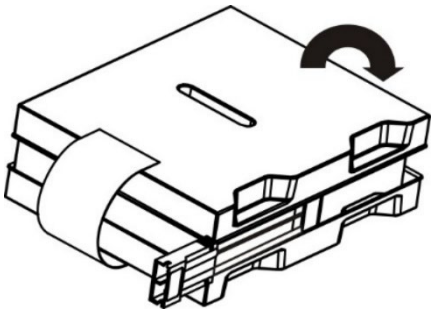


Step 2: Connect all battery terminals accordingly.



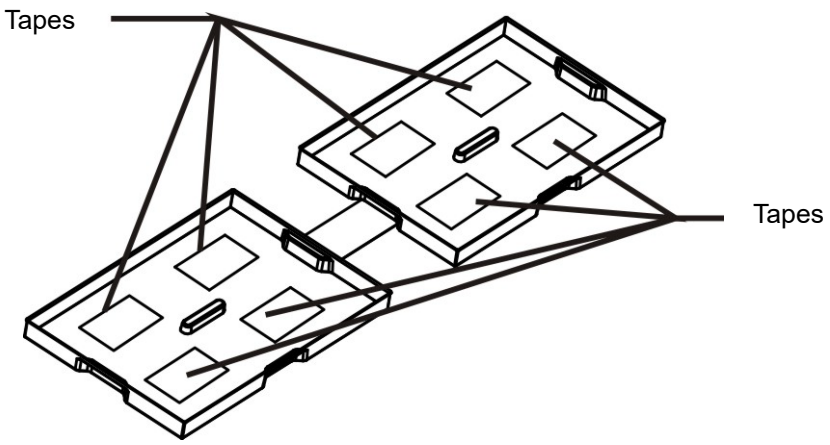
Step 3: Put the assembled batteries back into the plastic box.



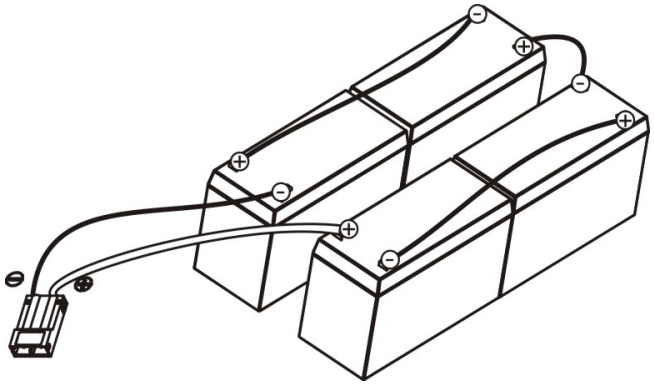


4-battery Kit

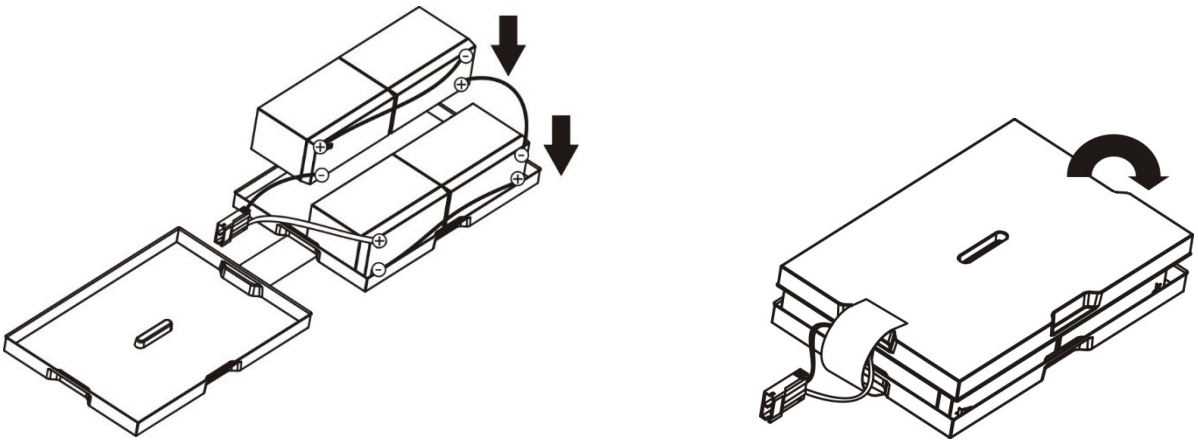
Step 1: Remove the adhesive tapes.



Step 2: Connect all battery terminals accordingly.

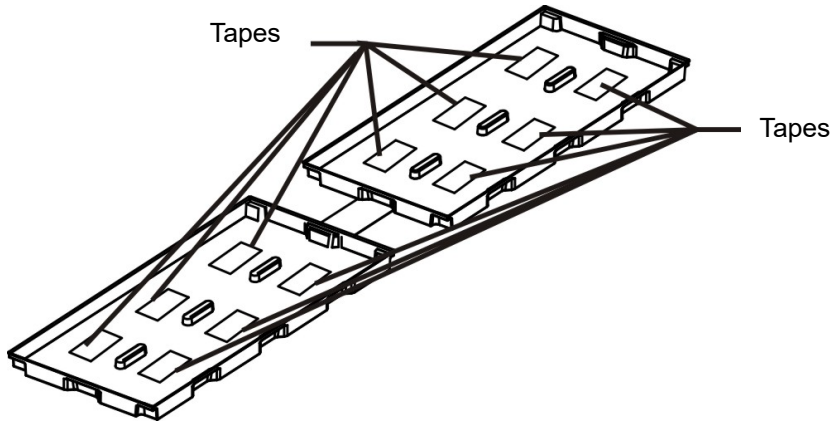


Step 3: Put the assembled batteries back into the plastic box.

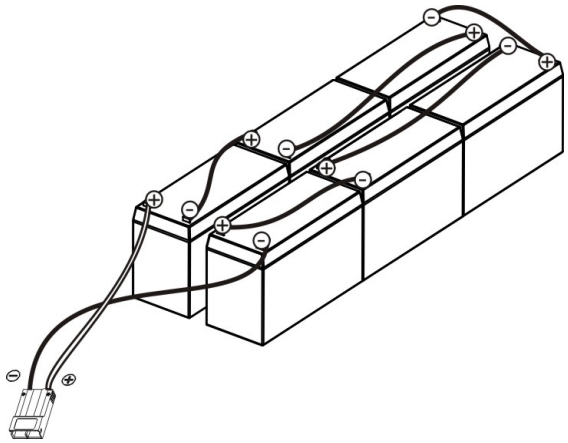


6-battery Kit

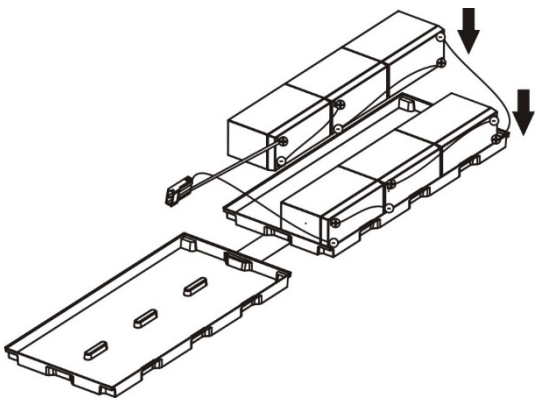
Step 1: Remove the adhesive tapes.

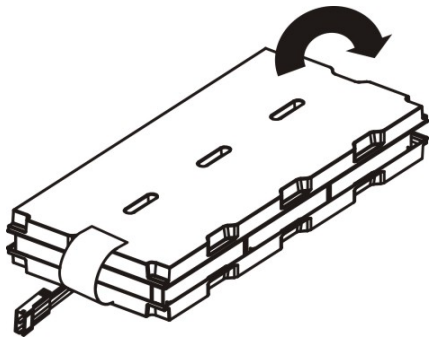


Step 2: Connect all battery terminals accordingly.



Step 3: Put the assembled batteries back into the plastic box.



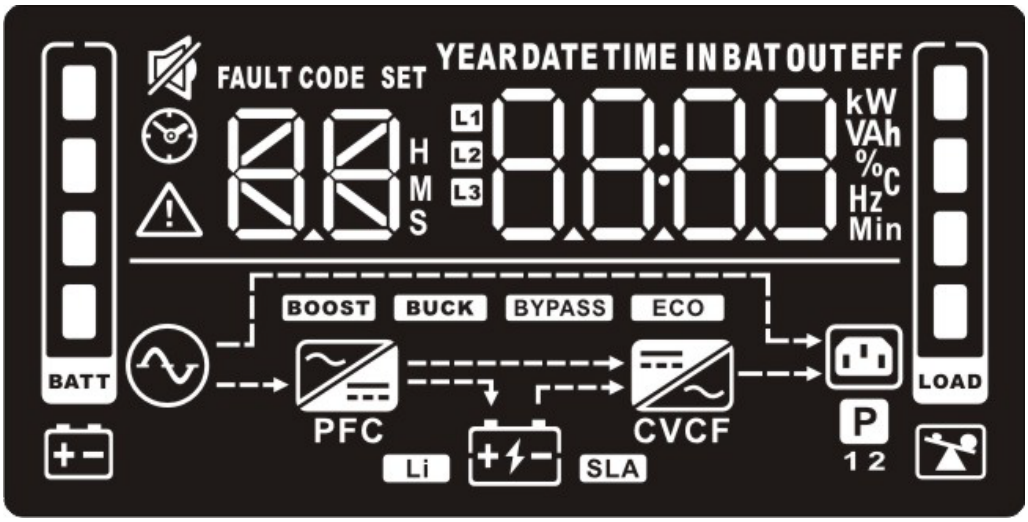


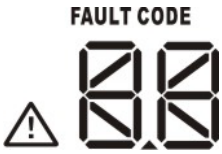
3. Operations

3.1. Button operation

Button	Function
ON/Mute Button	• Turn on the UPS: Press and hold ON/Mute button for at least 2 seconds to turn on the UPS. • Mute the alarm: After the UPS is turned on in battery mode, press and hold this button for at least 3 seconds to disable or enable the alarm system. This does not apply to situations when warnings or errors occur. • Up key: Press this button to display previous selection in UPS setting mode. • Switch to UPS self-test mode: While the UPS is on, press ON/Mute buttons for 3 seconds to enter UPS self-testing while in AC mode, ECO mode, or converter mode.
OFF/Enter Button	• Turn off the UPS: Press and hold OFF/Enter button for at least 2 seconds to turn off the UPS. When turned off, the UPS will be either in standby mode or in bypass mode if the bypass mode has been enabled in the settings. • Confirm selection key: Press this button to confirm selection in UPS setting mode.
Select Button	• Switch LCD message: Press this button to change the LCD message for input voltage, input frequency, input current, battery voltage, battery current, battery capacity, ambient temperature, output voltage, output frequency, load current and load percent. • Setting mode: Press and hold this button for 3 seconds to enter UPS setting mode when in Standby and Bypass mode. • Down key: Press this button to display next selection in UPS setting mode.
ON/Mute + Select Button	• Switch to bypass mode: When the mains power supply is normal, press ON/Mute and Select buttons simultaneously for 3 seconds to enter the bypass mode. This action will be ineffective when the input voltage is out of acceptable range. • Exit setting mode or return to the upper menu: When in settings mode, press the ON/Mute and Select buttons to return to the previous menu level. If you are already in the top menu, press both buttons simultaneously to exit settings mode.

3.2. LCD Panel



Display	Function
Backup time information	
	Displays the estimated backup time. H: hours, M: minute, S: second.
Configuration and fault information	
	Indicates the configuration items, and the configuration items are listed in detail in section 3-5.
	Indicates the warning and fault codes, and the codes are listed in detail in section 3-7 and 3-8.
Mute operation	
	Indicates that the UPS alarm is disabled.

Input, Battery, Temperature, Output & Load information	
	Displays the input voltage, input frequency, input current, battery voltage, battery current, battery capacity, ambient temperature, output voltage, output frequency, load current and load percent. k: kilo, W: watt, V: voltage, A: ampere, %: percent, ℃: centigrade degree, Hz: frequency
Load information	
	Indicates the load level by 0-24%, 25-49%, 50-74% and 75-100%.
	Indicates overload.
Programmable outlets information	
	Indicates that programmable management outlets are working.
Mode operation information	
	Indicates the UPS connects to the mains.
	Indicates the battery is working.
	Indicates charging status
	Indicates the bypass circuit is working.
	Indicates the ECO mode is enabled.
	Indicates the AC to DC circuit is working.

PFC	Indicates the PFC circuit is working.
	Indicates the inverter circuit is working.
CVCF	Indicates the UPS is working in converter mode.
	Indicates the output is working.
Battery information	
	Indicates the battery level by 0-24%, 25-49%, 50-74%, and 75-100%.
	Indicates low battery.

3.3. Audible Alarm

Battery Mode	Sounding every 5 seconds
Low Battery	Sounding every 2 seconds
Overload	Sounding every second
Fault	Continuously sounding
Bypass Mode	Sounding every 10 seconds

3.4. LCD display wordings index

Abbreviation	Display content	Meaning
ENA		Enable
DIS		Disable

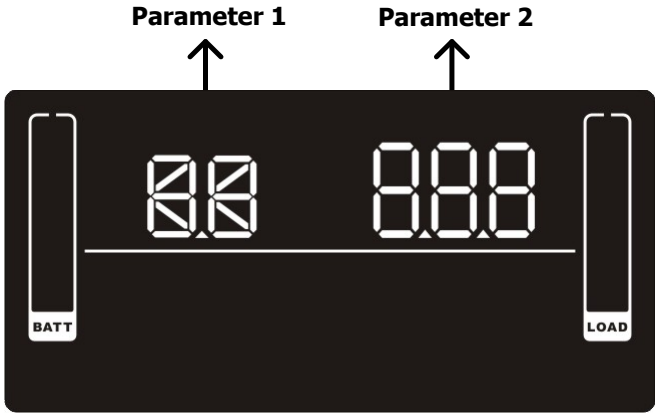
ESC		Escape
HLS		High loss
LLS		Low loss
AO		Active open
AC		Active close
EAT		Estimated autonomy time
RAT		Running autonomy time
SD		Shutdown
OK		OK
ON		ON
BL		Battery low

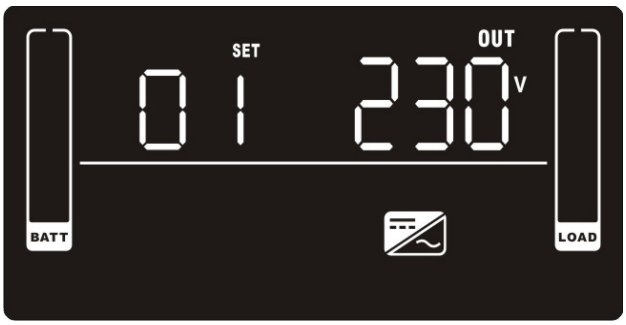
OL		Overload
OI		Over input current
NC		Batter not connected
OC		Overcharge
SF		Site wiring fault
EP		EPO
TP		Temperature
CH		Charger
BF		Battery fault
BV		Bypass out of range
FU		Bypass frequency unstable

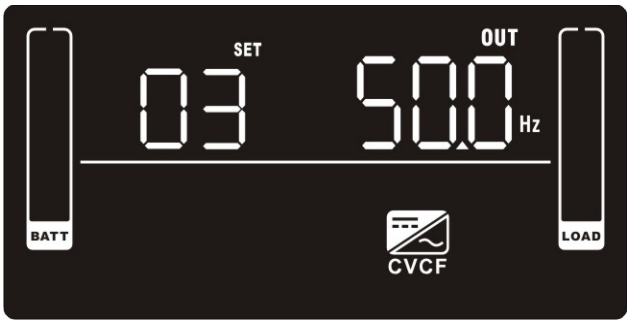
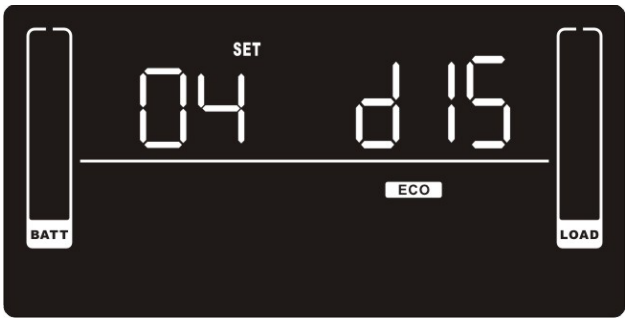
BR	bR	Replace battery
EE	EE	EEPROM error

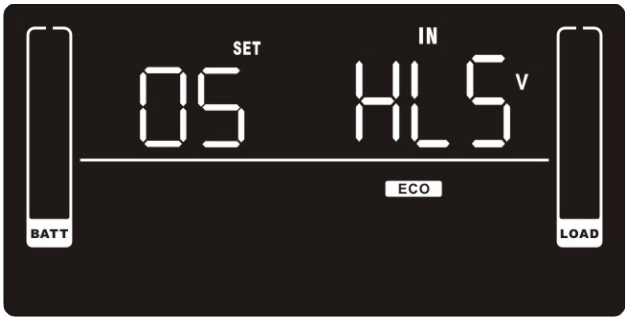
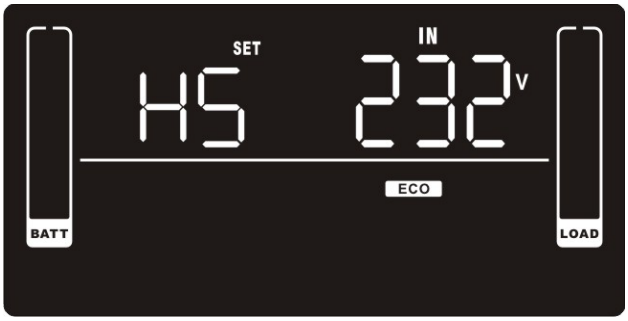
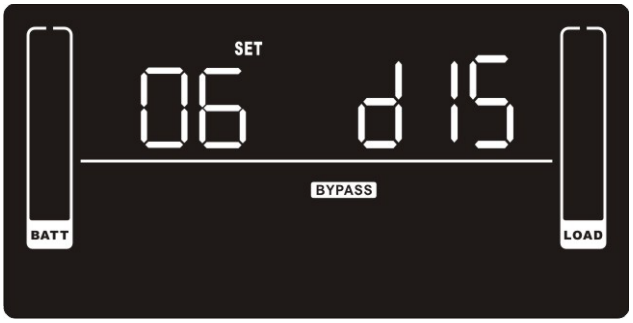
3.5. UPS Setting

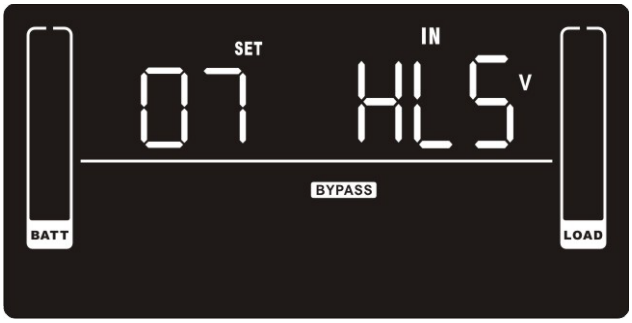
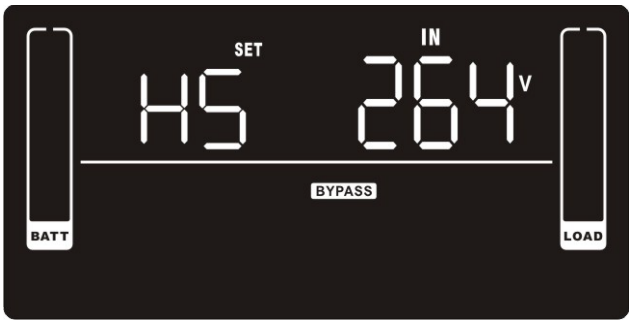
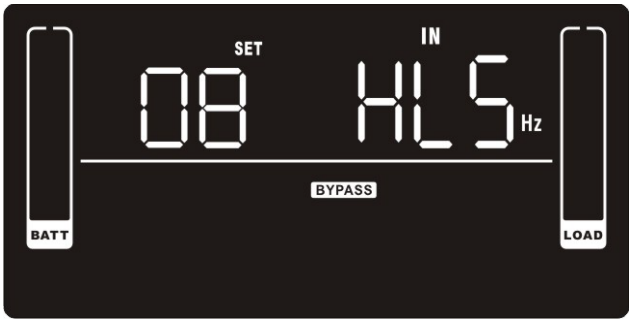
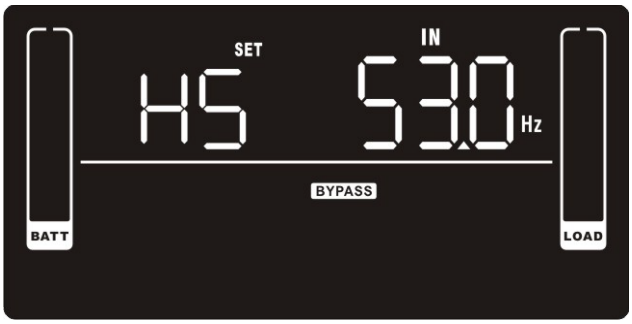
When configuring the device on the display, there are 19 different settings you can configure. The parameter meanings and options can be taken from the table below.

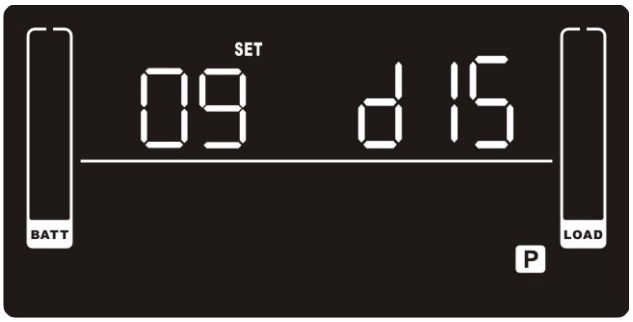


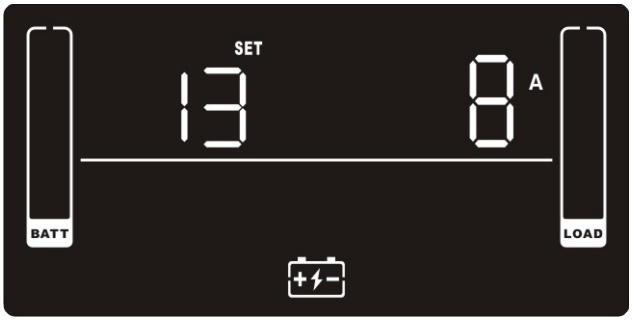
Parameter 01: Output voltage setting	
Interface	**Setting Parameter 2**
	Output voltage For the Expert Power Backup 8810-Series, you may choose the following output voltage: **200**: presents output voltage is 200Vac **208**: presents output voltage is 208Vac **220**: presents output voltage is 220Vac **230**: presents output voltage is 230Vac (Default) **240**: presents output voltage is 240Vac

Parameter 02: Frequency Converter enabled/disabled	
Interface	**Setting Parameter 2**
	Enable or disable converter mode. You may choose the following two options: **CF ENA**: converter mode enabled **CF DIS**: converter mode disabled (Default)
Parameter 03: Output frequency setting	
Interface	**Setting Parameter 2**
	Output frequency setting. In Battery Mode **BAT 50**: output frequency is 50Hz **BAT 60**: output frequency is 60Hz In Converter Mode **CF 50**: output frequency is 50Hz **CF 60**: output frequency is 60Hz
Parameter 04: ECO enable/disable	
Interface	**Setting Parameter 2**
	Enable or disable ECO function. **ENA**: ECO mode enabled **DIS**: ECO mode disabled (Default)

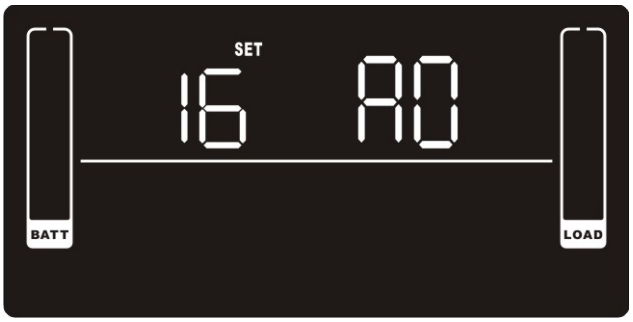
Parameter 05: ECO voltage range setting	
Interface	**Setting Parameter 2**
 	Set the acceptable high voltage point and low voltage point for ECO mode by pressing Down key or Up key. **HLS**: High loss voltage in ECO mode in parameter 2. For the Expert Power Backup 8810-Series, the setting range in parameter 3 is from +7V to +24V of the nominal voltage. (Default: +12V) **LLS**: Low loss voltage in ECO mode in parameter 2. For the Expert Power Backup 8810-Series, the setting range in parameter 3 is from -7V to -24V of the nominal voltage. (Default: -12V)
Parameter 06: Bypass enable/disable when UPS is off	
Interface	**Setting Parameter 2**
	Enable or disable Bypass function. You may choose the following two options: **ENA**: Bypass enabled **DIS**: Bypass disabled (Default)

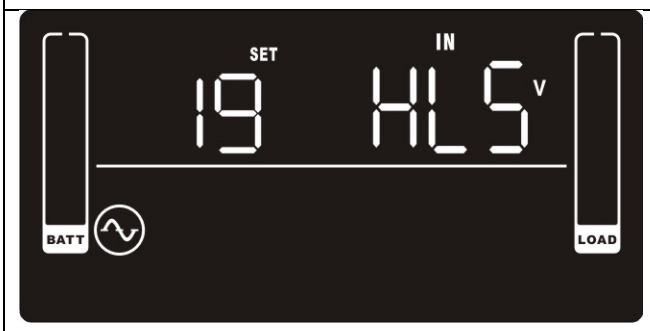
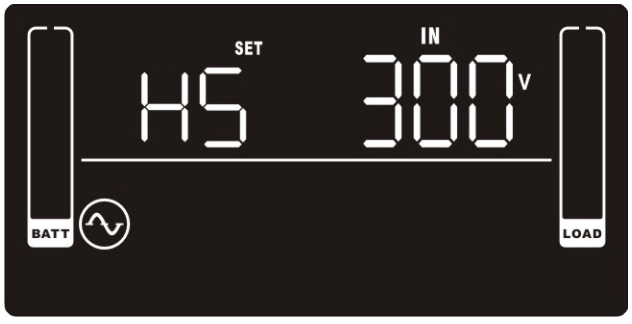
Parameter 07: Bypass voltage range setting	
Interface	**Setting Parameter 2**
 	Set the acceptable high voltage point and acceptable low voltage point for Bypass mode by pressing the Down key or Up key. **HLS**: Bypass high voltage point For the Expert Power Backup 8810-Series: **230-264**: setting the high voltage point from 230Vac to 264Vac. (Default: 264Vac) For 100/110/115/120/125/127Vac models: **LLS**: Bypass low voltage point For the Expert Power Backup 8810-Series: **170-220**: setting the low voltage point from 170Vac to 220Vac. (Default: 170Vac)
Parameter 08: Bypass frequency range setting	
Interface	**Setting Parameter 2**
 	Set the acceptable high frequency point and acceptable low frequency point for Bypass mode by pressing the Down key or Up key. **HLS**: Bypass high frequency point For 50Hz output frequency models: **51-55Hz**: setting the frequency high loss point from 51Hz to 55HZ. (Default: 53.0Hz) For 60Hz output frequency models: **61-65Hz**: setting the frequency high loss point from 61Hz to 65Hz. (Default: 63.0Hz) **LLS**: Bypass low Frequency point For 50Hz output frequency models: **45-49Hz**: setting the frequency low loss point from 45Hz to 49HZ. (Default: 47.0Hz) For 60Hz output frequency models:

	55-59Hz: setting the frequency low loss point from 55Hz to 59Hz. (Default: 57.0Hz)
Parameter 09: Programmable outlets enable/disable	
Interface	**Setting parameter 2**
	Enable or disable programmable outlets. **ENA**: Programmable outlets enabled **DIS**: Programmable outlets disabled (Default)
Parameter 10: Programmable outlets setting	
Interface	**Setting Parameter 2**
	Set up backup time limits for programmable outlets. **0-999**: setting the backup time limits in minutes from 0-999 for programmable outlets which connect to non-critical devices on battery mode. (Default: 999)
Parameter 11: Autonomy limitation setting	
Interface	**Setting Parameter 2**
	Set up backup time on battery mode for non-programmable outlets. **0-999**: setting the backup time in minutes from 0-999 for general outlets on battery mode. **DIS**: Disable the autonomy limitation and the backup time will depend on battery capacity. (Default) **Note**: When setting as “0”, the backup time will be only 10 seconds.

<table>
<tr><th colspan="2">Parameter 12: Battery total AH setting</th></tr>
<tr><th>Interface</th><th>Setting Parameter 2</th></tr>
<tr><td> 
</td><td>Set up the battery total AH of the UPS.
7-999: setting the battery total capacity from 7-999 in AH. Please set the correct battery total capacity if external battery bank is connected.</td></tr>
<tr><th colspan="2">Parameter 13: Maximum charger current setting</th></tr>
<tr><th>Interface</th><th>Setting Parameter 2</th></tr>
<tr><td> 
</td><td>Set up the maximum charger.
For low voltage models with 24/36/48VDC
1/2/4/6/8: setting the charger maximum current 1/2/4/6/8 in Ampere. (Default: 2A)
For high voltage models with 24/36/48VDC
1/2/4/6/8/10/12: setting the maximum charger current 1/2/4/6/8/10/12 in Ampere. (Default: 2A)

For low voltage and high voltage model with 72/96VDC
1/2/4/6/8: setting the charger maximum current 1/2/4/6/8 in Ampere. (Default: 2A)
Note: Please set the appropriate charger current based on battery capacity used. The recommended charging current is 0.1C~0.3C of battery capacity as following table for reference.
<table>
<tr><th>Battery capacity (AH)</th><th>Total charging current (A)</th></tr>
<tr><td>7~20</td><td>2</td></tr>
<tr><td>20~40</td><td>4</td></tr>
<tr><td>40~60</td><td>6</td></tr>
<tr><td>60~80</td><td>8</td></tr>
<tr><td>80~100</td><td>10</td></tr>
<tr><td>100~150</td><td>12</td></tr>
</table></td></tr>
</table>

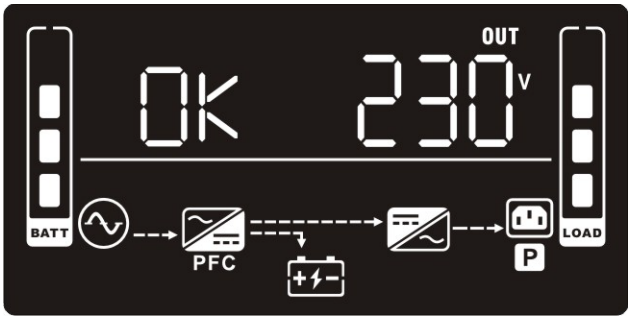
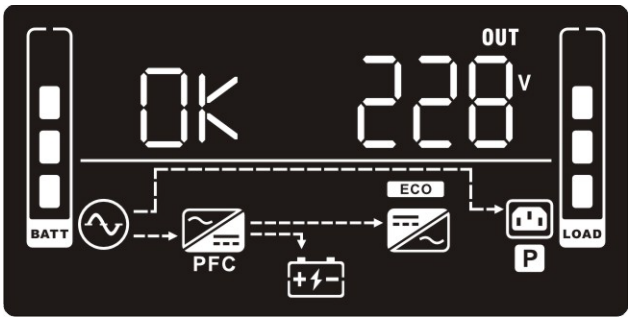
Parameter 14: Charge boost voltage setting	
Interface	**Setting**
	Set up the charger boost voltage. **2.25-2.40**: setting the charger boost voltage from 2.25 V/cell to 2.40V/cell. (Default: 2.36V/cell)
Parameter 15: Charge float voltage setting	
Interface	**Setting**
	Set up the charger float voltage. **2.20-2.33**: setting the charger float voltage from 2.20 V/cell to 2.33V/cell. (Default: 2.28V/cell)
Parameter 16: EPO logic setting	
Interface	**Setting Parameter 2**
	Set up the EPO function control logic. **AO**: Active Open (Default). When AO is selected as EPO logic, it will activate EPO function with Pin 1 and Pin 2 in open status. **AC**: Active Close. When AC is selected as EPO logic, it will activate EPO function with Pin 1 and Pin 2 in close status.

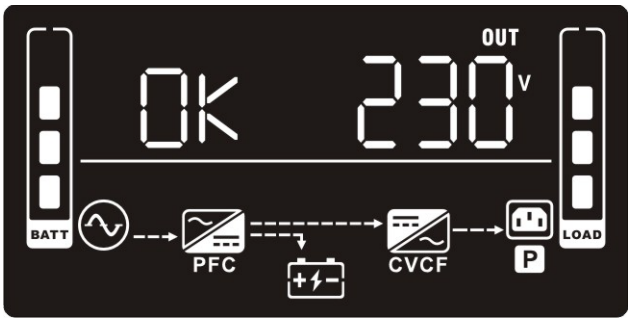
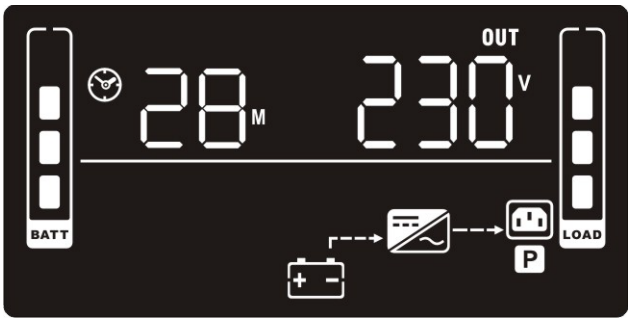
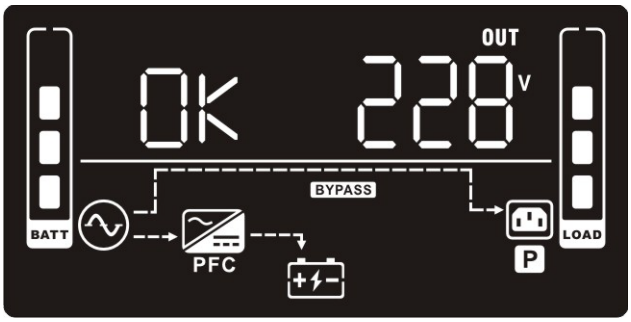
Parameter 17: External output isolation transformer connection	
Interface	**Setting**
	Allow or disallow external output isolation transformer connection. **ENA**: If selected, it's allowed to connect to an external output isolation transformer. **DIS**: If selected, it's not allowed to connect to external output isolation transformer. (Default)
Parameter 18: Display setting for autonomy time	
Interface	**Setting**
	Set up the display setting for autonomy time **EAT**: If EAT is selected, it will display the remaining autonomy time. (Default) **RAT**: If RAT is selected, it will show accumulated autonomy time so far.
Parameter 19: Acceptable input voltage range setting	
Interface	**Setting Parameter 2**
 	Set the acceptable high voltage point and acceptable low voltage point for input voltage range by pressing the Down key or Up key. **HLS**: Input high voltage point For the Expert Power Backup 8810-Series: **280/290/300**: setting the high voltage point in parameter 2. (Default: 300Vac) **LLS**: Bypass low voltage point For Expert Power Backup 8810-Series:

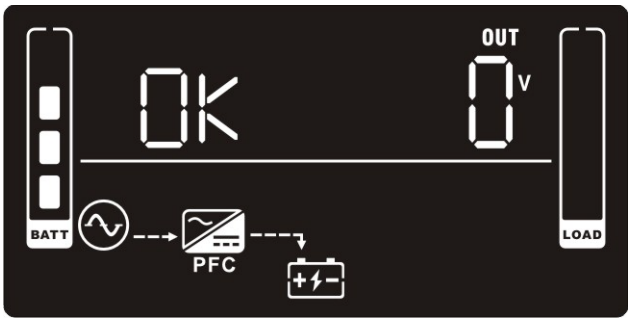
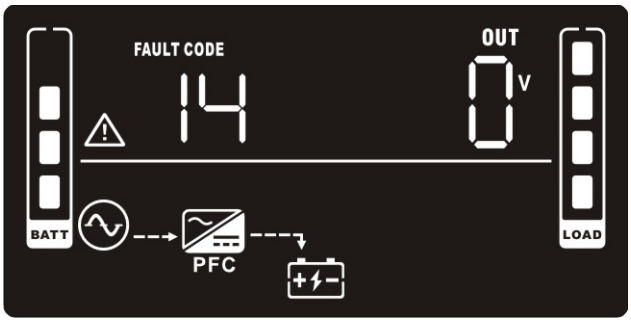
	110/120/130/140/150/160: setting the low voltage point in parameter 2. (Default: 110Vac)

Parameter 00: Exit setting	
Interface	**Setting Parameter 2**
	Exit setting mode.

3.6. Operating Mode Description

Online mode	
	When the input voltage is within acceptable range, UPS will provide pure and stable AC power to output. The UPS will also charge the battery during online mode.
ECO mode	
	Energy saving mode: When the input voltage is within voltage regulation range, UPS will bypass voltage to output for energy saving. The UPS will also charge the battery during ECO mode.

Frequency converter mode	
	When input frequency is between 40 Hz to 70 Hz, the UPS can be set at a constant output frequency of 50 Hz or 60 Hz. The UPS will still charge battery under this mode.
Battery mode	
	In case of a power failure or when the input voltage is beyond the acceptable range, the UPS changes to battery mode to keep powering the connected loads. An alarm will keep sounding every 5 seconds during battery mode.
Bypass mode	
	When the input voltage is within acceptable range but the UPS has been overloaded, the UPS will enter bypass mode. An alarm will keep sounding every 10 seconds in bypass mode. It is also possible to switch to bypass mode via the LCD display.

Standby mode	
	The UPS is powered off and provides no power to the connected loads. The battery is still being charged in standby mode.
Fault mode	
	When a fault has occurred, the ERROR icon and the fault code will be displayed. More information on the fault codes can be found in chapter 3-7. Faults Reference Code.

3.7. Faults Reference Code

Fault event	**Fault code**	**Icon**
Bus start fail	01	X
Bus over	02	X
Bus under	03	X
Inverter soft start fail	11	X
Inverter voltage high	12	X
Inverter voltage low	13	X
Inverter output short	14	X
Battery voltage too high	27	X
Battery voltage too low	28	X
Charger output short	2A	X
Over temperature	41	X
Overload	43	
Charger failure	45	X
Over input current	49	X

3.8. Warning Indicator

Warning	Icon (flashing)	Code	Alarm
Low battery		bL	Sounding every 2 seconds
Overload		OL	Sounding every second
Over input current		OI	Sounding 2 beeps every 10 seconds
Battery is not connected		nC	Sounding every 2 seconds
Over charge		OC	Sounding every 2 seconds
Site wiring fault		SF	Sounding every 2 seconds
EPO enabled		EP	Sounding every 2 seconds
Over temperature		tP	Sounding every 2 seconds
Charger failure		CH	Sounding every 2 seconds
Battery fault		bF	Sounding every 2 seconds. UPS is also off, to remind the user something is wrong with the battery.
Out of bypass voltage range		bv	Sounding every 2 seconds
Bypass frequency unstable		FU	Sounding every 2 seconds
Battery replacement		bt	Sounding every 2 seconds
EEPROM error		EE	Sounding every 2 seconds

NOTE: “Site wiring fault” function can be enabled/disabled via the software.

4. Troubleshooting

If the UPS system does not operate correctly, please solve the problem by using the table below.

Symptom	Possible cause	Possible solution
No indication and alarm even though the mains is normal.	The AC input power is not connected properly.	Check if the input power cord is firmly connected to the mains.
	The AC input is connected to the UPS output.	Plug the AC input power cord to the AC input correctly.
The icon ⚠ and the warning code EP flash on LCD display and alarm is sounding every 2 seconds.	EPO function is activated.	Set the circuit in closed position to disable EPO function.
The icons of ⚠ and ∿ and the warning code SF flash on LCD display. Alarm is sounding every 2 seconds.	Line and neutral conductors of UPS input are reversed.	
The icons of ⚠ and + − and the warning code nC flash on LCD display. Alarm is sounding every 2 seconds.	The external or internal battery is incorrectly connected.	
Fault code is shown as 27 on LCD display and alarm is continuously sounding.	Battery voltage is too high or the charger is fault.	
Fault code is shown as 28 on LCD display and alarm is continuously sounding.	Battery voltage is too low or the charger is fault.	
The icons ⚠ and ⚠ and the warning code OL flash on LCD display. Alarm is sounding every second.	UPS is overload	Remove excess loads from UPS output.
	UPS is overloaded. Devices connected to the UPS are fed directly by the electrical network via the Bypass.	Remove excess loads from UPS output.
	After repetitive overloads, the UPS is locked in the Bypass mode. Connected devices are fed directly by the mains.	Remove excess loads from UPS output first. Then shut down the UPS and restart it.

Symptom	Possible cause	Possible solution
Fault code is shown as 49 on LCD display and alarm is continuously sounding.	UPS is over input current.	Remove excess loads from UPS output.
Fault code is shown as 43 and the icon is lighting on LCD display. Alarm is continuously sounding.	The UPS shut down automatically because of overload at the UPS output.	Remove excess loads from UPS output and restart it.
Fault code is shown as 14 on LCD display and alarm is continuously sounding.	The UPS shut down automatically because short circuit occurs on the UPS output.	Check output wiring and if connected devices are in short circuit status.
Fault code is shown as 01, 02, 03, 11, 12, 13 and 41 on LCD display and alarm is continuously sounding.	A UPS internal fault has occurred. There are two possible results: 1. The load is still supplied, but directly from AC power via bypass. 2. The load is no longer supplied by power.	Contact your dealer
Battery backup time is shorter than nominal value.	Batteries are not fully charged	Charge the batteries for at least 5 hours and then check capacity. If the problem still persists, consult your dealer.
	Batteries defect	Contact your dealer to replace the battery.
Fault code is shown as 2A on LCD display and alarm is continuously sounding.	The short circuit occurs on the charger output.	Check if battery wiring of connected external pack is in short circuit status.
Fault code is shown as 45 on LCD display. At the same time, alarm is continuously sounding.	The charger does not have output and battery voltage is less than 10V/PC.	Contact your dealer.

5. Storage and Maintenance

This chapter explains how to store and maintain the UPS and its internal batteries safely and how to handle the batteries at the end of their service life.

WARNING: The UPS contains sealed lead-acid batteries. Incorrect storage, maintenance or disposal can cause electric shock, fire, chemical burns or environmental damage.

5.1. Operation and General Maintenance

The UPS must be operated within the environmental limits specified in the technical specifications.

- Keep enough space around the UPS as specified in the installation instructions.
- In case of abnormal conditions, such as smoke, immediately switch off the UPS, disconnect it from the mains and from the load, and contact qualified service personnel.
- The expected battery life of the internal batteries is typically 3 to 5 years at 25 °C ambient temperature. Higher temperature and frequent discharges can reduce battery life.

NOTE: There are no user-serviceable parts inside the UPS enclosure. Maintenance and service work, including battery replacement, must only be qualified and trained personnel.

5.2. Storage of the UPS

- Before first storage: charge the UPS for at least 5 hours or until the battery is fully charged.
- Storage conditions
    - Store the UPS covered and in a cool, dry and clean location.
    - Avoid direct sunlight, proximity to heat sources and environments with high humidity, condensation, corrosive gases or excessive dust.
- To preserve battery life during prolonged storage, the UPS batteries must be recharged at regular intervals as specified:

Storage temperature	Recharge frequency	Charging duration
-25°C – 40°C	Every 3 months	1 – 2 hours
40°C – 45°C	Every 2 months	1 – 2 hours

5.3. Battery End of Life, Environmental and Disposal Information

This UPS contains lead-acid batteries that are subject to special collection and recycling requirements.

Collection and disposal

Pb **WARNING**: The battery contains lead-acid, which is a hazardous substance that can be harmful to human health and the environment if not handled and disposed of properly.

WARNING: Do not dispose of batteries with household waste. In accordance with the Waste Electrical and Electronic Equipment (WEEE) Directive, this product must not be disposed of with

general waste. Please contact your local waste disposal authority or your original dealer for information on recycling or returning this product. You can also return the device to GUDE Systems for proper disposal. Please contact us by phone or email to arrange this.

- End-users are required to return waste batteries to designated collection systems in accordance with applicable national regulations.
- Used batteries can typically be returned:
    - To your distributor or installer,
    - To authorized collection points or municipal recycling centers, or
    - To the manufacturer or an authorized service partner.
- Returning used batteries for proper treatment and recycling is free of charge and does not require the purchase of a new battery.

Environment and health information

- Batteries contain substances such as lead-acid and electrolytes that can cause harm to humans and the environment if released uncontrollably.
- Improper disposal may lead to contamination of soil and water and pose risks to people, animals and plants.
- By returning used batteries to approved collection and recycling systems:
    - Valuable raw material can be recovered and reused, and
    - The overall environmental impact of battery use is reduced.

6. Specifications

MODEL		8810-1	8810-2	8810-3
CAPACITY*		1000VA/1000W	2000VA/2000W	3000VA / 3000W
INPUT				
Voltage Range	Low Line Transfer	160VAC/140VAC/120VAC/110VAC ± 5 % or 80VAC/70VAC/60VAC/55VAC ± 5 % (based on load percentage 100% - 80 % / 80 % - 70 % / 70 - 60 % / 60 % - 0)		
	Low Line Comeback	175VAC/155VAC/135VAC/125VAC ± 5 % or 87VAC/77VAC/67VAC/62VAC ± 5 %		
	High Line Transfer	300 VAC ± 5 % or 150 VAC ± 5 %		
	High Line Comeback	290 VAC ± 5 % or 145 VAC ± 5 %		
Frequency Range		40Hz ~ 70 Hz		
Phase		Single phase with ground		
Power Factor		≧ 0.99 @ full load		
THDi		≦ 5% @ 205-245VAC or 100~130VAC THDU < 1.6% @ input and full linear load condition		
OUTPUT				
Output voltage		200/208/220/230/240VAC or 100/110/115/120/127 VAC		
AC Voltage Regulation		± 1% (Batt. Mode)		
Frequency Range (Synchronized Range)		47 ~ 53 Hz or 57 ~ 63 Hz		
Frequency Range		50 Hz ± 0.1 Hz or 60Hz ± 0.1 Hz (Batt. Mode)		
Current Crest Ratio		3:1		
Harmonic Distortion		≦ 2 % THD (Linear Load) ; 4 % THD (Non-linear Load)		
Transfer Time	AC Mode to Batt. Mode	Zero		
	Inverter to Bypass	< 4 ms		
Waveform (Batt. Mode)		Pure Sinewave		
EFFICIENCY				
AC Mode		≧89% @ full charged battery	≧91% @ full charged battery	
ECO Mode		≧96% @ full charged battery		
Battery Mode		≧88%	≧90%	
BATTERY				
Battery Type		12V/9AH	12V/9AH	12V/9AH
Numbers		2	4	6
Recharge Time		3 hours recover to 95% capacity for internal battery @ 2A charging current		

Charging Current		100/110/115/120 /127 VAC models: default 2A, max. 8A adjustable 200/208/220/230/240 VAC models: default 2A, max. 12A adjustable		Default: 2A, Max: 8A adjustable
Charging Voltage		27.4 VDC ± 1%	54.7 VDC ± 1%	82.1 VDC ±1%
PHYSICAL				
Dimension, D X W X H (mm)		410 x 438 x 88	510 x 438 x 88	630 x 438 x 88
Net Weight (kgs)	With battery	11.6	19.5	27.5
	Without battery	6.6	9.4	12.4
ENVIRONMENT				
Operation Humidity		20-95 % RH @ 0- 40°C (non-condensing)		
Noise Level		Less than 50dBA @ 1 Meter (With fan speed control)		
MANAGEMENT				
Smart RS-232 or USB		Supports Windows® 2000/2003/XP/Vista/2008/7/8/10, Linux, Unix and MAC		
Optional SNMP		Power management from SNMP manager and web browser		

* Derate capacity to 80% of capacity when the output voltage is adjusted to 100VAC, 200VAC or 208VAC. For 100/110/115/120/127VAC system, the output power ratings are different based on different input voltage. Please check output power rating table for the details.

** Product specifications are subject to change without further notice.

6.1. Runtime Chart (internal battery) in minutes

Model	**Expert Power Backup 8810-1**	**Expert Power Backup 8810-2**	**Expert Power Backup 8810-3**
Battery / Load percentage	9 Ah x 2	9 Ah x 4	9 Ah x 6
100%	2,43	2,43	2,64
90%	3,19	3,19	3,36
80%	4,14	4,06	4,34
70%	5,31	5,31	5,53
60%	6,93	7,06	7,33
50%	9,44	9,56	9,79
40%	12,92	13,20	13,51
30%	18,52	19,12	19,90
20%	29,90	31,06	32,61
10%	63,67	68,38	72,53

GUDE Systems GmbH
Von-der-Wettern-Str. 23
51149 Köln

E-Mail: info@gude-systems.com
Web: www.gude-systems.com
Tel.: +49-221-985 925 0