Security Plus II

Online Uninterruptible Power Supply

UPS-42100-85R

User Manual

Danger- The danger symbol is used to indicate imminently hazardous situations, locations, and conditions which, if not avoided, WILL result in death, serious injury, and/or severe property damage.

Caution- The caution symbol is used to indicate potentially hazardous situations and conditions which, if not avoided, may result in injury. Equipment damage may also occur.

Warning- The warning symbol is used to indicate potentially hazardous situations and conditions which, if not avoided, COULD result in serious injury or death. Severe property damage COULD also occur.

Attention- The attention warning symbol is used to indicate situations and conditions that can cause operator injury and/or equipment damage.

Other warning symbols may appear along with the Danger and Caution symbol and are used to specify special hazards. These warnings describe particular areas where special care and/or procedures are required in order to prevent serious injury and possible death.

Electrical Warnings- The electrical warning symbol is a lightning bolt mark enclosed in a triangle. The electrical warning symbol is used to indicate high voltage locations and conditions may cause serious injury or death.

Explosion Warnings- The explosion warning symbol is an explosion mark enclosed in a triangle. The explosion warning symbol is used to indicate locations and conditions where molten, exploding parts may cause serious injury or death if the proper precautions are not observed.

Protective Earth (Ground)

Connection point for the neutral conductor on PERMANENTLY INSTALLED EQUIPMENT

Earth Ground

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1.0 GENERAL SAFETY INSTRUCTIONS

Warnings in this manual appear in any of four ways:

Use of this equipment in life support applications where failure of this equipment can reasonably be expected to cause the failure of the life support equipment or to significantly affect its safety or effectiveness is not recommended. Do not use this equipment in the presence of a flammable anesthetic mixture with air, oxygen or nitrous oxide.

Connect your UPS power module's grounding terminal to a grounding electrode conductor.

The UPS is connected to a DC energy source (battery). The output terminals may be live when the UPS is not connected to an AC supply.

Operation

DANGER

Do not disconnect the earth conductor cable on the UPS or the building wiring terminals at any time as this would negate the protective earth of the UPS system and of all connected loads.

DANGER

The UPS system features its own, internal current source (batteries). The UPS output sockets or output terminal blocks may be electrically live even if the UPS system is not connected to the building wiring outlet.

WARNING

In order to fully disconnect the UPS system, first press the "OFF" button and then disconnect the mains.

NOTE TO USERS

To ensure correct operation of the UPS, please read this instruction manual carefully. Please keep this manual handy for future reference.

WARNING **ELECTRICAL HAZARD AUTHORIZED PERSONNEL ONLY**	This UPS has dangerously high voltages on both its Input and output connections. Contact with these voltages may be life threatening. Please follow the operating instructions carefully. Please give close attention to the warnings in this manual and those posted on the UPS. There are no user serviceable parts inside the UPS. Disassembly and/ or maintenance should only be done by an authorized professional service technician

IMPORTANT INFORMATION FOR USERS OF THIS UNINTERRUPTIBLE POWER SUPPLY

1. Before operating the UPS or connecting any load equipment, please ensure the UPS is connected to a properly grounded electrical supply.
2. This UPS has dangerously high voltages on both its input and output connections. Contact with these voltages may be life threatening.
3. Please do not disassemble the covers. There is a risk of electric shock.
4. In an emergency, immediately turn off the circuit breaker for the circuit supplying power to the UPS; open DC on battery breaker.
5. This UPS has two power sources. One is the circuit supplying the UPS with input power. The other is the UPS battery. Prior to any maintenance, both of these power sources must be disconnected to ensure that the UPS is de-energized. If only the input power is disconnected, the UPS can still operate from the battery, and hazardous voltages may still exist.
6. To prevent damage or a safety hazard, keep the UPS away from open flame and any other devices that may cause sparks.
7. Do not open or damage individual battery cases as spillage of

caustic electrolyte may occur, resulting in danger to life, safety, and the environment.

8. The charging characteristics of UPS batteries vary by both brand and type. For this reason, replacement batteries should be of the same brand and type as those specified by the manufacturer. Using batteries other than the brand and type specified by the manufacturer may affect the performance of the UPS. Before installing batteries of different brand or type, please consult with the manufacturer.
9. The UPS has an internal EMI filter for purposes of enhancing electromagnetic compatibility with the input mains supply. This filter produces leakage current to earth on the input mains. When selecting a circuit breaker for the branch circuit supplying power
   to the UPS, ensure that the breaker selected is not an ELCB type circuit breaker that detects earth leakage current.
10. Please contact the manufacturer or an authorized distributor for any assistance with troubleshooting.
11. The UPS should only be serviced or maintained by a factory authorized service technician.
12. This UPS meets FCC Class A electromagnetic compatibility requirements.
13. Depleted batteries must be disposed of in a proper manner. Contact your local recycling or hazardous waste center or the UPS manufacturer for instructions concerning proper disposal.

CAUTION

Please be careful to observe the following general safety precautions during operation or maintenance

1. There are no user serviceable parts inside this UPS. Please don't remove the covers. This system can only be maintained or repaired by an authorized SurgeX service technician.

2. To improve electromagnetic compatibility (EMC), this UPS has an input EMI filter, which produces potentially dangerous leakage current to ground. Ensure the UPS is connected to a properly grounded input electrical source. Install this UPS indoors in an environment that is temperature and humidity controlled.
3. Install this UPS in a dust-free environment.
4. This UPS has two sources of power. Before maintenance is performed, turn off the branch circuit breaker powering the UPS and turn off all battery switches.
5. Even with the AC input power supply turned off, the UPS's internal battery still represents a potentially dangerous source of high voltage electrical power.
6. If the battery circuit has not been disconnected from the AC input, dangerous voltage potential still exists between the battery terminal and the ground terminal.
7. UPS batteries represent a high voltage source and a potential hazard to personal safety. Please pay attention to proper safety precautions and use insulated tools during installation.
8. UPS batteries contain corrosive and caustic chemicals. Improper handling of batteries may lead to the unintended release or leakage of these substances. Please handle batteries carefully.
9. Condensation may occur when the UPS is moved from a low temperature, low humidity environment to a warm humid environment. Condensation may cause UPS damage or hazardous electrical shock. To ensure the safety of both the UPS and the personnel around it, make sure that the UPS is installed only after it has fully acclimated to its installation environment. This UPS is not intended to be operated in an environment of either low temperature or high humidity.
10. The DC voltage is still present on the battery fuses even with the UPS turned off. The batteries must be removed before servicing UPS.

CAUTION

Ensure that no liquid or other foreign objects can enter into the UPS system.

WARNING

The UPS is to be operated by individuals with appropriate experience.

Standards* Safety	
Safety Conformance: IEC/EN 62040-1, UL1778 (5th Edition)	
Safety Markings: cTUVus, CE	
*** EMI**	
Conducted Emission: IEC/EN 62040-2, FCC PART15 CLASS A	
Radiated Emission: IEC/EN 62040-2, FCC PART15 CLASS A	
***EMS**	
ESD: IEC/EN 61000-4-2	Level 4
RS: IEC/EN 61000-4-3	Level 3
EFT: IEC/EN 61000-4-4	Level 4
SURGE: IEC/EN 61000-4-5	Level 4
CS: IEC/EN 61000-4-6	Level 3
Power-frequency Magnetic field: IEC/EN 61000-4-8	Level 4
Low Frequency Signals: IEC/EN 61000-2-2	
Warning: This is a product for commercial and industrial application in the second environment installation restrictions or additional measures may be needed to prevent disturbances.	

2.0 UNPACKING AND INSPECTION

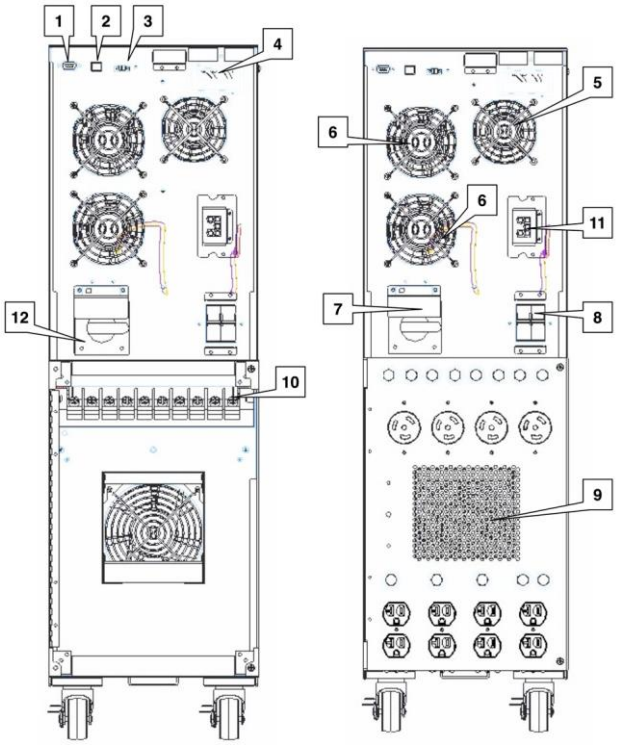
Unpack the package and check the contents. The shipping package contains:

- Quick Start Guide
- One UPS
- One RS-232 cable (option)
- One USB cable

NOTE:

Before installation, please inspect the unit. Be sure that nothing inside the package is damaged during transportation. Do not turn on the unit and notify the carrier and dealer immediately if there is any damage or lacking some parts. Please keep the original package in a safe place for future use.

3.0 UPS PANEL LAYOUT



1. RS-232 communications port
2. USB communications port
3. Emergency power off connector (EPO)
4. Intelligent pocket
5. Charger cooling fan
6. Power stage cooling fan
7. Maintenance bypass switch
8. Input circuit breaker
9. Isolation transformer cooling fan
10. Input / output terminal block connections
11. External battery cabinet connection

4.0 UPS INSTALLATION (Hardwired units only)

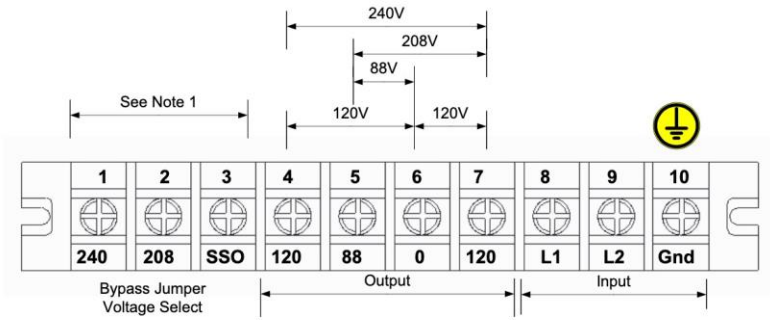
4.1 Overview

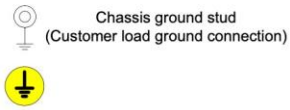
CAUTION

Installation and wiring must be performed in accordance with local electrical laws/regulations/codes. The following instructions should only be executed by qualified professional personnel.

1. Make sure the mains wire and breakers in the building are suitable for the rated capacity of the UPS to avoid the hazards of electric shock or fire.
2. Switch off mains power before installation.
3. Turn off all the connected devices before connecting to the UPS.
4. Remove terminal block cover on the rear panel of UPS, then connect the wires according to the following terminal block diagrams:

Rear panel terminal block layout – all models





Note: Illustration above showing 10-pole block applies to all models.

- 1 - 3 are SSO TAP selection (must match mains input / inv voltage selection)
- 4; 5; 6; 7 Next four are outputs as listed -120; 88; 0; +120
- 8; 9; 10 Last three are mains power input l1; l2; earth.

CAUTION

For field wired units, refer to the tables below for the proper conductor size and torque requirements. Only copper conductors are to be used for field wiring connections. The conductors should be rated at least 75°C or greater. The conductor recommendations listed in the chart below are intended for installations in North America. For international installations, please refer to the local and national electrical codes and standards.

	INPUT CONDUCTOR (AWG)			OUTPUT CONDUCTOR (AWG)			GROUND (AWG)		
RATING	MIN	MAX	TORQUE (in-lbs.)	MIN	MAX	TORQUE (in-lbs.)	MIN	MAX	TORQUE (in-lbs.)
2.0kVA	12	6	20	12	6	20	12	6	20
3.0kVA	12	6	20	12	6	20	12	6	20
4.0kVA	10	6	20	10	6	20	8	6	20
5.2kVA	8	6	20	8	6	20	8	6	20
6.0kVA	8	6	20	8	6	20	6	6	20
8.0kVA	4	1	60	4	1	60	6	4	60
10.0kVA	4	1	60	4	1	60	6	4	60

TABLE 2-4A HIGH VOLTAGE CONDUCTOR SIZE AND TORQUE SPECIFICATIONS

	INPUT CONDUCTOR (AWG)			OUTPUT CONDUCTOR (AWG)			GROUND (AWG)		
RATING	MIN	MAX	TORQUE (in-lbs.)	MIN	MAX	TORQUE (in-lbs.)	MIN	MAX	TORQUE (in-lbs.)
2.0kVA	10	6	20	10	6	20	8	6	20
3.0kVA	8	6	20	8	6	20	6	4	20

TABLE 2-4B LOW VOLTAGE CONDUCTOR SIZE AND TORQUE SPECIFICATIONS

4.2 Wiring Diagrams (Hardwired units only)

For North American applications, UPS models may be configured for an input voltage of 208 or 240 volts at 60 Hz. SSO tap must match customers utility voltage. Output voltages for these models are available at 120, 208 (using the 120 & 88 taps) and 240 volts at 60 Hz. See the table below to connect to the terminal block in Figure 2-5D to achieve the desired input and output voltage configurations.

NORTH AMERICAN CONNECTIONS										
	INPUT		OUTPUT							
VOLTAGE RATING	VOLTAGE L1 - L2	FREQ	VOLTAGE					NEURTRAL BOND	FREQ	SSO TAP JUMPER
208	208	60	-120	10.0	88	0	+120	SEE DIAGRAM	60	208-(0)
240	240	60	-120	8.0	88	0	+120		40	240-(0)

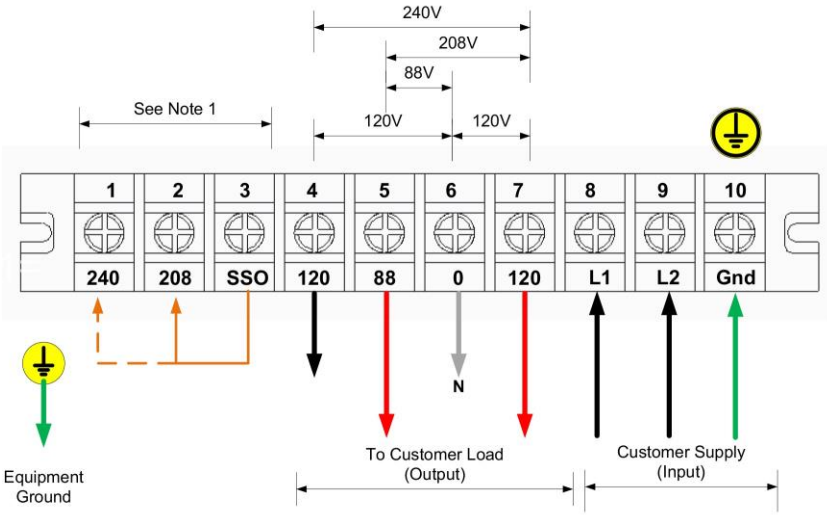
NOTE:

The neutral to ground bond connection must be properly connected for a 50 or 60 Hz configuration.

For international applications, UPS models may be configured for an input voltage of 220, 230 or 240 volts at 50 Hz. SSO tap must always be set to 240. Output voltage for these models matches the input voltage at 50 Hz. See the table below to connect to the terminal block in Figure 2-5B to achieve the desired input and output voltage configurations.

INTERNATIONAL CONNECTIONS									
	INPUT		OUTPUT						
VOLTAGE RATING	VOLTAGE L1 - L2	FREQ	VOLTAGE				NEURTRAL BOND	FREQ	SSO TAP JUMPER
--	--	--	--	--	--	--	SEE DIAGRAM	--	--
220	220	50Hz	0	--	110	220		50Hz	240-(0)
230	230	50Hz	0	--	115	230		50Hz	240-(0)
240	240	50Hz	0	--	120	240		50Hz	240-(0)

1) 120V and 208V Output



Output wiring – 208V & 120V

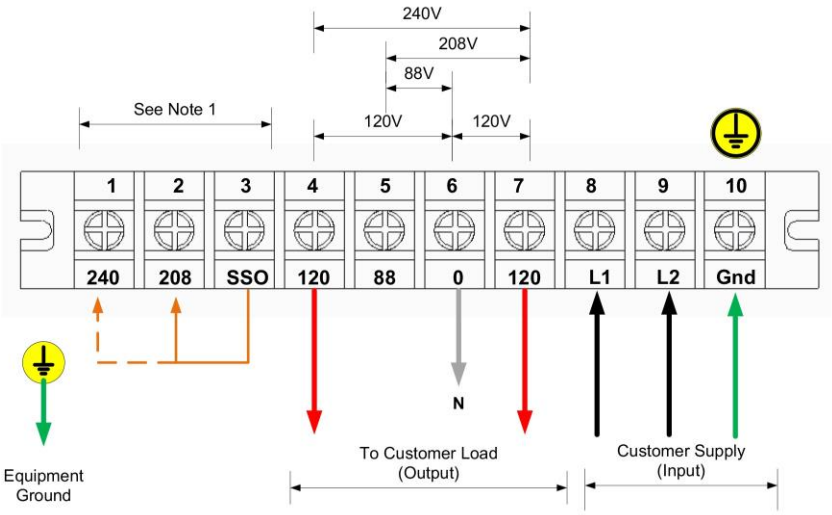
NOTE 1: SSO Tap Selection needs to be set to match the input voltage.

NOTE 2: 208 is obtained by using the 120 and 88 terminals.

NOTE 3: Make sure that the wires are connected tightly to the terminals.

NOTE 4: Install the output breaker between the output terminal and the load. The breaker should be qualified with leakage current protection if necessary.

2) 120V and 240V Output



Output wiring – 240V & 120V

NOTE 1: SSO Tap Selection needs to be set to match the input voltage. Install a jumper between 0-208V or 0-240V.

NOTE 2: Split phase wiring, load shall be balanced 50 / 50 on each side of transformer taps.

NOTE 3: Make sure that the wires are connected tightly to the terminals.

NOTE 4: Install the output breaker between the output terminal and the load. The breaker should be qualified with leakage current protection if necessary.

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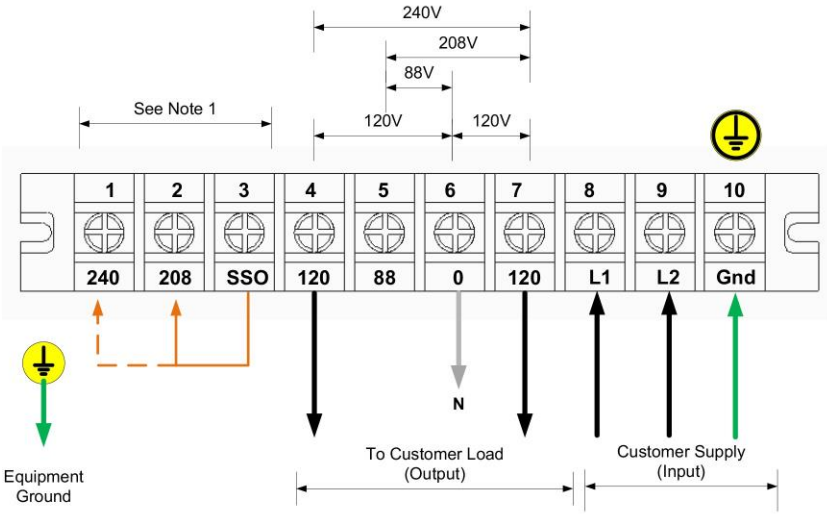
3) 120V Outputs



Output wiring – 120V

NOTE 1: SSO Tap Selection needs to be set to match the input voltage. Install a jumper between 0-208V or 0-240V.

NOTE 2: There are 2 sets of 120V outputs. Each set can carry half of the total UPS capacity.

NOTE 3: Make sure that the wires are connected tightly to the terminals.

NOTE 4: Install the output breaker between the output terminal and the load. The breaker should be qualified with leakage current protection if necessary.

4.3 Circuit Protection Requirements (Hardwired units only)

All SurgeX Hardwired Security Plus UPS system's mains INPUT must be protected by proper sized branch circuit breakers in the building installation. The recommended branch circuit ratings at full rated load are listed below:

2.0 kVA, Input 120V, Output 100-120V	35 AMP
3.0 kVA, Input 120V, Output 100-120V	45 AMP

	208V	**240V**
2.0 kVA, Input 208-240V, Output 200-240V	20 AMP	15 AMP
3.0 kVA, Input 208-240V, Output 200-240V	25 AMP	20 AMP
4.0 kVA, Input 208-240V, Output 120-240V	35 AMP	25 AMP
5.0 kVA, Input 208-240V, Output 120-240V	40 AMP	30 AMP
6.0 kVA, Input 208-240V, Output 120-240V	45 AMP	35 AMP
8.0 kVA, Input 208-240V, Output 120-240V	60 AMP	45 AMP
10.0 kVA, Input 208-240V, Output 120-240V	80 AMP	60 AMP

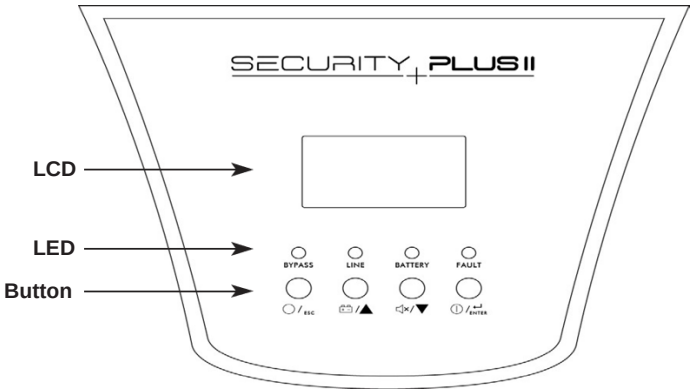
Refer to local and national electrical codes for proper installation guidelines. The breaker recommendations listed in the chart above are intended for installations in North America. For international installations, please refer to the local and national electrical codes and standards.

All SurgeX Hardwired Security Plus UPS system's OUTPUT must be protected by proper sized AC disconnect device. The recommended disconnect device ratings at full rated load are listed below:

2.0 kVA, Input 120V, Output 100-120V	20 AMP
2.0 kVA, Input 208-240V, Output 200-240V	10 AMP
3.0 kVA, Input 120V, Output 100-120V	30 AMP
3.0 kVA, Input 208-240V, Output 200-240V	15 AMP
4.0 kVA, Input 208-240V, Output 120-240V	20 AMP
5.0 kVA, Input 208-240V, Output 120-240V	25 AMP
6.0 kVA, Input 208-240V, Output 120-240V	30 AMP
8.0 kVA, Input 208-240V, Output 120-240V	50 AMP
10.0 kVA, Input 208-240V, Output 120-240V	65 AMP

5.0 OPERATION

5.1 Button Operation

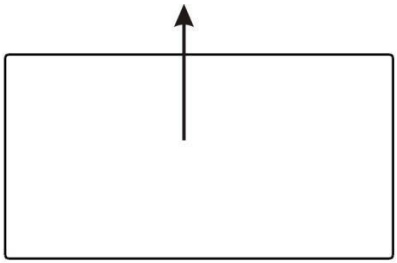


Button	Function
ON/Enter Button	Turn on the UPS: Press and hold the button more than 0.5s to turn on the UPS. Enter Key: Press this button to confirm the selection in
OFF/ESC Button	Turn off the UPS: Press and hold the button more than 0.5s to turn off the UPS. Esc key: Press this button to return to last menu in setting menu.
Test/Up Button	Battery test: Press and hold the button more than 0.5s to test the battery while in AC mode, or CVCF mode. UP key: Press this button to display next selection in setting menu.
Mute/Down Button	Mute the alarm: Press and hold the button more than 0.5s to mute the buzzer. Please refer to section 3-4-9 for details. Down key: Press this button to display previous selection in setting menu.
Test/Up + Mute/ Down Button	Press and hold the two buttons simultaneous more than 1s to enter/escape the setting menu.

* CVCF mode means converter mode.

5.2 LED Indicators and LCD Panel

LCD panel



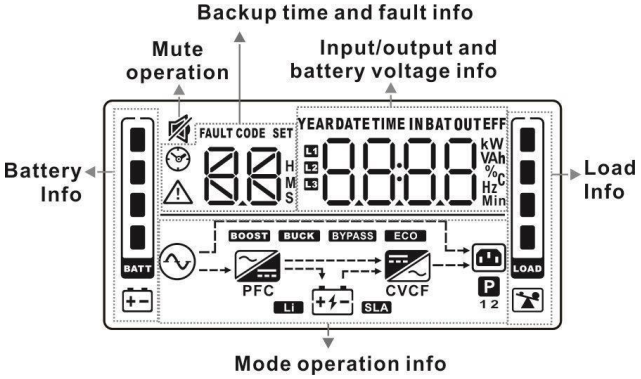
LED Indicators:

There are 4 LEDs on front panel to show the UPS working status:

LED Mode	Bypass	Line	Battery	Fault
UPS Startup	●	●	●	●
No Output mode	○	○	○	○
Bypass mode	●	○	○	○
AC mode	○	●	○	○
Battery mode	○	○	●	○
CVCF mode	○	●	○	○
Battery Test	●	●	●	○
ECO mode	●	●	○	○
Fault	○	○	○	●

Note: ● means LED is lighting, and ○ means LED is faded.

LCD Panel:



Display	Function
Backup Time Information	
	Indicates battery discharge time in numbers. H: hours, M: minutes, S: seconds
Fault Information	
	Indicates that the warning and fault occurs.
	Indicates the fault codes, and the codes are listed in detail in section 3-9.
Mute Operation	
	Indicates that the UPS alarm is disabled.
Output & Battery voltage information	
	Indicates the output voltage, frequency or battery voltage. Vac: output voltage, Vdc: battery voltage, Hz: frequency
Load information	
	Indicates the load level by 0-25%, 26-50%, 51-75%, and 76-100%.
	Indicates overload.

Display	Function
Mode operation information	
	Indicates the UPS connects to the mains.
	Indicates the battery is working.
BYPASS	Indicates the bypass circuit is working.
ECO	Indicates the ECO mode is enabled.
	Indicates the Inverter circuit is working.
	Indicates the output is working.
Battery information	
	Indicates the Battery capacity by 0-25%, 26-50%, 51-75%, and 76-100%.

5.3. Audible Alarm

Description	Buzzer status	Muted
UPS status		
Bypass mode	Beeping once every 2 minutes	Yes
Battery mode	Beeping once every 4 seconds	
Fault mode	Beeping continuously	
Warning		
Overload	Beeping twice every second	Yes
Others	Beeping once every second	
Fault		
All	Beeping continuously	Yes

5.4 Single UPS Operation

1. Turn on the UPS with utility power supply (in AC mode)

1. After power supply is connected correctly, set the breaker of the battery pack at “ON” position (the step only available for long-run model). Then set the input breaker at “ON” position. At this time the fan is running and the UPS supplies power to the loads via the bypass. The UPS is operating in Bypass mode.

NOTE:

When UPS is in Bypass mode, the output voltage will directly power from utility after you switch on the input breaker. In Bypass mode, the load is not protected by UPS. To protect your precious devices, you should turn on the UPS. Refer to next step.

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2. Press and hold the “ON” button for 0.5s to turn on the UPS and the buzzer will beep once.
3. A few seconds later, the UPS will enter to AC mode. If the utility power is abnormal, the UPS will operate in Battery mode without interruption.

NOTE:

When the UPS is running out of battery, it will shut down automatically at Battery mode. When the utility power is restoring, the UPS will auto restart.

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2. Turn on the UPS without utility power supply (in Battery mode)

1. Make sure that the breaker of the battery pack is at “ON” position.
2. Press the “ON” button to set up the power supply for the UPS, UPS will enter to power on mode. After initialization UPS will enter to No Output mode, then Press and hold the “ON” button for 0.5s to turn on the UPS, and the buzzer will beep once.
3. A few seconds later, the UPS will be turned on and enter to Battery mode.

5.5. Connect Devices to UPS

Once the UPS is connected to its AC source, connect load devices to UPS.

1. Turn on the UPS first and then switch on the devices one by one, the LCD panel will display total load level.
2. If it is necessary to connect the inductive loads such as a printer, the inrush current should be calculated carefully to see if it meets the capacity of the UPS to avoid overload.
3. If the UPS is in an overload state, the buzzer will beep twice every second.
4. If the UPS is in an overload state, remove loads immediately. For safety purposes, it is recommended that the total loads connected to the UPS are less than 80% of its nominal power capacity.
5. If the overload time is over acceptable time listed in the spec at AC mode, the UPS will automatically transfer to Bypass mode. After the overload is reduced, it will return to AC mode. If the overload time is over acceptable time listed in the spec at Battery mode, the UPS will enter a fault status. At this time, if bypass is enabled, the UPS will provide power to the load via bypass. If bypass function is disabled or the input power is not within bypass acceptable range, it will cut off the output of the UPS.

5.6. Charge the Batteries

1. After the UPS is connected to the utility power and the DC breaker is closed, the charger will charge the batteries automatically except in Battery mode or during battery self-test.
2. Suggest charge batteries at least 10 hours before use. Otherwise, the backup time may be shorter than expected.

5.7. Battery Mode Operation

1. When the UPS is in Battery mode, the buzzer will beep according to different battery capacity. If the battery capacity is more than 25%, the buzzer will beep once every 4 seconds; If the battery voltage drops to the alarm level, the buzzer will beep quickly (once every sec) to remind users that the battery is at low level and the UPS will shut down automatically soon. Reducing will prolong backup time. To eliminate the risk of data loos, reduce loads before batteries are depleted.
2. In Battery mode, pressing the Mute button to disable the buzzer.
3. The backup time may vary with different environment temperatures and load types.
4. Battery discharge protection can be enabled or disabled through LCD panel control. (Refer to LCD setting Section 6:09)

5.8. Test the Batteries

1. To check the battery status, press the “Test” button.
2. The UPSs default is set to perform a battery self-test automatically once per week.
3. The self-test feature is programmable through battery software.
4. During the battery self-test, the LCD display and buzzer indication will be the same as at Battery mode except that the battery LED is flashing.

5.9. Turn Off the UPS with Utility Power Supply in AC Mode

1. Turn off the inverter of the UPS by pressing “OFF” button for at least 0.5s. The buzzer will beep once and the UPS will enter Bypass mode.

NOTE 1: If the UPS has been set to enable the bypass output, it will bypass voltage from utility power to output terminal even though you have turned off the UPS (inverter).

NOTE 2: After turning off the UPS, please be aware that the UPS is in Bypass mode and there is risk of power loss for connected devices.

2. In Bypass mode, output voltage is still present. In order to cut off the output, switch off the input breaker. When the display panel clears, the UPS is off.

5.10 Turn Off the UPS Without Utility Power Supply in Battery Mode

1. Turn off the UPS by pressing “OFF” button for at least 0.5s, and then the buzzer will beep once.
2. The UPS will cut off power to output and there is no display shown on the display panel.

5.11 Mute the Buzzer

1. To disable the buzzer, press the “Mute” button for at least 0.5s. Press it again to re-enable the buzzer.
2. All warning alarms can be muted. Please refer to Section 8.1 for details.

5.12 Operation in Warning Status

1. When Fault LED flashes, the buzzer beeps once every second. The UPS is in fault mode. Check the troubleshooting table in Section 8 for a list of fault codes.
2. All warning alarms can be muted. Please refer to Section 8.1 for details.

5.13 Operation in Fault Mode

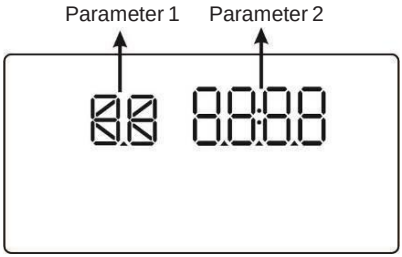
1. When Fault LED illuminates and the buzzer beeps continuously, it means that there is a fatal error in the UPS. Check the troubleshooting table in Section 8 for a list of fault codes.
2. If still problem still exists, contact SurgeX Technical Support.

5.14 Operation of Changing Charging Current

If using extended battery cabinet(s) and you want to change the charging current, please contact an authorized SurgeX service representative or SurgeX's Technical Support team.

6.0 LCD SETTING

There are three parameters to set up the UPS. Refer to following diagram.



Parameter 1: Program alternatives. Refer to below table.

Parameter 2: iSetting values for each program.

15 Programs Available List for Parameter 1:

Code	Description	Bypass	AC	ECO	CVCF	Battery	Battery Test
01	Output voltage	Y					
02	Output frequency	Y					
03	Voltage range for bypass	Y					
04	Frequency range for bypass	Y					
05	ECO mode enable/disable	Y					
06	Voltage range for ECO mode	Y					
07	ECO mode frequency range setting	Y					
08	Bypass mode setting	Y	Y				
09	Battery backup time setting	Y	Y	Y	Y	Y	Y
10	Reserved	Reserved for future					
11	Reserved	Reserved for future					
12	Hot standby function enable/ disable	Y	Y	Y	Y	Y	Y
13	Battery voltage adjustment	Y	Y	Y	Y	Y	Y
14	Charger voltage adjustment	Y	Y	Y	Y	Y	Y
15	Inverter voltage adjustment		Y		Y	Y	
16	Output voltage calibration		Y		Y	Y	
17	Charging current setting	Y	Y	Y	Y	Y	Y

Y means that this program can be set in this mode.

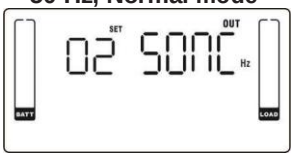
NOTE:

Parameter settings will be saved only when UPS shuts down normally with internal or external battery connection. (Normal UPS shutdown means turning off input breaker in bypass/no output mode).

01: Output Voltage

Interface	Setting
	**Parameter 3: Output voltage** You may choose the following output voltage in parameter 3: **208:** Output voltage is 208VAC **220:** Output voltage is 220VAC **230:** Output voltage is 230VAC **240:** Output voltage is 240VAC

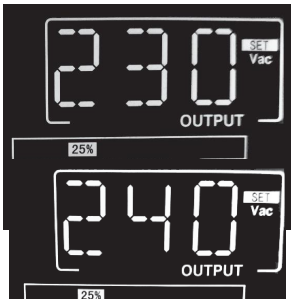
02: Output Frequency

Interface	Setting
60 Hz, CVCF mode  **50 Hz, Normal mode**  **ATO** 	**Parameter 2: Output Factory** Setting the output frequency. You may choose following three options in parameter 2: **50CF:** Setting UPS to CVCF mode and output frequency will be fixed at 50Hz. The input frequency can range from 46Hz to 64Hz. **60CF:** Setting UPS to CVCF mode and output frequency will be fixed at 60Hz. The input frequency can range from 46Hz to 64Hz. **50NC:** Setting UPS to normal mode (not CVCF mode). If selected, the output frequency will synchronize with the input frequency within 46~54 Hz. UPS will transfer to battery mode when input frequency is not within 46~54 Hz. **60NC:** Setting UPS to normal mode (not CVCF mode). If selected, the output frequency will synchronize with the input frequency within 56~64 Hz. UPS will transfer to battery mode when input frequency is not within 56~64 Hz. **At:** If selected, output frequency will be decided according to the latest normal utility frequency. If it is from 46Hz to 54Hz, the output frequency will be 50.0Hz. If it is from 56Hz to 64Hz, the output frequency will be 60.0Hz. The last two digits will show the current frequency. At is default setting.

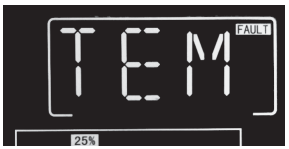
NOTE:

If the UPS is set to CVCF mode, the bypass function will be disabled automatically.

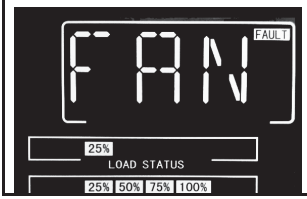
03: Voltage Range for Bypass

Interface	Setting
 	**Parameter 1 & 2:** Setting acceptable voltage range for bypass mode. Set up the range by setting high and low points. When it shows "LLS" in parameter 2, please press "Enter" key and it will show "LS" in parameter 1. Now the low point in parameter 2 can be set up by pressing "Up" or "Down" key. **LS:** Set the acceptable low voltage for bypass. Setting range is from 110V to 209V and the default value is 110V. Pressing "Enter" key to confirm the setting value for low point. Then, it will show HS in parameter 1. Please set up high point in parameter 2 by pressing "Up" or "Down" key. **HS:** Set the acceptable high voltage for bypass. Setting range is from 231V to 276V and the default value is 264V.

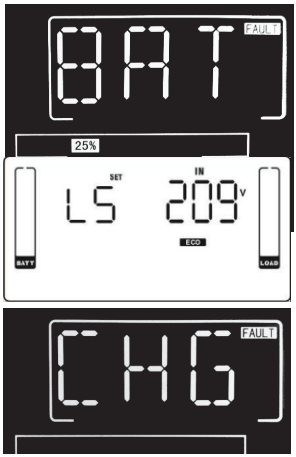
04: Frequency Range for Bypass

Interface	Setting
  	**Parameter 1 & 2:** Setting acceptable frequency range for bypass mode. Set up the range by setting high and low points. When it shows "LLS" in parameter 2, please press "Enter" key and it will show "LS" in parameter 1. Now the low point in parameter 2 can be set up by pressing "Up" or "Down" key. **LS:** Set the acceptable low frequency for bypass. 50 Hz system: Setting range is from 46.0Hz to 49.0Hz. 60 Hz system: Setting range is from 56.0Hz to 59.0Hz. The default value is 46.0Hz/56.0Hz. Pressing "Enter" key to confirm the setting value for low point. Then, it will show HS in parameter 1. Set up high point in parameter 2 by pressing "Up" or "Down" key. **HS:** Set the acceptable high frequency for bypass. 50 Hz: Setting range is from 51.0Hz to 54.0 Hz. 60 Hz: Setting range is from 61.0Hz to 64.0Hz. The default value is 54.0Hz/64.0Hz.

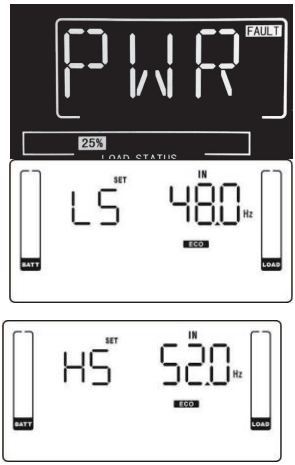
05: ECO Mode Enable/Disable

Interface	Setting
	**Parameter 2:** Enable or disable ECO function. You may choose following two options: **DIS:** disable ECO function **ENA:** enable ECO function If ECO function is disabled, voltage range and frequency range for ECO mode still can be set, but it is meaningless unless the ECO function is enabled.

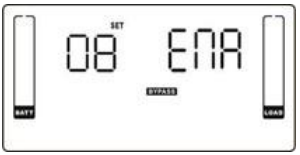
06: Voltage Range for ECO Mode

Interface	Setting
	**Parameter 1 & 2:** Setting acceptable voltage range for ECO mode. Set up the range by setting high and low points. When it shows "LLS" in parameter 2, please press "Enter" key and it will show "LS" in parameter 1. Now the low point in parameter 2 can be set up by pressing "Up" or "Down" key. **LS:** Low voltage point in ECO mode. The setting range is from 5% to 10% of the nominal voltage. Pressing "Enter" key to confirm the setting value for low point. Then, it will show HS in parameter 1. Set up high point in parameter 2 by pressing "Up" or "Down" key. **HS:** High voltage point in ECO mode. The setting range is from 5% to 10% of the nominal voltage.

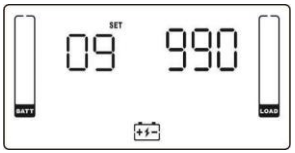
07: Frequency Range for ECO Mode

Interface	Setting
	**Parameter 1 & 2:** Setting acceptable frequency range for ECO mode. Set up the range by setting high and low points. When it shows "LLS" in parameter 2, please press "Enter" key and it will show "LS" in parameter 1. Now the low point in parameter 2 can be set up by pressing "Up" or "Down" key. **LS:** Set low frequency point for ECO mode. 50 Hz system: Setting range is from 46.0Hz to 48.0Hz. 60 Hz system: Setting range is from 56.0Hz to 58.0Hz. The default value is 48.0Hz/58.0Hz. Pressing "Enter" key to confirm the setting value for low point. Then, it will show HS in parameter 1. Set up high point in parameter 2 by pressing "Up" or "Down" key. **HS:** Set high frequency point for ECO mode. 50 Hz: Setting range is from 52.0Hz to 54.0 Hz. 60 Hz: Setting range is from 62.0Hz to 64.0Hz. The default value is 52.0Hz/62.0Hz.

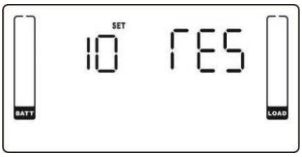
08: Bypass Mode Setting

Interface	Setting
	After it shows "08" in parameter 1, please press "Enter" key first. Then, you have the following options to choose in **ENA/DIS**. **ENA:** Bypass enabled. When selected, Bypass mode is activated. **DIS:** Bypass disabled. When selected, automatic bypass is acceptable, but manual bypass is not allowed. Manual bypass means users manually operate UPS for Bypass mode. For example, pressing OFF button in AC mode to turn into Bypass mode.

09: Battery Backup Time Setting

Interface	Setting
	**Parameter 2:** **000~999:** Set the maximum backup time from 0min to 999min. UPS will shut down to protect battery after backup time arrives. The default value is 990min. **DIS:** Disable battery discharge protection and backup time will depend on battery capacity. The default value is DIS.

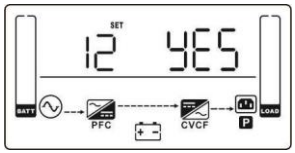
10: Reserved

Interface	Setting
	Reserved

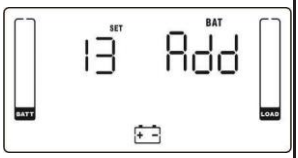
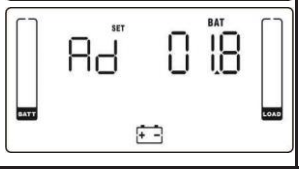
11: Reserved

Interface	Setting
	Reserved

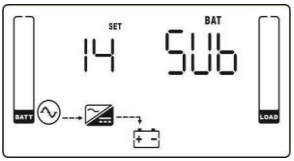
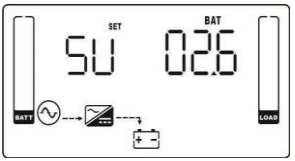
12: Hot Standby Function Enable/disable

Interface	Setting
	**Parameter 2: HS.H** Enable or disable Hot standby function. You may choose following two options in **Parameter 2:** **YES:** Hot standby function is enabled. It means that the current UPS is set to host of the hot standby function, and it will restart after AC recovery even without battery connected. **NO:** Hot standby function is disabled. The UPS is running at normal mode and can't restart without battery.

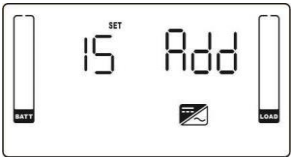
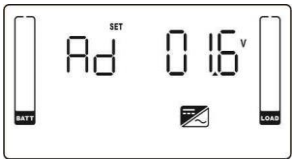
13: Battery Voltage Adjustment

Interface	Setting
 	After it shows “13” in parameter 1, please press “Enter” key first. Then, you may choose **Add** or **SUB** to adjust battery voltage in **Parameter 1** by pressing “Up” or “Down” key. After pressing “Enter” key to confirm your selection, it will jump to parameter 2 to set up the value. **Parameter 2:** the voltage range is from 0V to 5.7V, the default value is 0V.

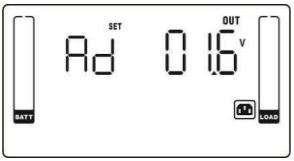
14: Charger Voltage Adjustment

Interface	Setting
 	After it shows “14” in parameter 1, please press “Enter” key first. Then, you may choose **Ad** or **SU** to adjust charger voltage in **Parameter 1** by pressing “Up” or “Down” key. After pressing “Enter” key to confirm your selection, it will jump to parameter 2 to set up the value. **Parameter 2:** the voltage range is from 0V to 9.9V, the default value is 0V. **NOTE:** *Before making voltage adjustment, be sure to disconnect all batteries first to get the accurate charger voltage. *We strongly suggest using the default value (0). Any modification should be suitable to battery specifications.

15: Inverter Voltage Adjustment

Interface	Setting
 	After it shows “15” in parameter 1, please press “Enter” key first. Then, you may choose **Ad** or **SU** to adjust inverter voltage in **Parameter 1** by pressing “Up” or “Down” key. After pressing “Enter” key to confirm your selection, it will jump to parameter 2 to set up the value. **Parameter 2:** the voltage range is from 0V to 6.4V, the default value is 0V.

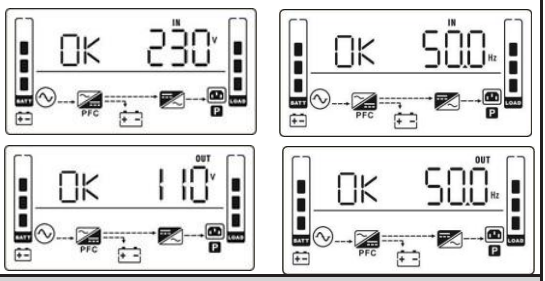
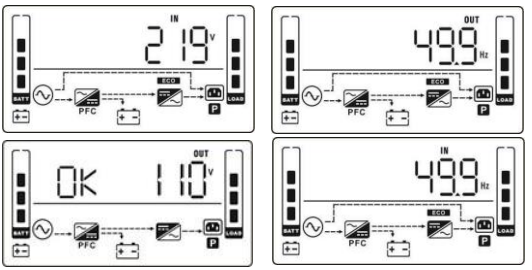
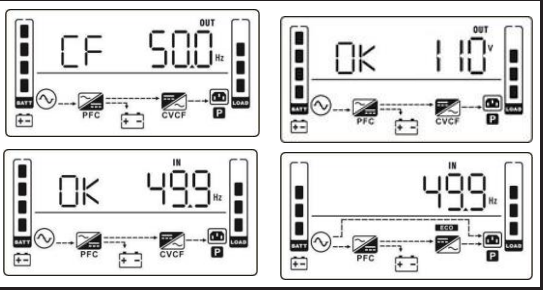
16: Output Voltage Calibration

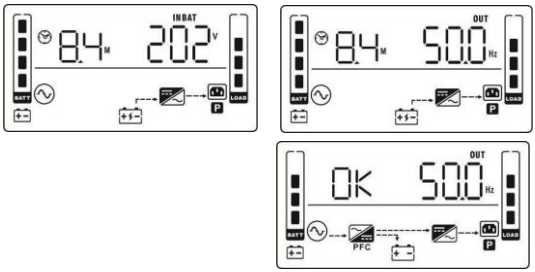
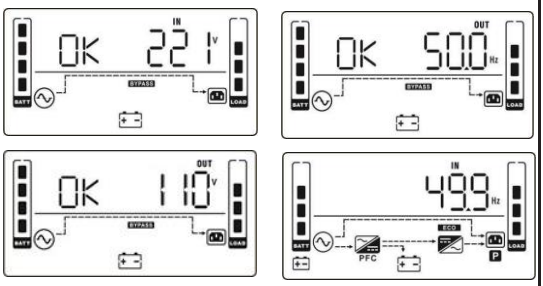
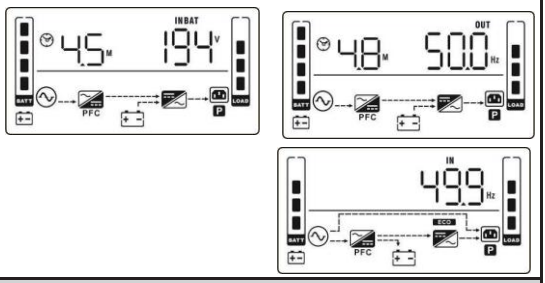
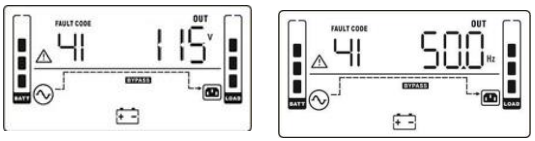
Interface	Setting
 	After it shows “16” in parameter 1, please press “Enter” key first. Then, you may choose **Ad** or **SU** to adjust output voltage in **Parameter 1** by pressing “Up” or “Down” key. After pressing “Enter” key to confirm your selection, it will jump to parameter 2 to set up the value. **Parameter 2:** the voltage range is from 0V to 6.4V, the default value is 0V.

17: Charging Current Setting

Interface	Setting
 	After it shows “17” in parameter 1 and “Cur” in parameter 2, please press “Enter” key first. Then, you may select 01, 02, 03 or 04 to set the charging current from 1A to 4A in **Parameter 1**. Then, calibrate the charging current by selecting “+” or “-“ in **Parameter 2**. **± 0~± 5:** You may choose ‘+’ as **Add** or ‘-’ as **Sub** to adjust charging current. This setting number is the first number after the decimal point. For example, if setting value is “+” and “3”, it means the calibrated formula is to add 0.3A. The setting charging current will become 4.3A as shown in left screen. (4A + 0.3A = 4.3A.)

7.0 OPERATION MODE/STATUS DESCRIPTION

OPERATING MODE/STATUS	
Description	**LCD Display**
AC 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 at AC mode.	
ECO Mode	
When the input voltage is within voltage regulation range and ECO mode is enabled, UPS will bypass voltage to output for energy saving.	
CVCF Mode	
When input frequency is within 46 to 64Hz, the UPS can be set at a constant output frequency, 50 Hz or 60 Hz. The UPS will still charge battery under this mode.	

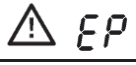
OPERATING MODE/STATUS	
Description	**LCD Display**
Battery Mode	
When the input voltage is beyond the acceptable range or power failure, UPS will backup power from battery and alarm will beep every 4 seconds.	
Bypass Mass	
When input voltage is within acceptable range and bypass is enabled, turn off the UPS and it will enter Bypass mode. Alarm beeps every two minutes.	
Battery Test	
When UPS is in AC mode or CVCF mode, press “Test” key for more than 0.5s. Then the UPS will beep once and start “Battery Test”. The line between I/P and inverter icons will blink to remind users. This operation is used to check the battery status.	
Fault Status	
When UPS has fault happened, it will display fault messages in LCD panel.	

8.0 FAULT CODE

Fault Event	Fault Code	Icon	Fault Event	Fault Code	Icon
Bus start failure	01	None	Battery SCR short circuited	21	None
Bus over	02	None	Inverter relay short circuited	24	None
Bus under	03	None	Charger short circuited	2a	None
Bus unbalance	04	None	Can communication fault	31	None
Inverter soft start failure	11	None	Over temperature	41	None
High Inverter voltage	12	None	CPU communication failure	42	None
Low Inverter voltage	13	None	Overload	43	
Inverter output short circuited	14		Battery turn-on failure	6A	None
Negative power fault	1A	None	PFC current failure in battery mode	6B	None
Inverter over current	60	None	Bus voltage changes too fast	6C	None
Inverter waveform abnormal	63		SPS 12V abnormal	6E	None
Inverter current detection error	6D	None			
Transformer over temperature	77	None			

8.1 Warning Indicator

Warning	Icon (Flashing)	Alarm
Overload		Beeping twice every second
Battery Unconnected		Beeping every second
Over charge		Beeping every second

Warning	Icon (Flashing)	Alarm
EPO enable		Beeping every second
Fan failure/Over tempera- ture		Beeping every second
Charger failure		Beeping every second
I/P fuse broken		Beeping every second
Overload 3 times in 30min		Beeping every second

8.2 Warning Code

Warning	Warning Event	Warning Code	Warning Event
0	Battery unconnected	10	L1 IP fuse broken
07	Over charge	33	Locked in bypass after overload 3 times in 30min
08	Low battery	3A	Cover of maintain switch is open
0	Overload	3D	Bypass unstable
0	Fan failure	3E	Boot loader is missing
0B	EPO enable	42	Over-temperature on transformer
0	Over temperature		
0	Charger failure		

9.0 TROUBLESHOOTING

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

Symptom	Possible Cause	Remedy
No indication and alarm in the front display panel even though the mains is normal.	The AC input power is not connected well.	Check if input cable firmly connected to the mains.
The icon ⚠ and the warning code EP flash on LCD display and alarm beeps every	EPO function is enabled.	Set the circuit to closed position to disable EPO function.
The icon ⚠ and + − flash on LCD display and alarm beeps every second.	The external or internal battery is incorrectly connected.	Check if all batteries are connected well.
The icon ⚠ and flash on LCD display and alarm beeps twice every second.	UPS is on 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.
Fault code is shown as 43. The icon lights on LCD display and alarm beeps continuously.	UPS is overload too long and becomes fault. Then UPS shut down automatically.	Remove excess loads from UPS output and restart it.

Symptom	Possible Cause	Remedy
Fault code is shown as 14 on LCD display, and alarm beeps continuously.	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, 04,11, 12, 13, 14,1A, 21, 24, 35, 36, 41, 42 or 43 on LCD display and alarm beeps continuously.	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 Technical Support.
Battery backup time is shorter than nominal value	Batteries are not fully charged	Charge the batteries for at least 7 hours and then check capacity. If the problem still persists, Technical Support.
The icon ⚠ and  flash on LCD display and alarm beeps every second.	Fan is locked or not working; or the UPS temperature is too high.	Check fans and notify dealer.

10.0 STORAGE AND MAINTENANCE

10.1. Storage

Before storing, charge the UPS at least 7 hours. Store the UPS covered and upright in a cool, dry location. During storage, recharge the battery in accordance with the following table:

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

10.2 Maintenance

⚠ CAUTION

The UPS system operates with hazardous voltages. Repairs may be carried out only by qualified maintenance personnel.

⚠ CAUTION

Even after the unit is disconnected from the mains, components inside the UPS system are still connected to the battery packs which are potentially dangerous.

⚠ CAUTION

Before carrying out any kind of service and/or maintenance, disconnect the batteries and verify that no current is present and no hazardous voltage exists in the terminals of high capability capacitor such as BUS-capacitors.

⚠ CAUTION

Only persons are adequately familiar with batteries and with the required precautionary measures may replace batteries and supervise operations. Unauthorized persons must be kept well away from the batteries.

⚠ CAUTION

Verify that no voltage between the battery terminals and the ground is present before maintenance or repair. In this product, the battery circuit is not isolated from the input voltage. Hazardous voltages may occur between the battery terminals and the ground.

⚠ CAUTION

Batteries may cause electric shock and have a high short-circuit current. Please remove all wristwatches, rings and other metal personal objects before maintenance or repair, and only use tools with insulated grips and handles for maintaining or repairing.

⚠ CAUTION

When replace the batteries, install the same number and same type of batteries.

⚠ CAUTION

Do not attempt to dispose of batteries by burning them. This could cause battery explosion. The batteries must be rightly deposed according to local regulation.

⚠ CAUTION

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

⚠ CAUTION

Please replace the fuse only with the same type and amperage in order to avoid fire hazards.

⚠ CAUTION

Do not disassemble the UPS system.