STACO ENERGY® PRODUCTS CO.

Your tailored power solutions provider™ www.stacoenergy.com

Staco SV

120-240V 50/60Hz

1 to 3kVA

USER MANUAL

003-2655 Rev A

Staco Energy is highly specialized in the development and production of uninterruptible power systems (UPS). The UPS in this series are high quality products, carefully designed and manufactured to ensure optimum performance.

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Thank you for choosing our product.

Safety Warnings

IMPORTANT SAFETY INSTRUCTIONS
SAVE THESE INSTRUCTIONS

This manual contains important instructions for Staco SV UPS that should be followed during installation and maintenance of the UPS. Please read all instructions before operating the and save this manual for future reference.

READ AND FOLLOW ALL SAFETY INSTRUCTIONS

a. Do not install outdoors.
b. Do not route wiring across or near hot surfaces.
c. Do not install near gas or electric heaters.
d. Use caution when servicing batteries. Battery acid can cause burns to skin and eyes. If acid is spilled on skin or in eyes, flush acid with fresh water and contact a physician immediately.
e. Unit should be installed where it will not readily be subjected to tampering by unauthorized personnel.
f. The use of accessory equipment not recommended by the manufacturer may present an unsafe condition.
g. Do not use this UPS for anything other than intended use.

This UPS is designed and manufactured according to the relevant product standards for normal use.

DANGER

This UPS contains LETHAL VOLTAGES. All repairs and service should be performed by AUTHORIZED SERVICE PERSONNEL ONLY. There are NO USER SERVICEABLE PARTS inside UPS.

WARNING

To reduce the risk of fire or electric shock, install this UPS in a temperature and humidity controlled, indoor environment, free of conductive contaminants. Do not operate near water or excessive humidity (95% maximum).

WARNING

Batteries present a risk of electrical shock or burn from high short circuit current. Observe proper precautions. Servicing should be performed by qualified service personnel knowledgeable of batteries and required precautions. Keep unauthorized personnel away from batteries.

There is a risk of explosion if batteries are replaced with an incorrect type. Replace with same type and rating only.

Proper disposal of batteries is required. Refer to your local codes for disposal requirements. Never dispose of batteries in a fire.

Emergency Intervention

First aid intervention

Local and company procedures should be followed for any first aid intervention that may be required.

Firefighting measures

1. Do not use water to put out a fire. Use fire extinguishers that are suitable for use with electrical and electronic equipment.
2. If exposed to heat or fire, some products may release toxic fumes into the atmosphere. Always use a respirator when extinguishing a fire.

Symbols used in the Manual

Some elements are highlighted with graphic symbols to alert the user to dangerous operations.

	**Danger / Risk of Electric Shock** *This symbol indicates the possibility of serious injury or substantial damage to the unit, unless adequate precautions are taken.*
	**Warning** *This symbol indicates important information which must be understood. Stated precautions must be taken*
	**Note**

Protective Equipment

No maintenance operation should be carried out on the unit without wearing the Personal Protective Equipment (PPE) described below. Personnel involved in the installation and/or maintenance of the unit must be properly clothed.

The following signs show the protective equipment that should be worn. The various items of PPE must be selected and sized according to the nature of the hazard (particularly electrical) posed by the unit.

	**Accident prevention footwear**		**Protective eyewear**
	**Protective clothing**		**Helmet**
	**Work gloves**		

GENERAL PRECAUTIONS

This manual contains detailed instructions for the use, installation and start-up of the Staco SV UPS. Read the manual carefully before installation. For information on using the UPS, the manual should be kept close at hand and consulted before carrying out any operation on the UPS.

Table of Contents

1. Important Safety Warnings

Strictly comply with all warnings and operating instructions in this manual. Save this manual and carefully read the following instructions before installing the unit. Do not operate this unit before reading through all safety information and operating instructions carefully.

1.1 Transportation

Transport the UPS system only in the original packaging 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 allow at least two hours for the UPS system to acclimate to the environment.
- 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 ventilation holes in the UPS housing.

1.3 Installation

- Do not connect devices which may overload the UPS system (e.g. laser printers) to the UPS output sockets.
- Ensure cables do not present a trip hazard.
- Do not connect domestic appliances (such as hair dryers) to UPS output sockets.
- The UPS may be operated by individuals with no previous experience.
- The UPS may be operated in TN & TT power distribution.
- Connect the UPS system only to an earthed shockproof outlet, easily accessible and close to the UPS system.
- Use only UL-tested, UL-marked power cables to connect load(s) to the UPS system.
- Ensure that the sum of the leakage current of the UPS and the connected devices does not exceed 3.5mA.
- Units are considered acceptable for use in a maximum ambient of 104°F (40°C). See **5.1 Operation** for more detail.
- CAUTION: The unit is heavy; lifting it requires a minimum of two people.

1.4 Operation

- Do not disconnect the mains cable on the UPS system or the building wiring outlet (shockproof socket outlet) during operation. This negates the protective earth of the UPS system and all connected loads.
- The UPS system features its own internal power source (batteries). The UPS output sockets may be electrically live even if the UPS system is not connected to the building outlet.
- In order to fully disconnect the UPS system, first press the OFF/Enter button and disconnect from mains.
- Prevent fluids or other foreign objects from getting inside the UPS system.
- The EPO, RS-232 and USB circuits are IEC 60950 safety extra low voltage (SELV) circuits. This circuit must remain separated from any hazardous voltage circuits by reinforced insulation.

1.5 Maintenance, Service and Faults

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

DANGER - 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.

- Before carrying out any kind of service and/or maintenance, disconnect the batteries and verify no hazardous voltage exists in the terminals of capacitors such as BUS-capacitors.
- To avoid electrical shock, turn off the unit and unplug it from the AC power source before servicing the battery.
- Only persons adequately familiar with batteries and required precautionary measures should replace batteries and supervise operations.

DANGER - Risk of electric shock. The battery circuit is not isolated from the input voltage. Hazardous voltages may occur between battery terminals and ground. Before touching, verify that no voltage is present.

- Do not dispose of batteries in a fire.
- Do not open or destroy batteries. Escaping electrolyte may be toxic and cause injury to skin and eyes.
- When replacing batteries, replace with the same number and type of batteries.

Manufacturer	Type	Rated
Toplite (Guangzhou) Technology Battery Co Ltd (MH29104)	NPW45-12	12 V dc, 9.0 Ah
	UXW460-12	12 V dc, 9.0 Ah
	NPW36-12	12 V dc, 7.2 Ah
	UXW360-12	12 V dc, 7.2 Ah
	NPW45-12 FR	12 V dc, 7.0 Ah
	UXW460-12/FR	12 V dc, 7.0 Ah
	NPW36-12 FR	12 V dc, 7.0 Ah
CSB Battery Co Ltd (MH14533)	UXW360-12/FR	12 V dc, 7.0 Ah
	GP1272	12 V dc, 7.2 Ah
	UPS 12460 F2	12 V dc, 9.0 Ah
	UPS 12360 6	12 V dc, 6.5 Ah
	UPS 12360 7	12 V dc, 6.5 Ah
	HR 1234W	12 V dc, 8.5 Ah
	HR 1234W FR	12 V dc, 8.5 Ah
Yuasa Battery (Guangdong) Co Ltd (MH29616)	NPW45-12	12 V dc, 8.0 Ah
	NPW45-12FR	12 V dc, 8.0 Ah

DANGER – Batteries present a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries:

a. Remove watches, rings, or other metal objects.
b. Use tools with insulated handles.
c. Wear rubber gloves and boots.
d. Do not lay tools or metal parts on top of batteries.
e. Disconnect charging source prior to connecting or disconnecting battery terminals.
f. Verify battery is not 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 are reduced when such grounds are removed during installation and maintenance.

1.6 FCC (120V Models)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

1.7 EMC (230V Models)

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.

2. Installation and setup

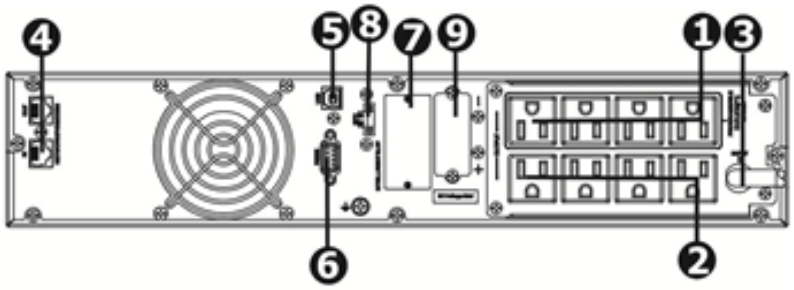
NOTE: Prior to installation, inspect the unit. Ensure nothing inside the package is damaged. Keep the original packaging in a safe place for future use.

Model No.	Type	Model No.	Type
Staco SV1000RTxxx	Standard Model	Staco SV1000RTXLxxx	Long-run Model
Staco SV1500RTxxx		Staco SV1500RTXLxxx	
Staco SV2000RTxxx		Staco SV2000RTXLxxx	
Staco SV3000RTxxx		Staco SV3000RTXLxxx	

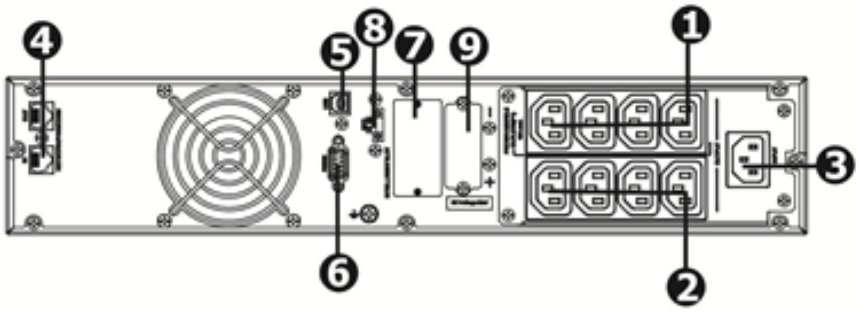
2.1 Rear panel view

2.1.1 1kVA & 1.5kVA Models

120V version

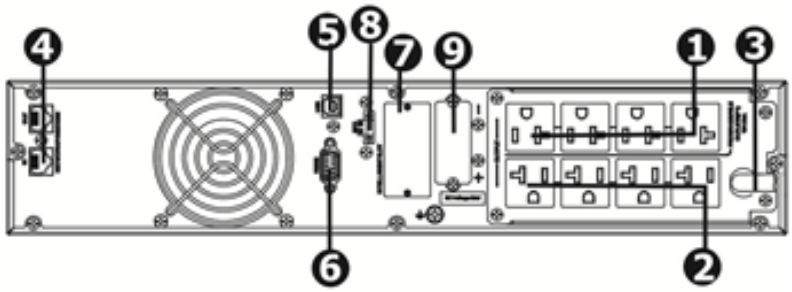


230V version

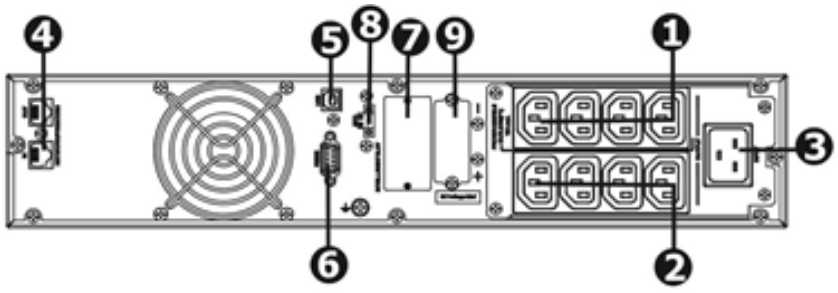


2.1.2 2kVA Models

120V version

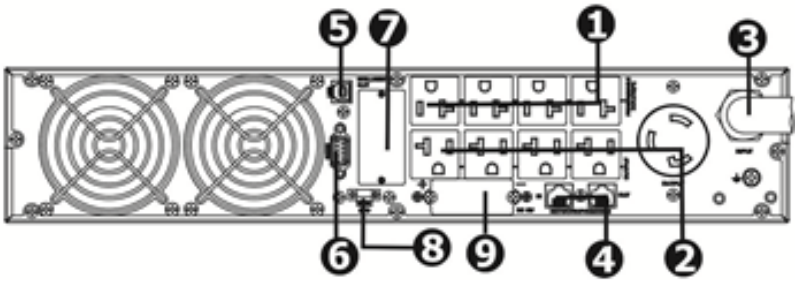


230V version

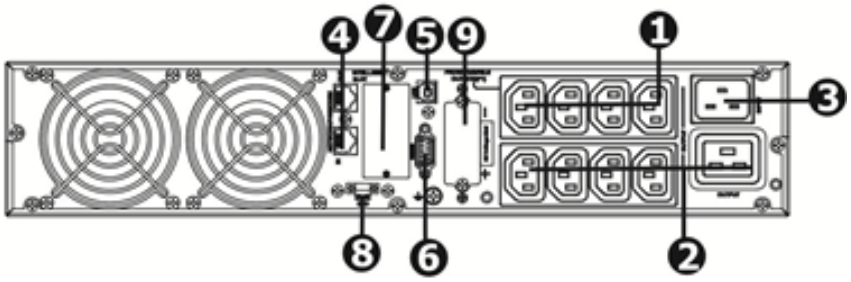


2.1.3 3kVA Models

120V version

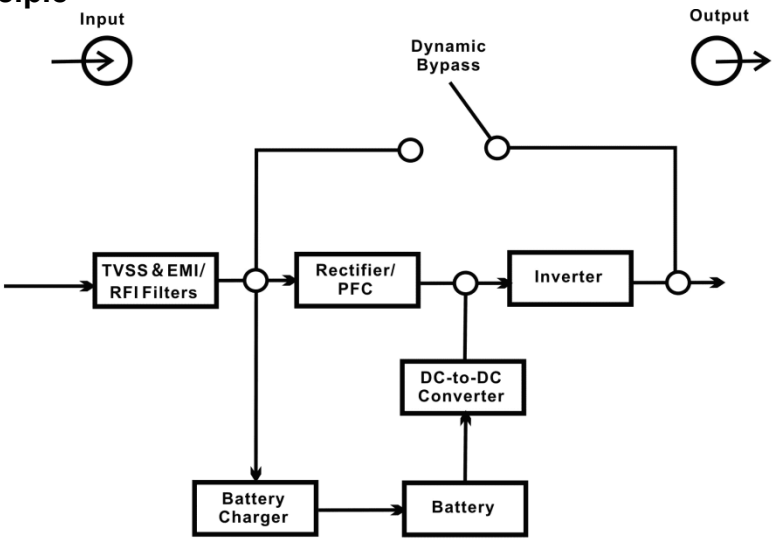


230V version



1. Programmable outlets – connect to non-critical loads
2. Output receptacles – connect to mission-critical loads
3. AC input
4. RJ45 surge protection
5. USB port
6. RS-232 port
7. Communication card slot
8. Emergency power off function (EPO) connector
9. External battery connector

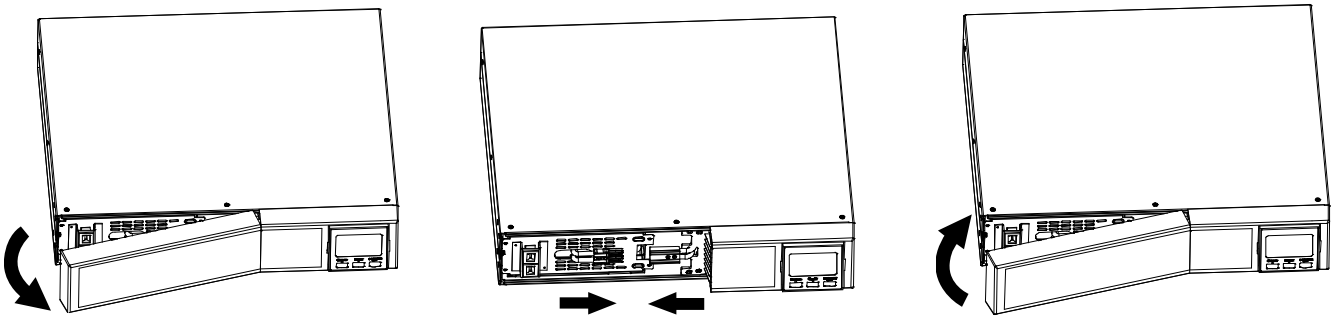
2.2 Operating principle



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

2.3 Install the UPS

To maximize battery life and for optimum safety, the UPS is shipped with the battery cable disconnected. Prior to installation, reconnect the battery thus:



Step 1 **Step 2** **Step 3**

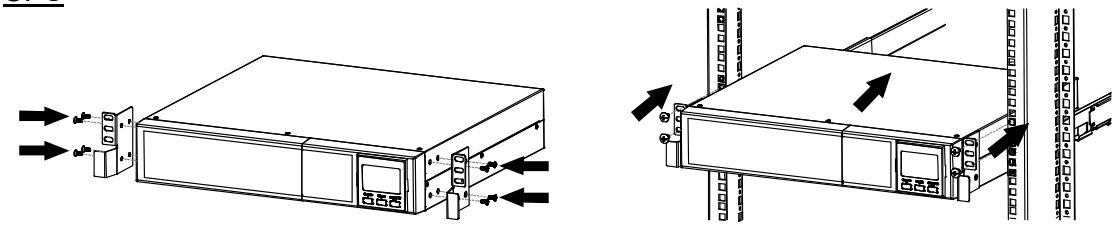
Step 1: Remove front panel
Step 2: Remove battery panel and reconnect battery cable
Step 3: Replace battery panel and front panel

The UPS may be mounted in tower or rack orientation. Refer to the following section for mounting procedures.

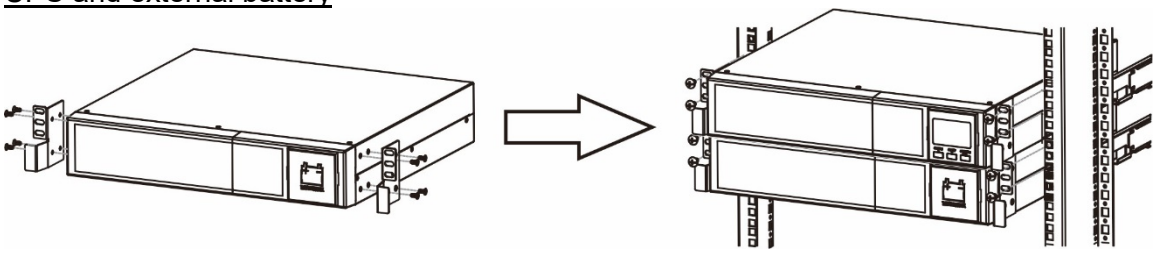
2.3.1 Rackmount Installation

CAUTION – Do NOT use the mounting brackets to lift the unit. Mounting brackets are solely for securing the unit to the rack.

UPS

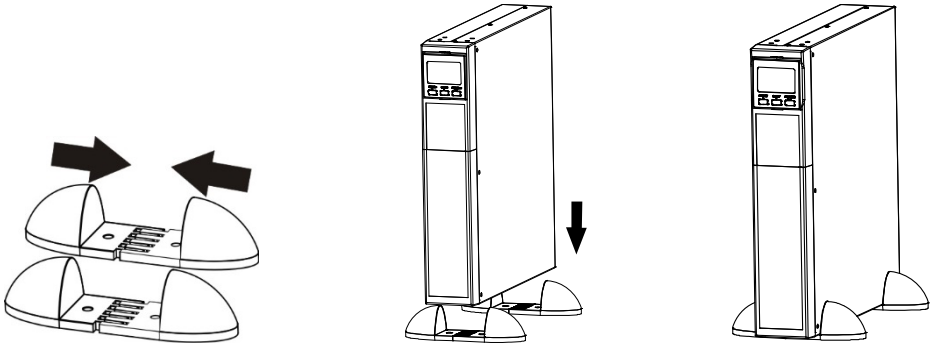


UPS and external battery

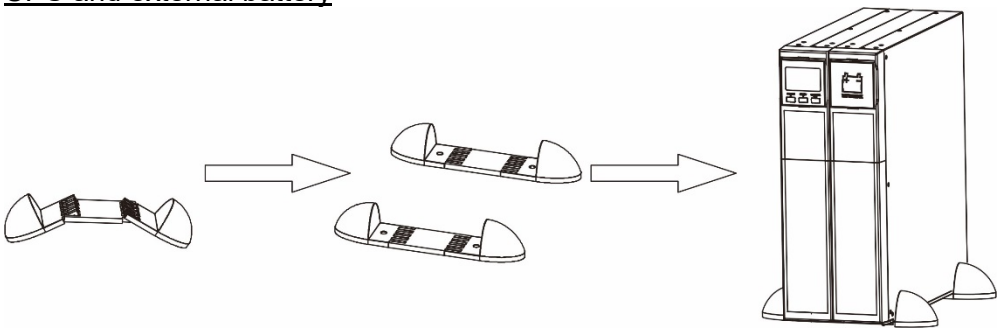


2.3.2 Tower Installation

UPS



UPS and external battery



NOTE: When mounting with feet, an additional 2.8 in (40mm) clearance is required either side.

2.4 UPS Setup

Step 1: UPS input connection

Plug the UPS into a two-pole, three-wire, grounded receptacle only. Avoid using extension cords.

Note: If the UPS is connected to an improperly wired outlet, the site wiring fault indicator will show on the LCD. (Refer to **4. Troubleshooting**).

WARNING: For 1 kVA and 1.5 kVA models, to reduce the risk of fire, connect only to a circuit provided with 15 amperes maximum branch circuit overcurrent protection in accordance with the National Electric Code, ANSI/NFPA 70.

WARNING: For 2 kVA models, to reduce the risk of fire, connect only to a circuit provided with 20 amperes maximum branch circuit overcurrent protection in accordance with the National Electric Code, ANSI/NFPA 70.

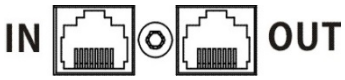
WARNING: For 3 kVA models, to reduce the risk of fire, connect only to a circuit provided with 30 amperes maximum branch circuit overcurrent protection in accordance with the National Electric Code, ANSI/NFPA 70.

Step 2: UPS output connection

There are two outlet banks: programmable outlets and general outlets. Connect non-critical devices to the programmable outlets and critical devices to the general outlets. During power failure, the backup time may be extended to critical devices by providing shorter backup time for non-critical devices.

Step 3: Network connection

RJ45 surge port



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

Step 4: Disable / Enable EPO function

Keep pin 1 and pin 2 closed for UPS normal operation. To activate EPO function, open contact between pin 1 and pin 2.

Note: The EPO function logic may be adjusted via the LCD. Refer to Section **3.5 UPS Settings** for details.

Step 5: External battery connection

Connect the external battery cable between the UPS and matching battery cabinet. When multiple battery cabinets are used, link the additional cabinets with the external battery cable.

WARNING – Connection to External Battery should be made by experienced Service personnel only.

WARNING – Risk of fire hazard.

Step 6: Switch on the UPS

Press the ON/Mute button for two seconds to power on the UPS.

Note: The battery charges fully during the first five hours of normal operation. Battery runtime capability may be reduced until the initial charge is completed.

Step 7: Install software

Install UPS monitoring software to fully configure UPS shutdown:

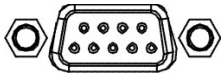
1. Download from www.stacoenergy.com or
2. Load ViewPower CD if delivered with the UPS

Step 8: Communication connection

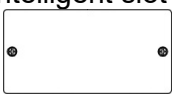
Communication ports:

USB port

RS-232 port



Intelligent slot



NOTE: The USB port and RS-232 port will not function concurrently

To allow for unattended UPS shutdown/start-up and status monitoring, connect the communication cable between the RS232 or USB port and a PC. With the monitoring software installed, the following operations may be performed:

- Remote Shutdown of UPS
- Send shutdown commands to remote computers
- Remotely set parameters of the UPS
- Set-up the number of battery strings connected
- Set-up voltage and frequency ranges

Refer to the operating manual provided with the software for details.

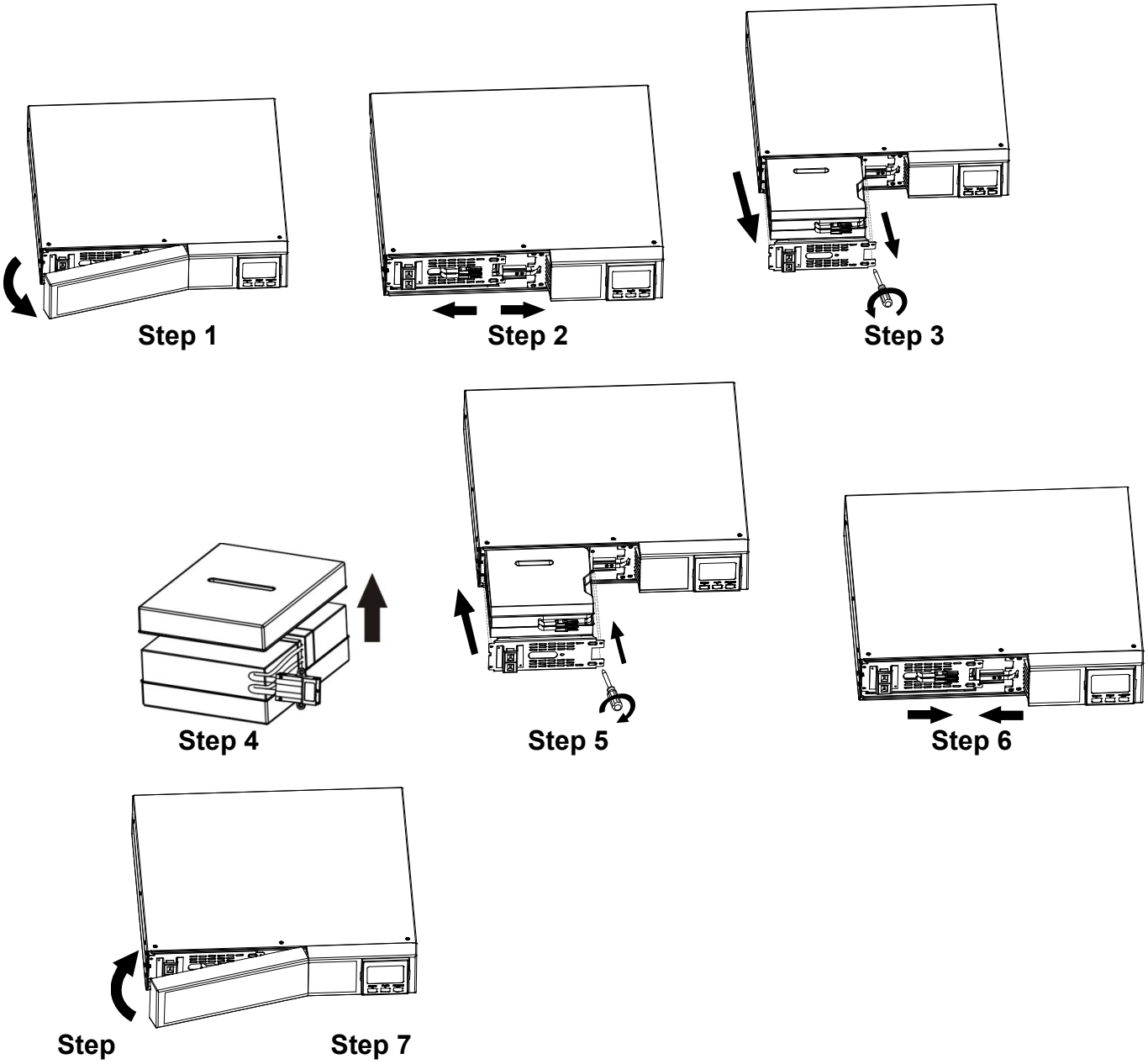
The UPS is equipped with an intelligent slot for either a SNMP or an AS400 card for advanced communication and monitoring.

2.5 Battery Kit Replacement

NOTE: Only authorized service personnel should replace internal battery kits. Replacement battery kits are available from Staco Energy, please visit www.stacoenergy.com or your local representative for details.

CAUTION - Consider all warnings, cautions, and notes before replacing batteries.

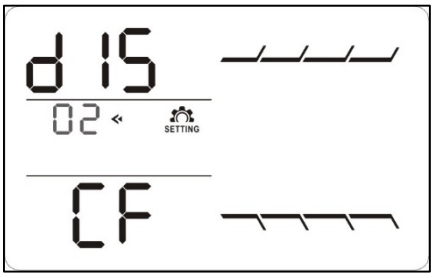
NOTE: Upon battery disconnection, equipment is not protected from power outages.



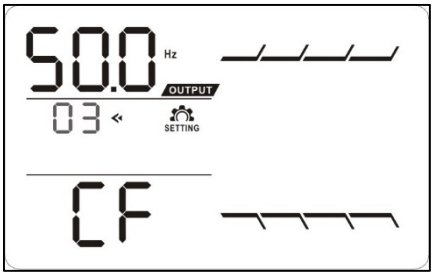
Step 1: Remove front panel by pulling the cover outward
Step 2: Disconnect battery cable
Step 3: Unscrew battery panel and remove battery box
Step 4: Remove top cover of battery box and replace with enclosed battery kit
Step 5: Reinsert battery box and replace top cover. Replace mounting screws
Step 6: Reconnect battery cable
Step 7: Replace front panel

2.7 Frequency Converter Mode

1. Install the UPS system per the instructions herein
2. Verify mains input is connected correctly
3. If battery pack is installed: Verify battery is connected correctly, and the battery pack breaker is at “ON” position
4. Apply input power
5. Press and hold the Select Button for 3 seconds to enter programming mode
6. Press down key (“SELECT”) until setting 02 displays



7. Press “OFF/ENTER” button to confirm selection
8. Press “ON/MUTE” button to “ENA”
9. Press “OFF/ENTER” button to apply selection
10. Press down key (“SELECT”) until setting 03 displays



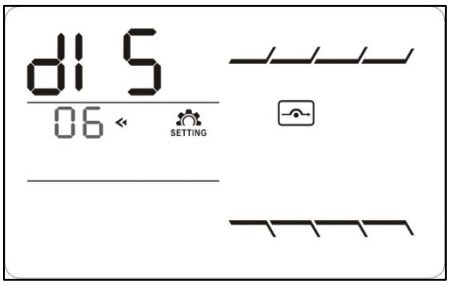
11. Press “OFF/ENTER” button to confirm selection
12. Press “ON/MUTE” button to select the desired output frequency:
    a. CF 50.0: output frequency is 50Hz
    b. CF 60.0: output frequency is 60Hz
13. Press “OFF/ENTER” button to apply selection
14. Press down key (“SELECT”) until setting 00 displays to exit the programming mode

When the unit is used without batteries connected, there will be a constant battery open alarm. To permanently silence this alarm, see **Section 2.9 Permanently Silence Audible Alarm.**

2.8 Power Conditioner Set-Up

NOTE: No batteries are connected

1. Install the UPS system per the instructions herein
2. Verify mains input is connected correctly
3. Apply input power
4. Press and hold the Select Button for 3 seconds to enter programming mode
5. Press down key (“SELECT”) until setting 06 displays



6. Press “OFF/ENTER” button to confirm selection
7. Press “ON/MUTE” button to “ENA”. This will enable bypass mode
8. Press “OFF/ENTER” button to apply selection
9. Press down key (“SELECT”) until setting 00 displays to exit the programming mode

When input power is first applied, the unit will apply power to the output via the static bypass. When the unit is switched on, it will transfer to inverter mode.

When input power is re-applied after a power outage, the unit will again deliver power via the static bypass. To operate in inverter mode, the unit must be manually switched on via the front panel.

When the unit is used without batteries connected, there will be a constant battery open alarm. To permanently silence this alarm, see **Section 2.9 Permanently Silence Audible Alarm.**

2.9 Permanently Silence Audible Alarm

WARNING: This procedure will fully disable all alarms

1. Install ViewPower software per instructions in section 2.4
2. Connect USB cord from computer to UPS (see Section **2.1 Rear panel view**).
3. Open ViewPower software.
4. Select connected UPS

5. Click on **Login** in upper right corner
6. Enter password (default: administrator)
7. Click on **UPS Settings**
8. Click on **Parameter Settings**
9. Set parameter **UPS Alarm** to **Disable**
10. Click **Apply**

To switch on Audible Alarm, set **UPS Alarm** to **Enable**.

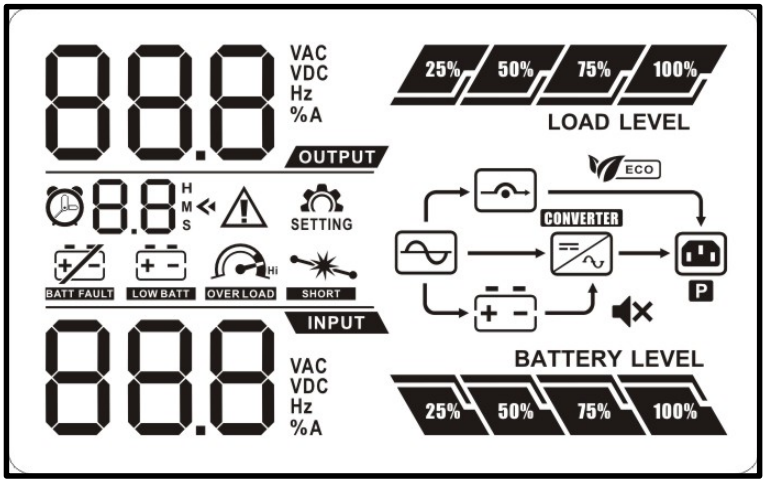
3. Operation

3.1 Button operation

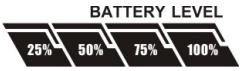
Button View

Button	Function
ON/Mute Button	• Switch on UPS: Press and hold for at least 2 seconds • Mute alarm: Once the UPS is switched on, press and hold for at least 3 seconds to disable or enable alarm • Up key: Press to display previous selection in UPS programming mode. • UPS self-test mode: Press for 3 seconds to enter UPS self-testing while in AC, ECO or converter mode.
OFF/Enter Button	• Switch off UPS: Press and hold for at least 2 seconds. UPS will be in bypass mode if mains is present and bypass is enabled • Confirm selection key: Press to confirm selection in UPS setting mode
Select Button	• Change LCD parameter: Press to change LCD parameter between input voltage, input frequency, input current, battery voltage, battery current, battery capacity, ambient temperature, output voltage, output frequency, load current or load percent • Programming mode: Press and hold for 3 seconds to enter UPS programming mode when in Standby or Bypass mode • Down key: Press to display next selection in UPS programming mode
ON/Mute + Select Button	• Transfer to bypass: When the mains power is normal, press ON/Mute and Select buttons simultaneously for 3 seconds. UPS will enter bypass mode. (This action will be ineffective when the input voltage is out of acceptable range) • Exit programming mode or return to the upper menu: When working in programming mode, press ON/Mute and Select buttons simultaneously for 0.2 seconds to return to the upper menu. In upper menu, press simultaneously to exit programming mode

3.2 LCD Panel



Display	Function
Backup time information	
	Battery backup time remaining H: hours, M: minutes, S: seconds
Configuration and fault information	
	Configurable parameters. See section 3.5 for settings key
	Warning/fault codes. See sections 3.7 and 3.8 for faults and warnings key
Mute operation	
	UPS alarms are disabled
Input, Battery, Temperature, Output & Load information	
	Displays input voltage, input frequency, input current, battery voltage, battery current, battery capacity, ambient temperature, output voltage, output frequency, load current and load percent VAC: AC voltage, DC: DC voltage Hz: frequency
Load information	
	Displays load level by 0-24%, 25-49%, 50-74% and 75-100%
	UPS is overloaded
	UPS output short circuit detected
Programmable outlets information	
	Programmable outputs have output voltage
Mode operation information	
	UPS is connected to an active AC source
	Battery is functioning correctly
	UPS is operating on bypass
	UPS is operating in ECO mode

	Inverter is functioning correctly
CVCF	UPS is operating in frequency converter mode
	UPS output is normal
Battery information	
	Displays battery level by 0-24%, 25-49%, 50-74%, and 75-100%
	Low battery
	Battery Fault

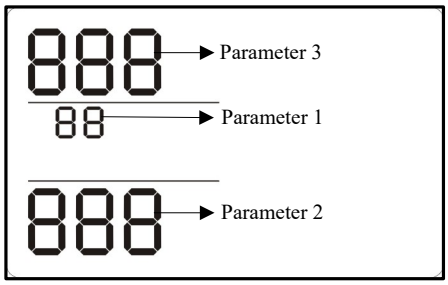
3.3 Audible Alarm

Battery Mode	Every 5 seconds
Low Battery	Every 2 seconds
Overload	Every second
Fault	Continuous
Bypass Mode	Every 10 seconds

3.4 LCD display wordings index

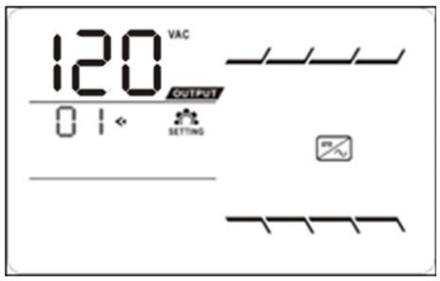
Abbreviation	Display content	Meaning
ENA		Enable
DIS		Disable
ESC		Escape
HLS		High loss
LLS		Low loss
AO		Active open
AC		Active close
EAT		Estimated autonomy time
RAT		Running autonomy time
SD		Shutdown
OK		OK
ON		ON
OI		Over input current
SF		Site wiring fault
EP		EPO
TP		Temperature
CH		Charger
FU		Bypass frequency unstable
BR		Battery Replace
EE		EEPROM error

3.5 UPS Settings

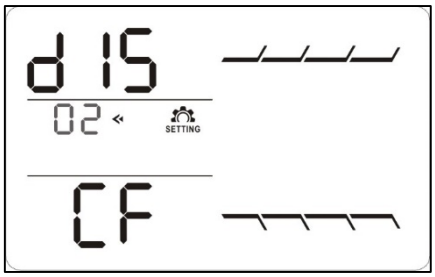


There are three parameters to set up the UPS.
Parameter 1: Program alternatives. Refer to below table
Parameter 2/3: Setting options or values for each program

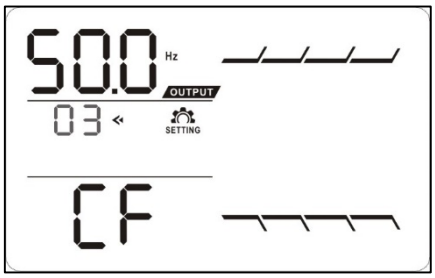
01: Output voltage setting

Interface	Setting
	<u>For 100/110/115/120/127 VAC models:</u> **100:** output voltage is 100Vac **110:** output voltage is 110Vac **115:** output voltage is 115Vac **120:** output voltage is 120Vac (Default) **127:** output voltage is 127Vac <u>For 200/208/220/230/240 VAC models:</u> **200:** output voltage is 200Vac **208:** output voltage is 208Vac **220:** output voltage is 220Vac **230:** output voltage is 230Vac (Default) **240:** output voltage is 240Vac

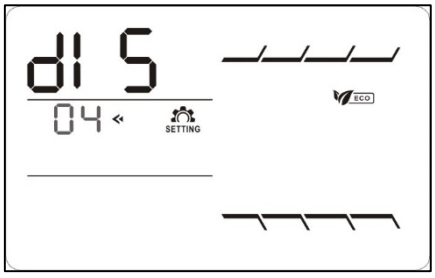
02: Frequency Converter enable/disable

Interface	Setting
	Enable or disable frequency converter mode **CF ENA:** Frequency converter enabled **CF DIS:** Frequency converter disabled (Default)

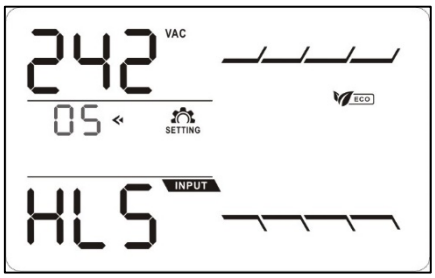
03: Output frequency setting

Interface	Setting
	<u>Set the initial frequency on battery mode:</u> **BAT 60.0:** output frequency is 60Hz **BAT 50.0:** output frequency is 50Hz <u>When frequency converter mode is enabled:</u> **CF 60:** output frequency is 60Hz **CF 50**: output frequency is 50Hz

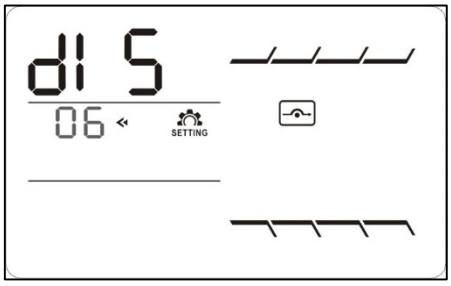
04: ECO enable/disable

Interface	Setting
	Enable or disable ECO function **ENA:** ECO mode enabled **DIS:** ECO mode disabled (Default)

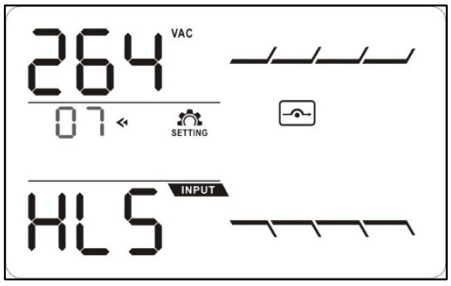
05: ECO voltage range setting

Interface	Setting
	Set the acceptable high voltage point and low voltage point for ECO mode **HLS:** High loss voltage in ECO mode 100/110/115/120/127 VAC models +3V to +12V of the nominal voltage (Default: +6V) 200/208/220/230/240 VAC models +7V to +24V of the nominal voltage (Default: +12V) **LLS:** Low loss voltage in ECO mode 100/110/115/120/127 VAC models -3V to -12V of the nominal voltage (Default: -6V) 200/208/220/230/240 VAC models from -7V to -24V of the nominal voltage (Default: -12V)

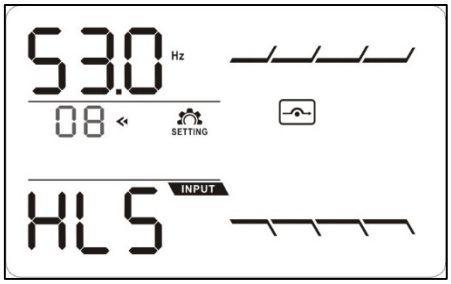
06: Bypass mode enable/disable when UPS is off

Interface	Setting
	Enable or disable Bypass function **ENA:** Bypass mode is enabled when UPS is off **DIS:** Bypass mode is disabled when UPS is off (Default)

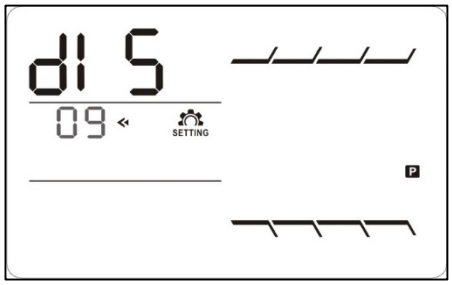
07: Bypass voltage range setting

Interface	Setting
	Set the acceptable high voltage point and acceptable low voltage point for Bypass mode **HLS:** Bypass high voltage point 100/110/115/120/127 VAC models: 120Vac to 140Vac (Default: 132Vac) 200/208/220/230/240 VAC models 230Vac to 264Vac (Default: 264Vac) **LLS:** Bypass low voltage point 100/110/115/120/127 VAC models: 85Vac to 115Vac (Default: 85Vac) 200/208/220/230/240 VAC models: 170Vac to 220Vac (Default: 170Vac)

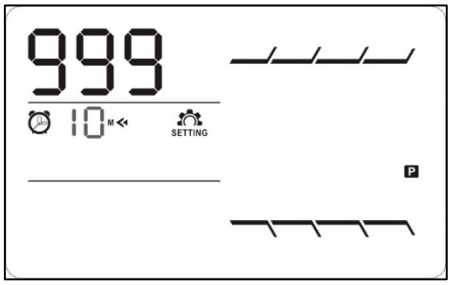
08: Bypass frequency range setting

Interface	Setting
	Set the acceptable high frequency point and acceptable low frequency point for Bypass mode **HLS:** Bypass high frequency point 60Hz output frequency models: 61Hz to 65Hz (Default: 63.0Hz) 50Hz output frequency models: 51Hz to 55Hz (Default: 53.0Hz) **LLS:** Bypass low Frequency point 60Hz output frequency models: 55Hz to 59Hz (Default: 57.0Hz) 50Hz output frequency models: 45Hz to 49Hz (Default: 47.0Hz)

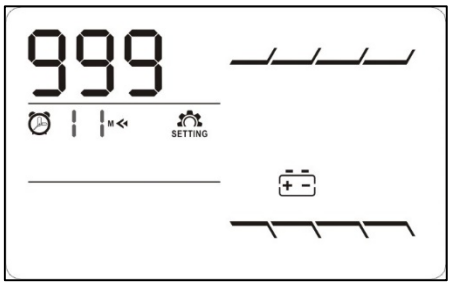
09: Programmable Outlets Enable/Disable

Interface	Setting
	Enable or disable programmable outlets **ENA:** Programmable outlets enabled **DIS:** Programmable outlets disabled (Default)

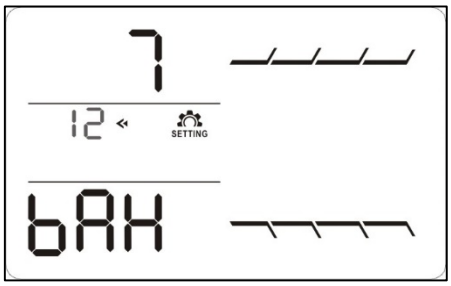
10: Programmable outlets setting

Interface	Setting
	Backup time limits for programmable outlets **0-999:** Backup time in minutes from 0-999 for programmable outlets (connected to non-critical devices) in battery mode (Default: 999)

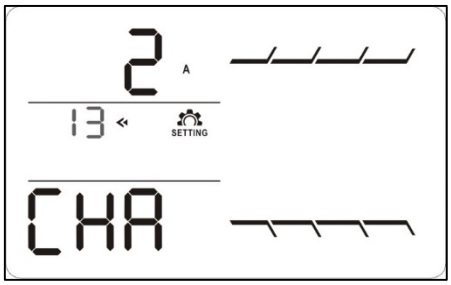
11: Autonomy limitation setting

Interface	Setting
	Backup time limits for general outlets **0-999:** Backup time in minutes from 0-999 for general outlets (connected to critical devices) in battery mode **DIS:** Disable the autonomy limitation - backup time will depend on battery capacity (Default) **Note:** If setting is “0”, backup time will be 10 seconds

12: Battery total AH setting

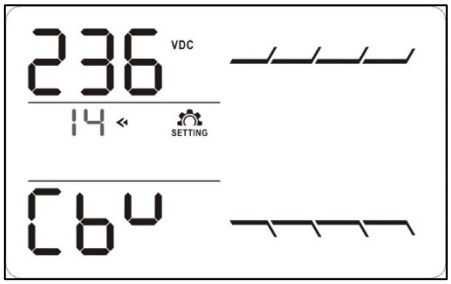
Interface	Setting
	Total AH of Battery **7-999:** Battery total capacity from 7-999 in AH. If an external battery pack is connected this value must be adjusted for the correct runtime to be displayed

13: Maximum charger current setting

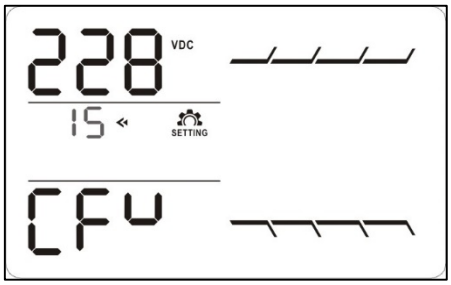
Interface	Setting
	Charger current 100/110/115/120/127 VAC models **1/2/4/6/8:** Maximum charger current in Ampere (Default: 2A) 200/208/220/230/240 VAC models: 1-2kVA: **1/2/4/6/8/10/12:** Maximum charger current in Ampere (Default: 2A) 3kVA: **1/2/4/6/8:** Maximum charger current in Ampere (Default: 2A) **Note:** Set the appropriate charger current based on battery capacity used. The recommended charging current is 0.1C~0.3C of battery capacity

Battery capacity(AH)	Total charging current (A)
7~20	2
20~40	4
40~60	6
60~80	8
80~100	10
100~150	12

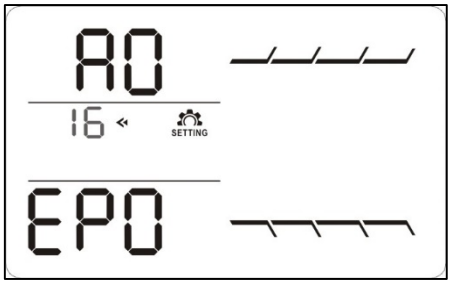
14: Charger boost voltage setting

Interface	Setting
	Charger boost voltage **2.25-2.40:** Charger boost voltage from 2.25 V/cell to 2.40V/cell (Default: 2.36V/cell)

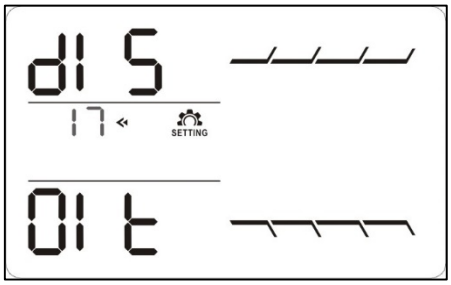
15: Charger float voltage setting

Interface	Setting
	Charger float voltage **2.20-2.33:** Charger float voltage from 2.20 V/cell to 2.33V/cell (Default: 2.28V/cell)

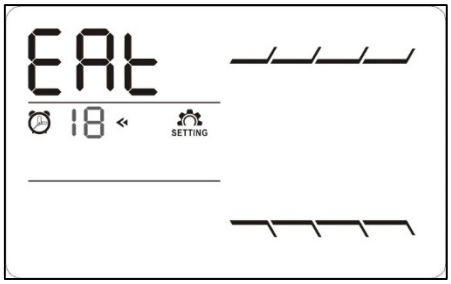
16: EPO logic setting

Interface	Setting
	EPO function control logic **AO:** Active Open (Default) When AO is selected, EPO function will activate when Pin 1 and Pin 2 is open **AC:** Active Closed When AC is selected, EPO function will activate when Pin 1 and Pin 2 is closed

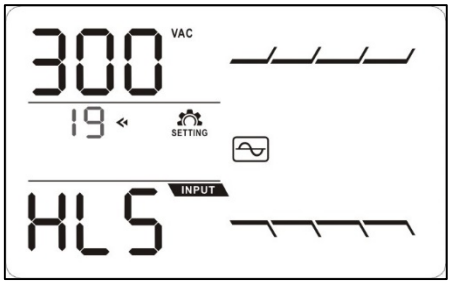
17: External output isolation transformer connection

Interface	Setting
	Soft start external transformer when UPS turns on **ENA:** Connected to an external output isolation transformer **DIS:** Not connected to external output isolation transformer (Default)

18: Display setting for autonomy time

Interface	Setting
	Display setting for autonomy time **EAT:** Display the remaining autonomy time (Default) **RAT:** Display accumulated autonomy time

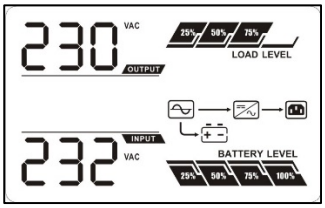
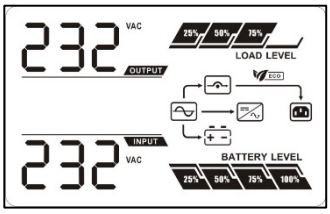
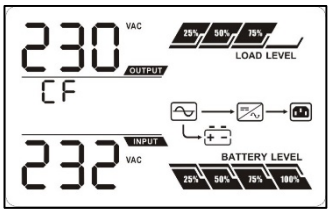
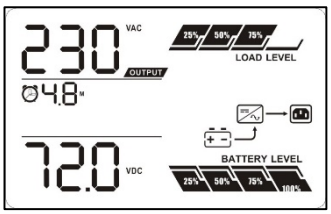
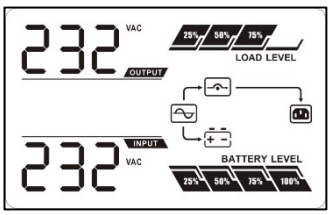
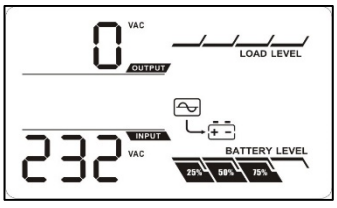
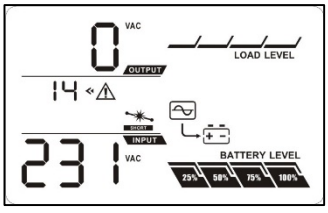
19: Acceptable input voltage range setting

Interface	Setting
	Acceptable high voltage point and low voltage point for input voltage range **HLS:** Input high voltage point 100/110/115/120/127 VAC models: **140/145/150:** High voltage point (Default: 150Vac) 200/208/220/230/240 VAC models: **280/290/300:** High voltage point (Default: 300Vac) **LLS:** Bypass low voltage point 100/110/115/120/127 VAC models: **55/60/65/70/75/80:** Low voltage (Default: 55Vac) 200/208/220/230/240 VAC models: **110/120/130/140/150/160:** Low voltage (Default: 110Vac)

00: Exit setting

Interface	Setting
	Exit programming mode

3.6 Operating Mode Description

Operating mode	Description	LCD display
Online mode	When input voltage is within acceptable range, UPS will provide pure and stable AC power to output. The UPS will charge the battery	
ECO mode	Energy saving mode: When input voltage is within voltage regulation range, UPS will supply voltage to output for energy saving. The UPS will charge the battery	
Frequency Converter mode	When input frequency is within 40 Hz to 70 Hz, the UPS may be set at a constant output frequency, 50 Hz or 60 Hz. The UPS will charge the battery	
Battery mode	When input voltage is beyond the acceptable range or power failure occurs, alarm will sound every 5 seconds and UPS is transferred to battery	
Bypass mode	When input voltage is within acceptable range but UPS is in overload, UPS will enter bypass mode. Alarm sounds every 10 seconds.	
Standby mode	UPS is powered off and without output power, batteries may still be charged.	
Fault mode	When a fault has occurred, the ERROR icon and the fault code will be displayed	

3.7 Faults Reference Code

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

3.8 Warning indicator

Warning	Icon (flashing)	Code	Alarm
Low Battery		bL	Every 2 seconds
Overload		OL	Every second
Over input current		OI	Every 10 seconds, 2 beeps
Battery is not connected		nC	Every 2 seconds
Over Charge		OC	Every 2 seconds
Site wiring fault		SF	Every 2 seconds
EPO enable		EP	Every 2 seconds
Over temperature		EP	Every 2 seconds
Charger failure		CH	Every 2 seconds
Battery fault		bF	Every 2 seconds
Out of bypass voltage range		b'	Every 2 seconds
Bypass frequency unstable		FU	Every 2 seconds
Battery replacement		bt	Every 2 seconds
EEPROM error		EE	Every 2 seconds

NOTE: "Site Wiring Fault" function may be enabled/disabled via software. See software manual for details.

4. Troubleshooting

Symptom	Possible cause	Remedy
UPS does not switch on even though the mains is normal.	The AC input power is not connected properly.	Ensure input power cord is firmly connected to the mains
	The AC input is connected to the UPS output.	Plug AC input power cord to building AC outlet
⚠ and warning code EP flash on LCD. Alarm sounds every 2 seconds.	EPO function is activated.	• Remove EPO signal • Verify EPO logic is set correctly
⚠ and  flash on LCD. Alarm sounds every 2 seconds.	Line and neutral conductors of UPS input are reversed.	Rotate mains power socket by 180° then reconnect to UPS
⚠ and  flash on LCD. Alarm sounds every 2 seconds.	The external or internal battery is not connected properly	Confirm all batteries are connected properly
Fault code 27 and  flash on LCD. Alarm sounds continuously.	High battery voltage and/or charger fault	Contact manufacturer
Fault code 28 and  flash on LCD. Alarm sounds continuously.	Low battery voltage and/or charger fault	Contact manufacturer
⚠ and  flash on LCD. Alarm sounds every second.	UPS is overloaded	Reduce loads on UPS output
	After repeat overloads, the UPS is locked in bypass mode	Reduce loads on UPS output. Power down the UPS then restart
Fault code 49 flashes on LCD. Alarm sounds continuously.	UPS is over input current.	Reduce loads on UPS output
Fault code 43 and  flash on LCD. Alarm sounds continuously.	UPS shut down due to extreme overload	Reduce loads on UPS output. Power down the UPS then restart
Fault code 14 and  flash on LCD. Alarm sounds continuously.	UPS shut down due to short circuit	Check output wiring and connected devices for short circuit
Fault code 01, 02, 03, 11, 12, 13 or 41 flashes on LCD. Alarm sounds continuously.	UPS internal fault has occurred	Contact manufacturer
Battery backup time is shorter than expected.	Batteries are not fully charged	Charge the batteries for at least 5 hours, then check capacity. If the problem persists, contact manufacturer
	Batteries defective	Contact your dealer to replace the battery
Fault code 2A flashes on LCD. Alarm sounds continuously.	Short circuit on charger output.	Check output wiring and cabling to external battery
Fault code 45 flashes on LCD. Alarm sounds continuously.	No charger output; battery voltage is less than 10V/PC.	Contact manufacturer

5. Storage and Maintenance

5.1 Operation

The UPS system contains no user-serviceable parts. If the battery service life (3-5 years at 77°F (25°C) ambient temperature) has been exceeded, the batteries must be replaced. Contact Staco Energy Products for replacement battery packs.

Do not discard the UPS or UPS batteries in landfill. The batteries in the UPS are sealed lead acid and recyclable. Refer to local codes; for proper disposal contact your local recycling/reuse or hazardous waste center.

5.2 Storage

Before storing, charge the UPS for 5 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
-13°F - 86°F (-25°C - 30°C)	Every 8 months	5-8 hours
86°F - 104°F (30°C - 40°C)	Every 90 days	5-8 hours
104°F - 113°F (40°C - 45°C)	Every 30 days	5-8 hours

5.3 Recommended Replacement Intervals

The Staco UPS has a long design life. Due to the characteristics of the part, not the design of the UPS, certain components used in the design have a limited life, even with proper maintenance.

Service and maintenance work should be performed only by factory authorized service personnel.

Staco recommends these limited-life components be periodically inspected and replaced before the expected expiration of their life cycle. The recommended replacement schedule is an estimate only. The life of these parts depends on site conditions such as ambient temperature, load profile, cleanliness of environment and other factors.

Staco Recommends a Factory Authorized Preventative Maintenance review is schedule at least once a year.

Component	Recommend Replace in:
Fans	4-5 years
Batteries	4-5 years

The functional lifetime of VRLA batteries is significantly affected by the temperature at which they are stored and operated. Ideally, VRLA batteries should be used in a 25ºC (77ºF) environment. For every 8.3ºC (15ºF) increase in temperature, the life expectancy of a battery will be halved. Exposure to temperatures in excess of 32ºC (90ºF) should be limited to no more than 30 days per year. Under no circumstances should the VRLA battery be exposed to temperatures over 40ºC (104ºF) which can lead to thermal runaway, a condition that damages the battery. Thermal runaway can cause batteries to swell. If the battery cases burst, the hazardous contents may be exposed.

Maintaining appropriate ambient temperature typically requires installing the UPS in a temperature controlled space. Areas without AC do not generally maintain the proper conditions for good battery life.

See Staco's website for warranty details:
http://www.stacoenergy.com/support/literature-download-center.html

6. UPS Specifications

6.1 120V Specifications

		1000 VA	1500VA	2000 VA	3000 VA
INPUT					
Voltage Range	Low Line Transfer	80 VAC/70 VAC/60 VAC/55 VAC ± 5 % (based on load percentage 100%-80% / 80%-70% / 70%-60% / 60%-0)			
	Low Line Comeback	87 VAC/77 VAC/67 VAC/62 VAC ± 5 %			
	High Line Transfer	150 VAC ± 5 %			
	High Line Comeback	145 VAC ± 5 %			
Frequency Range		40Hz ~ 70 Hz			
Power Factor		≧0.99			
THDi		≦ 5% @ 100~130VAC THDU < 1.6% @ input and full linear load condition			
OUTPUT					
Output Power Rating		See Table 6.2			
Output Voltage		100/110/115/120/127VAC			
AC Voltage Regulation		± 1% (Batt Mode)			
Frequency Range		47 ~ 53 Hz or 57 ~ 63 Hz (Synchronized Range)			
Frequency Range		50Hz ± 0.5% or 60Hz ± 0.5% (Bat. Mode)			
Current Crest Ratio		3:1			
Harmonic Distortion (THDU)		≦ 2% (Linear load) ≦ 4% (Non-Linear load)			
Transfer Time		Zero			
Output Waveform		Pure Sine wave			
EFFICIENCY					
AC Mode		≥89%		≥91%	
Battery Mode		≥88%		≥90%	
ECO MOde		≥96%			
BATTERY					
Battery Type		12V/9Ah	12V/9Ah	12V/9Ah	12V/9Ah
Numbers		2	3	4	6
Typical Recharge Time		3 hours to 95% capacity			
Charging Current		2A (default) / up to 8A (adjustable)			
Charging Voltage		27.4 VDC ± 1%	41.1 VDC ± 1%	54.7 VDC ± 1%	82.1VDC ± 1%
PHYSICAL					
Dims HxWxD (in)	UPS	3.46 x 17.24 x 16.14		3.46 x 17.24 x 20.08	3.46 x 17.24 x 24.8
	Shipping	7.08 x 19.68 x 22.04		7.87 x 22.24 x 27.56	7.87 x 23.62 x 29.92
Weight (lbs)	UPS	25.6	34.2	43.0	60.6
	Shipping	30.4	39	48.5	66.1
Input		NEMA 5-15P		NEMA 5-20P	NEMA 5-30P
Output		8x NEMA 5-15R		8x NEMA 5-20R	8x NEMA 5-20R & 1x NEMA 5-30R
ENVIRONMENT					
Humidity		20-95 % RH @ 32°F - 104°F (non-condensing) (0- 40°C)			
Noise Level		Less than 50dBA @ 1 Meter			
STANDARDS					
EMI		FCC Class A			
Safety		CTUVus complies with UL 1778: 2014 & CSA C22.2 No 107.3-14			
MANAGEMENT					
Smart RS-232/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			

6.2 120V Power Rating

Model	Input Max Current	Output Max Power rating
1kVA	12A	1000VA/1000W
1.5kVA	12A	1500VA/1450W @ 127Vac input 1500VA/1430W @ 125Vac input 1500VA/1300W @ 120Vac input 1500VA/1270W @ 115Vac input 1500VA/1200W @ 110Vac input 1500VA/1040W @ 100Vac input
2kVA	16A	2000VA/1930W @ 127Vac input 2000VA/1930W @ 125Vac input 2000VA/1850W @ 120Vac input 2000VA/1740W @ 115Vac input 2000VA/1640W @ 110Vac input 2000VA/1500W @ 100Vac input
3kVA	24A	3000VA/2880W @ 127Vac input 3000VA/2850W @ 125Vac input 3000VA/2740W @ 120Vac input 3000VA/2650W @ 115Vac input 3000VA/2500W @ 110Vac input 3000VA/2300W @ 100Vac input

6.3 230V Specifications

		1000 VA	1500VA	2000 VA	3000 VA
INPUT					
Voltage Range	Low Line Transfer	160VAC/140VAC/120VAC/110VAC ± 5 % (based on load percentage 100%-80% / 80%-70% / 70%-60% / 60%-0)			
	Low Line Comeback	175VAC/155VAC/135VAC/125VAC ± 5 %			
	High Line Transfer	300 VAC ± 5 %			
	High Line Comeback	290 VAC ± 5 %			
Frequency Range		40Hz ~ 70 Hz			
Power Factor		≧0.99			
THDi		≦ 5% @ 205~245VAC THDU < 1.6% @ input and full linear load condition			
OUTPUT					
Output Power Rating*		1000W	1500W	2000W	3000W
Output Voltage		200/208/220/230/240VAC			
AC Voltage Regulation		± 1% (Batt Mode)			
Frequency Range		47 ~ 53 Hz or 57 ~ 63 Hz (Synchronized Range)			
Frequency Range		50Hz ± 0.1 Hz or 60Hz ± 0.1 Hz (Bat. Mode)			
Current Crest Ratio		3:1			
Harmonic Distortion (THDU)		≦ 2% (Linear load) ≦ 4% (Non-Linear load)			
Transfer Time		Zero			
Output Waveform		Pure Sine wave			
EFFICIENCY					
AC Mode		≥89%		≥91%	
Battery Mode		≥88%		≥90%	
ECO Mode		≥96%			
BATTERY					
Battery Type		12V/9Ah	12V/9Ah	12V/9Ah	12V/9Ah
Numbers		2	3	4	6
Typical Recharge Time		3 hours recover to 95% capacity			
Charging Current		2A (default) / up to 12A (adjustable)			2A (default) / 8A (adjustable)
Charging Voltage		27.4 VDC ± 1%	41.1 VDC ± 1%	54.7 VDC ± 1%	82.1VDC ± 1%
PHYSICAL					
Dims HxWxD (mm)	UPS	88 x 438 x 410		88 x 438 x 510	88 x 438 x 630
	Shipping	180 x 500 x 560		200 x 565 x 700	200 x 600 x 760
Weight (kgs)	UPS	11.6	15.5	19.5	27.5
	Shipping	13.8	17.7	22	30
Input		IEC 320 C14 (10A)		IEC 320 C20 (16A)	
Output		4x IEC 320 C13		8x IEC 320 C13	8x IEC 320 C13 & 1x IEC 320 C19
ENVIRONMENT					
Humidity		20-95 % RH @ 0- 40°C (non-condensing) (32°F - 104°F)			
Noise Level		Less than 50dBA @ 1 Meter			
STANDARDS					
EMI		EN 62040-2:2006 (C2)			
Safety		EN 62040-1:2008			
MANAGEMENT					
Smart RS-232/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 200VAC or 208VAC

6.4 Battery Pack Specification

	1kVA	1.5kVA	2kVA	3kVA
Battery Type	12V 9Ah	12V 9Ah	12V 9Ah	12V 9Ah
Battery Quantity	4	6	8	12
Dimensions HxWxD in (mm)	3.46 x 17.24 x 14.96 (88 x 438 x 380)		3.46 x 17.24 x 18.90 (88 x 438 x 480)	3.46 x 17.24 x 23.62 (88 x 438 x 600)
Net Weight lbs (kgs)	37.7 (17.1)	47.4 (21.5)	63.9 (29)	90.8 (41.2)

NOTE: Battery cabinet should be used with corresponding UPS

Notes: