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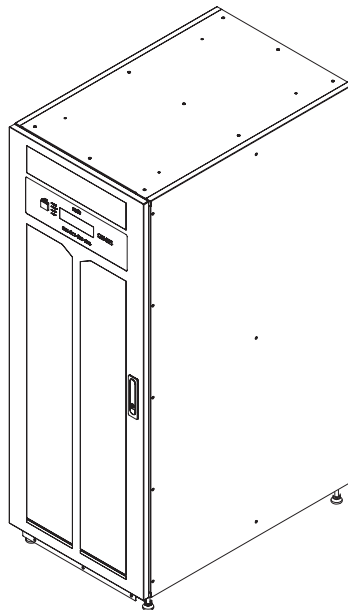


Owner's Manual

SmartOnline® SUT 3-Phase UPS System 20/30/40/60kVA

Models: SUT20K, SUT30K, SUT40K, SUT60K
AG-01F9, AG-01FA, AG-01FB, AG-01FC

Input: 120/127V (Ph-N)
208/220V (Ph-Ph), 3ph 4-Wire + PE



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1. Introduction

Tripp Lite's SmartOnline SUT Series Uninterruptible Power Supply (UPS) is a Voltage and Frequency Independent (VFI) true on-line, double conversion 3-Phase UPS system. The UPS continuously conditions the incoming electrical power supply, eliminating power fluctuations and interruptions that will otherwise damage sensitive electronic devices and cause system downtime.

The UPS applies the latest in DSP digital control technology and an output power factor up to unity. The efficiency of the UPS reaches up to 94% in normal operation, and up to 98% in ECO mode, making it one of the most efficient UPS systems in its class. In addition to supplying clean, reliable and uninterrupted power to sensitive electronic devices at all times, the SmartOnline SUT produces greater power efficiency at a lower cost.

With four different rated power levels – 20kVA, 30kVA, 40kVA and 60kVA – and offering paralleling capability up to 4 units, the UPS offers multiple capacity options to suit the load's requirements and offers the following features:

- True on-line UPS. Highest level of UPS protection, fully regulating the incoming power supply and transferring immediately to battery in the event of an extended mains failure to continuously support critical loads.
- All digital, high frequency modulation technology, which decreases operating volume, improves reliability and prolongs service life.
- Wide AC input voltage range minimizes frequent transfer from normal operation to battery mode, saving battery consumption and prolonging battery life.
- High efficiency – lower losses reduce cooling costs and extend system lifespan.
- Unity output power factor – more actual power allows more equipment to be supported.
- Programmable LCD allows users to conveniently set parameters for the UPS system; key operating conditions are visible via LCD for accurate, clear monitoring.
- Serial, USB and volt-free contact communication as standard; SNMP and MODBUS options for optimum configurability. Monitoring and management of the UPS via Tripp Lite's free PowerAlert® power management software. Download at www.tripplite.com/poweralert.
- Automatic fan detection indicates whether fans are operating normally; multi-stage fan speed control improves their reliability and efficiency, reduces operating noise and prolongs the service life of the fans.
- Both boost and float charge are provided. The charge current is adjustable from 1A to 20A. Charging mode is linked to charging current, maintaining the batteries at full charge capacity and extending battery life (float charge voltage: 163.2V DC; boost charge voltage: 168V DC).

The SmartOnline SUT UPS is ideally designed for protecting critical electrical equipment for:

- Data centers
- Telecommunications
- Computer network systems
- Medical treatment equipment
- Monitoring systems
- Light industrial
- Financial institutions

2. Important Safety Instructions

SAVE THESE INSTRUCTIONS

This manual contains instructions and warnings that should be followed during the installation, operation and storage of this product. Failure to heed these instructions and warnings may affect the product warranty.

2.1 Placement Warnings

Install the UPS in a well-ventilated indoor area, away from excess moisture, heat, dust, flammable gas or explosives. Leave adequate space around all sides of the UPS for proper ventilation. Refer to **3.4 Installation Environment**.

2.2 Connection Warnings

- The UPS must be well grounded due to a possible risk of current leakage.
- It is necessary to install protective devices and 4-pole contactors when the UPS is connected to the mains and bypass source. For relevant information, refer to **3.6.1 Precautions Prior to Wiring**.
- The protective devices connecting to the UPS must be installed near the UPS and must be easily accessible for operation.

2.3 Usage Warnings



WARNING:

To avoid any hazardous conditions during UPS installation and/or maintenance, these tasks must be performed only by an engineer authorized by Tripp Lite. Proper startup procedures must be followed in order for warranty to be valid. Contact Tripp Lite for further information.

- This is a class-A product. In a domestic environment, this product may cause radio interference, in which case, the user is required to take adequate measures.
- 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.
- If the UPS needs to be connected to a motor load, it must be confirmed by qualified service personnel.
- The parallel UPS systems can connect with common batteries. Before paralleling batteries, please make sure the battery voltage difference between each UPS is lower than 5V DC.
- The external vents and openings in the UPS are provided for ventilation. To ensure reliable operation of the UPS and to protect the UPS from overheating, these vents and openings must not be blocked or covered. Do not insert any object into the vents and openings that may hinder ventilation.
- In a low temperature environment (below 32°F/0°C), you must allow the UPS to adjust to room temperature for at least one hour before using to avoid moisture condensing inside the UPS.
- Do not place beverage containers or other liquids on the UPS, battery cabinet or any other accessory associated with the UPS.
- The risk of dangerous high voltage is possible when the batteries are still connected to the UPS even though the UPS is disconnected from the mains. Do not forget to disconnect battery cables to completely cut off the battery source. For more information about battery maintenance, refer to **4.3 Front View with Door Open**.
- All maintenance services must be performed by qualified service personnel. To avoid risk of high-voltage electrical shock, do not open or remove the UPS cover.
- Do not open or mutilate the battery or batteries. The released electrolyte is harmful to the skin and eyes and may be toxic.
- Do not dispose of the battery or batteries in a fire. The batteries may explode.
- The batteries contain chemical substances that may jeopardize or pollute our environment. Please contact the supplier shown on the batteries to properly dispose of the batteries.
- A battery can present a risk of electric shock and high short-circuit current. The following precautions should be observed before replacement of batteries:
 1. Remove watches, rings or other metal objects.
 2. Use tools with insulated handles.
 3. Wear insulating gloves and boots.
 4. Do not lay tools or metal parts on the top of batteries.
 5. Disconnect the charging source prior to connecting or disconnecting the batteries' terminals.
- Contact qualified service personnel if either of the following events occur:
 1. Liquid is poured or splashed on the UPS.
 2. The UPS does not run normally after instructions in this Owner's Manual are carefully observed.



2. Important Safety Instructions

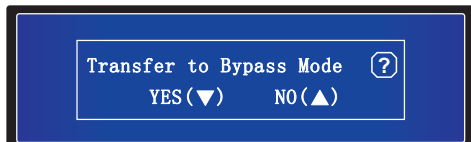
2.4 Storage Warnings

Prior to Installation














If the UPS needs to be stored prior to installation, it should be placed in a dry area. The allowable storage temperature is 5~104°F (-15~40°C).

After Usage

Press the **OFF** key () once and the LCD will appear with the below screen. To turn off the UPS, press the **DOWN** key (). Make sure the UPS is in bypass mode, disconnect the UPS from the utility power, open the internal battery fuse holders (refer to **4.3 Front View with Door Open**), remove all equipment from the UPS and store the UPS in a dry and well-ventilated area at a temperature between 5~104°F (-15~40°C). Idle batteries must be fully recharged approximately every three months if the UPS needs to be stored for an extended period of time. The charging time must not be less than 24 hours each time.



2.5 Glossary of Symbols

No.	Symbol	Description
1	 NORMAL	On-line mode LED indicator: green
2	 BATTERY	Battery mode LED indicator: yellow
3	 BYPASS	Bypass mode LED indicator: yellow
4	 FAULT	Fault LED indicator: red
5	 ON	ON key
6	 OFF	OFF key
7	 ESC	Goes back to previous screen or cancels current selection
8	 ▼	Moves down/Decreases number
9	 ▲	Moves up/Increases number
10	 ←	Confirms selection
11	 EPO	EPO key
12	R	R phase of AC input/UPS output
13	S	S phase of AC input/UPS output
14	T	T phase of AC input/UPS output
15	N	Input neutral line/Output neutral line/Battery neutral line
16		For UPS grounding
17		For critical load grounding/For external battery cabinet grounding
18	+	Positive battery terminal
19	-	Negative battery terminal

2. Important Safety Instructions

2.6 Standard Compliance

This product meets the following safety standards and electromagnetic compatibility (EMC) inspection standards:

- UL 1778
- CSA C22.2 No. 107.3
- FCC Part 15 Class A (EMC)
- GB17626-2 / IEC 61000-4-2 (ESD) Level 4
- GB17626-3 / IEC 61000-4-3 (Radiated Field) Level 3
- GB17626-4 / IEC 61000-4-4 (EFT) Level 4
- GB17626-5 / IEC 61000-4-5 (Surge) Level 4

3. Installation and Wiring

3.1 Important Safety Warning

Read this manual thoroughly before undertaking any installation and wiring. An authorized Tripp Lite engineer must perform the start-up of the UPS and a completed start-up form must be returned to Tripp Lite in order to activate the SmartOnline SUT warranty. Please contact your local supplier or intlservice@tripplite.com for further details. To find your local contact, go to www.tripplite.com/support/contacts and click on 'Service Centers'.

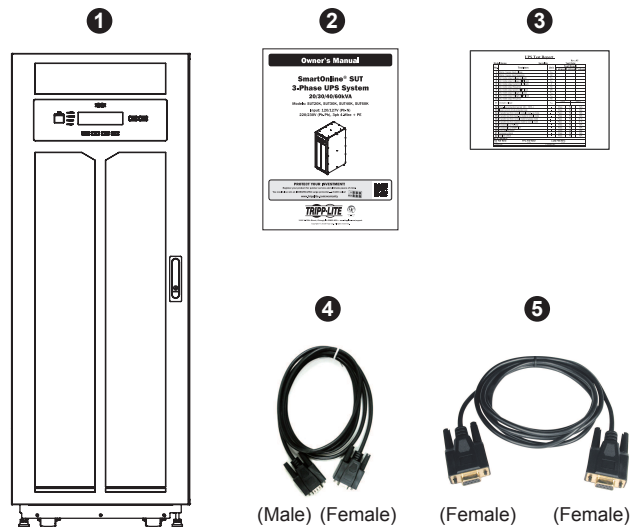
Package Inspection

External

Inspect the UPS exterior packaging. If any damage is observed, immediately contact the dealer from whom the UPS was purchased.

Internal

1. Check the rating label on the top of the UPS cabinet and make sure the device number and capacity match what you ordered.
2. Examine if any parts are loose or damaged.
3. The UPS package contains the items listed below. Please check if any items are missing.
4. If anything is damaged or missing, immediately contact the dealer from whom the UPS was purchased.
5. If the UPS needs to be returned, carefully repack the UPS and all of the accessories using the original packing material that came with the unit.



No.	Item	SUT20K	SUT30K	SUT40K	SUT60K
1	UPS (with internal batteries)	1 pc.	1 pc.	1 pc.	1 pc.
2	Owner's Manual	1 pc.	1 pc.	1 pc.	1 pc.
3	Test Card	1 pc.	1 pc.	1 pc.	1 pc.
4	RS-232 Cable (Male/Female)	1 pc.	1 pc.	1 pc.	1 pc.
5	Parallel Cable (Female/Female)	1 pc.	1 pc.	1 pc.	1 pc.

Notes:

1. The balance supports have been locked on the pallet when the UPS is shipped out of the factory. Keep them well maintained after unpacking, as it may be necessary to use them for installation.

3. Installation and Wiring

3.2 Transportation



WARNING

The UPS is packed on a pallet suitable for handling with a forklift. If using a forklift or other equipment to move the UPS, ensure its load bearing is sufficient to support the total packing weight of the UPS.

The UPS is fixed on the pallet with four balance supports. Do not discard the balance supports, as they may be required for installation (see section **3.5 UPS Installation**). When removing them, pay attention to the movement of the casters to avoid accidents.

The UPS cabinet may be pushed forward or backwards only; it may not be moved sideways.

If moving the UPS over long distance, use appropriate equipment such as a forklift; do not move the UPS cabinet using its attached casters over long distances, move the UPS cabinet in its original packaging until at the final destination site.

3.3 Delivery

Inspect the packaging materials and UPS cabinet carefully upon delivery. Do not install a damaged UPS, connect it to a battery or to the utility. The packing box of the UPS is equipped with an anti-tilt device. Confirm the device does not indicate any shock or excess tilt during transit. If the device indicates there has been excessive shock or tilt, do not install and contact your local Tripp Lite representative.

3.4 Installation Environment

- The UPS is designed for indoor use only. Do not place or install the UPS in an outdoor area.
- When moving the UPS to its installation site, ensure all corridors, doors, gates, elevators, floors, etc. are able to accommodate and bear the combined weight of the UPS system, any associated battery cabinets and all handling equipment. See **Appendix 1** for UPS combined weights.
- The installation site should have a dedicated AC circuit available, compatible with the UPS system's input requirements. See **Appendix 1** for input specifications.
- Ensure the installation area has sufficient space for maintenance and ventilation of the UPS system.
- Maintain the installation area's temperature below 86°F (30°C) and the humidity level below 90%. The highest operating altitude is 6500 ft. (2000 m) above sea level. Please consider the derating values when operating the UPS over 3300 ft. (1000 m); refer to Appendix 1. The optimum operating temperature for the batteries is between 68~77° (20~25°C).
- The UPS should be located in an environment with clean air and adequate ventilation to maintain the ambient temperature within the UPS operating range.
- The UPS is air-cooled with the aid of internal fans. Do not cover the ventilation openings of the UPS system.
- Install the UPS in an area in which the walls, floors and ceilings are constructed with fireproof materials. The UPS is suitable for mounting on concrete or other non-combustible surfaces only.
- Install a CO₂ or dry powder extinguisher in the installation area.
- Ensure the installation area is adequately sized for maintenance and ventilation:
 - o Maintain a clearance of 3 ft. (1 m) from the front of the UPS.
 - o Maintain a clearance of 1.67 ft. (50 cm) from the rear and both sides of the UPS.

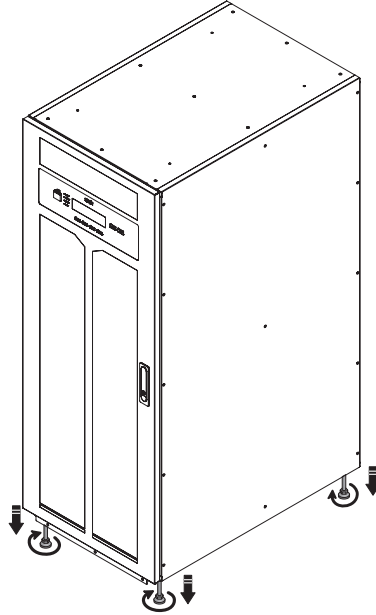
3. Installation and Wiring

3.5 UPS Installation

There are two installation methods. One is with the balance supports and the other is without the balance supports.

Installation without the Balance Supports

After moving the UPS to its final installation area, use the levelers to stabilize the UPS cabinet on the ground.

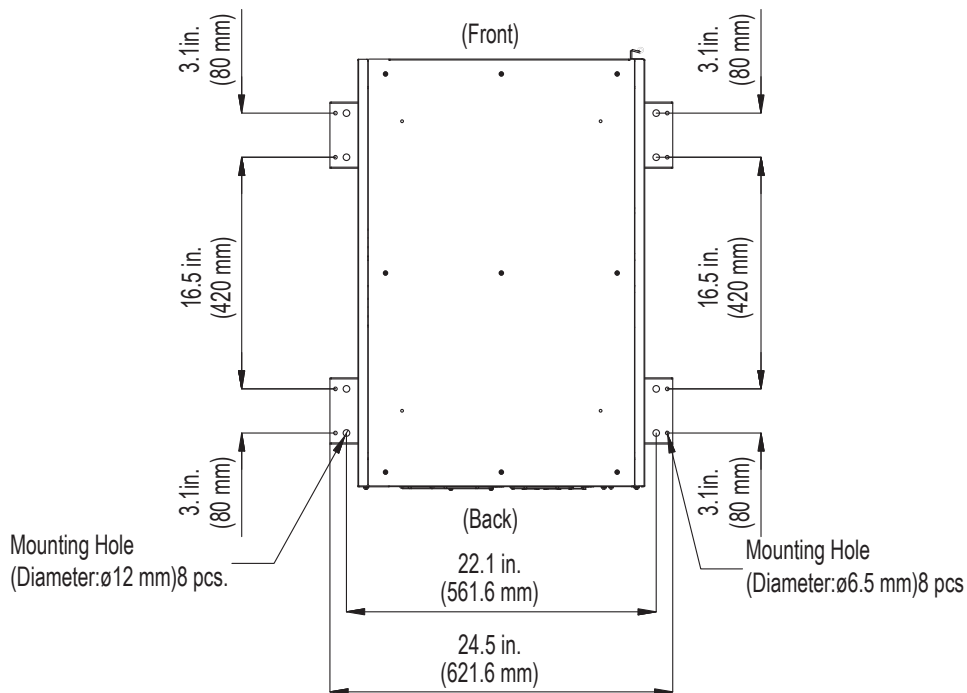


(Figure 3-1: Stabilize the UPS with Levelers)

Installation with the Balance Supports

To reinstall balance supports removed from the UPS during the unpacking process, follow these steps:

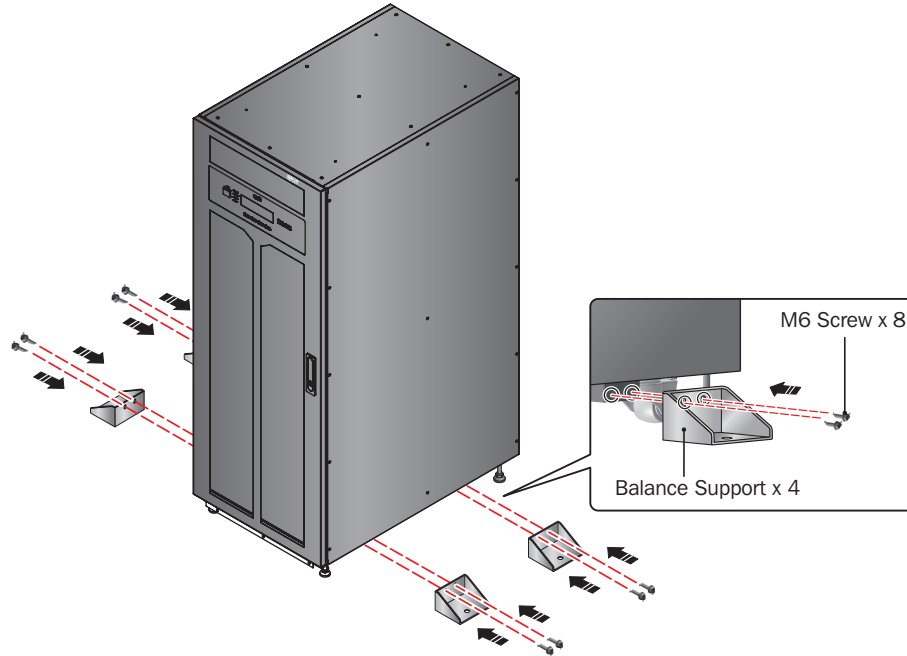
- 1 Once the installation area has been selected, follow the mounting hole diagram below to drill holes.



(Figure 3-2: Mounting Hole Diagram)

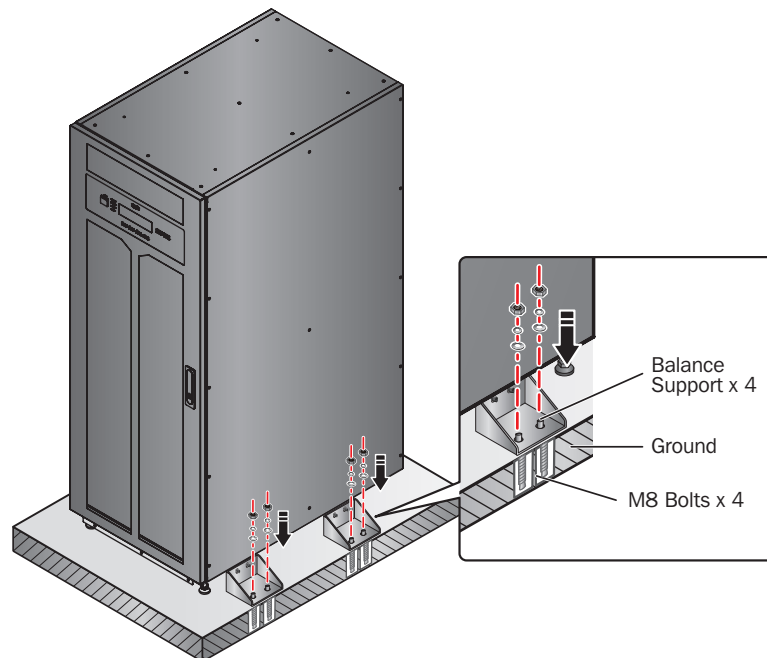
3. Installation and Wiring

- 2 Place the UPS over the drilled holes, use the levelers to stabilize the UPS on the ground and use the M6 screws to reinstall the balance supports (that were removed from the UPS during the unpacking process) on the UPS. Refer to the figure below.



(Figure 3-3: Balance Support Installation)

- 3 Use four user-supplied M8 bolts to fix the four balance supports on the ground to avoid UPS movement.



(Figure 3-4: Fix the Balance Supports on the Ground)

3. Installation and Wiring

3.6 Wiring

3.6.1 Precautions Prior to Wiring

- The wiring must be performed by qualified professional personnel.
- Before wiring or making any electrical connection, make sure the power supplied to the input and output of the UPS is completely cut off and the internal battery connectors are disconnected.
- When connecting the UPS to the utility AC power and bypass source, protective devices and 4-pole connectors must be installed. The protective devices and 4-pole contactors must use approved components that meet safety certifications. Please refer to the following table for suggested protective devices. For the installation of the protective devices and 4-pole contactors, see *Figures 3-10~3-18*.

UPS System	Recommended Protective Device
SUT20K	D-Curve 75A circuit breaker
SUT30K	D-Curve 125A circuit breaker
SUT40K	D-Curve 150A circuit breaker
SUT60K	D-Curve 225A circuit breaker

- When connecting the critical loads to the UPS, a listed certified breaker must be installed between them. Refer to the table below

UPS System	Recommended 3-Pole Breaker
SUT20K	C-Curve 75A circuit breaker
SUT30K	C-Curve 125A circuit breaker
SUT40K	C-Curve 150A circuit breaker
SUT60K	C-Curve 225A circuit breaker

- Check that the size, diameter, phase and polarity of each cable connecting to the UPS is correct. For the specifications of input/output cables and circuit breakers, refer to **Table 3-1**.

Table 3-1: Specifications of Input/Output Cables and Circuit Breakers

	SUT20K	SUT30K	SUT40K	SUT60K
AC Input Cable*	2 AWG (25 mm ²)	1/0 AWG (50 mm ²)	3/0 AWG (95 mm ²)	250 kcmil (120 mm ²)
Output Cable*	2 AWG (25 mm ²)	1/0 AWG (50 mm ²)	3/0 AWG (95 mm ²)	250 kcmil (120 mm ²)
Battery Input Cable*	1 AWG (35 mm ²)	1/0 AWG (50 mm ²)	3/0 AWG (95 mm ²)	250 kcmil (120 mm ²)
Tightening Torque	130 in. lb. (14.7 N·m)	130 in. lb. (14.7 N·m)	130 in. lb. (14.7 N·m)	130 in. lb. (14.7 N·m)
Input Breaker	75A (3-pole x 1)	125A (3-pole x 1)	150A (3-pole x 1)	225A (3-pole x 1)

* Use only copper wire rated to 194°F (90°C) or higher

Notes:

1. In accordance with **local electrical codes**, install a suitable conduit and bushing.
2. Please refer to national and local electrical codes for acceptable non-fuse breakers and cable size.
3. Cables with PVC material and with temperature resistance up to 201°F (105°C) are suggested.
4. Make sure that the input/output cables are locked tightly.

- When connecting with the external battery cabinet, confirm the polarity. Do not reverse the polarity.
- The grounding cable of the external battery cabinet must be connected to the (⊕) terminal of the battery terminal block.
- Installer should consider the maximum current and wiring gauge that may be required for future expansion of parallel configurations.
- The input of the UPS must be a Y connection, and the neutral line (N) must be connected to avoid UPS failure. Do not connect the neutral line (N) of the UPS with the ground terminal (⊕).
- If there is a floating voltage between the input power's neutral (N) and the ground (⊕) and you require that the VNG of the UPS should be zero, it is suggested an installation transformer be installed in front of the UPS input side and the UPS neutral (N) be connected with the ground (⊕).
- The utility AC power must be three phases (R/S/T) and meet the specifications on the UPS rating label. When connecting the utility input power to the UPS, make sure it is in positive phase sequence (clockwise phase rotation).
- Connect the external battery cabinet's grounding terminal to the grounding terminal (⊕) of the UPS system's battery terminal block. Do not connect the grounding terminal of the external battery cabinet to any other grounding system.
- The ground terminal (⊕) of the UPS must be grounded. Use ring-type terminal for wiring.

3. Installation and Wiring



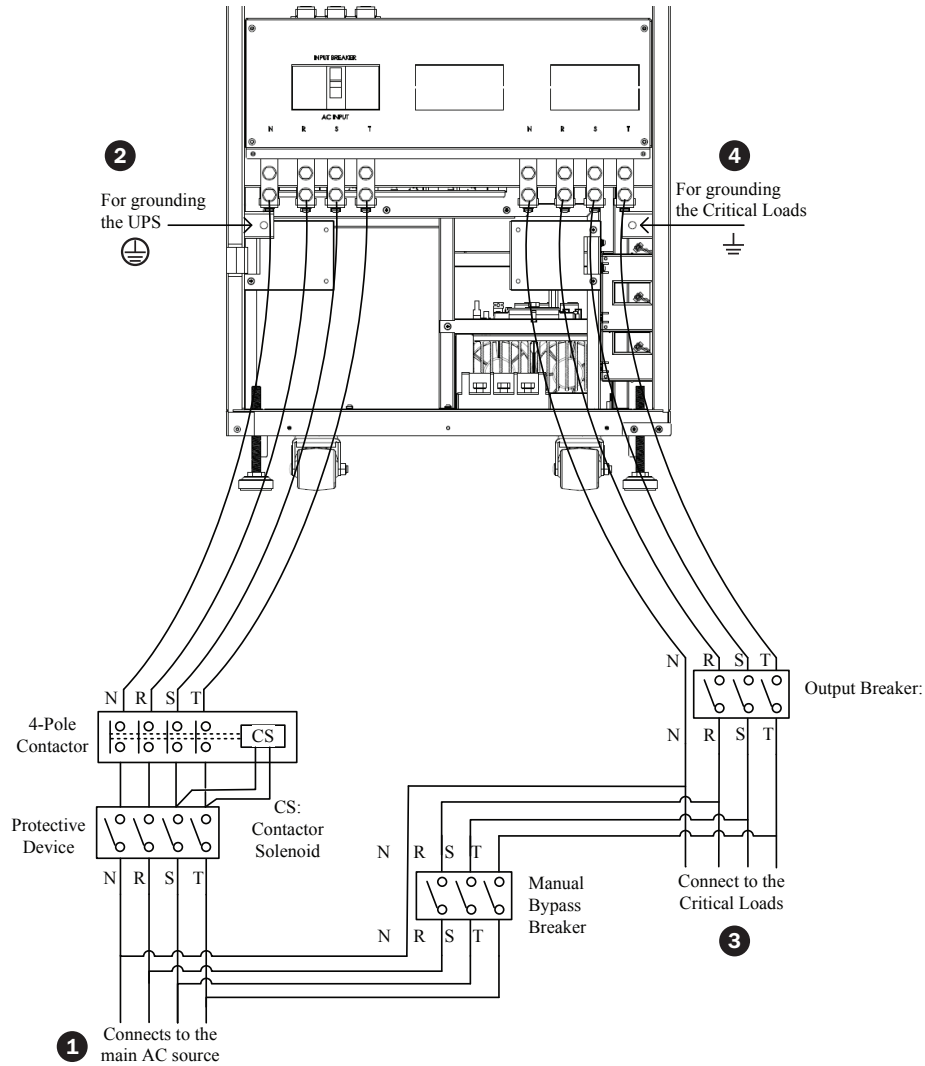
WARNING:

1. Incorrect wiring will lead to severe electric shock and damage to the UPS.
2. The UPS will not work normally if the input power's neutral (N) is not firmly connected or is not connected to the AC Input Block's neutral (N) terminal.

3.6.2 Wiring Procedure

Note: Prior to wiring, first read 3.6.1 Precautions Prior to Wiring.




- 1 Remove the cover plate to access the wiring terminal block shown in Figure 3-5.



(Figure 3-5: Single Unit Wiring Diagram)

3. Installation and Wiring

2 Ensure the functions of the wiring terminal block shown in *Figure 3-5* are clearly understood.

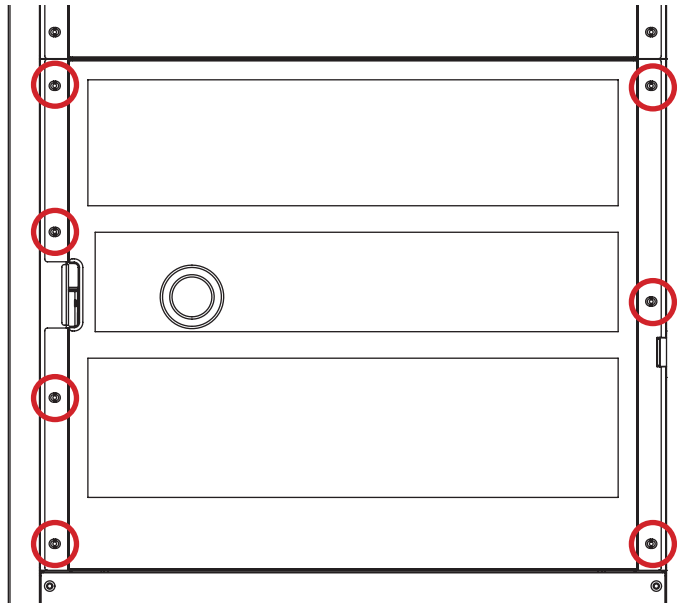
No.	Item	Function	Description
1	AC Input Terminal Block	Connects the main AC source	Includes 3-phase (R, S, T) and neutral (N) terminals
2		For the UPS grounding	Includes one grounding terminal
3	UPS Output Terminal Block	Connects the critical loads	Includes 3-phase (R, S, T) and neutral (N) terminals
4		For the critical loads' grounding	Includes one grounding terminal
5	Battery Input Terminal Block	Connects an external battery cabinet	Includes three terminals, positive (+), neutral (N) and negative (-)
6		For an external battery cabinet's grounding	Includes one grounding terminal

3 Confirm the UPS rating voltage is 120/208V AC or 127/220V AC, and the battery rating voltage is $\pm 144V$ DC.

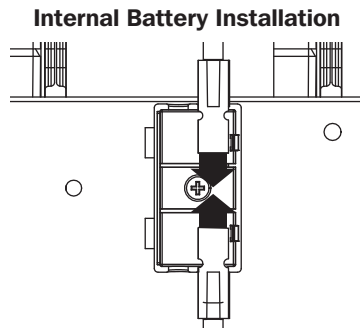
4 Confirm the input breaker is in the **OFF** position. For the position of each breaker, refer to unit's front panel.

5 Select the proper input and output cables according to the UPS capacity (refer to **Table 3-1**).

6 Open the UPS front door to unscrew and remove the panel labeled "Battery Compartment".

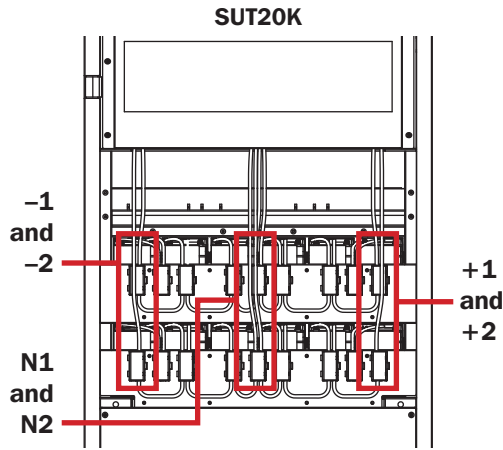


7 The UPS system is shipped with the battery cables disconnected. Remove the insulation tape covering the BAT(+) red wires and reconnect to the terminals (Figure 3-6). Refer to Figures 3-7~3-10 for each model's respective battery installation.



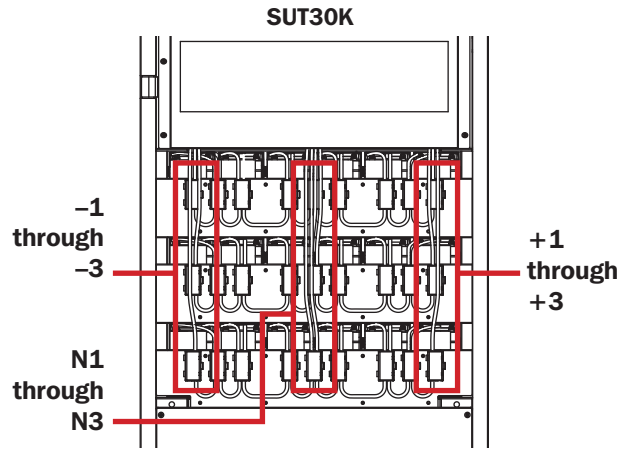
(Figure 3-6: Battery Cable Connection)

3. Installation and Wiring



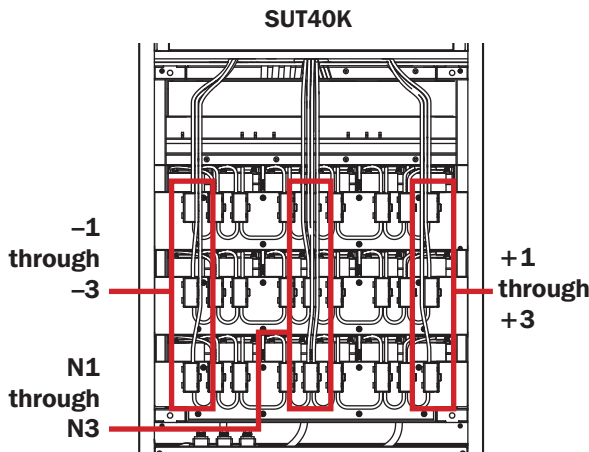
(Figure 3-7)

First connect the -1 and -2 cables on the left, then the +1 and +2 cables on the right.



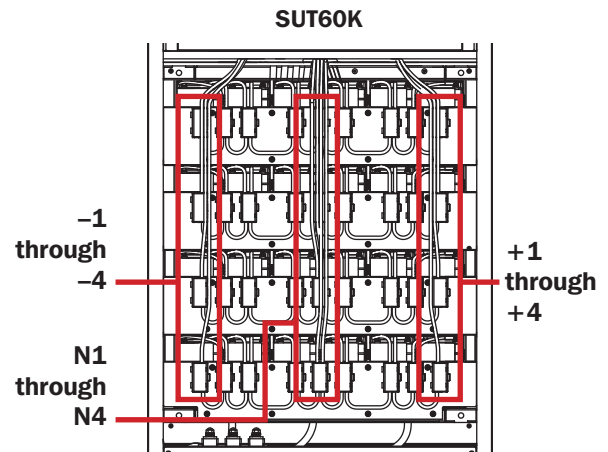
(Figure 3-8)

First connect the -1, -2 and -3 cables on the left, then the +1, +2 and +3 cables on the right.



(Figure 3-9)

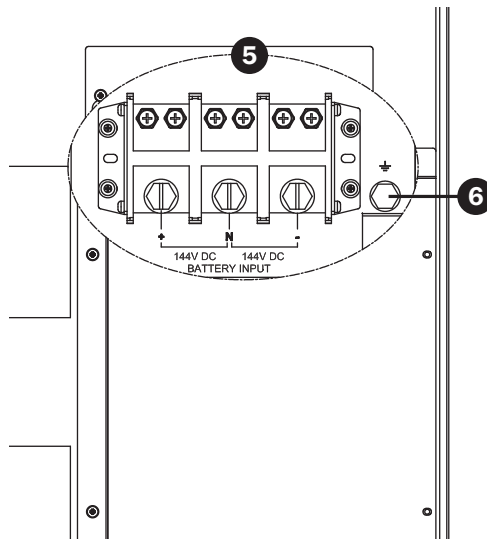
First connect the -1, -2 and -3 cables on the left, then the +1, +2 and +3 cables on the right.



(Figure 3-10)

First connect the -1, -2, -3 and -4 cables on the left, then the +1, +2, +3 and +4 cables on the right.

- 8 Connect optional external battery to the external battery cabinet terminal block located at the lower right of the unit (refer to Figure 3-11).



(Figure 3-11: Connect an external battery [optional] to the external battery cabinet terminal block.)

3. Installation and Wiring

3.6.3 Parallel Units Wiring

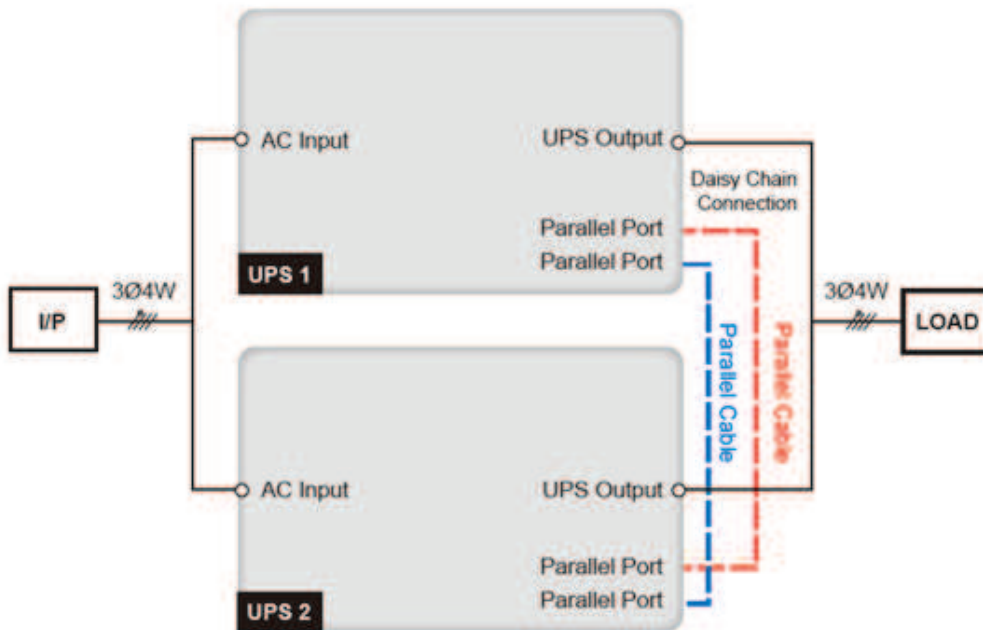
Note: Prior to wiring, first read 3.6.1 Precautions Prior to Wiring.

- 1 Follow steps 1 ~ 5 in section 3.6.2 Wiring Procedure.
- 2 The UPS system is shipped with the battery cables disconnected. Locate the battery connection cables behind the labeled connector door in the cabinet. Connect the battery cabinet cables to the wiring terminal block and ensure the UPS system is properly grounded (refer to Figures 3-6~3-10).
- 3 Use the provided parallel cable to connect the parallel ports on the parallel units. See Figure 6-1 for parallel port location.
- 4 Refer to 6. Communication Interfaces to set the parallel switch in the ON or OFF position.
- 5 Follow steps 7 ~ 8 in section 3.6.2 Wiring Procedure.



WARNING:

1. When UPS systems are paralleled, the length of each unit's input cables/output cables must be equal. This ensures that the parallel UPS systems can equally share the equipment loads in bypass mode.
2. Only UPS systems with the same capacity, voltage and frequency can be paralleled; otherwise, parallel functions will fail.
3. Before start-up of parallel units, qualified service personnel should set ID (0, 1, 2 or 3) through the LCD. Otherwise, UPS systems cannot be started. If the symbol '!' appears after an ID number, it indicates there is a conflict between ID numbers.



(Figure 3-12: Parallel Units Wiring Diagram)

3. Installation and Wiring

3.7 External Battery Cabinet Connection Precautions



WARNING:

1. Connect loads to the UPS only after the batteries are fully charged. This guarantees that the UPS can provide sufficient backup power to the loads connected when a power failure occurs.
2. When using both the UPS internal batteries and external batteries, ensure the voltage difference is <5V DC.

Battery

1. Charge Voltage
 - 1) Float voltage: $\pm 163.2V$ DC (default)
 - 2) Boost voltage: $\pm 168V$ DC (default)
2. Charge Current
 - 1) Minimum: SUT20K/SUT30K/SUT40K/SUT60K → 1A
 - 2) Maximum: SUT20K → 10A
SUT30K/SUT40K/SUT60K → 20A
 - 3) Default: SUT20K → 5A
SUT30K → 7.5A
SUT40K → 7.5A
SUT60K → 10A
3. Low Battery Shutdown: 120V DC (default: 120V DC)
4. Number of Batteries: SUT20K → 48 pcs.
SUT30K → 72 pcs.
SUT40K → 72 pcs.
SUT60K → 96 pcs.

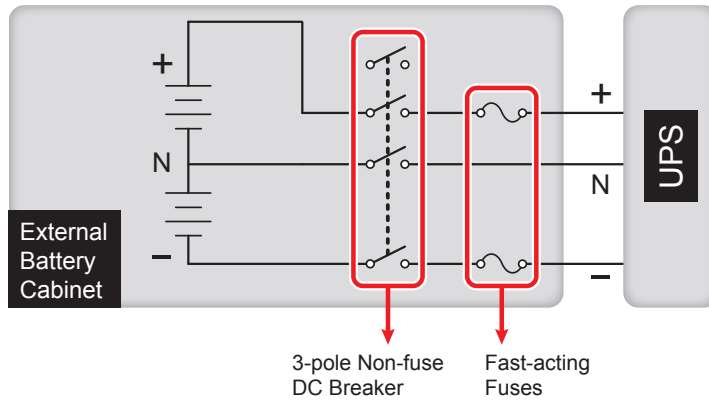
Notes:

1. Charge current is adjustable from 1A to the 20A maximum in increments of 0.5A.
 2. To modify the default charge current setting or default low battery shutdown setting, contact your local dealer or service personnel.
- Only use the same type of batteries from the same supplier. Never combine old, new or different Ah batteries at the same time.
 - The number of batteries must meet UPS requirements.
 - Do not connect the batteries in reverse polarity.
 - When connecting a non-Tripp Lite external battery cabinet to the UPS, it is compulsory to install an appropriate non-fuse DC breaker and fast-acting fuses (when short-circuit occurs, the melting current must be 5~6 times of the battery fuse's rating current).
 - To extend battery backup time, connect several external battery cabinets to the UPS.
- Note:** Recharge time will be extended; take note of charger capacity.
- To extend battery backup time, external batteries may be connected to the UPS.

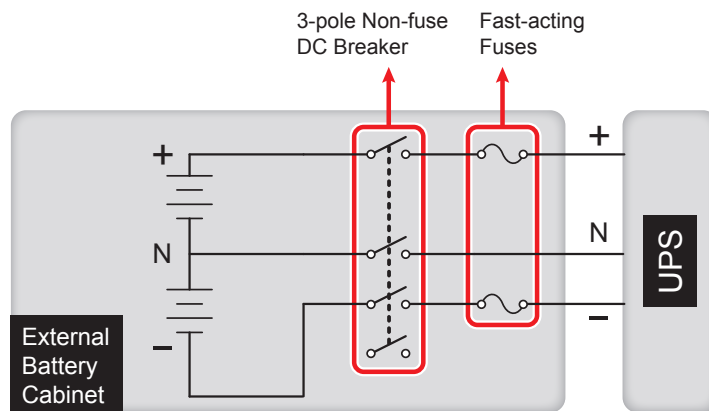
Rating Power (kVA)	Circuit Breaker Rating Current	Battery Cable	Battery Fuse
20	250V AC / 75A	1 AWG (35 mm ²)	660V DC / 80A
30	250V AC / 125A	1/0 AWG (50 mm ²)	660V DC / 125A
40	250V AC / 150A	3/0 AWG (95 mm ²)	660V DC / 150A
60	250V AC / 250A	250 kcmil (120 mm ²)	660V DC / 250A

3. Installation and Wiring

- The breaker must be a 3-pole DC breaker with a 250V DC rating per pole. Follow *Figure 3-13* or *Figure 3-14* between the UPS external battery cabinet.



(Figure 3-13: A 3-pole Non-fuse DC Breaker and Fast-acting Fuses Installation I)



(Figure 3-14: A 3-pole Non-fuse DC Breaker and Fast-acting Fuses Installation II)

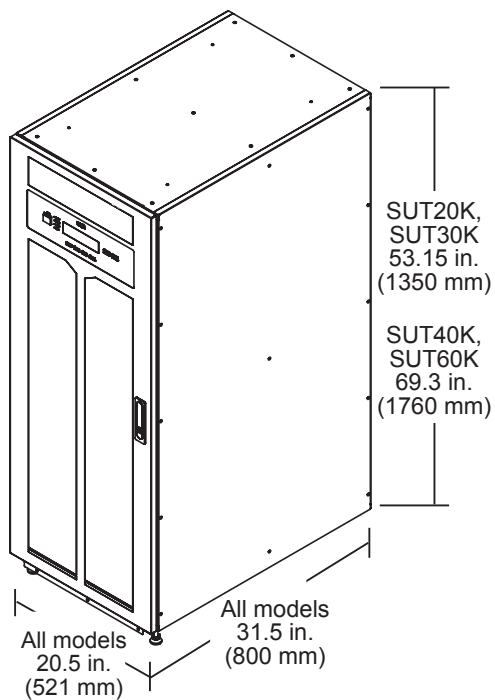
Battery Status Alarm

When the UPS system's batteries experience one of the problems shown below, the system will sound the following alarms:

No.	External Battery Cabinet Status	Alarm
1	Battery Test Fail	Sounds once every 2 seconds
2	Battery Low Warning	Sounds once every 0.5 second
3	Battery Low Shutdown	Long beep (5 seconds)
4	Battery Over Charge	Sounds once every 2 seconds
5	Battery Missing	Sounds once every 2 seconds

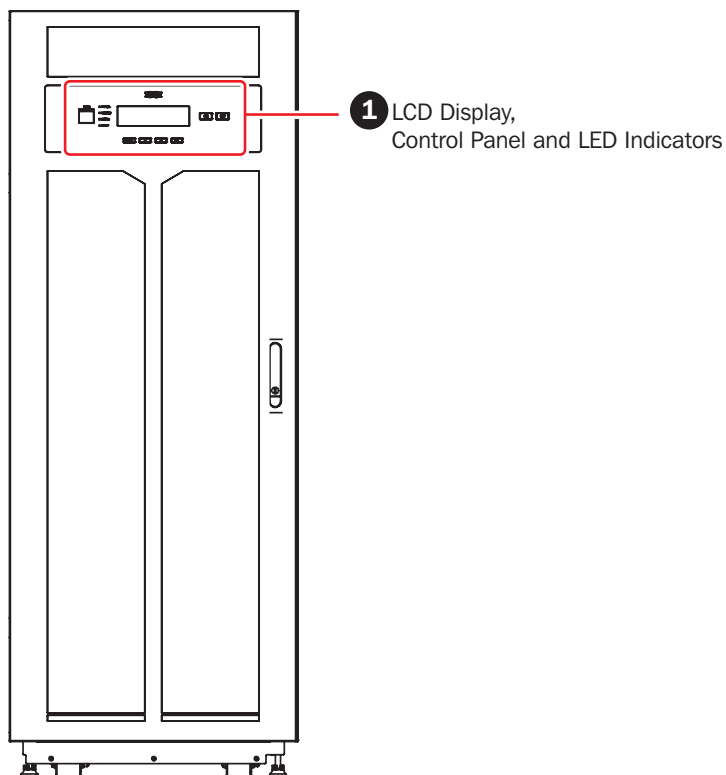
4. System Components

4.1 Appearance and Dimensions



(Figure 4-1: UPS Appearance and Dimensions)

4.2 Front View



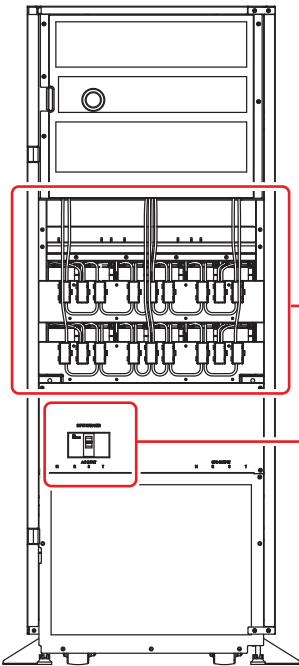
(Figure 4-2: Front View)

1 LCD Display, Control Panel and LED Indicators

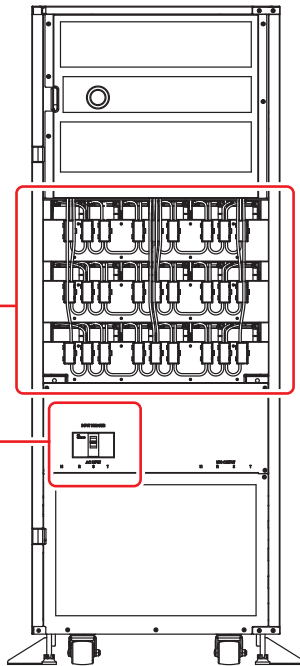
1. LCD displays UPS status.
2. Control panel includes ESC, move-up, move-down, confirmation, ON/OFF and EPO buttons (refer to Figure 4-7).
3. LED indicators include NORMAL, BATTERY, BYPASS and FAULT.
4. See **Chapter 8. LCD Display and Settings** for more information.

4. System Components

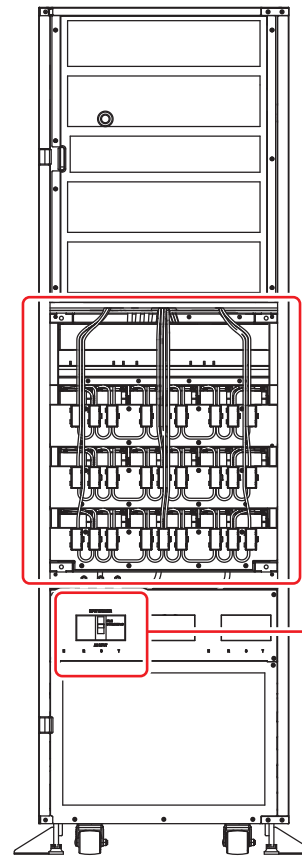
4.3 Front View with Door Open



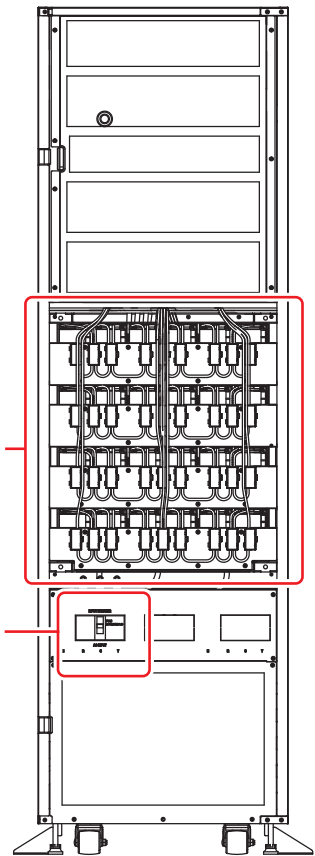
(Figure 4-3: SUT20K Front View with Door Open and Battery Compartment Panel Removed.)



(Figure 4-4: SUT30K Front View with Door Open and Battery Compartment Panel Removed.)



(Figure 4-5: SUT40K Front View with Door Open and Battery Compartment Panel Removed.)



(Figure 4-6: SUT60K Front View with Door Open and Battery Compartment Panel Removed.)

2 Input Breaker

Controls the UPS system's main input switch and is used for safety protection.

3 Internal Battery Cabinet

The four UPS models have different contents inside the internal battery cabinet. See the table below for more information.

1. The internal battery cabinet includes:

No.	Item	Quantity			
		SUT20K	SUT30K	SUT40K	SUT60K
1	Internal Batteries	48	72	72	96
2	Battery Tray	12	18	18	24

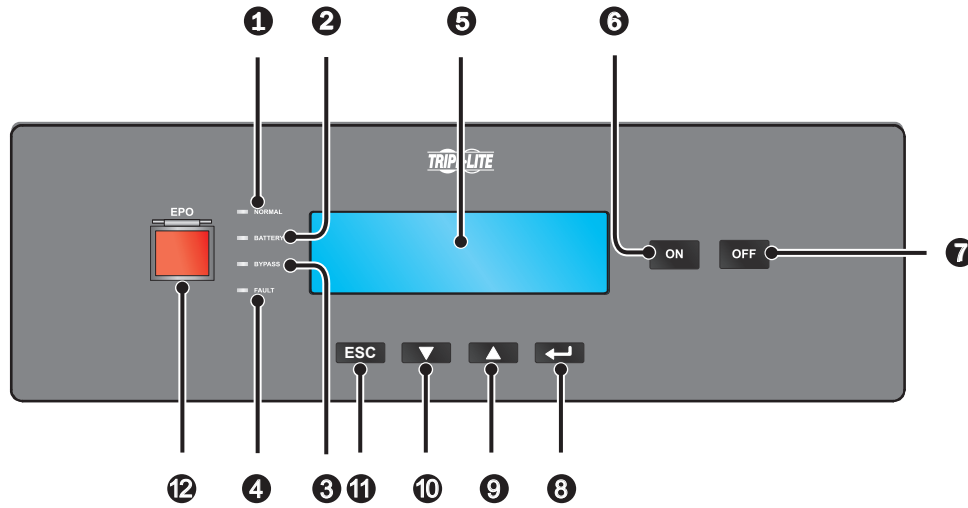
2. The internal batteries, battery trays and battery cables shown in the above table have already been configured at factory. Only qualified service personnel should perform battery installation, wiring and connection.

START UP and COMMISSIONING

An authorized Tripp Lite engineer must perform the start-up of the UPS and a completed start-up form must be returned to Tripp Lite in order to activate the SmartOnline SUT-Series warranty. Please contact your local supplier or intlservice@tripplite.com for further details. To find your local contact, go to www.tripplite.com/support/contacts and click on 'Service Centers'.

4. System Components

4.4 Control Panel

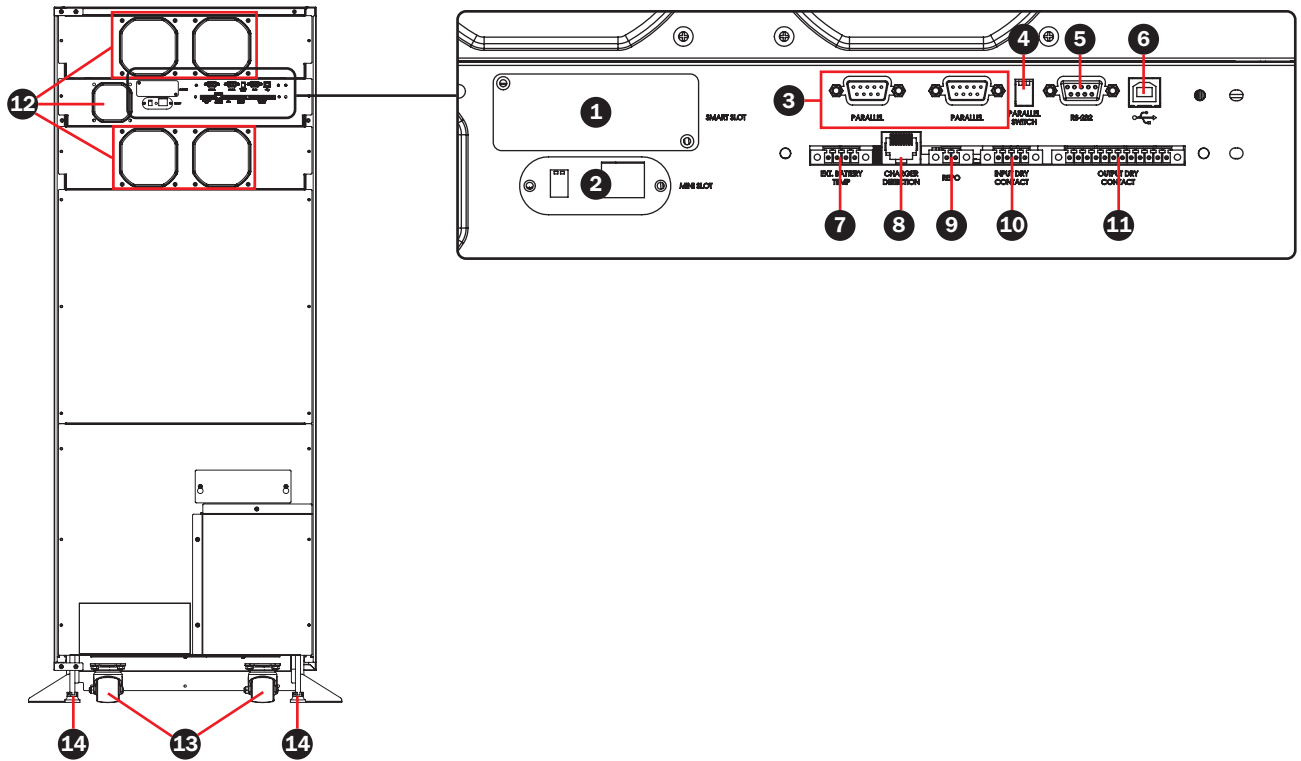


(Figure 4-7: Front Panel)

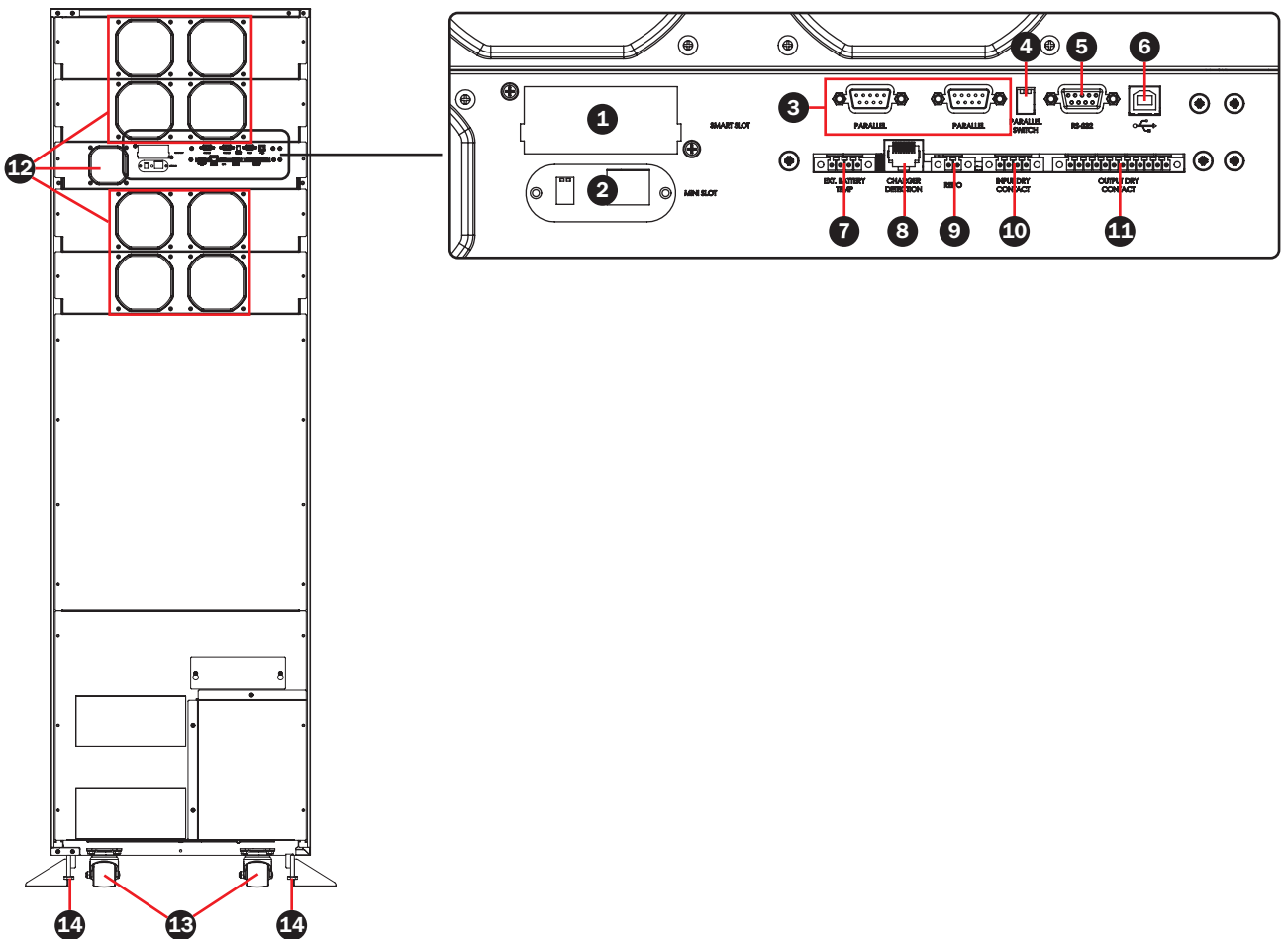
No.	Item	Description
1	NORMAL	UPS is operating in on-line mode and the utility AC power is normal.
2	BATTERY	UPS is operating in battery mode and the external batteries are discharging.
3	BYPASS	UPS is operating in bypass mode.
4	FAULT	UPS has abnormalities.
5	LCD Display	Displays UPS operating status and relevant monitoring data.
6	ON	ON key: Press this key for 3~4 seconds and release it after hearing a beep to start up the UPS.
7	OFF	OFF key: Press this key once and the LCD shows the following screen. To shut down the UPS, press the DOWN key ().
8		Confirms selection and accesses menu screen.
9		Moves up/Increases number.
10		Moves down/Decreases number.
11	ESC	Goes back to previous screen or cancels current selection.
12	EPO	When an emergency event occurs, press the EPO key for more than one second to shut down the rectifier, inverter and output of the UPS immediately. To reset, disconnect the EPO key and push the unit's OFF button for 3 seconds, then push the unit's ON button.

4. System Components

4.5 Rear Panel



(Figure 4-8: SUT20K, SUT30K Rear Panel)



(Figure 4-9: SUT40K, SUT60K Rear Panel)


4. System Components

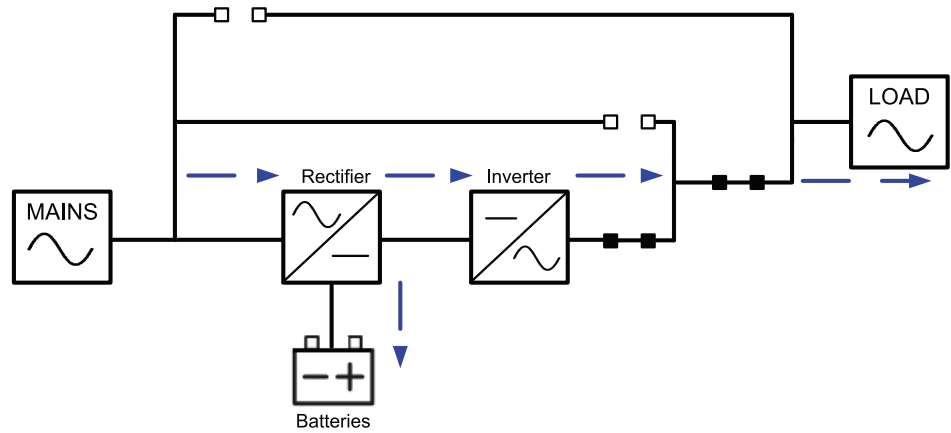
No.	Item	Description
1	SMART Slot	Connects SNMP Relay I/O/ModBus card. For detailed information, refer to 6. Communication Interfaces .
2	MINI Slot	For more information, contact Tripp Lite.
3	Parallel Ports	For UPS parallel usage. For detailed information, refer to 6. Communication Interfaces .
4	Parallel Switch	Controls parallel ports' statuses (ON or OFF). For detailed information, refer to 6. Communication Interfaces .
5	RS-232 Port	Connects to a computer. For detailed information, refer to 6. Communication Interfaces .
6	USB Port	Connects to a computer. For detailed information, refer to 6. Communication Interfaces .
7	External Battery Temperature Input	Connects to the external Battery Cabinet Temperature Sensor. Contact the external battery cabinet manufacturer for instructions.
8	Charger Detection Port	Connects to a charger box and detects the charger status. For detailed information, refer to 6. Communication Interfaces .
9	REPO Port	When an emergency event occurs, the UPS immediately disconnects the power supply and shuts down the unit. For detailed information, refer to 6. Communication Interfaces .
10	Input Dry Contacts	Receive external information of devices connected to the input dry contacts. For detailed information, refer to 6. Communication Interfaces .
11	Output Dry Contacts	Receive the UPS system's event information. For detailed information, refer to 6. Communication Interfaces .
12	DC Fans	Cool and ventilate the UPS.
13	Casters	The casters are designed to provide final positioning movement only. Do not use the casters to move the UPS over a long distance. The casters are not designed to provide long-term support for the UPS after installation.
14	Levelers	The levelers are designed to provide long-term support for the UPS.

5. Operation Modes

This section provides a basic description of the UPS system's path of electrical power in its various operating modes. For more information about how operating modes are shown in the LCD's main screen, refer to **8. LCD Display and Settings**.

Normal (On-line) Mode

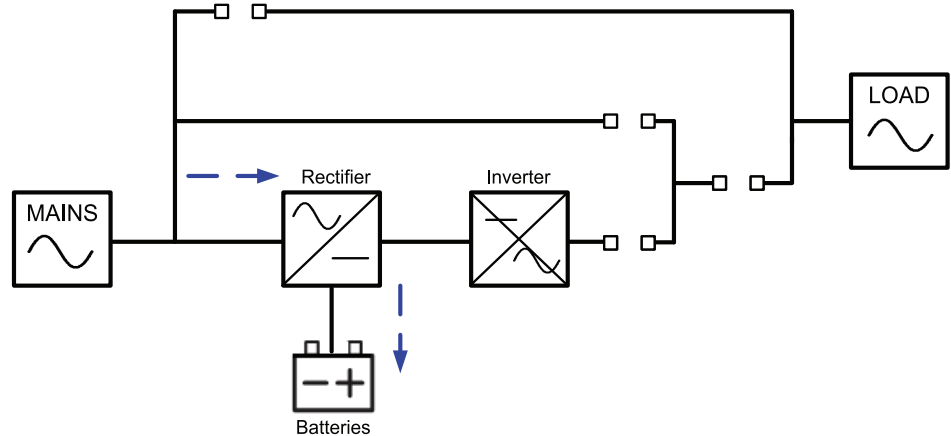
The critical load is supplied by the inverter, which derives its power from the utility AC power. The UPS charges the batteries as needed and provides power protection to the equipment. During on-line mode, the NORMAL LED indicator ( NORMAL) illuminates (green).



(Figure 5-1: Path of Electrical Power through the UPS in Normal [On-line] Mode)



Standby Mode

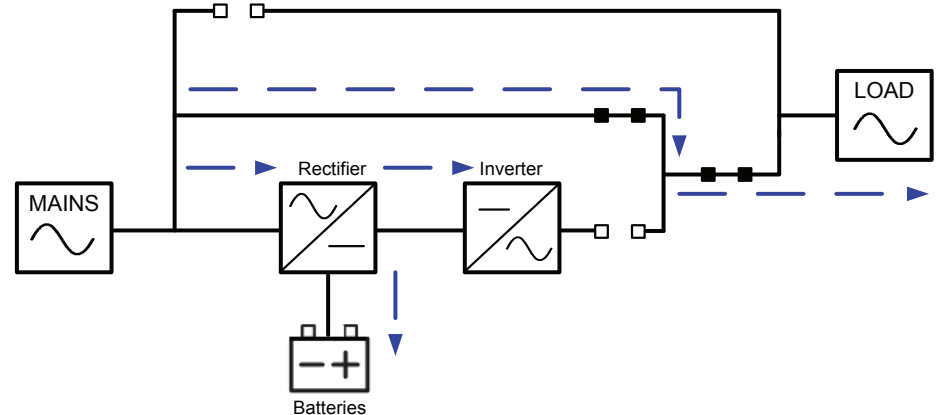
When the input voltage and frequency of the utility AC power are within the normal range, the UPS runs in standby mode and charges the batteries. The bypass and the inverter have no output.



(Figure 5-2: Path of Electrical Power through the UPS in Standby Mode)

ECO Mode

The UPS can be set in ECO mode manually. In ECO mode, when the utility input voltage is within the $\pm 10\%$ range of rated voltage, the load is supplied by the utility power and the BYPASS LED indicator ( BYPASS) illuminates (yellow); if out of the range, the load is supplied by the inverter and the NORMAL LED indicator ( NORMAL) illuminates (green).

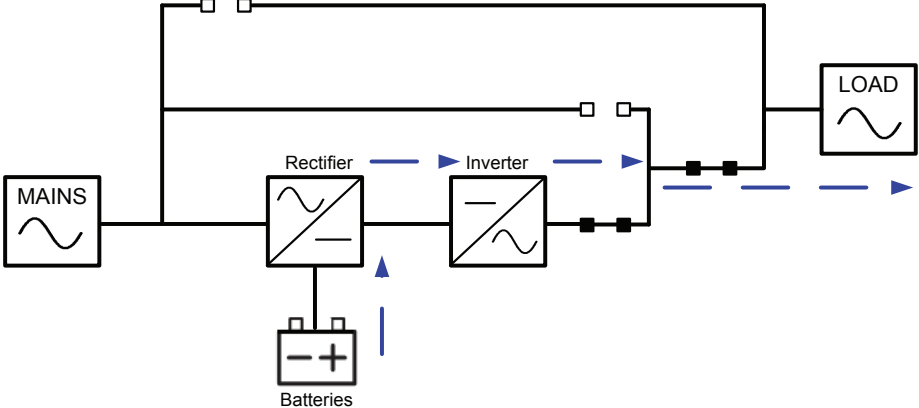


(Figure 5-3: Path of Electrical Power through the UPS in ECO Mode)

5. Operation Modes

Battery Mode

When the UPS is operating during a power outage, the batteries provide DC power, which maintains inverter operation to support the critical load. During battery mode, the BATTERY LED indicator (BATTERY) illuminates (yellow).



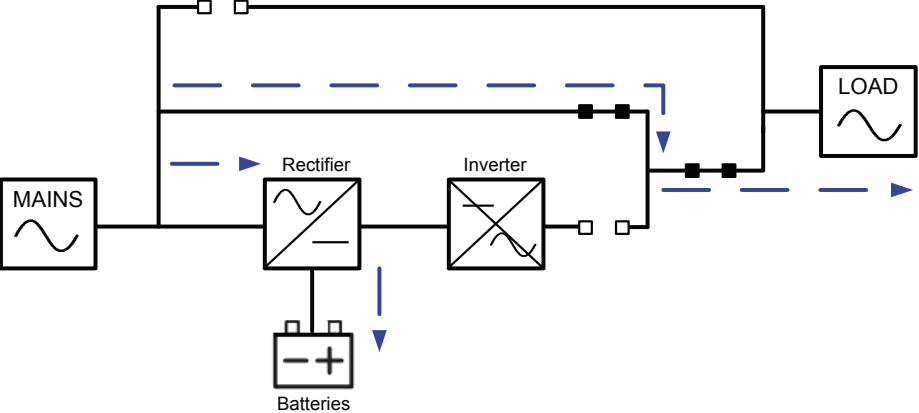
(Figure 5-4: Path of Electrical Power through the UPS in Battery Mode)

Table 5-1: Battery Status

Battery Capacity	Buzzer	LCD Display
Full/Mid	The alarm beeps once every second. (ON for 0.1 second and OFF for 9.9 seconds)	BATTERY CAPACITY 00V/ 000%
Low	The alarm beeps once every 0.5 second. (ON for 0.1 second and OFF for 0.9 second)	BATTERY CAPACITY 00V/ 000%
Depleted	Long beep.	SHUTDOWN DUE TO LOW BATTERY

Bypass Mode

The critical load is directly supplied by the utility power and the batteries are charged. During bypass mode, the BYPASS LED indicator (BYPASS) illuminates (yellow).

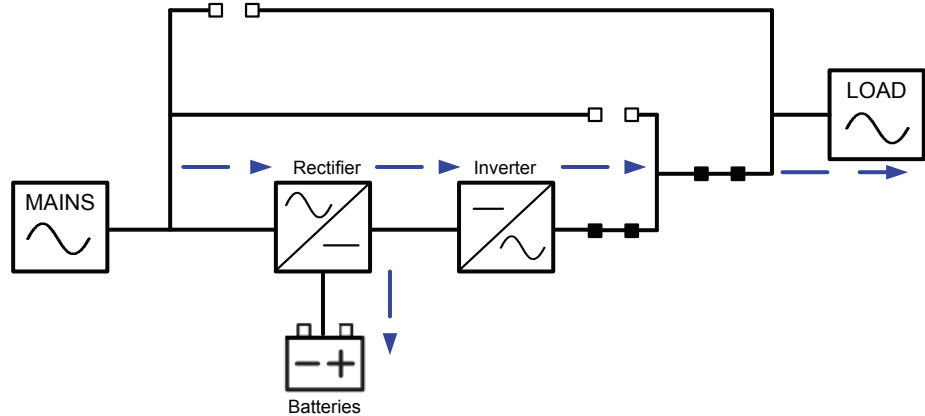


(Figure 5-5: Path of Electrical Power through the UPS in Bypass Mode)

5. Operation Modes

Frequency Conversion Mode

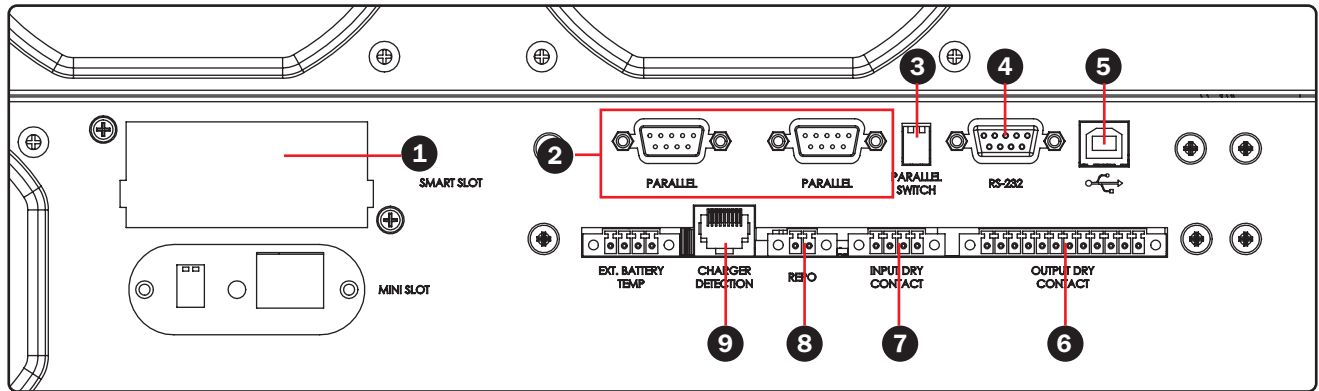
When the UPS is manually set in converter mode, the output frequency can be set as 50 Hz or 60 Hz. After the output frequency is set up, the system will automatically disable the bypass function. Once the inverter shuts down, there is no bypass output. During converter mode, the NORMAL LED indicator (NORMAL) illuminates (green).



(Figure 5-6: Path of Electrical Power through the UPS in Converter Mode)

6. Communication Interfaces

For the positions and functions of the communication interfaces, refer to the following diagram:



(Figure 6-1: Communication Interfaces)

Notes:

1. The UPS functions normally without connecting to the communication interfaces.
2. All communication interfaces may be used at the same time and will not interfere with one another's functionality.

1 SMART Slot

Install an SNMP card in this SMART slot to remotely control and monitor the UPS status via a network. The Relay I/O or MODBUS card may also utilize this slot to provide dry contact or MODBUS functionality, respectively.

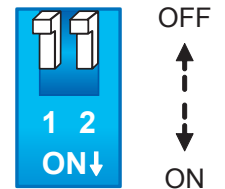
2 Parallel Ports

The two parallel ports are for UPS parallel communication. A maximum of four UPS systems with the same capacity, voltage and frequency may be coupled using the provided parallel cable to run in parallel mode.

3 Parallel Switch

When paralleling UPS systems, the DIP switches must be set up to activate the parallel function. The parallel switch includes two DIP switches. To turn on a DIP switch, switch the DIP to the down position; to turn off a DIP switch, switch the DIP to the up position.

1. When two UPS systems are paralleled, turn on each UPS DIP switch.
2. When three UPS systems are paralleled, turn off the middle UPS DIP switches and turn on the remaining DIP switches.
3. When four UPS systems are paralleled, turn off the middle two DIP switches and turn on the remaining DIP switches.

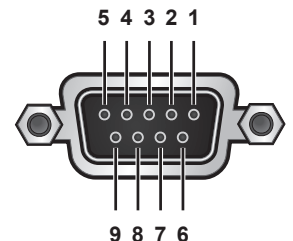


(Figure 6-2: Parallel Switch)

4 RS-232 Port

The RS-232 port is built into the UPS rear panel to provide communication between the UPS and a computer. Use Tripp Lite's free PowerAlert® power management software (available for download at www.tripplite.com/poweralert) to check and monitor the UPS status via a computer. Detailed information is as follows:

1. Monitors the load level, battery status, battery voltage, UPS operation mode, input voltage, input frequency, output voltage and UPS temperature.
2. Sets shutdown delay time.
3. Enables/disables audible alerts.
4. Supports remote shutdown.
5. Pin Assignment:
 - 1) Pin 2: TXD <Transmitting Data>
 - 2) Pin 3: RXD <Receiving Data>
 - 3) Pin 5: GND <Signal Ground>
6. Hardware
 - 1) Baud Rate: 2400 BPS
 - 2) Data Length: 8 bit
 - 3) Stop Bit: 1 bit
 - 4) Parity: None



(Figure 6-3: RS-232 Port)

Note: Other pins are reserved and cannot be used.