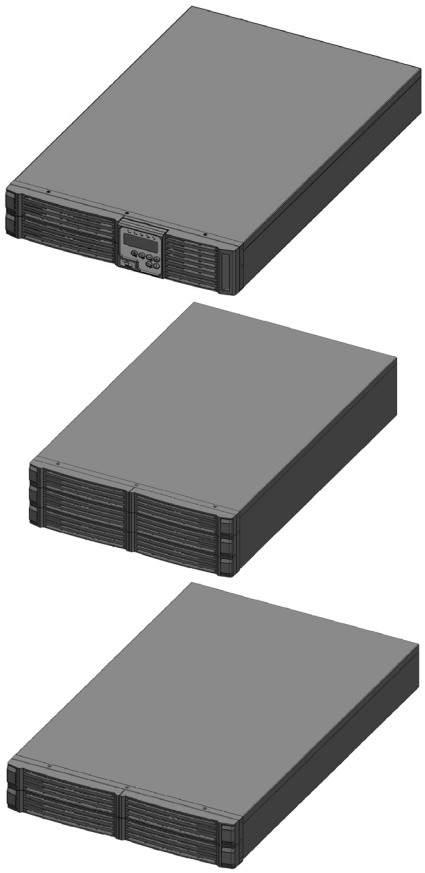
Falcon Electric, Inc.

FN2 Series
Uninterruptible Power Supply
Installation & User Manual



Rackmount Models

- FN2-4.5KRM-2TXI
- FN2-6KRM-2TXI
- FN2-8KRM-2TXI
- FN2-10KRM-2TXI

www.falconups.com

Contents

Safety

Retain This User Manual

SAVE THESE INSTRUCTIONS: This manual contains important instructions which must be followed during the installation, operation, and maintenance of the FN2 Series UPS and batteries.

Please read all instructions before operating this equipment and save this manual for future reference.

This UPS operates from utility power and contains several high current back-up batteries; this information is important to all personnel involved. Please read this manual first before continuing to unpack, install or operate this UPS.

Warnings

⚠ When replacing batteries, replace with the same number of the following battery: NP7.2-12 (7Ah) or NPW45-12 (9Ah)

⚠ CAUTION: Risk of Energy Hazard, 12V, 7 or 12V, 9 Ampere-hour batteries. Before replacing batteries remove conductive jewelry such as chains, wrist watches, and rings. High energy through conductive materials could cause severe burns.

⚠ CAUTION: Do not dispose of batteries in a fire. They may explode.

⚠ CAUTION: Do not open or mutilate batteries. Released material is harmful to the skin and eyes. It may be toxic.

⚠ Servicing of batteries should be performed or supervised by personnel knowledgeable about batteries and the required precautions.

⚠ When replacing batteries, replace with the same type and number of batteries or battery packs.

⚠ CAUTION: A battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries:

- Remove watches, rings or other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of batteries.
- Disconnect charging source prior to connecting or disconnecting battery terminals.
- Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance.

⚠ CAUTION: Risk of electric shock. Do not remove cover. No user serviceable parts inside. Refer servicing to qualified service personnel.

⚠ WARNING: To reduce the risk of fire, replace only with the same type and rating of fuse.

⚠ CAUTION: A disconnect switch must be provided by others for the AC output circuit. To reduce the risk of fire, connect only to a circuit provided with branch circuit over-current protection for 30 amperes for 4.5 to 6kVA rating or 50 amperes for 8 to 10kVA rating in accordance with the National Electric Code, ANSI/NFPA 70.

⚠ CAUTION: To reduce the risk of fire connect the UPS only to a circuit provided with branch circuit over-current protection of 30 amperes for 4.5kVA rating, 45 amperes for 6kVA rating or 75 amperes for 8 to10kVA rating in accordance with the National Electric Code, ANSI/NFPA 70.

This UPS should be installed according to the instructions in this manual. Failure to do so could result in unsafe operation and could invalidate your warranty.

This device is ***not*** intended for life support applications.

The maximum UPS output load (in watts) must never exceed that shown on the UPS rating label.

NEVER CONNECT equipment that could overload the UPS or demand half-wave rectification from the UPS, for example: electric drill motors, vacuum cleaners or hair dryers. Do not attempt to apply source voltage into the UPS output.

Storing magnetic media on top of the UPS may result in data loss or corruption.

This UPS is equipped with an EMI filter. To prevent potential leakage current hazards, ensure that the AC mains supply is securely grounded.

To ensure safety for a hard-wired UPS, the system must be installed by a licensed electrician.

This UPS may include a Maintenance Bypass Switch. Please follow the procedures when installing or operating Maintenance Bypass Switch.

Symbols:

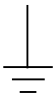
 Attention or consult accompanying documents

 Input

 Output

 Alternating Current

 Direct Current

 Ground

 Recycle

 Do not dispose with ordinary trash

Transportation

This UPS must be handled with care and given special attention due to the high amount of energy stored within its internal sealed, lead-acid batteries. Please retain the shipping container in the unlikely event the UPS needs to be returned for service. The container has been specifically designed to ship the UPS safely.

Storage

If the UPS is unused for an extended period, it must be stored in a moderate climate. The batteries should be charged for 12 hours every 3 months by connecting the UPS to the utility supply. Repeat this procedure every month if the ambient temperature is above 25°C (77°F). Failure to follow this procedure can reduce battery life.

Temperature:

- Storage Temperature Range: -10°C to 40°C (14°F to 104°F)

Operating Conditions

The UPS must be installed in a clean, temperature controlled, indoor environment, free from moisture, flammable gasses, fumes, corrosive substances and conductive contaminants.

Avoid direct sunlight.

Do not install the UPS in a flammable or otherwise hazardous environment.

Avoid vibration and areas subject to physical impact.

To prevent overheating, keep all ventilation openings free from obstruction. Keep the UPS rear panel at least 12 inches away from the wall or other obstructions.

Temperature:

- Operating Temperature Range: 0°C to 40°C (32°F to 104°F)

Humidity:

- 10% to 90% relative humidity, non-condensing

Altitude:

- 3280 ft (1000 m)

Introduction

Overview

The FN2 Series On-line UPS System provides the highest level of protection against severe power fluctuations. The FN2 Series UPS continually regenerates new, AC power in pure sine wave for superior protection.

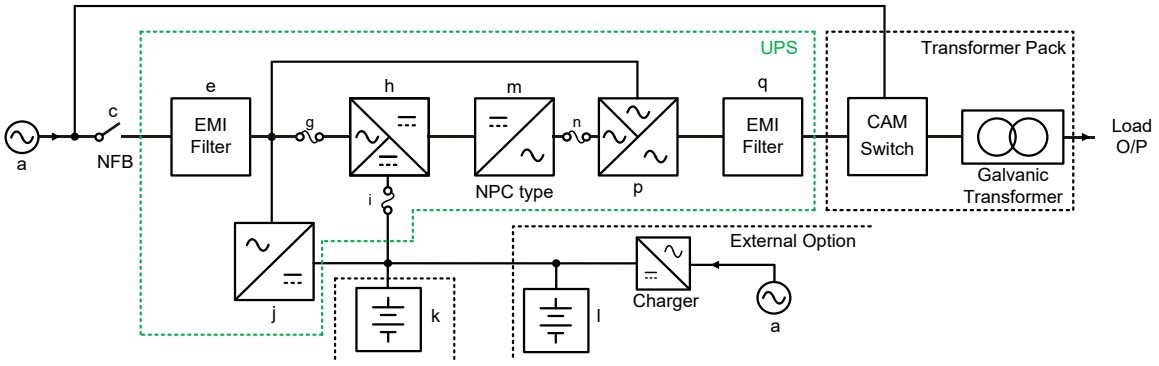
This user manual provides basic information about the Falcon FN2 Series Uninterruptible Power Supply (UPS). FN2 models are available in nominal power ratings of 4500, 6000, 8000 and 10000 volt-amperes (VA).

This manual also provides complete unit installation, safety considerations, important features, as well as detailed operation and configuration of this device.

UPS Features

- ✓ True on-line architecture continuously supplies your critical device with stable, regulated, transient-free, pure sine wave AC power.
- ✓ Precision Output Voltage & Frequency
- ✓ Unity Power Factor (VA = W)
- ✓ Parallel / N+1 Operation
- ✓ Superior Brownout, Surge & Transient Protection
- ✓ 20 kHz PWM sine wave topology yields excellent overall performance.
- ✓ The fully digitalized control circuitry built into the UPS allows upgrading the functionality of the UPS as well as reaching a high level of protection of the UPS. Powerful communication capability enhances remote control and monitoring.
- ✓ Optional Constant Frequency Mode. (Fixed 50Hz or 60Hz output frequency)
  *UPS De-rated to 75% capacity in Constant Frequency Mode
- ✓ Hot-Swappable Battery Packs

UPS Block Diagram



a. Utility Input: AC source to the UPS.

c. Utility Input Breaker: No-fuse Breaker (NFB) for UPS input over-current protection.

e. Input EMI Filter: Protects against electromagnetic interference from the utility input.

g. Input Fuse: Over-current protection for rectifier circuit.

h. Rectifier and DC Boost: The rectifier converts AC to DC and corrects input power factor. When utility power is abnormal, the DC boost will increase the DC voltage to acceptable level for the inverter.

i. Battery Fuse: Over-current protection for the batteries.

j. Charger: Two-stage, constant current / constant voltage charger for batteries.

k. External Battery: When utility power is abnormal, the internal batteries provide backup power.

l. External Battery Bank: To provide extended backup time by adding additional battery bank. External chargers can also be added.

m. Inverter: Neutral Point Clamped (NPC) type inverter converts DC to AC.

n. Inverter Output Fuse: Over-current protection for the UPS inverter output.

p. Auto Bypass Loop: When the UPS is overloaded or abnormal, the UPS will automatically switch the load to bypass power.

q. Output EMI Filter: Eliminates magnetic interference from the UPS output and protects from interference caused by the load.

Product Overview

Inspecting the Equipment

Visually inspect the packages for shipping damage. If the equipment has been damaged during shipment, and is signed for as received, make sure the receiver slip is noted with the detail of the damage exception. Keep the shipping cartons and packing materials for the carrier, and immediately file a claim for “shipping damage” with the carrier. If you discover damage after acceptance, file a claim for “concealed damage.”

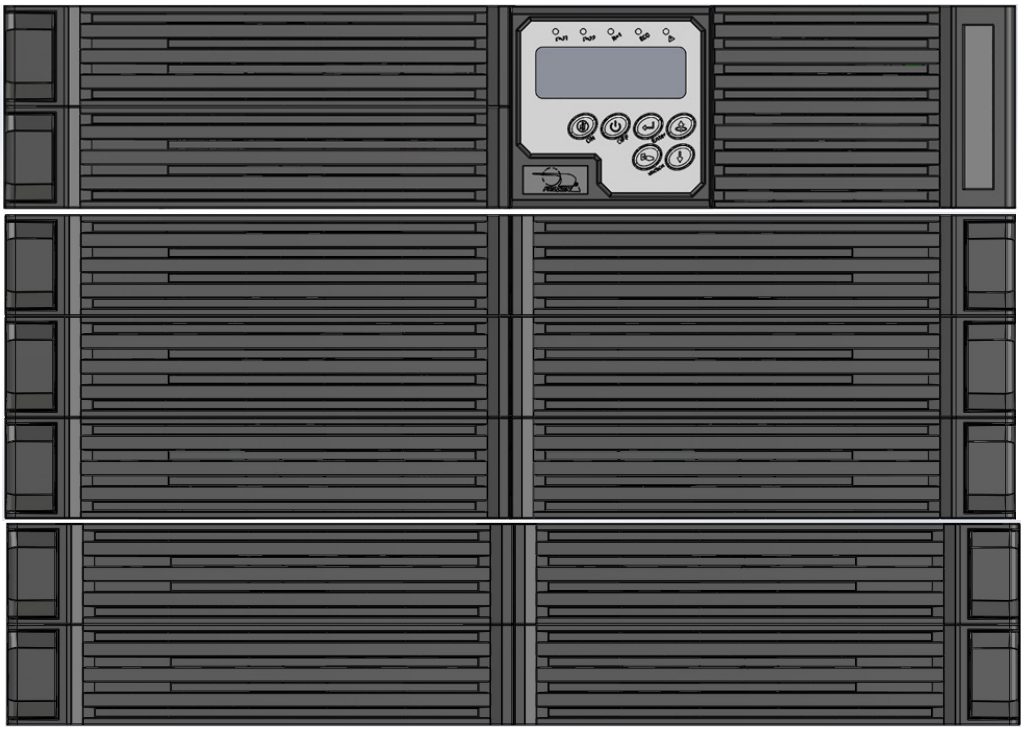
To file a claim for shipping damage or concealed damage:

- ❖ YOU MUST file with the carrier within 24 hours of receipt of the equipment;
- ❖ YOU MUST send a copy of the damage claim within 3 days to Falcon Electric, Inc.

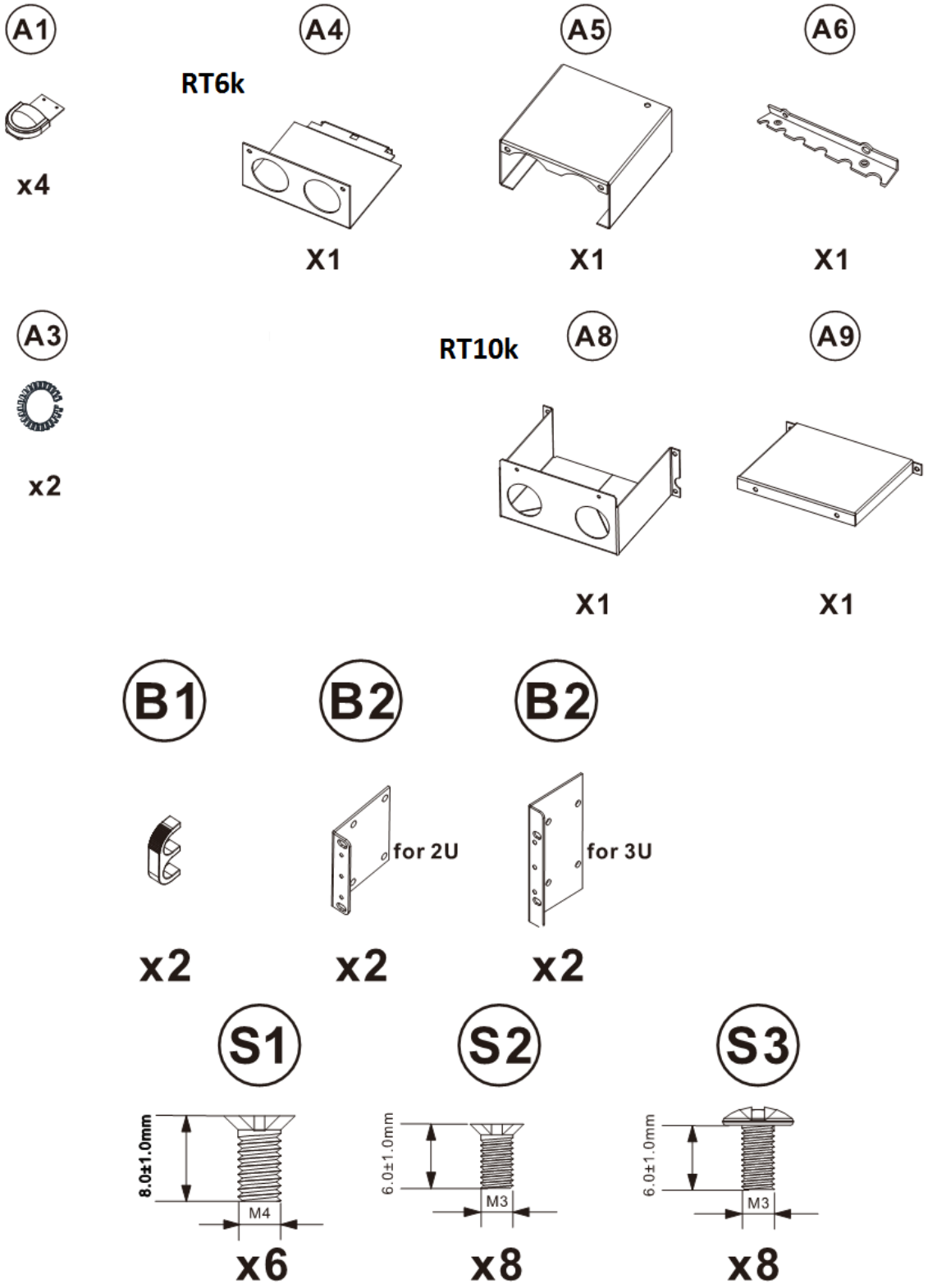
Box Contents

The UPS system is shipped complete with all accessories required for operation. A full listing of the box contents is provided below.

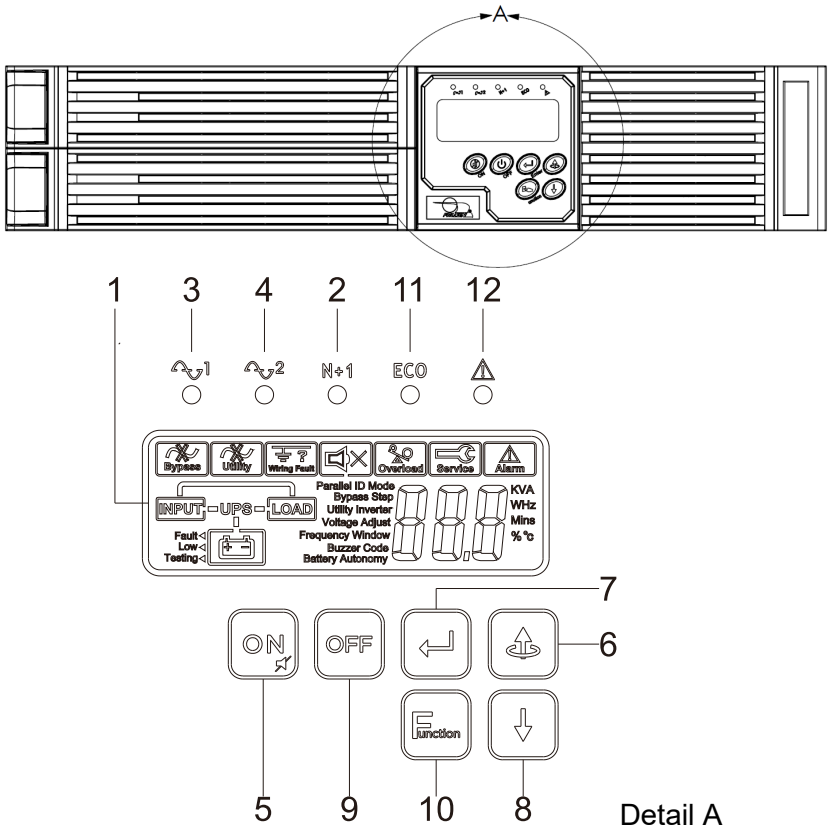
- **FN2 UPS Rackmount System (Uninterruptible Power Supply)**
  - **Inverter Module**
  - **Battery Module**
  - **Transformer Module**
- **Installation & User Manual**
- **Communication Software with USB Cable**
- **Accessories Kit**



Accessories Kit:



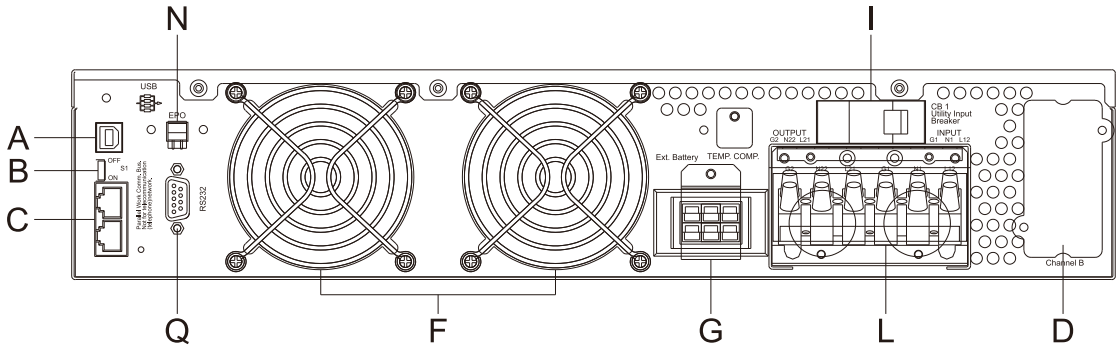
Front Panel



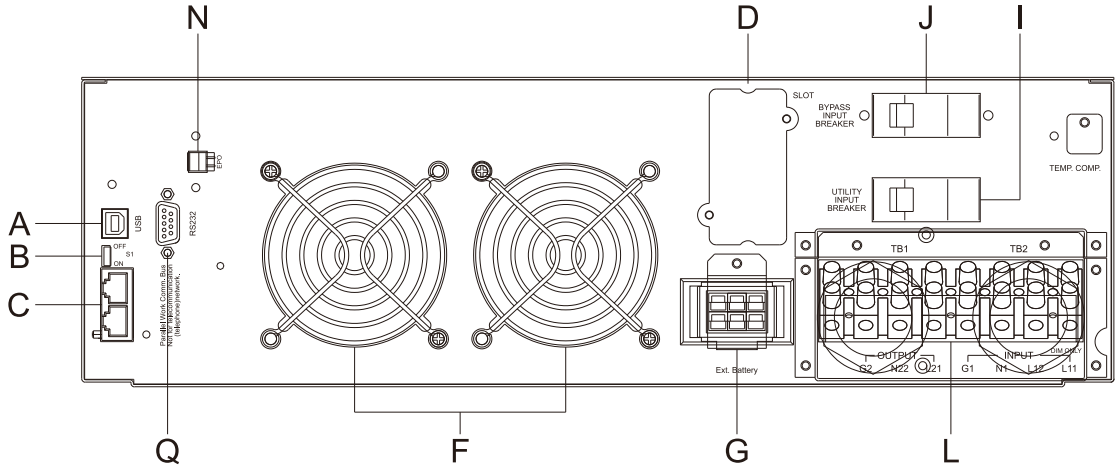
1. LCD Display
2. Green LED indicates N+1 operation is enabled.
3. Green LED indicates the utility input voltage is within the acceptable window. Flashing green LED indicates that the utility input voltage is outside the acceptable window.
4. Green LED indicates the bypass input is normal.
5. UPS On / Alarm Silence button
6. Previous Page / Change Setting button
7. Confirm button (Enter)
8. Next Page button
9. Off button
10. Special Functions button
11. Yellow LED indicates ECO Mode is active.
12. Red LED indicates UPS Alarm / Fault.

Rear Panel

4.5 to 6kVA Rackmount



8 to 10kVA Rackmount



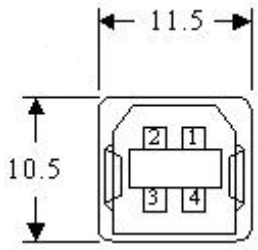
A USB Port
B Terminal Resistor for parallel function
C CAN Bus Connection port for parallel function
D Communication Option Slot 1
F Cooling Fan
G External Battery Connector
I Utility Input Breaker (CB1)
J Bypass Input Breaker (CB2, Dual input model only)
N E.P.O. (Emergency Power Off) : Normally Open Contact (Default)
Q RS232 Port

Communication Port

The communication port on the UPS provides USB communication with the UPS software to remotely monitor the power and UPS status.

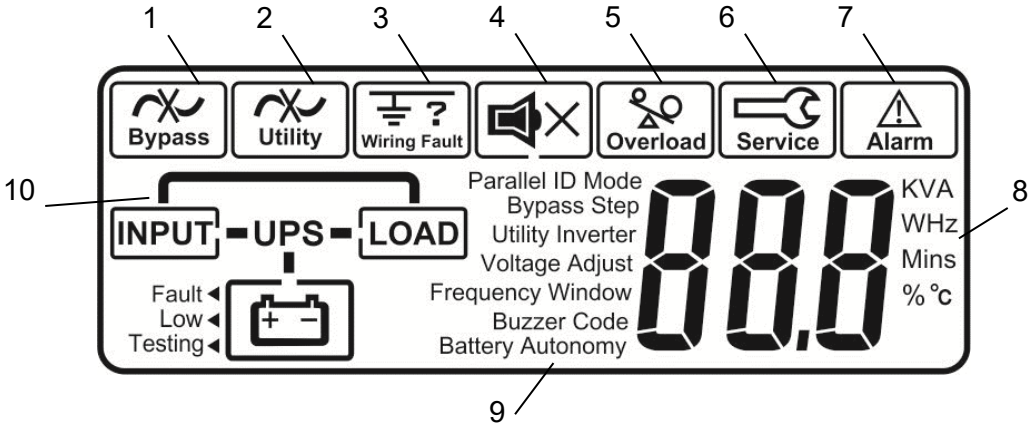
The software bundled with the UPS is compatible with many operating systems such as Windows 2000, XP, Server 2003, VISTA, Server 2008, Windows 7 and Windows 10. For other applications such as Novell NetWare, Unix, or Linux, please contact Falcon.

USB Port
Complies with USB version 1.0,1.5 Mbps
Complies with USB HID version 1.0



1 → VCC (+5V)
2 → D－
3 → D＋
4 → Ground

LCD Display Icons



#	Icon	Description
1	Bypass	Bypass input abnormal / UPS fails to transfer to bypass / Bypass abnormal at ECO mode
2	Utility	Utility input abnormal
3	Wiring Fault	Not Used
4		Alarm Silent
5	Overload	UPS Output overload
6	Service	Not Used
7	Alarm	UPS Alarm
8	88.8 KVA WHz Mins % ℃	3-Digit Measurement
8a	EPO	Emergency Power Off
8b	OFF	UPS Inverter Off
8c	INPUT + OFF	UPS Abnormal Lock
9	Parallel ID Mode Bypass Step Utility Inverter Voltage Adjust Frequency Window Buzzer Code Battery Autonomy	3-Digit Measurement Selection Identification
10	INPUT UPS LOAD Fault Low Testing	UPS Operation Flow Chart

Getting Started

Installation

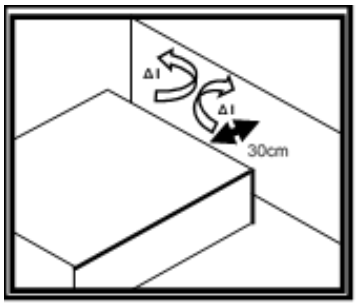
This UPS must be installed in a clean environment, free from moisture, liquids, flammable gases or fumes and corrosive substances. Operate the UPS in an indoor environment within the temperature range of 0ºC to 40ºC (32ºF to 104ºF) To maximize battery life, a temperature range of 20ºC to 25ºC (68ºF to 77ºF) is ideal.

This UPS is designed for use with industrial, scientific or data processing class equipment. (PCs, workstations, servers etc.)

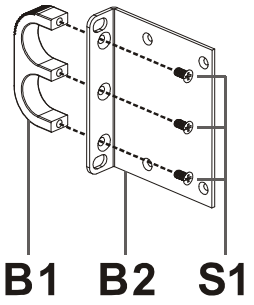
The system air flow is from front to rear.

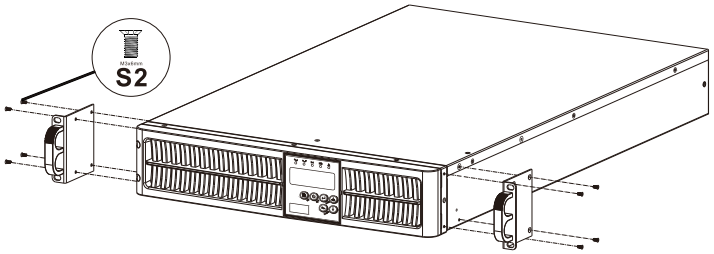
Please follow these instructions:

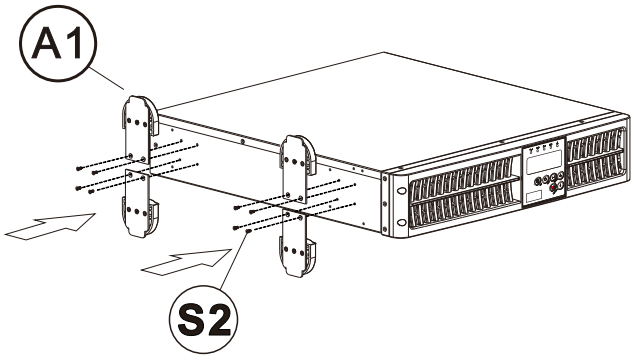
1. Keep at least 12 inches (30.5cm) clearance from the rear panel of the UPS to the wall.
2. Do not block the air flow to the ventilation openings of the unit.
3. Ensure that the installation site is clear and allows enough workspace to access UPS.

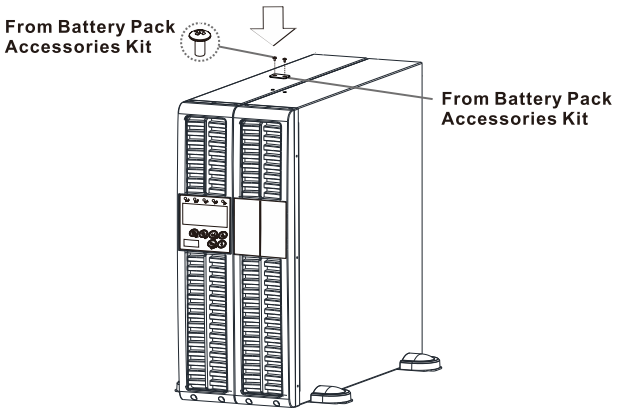


Accessory Installation



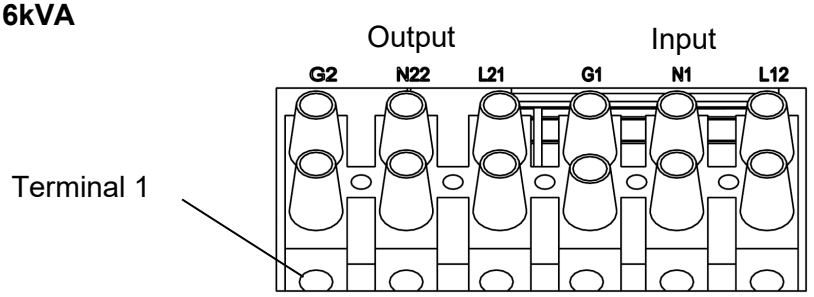






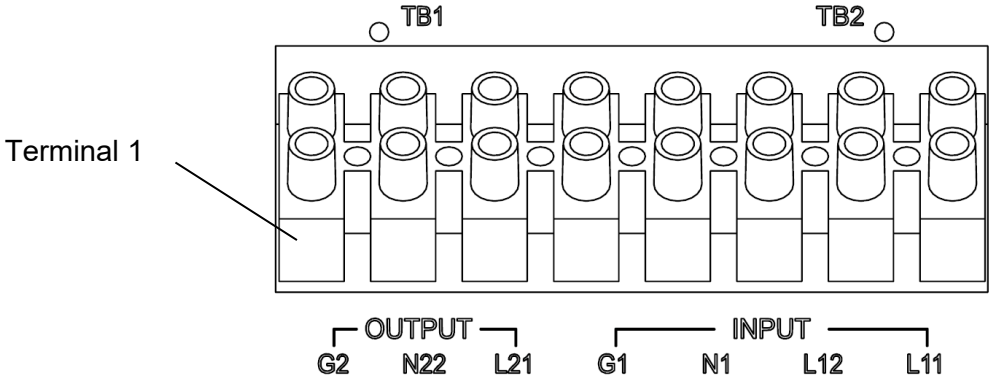
Inverter Module Terminal Block

4.5 to 6kVA



Output / Input Configuration Table					
Terminal 1	Terminal 2	Terminal 3	Terminal 4	Terminal 5	Terminal 6
G2	N22	L21	G1	N1	L12
Utility Ground	L2 (N)	L1 (L)	Utility Ground	Utility Neutral (L2)	Utility Line (L1)

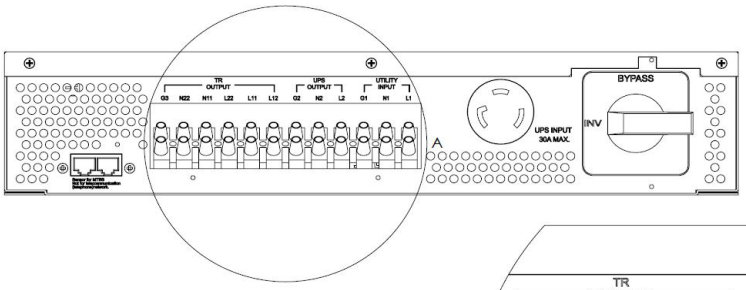
8 to 10kVA



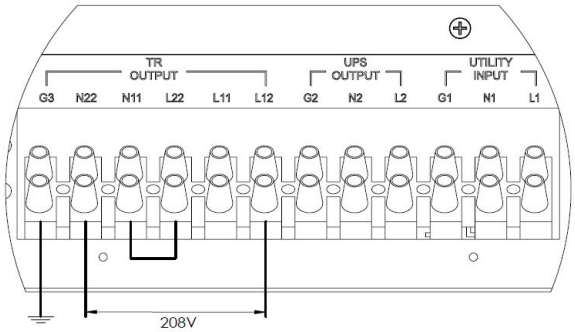
Output / Input Configuration Table							
Terminal 1	Terminal 2	Terminal 3	Terminal 4	Terminal 5	Terminal 6	Terminal 7	Terminal 8
G2	N22	L21		G1	N1	L12	L11
Utility Ground	N (L2)	L (L1)	-	Utility Ground	Utility Neutral (L2)	Utility Line (L1)	Jumper to L12

Transformer Output Terminal Block

4.5 to 6kVA
208V Output

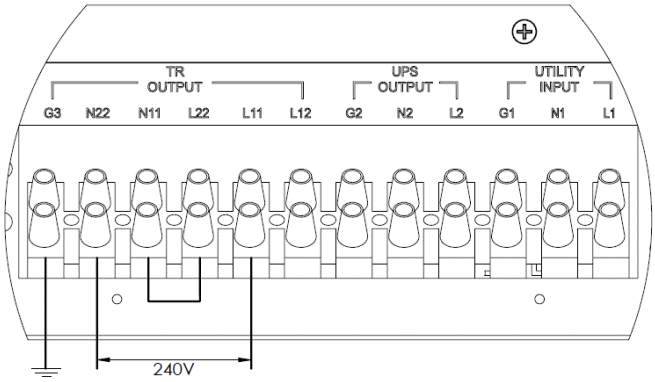


Transformer module shown for illustration purposes only. Rear panel layout varies by model.



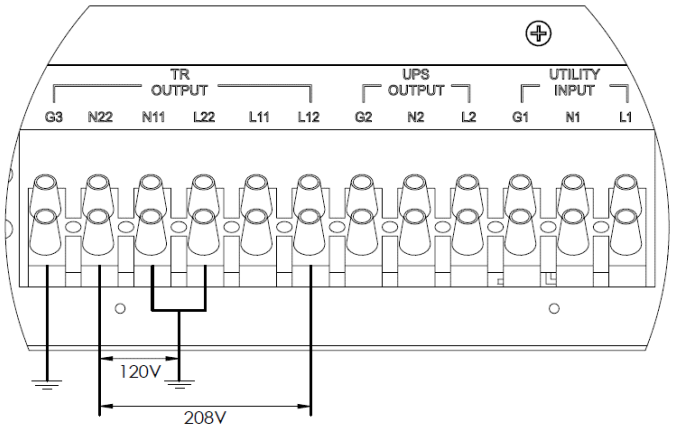
Output Configuration Table (208V)					
Terminal 1	Terminal 2	Terminal 3	Terminal 4	Terminal 5	Terminal 6
G3	N22	N11	L22	L11	L12
Ground	0V	0V	120V	120V	88V
	N (L2)	Jumper N11 to L22		Not Used	L (L1)

240V Output



Output Configuration Table (240V)					
Terminal 1	Terminal 2	Terminal 3	Terminal 4	Terminal 5	Terminal 6
G3	N22	N11	L22	L11	L12
Ground	0V	0V	120V	120V	88V
	N (L2)	Jumper N11 to L22		L (L1)	Not Used

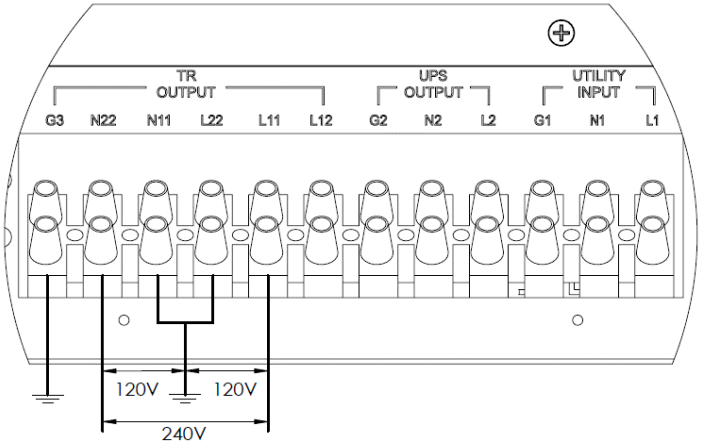
208V / 120V Output



Output Configuration Table (208V / 120V)					
Terminal 1	Terminal 2	Terminal 3	Terminal 4	Terminal 5	Terminal 6
G3	N22	N11	L22	L11	L12
Ground Jumper to N11	0V	0V	120V	120V	88V
	(L2)	Jumper N11, L22 & G3 Neutral		Not Used	(L1)

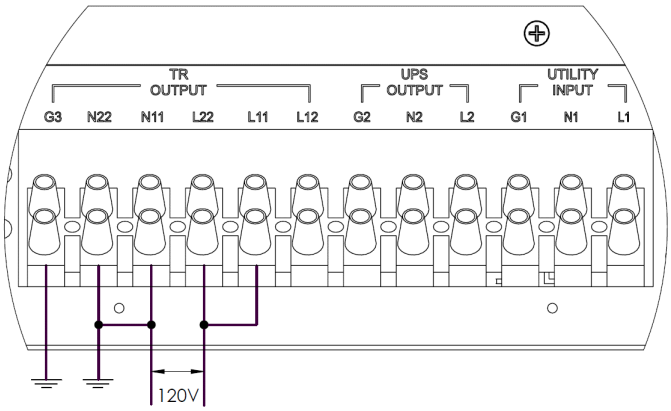
***The 120Vac output must not be loaded more than 50% of maximum rated UPS output capacity.**

240V / 120V Output



Output Configuration Table (240V / 120V)					
Terminal 1	Terminal 2	Terminal 3	Terminal 4	Terminal 5	Terminal 6
G3	N22	N11	L22	L11	L12
Ground Jumper to N11	0V	0V	120V	120V	88V
	N (L2)	Jumper N11, L22 & G3 Neutral		L (L1)	Not Used

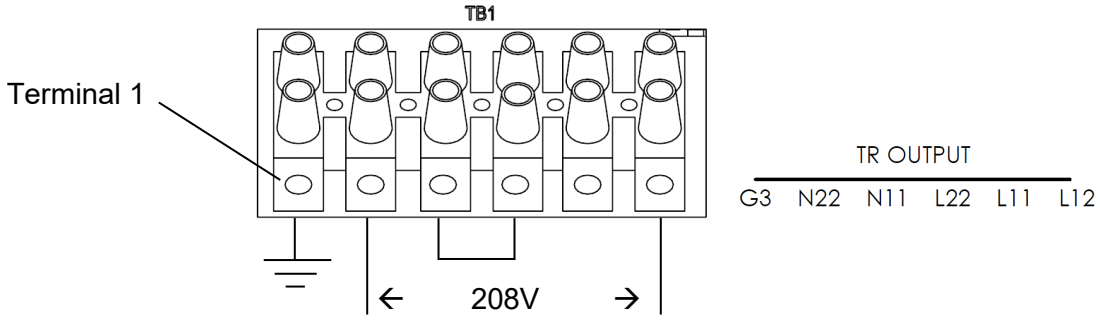
120V Output



Output Configuration Table (120V)					
Terminal 1	Terminal 2	Terminal 3	Terminal 4	Terminal 5	Terminal 6
G3	N22	N11	L22	L11	L12
Ground Jumper to N22	0V	0V	120V	120V	88V
	Jumper to N11 & Ground	Jumper to N22 (N)	Jumper to L11 (L)	Jumper to L22	Not Used

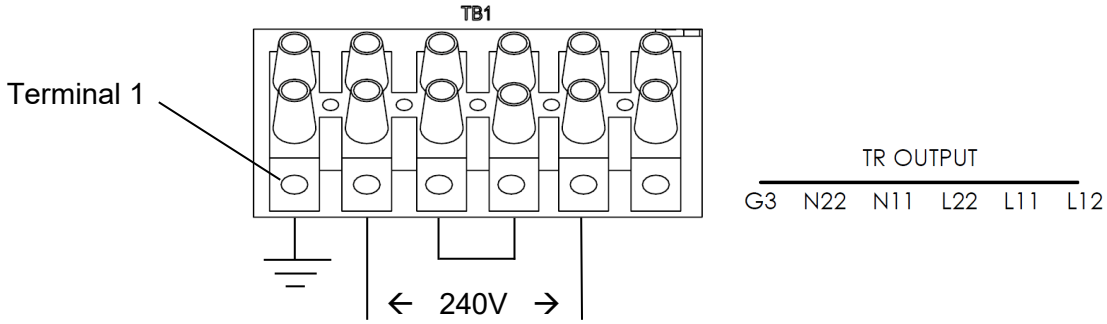
8 to 10kVA

208V Output



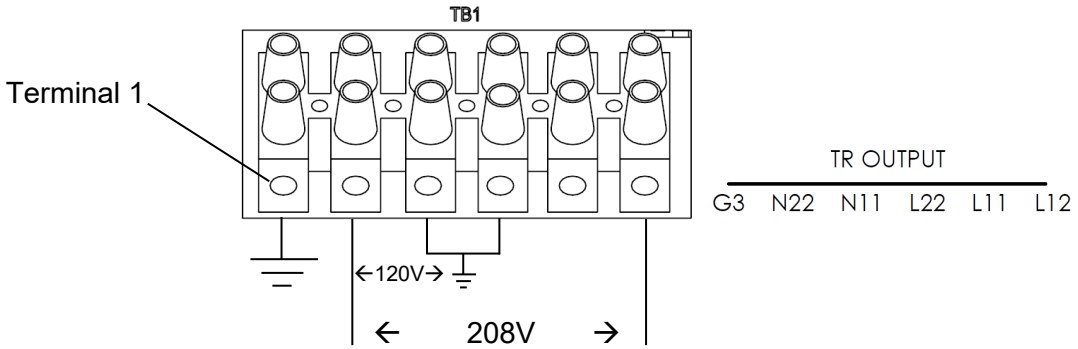
Output Configuration Table (208V)					
Terminal 1	Terminal 2	Terminal 3	Terminal 4	Terminal 5	Terminal 6
G3	N22	N11	L22	L11	L12
Ground	0V	0V	120V	120V	88V
	N (L2)	Jumper N11 to L22		Not Used	L (L1)

240V Output



Output Configuration Table (240V)					
Terminal 1	Terminal 2	Terminal 3	Terminal 4	Terminal 5	Terminal 6
G3	N22	N11	L22	L11	L12
Ground	0V	0V	120V	120V	88V
	N (L2)	Jumper N11 to L22		L (L1)	Not Used

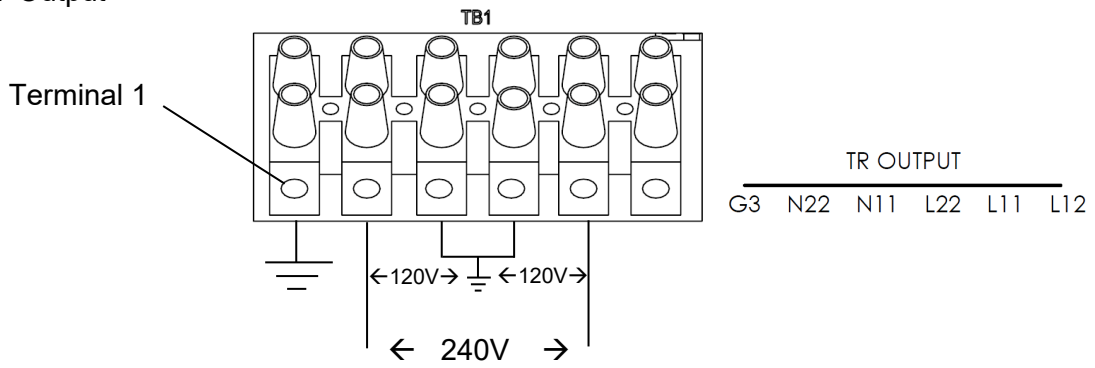
208V / 120V Output



Output Configuration Table (208V / 120V)					
Terminal 1	Terminal 2	Terminal 3	Terminal 4	Terminal 5	Terminal 6
G3	N22	N11	L22	L11	L12
Ground Jumper to N11	0V	0V	120V	120V	88V
	N (L2)	Jumper N11, L22 & G3 Neutral		Not Used	L (L1)

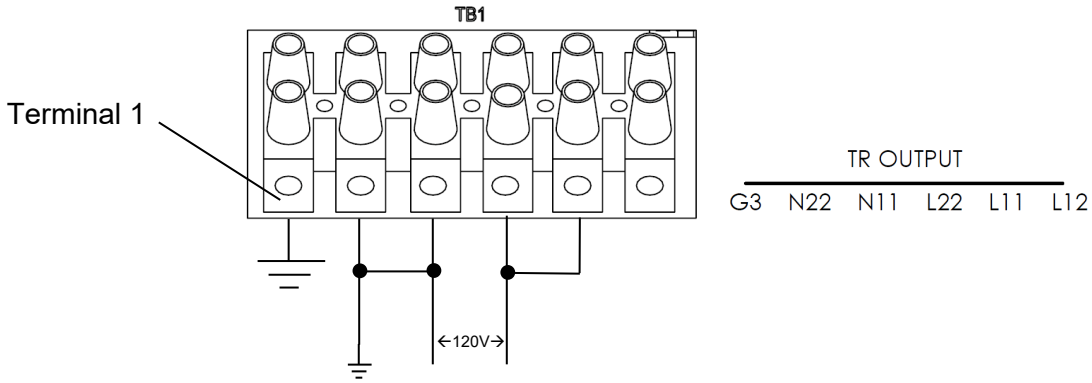
***The 120Vac output must not be loaded more than 50% of maximum rated UPS output capacity.**

240V / 120V Output



Output Configuration Table (240V / 120V)					
Terminal 1	Terminal 2	Terminal 3	Terminal 4	Terminal 5	Terminal 6
G3	N22	N11	L22	L11	L12
Ground Jumper to N11	0V	0V	120V	120V	88V
	N (L2)	Jumper N11, L22 & G3 Neutral		L (L1)	Not Used

120V



Output Configuration Table (120V)					
Terminal 1	Terminal 2	Terminal 3	Terminal 4	Terminal 5	Terminal 6
G3	N22	N11	L22	L11	L12
Ground Jumper to N22	0V	0V	120V	120V	88V
	Jumper to N11 & Ground	Jumper to N22 (N)	Jumper to L11 (L)	Jumper to L22	Not Used

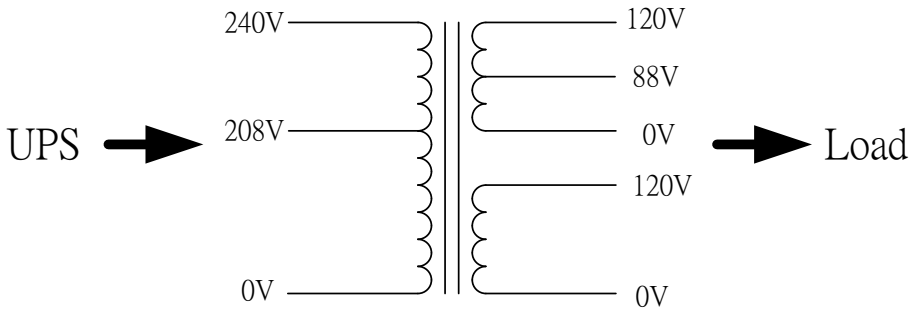
Notes:

- The maximum current for each terminal is 36 Amps RMS for 4.5 to 6kVA, 65 Amps RMS for 8 to 10kVA.
- For 120Vac output only application, output terminal N22 must use AWG #8 wire connected to ground. (Neutral Bonding)

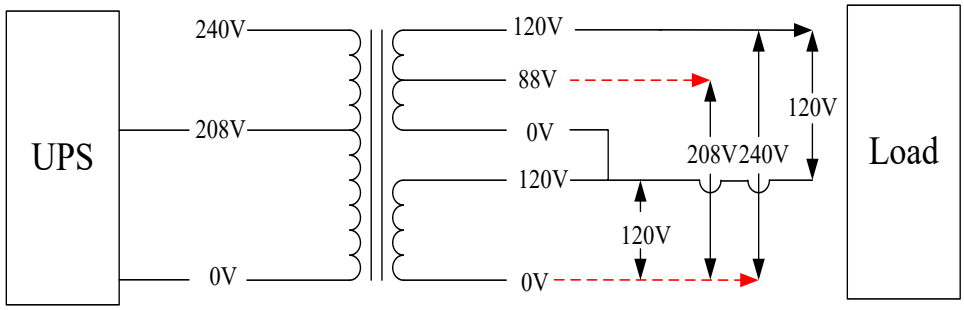
AC Input / Output Current and Wire Recommendation

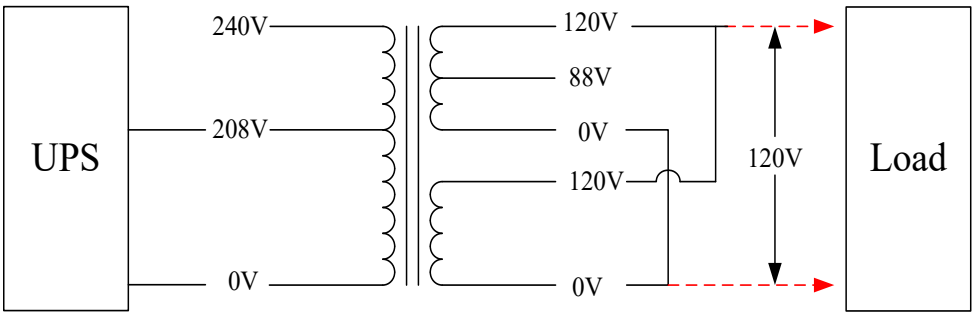
Model	Maximum Current	Conductor Selection
4.5kVA	30A (Input) 30A (Output)	Input: Use #10 AWG, 90°C copper wire, TRQ: 12 IN LB Output: Use #10 AWG, 75°C copper wire, TRQ: 12 IN LB
6kVA	36 A (Input) 36A (Output)	Input: Use #8 AWG, 90°C copper wire, TRQ: 12 IN LB Output: Use #8 AWG, 75°C copper wire, TRQ: 12 IN LB
8kVA	52A (Input) 40A (Output)	Input: Use #6 AWG, 90°C copper wire, TRQ: 18 IN LB Output: Use #8 AWG, 90°C copper wire, TRQ: 10 IN LB
10kVA	62A (Input) 50A (Output)	Input: Use #4 AWG, 90°C copper wire, TRQ: 18 IN LB Output: Use #6 AWG, 90°C copper wire, TRQ: 10 IN LB

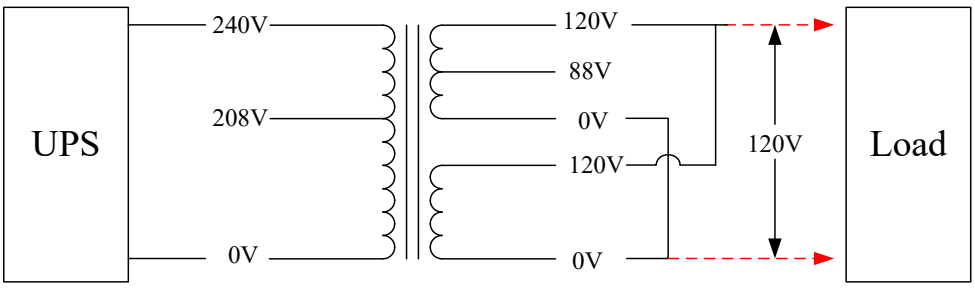
Transformer Schematic



Transformer Configurations

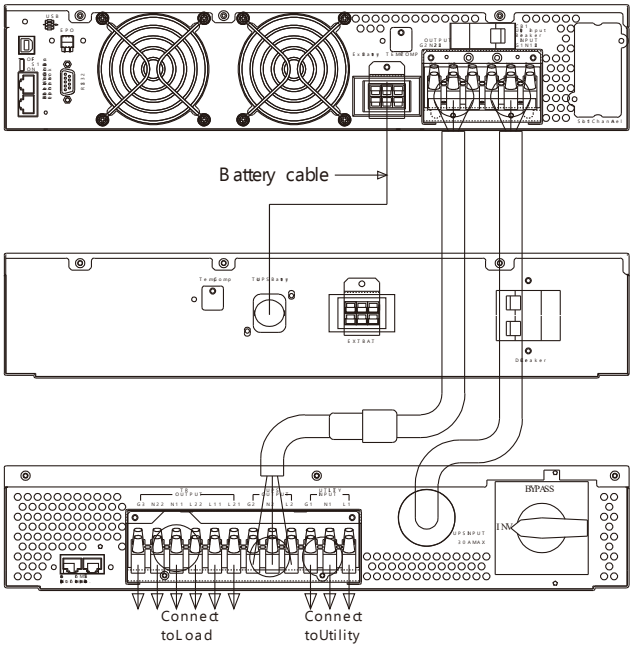




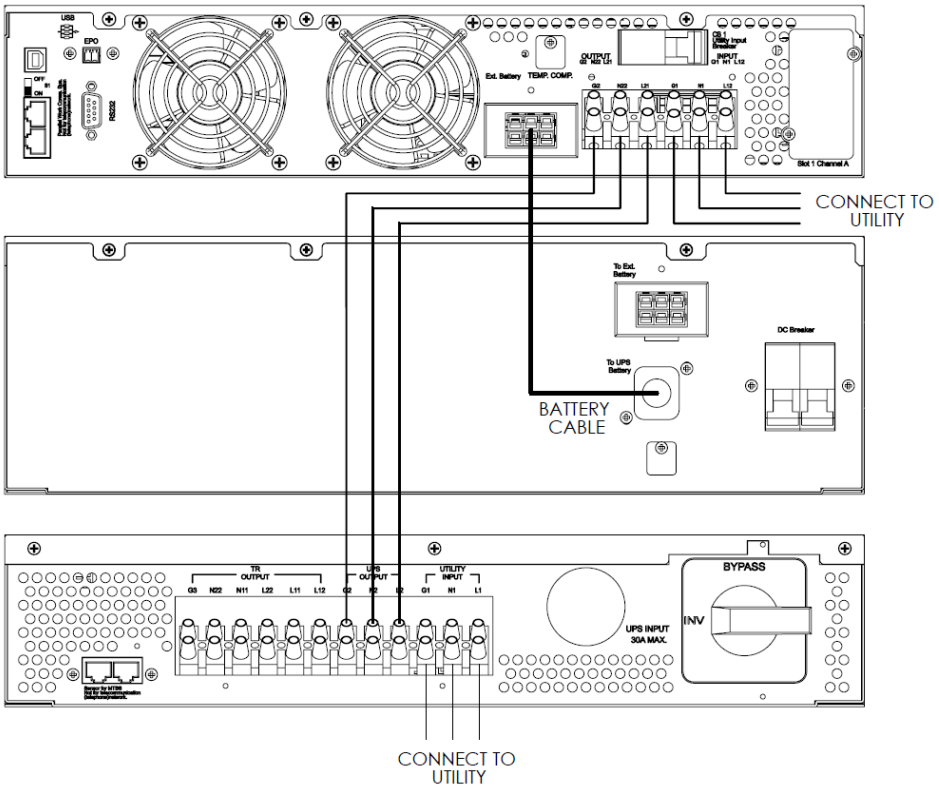


System Wiring Diagrams

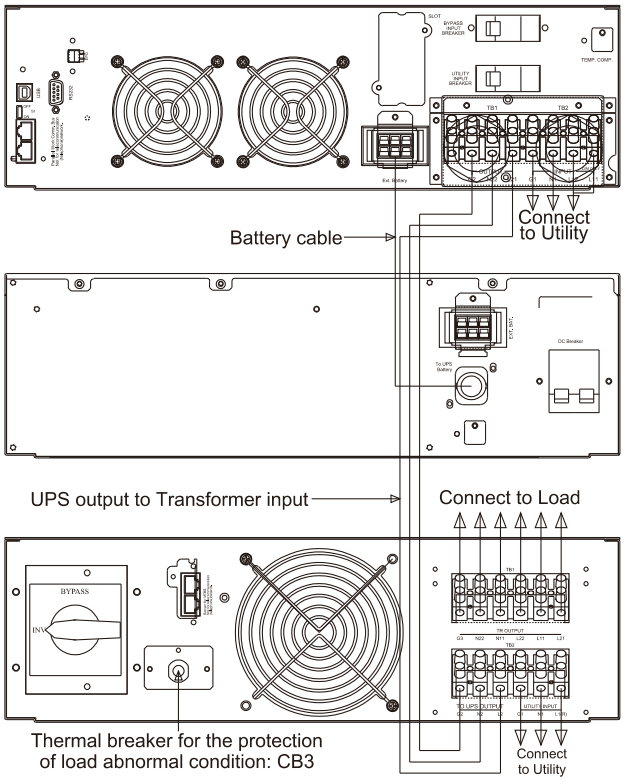
4.5kVA System with Transformer Module



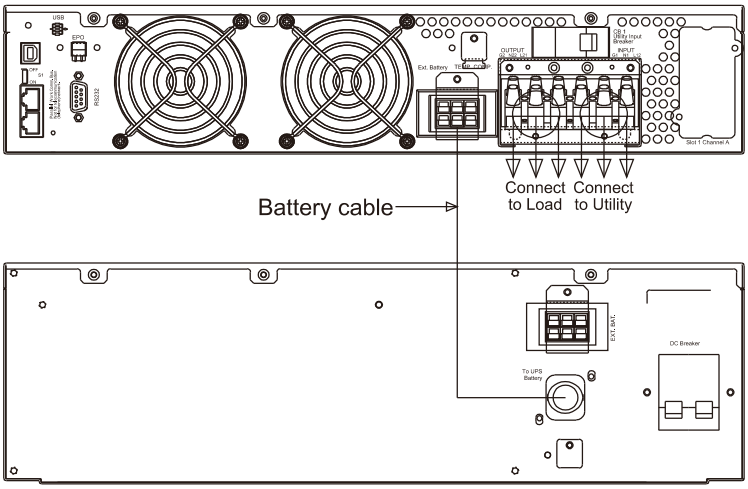
6kVA System with Transformer Module



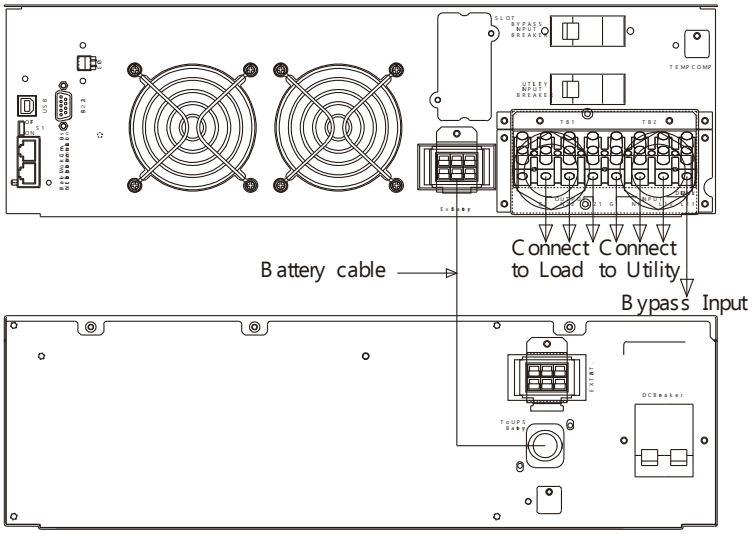
8 to 10kVA System with Transformer Module



4.5 to 6kVA System without Transformer Module



8 to 10kVA System without Transformer Module



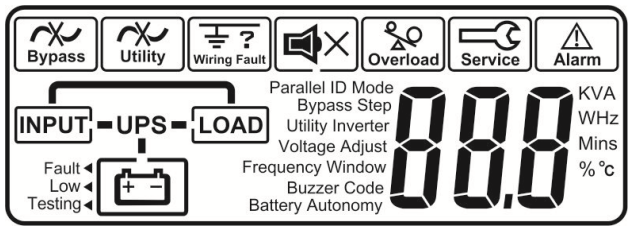
Start-up Procedure

AC Start

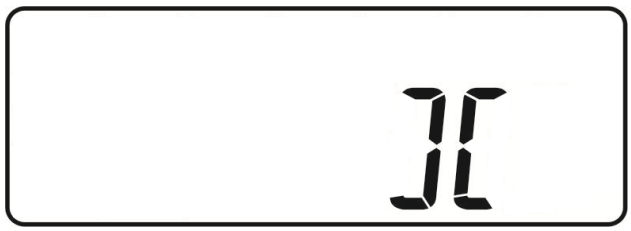
1. Verify input terminals are wired properly for 208V or 240V Utility Input Power.
   a. Verify all grounds are wired properly.

2. Turn on the input circuit breaker to start up the UPS. Green LEDs J1 and J2 show that the Utility and Bypass inputs are normal. UPSs with parallel function enabled will display figure A1, then figure A2, and then figure B. Otherwise, the LCD will display figure A1 directly followed by figure B.

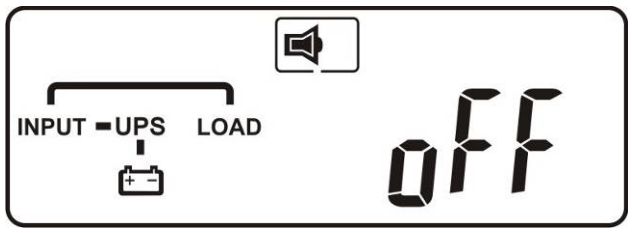
A1



A2

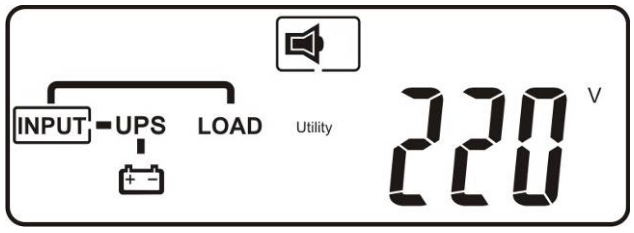


B



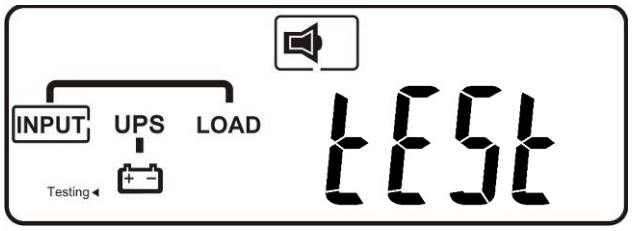
3. The UPS is now in Bypass Mode. It will proceed to self-test automatically. If no abnormal message appears then the pre-startup of the UPS was successful, and the charger starts to charge the batteries.
4. Press the UPS On button ⏻ for approximately three seconds. The buzzer sounds twice and the LCD display changes from figure B to figure C.

C

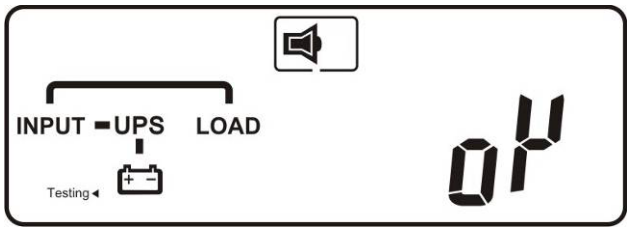


5. The UPS is in self-test mode. The LCD display will change from figure C to figure D, and the UPS will remain in battery mode for approximately four seconds. Then the display will change from figure E1 to figure F if the self-test was successful.

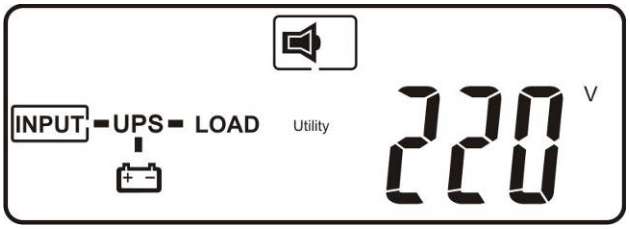
D



E1

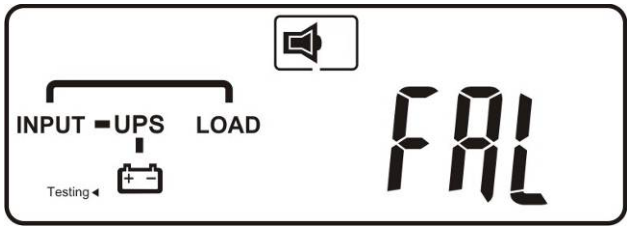


F



6. If the self-test fails, the LCD display will change from figure D to figure E2, then an error code or error status will appear on the screen.

E2

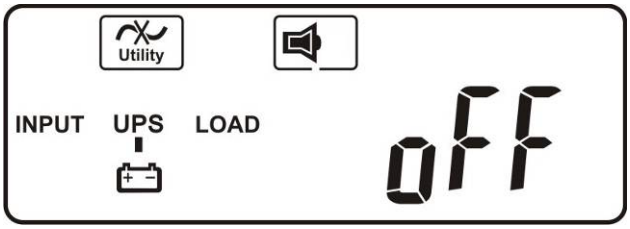


7. Start-up operation of the UPS is now complete. Allow a minimum of 8 hours for the UPS to charge the internal batteries before powering a load.

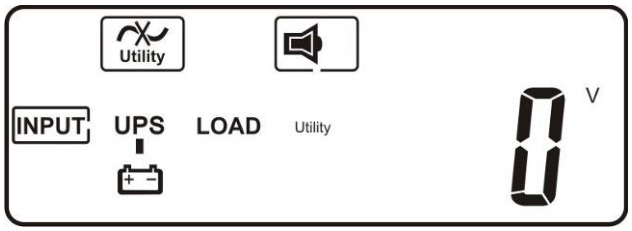
Battery Mode Start-up (Cold Start)

1. Press the UPS On button once for approximately 5 seconds to turn on the UPS. The buzzer will sound twice. The LCD display will change from figure A to figure G for approximately 15 seconds.
    a. Press the UPS On button again for about three seconds until the LCD display changes from figure G to figure H. The UPS will be in self-test mode. The UPS output will turn on in approximately one minute and the LCD displays figure I. In case of failure of cold start procedure, the UPS will automatically turn off. You must then repeat step 1.

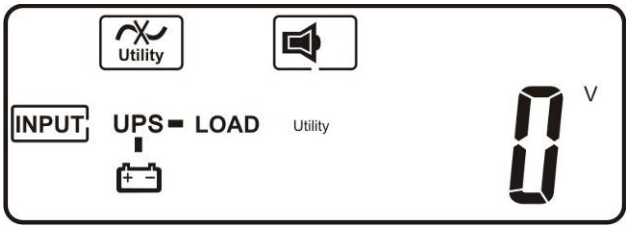
G



H



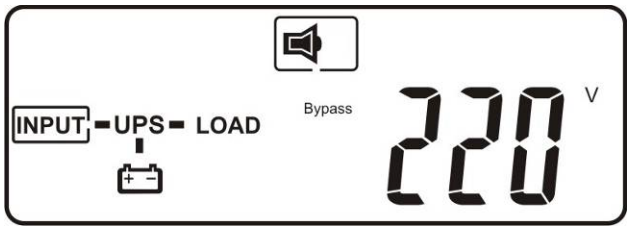
I



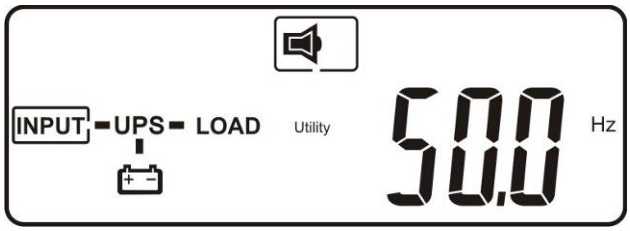
2. Check measured values and figures detected by the UPS.

    a. If you would like to check the measured values and figures detected by the UPS use the Next Page and Previous Page buttons. When you scroll down the LCD will display figure C (Voltage from Utility Input) → figure I1 (Voltage from Bypass Input) → figure J (Frequency from Utility Input) → figure K (Frequency from Bypass Input) → figure L (UPS Output Voltage) → figure M (UPS Output Frequency) → figure N (UPS Output Load %) → figure O (Inverter Current, Amps) → figure O1 (UPS Battery Voltage)→ figure P (UPS Internal Temperature) →figure O2 (UPS Battery Quantity).

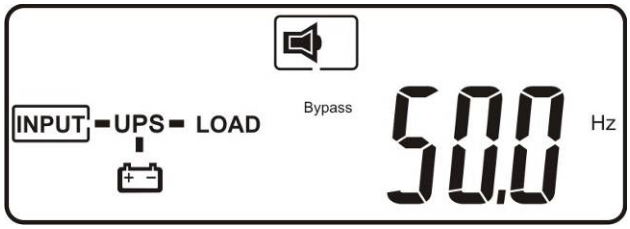
I1


INPUT
UPS
LOAD
Bypass
220
V

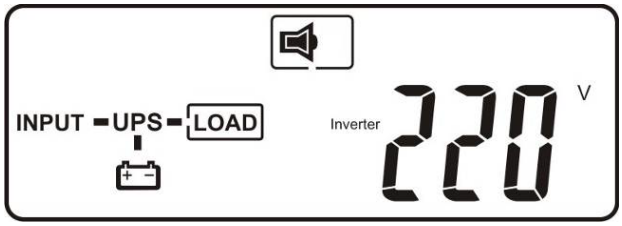
J


INPUT
UPS
LOAD
Utility
50.0
Hz

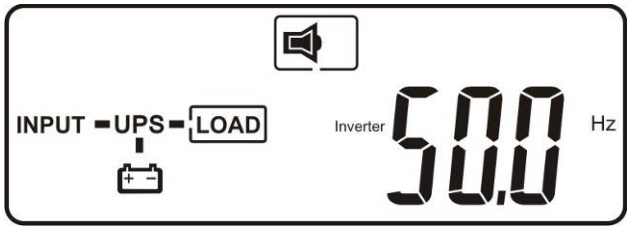
K


INPUT
UPS
LOAD
Bypass
50.0
Hz

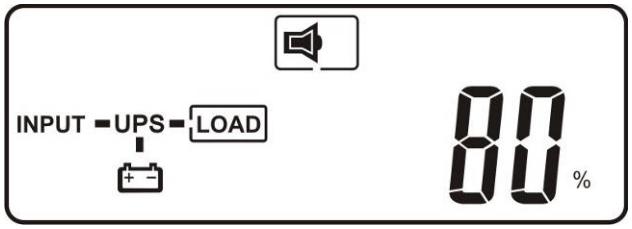
L


INPUT
UPS
LOAD
Inverter
220
V

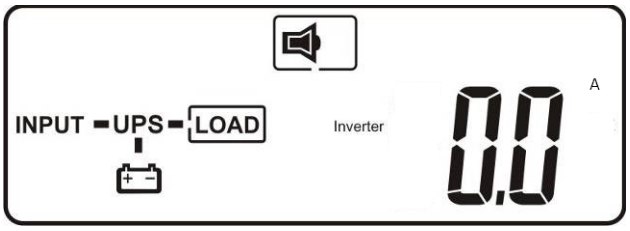
M


INPUT
UPS
LOAD
Inverter
50.0
Hz

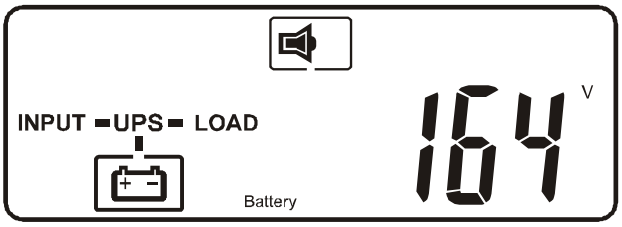
N


INPUT
UPS
LOAD
80
%

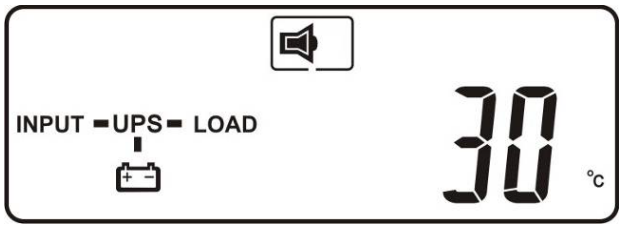
O


INPUT
UPS
LOAD
Inverter
0.0
A

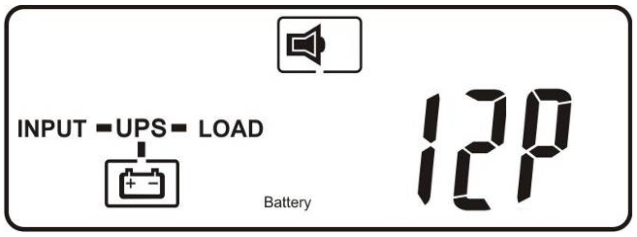
O1


INPUT
UPS
LOAD
Battery
164
V

P


INPUT
UPS
LOAD
30
°C

O2

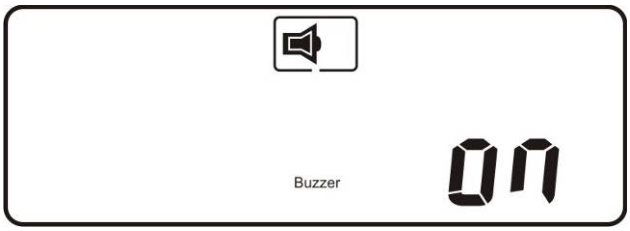

INPUT
UPS
LOAD
Battery
12P

UPS Settings and Functions

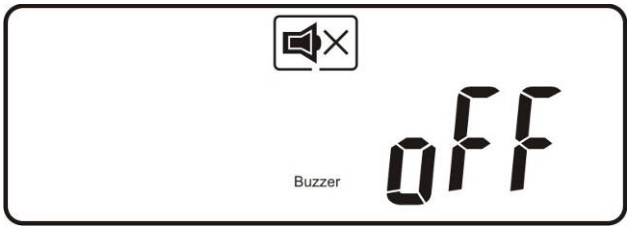
Settings:

1. Verify that the UPS is operating normally. Press the Function button to change the LCD display to figure Q1.

Q1

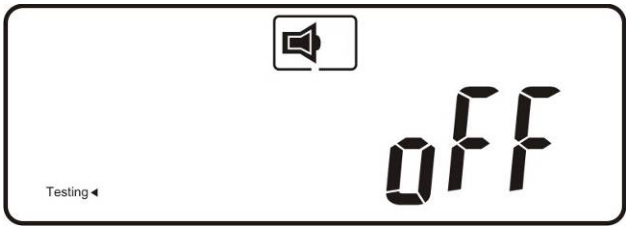


Q2

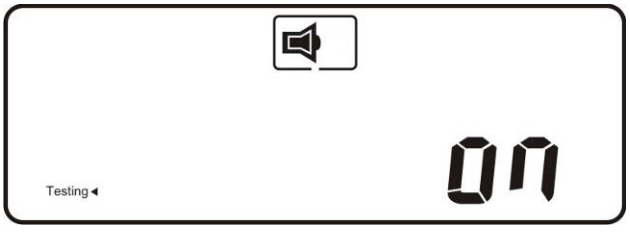


2. Press the Next Page button to scroll through the UPS settings. The LCD will display in sequence figure Q1 (buzzer) → figure R1 (Self-test) → figure S1 (Bypass Voltage Windows) → figure T (Output Frequency Synchronization Window) → figure U (Inverter Output Voltage) → figure V1 (UPS Operation Mode) → figure W (Output Voltage Micro Tune Value) → figure X (UPS Id) → figure Y (Parallel function status) → figure Z (Battery cabinet/capacity setting).

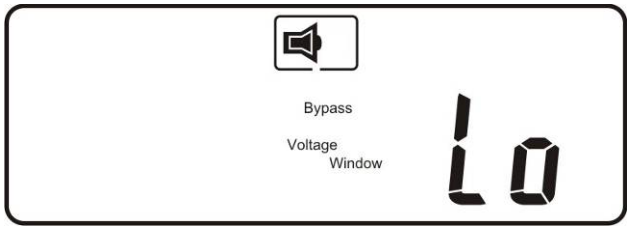
R1



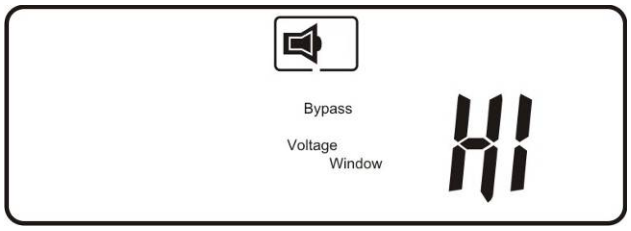
R2



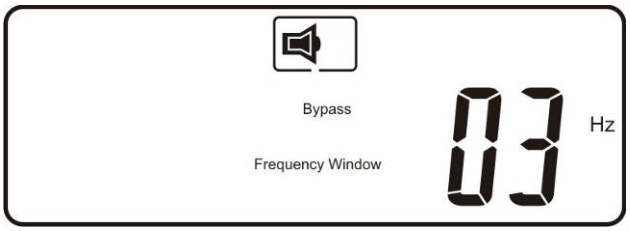
S1



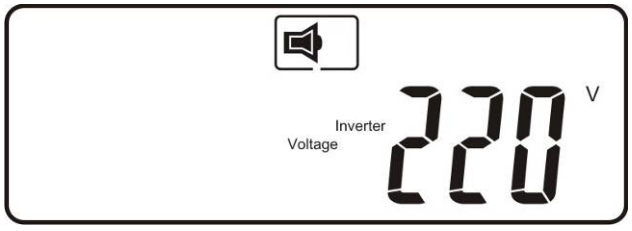
S2


Bypass
Voltage
Window
HI

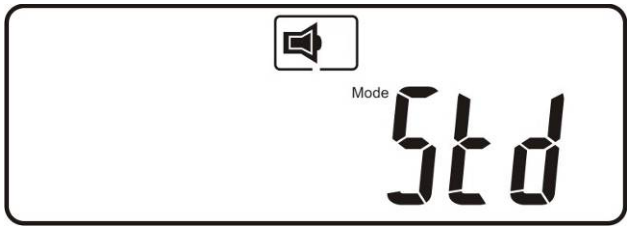
T


Bypass
Frequency Window
03
Hz

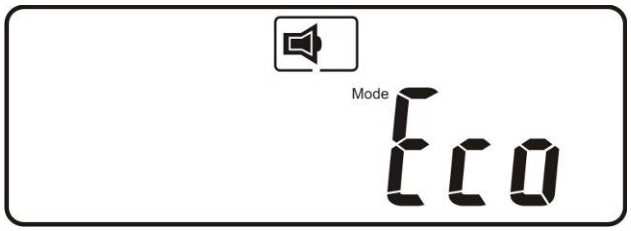
U


Inverter
Voltage
220
V

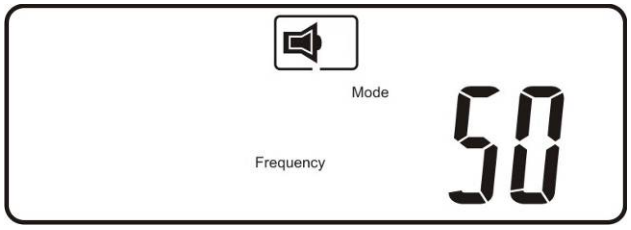
V1


Mode
Std

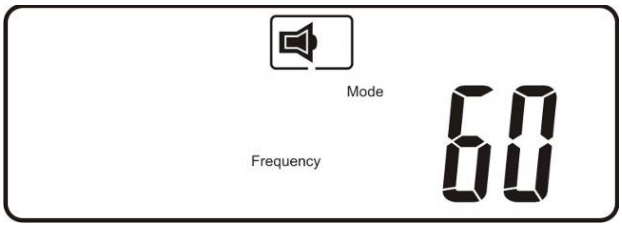
V2


Mode
Eco

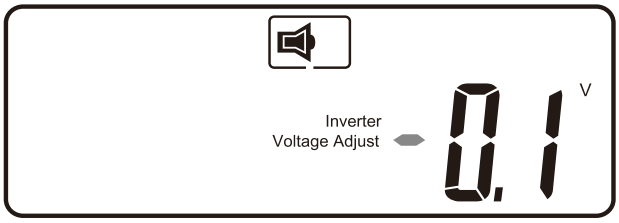
V3


Mode
Frequency
50

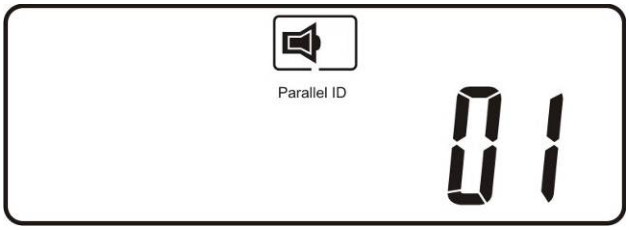
V4



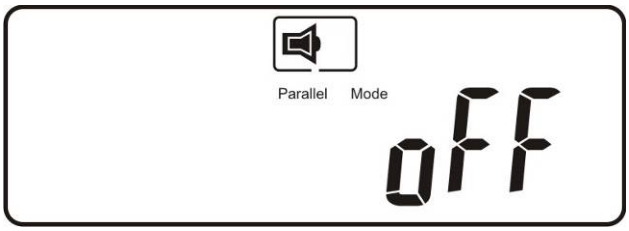
W



X



Y



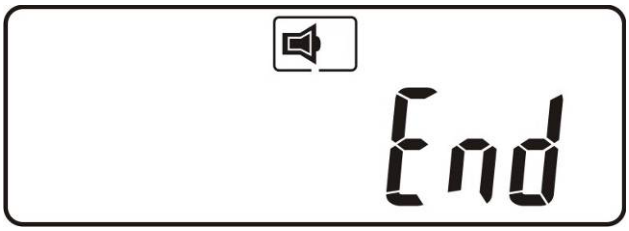
3. Press the Previous Page button to execute special functions. The functions include buzzer ON (as in figure Q1), buzzer OFF (as in figure Q2, Alarm silence for UPS Warning), and self-test OFF (as in figure R1) or self-test ON (as in figure R2). The UPS will execute the battery test for ten seconds. If the self-test is successful it will display figure E1; otherwise, it will display figure E2 and an error message at the same time.

Functions

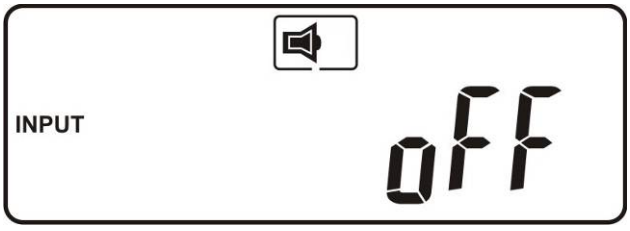
4. Make sure the UPS is in Bypass Mode. Press the On and Next Page buttons simultaneously for approximately three seconds. The buzzer will sound twice, and the LCD will display figure Q1, indicating that the UPS is in setting mode.
5. To scroll through the options, refer to step 2. Except for Buzzer (figures Q1 and Q2) and Self-test (figures R1 and R2), all the other default settings may be changed by pressing the Previous Page button.
    a. Figures S1 and S2 indicate the bypass input acceptable window.
    b. Figure T indicates the bypass frequency window of the Inverter Output. The acceptable setting values are ±3 Hz and ±1 Hz.
    c. Figure U indicates the acceptable Inverter Output Voltage. Possible values are 200, 208, 220, 230, or 240 VAC.

d. Figures V1, V2, V3 and V4 indicate the operation modes of the UPS. Possible values are Std (Online), Eco (Economical) mode, Constant 50Hz Output and Constant 60Hz Output.
e. Figure W indicates the fine tune range of inverter voltage which can be set from -6V to +6V of rating voltage. (The minimum adjustable scale is 0.1V).
f. Figure X indicates the position of the UPS when the UPS is in Parallel mode. Possible positions are 1, 2, 3, and 4. The position must be 1 if the UPS is not in Parallel mode.
g. Figure Y indicates the parallel function status. “OFF” and “ON” separately indicate disabled and enabled.
h. Figure Z indicates the last page of settable parameters.
i. After changing settings, you must press the Enter ↵ key to save all your changes and exit the setting mode. Then the LCD will display figure AA, figure A1, then figure A2, and then figure B.

Z



AA



j. Turn Off the Utility Input breaker and restart UPS.
k. Your setting changes are now complete.

10-Second Battery Test

6. Verify the UPS is on and operating in Online Mode.
a. Press the Function button.
b. Press the Next Page button.
c. Press the Previous Page button.
d. The UPS will conduct a 10-second battery test, if passed, LCD will display figure E1. If the batteries are dead, the test will fail, and LCD will display figure E2 along with battery error code and alarm. This typically indicates the batteries must be replaced.

Bypass Mode

7. Verify the UPS is on and operating in Online Mode.
    a. Press the Off Button for approximately 5 seconds, UPS will emit 2 beeps.
    b. UPS is in Bypass Mode
        i. Display will indicate as shown in Figure B.
    c. Press the Off Button for approximately 5 seconds, UPS will emit 2 beeps and return to Online Mode operation.

Maintenance Bypass Switch (MBS) (Located on Transformer Module Only)

⚠ WARNING: DO NOT PLACE THE MAINTENANCE BYPASS SWITCH (MBS) IN THE BYPASS POSITION WHILE THE UPS IS OPERATING IN ONLINE MODE. THE FOLLOWING PROCEDURE MUST BE PERFORMED BEFORE USING THE MAINTENANCE BYPASS SWITCH. FAILURE TO FOLLOW THIS PROCEDURE WILL RESULT IN DAMAGE TO THE UPS OR CONNECTED EQUIPMENT.

8. Press the Off Button for approximately 5 seconds, UPS will emit 2 beeps.
    a. UPS is in Bypass Mode
        i. Display will indicate as shown in Figure B.
    b. Locate and remove the MBS cover.
    c. Turn the MBS knob clockwise to the Bypass position.
        i. The UPS load is now connected directly to utility power through the MBS. The UPS input breaker may now be turned off.
9. To return to Online Mode operation, turn on input circuit breaker.
    a. Display will indicate as shown in Figure B.
    b. Turn MBS knob counterclockwise to the “INV” (Inverter) position.
    c. Reinstall MBS cover.
    d. Press the On Button for approximately 3 seconds, UPS will emit 2 beeps.
        i. UPS will perform power on self-test, if passed UPS will return to normal operation.

Troubleshooting

⚠ WARNING: Error Codes may require user to shut down and restart the UPS. MBS can be used to power the critical load while the UPS restart is taking place.

⚠ Connected equipment may need to be turned off to prevent damage in case of a critical UPS failure.

1. If there is a serious abnormal condition, the UPS will lock itself in the “OFF” position as shown in figure B.
2. After three seconds all messages will be locked except both Bypass indicators (LED J2 and LCD Bypass) and Utility indicators (LED J1 and LCD Utility). If the Bypass or Utility is abnormal after the UPS is locked, the related LED J2 or J1 will be off and the related LCD symbol Bypass or Utility will appear.
3. To release the UPS lock, proceed as follows:
    a. Note the error code.
    b. Check the error messages in troubleshooting guide for help with the problem.
    c. Press the Off ⏻ button for five seconds. A buzzer will sound twice.
    d. Turn Off the Utility Input breaker.
4. Shutoff
    a. Press the Off ⏻ button for five seconds. The Inverter output will be turned off, and the output load will be supplied by the Bypass loop. The LCD will display figure B.
    b. Turn Off the Utility Input breaker.
        i. The UPS is now turned off.

If the UPS malfunctions during operation, please check the following:

1. Verify Input / Output wiring.
2. Verify AC Input Source is within UPS acceptable voltage range.
3. If problems persist, reference the following table for possible conditions and solutions otherwise please contact Falcon Electric, Inc. Service Department.

Error Code	Description
Er05	Battery weak or dead
Er06	Output short circuit
Er10	Inverter over-current
Er11	UPS over-temperature
Er12	Severe UPS output overload
Er14	Fan error
Er16	Output parameters set error in parallel system
Er17	ID Numbers are in conflict in Parallel System or ID number error in single unit
Er21	Parallel communication error (communication wire disconnected or failure to find ID1 UPS) in Parallel
Er24	CVCF mode with bypass input (Bypass must be disabled for CVCF mode.)
Er27	The UPS must be operated in normal mode in Parallel System.
Er28	Bypass overload time out and cut off output
Er33	Isolation transformer is over-temperature
Er**	Other error codes, contact Falcon Service Department for further assistance.

Condition	Error Code	Solution
Red LED (UPS Fault)	**Er05, Low◄ & Fault ◄**	Verify batteries are all connected properly. Replace battery packs.
	Er06, Er10, Er12, Er28 & 	If CB3 is tripped, turn off the UPS and keep the MBS at INV position before pressing CB3. Disconnect load and restart UPS. After error clears, reconnect load.
	EPO	Remove the short circuit at the EPO terminal then restart UPS.
	Er11, Er33	Remove any objects blocking the ventilation holes.
	Er14	Replace cooling fan.
	Er15	If UPS is in CVCF mode, you must restart the UPS.
	Er16, Er17, Er27	All the parameters except ID Number in a parallel UPS must be the same. Please reference parallel procedure to reprogram.
	Er21	Disconnect and reconnect the RJ45 connector or set UPS with ID=1.
	Er24	Bypass voltage present in CF50 / CF60 constant mode. Please contact Falcon Electric, Inc. for resolution.
	Er**	Other error codes, contact Falcon Service Department for further assistance.

Batteries

Battery Precautions

NEVER discard the UPS, the UPS battery pack, or batteries in the trash. Contact your local recycling or hazardous waste center for information on proper disposal of the used battery pack or batteries. The depleted batteries or packs may be returned to the Falcon Service Center at the end user's expense for recycling. Prior to returning the depleted batteries or packs, please contact the Falcon Service Center and obtain a Return Material Authorization (RMA) number.

NEVER dispose of used batteries or the UPS in the trash or a landfill as it is a violation of federal and state laws. The UPS and batteries must be recycled. For UPS and battery recycling information, please contact the Falcon Service Center.

Battery Storage

If the UPS system is to be stored for an extended period, the following precautions should be observed to maximize battery life:

- ✓ Connect and turn on UPS to a properly rated outlet for at least 12 hours to ensure batteries are in a fully charged state prior to long-term storage.
  - Always switch off the UPS when relocating the UPS. Be aware that, even when disconnected, charged batteries present a risk of electric shock.
- ✓ If the UPS is unused for an extended period, it must be stored in a moderate climate. The batteries should be charged for 12 hours every 3 months by connecting the UPS to the utility supply. Repeat this procedure every month if the storage ambient temperature is above 25°C (77°F). Failure to follow this procedure can result in shortened battery life.

Battery Capacity Retention

The table below provides typical battery storage period based on ambient temperature. The recommendations below yield about 60% battery capacity at maximum storage period. The batteries require recharge after storage. Please reference battery manufacturer documentation.

Temperature	Maximum Storage Period (Months)	Recommendation
5°C / 41°F	20	Good Condition. Recharge prior to use. (Minimum 6Hrs to 90% capacity)
25°C / 77°F	10	
30°C / 86°F	6	
40°C / 104°F	3.5	
50°C / 122°F	1	

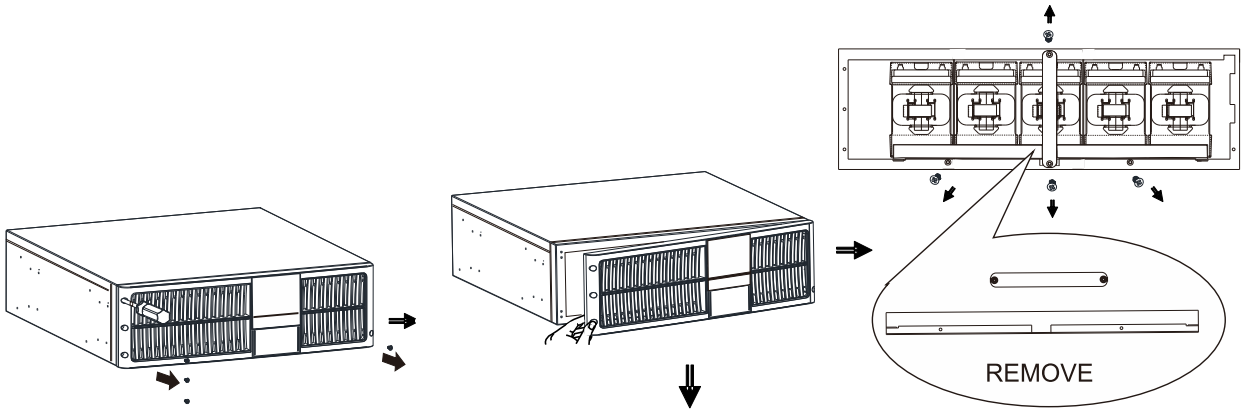
Battery Service Life (Float / Trickle Charge)

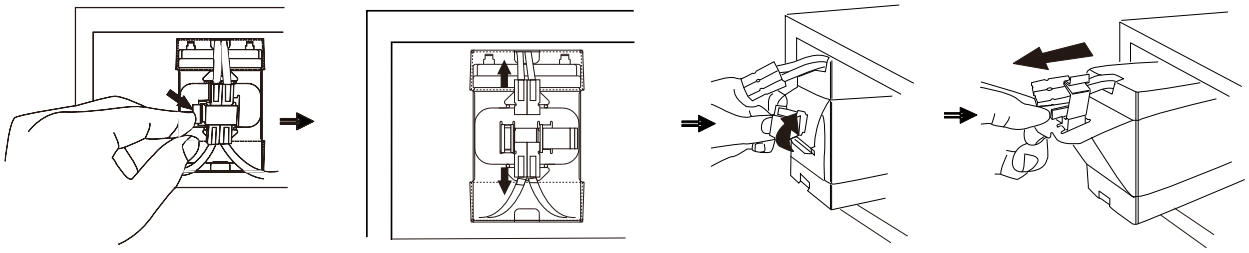
The table below provides the typical battery service life during float / trickle charge. Ambient temperature greatly affects the overall battery life.

Temperature	Period (Years)	Float Charge
25°C 77°F	5	2.275VDC / CELL
40°C 104°F	1.7	
50°C 122°F	0.9	

Battery Replacement

⚠ REFERENCE SAFETY SECTION OF THIS MANUAL FOR ALL BATTERY SAFETY WARNINGS.





Options

Communication

Software:

UPSilon Monitoring (Reference UPSilon manual for installation instructions.)

1. Connect supplied USB cable between UPS and PC workstation.

Dry Contact Relay Card (Falcon Item #: UA88383)

Pin 1: UPS on Bypass mode

Pin 2: Utility Abnormal

Pin 3: Utility Normal

Pin 4: Inverter On

Pin 5: Battery Low

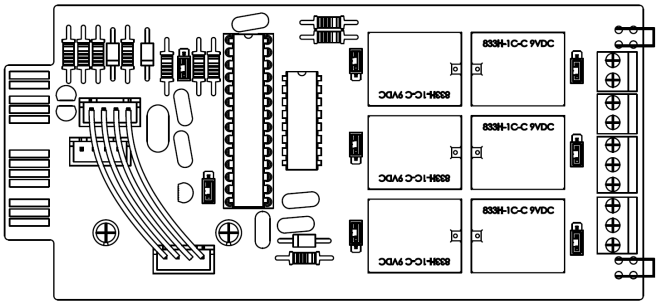
Pin 6: Battery Abnormal

Pin 7: UPS Alarm

Pin 8: Common

Pin 9: Shutdown UPS positive (+) signal

Pin 10: Shutdown UPS negative (-) signal



Notes:

- The shutdown function will be activated after +6 to +25 VDC is applied between pin 9 and pin 10 for 5 seconds.
- The capacity of each relay contact is 40 VDC/25mA.
- Installation Position: Slot 1 (CHA-CN7) or Slot 2 (CHB-CN8).
- Flexible signal output for N.C. (Normal close) or N.O. (Normal open) contact by shorting pins 1-2 or pins 2-3 from JP1-5.
- The shutdown function will be enabled 1 minute after blackout occurs if pins 1-2 of both CN1 and CN6 are shorted. Otherwise the shutdown function can be enabled only by pins 9-10 of CN3 if pins 2-3 of both CN1 and CN6 are shorted.

N+1 / Parallel Operation

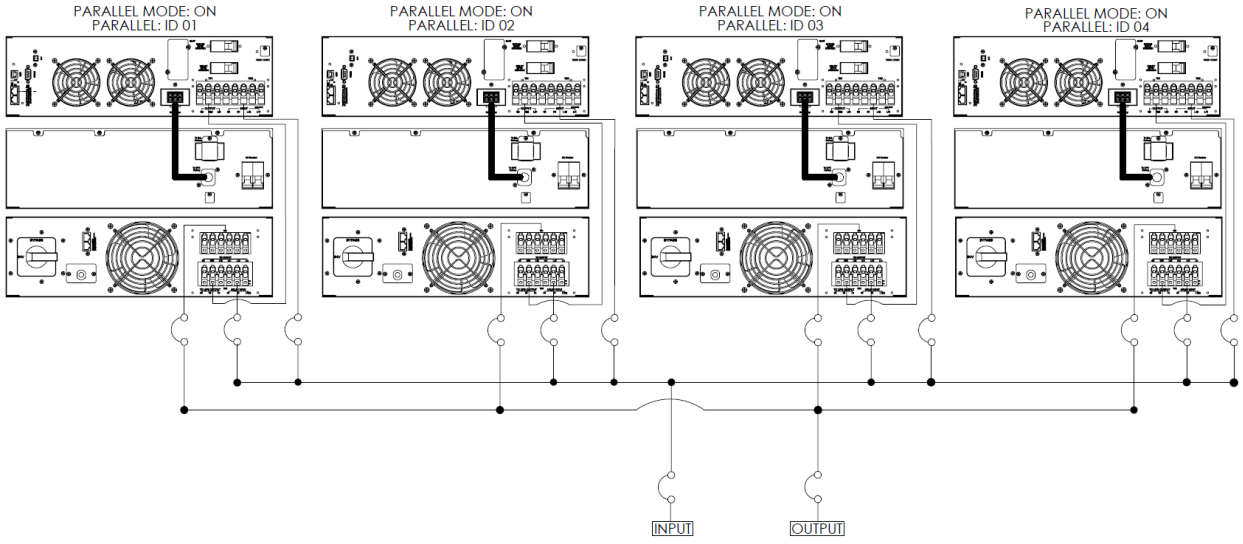
Up to (4) FN2 Series UPSs may be connected in parallel, to provide up to 24kVA capacity for 6kVA models and 40kVA capacity for 10kVA models.

N+1 Parallel Redundant configuration allows a up to 4 UPSs of the same capacity to be connected in parallel onto a common output bus. This configuration establishes one UPS (N) and up to 3 spares (N+#). The N+1 operation is automatically controlled by the UPS output load monitoring. During normal operation, the load is shared equally among the total number of UPSs installed. If the total connected load amount is equal to the capacity of one of the UPSs in the system, the N+1 operation will be active. When the load is above the capacity of a single UPS in the system, the N+1 operation will be inactive, and the total output capacity will increase.

N+1 Parallel Redundancy allows critical equipment to remain protected in case of a single UPS failure and is expandable if the application power consumption increases.

*Please see Parallel / N+1 Quick Installation Guide for installation / operation details.

Power Wiring Diagram



Constant Frequency Operation

The FN2 UPS can operate in Constant Frequency Mode at either 50Hz or 60Hz output depending on the desired program setting. This option is for applications that require a constant frequency for the applied load. The output frequency will not be synched to the input frequency.

Notes:

- This option requires Bypass Line to be disabled internally. Please specify this option at the time of order or contact Falcon Electric Service Department for details.
- In constant frequency mode, the UPS output capacity is de-rated to 75% of its maximum capacity rating.
- Parallel / N+1 Operation is not available in constant frequency mode.

Specifications

Electrical

*For latest released version, please visit our website at falconups.com.

Service & Warranty

Technical Support

In the event your FN2 Series UPS requires service, or should any other technical support be required, call, fax or email Falcon Electric, Inc. Service Department.

Falcon Electric, Inc.
5116 Azusa Canyon Road
Irwindale, CA 91706

Service: 800.842.6940 ext. 129
Fax: 626.962.6850

Email: service@falconups.com
Website: www.falconups.com/support

Please have your UPS model, serial number and date of purchase on hand prior to your call. This information is located on the identification label on the rear or top panel of the UPS. This information is essential in retrieving your unit's historical records. Should our service department determine service is required, you will be given a Return Material Authorization (RMA) number along with return shipping instructions.

The RMA number issued must appear on the outside of the shipping carton. The original shipping container must be used when returning any FN2 Series product. Failure to use the original shipping container and packing materials will likely result in the unit being received by Falcon with shipping damage.

Falcon® Electric will not assume any responsibility for shipping damage. In the event shipping damage is found, you will be notified of the damage and be instructed to file a claim with the freight carrier. You will be billed for all required repairs due to the shipping damage. You must submit a copy of our repair invoice to the carrier for reimbursement.
All units must be returned prepaid. The address and shipping instructions will be given to you at the time the RMA is issued.

Falcon Electric Limited Warranty

LIMITED WARRANTY

Two-Year Limited Warranty: Falcon Electric warrants that this product will be free from defects in materials and workmanship for a period of two years from the date of shipment within the 50 states and Canada (Domestic). The warranty is limited to one year for all other destinations (International).

Procedures: Any defective product must be returned to Falcon. No product can be returned without first obtaining a Return Material Authorization (RMA) number from Falcon. Falcon will repair, replace or refund the purchaser price, at Falcon's sole discretion, for any defective product that is returned to Falcon with an RMA number. For defective product sold domestically, as defined above, returned within 30 days of shipment, Falcon will pay for the shipping costs to and from its service center. For a defective product returned after 30 days but within 90 days of shipment, Falcon will only pay for shipping costs in sending the new or repaired product back to the end-user. For a defective product returned more than 90 days after shipment, all shipping costs will be borne by the end-user. Falcon will not pay any shipping costs sold internationally, as described above.

Exclusions: This limited warranty does not cover damage caused by: (i) improper installation, misuse or neglect; (ii) unauthorized repairs or modifications or use of unauthorized parts; (iii) acts or events outside of Falcon's control, such as fire, accidents, impacts; (iv) normal wear and tear, such as cleaning and replacement of batteries.

The warranty is null and void if: (i) the product is used in conjunction with life support equipment; (ii) The factory seal is broken or shows signs of tampering; or (iii) the battery is allowed to discharge below the minimum battery cutoff point. To prevent this discharge, remove the battery fuse, or switch the battery disconnect to the "off" position when the unit is to be stored without the AC power being supplied to the UPS for more than two days. The battery must be recharged every four to six months when not in use. This limited warranty is not transferable.

Limitations: In no event is Falcon responsible for any special, indirect, secondary or consequential damages, such as personal injury, damage to property, loss of data, lost profits, etc. In no event will Falcon's liability under this limited warranty exceed the purchase price paid for the product in question.

Disclaimers: The limited warranties set forth in this document are the only warranties that apply to Falcon's products. All other warranties are expressly disclaimed, including any implied warranties of merchantability or fitness for a particular purpose. This warranty gives you specific legal rights, and you may have other legal rights that vary from state to state.