



OWNER'S OPERATING MANUAL

ED Series Frequency & Phase COnverters

FOR MODELS:

ED2KRM-3P2-1P1-5

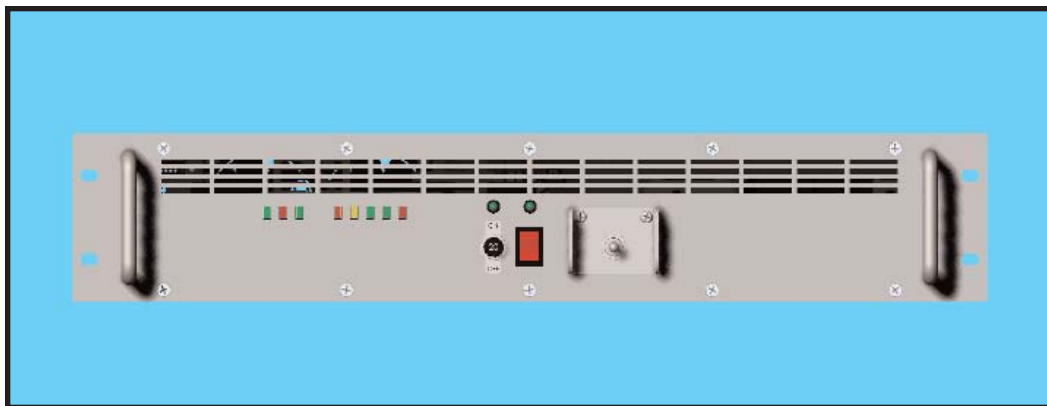
ED2KRM-3P2-1P1-6

ED2KRM-3P2-1P1-4

ED2.4KRM-3P2-1P1-5

ED2.4KRM-3P2-1P1-6

ED2.4KRM-3P2-1P1-4



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IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions which must be followed during the installation, operation and maintenance of this UPS and its batteries. Please read all instructions before operating this equipment and save this manual for future reference.

CAUTION

All of the models presented herein are designed for installation and use in a controlled environment free of contamination.

CAUTION

This UPS utilizes voltage that may be hazardous. Do not attempt to disassemble. This unit contains no user replaceable parts. Refer all servicing to Falcon Electric, Inc.

CAUTION

This UPS is not intended to be used in conjunction with life support or operating room equipment.

CAUTION

Always unplug this UPS prior to cleaning and never apply liquid or spray detergent on the UPS.

CAUTION

Never attempt to service batteries. High voltage exists within the unit, which could cause electrical shock. Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries. When replacing the UPS batteries, use the same number and type of batteries.

IMPORTANT

Allow at least 24 hours, after the UPS is first installed and turned on, to fully charge the internal battery and assure the maximum backup time is available.

DO NOT

DO NOT plug this UPS into its own output as this may damage the UPS.

DO NOT remove or unplug the input cord when the UPS is turned on. This removes the safety ground from the UPS and the equipment connected to the UPS.

CAUTION

This UPS contains its own energy source (batteries). The output receptacles may carry live voltage even when the UPS is not connected to an AC source.

CHAPTER 1

ED Series UPS - Overview

Phase-imbalance on three-phase, 400Hz power systems can be a serious and difficult problem to resolve. The problem is created when single-phase equipment is connected to one or two of the individual three phases. Other three-phase equipment connected to the same power system may experience problems as a result. Phase imbalance can result in high or excessive third order harmonics, tripping of circuit breakers and destructive over-heating or single phasing of three-phase motors connected to the same power system.

The Falcon Electric ED models equipped with a three-phase input provide the ideal solution for powering single-phase loads from a three-phase power source, while maintaining phase balance. The product has been designed to accept a 115/200Vac, three phase input. The three-phase power is isolated and converted to DC, regulated, and fed into a PWM DC-AC inverter. The PWM DC-AC inverter creates low impedance 120Vac single-phase output with a $\pm 3\%$ voltage regulation. The output frequency is independent of the input and may be set to 50Hz, 60Hz or 400Hz. The ED three-phase models may be ordered with internal battery backup or without. If ordered without internal batteries, the unit has enough stored energy to provide more than 100 milliseconds of ride-through. A high temperature battery option is also available, and the internal electronics have been designed to operate in a 50°C environment.

This User's Guide is provided with your new ED unit. It will enhance your understanding of the product and its functions. Read this handbook carefully in the order it is presented prior to operating your unit. This will save you time and effort in your installation and application. The illustrations will also familiarize you with the ED's operating modes and indications. Always operate the unit within the guidelines and specifications given to maximize the unit's efficiency and lifetime. Also, your understanding of the product is essential in providing you years of service for your back-up power requirements.

Refer to the simplified block diagram, Figure 1, on the next page for a system description.

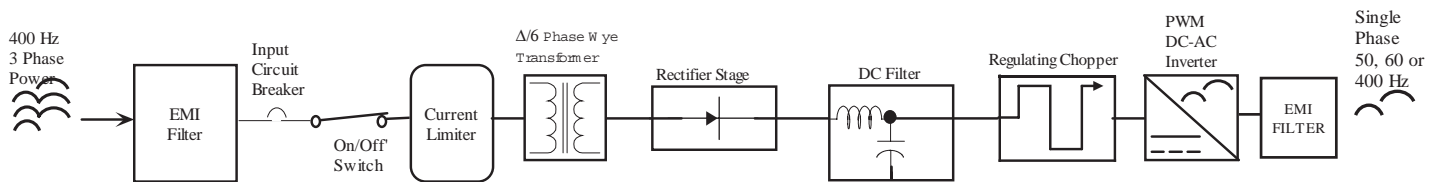
The 400 Hz, three-phase AC source is fed through an EMI filter stage into a delta, six-phase isolation transformer, which is then rectified and filtered. The rectified DC is regulated in the regulating chopper and fed to a single-phase PWM DC-AC inverter. The sinewave output of the PWM inverter goes through a second EMI filter and is made available at the unit output. The single-phase output can be set at the factory to 50, 60 or 400Hz.

If supplied with an optional internal batteries, during a utility power-loss, the AC rectification and battery charging capabilities of the UPS become inactive. The fully-charged battery, however, supplies the necessary power requirement to maintain the remaining system blocks.

The FALCON® ED on-line topology is unique to other on-line systems since it is designed to meet the needs of non-linear loads. Equipment incorporating switch mode power supplies are considered non-linear loads. Most low cost power protection equipment cannot handle the high peak currents demanded by these loads. The FALCON® ED unit is specially devised to accept these loads and protect them efficiently without any of the output waveform degradation common to other UPS.

Should the unit experience a sustained overload greater than 125% of its rated output, it will shutdown completely if the overload is not corrected within 15 seconds.

FIGURE 1: FALCON THREE-PHASE ED BLOCK DIAGRAM



ED Series™ UVS PLUS®

ED Series Rackmount Frequency Converter

Model Number	ED2KRM-3P2-1P1-5 ED2KRM-3P2-1P1-6 ED2KRM-3P2-1P1-4	ED2.4KRM-3P2-1P1-5 ED2.4KRM-3P2-1P1-6 ED2.4KRM-3P2-1P1-4
Nominal VA	2000	2400

Electrical Input

AC Voltage, +10% -20%	115/200 Vac 3Ø	
Current-Amps	7.5	8.5
Frequency Range	350-450Hz	

Electrical Output

AC Voltage, ± 3%	115 Vac		
Frequency	50, 60 or 400Hz ±1%		
Watts	50 & 60Hz (400Hz)	1400 (1190)	1680 (1428)
Current-Amps	50 & 60Hz (400Hz)	16.7 (14.2)	20 (17)
Non – Linear Repetitive Peak (Amps)	50 & 60Hz (400Hz)	40 (28.4)	48 (34)
Total Harmonic Distortion	< 3% @ 100% Linear Load, < 5% @ 100% Non – Linear Load		
Overload	200% for 0.5 Seconds, 120% for 30 Seconds		
Dynamic Response	± 5% RMS for 100% Step Load Change, 1ms Recovery Time		
Output Protection	Short Circuit and Overload		
Ride Through (without batteries)	100ms		
Optional Battery Back-up	10 minutes	7 minutes	
Optional Battery Type	8AH, Hawker		

Electrical Connections

Input	CPC23-7
Output	CPC17-3

Environmental

Operating Temperature	0° C to 50° C (32° F to 122° F)
Storage Temperature	-40° C - +60° C
Humidity	10% to 95% Non – Condensing
Operating Altitude	10,000 Feet
Transportation Altitude	40,000 Feet
Cooling	Low Velocity Forced Air Fans
Audible Noise @ 1.5 Meters	54dBA

Controls and Indicators

Sequenced LEDs	Load Level / Battery Level
Single LED	Utility Present, Summary Alarm, Inverter On
Audible Alarms	Utility Interrupt, Inverter Failure, Overload
Communications	Dry Contact Closures on Utility Loss via 9 Pin "D" Connector

Mechanical UPS

Dimensions H x W x D i nches (mm)	3.5 x 17.13 x 20.18	(88.9 x 435.1 x 512.6)
Weight lb . (kg)	55 lbs. (25)	60 lbs. (27.2)

Mechanical Optional Battery Enclosure

Dimensions H x W x D i nches (mm)	3.5 x 17.2 x 20.2	(88.9 x 435.1 x 512.6)
Weight lb . (kg)	65 lbs (29.5)	

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CHAPTER 2

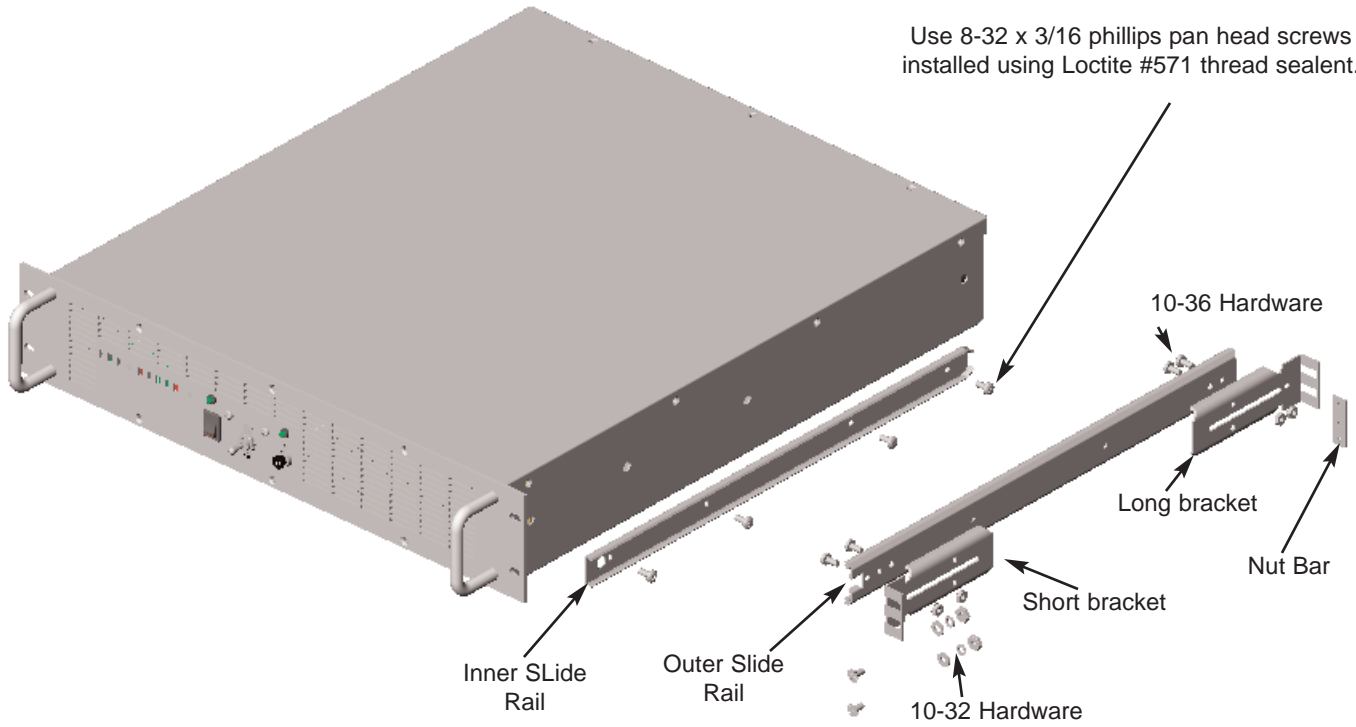
Installation

Slide Installation Detail

CAUTION

The (8) screws mounting the slides to both sides of the ED rackmount unit must not exceed 3/16 inch or unit damage may result.

Use 8-32 x 3/16 phillips pan head screws installed using Loctite #571 thread sealent.



Inspecting the Equipment

If any FALCON® equipment has been damaged during shipment, keep the shipping cartons and packing materials for the carrier and file a claim for shipping damage. If you discover damage after acceptance, file a claim for concealed damage.

To file a claim for shipping damage or concealed damage: 1) File with the carrier within 15 days of receipt of the equipment; 2) Send a copy of the damage claim within 15 days to the Falcon® Service Department.

UPS Setup

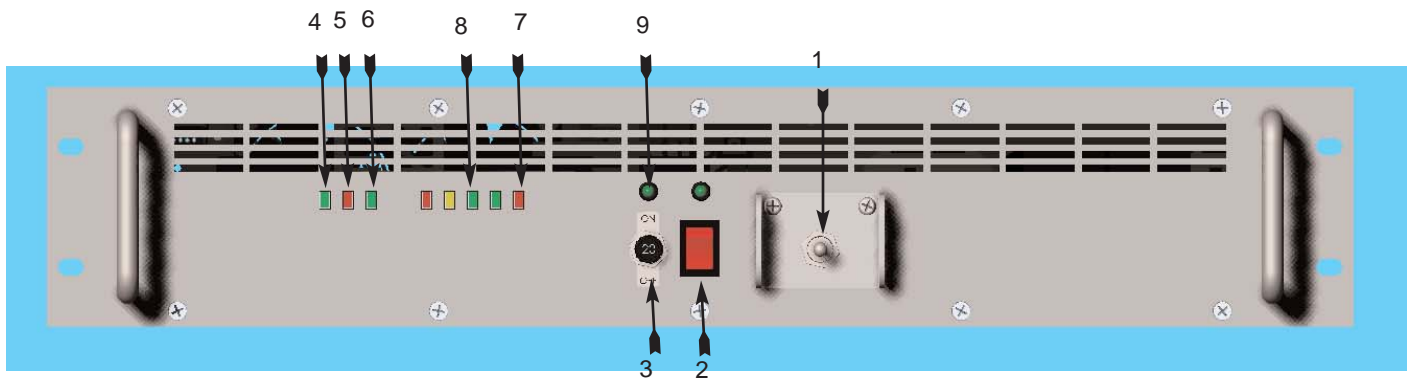
1. Verify that the following is included in the UPS shipping carton: UPS, Owner's Guide.
2. Verify that the UPS unit is configured for the proper input/output voltage and battery options. This information is stated on the nameplate label located on the rear panel of the unit.
3. When installing this UPS into a rack enclosure the following must be followed:
 - a. Due to the UPS weight, it must be installed using a rack mounted shelf or using slides manufactured by General Devices, part number CLB-203-20, using (8) Phillips, pan head 8-32 x 3/8" screws, (4) per slide.
 - b. Secure the UPS front panel to the rack rails using four screws supplied by the rack manufacturer.

IMPORTANT

4. **DO NOT BLOCK UPS AIR VENTS. THE UPS MUST NOT BE INSTALLED IN AN ENCLOSED AREA.**
5. If you have not already done so, connect the equipment to be protected to the UPS output receptacles or connector located on the rear panel. Verify that the connected equipment does not exceed the rated output (in watts) of the UPS.
6. Connect the UPS to the nearest grounded power source. Switch the on/off switch located on the ED front panel to the on position. The UPS should power up.

CHAPTER 3

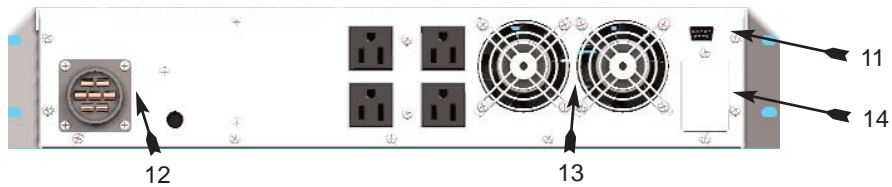
Controls, Displays & Functions



1. **INPUT POWER CIRCUIT BREAKER & INDICATOR**
Pull button to remove input power. The UPS will go into battery mode when pulled. Push the button in to reset the circuit breaker.
2. **OFF/ON POWER SWITCH**
Depress the switch to the up position to turn the unit on. The down position turns the unit off.
WARNING! This switch turns the UPS on and off. Turning this switch to the off position will turn off power to the connected load.
3. **UPS OUTPUT CIRCUIT BREAKER & INDICATOR**
This circuit breaker provides overload protection for the UPS. Pull the button to turn off the UPS output. Push the button to reset the circuit breaker.
4. **AC- AC LINE INDICATOR**
This green LED turns on when the utility AC is present.
5. **INV- INVERTER OPERATING**
The LED turns green when the UPS inverter is turned on. This LED normally turns on a few seconds after the AC line indicator LED and remains on during both utility and battery operation.
6. **ALM- ALARM STATUS INDICATOR**
This red LED turns on and a continuous audible alarm is sounded when the UPS is overloaded or has failed. Should this occur, check the load level and correct any overload condition if present. During this condition, If the unit is not overloaded, call FALCON® support for further assistance..
7. **LOW BATT.- LOW BATTERY WARNING INDICATOR**
For ED units configured with internal or external batteries, the red LED will turn on when the ED is operating in battery mode and the low battery level warning point has been reached. Typically one minute of battery runtime remains after the LED turns on.
8. **OVERLOAD/ FULL LOAD/ 75% LOAD/ 50% LOAD-**
Adjacent to the red low battery LED is the green 50% load LED.
Adjacent to the green 50% load LED is the green 75% load LED.
Adjacent to the green 75% load LED is the yellow 100% load LED.
Adjacent to the yellow 100% LED is the red overload LED. All overload conditions must be corrected immediately.
9. **OUTPUT POWER INDICATOR LED**
Lit when output voltage is present.
10. **INPUT POWER INDICATOR**
Lit when input power is present and the input circuit breaker is in the “on” position.

TYPICAL REAR PANEL LAYOUT

5-15R
Output
Configuration



L5-20R
Output
Configuration



Dual Amp CPC
Output
Configuration



CPC Outlet Pin Assignment
Pin 1 - Output Line
Pin 2 - Output Neutral
Pin 3 - Output Ground

11. **DB-9F CONTACT CLOSURE INTERFACE**

This connector gives access to the ED contact closure status interface. Please reference page 8 of this manual for details.

12. **POWER INLET (Amp CPC, 7 pin)**

Panel Mounted Inlet

AMP INPUT INLET, 7 POSITION AMP # 206137-1

AMP PIN CONTACT # 66262-2 (7 pcs.)

Mating Input Plug & Hardware

AMP CPC PLUG # 206136-1

AMP PLUG STRAIN RELIEF # 206512-1

AMP FEMALE CONTACT # 66740-6 (7 pcs.)

Inlet Pin Assignment

Pin 1 - Not Used

Pin 2 - Utility Neutral

Pin 3 - Utility Phase A

Pin 4 - Utility Phase B

Pin 5 - Utility Phase C

Pins 6 & 7 - Utility Ground

13. **COOLING FANS (2)**

Cooling fans draw cool air from the outside of the rear panel and exhaust it out through slots in the UPS front panel. **ALWAYS KEEP COOLING FAN AND FRONT PANEL VENTS CLEAR OF DEBRIS. DO NOT OPERATE THE UPS IN AN ENCLOSED SPACE.**

14. **EXTERNAL BATTERY CONNECTOR & COVER PLATE**

Removal of this cover plate will expose the 72Vdc external battery connector. For more external battery bank information, please contact the factory.

CHAPTER 4

DB-9 COMMUNICATIONS INTERFACE

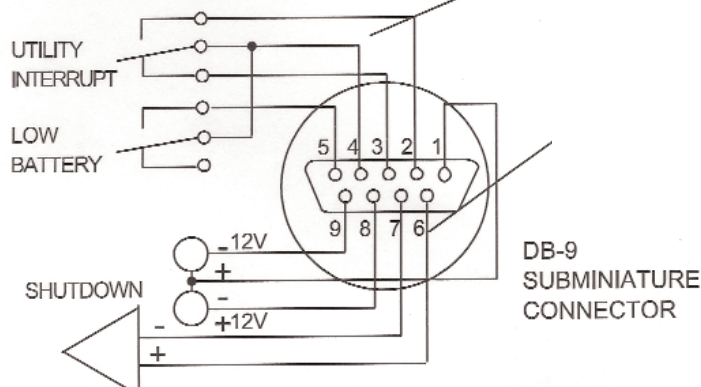
SIGNALS AND INTERFACING

The **FALCON**® ED unit is designed to be compatible with all sophisticated operating systems when they feature a Shutdown monitoring function. These signals are made available through a DB-9 subminiature, female connector at the rear of the unit. Interfacing cables are available. Below is a diagram of the 9-pin jack and its pin-out:

- 1 - **+12V SOURCE RETURN**
- 2 - **UTILITY INTERRUPT, Normally Open Contact**
- 3 - **UTILITY INTERRUPT, Normally Closed Contact**
- 4 - **COMMON, Contact Closures**
- 5 - **LOW BATTERY, Normally Open Contact**
- 6 - **AUTOMATIC SHUTOFF CIRCUIT (ASC)**
- 7 - **ASC RETURN**
- 8 - **+ 12VDC @ 30ma SOURCE**
- 9 - **- 12VDC @ 30ma SOURCE**

NOTES:

- 1. Contacts rated 2A @ 28VDC.
- 2. A +5 to +12VDC signal applied to pin 6 with respect to pin 7 for at least one millisecond when no utility power is present will cause the ED to shutdown. The current drawn is about 2ma @ 5VDC and 5ma @ 12VDC. The 12VDC source provided at pins 8 to 1 may be utilized for this function. Upon the return of utility power, restart is automatic.
- 3. NORMAL contact states are maintained with system power "ON" and the Inverter operational or with system power completely "OFF".



CHAPTER 5

OPERATION

The FALCON® ED unit is very simple to use.

1. Prior to turning on the unit, verify the ED is connected to the a three-phase Wye, 115/200 Vac, 400 Hz power source.
2. Activate the power switch located on the front panel, to the "ON" position.
3. The green AC LED will illuminate.
4. The green INV LED will illuminate.
5. Using an AC volt meter, measure the output voltage at the ED output receptacle or connector and verify it is within specification.
6. Using an AC frequency meter, measure the ED output frequency at the ED output receptacle or connector and verify it is within specification.
7. If configured with internal or external batteries, perform steps 7 - 10, leave the power switch "ON" and open the input circuit breaker. This will simulate a power loss and test battery operation.
8. The green AC LED will shut off.
9. An intermittent audible alarm will sound.

The system will continue to operate. If this were to continue for a long period of time, the red LOW BATTERY light would illuminate, indicating that battery back-up time is ending and system shutdown is imminent. The intermittent alarm will become continuous at this point. The ED unit will automatically shut itself off to avoid excessive battery discharge. When power returns, normal operation of the UPS resumes without any operator adjustment.

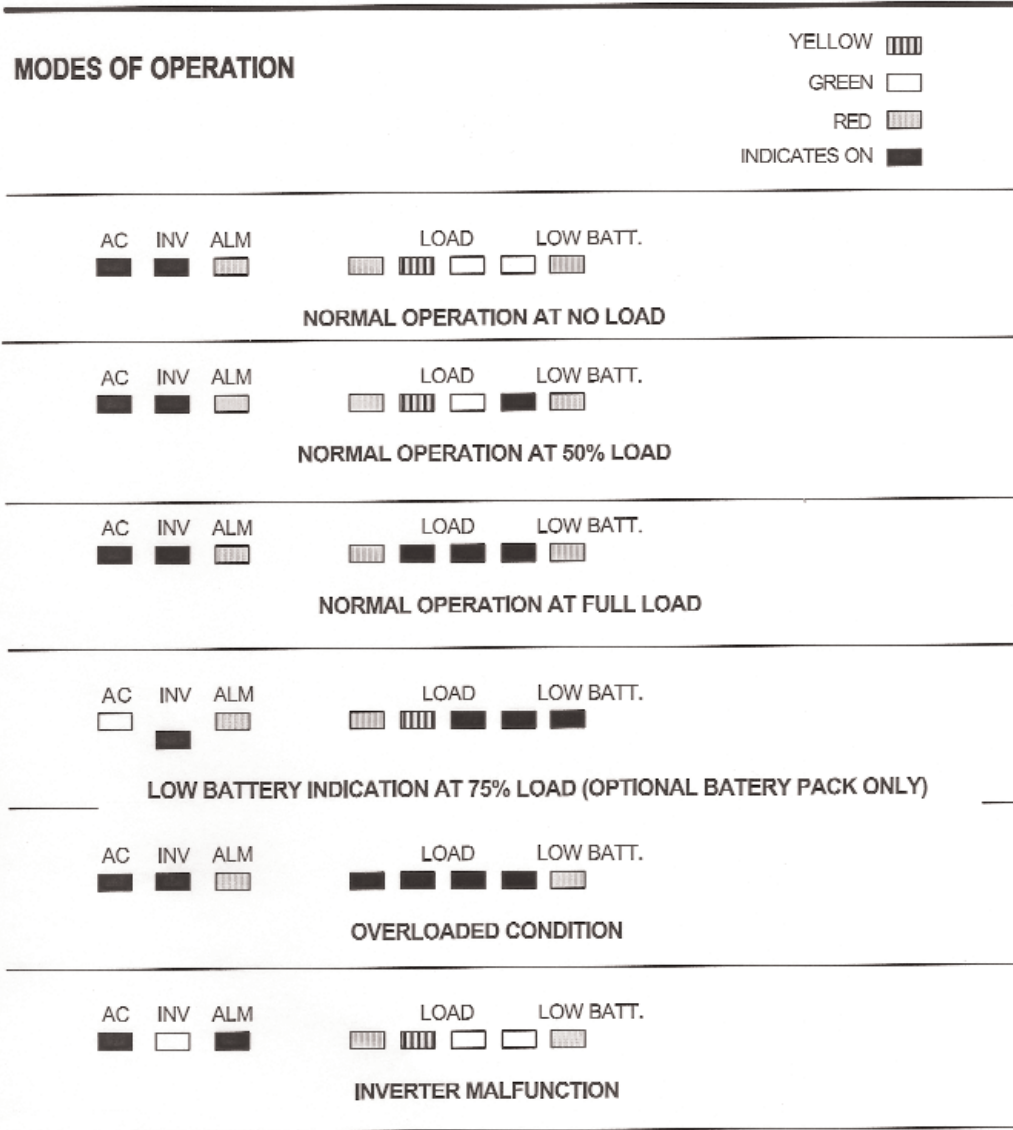
The duration of actual battery back-up time and the low battery condition varies depending on the amount of load, charge on the battery, and condition of the battery. See SPECIFICATIONS Section on page 4 for approximate hold-up times at 100% and 50% loads.

10. Reset the input circuit breaker and turn the power switch "OFF".
11. Turn off the devices you wish to plug into the UPS. Connect them to the outlets located on the rear of the UPS.
12. Activate the ED unit power switch to the "ON" position.
13. Turn "ON" each of your devices.
14. Some of the LOAD indicators may illuminate. The amount of load determines the actual number of indicators lit.
The bottom green L.E.D. signifies approximately 50% of load capacity. The second green L.E.D. represents approximately 75% of load capacity. If the yellow L.E.D. illuminates, full load has been achieved. If the red light illuminates, an OVERLOAD condition is present. If this situation continues for about 15 seconds, the unit will automatically shut off.
If the system overheats or the Inverter fails, the unit automatically sounds a continuous alarm and the red ALM light will illuminate.

To escape this condition, the problem must first be corrected. Then turn the UPS power switch "OFF" and then back "ON".
 If configured with internal or external batteries, it is recommended that you leave the ED unit power switch "ON" at all times and switch your devices "OFF" individually. This will ensure that your batteries are always at a maximum charged state.

WARNING

The power switch acts as a system ON/OFF switch. When this switch is turned "OFF", power is lost to the entire unit including all outlets at the rear of the UPS, since the battery circuit is also disabled.



CHAPTER 6

Maintenance & Technical Support

1. **Care & Maintenance**

Falcon® ED Series UPSs are designed to be low maintenance. They can be cleaned with a damp cloth or non-abrasive cleanser, providing the UPS is turned off and the input plug is disconnected from the utility source.

On a regular basis, check the vents to make sure they are kept free from accumulation of dust, dirt or lint.

2. **Battery Life vs. Temperature**

For full battery life, keep the UPS close to an ambient temperature of 77°F.

The batteries should never be exposed to temperatures below 40°F or above 104°F. High temperature battery options are available. Please contact the factory for more information.

3. **Battery Replacement**

This UPS contains sealed maintenance-free batteries (VRLA). When situated in a typical office environment, with the proper charging and limited cycling, these batteries can last many years. We recommend that the batteries be replaced every three years.

WARNING

Untrained personnel should never attempt to service batteries. High voltage exists within the unit, which could cause electrical shock. **Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions.** Keep unauthorized personnel away from batteries. When replacing the UPS batteries, use the same number and type of batteries.

NEVER

A. **NEVER** dispose of batteries in a fire, as batteries will explode.

B. **NEVER** dispose of used batteries or the UPS in the trash or landfill as it is against federal and state laws. **The UPS and Batteries must be recycled.**

For UPS and battery recycling information, please contact our service department for the name and address of the nearest battery recycling facility.

C. **Spent batteries must be recycled in accordance with all Federal, State and local laws. To locate a recycling center near you, contact the Falcon service department.**

CAUTION

A. Do not open or mutilate the battery or batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

B. A battery can present a risk of electrical shock and high short circuit current. **REFER ALL BATTERY SERVICING OR REPLACEMENT TO A QUALIFIED SERVICE TECHNICIAN. UNTRAINED PERSONNEL SHOULD NEVER ATTEMPT BATTERY REPLACEMENT.**

The following precautions should be observed by a qualified technician when working with batteries.

1. Remove watches, rings, or other metal objects.
2. Use tools with insulated handles.
3. Wear rubber gloves and boots.
4. Do not lay tools or metal parts on top of batteries.

4. **Storing the UPS and Batteries**

Should you need to store the UPS for a long period, fully recharge the battery just prior to storage and recharge the battery every 6 months by plugging the UPS into a power outlet and turning the UPS on. It is recommended that the batteries charge for 24 hours after long-term storage.

5. **FCC**

This equipment generates and uses radio frequency energy and if not installed and used properly in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. All models covered in this manual have been tested and found to comply with the limits for a Class A computing device, in accordance with the specifications in FCC regulations, Part 15, Subpart J, which are designed to provide reasonable protection against such interference.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- a. Reorient or relocate the receiving antenna.
- b. Increase the separation between the equipment and the receiver.
- c. Connect the equipment into an outlet on a circuit different from the one that the receiver is connected to.
- d. Consult the dealer or an experienced radio/television technician for assistance.

6. **Technical Support**

Your FALCON® Electric ED Series is backed by one of the finest customer service teams assembled. Write, call, fax or email should you require technical assistance or service.

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Should service be desired, you must first obtain a Return Material Authorization number (RMA) and return shipping instructions from our customer service department. Please have your UPS model, serial numbers and date of purchase on hand prior to the call. This information is located on the identification label on the rear panel of the unit. This information is essential in retrieving your unit's historical records.

The RMA number issued must appear on the outside of the shipping carton. The original shipping container must be used when returning any ED Series product. Falcon® Electric will not assume any responsibility for shipping damage. In the event of shipping damage, you will be charged for repairs due to the damage.

All units must be returned prepaid. The address and shipping instructions will be given to you at the time the RMA is issued.

7. **Requesting Technical Information or Support.**

You may request technical information or support by email or telephone.

Please send your technical or support questions by Email to:

SUPPORT@FALCONUPS.COM

You may contact a FALCON support engineer directly by calling the FALCON support line between 9:00 am and 4:00 pm PST.

800-842-6940

8. **FALCON Web Support**

Product data sheets, specification and owner's guides are available in Adobe .PDF format on our corporate website.

WWW.FALCONUPS.COM