



# Operation & Programming Manual

## Phase, Frequency Converter & Optional UPS

Models:

ED4-1000RM-3/1-X-M

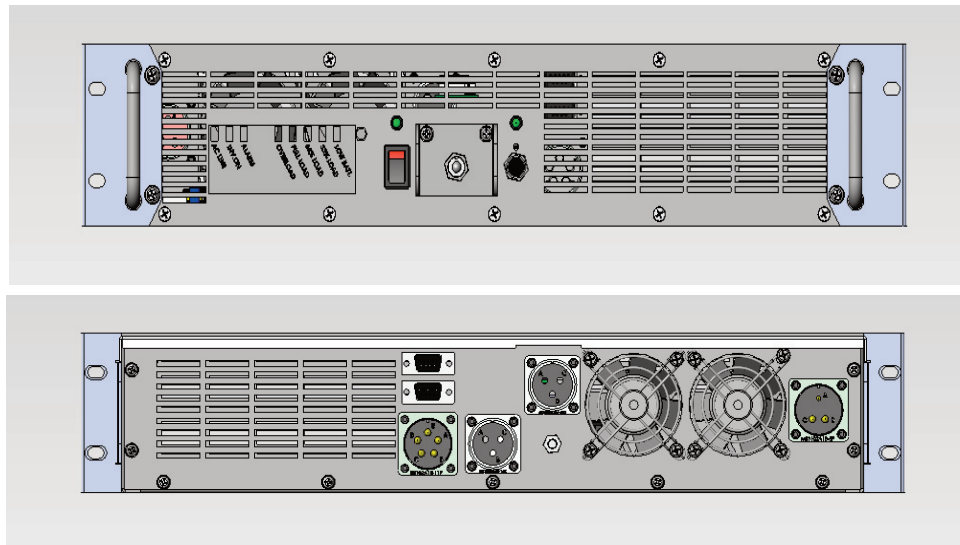
ED4-1500RM-3/1-X-M

ED4-2000RM-3/1-X-M

ED4-2400RM-3/1-X-M

[Where X = 4 (400Hz), 5 (50Hz) or 6 (60Hz) output frequency],

## Optional EDBR-1SH-M & EDBR-2SH-M Battery Bank Modules



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# **IMPORTANT SAFETY INSTRUCTIONS**

## **SAVE THESE INSTRUCTIONS**



### **WARNING**

**HIGH VOLTAGES ARE PRESENT DURING THE  
INSTALLATION AND OPERATION OF THIS EQUIPMENT**

**Avoid contact with AC & DC supply voltage connections during installation, operation or maintenance of the converter and battery modules. Do not attempt to disassemble. These units contain no user replaceable parts. Refer all servicing to qualified personnel.**



### **IMPORTANT**

**The ED4-XXXXRM-3/1-X-M and optional EDBR-1SH-M or EDBR-2SH-M battery banks presented herein are designed for installation and use in a controlled environment free of contamination.**



### **WARNING**

**Always disconnect AC and battery power from the converter prior to cleaning any optional filter elements. The elements must be removed for cleaning. Clean with liquid or spray detergent and water only. Rinse completely. Always allow the filter elements to completely dry prior to installation.**



### **WARNING**

**This equipment connects to a secondary energy source (external battery bank). The output connector (J2) may carry live voltage even when the UPS is not connected to an AC source.**

## **References**

1. ED4-xxxxRM-3/1-x-M Specification
2. Interface Control Drawings

## **Product Definition**

The ED phase and frequency converter, as well as the optional UPS and battery banks, have been designed to operate over the entire -20°C to +60°C operational temperature range. The technology has been enhanced to meet Mil COTS requirements with the incorporation of a microprocessor, firmware and two independent RS-232 ports to be used for remote monitoring purposes. Falcon has provided a modified version of our existing communications protocol for the purpose of customer developed communications software.

These ED models have been designed to meet or exceed rugged military standards such as the Army Munson Road Test. The product was developed, tested and manufactured in accordance with the attached specification and interface control drawings.

# ED-M Series™

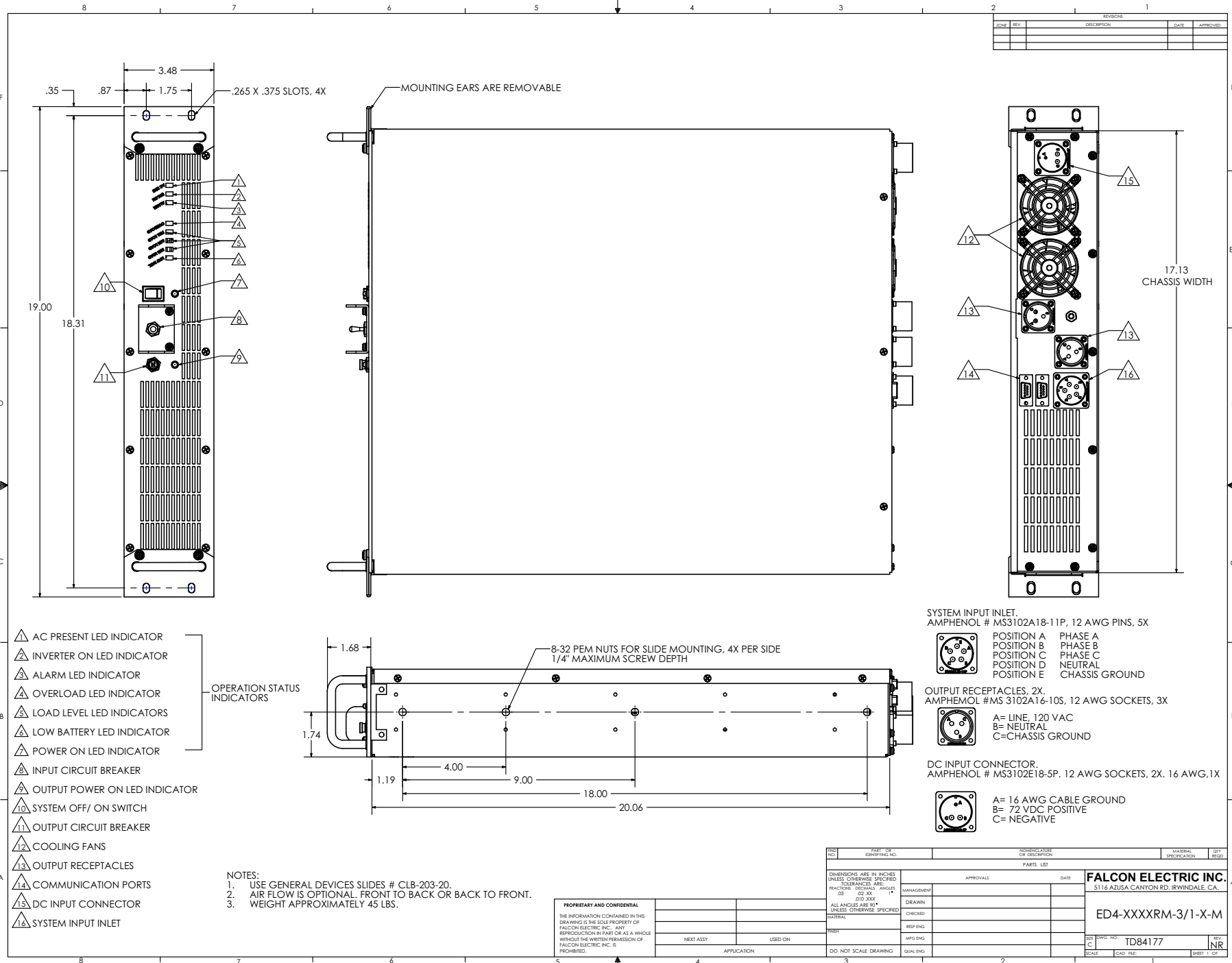
# 1kVA to 2.4kVA

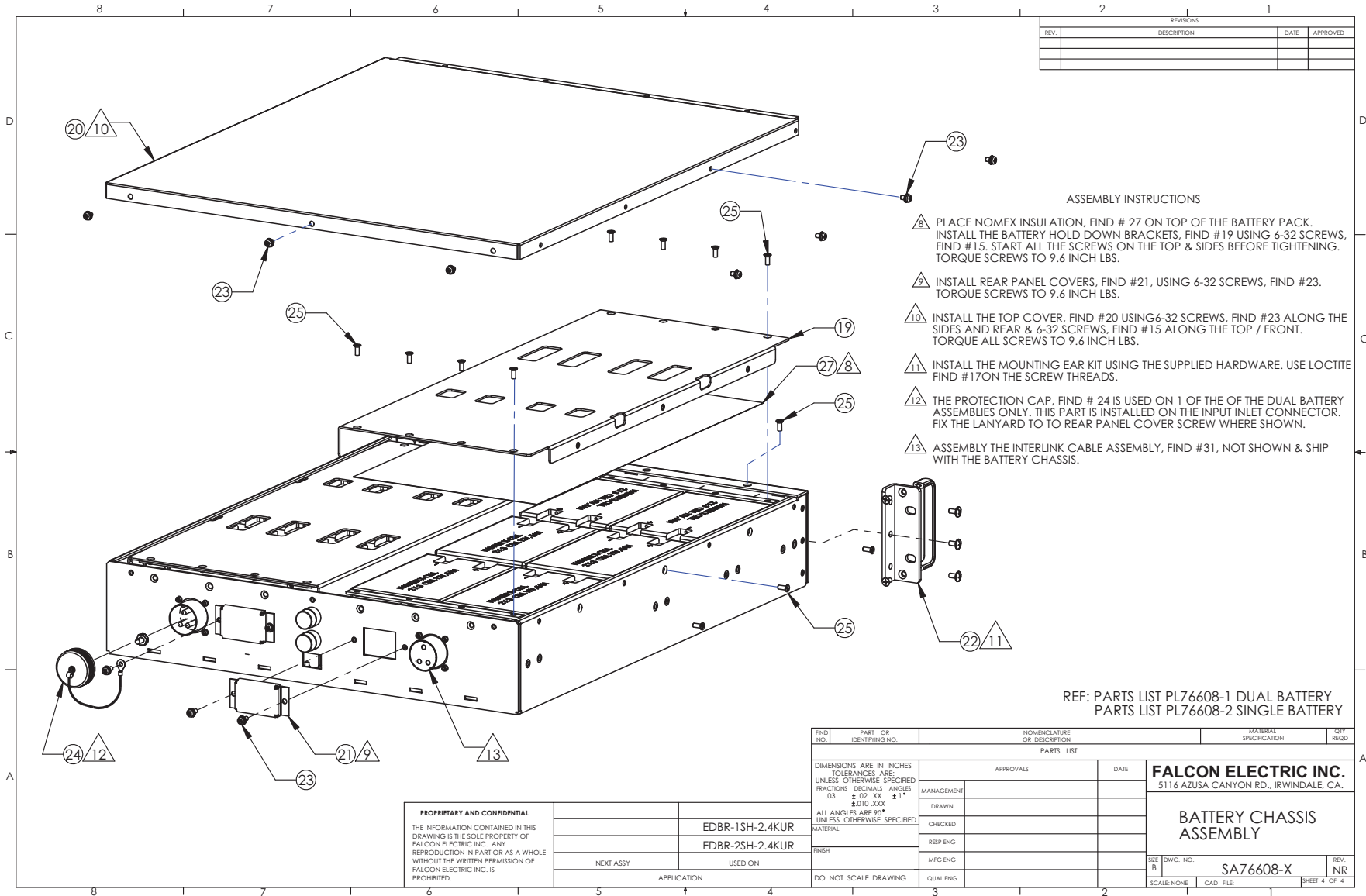
## ED Series Rackmount Frequency & Phase Converters, UPS 400 Hz Isolated Input

Model Number	ED4-1000RM-3/1-4-M ED4-1000RM-3/1-5-M ED4-1000RM-3/1-6-M	ED4-1500RM-3/1-4-M ED4-1500RM-3/1-5-M ED4-1500RM-3/1-6-M	ED4-2000RM-3/1-4-M ED4-2000RM-3/1-5-M ED4-2000RM-3/1-6-M	ED4-2400RM-3/1-4-M ED4-2400RM-3/1-5-M ED4-2400RM-3/1-6-M
Nominal VA	1000	1500	2000	2400
<b>Electrical Input</b>				
Nominal AC Voltage	115/200 Vac 3Ø (±20%) or 120/208 Vac 3Ø (±20%)			
Current	3.6A (per phase)	5.2A (per phase)	7.5A (per phase)	8.5A (per phase)
Frequency	350-450 Hz			
Isolation	Three-Phase Galvanic			
Power Factor	>0.87pf			
<b>Electrical Output</b>				
Watts	700	1050	1400	1680
Current (@ 0.7pf load)	8.3A	12.5A	16.7A	20A
Non-Linear Repetitive Peak Amps	20A	30A	40A	48A
AC Voltage (Specify at the time of order)	115 Vac or 120 Vac (nominal)			
Frequency	-4-M Models = 400 Hz ±1% -5-M Models = 50 Hz ±1% -6-M Models = 60 Hz ±1%			
Voltage Regulation	±3%			
Dynamic Response	± 5% RMS for 100% Step Load Change, 1ms Recovery Time			
Harmonic Distortion	< 3% @ 100% Linear Load, < 5% @ 100% Non-Linear Load			
Overload	200% for 0.5 Seconds, 120% for 30 Seconds			
Crest Ratio	3:1			
Ride Through Without Batteries	100ms (typical)			
<b>Optional Battery Backup Support</b>				
DC Bus Voltage	72 Vdc			
Battery Charger Current	400 ma			
Battery Bank Models	EDBR-1SH-M EDBR-2SH-M			
Battery Type	Energys Cyclon X Cells wide temperature batteries (rated -60°C to +80°C operational)			
Back Up Time (typ.)	-1SH -2SH	13 32	8.5 18	4.4 12
Transfer Time	0 ms			
Line Falls/Recovery	0 ms			
<b>Electrical Connections</b>				
Input	(1 ea.) AMPHENOL# MS3102A18-11P, 12 AWG Pins			
Output	(2 ea.) AMPHENOL# MS 3102A16-10S, 12 AWG SOCKETS			
Optional Battery Bank	(1 ea.) AMPHENOL# MS3102E18-5P, 12 AWG SOCKETS			
<b>Environmental</b>				
Temperature	Operational -20°C to 60°C (-4°F to 140°F) Storage -40°C to 60°C (-40°F to 140°F)			
Humidity	10% to 95% Non – Condensing			
Altitude	Operational - 10,000 Feet Transportation - 40,000 Feet			
Cooling	Low Velocity Forced Air Fans			
Audible Noise (@ 1.5 Meters)	54dBA			
<b>Controls &amp; Indicators</b>				
LED Display	Sequenced - Load Level / Battery Level Single - Utility Present, Summary Alarm, Inverter On, Output On, Charger Off			
Audible Alarms	Utility Interrupt, Inverter Failure, Overload			
Controls	UPS On/Off, Input & Output Circuit Breakers			
Communications	Two RS-232 ports located on the UPS rear panel			
<b>Mechanical</b>				
Dimensions UPS	3.48 x 17.13 x 20.06 (88.4 x 435.2 x 509.6)			
H x W x D	3.48 x 16.9 x 20.46 (88.4 x 429.3 x 519.7)			
Battery Banks	45 (15.88)			
Weight lbs. (kg)	EDBR-1SH-M = 60 (27.3) EDBR-2SH-M = 90 (40.9)			
Battery Bank Options				

Specifications subject to change without notice.

Falcon Electric, Inc. - 5116 Azusa Canyon Rd. - Inwindale, CA 91706 - 800.842.6940 - Fax 626.962.6850  
[www.falconups.com](http://www.falconups.com) - email: [sales@falconups.com](mailto:sales@falconups.com)





REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED

ASSEMBLY INSTRUCTIONS

- ▲ PLACE NOMEX INSULATION, FIND # 27 ON TOP OF THE BATTERY PACK. INSTALL THE BATTERY HOLD DOWN BRACKETS, FIND #19 USING 6-32 SCREWS, FIND #15. START ALL THE SCREWS ON THE TOP & SIDES BEFORE TIGHTENING. TORQUE SCREWS TO 9.6 INCH LBS.
- ▲ INSTALL REAR PANEL COVERS, FIND #21, USING 6-32 SCREWS, FIND #23. TORQUE SCREWS TO 9.6 INCH LBS.
- ▲ INSTALL THE TOP COVER. FIND #20 USING 6-32 SCREWS, FIND #23 ALONG THE SIDES AND REAR & 6-32 SCREWS, FIND #15 ALONG THE TOP / FRONT. TORQUE ALL SCREWS TO 9.6 INCH LBS.
- ▲ INSTALL THE MOUNTING EAR KIT USING THE SUPPLIED HARDWARE. USE LOCTITE FIND #17 ON THE SCREW THREADS.
- ▲ THE PROTECTION CAP, FIND # 24 IS USED ON 1 OF THE OF THE DUAL BATTERY ASSEMBLIES ONLY. THIS PART IS INSTALLED ON THE INPUT INLET CONNECTOR. FIX THE LANYARD TO TO REAR PANEL COVER SCREW WHERE SHOWN.
- ▲ ASSEMBLY THE INTERLINK CABLE ASSEMBLY, FIND #31, NOT SHOWN & SHIP WITH THE BATTERY CHASSIS.

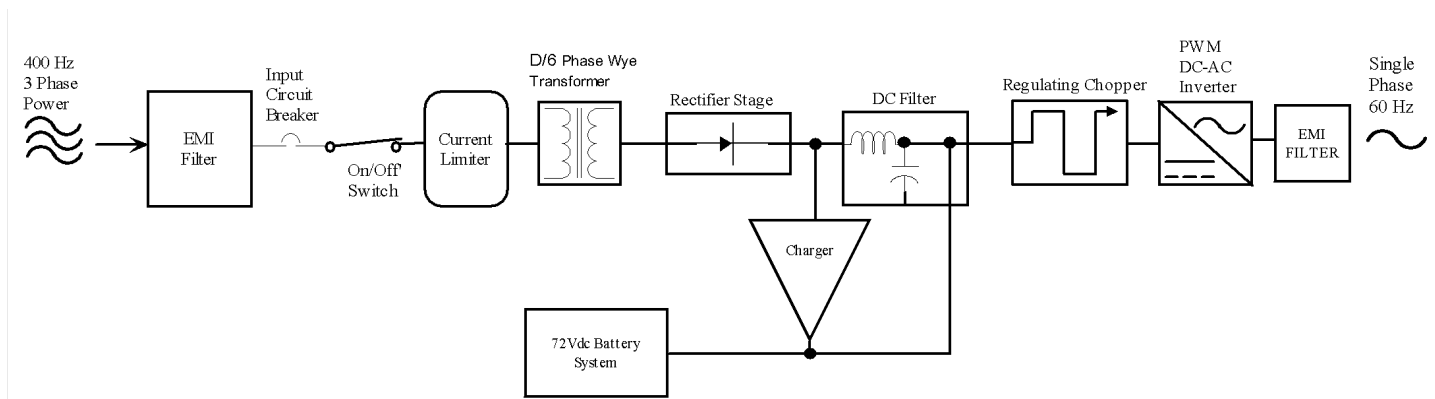
REF: PARTS LIST PL76608-1 DUAL BATTERY  
PARTS LIST PL76608-2 SINGLE BATTERY

FIND NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QTY REQD.
PARTS LIST				
DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES .03 ±.02 .XX ±1°		APPROVALS	DATE	<b>FALCON ELECTRIC INC.</b> 5116 AZUSA CANYON RD., IRVINDALE, CA.
ALL ANGLES ARE 90° UNLESS OTHERWISE SPECIFIED		MANAGEMENT		
MATERIAL		DRAWN		
FINISH		CHECKED		
DO NOT SCALE DRAWING		RESP ENG		
NEXT ASSY		MFG ENG		SEE DWG. NO. <b>SA76608-X</b> REV. <b>NR</b> SCALE NONE CAD FILE: SHEET 4 OF 4

**PROPRIETARY AND CONFIDENTIAL**  
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FALCON ELECTRIC INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF FALCON ELECTRIC INC. IS PROHIBITED.

EDBR-1SH-2.4KUR	USED ON
EDBR-2SH-2.4KUR	
APPLICATION	

## ED THREE-PHASE FREQUENCY, PHASE CONVERTER BLOCK DIAGRAM





## **Theory of Operation**

### **Utility Mode Operation:**

Incoming 115/200Vac, three-phase, 400Hz power is connected to the converter via a rear panel mounted MS3102A18-11P connector. The source sides of the three-phase power are then connected to a three-phase line filter. The output of the filter is connected to a three-pole, 15A circuit breaker and inrush current limiting circuitry. The output of the inrush current limiter feeds the input of a three-phase, 400Hz isolation transformer. The output of the transformer is rectified and filtered, providing an unregulated +/-160Vdc split-rail output that feeds a pair of boost choppers having a +/-180Vdc regulated output. The regulated +/-180Vdc powers a continuous duty, pulse width modulated inverter, having a regulated 115Vac +/-3% 60Hz output. The output of the inverter is then connected to a protection circuit breaker and an output filter module. Converter output power is made available through a MS3102A16-10S style connector located on the UPS rear panel.

### **Optional EDBR-1SH-M and EDBR-2SH-M Battery Bank Mode of Operation:**

Battery current is supplied from the optional external battery system to the converter module through a front panel mounted MS3102E18-5P connector and external interface cable. Over-current protection is provided by two 30 Amp fuses connected in parallel, located on the output of the battery system. Additional protection fuses are located internal to the module to protect the battery bank in the event of a second converter module failure. The battery current is supplied to the converter via a second MS3102E18-5S connector. The positive side of the battery passes through a protection fuse and a solid-state battery disconnect switch. It is then connected directly to the +160Vdc bus. The negative battery lead is connected to the input of the “negative battery mirror” circuit and the AC neutral. The output of the negative battery mirror is connected to the -160Vdc bus. In the event of a utility loss, the battery seamlessly supplies current to the chopper and inverter circuits to sustain the PWM inverter output. When the battery level reaches 66Vdc +/- 2Vdc, the low battery audible alarm and LED are initiated. When the battery level drops to 61Vdc +/-2Vdc, the battery cutoff switch is opened stopping any further depletion of the battery. The inverter also turns off at this point. When the utility voltage returns, the UPS will automatically power up the inverter and start recharging the battery.

### **Communications Operation:**

Two RS-232 DB-9F connectors are located on the converters rear panel. They are labeled RS-232 A and RS-232 B. The RS-232 pin connections supported for both connectors are pins 2 (RxD), 3 (TxD) and 5 (RS-232 Gnd.). Both connectors are internally connected to the communications board sub-system. The sub-system also supports the connection of the input (phase A to phase B) for the purposes of monitoring the input voltage (200Vac nominal between phases A and B) and the input frequency (400Hz nominal). The output is also connected to the sub-system for the purpose of powering the communications sub-system to allow for the monitoring of the converter output voltage (115Vac nominal) and the percentage of output load. The percentage is given with respect to the full rated output capacity of the unit. The converter battery voltage is monitored and indicated with respect to the amount of battery charge remaining. The following dry contact signals are monitored and reported by the sub-system: Utility loss, low battery (66Vdc +/- 2Vdc), converter failure alarm. In the event of a detected unit failure, the communications board will indicate a failure alarm, the output will then be turned off disabling the communications functions, as the communications sub-system is powered by the module's output. There is enough reserve stored energy in the communications power supply to allow for the failure alarm bit to be detected. The audible and LED alarms will be initiated and remain active until the unit is turned off.

## Safe Battery Bank to Converter Interconnect Cable Installation and Removal Procedures



### WARNING

HIGH VOLTAGES AND CURRENTS ARE PRESENT WHEN PERFORMING THE FOLLOWING PROCEDURES. AVOID DIRECT CONTACT WITH CABLE CONNECTOR PINS AND ALL FUSES DURING THEIR REMOVAL AND INSTALLATION. HIGH VOLTAGES ARE PRESENT AT THE CONVERTER AND BATTERY BANK INTERFACE CABLE PANEL CONNECTORS.

#### Optional battery interface cable installation procedure when the converter is powered off:

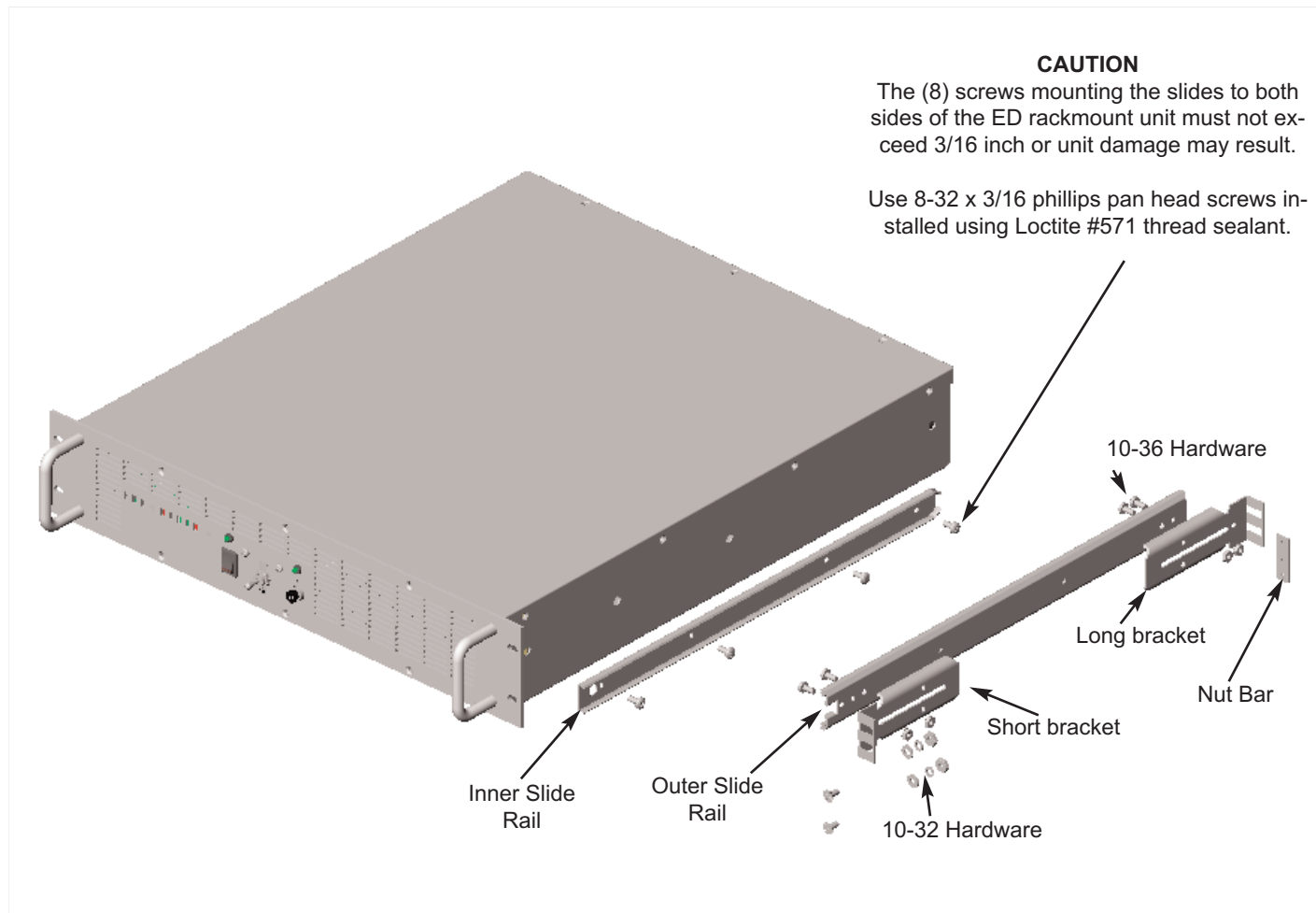
1. Locate the converter/battery interface cable.
2. Connect the converter side of the cable to the converter.
3. Using the fuse caps to remove the battery fuses, unscrew the two caps and remove the two fuses located on the battery bank front panel.  
**Do not remove the fuses with your fingers; only use the insulated plastic fuse caps and remove the fuse from the holder.**
4. Connect the battery banks side of the interface cable.
5. Use the fuse caps to reinstall the battery fuses and tighten the fuse caps. Both battery bank fuses are the same type and rating.

#### Optional converter and battery interface cable removal procedure when the converter is powered off:

1. Use the fuse caps to remove the battery fuses and unscrew the fuse caps and remove both fuses.  
Both battery bank fuses are the same type and rating.
2. Disconnect the battery banks side of the interface cable.
3. Disconnect the converter side of the cable to the converter.
4. Use the fuse caps to reinstall the battery fuses and tighten the fuse caps. **Do not install the fuses with your fingers; only use the insulated plastic fuse caps by inserting the fuse into the metal side of the cap and inserting the fuse into the holder.**

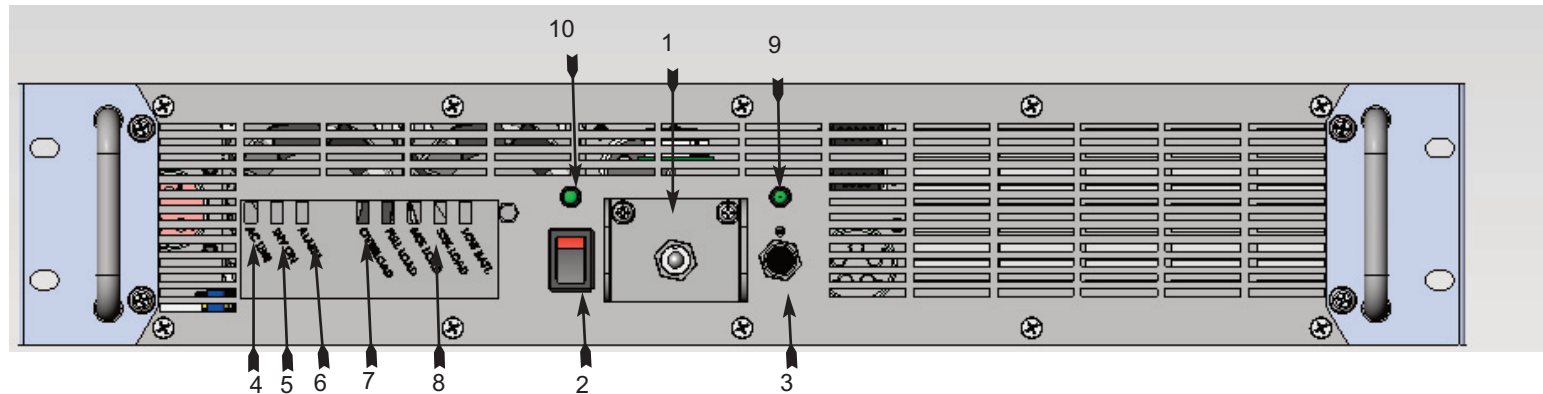
## Installation

### Slide Rail Installation Detail



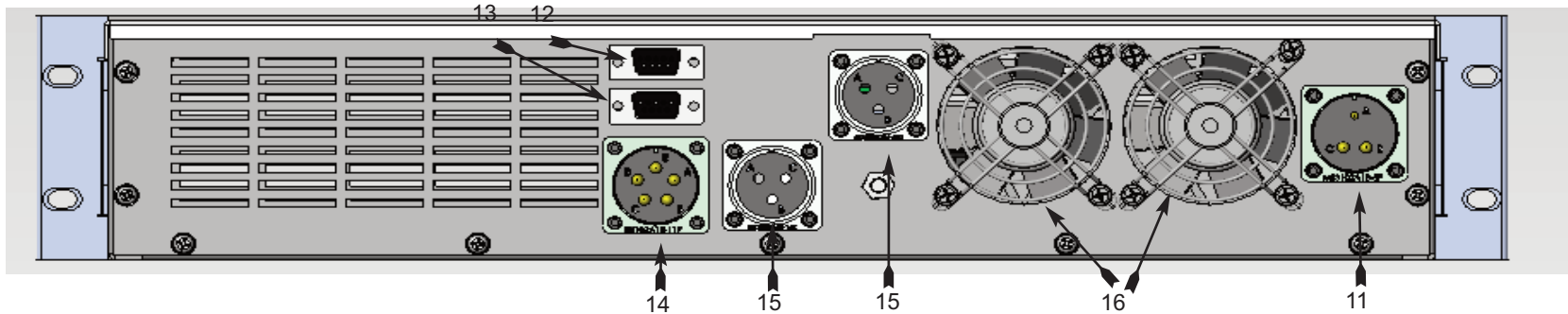
## Controls, Displays & Functions

### PHASE, FREQUENCY CONVERTER MODULE FRONT PANEL LAYOUT



1. **INPUT POWER CIRCUIT BREAKER**  
Switch the lever down to remove input power. With the external battery system connected, the unit will go into battery mode. Switch the lever to the up position to turn input power on and 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 unit on and off. Turning this switch to the off position will turn off power to the connected load.**
3. **OUTPUT CIRCUIT BREAKER**  
This circuit breaker provides overload protection for the unit. Pull the button out to turn off the output power to the unit. Push to reset.
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 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 unit has failed. During this condition, if the unit is not providing output, call FALCON® support for further assistance.
7. **LOW BATT.- LOW BATTERY WARNING INDICATOR**  
This ED unit is configured with an external battery system. 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 or less of battery runtime remains after the LED turns on.
8. **OVERLOAD/ FULL LOAD/ 66% LOAD/ 33% LOAD-**  
Adjacent to the red low battery LED is the green 1% to 33% load LED.  
Adjacent to the green 33% load LED is the green 34% to 66% load LED.  
Adjacent to the green 66% load LED is the yellow 67% to 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.

## PHASE, FREQUENCY CONVERTER MODULE REAR PANEL LAYOUT



11. **OPTIONAL BATTERY SUB-SYSTEM CONNECTOR**  
MS3102E18--5P  
Pin A = Ground, Pin B = 72Vdc Positive, Pin C = 72Vdc Return
12. **DB-9F RS-232A INTERFACE**  
This connector gives access to the first of two RS-232 ports. Pin 2 = RxD, Pin 3 = TxD, Pin 5 = Com Ground
13. **DB-9F RS-232B INTERFACE**  
This connector gives access to the second of two RS-232 ports. Pin 2 = RxD, Pin 3 = TxD, Pin 5 = Com Ground
14. **POWER INLET**  
Panel Mounted Inlet Mating Input Plug & Hardware  
**Input Power Pin Assignment MS3102A18-11P**  
Utility Phase A MS3102A18-11P - Pin A  
Utility Phase B MS3102A18-11P - Pin B  
Utility Phase C MS3102A18-11P - Pin C  
Utility Neutral MS3102A18-11P - Pin D  
Utility Ground MS3102A18-11P - Pin E
15. **OUTPUTS**  
**Output Pin Assignment**  
MS3102A16-10S Pin A = Line, Pin B = Neutral , Pin C = Ground
16. **COOLING FANS (3)**  
Cooling fans draw cool air from the outside of the front panel and exhaust it out through fans in the rear panel.  
**ALWAYS KEEP COOLING FAN AND FRONT PANEL VENTS CLEAR OF DEBRIS. DO NOT OPERATE THE UNIT IN AN ENCLOSED SPACE.**

## Operation

The FALCON® ED unit is very simple to use.

1. Prior to turning on the unit, verify the ED is connected to a three-phase Delta or Wye, 115/200 Vac, 400 Hz power source.
2. Turn on the input circuit breaker and 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 connector and verify it is 115Vac +/-3%.
6. Using an AC frequency meter, measure the ED output frequency at the ED output receptacle or connector and verify it is 50Hz or 60Hz or 400Hz +/-1Hz.
7. To test the optional external batteries 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 unit 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 2 for approximate hold-up times at 100% load.

10. Reset the input circuit breaker and turn the power switch "OFF".
11. Turn off the devices you wish to connect to the unit. Connect them to the output connector located on the rear panel 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 33% of load capacity. The second green L.E.D. represents approximately 66% 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 10 to 15 seconds, the unit will automatically shut off.
15. 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 power switch "OFF" and then back "ON". 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.

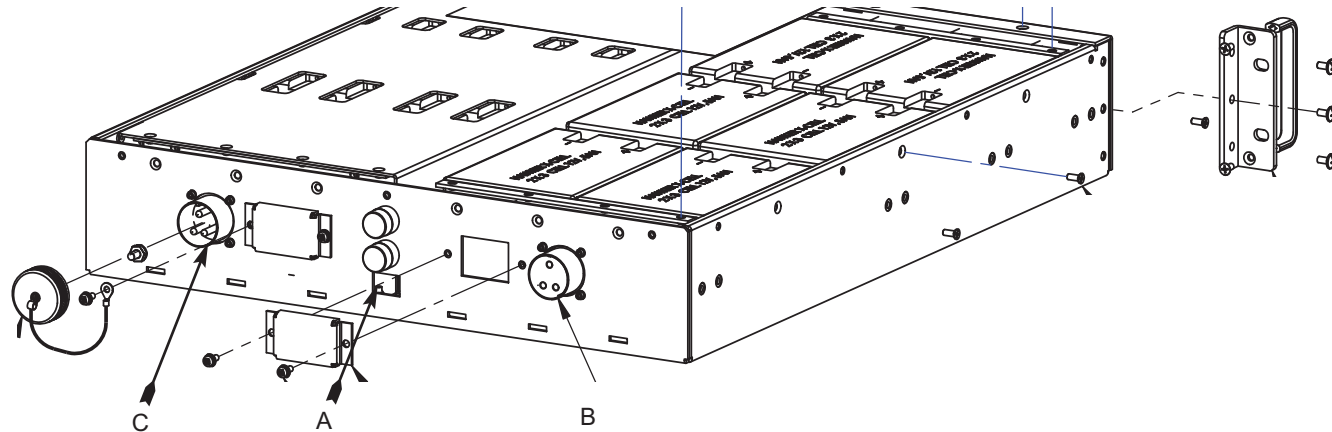


## WARNING

The power switch acts as a system ON/OFF switch. When this switch is turned "OFF", power is lost to the entire unit including the output connector at the rear of the unit, since the battery cutoff circuit will disconnect the battery supply.

### Optional EDBR-1SH-M and EDBR-2SH-M Battery Bank

The optional external 72Vdc, 5AH battery system may be shipped with the unit. The battery system is connected to the phase and frequency conversion module using the supplied interface cable. **Prior to attempting to install or remove the battery interface cable, follow the "Safe Battery Bank to UPS Interconnect Cable Installation and Removal Procedures" located on page 7 of this manual.**



- A. Battery system output fuses (2 pieces of Bussman KTK-R-30)
  - B. Converter1 Output interface connector (See pinout diagram)
  - C. Converter 2 Output interface connector (See pinout diagram)
- Battery Output Connector Pinout - A = Chassis Ground, B = +72Vdc, C = 72Vdc Return

## ED Series Modified Communications Protocol

The ED Series RS-232 Communications has a limited protocol set adopted from an existing commercial communications protocol. As the original ED COTS design was analog based, a digital monitoring and communications board was added to the design to meet remote monitoring requirements. To expedite the implementation of the remote monitoring, a modified and limited version of an existing Falcon communications protocol has been used.

A. General: This document specifies the RS-232 communication protocol for Falcon model ED4-2400RM-3/1-6-M. The protocol provides the following Features:

1. Monitor battery charger voltage status.
2. Monitor battery mode status.
3. Monitor the utility mode status.
4. Monitor output status.
5. Report existing ED utility loss, low battery and alarm signals. **Remote battery mode UPS shutdown function is present but not supported at this time.**

The connected computer and proprietary communications software shall control information exchange by continuous polling of each of the UPS RS-232 ports using a query command followed by carriage return <cr>. The UPS will respond with data followed by a <cr>.

B. RS-232 Port Setup:

BAUD RATE: 2400 bps  
DATA LENGTH: 8 bits  
STOP BIT: 1 bit  
PARITY: None

Interface cabling to the ED Series RS-232 PORTS A & B (Supports Concurrent Operation)

Straight RS-232 cable.

DB-9M  
Pin 5 – Ground Return  
Pin 2 – RxD  
Pin 3 – TxD



## Communications Protocol

### 1. Status Inquiry:

Remote Query: Q1<cr>

Converter: The following format converter status data stream is returned:  
(MMM.M NNN.N PPP.P QQQ RRR S.SS 'IT.T b7b6b5b4b3b2b1b0<cr>

UPS status data stream:

There is a space character between every field for data separation. The meaning of each field list is as follows:

a. Start Byte :(

b. Input Voltage : MMM.M

M is an integer number ranging from 0 to 9 with the unit of measurement in Volts.

c. Input Fault Voltage : NNN.N

N is an integer number ranging from 0 to 9 with the unit in Volts.

\*\* For ONLINE UPS\*\* Reported by Default

The purpose of this data is to identify a short duration utility fail which may have caused the online ED converter to go to battery mode. When this occurs the input voltage will appear normal at the time of query, prior to the fail and will still appear normal at next query. The Input Fault Voltage will hold the utility fail voltage until the next query. After the query, the input fault voltage will be the same as input voltage until next utility fail occurs.

d. Output Voltage : PPP.P

P is an integer number ranging form 0 to 9 where the unit of measurement is in Volts.

e. Output Current : QQQ

QQQ is a percentage of the maximum rated output current, not an absolute value.

f. Input frequency: RR.R (example 06.1 = 60.1Hz, 05.3=53Hz or 41.0=410Hz)

R is an integer number ranging from 0 to 9 where the unit of measurement is Hz.

g . Battery voltage: SS.S or S.SS

S is an integer number ranging from 0 to 9.

For ED on-line units the battery voltage/cell is provided in the form S.SS.

For standby units the actual battery voltage is provided in the form SS.S (Present but Not Used)

The converter type in the converter status will determine which reading was obtained.

h. Internal converter Temperature: TT.T (This command is acknowledged but is not supported by the converter)

T is an integer number ranging form 0 to 9 with the unit of measurement in degrees centigrade.

i. Converter Status : <U>

<U> is one byte of binary information such as <b7b6b5b4b3b2b1b0>.

Where bn is a ASCII character '0' or '1'

Converter status bits:

Bit Description

7	1: Utility Fail (Immediate)
6	1: Low Battery (asserts at a 62Vdc +/-2Vdc low battery level)
5	1: Bypass/Boost or Buck Active (This bit will always be "0" as it is not supported by the converter)
4	1 : ALARM_( During a failure alarm condition the converter would will be turned off. The alarm bit will only be active for a few seconds prior to the loss of the UPS output)
3	1: Converter Type (0 is ED on line type) Default
2	1: Test in Progress (This bit will always be "0" as it is not supported by the converter)
1	1: Shutdown Active (This bit will always be "0" as it is not supported by the converter)
0	1:BeeperOn (This bit will always be "0" as it is not supported by the converter)

j. Stop Byte : <cr>

Example: Computer: Q1<cr> UPS response:

(208.4 140.0 208.4 034 59.9 2.05 35.0 00110000<cr>

Input voltage is 208.4Vac.

Input fault voltage was 140.OV.

Output voltage is 208.4 V.

Output current is 34% of the rated output.

Input frequency is 590 Hz.

Battery voltage is 2.05V per cell. (36 Cells in the ED 72Vdc battery system = 36 x 2.05Vdc = 73.8Vdc)

Internal Temperature is 00.0 degrees of centigrade. Not Supported.

The converter type is an online. The converter has failed. Bypass is active (as the ED is a phase and frequency converter, bypass is not supported)

Supported by not used, and the 2. Test optional UPS function for 10 seconds: (This command is acknowledged but is not supported by the converter)

2. Converter Information Command:

Computer: I<cr>

The converter response: #Company Name Converter\_Model Version<cr>

This function will cause the converter to respond with the basic information about the manufacture of the converter and its model name. The length of every field is listed as follows:

Company\_Name : 15 characters, leave space if less than 15 characters.

Converter\_Model :10 characters, leave space if less than 10 characters.

Version : 10 characters, leave space if less than 10 characters.

There must be a space character between every field for separation.

### 3. Converter Rating Information:

Computer: F<cr>

The converter response: #MMM.M QQQ SS.SS RRR<cr>

This function instructs the converter to send the rating value of converter. There must be a space character between every field for separation. The converter's response contains the following information field:

- a. Rating Voltage: MMM.M
- b. Rating Current QQQ
- c. Battery Voltage SS.SS or SSS.S
- d. Frequency: RRR

#### **Supported Monitoring Functions**

ITEM	COMMAND	DESCRIPTION
1	Q1	Status Inquiry
2	I	Converter Information Command
3	F	Converter Rating Information

## Maintenance & Technical Support

### Care & Maintenance

Falcon® ED Series converters are designed to be low maintenance. They can be cleaned with a damp cloth or non-abrasive cleanser, providing the unit 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.

### Optional Battery -- Life vs. Temperature

Should the unit have the external battery option, for full battery life, keep the unit close to an ambient temperature of 25°C. The batteries should never be exposed to temperatures below -60°C or above 80°C.

### Optional Battery -- Replacement

The optional external battery system contains sealed wide temperature range, maintenance-free batteries (VRLA). The proper charge level must be maintained to assure the maximum battery life. **The batteries, when stored, will self-discharge and require recharging every six months if stored in a 25°C environment. They will have to be recharged every month if stored in a 50°C or above environment.**



#### 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 trained personnel knowledgeable of batteries and the required precautions.** Keep unauthorized personnel away from batteries. When replacing the optional batteries, use the same number and type of batteries. Follow the **Safe Battery Bank to Converter Interconnect Cable Installation and Removal Procedures on page 7 of this manual when connecting or disconnecting the battery bank for the UPS.**



#### IMPORTANT

- A. **NEVER** dispose of batteries in a fire, as batteries will explode.
- B. **NEVER** dispose of used batteries or the unit in the trash or landfill as it is against federal and state laws. **The unit and battery option must be recycled.** For unit 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.**



#### IMPORTANT

- 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.

**Storing the unit and optional battery bank.**

Should you need to store the unit for a long period, fully recharge the battery just prior to storage and recharge the battery every 6 months by plugging the unit into a power outlet and turning the unit on. It is recommended that the batteries charge for 48 hours after long-term storage.

**The optional batteries, when stored, will self-discharge and require recharging every six months if stored in a 25°C environment. They will have to be recharged every month if stored in a 50°C or above environment.**

**Technical Support**

For technical assistance contact:

FALCON ELECTRIC, INC.  
5116 Azusa Canyon Road  
Irwindale, CA. 91706  
Voice 626.962.7770  
Fax 626.962.6850  
Service 800.842.6940  
Email: [mstout@falconups.com](mailto:mstout@falconups.com)  
[www.falconups.com](http://www.falconups.com)

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 model and serial number 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.