

UltraLITE Model ELC Centralized Emergency Lighting Inverter

600W- 2kW General Specification

PART 1 - GENERAL

1.1 DESCRIPTION

This specification describes the features and design of an online, dual conversion, uninterrupted emergency lighting inverter power system. The Model ELC emergency lighting inverter system is designed to assure maximum reliability, serviceability and performance. The system incorporates an advanced DSP controlled, high frequency IGBT PWM rectifier/charger, IGBT PWM inverter, high speed automatic bypass transfer device, and 90 minute battery pack to provide immunity from all line disturbances and power interruptions with no break in AC output power. The system as described herein includes a normally on uninterrupted AC output power section and provision to include an optional normally off AC output power section, thus enabling compatibility with emergency lighting fixtures operating in normally on and/or standby modes. A self-diagnostic monitoring alarm system continuously advises system status and battery condition.

1.2 INVERTER RATINGS

<u>Model</u>	<u>Rating</u>
ELC 600	600 Watts
ELC 1000	1000 Watts
ELC 1500	1500 Watts
ELC 2000	2000 Watts

1.3 STANDARDS

The system is designed in accordance with applicable portions of the following standards:

- A. American National Standards Institute (ANSI C57.110)
- B. Institute of Electrical and Electronic Engineers (IEEE 519-1992) (C62.41-1991)
- C. National Electrical Manufacturers Association (NEMA PE-1)
- D. National Electric Code (NEC 2005, Article 700)
- E. National Fire Protection Association (NFPA 70) (NFPA 101) (NFPA 111)
- F. Underwriters Laboratories (UL 924)
- G. Federal Communications Commission (FCC Part 15, Sec. J, Class A)
- H. Federal Aviation Administration (FAA-G-201e)
- I. Listed UL 924 Emergency Lighting Equipment with 90 minutes, or UL 924 Auxiliary Lighting and Power Equipment for other than 90 minutes battery backup, or C-UL listed with 30 minutes to CSA Standard C22.2 No. 141-02, Canadian Electrical Code, Part I, and the National Building Code of Canada.

PART 2 - PRODUCTS

2.1 Input Specifications

- A. Input Voltage: 120 VAC or 277 VAC.
- B. Operating Range: +12% to -15% at full load without battery usage.
- C. The unit incorporates the use of variable range logic in conjunction with the load percentage to extend the input range to +12% to -30%, without battery usage, while maintaining a regulated output voltage.
- D. Frequency Range: 57.5 hertz to 62.5 hertz.
- E. Power Factor: Self correcting to > 0.97 (approaching unity).
- F. System AIC (Amperes Interrupting Current) Rating: 10kAIC.

2.2 Output Specifications

- A. Output Voltage: 120 VAC or 277 VAC.
- B. Sine Wave Voltage Output: Maximum 3% THD under linear load.
- C. Output Frequency: 60 hertz, plus or minus 0.5% under full load while in the battery operation mode.
- D. Harmonic Attenuation: Reflected load generated harmonics are attenuated at the input.
- E. Overload Rating (without use of static bypass): Up to 102% continuous, 125% for 30 cycles, 150% for 4 cycles when fed from the AC power source, or on battery.
- F. LED Inrush Rating (without use of static bypass): Peak overload capability of 1200% during a current surge of ¼ cycle, when fed from the AC power source or on battery, to accommodate inrush current from LED fixtures/drivers.
- G. Fault Clearing (with bypass available): 150% for 1 minute, 500% for 1 second, 1000% for 1 cycle.
- H. Normally Off Bus Output with User-Programmable Soft-Start: Adjustable settings are provided to limit the high inrush current, associated with energizing normally off emergency lights, to within inverter on battery overload ratings.
- I. Voltage Regulation: $\pm 2\%$.

2.3 Battery Specifications

- A. Battery Time: Standard battery run time is 90 minutes at full rated kilowatt output and listed to UL 924 Emergency Lighting Equipment, or 30 minutes at full rated kilowatt output and C-UL listed to CSA Standard C22.2 No. 141-02, or another battery run time at full rated kilowatt output and listed to UL 924 Auxiliary Lighting and Power Equipment.
- B. Battery Type: Integral, valve regulated, sealed lead calcium, maintenance free batteries.
- C. Charger: Four stage, 400 watts, temperature compensated, smart charge.
- D. Recharge Time: UL 924, NFPA 101 compliant, 24 hour recharge.

- E. DC Bus Voltage: 72 VDC.

2.4 Performance

- A. **Compatibility:** UltraLITE Model ELC centralized emergency lighting inverter systems are compatible with all fixture types. Fixture types include, but are not limited to LED, magnetic fluorescent ballasts, incandescent lamps, electronic and high power factor fluorescent ballasts and HID fixtures. Normally on and optional normally off AC outputs are 100% rated and limited only by the system's maximum kilowatt output rating.
- B. **Normal Operation:** The load is supplied with regulated power derived from the normal AC power input terminals through the rectifier charger and inverter. The rectifier charger is fully rated to charge the batteries and supply sufficient DC energy for the inverter when under full load. The battery is connected in parallel with the rectifier charger output.
- C. **Uninterrupted Emergency Operation:** Upon the failure or unacceptable deviation of commercial AC power, energy will be supplied by the battery through the inverter and continue to supply power to the load without switching loss or disturbance. When power is restored at the AC input terminals of the system, the rectifier charger continues to supply power to the load through the inverter and simultaneously recharges the batteries.
- D. **Standby Emergency Operation (optional):** Upon the failure or unacceptable deviation of commercial AC power or upon a remote input "command on signal", the standby, normally off AC output bus section of the system becomes energized thus providing emergency power for standby lighting fixtures which are required to illuminate only in the event of emergency. User-adjustable settings include transfer on delay time (0 to 8 seconds), transfer off delay time (0 to 15 minutes), and a soft start control (0 to 172 cycles) to accommodate the high inrush current associated with energizing normally off emergency lights, compatible with various lighting types and manufacturers.
- E. **Automatic Bypass Operation:** The system includes a high speed automatic bypass for fault clearing, for instantaneous overload conditions and/or to connect the load to the normal utility source in the event of a system rectifier charger or inverter failure.
- F. **Manual Bypass Switch:** The system includes an integral inverter bypass switch for use in case of an inverter failure. The switch is accessible via the front of the inverter enclosure, through a hinged door that requires a hand tool for access. When in the bypass position, the switch bypasses the inverter power control electronics and diverts utility power to the inverter's normally on output bus.
- G. **System Input Breaker Ratings:** Input breakers are sized to accommodate full rated load, low line input, and maximum recharge current simultaneously.

600 watt unit – 15A @ 120 VAC or 10A @ 277 VAC
 1000 watt unit – 20A @ 120 VAC or 10A @ 277 VAC
 1500 watt unit – 25A @ 120 VAC or 15A @ 277 VAC
 2000 watt unit – 30A @ 120 VAC or 15A @ 277 VAC

2.5 Environmental Specifications

- A. **Operating Temperature:** (20°C to 35°C for UL 924 Listed models – Emergency Lighting Equipment) (0°C to 40°C for UL 924 Listed models – Auxiliary Lighting and Power Equipment) (10°C to 40°C for C-UL Listed models). Optimum battery performance and life achieved at 25°C. Inverter electronics designed for use at 0°C to 40°C.
- B. **Inverter Storage Temperature:** -20°C to 50°C.
- C. **Battery Storage Temperature:** 25°C for 6 months. For each 9°C rise, reduce storage time by half.

- D. Relative Humidity: 95% non-condensing.
- E. Elevation: 5,000 feet, 1,500 meters.
- F. BTU/HR Emitted, Weight, Cabinet Sizes for UL 924 Listed models with 90 Minutes:

Rating / Voltage	BTUs / Hr		Dimensions W x D x H
	Full Load	Weight (lb.)	
600 / 120 - 120	546	269	22" x 11.75" x 40"
600 / 120 - 277	734	286	22" x 11.75" x 40"
600 / 277 - 120	734	286	22" x 11.75" x 40"
600 / 277 - 277	921	303	22" x 11.75" x 40"
1000 / 120 - 120	648	352	22" x 11.75" x 50"
1000 / 120 - 277	836	369	22" x 11.75" x 50"
1000 / 277 - 120	836	369	22" x 11.75" x 50"
1000 / 277 - 277	1024	386	22" x 11.75" x 50"
1500 / 120 - 120	750	372	22" x 11.75" x 50"
1500 / 120 - 277	938	402	22" x 11.75" x 50"
1500 / 277 - 120	938	402	22" x 11.75" x 50"
1500 / 277 - 277	1125	432	22" x 11.75" x 50"
2000 / 120 - 120	955	534	22" x 11.75" x 50"
2000 / 120 - 277	1143	564	22" x 11.75" x 50"
2000 / 277 - 120	1143	564	22" x 11.75" x 50"
2000 / 277 - 277	1330	594	22" x 11.75" x 50"

- G. Audible Noise Level: Not greater than 50 dba at 3 feet.
- H. Enclosure: NEMA 2, powder-coat painted steel construction, drip-proof, and sealed prohibiting rodent entry.

2.6 Display Monitor and Diagnostics

- A. Display Panel – System includes a local, front mounted, sealed, LED display panel to indicate system status and battery condition. Display automatically monitors inverter input voltage normal, inverter input voltage high, inverter input voltage low, inverter on automatic bypass, % load, battery in use, battery full charge, battery low and check battery.
- B. Audible Alarm – The display panel includes an audible alarm with alarm silence for system on battery, low battery, check battery, over temperature warning, system fault, and inverter overload.
- C. Control Functions – The display panel includes a push button for inverter on, fail safe dual push buttons for inverter off, alarm silence push button and push button for system battery testing.
- D. Communications Port (RS232) – Includes a DB9 and USB communications port for remote monitoring access to electrical measurements, system set point programming and system logs.
- E. Network Communications (optional) – User-access to system status, alarm conditions, electrical measurements, system logs, and battery test pass/fail results are provided via an Ethernet TCP/IP, MODBUS TCP, or MODBUS RS485 network connection.
- F. Electrical Measurements (RS232) – Electrical measurements include: input voltage L1-neutral, output voltage L1-neutral, output current (amps), output watts, output volt amperes, % load, battery voltage and DC charging current, and output frequency.
- G. System Set Points (RS232) – System includes provisions to program via computer interface the following: low battery alarm, battery usage, automatic battery tests programmable for 30 day

intervals, or 90 day intervals and an annual discharge test. The start date and time of the 30, or 90 day test selected and of the annual test (365 day interval) is easily programmed via the RS232 connection (DB9 or USB port). The time duration of the automatic battery test is programmable (30 seconds or 5 minutes).

- H. System Log (RS232) – System includes provisions to log power outages, system overloads and battery test pass/fail results, all with a date and time stamp.
- I. Automatic Self-Testing – System provides a programmable 30 second (UL 924A) or 5 minute (UL 924) automatic battery test that can be programmed to occur every 30, or 90 days.

2.7 Relay Interface

- A. Status / Alarm relay interface normally open contacts are provided for optional remote annunciator panel or automatic message dialer. Includes potential free, 120 VAC @ .5amps, contacts for inverter on battery, low battery warning, and general alarm.
- B. A normally closed Battery Test Active contact is provided that opens during automatic or manual system testing. This contact may be used to signal one or more UL924 listed shunt relays to bypass local control devices during periodic and annual NFPA-mandated tests, in order to provide emergency power to designated emergency lighting fixtures.

2.8 Reliability

- A. MTBF Electronic / Electrical System: 100,000 hours.
- B. MTTR: One hour typical.

2.9 Standard Equipment

- A. Terminals for hardwired input.
- B. Normally on, uninterrupted AC output bus.
- C. Automatic static bypass.
- D. Inverter manual bypass switch.
- E. Front mounted diagnostic monitor panel.
- F. Batteries (UL 924 Emergency Lighting Equipment with 90 minutes, C-UL Emergency Lighting Equipment with 30 minutes).
- G. Thermal magnetic AC input circuit breaker.
- H. Quantity one (1) AC output circuit breaker.
- I. DC battery circuit breaker and Anderson connector with interconnect cable.
- J. Output distribution circuit breaker panel.
- K. Copper conductor construction.
- L. Functional powder-coat painted steel cabinet enclosure with hinged access door.

2.10 Optional Equipment

- A. Timed normally off AC output bus with user-adjustable settings including transfer on delay time, transfer off delay time, and a soft start control.
- B. Pre-installed, 15 amp at 277 VAC, 15 or 20 amp at 120 VAC, single pole, output circuit breakers for use with normally on AC output bus and/or optional timed normally off AC output bus. (A total of 12 breakers or 6 monitored breakers, factory-wired to the normally on and/or normally off output bus, in any combination)
- C. System output circuit breaker open or tripped alarm contacts (monitored breakers).
- D. Remote annunciator panel.
- E. Fax/Voice/Web multifunction communications modem.
- F. Network device SNMP / Ethernet TCP/IP adapter.
- G. Network device SNMP / MODBUS TCP / Ethernet TCP/IP adapter.
- H. Network device SNMP / MODBUS RS485 / Ethernet TCP/IP adapter.
- I. Control device(s) override.
- J. Zone sensing device(s).

2.11 Warranty

- A. All power components and system electronics are guaranteed to be free from defects in material and workmanship for a period of 2 years following shipment from the factory.
- B. Batteries are warranted for 1 year full replacement, 14 years prorated.
- C. Extended warranty and maintenance contracts are available.

2.12 Serviceability

The inverter's power section, including all control cards and system electronics, is front-accessible and located behind a secure hinged access door for ease of service or component replacement. An integral inverter bypass switch is included. A DC circuit breaker and DC Anderson connector have been incorporated into the design to facilitate rapid replacement of the batteries via the front of the system enclosure. No side or rear access is required. To facilitate inverter diagnostics and programming, a DB9 and USB communications port is provided for access to electrical measurements, system set points, and system logs.