Lynx Power 3 (LP3)
Battery Backup Inverter with Power Regeneration Capabilities
Technical Specifications

PART 1 GENERAL

1.1 SUMMARY

A. This specification describes a three phase, solid state Inverter System utilizing reliable ECM Technology here after referred to as the LP 3. The LP 3 shall operate in conjunction with the existing building electrical system to provide high quality power conditioning, back-up power protection and distribution for loads. The system shall consist of solid-state inverter, a temperature compensated rectifier/battery charger, a 100% rated for continuous duty static switch , an internal maintenance bypass switch, battery plant, status/control panel, regeneration interface, and synchronizing circuitry as described herein. This unit has been designed to handle in-rush power to motor loads.

1.2 STANDARDS

A. The LP3 shall meet the requirements of the following standards:

1. IEEE 587-1980/ANSI C62.41 1980 Standards for Surge Withstand Ability
2. FCC rules and regulations of Part 15, Subpart J, Class A
3. Listed under UL 924, Standards for Lighting Inverter Equipment
4. NEMA PE 1 (National Electrical Manufacturers Association) - Lighting Inverter Systems
5. NEMA 250 (National Electrical Manufacturers Association) – Enclosures for Electrical Equipment (1000 Volts Maximum)
6. NFPA 70 – National Electrical Code
7. ISO 9001
8. Occupational Safety & Health Administration (OSHA)
9. Listed under UL1778 standards for Uninterruptible Power Systems (UPS) and UL924 standards for emergency lighting

1.3 SUBMITALS

A. Submittals for engineering approval shall contain the following documentation:

1. Installation Drawings: Indicate electrical characteristics and connection requirements. Provide cabinet dimensions; battery type, size, weight, and location of conduit entry and exit; single-line diagram, control, and external wiring requirements; heat rejection and air flow requirements.

2. Product Data: Provide catalog sheets and technical data sheets to indicate physical data and electrical performance, electrical characteristics, and connection requirements.

B. Upon delivery of the LP3 system the following submittals shall be included:

1. An operators and users manual showing safe and correct operation of all LP3 functions.

1.4 QUALIFICATIONS & QUALITY ASSURANCE

A. Manufacturers Certification: The manufacturer shall specialize in manufacturing of on-line, double conversion three phase LP3 modules specified in this document with a minimum of twenty years documented experience, and with a nation wide service organization. The manufacturer will use only reliable ECM technology. The manufacturer shall comply with ISO 9001 and shall be designed to internationally accepted standards.

B. Factory Testing: Prior to shipment, the manufacturer shall complete a documented test procedure to test all functions of the LP3 module and batteries (via a discharge test) and guarantee compliance with the specification. The manufacturer shall provide a copy of the test report upon request.

C. Materials and Assemblies: All materials and parts comprising the LP3 shall be new, of current manufacture, and shall not have been in prior service, except as required during factory testing. All active electronic devices shall be solid state and not exceed the manufacturers recommended tolerances for temperature or current to ensure maximum reliability. All semiconductor devices shall be sealed. All relays shall be provided with dust covers. The manufacturer shall conduct inspections on incoming parts, modular assemblies and final products.

1.5 DELIVERY, STORAGE, AND HANDLING

A. All products shall be packaged in a manner to prevent penetration by debris and to allow safe delivery by all modes of ground transportation and air transportation where specified.

B. Prior to shipping, all products shall be inspected at the factory for damage.

C. Equipment shall be protected against extreme temperature and humidity and shall be stored in a conditioned or protected environment.

D. Equipment containing batteries shall not be stored for a period exceeding three months without powering up the equipment for a period of eight hours to recharge the batteries.

1.6 ENVIRONMENTAL REQUIREMENTS

A. The LP3 shall operate under the following environmental conditions:

1. Temperature:

a. LP3 Module

(1). Operating: 0° to 40°C (32°F to 104°F)

(2). Non-Operating: -20°C to +60°C (-4°F to 140°F)

b. Batteries: 25°C (77°F)

2. Relative humidity (operating and storage): 5 to 95% non-condensing

3. Barometric Pressure:

a. Up to 1000 meters above sea level

b. Up to 2000 meters with ambient temperature less than 28°C

c. Up to 12,000 meters above sea level non operating

4. Audible Noise: 45 DBA at 3 feet

1.7 WARRANTY

A. LP3 Module: The LP3 shall be covered by a full parts and labor warranty from the manufacturer for a period of twelve (12) months from date of installation or acceptance by customer or eighteen (18) months from date of shipment from the manufacturer, whichever occurs first.

B. Battery: The battery manufacturer's warranty shall be passed through to the final customer and shall have a minimum period of one year full replacement with a 9 year prorated warranty.

1.8 SERVICE AND SPARE PARTS

A. The manufacturer shall upon request provide spare parts kits for the LP3 module in a timely manner as well as provide access to qualified factory trained service personnel to provide preventative maintenance and service on the CLEI module when required.

1.9 MAINTENANCE, ACCESABILITY AND SELF DIAGNOSTOCS

A. All LP3 subassemblies, as well as the battery, shall be accessible from the front. LP3 design shall provide maximum reliability and minimum MTTR (mean time to repair). To that end, the LP3 shall be equipped with a self-test function to verify correct system operation. The electronic LP3 control and monitoring assembly shall therefore be fully microprocessor based.

1. Auto-compensation of component drift;

2. Self-adjustment of replaced subassemblies;

3. Extensive acquisition of information vital for computer-aided diagnostics.

B. The LP3 shall be repairable by replacing standard subassemblies. Communication via an RJ45 with maintenance system shall be possible.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS/PRODUCT

A. DSPM Lynx Power 3 Emergency Elevator System

B. Engineer permits substitutions, subject to meeting all the requirements of this specification and having written approval no less than 10 days prior to bid closing.

2.2 PRODUCT SPECIFICATION

A. LP3 Design Requirements

1. Output Power Continuous Rating: The continuous output power rating of the LP3 shall be shall be_____ KVA (refer to product data sheet for power ranges).

2. Input Voltage: _____ VAC – 15% / +10%, 3 phase, 3 wire plus ground.

3. Output voltage: _____ VAC 3 phase, 3 wire plus ground.

4. Battery Autonomy: The LP3 shall be capable of operating at full load for 90 minutes at Unity PF output at a temperature of 25°C on battery power. Other backup times available.

5. Battery Type: Valve regulated sealed lead calcium (VRLA).

B. AC Input Characteristics

1. Input Frequency: 60 Hz

2. Power walk-in: 0 to 100% over a 10-second period.

3. Magnetizing Inrush Current: Less than nominal input current for less than one cycle.

4. Input Surge Protection: The LP3 is equipped with input R/Cs to withstand surges per IEEE 587-1980/ANSI C62.41

C. AC Output Characteristics

1. Voltage Regulation: ± 3% for balanced load and full 90 minute battery discharge mode.

2. Frequency: 60 Hz (± 0.1 Hz when free running).

3. Voltage Distortion: Maximum 5% total (THD) @ 100% linear loads.

4. Voltage Transient (Step Load) Response:

   a. + 5% for 50% step load change

   b. ± 8% for 100% step load change

   c. ± 3% for loss or return of AC input power or manual transfer at full load.

5. Voltage Recovery Time: Return to within 3% of nominal value within 50 milliseconds.

6. Phase Angle Displacement: 120° ± 1° degrees for balanced load; 120° ± 3° degrees for 50% unbalanced load.

7. Non-Linear Load Capability: Output voltage total harmonic distortion shall be less than 8% when connected to a 100% non-linear load with a crest factor not to exceed 2.5%.

8. Slew Rate: 1 Hz/second maximum

9. Power Factor: Unity power factor

10. Inverter Overload Capability (KVA Rating):

    a. 125% of rated load for 1 minute

    b. 145% of rated load for 10 seconds

    c. 700% ≤ 3 cycles, 500% 10 cycles

11. Bypass Overload Capability: > 700% for one cycle; > 150% for 30 seconds

D. DC Bus

1. DC Bus Voltage: 2.2 VDC/cell nominal Float level. The battery charger will compensate for temperature changes in accordance with the battery manufacturer's requirements. LP3 will utilize the patented Watch-dog interface software to control DC voltage; this control will extend life of batteries by 50%.

2.3 MODES OF OPERATION

A. The LP3 module shall be designed to operate as a system in the following modes:

1. Normal: The inverter shall be in standby ready to supply power to the critical load. The rectifier/battery charger shall derive power from the utility AC source, supply DC power to the inverter and simultaneously float charging the battery. Regeneration power is returned to utility.

2. Emergency: Upon failure of the utility AC power source, the critical load shall be supplied by the inverter which shall obtain its power from the battery. The regeneration section will return energy to the batteries.

3. Recharge: Upon restoration of the utility AC power source the rectifier/battery charger shall power the inverter and simultaneously recharge the battery.

4. Bypass Mode: The static bypass transfer switch shall be used to transfer the load to the bypass without interruption to the critical power load. Automatic re-transfer or forward transfer of the load shall be accomplished by turning the inverter on.

5. Regeneratiion Mode: Energy from elevator will be converted to battery charge current during power outages.

6. Manual Bypass Switch: A manual make before break internal manual bypass switch shall be provided to bypass the LP3 inverter output and static bypass switch allowing operation of the critical load.

2.4 COMPONENT DESCRIPTION

A. Rectifier / Battery Charger: Incoming AC power shall be converted to a regulated DC output voltage. The rectifier / battery charger shall provide high quality DC power to charge the batteries and power the inverter and shall have the following characteristics:

1. Input Current Limiting: The LP3 shall be equipped with a system designed to recharge the battery recharge current to conform to UL924 standard.

2. Modular Assembly: The rectifier/battery charger assembly shall be constructed of modular design to facilitate rapid maintenance.

3. Charging Levels: The battery charging circuitry shall be capable of being set for automatic battery recharge operation, float service and equalizing operation.

4. Temperature Compensated Charging: The battery charger shall be equipped with a temperature probe to enable temperature compensated charging and adjust the battery float voltage to compensate for the ambient temperature using a negative temperature coefficient of 3 mV per cell per degree Celsius at a nominal temperature of 25°C.

5. Capacity: The rectifier/battery charger shall have sufficient capacity to support a fully loaded inverter and fully recharge the battery in accordance with UL 924.

B. Inverter: The LP3 output shall be derived from a Pulse Width Modulated (PWM) IGBT inverter design. The inverter shall be capable of providing precise output power while operating over the battery voltage range. The inverter assembly shall be constructed as a modular assembly to facilitate rapid maintenance.

C. Static Bypass: The static bypass transfer switch shall be solid-state, rated for continuous 100% duty and shall operate under the following conditions:

1. Uninterrupted Transfer: The static bypass transfer switch shall automatically cause the bypass source to assume the critical load without interruption after the logic senses one of the following conditions:

2. Inverter overload exceeds unit's rating.

3. Battery protection period expired and bypass current is available.

4. Inverter failure.

5. Automatic Uninterrupted Forward Transfer: The static bypass transfer switch shall automatically forward transfer power from the bypass to the rectifier / inverter, without interruption, after an instantaneous overload -induced reverse transfer has occurred and the load current return the LP3's nominal rating or less.

6. Manual Transfer: A manual static transfer shall be initiated from the LP3 by turning the maintenance bypass switch.

D. Microprocessor Controlled Logic: The full LP3 operation shall be provided through the use of microprocessor controlled logic. All operation and parameters are firmware controlled. The logic shall include a self-test and diagnostic circuitry such that a fault can be isolated down to the printed circuit assembly or plug-in power assembly level.

E. Standard Communication Panel: The LP3 will include a standard easy to use communication panel. Included will be a LCD display. The LP3 communication panel will include pushbuttons that will permit the user to safely command the LP3.

2.5 SYSTEM CONTROLS AND INDICATORS

A. Front Panel LCD Display: The LP3 control panel shall provide a LCD display. The indication of LP3 status, metering, battery status, alarm event log and advanced operational features will be available. The display provides access to:

1. Measurements, status indications and events.

2. Menu protected by a password, used to make specific settings.

3. Event log with time stamping.

4. Access to all measurements.

B. System Parameters Monitored (data displayed): The visual display will display the following system parameters based on true RMS metering:

1. Measurements

a. Input voltage -(3 phase simultaneously)

b. Output voltage -(3 phase simultaneously)

c. Output current per phase- (3 phase simultaneously)

d. Output KW - (3 phase simultaneously)

e. DC voltage

f. Battery temperature

2. Status indications and events

g. Load on battery

h. Load on LP3

i. Load on automatic bypass

j. Low-battery warning

k. General alarm

l. Battery temperature

m. Additional indications shall provide maintenance assistance

2. Time-stamped historical events: This function shall time-stamp and store all important status changes, anomalies and faults and make this information available for automatic or user-requested consultation; it shall interpret the events and indicate remedial measures if applicable.

3. Optional Dry Contacts: The LP3 shall be capable of providing standard with a relay. The contacts will be normally open and will change state to indicate the operating status. The contacts will be rated at 2.0 A (125 VAC / 30 VDC). Contacts shall be programmed as:

a. Power On

b. Load on Utility

c. On Battery

d. Inverter On

e. Summary Alarm

2.6 MECHANICAL DESIGN AND VENTILLATION

A. Enclosure: The LP3 shall be housed in a freestanding enclosure. The mechanical structure of the LP3 shall be sufficiently strong and rigid to withstand handling and installation operations without risk. Access to LP3 subassemblies shall be through the front only. The sheet-metal elements in the structure shall be protected against corrosion by a suitable treatment, such as zinc electroplating, powder coating, epoxy paint or an equivalent.

B. Cable Access: The standard LP3 available shall accommodate side, top and bottom entry cables.

C. Ventilation and Heat Rejection: The LP3 shall be designed for forced air-cooling. Air inlets shall be provided from the front bottom of the LP3 enclosure. Air exhaust shall be from the sides and top portions of the unit.

2.7 BATTERY

A. The LP3 module shall use a valve regulated sealed lead calcium, heavy-duty industrial battery, designed for auxiliary power service in a LP3 application. The primary battery shall be furnished with impact resistant plastic case and housed in matching battery cabinet (s).

1. Protection against Deep Discharge and Self-Discharge: The LP3 shall be equipped with a device designed to protect the battery against deep discharge depending on discharge conditions, with isolation of the battery by a circuit breaker. In particular, a monitoring device shall adjust the battery shutdown voltage as a function of a discharge coefficient to avoid excessive discharge at less than the rated output.

2. Battery Self-Tests: The battery monitoring system shall be to perform the following automatic functions:

a. Battery circuit check

b. Partial discharge test customer selectable.

2.8 Optional External Maintenance Bypass: The maintenance bypass provides a wrap around bypass configuration for total LP3 isolation during maintenance. Maintenance bypass transfers shall be without interruption and shall have mechanical keyed interlocks to protect the LP3 from damage in the event of out of sequence transfers.

PART 3 EXECUTION

3.1 SITE TESTING START-UP

A. The LP3 system will be checked, started-up and tested on-site by a manufacturer's qualified field service engineer.

3.2 MAINTENANCE TRAINING

A. The manufacturer shall make available to the customer various levels of training ranging from basic LP3 operation to LP3 maintenance.

END OF SECTION