Cobra 3

Stand-By Emergency Central Lighting Inverter (CLI) Technical Specifications

PART 1 GENERAL

1.1 SUMMARY

A. This specification describes a stand-by, three-phase, solid state Lighting Inverter System utilizing Patented ECM Technology here after referred to as the CLI. The CLI shall operate in conjunction with the existing building electrical system to provide high quality power conditioning, back-up power protection and distribution for Lighting loads and other critical loads. The system shall consist of a 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, andsynchronizing circuitry as described herein.

1.2 STANDARDS

A. The CLI 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. UL 1778, 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)

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 CLI system the following submittals shall be included:

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

1.4 QUALIFICATIONS & QUALITY ASSURANCE

A. Manufacturers Certification: The manufacturer shall specialize in manufacturing of on-line,double conversion three phase CLI 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 patented 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 CLI 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 CLI 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 CLI shall operate under the following environmental conditions:

1. Temperature:
   a. CLI 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. CLI Module: The CLI 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.

1.9 MAINTENANCE, ACCESSIBILITY AND SELF DIAGNOSTICS

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

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1. Auto-compensation of component drift;
2. Self-adjustment of replaced subassemblies;
3. Extensive acquisition of information vital for computer-aided diagnostics.

B. The CLI shall be repairable by replacing standard subassemblies. Communication via an RS232 with maintenance system shall be possible.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS/PRODUCT

A. DSPM Cobra 3 Emergency Lighting 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. CLI Design Requirements

1. Output Power Continuous Rating: The continuous output power rating of the CLI shall be shall be _____ KW (refer to data sheet for power ranges).
2. Input Voltage: _____ VAC – 15% / +10%, 3 phase, 4 wire plus ground.
3. Output voltage: _____ VAC 3 phase, 4 wire plus ground.
4. Battery Autonomy: The CLI shall be capable of operating at full load for 90 minutes at Unity PF output at a temperature of 25°C on battery

power.

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 CLI is equipped with input MOVs 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:

a.125% of rated load for 1 minute
b.145% of rated load for 1 second

C. AC Output Characteristics

1.DC Bus Voltage: 2.3 VDC/cell nominal Float level. The battery charger will compensate for temperature changes in accordance with the battery manufacturer's requirements. CLI will utilize our watch-dog interface software to control DC voltage; this control will extend life of batteries by 50%.

2.3 MODES OF OPERATION

A. The CLI module shall be designed to operate as a double conversion, standby reverse transfer system in the following modes.

1.Normal:The inverter shall be in a stand –by mode ready to supply power to the critical load.The rectifier/battery charger shall derive power from the utility AC source and supply DC power to the inverter and simultaneously float charging the battery.

2. Emergency: Upon failure of the utility AC power source, the critical load shall be supplied by the inverter, switching within 16 to 60 milliseconds and shall obtain its power from the battery.

3. Recharge: Upon restoration of the utility AC power source (prior to complete battery discharge), 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.

5. Manual Bypass Switch: A manual break before make internal bypass switch shall be provided to isolate the CLI inverter output and static bypass and connect the load directly to the utility until service personnel can arrive to repair unit.

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 CLI shall be equipped with a system designed to limit 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 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 to full capacity in accordance with UL 924 specifications.

B. Inverter: The CLI 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.

D. Microprocessor Controlled Logic: The full CLI 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 CLI will include a standard easy to use communication-panel. Included will be a LED display. The CLI communication panel will include pushbuttons that will permit the user to safely command the CLI.

2.5 SYSTEM CONTROLS AND INDICATORS (optional).

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. Measurements

a. Input voltage indicator

b. CLI output voltage indicator

c. CLI output current indicators

d. DC voltage indicators

2.6 MECHANICAL DESIGN AND VENTILATION

A. Enclosure: The CLI shall be housed in a freestanding enclosure. The mechanical structure of the CLI shall be sufficiently strong and rigid to withstand handling and installation operations without risk. Access to CLI subassemblies shall be through the front and top 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 CLI available shall accommodate side, top and bottom entry cables.

C. Ventilation and Heat Rejection: The CLI shall be designed for forced aircooling. Air inlets shall be provided from the front bottom of the CLI enclosure. Air exhaust shall be from the top or side portions of the unit.

2.7 BATTERY

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

1. Protection against Deep Discharge and Self-Discharge: The CLI 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.

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

a. Battery circuit check

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