

# ***Spectron LSN (Life Safety Network) Suggested Specifications***

## **1. General**

### **1.1 Scope**

A Dual-Lite Spectron LSN (Life Safety Network) Series Inverter System shall be furnished to provide a reliable source of power, and shall operate during a utility line deficiency without any interruptions of power supplied to the load. The transfer from utility power to battery power shall utilize a true no break system, [digitally generated sine wave, pulse width modulated output system] to maintain a zero transfer time. The system shall be capable of powering any combination of electronic, power factor corrected, and self-ballasted fluorescent, incandescent or HID lighting, building management systems, motors, security systems and any other critical voltage or frequency-sensitive electronic loads. The system shall operate from 5-100% loading, and be rated to deliver its full KVA rating, at unity power factor, for a minimum of 90 minutes. A boost-tap transformer circuit shall be utilized to provide regulated output, during brownouts within +/-5% of incoming line voltage, without transferring to battery. Upon return of the normal AC utility line power, the system shall recharge the batteries within 24 hours without any interruptions of power supplied to the load. Upon an inverter failure, the load shall automatically be connected to the AC utility line.

### **1.2 Code & Standards**

The Dual-Lite Spectron LSN Series Inverter System shall be listed to meet these standards. APPLICABLE CODES AND STANDARDS INCLUDE:

- UL 924 Standard for emergency Lighting and Power Equipment
- UL 1778 Standard for Uninterruptible Power Supply Equipment
- ANSI C62.41: ANSI C62.45 (Cat. A & B)
- FCC class A
- Complies with NEC, OSHA and Life Safety Code

## **2. Product**

### **2.1 Manufacturer**

The Central Emergency Inverter System specified herein shall be the Dual-Lite Spectron LSN Series Inverter System manufactured by Dual-Lite, Christiansburg, Virginia.

### **2.2 Category and Type**

Furnish and install a Dual-Lite Spectron LSN Series Inverter System that will supply a minimum of \_\_\_\_ KVA at 60Hz for a period of \_\_\_\_ hours upon interruption, brownout, or failure of the monitored AC utility line.

### **2.3 Operation**

The system's operation is fully automatic. It uses a linear transformer, with boost tap and surge protection devices. The inverter shall be of the Pulse Width Modulated (PWM) design, and shall provide true "no break" power to the load at all times.

During normal operation, the charger maintains the battery bank at full capacity. The three on-board microprocessors continuously monitor charger settings and system's overall readiness. The system consists of circuitry including an automatic, multi-rate, software controlled charger; continuous self-diagnostics monitoring 265 various parameters, and programmable system testing capabilities. The system shall incorporate 30 individual alarms and 9 system logs. All Logs and Alarms are automatically recorded and readily displayed through the microprocessor controlled User Interface Display (UID). The system shall also include a RS232 Serial port for remote communications.

The system's automatic overload and short circuit protection in normal and emergency operations shall consist of 150% momentary surge capability, 120% overload for 5 minutes, and 110% overload for 10 minutes. The system protection shall also include a low battery voltage disconnect, AC-input circuit breaker, a DC input fuse and switch, and an AC output fuse. The system shall supply a digitally generated sinusoidal output waveform (PWM) with less than 5% total harmonic distortion at rated linear load. A boost tap transfer protection circuit will maintain the desired

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output voltage during low voltage “brownout” situations, without continuously switching to batteries; thereby preserving battery capacity.

### **2.4 Input Voltage**

The available input voltage(s) to the systems shall be 120, 208, 240, 277, and 347 volts, +10% to -15%, single phase, with a frequency of 60Hz. The system shall have an AIC rating of 42,000 RMS symmetrical amperes.

### **2.5 Output Voltage**

The available output voltage(s) of the system shall be 120, 240, 277, 120/240, 120/277, 347 volts, +/- 5%, single phase sine wave, with a frequency of 60Hz + 0.05Hz on inverter. The output frequency when on utility power shall be as supplied by the utility.

### **2.6 System Diagnostics**

The system’s user interface display (UID) shall include an array of 5 LED lights; a 2-line 40-character LCD display, and keypad to control and monitor the system. The UID will be menu driven and will also have the ability to display individual system parameters using a corresponding number code (Hot Key). The array of LED lights shall monitor the AC Output presence (green), System Ready status (green), Battery Charging status (red), Inverter On (amber), and Alarm functions (red). The system shall provide for the displaying of all parameters, operating modes, alarms, and acknowledgment of alarms. To ensure only authorized personnel can operate the unit, the system shall be multi-level password protected for all control functions and parameter changes.

The system will have a continuous scrolling display of the following meter functions: input AC voltage, output voltage, AC output amps, battery voltage, battery charging amps, battery discharge amps, output volt-amps (VA), output power (Watts), power factor, percent loading, input frequency, output frequency, ambient temperature, battery temperature, last inverter run time, total inverter run time, system run time, date and time. The system will also have the capability to display all other meter functions via a menu driven display, or “Hot Key” commands. The system shall be completely microprocessor controlled providing continuous monitoring of all sub-systems to ensure system is operational in emergency situations. The system will continuously monitor 265 parameters to insure readiness.

### **2.7 Alarms**

The system shall have 30 audible and visual alarms with automatic logging of the 25 most recent events. The system’s alarm acknowledgement feature shall enable the user to silence only the current audible alarm(s) without silencing other alarms, or clearing the alarming condition until the fault has been addressed. Alarms shall monitor as a minimum; low, near low, and high battery voltage, high AC input voltage, high and low AC output voltage, output volt-amp overload, low run time left; high ambient, heat-sink, transformer, and battery temperatures, temperature probe failure, system test failure, and circuit breaker tripped.

### **2.8 Manual and Programmable Testing**

The system shall incorporate a manual test function and three automatic test modes. The user shall be able to perform a system test at anytime. The system shall also perform a programmable, self-diagnostic test of its subsystems to ensure reliability, including a weekly, monthly, and annual test. Automatic recording of the last 20 test events shall be kept in their own separate Test Results Log.

### **2.9 Battery Charger**

The charger shall be software controlled, temperature compensated, three-step float type charger, with equalize. The charger shall charge the batteries continuously during normal standby condition. Following a power failure the charger will start in constant current mode until battery voltage reaches Equalize. Equalize voltage will be maintained until charging current drops to .5 amps or .3% of the battery amp/hour rating; battery voltage will then be allowed to drop down to Float. Recharge time shall not exceed 24 hours.

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## **2.10 Batteries**

The batteries will provide sufficient power to maintain the output voltage of the inverter for a period of 1.5 hours, without dropping below 87.5% of nominal battery voltage. The standard batteries shall be enclosed in a cabinet that permits easy maintenance without requiring removal. The following types shall be available:

\_\_\_ **Sealed Lead Calcium, VRLA (S):**

Standard battery supplied (unless specified otherwise). Requires no addition of water over the life of the battery. The case and cover shall be constructed of polypropylene, contain low-pressure safety release vents, and be non-gassing in normal use. 10-year design life expectancy at 77°F (25°C).

\_\_\_ **Sealed Lead Calcium VRLA (G):**

Optional, supplied in cabinets. Requires no addition of water over the life of the battery. 20-year design life expectancy at 77°F (25°C).

\_\_\_ **Wet Cell Nickel Cadmium (N):**

Optional, supplied in cabinets. Pocket plate construction with a translucent case. 25-year design life expectancy at 77°F (25°C).

## **2.11 System Options**

The following factory installed optional equipment shall be available with the system:

\_\_\_ **Output Circuit Breakers with Alarms:**

A maximum of 14 positions (20 positions without alarms) are available for all models. Single pole 120V and 277V breakers use one position each, while double pole 240V breakers use two positions each. When specifying, for each circuit breaker chosen, decrease the available number of output breakers by the proper number of positions occupied.

\_\_\_ **Normally Off Output Breaker:**

Used when the lighting fixtures are to be energized only during a power outage. The Normally Off circuit breakers are user programmable for a delay of up to 999 seconds. A maximum of 8 positions are available for all models. Single pole 120V and 277V breakers use one position each, while double pole 240V breakers use two positions each. When specifying, for each circuit breaker chosen, decrease the available number of output breakers by the proper number of positions occupied.

\_\_\_ **Optional Run time:**

UL924 and the NEC require a minimum of 90 minutes. Up to four hour run time is available.

\_\_\_ **Facsimile Modem Communications Panel (FAX):**

Transmits system operating status reports over a dedicated analog phone line to up to six locations. Each designated fax location automatically receives a unit status report transmission following all monthly and annual test cycles, or when an alarm condition is detected by the system's self-diagnostic electronics. Status reports include readings on key operating parameters, as well as complete alarm and inverter log printouts, in uncoded, user-friendly descriptions. Option also allows for two-way communications thru terminal emulation software such as HyperTerminal (HyperTerminal is not supplied with unit).

\_\_\_ **System Monitoring Terminals (SMT):**

Provides 2, PC board mounted, terminal blocks to allow customer access to the RSP (Remote Status Panel) outputs, and both the Inverter and Alarm Active Relays. These relays are form C low power contacts (commonly referred to as "dry contacts") and can be user defined for a time delay of up to 999 seconds. They both incorporate normally open and normally closed contacts. It also provides access to +12 Volts DC, DC ground, and the 2 Normally Off relay driver signals.

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### **2.12 System Accessories**

The following accessories shall be available with the system:

\_\_\_ **Maintenance Bypass Switch (MBS):**

For increased safety, permits the transfer of protected equipment to direct AC utility power when maintenance is to be performed on the system. Can be Make-Before-Break (MBB) or Break-Before-Make(BBM).

Note: The MBS cannot be used in conjunction with more than one single pole output circuit breaker, or units with dissimilar input and output voltages.

\_\_\_ **Remote Status Panel (RSP):**

Permits greater flexibility and convenience to monitor the system operational status from a remote location, up to 1000 ft. This option allows the user to remotely monitor the status of the inverter via 5 LEDs and an audible alarm. The RSP provides the following indicators:

Alarm LED (Red)

Audible Alarm

Charging LED (Red)

Emergency Power LED (Yellow)

Ready LED (Green)

A/C On LED (Green)

\_\_\_ **Multiplexer (MX):**

The Multiplexer is an external device that enables the user to communicate with up to 16 Spectron LSN systems, through a single dedicated analog phone line. The MX option requires for one of the systems to be monitored to have the FAX option. The phone line is then installed to that system. Systems can be installed up to 100 feet away from the Multiplexer without the use of Short Haul Modems.

\_\_\_ **Short Haul Modem (SHM):**

Short Haul Modems are devices that boost signal levels when RS232 communications are installed more than 100 feet away from the Spectron LSN. The SHM consists of 2 devices; one that is installed next to the Master Spectron LSN, and the other is installed at the remote location.

### **2.13 Maintenance, Service and Enhanced Warranty Plans**

The following plan(s) shall be offered to assure initial and long term viability of the system through additional maintenance and service plans and/or through enhancements to the standard two-year electronics limited warranty.

#### **FACTORY START UP (FS)**

Factory Start Up is designed to insure proper operation and installation of the Spectron LSN Inverter System. It provides for a highly trained Factory Authorized Technician to administer an on site point-by-point visual check of the system. Included is a check of all internal electrical connections, AC and Battery connections, system voltages and all system parameters. The system is then powered up and all systems parameters are tested, calibrated and recorded. The technician will also perform a Battery Discharge Test to insure proper battery capacity. If any malfunctions are detected, depending on the availability of parts, the technician will remedy them while on site, or make arrangements to do so. The Technician will instruct on site personnel on the operations and maintenance of the equipment. Warranty of the equipment will commence on the Start Up date providing all other Warranty terms have been met.

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## **EXTENDED WARRANTY (EW)**

Extends the normal two-year Warranty of the electronics portion of the system up to an additional three years, available in one-year increments. Extended Warranty requires the Factory Start Up and FAX options to be ordered with the system. It provides for the continuous monitoring of the equipment by our Factory Technical Support Group. It also provides for a yearly jobsite visit by a Factory Authorized technician to perform a battery discharge test, and a visual and electrical check of the equipment.

Upon notice of any system's failures, the problem will be remedied via the remote connection or by sending a Factory trained Authorized technician to the jobsite. This automatic response process insures the highest degree of system reliability and minimizes owner's involvement. All parts and labor, except batteries, are included in the Extended Warranty. Batteries carry their own pro rata warranty. Requires a dedicated analog telephone line, to be provided by customer.

## **SERVICE AGREEMENT (SA)**

Provides for an Annual visit by a Factory Trained Authorized to test all system's options and related accessories Technician will perform a physical and mechanical inspection of all batteries and battery connections. Included will be a test, calibration and recording of the system's charger output, battery Float voltages, and all input/output settings. Technician will also perform a simulated power outage discharging the batteries to 87.5% of nominal voltage and record periodic readings of individual battery voltages.

## **MONITORING PROGRAM (MP)**

Requires Factory Start Up and Fax options. It provides for the continuous monitoring of the equipment by our Factory Technical Support Group. All weekly, monthly and yearly system tests will be reviewed and analyzed for early warning signs of system malfunctions. Any failures will be automatically relayed to our Service Department where corrective action can be taken. This Monitoring Program is the only automated failure reporting system in the industry. Requires a dedicated analog telephone line, to be provided by customer.

## **2.14 Mechanical**

The system shall be contained in a code gauge, NEMA 1 steel cabinet, finished in a scratch resistant, powder coat finish, with a key lock, and conduit knockouts at the top and sides, with front opening doors with air filters. Cabinets shall be designed to allow stacking to minimize the overall system's footprint. The system shall include a plenum to expel heated air from inside the unit. All components must be front accessible. All components shall have a modular design and a quick disconnect means to facilitate field service.

## **3. Execution**

### **3.1 Wiring**

All wiring shall be installed in conduit and shall be sized as required for voltage drop purposes to assure proper operation of connected loads. Input and output wiring shall enter the cabinet in separate conduits.

### **3.2 System Operation**

The system shall allow connection of both "normally on" and "normally off" (optional) loads. Connected loads shall be carried via the transfer circuit by the utility during normal operation or by the system inverter during utility failures without interruption.

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## **3.3 Connected Loads**

The system shall be designed to maintain the normal operation and performance integrity of all connected loads, including voltage and frequency sensitive equipment, by providing true “no break,” digitally generated sinusoidal output. Refer to plans for type and location of loads served by the system.

## **3.4 Factory Start-up**

Provides a factory service representative to perform the initial start-up of the system. Refer to Section 2.13 for additional information.

## **3.5 Drawings and Manuals**

Drawings and manuals supplied with each system shall include:

- \_\_\_ Complete set(s) of shop drawings showing physical dimensions, mounting information and wiring diagrams.
- \_\_\_ Installation/Users manual(s) with complete instructions for locating, mounting, interconnection, and wiring of the system with operating and preventive maintenance procedures.

## **3.6 Installation**

The system shall be installed in accordance with all appropriate manufacturers’ installation instructions and in compliance with all appropriate codes.

## **3.7 Warranty**

The system shall be guaranteed, under normal and proper use, against defects in workmanship and materials for a period of two years from the date of shipment. Batteries supplied as part of the systems shall be covered under a separate pro-rata warranty as described below.

- **Sealed Lead Calcium VRLA, 10-year life expectancy (Type S)** - one-year full replacement warranty plus an additional nine years pro-rata.
- **Sealed Lead Calcium, 20-year life expectancy (Type G)** - One year full replacement warranty plus an additional fourteen years pro-rata.
- **Wet Cell Nickel Cadmium, 25-year life expectancy (Type N)** - One year full replacement warranty plus an additional fourteen years pro-rata.

**Note:** Batteries must be installed on the system’s energized charging circuit within 90 days from date of shipment to maintain the validity of the Warranty.

## **3.8 Maintenance and Service**

Maintenance and service programs will be made available by the supplier to assure long-term reliability of the system. Refer to Section 2.13 for additional information.

- Specifications subject to change without notice.