TECHNICAL SPECFICATIONS

POWER WAVE ELEVATE

THREE-PHASE (30 TO 200KVA)
ELEVATOR BATTERY BACKUP SYSTEM
SINGLE INTEGRATED SYSTEM FOR ELEVATOR AND EMERGENCY LIGHTING

(ALSO AVAILABLE UP TO 300KVA**)**

1. GENERAL

1.1 SCOPE

This guide provides technical information and specifications for OnLine Power's Power Wave Elevate. The Power Wave Elevate equipment herein shall be referred to as the Battery Backup System, or UPS.

In case of a power failure. the Power Wave Elevate a UL924 UPS utilizes a bidirectional operation to provide the backup power to the Elevator up to 2 hours (120 minutes), with delay transfer and still suitable for all lighting loads including per UL 924 any combination for electronic and security systems, Power Factor Corrected Self-Ballast Fluorescent, Incandescent, Quartz Restrike, Halogen, HID, HPS and LED Lighting during battery backup operation.

The Power Wave Elevate shall be capable of providing (7) Normally closed contacts to interface with building power system management.

For Regen Elevators, the optional Regen Manager eliminates the need for traditional Automatic Transfer Switch (ATS), load banks and cooling systems, reducing footprint, and eliminating the need for onsite maintenance by remotely monitoring the system status and readiness to provide emergency power. Additionally, during a power outage, the system converts Regenerative power generated by Elevator to DC power and supply power to the batteries to extend the Battery Backup time.

When the unit is on emergency power, on utility return, the unit shall provide optional adjustable time-delay (60 or 120 seconds) to allow elevator control to switch to normal power, so eliminating the need for ATS Switch.

Power Elevate shall have the ability to issue a signal to elevator, *Utility Power is Not Present*, to allow elevator to display *Unit is on Emergency Power*.

The system also provides 120VAC Connection for Elevator Cab Lighting up to 3kw, eliminating the use of additional transformers. The Power Wave Elevate can

provide optional 2 (two) Main Sub-Feed Breakers (UL489) to feed the EM Lighting and the Elevator.

1.2 STANDARD

The Elevator Battery Backup System complies with the following standards:

- **Certified to UL1778 for safety.**
- **Certified to UL 924 and CSA 22.2 No. 107.1.**
- **Meets IBC 1009 and IFC Compliance**
- **Meets ICC 1009.2.1 Requirements.**
- **FCC rules and regulations, Part 15, Subpart J, Class A**
- **NEMA PE-1**
- **NFPA 101 (Life Safety Code)**
- **ANSI C62.41 (IEEE 587)**
- **ANSI C62.42.45 (Cat. A and B)**
- **TVSS UL1449 4th Editions - UL Standard for Safety Transient Voltage Surge Suppressors (Type 3, 4)**

1.3 APPROVED MANUFACTURER

The Inverter shall be an Elevator Battery Backup System and shall be manufactured by: OnLine Power, Inc.

Website: www.onlinepower.com

You can contact us at: (800) 227-8899 or via e-mail: sales@onlinepower.com

1.4 QUALIFICATION AND QUALITY ASSURANCE

1.4.1 Manufacturer's Certification

A minimum of twenty years' experience in the design, manufacture and testing of a solid-state Emergency Central Lighting Inverter is required. The manufacturer shall specialize in manufacturing online, High Frequency, Emergency Central Lighting Inverter and Elevator Emergency Backup modules as specified in this document. The manufacturer shall hold a current ISO 9001 certificate and shall design and develop the units in accordance with internationally accepted standards.

1.4.2 Materials and Assemblies

All materials and parts in the Elevator Emergency Backup System shall be new, of current manufacture and unused, except for the purpose of factory testing. All active electronic components shall be in a solid state and designed so as not to exceed the manufacturer's recommended ratings and tolerances for ensuring maximum reliability. All IGBTs and other semiconductor devices shall be sealed.

1.4.3 Factory testing

Every unit shipped will have completed a documented functional test of the Elevator Emergency Backup System. A copy of the test report shall be available at the customer's request.

1.5 HIGHLIGHTED FEATURES

- The Elevator Battery Backup System shall meet safety requirements per IBC 1009 and IFC Compliance, while still meeting all UL924 requirements.
- The Elevator Battery Backup System shall be one integrated system to provide up to 120 minutes of backup to the elevator and 90 minutes backup to building lighting system.
- The Optional Regen Manager eliminates the requirement for a traditional Automatic Transfer Switch (ATS) and its associated circuitry. This reduces the system's footprint need for load banks, cooling systems, and onsite maintenance through remote monitoring capabilities. Additionally, during a power outage, the system converts Regenerative power generated by Elevator to DC power and supply power to the batteries to extend the Battery Backup time.
- Power Elevate shall have the ability to issue a signal to elevator, *Utility Power is Not Present*, to allow elevator to display *Unit is on Emergency Power*.
- When the unit is on emergency power, on utility return, the unit shall provide optional adjustable time delay (60 or 120 seconds) to allow elevator control to switch to normal power, thus eliminating the need for ATS Switch.
- The Elevator Battery Backup System must be compatible with all elevators including regenerative elevators.
- It provides RS232 or RS485 Communication Port monitor health of the system, any alarm or warning.
- The system shall include user programmable (monthly and yearly) battery test scheduling and report with printing capability for UL924 compliancy.
- The Elevator Battery Backup shall have provision for 2 (two) Main Sub-Feed Breakers (UL489) to feed the Lighting and the Elevator.
- Optional remote communications (RS232, RS485) to reduce onsite maintenance cost by monitoring health, alarms, and warnings of the system.
- It shall provide 120VAC (3kw) Connection for Elevator Cab Lighting therefore eliminating the use of additional transformers.
- Programmable automatic system testing capabilities (10 seconds monthly and full battery backup yearly) to meet UL924 requirements.

1.6 OTHER FEATURES

- **Multi-CPU design**

The Elevator Emergency Backup System shall employ several CPUs in the control circuit, and critical functions design with parallel redundancy to improve reliability. Therefore, in case of one CPU failure, the other CPUs keep the Elevator Emergency Backup System operational, and the output AC is not affected.

- **Intelligent Charger:**

The Elevator Emergency Backup System shall automatically recharge (boost charge) the batteries every time the batteries are depleted to a voltage level equal to 2V/Cell. Thus, the batteries can be restored to full capacity as soon as possible and made ready for the next back-up requirement. To keep the batteries in the best condition, the Elevator Emergency Backup System will boost-charge the batteries for several hours (selectable) automatically every month. To avoid over charging the batteries, boost charge will stop when the ambient temperature is over 35ºC (95ºF).

- **Programmable automatic system testing capabilities (10 seconds monthly and full battery backup yearly).**
- **No break in transfer time (from Utility to Battery) mode.**
- **Visual displays of all alarms.**
- **DC to AC converter (Inverter)**
- **Input surge protection.**
- **EMI suppression.**
- **Plug & Play Modular design.**
- **Cold Start function.**

  The Elevator Battery Backup System shall accept wide input range, so that it can work effectively under an unstable AC source. All the input components used are specifically selected to handle extreme high voltage and high current**.**
- **Protection against misuse:**

The Elevator Emergency Backup System shall be designed with a breaker on/off sensor, power supply sensor.

- **Redundant power supply:**

A supplemental power supply is added to provide redundancy for supplying power to the static switch, so that there will be AC output no matter what happens to the Elevator Emergency Backup System.

- **DC Input Breaker**
- **Battery bank sized for the system's runtime requirements (90 to 120 Minutes for UL924 and Elevator application)**
- **Communication Interface Provisions:**
  - (RS232, RS485) for dedicated computer monitoring health of the system 24-7.
  - Web Communication
  - Facility Interface (Dry Contacts)
- **Manual Test Switch**
- **100% Unbalance Load - Output Voltage Regulation – ±1%, Phase Shift – 120° ±0.5%.**

INVERTER DESIGN REQUIREMENTS

- **Output Load Capacity – The continuous output power rating of the Inverter shall be [Select Unit Capacity]**

  “Output load capacity must be sized based on the total system starting current (Inrush Current)”
- **Input Voltage – [Select Input Voltage.]**

- **Output Voltage – [Select Output Voltage],**
- **Battery Type – [Select Battery Type from drop down menu].**
- **Battery Run Time – 120 Minutes Standard. (based on steady state current)**
- **Optional Sub-Feed Breakers:**
  - **One (1) Breaker to feed the Elevator Panel (UL489) 3Pole at ___Amps**
  - **One (1) Breaker Emergency Lighting Panel. (UL489) 3 Pole at ___Amps**

For all other configurations consult factory

2. SYSTEM DESCRIPTIONS

2.1 SPECIFICATIONS

2.1.1 System Overall Specification

- **Operation Mode –**
  - Green Mode: Hybrid design; (Fast Transfer less than 2ms).
- **Overall System Efficiency** 96%~98% (varies by KVA)
- **Overload –**
  - 110-125% – 15 minutes
  - 125-150% – 5 minutes
  - Higher than 150% – 30 Seconds
- **Protections –**
  - Short Circuit for Rectifier/By-pass
  - MOV for Lightning
  - EMC Filter for Input and Output
- **Status Panel:**
  - It shall consist of 4 X 40 characters LCD display for real time status, Data or Historical Events
  - 24 Status LEDs, 8 Warning LEDs
  - Mimic Display
  - Audible Alarm
  - Inverter ON/OFF Switch.
  - LCD control Switch.

2.1.2 AC Input

- **Input Power Factor ≥ 0.97**
- **Power Walk-In time – 20 sec from 0 to 100%**
- **Frequency – 50/60 Hz ± 7**
- **Input Current Harmonics –**
  - 33% for 6 Pulse Rectifier unit.

- 15% for 12 Pulse Rectifier units.
- 9% Input Filter option is available.

2.1.3 Inverter and Output Specification:

- **DC Input Voltage Range to Inverter –** 285-420VDC (inverter can be started without an AC source).
- **Output Waveform –** Sinusoidal Wave
- **Output Power Factor –** 0.8 PF
- **Output Voltage Regulation at 100% Unbalanced Load –** ±1%
- **Output Frequency Tolerance –** ±0.1 Hz
- **Phase Shift Under 100% Unbalanced Load –** 120° ±0.5%
- **Output Voltage Total Harmonics (THD) –** Less than 2%
- **Output Maximum Peak Current (AMP) –** +125% of Rated Output current.
- **Overload:**
  - Less than 110% Load: Continuous
  - 125-150%: 5 minutes
  - Higher than 150%: 30 Seconds
- The System shall have (optional):
  - RS232, RS485 ports for dedicated computers
  - Web Communication provision
  - Facility Interface (Normally Close Dry Contacts)
  - Transfer (from Emergency Power to Utility Power).

2.1.4 Battery Specification

Sealed, Maintenance-Free VRLA (Valve-Regulated Lead–Acid) Batteries shall be provided. The batteries shall have an expected life of 10 years or a minimum of 250 complete discharge cycles. The batteries shall be contained in the external cabinet(s) with dedicated circuit breakers (not fuses) for battery protection and convenient power cut-off, and servicing. The battery run time (based on 100% full load) shall be no less than the specified time. Runtime shall comply with UL924 providing a minimum of 90 minutes at full load. Specified extended runtimes shall be provided only as an option. Optional 20 years battery life expectancy and high-temperature are available.

- Standard Run Time – To run for 2 hours based on the elevator power requirement and 90 minutes for lighting load in accordance with UL924 (if combined with lighting load)
- Extended Run Time – As required (Optional) up to 240 minutes at full load.
- Battery Type – Sealed, Maintenance-free, Lead-Acid, VRLA (Standard) 10 years
  - Optional High Temperature (35°C)
  - Optional 20 years
- **Voltage –** 348VDC (Range: 295-410VDC)
- **Low Battery Warning Voltage –** 320VDC
- **Low Battery Shut-down Voltage –** 295VDC.

- **Boost Charge Voltage –** 402VDC
- **Float Charge Voltage –** 390VDC

2.2 STATIC SWITCH SPECIFICATION:

- **Voltage Range:**
  - 96-144VAC (Line to Neutral) for 208/120V units
  - 222-332VAC (Line to Neutral) for 480/277V units.
- **Efficiency: 99.5%**
- **Transfer Time:**
  - From Main Input Source to Inverter: 0.2ms
  - From Inverter to Main Input Source: 0.2ms
- **Overload:**
  - 100% for 30 Seconds
  - 300% for 7 Seconds
- **Isolation with Output**

2.2.1 Mechanical Design and Constructions

- Physical Specifications

Cabinet floor mount design, forklift capable, black finish with a maximum depth of 32” to maximize front accessibility. The cabinet shall be no more than a 56” width for best layout (bookshelf style). The cabinet height shall not exceed 80” to allow access through a standard door.

- Enclosure

All system components shall be housed in a single floor mounted freestanding NEMA 1 enclosure. The cabinet should have front access, allowing easy component access. Cabinet doors shall require a key for gaining access. Front access only shall be required for safety and servicing, adjustments and installation. The cabinet shall be structurally adequate and have provisions for hoisting, jacking and forklift handling.

- Construction

Only quality, unused material shall be used to build the unit, under strict observance of quality standards and workmanship. The cabinets shall be cleaned, primed and painted matt black. The unit shall be constructed with rigorously tested, burned-in, replaceable subassemblies. Only two electronic subassemblies, a Heat Sink Assembly with IGBTs and drivers and a Control PCBA, shall be used for maximum reliability and ease of servicing. All printed circuit assemblies shall have plug connections. Like assemblies and like components shall be interchangeable.

- Earthquake Protection:

The cabinet shall be evaluated for earthquake zone 4 installation with the addition of optional earthquake brackets.

2.2.2 Environmental (Electronics)

Operating Temperature: **0□to 40□C (0 to 104□F)**

Storage Temperature: **-20° to 70°C (-4° to 158°F)**

Altitude:	**Less than 1500 meter (5000 feet) Above Sea level**
Relative Humidity:	**0 ~ 90% (Non-Condensing)**
Audible Noise:	**Less than 65dBA at 1 meter/39.4 inches**

2.3 MODES OF OPERATION

2.3.1 Green Mode

Green Mode (Fast Transfer, less than 2ms). This mode bypasses the Double Conversion operations during normal steady state enabling higher efficiencies, greater that 97%.

2.3.2 Normal

The rectifier converts the AC input to DC power to supply the inverter and charge the batteries simultaneously. All the fluctuations, surges and spikes of the AC input are removed during AC to DC conversion. Therefore, the AC supplied by the inverter is clean and stable.

2.3.3 Backup

Since the batteries are connected directly to the DC bus, when the AC fails, the batteries change immediately from receiver to donor, supplying energy to the inverter instead of receiving energy from the rectifier. The output AC is not interrupted. Therefore, the load connected to the output is protected.

2.3.4 Optional Regen Manager

The Optional Regen Manager, during a power outage, converts Regenerative power generated by Elevator to DC power and supply power to the batteries and extends the Battery Backup time. Additionally Eliminates the requirement for a traditional Automatic Transfer Switch (ATS) and its associated circuitry. This reduces the system's footprint, load banks, cooling systems, and the need for onsite maintenance through remote monitoring capabilities.

2.3.5 Reserve Mode

When the inverter is in an “abnormal condition”, such as over temperature, short circuit, abnormal output voltage or overloaded for a period exceeding the inverter’s limit, the inverter will automatically shut down in order to protect itself from damage. If the utility power is normal, the static switch shall transfer the load to the reserve source without interrupting the AC output.

2.3.6 Maintenance Bypass Mode

In the case of UPS maintenance or battery replacement, and where the load cannot be interrupted, the user can turn off the inverter, close the bypass breaker and then open the rectifier and reserve breakers. The AC output will not be interrupted during the manual bypass transfer procedure.

Generally, the Elevator Battery Backup System is expected to run 24 Hours a day in normal operation mode once it is installed, except when the utility power fails, under overload conditions, or during maintenance.

2.4 COMPONENT DESCRIPTIONS

2.4.1 Input Terminal Block

For ease of installation, an input terminal block is hard wired and located in a convenient location for incoming power cables. The conduit entries are located on the top or bottom (raised floor) entry.

2.4.2 Input Circuit Breaker

A circuit breaker is provided and hard wired at the UPS input for protection of overload conditions. Optionally, a higher KAIC breaker is available and should be specified when required.

2.4.3 Additional 120VAC Connection for Elevator Cab Lighting

2.4.4 Input Contactor

The UPS will have a line contactor to disconnect the input line when an outage occurs so that there is no back feeding of power into the power line.

2.4.5 Output Circuit Breaker

An output circuit breaker is provided and hard wired at the Elevator Battery Backup System output for protection from overload conditions. Optionally, a higher KAIC breaker is available and should be specified when required.

2.4.6 DC (Battery) Breaker

The Elevator Battery Backup System will have a DC Battery Circuit Breaker to disconnect the DC power from the batteries to allow for service.

2.4.7 Input Transformer

The input transformer adjusts the input voltage for proper rectifier DC voltage, depending on the unit rated power and back-up capacity.

2.4.8 Rectifier

The main function of a rectifier is to convert the AC input to DC power and supply it to the inverter. The inverter then converts the DC power to AC power for the load. The Elevator Battery Backup System uses DC power to charge the batteries as well, which is the most efficient method of charging.

The Elevator Battery Backup System units 10KVA to 60KVA uses 6-pulse, fully controlled rectification (optional 12-pulse). An inductor is added before the rectifier to improve the power factor, smooth the current waveform and eliminate the harmonic current. The control circuit regulates the DC bus within 1%. Soft Walk-In circuitry (approximately 20sec.) and Current Limit circuitry is used to prevent over current or instantaneous surge currents.

The power component used in the rectifier is specifically selected to withstand extreme high voltage and high current. The rectifier is designed to operate under a wide range of AC input, from 177 to 300VAC, and to operate under poor power conditions found in some areas.

2.4.9 Inverter

The inverter is composed of IGBTs, inductors, capacitors, snubbers, control circuits and protection circuits. The inverter converts the DC power from the DC bus to AC power to supply the output load. The Elevator Battery Backup System uses IGBT technology which switches at frequencies beyond the audible range, therefore producing no audible noise.

An independent inverter is used for each phase. Although it is more expensive, each inverter has its independent feedback, so that the voltage is unaffected when load is added to the adjacent phase, producing excellent voltage regulation under 100% unbalanced load.

The Elevator Battery Backup System shall use redundant protection circuitry to protect the inverter. A robust snubber is added to suppress the spikes and noise, oversized, semi-conductor fuses are provided, with maximized ventilation the design is more reliable.

2.4.10 Static Switch

The static switch is composed of two pairs of SCRs, connected back-to-back. The switch can transfer the load from reserve to inverter or from inverter to reserve without losing power at the output. Therefore, it is a very important portion of an Elevator Battery Backup System.

2.4.11 Maintenance Bypass

The Maintenance Bypass system shall use 3 circuit breaker schemes:

- **Rectifier**
- **Reserve**
- **Bypass**

The maintenance bypass switch is already installed inside the Elevator Battery Backup System for convenience, and it should be open under normal operation, and only closed during maintenance. All power supplies inside the UPS must be disconnected before touching any parts inside the UPS. The maintenance bypass switch is necessary to maintain AC power at the output and yet keep maintenance personnel safe at the same time. If the bypass breaker is closed under normal operation, the inverter will stop, and the load will be automatically transferred to reserve to prevent the inverter connecting directly to the AC source.

Note: To safely use the maintenance bypass breaker, switch off the **Rectifier Breaker** first. The static switch will automatically transfer the load to reserve without delay. Then close the **Maintenance Bypass Breaker,** and then open the **Reserve Breaker**, so that the load gets power from the output without interruption.

2.4.12 Output Transformer

The Output isolation transformer (True Galvanic Isolation) can solve the problem of poor input grounding, allowing a different ground between input and output, avoiding the annoying problem of ground leakage current, and can be tied to any potential provided on site.

2.4.13 Inverter Test Switch

Inverter Test Switch is a push button switch for testing the unit for proper operation. When the unit is running and the switch is pressed, the unit will automatically transfer to battery operation. The unit will continue to run on batteries until the switch is released. When the switch is released, the unit returns to normal operation (provided input power is present).

2.5 SYSTEM DIAGNOSTICS AND ALARMS

The front panel is located at the front of the PCB holder. It gathers the real time information of the System and shows it clearly to the user. It also provides switches for controlling and setting up the system.

2.5.1 Optional Dry Contacts

Optional Seven (7) dry contact terminals shall be provided. These terminals are Normally Closed, dry (non-conducting) contact. When an event occurs, the terminal will close (conduct). Maximum contact rating is 16A/250VAC (16A/30VDC). The connections provided are:

- Inverter ON
- Output Overload
- UPS Fault
- Charger OFF
- Bypass ON
- Battery Low
- Summary Alarm

2.5.2 LCD display

Real time status, data or historical events are displayed on the LCD. The System parameters, real time clock, inverter, and buzzer also can be set through this LCD. The LCD is backlit by LEDs to provide a sharp display. In order to lengthen the LED's lifetime, the LEDs are automatically shut off 3 minutes after no key is activated but will light up again when one of the up/down/enter keys are pressed.

2.5.3 Status LEDs

24 LED's, representing all the essential information of the system and providing the most up to date information to the user. These LEDs are especially important when abnormal conditions occur.

2.5.4 Warning LEDs

When an abnormal condition occurs, the LED's will light up to warn the user of the cause of the faulty condition. The LEDs are not illuminated under normal conditions,

2.5.5 Audible (Buzzer) Alarm:

For abnormal conditions, an audible sound should be emitted to warn the user to check the status of the system. The alarm buzzer will beep under an Inverter Overload, Back Up Mode, or an Inverter short circuit condition.

2.6 OPTIONS

2.6.1 Regen Manager (for Regen Elevators):

The Optional Regen Manager, during a power outage, converts Regenerative power generated by Elevator to DC power and supply power to the batteries and extends the Battery Backup time. Additionally Eliminates the requirement for a traditional Automatic Transfer Switch (ATS) and its associated circuitry. This reduces the system's footprint, load banks, cooling systems, and the need for onsite maintenance through remote monitoring capabilities.

2.6.2 Dry Contacts:

Seven (7) dry contact terminals shall be provided. These terminals are Normally Closed, dry (non-conducting) contact. When an event occurs, the terminal will close (conduct). Maximum contact rating is 16A/250VAC (16A/30VDC). The connections provided are:

- Inverter ON
- Output Overload
- UPS Fault
- Charger OFF
- Bypass ON
- Battery Low
- Summary Alarm

2.6.3 Time Delay (Battery to Utility):

Optional adjustable time delay (60 or 120 seconds) to allow elevator control to switch to normal power, thus eliminating the need for ATS Switch.

2.6.4 Seismic Mounting Brackets for Electronics and Battery Cabinets:

The seismic floor mounting brackets include one left bracket and one right bracket per cabinet (UPS and Battery).

2.6.5 OSHPD Rated Units: (Shaker Table Tested and Certified for Operation):

Our System has also received special seismic certification from the California Office of Statewide Health Planning and Development (OSHPD), which are the most rigid seismic standards available. They have been shaker table-tested in accordance with the ICC-ES AC156, **(Different Height)**

2.6.6 Local on PC - Via RS232 or RS485 Communication Port

This option requires a PC and UPSCom monitoring software on a Windows platform. Data sent to the PC is displayed as a control room panel for real-time monitoring. The distance from the PC for RS232 cable should be limited to between 25 and 150 feet. By using the RS485 port, the range can be extended to one thousand (1000) feet.

2.6.7 Battery Monitoring (Optional)

Battery Monitoring is also available through the Battery Advisor Monitoring System. Monitors for individual battery voltage, battery impedance and (optional) battery temperature.

2.6.8 Optional Temperature Monitoring System

For fire prevention, a battery thermal runaway control option provides protection in case of an over-temperature condition in the battery compartment. If such a condition occurs, this option shuts off the charger. Charging resumes when the temperature returns to normal. With optional dry contact relay for user Interface to facility equipment.

2.6.9 DB9 Connection

Four RS-485 and one RS-232 is provided to communicate with more sophisticated (option) modules. Each connector is especially dedicated to one type of external module. The following are some connections examples of optional modules.

2.6.10 Software for PC Monitoring – UPSCOM™

UPSCOM™ is a hardware/software combination installed on a PC to monitor multiple units with a DB9 connection in series. The connector on the Elevator Battery Backup System's side is RS-485 (for long distance transmission); therefore, an RS-485 ⇔ RS-232 adapter (hardware) is required to modify the signal. The software and hardware together form a package called UPSCOM™. See the UPSCOM™ specification for further information. Software on a CD, cable harness and an SNMP CARD are provided with the UPSCOM option.

2.6.11 Modbus RS485 RTU

Modbus RS485 RTU is available as an option for Building Management System Integration.

2.6.12 Input Transient Voltage Surge Suppressor (TVSS) To UL1449 Type 3, 4

TVSS is a DIN rail mounted device, connected to the Inverter input. Its plug-in phase modules are easily replaceable. The device contains energy absorbing components and has two-stage protection. When a protection component is damaged by absorbed transient, the device will display a flag indicating a need for replacement.

2.6.13 Web/Simple Network Management Protocol (SNMP) Communication Card

This option is a web enabled monitoring device for a unit with Internet or network connection. The SNMP/Web card can monitor the Inverter on the network through a standard web browser. Connection can be made through Ethernet or a WIFI Modem. Independent IP addresses are automatically provided.

2.6.14 UPSCOM™

It is a hardware/software combination installed on a PC to monitor multiple units with DB9 connection in series. The connector on the UPS's side is RS-485 (for long distance transmission); therefore, an RS-485 ⇔ RS-232 adapter (hardware) is required to modify the signal.

2.6.15 Wireless Battery Monitoring System (Battery String and or Individual Battery)

This option provides monitoring of individual battery, string, or both on a local display, (without PC requirement), remote or web enabled display. It provides for assessment and warning of actual remaining battery capacity and block deterioration for maximum battery life and total run time availability to avoid backup failure, with the following capabilities:

- **User selectable measurement intervals (Second, Hour, Daily, Weekly and Monthly) to measure, record and graph.**
- String Monitor:
  - **String voltage**
  - **String current**
  - **Cabinet temperature**
  - **String Impedance**
- Individual Battery Monitor:
  - **Battery voltage**
  - **Battery Ohmic value (without loss of battery capacity)**
  - **Individual Battery Impedance**
  - **Battery temperature - Optional**

A wireless touch screen data collector (up to 75 feet with single antenna) is used to communicate with all sensors while it can provide an Ethernet port for remote monitoring and communications.

2.6.16 Battery Cabinet

Battery Cabinet must be designed for offering optional fans and interface with building fans without need of external temperature controller, by offering interfacing with building exhaust fan controls, with or without dry contact and with sound alarm, to meet energy storage standard safety section 1206 to maintain less than 1% Hydrogen concentration.

2.6.17 Battery Thermal Runaway Control (Without Shutting down the Battery)

Provides protection in case of over temperature condition in battery compartment by shutting off the charger and will resume charging when temperature has returned to normal temperature range, (without shutting down the backup battery bank) **to meet section 1206 of electrical energy storage compliance (Greater than 75 KWH of Battery Power).** With optional dry contact for facility ventilation.

2.6.18 Delta connections

- ☐ Delta
- ☐ Hi-Legged Delta (3 single phases with 1 leg Grounded).

2.6.19 Two (2) Sub-Feed Breakers

- ☐ One (1) Breaker to feed the Elevator Panel (UL489)
- ☐ One (1) Breaker Emergency Lighting Panel. (UL489)

3. WARRANTY

3.1 INVERTER MODULE

The inverter manufacturer shall warrant the Inverter against defects in materials and workmanship for a period of twenty-four (24) months. The warranty shall cover all parts and labor for a 12-month period beginning with the factory startup, 13th through 24th months only valid with factory performed preventive maintenance, (extended warranty contract).

3.2 BATTERY

The battery manufacturer's standard warranty shall be transferred and assigned to the end user. It will have a minimum period of one (1) year (9 years pro rate) when operated in a specified environment not to exceed 25°C (77°F).

4. FACTORY STARTUP, MAINTENANCE, & EXTENDED WARRANTY

4.1 FACTORY STARTUP

Offer factory trained service personnel to perform the initial startup of the Central Lighting Inverter System.

4.2 SYSTEM OPERATION

The system shall allow connection of either "normally on" or "normally off" (Dedicated Emergency Lighting) 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 with zero transfer time.

4.3 SERVICE PERSONNEL

The Elevator Battery Backup System manufacturer shall employ a nationwide service organization, with factory trained Customer Service Engineers dedicated to the startup, maintenance and repair of Elevator Battery Backup System and power equipment. The manufacturer shall provide a fully automated national dispatch center to coordinate field service personnel scheduling. One toll free number shall reach a qualified support person 24 hours a day, 7 days a week and 365-days a year. For emergency service calls, the response time from a local Customer Engineer shall be approximately 15 minutes.

4.4 CONNECTED LOADS

Power Wave Elevate 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", continually conditioned sinusoidal output. Refer to plans for the type and location of loads served by the system.

4.5 REPLACEMENT PARTS

Parts shall be available through an extensive network to ensure around-the-clock parts' availability throughout the country. Customer Support Parts Coordinators shall be on call 24 hours a day, 7 days a week and 365 days a year for immediate parts dispatch. Parts shall be delivered to the site within 24 hours.

4.6 MAINTENANCE TRAINING

In addition to the basic operator training conducted as a part of the system start-up, optional classroom courses for customer's employees shall be made available by the manufacturer. The course shall cover Elevator Battery Backup System safety, theory of operation, location of subassemblies, battery considerations and System operational procedures. It shall include AC/DC and DC/AC conversion techniques as well as control and metering, troubleshooting and fault isolation using alarm information and internal self-diagnostics with an emphasis on interpretation.

4.7 MAINTENANCE CONTRACTS

A comprehensive range of preventive and full-service maintenance contracts shall be available. An extended warranty and preventive maintenance package shall be available. Factory trained Service Engineers shall perform all services.

4.8 LOAD BANK TESTING AT SITE

The manufacturer's field service personnel shall provide optional load bank testing at site if requested. The testing shall consist of a complete test of the Elevator Battery Backup System and the associated options supplied by the manufacturer. The test results shall be documented, signed, and dated for future reference.

5. INSTALLATION

The Elevator Battery Backup System shall be installed in accordance with all appropriate manufacturer's installation instructions and in compliance with all appropriate local codes.

5.1 WIRING INSTALLATION

The Elevator Battery Backup System and battery cabinet(s) conduit entry arrangement shall allow for flexibility of user wiring installation. The wiring shall be routed through the top or bottom (for raised floor) of the cabinet.

5.2 WIRING TERMINATION

The Elevator Battery Backup System input, output and DC connections shall be hard-wired within the cabinet. Hard wired DC connection in battery cabinet(s) shall be provided, Input, Output and DC terminal blocks shall be compression type.

Drawings and manuals supplied with each unit shall include:

- **Complete set(s) of shop drawings showing physical dimensions, mounting information and wiring diagrams.**
- Installation and operation Manual(s) with complete instructions for locating, mounting, interconnecting, and wiring of the system including batteries and its required maintenance.