TECHNICAL SPECFICATIONS

POWER WAVE 3

THREE-PHASE (8 TO 50 KW)
UL924 CENTRAL LIGHTING INVERTER

1. GENERAL

1.1 SCOPE

This guide provides technical information and specifications for OnLine Power's Power Wave 3 **C**entral **L**ighting **I**nverter **S**ystem.

The Power Wave 3 equipment herein shall be referred to as UPS or Central Lighting Inverter.

The Power Wave 3 features high reliability solid-state double conversion digital signal processing and a high frequency pulse-width modulated (PWM) system that harnesses the advantages of IGBT's (**I**nsulated-**G**ate **B**ipolar **T**ransistors) in its design. The Power Wave 3 will provide high quality regulated and conditioned AC power to all types of lighting loads all the time. It switches to battery power with virtually zero transfer time upon an input power loss or disruption.

The Power Wave 3 meets UL 924 requirements for emergency lighting system applications and provides the security of 90-minutes of battery backup power. It is suitable for all lighting loads including 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 3 can be operated at 0 to 100% loading for a minimum of 90 minutes. Upon the restoration of power from the AC utility line, the system automatically returns to normal operation without any interruption of power to the load. The Power Wave 3 meets UL 924 requirements for recharging the battery while utilizing an industry distinctive small footprint. This allows equipment installation in limited spaces.

NOTE: This Guide Specification is subject to change without notice due to product improvement and/or enhancement.

Please use this document as a guide specification and do not hesitate to contact our Application Engineering Department if you have any further questions or special requirements.

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

1.2 STANDARD

The Power Wave 3 complies with the following standards:

- **CSA certified per UL1778,**
- **UL 924 and CSA 22.2 No. 107.1.**
- **UL 924/UL 924A – Life Safety for Emergency Backup Lighting**
- **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 Emergency Central Lighting Inverter system and shall be manufactured by:

OnLine Power, Inc.

Website: www.onlinepower.com

1.4 QULIFICATION AND QUALITY ASSURANCE

A. Manufacturer's Certification

A minimum of twenty year's experience in the design, manufacture and testing of solid-state UPS is required. The manufacturer shall specialize in manufacturing of online, double conversion, high frequency, UPS (Inverter) 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.

1.4.1 Materials and Assemblies

All materials and parts in the UPS shall be new, of current manufacture and unused, except for the purpose of factory testing. All active electronic components shall be solid state and designed so as not to exceed the manufacturer's recommended ratings and tolerances for ensuring maximum reliability. All IGBT's and other semiconductor devices shall be sealed. All incoming parts, modular assemblies and sheet metal shall undergo detailed receiving quality inspection.

1.4.2 Factory Testing

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

1.5 PRODUCT FEATURES

The system shall utilize high frequency pulse width modulation and digital signal processing for control and monitoring. The system's automatic overload and short circuit protection of the inverter in normal and emergency operations shall have 150% momentary surge capability and withstand a 115% overload for 5 to 10 minutes, 125% for 30 second. The system's protection shall also include a low battery voltage disconnect to prevent damage to the battery bank. The system shall supply a clean, computer grade, sinusoidal output waveform with less than 5% total harmonic distortion at full rated load. Dynamic brownout protection must maintain the desired voltage without continuously switching to batteries in low voltage situations up to -15%. The system shall maintain output regulation of less than + 5% under all operating condition except overload and short circuit. The system shall be able to protect itself from an internal over-temperature condition and issue an alarm under such conditions.

The system shall include the following additional features;

- **An automatic, multi-rate, software-controlled charger**
- **Programmable automatic system testing capabilities (10 seconds monthly and 90 minutes yearly)**
- **A microprocessor controlled diagnostic panel capable of displaying alarm and status.**
- **Must provide power factor correction close to unity (1.0 pf)**
- **No break in transfer time (from Utility to Battery) mode**
- **Visual displays of all alarms**
- **A DC to AC converter (Inverter)**
- **A battery bank sized for the system's runtime requirements (Min. 90 minutes for UL 924).**
- **DC Input Breaker**
- **A battery bank sized for the system's runtime requirements**
- **Full KW rating.**
- **Communication Interface Provisions:**
  - (RS232, RS485) for dedicated computer
  - Web Communication
  - Facility Interface (Dry Contacts)
- **Manual Test switch**
- **Optional integrated output distributions (N/ON, N/OFF with or without time delay).**

1.6 INVERTER DESIGN REQUIREMENTS

Output Load Capacity – The continuous output power rating of the Inverter shall be [**Select Unit Capacity]** at 0.8 power factor.

Input Voltage – **[Select Input Voltage.] ,** + 15% / -10, 3-phase, 4 wires plus-ground.

Output Voltage – **[Select Input Voltage.]** , 3-phase, 4 wires plus-ground.

For Selectable items refer to catalog and use from drop down menu.

Efficiency – Greater than 90% (Typical)

Battery Autonomy – The UPS shall be capable of operating at full load for a minimum of 90-minutes on battery power at a temperature of 25°C

Battery Protection – Battery CB (Circuit Breaker), for safe UPS battery operation and servicing

Battery Type – [Select Battery Type from drop down menu]

2. SYSTEM DESCRIPTIONS

2.1 SPECIFICATIONS

2.1.1 AC Input

- **Frequency –** 60 Hz +/- 5%, or 50 Hz +/- 5%
- **Power Factor –** 0.8 PF
- **Slew Rate –** 1 Hz/second, maximum
- **Input Protection –** Circuit breaker, Contactor
- **Input Surge Protection –** TVSS (Transient Voltage Surge Suppressor)
- **Transfer Time –** Zero no break transfer (unit static transfer must not switch upon input power loss)
- **Input Power Connections –** Hard wired terminal block, (see UPS cabinet**: All system components shall be housed in a single floor mounted small footprint (39"x 18"), freestanding NEMA 1 enclosure. The cabinet should have front access only with two doors and a depth of no more than 18 inches, allowing easy component-reach from the front. The enclosure shall have shelves for component separation and clear and accessible layout. Cabinet doors shall require a key for gaining access. Front access only shall be required for safety and expedient servicing, adjustments and installation. The cabinets shall be structurally adequate and have provisions for hoisting, jacking and forklift handling. Enclosure design shall fully comply with UL 1778 for locked door, unauthorized access protection and UL 924 for accidental or unauthorized unit shutdown.**
- **Table 2-1**)

2.1.2 AC Output

- **Frequency –** 60 Hz ± 0.5 Hz (when on inverter)
- **Voltage Regulation –** +5% Regulated within CBEMA curve
- **Output Waveform –** Sine Wave < 5% THD
- **Efficiency –** Greater than 90%
- **Inverter Overload Capability –** 125% for 10 minutes, 150% surge for 10 seconds
- **Bypass Overload Capability –** 150%

- **Protection –** Fault current limited
- **Non-Linear Load Capability –** 100%
- **Crest Factor –** 3 to 1
- **Output Power Connections** – Hard wired terminal block, (see Table 2 1)
- **Output Distribution –** The UPS shall have Main Output Breaker, Optional internal or external distribution, Auxiliary Breaker: Normally ON, Normally OFF, Normally OFF with time delay
- **Communication Interface Optional –** The UPS shall have RS232, RS485 for dedicated computer, Web Communication provision, Facility interface Contact

2.1.3 Battery

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 breaker (no 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 –** 90 minutes at full load, based on UL924
- **Extended Run Time –** As required
- **Battery Type – Sealed, Maintenance-free, Lead-Acid, VRLA (Standard) 10 years**
  - Optional High Temperature (35°C)
  - Optional 20 years
- **Charger Ampacity –** Per UL 924
- **Float Voltage –** 2.25 V per cell
- **Protection –** Circuit breaker
- **Wiring –** Power cables from the UPS to the battery cabinet(s) shall be provided by the customer in accordance with local code. With multiple battery cabinets, interconnecting cables shall be provided by customer.
- **Nominal DC Link Voltage –** Depends on the kW.
- **Battery Cabinets –** Matching battery cabinet(s) shall be used.

2.1.4 Mechanical Design and Constructions

A. Physical Specifications

UPS cabinet: All system components shall be housed in a single floor mounted small footprint (39”x 18”), freestanding NEMA 1 enclosure. The cabinet should have front access only with two doors and a depth of no more than 18 inches, allowing easy component-reach from the front. The enclosure shall have shelves for component separation and clear and accessible layout. Cabinet doors shall require a key for gaining access. Front access only shall be required for safety and

expedient servicing, adjustments and installation. The cabinets shall be structurally adequate and have provisions for hoisting, jacking and forklift handling. Enclosure design shall fully comply with UL 1778 for locked door, unauthorized access protection and UL 924 for accidental or unauthorized unit shutdown.

Table 2-1

Unit Rating KVA/KW	Cabinet Dimensions W x H x D (Inches)	Terminal Block		
		Input	Output	DC
10 ~ 30kVA	**39 x 68 x 18**	**2/O-14 AWG**	**2/O-14 AWG**	**2/O-14 AWG**
40kVA				**4/O-10 AWG**
50kVA/50kW				**2/O-14 AWG**
50kVA/50kW (208Y/120V Input)		**350 – 6 AWG**		**4/O-10 AWG**

B. Enclosure

All system components shall be housed in a single floor mounted freestanding NEMA 1 enclosure. The cabinet should have front access only with two doors, allowing easy component access from the front. The enclosure shall have shelves for component separation and clear and accessible layout. Cabinet doors shall require a key for gaining access. Front access only shall be required for safety and expedient servicing, adjustments and installation. The cabinets shall be structurally adequate and have provisions for hoisting, jacking and forklift handling. Enclosure design shall fully comply with UL 1778 for locked door, unauthorized access protection and UL 924 for accidental or unauthorized unit shutdown.

C. Construction

Only quality, unused material shall be used to build the unit, under strict observance of standards and quality 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 IGBT's 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.

D. Earthquake Protection:

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

2.1.5 Environmental (Electronics)

Operating Temperature: **0° to 40°C (32° to 104°F)**

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

Altitude: **1,829 meters (6,000 feet)**

Relative humidity: **0% to 95% (non-condensing)**

Audible Noise: **57 dBA, typical**

2.2 MODES OF OPERATION

The UPS module shall be designed to operate as an on-line, high precision PWM conversion, fully automatic system with “no break” transfer time in the following modes.

2.2.1 Standby

After power is applied, the system is placed in STANDBY mode and a self-check ensues. During this period, the start subroutine checks for the input voltage and proper operation of the inverter and bypass SCRs. After the routine is completed and check confirmed OK, the system goes into the NORMAL mode.

2.2.2 Normal

The input contactor K1 receives a closing signal and connects the input power to the DC supply transformer. The DC rectifier supplies the battery charger, Control Board and the DC/AC inverter circuits. The battery charger is then activated allowing the batteries to be continuously charged. The on-line DC/AC inverter converts the DC voltage to a PWM (Pulse-Width-Modulation) waveform. This waveform is filtered and reconstructed back to clean AC output power for critical loads regardless of whether the unit is powered by the utility or battery backup.

2.2.3 Emergency

If the system controller senses a change in input frequency of more than +3 Hz or an out of range input voltage, it will consider it an input failure and will immediately open the input contactor, isolating the UPS from the facility. At the same time, the charger is turned off and the battery bank becomes a DC supply source to the inverter circuit, maintaining an uninterrupted AC supply to the protected load without switching static bypass to prevent any glitches or risking the load. The LCD screen will display an alarm message. When the facility power returns and is in phase with inverter, the system controller closes the input contactor and the system returns to NORMAL automatically.

2.2.4 Recharge

When utility power is restored and before the batteries are completely exhausted, the UPS shall automatically return to normal operation. This retransfer to normal operation shall be uninterrupted. The battery charger shall automatically recharge the batteries to full capacity. Recharge characteristics must strictly comply with UL924 requirements.

2.2.5 Bypass

In the event of a component malfunction in either the Rectifier/Charger or the Inverter sections, the unit’s static bypass switch shall transfer the load to the utility without interruption of power. Activation of the bypass mode shall cause an alarm indication and initiate output relay dry contact closure (for customer use).

2.2.6 Battery off

When the battery is removed for maintenance or the battery breaker is off, the unit will continue to function, meeting all the specified performance parameters with the exception of the power backup time capability.

2.3 COMPONENT DESCRIPTIONS

2.3.1 Input Terminal Block

For ease of installation, an input terminal block shall be hard wired per UPS cabinet: All system components shall be housed in a single floor mounted small footprint (39”x 18”), freestanding NEMA 1 enclosure. The cabinet should have front access only with two doors and a depth of no more than 18 inches, allowing easy component-reach from the front. The enclosure shall have shelves for component separation and clear and accessible layout. Cabinet doors shall require a key for gaining access. Front access only shall be required for safety and expedient servicing, adjustments and installation. The cabinets shall be structurally adequate and have provisions for hoisting, jacking and forklift handling. Enclosure design shall fully comply with UL 1778 for locked door, unauthorized access protection and UL 924 for accidental or unauthorized unit shutdown.

Table 2-1 and located in the Inverter close to knockouts for incoming power cables. The conduit entries shall be located on the top and both sides of the cabinet.

2.3.2 Main Input Circuit Breaker

A circuit breaker shall be provided and hard wired at the UPS input for protection from the utility line and associated wiring disturbances. Optionally, a higher KAIC breaker shall be available and should be specified when required.

2.3.3 Input Contactor

The UPS shall 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.

2.3.4 Input Transformer

An input transformer shall be factory installed inside the standard Inverter cabinet. It shall be located in the lower part of the cabinet, with a barrier separating it from the electronics section, to provide isolation between the line and the rectifier/inverter circuit.

2.3.5 Rectifier

A solid-state circuit designed to convert incoming AC power to regulated DC bus voltage shall provide input to the inverter and battery charger.

2.3.6 Inverter

The inverter shall feature PWM (**P**ulse-**W**idth **M**odulation) design utilizing high frequency (10 to 15 kHz) switched IGBT’s. It shall utilize a true double conversion system, generating rated AC output from the utility power or the batteries when in backup mode. The unit shall have a single heat sink and power IGBT assembly tray for reduced switching noise and maximum reliability. The assembly shall come as an FRU (**F**ield **R**eplaceable **U**nit) and its’ design and mounting location shall provide for easy accessibility and maintenance. It shall be located on the electronics shelf to allow direct access when the door is opened and can be replaced in about 15 minutes using only a screwdriver.

2.3.7 Charger

A separate battery charger circuit shall be provided. It shall use the same IGBT's as the inverter and have constant voltage and current limiting control. The battery float voltage will be microprocessor programmable for the applicable KW and DC bus ratings. The charging current limit shall be temperature compensated for battery protection. Battery recharge design shall be in full compliance with UL 924. To increase ease and safety of service, a modularly designed Heat Sink Subassembly FRU shall combine the rectifier, inverter, charger, IGBT's and drivers into a single unit.

2.3.8 Static Bypass 100% rated, Continuous Duty

The bypass serves as an alternate source of power for the critical load when an input line failure or abnormal condition prevents operation in inverter mode. It consists of a fully rated, continuous duty static switch for high speed transfers and features two back-to-back SCRs to allow make before break transfer. The design shall include a manual bypass switch, protected within the locked cabinet. It shall be accessible only to authorized personnel, allowing the unit to stay in bypass at all times for safe work on the unit. Manual transfer to bypass shall not cause unit trip, nor transfer into battery backup mode. The static switch shall be able to be powered up by an optional separate power source such as a generator or other power supply for dual input capabilities.

A. Transfer to Bypass will initiate automatically under the following conditions

- **Critical bus voltage out of limits**
- **Total battery discharge (for specified backup time without damaging batteries)**
- **Over temperature**
- **Inverter problem**

B. Automatic Re-transfer

- **When transfer to bypass is activated through test switch**
- **When there is no Inverter problem**

C. All Transfers to bypass shall be inhibited under the following conditions

- **Bypass voltage out of limits (+/- 10 % of nominal)**
- **Bypass frequency out of limits (+/- 3 Hz)**

2.3.9 Control Logic

The entire inverter operation shall be performed by microprocessor-controlled logic. All operations, parameters, diagnostics, test and protection routines are firmware controlled. The firmware also compensates for component drift and changes in operating environment to ensure stable and consistent performance. A self-test and diagnostics subroutine shall assist in troubleshooting the unit. The Control PCB shall be located on the front door to isolate it from power wiring and switching devices. This arrangement shall minimize EMI and allow hot board swaps, in the manual bypass mode.

2.3.10 Internal Maintenance Bypass Switch, MBS Switch

Internal Manual Maintenance Bypass Switch is a (3) position, 4 Pole “UPS”, “SBS” and “BYPASS” rotary switch, when set to “BYPASS” provides power directly from UPS main input feed to the load which ensures continuous power to critical load without interruption.

2.3.11 Output Transformer

An isolation output transformer shall be utilized to provide specified output voltage and separate the inverter rectifier/inverter section from the load disturbances and conducted noise.

2.3.12 Manual Inverter Test Switch

The unit shall have a momentary contact test switch to allow the user to accomplish a manual system test without the need to operate any breakers or shut down the system. The test switch shall be in compliance with UL924 specifications, well marked, accessible only after opening a locked front cabinet door to protect from accidental activation. The Lighting Inverter shall resume normal operation after the test switch is released.

2.4 SYSTEM DIAGNOSTICS AND ALARMS

Front Panel LCD Display A standard 4-line x 20 character back lit, blue front panel LCD display shall be used for instant indication of UPS status, metering, alarms and battery condition. The display will provide easy readout on two standard and two optional screens and provide continuous information with scrolling updates.

2.4.1 Status Display

A. UPS Status

- **Standby –** System is performing self-diagnostic
- **Startup –** Inverter is being started
- **Normal –** All parameters are acceptable
- **Problem –** Loss of utility power over load
- **Failure –** System requires service

B. Battery Status

- **Battery OK –** Battery voltage is within an acceptable range
- **Battery OV –** Battery Over Voltage
- **Battery UV –** Battery Under Voltage

C. Input Voltage Status

- **Input OK –** Input voltage and frequency are within an acceptable range
- **Input BAD –** Input voltage and/or frequency is outside the acceptable range

D. Battery Charger Status

- **Charger ON –** Battery charger is charging or maintaining the battery at float voltage

- **Charger BAD –** Battery is not being charged

E. UPS Internal DC Buss

- **DC OK –** DC buss is within the acceptable range
- **DC BAD –** DC buss is out of the acceptable range

F. Static Bypass Status

- **On Inverter –** Critical load is being powered and protected by the inverter
- **On Bypass –** Critical load is being powered from utility power

G. Inverter Output Status

- **Out OK –** Output is within an acceptable range and the critical load is being powered by the inverter
- **Out BAD –** No output is available from the inverter and the critical load is being powered by utility power

2.4.2 Metering Display

- **Output voltage**
- **Output power**
- **Input voltage**
- **Input current**
- **DC buss**
- **Battery voltage**
- **Battery current (+) Charging (-) Discharging**

2.4.3 Touch Screen Display, Events Logging – Optional

- **UPS Events Time/Date** stamp up to 50 scrolling events with freeze function
- **Minutes on Battery –** Shows UPS battery backup mode accrued time
- **System Hours –** UPS in operation; total accrued time
- **Battery Event –** The number of times the UPS operated in backup mode
- **Temp –** The UPS cabinet temperature

2.4.4 Alarm Relays - Optional

An optional dry contact signal shall be available for each of the following alarm conditions:

- **Low Battery**
- **On Bypass**
- **Summary Alarm**
- **Input Fail**
- **Common**

2.4.5 Communication Ports – Optional

The optional configuration will include two communication ports configured for RS232 and RS485 data transfer. All parameters displayed on the front panel shall be available on these ports for remote monitoring. Local PC monitoring option is available via RS232, and RS485.

Ethernet connection RJ45 is available as an option.

2.5 OPTIONS

2.5.1 Normally On / Normally Off (with or without time delay) Output Auxiliary Circuit Breakers

These circuit breakers are single pole, 20 Amp din-rail mountable devices for protection of the customer's load circuits.

2.5.2 Normally On/Normally Off Output Auxiliary Circuit Breakers with trip indicator

2.5.3 Custom KAIC Input / Output Main Circuit Breakers

2.5.4 Seismic Mounting Brackets for UPS and Battery Cabinet (s):

Left and right seismic floor mounting brackets are available.

2.5.5 External Manual Bypass Switch – Optional

This option provides a wrap-around rotary bypass (Make Before Break) switch mounted in separate lockable wall mountable enclosure, it provides complete isolation of the UPS (Inverter) system from the load while supplying power to the load from source without interruption to safely perform maintenance on the UPS.

Note: This option is offered for same Input / Output voltage only.

Note: External Maintenance Bypass Switch cannot be purchased with integrated Output Auxiliary Branch Circuit Breaker options.

2.5.6 Audio Alarm with Silence Switch

This option provides an audible warning signal acknowledge and reset for Input Fail, On Bypass, Inverter On, Low Battery and Summary Alarm for any of the previously mentioned alarm conditions.

2.5.7 Event Log local on inverter display

The microprocessor monitors and records up to one hundred events and displays up to fifty of the most recent date and time stamped events on the front panel display. Its key selectable menu provides access to events, system information, display, freeze and delete functions.

2.5.8 Local on PC - Via RS232 or RS485 Communication Port

This option requires a PC and LabView monitoring software on a Windows platform. Data sent to the PC are 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 1000 feet.

2.5.9 Dry contact signals

This option provides dry contact signals for facility interface (for customer use) in two configurations; for the following signals:

- **Low Battery**
- **On Bypass**
- **Summary Alarm**
- **Input Fail**
- **Common**

A. Voltage-free alarm signals N/O (Terminal block for hardwire connection) with single common for user Facility Interface compatible with IBM AS400.

B. Voltage-free alarm signals N/O or N/C (customer selectable), Terminal block for hardwire connection, with isolated common for user Facility Interface compatible with IBM AS400.

2.5.10 Remote UPS Status Panel

The Remote Status Panel is available in a console mount style. It can also be wall mounted and comes with a 10 foot long “DB” connector signal cable or optional cable that can be up to 1000 feet long. The Remote Status Panel requires 120 VAC power, comes with a 6-foot power cord and Silence and LED /Horn test switches. It includes the following LED’s:

- **On Battery**
- **Low Battery**
- **On Bypass**
- **Sum Alarm**
- **Inv. On**
- **Input On**

2.5.11 Global Monitoring System (GMS)

All GMS items are optional. The GMS allows for remote communications including fast internet access for SMS, E-Mail and Phone Calls (up to 8 phone numbers).

A. Web/Simple Network Management Protocol (SNMP) Communication Card (RJ45)

The optional Web/SNMP Card is a web enabled monitoring device for units with Internet or network connections. The internal IP internet address can be pre-installed in firmware to fit the customer’s network settings. The Web/SNMP Card can monitor the UPS over a network using a standard web browser. Network

management system software with an alarm viewer utility provides monitoring of multiple units on a single console (Individually).

The communication:

- **WIFI (basic or advance)**
- **GPRS mobile modem (Advance only – 8 Email Address)**
- **Dial-up modem (Advance only)**

B. RJ45

- **Auto Email status report daily – configurable**
- **SMS capable of SNMP TRAP for events (up to 500 events) notification (Advance only)**
- **Support TCP/IP, UDP, Telnet, SNTP, PPP, HTTP, SMTP protocol**
- **Manage and configure via Telnet, Web Browser or NMS**
- **SNMP TRAP for events, up to 100 events (for Basic)**

2.5.12 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 failures, with the following capabilities:

- **User selectable measurement intervals (Second-Hour-Daily-Weekly and Monthly)**
- **To Measure, record and graph**

A. String Monitor

- **String voltage**
- **String current**
- **Cabinet temperature**

B. Individual Battery Monitor

- **Battery voltage**
- **Battery Ohmic value (without loss of battery capacity)**
- **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.

2.5.13 Battery Breaker alarm

It provides a local sound alarm in addition to a dry contact signal interface when the battery breaker is in OFF position.

2.5.14 Battery Thermal Runaway Control

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).

2.5.15 External Auxiliary Output Circuit Breaker Panel Board

This option provides up to 42 single-pole panel with main breaker for additional distribution.

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 rata) when operated in specified environment not to exceed 25°C (77°F).

4. FACTORY STARTUP, MAINTENANCE, & EXTENDED WARRANTY

4.1 FACTORY STARTUP

Offers 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 UPS manufacturer shall employ a nationwide service organization, with factory trained Customer Service Engineers dedicated to the startup, maintenance and repair of UPS 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, response time from a local Customer Engineer shall be approximately 15-minutes.

4.4 CONNECTED LOADS

The Central Lighting Inverter 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", continually conditioned sinusoidal output. Refer to plans for 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 UPS 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 offering of preventive and full-service maintenance contracts shall be available. An extended warranty and preventive maintenance package shall be available. All services shall be performed by factory trained Service Engineers.

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 UPS system and the associated options supplied by the manufacturer. The test results shall be documented, signed and dated for future reference.

5. INSTALLATION

The Central Lighting Inverter 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 UPS and battery cabinet(s) conduit entry arrangement shall allow for flexibility of user wiring installation. The wiring shall be routed through the top or either side of the cabinet.

5.2 WIRING TERMINATION

The UPS 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 accepting wire range per UPS cabinet: All system components shall be housed in a single floor mounted small footprint (39”x 18”), freestanding NEMA 1 enclosure. The cabinet should have front access only with two doors and a depth of no more than 18 inches, allowing easy component-reach from the front. The enclosure shall have shelves for component separation and clear and accessible layout. Cabinet doors shall require a key for gaining access. Front access only shall be required for safety and expedient servicing, adjustments and installation. The cabinets shall be structurally adequate and have provisions for hoisting, jacking and forklift handling. Enclosure design shall fully comply with UL 1778 for locked door, unauthorized access protection and UL 924 for accidental or unauthorized unit shutdown.

Table 2-1 on page 5.

5.3 DRAWINGS AND MANUALS

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.**