TECHNICAL GUIDE SPECIFICATIONS

WAVE RIDER 1

SINGLE-PHASE, (2.1 TO 17 KW)
UL924 CENTRAL LIGHTING INVERTER

Crucial Power Products

1. GENERAL

1.1 SCOPE

This guide provides technical information and specifications for Crucial Power's Wave Rider 1 **C**entral **L**ighting **I**nverter **S**ystem.

The Wave Rider 1 features high reliability solid-state double conversion digital signal processing and a high frequency pulse-width modulated (PWM) system that harnesses the advantages of IGBTs (Insulated-Gate Bipolar Transistors) in its design. The Wave Rider 1 will provide high quality regulated and conditioned AC power to all types of lighting loads all of the time. It switches to battery power with virtually zero transfer time upon an input power loss or disruption.

The Wave Rider 1 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 re-strike, halogen, HID, HPS and LED lighting during battery backup operation.

The Wave Rider 1 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 Wave Rider 1 meets UL 924 requirements for recharging the battery while utilizing an industry distinctive small footprint cabinet design. This allows equipment installation in limited spaces.

NOTE: This Guide Specification follows the Construction Specification Institute guidelines per CSI MP-2-1, MP-2-2. It 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) 244-4069 or via e-mail: sales@crucialpower.com**

1.2 APPROVED MANUFACTURER AND PRODUCT DESCRIPTIONS

1.2.1 **Approved Manufacturer:** The Inverter shall be an Emergency Central Lighting Inverter and shall be manufactured by:

Crucial Power Products, Inc.
14000 S. Broadway
Los Angeles, CA 90061
Phone: (800) 244-4069, Fax: (800) 246-2346
Power Service – 1 (800) 797-7782

1.3 QUALIFICATIONS AND QUALITY ASSURANCE

1.3.1 Manufacturer's Certification:

A minimum of twenty years 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.

1.3.2 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 IGBTs and other semiconductor devices shall be sealed. All incoming parts, modular assemblies and sheet metal shall undergo detailed receiving quality inspection.

1.3.3 Factory Testing:

Every unit shipped will have completed a documented functional test of the UPS module and battery system, including a battery discharge test. A copy of the test report shall be available at the customer's request.

1.4 STANDARDS

The Wave Rider 1 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 3rd Edition)

1.5 INVERTER DESIGNE REQUIREMENTS

- **Output Load Capacity –** The continuous output power rating of the Inverter shall be [Select Unit Capacity] kVA unit @ 0.7 pf, [Select Unit Capacity] kW unit @ 1.0 pf.
- **Output Power Upgrade –** The unit shall be designed to have a min 20% of the rated power capacity upgradeability without having to change the unit option specified when ordering.
- **Input Voltage** –[Select Input Voltage.] VAC, – 15% / + 10%
- **Output Voltage –**[Select Output Voltage (s).] VAC, 1 phase, 2 wires plus-ground

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

- **Battery Autonomy –** The Inverter shall be capable of operating at full load for a minimum of 90-minutes on battery power at a temperature of 25° C.
- **Efficiency – Greater than 90%**
- **Battery Type** – Valve Regulated Sealed Lead-Acid (VRLA) standard; other types of batteries are optionally available.
- **Battery Protection** – Battery CB (Circuit Breaker), for safe UPS battery operation and servicing
- **Cable Installation** – Conduit entries on the top and both sides of enclosure

2. PRODUCT DESCRIPTION

2.1 OPERATIONS

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.

To reduce operating cost while it is charging the battery system during normal utility power operation, the design must provide power factor correction close to unity (1.0 pf).

The system shall include the following additional features;

- An automatic, multi-rate, software-controlled charger
- Full KW rating at unity power factor
- Self diagnostic, programmable system testing capabilities (10 seconds monthly and 90 minutes yearly)
- A battery charger that meets the UL 924 standard
- A microprocessor controlled diagnostic display panel capable of audible alarms
- 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
- An RS232 communication interface
- A DC to AC converter (inverter)
- AC and DC input protection
- A battery bank sized for the system's runtime requirements

2.2 SYSTEM DESCRIPTIONS

2.2.1 AC Input Specifications

Frequency – 60 Hz +/- 5%

Input Current – Sinusoidal, close to unity power factor under all line/load conditions (power factor correction)

Input Protection – Contactor and optional input circuit breaker

Input Surge Protection – TVSS (Transient Voltage Surge Suppressor)

Transfer Time – Zero no break transfer (unit static transfer must not switch upon input power loss)

Slew Rate – 0.4 Hz/second, maximum

Input Power Connections – Hard wired terminal block or optional input cable

Number of Wires – Two (2) wires plus ground

Cable Installation – Conduit entries on the top and both sides of enclosure

2.2.2 AC Output Specifications

Frequency – 60 Hz +/- 0.5 Hz

Voltage Regulation – +/- 3% No load to full load, high line to low line (typical)

Output Waveform – Sinusoidal

Voltage Distortion – < 5% THD; < 3% Single Harmonic

Inverter Overload Capability – 115% for 5 to 10 minutes, 125% for 30 seconds

Bypass Overload Capability – 150%

Protection – Fault current limited

Non-Linear Load Capability – 100%

Crest Factor – 1 to 2

Output Power Connections – Hard wired terminal block or optional output receptacle panel board with NEMA type receptacles and over current protection (max 30 CBs)

Output Distribution – The unit shall have an internal or external load center for customer use to eliminate the need for optional distribution

Number of Wires – Two (2) wires plus ground

2.3 COMPONENT DESCRIPTIONS

2.3.1 Input Terminal

For ease of installation, an input terminal block shall be hard wired and located in the UPS 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 Input Circuit Breaker (optional)

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 isolate the rectifier in case of a line problem and allow for a smooth transfer or retransfer to and from bypass.

2.3.4 Input Transformer

An input transformer shall be factory installed inside the standard UPS 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, rectifier and inverter circuits.

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 (Pulse-Width Modulation) design utilizing high frequency (10 to 15 kHz) switched IGBTs. 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 (Field Replaceable Unit) 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 IGBTs as the inverter and have constant voltage and current limiting control. The battery float voltage will be microprocessor programmable for the applicable kVA 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 increased ease and safety of service, a modularly designed Heat Sink Subassembly FRU shall combine the rectifier, inverter, charger, IGBTs and drivers into a single unit.

2.3.8 Static Bypass

A continuous duty, 100% rated 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 will consist of a fully rated, continuous duty static switch for high-speed transfers and feature two back-to-back SCRs to allow make before break transfer. The design shall include a manual bypass switch that is protected within the locked cabinet. It shall be accessible only to authorized personnel, allowing the unit to remain continually in bypass to allow a technician to safely work on the unit. Manual transfer to bypass shall not cause the unit to trip or transfer to the battery backup mode. To allow redundant input capabilities, the static switch shall be able to safely route power from an optional power source such as a generator or other power supply.

2.3.8.1 **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 period expired
- UPS problem

2.3.8.2 **Automatic Re-transfer** occurs whenever the inverter can handle the critical load. It shall be inhibited for the following conditions:

- When transfer to bypass is activated manually or remotely
- When there is a UPS problem

2.3.8.3 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

UPS operation shall be regulated by the microprocessor-controlled logic. All operations, parameters, diagnostics, test and protection routines will be firmware controlled, compensating component drift and changes in operating environment to ensure stable and consistent performance. A self-test and diagnostic subroutine shall assist in troubleshooting the unit. The Control PCBA shall be located on the front door and be isolated from power wiring and switching devices. This arrangement shall minimize EMI and allow hot board swap in the manual bypass mode.

2.3.10 Manual Maintenance Bypass Switch, MBS Switch (Optional)

An auto/manual MBS switch may be provided in the UPS cabinet for connecting power to the critical load through the external maintenance bypass line. It shall be used when the unit needs to be de-energized for maintenance, without disrupting power to the load. Operating the switch shall be strictly restricted to authorized personnel using a cabinet access key. The MBS shall have an auxiliary position that ensures full synchronization and prevents inrush current during transfer.

2.3.11 Output Transformer

An output isolation transformer shall be utilized to provide specified output voltage and separate the UPS rectifier and inverter sections from 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 Wave Rider 1 shall resume normal operation after the test switch is released.

2.3.13 Battery

Sealed, maintenance-free VRLA (**V**alve-**R**egulated **L**ead–**A**cid) 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 same cabinet as the UPS cabinet with a 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 is available.

2.4 SYSTEM DIAGNOSTICS AND ALARMS

2.4.1 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.

2.4.2 Status Display

2.4.2.1 System Status

- **Standby –** System is performing a self-diagnostic
- **Start up –** Inverter is starting
- **Normal –** All parameters are acceptable
- **Problem –** Loss of utility power or overload
- **Failure –** System requires service

2.4.2.2 System Rating in KVA

2.4.2.3 Battery Buss Voltage Status

- **Battery OK –** Battery voltage is within an acceptable range
- **Battery BAD –** Battery voltage is out of range

2.4.2.4 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

2.4.2.5 Battery Charger Status

- **Charger ON –** Battery charger is charging or maintaining the battery at float voltage
- **Charger OFF –** Battery is not being charged

2.4.2.6 System Internal DC Buss

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

2.4.3 Static Bypass Status

- **ON Inverter –** Critical load is being powered and protected by the inverter
- **ON By Pass –** Critical load is being powered from utility power

2.4.4 Inverter Output Status

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

2.4.5 Metering Display

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

2.4.6 Events and Alarms screen – Optional

- UPS Events Time/Date stamp up to 50 scrolling events with freeze function
- Auxiliary Output CB Trip – up to 20 circuit breakers trip alarm on first priority trip screens

2.4.7 System Information Screen – Optional

- 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

2.4.8 Alarm Relays

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

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

2.4.9 Communication Ports

The standard configuration will include two communication ports configured for RS232 and one for RS485 data transfer. All parameters displayed on the front panel shall be available on these ports for remote monitoring.

2.4.10 Power Flow Mimic

An optional laminated overlay with embedded color LEDs combines information on the front panel display with a graphic power flow visualization for instant load power status recognition.

2.5 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:

2.5.1 Normal

During normal operation, utility (or generator) power is rectified to DC, drawing sinusoidal input AC current at unity power factor under all load conditions. The DC Rectifier supplies DC power to the Inverter and Battery Charger sections. Using high frequency PWM (10 to 15 kHz) power technology, the inverter shall continuously support the load without using energy stored in the battery.

2.5.2 Emergency

Upon loss of input power or when power exceeds the specified input limits, the control logic shall allow the inverter to draw energy from the battery without interruption to the load and disconnect the input line. The transfer to the battery shall be uninterrupted; a "no break" power transfer. The inverter shall supply power from the batteries to the critical load. The output voltage shall be sinusoidal and within the specified limits of 5% regulation. If power is not restored before the batteries have been exhausted, the UPS shall completely shut down to protect the batteries from possible damage.

2.5.3 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.

2.5.4 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).

2.5.5 Off-Battery

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.

2.6 BATTERY SPECIFICATIONS

- **Standard Run Time –** 90 minutes at full load
- **Extended Run Time –** As required
- **Battery Type –** Sealed, Maintenance-free, Lead-Acid, VRLA (Standard); other types are of batteries are optionally available
- **Expected Life –** 10 years (Optional 20 years available)
- **Charger Ampacity –** Per UL 924
- **Float Voltage –** 2.25 V per cell
- **Protection –** circuit breaker (In each battery cabinet if any)
- **Wiring:** Power cables from the UPS to the battery cabinet (if used) 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:** kVA/kW, (dependent on the number of batteries). See Table on page15.
- **Battery Cabinets:** Matching battery cabinets (if used for extended run time other than 90 minutes) NEMA 1 shall be used.

2.7 OPTIONS

2.7.1 External Manual Bypass Switch

If specified by the customer, the bypass switch can be mounted in a separate enclosure and field mounted in the UPS cabinet or on an adjacent wall. This box includes a rotary switch with make before break contacts to provide a single control for transferring to and from maintenance bypass without load support interruption.

2.7.2 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.

2.7.3 Remote UPS Status Panel

The Remote Status Panel is available in a console mount style box in a black finish. 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 LEDs: Input Fail, On Bypass, Inverter On, Low Battery and Summary Alarm.

2.7.4 External Status Indicator (for customer use):

Volt-free contacts (dry contact) alarm signals (hardwire) interface for user and compatible with IBM AS400 standard shall be provided for following signals:

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

2.7.5 External Status Indicator, N/O or N/C Contact with Isolated Common

Terminal blocks for hardwire connection (N/O and N/C alarm relay) shall be provided for following signals:

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

2.7.6 Normally On/Normally Off Output Auxiliary Circuit Breakers

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

2.7.7 Battery Breaker alarm

It provides a signal when the battery breaker is in OFF position.

2.7.8 External Auxiliary Output Circuit Breaker Panel Board

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

2.7.9 Higher KAIC Norm On/Off Output Circuit Breaker

The single-pole, 20 A circuit breaker with higher KAIC can be mounted on a DIN rail or installed in a molded case.

2.7.10 Seismic Mounting Brackets

Left and right seismic floor mounting brackets are available.

2.7.11 Battery Monitoring (Wireless) System (Battery String or Individual Battery)

This option provides single battery block, string or entire battery system monitoring on a local display, remote or web enabled PC. It provides for assessment of actual remaining charge and block deterioration for maximum battery life and total backup safety.

2.7.12 Global Monitoring System (GMS)

All GMS items are optional. The GMS allows for flexibility in local and remote communications including internet access.

2.7.12.1 Local On UPS Display

- **Event Log:** Monitors the microprocessor circuit by acquiring system data. It displays up to fifty of the most recent date and time stamped events on the front panel display. The key

selectable menu provides access to events, system information, display, freeze and delete functions.

- **Auxiliary Circuit Breaker Trip Monitor with Event Log:** In addition to the event log and system data, this option registers trips of up to 20 auxiliary output circuit breakers for monitoring of dedicated circuits. Trip signals from the breakers are displayed on a circuit breaker trip screen. Auxiliary circuit breakers with trip modules mount easily on a DIN rail.

2.7.12.2 Local On PC - Via RS232 or RS485 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.

2.7.12.3 Web/SNMP Card

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.

2.7.13 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, (without shutting down the backup battery bank).

2.7.14 Battery Breaker alarm

It provides a signal when the battery breaker is in OFF position.

2.7.15 WARRANTY

2.7.15.1 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 from the startup, 13th through 24th months only valid with factory performed preventive maintenance, (extended warranty contract).

2.7.15.2 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.

Battery Cell temperatures shall not exceed 92° F for more than 30 days annually. The average annual ambient temperature of the batteries shall not exceed 77° F. Batteries shall be factory certified and installed and charged within 90 days of shipment.

2.8 MAINTENANCE, SERVICE AND ENHANCED WARRANTY PLANS

2.8.1 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.

2.8.2 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.

2.8.3 Maintenance Training:

In addition to the basic operator training conducted as a part of the system start-up, 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 UPS 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.

2.8.4 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.

2.8.5 Site Testing:

The manufacturer's field service personnel shall provide site testing if requested. The testing shall consist of a complete test of the UPS system and the associated options supplied by the manufacturer. A partial battery discharge test shall be provided as part of the standard start-up procedure. The test results shall be documented, signed and dated for future reference.

2.9 MECHANICAL DESIGN AND CONSTRUCTION

2.9.1 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.

2.9.2 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 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.

2.9.3 Earthquake Protection

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

3. INSTALLATION CONSIDERATIONS

3.1 WIRING INSTALLATION:

The UPS cabinet 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 and battery cabinets if used**.**

3.2 WIRING TERMINATION:

The UPS input and output power connections shall be hard wired within the cabinet. Input and output terminal blocks shall be provided for easy field wiring

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3.3 SYSTEM OPERATION:

The system shall allow connection of either “normally on” or "normally off" 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.

3.4 CONNECTED LOADS:

The Crucial 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.

3.5 FACTORY STARTUP:

Provides a factory service representative to perform the initial startup of the Central Lighting Inverter System.

3.6 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 Manual(s) with complete instructions for locating, mounting, interconnecting and wiring of the system
- User Manual(s) outlining complete operating and preventive maintenance procedures

3.7 INSTALLATION:

The Central Lighting Inverter shall be installed in accordance with all appropriate manufacturer’s installation instructions and in compliance with all appropriate codes.

3.8 ENVIRONMENTAL REQUIREMENTS

- **Operating Temperature:** 0°C to 40°C (32°F to 104°F)
- **Storage Temperature:** - 20°C to +45°C (- 4°F to 113°F)
- **Maximum Recommended Storage Temperature For Batteries:** 25°C (77°F) for up to six months. Storage at up to 40°C (104°F) is acceptable for a maximum of three months.
- **Humidity (operating and storage):** 0 to 95% RH, non-condensing
- **Altitude:** Up to 6000 ft (1,829 meters)
- **Audible Noise:** -57 dBA, typical

3.9 PHYSICAL SPECIFICATIONS AND MODEL NUMBERS

- Cabinet shall be double door, floor mountable, fork liftable and painted black with a maximum depth of 18" to maximize front accessibility
- Cabinet shall be no more than 40" width for best layout (book shelf style)
- Cabinet height shall not exceed 80" to allow pass through standard door

Unit Rating KVA / KW	**Cabinet Dimensions W x D x H (Inches)**
3KVA ~ 8KW	39 x 18 x 68
10KVA ~ 17KW	51 x 30.5 x 70