TECHNICAL GUIDE SPECIFICATIONS

PowerRide 3

Three Phase, 8 to 50 KW
UL924 Emergency Lighting Inverter

Perfect Power Systems

1.0 GENERAL

1.1 SCOPE:
Emergency Lighting Inverter specification defines a high reliability three-phase, on-line, solid-state, double conversion, digital signal processing, high frequency pulse width modulated (PWM) system, utilizing IGBTs, hereafter referred to as the "PowerRide **3**".
It shall be designed to provide high quality regulated and conditioned AC power to all lighting loads at all times. It shall provide zero transfer time (no break and no transferring at static bypass switch) to battery upon input power loss or disruption. The unit shall be specifically designed to meet UL 924 for emergency lighting applications and provide 90 minutes of battery back up. It shall be suitable for all lighting loads including any combination of electronic and security system, power factor corrected, self-ballast Fluorescent, Incandescent, Quartz Re-strike, Halogen, HID and HPS during emergency backup. System shall be operated from 0 to 100% loading for the minimum of 90 minutes. Upon return of the normal AC utility line, system shall return to normal mode automatically without any interruption of power to the load. The charging system shall recharge the battery within UL 924 requirements while it uses industry distinctive small footprint stackable cabinet design allowing for equipment installation in limited spaces**.**

1.2 STANDARDS: The Inverter shall comply with the following standards:

A - CSA certified per UL1778,
B - UL 924 and CSA 22.2 No. 107.1.
C - UL 924/UL 924A –Life Safety for Emergency Back up Lighting
D - FCC rules and regulations, Part 15, subpart j, class A
E – NEMA PE-1
F – NFPA 101 (Life safety code)
G – ANSI C62.41 (IEEE 587)
H – ANSI C62.42.45 (Cat. A and B)
I – TVSS (UL1449 2nd Edition)

2.0 PRODUCT DESCRIPTION

2.1 APPROVED MANUFACTURERS AND PRODUCT DESCRIPTION

Approved Manufacturer: The unit shall be an Emergency Lighting Inverter and shall be manufactured by:

PERFECT POWER SYSTEMS
5940 Triumph Street, Los Angeles, CA 90040.
Phone: (800) 786-6915, Fax: (800) 246-2346
Power Service – 1 800 797 7782

2.2 Operation

The system shall utilize High Frequency Pulse Width Modulation, 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 consist of 150% momentary surge capability and 115% overload for 10 minutes. The system protection shall also include a low-battery voltage disconnect to prevent damages 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 will 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% at all operating condition except overload and short circuit. The system shall be able to protect its self from internal over-temperature condition in the event of internal cooling condition and issue an alarm under such condition.

The system shall consist of circuitry including an automatic, multi-rate, software-controlled charger; self-diagnostic, programmable system testing capabilities a microprocessor-controlled, diagnostic display panel capable of audible alarms and visual displays of all alarm and inverter; a DC to AC converter (inverter);a battery charger that meet UL 924 standard; an AC and DC input breakers for protection; a battery-bank sized for the system's runtime requirements and full rating, and an RS232 communication interface.

2.3 System Description

2.3.1 Inverter Design Requirements

- **Output Load Capacity:** The continuous output power rating of the Inverter shall be [ ] kW.
- **Output Voltage - [ ]** VAC**,** 3 phase, 4 wires plus-ground
- **Battery Autonomy:** the Inverter shall be capable of operating at full load for 90 minutes on battery power, at a temperature of 25 C.
- **Battery Type:** valve regulated sealed lead-acid (VRLA) standard, other types are optional
- **Battery Protection:** battery CB, for each string or cabinet for ease of battery operation and servicing
- **Cable Installation:** conduit entries on the top and both sides of enclosure

2.3.2 AC Input Specifications

- **Input Voltages:** 208Y/120 VAC, 480Y/277 VAC, 4 wires plus ground

- **Frequency:** 60 Hz +/- 5%, or 50 Hz +/- 5%
- **Power Factor:** 1.0 PF
- **Slew Rate: 1** Hz/second, maximum
- **Input Protection:** circuit breaker, contactor
- **Input Surge Protection:** optional Transient Voltage Surge Suppressor (TVSS)
- **Transfer Time:** zero, no break transfer (unit static transfer must not switch upon input power loss)
- **Input Power Connections:** hard wired terminal block
- **Number of Wires:** 4 wires plus ground
- **Cable Installation:** conduit entries on the top and both sides of enclosure

2.3.3 AC Output Specifications

- **Output Ratings:** 8 kW, 12 kW**,** 16 kW, 20 kW, 24 kW, 32 kW, 40 kW, 50 kW
- **Output Voltages:** 208Y/120 VAC, 480Y/277 VAC
- **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:** 3:1 Typical
- **Output Power Connections:** hard wired terminal block
- **Output Distribution:** unit shall have an option for internal output circuit breaker or external load center attached to the unit for customer use, eliminating the need for external distribution
- **Number of Wires:** 4 wires plus ground

2.4 Battery, Battery Charger Specifications

1. **Standard Run Time:** 90 min at full load
2. **Extended Run Time :** as required
3. **Battery Type:** sealed, maintenance-free, lead-acid, VRLA (STANDARD), with other types are optional
4. **Expected Life:** 10 years
5. **Charger Ampacity:** per UL 924

6. **Float Voltage:** 2.25 V per cell
7. **Protection:** circuit breaker in each battery cabinet
8. **Wiring:** factory shall provide battery interconnecting cables (power cables from the Inverter to the battery cabinet shall be provided by the customer based on local code)**.**
9. **Nominal DC Link Voltage:** kVA/kW dependent.
10. **Battery Cabinets:** matching battery cabinets, UL 924 listed**,** NEMA 1, consult factory for other types. The specific Inverter and battery cabinet shall be a CSA listed system per UL924, with a minimum of 90 minutes of battery operation under full load conditions.

2.5 QUALIFICATIONS AND QUALITY ASSURANCE

2.5.1 Manufacturer's Certification: A minimum of twenty years experience in the design, manufacture and testing of solid-state Inverter is required. The manufacturer shall specialize in manufacturing of on-line, double conversion high frequency Inverter modules specified in this document. The manufacturer shall hold a current ISO 9001-2000 certification and shall design the units in accordance with internationally accepted standards.

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

2.5.3 Factory Testing: Every unit shipped will have completed a documented functional test of the Inverter module and a battery system, including a battery discharge test. A copy of the test report shall be available upon customer's request.

2.6 Operating Modes

2.6.1 Standby Mode:
After power is applied, the system is placed in STANDBY mode and a self-check starts. During this period, the start subroutine checks for the input voltage and proper operation of the inverter and bypass SCR's. After the routine is completed and check confirmed OK, the system goes into the NORMAL mode.

2.6.2 Normal Mode:
The input contactor K1 receives a closing signal, connecting input power to the DC supply transformer. The DC rectifier supplies the battery charger, Control Board and the DC/AC inverter circuit. 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 pulse-width-modulation (PWM) waveform. This waveform is filtered and reconstructed back to a desired clean AC output power to critical loads at all time (with utility present or unit utilizing battery).

2.6.3 Response To Input Power Abnormal Condition

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 shall close the input contactor and the system returns to NORMAL automatically.

2.7 System Diagnostics/Alarm

2.7.1 Front Panel LCD Display: Standard, 4 lines x 20 characters back lit, LCD display on the Inverter for instant indication of unit status, metering, alarms and battery condition. The display provides easy read-out on 2 standard and 2 optional screens, providing continuous information with scrolling update:

2.7.2 Status display

2.7.2.1 System Status

- **Standby:** System is performing self-diagnostic.
- **Start up:** Inverter is being starter.
- **Normal:** All parameter are acceptable.
- **Problem:** Lost of utility power over load.
- **Failure:** System requires service.

2.7.2.2 System Rating in KVA

2.7.2.3 Battery Buss Voltage Status

- **Battery ok:** Battery voltage is within acceptable range.
- **Battery bad:** Battery voltage is out of range.

2.7.2.4 Input Voltage Status

- **Input ok:** Input voltage and frequency are within acceptable range.
- **Input bad:** Input voltage and/ or frequency is within acceptable range.

2.7.2.5 Battery Charger Status

- **Charger on:** Battery charger is charging or keeping batteries at float voltage.
- **Charger off:** Battery is being charged.

2.7.2.6 System Internal DC Buss

- **DC ok:** DC buss is within acceptable range.
- **DC bad:** DC buss is out of acceptable range.

2.7.2.7 Static By Pass Status

- **On inverter:** Critical load is being powered and protected by inverter.
- **On by pass:** Critical load is being powered from utility power.

2.7.2.8 Inverter Output Status

- **Out ok:** Output is within acceptable range critical load is being power by inverter.
- **Out bad:** No output is available from inverter and critical load is being powered from utility power.

2.7.3 Metering Display

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

2.7.4 Events and Data Logging – Optional

- UPS Events Time/Date stamp up to 50 scrolling events, with freeze function
- Aux. Output CB Trip – up to 20 CBs Trip alarm on 1st priority trip screens

2.7.5 System Utilization Screen – Optional

- Minutes on Battery: UPS in battery back up mode, accrued time
- System Hours: UPS in operation, accrued time
- Battery Event: number of times UPS operated in back up mode
- Temp: UPS cabinet temperature

2.7.6 Alarm Relays: Standard**,** dry contacts signal relays closing for each of the **f**ollowing alarm conditions: Input Fail, On Bypass, Low Battery, Summary Alarm

2.7.7 Communication Ports: Standard, Three com ports are available, 2 configured for RS232 type protocol and 1 for RS485 data transfer. All parameters displayed on front panel shall be available on these ports for remote monitoring

2.7.8 Power Flow Mimic: Optional. A laminated overlay with embedded color LED's. Combines information on front panel display with a graphic power flow visualization for instant load power status recognition

2.8 Mechanical Design and Construction

2.8.1 Enclosure: 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 the depth of no more than 18 inch, 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.

2.8.2 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: heat sink assembly with IGBTs and drivers and control PCBA shall be used for maximum reliability and simple servicing. All printed circuit assemblies shall have plug connections. Like assemblies and like components shall be interchangeable.

2.8.3 Earthquake Protection: The cabinet shall be evaluated for earthquake compliance with installation of the addition of optional seismic brackets.

2.9 COMPONENT DESCRIPTION

2.9.1 Input Terminal Block: an input terminal block shall be hard wired, and located in the Inverter close to knockouts for incoming power cable for easy installation. The conduit entries shall be located on the top and both sides of the cabinet.

2.9.2 Input Circuit Breaker: a circuit breaker shall be provided and hard wired at the Inverter input for protection from the utility line and associated wiring disturbances. An optional, higher KAIC breaker shall be available, and should be specified when required.

2.9.3 Input Contactor: The Inverter shall have a line contactor to isolate the rectifier in case of a line problem and allow for a smooth transfer/retransfer to and from bypass.

2.9.4 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 from the electronics section, to provide isolation between the line and the rectifier / inverter circuit.

2.9.5 Rectifier: a solid state circuit design, converting incoming AC power to regulated DC bus voltage for the input to the inverter and battery charger.

2.9.6 Inverter Heat Sink Assembly: The inverter shall feature pulse-width modulation (PWM) design utilizing high frequency (15 kHz) switched IGBT's. It shall use a true double conversion system, generating rated AC output from the utility power, or the batteries when in back up mode. The unit shall have a heat sink and power IGBT's assembly for reduced switching noise and maximum reliability**.** The assembly shall come as a FRU and its design and mounting location shall be conceived for an easy maintenance. It shall be located on the electronics shelf with direct access, with opened door and can be replaced in app.15 min, using only a screwdriver.

2.9.7 Charger: A separate battery charger circuit shall be provided. It uses the same IGBT's as in the inverter, with constant voltage and current limiting control. The battery float voltage is uP programmable for the applicable kVA and DC bus ratings. Full recharge of the batteries shall be in full accordance with UL 924. The rectifier, inverter and charger shall be a part of the heat sink, IGBTs and drivers subassembly as part of FRU modular design aimed at increased ease and safety of service.

2.9.8 Static Bypass : 100% rated, Continuous Duty
The bypass serves as an alternative 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 back up mode. The static switch shall be able to be powered up by an optional separate power source (generator or other power supply) for dual input capabilities.

2.9.8.1 Transfer to Bypass - will initiate automatically under the following conditions:

- Critical DC bus voltage out of limits
- Low Battery
- Over temperature
- Inverter problem

2.9.8.2 All Transfers to Bypass shall be inhibited for the following conditions

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

2.9.9 Control Logic: The entire Inverter operation shall be performed by the microprocessor controlled logic. All operations, parameters, diagnostics, test and protection routines are firmware controlled, compensating 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. Control PCB shall be located on the front door, removed from power wiring and switching devices. This arrangement shall minimize EMI and allow hot boards swap, in manual bypass mode.

2.9.10 Manual Maintenance Bypass Switch: An auto/man MBS switch shall be provided in the Inverter 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 with cabinet access key. The MBS shall be operated in conjunction with a S-1 synchronization switch, ensuring full synchronization and no inrush current during transfer.

2.9.11 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.

2.9.12 Manual Inverter Test Switch: Unit shall have a momentary test switch to allow the user a manual system test without the need to operate any breakers or shutting down the system. The test switch shall be in compliance with UL924 rules, well marked, accessible only after opening a locked front cabinet door and further protected from accidental activation. The PowerRide shall resume a normal operation after the test switch release.

2.9.13 Battery Subsystem: Sealed, maintenance-free VRLA batteries shall be provided. The batteries shall have an expected life of 10 years. The batteries shall be contained in a separate battery cabinet with a dedicated circuit breaker for battery protection, convenient power cut-off, and

servicing.
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.

2.10 Accessories

2.10.1 External Maintenance Bypass Switch: If specified by the customer, the bypass switch, enclosed in a box, could be field mounted on the **outside of** Inverter cabinet or 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 with no load support interruption.

2.10.2 Audio Alarm with Silence Switch: Provides audible warning signal, acknowledge and reset for Input Fail, On Bypass, Inverter On, Low Battery and Summary Alarm for any of the foregoing alarm conditions.

2.10.3 Remote Unit Status Display: The Remote Status Display is available in a console mount style box. It can also be wall mounted and comes with a 10 ft long “DB” connector signal cable or optional cable that can be up to 1000 feet long. Remote Status Panel may requires 120 VAC power, comes with 6 ft power cord, Silence, LED /Horn test switches. It includes following LED’s: Input Fail, On Bypass, Low Battery, and Summary Alarm.

2.10.4 Form “C” N/O Contacts for Alarms: Terminal strip TB is provided on the optional alarm relay board for user connection to the individual alarm contacts. The Remote Contact Board includes isolated Form C contacts for the same signals as on the Remote Status Panel.

2.10.5 Input Transient Voltage Surge Suppressor (TVSS): 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 a two-stage protection. When a protection component is damaged by absorbed transient, the module will display a flag indicating a need for replacement. At this time the device is still operational, due to redundant circuits. After the second spike, the device shows alarm condition indicating need for replacement. An additional Remote indication contacts “TS” is available to allow remote control of the protection status.

2.10.6 External Status Indicator: customer use, N/O dry contacts compatible with IBM AS400 standard shall be provided on a terminal block for the following signals: **Low Battery, On Bypass, Summary Alarm, and Input Fail.**

2.10.7 Normally On or Normally Off Output Aux. Circuit Breakers: These CB’s are 1 pole, 20 A devices for critical load distribution.

2.10.8 Higher KAIC Norm On/Off Output CB: 1 Pole, 20 A Circuit Breaker with Higher KAIC, DIN rail mounted or molded case design.

2.10.9 External Output Aux. CB’s In Panel Board: 1 pole, 20A located in external panel board can be mounted on the Inverter cabinet side or adjacent wall. Maximum number of QO breakers – 42.

2.10.10 10% Input Current Harmonic Filter

2.10.11 5% Input Current Harmonic Filter

2.10.12 EMI Filter: complies with: EN55022, 1998 Class "B" Radiated Emission EN55022, 1998 Class "B" conducted emission. FCC Part 15 Class "B" radiated emission, FCC Part 15 Class "B" conducted emission.

2.10.13 Dual Input Power Source

- WYE/WYE
- DELTA/WYE
- DELTA/DELTA

2.10.14 Output Transformer with Harmonic Tolerance (up to K-50)

2.10.15 Seismic Mounting Brackets: Left / Right seismic floor mounting brackets

2.10.16 Stackable Rack: floor space saving solution (1 rack per 2 cabinets)

2.10.17 Battery Monitoring System: single jar, string and entire system monitoring on a local, remote or web enabled PC. Assessment of actual remaining charge and jars deterioration for maximum battery life and total back up safety.

2.10.18 Emergency Circuit Converter (ECC), wall mountable plate with manual test switch

2.10.19 Emergency Control Module (ECM), modular to be installed inside (light fixture or wall).

2.11 Option

Global Monitoring System (GMS): All GMS items are optional. The GMS shall allow for flexibility in remote communications, metering, measurements, data logging, and system status including internet access.

2.11.1 Local On Inverter Display

- **Event Log:** Monitoring uP circuit acquires system data and displays up to 50 most recent Date/Time stamped events on the front panel display. Its key-selectable menu provides access to events, system information, display, freeze and delete functions.
- **Aux. CBs 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 CB trip screen. Trip modules mount easily on a DIN rail with aux.CB's.

2.11.2 Local On PC - **Via RS232 or RS485 Port**: This option requires a PC and LabView monitoring software on a Windows platform. Data sent to PC's is displayed as a control room panel for real-time monitoring. The distance to PC for RS232 cable shall be 25 – 150 ft, RS485 increases the range to 1000 ft

2.11.3 Remote Dial Up- Monitor 2000: The Monitor 2000 requires a phone line for remote operation. The device shall send data, voice and text messages

to 32 destinations like phone, fax, pager and e-mail via phone line DSL service. The Manager 2000 Windows software installed on a remote PC displays Inverter parameters, events and stats graphs. The device shall be installed in the unit and comes fully wired and function-tested

2.11.4 Web/SNMP Card: This option is a web enabled monitoring device for a unit with Internet or network connection. The internal IP address can be pre-installed in firmware to fit customer network settings. The SNMP/Web card can monitor the Inverter on the network through a standard web browser.

2.12 Maintenance, Service, and Enhanced Warranty Plans:

2.12.1 Service Personnel: The Inverter manufacturer shall employ a nationwide service organization, with factory-trained Customer Service Engineers dedicated to the start-up, maintenance, and repair of Inverter and power equipment. The manufacturer shall provide a fully automated national dispatch center to coordinate field service personnel schedules. One toll-free number shall reach a qualified support person 24hrs/day, 7days/week and 365 days/year. For emergency service calls, response time from a local Customer Engineer shall be approximately 15 minutes.

2.12.2 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 24hrs/day, 7days/week, 365 days a year for immediate parts dispatch. Parts shall be delivered to the site within 24 hours.

2.12.3 Maintenance Training: In addition to the basic operator training conducted as a part of the system start-up, classroom courses for customer employees shall be made available by the manufacturer. The course shall cover Inverter theory, location of subassemblies, safety, battery considerations and Inverter 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 interpretation shall be stressed.

2.12.4 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.

2.12.5 Site Testing: The manufacturer's field service personnel shall provide site testing if requested. The testing shall consist of a complete test of the Inverter system and the associated accessories 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.

NOTE: This Guide Specification follows the Construction Specification Institute guidelines per CSI MP-2-1,MP-2-2. It is subject to change 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, should you have any further questions or special requirements.

You can contact us at: **800–786-6915,** or via e-mail: **info@perfectpowersystems.com.**

2.12.6 WARRANTY

2.12.6.1 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 one (1) year period beginning from the start up, or 18 months from the ship date, whichever comes first. Optional 1 year extended warranty and maintenance contract packages shall also be available at the end of the factory maintenance period.

2.12.6.2 Battery: Battery manufacturer's standard warranty shall be transferred and assigned to the end user. It will have a minimum period of ten year**.**

3.0 Execution

3.1 Physical Specifications

Cabinet shall be double door, floor mountable, fork liftable, black painted with max 18" depth 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.

*kW	Input – Output Voltage	kVA Model Number	DC Volts	BTU/ Hr	Total Weights (lbs)	(Qty) Size of Cabinets
8	208Y/120 - 208Y/120 480Y/277 - 480Y/277 480Y/277 - 208Y/120	PD010B05LHT3-VA PD010H09LHT3-VA PD010H05LHT3-VA	192	3032	2475 lbs	(2) 68"
12	208Y/120 - 208Y/120 480Y/277 - 480Y/277 480Y/277 - 208Y/120	PD015B05LHT3-VA PD015H09LHT3-VA PD015H05LHT3-VA	192	4549	4670 lbs	(3) 68"
16	208Y/120 - 208Y/120 480Y/277 - 480Y/277 480Y/277 - 208Y/120	PD020B05LHT3-VA PD020H09LHT3-VA PD020H05LHT3-VA	192	6066	5239 lbs	(3) 68"
20	208Y/120 - 208Y/120 480Y/277 - 480Y/277 480Y/277 - 208Y/120	PD025B05LHT3-VA PD025H09LHT3-VA PD025H05LHT3-VA	288	7582	6247 lbs	(3) 68"
24	208Y/120 - 208Y/120 480Y/277 - 480Y/277 480Y/277 - 208Y/120	PD030B05LHT3-VA PD030H09LHT3-VA PD030H05LHT3-VA	288	9098	6287 lbs	(3) 68"
32	208Y/120 - 208Y/120 480Y/277 - 480Y/277 480Y/277 - 208Y/120	PD040B05LHT3-VA PD040H09LHT3-VA PD040H05LHT3-VA	312	12131	10730 lbs	**(4) 68"
40	208Y/120 - 208Y/120 480Y/277 - 480Y/277 480Y/277 - 208Y/120	PD050B05LHT3-VA PD050H09LHT3-VA PD050H05LHT3-VA	552	15164	11263 lbs	(5) 68"
50	208Y/120 - 208Y/120 480Y/277 - 480Y/277 480Y/277 - 208Y/120	PD062B05LHT3-VA PD062H09LHT3-VA PD062H05LHT3-VA	552	18000	15669 lbs	***(7) 68"

***** 60 KW is available - contact factory
****** 4 Cabinets with 10" Hutch OR 4 Cabinets plus One 48" Cabinet.
******* Use 150AH batteries in total of 6 cabinets [2569 lbs + (5 x 2590 lbs)] available.
Weights are approximate weight for basic unit and subject to change without notice. Actual weight can be vary depends on options.

3.2 Installation

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

3.3 Environmental Requirements

A. Temperature:

- Operating - 0 C to 40 C (32 F to 104 F)
- Storage - 20 C to +45C (- 4F to 113 F)
- Maximum recommended storage temperature for batteries is 77 F for up to six months. Storage at up to 104 F is acceptable for a maximum of three months.

B. Humidity: operating and storage: 0 to 95% RH, non condensing

C. Altitude: up to 6000 ft (1,829 meters)

D. Audible Noise: 57 dB typ. on "response curve A"

3.4 **Wiring Installation**: Inverter cabinet conduit entry arrangement shall allow for flexibility of user wiring installation. The wiring shall be routed thru the top or either side of the cabinet.

3.5 **Wiring Termination**: The Inverter input and output power connections shall be hard wired within the cabinet. Optional input line cable and output distribution panel shall be available (limited range of units only, please consult factory for details)**.** Input and output terminal blocks shall be provided for easy field wiring of Inverter and battery cabinets

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, interconnection and wiring of the system.
User Manual(s) outlining complete operating and preventive maintenance procedures.

3.7 **Factory Startup**

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