

Crucial Power Products WaveRider Emergency Lighting System, On Line Inverter (Uninterruptible)

1. SCOPE

The Crucial Power Products Emergency Lighting Inverter shall be a solid-state single phase designed to provide regulated and conditioned sinusoidal power for emergency lighting applications. The Crucial Power Products Emergency Lighting Inverter shall provide uninterrupted power during all modes of operation. There shall be no interruption of power to the lighting system when the unit transfers to and from battery operation. The Crucial Power Products Emergency Lighting Inverter and battery subsystem shall be U.L. listed to U.L. 924 *Standard for Emergency Lighting and Power Equipment*. Our units come standard with the Battery Exercising (BEX) and a battery pulse system (to extend the life) and continual self-Diagnostics included in each unit. This unit has a one-year warranty except the batteries are 1 year full 9 years pro-rated.

2. MODES OF OPERATION

NORMAL: During normal operation, utility (or generator) power is thoroughly conditioned and regulated by transformer 30 kilohertz microprocessor system. The microprocessor in conjunction with the input filter, will filter noise and transients from the incoming power. Additionally, the WaveRider regulates its output voltage to within specified limits. The rectifier section maintains the batteries in a fully charged state. The inverter is always providing power to the load.

EMERGENCY: Upon loss of input power or when power exceeds the specified input limits, the control logic shall transfer to operation and disconnect the input line. The transfer to battery shall be an uninterrupted or "no break" power transfer. The inverter shall supply power from the batteries and through the microprocessor to the lighting system. The output shall be PWM sinusoidal and within specified limits. If power is not restored before the batteries have been exhausted, the Inverter shall completely shutdown - protecting the batteries from possible damage.

RECHARGE: Upon restoration of input power and before the batteries are completely exhausted, the Inverter 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 using our (patent pending) pulse charging system that allows our batteries to run cooler and extend the life significantly. This system will also plot the current to allow cooler batteries and extend the life. It will also tell the customer when the batteries need to be replaced.** The battery charger shall recharge the batteries as set forth in U.L. Standard 924.

MANUAL BYPASS SWITCH: The bypass shall be an optional feature. If the Inverter is equipped with this feature, the bypass shall allow trained field service personnel to service the logic boards and batteries. The static bypass switch (SBS) will transfer the load to the utility in the event of an inverter failure. The bypass shall be a make-before-break configuration and shall be offered in both internal and external configurations.

3. MAJOR SYSTEM COMPONENTS

The Crucial Power Products Emergency Lighting Inverter shall consist of the following major subsystems:

30 KILOHERTZ MICROPROCESSOR: The 30 kilohertz microprocessor shall provide regulation and conditioning from incoming power aberrations. Power to the critical load shall be supplied by the 30 kilohertz microprocessor whether the Inverter is in normal mode or emergency mode. The output wave shape shall be PWM sinusoidal for all modes of operation.

STATIC BATTERY SUBSYSTEM: Sealed, maintenance-free batteries shall be provided. The batteries shall have an expected life of ten (10) years. The batteries shall be fully wired and contained within a freestanding battery cabinet. Battery run time (based on 100% full load) shall be no less than ninety (90) minutes. Extended battery run times greater than ninety (90) minutes shall be available.

INVERTER: The inverter shall convert DC power supplied from the batteries into AC power. The inverter shall be maintained in an on-line mode. It shall be a Pulse width Modulated (PWM) design. Cooling fans are provided to keep the internal components running at their optimum rated temperature. The system is rated for 160,000 MTBF.

CHARGER: A separate battery charger shall be provided. The battery charger shall maintain the batteries at full charge. **The battery charger shall be sized such that it recharges using our new patent pending process to extend battery life. This system will also monitor and plot the charging current to limit heat and extend the life of the batteries. This system will also advise the customer when the batteries need to be replaced. The batteries will conform to the noted re-charge time as set forth in UL 924 listing.**

POWER CONNECTIONS: The Inverter input and output shall be hard wired. A main input and output circuit breaker shall be provided. The (optional) output circuit breakers are provided with over-current protection and a means to easily disconnect power from the lighting system.

MONITORING AND COMMUNICATION SUBSYSTEM: The Crucial Power Products Emergency Lighting Inverter shall be furnished with a system status indicator panel. This unit comes standard with a Battery Exercising System (BEX) and self diagnostic as standard. This panel shall have the following enunciators:

The system status panel, the Inverter liquid crystal display. The LCD display shall display UPS operating information such as input voltage, input current, output voltage, output KVA, etc.

Three (3) communications ports shall be provided. One port shall provide dry contact closures for the following parameters:

- Loss of Input Power
- UPS on Battery Operation
- Low Battery Condition
- UPS Operational

The second and third port shall be based upon the **RS-232 and LOCAL ONLY** operating parameters, including input and output data and UPS status shall be available for local monitoring via the RS-232 or RS 485 port.

A summary alarm contact, accessible from a terminal block within the Inverter, shall be provided. The summary alarm contact indicates whether or not the Inverter is functioning properly.

4. SPECIFICATIONS

The Inverter shall meet the following minimum specifications:

INPUT SPECIFICATIONS	Voltages	120, or 208, or 240 or 277 (3.0, 5.0, 7.5, 10 12.5 & 15 KVA)
	Voltage Range	+15% to -20% of Nominal Voltage
	Frequency	60 Hz +/-5%
	Power Factor	0.7 Lagging (Typical) 1.0 Unity
	Power Connections	Hard Wired (Terminal Block)
	Number of Wires	2 Wires Plus Ground
	Input Circuit Breaker	42 KAIC

OUTPUT SPECIFICATIONS	Output Ratings	3 KVA; or 3 kW 1425BTU's /Hour 5.0 KVA; or 5 kW 2047 BTU's / Hour 7.5 KVA; or 7.5 kW 3033 BTU's /Hour 10KVA; or 10 kW 3797 BTU's 12.5 KVA; or 12.5 kW 4325 BTU's / Hour 15 KVA; or 15 kW 5309 BTU's / Hour
	Voltages	120, or 208, or 240, or 120/240, 277 VAC
	Voltage Regulation	+/-3% No Load to Full Load +/-3% High Line to Low Line
	Frequency	60 Hz +/-0.5 Hz (When on Inverter)
	Output Waveshape	PWM Sine Wave
	Harmonic Distortion	<5% THD; <3% Single Harmonic
	Crest Factor	3 to 1
	Power Factor	0.65 Lagging and Leading to Unity
	Overload	125% for Ten (10) Minutes; 150% Surge Per ANSI/IEEE C62.45 CAT A & B
	Over-current Protection	Main Output Circuit Breaker
	Power Connections	Hard Wired (Terminal Block)
	Number of Wires	2 Wires neutral Plus Ground
	Noise Rejection	-120 dB Common Mode; -60 dB Normal Mode
	Isolation	No Direct Electrical Connections Between Input and Output – Including Neutral
Output Neutral	Solidly Bonded to Inverter Frame, grounded	
BATTERY SPECIFICATIONS	Standard Run Time	90 Minutes Minimum @ Rated Load
	Extended Run Time	Up to 4 Hours (Optional)
	Battery Type	Sealed, Maintenance-Free, Lead-Acid
	Expected Life	10 Years
	Nominal DC Link	KVA, kW dependent
	Charger Ampacity	New pulse charging to extend battery also will monitor and advise the customer when the batteries need to be changed. Sized to Meet Requirements of U.L. 924
	Float Voltage	2.25 Volts per Cell
	Protection	Optional Output Circuit Breakers
	Packaging	Free-Standing, Fully Enclosed Battery Cabinet

MONITORING AND COMMUNICATIONS	LCD Screen	LCD Screen Input Voltage Battery Charger; UPS Output; On Battery; Low Battery; Summary Alarm
	Display	160 Character LCD Display
	Audible Alarm	Standard Feature; Includes Alarm Silence
	Dry Contact Interface Port	Input Power Present (N.O.); UPS on Battery Operation (N.O.); Low Battery Condition (N.O.); UPS Operational (N.C.)
	RS-232 Interface Port	Standard Feature Local Only
	RS-485 Interface Port	
	Summary Alarm	N.O. Dry Contact (Terminal Block)
	Battery Test Switch	Located on Real Panel-Standard Feature
	Remote Emergency Power Off	Standard Feature
ENVIRONMENTAL SPECIFICATIONS	Agency Listings	CSA Listed to UL 924; FCC Class A
	Surge Withstandability	ANSI C62.41-1980 Categories A & B
	Temperature	0 to +40 degrees C (Operating); -20 to +40 degrees C (Storage)
	Relative Humidity	0 to 95% Non-Condensing
	Altitude	Up to 6,000 Feet (1,829 Meters)
	Internal Fans control Heat Dissipation	1,137 BTU/Hour (3 kVA/ kW); 1,668 BTU/Hour (5.0 kVA/ kW); 2,047 BTU/Hour (7.5 kVA) / kW 3,033 BTU/Hour (10 kVA) / kW 4,100 BTU/HOUR(12.5 KVA/kW 5,309 BTU/Hour (15 kVA) / kW
	Efficiency	92% Minimum
	Audible Noise	57 dB @ 1 Meter
	Number of Cabinets	2: UPS Cabinet and Battery Cabinet
	Dimensions (H x W x D)	(1) 39" X 18" X 48 3 KVA / kW (1) 39"x18"x48" (5.0 KVA / kW (1) 39"x18"x68" (7.5 KVA) (2) 39 x 18 x 68 Cabinets for 7.5 kW (2) 39"x18"x68" (10 KVA/ 10 kW (2) 39"x18"x68" (12.5 KVA/kW (2) 39"x18"x68" (15 KVA / 15 kW

<p style="text-align: center;">ENVIRONMENTAL SPECIFICATIONS (cont.)</p>	<p style="text-align: center;">Weight (UPS/Battery Cabinet)</p>	<p>3.0 KVA 600lbs 3.0 kW: 725 lbs 5.0 KVA: 900lbs 5.0 kW: 1650lbs 7.5KVA: 1150lbs 7.5 kW: 1700lbs 10 KVA: 1600 10 kW: 2200 12.5 KVA 1850 12.5 kW 2550 15 KVA: 2250lbs 15 kW 3150</p>

5. OPTIONS

The Crucial Power Products Inverter can have (at an additional cost) the following options: These must be ordered individually at an additional cost.

- External make-before-break maintenance bypass switch
- Output Circuit Breakers

6. QUALIFIED SYSTEMS

The Crucial Power Products Inverter shall be a line interactive microprocessor Uninterruptible Power System, designed specifically for emergency lighting systems, and manufactured by Crucial Power Products.

All Crucial Power Products Emergency Lighting Systems are manufactured to meet ISO 9001.

Manufactured by:

**Crucial Power Products
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