CSI263353.01END – Static Uninterruptible Power Supply Systems

 Endurance Series

**MINUTEMAN UPS**

**Endurance Series**

**Product Specifications**

**1000VA – 3000VA**

**Single-Phase Uninterruptible Power Supply Systems**

1. **GENERAL**
	1. **SUMMARY**

This product specification will outline and define the electrical and mechanical features for a true double conversion, online, true sinewave, solid-state, uninterruptible power supply (UPS) system. The UPS shall provide high-quality, regulated AC power to sensitive electronic equipment connected to the system.

* 1. **STANDARDS**

The UPS shall be designed and manufactured in accordance with the applicable sections of the current revision of the following regulatory organizations codes. Where a conflict may arise between these standards made herein, the statements in this specification shall govern.

* FCC Part 15, Subpart B Class A/ANSI C63.4:2009, Class A
* ISO 9001 & 14001
* cUL (UL1778 5th edition, CSA 22.2 No. 107.3-14 / R:2014 3rd Edition)
* CE
* IEEE/ANSI EN62040-2, IEC61000-2-2, IEC61000-4-2, IEC61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6, IEC61000-4-8, IEEE C62.41 Category A1, IEC62040-1-1, IEC/EN62040-2
* RoHS WEEE 2011/65/EU Directive
* EPA Energy Star 2.0
* Dept. of Energy DoE CFR 10 Part30 (1000VA and 1500VA models only)
* ESS UN38.3 and UL1973 for battery Energy Storage Systems (ESS)
	1. **SYSTEM DESCRIPTION**
		1. **Design Requirements – UPS Module**

**1.3.1.1 Topology:** Single-phase,double-conversion online

**1.3.1.2 Standard Voltage Settings:** Input/output voltage specifications of the UPS shall be:

Input: 55 – 160VAC single-phase, two-wire plus ground

Output: 100/110/115/120/125/127VAC single-phase, two-wire plus ground

**1.3.1.3 Output Load Capacities:** The specified output load capacity of the UPS shall range between 1000-3000VA with a 0.9 lagging power factor.

* + 1. **Design Requirement – Batteries**

**1.3.2.1 Battery Type:** Sealed, maintenance-free lithium ferro-phosphate, (LiFePO4)

**1.3.2.2 Reserve Time:** A minimum of 9 minutes at a full, measured load with an ambient temperature between 20° – 30°C

**1.3.2.3 Recharge Time:** Internal batteries will charge to 100% capacity within two hours after the UPS returns utility (AC) power from low battery cut-off.

* + 1. **Modes of Operation** – The UPS shall be designed to operate as a true double-conversion online system in the following modes:

**1.3.3.1 AC Normal Mode:** The AC power of the connected load of the UPS is supplied by the internal DC/AC inverter power source. Any non-hazardous harmonics and/or anomalies are filtered through Power Factor Correction (PFC) circuitry. While operating in AC Normal Mode the internal batteries of the UPS are simultaneously float-charging.

**1.3.3.2 Battery Mode:** Whenever utility AC power exceeds the threshold limits, (higher or lower), of the UPS input, the UPS will transfer to Battery Mode and supply AC power to its connected load using the internal batteries. There shall be no interruption in power when switching from the AC Normal Mode to the Battery Mode. When utility AC power returns to nominal input levels, the UPS will transfer to AC Normal Mode with no interruption of power.

**1.3.3.3 Economy Mode:** When operating in Economy Mode, the input utility power to the UPS will bypass the inverter circuit and connect directly to the output of the UPS, powering the connected equipment while simultaneously charging the internal batteries. When utility AC power exceeds the thresholds of the UPS input parameters, the UPS will transfer to the On Battery Mode, providing AC power connected equipment. When utility power returns to nominal levels, the UPS will transfer return to Economy Mode, providing output utility AC power and will simultaneously begin recharging the internal batteries.

**1.3.3.4 Recharge Mode:** Upon restoration of AC utility power, after any utility AC power anomaly in which the UPS transfers to On Battery Mode, the internal charger will automatically start recharging the internal batteries.

**1.3.3.5 Bypass Mode:**

Automatic Internal Bypass: When an internal UPS fault is detected, the UPS will automatically transfer to a utility Bypass Mode. The Bypass will directly pass utility AC power directly to the output of the UPS. Simultaneously, the UPS will sound an audible alarm and display an error code for the failure on the LCD display.

Manual Bypass: Using software via a communications connection or the front panel display, the UPS must be able to be manually placed into, and removed from, a Bypass Mode if the UPS is operating in a faultless state.

**1.3.3.6 DC Cold Start Mode:** The UPS shall have the capability power on and operate in the Battery Mode without AC utility power applied.

**2.0 PERFORMANCE REQUIREMENTS**

**2.1 AC INPUT TO UPS**

**2.1.1 Wiring Configuration for Standard Units:** Single-phase, 2-wire plus ground.

**2.1.2 Voltage Range (Non-Battery mode):** 55 – 160VAC for all models

**2.1.3 Nominal Frequency:** Auto-Select 50/60Hz (+/- 6Hz.)

**2.1.4 Power Factor:** 0.9 lagging minimum at nominal input voltage and full rated UPS output load

**2.1.5 Input Protection:** All units will have a re-settable input circuit breaker to prevent excessive overload in AC mode, rated for the following:

1KVA/1.5KVA: 20 Amps

2KVA: 30 Amps

3KVA: 40 Amps

**2.1.6 Inrush Current:**

1KVA model: 27 Amps for 17ms

1.5KVA model: 43 Amps for 17ms

2KVA model: 57 Amps for 17ms

3KVA model: 78 Amps for 17ms

**2.1.7 Current Limit:**

1KVA model: 20 Amp input circuit breaker

1.5KVA model: 20 Amp input circuit breaker

2KVA model: 30 Amp input circuit breaker

3KVA model: 40 Amp input circuit breaker

**2.1.7 Current Distortion:**

Linear loads: Not to exceed 3.2% at full linear load and normal line voltage

Non-linear loads: Not to exceed 7% at full non-linear load and normal line voltage

**2.1.8 AC Leakage Current:** < 2mA

**2.1.9 AC Surge Energy Protection:** All models will be capable of sustaining input surges without damage per: EN61000-4-5: 2KV

**2.1.10 Input Common Mode Choke**

**2.1.11 Voltage Transient Response:** 0nS – Normal mode, <5nS – Common mode.

**2.1.12 Transient Recovery Time:** <25mS

**2.1.13 Backfeed Protection:** All models will provide back-feed protection to utility power by providing an isolation relay at the input of the UPS.

**2.1.14 Power Factor Correction:** ≥ 99% at nominal input voltage and full load

**2.2 OUTPUT OF UPS**

**2.2.1 Wiring Configuration:** Single-phase, 2-wire plus ground.

**2.2.2 Output Waveform:**

AC Normal Mode: True sine wave.

Battery Mode: True sine wave.

Economy Mode: Same as input to the UPS

**2.2.3 Voltage Regulation:**

AC Normal Mode: Not to exceed ± 2% of the programmed UPS output setting

Battery Mode: Not to exceed ± 2% until Low Battery Warning.

Economy Mode: Not to exceed ± 3% of the input to the UPS

**2.2.4 Frequency:** The UPS will auto-synchronize to 50Hz or 60Hz depending on the input utility frequency during the startup. ≤55Hz will default to 50Hz and ≥55Hz will default to 60Hz.

AC Normal Mode: Nominal Frequency of 50 or 60Hz ± 3Hz unless synchronized to the line.

Battery Mode: The UPS will operate at the last recorded frequency at 50Hz or 60Hz prior to transfer to Battery Mode ±0.1Hz

Economy Mode: The UPS will auto-synchronize to 50Hz or 60Hz depending on the input utility frequency during the startup. ≤55Hz will default to 50Hz and ≥55Hz will default to 60Hz.

**2.2.5 Voltage Distortion:** The Voltage Distortion rating will apply to all UPS modes of operation

Linear loads: ≤ 2% at full-rated linear load

Non-linear loads: ≤ 4% at full-rated non-linear load

**2.2.6 Current Distortion:**

Linear Loads: Not to exceed 5% at full load under normal voltage

Non-linear Loads: Not to exceed 7% at full load under normal voltage

**2.2.7 Peak Output Voltage:** 190VDC

**2.2.8 Dynamic Response**:

AC Normal Mode: ±6% in 2 cycles at 100% load change

 Battery Mode: ± 9% in 2 cycles at 100% load change

**2.2.9 Crest Factor:** 3:1

**2.2.10 Load Power Factor Range (All Modes):** 1.0 - 0.9 lagging without de-rating.

**2.2.11 Output Power Factor Rating (All Modes):** Rated KVA at 0.9 lagging power factor for all models.

**2.2.12 Current Monitoring:** All units will have current monitoring circuitry on the UPS output receptacles to measure the combined total load of all the receptacles. This circuitry shall be used to calculate actual load.

**2.2.13 Overload Capacity:** All Models will operate for the following durations based on the size of the overload:

AC Normal Mode: The UPS will transfer to Bypass Mode under the following overload parameters:

 100% to 110%: The UPS must remain in AC Normal Mode with a continuous alarm

 110% to 130%: 5 minutes with an ambient temperature ≤104°F (40°C)

 2.5 minutes with temperature ≥104°F (40°C)

 130% to 140%: 30 seconds

 >140%: 1.5 seconds

Battery Mode: The UPS will shut down under the following overload parameters:

 100% to 110%: The UPS must remain in Battery Mode with a continuous alarm

 110% to 130%: 1 minute

 130% to 140%: 2 seconds

 >140%: 1.5 seconds

Economy Mode: The UPS will transfer to Bypass Mode under the following overload parameters:

 100% to 110%: The UPS must remain in Economy Mode with a continuous alarm

 110% to 120%: 30 minutes

 120% to 130%: 10 minutes

 >130%: 1 minute

**2.2.14 Output Voltages in Battery Mode:** The inverter shall have adjustable output voltages of 100, 110, 115, 120, 125 or 127VAC. Adjustments can be programmed using the front panel LCD display, serial or network communications.

**2.2.15 Efficiency:**

AC Normal Mode: ≥ 90% Full load (AC – AC)

Battery Mode: ≥ 87% Full load (DC – AC)

Economy Mode: > 96% Full load

**2.2.16 Transfer Time:**

AC Normal to Battery Mode: 0ms from Online mode to On Battery mode

Battery to AC Normal Mode: 8ms from Economy mode to On Battery mode

**3.0 COMPONENTS**

**3.1 CHARGER**

**3.1.1 General:** The term charger shall denote the solid-state equipment and controls necessary to convert incoming AC power to regulated DC power for battery charging. The charger will be battery independent and will operate regardless of battery voltage or installation. The charger shall be a two-stage, pulse-width modulated, switching-type charger with constant voltage/current limiting control circuitry.

**3.1.2 DC Filter:** The charger shall have an output filter to minimize ripple voltage into the battery. Under no conditions shall ripple voltage into the battery exceed 2% RMS. The filter shall be adequate to ensure that the DC output of the charger will meet the input requirements of the Converter and DC/DC Booster circuits.

**3.1.3 Automatic Restart:** Upon restoration of utility AC power, after a utility AC power outage, the UPS shall automatically restart and resume the battery recharge mode.

**3.1.4 Battery Recharge:** The charger shall be capable of producing battery-charging current sufficient to replace 100% of the battery-discharged power within eight (2) hours. After the battery is recharged, the charger shall maintain the battery at full charge until the next emergency operation.

**3.1.5 Overvoltage Protection:** There shall be charger over-voltage protection so that if the charger voltage rises to the pre-set limit, the charger will turn off and issue a fault alarm.

**3.1.6 Charger Voltage**

1KVA model: 28.0VDC ±1%

1.5KVA model: 52.5VDC ±1%

2KVA model: 52.5VDC ±1%

3KVA model: 84.0VDC ±1%

**3.1.7 Charge Current:**

Charge Mode: 4A (Default), (8A max with an ambient temperature ≥50°F to 104°F (10°C to 40°C)

 6A max with an ambient temperature ≥104°F to 113°F (40°C to 45°C)

 1A max with an ambient temperature ≤50°F or ≥113°F (10°C or 45°C)

Float Mode: <1A max

**3.2 INVERTER**

**3.2.1 General:** The term inverter shall denote the solid-state equipment and controls to convert DC power from the Converter or the DC/DC Booster circuits to regulated AC power for supporting the critical load.

**3.2.2 Overload Capability:** The inverter shall be capable of supplying acceptable current and voltage for overloads exceeding 111% and up to 130% for at least 60 seconds. A status indicator and audible alarm shall indicate overload operation.

**3.2.3 Fault Clearing and Current Limit:** For currents of greater than 150% or for overload currents occurring for a time greater than the capability of the UPS, the inverter shall have electronic current-limiting protection to prevent damage to components. The inverter shall be self-protecting against any magnitude of connected output overload. Inverter control logic shall sense and disconnect the inverter from the critical AC load without the requirement to clear protective fuses.

**3.2.5 Fuse Failure Protection:** Power semiconductors in the inverter unit shall be fused so that loss of any one power semiconductor will not cause cascading failures.

**3.2.6 Inverter DC Protection:** The inverter shall be protected by the following disconnect levels:

DC Overvoltage Shutdown

DC Over-current Shutdown

DC under-voltage Warning (Low Battery Reserve)

DC under-voltage Shutdown (End of Discharge)

**3.2.7 Over-discharge Protection:** To prevent battery damage from over-discharging, the UPS control logic shall automatically turn off the inverter at a predetermined level as to not damage the batteries.

**3.2.8 Output Frequency:** The output frequency of the inverter shall be microprocessor controlled. The microprocessor shall regulate the inverter output frequency to +/- 0.1Hz for steady state and transient conditions. Total frequency deviation, including short time fluctuations and drift, shall not exceed 0.2Hz from the rated frequency unless synchronized to utility power.

**3.3 DISPLAY AND CONTROLS**

**3.3.1 Monitoring and Control:** The UPS shall be provided with a microprocessor-based unit status display and controls section designed for the convenient and reliable user operation.

**3.3.2** **LCD Display:** The UPS shall have a LCD display located on the front panel that provides the following information

**3.3.2.1 LCD Icon Display:** The LCD display panel will include dedicated display icons for the following information:

AC Normal

On Battery

Battery Charging

Bypass Mode

ECO Mode

Rectified circuit status

Inverter circuit status

Power Factor Correction (PFC) status

Output Status

Low Battery

Overload

Alarm Silence

Receptacle programming active

**3.3.2.2 The LCD Numeric Display:** The LCD screen will provide a numeric display of realtime UPS status information for the following: (Selection of the items can be made from the scroll button on the front panel)

Configuration options

Alarm error codes

Ambient temperature

Input voltage and frequency

Output voltage and frequency

Input current

Output load current

Battery voltage and current

Battery capacity

Load percentage

Estimated runtime

**3.3.2.3 LCD Meter Display**

Connected load capacity: The LCD display will have a Load bar graph providing real time updates on the connected load capacity of the UPS in 25% segments

Battery capacity: When the UPS is operating in AC Normal or ECO modes, the LCD display will have a Battery bar graph providing real time updates on the charge capacity of the internal batteries in 25% segments.

Est. runtime (Battery Mode): When the UPS is operating in Battery Mode, the Battery bar graph will provide a real time display of the estimated runtime based on 25% segments.

**3.3.4 Physical Controls**

ON/MUTE Button: To power On the UPS, press and hold the ON/MUTE button until the UPS sounds twice, (up to four seconds). Press and release the ON/MUTE button to silence the audible alarm when the UPS is in battery mode.

SELECT (Scroll) Button: Press the Select button to scroll through any monitoring screens or menu options.

OFF/ENTER Button: To power off the UPS, press and hold the OFF/ENTER button until a tone sounds then release. When scrolling through menu option on the LCD display, press and release the OFF/ENTER button to select the current menu or setting option.

**3.3.5 Power Monitoring Software:** The UPS shall be compatible with Power Monitoring Software to report important status information concerning the UPS and the utility power. The software must communicate vis RS232 or USB connection and be able to perform a graceful shutdown of connected computers prior to the shutdown of the UPS.

**3.3.6 Communications Port:** The UPS will have one each of a RS232 and USB communication port. The ports will be used to communicate with the power monitoring software and will allow the user to configure, monitor and manage the UPS. The RS232 and USB ports will be able to provide simultaneous communications.

**3.3.7 Emergency Power Off (EPO) Port:** The UPS shall have a 2-pin connector on the rear panel of the UPS for the exclusive purpose of providing a EPO communication port. The EPO port connects the UPS to a user-installed switch. In the Normal, Economy or On Battery mode, open the connection between pin1 and pin2 for approximately 0.5 seconds in order to shut down the UPS. In order to restart the UPS after enabling the EPO from AC or Economy mode, reconnect pin1 and pin2, then power the UPS off and then back on via the ON and OFF buttons located on the front panel of the UPS. To restart the UPS from an EPO shutdown while in Battery mode, reconnect pin1 and pin2 then press the ON button once nominal utility power returns.

**3.3.7.1 AC Mode:** Open the connection between pin1 and pin2 for approximately 0.5 seconds in order to shut down the UPS. Restart the UPS by reconnecting pin1 and pin2, then power the UPS off and then back on via the ON and OFF buttons located on the front panel of the UPS.

**3.3.7.2** **Economy Mode:** Open the connection between pin1 and pin2 for approximately 0.5 seconds in order to shut down the UPS. Restart the UPS by reconnecting pin1 and pin2, then power the UPS off and then back on via the ON and OFF buttons located on the front panel of the UPS.

**3.3.7.3 DC Mode:** Open the connection between pin1 and pin2 for approximately 0.5 seconds in order to shut down the UPS. Restart the UPS from an EPO shutdown while in Battery mode by reconnecting pin1 and pin2 then press the ON button once nominal utility power returns.

**3.4 INTERNAL BATTERY SYSTEM**

**3.4.1 Internal Battery Configurations:**

1KVA model: 24VDC / 7.5 Amp/hour

1.5KVA model: 48VDC / 5.0 Amp/hour

2KVA model: 48VDC / 10.0 Amp/hour

3KVA model: 72VDC / 7.5 Amp/hour

**3.4.2 Accepted Battery Manufacturers**

 **Voltronicpower**

**3.4.3 Low Battery Thresholds**

**3.4.3.1 Low Battery Warning:** The UPS will enter a Low-Battery state when the internal battery voltage reaches the following values:

1KVA model: 22.4VDC ±0.4VDC

1.5KVA model: 42.0VDC ±0.4VDC

2KVA model: 42.0VDC ±0.4VDC

3KVA model: 67.2VDC ±0.4VDC

**3.4.3.2 Low Battery Cut-off:** The UPS will perform a Low Battery Cut-Off and shutting down when the internal battery voltage reaches the following values:

1KVA model: 21.2VDC ±0.4VDC

1.5KVA model: 39.8VDC ±0.4VDC

2KVA model: 39.8VDC ±0.4VDC

3KVA model: 63.6VDC ±0.4VDC

**3.4.4 DC Leakage Current:** <100uA

**3.4.5 Hot-swappable Batteries:** All units must have hot-swappable battery function. When the unit is operating in the AC Normal or Economy mode, the user must be able to replace the batteries without turning off the UPS.

**3.4.6 Battery Module Replacement:** The internal batteries of the UPS shall be constructed of replaceable subassemblies. These subassemblies will be removeable through the front panel of the UPS without requiring the UPS to be powered off.

**3.4.7 Independent Battery Bypass:** The UPSmust be able to provide filtered and regulated output power to connected loads with dead internal batteries, or without internal batteries, when operating in Normal Mode and input utility power is within the nominal threshold range of the UPS.

**4.0 PRODUCT FABRICATION**

**4.1 MATERIALS**

All materials of the UPS shall be new, of current manufacture, high grade and free from all defects and shall not have been in prior service except as required during factory testing.

The maximum working voltage, current, and di/dt of all solid-state power components and electronic devices shall not exceed 90% of the ratings established by their manufacturer. The operating temperature of solid-state component sub-assembly shall not be greater than 90% of their ratings.

**4.1.1 Case:** All UPS will be manufactured using a metal case with a two-piece plastic front panel, including a removeable battery door. Each UPS will come with 19-inch rackmount ears installed as standard for installation in a cabinet and/or rack. Vertical (Tower), floor-mount installation is possible with optional hardware included in the original packaging.

**4.1.2 Front Panel:** The front panel assembly of the UPS will be manufactured of ABS plastic. The assembly will include a removeable battery door and LCD display and control panel insert. The battery door shall be removeable without the use of any tool. The LCD and control panel insert shall be rotatable, without the use of tools, to appropriately orient it based on horizontal or vertical installation.

**4.1.3** **Rear Panel:** The rear panel of the UPS will be constructed of a metal panel and must include the following connections:

* Output receptacles
* Input power cord
* Input circuit breaker
* Option card slot
* 1Gbit-rated RJ45 network surge protection
* RS232 serial communication port (DB9 connector)
* Female USB Type B connector
* 2 Pin Emergency Power Off port
* Internal cooling fan opening

**4.1.4** Wiring practices, materials and coding shall be in accordance with the requirements of the National Electrical Code (ANSI/NFPA 70).

**4.2 APPEARANCE**

**4.2.1 Color:** The metal portion of the UPS case shall be powder-coated using Pantone color process number Black C. The front panel ABS plastic assembly shall be of the same color.

**4.2.2 Printing:** The front and rear panels of the UPS shall contain white silkscreened printing.

* Front Panel: The front panel will contain the Manufacturer’s logo, model number and control button descriptions.
* Rear Panel: The rear panel will contain silkscreen descriptions for all ports and connectors

**4.2.3 Labels:** All UPS will contain the following product labels:

* Safety/Specification Label: A Safety/Product Specification will be applied on the top cover of the UPS
* Caution/Warning Label: A Caution/Warning label, in both English and French, will be applied on the top cover of the UPS.
* Battery Disconnect Label: A yellow Battery Disconnect warning label across will be applied on the top cover of the UPS
* Battery Replacement Label: A battery replacement caution label will be applied to the top cover of the UPS
* Serial Number Label: There must be a scannable serial number on rear panel of UPS consisting of both a numeric and Bar Code 3of 9 format

**4.3 CONSTRUCTION AND MOUNTING**

The UPS shall be constructed of replaceable subassemblies, including internal battery modules. Battery modules must be replaceable by removal the front bezel and detaching the retaining bracket without the use of tools.

**4.4 MOUNTING**

The UPS enclosure shall be adaptable for mounting vertically or horizontally with the appropriate installation hardware. Variations of installation formats include:

* Two-post Rack/Cabinet Installation: The UPS will come standard with attached ears for front-mounting the unit in a standard 19-inch rack or cabinet.
* Four-post Rack/Cabinet Installation: The UPS must be compatible with four-post cabinet and/or rack installations.
* Floor Mount: All UPS models will include brackets to allow for vertical installation on a floor or platform.

**4.4 PHYSICAL CHARACTERISTICS**

**4.4.1 Dimensions (H x W x D):**

 1KVA Model: 3.5” x 17.2” x 16.1”

1.5KVA Model: 3.5” x 17.2” x 16.1”

 2KVA Model: 3.5” x 17.2” x 20.1”

 3KVA Model: 3.5” x 17.2” x 24.8”

**4.4.2 Physical Weights:**

1KVA model: 23.8 lbs.

1.5KVA model: 25.6 lbs.

2KVA model: 33.5 lbs.

3KVA model: 45.2 lbs.

**4.5 UPS HEAT DISSIPATION**

**4.5.1 AC Normal Mode:**

1000VA Models: (292) BTUs

1500VA Models: (461) BTUs

2000VA Models: (572) BTUs

3000VA Models: (848) BTUs

**4.5.2 Battery Mode:**

1000VA Models: (390) BTUs

1500VA Models: (521) BTUs

2000VA Models: (768) BTUs

3000VA Models: (1005) BTUs

**4.5.3 ECO/BYPASS Mode:**

1000VA Models: (154) BTUs

1500VA Models: (231) BTUs

2000VA Models: (308) BTUs

3000VA Models: (369) BTUs

**4.6 COOLING**

Cooling of the UPS shall be by forced air. High-quality, variable speed fans shall be used to minimize audible noise. The fan speed will be regulated by the internal temperature of the UPS.

**4.7 GROUNDING**

The UPS chassis shall provide proper grounding to all output receptacles for reducing the risk of electrical shock hazard.

**4.8 INPUT POWER CORD**

All UPS models shall come included with a power cord of no less than six (6)-feet in length. The cord for all models will be connected to the UPS using a strain-relief assembly and be terminated with a NEMA-rated input plug.

**4.9 INPUT AC PLUG**

All UPS models must have a NEMA-rated input plug, molded to the input power cord, rated to the following:

1KVA model: NEMA 5-15P straight blade plug

1.5KVA model: NEMA 5-15P straight blade plug

2KVA model: NEMA 5-20P straight blade plug

3KVA model: NEMA L5-30P locking plug

**4.10 OUTPUT RECEPTACLES**

1KVA model: (8) Battery Backup/Surge (All NEMA 5-15R)

1.5KVA model: (8) Battery Backup/Surge (All NEMA 5-15R)

2KVA model: (8) Battery Backup/Surge (All NEMA 5-15/20R)

3KVA model: (7) Battery Backup/Surge (6 - NEMA 5-15/20R / 1 - NEMA L5-30R)

**4.11 OUTPUT LOAD SHEDDING**

All models will have output receptacles electrically wired into two independent circuits. One circuit must have the ability to be individually controlled via management software and SNMP. The second circuit will be defined as “Always On” with continuous output until the UPS is powered off or the output for the entire UPS is removed.

**4.11.1 Load Bank Configurations**

1KVA/1.5KVA: Load Bank 1: (4) NEMA 5-15R

 Load Bank 2: (4) NEMA 5-15R (Always On)

 Load Bank 2: (4) NEMA 5-15/20R (Always On)

3KVA: Load Bank 1: (3) NEMA 5-15/20R

 Load Bank 2: (3) NEMA 5-15/20R (Always On)

 Load Bank 2: (1) NEMA L5-30R (Always On)

**4.12 TELEPHONE/NETWORK PROTECTION**

All models will have two RJ45 connectors, located on the back panel, for input and output surge protection of a standard (10/100/1000 Base T) Ethernet network.

**4.13 OPTION CARD SLOT**

The UPS will have an open slot on the back panel of the UPS for the purpose of utilizing optional communication cards. The option card communication slot will be compatible with Ethernet, Serial or contact closure protocols.

**5.0 ENVIRONMENTAL CONDITIONS**

**5.1 AMBIENT TEMPERATURE RANGE**

**5.1.1 Operating Temperature:** Allmodels: 32oF to 104oF (0oC to +40oC).

**5.1.2 Storage/Transport Temperature:** All models:14oF to 113oF (-10oC to +45oC).

**5.2 RELATIVE HUMIDITY**

All models: 10 to 95% non-condensing.

**5.3 ELEVATION LIMITS**

**5.3.1 Operating Maximum:** All models must be able to operate from 0m to +3,000m, (0 to +10,000 ft.), without derating.

**5.3.2 Storage Elevation:** All models: Storage/Transport: 0 to +15,000 meters (0 to +50,000 feet).

**5.4 AUDIBLE NOISE**

All Models: Noise generated by the UPS under any condition of normal operation shall not exceed 50dBA when measured at 1 meter from the surface of the UPS.

**6.0 ACCESSORIES (Optional)**

**6.1 SNMP CARD**

The UPS must have an internal option card slot located on the backplane of the unit. This card slot can be used for the installation of a Simple Network Management Protocol (SNMP) card which will connect the UPS directly to an IP-based network using Ethernet communications. With the SNMP card properly installed and connected, the UPS will then become a managed device on a Local Area Network (LAN). Access to the installed card over the LAN will be provided to all authorized individuals through either a Network Management System (NMS) or by entering the programmed URL address of the card in an industry standard web browser. Authorized individuals shall be able to monitor, configure and manage all aspects of the UPS operation through the card. In the event of a utility failure, the SNMP card shall continue with live communications without the requirement of additional or separate UPS device until such time as the UPS shuts down for Low Battery Cut-Off. On resumption of utility power, the SNMP card shall automatically resume full communications over the LAN.

The optional SNMP card shall also be capable of HTTPs communications when SNMP management is not available or practical. Using most industry-standard web browsers as an interface, authorized users shall have access to all information available through the web interface.

**6.2 PROGRAMMABLE RELAY CARD**

An optional Programmable Relay Card can be installed into the open option card slot using the internal card slot of the UPS. When installed, the card will provide a configurable dry-contact closure communication port between the UPS and an attached device. A terminal block with a ground, common and six relay contacts are used for monitoring alarm events on the UPS to an attached device through a user-customized cable. The card is programmed using a Hyper-terminal application. An included feature will be the ability of the card to provide signals to Windows NT4/2000/XP/2003/7/8/10 for notification of power failure and low battery status on the connected UPS. Up to three computers may be configured for both the power failure and low battery status. Up to six computers may be configured for a single signal.

**6.3 RAIL INSTALLATION KIT**

All UPS models will support installation into a four-post rack or cabinet using a sliding rail attachment kit supplied as an optional accessory by the manufacturer of the UPS.

**7.0 MANUFACTURERS WARRANTY AND SERVICE**

**7.1 STANDARD WARRANTIES**

**7.1.1 UPS and Electronics:** The UPS manufacturer shall warrant the UPS module against defects in materials and workmanship for 60 months from purchase date or 66 months from date of manufacture, whichever period expires first.

**7.1.2 Battery Modules:** The UPS manufacturer shall warrant the UPS battery module(s) against defects in materials and workmanship for 60 months from purchase date or 66 months from date of manufacture, whichever period expires first.

**7.2 EXTENDED WARRANTIES**

A complete offering of optional, extended replacement and parts and labor maintenance warranties for both the UPS system and the battery system shall be available. An extended warranty package shall be available to either replace the defective equipment or repair it for a total of 84 months from the date of purchase.

**7.3 MANUFACTURERS WARRANTY PROCEDURE**

Within the first sixty (60) months, any defect or malfunction of the UPS device shall require contact with the manufacturer for diagnosis. If required the manufacturer will provide the customer with a Return Materials Authorization, (RMA), number to send the defective product to the factory for repair or replacement, at the discretion of the manufacturer. It will be the responsibility of the customer to provide transportation of the unit to the factory. Once repaired, or replaced, the manufacturer will incur ground freight expense to return the product to the customer.

**8.0 QUALITY ASSURANCE**

**8.1 MANUFACTURER QUALIFICATIONS**

The UPS supplier must have a minimum of forty (40) years’ experience in the design, manufacture, and testing of solid-state UPS systems. All production manufacturing facilities must be ISO9001 and ISO14001 certified.

**8.2 FACTORY TESTING**

Before shipment, the manufacturer shall fully and completely test the UPS to assure compliance with the published specification.

**8.3 MEAN TIME BETWEEN FAILURE**

The UPS shall have a mean time between failure, (excluding batteries), of 100,000 hours.

**9.0 SUBMITTALS**

**9.1 PROPOSAL SUBMITTALS**

Documentation for any submittal must include the following:

* System configuration and description.
* Functional relationship of equipment including weights, and dimensions.
* Descriptions of equipment to be furnished, including deviations from these specifications.
* Size and weight of shipping units to be handled by installing contractor.

**9.2 UPS DELIVERY SUBMITTALS**

Submittals upon UPS delivery must include one (1) User’s Manual which includes a functional description of the equipment, safety precautions, instructions, operating procedures, and battery replacement instructions.