

MINUTEMAN POWER TECHNOLOGIES
Endeavor Series
Product Specifications
1000VA – 3000VA
Single-phase Uninterruptible Power Supply

1.0 GENERAL

1.1 SUMMARY

This product specification will outline and define the electrical and mechanical features for a true double conversion, on-line, 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.

1.2 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 FCC 47 CFR Part 15 Subpart B and ANSI C63.4:2014 ISED ICES-003 Issue 6
(Class B for 1KVA and 1.5KVA models)
(Class A for 2KVA and 3KVA models)
- ISO 9001 & 14001
- cTUVus (Conforms to UL1778 5th Edition & CSA 22.2 no. 107.3-14 / R: 2014)
- CE
- IEEE/ANSI C62.41 Category A1, EN61000-3-2, EN61000-3-3, EN62040-2, IEC61000-2-2
IEC61000-4-2, IEC61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6,
IEC61000-4-8
- RoHS WEEE 2011/65/EU Directive
- EPA Energy Star

1.3 SYSTEM DESCRIPTION

1.3.1 Design Requirements:

- A. Voltage** – Input/output voltage specifications of the UPS shall be:
 System Input: 0 – 150VAC single-phase, two-wire plus ground.
 System Output: 110, 120VAC single-phase, two-wire plus ground.
- B. Output Load Capacity** – The specified output load capacity of the UPS shall range between 1000-3000VA with a 0.9 lagging power factor.

1.3.2 Design Requirements – Batteries

- A. **Battery Cells:** Maintenance-free, sealed, non-spillable, lead acid, valve regulated.
- B. **Reserve Time:** 3.5 minutes at full load, with ambient temperature between 20 and 30 degrees Celsius.
- C. **Recharge Time:** To 90% capacity within eight hours after return of nominal AC power from low battery cut-off.

1.3.3 Modes of Operation – The UPS shall be designed to operate as a True On-Line, double conversion, extended runtime system in the following modes:

- A. **On-Line Mode** – The critical AC load is supplied by the inverter power source. Any non-hazardous harmonics and/or anomalies are filtered through Power Factor Correction (PFC) circuitry. The internal batteries are simultaneously float-charging.
- B. **On Battery Mode** – Upon failure or overvoltage of utility AC power, the connected AC load is supplied power by the UPS switching from the On-Line mode to the Battery mode while using the internal batteries. There shall be no interruption in power when switching from the On-Line mode to the Battery mode. When utility AC power returns, the UPS will return to On-Line mode with no interruption of power.
- C. **Economy Mode** – When operating the UPS in Economy mode, the input utility power will bypass the inverter circuit and connect directly to the output of the UPS, powering the connected equipment while simultaneously charging the batteries. During a blackout, brownout or overvoltage event, the UPS will transfer to the On Battery mode, powering the connected equipment. When utility power returns or is at an acceptable level, the UPS will automatically transfer back to Economy mode and start recharging the batteries.
- D. **Recharge Mode** – Upon restoration of AC utility power, after a utility AC power outage, the internal charger shall automatically start recharging the internal batteries.
- E. **Bypass Mode** - Automatic Internal Bypass: Automatically activates when the UPS detects an internal hardware failure, battery failure or an overload.
- F. **DC Cold Start Mode** – The UPS shall start and operate in the Battery Mode without AC utility power applied.

1.3.4 Performance Requirements

1.3.4.1 AC Input to UPS

- A. **Wiring Configuration for Standard Units:** Single-phase, 2-wire plus ground.
- B. **Voltage Range (Non-Battery mode):** 55 – 150VAC for all models
- C. **Frequency:** Auto-Select 50/60Hz (+/- 6Hz.)
- D. **Power Factor:** 0.9 lagging minimum at nominal input voltage and full rated UPS output load
- E. **Input Protection:** All units will have a re-settable input circuit breaker to prevent excessive overload in AC mode, rated for the following:
 - 1KVA: 15 Amps
 - 1.5KVA: 20 Amps

- 2KVA: 30 Amps
- 3KVA: 40 Amps

- F. Inrush Current:** 1KVA model – 28 Amps for <100ms.
 1.5KVA model – 90 Amps for <100ms.
 2KVA model – 90 Amps for <100ms.
 3KVA model – 145 Amps for 1.5ms.<100ms.
- G. Current Limit:** 1KVA model – 15 Amp input circuit breaker
 1.5KVA model – 20 Amp circuit breaker
 2KVA model – 30 Amp circuit breaker
 3KVA model – 40 Amp circuit breaker
- H. Surge Energy Rating:** The UPS shall have Metal Oxide Varistors for surge energy protection with a rating of 1,000 Joules.
- I. Surge Protection:** All models will be capable of sustaining input surges without damage per ANSI C62.41 A1 standard and be certified under: EN61000-4-5: 2KV
- J. Power Factor Correction (PFC):** $\geq 99\%$ at nominal input voltage and full load
- K. Current Distortion:**
- Linear loads: $\leq 1\text{VKA model} - < 5\%$ at full load and normal line voltage
 $\geq 1.5\text{KVA models} - < 3\%$ at full load and normal line voltage
 - Non-linear loads: $\leq 1\text{VKA model} - < 7\%$ at full load and normal line voltage
 $\geq 1.5\text{KVA models} - < 5\%$ at full load and normal line voltage
- K. Voltage Transient Response:** 0nS – Normal mode, <5nS – Common mode.
- L. Transient Recovery Time:** <25mS
- M. Back-feed Protection:** All models will provide back-feed protection to utility power by providing an isolation relay at the input of the UPS.

1.3.4.2 AC Output, UPS Inverter

- A. Wiring Configuration:** Single-phase, 2-wire plus ground.
- B. Output Waveform:** True sine wave.
- C. Voltage Regulation:** Not to exceed $\pm 2\%$ until Low Battery Warning.
- D. Frequency:** Nominal Frequency $\pm 0.5\text{Hz}$ unless synchronized to the line.
- E. Voltage Distortion:**
- Linear loads: $\leq 3\%$ at full-rated linear load
 - Non-linear loads: $\leq 6\%$ at full-rated non-linear load
- F. Load Power Factor Range:** 1.0 - 0.9 lagging without de-rating.
- G. Step Load:** All models must be able to support a fifty (50) -percent rated load increase, with the batteries at a fifty (50) -percent charge, without dropping the connected loads.

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- H. Output Power Rating:** Rated KVA at 0.9 lagging power factor for all models
- I. Overload Capacity:** All Models will operate for the following durations based on the size of the overload:
- On-line Mode
 - ≤ 105% of rated load – Continuous
 - 106% to 125% of rated load – 1 minute
 - 126% to 150% of rated load – 30 seconds
 - > 150% of rated load – Immediate
 - Battery Mode
 - ≤ 105% of rated load – continuous
 - 106% to 125% of rated load – 1 minute
 - 126% to 150% of rated load – 30 seconds
 - > 150% of rated load – Immediate
 - Economy Mode
 - ≤ 105% of rated load – continuous
 - 106% to 125% of rated load – Bypass mode
 - 126% to 150% of rated load – Bypass mode
 - > 150% of rated load – 0.5 seconds
- J. Inverter Output Adjustment:** 110, 120VAC. Inverter output voltage adjustments must be performed via optional output voltage selector software available from the UPS supplier.
- K. Efficiency:** > 90% Full load in On Line mode (AC – AC)
 > 97% Full load in Economy mode for models > 1KVA
 > 96% Full load in Economy mode for models ≤ 1KVA
- L. Dynamic Response:** ± 5% at 100% load change in 30ms
- M. Transfer time:** 0ms from Online mode to On Battery mode
 8ms from Economy mode to On Battery mode
- N. Crest Factor:** 3:1

1.3.5 UPS System Test – The UPS must be able to perform an internal self-test of both the electronics and batteries, reporting any detected faults through Audio, Visual or software communication alarms. Self-tests must be performed through the following procedures:

- Power On: The UPS will perform an automatic self-test when proper AC utility is available and the unit is powered on by pressing the On/Off/Test button
- Front Panel: While the UPS is operating in On-line Mode, the UPS can perform a self-test when the On/Off/Test button is pressed for four (4) seconds.
- Software: The UPS can perform a self-test when accessed via a computer either through the power monitoring software or the optional SNMP card, (when properly installed).

1.3.6 Independent Battery Bypass – When the UPS is operating in Normal mode, and input utility power is within the nominal range of the UPS, it must be able to provide a filtered

and a regulated output to connected loads with dead internal batteries or without internal batteries.

- 1.3.7 Output Load Shedding** – All models will have output receptacles electrically wired into three independent circuits. Two circuits must have the ability to be individually controlled via management software and SNMP. The third circuit will be configured as Always On and can only be disabled when the output of the entire UPS is shut off.

1.3.6.1 Load Bank Configurations

1KVA/1.5KVA: Load Bank 1 – (3) NEMA 5-15R; Load Bank 2 – (3) NEMA 5-15R;
Load Bank 3 – (2) NEMA 5-15R (Always On)
2KVA: Load Bank 1 – (4) NEMA 5-15/20R; Load Bank 2 – (4) NEMA 5-15/20R; Load Bank 3 – (1) NEMA L5-20R (Always On)
3KVA: Load Bank 1 – (4) NEMA 5-15/20R; Load Bank 2 – (3) NEMA 5-15/20R; Load Bank 3 – (1) NEMA L5-30R (Always On)

- 1.3.8 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.

1.4 ENVIRONMENTAL CONDITIONS

The UPS shall be able to withstand the following environmental conditions without damage or degradation of operating characteristics:

- 1.4.1 Operating Ambient Temperature:** All models: 32°F to 104°F (0°C to +40°C).
- 1.4.2 Storage/Transport Ambient Temperatures:** All models: 5°F to 131°F (-15°C to +55°C).
- 1.4.3 Relative Humidity:** All models: 0 to 95% non-condensing.
- 1.4.4 Altitude:** All models: Operating: 0 to +3,000 meters (0 to +10,000 feet).
All models: Storage/Transport: 0 to +15,000 meters (0 to +50,000 feet).
- 1.4.5 Audible Noise:** Noise generated by the UPS under any condition of normal operation shall not exceed the following when measured at 1 meter from the surface of the UPS:

1KVA/1.5KVA: 45dBA
2KVA/3KVA: 60dBA

1.5 SUBMITTALS

- 1.5.1 Proposal Submittals** – Submittals with the proposal shall include:
- 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.
- 1.5.2 UPS Delivery Submittals** – Submittals upon UPS delivery shall include one (1) User’s manual that shall include a functional description of the equipment, safety precautions, instructions, operating procedures and battery replacement instructions.

1.6 WARRANTY

- 1.6.1 All Models** – The UPS manufacturer shall warrant all UPS models, including internal batteries, against defects in materials and workmanship for 60 months from purchase date or 66 months from date of manufacture, whichever period expires first.

1.7 QUALITY ASSURANCE

- 1.7.1 Manufacturer Qualifications** – A minimum of thirty years experience in the design, manufacture, and testing of solid-state UPS systems is required. The system shall be designed and manufactured according to world-class quality standards. All production manufacturing facilities shall be ISO9001 & ISO14001 certified.
- 1.7.2 Factory Testing** – Before shipment, the manufacturer shall fully and completely test the system to assure compliance with the specification.
- 1.7.3 Mean Time Between** – Failure The UPS shall have a mean time between failure, (excluding batteries), of 100,000 hours.

2.0 PRODUCT

2.1 FABRICATION

- 2.1.1 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.

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

- 2.1.3 Construction and Mounting** – The UPS enclosure shall be adaptable for standing vertically or mounting on a wall with appropriate mounting hardware supplied by the manufacturer of the UPS. The UPS enclosure can be mounted horizontally on the floor using brackets supplied by the manufacturer. It shall also be capable of mounting within a 19” or 23” wide rack or cabinet structure with the appropriate mounting hardware supplied by the manufacturer.

The UPS shall be constructed of replaceable subassemblies. Any internal battery modules shall be replaceable by removing the front bezel and detaching the retaining bracket.

- 2.1.4 Physical Characteristics:**

A. Dimensions:

1KVA models: Height: 3.5 inches (2U), Width: 19 inches, Depth: 13.3 inches
 1.5/2KVA models: Height: 3.5 inches (2U), Width: 19 inches, Depth: 17 inches
 3KVA models: Height: 3.5 inches (2U), Width: 19 inches, Depth: 24.5 inches

B. Weights:

1KVA models: 29.3 lbs.
1.5KVA models: 45.9 lbs.
2KVA models: 47.6 lbs.
3KVA models: 70.5 lbs.

2.1.5 UPS Heat Dissipation**A. AC Mode:**

1KVA models: 341 BTUs
1.5KVA models: 512 BTUs
2KVA models: 546 BTUs
3KVA models: 819 BTUs

B. Inverter Mode:

1KVA models: 553 BTUs
1.5KVA models: 461 BTUs
2KVA models: 614 BTUs
3KVA models: 1106 BTUs

2.1.6 Cooling – Cooling of the UPS shall be by forced air. High quality fans shall be used to minimize audible noise.

2.1.7 Grounding – The UPS chassis shall provide proper grounding to all output receptacles for reducing the risk of electrical shock hazard. The UPS will also provide an external grounding stud.

2.1.8 Input Power Connection – All UPS models shall come included with a power cord of no less than ten (10)-feet in length. The cord for all models will be connected to the UPS using a strain-relief assembly.

2.1.9 Input Power Plug/Connector:

1KVA models: NEMA 5-15P straight blade plug
1.5KVA models: NEMA 5-15P straight blade plug
2KVA models: NEMA 5-20P straight blade plug
3KVA models: NEMA L5-30P locking plug

2.1.10 Output Power Receptacles

1KVA models: 8-Battery Backup/Surge (All NEMA 5-15R)
1.5KVA models: 8-Battery Backup/Surge (All NEMA 5-15R)
2KVA models: 9-Battery Backup/Surge (8-NEMA 5-15/20R / 1-NEMA L5-20R)
3KVA models: 8-Battery Backup/Surge (7-NEMA 5-15/20R / 1-NEMA L5-30R)

2.1.11 External Battery Pack Connector – All models will have a five (5)-pin Anderson connector, rated for 40 Amps, located on the back panel of the UPS, for exclusive use in attaching an external battery pack. The Anderson connector must be individually keyed to match the respective UPS model for which it is designated.

2.1.12 Network Surge Protection – All models will have two RJ45 connectors, located on the back panel, for input and output surge protection of a standard (10/100 Base T) Ethernet network. All MOV shall be 180VACrms and provide up to 1,000 Joules of protection.

2.2 COMPONENTS

2.2.1 Charger

2.2.1.1 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, temperature-compensated, switching-type charger with constant voltage/current limiting control circuitry.

2.2.1.2 Charge Modes – The charger will have two modes of operation, the standard charge mode and float charge mode.

- Standard mode: The charge voltage will be 0.125 times the Amp/hour rating of the internal batteries of the respective UPS

- Float mode: The charge voltage will be 0.0625 times the Amp/hour rating of the internal batteries of the respective UPS

2.2.1.3 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 insure that the DC output of the charger will meet the input requirements of the Converter and DC/DC Booster circuits.

2.2.1.4 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.

2.2.1.5 Battery Recharge – The charger shall be capable of producing battery-charging current sufficient to replace 90% of the battery-discharged power within eight (8) hours. After the battery is recharged, the charger shall maintain the battery at full charge until the next emergency operation

2.2.1.6 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.

2.2.1.7 Temperature Compensation – The charger will vary the voltage charge of the batteries by $-3.3\text{mV} / ^\circ\text{C} / \text{cell}$ (using a 12V battery).

2.2.2 Inverter

2.2.2.1 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.

2.2.2.2 Overload Capability – The inverter shall be capable of supplying current and voltage for overloads exceeding 115% and up to 125% of full load current for 1 minute. A status indicator and audible alarm shall indicate overload operation.

2.2.2.3 Fault Clearing and Current Limit – The inverter shall be capable of supplying an overload current of up to 150% of its full-load rating for thirty (30) seconds. For greater currents or longer time duration, 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

2.2.2.4 Inverter Output Voltage Adjustment – The inverter shall have adjustable output voltages of 110, 120VAC.

2.2.2.5 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.

2.2.2.6 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)

2.2.2.7 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.

2.2.2.8 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 0.5Hz from the rated frequency unless synchronized to utility power

2.2.3 Battery System

2.2.3.1 Hot-swappable – 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.

2.2.3.2 Internal System Voltage – All models must have the internal batteries configured to support the following DC Bus voltages:

1KVA: 24VDC
1.5KVA/2KVA: 48VDC
3KVA: 72VDC

2.2.3.3 Approved Battery Manufacturers – The only approved battery manufacturers for use in the UPS or the optional external battery packs, are the following:

- B&B Battery
- China Storage Battery
- YUASA Battery

2.2.4 Display and Controls

2.2.4.1 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. The UPS shall have a LCD display located on the front panel that provides the following information

A. LCD Icon Display – The LCD display panel will include dedicated display icons for the following information:

- AC Normal
- On Battery

- Overload
- Bad Battery
- Fault

B. LCD Numeric Display – The LCD display will also have a real-time meter to display, in numeric fashion, the following data (Selection of the items can be made from the scroll button on the front panel) and the two Fault conditions:

- Input Voltage
- Input Frequency
- Output Voltage
- Output Frequency
- Output kVA, kW
- Connected Load Capacity
- Battery Capacity
- Estimated runtime in the AC and DC modes
- Bypass Mode
- ECO Mode
- Emergency Power Off
- Fault (display Error code and Warning icon)

2.2.4.2 Load and Battery Metering – The LCD Display will have two bar graphs for measuring load and battery status:

- The Load capacity bar graph will display the amount of the load (percent) on the Battery Backup output receptacles when the UPS is operating in AC mode.
- The Battery capacity bar graph will display the percent of charge in the AC mode. It will display the Battery capacity (percent) remaining in the Battery mode and it will indicate a Low Battery Warning.

2.2.4.3 Controls – UPS start-up operations shall be accomplished through the front panel pushbutton control. To initiate a complete shutdown of the UPS, press and then release the On/Off /test button during the audible alarm's first beep to turn the UPS Off, the input power cord must be removed from utility power and the circuit breaker must be turned off.

2.2.4.4 Power Monitoring Software – The UPS shall be provided with Power Monitoring Software to report important status information concerning the UPS and the utility power. The software must also be able to perform a graceful shutdown of connected loads prior to the shutdown of the UPS.

2.2.4.5 Communications Ports – The UPS will have one each of a RS232 and USB communication port. The ports will be able to provide simultaneous communications.

A. RS232 – The RS232 communication port will be comprised of a 9-pin subminiature D-shell connector on the rear panel of the UPS for connecting a RS232 communication cable between the UPS and a computer for RS232 communications. The 9-pin port will also be able to support contact closure without any modifications.

B. USB – The USB port will be HID-compliant and comprised of a USB 2.0 Type B connector for communications between the UPS and a computer.

2.2.4.6 Remote Emergency Power Off (REPO) Port – The UPS shall have a RJ11 connector on the rear panel of the UPS for the exclusive purpose of providing a REPO communication port. The REPO port connects the UPS to a user-installed REPO switch. In the Normal, Economy or On Battery mode, short pin4 to pin5 for approximately 0.5 seconds in order to shut down the UPS. The UPS must be powered off and then back on via the ON/OFF/TEST switch located on the front panel to restart the UPS.

2.2.4.7 Alarm Messages – The following alarm messages shall be displayed via the LCD display located on the front panel:

- While operating in the battery mode, the AC Normal Icon will turn off and the On-Battery Icon will turn on and the alarm will sound once every 10 seconds until the unit reaches Low Battery Warning (LBW). The alarm will turn off if utility power returns.
- When the unit reaches a Low Battery Warning, the LCD will display an error code and the alarm will sound 2 beeps every 5 seconds until the unit reaches Low Battery Cut-off (LBCO) then the alarm will turn off.
- The alarm will sound continuous and the LCD will display corresponding error code, if the unit senses an internal fault. The alarm will remain on until the unit is turned off.
- The alarm will sound continuous and the Overload icon will illuminate with the respective error code, if the unit senses an overload on the output. The alarm will turn off if the overload is removed.
- The alarm will sound 3 beeps every 5 minutes, if the battery is weak/bad or disconnected and the Weak/Bad Battery icon will illuminate with the respective error code. The alarm will remain in this state until the battery is recharged, replaced, or reconnected.

2.2.4.8 Audible Alarm Silencer – When the unit is operating in Battery Mode, the audible alarm can be silenced when the alarm silencer button on the LCD panel is pressed. Once the UPS reaches a LBW, or a fault condition occurs, the alarm will be activated and cannot be silenced. Once the UPS transfers to the AC mode the alarm will be reset to default

2.2.5 Accessories (Optional)

2.2.5.1 SNMP Card – The UPS shall come equipped with an internal SNMP adapter card slot located on the backplane of the unit, which will connect the UPS directly to any IP-based network using Ethernet communications. The UPS will become a managed device on the network. From a network management station, the system administrator shall be capable of monitoring important system measurements, alarm status, and alarm history data. The network administrator shall also be capable of executing battery tests, observing the results of such tests, and turning the UPS on and off via his SNMP communication network. In the event of a utility failure, the SNMP shall continue with live communication without the requirement of additional or separate UPS equipment until such time as the UPS shuts down for Low Battery. On resumption of utility power, the SNMP card shall resume full SNMP communication automatically. The optional SNMP card shall also be capable of HTTP communications when SNMP management is not available or practical. Using most industry standard web browsers as an interface, the system administrator shall have access to all information available through the web interface. Included with the optional SNMP Card will be SNMP Manager Software. The software will be able to

monitor and control 50-100 UPS, using installed SNMP cards, through a single management window on a networked computer platform.

- 2.2.5.2 Programmable Relay Card** – A Programmable Relay Card shall be provided, as an option, to the UPS. The Programmable Relay Card is installed using the internal card slot in 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.
- 2.2.6 External Battery Packs (Optional)** – The battery power pack shall include sealed, non-spillable, lead-acid, valve regulated battery cells housed in a separate cabinet that matches the UPS cabinet styling to form an integral system line-up. Each battery power pack shall be designed with the ability to be daisy chained, in an unlimited number, from the UPS, for unlimited runtimes while operating in battery mode. Battery cells shall be mounted in metal cases designed to exactly match the width and height dimensions and installation of the control UPS. A battery disconnect circuit breaker shall be included for isolation of the battery pack from the UPS module. Brackets shall be provided for installation into a 19' rack or cabinet. Also, a set of stands shall be included for installation of the UPS in a vertical format for use on a floor. The set of stands shall be of a design so as to interconnect with the control UPS to form a solid configuration. Each battery power pack will have an independent charger with the ability to operate with a utility input voltage of 115VAC or 230VAC. The charger shall be capable of producing battery-charging current sufficient to replace 90% of the battery discharge power within six hours. After the battery is recharged, the charger shall maintain the battery at full charge until the next emergency operation.
- 2.2.6.2 Multiple Battery Pack Installations:** Each battery pack shall be designed with the ability to be daisy-chained without an external battery pack charger.
- 2.2.6.3 UPS connector** – The external battery pack will have a five (5) –pin Anderson connector, rated for 40 Amps, located on the back panel of the battery pack, for exclusive use in attaching to the UPS. The Anderson connector must be individually keyed to match the respective UPS model for which it is designated
- 2.2.6.4 Daisy-chain Connector** – The external battery pack will have a five (5) –pin Anderson connector, rated for 40 Amps, located on the back panel of the battery pack, for used for attaching to the UPS an additional battery pack, for the purpose of daisy-chaining to achieve extended runtime of connected loads. The Anderson connector must be individually keyed to match only the same type of battery pack used with the respective UPS.
- 2.2.5.4 AC Input Connector** – All battery pack models will 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 battery pack using a detachable IEC 320 to a NEMA 5-15P connector power cord to connect to utility power.

2.2.5.5 DC Circuit Breaker

- A. 24-volt Battery Packs – 40 Amp
- B. 48-volt Battery Packs – 40 Amp
- C. 72-volt Battery Packs – 40 Amp

2.2.5.6 Construction and mounting – The battery pack enclosure shall be adaptable for standing vertically or mounting on a wall with appropriate mounting hardware supplied by the manufacturer. The battery pack enclosure can be mounted horizontally on the floor using brackets supplied by the manufacturer. It shall also be capable of mounting within a 19” or 23” wide rack or cabinet structure with the appropriate mounting hardware supplied by the manufacturer.

The battery pack shall be constructed of replaceable battery module assemblies. Any internal battery modules shall be replaceable by removing the front bezel and detaching the retaining bracket.

2.2.5.7 Physical Characteristics of All Models:

A. Dimensions: (H x W x D):

24-volt models: Height: 3.5 inches (2U), Width: 19 inches, Depth: 13.1 inches
48-volt models: Height: 3.5 inches (2U), Width: 19 inches, Depth: 17 inches
72-volt models: Height: 3.5 inches (2U), Width: 19 inches, Depth: 17 inches

B. Physical Weights of All Models:

24-volt models: 39.6 lbs.
48-volt models: 66 lbs.
72-volt models: 56 lbs.

3 Manufacturer’s Warranty and Service

3.2 Manufacturer’s 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.