**HV SERIES**

**Uninterruptible Power Systems**

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Guide Specification for 14.0 KVA – 17 KVA Systems

Part I

1.1 General

 This specification describes the electrical and mechanical characteristics and requirements for a single phase uninterruptible power system (UPS). The system as specified herein shall include all the components required to deliver reliable, high quality, re-generated uninterruptible power for the intended load. The system shall be a line interactive UPS incorporating an IGBT based microprocessor controlled PWM inverter, high speed transfer SCR devices, constant voltage regulating transformer, battery charger, an energy storage battery platform, monitoring display panel, and all related hardware components and software to facilitate a functional centralized system. A self- diagnostic monitoring system shall continuously advise of system status and battery condition.

1.2 Standards

1.2.1 Systems shall be designed in accordance with applicable portions of the following codes and standards:

 American National Standards Institute (ANSI C57.110).

 Institute of Electrical and Electronic Engineers (IEEE 519-1992) (C62.41-1991).

 National Electrical Manufacturers Association (NEMA PE-1).

 National Electric Code (NEC).

 National Fire Protection Association (NFPA 70).

 Underwriters Laboratories (U.L.1778).

 Federal Communications Commission (FCC Part 15, Sec. J, Class A).

1.2.2 Listings: Listed to UL 1778 and C-UL CSA C22.2 No. 107.1-21.

1.2 Submittals

1.3.1 Include submittal documentation for the installation of the system, including wiring diagrams and cabinet outlines showing dimensions, weights, BTUs, input/output current, input/output connection locations and required clearances.

* + 1. The manufacturer shall be ISO9001 “Quality Assurance Certified”.
		2. The supplier shall be a United States based manufacturer of Uninterruptible Power Systems with 15 years experience or greater in design and fabrication of UPS equipment.
		3. Include factory test results and /or specifications to validate compliance with the requirements. The manufacturer must include battery test documentation to validate the specified minimum emergency reserve with full rated load.
		4. Furnish (6) equipment submittal copies. Submittals are to be specific for the equipment furnished and must include as-built information.

Part II

2.1 Manufacturers

 The equipment specified shall be the HV Series uninterruptible power system, manufactured by Trystar or approved equal.

2.2 Manufactured Units

* + 1. The system shall operate in accordance with requirements as specified herein to support any combination of resistive, leading or lagging power factor loads, linear, non-linear and power factor corrected loads. The systems inherent operating characteristics must limit rectifier/charger induced harmonics without the use of harmonic filters, thus allowing effective generator compatibility without excessive over sizing of the generator. Systems shall also be programmable to compensate for site specific generator / UPS synchronization requirements.
		2. Normal Operation: The load shall be supplied with regenerated, filtered and regulated power derived from the output regulating transformer. When utility AC or generator AC power is present, the battery charger shall maintain a ripple free float charge on the batteries.
		3. Emergency Operation: Upon the failure or unacceptable deviation of utility AC power, battery power shall be converted by the PWM inverter and filtered through the constant voltage regulating output transformer. There shall be no break or interruption of power to the load upon failure or restoration of the utility AC power. Any transfer time resulting in a break or loss of power is unacceptable.
		4. Automatic Restart: In the case of a commercial power outage that exceeds the battery run time required, the output of the inverter shall shut off, but automatically restarts once commercial AC power returns. Recharging of the batteries shall then commence immediately.
		5. Manual Maintenance Bypass: The system shall include an integral make before break service maintenance bypass switch. The service maintenance bypass switch incorporates make before break functionality allowing make before break transitions to and from bypass mode without power interruption or disturbance.
		6. System Output Rating: (14.0 KVA), (16.0 KVA), (17.0 KVA).
		7. Battery Time Reserve Capacity: (9 minutes) at full rated KVA output.
		8. Reliability: MTBF 100,000 hours. MTTR 1 hour.

Part III

3.1 Input Specifications

* + 1. Input Voltage: 208, 240, 277, 347 and 600 VAC.
		2. Input Voltage Operating Range: +10% to -15% at full load without battery usage.
		3. Frequency Range: 57.5 Hz to 62.5 Hz.
		4. Power Factor: Self correcting to >0.95 (approaching unity).
		5. Input Harmonics: < 10% THD (total harmonic distortion) with linear/non linear loading.
		6. Transient / Spike Attenuation: 3000:1.

3.2 Output Specifications

 3.2.1 Output Voltage: 208, 240/120, 277, 347 and 600 VAC.

3.2.2 Sine Wave Voltage: Maximum 5% harmonic distortion under linear load.

 3.2.3 Crest Factor: 3.5 : 1.

 3.2.4 K Factor: 30 or better.

 3.2.5 Harmonic Attenuation: Reflected load generated harmonics shall be attenuated 23dB at the input.

 3.2.6 Line Regulation: Typically better than +/-3%.

* + 1. Load Regulation: Typically better than +/-3%.

3.3 Battery Specifications

3.3.1 Battery time: Based on full KVA load.

3.3.2 Battery Type: Sealed, maintenance free.

3.3.3 Charger: 5 Amps., two stage.

 3.3.4 Recharge Time: Typically 10 times discharge time to full charge.

 3.3.5 Bus Voltage: 120 VDC, float 2.27 VPC, final 1.75 VPC.

3.3.6 Projected Life: 5 years service, 10 year design life.

3.4 Performance Specifications

* + 1. Overload Capability: 125% for ten minutes.
		2. Surge Capability: 150% of rated output without need of static bypass.
		3. Frequency Stability: +0.2 Hz.
		4. Isolation: NEC article 250.20b, include isolation transformer to validate this requirement for a separately derived power source.
		5. Inner Winding Capacitance: 0.01 pF (primary to secondary coupling).
		6. Common Mode Noise Attenuation: 120 dB (106 : 1 ground noise attenuation).
		7. Transverse Mode Noise Attenuation: 70 dB (3160 : 1 line noise attenuation).
		8. Reactive Power Factor Correction: Input power factor > 0.95 self correcting.
		9. Efficiency: Not less than 93% under full rated load.
		10. Reliability: The constant voltage regulating transformer shall have a reliability of 200,000 hours MTBF and the electronic system shall have a reliability of 100,000 hours MTBF.

3.5 Environmental Specifications

3.5.1 Operating Temperature: 0°C (32°F) to 40°C (105°F).

 3.5.2 Storage Temperature: -20°C to 50°C.

 3.5.3 Relative Humidity: 95% non-condensed.

 3.5.4 Elevation: 5,000 feet, (1500 meters) above sea level without de-rating.

3.5.5 Ratings and Cabinet Sizes:

 KVA / KW Rating Dimensions W x D x H

14000 / 10000 33.25” x 35.75” x 52.8”

16000 / 12000 33.25” x 35.75” x 52.8”

17000 / 14500 33.25” x 35.75” x 52.8”

* + 1. Audible Sound Level: Not greater than 55 dBA.
		2. Enclosure: NEMA 1 for indoor use.

Part IV

4.1 Display Monitor and Diagnostics

Display - Backlit, 40 character alphanumeric LCD display for sharp visual resolution of data and titles. Displays data as selected by user keypad.

Keypad – Sealed, membrane keypad for user selection of monitored electrical operating parameters, monitored alarm conditions, UPS system control settings and log functions.

Alarm Panel – Automatic indication of general system status including UPS on, on battery, and bypass status.

Measurements – AC input voltage, AC output voltage line to neutral, AC output voltage line to line, AC output current line one, AC output current line two, percent (%) load, current crest factor line one, current crest factor line two, DC charging voltage, DC charging current, battery bus voltage, output frequency, battery back up time remaining, load KW and load power factor.

Accuracy – True RMS measurements with 1% accuracy.

Alarm Messages – Low battery voltage warning, DC battery charger failure, over temperature warning, and output overload warning.

4.2Communications Interface

* + 1. Status / Alarm relay interface normally open contacts shall be provided for optional remote annunciator panel or automatic message dialer. Include contacts for UPS on, utility AC power failure (system using battery power), low battery warning, system in bypass mode and general alarm.
		2. Status / Alarm relay contact ratings: 24 VAC and/or 24 VDC, 500mA.
		3. Power supply included for + 5 VDC, 5mA with fully isolated logic ground.

 Part V

5.1Accessories (Optional Equipment)

* + 1. Include external, wall mounted, make before break maintenance bypass switch.
		2. Include automatic message dialer used in conjunction with system alarm conditions for system on emergency battery power, low battery warning and general alarm.
		3. Include remote annunciator panel used in conjunction with system alarm conditions for system on emergency battery power, low battery warning and general alarm.
		4. Include external communications module with integrated webserver for remote monitoring of

alarms via Ethernet TCP/IP, MODBUS TCP/IP, or MODBUS RS485.

* + 1. Include client-side application software that performs an orderly, unattended shutdown of

customer file servers.

* + 1. Include BACnet communications over BACnet/IP or MS/TP with the addition of customized external hardware.
		2. Include Basic or Advanced version of “UNMS II” (UPS Network Management System) software to monitor multiple UPS’s from a single network device (computer, tablet, laptop, or smartphone).

Part VI

6.1 Warranty

* + 1. The manufacturer shall guarantee all systems to be free from material defects and workmanship for a period

 of 1 year following shipment from the factory.

* + 1. Batteries shall be warranted with a 1 year full replacement warranty and an optional 4 year pro-rate with applicable maintenance contract.