

MGE UPS SYSTEMS

GALAXY 3000 10-30 kVA UPS

Data Center Grade Three Phase Uninterruptible Power Supply

Guide Specifications

1.0 GENERAL

1.1 SUMMARY

This specification describes a three-phase, on-line, double conversion, solid state Uninterruptible Power System, hereafter referred to as the UPS. The UPS shall operate in conjunction with the existing building electrical system to provide high quality power conditioning, back-up power protection and distribution for electronic equipment loads. The system shall consist of a solid state inverter, power factor corrected rectifier, a 100% rated for continuous duty static switch, an internal maintenance bypass switch, battery plant, graphical status/control panel, and synchronizing circuitry as described herein.

1.2 STANDARDS

The UPS shall meet the requirements of the following standards:

- A. UL listed under 1778, standards for uninterruptible power supply equipment
- B. UL Canada (cUL)
- C. FCC rules and regulations of part 15, subpart j, class A
- D. IEC 1000 (801) level 4
- E. The UPS shall be designed in accordance with the applicable sections of the documents published by:
 - ▶ National Fire Protection Association (NFPA)/National Electric Code (NEC)
 - ▶ National Electrical Manufacturer's Association (NEMA)
 - ▶ Occupational Safety & Health Administration (OSHA)

1.3 SUBMITTALS

Submittals shall contain the following documentation:

- A. **Installation Package:** Complete electrical characteristics and connection requirements. Provide detailed equipment outlines with cabinet dimensions and spacing requirements; location of conduit entry/exit paths; location of floor/seismic mounting; available battery types/sizes; all cabinet weights; heat rejection and air flow requirements; single-line diagram; control, and external wiring.
- B. **Product Data:** Provide catalog sheets and technical data sheets to indicate physical data and electrical performance, electrical characteristics, and connection requirements.
- C. **Manufacturer's Installation Instructions:** Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product. Include equipment installation outline, connection diagram for external cabling, internal wiring diagram, and written instruction for installation.

1.4 FINAL SUBMITTALS

Upon delivery of the UPS system, the following submittals shall be included:

- A. A complete set of installation drawings showing all the information stated in section 1.3.
- B. An installation and users manual showing safe and correct operation of all UPS functions.

1.5 QUALIFICATIONS & QUALITY ASSURANCE

- A. **Manufacturer's Certification:** The manufacturer shall specialize in manufacturing of on-line, double conversion three phase UPS modules specified in this document with a minimum of twenty years documented experience, and with a nationwide first party service organization. The manufacturer shall be ISO 9001 certified and shall design to internationally accepted standards.
- B. **Factory Testing:** Prior to shipment the manufacturer shall complete a documented test procedure to test all functions of the UPS module and batteries (via a discharge test), when supplied by the UPS manufacturer, and guarantee compliance with the specification. The factory test shall be performed in the presence of the customer providing the manufacturer receives adequate prior notice. The manufacturer shall provide a copy of the test report upon request.
- C. **Materials and Assemblies:** All materials and parts comprising the UPS shall be new, of current manufacture, and shall not have been in prior service, except as required during factory testing. All active electronic devices shall be solid state and not exceed the manufacturer's recommended tolerances for temperature or current to ensure maximum reliability. All semiconductor devices shall be sealed. All relays shall be provided with dust covers. The manufacturer shall conduct inspections on incoming parts, modular assemblies and final products.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. All products shall be packaged in a manner to prevent penetration by debris and to allow safe delivery by all modes of ground transportation and air transportation where specified.
- B. Prior to shipping all products shall be inspected at the factory for damage.
- C. Equipment shall be protected against extreme temperature and humidity and shall be stored in a conditioned or protected environment.
- D. Equipment containing batteries shall not be stored for a period exceeding three months without powering up the equipment for a period of eight hours to recharge the batteries.

1.7 ENVIRONMENTAL REQUIREMENTS

The UPS shall operate under the following environmental conditions:

- A. **Temperature:**
 - UPS Module Operating:** 0° to 40°C (32°F to 104°F)
 - Non-Operating:** -20°C to +45°C (-4°F to 113°F)
- B. **Relative humidity (operating and storage):** 0 to 95% non-condensing
- C. **Barometric Pressure:** Up to 1000 meters above sea level (up to 2000 meters with ambient temperature less than 28°C) / (up to 12,000 meters above sea level non operating)
- D. **Audible Noise:** 67 dBA at 3 feet

1.8 WARRANTY

- A. **UPS Module:** The UPS shall be covered by a full parts and labor warranty from the manufacturer for a period of twelve (12) months from date of installation or acceptance by customer or eighteen (18) months from date of shipment from the manufacturer, whichever occurs first.
- B. **Battery:** The battery manufacturer's warranty shall be passed through to the final customer and shall have a minimum period of one year.

1.9 SERVICE AND SPARE PARTS

The manufacturer shall, upon request, provide spare parts kits for the UPS module in a timely manner; as well as provide access to qualified factory trained first party service personnel to provide preventative maintenance and service on the UPS module when required.

1.10 MAINTENANCE, ACCESSIBILITY AND SELF DIAGNOSTICS

All UPS subassemblies, as well as the battery, shall be accessible from the front. UPS design shall provide maximum reliability and minimum MTTR (mean time to repair). To that end, the UPS shall be equipped with a self-test function to verify correct system operation. The self-test function shall identify the subassembly requiring repair in the event of a fault. The electronic UPS control and monitoring assembly shall therefore be fully microprocessor based, thus doing away with all potentiometer settings. This shall allow:

- Auto-compensation of component drift;
- Self-adjustment of replaced subassemblies;
- Extensive acquisition of information vital for computer-aided diagnostics (local or remote);
- Socket connection to interface with computer-aided diagnostics system.

The UPS shall be repairable by replacing standard subassemblies requiring no adjustments. Communication via a modem with a remote maintenance system shall be possible.

2.0 PRODUCT DESCRIPTION

2.1 APPROVED MANUFACTURERS & PRODUCT DESCRIPTION

- A. **Approved Manufacturer(s):** The specified equipment will be manufactured by MGE UPS SYSTEMS or approved manufacturer in compliance with specifications.
- B. **Product Description:** This specification describes a three phase, double conversion, on-line, solid state Uninterruptible Power System, hereafter referred to as the UPS. The UPS shall operate in conjunction with the existing building electrical system to provide power conditioning, back-up power protection and distribution for electronic equipment loads. The system shall consist of a solid state IGBT PWM inverter, IGBT rectifier with a power factor corrected input, static switch, internal maintenance bypass switch, battery plant, graphical status/control panel, dry contact and communications ports, and synchronizing circuitry as described herein.

2.2 SYSTEM DESCRIPTION

A. UPS Design Requirements

1. **Output Power Continuous Rating:** The continuous output power rating of the UPS shall be [] kVA at a 0.8 lagging power factor.
2. **Field Power Upgrade:** The following power ratings may be upgraded in the field to provide up to 50% (fifty percent) more output power with no increase in footprint:
 - (i) 10 kVA/8 kW UPS modules shall upgrade to 15 kVA/12 kW
 - (ii) 20 kVA/16 kW UPS modules shall upgrade to 30 kVA/24 kW
3. **Input Voltage:** [] VAC – 15% / +15%, 3 phase, 4 wire plus ground
4. **Output voltage:** [] VAC 3 phase, 4 wire plus ground
5. **Battery Autonomy:** The UPS shall be capable of operating at full load for [] minutes at 0.8 PF output at a temperature of 25°C on battery power
6. **Battery Type:** Valve regulated sealed lead acid (VRLA)

B. AC Input Characteristics

1. **Voltage:** 208, 220, 480 or 600 VAC, $\pm 15\%$, 3 phase, 3 wire plus neutral plus ground
2. **Frequency:** 60 Hz (+8% / - 25%)
3. **Power Factor:** < .99 lagging
4. **Total Harmonic Distortion:** Less than 3% at full load
5. **Power walk-in:** 0 to 100% over a 10-second period
6. **Inrush Current:** Less than nominal input current for less than one cycle
7. **Input Surge Protection:** The UPS is equipped with input MOVs to withstand surges per IEEE 587-1980/ANSI C62.41

C. AC Output Characteristics

1. **Voltage:** 208, 220, 480 or 600 VAC, $\pm 15\%$, 3 phase, 3 wire plus neutral plus ground
2. **Frequency:** 60 Hz $\pm 1\%$ (or selectable up to 4%), 60 Hz $\pm 0.1\%$ when free running
3. **Voltage Regulation:** $\pm 1.0\%$ for balanced load
 ± 1.75 for 50% unbalanced load
 $\pm 2.5\%$ for 100% unbalanced load
4. **Voltage Distortion:** Maximum 2% total (THD) and 1% any single harmonic on 100% linear loads
5. **Voltage Transient (Step Load) Response:** + 3% for 50% step load change
 $\pm 5\%$ for 100% step load change
 $\pm 1\%$ for loss or return of AC input power or manual transfer at full load
6. **Voltage Recovery Time:** Return to within 1% of nominal value within 16.67 milliseconds (one cycle)
7. **Phase Angle Displacement:** $120^\circ \pm 1^\circ$ for balanced load; $120^\circ \pm 3^\circ$ for 100% unbalanced load
8. **Non-Linear Load Capability:** Output voltage total harmonic distortion shall be less than 3% when connected to a 100% non-linear load with a crest factor not to exceed 3%.
9. **Slew Rate:** 1 Hz/second maximum (or selectable up to 2.0 Hz/sec)
10. **Power Factor:** 0.8 at the rated volt-amperes (VA)
11. **Inverter Overload Capability:** 120% of rated load for 1 minute
145% of rated load for 30 seconds
12. **Bypass Overload Capability:** >212% for one cycle; > 150% for 30 seconds

D. Battery

1. **Battery Voltage:** 198 VDC minimum before cutoff; 240 VDC nominal, 277 VDC maximum maintenance charge voltage; 300 VDC equalization voltage
2. **Maximum DC Current:** Maximum DC current at cutoff voltage will be [] A.

2.3 MODES OF OPERATION

The UPS module shall be designed to operate as a double conversion, on-line reverse transfer system in the following modes.

- A. **Normal:** The inverter shall continuously supply power to the critical load. The PFC rectifier shall derive power from the utility AC source and supply DC power to the inverter, while simultaneously float charging the battery.
- B. **Emergency:** Upon failure of the utility AC power source, the critical load shall be supplied by the inverter, which, without any interruption, shall obtain its power from the battery.
- C. **Recharge:** Upon restoration of the utility AC power source (prior to complete battery discharge), the PFC rectifier shall power the inverter and simultaneously recharge the battery.
- D. **Bypass Mode:** The static bypass transfer switch shall be used to transfer the load to the bypass without interruption to the critical power load. This shall be accomplished by turning the inverter off. Automatic re-transfer or forward transfer of the load shall be accomplished by turning the inverter on.
- E. **Maintenance Bypass/Test Mode:** A manual make before break internal maintenance bypass switch shall be provided to isolate the UPS inverter output and static bypass transfer switch for maintenance. This shall allow the UPS to be tested or repaired without affecting load operation.

2.4 COMPONENT DESCRIPTION

A. PFC Rectifier and Battery Charger

Incoming AC power shall be converted to a regulated DC output voltage by an IGBT (insulated gate bipolar transistor) power factor corrected (PFC) rectifier. The rectifier shall provide high quality DC power to charge the batteries and power the inverter and shall have the following characteristics:

1. **Input Power Factor Correction (PFC):** The PFC rectifier shall be power factor corrected so as to maintain an input power factor of 0.98 lagging to unity at all load levels to ensure generator compatibility and avoid reflected harmonics from disturbing loads sharing the utility power.
2. **Input Harmonic Current Suppression:** The PFC rectifier shall produce a sinusoidal input AC current on each phase with low harmonic content, limiting THD on the UPS input to below 3%. This shall eliminate the requirement for an input filter.
3. **Modular Assembly:** The PFC rectifier assembly shall be constructed of modular design to facilitate rapid maintenance.
4. **Battery Charger Current Limiting:** The UPS shall be equipped with a system designed to limit the battery recharge current (from 0.05 C10 to 0.1 C10).
5. **Charging Levels:** The 'battery charging circuitry' shall be capable of being set for automatic battery recharge operation, float service, manual battery charge service, and equalizing or commissioning operation.
6. **Intermittent Charging:** The battery charge level shall be maintained by an intermittent charging technique between two values V_{fmin} and V_{fmax} very close to the floating voltage. This technique shall be based on a cycle made up of a short charge period (a few seconds) from V_{fmin} to V_{fmax} followed automatically by a slow discharge period (a few minutes) from V_{fmax} to V_{fmin} . This cycle shall be repeated continuously to maintain the battery charge level. In this way the battery shall actually be charging only for a small part of the time, which considerably increases its service life.

7. **Temperature Compensated Charging:** The battery charger shall be equipped with a temperature probe to enable temperature compensated charging and adjust the battery float voltage to compensate for the ambient temperature using a negative temperature coefficient of 3 mV per cell per degree Celsius at a nominal temperature of 25°C.
8. **Battery Capacity:** The battery charger shall have sufficient capacity to support a fully loaded inverter and fully recharge the battery to 95% of its full capacity within 6-8 hours.

B. Inverter

The UPS output shall be derived from a *Variable Frequency Pulse Width Modulated (PWM)* IGBT inverter design. The inverter shall be capable of providing the specified precise output power characteristics (specified in section 2.2.C) while operating over the battery voltage range. The inverter assembly shall be constructed as a modular assembly to facilitate rapid maintenance.

C. Static Bypass – 100% Rated, Continuous Duty

The static bypass transfer switch shall be solid-state, rated for 100% continuous duty operation without mechanical contactor device in parallel for higher reliability and consistent response time and shall operate under the following conditions:

1. **Uninterrupted Transfer:** The static bypass transfer switch shall automatically cause the bypass source to assume the critical load without interruption after the logic senses one of the following conditions:
 - a) Inverter overload exceeds unit's rating
 - b) Battery protection period expired and bypass current is available
 - c) Inverter failure
2. **Interrupted Transfer:** If the bypass source is beyond the conditions stated below, the UPS will make an interrupted transfer (not less than 100 msec. in duration).
 - a) Bypass voltage greater than + 10%, -10% from the UPS rated output voltage.
 - b) Bypass frequency greater than ± 2 Hz from the UPS rated output frequency.
3. **Automatic Uninterrupted Forward Transfer:** The static bypass transfer switch shall automatically forward transfer power, without interruption, after the UPS inverter is turned "ON" after an instantaneous overload-induced reverse transfer has occurred and the load current returns the UPS's nominal rating or less.
4. **Manual Transfer:** A manual static transfer shall be initiated from the UPS Control Panel by turning the UPS inverter off.
5. **Overload Ratings:** The static bypass transfer switch shall have the following overload characteristics:
 - a) 1000% of UPS output rating for 0.016 seconds (one cycle)
 - b) 150% for 1 second
 - c) 130% of UPS output rating for 1 minute

D. Output Static Switch – 100% Rated, Continuous Duty

UPS output shall be equipped with a 100% rated output static switch without mechanical contactor device in parallel for higher reliability and consistent response time of 16.66 msec.

E. Microprocessor Controlled Logic

The full UPS operation shall be provided through the use of microprocessor controlled logic. All operation and parameters are firmware controlled, thus eliminating the need for manual adjustments or potentiometers. The logic shall include a self-test and diagnostic circuitry such that a fault can be isolated down to the printed circuit assembly or plug-in power assembly level. Every printed circuit assembly or

plug-in power assembly shall be monitored. Diagnostics shall be performed via a PC through the local diagnostics port on the UPS.

F. **Standard Display, Control and Indicator Panel**

The UPS will include a standard easy to use control and indicator panel. Included will be a backlit, color graphic animated LCD display and LED indicators. The UPS panel will include UPS "ON" and UPS "OFF" pushbuttons that will permit the user to safely command the UPS on or off without risk of load loss.

3.0 **SYSTEM CONTROLS AND INDICATORS**

A. **Front Panel LCD Display:** The UPS control panel shall provide a back-lit, color graphic display with choice of over 15 operating languages for indication of UPS status, metering, battery status, alarm/event log and advanced operational features. The display provides access to:

- An animated, color mimic diagram indicating UPS power flow
- Measurements, status indications and events
- Bar-graphs and waveforms of the measured values
- Personalization menu protected by a password, used to make specific settings
- Event log with time stamping
- Access to all measurements

System Parameters Monitored: The visual display will display the following system parameters based on true RMS metering:

Measurements:

- Input voltage (Ph-Ph)
- Input current per phase
- Bypass voltage
- Bypass input frequency
- UPS output voltage (Ph-Ph and Ph-N) (3 phase simultaneously)
- UPS output current per phase (3 phase simultaneously)
- UPS output frequency
- UPS output % load
- UPS output kVA
- UPS output power factor
- Battery voltage
- Crest factor
- Battery current
- Battery backup time and remaining service life
- Battery temperature

Status Indications and Events:

- Load on battery
- Load on UPS
- Load on automatic bypass
- Low-battery warning
- General alarm
- Battery fault
- Remaining back-up time during operation on battery power

- Bypass source outside tolerances
- Battery temperature
- Additional indications shall provide maintenance assistance

Display of Operating Curves: The graphical display shall be capable of displaying curves and bar graphs of the above-mentioned measured values for significant periods.

Time-Stamped Historical Events: This function shall time-stamp and store all important status changes, anomalies and faults, and make this information available for automatic or user-requested consultation.

- B. **LED Status Indicators:** The UPS control panel shall provide three LEDs that signal the following status conditions:
- Green LED: Load protected
 - Yellow LED: minor fault
 - Red LED: major fault, load not protected
- C. **On/Off Switch:** The UPS shall provide the ON and OFF buttons to start and stop the inverter. The switch shall provide a built-in time delay to eliminate the risk of inadvertent operation (additional confirmation is requested). It is possible to remotely activate the OFF function via an isolated dry contact to create an emergency power off function resulting in:
- Inverter shutdown
 - Opening of the automatic bypass
 - Opening of the input, bypass, output devices and battery circuit breaker
 - Opening of the isolated dry contact on the programmable relay card
- D. **Audible Alarm Reset:** The UPS shall provide an audible alarm that can be stopped using the user interface. If a new alarm is sensed after the original alarm has been silenced, it will reactivate the audible alarm.
- E. **Emergency Power Off (EPO):** The UPS shall be equipped with a local emergency power off button and dry contact input that can be used to command UPS shut down remotely. Activation of this command shall lead to the following actions:
- inverter shutdown
 - opening of the static bypass switch and the battery circuit breaker
 - opening of input and output devices
 - opening of an isolated dry contact on the programmable relay board
- F. **DB-9 Connector:** One DB-9 connector with serial output will be provided for field diagnostics.
- G. **Dry Contacts:** The UPS shall be provided standard with a programmable input/output relay board. This board shall have 8 dry contacts, i.e., 6 for input signals and 2 for output signals. Contacts shall be programmed as:
- UPS on Line
 - Load on Bypass
 - UPS on Battery
 - UPS Battery Low
 - General alarm
 - Remote UPS on (input)
 - Remote UPS off (input)

The contacts will be normally open and will change state to indicate the operating status. The contacts will be rated at 2.0 A (250 VDC / 30 VDC).

3.1 MECHANICAL DESIGN AND VENTILATION

- A. **Enclosure:** The UPS shall be housed in a freestanding enclosure with dead front construction. The mechanical structure of the UPS shall be sufficiently strong and rigid to withstand handling and installation operations without risk. Access to UPS subassemblies shall be through the front or top. The sheet-metal elements in the structure shall be protected against corrosion by a suitable treatment, such as zinc electroplating, bichromating, epoxy paint or an equivalent.
- B. **Cable Access:** The standard UPS available shall accommodate top and bottom entry cables. The 10 and 15 kVA Micro Cabinet version shall accommodate bottom entry cables as standard and top entry cables with the addition of an auxiliary cabinet.
- C. **Cabinet Weights and Dimensions:** The width of the UPS is [] (in inches) and has a maximum weight of [] (in lbs).
- D. **Ventilation and Heat Rejection:** The UPS shall be designed for forced air-cooling. Air inlets shall be provided from the front bottom of the UPS enclosure. Air exhaust shall be from the top rear portion of the unit. Full load heat rejection is [] BTU /hour.

3.2 BATTERY

The UPS module shall use a valve regulated sealed lead acid heavy-duty industrial battery designed for auxiliary power service in a UPS application. The primary battery shall be furnished with impact resistant plastic cases and housed in rack out containers inside the UPS module.

- A. **Protection Against Deep Discharge and Self-Discharge:** The UPS shall be equipped with a device designed to protect the battery against deep discharge, depending on discharge conditions, with isolation of the battery by a circuit breaker. In particular, a monitoring device shall adjust the battery shutdown voltage as a function of a discharge coefficient to avoid excessive discharge at less than the rated output. A second device shall avoid self-discharge of the battery into the UPS control circuits during an extended shutdown of the UPS (over two hours).
- B. **Battery Self-Tests:** The battery monitoring system shall be to perform the following automatic functions:
 - Battery circuit checks every twelve hours
 - Open-circuit battery test once a month
 - Partial discharge test every three months

This self-test system shall signal faults via LEDs on the front panel or a message to remote supervision systems.

4.0 ACCESSORIES

- A. **Extended Battery Cabinet:** Matching battery cabinets shall be furnished in both adjacent or stand alone versions for the 10-30 kVA 32.75" standard UPS cabinet. The cabinet shall match the width, height, and depth of the UPS module. All power wiring and control cables shall be included for adjacent models.
- B. **UL 924 Listed Battery Cabinet:** A UL 924 listed battery cabinet shall be provided for 10, 15, 20, and 30 kVA UPS modules. The specific UPS and specific battery cabinet comprise the UL 924 listed system. This system shall be in compliance with UL 924 criteria for a minimum of 90 minutes of battery operation with a full load on the UPS. UL 924 recharge criteria shall be met with both normal and reduced input voltage conditions. The battery cabinet shall be non-matching and available in stand alone version only. Power wiring and control cables from the UPS to the battery cabinet are not included. With multiple battery cabinets, interconnect cables shall be provided.
- C. **Automated monitoring / RemotePowerMonitoring™ Service:** RemotePowerMonitoring™, which is a twenty-four hour-per-day, seven day-per-week remote UPS monitoring and reporting service shall be

provided. The systems shall use standard analog telephone lines (via modem) as the communication medium to transmit critical UPS data, alarms and anomalies back to a central station. In addition, the central station shall communicate with each of the subscribing UPS on a routine basis to check equipment status, operating conditions and all measured values. All reported anomalies and all routine interrogation data shall be accumulated for utilization in generating a quarterly customer report.

D. External Control and Communications Devices

Up to three of the following control and communications devices may be installed in the UPS module:

1. **RS232 U-Talk or Dry Contacts (66060):** The U-Talk protocol shall be used with Solution-Pac 2 for remote monitoring or graceful shutdown for most popular file servers. The dry contacts will close on predefined conditions to monitor UPS operations. Requires one communication slot and optional cables. The dry contacts will close on the conditions listed below, but shall be user programmable to close on preset thresholds of other user UPS parameters:

- UPS on Line
- Load on Bypass
- UPS on Battery
- Low Battery Warning
- Battery Fault
- General Alarm

Two (2) dry contact inputs shall also be provided to turn the UPS inverter on and off remotely upon closure of the contacts. This feature may also be disabled if required.

2. **RS232 or RS485 JBus/Modbus Card (66061):** The U-Talk protocol shall be used with Solution-Pac 2 for remote monitoring or graceful shutdown for most popular file servers. The JBus protocol shall be used with third party Building Management Systems (BMS) to monitor detailed three-phase information. Requires one communication slot and optional cables.

3. **High Voltage 6 Alarm Relays Card (66069):** A second set (one set provided standard with the UPS module) of six (6) normally open dry contact outputs rated at 2.0 A (250 VDC / 30 VDC) shall be available to monitor UPS operation. The dry contacts will close on the conditions listed below, but shall be user programmable to close on preset thresholds of other user UPS parameters:

- UPS on Line
- Load on Bypass
- UPS on Battery
- Low Battery Warning
- Battery Fault
- General Alarm

Two (2) dry contact inputs shall also be provided to turn the UPS inverter on and off remotely upon closure of the contacts. This feature may also be disabled if required.

4. **Network Management Card (66074):** The Network Management Card (NMC) shall provide a web interface, SNMP (Simple Network Management Protocol), logging, and email capabilities. The NMC shall be used for remote monitoring or graceful shutdown for most popular file servers.

5. **IBM AS/400 Volt-Free Contact/Remote Power Off Card (66068):** The UPS shall interface with an IBM® AS400-UPS signal interface providing the following signals via dry contacts:

- load on battery
- load on bypass
- low battery shutdown warning

- load powered by UPS

6. **MultiSlot Communications Card Expander (66071):** The MultiSlot shall provide three additional communication slots. The U-Talk Acquisition Card (66063) is included.

E. Network Based Power Management Software:

1. **Solution-Pac 2** software shall facilitate the management of the UPS over any point in a wide area network (WAN) or local area network (LAN). The software shall use a distributed, TCP/IP based architecture and must be SNMP manageable. To reduce the volume of network traffic, the software will employ trap reception acknowledgement. The software must be capable of graceful server shutdown of individual or multiple servers from any point on the network for up to 50 servers per card.
2. **Enterprise Power Manager** software shall facilitate the management of the UPS and servers over any point in a wide area network (WAN) or local area network (LAN). The software shall provide an overall, consolidated view of the main operating parameters of all power devices on the network. The information shall be accessible from any workstation using a standard web browser. The software shall use Secure Sockets Layer (SSL) and several levels of password protection for complete security. MGE network device required.

F. **Input Isolation Transformer:** A delta zigzag input isolation transformer can be provided inside the standard UPS cabinet to isolate the rectifier input and DC bus for ungrounded DC systems. Input isolation transformers shall be standard on UPSs with input voltages other than 208 V.

G. **Distribution Panelboards:** Optional 24 or 42 pole front facing distribution panelboards will be provided with the UPS in a matching adjacent cabinet. The panelboard will be a Square D, NQO panel accommodating 10-100 amp breakers. Panelboards will accommodate any combination of one, two or three pole breakers. The 24 pole panelboard system shall be provided in conjunction with the maintenance bypass offering and shall be housed in the same cabinet. The 42 pole distribution shall be housed in an independent cabinet.

H. **Two or Three Circuit Breaker External Maintenance Bypass in Matching Cabinet:** The maintenance bypass option provides for two (2) or three (3) circuit breakers mounted in a matching, adjacent cabinet to provide a wrap around bypass configuration for total UPS isolation during maintenance. Maintenance bypass transfers shall be without interruption and shall have mechanical keyed interlocks to protect the UPS from damage in the event of out of sequence transfers. An optional electrically based solenoid activated key release shall be available to control the removal of the keys from the key interlocks.

I. **Two or Three Circuit Breaker External Maintenance Bypass – Wall Mount:** The maintenance bypass option provides for two (2) or three (3) circuit breakers mounted inside a wall mounted enclosure to provide a wrap around bypass configuration for total UPS isolation during maintenance. Maintenance bypass transfers shall be without interruption and shall have mechanical keyed interlocks to protect the UPS from damage in the event of out of sequence transfers. An optional electrically based solenoid activated key release shall be available to control the removal of the keys from the key interlocks.

J. **Remote Alarm Status Panel:** A wall mounted panel, 17.5”Hx12”Wx4”D, with eight (8) indicating LED's shall display UPS status and any active alarms. The alarms shall be a latching type, such that if an alarm is triggered, the LED will stay ON (latch) even if the alarm is corrected. This feature will provide the operator the chance to verify the occurrence of the alarm. The parameters monitored and controls provided on the RASP panel include:

1. UPS on line (Green LED)
2. UPS on battery (Yellow LED)
3. Load on bypass (Yellow LED)
4. UPS Summary alarm (Red LED)
5. Low Battery shutdown

The Remote Alarm Status Panel shall also be equipped with:

- ▶ Alarm Test/Reset push-button: (white LED) to reset the latching alarm
- ▶ Audible Alarm: for alarm annunciation
- ▶ Audible Alarm reset push-button: (white LED) to silence the audible alarm

The RASP door shall be equipped with a key lock. The recommended maximum distance from the UPS module shall be 500 feet.

- K. **Remote Summary Alarm Panel:** A wall mounted panel with five (5) indicating LED's shall display UPS status and any active alarms. The alarms shall be a latching type, such that if an alarm is triggered, the LED will stay ON (latch) even if the alarm is corrected. This feature will provide the operator the chance to verify the occurrence of the alarm. The parameters monitored and controls provided on the RSAP panel include:

1. UPS summary alarm (Red LED)
2. UPS on battery (Yellow LED)

The Remote Summary Alarm Panel shall also be equipped with:

- ▶ Alarm Test/Reset push-button: (white LED) to reset the latching alarm
- ▶ Audible Alarm: for alarm annunciation
- ▶ Audible Alarm reset push-button: (white LED) to silence the audible alarm

The RSAP door shall be equipped with a key lock. The recommended maximum distance from the UPS module shall be 500 feet.

- L. **Seismic Anchors:** Seismic Zone 4 anchors shall be available for all system cabinets.

- M. **Dual Input:** A second input terminal block shall be provided to accommodate a separate input source.

5.0 FIELD QUALITY CONTROL & SERVICE ORGANIZATION

5.1 FIELD SERVICE ENGINEER QUALIFICATIONS

The manufacturer must employ a 7 X 24 nationwide (international where applicable) field service organization with rapid access to all regions of the nation. The responding service professionals must be factory-trained engineers with an accredited and proven competence to service three phase UPS.

5.2 SPARE PARTS

Field Engineers must have immediate access to recommended spare parts with additional parts storage located in regional depots. Additional spare parts shall be accessible on a 7 x 24 basis from the national depot and must be expedited on a next available flight basis or via direct courier (whichever mode is quickest).

5.3 MAINTENANCE TRAINING

The manufacturer shall make available to the customer various levels of training ranging from basic UPS operation to UPS maintenance.

5.4 MAINTENANCE & SERVICE CONTRACTS

The manufacturer shall offer additional preventative maintenance and service contracts covering both the UPS and the battery bank. Accredited professional service engineers employed exclusively in the field of critical power systems service shall perform all maintenance and service. The manufacturer shall also offer extended warranty contracts.

END OF SECTION

SPECIFICATION KEY

2.2 A –1 OUTPUT POWER RATINGS

- 10 kVA/8 kW (available in Micro or Standard Cabinet widths, See 4.2 C for widths)
- 15 kVA/12 kW (available in Micro or Standard Cabinet widths, See 4.2 C for widths)
- 20 kVA/16 kW (available in Standard Cabinet widths only, See 4.2 C for widths)
- 30 kVA/24 kW (available in Standard Cabinet widths only, See 4.2 C for widths)

2.2 A-3 / A-4 INPUT / OUTPUT VOLTAGES

- 208 VAC
- 220 VAC
- 480 VAC
- 600 VAC

2.2 A-5 BATTERY BACK-UP TIME

Interior Mounted Battery Offering

Configuration	Battery	Run Time (minutes)			
		10kVA	15kVA	20kVA	30kVA
20 x 20 Ah	NPX-80 (or equivalent)	12	8	N/A	N/A
20 x 40 Ah	NPX-150 (or equivalent)	36	20	14	8
20 x 50 Ah	UPS12-200FR (or equivalent)	56	33	23	12
20 x 75 Ah	UPS12-270FR (or equivalent)	92	51	36	19

Auxiliary Cabinet Battery Offering

Configuration	Battery	Run Time (minutes)			
		10kVA	15kVA	20kVA	30kVA
20 x 100 Ah	UPS12-370FR (or equivalent)	100	61	43	29
20 x 134 Ah	UPS12-457FR (or equivalent)	151	88	60	45

2.2 B-2 INPUT CURRENTS

	10kVA	15kVA	20kVA	30kVA
A @ 208 VAC	28	42	56	83
A @ 220 VAC	26	39	53	79
A @ 480 VAC	12	18	24	36
A @ 600 VAC	10	15	19	29

2.2 D-2 BATTERY CURRENT

	10kVA	15kVA	20kVA	30kVA
ADC	39	59	78	116

3.1 C UPS MODULE WEIGHTS AND DIMENSIONS

Dimensions (Inches)/ Weights (Lbs.)

kVA	Micro Cabinet	Standard Cabinet					
	10/15	10/15	10/15	10/15	20/30	20/30	20/30
Input / output Volts	*208/208 8 *220/220 0	208/208 220/220	†208/208 †220/208 †480/208 †600/208	††480/480 ††600/600	208/208 220/220	†208/208 †220/208 †480/208 †600/208	††480/480 ††600/600
Height	48.5	62.4	62.4	62.4	62.4	62.4	62.4
Width	*23	32.75	32.75	56.5	32.75	32.75	56.5
Depth	33.5	35.5	35.5	35.5	35.5	35.5	35.5
Weight	780	1434	1723	2023	1439	1839	2239

* The electrical room versions 10 and 15 kVA Micro Cabinet models require an additional 4.50" for top feed enclosure.
† includes Input Isolation Transformer inside the UPS cabinet.
†† Includes Output Transformer in separate enclosure., If MPB used separate Aux Input Transformwer is required.

3.1 D UPS MODULE HEAT REJECTION

(Input / Output V)	BTU/HR		
	208/208	480/208 600/208	220/220 480/480
10kVA/8kW	4821	5800	6824
15kVA/12kW	7232	8871	10235
20kVA/16kW	8895	10918	12965
30kVA/24kW	13342	16377	19447