

# MGE UPS SYSTEMS

## COMET 40-150 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, 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 inverter, rectifier/battery charger, a 100% rated for continuous duty static switch, an internal maintenance bypass switch, and battery plant 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 nation wide 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 manufacturers 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 be capable of withstanding any combination of the following environmental conditions in which it must operate without mechanical or electrical damage or degradation of operating characteristics.

- A. **Temperature**
  - Operating:** 0°C to 30°C (32°F to 86°F)  
Up to 40°C for 8 hours @ 75% load
  - Non-Operating:** -20° to +45°C (-4°F to 113°F)
- B. **Relative humidity** (operating and storage): 0 to 95% non-condensing
- C. **Barometric Pressure** (operating): Up to 3,000 feet (1000m) above sea level

(up to 6,000 feet with ambient temperature less than 28°C)

D. **Audible Noise:** 65 dB "A" weighting 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 or settings. 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 inverter, rectifier/battery charger, a 100% rated for continuous duty static switch, an internal maintenance bypass switch, and battery plant 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. **Input Voltage:** [ ] VAC, +12% / -15%, 3 phase, 3 wire “grounded wye” configuration plus ground.
3. **Output voltage:** [ ] VAC, 3 phase, 3 wire plus ground.
4. **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.
5. **Battery Type:** Valve regulated sealed lead acid (VRLA).

### B. AC Input Characteristics

1. **Voltage:** 208, 220, 480 or 600 VAC, +12% / -15%, 3 phase, 3 wire “grounded wye” configuration plus ground
2. **Frequency:** 60 Hz  $\pm$  4%
3. **Power Factor:** Up to .98 lagging
4. **Total Harmonic Distortion:** An input filter shall be provided to limit input current harmonic distortion (THD) to less than 10% THD and improve input power factor to .98. The input filter shall be mounted inside the UPS cabinet.
5. **Power Walk-In:** 0 to 100% over a 2 second period and during initial start only.
6. **Magnetizing Inrush Current:** Less than nominal input current for less than one cycle for 480/480 models. 600% of nominal input current for less than one cycle for 208, 220 and 600 VAC input.

### C. AC Output Characteristics

1. **Voltage:** 480 VAC, 3 ph, 3 wire plus ground (Output voltage adjustable  $\pm$  3%)  
208Y/120 VAC 3 ph, 4 wire plus ground (Output voltage adjustable  $\pm$  3%)  
220Y/127 VAC, 3 ph, 4 wire plus ground (Output voltage adjustable  $\pm$  3%)
2. **Frequency:** 60 Hz  $\pm$  2% synchronized with bypass (selectable in  $\pm$ 1%,  $\pm$ 1.5%,  $\pm$ 2%,  $\pm$ 3%,  $\pm$ 4% increments). 60 Hz  $\pm$  0.1% free running.
3. **Voltage Regulation:**  $\pm$  1.0% for 100% balanced load  
 $\pm$  1.75% for 50% unbalanced load  
 $\pm$  2.5% for 100% unbalanced load
4. **Voltage Distortion:** Maximum 2% total (THD) and 1% for any single harmonic on 100% linear loads.
5. **Voltage Transient Response:**  $\pm$  5% for 100% step load change  
 $\pm$  3% for 50% step load change  
 $\pm$  1% for loss or return of AC input power

± 1% for manual transfer at full load

6. **Voltage Recovery Time:** Return to within 1% of nominal value within 16.67 milliseconds.
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 3.0% when connected to a 100% non-linear load with a crest factor not to exceed 3.0.
9. **Slew Rate:** Set at 1 Hz/second maximum (selectable up to 2.0 Hz).
10. **Power Factor:** 0.8 at the rated volt-amperes (VA).
11. **Inverter Overload Capability:** 105% - 110% of rated load for 10 minutes  
>110% - 130% of rated load for 1 minute  
>130% - 150% of rated load for 10 seconds  
>150% of rated current for 0.15 seconds

#### D. **Battery**

1. **Battery Voltage:** 360 VDC minimum before cutoff; 432 VDC nominal; 492 VDC maximum maintenance charge voltage.
2. **Maximum DC Current:** Maximum DC current at cutoff voltage will be [ ] A.

## 2.3 **MODES OF OPERATION**

The UPS 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 rectifier/battery charger 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 rectifier/battery charger 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 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. **Rectifier/Battery Charger:** A six (6) pole, solid-state rectifier shall convert the incoming AC power

to regulated DC voltage, which shall be subsequently filtered to provide power for the battery charging functions. The rectifier/battery charger shall have sufficient capacity to support recharging of the battery. The rectifier/battery charger assembly shall be constructed of modular design to facilitate maintenance.

Input Protection: The rectifier/battery charger shall be protected by input fuses.

- B. **Inverter:** The UPS output shall be derived from a Pulse Width Modulated (PWM) IGBT inverter design. The inverter shall be capable of providing the specified precise output power characteristics while operating over the battery voltage range. The inverter assembly shall be constructed of modular rack out assemblies to facilitate maintenance.
- C. **Static Bypass:** The static bypass transfer switch shall be solid-state, rated for continuous duty 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 available
    - c. Inverter failure
  - 2. **Interrupted Transfer:** If the bypass source is beyond the conditions stated below, interrupted transfer shall be (not less than 500 msec in duration) made upon detection of a fault condition:
    - a. Bypass voltage greater than + 10%, -10% from the UPS rated output voltage.
    - b. Bypass frequency greater than  $\pm 2$  Hz from the UPS rated output frequency.
  - 3. **Automatic Uninterrupted Forward Transfer:** The static bypass transfer switch shall automatically forward transfer, without interruption, after the UPS inverter is turned "ON", after an instantaneous overload-induced reverse transfer has occurred and the load current returns to less than the unit's 100% rating.
  - 4. **Manual Transfer:** A manual static transfer shall be initiated from the System Status and 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. 130% of UPS output rating for 1 minute
    - c. 110% of UPS output rating for 10 minutes
- D. **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 unit, or via a modem through the RS232 communication port.
- E. **Standard Display, Control & Indicator Panel:** The UPS will include a standard easy to use display, control & indicator panel. Included will be a color LCD display with touch sensitive screen, pushbuttons, and LED indicators. The UPS panel will include fail safe 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 display panel shall provide a color liquid crystal display (LCD) with touch sensitive screen for indication of UPS status, battery status, alarm/event log, and advanced operational features.

The display provides access to:

- A color mimic diagram indicating UPS power flow
- Measurements, status indications and events
- Personalization menu protected by a password, used to make specific settings
- Alarm/event log with date and time stamping
- Access to all measurements

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

- ▶ Input voltage
- ▶ Bypass voltage
- ▶ Bypass input frequency
- ▶ UPS output voltage (3 phase simultaneously)
- ▶ UPS output current/phase (3 phase simultaneously)
- ▶ UPS output frequency
- ▶ UPS output % load
- ▶ UPS output kVA
- ▶ Battery voltage
- ▶ Time remaining on battery and available battery time

**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

**Time-Stamped Historical Events:** This function shall date and time stamp and store all alarms and events that occur. The alarm file capacity is 120 days First In – First Out (FIFO) stored in non-volatile memory.

- B. **LED Status Indicators:** The UPS control panel shall provide four LEDs that signal the following status conditions:

- Green LED: Load protected
- Yellow LED: Fault

- Red LED: Load not protected
  - Battery LED: Battery status
- 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 (hold for 3 seconds). It is possible to remotely activate the OFF functions 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):** When EPO is pressed, it shall cause the AC input contactor bypass input contactor and battery circuit breakers to open, thereby shutting down the UPS and the load. The EPO function shall be capable of being initiated by an externally provided N/C isolated dry contact (REPO).
- F. **DB-9 Connector:** One DB-9 connector will be provided for field diagnostics.
- G. **Dry Contacts:** Four (4) isolated dry contacts shall be available for external connection on a DB-15 connector provided. Contacts available include:
- ▶ UPS on Line
  - ▶ Load on Bypass
  - ▶ UPS on Battery
  - ▶ UPS Battery Low

The contacts will be normally open and will change state to indicate the operating status. The contacts will be rated 100 milliamp at 24 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.
- 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 portion of the unit. Full load heat rejection is [ ] BTU /hour.

## 3.2 BATTERY

- A. **Temperature Compensation:** The UPS will include provisions for automatic temperature compensation charging during the charging cycle. Between 30° and 40°C ambient temperature inside the battery compartment, the charger voltage will phase back to prevent overcharging of the battery in a high temperature condition. Above 40°C the UPS will stop charging the battery and alarm on a high battery temperature.
- B. **Deep Cycle Protection:** The battery cutoff voltage will be automatically raised during long discharges to extend battery life.
- C. **Long Outage Protection:** The UPS will remain connected to the battery and automatically restart the charger and UPS for outages less than 3 times the full load battery time plus two hours. For longer outages the UPS will shutdown to protect the battery and require a manual restart.

## 4.0 ACCESSORIES

- A. **Battery Cabinet:** The battery cabinets shall be matching and available in both adjacent or stand alone versions. All power wiring and control cables for adjacent versions will be included for adjacent models. Battery disconnect shall be provided.
- B. **UL 924 Listed Battery Cabinets:** UL 924 listed battery cabinets shall be provided for 50, 65, and 80 kVA UPS modules. The specific UPS and specific battery cabinets 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 cabinets shall be non-matching and available in stand alone version only. Power wiring and control cables from the UPS to the battery cabinets 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**

Two communication slots shall be provided for customer use. The communication port options are listed as follows:

1. **RS232 U-Talk or JBus/Modbus Board (PAJO) (6761292T):** 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.
2. **RS485 J-Bus/Modbus Board (JOJO) (81-160050-02):** Use with external Building Management System (BMS) to monitor detailed three-phase information. Requires one communication slot and optional cables.
3. **High Voltage 6 Alarm Relays Card (66069):** Six (6) normally open dry contact outputs rated at 2.0 A (250 VDC / 30 VDC) shall be available to monitor UPS operation. A MultiSlot is required. 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. A MultiSlot is required.
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 (a MultiSlot is required):
  - load on battery
  - load on bypass
  - low battery shutdown warning
  - load powered by UPS
6. **Contact Five Board (81-160009-02):** Five (5) dry contacts (rated 120 volts @ 1 amps) on a terminal block. Requires one communication slot. Five Form-C contacts include:
  - ▶ UPS on Line
  - ▶ Load on Bypass
  - ▶ UPS on Battery
  - ▶ UPS Battery Low
  - ▶ Summary Alarm
7. **Network Management Link:** The MultiSlot shall provide three additional communication slots. The Network Management Card (NMC) shall be installed in one or all three slots for monitoring and graceful shutdown for most popular file servers. The NMC provides a web interface, SNMP, logging and email capabilities. Requires one communication slot and network cabling (provided by customer). The basic network connection requires the MultiSlot (66071), U-Talk Acquisition Card (66063), Network Management Card (66074), and RS232 U-Talk or JBus/Modbus board configured for U-Talk.
8. **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. **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.

- G. **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.

H. **Monitor Plus Remote Display (81-160006-02)**

The Monitor Plus Remote Display is a status and control panel, and shall be available locally or remotely to control, monitor, and display system operations and parameters. The available languages will be English, French, Spanish, Dutch, and Italian. Requires one communication slot.

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

- ▶ Input voltage
  - ▶ Bypass voltage
  - ▶ Bypass input frequency
  - ▶ UPS output voltage (3 phase simultaneously)
  - ▶ UPS output current/phase (3 phase simultaneously)
  - ▶ UPS output frequency
  - ▶ UPS output % load
  - ▶ UPS output kVA
  - ▶ Battery voltage
  - ▶ Time remaining on battery and available battery time
- I. **Distribution Panelboards:** Optional distribution panelboards will be provided with the UPS in a 42" wide cabinet. The panelboard will be a Square D, NQO panel compatible with bolt on or plug in breakers, with 10-100 amp trips. Panelboards will accommodate any combination of one, two, or three pole breakers; up to 42 poles per panelboard. Main input circuit breaker and two sub main circuit breakers feeding the panelboard will also be provided.
- J. **Main Distribution Breakers:** Four main distribution circuit breakers may be provided in a matching 42" cabinet in place of each panelboard and sub-main circuit breaker on all 208-output models. Each of the four distribution circuit breakers may be sized up to 400.
- K. **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.
- L. **Two or Three Circuit Breaker External Maintenance Bypass – Wall Mount:** Requires contact 5 board. The maintenance bypass option provides for two (2) or three (3) circuit breakers mounted inside a wall mounted enclosure for total UPS isolation and UPS 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.
- M. **Battery Disconnect:** An external wall mounted battery disconnect shall be provided to isolate the battery from the UPS for maintenance.
- N. **Seismic Anchors:** Seismic Zone 4 anchors shall be available for the UPS cabinet and MGE matching auxiliary and battery cabinets.
- O. **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 nation wide (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

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## 2.2 A-1 OUTPUT POWER RATINGS

- 40 kVA/32 kW
- 50 kVA/40 kW
- 65 kVA/52 kW
- 80 kVA/64 kW
- 100 kVA/80 kW
- 125 kVA/100 kW
- 150 kVA/120 kW

## 2.2 A-2 / A-3 INPUT / OUTPUT VOLTAGES

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

## 2.2 A-4 BATTERY BACK-UP TIME

Dimensions 66"W x 33"D	Qty	40 kVA	50 kVA	65 kVA	80 kVA	100 KVA	125 KVA	150 KVA
26" W	1	13	10	6	-	-	-	-
32" W	1	30	23	15	11	8	-	-
48" W	1	43	34	24	18	13	9	6
48" W	1	61	53	36	26	19	13	9
64" W	2	-	56	40	31	24	17	14
96" W	2	-	-	55	44	35	26	20
96" W	3	-	-	-	53	40	30	24
96" W	2	-	-	-	60	54	40	31
144" W	3	-	-	-	-	58	44	35
144" W	3	-	-	-	-	-	60	54

**2.2 B-2 NOMINAL INPUT CURRENT (ON BYPASS)**

Current	40 kVA	50 kVA	65 kVA	80 kVA	100	125 kVA	150 kVA
208	111	139	180	222	278	347	417
220	105	131	170	210	263	328	394
480	48	60	78	96	120	150	180
600	38	48	63	77	96	120	145

**2.2 D-2 BATTERY DC CURRENT**

KVA	40 kVA	50 kVA	65 kVA	80 kVA	100 kVA	125 kVA	150 kVA
ADC	82	103	134	165	197	246	295

**3.1 C UPS MODULE WEIGHTS AND DIMENSIONS**

Dimensions (Inches)

Single Input	40-80 kVA	40-80 kVA	40-80 kVA	100 - 150 kVA	100 - 150 kVA	100 - 150 kVA
	480/480 480/208	208/208 220/220	600/208	480/480 480/208	208/208	600/208
Height	66	66	66	66	66	66
Width	32	32/58 *	58/84 *	42	68	68/94 **
Depth	33	33	33	33	33	33

\* 50-80 kVA: Dual feed 208/208 VAC feed and 600 VAC input configurations

\*\* 100-150 KVA: 600 VAC dual input configuration

Weight (lbs.)

Input/ Output	40/50 kVA	65 kVA	80 kVA	100 kVA	125 kVA	150 kVA
480/480	880	970	970	1460	1460	1460
480/208	1360	1590	1590	2450	2450	2450
208/208	1760	2115	2115	3400	3400	3400
600/208	2820	2910	2910	3400	3400	3400
220/220	1760	2115	2115	3400	3400	3400

**3.1 D UPS MODULE HEAT REJECTION**

Voltage	40 kVA/ 32 kW	50 kVA/ 40 kW	65 kVA/ 52 kW	80 kVA/ 64 kW	100 KVA/ 80 kW	125 KVA/ 100 KW	150 KVA/ 120 kW
	BTU/HR	BTU/HR	BTU/HR	BTU/HR	BTU/HR	BTU/HR	BTU/HR
480/480	8,220	10,276	11,328	13,942	15,420	20,804	26,351
480/208	12,135	15,169	15,433	21,603	22,278	30,662	41,560
208/208	13,500	16,873	17,552	21,603	28,300	38,247	50,759
600/208							
220/220							