

## MD Series Uninterruptible Power Systems 3.1 KVA - 7.5 KVA

### General Specification

1.0 General

This specification describes the features and design of the MD Series Uninterruptible Power System. The system is designed and manufactured to assure maximum reliability, serviceability and performance. The system is a line interactive UPS incorporating an IGBT based microprocessor controlled PWM inverter, high speed transfer devices, constant voltage regulating transformer, battery charger and energy storage battery platform to facilitate complete protection for critical electronic equipment applications. The UPS as specified herein provides complete immunity from line disturbances and power interruptions with no loss of or disruption in AC output power. The system's constant voltage output transformer regenerates the output waveform during all phases of operation, thus maintaining a regulated, clean power source for the intended load. A self-diagnostic monitoring system continuously advises of system status and battery condition.

2.0 UPS Ratings

<u>Model</u>	<u>Rating</u>	<u>Model</u>	<u>Rating</u>
MD3100	3.1 KVA / 2170 Watts	MD6000	6.0 KVA / 4200 Watts
MD3500	3.5 KVA / 2450 Watts	MD7000	7.0 KVA / 5000 Watts
MD4500	4.5 KVA / 3200 Watts	MD7500	7.5 KVA / 5250 Watts
MD5000	5.0 KVA / 3500 Watts		

3.0 Standards

The systems are designed in accordance with applicable portions of the following codes and standards:

- 3.1 American National Standards Institute (ANSI C57.110).
- 3.2 Institute of Electrical and Electronic Engineers (IEEE 519-1992) and (C62.41-1991).
- 3.3 National Electric Code (NEC) (NFPA 700).
- 3.4 National Electrical Manufacturers Association (NEMA PE-1).
- 3.5 Underwriters Laboratories (U/L 1778).
- 3.6 Federal Communications Commission (FCC Class A Limits, 47 C.F.R. Part 15, Subparts A, B).
- 3.7 Listed U.L. Standard U.L.1778 and cU.L. C22.2, No. 107.1-M01.

4.0 Input Specifications

- 4.1 Input Voltage: 120 VAC, 127 VAC, 208 VAC, or 240 VAC.
- 4.2 Input Voltage Operating Range: +10% to -15% at full load without battery usage.
- 4.3 Input Voltage Extended Range: The unit incorporates the use of Fuzzy Ranging™ in conjunction with load percentage to extend the input range up to +10% to -40% without battery usage.
- 4.4 Frequency Range: 57.5 Hz to 62.5 Hz.
- 4.5 Power Factor: Self correcting to >0.95.
- 4.6 Input Harmonics: <10% THD.
- 4.7 Transient / Spike Attenuation: 3000:1

5.0 Output Specifications

- 5.1 Output Voltage: 120/240 VAC or 120, 208 VAC.
- 5.2 Output Waveform: Sinusoidal, regenerated, with maximum 3% harmonic distortion, any single harmonic.
- 5.3 Crest Factor: 3.0 : 1.
- 5.4 K Factor: 30 or better.
- 5.5 Harmonic Attenuation: Reflected load generated harmonics are attenuated 23dB at the input.
- 5.6 Line Regulation: Typically better than +/-3%.
- 5.7 Load Regulation: Typically better than +/-3%.

6.0 Battery Specifications

- 6.1 Battery time: Based on full Kwatt load and/or full KVA load.
- 6.2 Battery Type: Sealed, maintenance free.
- 6.3 Battery Charger: 3 Amp., two stage, filtered 0.1% or 5 Amp., two stage, filtered 0.1%.
- 6.4 Recharge Time: Typically 10 times discharge time to full charge.
- 6.5 Bus Voltage: 48 VDC or 96 VDC, Float 2.27 VPC, final 1.75 VPC.
- 6.6 Projected Life: 5 years service, 10 year design life.

7.0 Performance Specifications

- 7.1 Normal Operation: The load is supplied with regenerated, filtered and regulated utility power derived from the output constant voltage regulating transformer. When public utility AC power is present, the battery charger maintains a ripple free float charge on the batteries.
- 7.2 Uninterrupted Emergency Operation: Upon failure or unacceptable deviation of the public utility AC power, energy will be supplied by the battery, converted to AC through the PWM inverter, regenerated, filtered and regulated through the system's constant voltage regulating output transformer, and will continue to supply power to the load without interruption, loss or disturbance. When utility power is restored, the system reverts to normal operation without interruption, loss or disturbance.
- 7.3 Automatic Restart: In the case of a public utility power outage that exceeds the battery time requirement, the output of the system will de-energize to protect the battery system, but will automatically restart once commercial AC power returns. When the public utility power returns, recharging of the batteries commences immediately.
- 7.4 Overload Capability: 125% for ten minutes.
- 7.5 Surge Capability: 150% of rated output without need of static bypass.
- 7.6 Frequency Stability:  $\pm 0.2$  Hz.
- 7.7 Isolation: NEC article 250.20b, complies with this standard that specifies a separately derived power source.
- 7.8 Inner Winding Capacitance: 0.01 pF (primary to secondary coupling).

- 7.9 Common Mode Noise Attenuation: 120 dB (10<sup>6</sup> : 1 ground noise attenuation).
- 7.10 Transverse Mode Noise Attenuation: 70 dB (3160 : 1 line noise attenuation).
- 7.11 Reactive Power Correction: Load at .6 pF corrected to > 0.95 at input (automatically correcting).
- 7.12 Expandability: Available with MD3100 Models (expandable to MD3500), MD4500 Models (expandable to MD5000) and MD6000 Models (expandable to MD7500).
- 7.13 Efficiency, BTU/HR Emitted, Weight (without battery), Cabinet Dimensions (with minimum battery runtimes):

Model	Efficiency	BTU/HR	Weight	Dimensions W x D x H
MD3100	89%	814	215 lb.	15" x 29.75" x 22.5"
MD3500	89%	919	215 lb.	15" x 29.75" x 22.5"
MD4500	89%	1200	251 lb.	15" x 29.75" x 22.5"
MD5000	89%	1313	266 lb.	15" x 29.75" x 22.5"
MD6000	90%	1432	330 lb.	15" x 29.75" x 30.5"
MD7000	90%	1705	350 lb.	15" x 29.75" x 30.5"
MD7500	92%	1711	375 lb.	15" x 29.75" x 30.5"

8.0 Display Monitor and Diagnostics

- 8.1 Display Panel – Front mounted, sealed, alphanumeric LED display. Displays input voltage, output voltage, % load, % battery as selected using display select push button. System display panel includes automatic visual status indicators for system on, system on battery, low battery and general alarm. Includes audible alarm for system on battery, low battery and general alarm condition(s).
- 8.2 General Alarm Conditions (Contact Closure) – Communications port for access to general alarm conditions and electrical measurements. General alarm conditions include: loss of AC input power, low battery warning, frequency fault, check battery, shorted SCR, low battery shutdown, low output voltage, high output voltage, system overload and system over temperature warning.
- 8.3 Electrical Measurements (RS232) – Communications port for access to general alarm conditions and electrical measurements. Electrical measurements include: AC input voltage, AC output voltage, output amps, % load, output watts, output VA, power factor, input line frequency, number of power outages recorded from last clear function and number of overloads recorded from last clear function.
- 8.4 Battery Replacement Testing – The system includes provisions for determining battery life and scheduled battery replacement.

9.0 Communications Interface

- 9.1 Status / Alarm relay interface normally open contacts provided for optional remote annunciator panel or automatic message dialer. Includes contacts for UPS on, utility AC power failure (system using battery power), low battery warning, system in bypass mode and general alarm.
- 9.2 Status / Alarm relay contact ratings: 30 VAC and/or 30 VDC, 350mA for use with optional remote annunciator panel, or automatic message dialer or for use with customer’s remote indicator.
- 9.3 +/- 12 VDC, 1 mA power supply and potential free contact closure REPO input for use with optional factory supplied or customer supplied REPO push button.
- 9.4 RS232 communication port included for customer’s remote computer terminal display of all monitored criteria.

10.0 Environmental

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

10.2 UPS Storage Temperature (without batteries): -20° to 50°C (-4°F to 122°F).

Battery Storage Temperature: Fully charged batteries at 0°C to 25°C (32°F to 77°F) for 6 months before charging is required. For each 9°C rise, battery reduce storage time by half.

10.3 Relative Humidity: 95% non-condensed.

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

11.0 Reliability

11.1 Total System MTBF: 100,000 hours.

11.2 Transformer MTBF: 200,000 hours.

11.3 MTTR: Less than one hour.

12.0 Standard Equipment

12.1 Thermal magnetic main input circuit breaker.

12.2 Standard internal battery platform.

12.3 Thermal magnetic DC circuit breaker.

12.4 8 ft. input line cord with plug (except 6 KVA – 7.5 KVA 120VAC input models, which require a hardwired input connection).

12.5 (4) NEMA 5-15R1 output receptacles on models 3.1kVA – 5.0kVA.

12.6 Hardwired output connection or optional output receptacles on models 6.0 KVA – 7.5 KVA.

12.7 Copper conductor construction throughout entire system.

12.8 Local display monitor / diagnostics panel.

12.9 Communications port (RS232).

12.10 NEMA 1 enclosure provided on swiveling lockable casters.

13.0 Optional Equipment

13.1 Internal and/or external extended battery time options.

13.2 Accelerated battery chargers.

13.3 Flush mounted output circuit breaker(s) / receptacle(s) / flexible cable(s).

13.4 Internal Make-Before-Break (MBB) bypass switch.

13.5 Make-Before-Break (MBB) or Break-Before-Make (BBM) wrap-around bypass switch assembly that is attached to the UPS cabinet, and may be used on UPS models with an input plug and output receptacle options or a hardwired input / output.

- 13.6 Hardwired input / output option.
- 13.7 Floor mounting channels in lieu of swiveling lockable casters.
- 13.8 External, wall mounted, Make-Before-Break (MBB) or Break-Before-Make (BBM) maintenance bypass switch options for use with hardwired output terminals and external power distribution.
- 13.9 Automatic message dialer used in conjunction with system alarm conditions for either system on emergency battery power, low battery warning or general alarm.
- 13.10 Remote annunciator panel used in conjunction with system alarm conditions for system on emergency battery power, low battery warning and general alarm.
- 13.11 NetMinder Communications Module – External module with integrated webserver for remote monitoring of alarms and electrical parameters via Ethernet TCP/IP, MODBUS TCP, or MODBUS RS485.
- 13.12 NetMinder RCCMD client-side application software that performs an orderly, unattended shutdown of customer file servers.

14.0 Warranty

- 14.1 All systems are guaranteed to be free from defects in material and workmanship for a period 1 year following shipment from the factory.
- 14.2 Batteries are warranted with a 1 year full replacement warranty and an optional 4 year pro-rate with applicable maintenance contract.
- 14.3 Optional, extended warranty and maintenance contracts available.