

## LTR Series Uninterruptible Power Systems 700 VA - 2.1 KVA

### General Specification

1.0 General

This specification describes the features and design of the LTR 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 a 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>
LTR700	700 VA / 500 Watts	LTR1400	1400 VA / 1000 Watts
LTR850	850 VA / 600 Watts	LTR1600	1600 VA / 1200 Watts
LTR1000	1000 VA / 700 Watts	LTR1800	1800 VA / 1300 Watts
LTR1200	1200 VA / 850 Watts	LTR2100	2100 VA / 1500 Watts

3.0 Standards

The system is 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 70).
- 3.4 National Electrical Manufacturers Association (NEMA PE-1, 2003) and (IEC 62040-3).
- 3.5 Underwriters Laboratories (UL 1778, UL 544).
- 3.6 Federal Communications Commission (FCC Part 15, Sec. J, Class A).
- 3.7 Listed UL Standard UL 1778, UL 544 and cUL C22.2, No. 107.1-M01.

4.0 Input Specifications

- 4.1 Input Voltage: 208, 240 or 120 VAC at 60Hz.
- 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: < 5% THD.
- 4.7 Transient / Spike Attenuation: 3000:1.

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## 5.0 Output Specifications

- 5.1 Output Voltage: 240/120, 208/120 or 120 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 KW load.
- 6.2 Battery Type: Sealed, maintenance free.
- 6.3 Battery Charger: 2 Amp, 3 stage, filtered 0.1%, temperature compensated (internal batteries only).
- 6.4 Recharge Time: Typically 10 times discharge time to full charge.
- 6.5 Bus Voltage: 24 VDC, float 2.27 VPC, final 1.75 VPC.
- 6.6 Projected Life: 5 years service.

## 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 Hot Start (DC): The UPS is capable of being started from battery power when no AC power is present. This feature can be enabled or disabled through the RS232 interface.
- 7.5 Overload Capability: 125% for ten minutes.
- 7.6 Surge Capability: 150% of rated output without need of static bypass.
- 7.7 Frequency Stability:  $\pm 0.2$  Hz.
- 7.8 Isolation: NEC article 250.20b, complies with this standard that specifies a separately derived power source.

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- 7.9 Inner Winding Capacitance: 0.01 pF (primary to secondary coupling).
- 7.10 Common Mode Noise Attenuation: 120 dB ( $10^6$  : 1 ground noise attenuation).
- 7.11 Transverse Mode Noise Attenuation: 70 dB (3160 : 1 line noise attenuation).
- 7.12 Leakage Current to Ground: < 300 $\mu$ A
- 7.13 Reactive Power Correction: Load at .6 PF corrected to > 0.95 at input (automatically correcting).
- 7.14 Expandability: Available with LTR700 Models (expandable to LTR850), LTR1200 Models (expandable to LTR1600) and LTR1800 Models (expandable to LTR2100).
- 7.15 Efficiency, BTU/HR Emitted, Weight, Cabinet Sizes:

<u>Model</u>	<u>Efficiency</u>	<u>BTU/HR</u>	<u>Weight</u>	<u>Dimensions W x D x H</u>
LTR700	85%	256	70 lb.	19" x 20" x 8.75"
LTR850	85%	307	70 lb.	19" x 20" x 8.75"
LTR1000	85%	358	75 lb.	19" x 20" x 8.75"
LTR1200	85%	435	104 lb.	19" x 20" x 8.75"
LTR1400	85%	512	104 lb.	19" x 20" x 8.75"
LTR1600	85%	561	104 lb.	19" x 20" x 8.75"
LTR1800	87%	598	123 lb.	19" x 20" x 8.75"
LTR2100	87%	670	123 lb.	19" x 20" x 8.75"

*Note: Weight includes minimum internal batteries.*

## 8.0 Display Monitor and Diagnostics

- 8.1 Display Panel – Front mounted, sealed, alphanumeric LED panel. Displays input voltage, output voltage, % load, and % 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, and 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 open collector transistor interface is provided for use with optional remote annunciator panel, or automatic message dialer. Inverter on, utility AC power failure (system using battery power), low battery warning, and general alarm signals are included.
- 9.2 Status / Alarm open collector transistor ratings: 40 VDC maximum, 300mA for use with optional remote annunciator panel or automatic message dialer or for use with customer's remote indicator.

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- 9.3 +/- 10 VDC, 1 mA power supply and potential free contact closure REPO input included for use with customer's remote emergency power off 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 Storage Temperature: -20°C to 50°C.
- 10.3 Relative Humidity: 95% non-condensed.
- 10.4 Elevation: 5,000 feet, 1500 meters 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 Input plug with 6' detachable input line cord.
- 12.2 Keyed power on/off switch.
- 12.3 Main printed circuit control board (single PC board design).
- 12.4 Constant voltage regulating output transformer.
- 12.5 Standard internal battery.
- 12.6 NEMA 5-20R2 duplex output receptacles, quantity of three (3); or for Canadian installations, NEMA 5-15R2, quantity of three (3).
- 12.7 Copper conductor construction throughout entire system.
- 12.8 Local display monitor / diagnostics panel.
- 12.9 Communications port (RS232).
- 12.10 Functional rack mountable style enclosure.

13.0 Optional Equipment

- 13.1 Internal and/or external battery options for extended back up time.
- 13.2 External battery options available in rack-mountable enclosures or in free-standing cabinets supplied on lockable casters.
- 13.3 Locking type input plug for 240, 208 or 120 VAC with 6' detachable input line cord.
- 13.4 Optional output NEMA receptacles for 240, 208 or 120 VAC. Consult factory for available configurations.

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- 13.5 Hardwired input and output connections.
- 13.6 External wall-mounted make before break bypass switch for 120 VAC input / output hardwired models.
- 13.7 Automatic message dialer used in conjunction with system alarm conditions for system on emergency battery power, low battery warning, and general alarm.
- 13.8 Remote annunciator panel used in conjunction with system alarm conditions for system on emergency battery power, low battery warning, and general alarm.
- 13.9 Software package for automatic, unattended, graceful shutdown of computer systems in the event of an extended outage and limited battery time remaining, plus remote monitoring and notification of electrical parameters and alarm conditions.
- 13.10 Network device SNMP / Ethernet TCP/IP adapter.
- 13.11 Network device SNMP / MODBUS TCP / Ethernet TCP/IP adapter.
- 13.12 Network device SNMP / MODBUS TCP & RS485 / Ethernet TCP/IP adapter.

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 additional 3 year pro-rated warranty with the applicable optional maintenance contract.
- 14.3 Optional, extended warranty and maintenance contracts available.