

■ AC Power  
For *Business-Critical Continuity™*

## Liebert® Series 610 UPS

The Ultimate Reliability Solution For Large-Scale, Mission Critical Applications



## Continuous Improvement: Building Upon The Best

**The Liebert Series 610 UPS system is built on the reliability record of the Liebert Series 600 UPS that is unequalled in the power protection industry. Now, this latest generation product line brings dependability to yet another level.**

The Liebert Series 610 retains the proven, robust high power topology of the original Liebert Series 600 product line while adding significant output performance and reliability improvements over previous models. Unlike typical large UPS inverters then, and even now, this design provides industry-leading performance without the need to parallel inverter IGBTs or inverter power subassemblies — which means fewer critical parts.

The Liebert Series 610 has proven itself to be the most durable UPS in the industry with year after year of continuous improvement since its introduction. Based on actual field performance of systems shipped since the original product introduction, Liebert Series 610 equipment has demonstrated a critical bus MTBF (mean time between failure) of greater than 2.8 million hours. This is significantly better than any other competitive UPS product.

### **The Standard For Performance And Efficiency**

The Liebert Series 610 includes several new features that are all designed to enhance performance, efficiency, application flexibility — and above all — reliability.

These latest updates provide further improvements to the unit's overload and critical output bus fault management, further ensuring that the connected load is powered by the UPS rather than being transferred to bypass...or suffering a loss of power to the critical bus. Other improvements include the addition of an easy-to-read system display panel to provide detailed operating information and control capabilities.

Liebert's Series 610 UPS is an industry leader in every key respect, including demonstrated reliability in field operation, compact footprint, efficiency, operator controls and the widest range of choices for dual-load-bus system configurations.



# No-Compromise Reliability In High Power Applications

**There are certain operations and processes in this world that are so critical to the existence of a business, institution, government agency or other organization...that even the mere thought of them shutting down due to a power failure is unthinkable. It is at this point that a solution is required that leaves no room for failure, no room for compromise of any kind – a solution that actually goes beyond “High 9’s” reliability. This is when to turn to a Liebert Series 610 UPS system.**

## Documented Performance

The Liebert Series 610 delivers 100% protection with its true on-line, double-conversion topology that provides complete input to output isolation with totally regenerated power. This is a level of protection unmatched by single-conversion UPS products including line-interactive and others that call themselves “on-line.”

A true double conversion UPS is the only way to guard against the full spectrum of power disturbances. Anything less is a compromise that can lead to serious problems.

Emerson Network Power’s primary goal in UPS design is delivering high output reliability. A key strategy for achieving this goal is the continuous improvement of the Liebert Series 610 UPS, building on what’s known to work well. The best products simply don’t come from starting over with a new design every few years.

The Liebert Series 610 features the safest and most reliable design for high power applications with years of proven performance in the field.

A key to reliability is to get the job done with a reduced number of operating parts. Fewer components mean fewer individual items that can malfunction, thereby reducing the risk of a critical output bus failure due to a component failure.

Other factors that contribute to the remarkable reliability of this product line are the use of conservatively rated components, minimizing transfers to bypass by managing fault conditions, making operator controls understandable, and providing easy access for maintenance and repair. The Liebert Series 610 UPS systems leads the industry in all these areas.



**The Liebert Series 610 UPS includes a redesigned operator interface control panel located on the front of the unit. It features a backlit blue display that is easy to read. The display panel enables the user to quickly identify the current status of the UPS system and to perform most manual control operations. Designed for intuitive operation, the display screen is driven by an easy-to-use, user-prompted menu program.**

# Overload And Fault Management: It's All About Maintaining The Critical Bus

## Designed For Maximum Reliability

Reliability starts with the ability to keep your critical load on-line and protected. The enhanced fault current management capabilities of the Liebert Series 610 are designed to do just that. The Liebert Series 610 is designed for immediate response to utility outages “plus” high overload capacity “plus” adaptive response to other critical bus fault conditions. The system will manage faults occurring upstream and downstream from the UPS as well as internal to the UPS.

The fault handling capabilities of the Liebert Series 610 — especially when used in multi-module installations — are designed to keep the critical load on the UPS, no matter what the condition of the incoming power.

A fault is managed in this order of priority:

### Single Module System

#### • First priority

Manage an internal fault within the UPS module without the critical bus exceeding voltage limits and without transfer to bypass.

#### • Second priority

If the fault or overcurrent cannot be handled internally by the module, then transfer the critical bus to the bypass source without exceeding voltage limits.

### Multi-Module System

#### • First priority

Manage an internal fault within the UPS module without the critical bus exceeding voltage limits and without transfer to bypass.

#### • Second priority

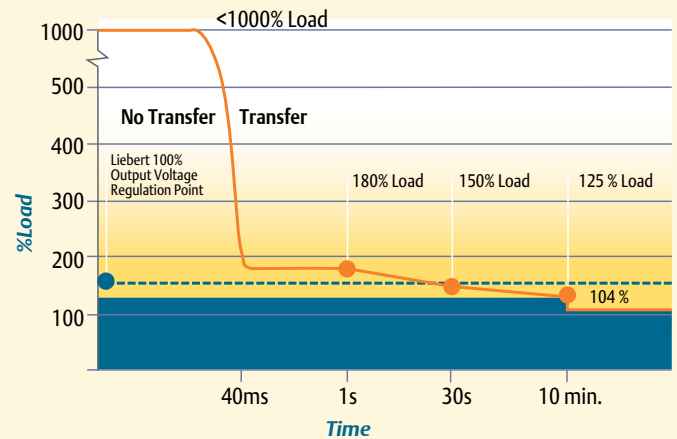
If the fault cannot be handled internally to the module and redundant modules are present, disconnect that module from the critical bus without exceeding voltage limits and without transfer to bypass.

#### • Third priority

If fault or overcurrent cannot be handled by the remaining modules on-line, then transfer the critical bus to the bypass source without exceeding voltage limits.

The curve represents UPS overload capability as a function of time. The inverter remains on-line providing regulated power output at full voltage at every point of the overload/ time curve.

Current versus Time Curve of Overload Capacity



## Critical BUS Management

The system offers three levels of protection to keep the critical bus operating while maintaining operation within industry recommended limits. Voltage levels outside these limits can cause erratic or incorrect operation of critical customer equipment. The system is designed to better discriminate between undervoltage conditions — due to an external or internal overload fault event — that can be managed without a transfer to bypass.

## Pulse-Parallel Operation

The overload handling characteristics of the Liebert Series 610 are also enhanced through the use of pulse-parallel operation. When an overload condition, such as transformer inrush current or a branch load circuit fault, exceeds 155% of the full load current rating, the static bypass switch pulses on. This allows up to 1000% rated full load current from the bypass line to clear the overload without a full transfer to bypass, while keeping your critical load operations still connected to the UPS inverter.

The bypass source is in parallel with the UPS output, permitting the bypass source to carry the initial overload current. If the overload clears, a complete load transfer to bypass is not made. If the overload condition exceeds the inverter capacity, the automatic transfer is completed, maintaining the load voltage within specified limits. The use of pulsed static switch operation provides a simple, reliable response to brief output bus dynamic overload conditions and reduces nuisance transfer/retransfer cycles for short-term conditions. Liebert UPS systems also use a motor-operated circuit breaker in parallel with the bypass static switch in order to provide an additional level of critical output bus availability.

## Digital Control Accuracy

The reliability and performance of the Liebert Series 610 UPS is enhanced through the use of digital control and Application-Specific Integrated Circuits (ASICs) for key control logic functions. These computer-tested controls also provide self diagnostics and greatly reduce the parts count and number of interconnect points.



## Performance And Features Make This The Ultimate UPS System

What's the "real world" performance standard you expect from your power protection? Protecting the operation of the critical bus no matter what.



The Liebert Series 610 will meet your highest output performance expectations. This includes the ability to handle both balanced and unbalanced loads, high crest factors, dynamic loads and overloads, as well as both external and internal faults.

### Proven Advantages That Have Made The Liebert Series 610 The Standard Of Reliability

#### Reliability:

##### ■ High Performance PWM Inverter

The most robust inverter in the industry, it meets all industry performance standards with the lowest parts count. Handles most overloads while meeting voltage waveform requirements and minimizing the use of a static bypass source.

##### ■ Manages Overloads and Faults

Without the need for a static switch on the UPS inverter output. It can also handle dynamic loading and non-linear loads.

##### ■ Lower Parts Count

Continuous improvement dramatically improves reliability by reducing the potential points of failure within the system.

#### Flexibility:

##### ■ Connected Load Compatibility

The Liebert Series 610 supports all normally-expected load configurations and performance characteristics without the need for special provisions.

##### ■ Smaller Footprint

All of the Liebert Series 610 models have an exceptionally small footprint, even those with input isolation transformers.

##### ■ Higher DC Bus Utilization

Provides higher AC/AC and DC/AC efficiency and allows a relatively smaller battery.

##### ■ Lower Heat Output

The low BTU output of the Liebert Series 610 reduces the need for complex air cooling arrangements.

#### Low Total Cost Of Ownership:

##### ■ Higher Operating Efficiency

The Series Liebert 610 has excellent operating efficiency in all configurations and with all types of loads. Even with an input isolation transformer and a 12-pulse rectifier, the 610 is better than 92.5% efficient from 50% through 100% load. Versions with the standard 6-pulse rectifier are approximately 94% efficient throughout this range.

##### ■ Lower Operating Costs —

Thanks to >93% operating efficiency and an input power factor of greater than 0.9 for all units with input filters.

# Liebert Series 610 Configurations:

More Ways To Achieve The Level Of Protection And Reliability You Need

## Technology Designed For Reliability

Thanks to digital controls and a unique inverter topology, the Liebert Series 610 can be used in all of the conventional single-bus system configurations: single module, parallel-redundant or isolated redundant.

In addition, the Liebert Series 610 is uniquely well suited for high-availability, multi-module system configurations and for configurations using Load Bus Sync™ (LBS) and Liebert Power-Tie™ technologies.

Unlike some competitive products, which are optimized for one or two particular configurations, the 610 can be used reliably in a wide variety of custom applications and with custom switchgear to meet the requirements of your facility.

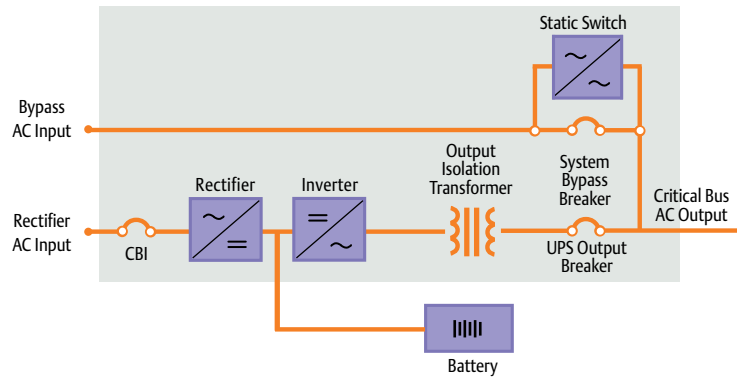


## Single-Module Configuration

Single-module systems provide a basic protection configuration.

The critical bus is powered by a single UPS system with bypass capability.

Single Module System



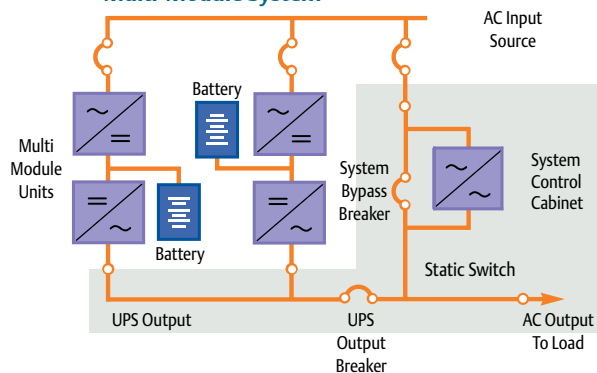
## Multi-Module Configuration

The need for maximum reliability has driven customers to add redundant UPS modules to their critical power systems. First, a redundant UPS module improves maintainability since one UPS module at a time can be taken off-line for service without shutting down the whole system. Second, a redundant UPS module adds fault management capability by preventing a single module or single battery failure from taking down the critical output bus.

### Parallel Redundant

The most common multi-module configuration is parallel redundancy, in which the system has one UPS module more than is required to carry the rated critical load.

Multi-Module System





Liebert Static Transfer Switch 2 connects to dual bus power distribution system, making nearly instant transfer of its connected load from one power source to the other.

## Dual-Bus Configurations

### Distributed Redundant

While both parallel and isolated redundant systems improve the ability of the critical bus to survive disturbances created outside the facility — their redundancy ends where the critical bus begins. All the critical load equipment is somewhere downstream, with two or more circuit breakers in series between UPS output and load input. For maximum reliability, an even better solution is a dual-bus, distributed redundant system, which takes redundancy all the way out to the critical load equipment.

The simplest way to build a dual-bus system is with our exclusive Load Bus Sync™ (LBS) option, which keeps two or more UPS systems in a synchronized state even when operating on batteries or out-of-synch generator sets. Each UPS powers its own downstream distribution equipment, so that each piece of load equipment can be connected to both. With proper transfer devices, such as a static transfer switch, any connected load can be switched transparently between UPS sources so that one complete UPS and distribution system can be de-energized for maintenance or expansion. The LBS can be used to synchronize any two Liebert Series 610 UPS systems or the 610 to a genset or to another vendor's UPS.

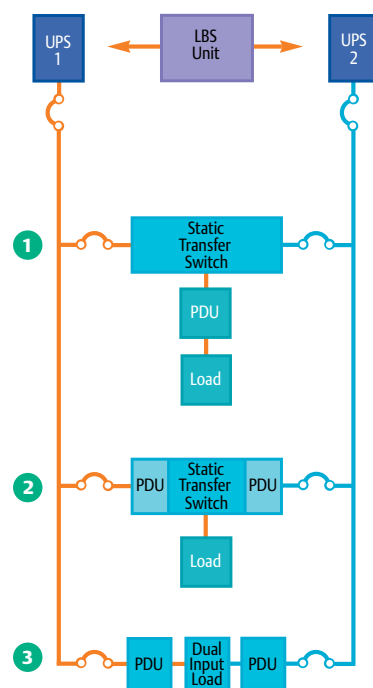
### Power-Tie®

Another approach to a dual-bus system is Liebert's Power-Tie configuration, which uses a tie breaker to transfer loads between UPS systems in order to facilitate maintenance. The Power-Tie can be used between any two identical Liebert Series 610 systems, either Single Module or Multi-Module.

### Static Transfer Switch2

In addition to the LBS and Power-Tie options, the Liebert Static Transfer Switch 2 (STS2) makes the redundancy truly usable. The STS2 can be used with a power distribution unit (PDU) or dedicated to a specific piece of load equipment to provide dual power cord functionality. The STS2 connects to a dual bus power distribution network and makes a nearly instant (less than quarter-cycle) transfer of its connected load from one power source to the other.

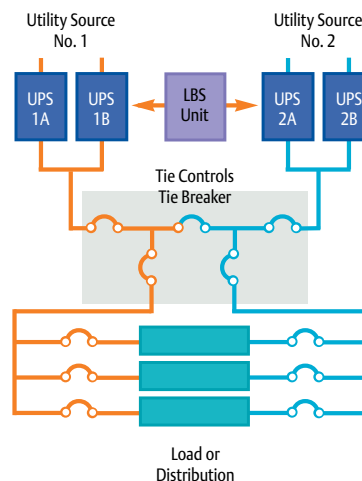
### Distributed Redundant Configurations



### Distribution Options For Dual-Bus Systems

- 1 After choosing a dual-bus system, your next task is configuring your power distribution system to best meet your needs. The first arrangement provides a high level of fault tolerance. A Liebert STS2 ahead of the PDU provides uninterrupted transfers between UPS systems. The fast-switching capability of the static switch provides protection against “fast” power system failures, such as source failures, breaker trips and even operator error. The limitation here is that you still can't service the PDU when the load is on-line.
- 2 The second arrangement has a single-input load receiving power from a static switch on the output of two PDUs. The static switch can take power from either PDU. This enables you to service one UPS and one PDU at a time, while remaining on UPS power from the other PDU.
- 3 Another option is to connect a dual power cord device to two different PDUs. Everything is now serviceable while the load is on-line. This option is only available, however, if your load equipment has dual power cords and if the equipment has 100% functionality with either input.

### Power-Tie™ Configuration



# Battery And DC Energy Storage Solutions For Your Liebert Series 610 UPS



Emerson Network Power offers an unequalled selection of batteries, battery monitoring, flywheel energy storage and ancillary equipment for use with the Liebert Series 610 UPS system.

## Battery Cabinets And Associated Components

### Liebert Series 610 Battery Pack Systems

Each Liebert Series 610 Battery Pack contains one series string of 240 cells of valve-regulated lead acid (VRLA) batteries in a matching cabinet. For additional back-up time, multiple battery packs can be combined into systems by paralleling cabinets. Each battery pack includes a battery disconnect circuit breaker with under-voltage release and auxiliary contacts. All Liebert Battery Packs include flame-retardant batteries and are suitable for installation in the computer room per requirements of UL1778.

### Flooded Cell Battery Systems

Emerson Network Power can provide a wide variety of flooded cell type batteries, racks and other associated equipment from the leading manufacturers.

### Module Battery Disconnect (MBD)

The MBD is an external battery circuit breaker which is required to isolate the UPS module from battery systems other than Liebert manufactured battery packs. Each MBD is housed in a NEMA-1 enclosure. 600A-1200A MBD enclosures are designed for wall mounting. 1400A-1600A enclosures are designed for floor mounting.

### Battery Isolation Switch (BIS)

The BIS is an external battery isolation switch used to isolate individual battery strings of battery systems other than Liebert manufactured battery packs for maintenance. Each BIS is housed in a NEMA-1 enclosure. 600-1200A BIS enclosures are designed for wall mounting. 1400-1600A enclosures are designed for floor mounting.

### DC Junction Box

Systems with two or more flywheel cabinets or battery strings in parallel may require an external DC Junction Box. The junction box is a wall-mounted cabinet with bus bars for attaching positive, negative and ground cables. Each bus bar has pairs of holes for mounting two-hole compression lugs.





# Alber Battery Monitoring Systems

**Emerson Network Power offers the latest in UPS battery monitoring technology with products by Albér — a leader in the field since 1972. Albér technologies by Liebert are designed to indicate potential battery failure, optimize useful battery life, reduce maintenance cost and increase safety.**

Like an ultrasound for a battery, this technology lets you “look inside” and assess its true state of health. Alber battery monitors use a patented Internal DC resistance test method that bypasses the limitations of outdated AC based impedance testing. By tracking internal resistance, the system can predict and report failing conditions prior to complete failure. A life-remaining estimate algorithm, which uses discharge parameters and internal resistance readings, assists in predicting remaining battery life.

Alber Battery Monitoring Systems continuously diagnose all critical battery parameters such as cell voltage, overall string voltage, current and temperature. An alarm sounds for any out-of-tolerance condition. Trend analysis provides the ability to analyze performance and aid in trouble shooting.



## Alber BDS-256XL Battery Monitoring System Is Designed For Large UPS Systems

The Alber BDS-256XL battery monitoring system continuously monitors and diagnoses all critical battery parameters for large UPS systems. It can monitor up to 256 cells/modules per string. Tracking and reporting allow a proactive response in replacing a bad battery before it affects others in the string. The modular design easily expands to monitor an unlimited number of strings.



## The Alber BDS-40 Battery Monitoring System For UPS Battery Cabinets

The Alber BDS-40 mounts to the top of a UPS battery cabinet and monitors 12 volt VRLA batteries. The easy to use system tracks internal resistance, predicting and reporting failing conditions prior to complete failure to allow proactive replacement. Each BDS-40 unit will monitor all the batteries in one cabinet, up to 40 12V modules. Two different units make up the BDS-40 system. The BDS-40 Base Unit is the central point where UPS-supplied power and communication connections are made. Each additional battery cabinet in the system may then use a BDS-40 Plus Unit, which transfers the data to the Base Unit for alarm and data storage. Each Base Unit can manage up to five Plus Units for a total of six battery cabinets.

## A Wide Range Of Control Accessories And Switchgear Options To Meet Your Site Needs

**Emerson Network Power can provide a variety of control, maintenance bypass and transformer options to enhance the operation of your Liebert Series 610 UPS.**

### Liebert Series 610 System Control Cabinet

The System Control Cabinet is used for paralleling two or more Liebert Series 610 UPS Multi-Module Units for redundancy, capacity or future growth. Each SCC includes:

- Microprocessor-based monitoring with backlit LCD display, controls.
- Momentary-duty static switch.
- Continuous duty static switch options with custom switchgear.
- Automatic system isolation and bypass breakers.
- Automatic equalize charge timer.
- Interface for a remote power off.
- Liebert SiteScan® Web interface.
- Alarm status contacts.
- RS-232 port.
- Visual/audible alarms.

### System Control Cabinet Factory Installed Options

**Customer Alarm Interface**— Provides for the input and display of up to 8 alarms, each with a customer-selected message of up to 16 characters.

**Dial-up Modem**— Provides a 2400-baud internal modem with remote dialup and autodial capabilities.

**Maintenance Bypass Interlock Interface**— Provides the interface necessary for maintenance bypass switchgear equipped with the Liebert key interlock system.

**Load Bus Sync™ Interface** — Communicates with Load Bus Sync Control Panel.

### Matching Maintenance Bypass and Transformer Cabinets

#### Maintenance Bypass Cabinet

The Liebert Maintenance Bypass Cabinet is a matching enclosure which bolts to the right-hand side of the UPS module. The cabinet is equipped with two, three or four molded case circuit breakers for make-before-break maintenance bypass.

#### Transformer Cabinets

**Input Isolation Transformer Cabinet**— The input isolation transformer provides electrical isolation between utility input and the rectifier. It is provided in a matching cabinet designed to attach to the UPS module.

#### Bypass Transformer Cabinet

The bypass transformer provides electrical isolation and step down voltage from the utility to the bypass input of the UPS. It is provided in a matching cabinet designed to be attached to the UPS module.

### Maintenance Bypass Switchboards And Panelboards

Standard Liebert Maintenance Bypass Switchboards are designed to meet NEMA 1 construction for freestanding floor mounting, while standard Liebert Maintenance Bypass Panelboards are designed to meet NEMA 1 construction for wall mounting.

Features include padlocking provisions on each switching device (except devices with key interlocks), identification labels on each device and a transfer/retransfer sequence label. Each unit can be configured with molded case switches, standard interrupting molded case circuit breakers or high interrupting molded case circuit breakers.

Factory installed options include a Key Interlock System that ensures that the UPS module is in the bypass mode of operation before the wrap-around breaker is closed. This assists in the proper sequential operation of the maintenance bypass breakers.



## Custom Solutions: Switchgear From Leading Manufacturers



**Custom switchgear capabilities provide you with the right power control and distribution systems to complement your Liebert Series 610 UPS system.**

Emerson Network Power can supply a full range of high quality switchgear and related system components from all leading manufacturers including ASCO and Siemens.

Liebert product engineers will custom design the switchgear set-up for your specific requirements. We test the entire switchgear system at full system load with the UPS before we ship it.

These components include transfer switches, bypass switches, utility paralleling switchgear and others, as well as distribution sections with circuit breakers and switchboards.

A Liebert Series 610 System Control, including the system

control logic, static bypass switch up to 4000 Amps and motor operated system circuit breakers, can also be integrated into your custom switchgear solution.

Your Liebert Representative can discuss the full range of custom designed switchgear options available for use with your Liebert Series 610 UPS system.



## There Is A Liebert Monitoring Solution Designed To Meet Your Needs

Emerson Network Power has built advanced monitoring and communications capabilities into the Liebert Series 610 UPS system. Liebert monitoring and control products allow you to take full advantage of these features. You will find a full range of monitoring and control systems, communications modules and other equipment designed to interface with a variety of communication protocols, operating platforms and building management systems. Knowing what is happening with your power equipment, so you can keep it at its peak operating performance; this is vital to system availability.

**Important facility operational and status information needs to be communicated by different means with varying levels of importance. This is why Liebert gives you so many ways to supervise your enterprise:**



### Liebert SiteScan™ Web Enterprise Monitoring Systems

The Liebert SiteScan™ Web is a comprehensive critical systems monitoring solution dedicated to ensuring reliability through graphics, event management and data extrapolation. The standard Web interface allows users easy access from “anywhere” at “anytime.”

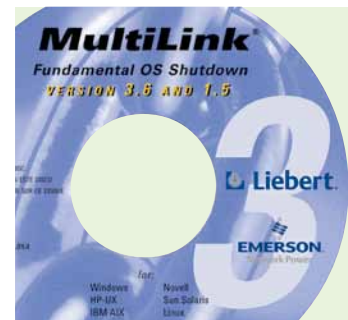
- Single and multi-site applications.
- Event management and unit control.
- Trend and historical data captures and reporting.
- Full ASHRAE BACnet compatibility.
- Java based.
- Windows 2000 and XP compatible.

### Network-Based Monitoring Systems

The Liebert Nform family of monitoring software and communications hardware solutions combines the coverage of facility monitoring with the efficiency of a network-based system. They provide a cost-effective, centralized monitoring solution flexible enough to support your critical system configurations while utilizing your existing distributed infrastructure.

### Stand-Alone Monitoring Solutions

Critical equipment shutdown software, as well as autonomous microprocessor controlled modules, are available to provide supervision, control and remote alarm notification for Liebert power equipment.



### Liebert MultiLink™ Automated Shutdown Software

Liebert MultiLink will monitor UPS status and perform user-specified actions to execute notifications and provide automated, unattended critical equipment shutdown to protect critical data during extended power outages.



### Liebert Universal Monitor

All-purpose microprocessor-based alarm and notification unit that allows a variety of Liebert equipment to be monitored and controlled both remotely and locally from a single point.



## Critical Space Services



**The service business of Emerson Network Power has the necessary resources and expertise to support the critical power and environmental infrastructure that supports your mission-critical computing and communications systems.**

### Total Service Capability

Service Excellence programs from service business of Emerson Network Power provide a simple and easy to understand strategy for meeting all of your critical space service and maintenance needs. Basic, Essential and Preferred levels allow you to select the complement of critical power and environmental system services that best fits your requirements. These programs include guaranteed four-hour response time, emergency service and preventive maintenance.

With over 300 Liebert-employed Customer Engineers and a network of over 900 factory authorized service personnel, our technical capabilities, geographical coverage and ability to respond are second to none. These factory-trained service professionals have direct access to the most comprehensive factory authorized parts network in the industry. We also provide them with immediate online access to detailed schematics and your equipment's complete service record from the time it was started up.

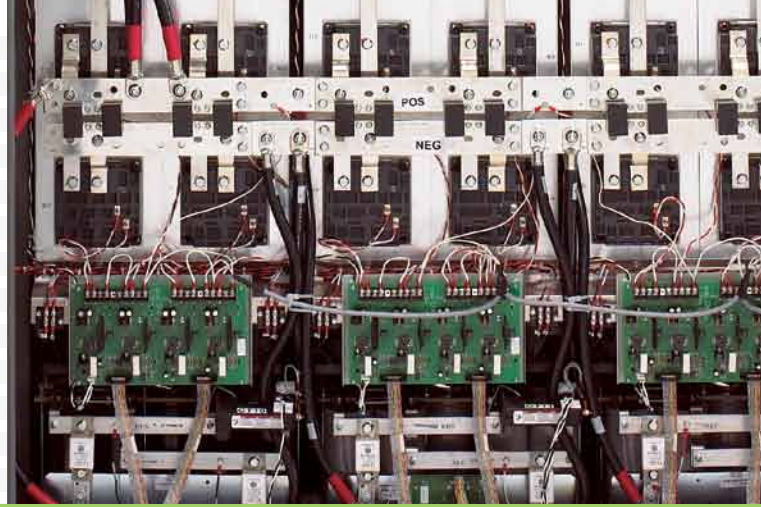
### Remote Monitoring — Always There, Always Alert

The key to providing proper service for your critical power systems is being aware of that equipment's operating status at any given time. Our Remote Monitoring Service is designed to maximize the capabilities of your Liebert equipment by maximizing the effectiveness its monitoring capabilities.

Continuous 24-hour remote monitoring of UPS/power conditioning equipment, environmental products, fire and water detection, and other facility systems is available through service business of Emerson Network Power's Remote Monitoring. No matter where your facilities are located, Remote Monitoring can provide continuous oversight of a wide range of critical installations from our Customer Response Center. Combining the capabilities of your Liebert monitoring systems with our Remote Monitoring Service provides you with a seamless rapid-response system.



# Liebert Series 610 Specifications



UPS RATING		LOAD POWER FACTOR	AC INPUT/ OUTPUT VOLTAGE	%EFFICIENCY AT VARIOUS LOADS <sup>1</sup>			NOMINAL BATTERY REQUIREMENTS (CELLS)	MAXIMUM HEAT DISSIPATION (BTU/hr) FULL LOAD	DIMENSIONS WxDxH <sup>2</sup> (inches)		APPROXIMATE WEIGHT <sup>2</sup>	
kVA	kW			50%	75%	100%			Top Entry Only	Top & Bottom Entry	SMS	MMU
225	180	0.8	208/208	93.0%	92.5%	92.5%	240	49,800	N/A	56x33x78	3,870	3,820
225	180	0.8	480/208	93.0%	93.5%	93.5%	240	42,700	N/A	56x33x78	3,475	3,425
225	180	0.8	480/480	93.0%	94.0%	94.0%	240	39,200	48x33x78	56x33x78	3,190	3,140
225	180	0.8	600/208	92.5%	93.0%	93.0%	240	46,250	N/A	56x33x78	3,660	3,610
225	180	0.8	600/600	93.0%	93.5%	93.5%	240	42,700	48x33x78	56x33x78	3,460	3,410
300	240	0.8	208/208	93.0%	92.5%	92.5%	240	66,400	N/A	72x35x78	5,400	5,350
300	240	0.8	480/208	93.0%	93.5%	93.5%	240	56,950	N/A	72x35x78	4,450	4,400
300	240	0.8	480/480	93.0%	94.0%	94.0%	240	52,300	N/A	72x35x78	4,200	4,150
300	240	0.8	600/208	92.5%	93.0%	93.0%	240	61,650	N/A	72x35x78	5,050	5,000
300	240	0.8	600/600	93.0%	93.5%	93.5%	240	56,950	N/A	72x35x78	4,600	4,550
300	270	0.9	480/480	93.5%	94.0%	94.0%	240	58,820	N/A	72x35x78	4,200	4,150
400	320	0.8	208/208	92.5%	92.0%	92.0%	240	94,950	N/A	96x35x78	8,400	8,350
400	320	0.8	480/208	93.0%	93.5%	93.5%	240	75,950	N/A	72x35x78	5,150	5,100
400	320	0.8	480/480	93.0%	94.0%	94.0%	240	69,700	N/A	72x35x78	4,900	4,850
400	320	0.8	600/208	92.5%	93.0%	93.0%	240	82,200	N/A	72x35x78	5,900	6,050
400	320	0.8	600/600	93.0%	93.5%	93.5%	240	75,950	N/A	72x35x78	5,400	5,350
625 (6P)	500	0.8	480/480	93.5%	94.5%	94.5%	240	99,300	N/A	108x39x78	7,500	7,405
625 (12P)	500	0.8	480/480	93.0%	93.5%	93.5%	240	118,650	N/A	120x39x78	10,580	10,485
625 (6P)	500	0.8	600/600	93.5%	94.0%	94.0%	240	108,950	N/A	108x39x78	7,900	7,805
625 (12P)	500	0.8	600/600	92.5%	93.0%	93.0%	240	128,450	N/A	120x39x78	10,580	10,485
750 (6P)	600	0.8	480/480	93.5%	94.5%	94.5%	240	119,200	N/A	108x39x78	8,100	8,005
750 (12P)	600	0.8	480/480	93.0%	93.5%	93.5%	240	142,350	N/A	120x39x78	11,580	11,485
750 (6P)	600	0.8	600/600	93.5%	94.0%	94.0%	240	130,700	N/A	108x39x78	8,500	8,405
750 (12P)	600	0.8	600/600	92.5%	93.0%	93.0%	240	154,135	N/A	120x39x78	11,580	11,485
750 (12P)	675	0.9	480/480	93.0%	93.5%	93.5%	240	160,150	N/A	120x39x78	11,880	11,785
750 (12P)	675	0.9	600/600	92.5%	93.0%	93.0%	240	173,400	N/A	120x39x78	11,880	11,785
1000(12P) <sup>3</sup>	900	0.9	480/480	92.5%	93.0%	93.0%	240	231,200	N/A	177x44x82	16,700	16,555
1000 (12P)	900	0.9	600/600	92.5%	93.0%	93.0%	240	231,203	N/A	177x44x82	16,700	16,555

1 Efficiency measured at rated load power factor and non-linear load without input filter. Input filter loss is less than 0.5%.

2 Dimensions and weights do not include System Control Cabinet furnished with Multi-Module Systems. Weights are for the standard configurations; top-entry models will be 200 pounds less.

3 1000 kVA unit is SCR-based inverter. See also separate 1000 kVA Liebert Series 610 brochure.

# Liebert Series 610 Specifications

See separate brochure for 1000 kVA

## Input

- Voltage: 480, 208 or 600 VAC, 3-phase, 3-wire plus ground
- Voltage Range: +10, -15% (no battery discharge down to -20%)
- Power Factor: 0.92 lagging with input filter (0.85 without)
- Frequency Range: 60 Hz,  $\pm 5\%$
- Current Distortion: 7% reflected THD at full load with input filter. 4% reflected THD at full load with optional 12-pulse rectifier and input filter (for 500-750 kVA)
- Subcycle Magnetizing Inrush: 2-3 times normal full load current; 5-8 times normal for units with optional input isolation transformer or 12-pulse rectifier
- Configurable walk-in of 20% to 100% over 15 seconds

## Output and Bypass

- Voltage: 480, 208 or 600 VAC, 3-phase, 3-wire or 4-wire plus ground
- Voltage Adjustment:  $\pm 5\%$
- Voltage Regulation:  $\pm 0.5\%$  for balanced load;  $\pm 2\%$  for 50% unbalanced load
- Dynamic Regulation:  $\pm 5\%$  deviation for 100% load step.  $\pm 4\%$  deviation for 50% load step.  $\pm 1\%$  for loss or return of AC input. Manual return of load to UPS:  $\pm 4\%$
- Transient Response Time: Recover to  $\pm 1\%$  of steady state within 16 milliseconds (1 cycle) with connected battery
- Voltage Distortion: For linear loads, less than 4% THD. Maximum of 2% RMS for any single harmonic. Less than 5% THD for 100% nonlinear loads without kVA/kW derating

- Phasing Balance:  $120^\circ \pm 1^\circ$  for balanced load.  $120^\circ \pm 3^\circ$  for 50% unbalanced load
- Frequency Regulation:  $\pm 0.1\%$
- Load Power Factor Range: Unity to rated lagging load factor without derating
- Overload: 125% of full load for ten minutes. 150% for 30 seconds. 104% continuous
- Fault-Clearing Current: Up to 1,000% for 16 milliseconds. Up to 500% for 40 milliseconds

## Environmental

- Operating Temperature:  $0^\circ$  to  $40^\circ\text{C}$  without derating
- Non-Operating Temperature:  $-20^\circ\text{C}$  to  $70^\circ\text{C}$
- Humidity: 0-95% relative humidity without condensation
- Operating Altitude: Up to 4,000 feet (1200 meters) without derating
- Non-Operating Altitude: Up to 15,000 meters
- Audible noise 65-72 dBA typical, depending on kVA rating; measured 5 ft. from the unit

## Physical

- ETL listed to UL 1778 UPS standard and CSA certified. Meets requirements for safe high-performance UPS operation

## Standard Features

- Easy-to-read backlit LCD monitor/control display panel
- Self-diagnostics
- Output isolation transformer
- 2-stage battery charge current limit

- 2-stage input AC current limit
- Internal wrap-around bypass
- Automatic and programmable retransfer
- Automatic line-drop compensation
- Battery overdischarge protection
- Battery-time-remaining display and battery statistics
- Automatic equalize charge timer
- Emergency Power Off (EPO)
- Front access for service and maintenance

## Options and Accessories

- Input filter/power factor correction
- 12-pulse rectifier input (for 500-750 kVA)
- Load Bus Sync™ (for dual load bus systems)
- Power-Tie®Dual-Bus System
- Input isolation transformer
- Bypass isolation transformer
- Maintenance bypass cabinet, matching or panelboard
- Power distribution unit (single or dual input)
- Standard and custom switchgear packages
- Valve-regulated lead-acid battery packs
- Flooded rack-mounted battery systems
- SNMP capabilities
- Remote monitor panel
- Communications interfaces
- Alarm status contacts
- Customer alarm inputs

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SL-30500 (R10/10) Printed in USA

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