



Single or
Multi-Module

Documented
Reliability

IGBT-Based
Inverter

RELIABLE PROTECTION FOR MISSION-CRITICAL SYSTEMS

Series 600T™ UPS 65-750 kVA, 60 Hz



- LIEBERT SERIES 600T: • COMPLETE DUAL-BUS SYSTEMS CAPABILITY
• FIELD-PROVEN RELIABILITY • HIGH EFFICIENCY • SMALLEST FOOTPRINT
• SUPERIOR GRAPHICS DISPLAY AND DIAGNOSTICS.

TRUST YOUR BUSINESS TO THE PROVEN LEADER IN POWER PROTECTION

Series
600T

Modern business facilities — in all industries — need reliable electric power in order to function. So, when planning an expansion or upgrade of your facility, demand the most reliable Uninterruptible Power System (UPS) ever built — the Liebert Series 600T.

The Series 600T is the newest member of the Series 600 line, retaining the best elements of the original product while adding transistorized inverters and new packaging technologies. Introduced to the North American market in 1995, the Series 600T is also available in 50 Hz models for Europe, Asia and Latin America.

These new products are industry leaders in every key respect: demonstrated reliability in field operation, compact footprint, efficiency, operator controls, and the widest range of choices for dual-load-bus system configurations.

DOCUMENTED RELIABILITY

The Liebert Series 600 has proven itself the most durable UPS in the industry. Our database of installed systems has information on all of the Series 600 UPS systems shipped since original product introduction more than a decade ago. Based on actual field performance, our Series 600 equipment has **demonstrated a critical bus MTBF of more than 1,000,000 hours.**

BIG PERFORMANCE IN A COMPACT BOX

All of the Series 600T models have an exceptionally small footprint, even those with input isolation transformers and 12-pulse rectifiers. For example, a standard 500 kVA module with 6-pulse rectifier is just 6 feet wide, while the top-of-the line 750 kVA module with input isolation transformer and 12-pulse rectifier is just 10 feet wide. In some cases, a facilities manager can install two Liebert UPS modules in the space formerly required by just one.

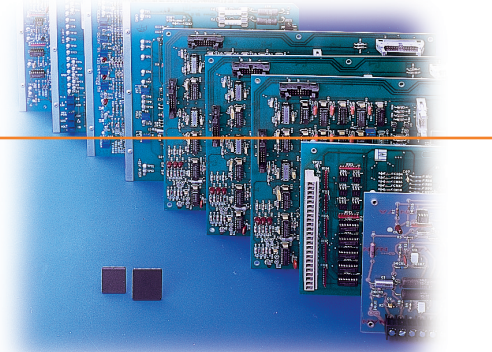
OUTSTANDING EFFICIENCY

The Series 600T has excellent operating efficiency in all configurations and with all types of loads. Even with input isolation transformer and 12-pulse rectifier, the 600T 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.

THE RIGHT TRANSISTORS FOR THE JOB

The 600T inverter takes full advantage of the latest-generation IGBTs. Earlier IGBTs could not have done the job unless they were used in parallel, a violation of Liebert's high-reliability design principles. Our designers waited until the right devices became available.

Some other manufacturers — in their haste to “get transistorized” — used conventional bipolar transistors or bipolar Darlington, often putting their power semi-conductors in parallel to achieve the higher power ratings. Even after switching to IGBTs, some manufacturers continue their practice of using transistors in parallel. Some resort to paralleling entire inverter modules to reach higher power levels. By contrast, our exclusive inverter design puts less stress on each power semiconductor and eliminates the need for paralleling devices.



Application-Specific Integrated Circuits (ASICs) reduce the parts count and significantly increase system reliability.

2

ALL-DIGITAL LOGIC AND OPERATOR CONTROLS

We have enhanced the reliability and performance of the UPS by putting all the key control logic functions into Application-Specific Integrated Circuits (ASICs). These computer-tested ASICs replace the discrete logic boards used by other manufacturers and greatly reduce the parts count and number of interconnect points.

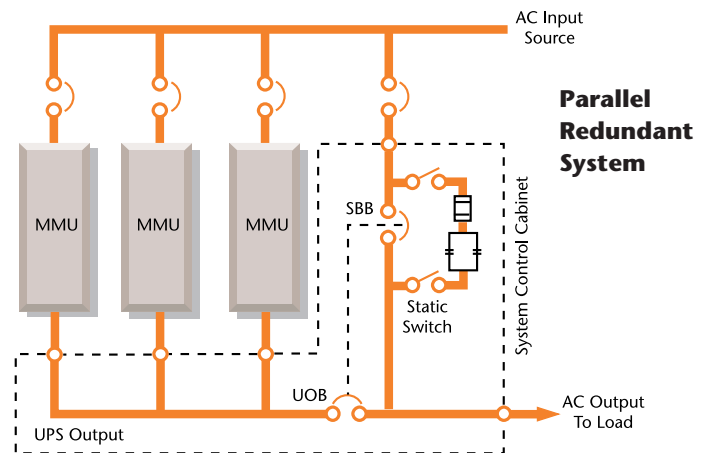
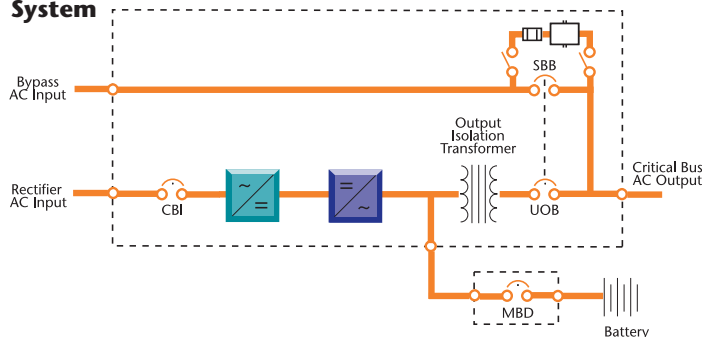
The unique Series 600T operator interface makes the UPS easy to use and understand. All system information is displayed in text **and graphics** on a full-sized Liquid Crystal Display (LCD) screen. The controls are intuitive, with all functions available through menus and simple pushbuttons.

MORE OPTIONS FOR MAINTAINABILITY

Thanks to the all-digital controls and unique inverter topology, the Series 600T can be used in any of the conventional single-bus system configurations: single module, parallel-redundant or isolated redundant. In addition, the Series 600T is uniquely well suited for the emerging new standards for high-availability systems: Power-Tie™ and Load Bus Sync™ (LBS).

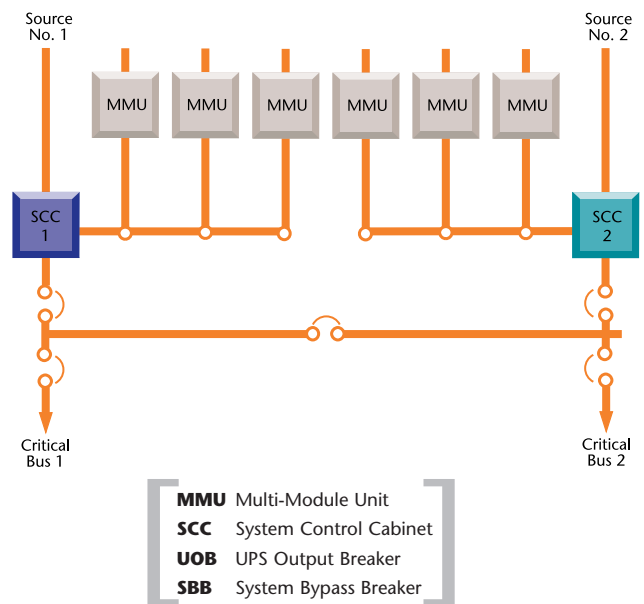
The diagrams below and at right show standard single module and multi-module system configurations. Please refer to "Configuration Options," next page, for other possibilities.

Single Module System



Parallel Redundant System

Basic Power-Tie™ Configuration



C O N F I G U R A T I O N S

Series 600T

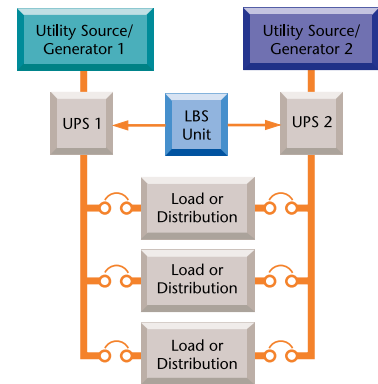
The Series 600T is available in single module and multi-module configurations to meet the requirements of your facility. Unlike some products, which are optimized for one or two particular configurations, the 600T can be used reliably in a wide variety of applications without modification.

The simplest application is the single module system, shown in the diagram on the previous page. But two different needs have 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 tolerance by preventing a single module or battery failure from bringing down the critical facility bus.

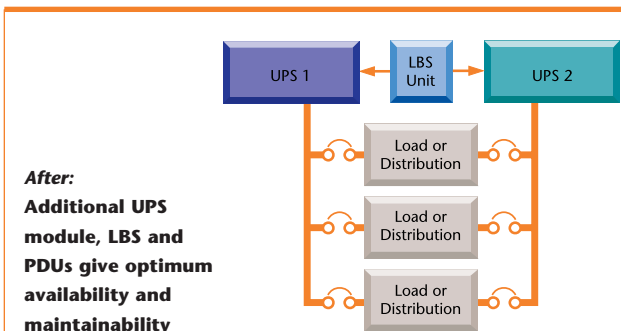
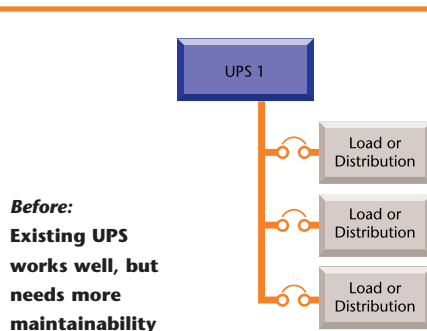
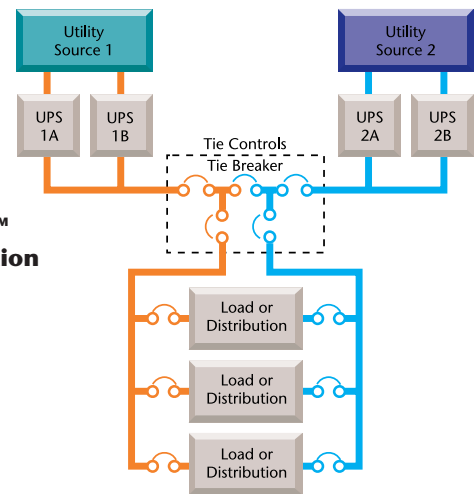
The most common practice is parallel redundancy (illustrated on previous page), where the system has one UPS module more than is required to carry the rated critical load. Another configuration, called isolated-redundant, has a reserve UPS module idling as the first bypass source for one or more primary modules.

Both parallel and isolated redundant systems improve the ability of the critical bus to survive disturbances created outside the facility. But both configurations share a common weakness: their redundancy ends where your 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. A better solution is a dual-bus, distributed-redundant system, which helps take redundancy all the way out to the critical load equipment.

Distributed Redundant Configuration with Load Bus Sync



Power-Tie™ Configuration



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 sync even when operating on batteries or asynchronous gensets. Each UPS powers its own downstream distribution equipment, so that each piece of load equipment can be connected to both. With proper transfer devices (see “Distribution Options” below), any connected load can be switched transparently between sources so that one complete UPS and distribution system can be de-energized for maintenance. The LBS can be used to synchronize any two Liebert Series 600/Series 500 or Series 300 UPS systems.

Another approach is our **Power-Tie™**, 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/Emerson Series 600/500 systems, either Single Module or Multi-Module.

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

DISTRIBUTION OPTIONS FOR DUAL-BUS SYSTEMS

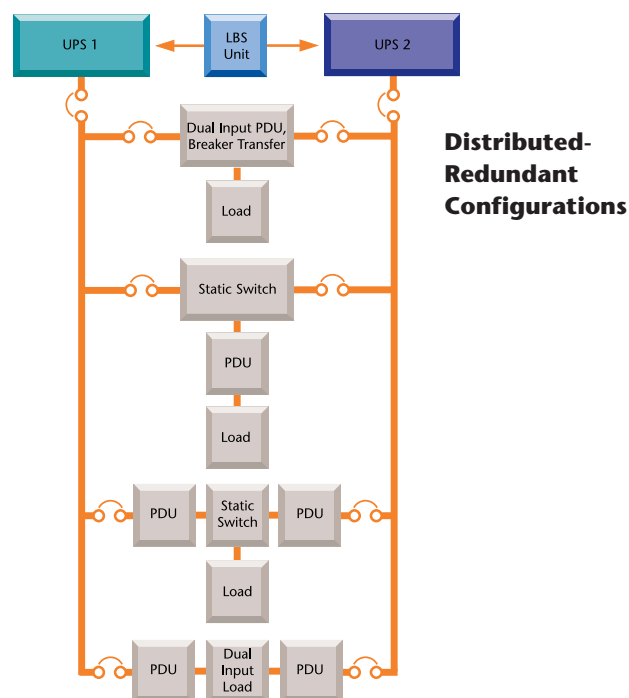
After choosing a dual-bus system, your next task is configuring your power distribution system to best meet your needs.

The simplest approach is a dual-input PDU with a breaker arrangement (either manual or motorized) feeding single-input loads. Breakers are used to transfer the PDU and loads between UPS 1 and UPS 2 when it's time to service one UPS or the other. The limitation is that the PDU itself cannot be completely serviced while the load is on-line.

The second arrangement provides a higher level of fault tolerance. A Liebert Static Transfer Switch (STS) 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 as well, 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.

The third 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 means you can service one UPS and one PDU at a time, while remaining on UPS power from the other PDU.

The bottom option shows a dual-power-cord machine fed by two conventional 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.



S P E C I F I C A T I O N S

Series 600T

UPS RATING		LOAD POWER FACTOR	AC INPUT/ OUTPUT VOLTAGE	%EFFICIENCY AT VARIOUS LOADS ¹			NOMINAL BATTERY REQUIREMENTS (CELLS)	MAXIMUM HEAT DISSIPATION (BTU/HR) FULL LOAD	DIMENSIONS WxDxH ² (INCHES)		APPROXIMATE WEIGHT ²	
kVA	kW			50%	75%	100%			TOP ENTRY ONLY	TOP & BOTTOM ENTRY	SMS	MMU
65	52	0.8	480/480	92.5%	93.5%	93.5%	240	12,350	N/A	34x32x68	1,500	1,470
65	52	0.8	480/208	92.5%	93.0%	93.0%	240	13,350	N/A	34x32x68	1,700	1,670
65	52	0.8	208/208	92.0%	92.0%	92.0%	240	15,450	N/A	34x32x68	1,900	1,870
80	64	0.8	480/480	92.5%	93.5%	93.5%	240	15,200	N/A	34x32x68	1,700	1,670
80	64	0.8	480/208	92.5%	93.0%	93.0%	240	16,450	N/A	34x32x68	1,950	1,920
80	64	0.8	208/208	92.0%	92.0%	92.0%	240	19,000	N/A	34x32x68	2,100	2,070
100	80	0.8	480/480	92.5%	93.5%	93.5%	240	19,000	48x33x78	56x33x78	2,500	2,465
100	80	0.8	480/208	92.5%	93.0%	93.0%	240	20,550	48x33x78	56x33x78	2,800	2,765
100	80	0.8	208/208	92.0%	92.0%	92.0%	240	23,750	48x33x78	56x33x78	3,100	3,065
125	100	0.8	480/480	92.5%	93.5%	93.5%	240	23,750	48x33x78	56x33x78	2,600	2,565
125	100	0.8	480/208	92.5%	93.0%	93.0%	240	25,700	48x33x78	56x33x78	2,900	2,865
125	100	0.8	208/208	92.0%	92.0%	92.0%	240	29,700	48x33x78	56x33x78	3,250	3,215
150	120	0.8	480/480	93.0%	94.0%	94.0%	240	26,150	48x33x78	56x33x78	2,850	2,800
150	120	0.8	480/208	93.0%	93.5%	93.5%	240	28,450	N/A	56x33x78	3,050	3,000
150	120	0.8	208/208	93.0%	92.5%	92.5%	240	33,200	N/A	56x33x78	3,320	3,270
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	480/208	93.0%	93.5%	93.5%	240	42,700	N/A	56x33x78	3,475	3,425
225	180	0.8	208/208	93.0%	92.5%	92.5%	240	49,800	N/A	56x33x78	3,870	3,820
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	480/208	93.0%	93.5%	93.5%	240	56,950	N/A	72x35x78	4,450	4,400
300	240	0.8	208/208	93.0%	92.5%	92.5%	240	66,400	N/A	72x35x78	5,400	5,350
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	480/208	93.0%	93.5%	93.5%	240	75,950	N/A	72x35x78	5,150	5,100
400	320	0.8	208/208	92.5%	92.0%	92.0%	240	94,950	N/A	96x35x78	8,400	8,350
400	360	0.9	480/480	93.0%	94.0%	94.0%	240	78,450	N/A	72x35x78	5,100	5,050
450	360	0.8	480/480	93.0%	94.0%	94.0%	240	78,450	N/A	72x35x78	5,100	5,050
500	400	0.8	480/480	93.0%	94.0%	94.0%	240	87,150	N/A	72x39x78	5,775	5,710
500	450	0.9	480/480	93.0%	94.0%	94.0%	240	98,050	N/A	72x39x78	5,795	5,730
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
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 (12P)	675	0.9	480/480	93.0%	93.5%	93.5%	240	160,150	N/A	120x39x78	11,880	11,785

¹ Efficiency measured at rated power factor and non-linear load. Input filter loss is less than 0.35%.

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.

Input

- Voltage: 208, 400 or 600 VAC, 3-phase, 3-wire plus ground
- Voltage Range: +10, -15% (no battery discharge at -20%)
- Power Factor: 0.85 lagging; 0.92 lagging with optional input filter.
- Frequency Range: 60 Hz, $\pm 5\%$. Frequency change models available (50 Hz in/ 60 Hz out or 60 Hz in/ 50 Hz out)
- Current Distortion: 7% reflected THD at full load with optional input filter. 4% reflected THD at full load with optional 12-pulse rectifier and input filter.
- 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. Walk-in of 20% to 100% over 15 seconds.

Output and Bypass

- Voltage: 200, 480 or 600 VAC, 3-phase, 3-wire or 4-wire.
- 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).
- 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: 1.0 to 0.7 lagging 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° to 40°C without derating.
- Non-Operating Temperature: -20°C to 70°C .
- Humidity: 0-95% relative humidity without condensation.
- Operating Altitude: Up to 1,200 meters without derating.
- Non-Operating Altitude: Up to 15,000 meters.

Standard Features

- LCD 80-character x 25 line monitor/control panel
- Self-diagnostics
- 2-stage battery charge current limit
- 2-stage input AC current limit
- Internal maintenance bypass
- Programmable automatic retransfer
- Automatic line-drop compensation
- Battery overdischarge protection
- Battery-time-remaining display
- Automatic equalize charge timer
- Emergency Power Off
- Output isolation transformer

Options and Accessories

- Input filter/power factor correction
- 12-pulse rectifier input
- Power-Tie® Dual-Bus System
- Load Bus Sync™ (for dual load bus systems)
- Input isolation transformer
- Bypass isolation transformer
- Maintenance bypass cabinet
- 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
- SiteScan centralized monitoring system
- Remote monitor panel
- Communications interfaces
- Alarm status contacts
- Customer alarm inputs
- Frequency-change models (50 Hz in/60 Hz out, or 60 Hz in/50 Hz out)
- Flywheel Energy Storage System interface



LIEBERT: A CLEAR PATH TO THE FUTURE

Series 600T™ UPS 65-750 kVA, 60 Hz

LIEBERT UPS SYSTEMS
ARE AVAILABLE FROM:

LIEBERT CORPORATION

1050 DEARBORN DRIVE
P.O. BOX 29186
COLUMBUS, OHIO 43229-0186
800.877.9222 PHONE (U.S. & CANADA ONLY)
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LIEBERT WEB SITE

<http://www.liebert.com>

Liebert Corporation founded the computer protection industry in 1965, and we've never looked back. Today we have more than 1,000,000 installations worldwide protecting everything from stand alone PCs to global telecommunications systems.

Liebert provides a complete range of computer and peripheral equipment protection:

- High quality desktop micro system power protection.
- Sophisticated, reliable power protection for LAN's and WAN's.
- LAN server protection enclosures with integrated UPS, air conditioning and wire management.
- Glass House protection and support for the centralized processing, supercomputer or network control centers.
- Environmental protection: floor-, wall- and ceiling-mounted units for small rooms and spot protection; large-scale redundant cooling modules for the traditional glass house; and the hardened systems for aggressive industrial atmospheres.
- Facility-wide protection for mission-critical computers and equipment with a single, centralized UPS system.
- Real-time monitoring and control of enterprise-wide computer and control systems from a single or multiple locations.

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