

Liebert Static Transfer Switch2 *The Cornerstone of High-Availability Power Systems*



The Power to Protect Your Critical Operations

For maximum availability applications, the Liebert Static Transfer Switch2 (STS2) provides an automatic, seamless transfer between your critical load and the outputs of two independent UPS systems in a dual-bus power configuration. If the primary UPS should fail, the switch will automatically transfer the loads to the alternate UPS.

Liebert is the market leader in dual-bus power systems, building the world's most reliable UPS and Static Transfer Switch products. Liebert STS2 further extends our market leadership with design benefits unmatched by competitive products.

Standard Features Of The Liebert STS2 Provide Greater Overall Protection

Reliability:

- 100% rated, fuseless design.
- Hot-swappable circuit breakers.
- Flash memory enables firmware updates while supporting critical load.
- Rack-out control/power assembly on units up to 600A to allow maintenance, service or full replacement without disrupting the critical load.

Flexibility:

- Internal CANBUS protocol: high-bandwidth communication between system components via twisted-pair cables. Options can be added as simple network nodes.
- Dual-lug installation bus with pem nuts for single-hand installation and "hot" torque service.

Low Total Cost Of Ownership:

- Conservative design margins and excellent overload capacity.
- UL listed.

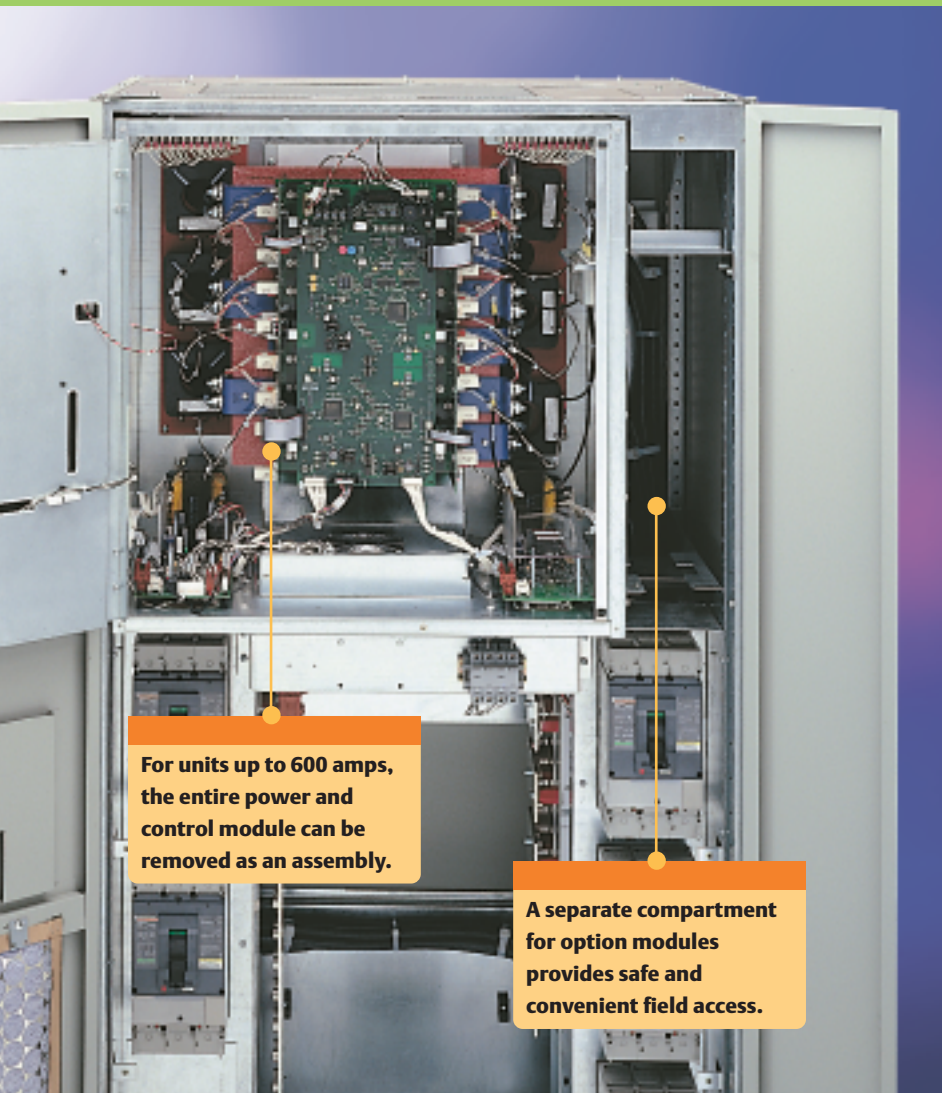


Color Touch-Screen Interface

The color touch-screen LCD interface allows you to quickly check the status of the unit and identify problems. The controls of the Liebert STS2 are intuitive and simple.

The color LCD monitor is divided into three segments. In addition to a system mimic diagram, there is a Status/Alarm panel and a section dedicated to operator instructions and menus. The screen allows you to configure the unit, including the control of the preferred source, auto/manual retransfer selection, alarm notification and other system setpoints. You benefit from improved operator effectiveness, reduced training time, and less chance of operator error.





For units up to 600 amps, the entire power and control module can be removed as an assembly.

A separate compartment for option modules provides safe and convenient field access.

True Front-Access Design

All mechanical and electronic components of the Liebert STS2 are accessible from the front of the unit for installation and service — no side or rear access required.

This gives you several immediate benefits:

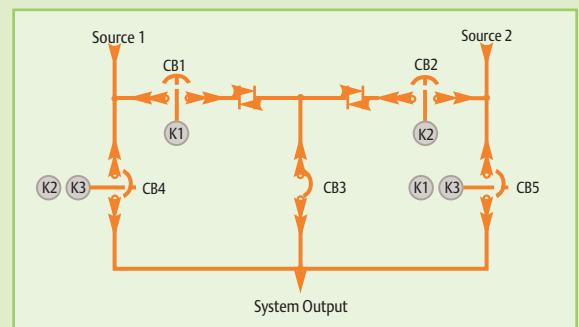
- Greater freedom in system design. The Liebert STS2 can be placed adjacent to or in back of other equipment. It can also be placed against a wall or partition.
- Simplified installation, with ample space for cable connections through top and bottom access plates.
- Less floor space required for maintenance access.
- Designed for maintainability, with all key components visible and accessible from the front of the unit, without shutting down the connected load.

True Internal Redundancy

The Liebert STS2 has triple-redundant logic. Each DSP controller is capable of working independently, and each helps monitor the other two. If one malfunctions, the other two lock it out. Each controller has power feeds from both power supplies.

The two power supplies feature true dual-bus power distribution. Both have dual inputs, one from each AC input source. All power connections have diode protection, so that internal or external faults cannot propagate. The result is a rugged, fault-resilient package that is optimized for real-world applications.

One-Line Diagram



Optimized Transfer Option Enhances Cost-Efficient System Operation

Liebert offers a patented optimized transfer option for the Liebert STS2 that greatly improves operation when used in primary side switching applications.

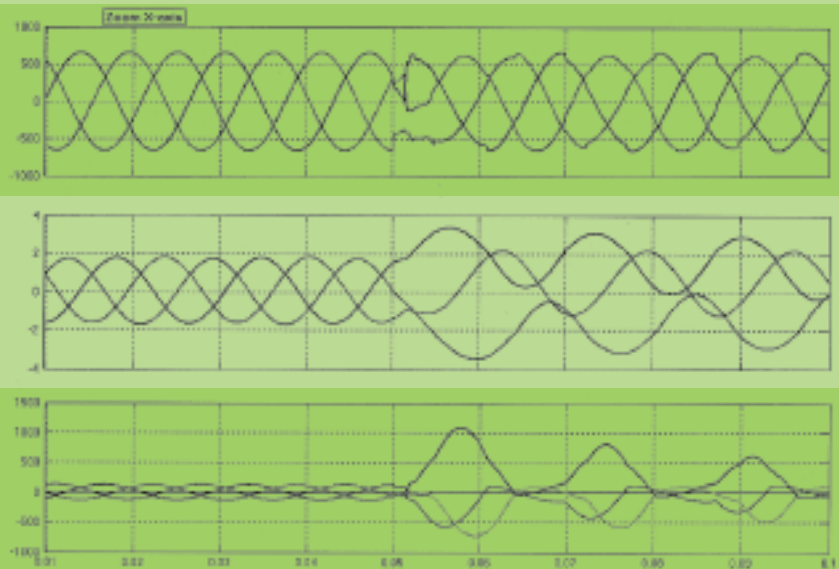
Figure 1 Standard STS2 transfer

Figures 1 and 2 show results for the standard STS2 vs. the optimized STS2 for the same condition (alternate source lags 120 degrees) respectively. The optimized transfer control algorithm minimizes the transformer saturation current resulting from an out of phase transfer.

load voltages

transformer fluxes

primary currents



The Liebert STS2 can be used in two different types of high-availability dual bus configurations — as primary or secondary side switches. For primary side switching, the unit is connected to the primary or input of a downstream transformer. On secondary side switching the Liebert STS2 is connected to the secondary or output of two transformers.

One of the main advantages of using primary side switching is lower cost.

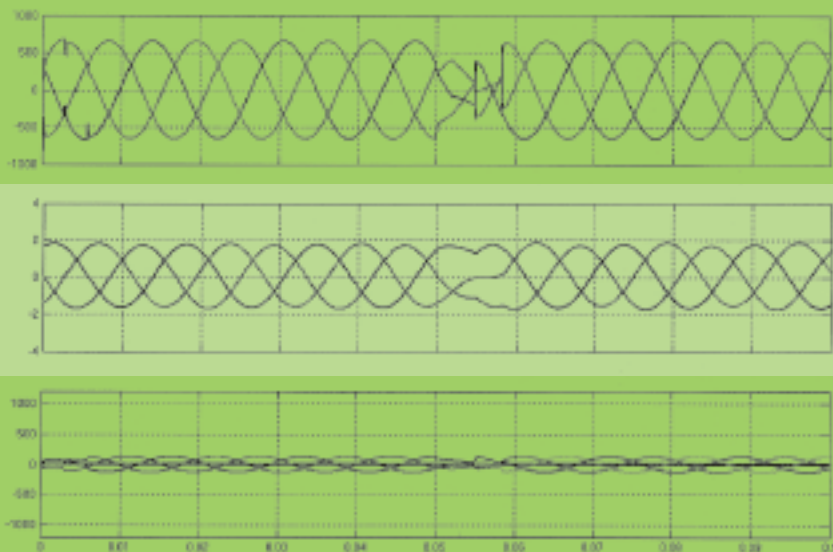
These savings are the result of only one power distribution unit, a lower current due to 480V vs. 208V, and lower installation and wiring cost thanks to use of smaller 3 wire cable.

The one drawback of this configuration is the creation of transformer inrush saturation current each time switching occurs. The downstream transformer can cause large peak saturation current during automatic transfers. The transformer saturation is caused by DC-flux built-up during transfer, especially when the sources are not in phase.

See also

White Paper "STS2 Optimized Transfer (June 4, 2004)" at www.liebert.com.

Figure 2 Optimized STS transfer



The patented Liebert static switch optimized transfer control algorithm eliminates the downstream transformer inrush saturation.

The Liebert algorithm is designed to optimize transfer timing such that the volt-seconds applied to the downstream transformer primary is balanced, thus minimizing peak saturation current. This balance is achieved by directly computing the volt-second applied to the transformer during transfer events and determining the optimum time to turn on the alternate source SCRs in order to balance the volt-second within specified tolerance.

This results in a volt-second balancing algorithm that is independent of voltage wave shape, voltage failure decay rate, etc., making it superior to other algorithms based on voltage phase angle difference only.

Liebert’s transfer control does more than balance the flux.

Due to our unique approach to the optimized transfer algorithm, transfer time should not be the only performance measure for this new optimized switch. Liebert’s method, whenever possible, also seeks to minimize voltage disturbances while maintaining transformer flux balance. It takes both voltage disturbance and volt-second balance into consideration.

Liebert has a unique flux balance algorithm that doesn’t just “sit and wait” for the balance point to occur. Rather, we will “pulse fire” the SCRs as soon as possible in order to minimize the load discontinuity and hence the voltage disruption.

So how safe is this new optimized Liebert STS2 for your critical loads?

The optimized Liebert STS2 safely meets both the CBEMA standard (prior to 1996) and the latest ITIC standard (1996) for critical loads. Liebert’s optimized STS2 eliminates the risk of transformer saturation problems during automatic transfers, while its algorithm control ensures minimum voltage disturbance during transfers while still balancing the flux.

Liebert STS2 Communication and Product Options



Liebert STS2 has a wide choice of monitoring and communications options to keep you connected to your critical power protection system.

RS-232 Terminal Port — Standard on all units, this port is primarily used as an alternate user interface to configure, control, and diagnose the system.

Internal Modem — Connection to this modem is through a standard RJ-11 port. This port automatically dials the programmed telephone number when a designated alarm occurs. Upon successful connection, the system transmits the status information and then hangs up. System status and history information can be requested and date and time can be changed through the modem.

Input Contact Isolator (ICI) Board — Customizable input relays allow alarms from other devices to be displayed on Liebert STS2 display. Provides an interface for up to eight user inputs. External messages and alarms can be routed to the unit, via the ICI.

Programmable Relay Board (PRB) — Programmable output relays for custom customer alarms and connections. Up to two PRBs can be installed in the Liebert STS2 to route system events to external devices.

Comms Board — Includes a terminal block to provide a DTE connection to an external modem. This board also provides a direct connection to a Liebert SiteScan® Web system, via an RS-422. SiteLink-12 or SiteLink-4 is required for SiteScan to communicate with the Liebert STS2.



Liebert OpenComms™ NIC (Network Interface Card) —

The Liebert OpenComms NIC provides connectivity to any TCP/IP-based Ethernet network to allow the device to communicate with network management systems (NMS) via SNMP. Events can be transmitted to the NMS to provide remote status monitoring, plus fault and alarm detection. The NIC includes an RJ-45 port for an Ethernet connection, via Category 5 cable. The NIC can also integrate the system with an existing Building Management System (BMS) or out-of-band monitoring, using Modbus.



Options and Accessories

Seismic Anchors — To ensure stability for the unit in the event of seismic activity, anchors are available for securing the unit to a concrete floor to meet seismic Zone 4 requirements.

Seismic Floor Stand — Designed to level the unit and provide bottom cabling access without relying upon a raised floor for support. Available in 18, 24, 30, 36 inch heights.

Distribution Cabinet (Up to 600A) — An output distribution cabinet mounts on the side of the STS2. It is a full height section with hinged doors to allow for easy access. The cabinet contains one vertically mounted I-line panelboard for load distribution. The panelboard is totally enclosed with an accent cover that provides access without exposing other portions of the unit. The panelboard provides space for 100A through 250A three-pole branch circuit breakers. It also includes a separate isolated neutral bus bar and safety-ground bus bar for the neutral and safety-ground connections.

Redundant Output Breaker — An output plug-in, non-automatic circuit breaker provides redundancy in the output power path. The breaker is connected in parallel with the output plug-in non-automatic circuit breaker.

Input Junction Boxes and Cable (Up to 600A) — The input junction box option is available to simplify input connections to the STS2. Two input junction boxes and the associated flexible 10-foot long input cables are provided with this option. Available with bottom cable entrance only, typically when the unit is located on a raised floor.

Remote Source Selection — An optional Remote Source Selection board may be installed in your STS2. This option allows you choose the preferred input source from a remote location. Terminal connections enable you to remotely select a preferred source in the same process as the local source transfer selection.

Key Lockout Switch — The key lockout switch activates a software lockout of the touch-screen display to prevent manual transfers and configuration changes. When locked out, the touch-screen becomes a read only display. A key is needed to perform manual transfers or change settings.

Critical Space Support from Emerson Network Power Service



Total Service Capability

Emerson Network Power Service provides a Basic, Essential and Preferred level of maintenance and service that allows you to select the complement of critical power system services that best fits your requirements. These programs include guaranteed four-hour response time, emergency service and preventive maintenance.

With more than 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. For customers who need to have these vital protection systems continuously monitored, but don't want to do it themselves, Emerson Network Power Service offers Remote Monitoring Service. This seamless, rapid-response system is designed to maximize the capabilities of your Liebert equipment by maximizing the effectiveness of its monitoring capabilities.

Continuous 24-hour remote monitoring of UPS/power conditioning equipment, environmental products and other critical space support systems is available. No matter where your facilities are located, we can provide continuous oversight of a wide range of critical installations from our Customer Response Center.

When a problem is detected, the monitoring system immediately alerts the Customer Response Center where each alarm is evaluated and processed. The center offers instant phone assistance using a customer-defined response and call escalation plan. Liebert will coordinate all service vendors, track the response and solution time for service calls and provide comprehensive reports on alarms and corrective actions.

Ensuring The High Availability Of Mission-Critical Data And Applications.

Specifications

Amp Rating	Heat Output (KW)	Uncrated Dimensions (WxDxH)		Uncrated Weight		Shipping Dimensions ¹ (WxDxH)		Shipping Weight ¹	
		(inches)	(mm)	(lbs)	(kg)	(inches)	(mm)	(lbs)	(kg)
100	0.8	30x32x77	762x813x1956	780	354	48x44x80	1016x1194x2032	880	399
250	1.37	30x32x77	762x813x1956	780	354	48x44x80	1016x1194x2032	880	399
400	2.04	38x32x77	965x813x1956	1200	544	48x44x80	1016x1194x2032	1300	590
600	3.08	38x32x77	965x813x1956	1200	544	48x44x80	1016x1194x2032	1300	590
800	4.03	84x32x77	2134x813x1956	2500	1134	92x47x80	2337x1194x2032	2600	1179
1000	5.09	84x32x77	2134x813x1956	2500	1134	92x47x80	2337x1194x2032	2600	1179

Note: ¹ Shipping dimensions and weight include the pallet and packing material. Actual weights will vary depending on installed options.

Operating Specifications

Voltage: 208, 220, 240, 380, 400, 415, 480 or 600 VAC (field selectable), +/- 10%

Frequency: 50 or 60 Hz (field selectable), +/- 0.5 Hz

Overload Capability: 125% for 10 minutes, 150% for 2 minutes

Operating Temperature: 0 to 40° C

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