Vertical Specific Solution for Critical Applications in Healthcare
A Commitment to Best-in-Class Technologies

When it comes to protecting critical infrastructures across the globe, breakthrough technology is at the heart of competitive advantage for any business. Emerson Network Power’s 12 Centers of Expertise uniquely position us to provide systems and integrated solutions wherever our customers are located, meeting the world’s ever-growing need for Business-Critical Continuity™ across all industries. We continually invest in research and development – and, most importantly – people with the right expertise, in order to help prepare our customers for whatever changes that may come their way. Not only are we the experts in manufacturing and designing great technology, but we are the largest provider of services for critical infrastructures anywhere in the world. Emerson Network Power’s services are broad enough to fit the entire range of equipment in your critical space, and we specialize in the latest tools and procedures you can depend on.

Grid-to-chip technologies and expertise that keep data centers, telecom networks, digital healthcare providers / facilities and business-critical applications up and running while maintaining energy efficiency

- Infrastructure Management & Monitoring
- AC & DC Power Systems
- Precision Cooling Systems
- Racks & Integrated Cabinets
- Surge Protection & Power Switching & Controls
- Outside Plant Solutions
- Embedded Computing & Power
- Connectivity Solutions
- 24x7 Local Support – Anywhere in the World

Emerson Network Power Global Service Coverage
- Over 150 service locations worldwide
- 2,000 certified professionals with knowledge and expertise in local safety, environmental and labor specifications
- Employees: About 43,000

Emerson Network Power Global Design Resources
- Total E&D Engineers: 3,332
- Number of PhDs: 50
- Number of active patents: 1,396

NUS Consulting

Liebert improved the new NUS Consulting IT and communications suite by:
- Maximizing operating efficiency
- Increasing the level of reliability
- Minimizing support equipment footprint
- Increasing ease and speed of service

Macquarie Corporate Telecommunications

With this project, Emerson enabled:
- Integrated solution focused on delivering maximum functionality
- Excellent service support
- A customer-preferred technology partner
- Enterprise-wide secure precision AC systems

SingTel

Liebert precision cooling and Emerson Network Power solutions enables SingTel to adapt:
- Through technologies that bring enormous flexibility in modularity, scalability and availability at the most effective cost
- Through system architecture that anticipates change - so adaptable it can accommodate new technologies and be completely reconfigured onsite
- Through tailored AC solutions that manage high density loads, eliminate hotspots, increase capacity and billable space, and improve OPEX using the Liebert XD system
Protecting Your Facility from Grid to Chip

Bank of China

Emerson solutions enabled the Bank of China through:
- Leading edge precision cooling technology
- Maximum benefit from specialized glycol systems
- Local dedicated teams for excellent service support

Bharti Airtel Ltd.

Emerson integrated solutions including Liebert precision cooling allowed Bharti Airtel to benefit from the unique features of Liebert’s Adaptive Architecture:
- Reliable system with 24/7 availability in India
- Flexibility of scalable mission-critical integrated cooling solution
- Best total cost of ownership

Triara

Liebert precision cooling solutions allowed Triara to:
- Achieve Tier 4 certification for their data centre
- Achieve high nines reliability and dependability
- Enable their clients’ business-critical continuity
Keeping the Digital Hospital Online

Emerson Network Power provides integrated solutions specific to the needs of hospitals and healthcare facilities. With Emerson, expect a robust IT infrastructure protected by the Global Leader in Business-Critical Continuity™.

Doug Lauterback
Director of IS Imaging Services
Baycare Health System
Tampa Bay, Florida

“We knew early on that we were going to go with Liebert precision cooling from Emerson Network Power, and there are advantages to using a single vendor for the power and cooling infrastructure.”

Kent Hoyos
CIO
Pomona Valley Medical Center
Pomona, California

“All of a sudden the help desk got quiet. The problems that we were experiencing because of the un-optimized operating conditions just ceased.”

Emerson Solutions for the Healthcare System
Emerson Network Power has been serving the Hospital and Healthcare sector in Asia for the last twenty years. Over that period we have worked with Facility Managers, Department Heads, Hospital Administrators and (increasingly in the past years) IT professionals, to enable mission critical systems. The care delivery landscape today has fundamentally changed from that of the past, but from a critical infrastructure perspective, three key areas have emerged:

1. **The impact of digitization:** Hospitals have embraced the benefits of information technology to the benefit of patient care and support processes to the point where the computer room (data center) has shifted to the core of the operation. Within this area, Emerson enables customers to optimize the performance of the computer room, expand capacity where necessary and also manage the impact of high density computing.

2. **Space is valuable:** Two separate dynamics intersect in the hospital: 1) the prioritization of space to hospital care and 2) the need for IT resources to be pervasive throughout the facility. Emerson meets this challenge by offering solutions that provide the functionality and security usually found in a computer room, but at a single or half rack scale. Similar to a mobile phone network placing key technologies throughout our physical environment, so too in hospitals do we find the need to have “IT Everywhere”.

3. **Applications specific to Hospitals:** Diagnostics & Imaging and MRI technology is found in most facilities and requires specific attention with respect to managing optimal power and thermal conditions. In addition to imaging facilities, Emerson brings extensive experience in infrastructure supporting R&D labs (clean rooms).

---

**Mike Moore,**
Technical Planning Director
Norton Healthcare
Louisville, Kentucky

“By building the NOC and the data center the way we did, we were able to increase our workload at least by 100 percent in the NOC without increasing staff, and the centralized monitoring system has reduced help desk calls by 20 percent.”

---

**Jim De Stefano,**
Assistant director and project coordinator of Maintenance
Altoona Hospital
Altoona, Pennsylvania

“The hospital’s investment in upgrading the system has paid off immensely.”

---

**Kevin Deitsch,**
Electrician
St. Joseph Hospital
Denver, Colorado

“We wanted to centralize operations in a single plant and be able to power the entire campus for extended periods with no utility feed, if necessary.”

---

**Contents**

- Hospital Space Constraints  
-  
- Digitization of Healthcare Facilities  
- Managing High Heat Density in the Hospital Data Center  
- Digitization of Healthcare Facilities  
- Expansion of IT Applications in Healthcare  
- Digitization of Healthcare Facilities  
- Optimizing IT Performance in Healthcare  
- IT Infrastructures in Healthcare Applications  
- Clean Room for Research and Clinical Laboratories  
- IT Infrastructures in Healthcare Applications  
- Thermal and Power Management for Diagnostics and Imaging  
- Digitization of Healthcare Facilities  
- Importance of Reliable Back Up Power in Healthcare  
- Integrated Solutions for Efficiency Without Compromise  
- Solutions for the Healthcare Industry  
- Power  
- Solutions for the Healthcare Industry  
- Cooling  
- Integrated Racks  
- Data Center in a Rack  
- IT Performance Optimization  
- Innovations in Transfer Switches and Power Systems
Addressing Presence of IT Everywhere

Hospitals Rely on Information Technology

As technology becomes available to the healthcare industry, the demand for IT applications increases. Hospitals deploy various devices and equipment that need to be supported by a robust IT infrastructure. In a typical hospital environment, the presence of healthcare equipment in different areas of a hospital is fast becoming evident.

Information Technology (IT) is used dynamically in these areas of the hospital

- Imaging Stations
- PACS Imaging
- Operating Rooms
- Patient Rooms
- Nurse Stations
- Diagnostics Rooms
- Laboratories (Clinical & Research)
- Pharmacy
- Hospital Administration
- Visitor’s Lounges
- Mobile Health Records Consoles
- Mobile Client Assistant (MCA)
- Computer on Wheels (CoW)

IT is also used in:

- Hospital Information System (HIS)
- Electronic Medical Records (EMR)
- Procurement and Logistics Records
- HR and Payroll Administration
- Finance and Accounting Database
- Telecommunications Applications like VoIP, Wi-Fi, Mobile Networks
- Tele-Medicine using Video Conferencing and other essential ICT devices

IT is Everywhere

In almost all areas of a healthcare facility, medical, imaging, diagnostic and mobile IT devices are indispensable. Equipment like computer workstations, imaging units, communication facilities, mobile patient monitors and IT networks all rely on clean, continuous power to be able to address the critical needs of a healthcare system.
**Healthcare Challenge**

Hospitals in the past used to deploy UPS (uninterruptible power systems units) sporadically. Nurse stations, patient rooms, diagnostic / imaging units, laboratories all demand uninterruptible power supply. Healthcare facilities utilize standalone or isolated backup power systems that usually come with the equipment they protect. Consequently, in the event of a power outage, critical IT and medical equipment only get backup power but not uninterruptible power supply. The UPS serves as equipment for backup power rather than a device for uninterruptible power supply, compromising system availability that has an impact on care delivery. Likewise, this poses a risk in data and security management as these equipment types require continuous power, not just a grace period for shutdown.

**Space is a Premium**

One of the challenges that hospitals face is the lack of space. Instead of dedicating much needed space for large data centers, a hospital would choose to invest in expanding hospital rooms, diagnostic / imaging units and laboratories, complementary to their primordial function. These also command an increase in revenue-generating streams and enhance competence. Ultimately, patient care has to remain the top priority for healthcare facilities. That being the case, there is often very little space left for IT equipment, much less for the infrastructure that protects IT equipment and applications.

To address this, hospitals used to commonly deploy IT protection equipment sporadically and without a central facility. This resulted to unmanaged IT power protection equipment as these are all standalone servers, CPUs, imaging units and UPS. While the strategy served the needs of hospitals in their default states, the lack of flexibility made it less than ideal. In the event of a power failure or interruption, patient records may be lost, equipment may be damaged and critical hospital operations may be disrupted.

**Emerson Solution**

Emerson provides a solution for healthcare facilities in addressing continuous power for IT and medical equipment. Instead of decentralized or de-clustered standalone backup UPS, a large centralized or clustered redundant UPS system may be utilized for multiple critical branches in the hospital. A large UPS system like Liebert APM, Liebert NXR or Liebert NXL, Hipulse U or Trinergy can provide uninterruptible and redundant power that may support mission-critical applications like computing, communication and networks, imaging equipment and data storage / devices in the facility. Moreover, these UPS systems allow growth in the healthcare system. With more load being added, the facility grows and expands or modernizes, improving overall system availability.

In turn, continuous supply of clean power is provided to critical equipment in the healthcare facility without running the risk of losing data and communication systems. Emerson Network Power protects your system with uninterruptible power and protection from surges and outages.
As digitization steps up the way patient care is rendered by hospitals, the demand in computing capacity increases. In progressive hospitals, more and more devices are used by hospital staff, doctors and laboratory technicians; Thus, the density it brings to the data center consequently increases.

As hospitals and healthcare facilities expand, data center and facility managers of hospitals face a tremendous challenge on heat density. Just like other industries that rely heavily on computing, the healthcare industry is faced with the same risks of compromising availability due to equipment breakdown or damage in the hospital network closet or data center.

**Healthcare Challenge**

With the deployment of electronic Picture Archiving and Communication Systems (PACS) and Electronic Health Medical Record systems (EMR), additional blade servers are required to support these functions. And when blade servers are deployed, space becomes a premium. Rapid deployment of blade servers has led to intense and unplanned heat issues or “hot spots” as these equipment emit extreme levels of heat up to 15 times greater, posing risks in the data center.

The best way to counter hot spots is by effectively concentrating cooling solutions into specific hot spot locations. These should be easy to deploy and moved to suit changing requirements and temperatures. Cooling solutions should be able to convert sensible heat to sensible cooling. This implies no latent removal of heat that saves costly re-humidification.

**Emerson Solutions**

The most ideal solution to address hot spots is bringing cooling closer to the heat source. This saves the data center up to 30% in energy consumption as spot cooling for extreme heat densities effectively manages heat in the rack level or in the network closet.

Liebert XD Precision Cooling solutions provide the most effective way of cooling hot spots in a highly dense data center as it brings cooling closer to the heat source. Liebert XD solutions offer zero footprint options and allow maximum flexibility and adaptability. It enables a “plug & play” approach to managing hotspots and deals with any unplanned deployment of high density applications.

**Case Study**

**Pomona Valley Hospital Medical Center**

**Pomona, California**

**Situation:**
- Implemented Electronic Health Record system (EHR)
- Increased computing and data storage equipment increased heat related failures in data center

**Solution:**
- High-density rack cooling
- Top of rack cooling units
- Supplemented existing under floor cooling
- Refrigerant based, no chilled water

**Results:**
- Brought temperature down from over 100°F to 64°F
- Heat-related server damage disappeared
- Cost savings estimated at US$ 300,000 in first year
Healthcare Challenge

In almost all cases, IT expansion causes problems in the data center. IT equipment are critical to keep the healthcare facility in business, but with the addition of more equipment in the data center, the facility runs the risk of power failure and outage. The more servers and equipment are added, the greater the risk of running on reduced power sources and reduced airflow caused by more under-floor cables. The IT infrastructure that supports the IT equipment may not be sufficient and no longer appropriate with increased equipment in the data centre.

Moreover, increase in number of data center equipment requires a scalable framework for power distribution. Scalable power and cable distribution immensely reduces the risk of outages and disruption in IT operations as it intelligently manages power distribution even when equipment is added to the IT system.

Emerson Solution

Emerson Network Power has an ideal solution for the expansion in healthcare data centers. Liebert APM is an adaptive power manager that combines power and distribution scalability. Unique in its class, the Liebert APM provides complete high-efficient power protection and distribution in a single cabinet, eliminating the complexity of power distribution involving complicated cabling. Its intelligent and adaptive capability to manage power within the data center row makes it a suitable solution for data center expansion in the future.

Designed to improve the utilization and management of IT systems, Liebert APM increases system availability and flexibility as your data center deals with change. The features of Liebert APM flex as IT applications and systems evolve, removing constraints to growth and allowing you to implement new add-on systems and applications while leveraging your initial investment.

Case Study

Cardinal Health

Dublin, Ohio

Situation:
- Multiple single-points-of-failure
- UPS reaching full capacity (75% loaded)
- Limited PDU circuit breaker space
- Limited ability to perform system maintenance

Solution:
- Engineered a Tier IV Dual Bus Design
- 2 UPS Units, 8 PDUs
- 4 Static Transfer Switches (STS)
- 4 Expansion Cabinets for STS Distribution
- Redundant CRAC units

Results:
- Virtually eliminated IT system downtime
- Customers and business unaffected by incidents and outages
- 98.4% success in 908 server and miscellaneous equipment unplugs / re-plugs
One important aspect of data center infrastructure management is site monitoring. Monitoring of IT equipment in the data center and other critical communications and data storage equipment plays an integral part in the management of data centers. IT managers and healthcare administrators need visibility of what’s going on in the data center for security and continuous operation of the hospital’s entire IT system. This then translates to intelligent courses of action to be taken by the healthcare facility and IT manager.

**Healthcare Challenge**

IT managers in healthcare facilities face the same problem as their counterparts in other industries. Existing monitoring platforms often offer reactive solutions rather than predictive; solutions, together with proactive insights into the data center environment. This means the IT manager and facility administrator only react to incidents after finding out what happened. They lack the tool that can provide them trends in the past, thereby enabling them to plan specific points of defense in any future eventuality. Also, the challenge lies in integrating monitoring with building and network management systems.

**Emerson Solutions**

Realizing the importance of monitoring in any data center, Emerson brings a monitoring and IT infrastructure management solution capable of providing rich data and trends that allow intelligent planning of data centers. Its monitoring platforms offer various solutions in monitoring hardware, software and security components in the data center. It increases visibility and controls critical IT infrastructure systems, integrating critical power, cooling and infrastructure support systems into a single network. It also allows remote monitoring via Web or a platform that integrates with the building network and management system. These solutions cover centralized monitoring of multiple sites, IT network monitoring, automated shutdown, leak detection and even battery monitoring for UPS, sending alarms in various forms to designated points of contact.

**Case Study**

**BayCare Health Systems**

*Tampa Bay, Florida*

**Situation:**
- Monitoring currently focuses on circuits that are tripped (reactive)
- Temperature monitoring handled at the return air of air conditioner (not looking at hotspots)
- Monitoring equipment was not managing other vendor’s equipment
- Limited ability to perform system maintenance

**Solution:**
- Remote Management and Monitoring
- Centralized Monitoring, Branch Circuit Monitoring, Leak Detection
- Environmental Control Systems

**Results:**
- People-free facility, reduced human error disruptions
- Proactively find problems before they become incidents
- Remote control of servers from anywhere in the world
Hospitals and healthcare facilities rely heavily on communication devices and Voice over Internet telephony (VoIP) to stay connected. With the same importance is the security required for healthcare patients and the facility itself. The use of VoIP, IP-based security cameras and radio frequency identification (RFID) devices require continuous and uninterrupted power to ensure security and integrity of data. In some relatively large facilities, these technologies are utilized for lifestyle enhancements and patient entertainment within hospitals.

**Healthcare Challenge**

As the demand for VoIP and IP-based devices of healthcare facilities and retirement homes increases, facilities struggle to keep the IT infrastructure stable and robust to address density in communication data and security. In modern-aged care institutions, patients are equipped with RFID or similar communication devices to give the hospital visibility on a patient’s whereabouts in the facility. This, being crucial to the safety of patients, requires an information and technology infrastructure that will support these demands. The same principle applies to IP-based security devices in facilities, as these rely on continuous power to prevent loss of data in critical safety procedures.

**Emerson Solutions**

As the global leader in enabling Business-Critical Continuity™, Emerson Network Power has suitable solutions for increasing data and video demands. Its complete portfolio of power protection solutions which includes UPS and surge protection products, provides a solid backup for VoIP and other communication equipment. Depending on the density of communications data, an appropriate true online double conversion UPS will serve the purpose of providing continuous power to the equipment. This results to increased availability of the data center infrastructure and ultimately to the safety and security of the patients and the healthcare facility.

**Case Study**

**PresCare**

**Brisbane, Australia**

**Situation:**
- PresCare prepares for ‘baby boomer crisis’
- It has invested in new technology for critical healthcare and communications services for its aged patients.
- Deployed commonly-used package tracking RFID technology.
- Need to build a new data center and communications network for RFID and lifestyle enhancing services such as videoconferencing and video-on-demand

**Solution:**
- Uninterruptible Power Supply: Liebert UPS systems
- Racks and enclosures: Knurr Racks

**Results:**
- The new data center supported 2,500 data points, Power-over-ethernet (PoE) switches and IP cameras
- These equipment are all routed to centralized communications cupboards and connected to the main data center over fiber cables.
- Emerson’s racks and power protection solutions housed the equipment and ensured 100 percent uptime
Diagnostics and imaging equipment require specific power and cooling conditions. These highly sensitive equipment utilize a considerable high amount of power thus emitting more heat in the room environment. Medical equipment such as CT Scanners, MRI, PET, Linear Accelerators, CGR and RDS cyclotron, Electron Microscopes, Gas Chromatograph and Cryogenic Compressors have unique needs for power and cooling.

Healthcare Challenge

Water-cooled systems rely on a continuous supply of liquid coolant to maintain process temperature within a specified range. Exceeding temperature specification or an interruption of coolant flow can cause sudden shutdown, interruption of operations, not to mention possible damage resulting in costly repairs and downtime. On top of that, restarts following such a stoppage are often time-consuming and expensive. Central plant chillers were designed to provide cooling fluid for building air conditioners and other seasonal heat-producing equipment. But what’s good for the building air conditioner isn’t necessarily good for an MRI or other sensitive piece of equipment or critical devices. Fluid temperatures and flow rates are not designed for these types of medical and industrial systems. In addition, building chillers re-circulate water through pipes and components that don’t meet the cleanliness requirements of critical equipment. Also, the building chiller may be cycled off, in contrast to your medical or process equipment that needs to operate all year.
Emerson Solutions

Water cooled electronic equipment has special needs beyond cool water. Sensitive equipment requires year-round operation, precise temperature-regulated water flow and a clean circulating loop — features only available with an equipment matched, factory-tested, dedicated chiller.

For reliability when selecting a chiller, look for a packaged, pre-tested system to ensure proper operation, indoor or outdoor installation, factory piping, charging and wiring to minimize installation time or confusion; and local representation for quick service response. Liebert chillers do this by providing dedicated, capacity-matched cooling, proper temperature and water flow, and year-round operation for a wide variety of water-cooled medical and industrial equipment.

Use of a dedicated chiller is also more efficient. Cooling requirements can be met during periods of low outside temperature without the extra expense of operating a large facility chiller. Installation is also simple. Liebert chillers can be supplied with plug-in hose connections and pre-charged refrigeration circuits.

Other advantages include:
- Precise temperature control and a continuous supply of cooling fluid.
- Factory-tested, piped, wired and charged for hassle-free start-up and operation.
- Local service and parts for quick and knowledgeable maintenance and service.

From precise medical diagnostic systems to machinery out on the plant floor, many pieces of medical and process equipment have unique needs for fluid cooling. Only Liebert has the expertise and technology to meet you dedicated chiller needs exactly, regardless of the application.

The Liebert Process Fluid Chiller is designed to cool sensitive medical and industrial process equipment, meeting or exceeding all manufacturers’ specifications for cooling capacity, and fluid-flow rates.

Liebert Process Fluid Chillers are specifically matched to the application to provide the proper temperature and flow rate for a variety of sensitive electronic systems. These dedicated chillers are tested at the factory to ensure proper operation and are supported by factory-trained experts with prompt access to common and genuine spare parts. In addition, the Process Fluid Chiller is easy to install, requiring only final piping and wiring connections for proper operation. These units feature a rugged design, durable enough for outside — yet quiet enough for indoor clean room or factory floor operation. Built-in quality along with Liebert’s leadership role in supporting critical electronic systems for more than four decades makes the Process Fluid Chiller the logical choice to support your water-cooled equipment.
Backup power is ever important today to keep healthcare institutions operating during power outages and disasters. Ensuring the reliability of the hospital’s back up power system is essential with the proliferation of highly critical loads in this environment.

**Healthcare Challenge**

A reliable emergency power system needs to undergo regular testing to be able to comply with government regulations. However, the hospital cannot afford to shut down even for a moment just for this purpose. Transfer switches are essential for this testing to be done efficiently and without interruption to the hospital’s operations. In the event of an outage, the transfer switch would ensure seamless switching to your emergency power source and provision of power to your priority loads for an extended period of time.

**Emerson Solutions**

Reliably transfer business-critical loads to emergency sources with Emerson’s line of industry-leading automatic transfer switches and non-automatic transfer switches. ASCO automatic transfer switches and non-automatic transfer switches from Emerson Network Power are applicable in many environments, and have been used in healthcare facilities worldwide.

Get the advantage of having an emergency power system equipped by best-in-class technology with ASCO transfer switches. ASCO 7000 Series Power Transfer Switches are available in bypass-isolation configurations to allow testing of the switch without interrupting power to the load. When an integrated solution is required, ASCO Power Transfer Load Centers are available in configurations that can include a transfer switch load panel, circuit breakers and voltage surge suppression pre-wired in a compact package.
Situation:

- Conducting government mandated monthly tests of its emergency system results in momentary power interruption in the 414 bed facility
- Sensitive electronic equipment would often need to be rebooted
- During controlled transfers from the hospital's live utility source to the five 850 kw generators, the hospital's 29 transfer switches would break one connection before making the other

Solution:

- 14 ASCO Closed Transition Transfer Switches: Allows "make-then-break" transition from main to backup power
- ASCO Paralleling Switchgear

Results:

- Testing is now done during peak hours without transfer induced power outage
- No complaints from the medical personnel
- ASCO Power Systems now installed in other Army Medical Centers in the country
Integrated Solutions for Efficiency Without Compromise
Efficiency Without Compromise™ for the Digital Hospital

MONITORING
Maximum visibility and control of facility thru remote and sensor based monitoring solutions

Temperature
Humidity and Water
Unauthorized Access
Smoke and Fire
Power and Cooling Issues

POWER
Ensuring optimal uptime and availability with solutions designed for high power density and computing

Surge Protection
Surge suppression protects your IT equipment against damaging power spikes — and from catastrophic failure.

Switch
Applications for emergency, standby and distributed power, when switching between normal and alternate power sources.

Power Protection For The Rack
Availability depends on the continuity of power and the ability of a UPS to ride through outages and provide clean power to sensitive IT loads. Maximizing uptime through a central UPS system ensures continuous power in the data center, protecting sensitive and mission-critical applications.

RACKS
- Lightweight extruded aluminum with modular construction mounting for all IT equipment
- Perforation rate of 75% or greater air in flow
- Tool-less accessory mounting, complete cable management provides the most versatile available
- Rack height of 42U and low enough to pass easily on standard lifts

SUPPORT SERVICES
Offering the full spectrum of on-site support services for batteries, power and cooling products including preventive maintenance.

Installation and Startup
Standard Warranty

Power
Emerson adapts an approach based on the needs of a healthcare facility. From the perspective of a hospital data center room, rack or row, Emerson Network Power provides a solution that addresses the presence of IT everywhere with modular, scalable and efficient centralized or clusterized UPS solutions in various capacities and needs. Our product portfolio meets the broadest spectrum of requirements from standalone to modular, scalable (adaptive) UPS from 1kVA through to 1000 4,800kVA.

Cooling
Emerson stands alone in its ability to deliver cooling solutions for the Room, Row or Rack, or tailor combinations of any of the three approaches to create optimal solutions for healthcare applications. Emerson Network Power has solutions to address the unique needs of hospitals for data center cooling, diagnostics and imaging suites and laboratories.
Integrated Racks

Emerson provides enterprise class IT infrastructure solutions for businesses combining efficiency and best total cost. The Data Center In A Rack (DCIR) addresses every need in the data center space, ranging from network closet to small computer rooms to large data centers by integrating Emerson’s best-in-class power, cooling, enclosures and service solutions.

Performance Optimization

Emerson provides monitoring solutions and assessment services for the healthcare facility’s IT infrastructure to encourage action oriented insight, monitoring and management. Knowing what is happening in the hospital’s data center or computer room and being able to respond is an important part of optimizing your IT infrastructure.
The intensified focus on data center energy efficiency and the push to virtualize as much infrastructure as possible has underscored the need for better power management and modularity in UPS technology. These two adaptable features enable end users to respond quickly to market demands while ensuring the highest level of reliability. Emerson introduces new modular UPS products designed to address these concerns. Our portfolio of products meets the broadest spectrum of requirements from standalone to modular, scalable (adaptive) UPS from 1kVA through to 1000kVA.

### Latest Solutions in Power

#### Liebert APM
**Flexible Adaptive Power Quality Solution for Critical Applications**

Liebert APM is the next generation UPS solution based on the scalable power platforms developed by Emerson Network Power. What differentiates Liebert APM from other power protection solutions is its Adaptive Power Manager features. Unique in its class, the Liebert APM provides highly efficient power protection and appropriate power distribution in a single cabinet, eliminating the complexity of two-stage power distribution. Its intelligent and adaptive capability to manage power within the data center row makes it a suitable solution for business expansion in the future.

- Energy Efficient: >96% Efficiency at 50-75% load; >95% Efficiency at 25% load. Input Power Factor = 1; Input Harmonic Current <3%
- Powerful Loading Capacity: Output Power Factor = 1 with leading and lag power factor (without derating)
- Easy to Install: Top/bottom cable inlet/outlet available; Needs no feeder cabinet; Integrates UPS and power distribution in a single cabinet
- Easy to Maintain: Front access provides easy bypass maintenance and replacement of rectifiers, inverters and fans
- Easy to Configure: Battery adopts 12Vx30/32/34/40 cell design and features flexible configuration. Original battery system can be modified and poor cells can be replaced without affecting UPS performance.

#### Chloride Trinergy
**High Power Modular Scalable UPS**

Chloride Trinergy’s revolutionary architecture comes from incorporating the three industry standard functioning configurations for the first time in one large power UPS:

- Maximum Power Control (Vfi) provides the highest level of power conditioning and protects the load from all electrical network disturbances
- Maximum Energy Saving (VFD) detects when conditioning is not required and allows the energy flow to pass through the bypass line
- High Efficiency and Power Conditioning (VI) compensates the load THDi, PF and main sags and swells

Chloride Trinergy’s unique combination of technology allows it to monitor the environment and operating conditions of the network before intelligently selecting the functioning mode best suited to the line conditions. Chloride Trinergy’s ability to choose the most efficient operating mode based on the different network conditions ensures that the supply to the load remains in optimum condition at all times. This allows the system to achieve extraordinary energy savings, first class performance and maximum power protection.

**Features and Performances**

- Transformer-free design
- Full IGBT double conversion technology
- Excellent input performances - PF > 0.9 - THDi < 3%
- Output Power Factor of 1
- Output Power Factor diagram symmetrical respect to zero
- Permanent 100% kVA - no derating with any load (lagging or leading)
- Optimum space-power ratio
- Automatic output power upgrade up to +10%
- High conversion efficiency (certified up to 99%)

---

**Solutions for the Healthcare Industry**

**New Approaches to Power**

**Modular UPS and Power Management**

- Optimum space-power ratio
- Automatic output power upgrade up to +10%
- High conversion efficiency (certified up to 99%)
Emerson stands alone in its ability to deliver cooling solutions for the Room, Row or Rack, or tailor combinations of any of the three approaches to create optimal solutions for our customers. Regardless of the dimensions of the challenge, Emerson Network Power offers customized cooling solutions for every need.

**Latest Solutions in Cooling**

**Liebert PEX**

*Flexible Adaptive Power Quality Solution for Critical Applications*

Liebert PEX is the next generation room and row cooling system from Emerson Network Power. It has become the ultimate solution by combining the most reliable cooling technologies in the industry - The EC fan and Digital Scroll (DS) compressor technology. EC fan plays an integral role in the Liebert PEX by providing effective capacity control while retaining high energy efficiency and low noise levels. The DS compressor technology in the Liebert PEX enables superior room condition, humidity and temperature control by adapting to changing heat load and latent conditions.

**SmartAisle™**

*Data Center Efficiency Management Platform*

SmartAisle™ is a platform of technologies designed to optimize the efficient design and operation of your data center infrastructure. With SmartAisle™, uniform temperature ensures effective cooling, and provides consistently hot return air for more effective precision cooling system performance. Without aisle containment, hot and cold air mix in both the hot and cold aisles, making the cooling system less effective and less energy efficient.

**Features and Performances**

- Reduces power consumption by up to 32 percent when used with cooling systems that have Liebert iCOM control and variable fan drives or electronically commutated (EC) fans.
- Data centers can be retrofitted for this approach without disrupting operations, and the equipment typically occupies minimal floor space.

**Liebert XD**

*High Heat Density Cooling Solution*

Liebert X-treme Density heat removal system is designed to address the higher heat loads generated by densely populated electronic rack enclosures. It can cool more than 30 kW per rack. Individual modules can improve enclosure airflow or cool hot spots, or zones. The modules in the Liebert XD system use a unique heat rejection process, using a pumped refrigerant. It operates at low pressure and becomes a gas at room temperatures, making it ideal for use around electronic equipment.

A unique XD model is the Liebert XDR which uses no fan energy, a technology which greatly reduces energy consumption and improves efficiency. The Liebert XDR is a fanless heat exchanger module that installs as the rear door of an equipment rack, providing up to 20kW of room-neutral cooling. The Liebert XDR design uses the server fans within the protected rack to provide airflow through the unit. The microchannel coil heat exchanger cools the air and returns it to room at close to the same temperature as the air entering the rack.

**Liebert CRV Row-Based Cooling**

*Intelligent Precision Cooling For Data Center Equipment*

The Liebert CRV is a self-contained precision cooling system that installs within a row of data center racks—close to the server heat source—for the most efficient cooling of critical IT equipment.

**Features and Performances**

- Offers flexibility, energy efficiency, and high value in a self contained, row-based precision cooling unit designed for reliability.
- Fits seamlessly within a row and helps protect high-density equipment by precisely delivering cool air close to the heat source— the servers themselves.
- Designed to work with the SmartAisle™ containment approach, it separates hot and cold airstreams to help maximize cooling unit performance and support increased rack densities using existing equipment.
As a suitable solution for small-to-mid-sized healthcare facilities, Emerson Network Power provides a rack solution with fully integrated power, cooling and monitoring solutions. This space-saving and energy efficient IT infrastructure streamlines your IT operations as it brings together enterprise-level IT protection available to your small computer room or data center.

The modular rack approach is scalable to your compute environment (needs & density) and addresses the core components of your IT infrastructure. Only Emerson Network Power can offer you the advantages of having a fully integrated and pre-engineered solution, from rack to room. By consolidating all your products and services with Emerson, you are assured that everything works together as one configured system.

This integrated rack solution has benefits that are equal to those of large enterprises. Achieving enterprise level network availability is defined by the quality of the installation, management, and ongoing support of the network’s infrastructure. Continuous availability in turn rests on the power and cooling infrastructure that supports these systems and is comprised of the following:

### Power Quality
- **Power Protection:** Liebert GXT True On-line UPS for best-in-class protection with UPS Railmount kit and Liebert Micropod. Redundant configuration for high-availability sites
- **Power Management:** UPS Management Cable enables full integration of the UPS
- **Power Distribution:** Basic and metered Liebert PDU that allows integrated management of branch PDU power, outlet power and outlet switching
- **Surge Suppression:** Provides clean power to your facility

### Monitoring And Management
- **High Availability Monitoring:** Liebert RDU provides fully featured monitoring ability for proactive management at multiple zones within the rack level with “intuitive” navigation and escalation features for maximum communication
- **Sensors:** Full suite of sensors and additional monitoring points including Motion Detection and GPRS communications (Temperature, water leak, humidity sensor, door sensor, USB camera and beacon)

### Proactive Maintenance
- **Support:** Ensuring that the system performs at optimal levels, Installation and StartUp is included with Preventive Maintenance visits. Also includes Standard Warranty for all products
- **Additional Support:** On site and extended warranty offerings as well as Premium 4-hour response time; Preventative Maintenance and Emergency Call Out

### Cooling
- **High Density Cooling:** Liebert XDA for medium and high density applications
- **Room Cooling:** Liebert PEX precision cooling for 24 x 7 close tolerance environmental control including air filtration and humidity control

### Enclosure and Physical Infrastructure
- **Rack:** Innovative rack built on a unique extruded aluminum platform, with a high perforation rate for maximum airflow
- **Rack Accessories:** Blanking panel, shelf, cable management, TFT display and KVM system
IT Performance Optimization

Emerson provides monitoring solutions and assessment services to encourage action-oriented insight, monitoring and management. Knowing what is happening in the data center or computer room and being able to respond is an important part of optimizing your IT infrastructure.

Data Center Audit

The Data Center Audit is a half-day audit of your data center, during which an Emerson expert in data center design and operation compares your infrastructure against more than 50 industry best practices, and identifies your overall risks and capacity challenges.

It entails a visual inspection of your data center, offering insight on general data center characteristics and existing/recommended maintenance practices. The site check-up provides:

- Performance relative to 50+ best practices in five categories: Cooling, Power, Monitoring, Service, and General Facility & Security
- Snapshot of data center health including capacity utilization statistics and opportunities to improve availability and efficiency
- Expert’s observations and recommendations

Data Center Environment Assessment

DCEA is a comprehensive audit that focuses on maximizing the efficiency and uptime of a data center. This service helps customers optimize the utilization of their power and cooling infrastructure. The assessment tools used in the audit measure the airflow and temperature of the room while a CFD simulation is also included. It provides a detailed facility floor plan that shows the location of existing equipment server racks and airflow obstructions.

At the end of the audit, a comprehensive report will be provided, showing points of failure and any potential cooling issues. Moreover, specific recommendations for improvement are included which can be used to protect IT investment, advance airflow and reduce heat within the data center.

DCEA covers the following services:

- Thermal and electrical assessments
- Updated floor plan and equipment list
- Computational Fluid Dynamics (CFD) rendering and generation of a ‘findings & recommendation’ report
- After 3 to 5 days (depending on data center size) of onsite inspection, measurement and data gathering, another three to four weeks are needed for CFD modeling, analysis and report writing.

- Detailed report that depicts a true picture of the customer’s data center with improvement recommendation/s to eliminate hotspots, improve airflow and reduce heat in the data center.
- In-person review of report findings

Data Center Infrastructure Management

Emerson Network Power’s Infrastructure Management products offer a comprehensive data center infrastructure resource management system that revolutionizes the manner in which organizations manage today’s increasingly complex and ever-changing data center environment. It is the only enterprise-wide solution with the capabilities and tools to deliver all aspects of intelligent data center management to assist organizations with the challenges they face. These include:

- Performance Optimization
  An integrated set of tools, products, and services that help data center professionals manage change and complexity while controlling cost and optimizing performance.
- Monitoring and Control
  Real-time acquisition of data from the data center infrastructure and environment. Ability to change operating status of managed devices.

- Management
  An integrated set of tools, products, and services that help data center professionals manage change and complexity while controlling cost and optimizing performance.
Business-Critical Continuity Thru Innovative Transfer Switching and Controls

Emerson Network Power provides complete power protection that enables a robust facility and IT infrastructure. As the global leader in enabling business-critical continuity™, Emerson Network Power integrates its power, cooling and infrastructure management technologies with transfer switching and controls to fully address the needs for clean, continuous and reliable power for the IT infrastructure.

Through its brand ASCO, Emerson provides Automatic Transfer Switches and Power Systems to safeguard data and telecommunications networks, industrial processes and critical installations from health care facilities to financial transaction centers. Over the past 100 years, Emerson has pioneered every major product innovation in power transfer technology. And we’re committed to providing a full range of quality-driven products, backed by 24-hour nationwide service support.

Fast Facts

- ASCO ‘Automatic Switch Company’ was established in 1888, making switches since 1920.
- Closed Transition switches were invented by ASCO in 1966 for Utilities, Transport and US Military located in areas troubled by Tornadoes.
- ASCO products are fully compliant with IEC60947-6-1 and AS/NZS3947-6-1:2001
- High MTBF – ASCO Switches are typically designed for a minimum of 12,000 transfers. In most applications (2 transfers/week), this equates to 1,000,000 hours (approx 115 years!)
- 30 TO 3000Amps

Benefits

- Purpose built automatic transfer switch
- In-Phase transfer, no OFF position required when switching Direct On-line motors which continue to operate during load transfer, this minimises inrush currents, voltage transients and breaker tripping.
- Easy to Install and operate
- Reduced costs of labour
- High reliability and low Total Cost of Ownership
- Fully rated to AC33, no de-rating required

QUICK LOOK AT THE TECHNOLOGIES

What is Open Transition?
Is switching between mains supply and generator supply. With “Break Before Make”, it has a transfer time of 166ms 1/6th second. Open Transition is used predominately for non critical transfers and has a lower cost entry point.

What is Closed Transition?
Is utilized for switching between mains supply and generator without interruption, ‘Make before Break’ has a transfer maximum parallel time of 100ms (5 Cycles). Closed Transition is suitable for live generator testing with actual site load, no requirement for load banks. Energy savings with peak lopping may be achieved.

What is Closed Transition with Bypass?
This is an option that allows Asco 7000 series power transfer switches to be inspected, tested, and maintained without any interruption of power to the load. The transfer switch is a draw out design for ease of maintenance, and can be bypassed to the mains or generator supply.
<table>
<thead>
<tr>
<th>Features</th>
<th>Open Transition (OTTS) – in phase 200 Series</th>
<th>Closed Transition (CTTS) 7000 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Phase Transfer</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Non Break Transfer</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Peak Lopping</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Generator Shunt Trip</td>
<td>n/a</td>
<td>✓</td>
</tr>
<tr>
<td>Approval from Power Utilities</td>
<td>n/a</td>
<td>✓</td>
</tr>
<tr>
<td>Minimise Inrush Current</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Overlapping Neutral Option</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Mechanically Held</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>No Requirement for External Power Source</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Generator Synchroniser Not Required</td>
<td>n/a</td>
<td>✓</td>
</tr>
<tr>
<td>One Control Pair for Generator Start/Stop</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Programmable Control Parameters</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>No Mechanical Interlock Required</td>
<td>n/a</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Fast Guide to ASCO Automatic Transfer Switches**

<table>
<thead>
<tr>
<th>Type of Transfer</th>
<th>Elevator</th>
<th>Motor</th>
<th>Transformer</th>
<th>UPS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Non VFD</td>
<td>VFD</td>
<td></td>
</tr>
<tr>
<td>Open Transition (OTTS) – in phase 200 Series</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Closed Transition (CTTS) 7000 Series</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Generator Requirements for Closed Transition**

- Output Breaker Shunt Trip
- Isochronous Governor (+/- 0.2hz)
- AVR ‘Automatic Voltage Regulator’ +/- 5% of nominal supply
- +/- 5 degrees phase angle difference
<table>
<thead>
<tr>
<th></th>
<th>Australia</th>
<th>Pakistan</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>1800-065345</td>
<td>92-42-36622526 to 28</td>
</tr>
<tr>
<td>F</td>
<td>61-2-97438737</td>
<td>92-42-36622530</td>
</tr>
<tr>
<td></td>
<td>Indonesia</td>
<td>Philippines</td>
</tr>
<tr>
<td>T</td>
<td>62-21-2513003</td>
<td>63-2-7207400</td>
</tr>
<tr>
<td>F</td>
<td>62-21-2510622</td>
<td>63-2-6203693</td>
</tr>
<tr>
<td></td>
<td>Japan</td>
<td>Singapore</td>
</tr>
<tr>
<td>T</td>
<td>81-3-54038594</td>
<td>65-64672211</td>
</tr>
<tr>
<td>F</td>
<td>81-3-54032924</td>
<td>65-64670130</td>
</tr>
<tr>
<td></td>
<td>Korea</td>
<td>Thailand</td>
</tr>
<tr>
<td>T</td>
<td>82-2-34831500</td>
<td>66-2-6178260</td>
</tr>
<tr>
<td>F</td>
<td>82-2-5927883</td>
<td>66-2-6178277 to 78</td>
</tr>
<tr>
<td></td>
<td>Malaysia</td>
<td>Vietnam</td>
</tr>
<tr>
<td>T</td>
<td>603-78845000</td>
<td>84-4-37628908</td>
</tr>
<tr>
<td>F</td>
<td>603-78845188</td>
<td>84-4-37628909</td>
</tr>
<tr>
<td></td>
<td>New Zealand</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>64-3-3392060</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>64-3-3392063</td>
<td></td>
</tr>
</tbody>
</table>

While every precaution has been taken to ensure the accuracy and completeness of this literature, Emerson Network Power assumes no responsibility and disclaims all liability for damages resulting from use of this information or for any errors or omissions.

Emerson, Business-Critical Continuity and Emerson Network Power are trademarks of Emerson Electric Co. or one of its affiliated companies.

© 2012 Emerson Electric Co.
All rights reserved throughout the world.
Specifications subject to change without notice.