Emergency Power System Services

Industrial UPS, Batteries, Chargers, Inverters and Static Switches

EMERSON
Network Power

Downtime Is Not An Option

The industrial uninterruptible power supply (UPS) is the foundation of your emergency power system. Unlike the commercial UPS designed to protect critical IT loads, the industrial UPS protects critical processes, control systems and fire/life safety systems. For applications such as oil and gas, petrochemical and power generation plants, when the power is interrupted, it can cause dangerous chemical process instability, damage to process equipment, or in some cases, the complete shutdown of the facility — costing millions in lost product, damaged equipment, and lost production time.

With so much at stake, it's important to protect your emergency power system by performing routine preventive maintenance — ensuring the maximum reliability of the backup system including the UPS, batteries, chargers, inverters and static switches.

Ensure the Continuous Operation of Your Facility

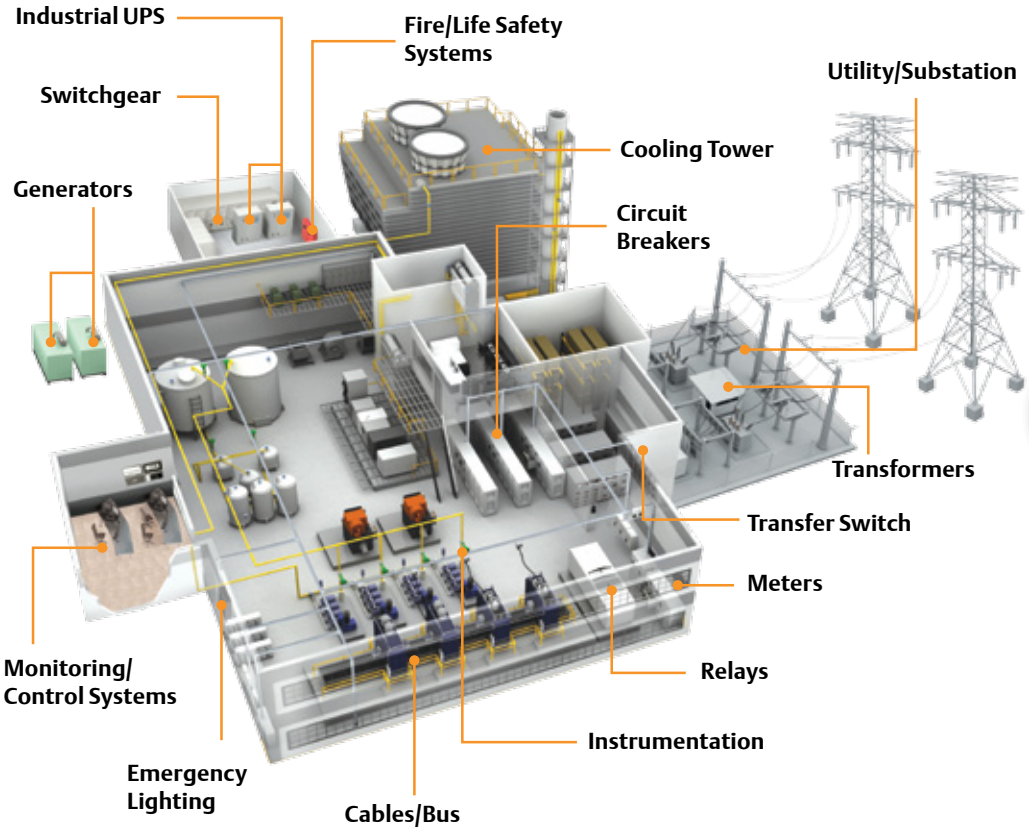
Services for Industrial UPS, Batteries, Chargers, Inverters and Static Switches

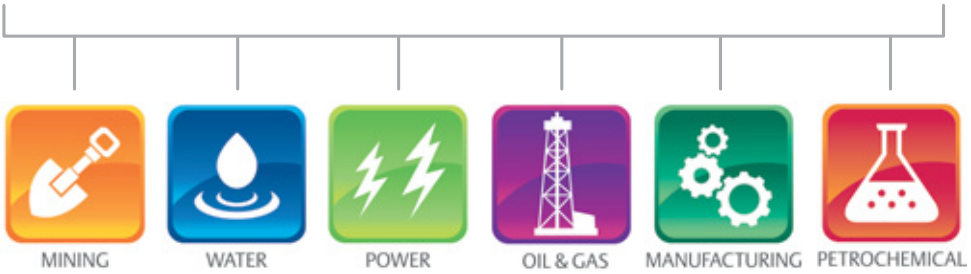
Every emergency power system contains life-limited components that must be maintained according to the manufacturer's specifications. To maximize the life of these components, regular maintenance is critical. An effective preventive maintenance strategy can be one of the most cost-effective measures you can take to ensure the continuous power to both your critical processes and your entire plant.

Emerson's Electrical Reliability Services is an authorized *Chloride*® and *Custom Power* service provider with access to their OEM parts, technical support and design engineering resources. With this expertise, Emerson can provide solutions for Chloride, Custom Power, and any other manufacturer's emergency power system. Emerson offers a wide variety of services to ensure these systems are performing properly and will support the critical load when power is interrupted. Whether you need startup support, routine maintenance or emergency response, we have the personnel and the technical expertise to support your service needs.

- Startup and Commissioning Services
- Maintenance and Testing Services
- Life-Extension Services
- Battery Replacements
- Emergency Services

Protecting Your Critical Assets, Processes and People





RELIABILITY

- Ensure operational reliability with preventive maintenance
- Minimize risk of downtime
- Enhance effective life and backup time of battery

SAFETY

- Improve worker safety
- Improve risk management and reduce catastrophic failures
- Ensure regulatory compliance

COSTS

- Eliminate unplanned outages and lost income as a result of downtime
- Reduce maintenance costs by extending time between planned outages
- Extend life of equipment

Startup and Commissioning Services

New equipment installations require startup and commissioning to ensure your emergency power system has been correctly installed and configured and will perform as designed. Emerson's highly qualified personnel will conduct testing to verify the system operates as an integrated system and will support the critical load during power interruptions. All testing is conducted in accordance with the manufacturer's and NETA's testing specifications. This includes the following tests:

- Visual and mechanical inspection of the equipment including subassemblies, wiring harnesses, contacts, cables and major components
- Electrical and mechanical functional tests
- Thermographic scan to check temperatures on all breakers, connections, and associated controls
- Verification of alarm circuits and indicators for static switch bypass switches

Maintenance and Testing Services

A regular preventive maintenance program from Emerson ensures maximum reliability of your equipment by providing systematic inspections, detection, and correction of incipient failures before they develop into major defects that could translate into costly downtime. Our trained technicians understand the critical nature of working on your emergency power system. All testing will be performed based on the maintenance recommendations from NETA and NFPA for UPS, batteries, inverters, and associated components. Emerson will also ensure compliance with IEEE standards.

UPS Maintenance

We'll test your UPS systems safety functions, control function, batteries and connections to ensure proper operation. This includes a visual and mechanical inspection, thermographic scan, electrical and mechanical interlock systems tests, alarm history review, insulation resistance tests, electronics calibration, verification of alarm circuits and indicators, replacement of life-limited components as required, static transfer tests, battery operation and return test, load balancing evaluation, phase rotation and site wiring checks.

Battery Maintenance

In the event of a power outage, a single bad cell in a string of batteries could compromise your entire backup system and leave you without protection. Frequent battery inspections identify weak or failing batteries. Timely assessments of the cell and string state of health helps identify when batteries need replaced to ensure system reliability. Emerson's technicians and engineers can design a maintenance plan based around tests and procedures that meet the requirements of NETA, IEEE, and/or NERC depending on your application.

Charger Maintenance

Battery chargers ensure that the batteries maintain the appropriate level of charge. Periodic maintenance should verify proper operation and examine interconnection cables, cell connectors, and other conductors for wear, contamination, corrosion and discolorations. Racks should be checked for corrosion, cleanliness and structural integrity.

Inverter Maintenance

Emerson technicians will also inspect and verify the inverter features and functionality including proper operation; input/output voltage and currents; system alignment; and verification of DC bus voltage and ripple on the battery plant.

Static Switch Maintenance

The static switch, also known as the automatic bypass, transfers power during an overload or failure of the rectifier, DC bus or inverter. To ensure the static switch operates within factory specifications, Emerson technicians will verify proper operation and system alignment and record inverter and bypass input voltage and currents to static switch, as well as static switch output voltages and currents.

Parts Availability

Our field service technicians adhere to recommended parts replacement cycles and have access to local OEM spare parts inventory to perform corrective maintenance as required. Technicians can also provide spare part recommendations to reduce downtime should a failure occur.

Emergency Power System Recommended Maintenance

The Electric Power Research Institute (EPRI) estimates the national cost of power interruptions is approximately $80 billion per year to U.S. electrical customers, with momentary interruptions accounting for two-thirds of the total cost. Studies have also shown that nearly 67 percent of all load losses are preventable. Of the 67 percent, failures can be attributed to product design, poor quality, operator error, battery failure, defective parts, and insufficient maintenance. Implementing a preventive maintenance program can be one of the most cost-effective measures you can take to avoid these costly business interruptions and ensure the ongoing health of both your critical equipment and your overall business. Because companies rely on their emergency power system to deliver continuous power without any disruption to their business, a maintenance program, similar to the one outlined below, is critical to ensure that your emergency power system minimizes your risk of downtime.

Batteries

Procedure	Frequency
☑ Conduct visual and mechanical inspection	1 month
☑ Perform battery resistance testing	12 months
☑ Record float and supply voltage measurements	12 months
☑ Inspect electrolytes	12 months
☑ Record specific gravity readings	12 months
☑ Test battery bank capacity including load testing with individual cell monitoring	Per Manufacturer Specifications

Battery Chargers

Procedure	Frequency
☑ Inspect and verify operation	1 month
☑ Examine interconnection cables, cell connectors, and other conductors for wear, contamination, corrosion and discoloration	12 months
☑ Check rack for corrosion, cleanliness and structural integrity	12 months

Inverters

Procedure	Frequency
☑ Inspect and verify operation	1 month
☑ Record input/output voltage and currents	12 months
☑ Verify system alignment	12 months
☑ Record DC bus voltage and ripple on battery plant	12 months

Static Switches

Procedure	Frequency
☑ Inspect and verify operation and system alignment	1 month
☑ Record inverter and bypass input voltage and currents	12 months
☑ Record output voltage and currents	12 months

Automatic Transfer Switches

Procedure	Frequency
☑ Perform functional testing	2 months
☑ Inspect physical and mechanical condition	12 months
☑ Inspect bolted electrical connections	12 months
☑ Perform manual transfer operation	12 months
☑ Verify positive mechanical interlocking between normal and alternate sources	12 months
☑ Perform insulation resistance tests, contact/pole-resistance tests	12 months
☑ Verify settings and operation of control devices	12 months
☑ Calibrate and set all relays and timers	12 months
☑ Perform automatic transfer tests to simulate loss of normal power, return to normal power, simulate loss of emergency power, and simulate all forms of single-phase conditions	12 months
☑ Verify correct operation and timing of relays, engine start sequence, time delay upon transfer, automatic transfer operation; interlocks and limit switch function; time delay and retransfer upon normal power restoration; engine cool down and shutdown feature	12 months

Uninterruptible Power Supply

Procedure	Frequency
☑ Conduct visual and mechanical inspection	1 month
☑ Perform functional testing	2 months
☑ Thermographic scan of breakers, connections, and associated controls	6 months
☑ Perform electrical and mechanical interlock systems tests	12 months
☑ Review alarm history	6 months
☑ Inspect filters and vents	6 months
☑ Measure insulation resistance, voltage readings for input/output and bypass; measure power supply levels and harmonic currents	6 months
☑ Calibrate electronics to system specifications	12 months
☑ Verify alarm circuits and indicators for static switch and bypass switches	12 months
☑ Replace life-limited components as required	12 months
☑ Test static transfer from invert to bypass and back	12 months
☑ Verify battery operation and return tests to UPS, generator, and ATS functions	6 months
☑ Evaluate load balancing	12 months
☑ Check phase rotation and site wiring	12 months

Life-Extension Services: Retrofit. Renew. Replace.

Over time the components comprising your emergency power system will eventually become worn or obsolete. These systems have higher maintenance requirements, pose higher safety risks for your personnel, and are at greater risk for failure.

Emerson's life-extension services transform older equipment to like-new condition, delivering enhanced efficiency and reliability — effectively extending the life of your system and your warranty. All renewed systems come with a one year installed parts warranty and 90 days labor warranty.

UPS Renewal Services

Our factory-authorized technicians will perform the following services to restore your emergency power system to OEM specifications:

- Modernize control systems for the UPS, inverter, and/or battery charger
- Replace most major components including printed circuit boards, chokes, meters, potentiometers, relays/sockets, LEDs, switches, push buttons, fuses and timers
- Test and calibrate to OEM specifications

Battery Replacement Services

A successful maintenance plan takes into account the age and actual wear of a UPS to determine where a specific device is relative to its expected life cycle. It also helps budget for major replacement items like batteries or capacitors. Proactively replacing your batteries will help to keep your power system running within specifications and minimize the risk of downtime to your business operations. Emerson offers complete battery and capacitor replacement solutions including both expert installation of new cells and proper recycling of spent batteries and capacitors.

Emergency Services

To assist customers in resolving emergency situations for emergency power systems including UPS, battery systems and inverters, we offer 24/7 on-site emergency service within specified service areas. In the event of a power failure, experienced support professionals will respond with the expertise and proper equipment to troubleshoot the problem and get you back online quickly and safely.

“Implementing a regular preventive maintenance program has paid for itself many times over. ERS identified and corrected many issues before they led to costly repairs and unexpected downtime. And after having our older systems restored to OEM specifications, we can sleep at night knowing our critical processes are protected. We’re confident that our emergency power system will operate when needed minimizing costly business interruptions.”

International Refining Company

Electrical Reliability Services — Your Partner for Success.

Experience You Can Trust

For more than 40 years we have been providing electrical testing, maintenance and engineering services to more than 15,000 valued repeat customers in the industrial, refining, chemical, power, oil & gas, water/wastewater, food and beverage, life sciences, data centers, education, and healthcare industries. Take a look at our proven track record and discover how we can help ensure your success.

Your Accredited Partner

As a full charter member of the InterNational Electrical Testing Association (NETA), you are assured that the people working on your equipment are trained and qualified. And, as an active participant in the national standards organizations such as the National Fire Protection Association (NFPA), National Electrical Code (NEC), and the Institute of Electrical and Electronics Engineers (IEEE), you know that all test and inspection procedures are done in accordance with industry and regulatory standards.

When and Where You Need Us

With strategically located service locations across the U.S. and the largest national service workforce comprised of professional engineers, electrical engineers, and NETA-certified field technicians, you are assured that we can respond when and where you need us.

Comprehensive Service & Support

Whether you need startup support, routine maintenance or emergency service, you can count on Emerson to deliver complete life cycle service and support for all your electrical assets. And, as the authorized Chloride and Custom Power service provider, we'll ensure your equipment operates within factory specifications – ensuring continuous power to all your critical operations for years to come.

Visit ElectricalReliability.com to learn more about our services.

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Ordering information

To learn more about this service and other Emerson Network Power solutions, please contact your local Electrical Reliability Services sales representative office or visit www.electricalreliability.com. In the U.S., call 1-877-468-6384.

Emerson — Your Partner in Reliability

From installation to operation, only Emerson has the knowledge and experience to seamlessly integrate all the essential services to deliver "high nines" reliability required by today's critical facilities. Look to us as your partner. We'll be with you every step of the way with the right combination of technology, people, and services. Contact Emerson to realize the true potential of your assets.

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