



VERTIV WHITE PAPER

Streamlining Compliance with an Automated Battery Resistance and Capacity Testing Solution

How Albér™ Battery Capacity Testing Interface Enhances Business Continuity for Utilities and Industrial Companies

Utilities and industrial companies in North America are governed by multiple regulations and standards. For utilities, an important one is the North American Electric Reliability Corporation (NERC) Reliability Standard PRC-005-6.

NERC standards provide minimum requirements for the reliability, efficiency, safety and risk management of North American bulk power operations. PRC-005-6 governs bulk power system owners, operators and users. This standard requires the testing of components, component types and segments used in bulk power operations, including station DC supply associated with protective functions (such as stationery batteries). PRC-005-06 is enforced by six regional entities, which monitor compliance, assess penalties for non-compliance and oversee mitigation strategies. When penalties are assessed, they can be costly, ranging from hundreds of thousands of dollars to a million dollars or more if multiple standards are violated.

Across all organizations, regularly testing batteries used in critical data center applications is best practice. Many follow IEE 450 recommendations for maintaining, testing and replacing vented lead-acid (VLA) batteries to ensure their quality, optimize performance and replace them proactively.

Meeting NERC PRC-005-6 Requirements

Who's affected?

- Power generation entities with geographically dispersed power producing resources with a capacity greater than 75 MVA
- Transmission and distribution entities with facilities operated at or above 100kV

What they must do: Establish a Protection System Maintenance Program (PSMP) with one or more of the following activities:

- Verify that a component specified by the regulation is functioning properly.
- Monitor its routine in-service operation.
- Test its functional performance or output behavior to diagnose any problems.
- Inspect the component for signs of failure, reduced performance or degradation
- Calibrate the component's operating threshold or measurement accuracy of a measuring element to ensure it meets the intended performance requirement

What Data Center Power Outages Cost Organizations

According to the Uptime Institute Annual Outage Analysis 2021:

- 119 global data center outages were reported in 2020.
- 36% were caused by an electrical or mechanical failure.
- Four in 10 of all outages cost between \$100,000 and \$1 million.
- One in six costs over \$1 million.

Backup Power Supplies Protect Vital Business Operations

Organizations want to avoid costly power outages due to the failure of backup power systems, which are powered by stationary batteries. As digital business demands increase, data center outages are increasingly taking company workforces and customers offline, harming productivity and revenues. Utility outages, of course, can take down neighborhoods, communities, and regions.

Monitoring and testing batteries used in uninterruptible power supplies (UPSs) and other applications thus makes good business sense, in addition to meeting regulatory and industry standards. While automated monitoring solutions for testing battery internal resistance are easy to find on the market, it's a different story for solutions that test capacity. Utility and industry companies either rent equipment and perform these tests manually or hire third-party contractors to perform capacity tests and routine maintenance. These capacity tests occur on a prescheduled basis, ranging from annually to every five years.

Scaling Battery Capacity Testing with Automated Processes

Engineers at small data center facilities may be able to use manual processes and match pace with increased maintenance and testing requirements. However, many utilities and industry companies use stationary batteries at hundreds to thousands of locations. For these organizations, manual testing isn't feasible or desirable.

Fortunately, there's an easier way to meet regulatory requirements and industry standard recommendations: automated testing. Vertiv is proud to announce the launch of Albér™ Battery Control Testing Interface (BCI). The solution integrates seamlessly with Albér™ Universal Xplorer Industrial (UXIME) to provide both internal resistance and capacity testing, providing greater visibility into battery performance.

Let's take a closer look at what's now possible with Albér™ BCTI and Albér™ UXIME.

Albér™ BCTI and Albér™ UXIME -- A Single Integrated Solution for Two Critical Battery Testing Procedures

Battery Internal Resistance Testing

Integrated solution: Albér™ BCTI and Albér™ UXIME

Tests performed: 24/7 monitoring of cell health, ohmic resistance to battery current.

How performed: Automated processes with Albér™ BCTI.

Timeframe: Typically performed every 30 days.

Standards satisfied:

- NERC PRC-005-6
- IEEE 450 recommended practice

Major benefit: Provides early warning of battery issues.

Battery Capacity Testing

Device: Previously required a stand-alone capacity tester (BCT) that interfaced with a load bank.

Now, can be performed by Albér™ BCTI and Albér™ UXIME, seamlessly integrated load controller hardware and a stationary battery monitor.

Test performed: Read battery capacity to determine battery end-of-life (which is at 80%).

How performed: Previously, required a temporary installation of a BCT device and the work of two technicians for 1-2 days.

Now, can be fully automated with Albér™ BCTI and Albér™ UXIME.

Timeframe:

- Upon initial installation
- Within the first two years
- Annually to every five years
- Annually if signs of battery degradation or at 85% of service life

Standards satisfied:

- NERC PRC-005-6
- IEEE 450 recommended practice

Major benefit: Determines when batteries are end-of-life, so they can be proactively replaced before failing and harming infrastructure performance.

Benefits of Adopting a Single Solution for Internal Resistance and Capacity Testing

So, what are the benefits of using Albér BCTI and Albér UXIME to perform both internal resistance and capacity testing? Using a single, integrated battery monitoring solution:

Avoids costly outages: With automated testing, utility and data center teams can perform testing whenever necessary – not just on a scheduled basis. That means teams can develop real-time insights into battery capacity, have documents to support audits and avoid disabling outages. For both data centers and utilities, continuous power availability protects service to customers. For utilities, ending outages due to backup power supply failures also prevents costly fines and penalties.

Saves money and time: While legacy capacity testing processes require third-party technicians and equipment, tests can be automated moving forward with Albér BCTI and Albér UXIME. That adds up to labor and equipment savings across every test, battery, site and network of facilities, which can be considerable.

As just one example, technicians no longer need to attach sense leads on up to 256 cells for each string tested, which is extremely time-consuming and increases safety risks. As a result, testing processes are streamlined from one to two days to under 20 minutes with Albér BCTI and Albér UXIME, saving time and simplifying testing operations.

Helps organizations plan budgets accurately: All organizations want to plan operating expenses, such as testing costs, accurately. For utilities, there is an extra burden, since their budgets are tightly regulated and scrutinized, and their ability to pass on cost increases is a multi-year, stakeholder-driven endeavor. By deploying a single battery monitoring solution, utilities gain by reducing OpEx expenses after initial device purchase, with testing savings adding up year after year.

Can be used to scale testing operations: Automation enables utilities and data centers to easily schedule and scale testing across all of their locations. Since tests are fast and seamless, they should also be easier to schedule in a manner that's less interruptive of daily operations than interfacing with third-party technicians who perform testing services.

Helps manage battery lifespan proactively: Continuity of service at utilities and data centers is mission-critical. Conducting regular capacity testing of batteries is the only way to determine batteries' true health and lifespan. By so doing, teams can actively manage out failing batteries. They also can change out individual cells that are failing to extend battery lifespans, avoiding unnecessary and costly replacements. Finally, teams don't need to overprovision batteries because they accurately understand current capacity.

Improves technician safety: Since capacity tests can now be automated, technicians don't need to handle battery connections. That eliminates the risk that technicians will touch live voltage, which can result in harm if staff aren't wearing the proper personal protective equipment (PPE).

Enhance data consistency: Manual testing approaches may vary across technicians. Automating capacity testing provide highly accurate, consistent data that can be used to establish battery performance baselines and measure changes over time.

Why Deploy Albér™ BCTI and Albér™ UXIME Together

Albér™ BCTI and Albér™ UXIME is a fully automated stationary battery monitoring solution that now offers both internal resistance and capacity testing for utility and industrial applications. Standard configurations are specifically designed for utility substations' 120V and 480V applications. As such, the device can be used to meet NERC PRC-005-6 requirements and IEEE 450 recommended practices for battery maintenance and monitoring.

Albér BCTI enables constant current and power testing by automating load control. Albér UXIME, the stationary battery monitor, collects, processes and reports data. Together, the integrated solution provides real-time data capture of all key variables teams need to measure battery performance. The solution also offers multiple remote communications and alarm options, alerting teams when preset battery parameters have been breached. By so doing, teams can take fast actions to replace battery cells or the batteries themselves. In addition, it provides real-time, accurate that enables teams to maintain complete, accurate maintenance records.

Teams that use Albér BCTI with Albér UXIME can thus improve business continuity and enhance operational performance over time.

Five Quick Steps to Get Started

Want to automate internal resistance and capacity testing with Albér BCTI and Albér UXIME? Here's how:



Install the solution at all facilities that require battery internal resistance and capacity testing



Connect the stand-alone solution to Albér™ UXIME, which should already be connected to a VLA/VRLA battery requiring testing



Use any of eight different configurations to meet more testing requirements, up to 62 cells and 12V and 6V VRLA modules



Set testing and maintenance intervals



Remotely monitor key component attributes and alarms

Conclusion

Regulations are constantly changing, typically increasing requirements for covered organizations such as utilities and industrial companies. In addition, many organizations are experiencing fast-paced growth due to digital transformation, meaning they are leasing and building new data center capacity around the globe. Adopting automated capacity testing now with Albér™ BCTI and Albér UXIME enables teams to create scalable processes. That will help them meet business and regulatory requirements in any market condition, while improving their operational efficiency and cost structure starting today.

Learn more about Albér BCTI.

¹Nand Singh, NERC Reliability Standard PRC-005-6 (A Compliance & PSMP Primer), page 3, presentation, <http://minmaxtech.com/wp-content/uploads/MinMax-PRC005-Presentation-20200531-1100.pdf>
²Enforcement Actions 2019, North American Electric Reliability Corporation (NERC), web page, undated, https://www.nerc.com/pa/comp/CE/Pages/Actions_2019/Enforcement-Actions-2019.aspx
³Nand Singh, NERC Reliability Standard, ibid, page 15.
⁴Annual outage analysis 2021, Uptime Institute, report, pages 3, 8, 9, <https://uptimeinstitute.com/annual-outage-analysis-2021>



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