SENTINEL

ENCELL technology

Battery Management System

About Encell Technology, Inc.

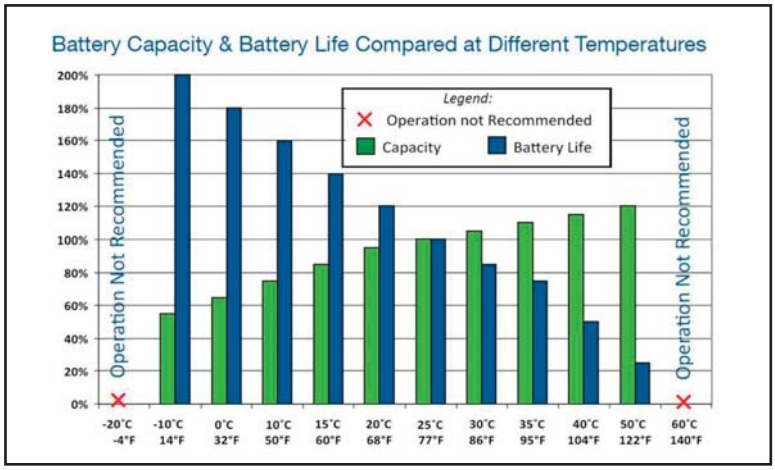
At Encell Technology, we have a vision. We see an energy future that is far less reliant on the old ways of generating energy and increasingly committed to using alternative sources such as wind, solar, and wave. We see a future where this energy can be provided at a cost that is as low or lower than current fossil-fuel or nuclear sources, and with far less impact on our environment. But before we reach that future we have to solve the energy storage challenges that these alternative sources create.

We were founded in 2006 with a goal to address these challenges. We design battery storage, monitoring and management systems and have developed a family of green and safe products uniquely suited to the requirements of several rapidly growing market segments, including wireless communications, cloud computing, mobile technology, automotive, healthcare and alternative energy such as wind, solar and wave. Our innovations include patents for battery designs, chemistries, and management tools and enable a complete approach to efficient and renewable power storage that no other available system provides.

The Challenge: Battery Degradation

Where power systems are concerned, reliability means profitability. And that reliability is dependent on quality battery backup systems. Sadly, most businesses dependent on these batteries have often had to juggle between high maintenance costs and good service. If the business is national in scope, keeping track of hundreds or thousands of these batteries can be a very expensive proposition indeed. In many cases, trying to manage these batteries has given way to simply replacing them on a preset schedule, whether they need replacing or not. In other cases, unmonitored batteries may fail before they are scheduled for maintenance, leaving no backup solution in place. Both are also very expensive propositions.

Standard systems typically use lead-acid battery stacks to supply backup power. These may be effective initially, but they lose performance when they are used, even over short periods of time. The continuous charging current takes years of life off these batteries; their temperature is raised by constant overcharging which causes grid corrosion, dehydration and positive active material degradation, reducing capacity and power still further. There is also the risk that high temperatures from overcharging can also cause thermal runaway resulting in rupture, gassing and even an explosion.



The Solution: Active Battery Management

Drawing on our seventy-five years of battery design experience, Encell Technology has developed an active battery management solution called the Sentinel that manages and extends the life of your lead acid batteries. The Sentinel is designed to work in harmony with current backup and power systems to protect them from damage due to constant overcharge and its resulting heat, grid corrosion, gassing and active material degradation. It protects lead acid investments, extends their lifespan, monitors and tests back-up power state of health of lead acid battery banks, and provides information that saves technicians time and companies money. Encell's technology not only offers real operational savings, but also reduces lead acid purchasing cycles and lowers energy consumption at each location.

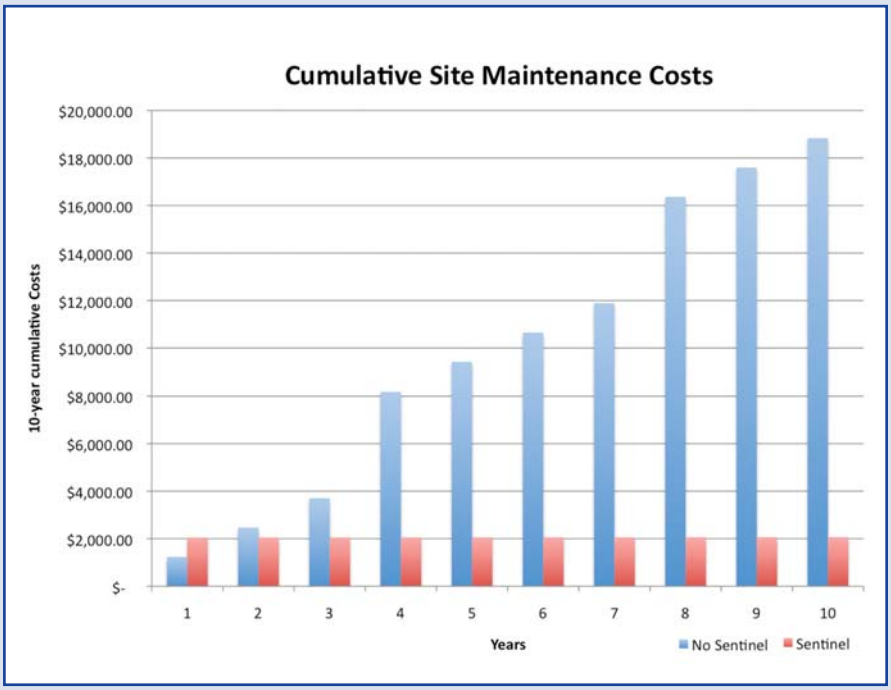
Warning data is delivered without a maintenance visit in real time via IP-based monitoring tools so that weaker batteries can be replaced before they can fail unpredictably. Healthier batteries last longer. Our charging and testing regimen removes stresses on batteries that shorten life and isolates them from overcharge.

The Sentinel substantially extends the life of new and seasoned lead-acid batteries. Our game-changing approach to monitoring and maintaining lead-acid batteries drastically reduces downtime as well as the cost and frequency of onerous maintenance.

The Result: CAPEX and OPEX Reduction

The Sentinel's automated service and maintenance regimen substantially reduces battery replacement purchases, which ultimately helps reduce the MNO's overall capital expenditures (CAPEX). In addition, the Sentinel's remote monitoring solution provides the MNO with valuable information on the state of health of the batteries and the true state of back-up availability at the BTS without requiring a site visit by a technician. These capabilities reduce the MNO's operating expenses (OPEX) by reducing site visits and enabling the MNO to plan maintenance visits that are still required more efficiently. Our innovative approach to battery management and monitoring drastically reduces network outages and the resulting lost revenue, reduces the cost and frequency of onerous reactive maintenance visits due to battery problems at the BTS and helps improve the MNO's level of service to its customers.

Financial Benefits of the Sentinel



Encell's Sentinel provides significant financial value as well. Our value proposition is grounded in firm financial returns that will enable an informed investment in our technology. We welcome the opportunity to develop a case by case ROI and TCO analysis to aid in any capital budgeting decision.

Capital Budgeting Metrics - Short ROI payback and an IRR in excess of 75%

CAPEX Avoidance - By extending the life of existing batteries, the Sentinel™ protects battery investments and reduces the number of purchase cycles of batteries required to meet backup needs.

Maintenance and Operating Cost Reduction – Remote monitoring means fewer technician visits. This saves substantial maintenance costs.

Reduced Power Consumption - Energy use at the tower is reduced with the elimination of float charging and the need for cooling to offset the resultant heat generation.

Key Features of the Sentinel

Lead Acid Battery Life Extension

- Reduces internal temperature and exercises the batteries to eradicate internal corrosion failure
- Encell's proprietary charging algorithms keep lead acid battery stacks in optimal state, extending useful life

Powerful Remote Management

- 'State of Health' monitoring tests lead acid battery stack's individual batteries
- Eliminates the affect of interference from constant float charging that impairs current monitoring techniques allowing the most accurate measurement possible.
- Tests are automatically run every twenty-four hours and can be monitored remotely
- Through our daily reporting dashboard, batteries' state of health can be accurately determined and corrective action taken without a single truck roll or maintenance visit

Environmental Safety

- Gassing and sulfuric acid spillage are virtually eliminated because the Sentinel™ takes the lead acid batteries off of the buss enabling them to sit in a safer standby mode
- The potential for acid spills is virtually eliminated

Reduced Environmental Impact

- Reduces the need for environmentally "unfriendly" lead acid batteries over time by increasing the useful life of these batteries in the field
- Improves energy consumption at the tower by removing float and trickle charge requirements

Battery Isolation

- Batteries are isolated from the DC power system in an off float-charge manner that preserves life while maintaining their availability to deliver immediate back-up power when needed

Patented Maintenance Regime

- Maintains batteries off of constant float charge and charges batteries only when necessary and only for as long as necessary, extending their useful life and reducing the energy consumption needs

Reduced Gassing, Grid Corrosion and Positive Plate Softening

- Maintenance regimen lowers the risk of gassing and grid corrosion by reducing battery temperature
- Reduced battery activity reduces the softening of the positive plate, resulting in healthier batteries that will last longer

Specifications - Sentinel 48V

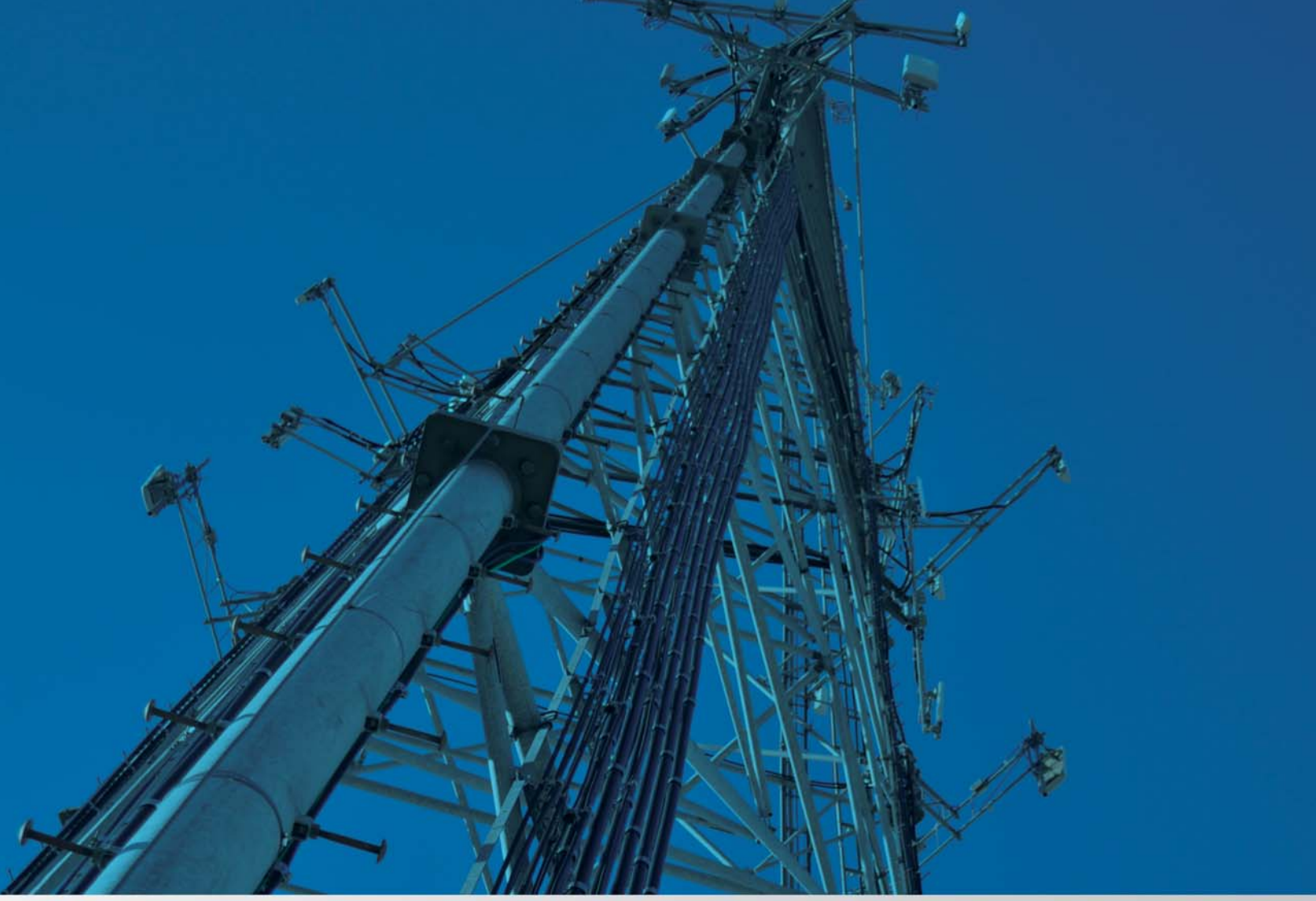
Weight	8.2 kg
Dimensions (H x W x D)	360 mm x 311 mm x 156 mm
Maximum Conduit Hole Trade-Size	2 @ 38 mm
Nominal Bus Voltage	48V
Maximum Non-Repetitive Peak Current per String	100A
Maximum Continuous Current per String	50A
Maximum Allowable System Continuous Current	200A
Nominal Battery Voltage	12V
Battery Type	Sealed Lead-Acid
Maximum No. Battery Banks (Strings)	4
Maximum Number of Batteries	16

Note: Customer will need to specify number of battery banks (strings) to have system factory pre-configured.

Ingenuity Powering the Future

ENCELL technology

ENCELL Technology, Inc.
1412 Sachem Place, Suite 204
Charlottesville, VA 22901
434-975-2355
www.encell.com encelltechnology@encell.com



SENTINEL

ENCELL technology