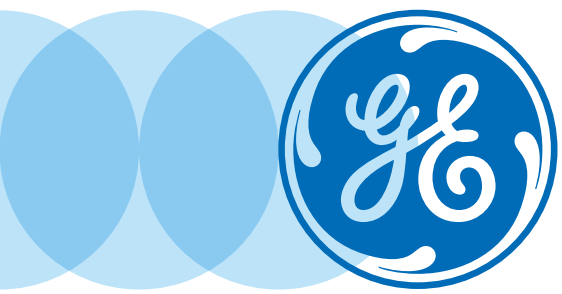


Battery Monitoring System

Battery management at its best



GE's Battery Monitoring System

If you're operating mission critical systems relying on the protection of a UPS and battery bank, battery monitoring is essential. It's about peace of mind – knowing that the batteries are healthy and being constantly monitored. Knowing that everything has been done that can be done, to protect your enterprise from the consequences of a power failure.

All batteries will fail, it is just a matter of time

It only takes the failure of one battery to compromise the entire battery string. It is often assumed that batteries are meticulously maintained, but this is rarely so. Many batteries are not inspected or maintained beyond an annual UPS service visit. Unknown and undetected battery failures become apparent right at the time when you need the batteries the most – during a mains failure.

UPS systems provide only rudimentary battery monitoring. The UPS cannot identify faults within individual batteries, nor detect an imbalance in the performance of multiple strings. To ensure the integrity of the battery system, it is necessary to detect failing blocks before they affect the performance of the entire system. The effectiveness of a battery monitoring system is proportional to the number of points that are monitored and the frequency that this occurs. With regular monitoring comes the accumulation of data, the ability to report and spot trends, and the ability to take timely remedial action.

GE's Critical Power business provides the most advanced and most cost-effective tool for monitoring and managing stand-by battery banks. GE's continuous data sampling, reporting and battery management capability delivers reduced costs, gives peace of mind, and most importantly - ensures that you have batteries that perform when needed.

Critical Power – when and where it matters the most

GE is trusted throughout the world to help protect the power supply of data centres, banks, hospitals, telecommunications operators, and a wide range of major commercial and industrial enterprises.

The GE Battery Monitoring System takes a modular approach to battery monitoring. This means that by selecting from a range of options, the system can be tailored to meet your specific requirements. Maintenance free VRLA or wet cells, lead acid or Nicad - Critical Power has a solution for your battery.

**The more critical your environment -
the more essential battery monitoring will be**



Understanding your batteries

Individual battery voltage

Incorrect charge voltages may result in loss of capacity, accelerated grid corrosion, excessive gassing and premature end of life. Voltage also identifies catastrophic failures, such as short circuit cells, and gives true visibility of performance under discharge.

Ambient temperature

A battery's life-span is normally specified at 20 or 25 degrees centigrade. Temperatures outside of the specified range can significantly affect the battery's corrosion rate, and therefore the life of the battery. An 8-10deg temperature increase can decrease battery life by 50%.

String current

String current monitoring measures the energy delivered or accepted by each battery string. A UPS will only measure total current and cannot detect imbalances between strings. An imbalance highlights potential problems within a battery string. String current measurement also allows detection of incorrect battery charging and any significant earth leakage faults.

Total string voltage

Tracking the string voltage confirms the charger is on and performing correctly.

Individual battery impedance (ohmic value)

The impedance of a battery will increase with age. High impedance results in a battery that cannot supply the required current – its key task. High impedance also highlights poor connections and open circuit batteries before failure. Batteries can fail in a very short period of time (less than a week) so measuring impedance daily allows you to detect faulty batteries without the need to discharge them.

By trending impedance you can accurately determine the end-of-life of the battery.

Battery temperature

Measuring the temperature of each battery highlights localised environmental problems through poor HVAC.

It can also highlight poor connections and excessive charger ripple. Temperature is a critical parameter for NiCad batteries. Most importantly, battery temperature measurements allow the early detection of thermal runaway.

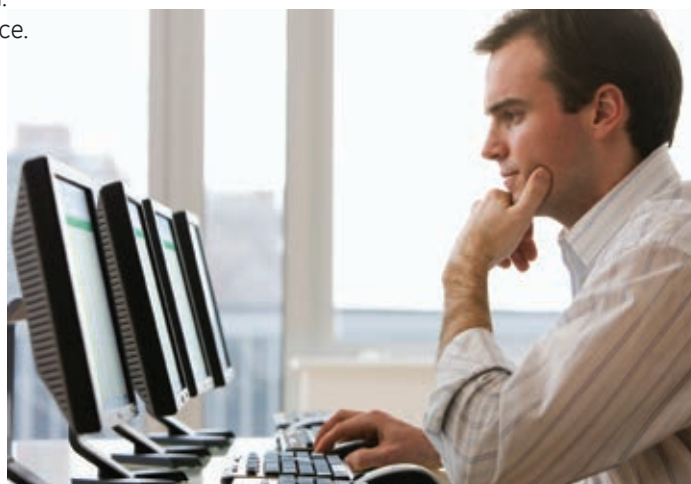
Many UPS failures are due to undetected battery problems

The financial benefits

By definition, wherever there is a bank of batteries, there is a mission-critical environment being protected. It follows that if the batteries are unable to perform when they are needed, the consequences and costs are going to be serious. Power failures happen all too often and at a time like that the investment in the UPS, battery bank and battery monitoring system needs no further financial justification.

However, even in day-to-day operation, GE battery monitoring provides a strong return. The following cost savings are worth considering:

- *Fewer batteries to purchase* - through extending the service life of the ones installed.
- *Reduced manpower* - through automation & reduced number of discharge tests.
- *Reduced call-out charges* - through effective preventive maintenance.
- *Planned battery purchasing* - through avoiding emergency replacements.
- *Reduced travel and time* - through remotely accessing status data.
- *Successful warranty claims* - through having documentary evidence.
- *Reduced insurance premiums.*



Battery Monitoring features

- 24/7 alarm notification.
- Automatic capture and recording of data during float, charge & discharge.
- Rapid voltage sampling - all batteries simultaneously every 4 seconds.
- Planned battery purchasing - through avoiding emergency replacements.
- Built in intelligence for battery state recognition and comparable impedance readings.
- Temperature compensation.
- User defined alarm limits.
- On-board memory.
- 750 VDC optical isolation.
- VRLA, VLA, Nicad.
- Flexible to suit battery model & application.

Data presentation is the key for efficient management

A single battery monitoring system can monitor up to 1,280 batteries. Connecting multiple systems via Digital Energy Link battery management software gives visibility to an unlimited number of batteries from a single desk.

Digital Energy offers:

- WAN/LAN integration for remote monitoring via Link software.
- RS 232 connection for local battery service & diagnosis.
- SNMP or Modbus interface to Building Management Systems.
- Dry contacts for alarm output.

Ensure that you can see and understand what is happening in your battery room

Link battery management software

- Proactive management tool
- Real time battery status
- Alarm & activity log with on-screen pop-ups and email alerts
- Live discharge display
- Automated data management
- Battery history database for life trending
- Point & click report generation



Permanent monitoring not only offers increased measurement frequency and consistency, it allows this to be done with greater safety and security. Keep personnel out of hazardous battery rooms and away from sensitive plants & operations. Simplify your health & safety planning and focus on your core operations.



Technical specifications

Sentinel Monitor

The monitor captures, processes and stores data from a range of sensors.

This includes monoblock voltages, impedance and temperature, string voltage and current, plus ambient temperature.

Power supply	24V DC Model: 11V - 33Vdc, max. 0.8A 48V DC Model: 20V - 65Vdc, max. 0.4A 72V DC Model: 55V - 140Vdc, max. 0.15A AC Model: 110V - 240Vac, 50/60Hz, max. 0.15A	Memory	350,000 data points
Battery inputs	up to 160 (scaleable to 1280)	Physical dimensions	Width: 430mm / 17 inches (19" rack compatible) Depth: 270mm / 10.6 inches Height: 45mm / 1.8 inches (1U)
Sensor type	Measure Module or m-Sensor	Operating temperature	0°C to 50°C / 32°F to 122°F
String voltage	2V-1000V	Storage temperature	0°C to 70°C / 32°F to 158°F
Current inputs	up to 5 (scaleable to 16)	Service port	RS232
Sensor type	Hall Effect	Comport 1 (optional)	Primary monitoring connection with option of: Ethernet - 10Base-T RS232 Wi-Fi
Measurement range	0A - 2000A	Comport 2 (optional)	Building management interface with option of: RS485 or RS232 interface Modbus ASCII or Modbus RTU protocol SNMP Modbus TCP
System accuracy	±1% + sensor accuracy		
Maximum distance	15m / 50ft ¹		
Temperature inputs - ambient	up to 5 (scaleable to 16)		
Measurement range	0°C to 80°C / 32°F to 176°F		
System accuracy	±1°C / 1.8°F		
Maximum distance	15m / 50ft		
Digital inputs	4		
Relay outputs	4 voltage free		
Rating	1.15 @ 24 Vdc		
Selectable	Any relay configurable to any alarm		

m-Sensor

Dual and Single Input

Purpose	Measures individual monoblock voltage, impedance and temperature			
Application	VRLA and vented lead acid, Ni-Cad cells			
Nominal voltage	Ni-Cad	2V	6V	12V
Voltage measurement range	0.8V - 1.9V	1.6V - 2.6V	4.8V - 7.8V	9.6V - 15.6V
- Accuracy	± 0.3%	± 0.3%	± 0.2%	± 0.2%
- Resolution	0.001V	0.001V	0.005V	0.005V
Impedance measurement range	0.15 - 5.00mΩ	0.15 - 5.00mΩ	0.50 - 20.00mΩ	1.00 - 40.00mΩ
- Accuracy	± 2.5% ± 15uΩ	± 2.5% ± 15uΩ	± 2.5% ± 25uΩ	± 2.5% ± 25uΩ
- Resolution	1uΩ	1uΩ	1uΩ	1uΩ
Temperature measurement range	-4°C to 70°C / 24.8°F to 158°F			
- Measurement location	Negative post of battery (Variable - Pilot to 1 per battery by demand)			
Maximum input voltage	± 5V	± 6V	± 25V	± 65V
Power supply current	50mA	30mA	18mA	18mA
Isolation	750 Vdc ²			
Power supply	Powered by monoblock being monitored			
Interface to Sentinel	PowerShield BBUS II (maximum 150m/492ft per BBUS port)			

Link Battery Management Software

Recommended³ minimum PC system requirements for Link Software:

Processor	1GHz or better x86 or x64 processor
Operating System	Windows XP professional or later
RAM	2GB 32 bit or 4MB 64 bit
Hard Drive	Single SATA 2 hard drive or better. 160GB with 20GB available hard disk space
Monitor	1024 x 768 or 1366 x 786

- 1 Greater distances may be used in a benign electrical environment
- 2 Design rated to 750 Vdc. UL certified to 600 Vdc
- 3 Recommended for up to 5 Sentinel sites, with single seat operation. Refer to GE Critical Power for larger configurations



GE
Industrial Solutions

GE Industrial Solutions is a first class global supplier of low and medium voltage products including wiring devices, residential and industrial electrical distribution components, automation products, enclosures and switchboards. Demand for the company's products comes from wholesalers, installers, panelboard builders, contractors, OEMs and utilities worldwide.

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