



Battery Monitoring for NERC Compliance



Monitoring Solution for NERC

The Vigilant Expert is Eagle Eye's complete battery monitoring solution for NERC PRC-005-6 compliance. This standard requires utilities to document and implement programs for the maintenance of all protection systems affecting the reliability of the bulk electric system (BES).

Under NERC PRC-005-6, battery maintenance falls under Table 1-4(f) "Exclusions for Protection System Station DC Supply Monitoring Devices and Systems" with no maximum maintenance interval. This table outlines the monitoring and alarming requirements needed to alleviate periodic maintenance activities.

Eagle Eye's solution is designed to meet each of PRC-005-2's requirements my monitoring and alarming for each requirement attribute listed below:

NERC PRC-005-6 -Table 1-4(f)

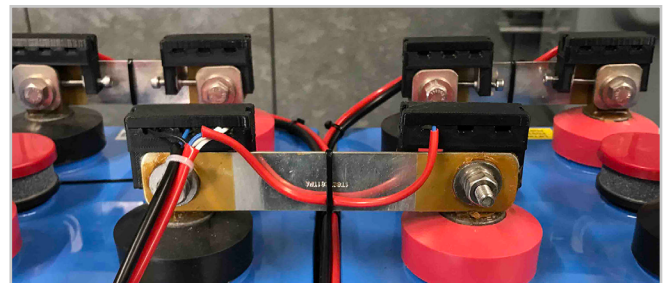
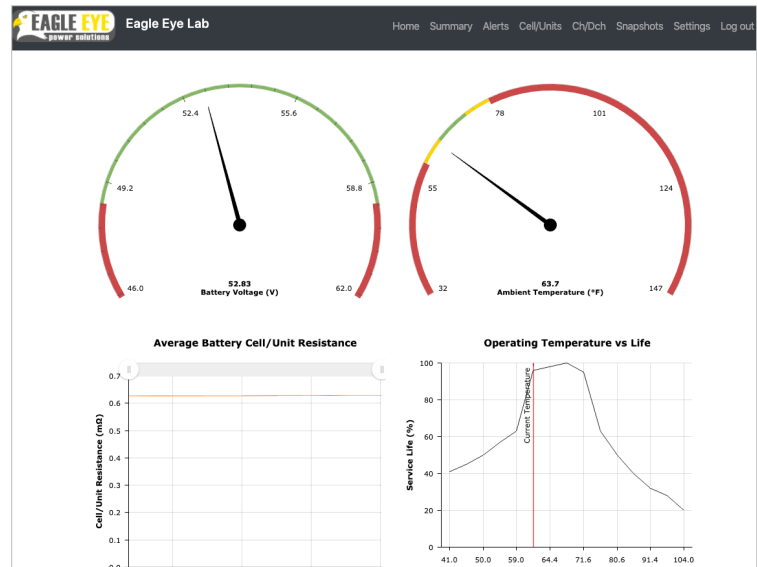
"Exclusions for Protection System Station DC Supply Monitoring Devices and Systems"

*Maximum Maintenance Interval: No periodic maintenance specified

Vigilant Solution	NERC Requirement Attribute	Maintenance Activities
✓ Measures DC supply voltage at battery main terminals	Any station dc supply with high and low voltage monitoring and alarming of the battery charger voltage to detect charger overvoltage and charger failure.	No periodic verification of station dc supply voltage is required.
✓ Monitors each cell electrolyte level	Any battery based station DC supply with electrolyte level monitoring and alarming in every cell .	No periodic inspection of the electrolyte level for each cell is required.
✓ Ground fault detection by float current	Any station DC supply with unintentional DC ground monitoring and alarming .	No periodic inspection of unintentional DC grounds is required.
✓ Measures float voltage at battery main terminals	Any station DC supply with charger float voltage monitoring and alarming to ensure correct float voltage is being applied on the station DC supply.	No periodic verification of float voltage of battery charger is required.
✓ Continuity detection by float current	Any battery based station DC supply with monitoring and alarming of battery string continuity .	No periodic verification of the battery continuity is required.
✓ Measures inter-cell & terminal connection resistances	Any battery based station DC supply with monitoring and alarming of the intercell and/or terminal connection detail resistance of the entire battery.	No periodic verification of the intercell and terminal connection resistance is required.
✓ Measures each cell's internal ohmic value and string float current	Any VRLA or VLA station battery with internal ohmic value or float current monitoring and alarming , and evaluating present values relative to baseline internal ohmic values for every cell/unit.	No periodic evaluation relative to baseline of battery cell/unit measurements indicative of battery performance is required to verify the station battery can perform as manufactured.
✓ Measures each cell's internal ohmic value	Any VRLA or VLA station battery with monitoring and alarming of each cell/unit internal ohmic value .	No periodic inspection of the condition of all individual units by measuring battery cell/unit internal ohmic values of a station VRLA or VLA battery is required.

Key Features

- **Individual Cell Condition:** The estimated condition of the cell at the time of daily physical testing, relative to the original (specified) capacity. Although an Ohmic value is used as a qualifier, other more critical parameters are used to calculate early deterioration this test
- **State of Health:** Estimated by a comprehensive algorithm which takes into account many different life-affecting parameters to estimate where the battery is in its life cycle with respect to time in service. It includes measured changes in internal & external factors and in all parameters that could identify a potential reduction in anticipated battery life
- **Battery Risk Factor:** The estimated risk of battery failure, based on specified service life versus the life expectancy estimated by the state of health algorithms
- **True Float Current:** Vigilant's Advanced Multi-Function (AMF) sensors measure true float current without the remanence and temperature problems of Hall-effect transducers



Battery Post Connections

Sensor Performance	
Working Voltage	0.05 – 18.5VDC
Voltage Resolution	± 1mV
Post Temperature Resolution	± 1°C
Cell Resistance Resolution	± 7μΩ
Strap Resistance Resolution	At 100μΩ strap r: ± 2μΩ
Float Current Resolution	At 100μΩ strap r: ± 1mA
Charge/Discharge Current	Max 800μΩ strap r: ± 0.1% Max 400μΩ strap r: ± 0.1%

Communication	
Onboard Storage	SSD
Memory Capacity	20 years of battery data average, expandable for larger systems
Local Data Download	Via USB port
External Protocols	Modbus TCP/IP, DNP3
Network Interface	RJ45 Ethernet

Electrical Data	
Electrical Supply (from DC supply)	36 – 72VDC 90 – 300VDC 280 – 580VDC
Other Power Options	24V mains supply
System Internal Power	via comms system
Operating Power (from charger)	@ 60 cells: 25W
Operating Temp Range	-4 – 70 °C (25 – 158°F)
Isolation I/P to O/P	1000VDC
Test current @ 2.5V	20A

General	
Dimensions (L x W x H)	Monitor: 50 x 50 x 25 mm (2 x 2 x 1 in.) Sensor: 242 x 200 x 65 mm (9.5 x 8 x 2.6 in)
Certification	CE

Ordering Information

Model No.	Description
Vigilant Expert	Battery Monitoring Solution for up to 240 cells