



VIGILANT® Battery Monitoring System for NERC Compliance



Product Overview

The VIGILANT Battery Monitoring System is Eagle Eye's complete solution for meeting NERC PRC-005-6 Compliance. Within this standard, battery maintenance falls under *Table 1-4(f): "Exclusions for Protection System Station DC Supply Monitoring Devices and Systems."* This table outlines the monitoring and alarming requirements needed to alleviate periodic on-site maintenance activities. The VIGILANT is designed to meet and exceed all of these requirements. With a built in web-server, the VIGILANT system is equipped to monitor and store all required battery parameters for the life of the battery.

Meeting Compliance

The VIGILANT system monitors and alarms for the following battery parameters as required in PRC-005-6:

- **Float Voltage:** Monitoring & alarming of battery float voltage measured at the battery terminals.
- **Electrolyte Level:** Monitoring & alarming of electrolyte level for every cell with infrared sensors.
- **Ground Fault:** Monitoring & alarming for unintentional DC ground fault by measuring earth potential relative to battery voltage.
- **String Continuity:** Monitoring & alarming for continuity by measuring of float current and ohmic values.
- **Cell/Unit Voltage:** Monitoring & alarming of float voltage for each cell/unit.
- **Intercell & Terminal Connection Resistance:** Monitoring each of battery terminal resistance and *each* intercell connection resistance as independent values.
- **Internal Ohmic Value:** Monitoring & alarming of each cell or unit internal resistance by DC pulse.
- **Cell/Unit Temperature:** Monitoring & alarming of each cell/unit temperature monitored at the negative post.

Key Features

- **One-Click Reporting:** Remove guesswork in reporting by easily creating NERC-compliant reports.
- **TPL-001-5 Compliance:** Monitoring of continuity and DC supply voltage for compliance to this standard.
- **Unobtrusive:** System does not affect battery performance in any way.
- **Battery Alarming:** Alarm against user-defined battery thresholds via Modbus, dry contact, or proprietary software.
- **Watchdog Alarming:** The system performs self-checks with a dedicated watchdog circuit and will alarm upon CPU failure, lockup, or loss of power.
- **Fleet Management Software:** Aggregate a fleet of systems on a single interface with bird's eye view alarming.

The screenshot shows the Eagle Eye Power Solutions web interface. At the top is a navigation bar with links: Home, Summary, Alerts, Battery, Discharges, Snapshots, Reports, Settings, and Logout. The main content area is titled 'NERC Report' and 'Station DC Supply PRC-005-6 Compliance Summary'. It contains two summary tables. The first table, 'Station DC Supply PRC-005-6 Compliance Summary', has four rows: Battery Float Voltage (Pass), Cell Voltage (Fail), Continuity (Pass), Cell Resistance (Pass), Post Temperature (Pass), Electrolyte Level (Pass), Ground Fault (Pass), and Station DC Supply (Pass). The second table, 'Station DC Supply TPL-001-5 Compliance Summary', has two rows: Battery Continuity (Pass) and Station DC Supply (Pass). Below these are 'Summary Data' and 'Battery & Strap Data' tables. The 'Summary Data' table has four columns: Battery Voltage (V), Battery Current (A), Ambient Temp (°F), and Ground Fault. The 'Battery & Strap Data' table has four columns: Min, Average, Max, and Cell ID, with sub-headers for Cell Voltage (V), Cell Resistance (mΩ), Post Temperature (°F), and Strap Resistance (μΩ).

Station DC Supply PRC-005-6 Compliance Summary			
Battery Float Voltage	Pass	Cell Voltage	Fail
Continuity	Pass	Cell Resistance	Pass
Post Temperature	Pass	Electrolyte Level	Pass
Ground Fault	Pass	Station DC Supply	Pass

Station DC Supply TPL-001-5 Compliance Summary			
Battery Continuity	Pass	Station DC Supply	Pass

Summary Data			
Battery Voltage (V)	Battery Current (A)	Ambient Temp (°F)	Ground Fault
28.24	0.10	74.5	Pass

Battery & Strap Data			
Min	1.37 (Cell 16)	0.17 (Cell 2)	70.77 (Cell 15)
Average	1.42	0.30	72.85
Max	1.48 (Cell 18)	0.43 (Cell 18)	75.40 (Cell 20)
Cell ID	Cell Voltage (V)	Cell Resistance (mΩ)	Post Temperature (°F)
1	1.45	0.36	74.51
2	1.37	0.17	73.27

One-Click NERC Report

VIGILANT System Components

Each Vigilant has the following main components:

- **Monitor:** 1 per battery bank. Records and stores measurement data, interfaces with network. Powered by the charger or external supply.
- **Sensors:** 1 per cell/unit. Pulses battery to record voltage, resistance, and temperature. Powered by the monitor.
- **Wiring Harness:** 2 per cell/unit. Wired connection from sensor to battery posts.
- **Connection Hardware:** 2 per cell/unit. Tab washer or clamp for physical connection of wiring harness to battery posts.
- **Electrolyte Level Sensor (optional):** 1 per cell. Measures electrolyte level.



Vigilant Components Installed



Monitor



Sensor



Wiring Harness



Connection Hardware



Electrolyte Sensor

Technical Specifications

Sensor Performance	
Voltage Measurement Range	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

Communication	
Onboard Storage	SSD
Memory Capacity	20 years of battery data average for 60-cell battery
Local Data Download	Via RJ45 network connection
External Protocols	Modbus TCP, DNP3 (in development)
Alarm Relays	(2) Dry contact output (300V, 1A)
Network Interface	RJ45 Ethernet

Electrical Data	
Monitor Electrical Supply (from DC supply)	36 – 72VDC 90 – 300VDC 280 – 580VDC
Other Power Options	24VDC mains input (for other voltages w/adaptor)
Sensor Electrical Supply	From Monitor (via comms)
Sensor Supply Current	Operating: 6mA With ELM: 10mA
Isolation I/P to O/P	1,000VDC
Test current @ 2.5V	20A

General	
Dimensions (W x H x D)	Sensor: 2 x 2 x 1 in. (50 x 50 x 25 mm) Monitor: 10 x 8.3 x 3.2 in. (255 x 210 x 80 mm)
Operating Temp. Range	-4 – 70 °C (25 – 158°F)