



Turn-key Partner



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863.409.0994

SBM-650 The reliable string-level monitoring for NERC compliance

☑	Reliably detects open battery or connection problems for continuity
☑	Total Internal Resistance + Connection Resistance to evaluate Battery Deterioration
☑	Float Voltage, Current and Ripple
☑	Ambient/Pilot Temperature Thermal Runaway Prevention
☑	Unintentional Ground
☑	NEMA 4 / IP66 rated for Battery Room Installation



Sentry Battery Monitor SBM-650 utilizes BatteryDAQ field proven technologies to reliably detect battery faults for NERC PRC-005-2 compliance. This string-level monitoring unit is designed for utility clients choosing not to monitor at the cell-level. Connections to the battery system are simplified & optimized for easy installation. **Monitor can be installed while battery bank is online.**

BatteryDAQ™
Model: SBM-650

	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> NERC Continuity </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> DC Bus Voltage 135.2 V </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Alarm </div>	Alarm Details
Float Current	DC 0.7	18.9	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> DAQ </div>	Config/Settings
Ripple Current	Ripple 1.2 A	19.7 °C		Ambient Battery Pilot
Continuity Change Percentage	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Change 6% </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 13.37 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> BaseR 999 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> G.F.Res. BT# </div>
Resistance for Up Arm and Low Arm	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 6.51 + 6.86 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 12.50 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> kohm </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 10 </div>
	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 0 </div>			

Precise Mid-Point Pulsed DC Method for Full Loop Ohmic Measurement
 Battery Internal Resistance + Connection Resistance
 50 to 3,000Ah
 Lead Acid, NiCad
 Pre-set for 120/240V

Total Resistance (Battery+Connection)

Continuity Baseline

Resistance to Ground

Ground Fault Setting

Ground Fault Location

Features

- 1) Continuously monitors battery string voltage, float current, ripple current, and temperature to ensure batteries are in the correct charging condition. An alarm will be generated if thresholds are breached.
- 2) Actively measures battery to DC bus continuity. An alarm will be generated if there is an open circuit, an open/dead battery, one or more deteriorated batteries, or a high connection resistance in any battery terminal or bus/switch connection.
- 3) Provides a precise value for total battery bank “Internal Resistance + Connection Resistance”. Reliably detects battery deterioration and continuity problems. Values can be trended for battery service and replacement scheduling.
- 4) Detects ground fault and displays real-time grounding resistance. Locates which cell should be inspected, in case of leaks within battery cells.
- 5) An intelligent embedded algorithm detects thermal runaway risk at its earliest stage. “Battery Working Status” is analyzed to avoid false alarms.
- 6) Touch screen to view data/alarm, and make changes to settings.
- 7) Compatible with VLA, VRLA, NiCad batteries. Minimum settings.
- 8) NEMA 4 grade sealed enclosure allows for safe and protected battery room installations.
- 9) Dry contact alarms can be linked to the charger, for counter adjustment to prevent thermal runaway.
- 10) RS485 Modbus-RTU and Ethernet Modbus-TCP for SCADA integration.

NERC PRC-005-2 Protection System Maintenance

Every 18 calendar months, verify/inspect the following:

- Battery bank ohmic values to station battery baseline (if performance tests are not opted)
- Battery charger float voltage
- Battery rack integrity
- Cell condition of all individual battery cells (where visible)
- Battery continuity
- Battery terminal connection resistance
- Battery cell-to-cell resistance (where available to measure)

PRC-005-2 Supplementary Reference and FAQ – October 2012
 Adopted by the NERC BOT November 2012

BMS Model	Sentry-6002NEMA (Link to details)	SBM650
String Voltage, current, temperature	Yes	Yes
Battery Bank ohmic values	Each cell, high resolution	Two sections for string resistance
Battery continuity	Yes	Yes
Battery cell-to-cell resistance	Each cell-to-cell, high resolution	Included in string ohmic reading



Specifications

Working Voltage	SBM-650-120, 120V Version (90 to 150V) SBM-650-240, 240V Version (180 to 300VDC)
Battery String Float Voltage LOW	Charging voltage low threshold Discharging termination voltage threshold Automatic switch threshold for float charging and discharging
Battery String Float Voltage HIGH	charging voltage high threshold
Battery String Continuity	Threshold for Total Resistance <i>Deteriorated batteries will alarm as a continuity problem.</i>
Voltage Measurement	Accuracy 0.1% Resolution 0.1A
Current Measurement	Float current and charging/discharging current Range +/-450A, resolution 0.1A Ripple current, resolution 0.1A
Temperature	Measurement accuracy +/- 1.0°C, resolution 0.1°C Working range -20 to 65°C
Ground Fault	Enable/Disable (Connect EG wire to Earth Ground to enable it.) Adjustable Threshold (Grounding Resistance) for Ground Fault
Alarm Beeping	Audio beep
Alarm Dry Contact	Urgent Alarm (Normal Close, Voltage-free, 60V 0.1A capacity) Service Alarm (Normal Close, Voltage-free, 60V 0.1A capacity)
Serial Port Modbus-RTU	Isolated RS485, Bus-Pin ESD Protection up to 15kV. 9650-8-1-None
Ethernet	Onboard Ethernet 10/100Mbps Web page for realtime data Modbus-TCP for SCADA or Master-800 centralized monitoring
Modbus-RTU and Modbus-TCP Data	Bank/DC voltage BUS+ to ground Voltage, BUS- to ground Voltage Ambient Temperature, Pilot Temperature Current and Ripple current Ground Fault (resistance to ground) Resistance for 2 sections (up and low arm from mid-point) (Battery Internal Resistance and Connection Resistance) Thermal Risk (value 0 to 100)
Enclosure and Dimensions	Impact-resistant polycarbonate sealed enclosure UL Listed NEMA Type 4X, 6, 6P, 12&13 IP66 rated 230mm x 180mm x 150mm (9" x 7" x 6")

*Specifications subject to change without notice



How it works

The monitor is connected to the DC bus and the middle point of the battery string. A pulsed DC current is applied to measure battery string total resistance (battery internal resistance and connection resistance).

Voltage, temperature, and current are continuously monitored.

The following conditions are periodically checked (default 1 hour) and an alarm is generated, if a fault is found.

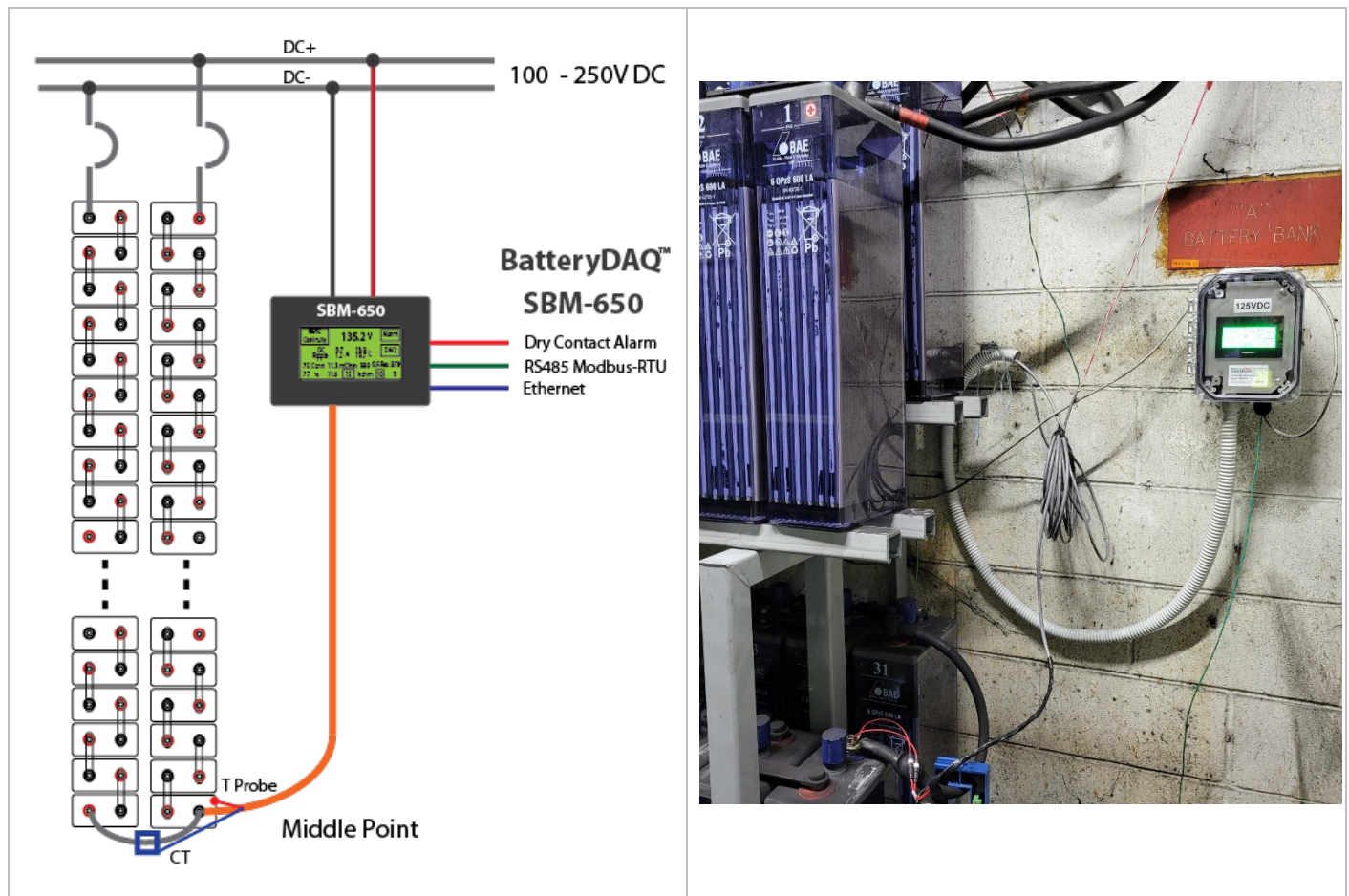
Data/alarm is available via Modbus-RTU.

- 1) Circuit break is off, or having a connection problem.
- 2) High connection resistance caused by corrosion
- 3) Any loose connection(s)
- 4) Open/bad battery cells, and deteriorated cells

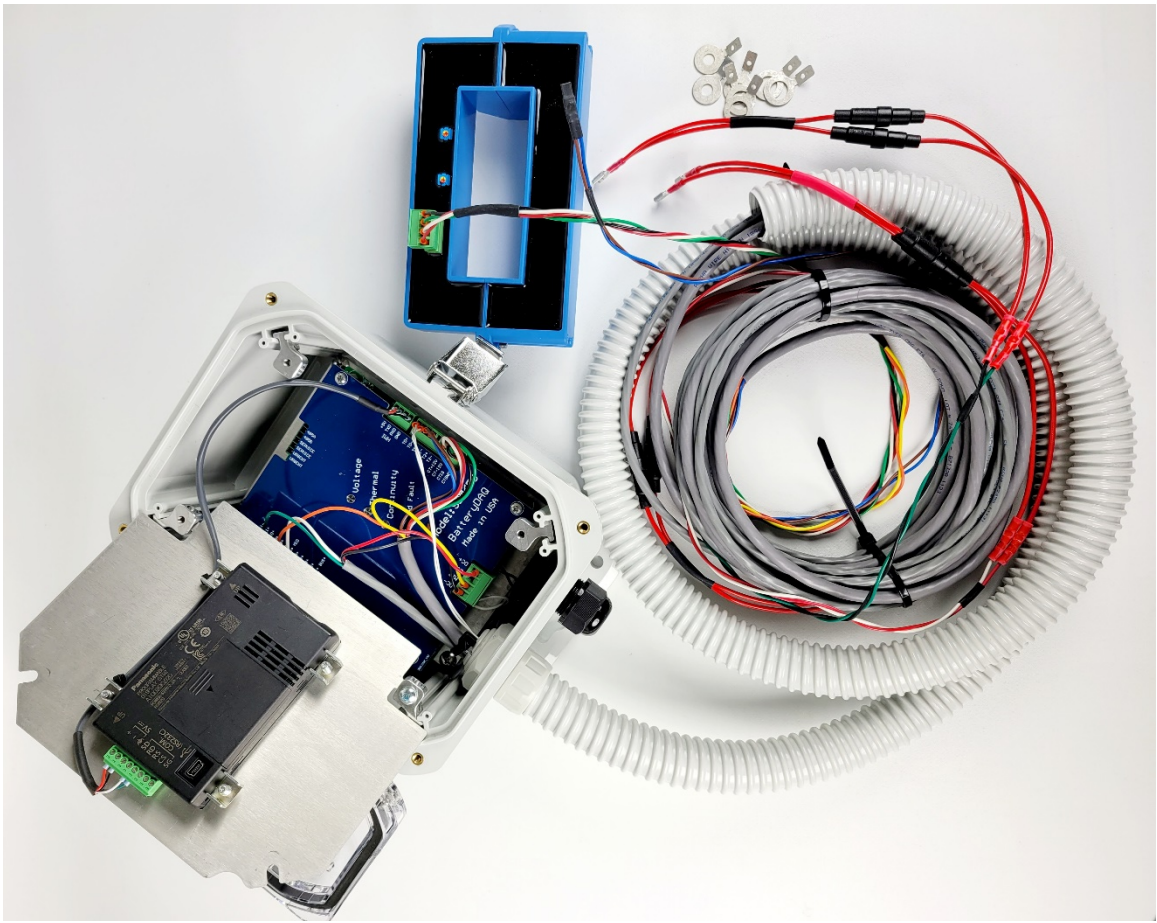
Utilizing a CT (Current Transducer), the charging and discharging status are monitored and analyzed to evaluate battery SOC (State-of-Charge), which provides a reliable thermal risk detection/alarm.

Alarm can be linked to charger for counter adjustment to avoid thermal runaway.

Ground faults are also detected when this function is enabled by connecting EG wire. (Do not connect EG wire if utilizing the charger's Ground Fault function.)



Kit Information

<p>SBM-650 Kit</p>	
<p>Description</p>	<p>Monitoring unit, HMI touch screen on panel. Wall/Rack mount. Includes split core CT and harness for Mid-point mode (default), pre-wired to terminals on unit. Default length 20ft (other length can be ordered.) Please choose: SBM650-120 (120V default) or SBM650-240 (240V version) Connection leads are protected by in-line fuse. 6mm/8mm/10mm tab washers are included.</p>

SBM-650 unit will be configured in factory for different voltage range.

When using a 240V version for 120V battery bank, the unit will work but the resistance accuracy will be lower.

120V version cannot be connected to 240V battery bank!!! Only authorized technician can re-config it on-site to change from 120V to 240V working range.

Model	SBM650-120	SBM650-240
Nominal Battery Bank Voltage	110/120V	220/240V
Working range	90 to 150VDC	180V to 300VDC



Installation Steps

Depending on the battery post/connection, it may be necessary to switch off battery string, to place the sampling leads/terminals to the battery post/connection. The SBM-650 monitor itself does not require an off-line installation.

To achieve high precision, the test current lead and sensing lead are separated as “2-wire” for Four-Terminal measurement. Use correct tab washers and hardware for installation.

#	Description
1	Mount unit on the wall/rack/strut/beam, with proximity to the battery bank. The unit is rated as IP66 and can be installed inside most battery rooms. Unit is NOT rated as explosion proof.
2	Unscrew 2 screws on the inner panel to flip & open panel to access the terminals on PCB. Unplug 8P MAIN terminal (DC+, MID, EG, DC-) from board.
3	MID Cable 8-conduct cable assembly, 2-wire for Middle Point, 2-wire for pilot T sensor, 4-wire for CT Install 2 tab-washers to battery middle point. This can be done by adding additional nut on the existing bolt without opening the battery connection. For 58x2V, the middle point is the Negative Post of cell#29. For an odd number of cells, for example 57x2V, the positive section has one more cell, still at cell#29-. Attach the temperature probe to battery surface. Install CT to battery cable, arrow points to the charging current direction.
4	BUS Cable 4-conduct cable assembly, 2-wire for DC+, 2-wire for DC- Install 2 tab-washers to DC+ plate. Connect fused leads [<i>BUS+</i> , <i>DC+</i>] Install 2 tab-washers to DC- plate. Connect fused leads [<i>BUS-</i> , <i>DC-</i>]
5	Check voltage at the 8P MAIN terminal plug. Shall have full string voltage between DC+ and DC-. Shall have half voltage from MID to DC+ or DC-. Plug terminal to PCB assembly to power on the unit. Plug 8P MAIN terminal to board, now the unit is powered on.
6	Check data and alarm: <ul style="list-style-type: none"> - BUS Voltage, Float Current - Temperature - Total Resistance [Comparing to baseline. Contact BatteryDAQ for baseline calculation.]
7	EG wire Protective/Earth Ground (YELLOW/GREEN) Do not connect EG wire if ground fault function is not needed, or the charger has ground fault detection. Connect a test resistor one end to ground, another end to touch battery post to trigger an alarm.
8	Connect alarm and/or RS485. Test communication, if connected to SCADA or other alarm management system
9	Connect to Ethernet if available. Set IP address. Check battery data on web page.
10	Secure all cables, seal glands if not utilized. Label the unit properly. Fill up the installation report.

Technical support: tech@batterydaq.com [Updated on 2023-09-15. Specifications subject to change without notice]

