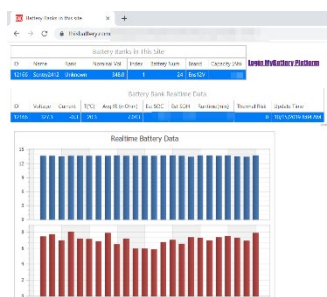
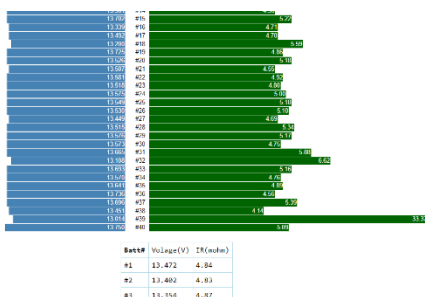


# Sentry-2412

Advanced Battery Health Monitor  
For Industrial Critical Backup Power Systems  
**UPS, Switch Gear, Emergency Lighting**



Rev 3.2



## Key Features

- **Precise IR - Internal Resistance/Conductance** measurement is performed on each battery (or multi-cell) with *advanced DC method*, user selectable internal resistance or conductance data display. Sufficient precision for high capacity Lead Acid or Nickel Cadmium batteries while used for multi-cell monitoring.
- **High Noise Immunity** - Provides for accurate/repeatable measurements on high ripple UPS/EPS systems.
- **Compact Design** – All-in-one solid design. Permits convenient installation on top, inside of the battery cabinet, or inside of an additional enclosure.
- **Easy to Install** - Simplified wiring: one wire per battery, plus three IR wires for one string. Easy to set for any number of cells for multi-cell applications. (*For example, 87 x 1.2V NiCad, 21 channel with 4-cell and last channel 3-cell.*)
- **Reliable Solid State Scanning** - (rather than mechanical relay) provides the highest reliability for industrial applications.
- **HMI Panel** - The plug and play touch panel (optional, handheld or panel mounting) displays battery data and alarms. Allows the technician to configure and calibrate without the need of a PC.
- **Access Data/Alarms from Anywhere** - Firewall friendly communication, plug and play, simplified management over large number of sites from anywhere via internet or private network. Alarming through email or SMS.
- **Supports Site/Building Management Systems** - The system fully supports 3<sup>rd</sup> party SCADA or site management systems with Modbus-RTU, Modbus-TCP, API and hyperlink to real-time data.

## Introduction

The **Sentry-2412** is an industrial grade battery health monitoring system designed for a wide range (100 to 350V) of UPS systems and utility switchgear DC applications. This compact unit combines superior data quality with a flexible and streamlined installation, which makes it suitable for server rooms, data centers, refineries, railroads, substations, as well as numerous other industrial applications.

## Functions

**Sentry-2412** is designed to automate recommended measurements in IEEE standards for VRLA and NiCad batteries to ensure safe operation, efficient battery maintenance, and optimal battery service life.

- 1) Continuously monitors Voltage, Current, Ambient and Pilot Temperatures to ensure batteries are in the correct float charging condition.
- 2) Detects thermal risk at early stage and generates alarm to prevent battery thermal runaway.
- 3) Online Internal Ohmic monitoring to detect battery premature or normal deterioration such as **Dryout / Loss of Compression / Swelling and Expansion / Grid or Strap Corrosion / Loss of Active Material / Negative Plate Discharge / and Other Capacity Losing Mechanisms.**
- 4) Provides actionable data and graph via Web and/or PC software for weak battery identification, alarm handling, preventative battery service and battery replacement.
- 5) Enables user to efficiently manage large number of battery banks and sites nationwide or worldwide.

## IEEE Standard Reference

**IEEE-1188**, IEEE Recommended Practice for Maintenance, Testing, and Replacement of Valve-Regulated Lead-Acid (VRLA) Batteries for Stationary Applications

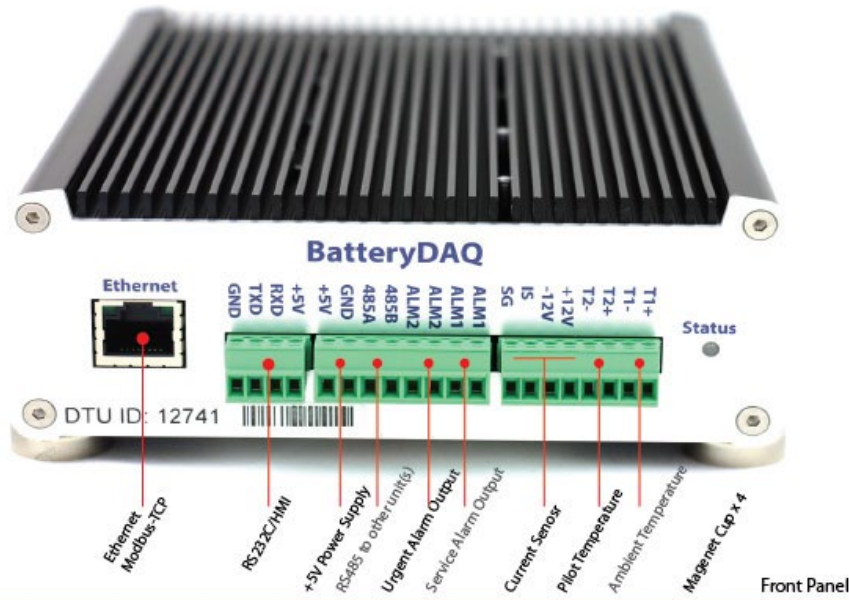
**IEEE-1106-2015**, IEEE Recommended Practice for Installation, Maintenance, Testing, and Replacement of Vented Nickel Cadmium Batteries for Stationary Applications

**IEEE-1184**, IEEE Guide for Batteries for Uninterruptible Power Supply Systems

**IEEE 1491-2012** IEEE Guide for Selection and Use of Battery Monitoring Equipment in Stationary Applications



## Terminals and Connections



### Typical Battery Banks:

VRLAB 24x12V UPS

VRLAB 20x6V DC

VRLAB 10x12V DC

Vented 60x2V (Every 3-cell)

Vented 120x2V (Every 6-cell)

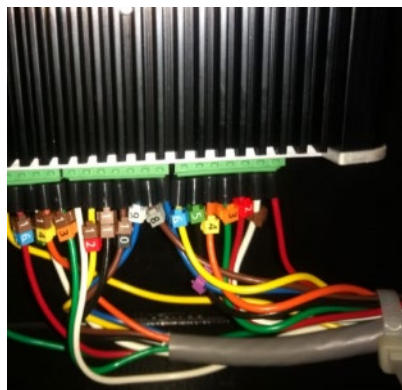
NiCad 120V DC (Every 4-cell)

NiCad 240V DC (Every 8-cell)

[For the multi-cell monitoring, the last channel can have a different number of cells. Example 87 NiCad cells, set wiring mode to "43", 4-cell per channel, last channel 3 cells.  $21 \times 4 + 3 = 87$ ]



Inside Battery Cabinet



Variable Battery Number



Build-in



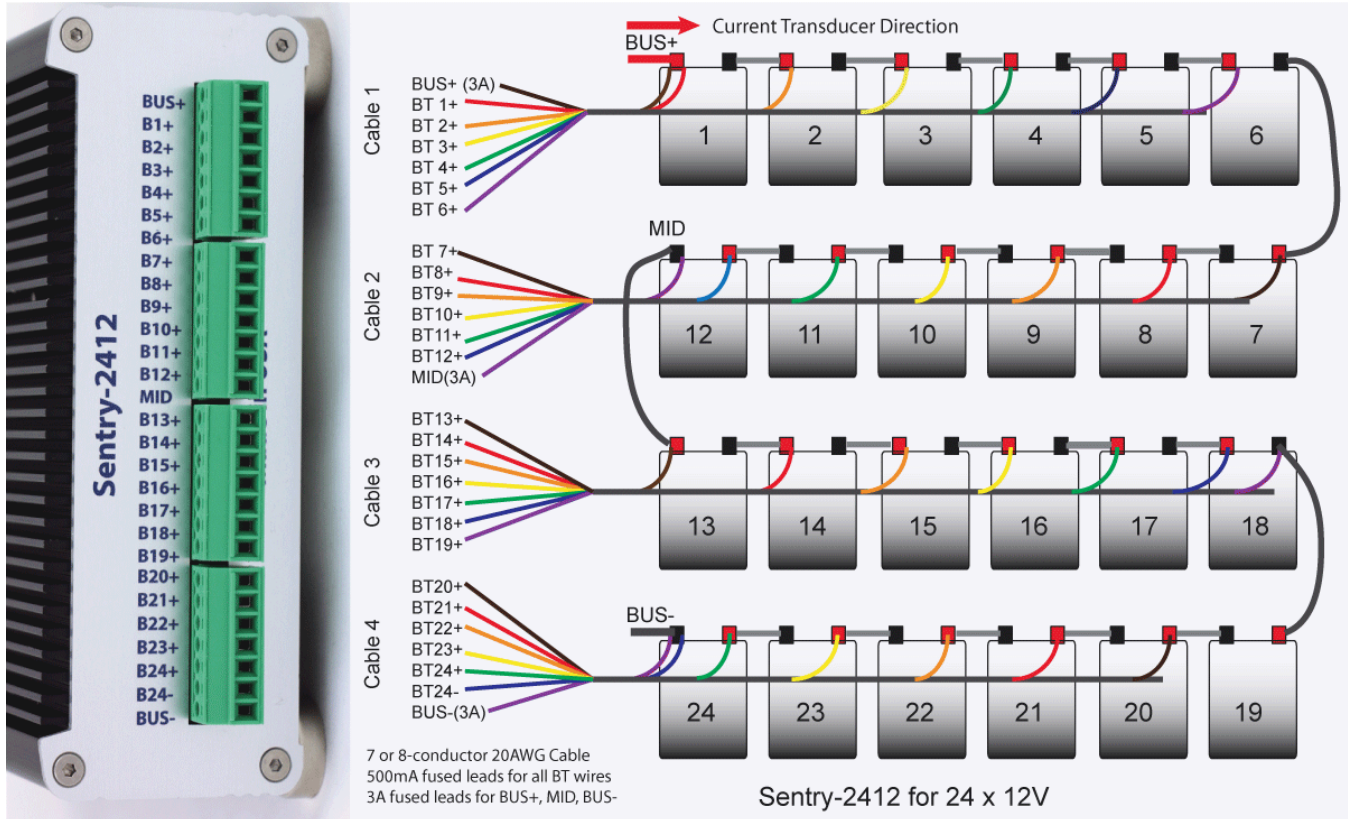
Additional Enclosure



## Wiring

**Caution:** For better Internal Resistance accuracy, the Sentry-2412 unit might be set for 120V applications in factory. Do NOT use a 120V version unit for 150V or higher voltage battery bank.

### Wiring Example: 24x12V



Refer to product manual for wiring less than 24 batteries.

In case of odd number, the up/first half has 1 more battery. Example 17 x 12V (9 + 8), the middle point is on #9- post.

## Software and Alarm Delivery

Option	Description	Note
Embedded Web Page	Immediate access to battery data/graph with web browser	Included
Battery Analyzer	PC software to manage multiple systems. Email/SMS alarm. Powered by Microsoft® SQL Server® Express database.	FREE
Master-800 Dashboard	Effectively manage multiple remote systems nationwide or worldwide in your private network, without PC software and IT security concerns. Email/SMS alarm.	Master-800 not included
MyBattery Platform	Secured cloud/public platform for unlimited (1,000,000+) sites and batteries. Access data worldwide with smart phone and/or laptop.	FREE Subscription
SCADA	Modbus-TCP, Modbus-RTU, API integration	FREE Technical Support

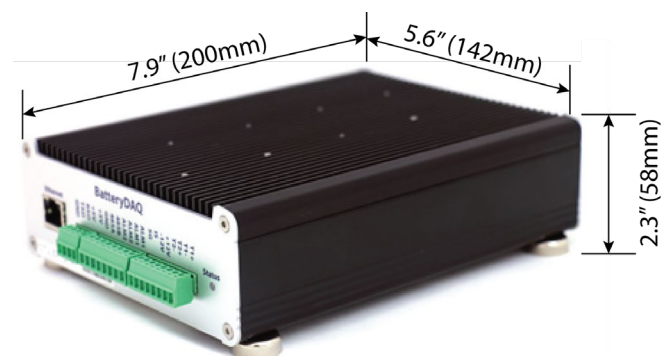


## Technical Data

Power Supply	
<b>Power Input</b>	Powered by battery bank, 100-350VDC input; Maximum Consumption: 5W
<b>Isolation</b>	1,500VDC@1min to battery string
Current/Temperature Measurement	
<b>Current Sensor</b>	Support LEM or BatteryDAQ certified current sensor with internal +/-12V power supply (Default range +/- 450A, window size D-35mm) Same sensor is used for <b>ripple current</b> measurement
<b>Accuracy</b>	0.1% + sensor accuracy
<b>Temperature Sensors</b>	1 ambient temperature sensor 1 pilot temperature sensor
<b>Range</b>	Measurement range: -40 to 85°C, Operating range: 5°C to 40°C (41°F to 104°F)
<b>Accuracy</b>	1 °C
Voltage Measurement	
<b>Channel</b>	Max 24 channels (configurable for less than 24 channels)
<b>Bus Voltage</b>	Range: 150 – 350V; Accuracy: 0.1% 120V Version: 90 to 150V
<b>Input Range to Each Channel</b>	+/- 16V for 6V / 12V batteries, Or +/- 20V for 16V batteries
<b>Accuracy</b>	0.1%
<b>Input Wiring</b>	1-wire from (+) positive of each battery plus the (-) negative of last battery. 0.5A inline fuses.
Internal Resistance /Conductance	
<b>Range and Resolution</b>	0 to 30mΩ, 0.01 mΩ resolution
<b>1-wire mode</b>	Total value of Internal Resistance + Connection Resistance. 3A fuses for BUS+, MID, BUS-.
Communication	

<b>Serial Port</b>	Isolated RS-232C and RS-485 interface
<b>Protocol and Serial Settings</b>	Modbus-RTU, 9600-8-1-None
<b>Modbus address</b>	1 to 28, configurable with HMI
<b>Ethernet</b>	Onboard Ethernet LAN connection to Battery Analyzer or Master-800. Embedded web page displays battery data/graph
<b>Integration Options</b>	Dry contact alarm outputs Serial port, Modbus-RTU Ethernet, Modbus-TCP Master-800, API
Indication and Alarm	
<b>LED indication</b>	Dual-color LEDs for status and alarm state
<b>Alarm Settings</b>	Bank/Charger Voltage High/Low Ambient/Pilot Temperature High Battery Voltage High/Low Internal Resistance High/Low
<b>Alarm Outputs</b>	Service Alarm (Normal Close, Voltage-free, 60V 0.1A capacity) Urgent Alarm (Normal Close, Voltage-free, 60V 0.1A capacity)
<b>Mounting:</b> Strong magnets	

### Dimensions



\*Specifications subject to change without notice



## Ordering Information

Working Voltage Range	Part Number	Typical Applications
150 to 350VDC (Default)	Sentry-2412	24 x 12V, 20 x 12V, 18 x 12V, 17 x 12V 240V Lead Acid 120x2V (every 6 cells) 240V NiCad System (every 8 cells, last channel can have more or less)
90 to 150VDC	Sentry-2412-120	20 x 6V, 18 x 6V, 17 x 6V 10 x 12V, 9 x 12V 120V Lead Acid 60x2V (every 3 cells) 120V NiCad System (every 4 cells, last channel can have more or less)

Each unit includes a full set of plugs, ambient and pilot temperature sensors, IR Leads (3A, x3), and CT cable.

Battery Analyzer PC software license is included free of charge.

For 25 to 44 x 12V, 300 – 650V high voltage battery strings, please choose [Sentry-4412HV](#).

## Accessories

Part Number	Description	Notes
SCK12T-300A	Current Transducer, D-35mm, +/-450A	Split core CT available <b>CY5-300A</b> , 64mm x 16mm window <b>CY10-300A</b> , 104mm x 40mm window
TB-xx	Tab Washers	6mm (default), 8mm/10mm available
TL-250	Sampling leads, QDC 500mA inline fused	¼" (0.250") QDC <i>Special Alkali Resistant leads available for NiCad.</i>
CB8C-xx	Cable 8-conductor, 20AWG	Estimate length from unit terminal to battery x 4
HMI-GT-02	Touch Screen Display	Service tool, can be used as local display
Master-800	Centralized Web Dashboard	Aggregates data/alarms from multiple remote BMS units.



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