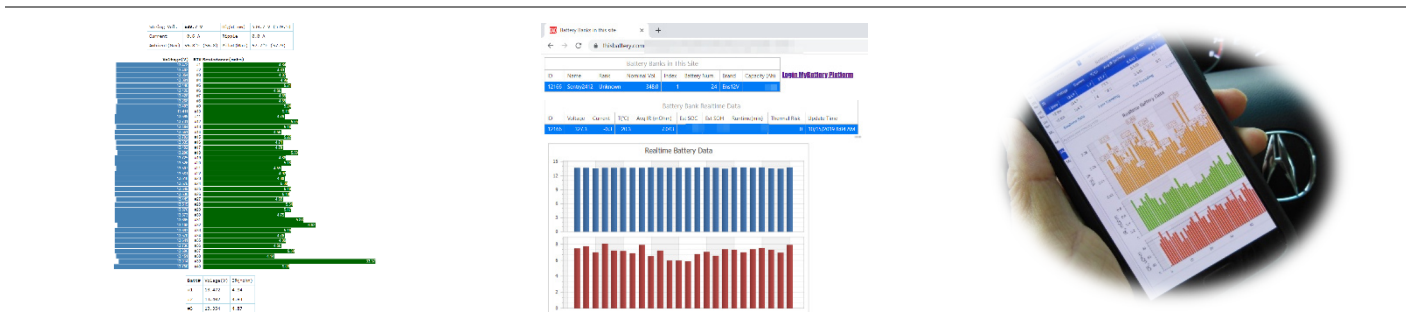# Sentry-4412HV

Advanced Battery Health Monitor

For Industrial Critical Backup Power Systems

High Voltage UPS

Rev 2.3

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 while used for multi-cell monitoring.

- **High Noise Immunity -** Provides for accurate/repeatable measurements on high ripple ups systems.

- **Compact Design –** All-in-one solid design. Permits convenient installation on top, inside of the battery cabinet, or inside additional enclosure.

- **Easy to Install –** One battery string is divided into 4 sections to match the popular rack layout. Inter-section (inter-tier) connection resistance is excluded in IR measurement.

- **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. It allows the technician to configure and calibrate without the need of a PC.

- **Access Data/Alarm from Anywhere -** Firewall friendly communication, plug and play, easy to manage 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 3rd party SCADA or site management systems with Modbus-RTU, Modbus-TCP, API and hyperlink to real-time data.

Introduction

The **Sentry-4412HV** is an industrial grade battery health monitoring system designed for a wide range (100 to 600V) of UPS systems with up to 44 blocks of 12V or 16V batteries. This compact unit combines superior data quality with a flexible and streamlined installation, which makes it suitable for server rooms, data centers, as well as numerous other industrial applications.

Functions

Sentry-4412HV is designed to automate recommended measurements in IEEE standards for VRLA and NiCad batteries to ensure safe operation, efficient battery maintenance, and optimal batery service life.

1) Continously monitors Voltage, Current, Ambient and Battery Temperature to ensure batteries are in correct float charging condition.

2) Detects thermal risk 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 / Nagative Plate Discharge / Other Capacity Losing Mechanisms**.

4) Provides actionable data and graph via Web and/or PC software for weak battery identification, alarm handling, preventative battery services and battery replacement.

5) Enables user to efficiently manage large number of battery banks and sites nationwide or worldwide.
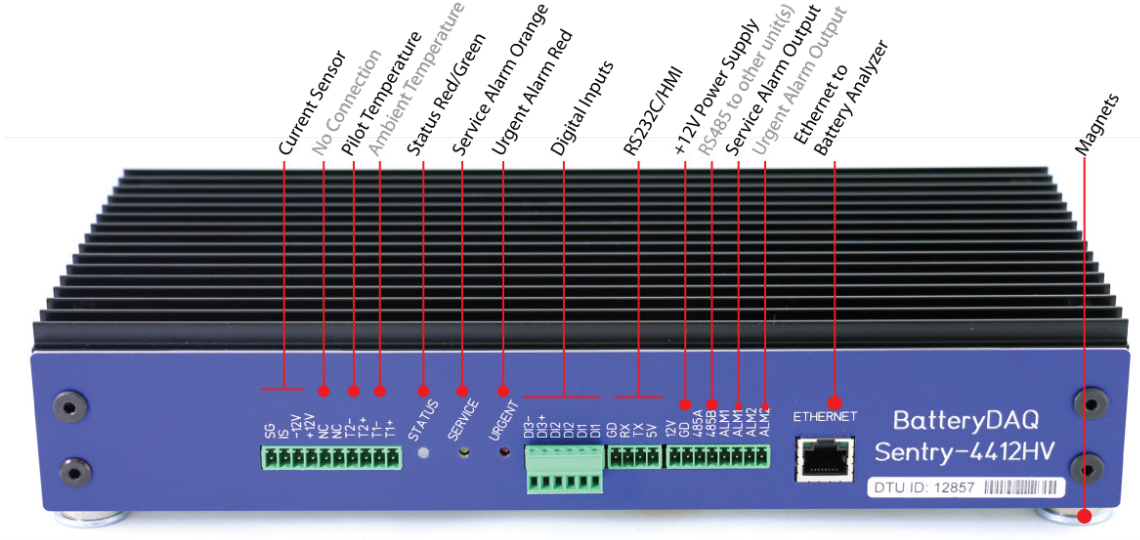
IEEE Standard Reference

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

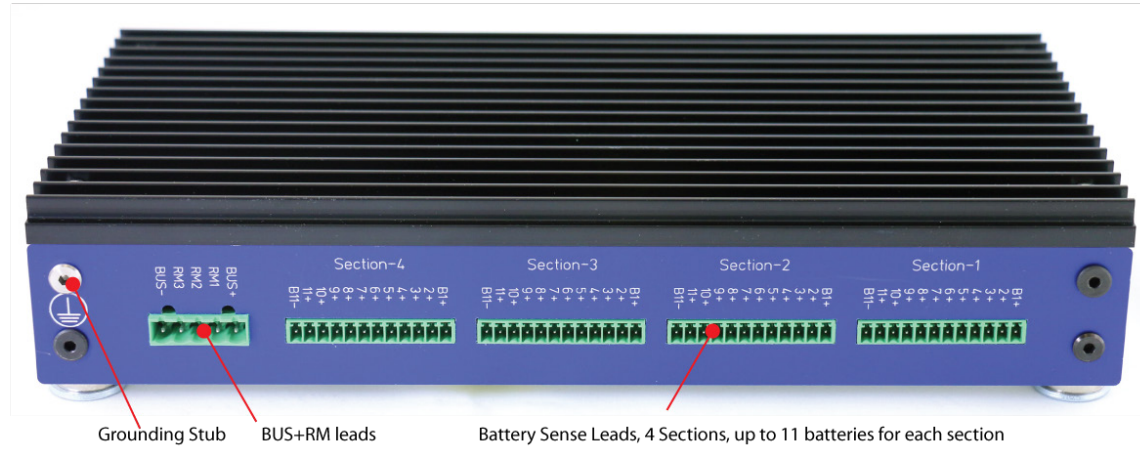**IEEE-1184**, IEEE Guide for Batteries for Uninterruptible Power Supply Systems

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

Terminals and Connections

Current Sensor
No Connection
Pilot Temperature
Ambient Temperature
Status Red/Green
Service Alarm Orange
Urgent Alarm Red
Digital Inputs
RS232C/HMI
+12V Power Supply
RS485 to other unit(s)
Service Alarm Output
Urgent Alarm Output
Ethernet to Battery Analyzer
Magnets

SIG · IS · +12V · NC · T2- · T2+ · T1- · T1+ · STATUS · SERVICE · URGENT · D3- · D3+ · D2 · D1 · GD · RX · TX · 5V · 12V · GD · 485A · 485B · ALM1 · ALM1 · ALM2 · ALM2 · ETHERNET

BatteryDAQ
Sentry-4412HV
DTU ID: 12857

Front Panel

BUS+ · RM1 · RM2 · RM3 · BUS-

Section-4 — B1+ · 2+ · 3+ · 4+ · 5+ · 6+ · 7+ · 8+ · 9+ · 10+ · 11+ · B11-
Section-3 — B1+ · 2+ · 3+ · 4+ · 5+ · 6+ · 7+ · 8+ · 9+ · 10+ · 11+ · B11-
Section-2 — B1+ · 2+ · 3+ · 4+ · 5+ · 6+ · 7+ · 8+ · 9+ · 10+ · 11+ · B11-
Section-1 — B1+ · 2+ · 3+ · 4+ · 5+ · 6+ · 7+ · 8+ · 9+ · 10+ · 11+ · B11-

Grounding Stub   BUS+RM leads   Battery Sense Leads, 4 Sections, up to 11 batteries for each section
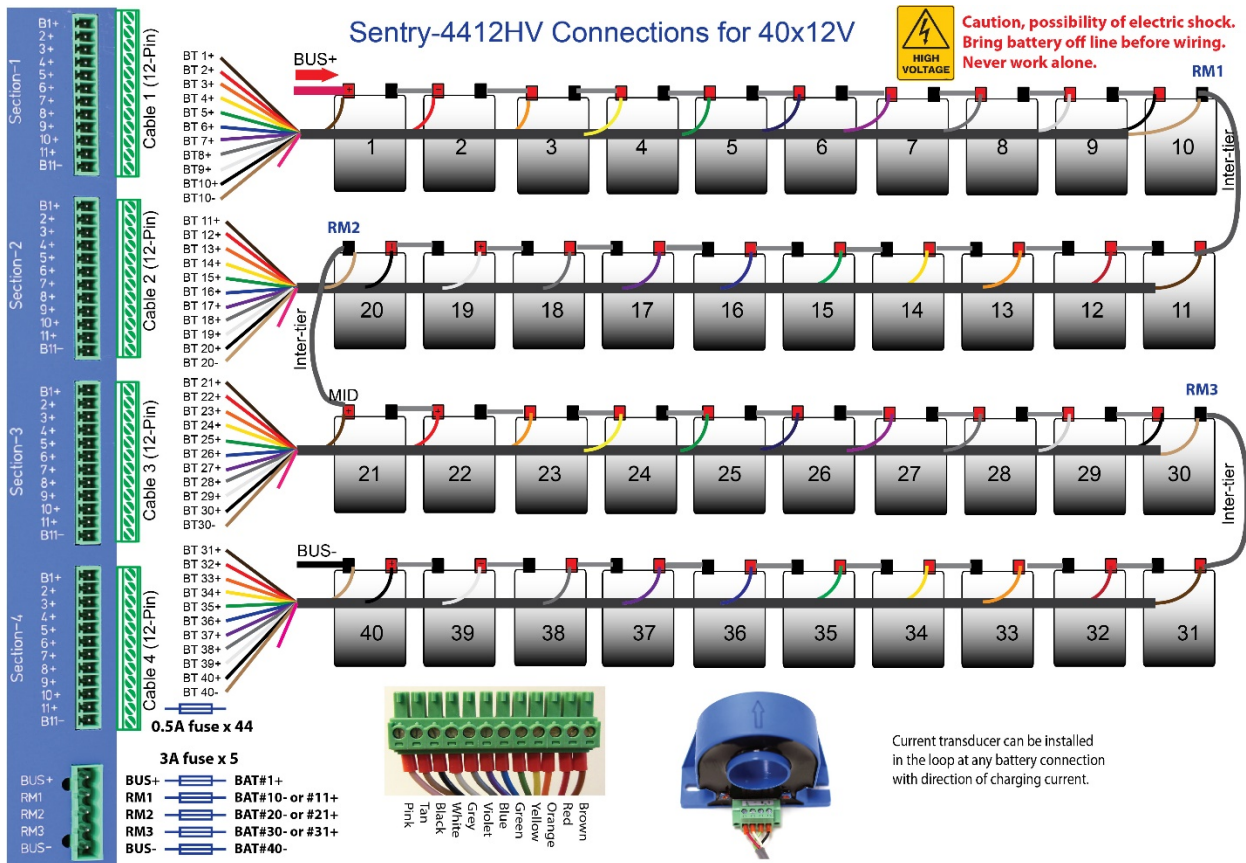

On Top of Battery Cabinet

Inside Additional Enclosure

Wiring

Caution: For best Internal Resistance accuracy, Sentry-4412 unit might be set for 300V or other low voltage applications in factory. Do NOT use a low voltage version unit for high voltage battery bank.

Wiring Example: 40x12V

Sentry-4412HV Connections for 40x12V

Caution, possibility of electric shock. Bring battery off line before wiring. Never work alone.

Current transducer can be installed in the loop at any battery connection with direction of charging current.

0.5A fuse x 44
3A fuse x 5

BUS+	BAT#1+
RM1	BAT#10- or #11+
RM2	BAT#20- or #21+
RM3	BAT#30- or #31+
BUS-	BAT#40-

Refer product manual for wiring for more or less batteries. Example: 43x12V, 11 + 11 + 11 + 10

Software and Alarm Delivery

| Option	Description	Note
Embedded Web Page	Immediate access 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 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	
Power Input	Powered by battery bank, 150-650VDC input; Maximum Consumption: 5W
Isolation	2,500VDC@1min to battery string
Current/Temperature Measurement	
Current Sensor	Support LEM or BatteryDAQ certified current sensor with internal +/-12V power supply (Default range +/- 450A, window size D-35mm) Same sensor is used for **ripple current** measurement
Accuracy	0.1% + sensor accuracy
Temperature Sensors	1 ambient temperature sensor 1 pilot temperature sensor
Range	Measurement range: -40 to 85°C, Operating range: 5°C to 40°C (41°F to 104°F)
Accuracy	1 °C
Voltage Measurement	
Channel	Max 44 channels (configurable for less than 44 channels, default 40x12V)
Bus Voltage	Range: 150 – 650V; Accuracy: 0.1% Check label on unit for other voltage range.
Input Range to Each Channel	+/- 16V for 12V (44x12V) batteries, Or +/- 20V for 16V (32x16V) batteries
Accuracy	0.1%
Input Wiring	1-wire from (+) positive of each battery plus the (-) negative of last battery. 0.5A inline fuses.
Internal Resistance /Conductance	
Range and Resolution	0 to 30mΩ, 0.01 mΩ resolution
1-wire mode	Total value of Internal Resistance + Connection Resistance. 3A fuses for BUS+, MID, BUS-.

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

Dimensions

6.2" (165mm), 12.0" (305mm), 2.35" (60mm)
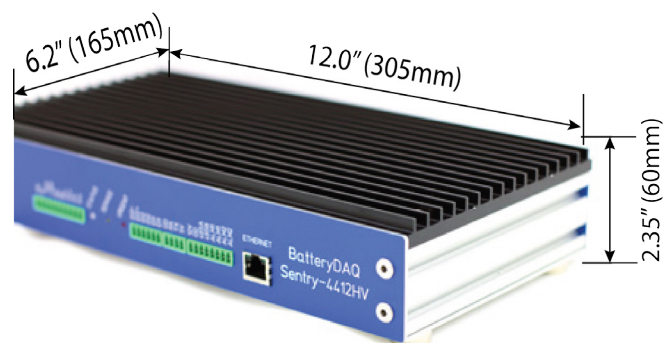
*Specifications subject to change without notice

Ordering Information

Working Voltage Range	Part Number	Typical Applications
350 to 650VDC (Default)	**Sentry-4412HV**	43 x 12V, 40 x 12V, 32 x 12V 240 x 2V (every 6 cells)
150 to 350VDC	**Sentry-4412-240**	40 x 6V

Each unit includes full set of plugs, ambient and pilot temperature sensors, IR Leads (3A, x5), and CT cable.

Battery Analyzer PC software license is included free of charge.

For up to 24 x 12V, 100 – 350V battery strings, please choose Sentry-2412.

Accessories

Part Number	Description	Notes
SCK12T-300A	Current Transducer, D-35mm, +/-450A	Split core CT available **CY5-300A**, 64mm x 16mm window **CY10-300A**, 104mm x 40mm window
TB-xx	Tab Washers	6mm/8mm/10mm available
TL-250	Sampling leads, QDC 500mA inline fused	¼" (0.250") QDC
CB12C-xx	Cable 12-conductor, 20AWG	Estimate length from terminal to battery x 4
HMI-GT-02	Touch Screen Display	Service tool, can be used as local display
Master-800	Centralized Web Dashboard	Manage multiple remote sites/battery banks

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