Sentry-6002NEMA

Battery Monitoring System

Substation Edition V2

CAT II Electrical Measurement Equipment

Installation and Service Manual

think before you print

Only print the page(s) you need

High Voltage and High Current Hazard exists on

Battery Terminals, Sampling Leads, Connectors and Inside Circuits!

Please read through this manual before installation

Information in this document is subject to change without notice.

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Notices

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Copyright

Liability

Neither **BatteryDAQ** nor any of its employees shall be liable for any direct, indirect, incidental or consequential damages arising from the failure of the battery monitoring system due to the failure of a proprietary part of the battery monitoring system, even if **BatteryDAQ** had been advised in advance except for as provided by law.

Specification

BatteryDAQ makes every effort to ensure that the specifications and details in this manual are accurate and complete. **BatteryDAQ** reserves the right to alter or improve the specification, design or manufacturing process at any time, without notice.

Warranty

BatteryDAQ warrants this system free from defects in material and workmanship in operation for one year from the date of commissioning or sale by **BatteryDAQ** or its authorized dealer.

Limitation of Warranty

This warranty does not apply to defects arising from system modification performed without **BatteryDAQ**'s written approval, or misuse of the system or any part of the system. The warranty excludes defects or malfunctions resulting from failure by the customer, or his designated personnel, to maintain and upkeep the batteries to which the system is fitted.

Repair and Return

This product can only be repaired by authorized personnel.

If you determine that a repair is needed, please contact our Customer and Product Service (CaPS) department to have an RMA number issued. CaPS should also be contacted to obtain information regarding equipment currently in-house or possible fees associated with repair.

For warranty service or repair, this product must be returned to the BatteryDAQ factory. Buyer shall pay shipping charges to send the product to BatteryDAQ, and BatteryDAQ shall pay shipping charges to return the product to the Buyer. However, Buyer shall pay all shipping charges, duties and taxes for products returned to BatteryDAQ from another country.

Telephone: 410-337-5233 email: caps@batterydaq.com

Safety Instructions

	Caution, follow the instructions
	Caution, possibility of electric shock or arc flash
	Protective Earth (ground) TERMINAL

The following safety precautions should be observed before any work is performed on the system containing the **BatteryDAQ** product.

1. **This system is intended for installation by personnel who are trained and qualified to recognize the hazards associated with working with such systems and are familiar with the safety precautions required to avoid possible injury.**
2. **Never work on any system that threatens life or injury through hazardous voltages except when applying absolute safety precautions.**
3. **Never work alone. Always ensure that you work with a properly trained colleague.**
4. **BatteryDAQ recommends that when performing any work concerning batteries, the safety procedures and safe working practices as described in the appropriate battery manufacturers documentation should be followed at all times.**
5. **Never make unauthorized changes or modifications to equipment. This may create unsafe, or even hazardous situations.**
6. **Where the battery documentation recommends that links are removed for safe working, it is important to totally remove any unit which is connected across any link to be broken prior to separation and subsequent removal of the link. Failure to do so will result in the string not being totally isolated.**
7. **Power off the unit when replacing/servicing cells for the battery. Any removed links must be fitted and reconnected before power on the unit.**

Tools and Equipment

1. Ensure all equipment and tools are proper, safe, and in good working order.
2. Ensure electrical tools have been tested for proper insulation and grounding where appropriate.
3. Observe all **CAUTION, WARNINGS,** and **DANGER** notices on equipment, tools, and building, whether internally or externally displayed.

Table of Contents

* Drawings/pictures in this manual may be for reference only.

1 Overview of Sentry-6002NEMA

BatteryDAQ provides advanced technologies and products for a variety of battery applications. Our technologies are outstanding in many aspects:

- Measurement Precision
- System Reliability
- Installation and Commission
- Communication, Networking, and Integration
- HMI Operator Interface
- Centralized Dashboard
- Cloud Based Informatics Platform

SENTRY-6002NEMA battery monitoring system is designed for power plants and substations to monitor battery banks with 60x2V or 120x2V wet/flooded or valve regulated lead acid batteries. It utilizes our 3rd generation technologies for high performance, easy installation, and long-term reliability to full fill NERC battery maintenance requirements.

It can be factory-configured for NiCad 120/240VDC applications.

(For other DC systems with different battery types or configurations, please contact us for the most suitable model.)

1.1 Product Features

Main Features

- All-in-one design for long term reliable operation
- Advanced precise IR (Internal Resistance) measurement technology
- Connection resistance monitoring for each inter-cell to ensure string connectivity
- Protection from over voltage input for each sampling channel
- No mechanical relays, resulting high reliability for remote applications
- Compact design allows for easy installation on the rack or wall.
- IP65 grade (NEMA 4) protection allows it to be installed in a corrosive battery room.
- Plug and play HMI touch panel (optional)
- Modbus-TCP for SCADA integration

Main measurements

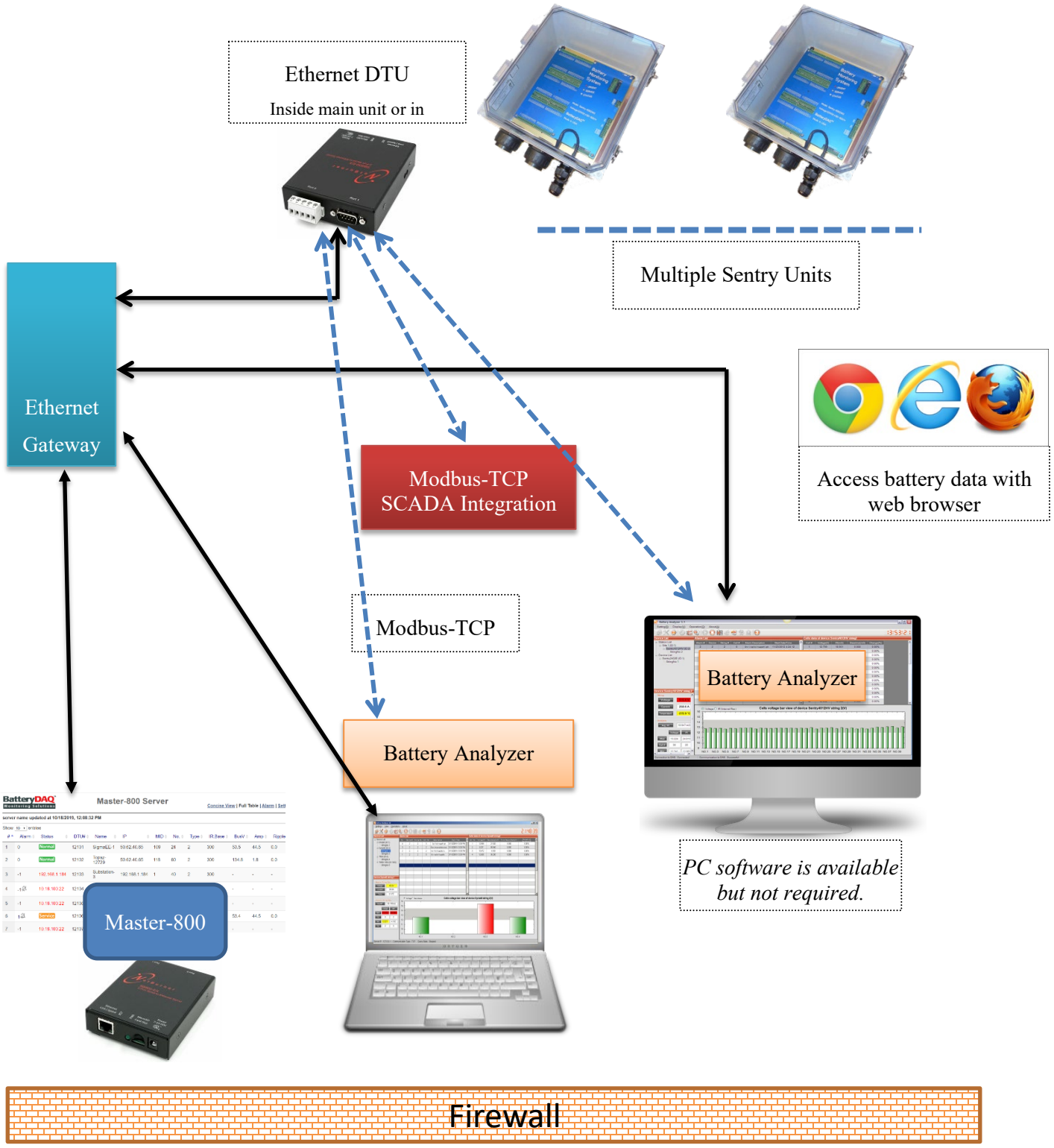
- Cell Voltage Monitoring
- Cell Internal Resistance (IR) Monitoring
- Inter-cell Connection Resistance (Battery String Continuity) Monitoring
- String Voltage Monitoring
- String Charge & Discharge Current Monitoring (optional)
- Ambient Temperature Monitoring
- Pilot Battery Temperature Monitoring

Data and Alarm Management Software

- Each system has a secured Ethernet DTU, compatible with IPv4 and IPv6.
- Embedded web page to display battery data and alarm.
- Historical data and discharge events are archived in SD card. Available for remote access via web page or ftp.
- A secured **Master-800** (*sold separately*) dashboard can be installed in the control center to manage hundreds of remote battery banks. It provides an overview of all banks and delivers alarms to designated receipts via email or SNMP.
- **Battery Analyzer** is optional. (This PC/Windows software and database may not be allowed in some networks because of IT security restriction.)
- **NERC Auto-fill Excel** workbook can pull data from remote sites and fill NERC report.

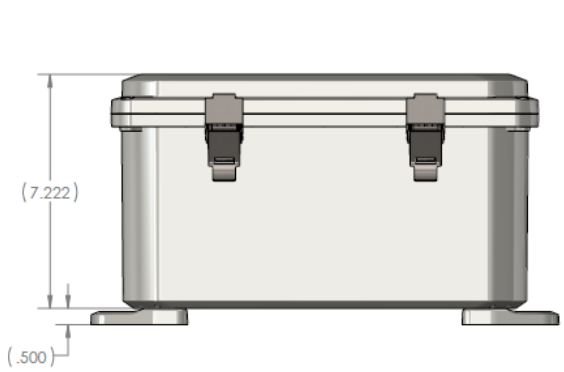
1 Product Overview

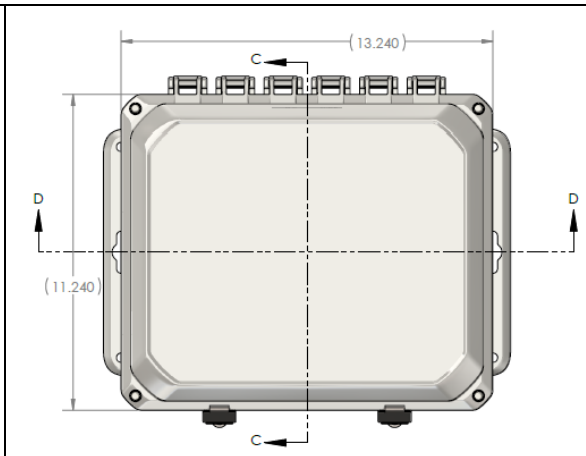
Communication Diagram

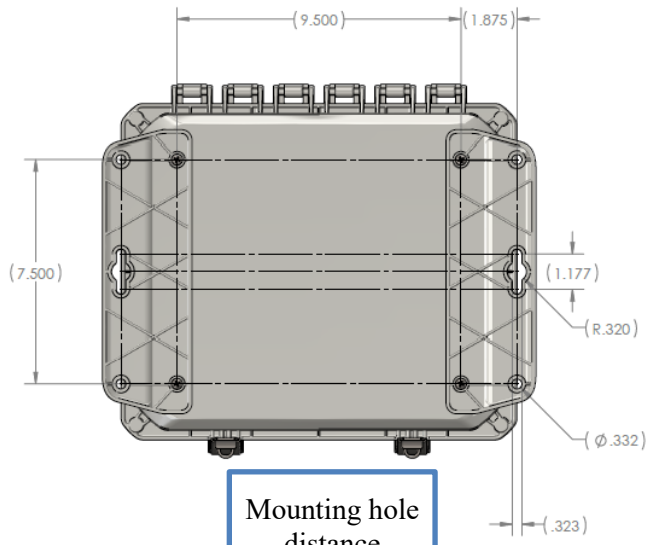


1.2 Enclosure Dimensions

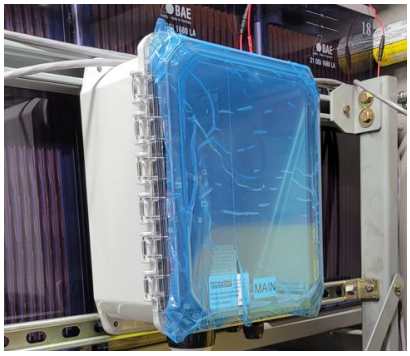
The **Impact-Resistant Polycarbonate** enclosure is rated for NEMA 4 and IP65 with UL certification.



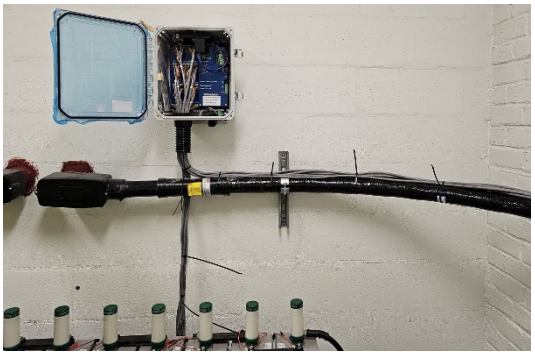




Mounting hole distance 13.25 inch



Rack Mouting



Wall Mounting

1.3 System Specifications

1.3.1 Environmental Conditions

Sentry-6002NEMA is designed for normal environmental conditions as UL61010-1 standard:

a) Indoor use;
b) Altitude up to 2,000 m;
c) Temperature 5 °C to 40 °C (41°F to 104°F); Extended temperature option (-20°C to 65°C) available.
d) Maximum relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C;
e) MAINS supply voltage fluctuations up to ±10 % of the nominal voltage;
f) TRANSIENT OVERVOLTAGES up to the levels of OVERVOLTAGE CATEGORY II;
g) NOTE 1: These levels of transient overvoltage are typical for equipment supplied from the building wiring.
h) TEMPORARY OVERVOLTAGES occurring on the MAINS supply.
i) POLLUTION DEGREE 2

1.3.2 Power Supply

Power Supply	
Voltage	Powered by battery bus, 100 to 300V DC input
Maximum Power Consumption	< 10W

1.3.3 Measurement and Accuracy

Current/Temperature Measurement	
Current Measurement with a Hall Sensor (default)	Supply current sensor with internal +/-12V Option-1 (Default): CK-300A, round window, measurement range +/- 450A, D-35mm window Option-2: CY10-300Q, split-core, measurement range +/- 450A, 104mm x 40mm window Contact BatteryDAQ for other range and window sizes. Accuracy: 0.1% + sensor accuracy
Temperature Sensors	1 ambient temperature sensor, 2 pilot temperature sensors
Temperature Measurement	Measurement range: -40 to 85ºC, Normal operating range: 5ºC to 40ºC (41ºF to 104ºF) Extended operating range: -20 ºC to 65ºC Accuracy: +/- 1 ºC
Voltage Measurement	
Channel	Max 60 channels per unit (configurable for less than 60 channels)

Bus Voltage Range	0 – 150V (each unit)
Accuracy	0.1%
Input Range to Each Channel	+/- 3V for 2V cells
Accuracy	0.1%
Input Wiring	2-wire from (+) POSITIVE and (-) NEGATIVE posts for each battery.
Internal Resistance and Inter-cell Connection Resistance	
Range and Resolution	0 to 3mΩ, 0.005 mΩ resolution
2-wire mode	Discriminated values for Internal Resistance and Inter-cell Connection Resistance.

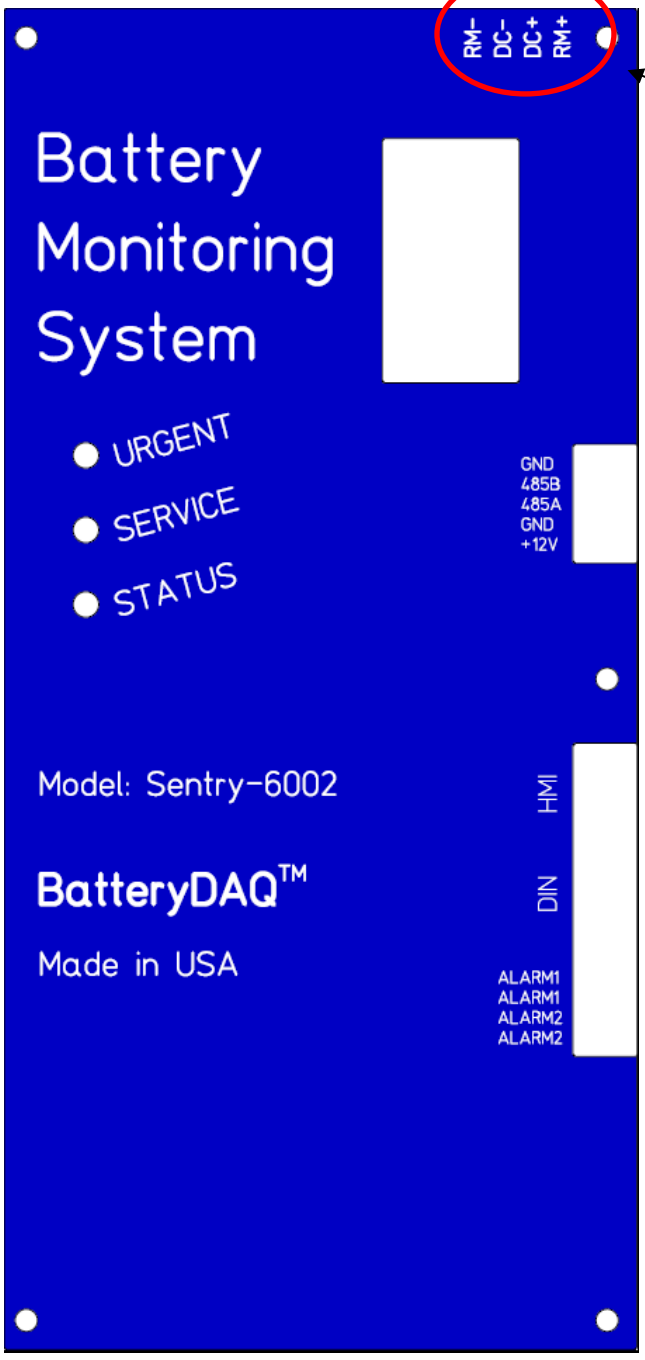
1.3.4 Communication, Indication, and Alarm

Communication	
Serial Port	Isolated RS-232C and RS-485 interface Optional Plug & Play wireless adapter (plug to 4-pin HMI port)
Protocol	MODBUS RTU
Serial Setting	9600-8-1-None
Modbus address	1 to 28, configurable with HMI
Ethernet	Secured DTU can be mounted inside Sentry unit or in control room. 10/100Mbps Ethernet HTTP, TCP, FTP Modbus-TCP *The default version does not have Wi-Fi (optional).*
Indication and Alarm	
LED indication	▪ Dual-color LEDs for status ▪ Orange LED for service alarm ▪ Red LED for urgent alarm
Alarm Outputs	Service Alarm (Normal Close, 60V 0.1A capacity) Urgent Alarm (Normal Close, 60V 0.1A capacity) *Alarm outputs are for low voltage signal connection (<60V) to other system. If a control for higher voltage or AC is needed, an intermediate relay must be used for safety and capacity requirement.

***Specifications subject to change without notice**

2 Connection Terminals

2.1 Instrument Panel (Right)



Power Supply Connector

DC+ and DC- obtain power from Battery Bus (120-240VDC).

For 120V (60x2V) system, jump RM+ to DC+ and RM- to DC-.

For 240V (120x2V) system with 2 units, or 180x1.2V NiCad with 3 units, see instruction for connection.

RS485 Port
Modbus RTU

HMI Touch Screen
RS232C
Optional Wireless

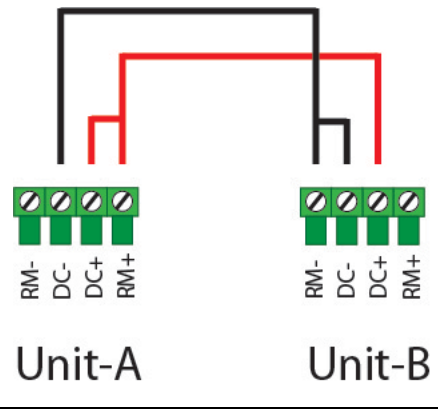
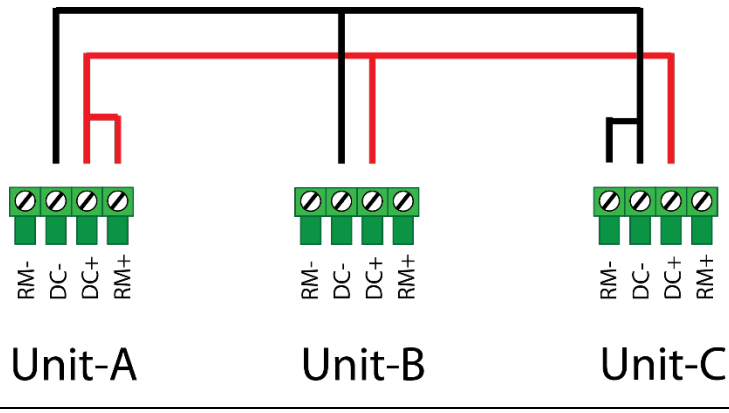
Digital
Inputs

Alarm

2.2 *Right Panel Connectors*

Connector 1: Battery Bus Connection

Pin No	Signal Name	Note
1 2 3 4	RM- DC- DC+ RM+	This plug is to obtain power supply for the unit. 120 – 240V input. For 120V (60x2V) system, connect DC+ to RM+ and DC- to RM-. For 240V (120x2V) system, each system has 2 Sentry-6002 units. For Unit A (BAT#1 to #60), connect DC+ to RM+. Wire DC- to BUS-. For Unit B (BAT#61 to #120), wire DC+ to BUS+, connect DC- to RM-. For 240V (180x1.2V) system, each string has 3 Sentry-6002 units. Unit A, connect DC+ to RM+. Unit C, connect DC- to RM-.

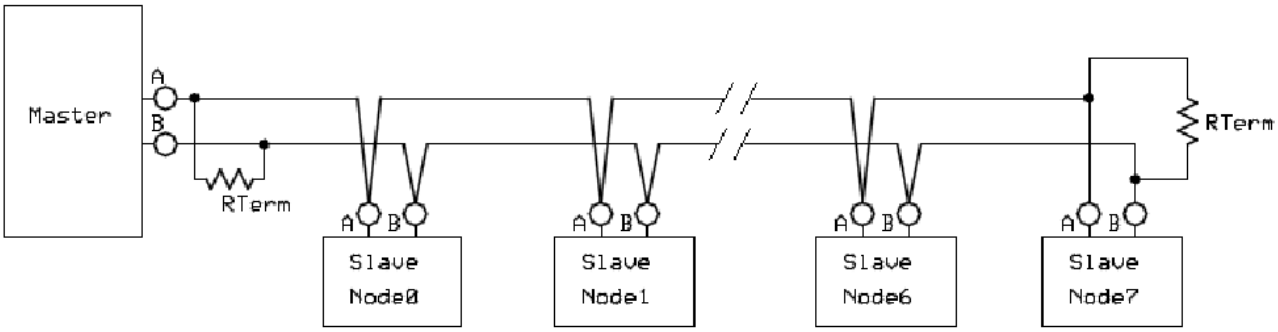
2 Units per String	3 Units per String
	

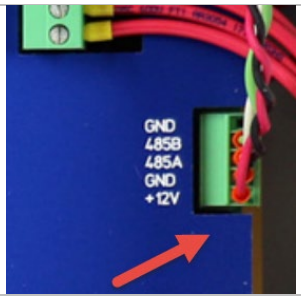
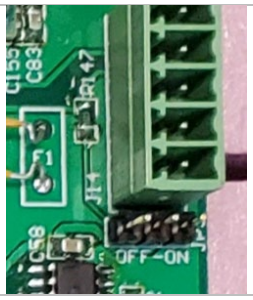
Connector 2: Power supply, RS485 Port

Pin No	Signal Name	Note
1	+12V	Power supply to external wireless adapter or other device. +12V, 0.2A
2	GND	Power supply GND
3	RS485A	RS485A
4	RS485B	RS485B
5	GND	Signal ground if needed

RS485 Termination resistors (180 ohm) might be necessary if the communication noise is high.

2 Connection Description



	
Onboard 180 ohm Termination Resistor	The termination JUMPER is on OFF position by default. Jump to ON for the first unit and the end unit if not already jumped. Make sure other units are on OFF position.

Connector 3: RS-232C or HMI

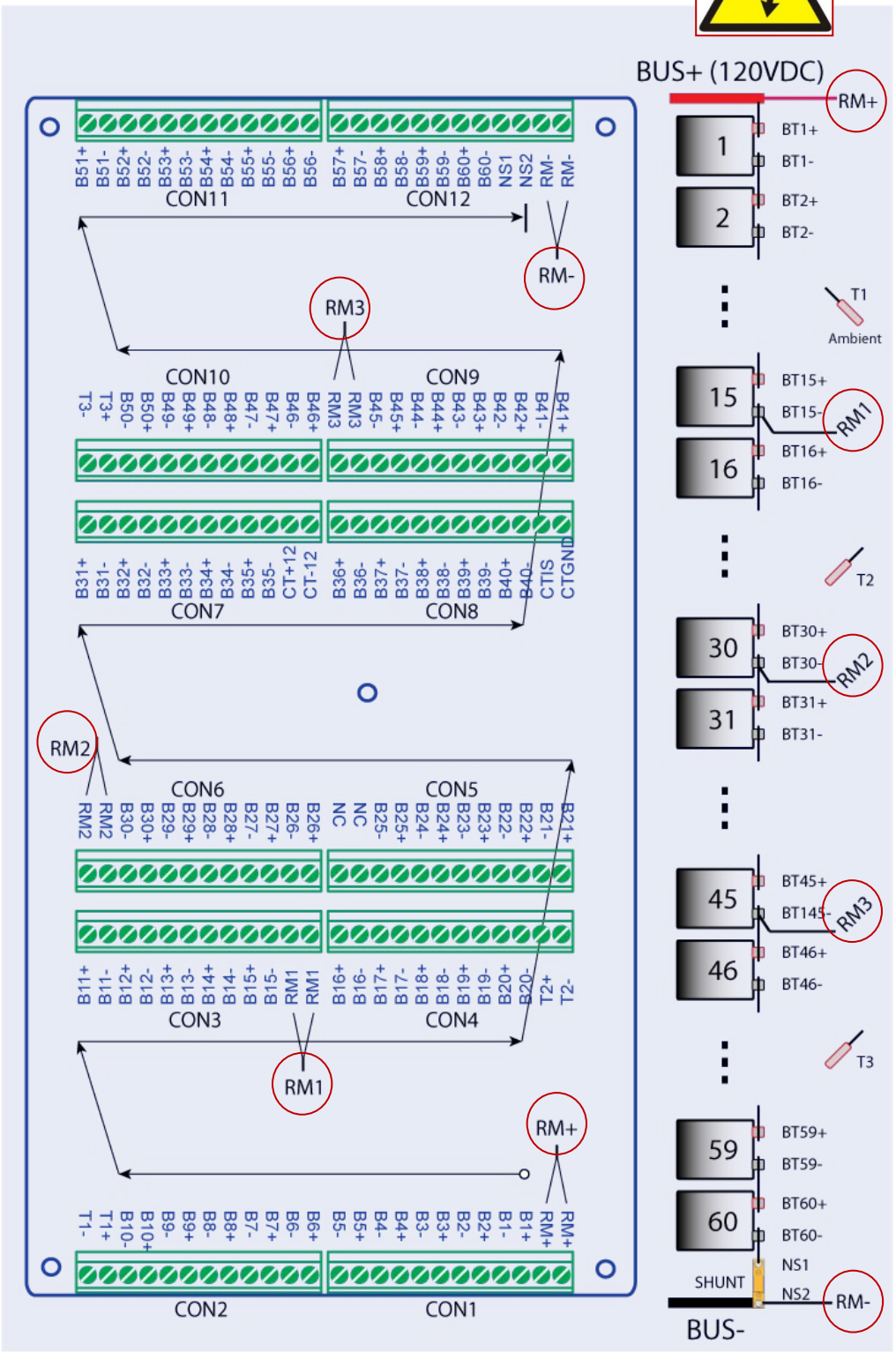
Pin No	Signal Name	Note
1	GND	GND
2	RXD	RS232 RXD
3	TXD	RS-232 TXD
4	+5V	+5V power to HMI

In case Wireless Adapter is utilized, adapter will be connected to RS232C HMI port and powered by 5V. HMI can be temporarily plugged for service but don't forget to plug wireless adapter back afterwards.

Connector 4: Digital signal input (optional) and Alarm Output

Pin No	Signal Name	Note
1	DI1	Digital input 1, dry contact
2	DI1	Digital input 1, dry contact
3	DI2	Digital input 2, dry contact
4	DI2	Digital input 2, dry contact
5	DI3+	Digital input 3+ (0 to 10V)
6	DI3-	Digital input 3-
7	Alarm 1	Service Alarm output
8	Alarm 1	Service Alarm output, solid state relay, "dry" contact
9	Alarm 2	Urgent Alarm output
10	Alarm 2	Urgent Alarm output, solid state relay, "dry" contact

2.3 Battery Connection Panel (Left)



[For NiCad 1-wire mode, please refer to additional instruction.]

2.4 Connectors on Battery Connection Panel

Con	Pin No	Signal Name	Note (for 60 cells)
1	CON-1 (1-2)	RM+ RM+	Two wires (twisted together) connect to the Positive post of this battery section. **10A** external fuse. For 60x2V system (120VDC), it is the Positive post of BATT#1, or the BUS+. For 120x2V system (240VDC), RM+ of the first unit goes to BAT#1+. RM+ of the 2nd unit goes to BAT#61+.
	CON-1 (3 to 12)	B1+, B1- B2+, B2- B3+, B3- B4+, B4- B5+, B5-	2 sampling leads for each battery. BT1+ goes to Battery 1 POSITIVE. BT1- goes to Battery 1 NEGATIVE. **500mA** fuse for each sampling lead is required for safety. ***Always count from Positive***
2	CON-2 (1-10)	B6+, B6-, B7+, B7- B8+, B8-, B9+, B9- B10+, B10-	Sampling leads for Battery #6 to #10
	CON-2 (11-12)	T1+ T1-	Ambient Temperature Sensor (2-wire) Mount to battery rack to sense room/air temperature
3	CON-3 (1 to 10)	B11+, B11-, B12+, B12- B13+, B13-, B14+, B14- B15+, B15-	Sampling leads for Battery#11 to #15
	CON-3 (11-12)	RM1 RM1	Internal resistance measurement drive Twist 2 wires together and connect to the post of BAT#15 Negative. **10A** fuse required
4	CON-4 (1-10)	B16+, B16-, B17+, B17- B18+, B18-, B19+, B19- B20+, B20-	Sampling leads for Battery #16 TO #20
	CON-4 (11-12)	T2+ T2-	Pilot Temperature Sensor (2-wire)
5	CON-5 (1-10)	B21+, B21-, B22+, B22- B23+, B23-, B24+, B24- B25+, B25-	Sampling leads for Battery for Battery #21 to #25
	CON-5 (11-12)	NC NC	Not connected, spare wires
6	CON-6 (1-10)	B26+, B26-, B27+, B27- B28+, B28-, B29+, B29- B30+, B30-	Sampling leads for Battery #26 TO #30
	CON-6	RM2	Internal resistance measurement drive

	(11-12)	RM2	Twist 2 wires together and connect to the post of Battery#30 Negative **10A** external fuse required
7	**CON-7 (1-10)**	B31+, B31-, B32+, B32- B33+, B33-, B34+, B34- B35+, B35-	Sampling leads for Battery #31 to #35
	CON-7 (11-12)	CT+12 CT-12	CT (Current Transducer) +/-12V power supply
8	**CON-8 (1-10)**	B36+, B36-, B37+, B37- B38+, B38-, B39+, B39- B40+, B40-	Sampling leads for Battery #36 to #40
	CON-8 (11-12)	CTIS CTGD	CT signal CT power supply GND
9	**CON-9 (1-10)**	B41+, B41-, B42+, B42- B43+, B43-, B44+, B44- B45+, B45-	Sampling leads for Battery #41 to #45
	CON-9 (11-12)	RM3 RM3	Internal resistance measurement drive Twist 2 wires together and connect to the post of BAT#45 Negative. **10A** fuse required
10	**CON-10 (1-10)**	B46+, B46-, B47+, B47- B48+, B48-, B49+, B49- B50+, B50-	Sampling leads for Battery #46 to #50
	CON-10 (11-12)	T3+ T3-	Pilot Temperature Sensor (2-wire)
11	**CON-11 (1-12)**	B51+, B51-, B52+, B52- B53+, B53-, B54+, B54- B55+, B55-, B56+, B56-	Sampling leads for Battery #51 to #56
12	**CON-12 (1-10)**	B57+, B57-, B58+, B58-, B59+, B59- B60+, B60-	Sampling leads for Battery #57 TO #60
	CON-12 (9-12)	NS1 NS2 RM- RM-	NS1 and NS2 are not connected. Reserved. Two wires (twisted together) connect to Negative post of this battery section. **10A** external fuse. For 60x2V system (120VDC), it is the Negative post of BATT#60, or the BUS-. For 120x2V system (240VDC), RM- of the first unit goes to BAT#60-. RM- of the 2nd unit goes to BAT#120-.

2.5 *Field Wiring Reference Table (Printout)*

Print out this page for field wiring. Check as you go.

Wire	Color	CB#1	√	CB#2	√	CB#3	√	CB#4	√	CB#5	√	CB#6	√
#1	BROWN	RM+		B6+		B11+		B16+		B21+		B26+	
#2	RED	RM+		B6-		B11-		B16-		B21-		B26-	
#3	ORANGE	B1+		B7+		B12+		B17+		B22+		B27+	
#4	YELLOW	B1-		B7-		B12-		B17-		B22-		B27-	
#5	GREEN	B2+		B8+		B13+		B18+		B23+		B28+	
#6	BLUE	B2-		B8-		B13-		B18-		B23-		B28-	
#7	VIOLET	B3+		B9+		B14+		B19+		B24+		B29+	
#8	SLATE	B3-		B9-		B14-		B19-		B24-		B29-	
#9	WHITE	B4+		B10+		B15+		B20+		B25+		B30+	
#10	BLACK	B4-		B10-		B15-		B20-		B25-		B30-	
#11	TAN	B5+		T1+		RM1		T2+		NC		RM2	
#12	PINK	B5-		T1-		RM1		T2-		NC		RM2	

Wire	Color	CB#7	√	CB#8	√	CB#9	√	CB#10	√	CB#11	√	CB#12	√
#1	BROWN	B31+		B36+		B41+		B46+		B51+		B57+	
#2	RED	B31-		B36-		B41-		B46-		B51-		B57-	
#3	ORANGE	B32+		B37+		B42+		B47+		B52+		B58+	
#4	YELLOW	B32-		B37-		B42-		B47-		B52-		B58-	
#5	GREEN	B33+		B38+		B43+		B48+		B53+		B59+	
#6	BLUE	B33-		B38-		B43-		B48-		B53-		B59-	
#7	VIOLET	B34+		B39+		B44+		B49+		B54+		B60+	
#8	SLATE	B34-		B39-		B44-		B49-		B54-		B60-	
#9	WHITE	B35+		B40+		B45+		B50+		B55+		NS1	
#10	BLACK	B35-		B40-		B45-		B50-		B55-		NS1	
#11	TAN	CT+12		CTIS		RM3		T3+		B56+		RM-	
#12	PINK	CT-12		CTGD		RM3		T3-		B56-		RM-	

T1: Ambient Temperature, mount to battery rack. T2: Pilot, mount to BAT#20. T3: Pilot, mount to BAT#50.

All voltage sensing leads to battery posts are using 500mA fuses. 5 IR leads are using 10A fuses.

RM+ (2-wire) on top of BAT#1+ post. RM-(2-wire) on top of BAT#60- post.**10A** fuses.

RM1 (2-wire) on BT#15-. RM2 (2-wire) on BT#30-. RM3 (2-wire) on BT#45-. **10A** fuses.

CT+12V, CT-12V, CTIS, CTGD to Current Transducer 4-wire (Red/White/Green/Black).

NC terminals are not connected. (Spare wires, can be used for replacing broken wire.)

NS1 and NS2 are not connected.

2.6 Connections for battery strings other than 60x2V

For battery strings with different number of cells, beside connecting sampling leads to each battery (+) and (-) post, RM leads need to be installed to correct post. In case you notice abnormal lower IR reading, check the RM lead connection first.

Section settings shall be checked with HMI during installation. It can be modified with HMI.

Battery Cells	Section Settings	RM+	RM1	RM2	RM3	RM-
54 x 2V	**14+13+14+13**	BUS+ or BAT1+	**BAT14-**	**BAT27-**	**BAT41-**	BAT54- or BUS-
55 x 2V	**14+14+14+13**	BUS+ or BAT1+	**BAT14-**	**BAT28-**	**BAT42-**	BAT55- or BUS-
56 x 2V	**14+14+14+14**	BUS+ or BAT1+	**BAT14-**	**BAT28-**	**BAT42-**	BAT56- or BUS-
57 x 2V	**15+14+14+14**	BUS+ or BAT1+	**BAT15-**	**BAT29-**	**BAT43-**	BAT57- or BUS-
58 x 2V	**15+14+15+14**	BUS+ or BAT1+	**BAT15-**	**BAT29-**	**BAT44-**	BAT58- or BUS-
59 x 2V	**15+15+15+14**	BUS+ or BAT1+	**BAT15-**	**BAT30-**	**BAT45-**	BAT59- or BUS-
60 x 2V	**15+15+15+15**	BUS+ or BAT1+	**BAT15-**	**BAT30-**	**BAT45-**	BAT60- or BUS-

3 Installation Guide

- Prepare and follow “Safe Work Plan – Electrical & Arc Flash Hazard Mitigation” guideline for specific site and battery.
- Batteries can present a risk of electrical shock or burns from high short-circuit current, both online and offline.
- Installation should be performed by qualified service personnel knowledgeable of batteries and required precautions.
- Keep unauthorized personnel away from batteries.
- This handbook must be read thoroughly before installation.
- Equipment mounting location must be identified and confirmed with end user before installation.

3.1 Installation Safety Warning

CAUTION

1) Ensure all equipment and tools are properly safe and in good working order.
2) Ensure electrical tools have been tested for proper insulation and grounding.
3) Observe all CAUTION, WARNINGS and DANGER notices on any equipment.
4) Never work alone.

CAUTION: High Voltage, High Current

Please follow the detailed instructions for each step.
Only a qualified electrician with battery knowledge can perform the installation.
Never work alone with high voltage.
Disconnect battery string from power system before installation. **If the charger(s) cannot provide enough power to DC load when battery is offline, a temporary battery must be arranged and connected. For example, charger(s) may not be able to power two DC emergency lube-oil pumps while the GT is shutdown/idle for scheduled maintenance.**

3.2 Preparation for Installation

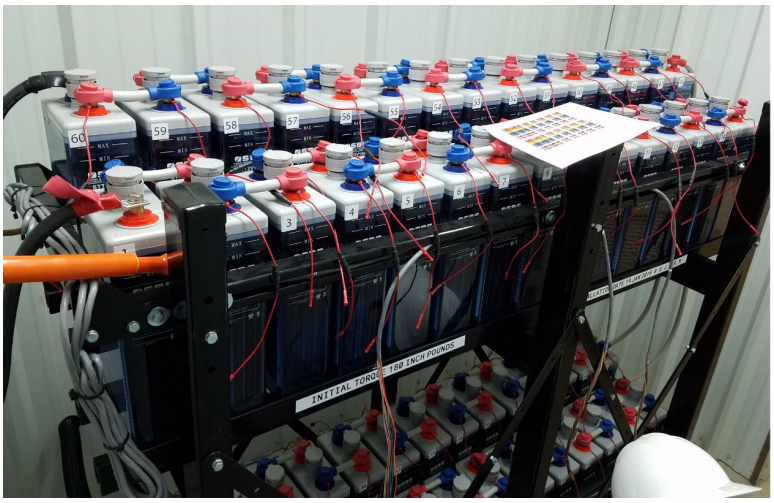
Fill site survey form and send to BatteryDAQ for ordering correct parts and factory configurations.

https://batterydaq.com/site-survey-power-plants-substations/

Step	Preparation	Description	Check
1	Unpacking	Unpack product and all accessories. Check with packing list.	
2	Software	Install **IPSetup.exe** to a laptop which can be brought to site. (*Refer to software chapter*.)	
3	Power on	Power on with external power adapter. (AC100-240V input, +12V output, with 5-pin terminals to RS485 port) LEDs will blink/flash when unit is powered on.	
4	HMI	Plug in HMI to RS232 port. Check the unit with HMI. Because the temperature sensor and CT are not connected, the current and temperature data are not corrected. Write down that value as reference for software and wiring check.	
5	Alarm Settings	With HMI, check alarm settings in Sentry unit, it may need to be adjusted to match specific battery. Cell Voltage High/Low String Voltage High/Low Temperature High Internal Resistance High (absolute value) Connection Resistance High	
6	Ethernet Connection	Connect to network with Ethernet cable. Refer to Ethernet chapter, run IPSetup.exe, check the IP address, set to static or dynamic IP if needed. (When the installation site is in a different network, this step may need to be performed on site.) Use web browser to check the DTU setting. Run Battery Analyzer software, check data. Comparing with HMI reading.	
7	Ethernet on Site	Contact the end user for the availability of the Ethernet port on site.	

		Prepare the proper length of Ethernet cable. Test the cable before site installation. Prepare the conduit for Ethernet cable if needed.	
8	**Wi-Fi**	If DTU ordered with Wi-Fi, configure Wi-Fi access with IPSetup.exe.	
9	**Mounting**	Mounting parts are not included. Unit can be mounted in the battery room, close to batteries. Decide the proper mounting method and prepare all the necessary hardware. Confirm mounting method with end user.	
10	**Wire duct**	Prepare conduit and/or wire duct as needed. Prepare material to mount wire duct	
11	**Current Transducer**	Verify the battery bus cable size and sensor window size. CT direction is the same as charging current.	
12	**Temperature Sensor(s)**	Pay attention to wire color and polarity: RED (+) and BLACK (-).	
13	**Voltage Sampling Leads** **Tab Washer** **Cables**	For 2-wire mode, each battery needs 2 sampling leads. For 60 cells, a total 120 (60x2) sampling leads. Sampling lead comes with safety inline fuse (0.5A) Check the tab washer size. Make sure it matches with the battery terminal. **Installer may need to purchase 12-conduct, 20 AWG (18AWG is acceptable.) unshielded cable if not ordered from BatteryDAQ. (Such cable often has a long lead time.)** Calculate the cable length. If possible, cut the cable to proper length, connect one end to 12-pin terminal plugs, and label them. *(This will significantly save installation time.)*	
14	**IR leads**	IR leads is protected with **10A** fuse. For 60 cells, 5 leads are required. (RM1, RM2, RM3, BUS+ and BUS- connections) Separate tab washers are required for IR leads. [Do not connect any IR lead to the same tab with sensing lead.]	

3.3 Installation Examples

	Sentry unit is installed in control room next wall. Cable duct runs on top of battery.
	Sentry unit is nstalled in control room next wall. O-ring fused leads are used. Spiral wrap protection

Sentry unit is mounted next to battery rack.

Cable duct runs on the center of battery top.

3.4 Installation Steps

Step	Description	Completion Time	Check
1	Locate/mount the Sentry unit on wall or rack.		
2	Cut to proper length and install 2-inch flexible tubing to unit.		
3	Install/connect network cable to Sentry unit if available.		
4	Install the wire duct to battery rack if needed.		
5	Prepare 12-conductor cables with terminal plug if harness is not pre-made. Label each cable #1 to #12 at 3 positions (plug end, 6 ft away from plug, and the other end.)		
6	Pass 12 cables through flexible tubing, run to wire duct. Strip off jacket to expose individual wire. (2 ft for most battery size.)		
7	Disconnect battery bank from power system.		
8	Install tab washers fused sampling leads (0.5A) on battery posts.		
9	Install 5 tab washers with 10A fused IR leads.		
10	Torque all battery posts with specified force.		
11	Power on Sentry unit with AC adapter. Hook up laptop to DTU, access the web page. Unplug 8P IR terminal from the main board.		
12	Install/secure 3 temperature probes, read/confirm temperature with HMI.		
13	Install/secure current transducer, read current with HMI. Calibrate zero/drift if needed.		

14	Connect 12-conductor cable wires to leads, start from BAT#1. Check cell voltage with HMI or laptop as you go. Correct any connection error such as missing or negative voltage.		
15	Check with HMI or Laptop: All channels shall have the correct voltage. String voltage shall be correct.		
16	Plug back 8P IR terminal, start IR test with HMI. Wait for 10 minutes, check voltage, IR and CR on laptop.		
17	Change alarm thresholds to match battery. Troubleshooting: any alarm, missing/wrong voltage, wrong IR, wrong CR.		
18	Bring back battery to online		
19	Fill installation record		

Print out this page and check each item as you go.

Record the completion time as reference for future installations.

3.4.1 Locate/Mount the Sentry Unit

Sentry-6002NEMA unit can be installed in the battery room. It can be mounted to the wall or the battery rack.

Enclosure is rated as:

NEMA Type 4, 4X, 12

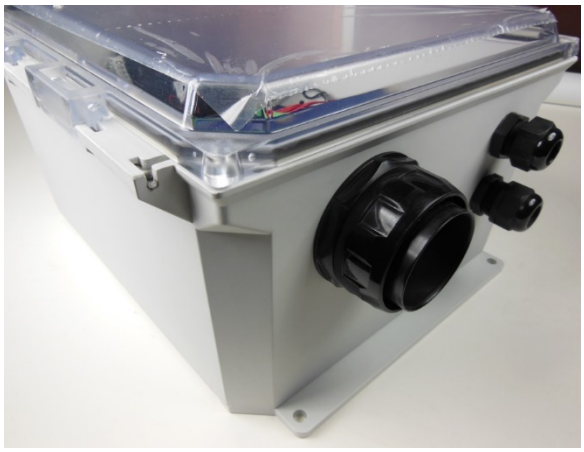
UL Type 1, 2, 3, 3R, 4, 4X, 12, 13

3.4.2 Install Flexible Tubing

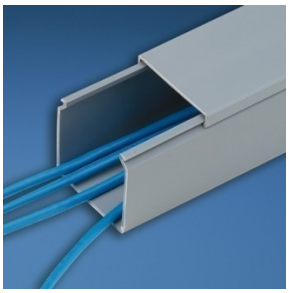
In order to meet IP65 (NEMA 4) protection grade, flexible tubing has to be installed to cable outlets.

Tubing length will be determined on site in order to reach the conduit or cable duct.

3.4.3 Connect Ethernet Cable

	System is designed with IP68 Ethernet cable connector.
	Wrap cable with the sealant supplied with the fitting. Secure it tightly

3.4.4 Install Wire Duct



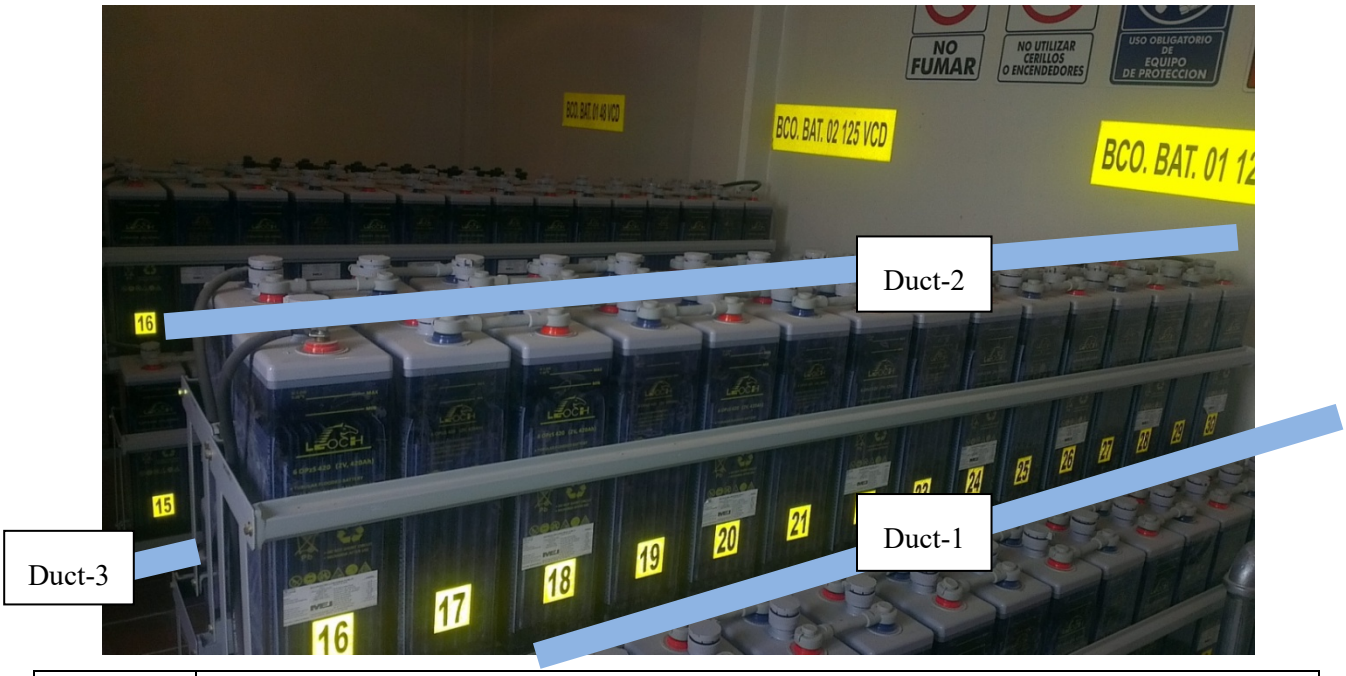
Install wire duct to protect cable

Cable duct shall not block the access for individual battery service and replacement.

The principle of numbering the batteries is to define the battery which is connected to the positive bus of the string as NO.1 and to order sequentially.

<u>Important:</u> Battery numbers for monitoring must begin from the positive bus! Otherwise, it will over-heat and damage the unit.

If the existing number #1 on the battery string starts from negative bus, a new set of

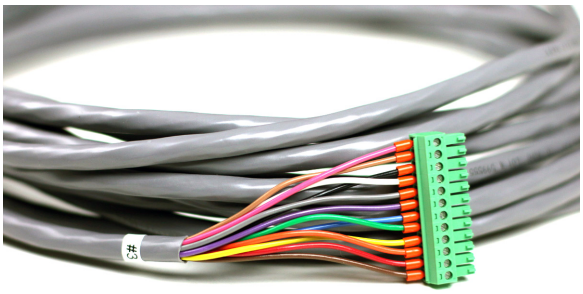


Duct-1	cable-1 (BAT 1-5), cable-2 (BAT 6-10), cable-3 (BAT 11 -15)
Duct-2	cable-4 (BAT 16-20), cable-5 (BAT 21-25), cable-6 (BAT 26 -30) cable-7 (BAT 31-35), cable-8 (BAT 36-40), cable-9 (BAT 41 -45)
Duct-3	cable-10 (BAT 46-50), cable-11 (BAT 51-55), cable-12 (BAT 56 -60)

3.4.5 Prepare 12-conductor cables

Prepare 12-conductor cables with proper length, label with #1, #2, … , #11, #12 on both ends.

Connect 12-conductor cable to 12-pin terminal plug if harness is not pre-made



Use 2.5mm, isolated screw driver for terminals.

Screw tightly to plugs.

Use insulated ferrules to protect wire for long term reliability.

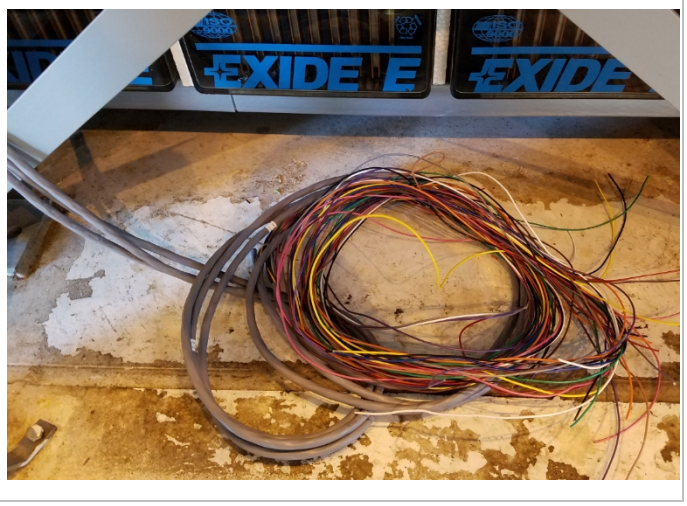
Recommended clamping tool:
Self Adjusting Ferrule Crimper ***HSC8*** *6-4 0.25-6mm²*

3.4.6 Pass Cables through Flexible Tubing

Pass all (12) cables through flexible tubing.

Run to wire conducts, confirm the length.

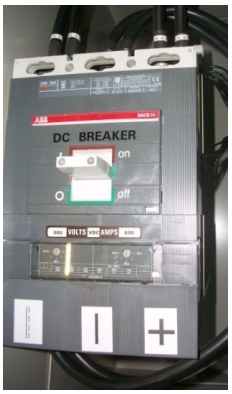
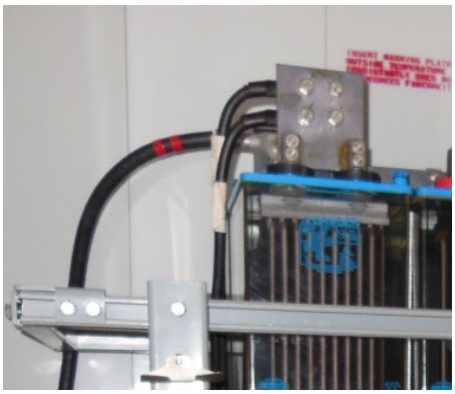
Cut and peel off jacket to proper length to cover the range of 5 batteries for each cable.



3.4.7 Disconnect Battery String

Never install a BMS with the battery string connected to power system.

Make the arrangement with operation manager when you schedule the installation.

		After disconnecting from power system, measure the voltage between battery terminals and enclosure/Ground. Make sure it is isolated and floating. Disconnect inter-tier connection if needed.

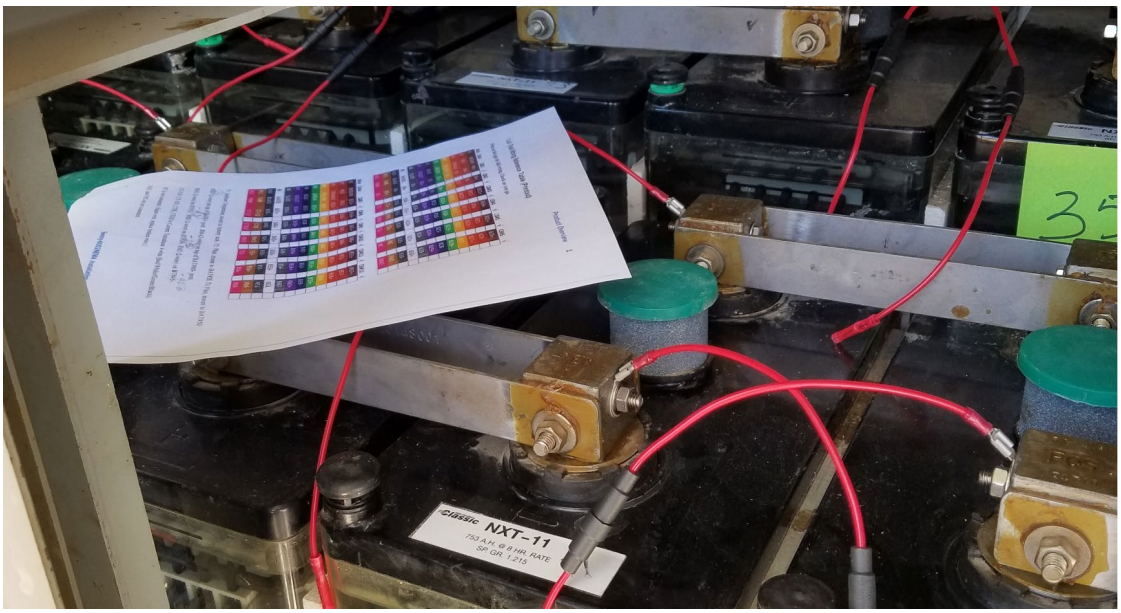
3.4.8 Install Tab Washers and Fused Leads

Use the correct size tab washers. 6mm/8mm/10mm diameter available.

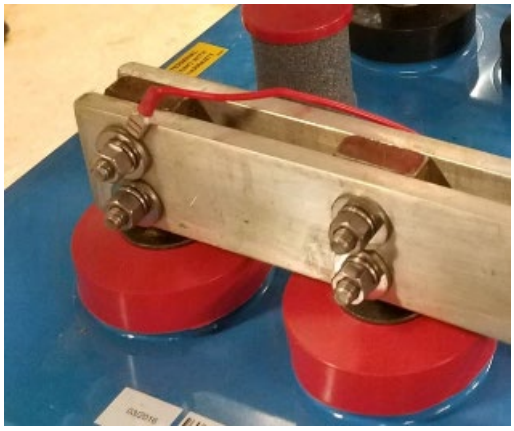
Sensing leads are protected with 0.5A (500mA) fuse. It can be replaced with 100mA to 1A fuse if 500mA is not available.

O-ring fused leads are also available for 6mm/8mm/10mm/12mm diameter.

The idea position to put the tab is on the post.



In the case there is no perpendicular holes on post to install the tab, install the tab on top of plate, this method will have lower accuracy for internal resistance and connection resistance.



3.4.9 Install Tab Washers for IR Leads

For RM leads, twist 2 wires as one connection before crimping to 10A O-ring fused lead (RED).

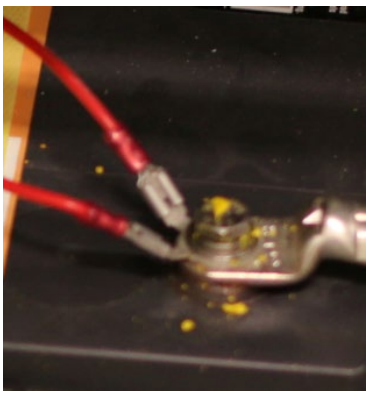
Install both sampling leads (BLACK 0.5A fuse) and IR leads (RED **10A** fuse) to:
1) BUS+ (terminal of bus cable to BAT1+)
2) RM1 (BAT15-)
3) RM2 (BAT30-)
4) RM3 (BAT45-)
5) BUS-(terminal of bus cable to BAT60-).

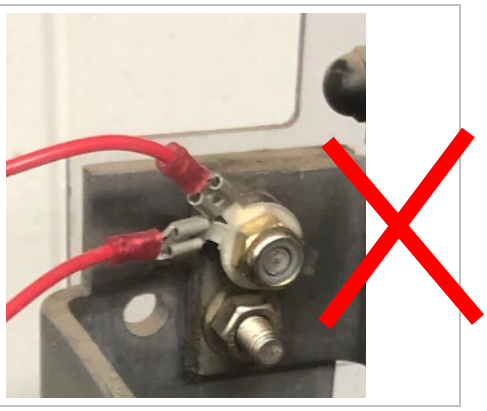
For the same terminal,

Option-1: install two tab washers to different bolts.

Option-2: put the tab washer for IR lead on top of tab washer for sampling lead.

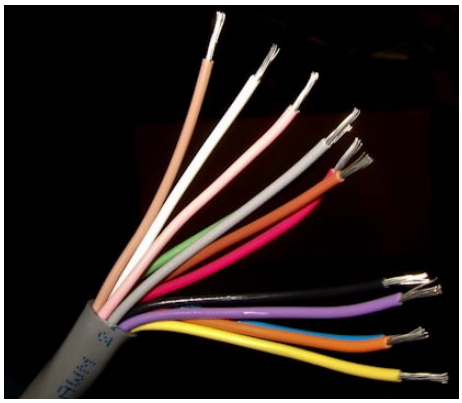
DO NOT SHARE TAB!





3.4.10 Connect Cable Wires to Leads

Crimp fused leads to wires with a reliable tool.



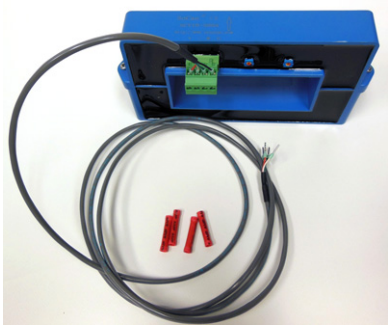
3.4.11 Install Temperature Sensors

Each unit comes with 3 temperature sensors. (1 for ambient, 2 for pilot)

Ambient temperature sensor can be attached to battery rack or wall.

Pilot temperature sensors can be attached to a pilot battery **surface**. **Never on a battery post.**

3.4.12 Install Current Transducer



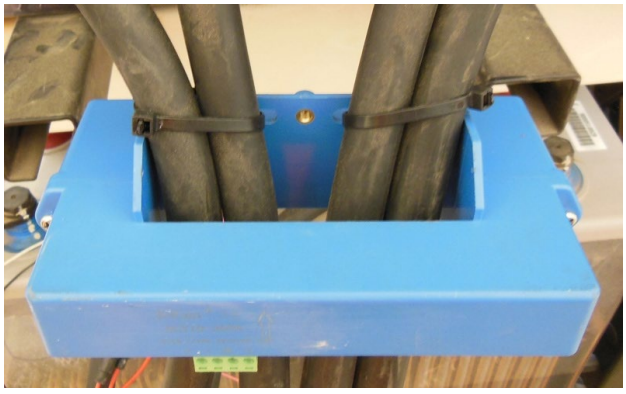
Current transducer can be installed at a convenient location in the string loop, such as positive bus to battery-1, or interconnection between tier-1 to tier-2.

The direction arrow is the charging current direction, from charger toward to battery positive terminal.

By default, the sensor window is D-35mm.

Split Core 104mm x 40mm is available.

Contact BatteryDAQ for other window size.

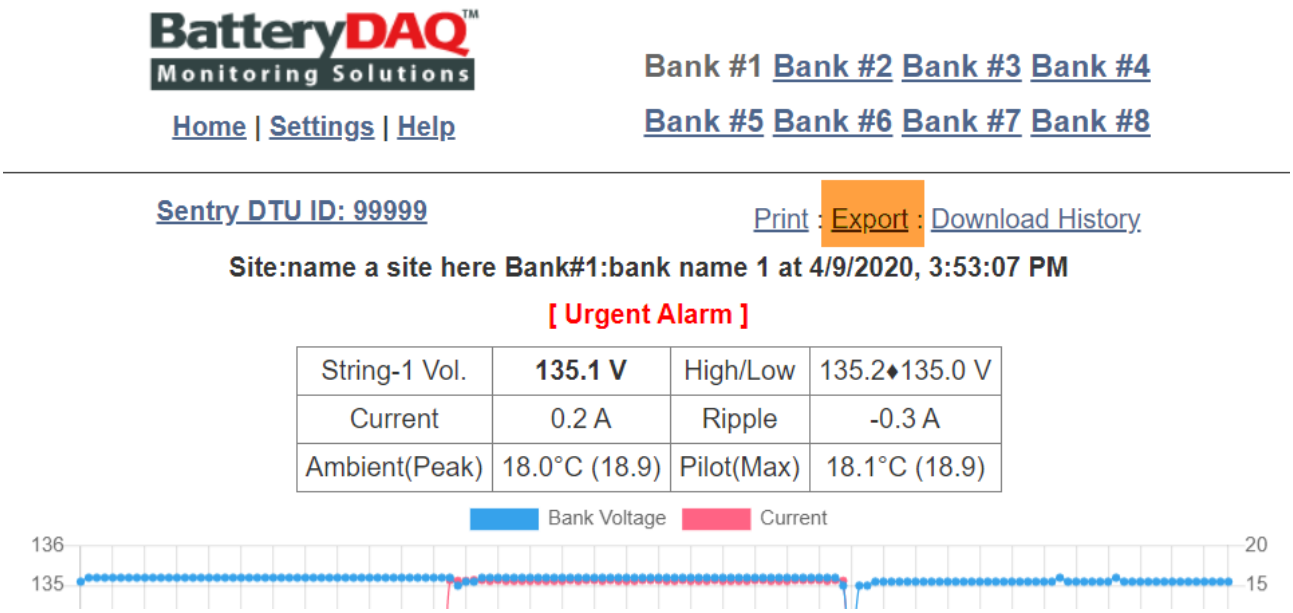


3.4.13 Verify Connection

1) Check all connections to confirm they are accurate and reliable.
2) Verify connection with multimeter at terminal plugs.
3) Measure the string voltage between BUS+ and BUS-.
4) Measure BUS+ to RM1, RM1 to RM2, RM2 to RM3, RM3 to BUS-.
5) Go through battery 1 to 60 at terminals to check voltage.
6) Plug to Sentry unit battery connection panel.

3.4.14 Power-on Test

1) **Test voltage sampling**. After powering on, verify there are no abnormal voltage readings.
2) **Test internal resistanc**e. Internal resistance measurement will be automatically started 30 seconds after power on. Using HMI to check the data. Wait for it to finish all channels. (Unfinished channel will show "-1".)
3) Connect your laptop, access web page to check battery data.
4) Export a set of data from web page and send to BatteryDAQ for a review.
5) Fill out the installation report.



3.4.15 File Installation Record

Print out the "Installation Record" and "Installation Acceptance Report". File the records. Scan and Send a copy to BatteryDAQ.

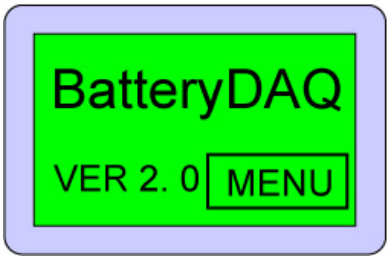
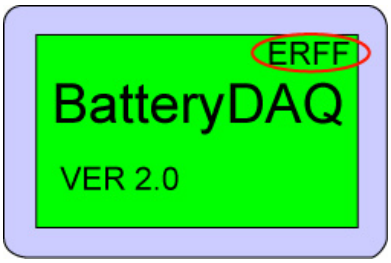
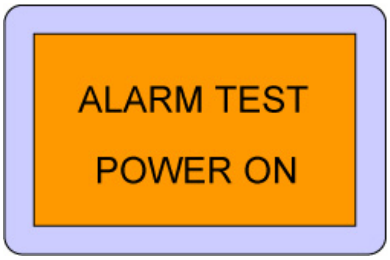
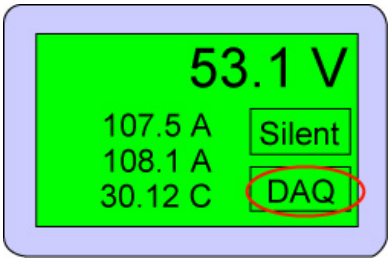
4 HMI Panel Operation

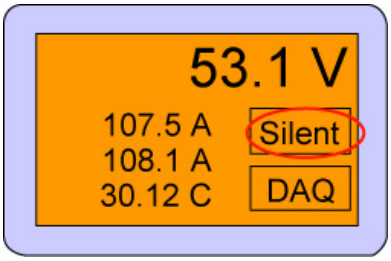
HMI is a touch screen panel. It has been programmed for comprehensive battery monitoring tasks. It is simple but very useful for field installation and maintenance.

- Displays the battery string information. (Voltage, current and temperature)
- Displays each cell (Battery Unit) voltage, internal resistance, connection resistance in numeric data or bar chart
- Displays (Flash) the alarm sign for abnormal battery condition. (Alarm Sound if selected)
- Sets alarm parameters for monitors
- Calibrates monitors.

(HMI content may vary for your order.)

4.1 Power-on Check

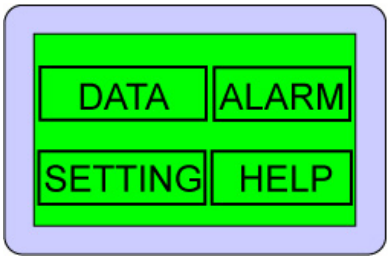
	**Power-on Interface** Equipment models and company logos will be displayed after system self-inspection. Enter the main menu by touching any place on the screen. The background light goes out when there is no operation for 1 minute.
	**ERFF Error** If the Sentry monitor is not powered on or the communication connection is not correct, the panel will display “ERFF”. Occasionally, when battery monitor is busy with other tasks, an “ERFF” may show up.
	**ALARM TEST** Each time the unit is turned on, this ALARM TEST will show.
	**Default page** If not touched, or after 10 seconds of operation, the panel returns to the default page which displays the string voltage, current 1, and ambient temperature. Press DAQ to check the battery data.



ALARM Condition

In case of an alarm or incorrect configuration, the panel will twinkle with an orange color. If the "Silent" is pressed, the twinkle will turn off for a short time. If the alarm condition still exists, the screen will twinkle again.

"Silent" alarm also closes the Urgent alarm output for 30 seconds.

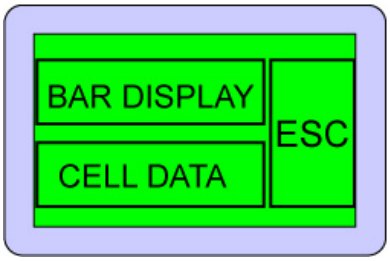


Main Menu

Click the battery data to check the battery online data.

Battery string data includes the string total voltage, sample battery temperature and string current.

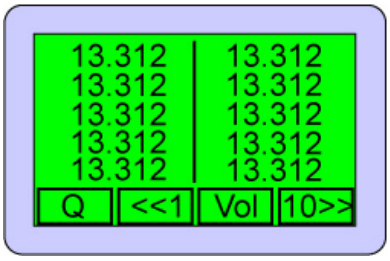
4.2 *Battery Data Query*



Display of Cell Data

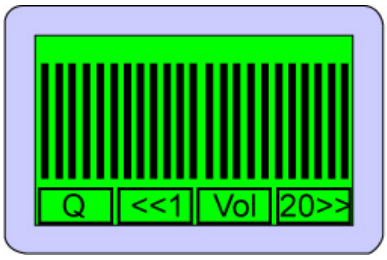
Click the enter key to check cell online data.

Cell data includes the voltage and resistance data of every cell. The number in the middle represents the battery number that corresponds to the number labeled on the battery. Click right or left key to check the data in sequential order.



Display of real-time detection data

The system is in real-time detecting state when running. By real-time detecting, sampling data is received, processed and displayed.

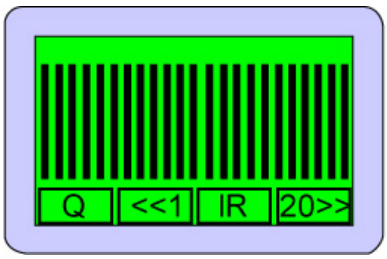


Display bar chart for Voltage

Each screen displays bar chart for 20 cells

Press "<<" or ">>" to select other cells.

Press "Q" to return to main menu.



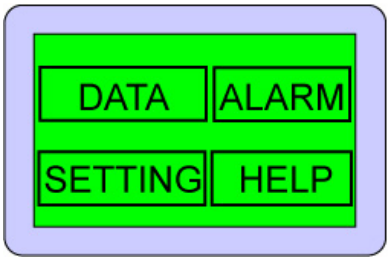
Display bar chart for Internal Resistance

Each screen displays bar chart for 20 cells

Press “<<” or “>>” to select other cells.

Press “Q” to return to main menu.

4.3 Alarm Check



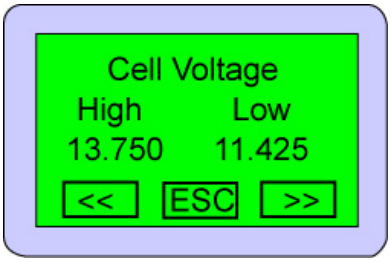
Real-time alarming event

The system processes the event over the alarming condition as a real-time alarming event.

Alarming event inquire

Inquire the alarming event.

4.4 Setting Operation



Alarm setting

Adjust alarming parameter according to the battery use requirement.

System configuration includes:

1. float voltage high/low limit for string and cell
2. Internal Resistance threshold

System setting

Some basic system settings can be done with HMI.

1) Battery number for this unit. Change to actual battery number for this string if it is not 40.
2) Wire mode, don’t change it.
3) Modbus address. Default 6. Do not change it.

4.5 Calibrate Sentry Unit

Routine calibration is not necessary unless required by maintenance schedule.

To ensure correct calibration and best system performance, it is strongly recommended to forward new calibration parameters along with Sentry unit **SN** (Serial Number) to BatteryDAQ for FREE verification.

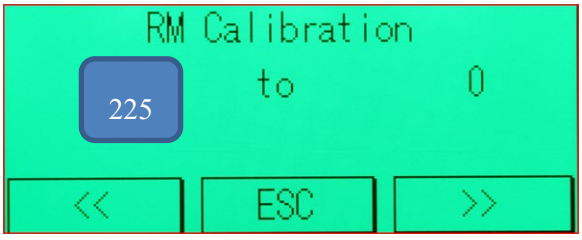
4.5.1 Internal Resistance Calibration

It is not recommended to calibrate Internal Resistance and Connection Resistance. If you have found the Internal Resistance or Connection Resistance reading is much higher or lower than it should be, there must be something wrong with connection or unit. Please export/print out a full set of data from web page, consult with BatteryDAQ before you take calibration action.

In any case if you wish to calibrate the value to match another high performance internal resistance meter, you may calibrate the IR GAIN with HMI.

New gain value = **previous gain** value * (standard IR value / readout)

DAQ → Settings → System Setting → [Page down] → Calibration → …. → **RM Calibration**

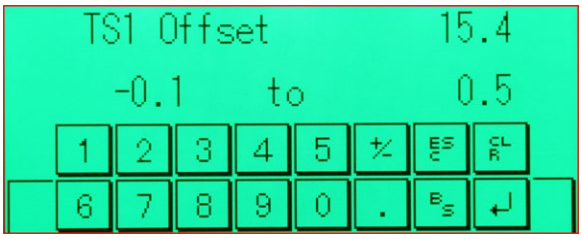


For example, actual value is 3.050mohm, readout is 2.751mohm, new calibration = previous calibration x (3.050/2.751). Previous Gain **225**, new Gain = 225 x (3.050/2.751) = **249**. Input 249 and save it.

4.5.2 Temperature Calibration

After installation, or after replacing a new temperature sensor, verify the temperature reading with an accurate thermometer. If the difference is more than **1.0** degree, you may use HMI to re-calibrate it.

DAQ → Settings → System Setting → [Page down] → Calibration → …. → **TS1** → **TS2**



TS1 is for ambient temperature

TS2 is for pilot temperature

TS1 (2) offset = previous offset + actual temperature – readout

You can read the calibrated temperature on the same page. So, fine tune it until it displays the accurate value.

The TS offset shall be within +/-**5.0** degree. All readings in HMI is Celsius.

4.5.3 Voltage Calibration

Only calibrate voltage gain if necessary.

Voltage offset is set to Auto for Sentry-6002, no need to calibrate.

From web page, check voltage for all batteries. If any battery voltage is abnormal, check the wiring to fix that.

Voltage calibration shall not be proceeded before all battery voltage is measured correctly.

After confirming cell voltage readings are correct for all batteries, measure battery bank voltage between POSTIVE and NEGATIVE bus with an accurate voltage meter.

Read out string voltage with HMI. If the difference is more than 0.5V or +/-0.4%, you may re-calibrate it.

DAQ → Settings → System Setting → [Page down] → Calibration → … → **Voltage Offset** → **Voltage Gain**

New Gain = previous gain x Standard/Readout. [Sentry-6002's gain shall be around **2140**.]

Make sure the IR measurement is finished before calibrate voltage.

4.5.4 DC Current calibration

CT1 is for DC current measurement. Giving it has to cover a wide range of current during charge and discharge, it is normal to have a small offset/drift, such as +/-0.5A for 300A CT.

Calibrate Offset

Current offset (for Sentry-6002 V1 and V2, offset should be around -2350.)

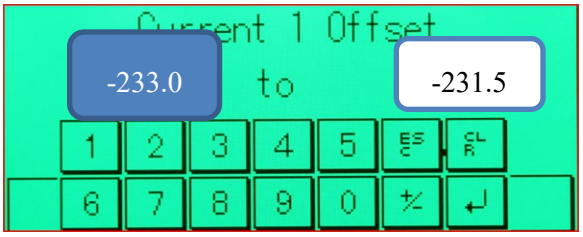
Calibrate zero at battery string open circuit or when the sensor is out of current loop.

With HMI, read the previous offset, write down. Read out current value.

New Offset = Previous Offset - Current * 2.5

Example

Current Reading	Previous Offset	Calculation	New Offset
-0.6	-233.0	-0.6 * 10000/gain(4000) = -1.5	Previous – Calculation -233.0 - (-1.5) = -231.5



Calibrate Gain

Calibrate gain when you select different CT, otherwise the gain does not need to be calibrated.

Current-1 gain shall be around 4000 for 300A CT. So if a 600A CT is selected, the gain shall be 8000. If an 800A CT is selected, the gain shall be 800x4000/300 = 10666.

In case a higher accuracy current measurement is required, the unit gain can be calibrated:

New gain input = previous x (actual current/readout)

For example, readout is 98.0A for actual 100A input, new gain = previous gain x (100/98.0)

4.5.5 Ripple Current Calibration

Sentry-6002 ripple is measured with the same CT. It has a RMS converter to extract ripple value from CT.

Ripple value is displayed as CT2.

4.5.5.1 Calibrate Ripple Offset

Readout Ripple from HMI, unplug CT, read ripple value again. It shall be around zero.

For example, ripple readout = -0.6A, ripple offset

Ripple current ZERO calibration: read out ripple current at battery open circuit or CT is out of current loop, adjust the offset at the ratio of 10000/600=16.7. [Ripple gain is 600 for 300A CT.]

Example, read out 0.5A ripple current, the existing offset is 1100, shall subtract 0.5*16.7=83, new offset shall be 1017.

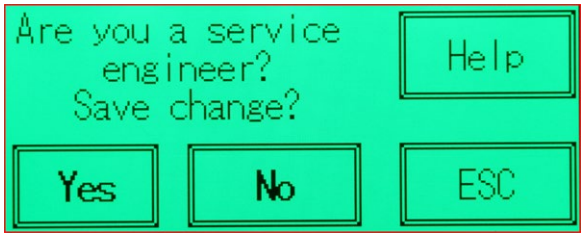
	With CT online, Ripple Readout	Unplug CT, Ripple Readout	Ripple Gain	Previous Ripple Offset	New Ripple Offset
Value	-0.6	-0.6	600	90.9	*0.6 * 10000 / 600 = 10.0* 90.9+10.0 = 100.9

After calibrate ripple offset, plug back CT, it shall display actual ripple current.

4.5.5.2 Calibrate Ripple Gain

Ripple gain does not need to be re-calibrated.

4.5.6 Save to Onboard Flash



If not saved, the modifications will be lost after a power off/on cycle.

After saving, system will start a fresh IR test.

5 Network Setting and Data Access

5.1 Set DTU IP Address

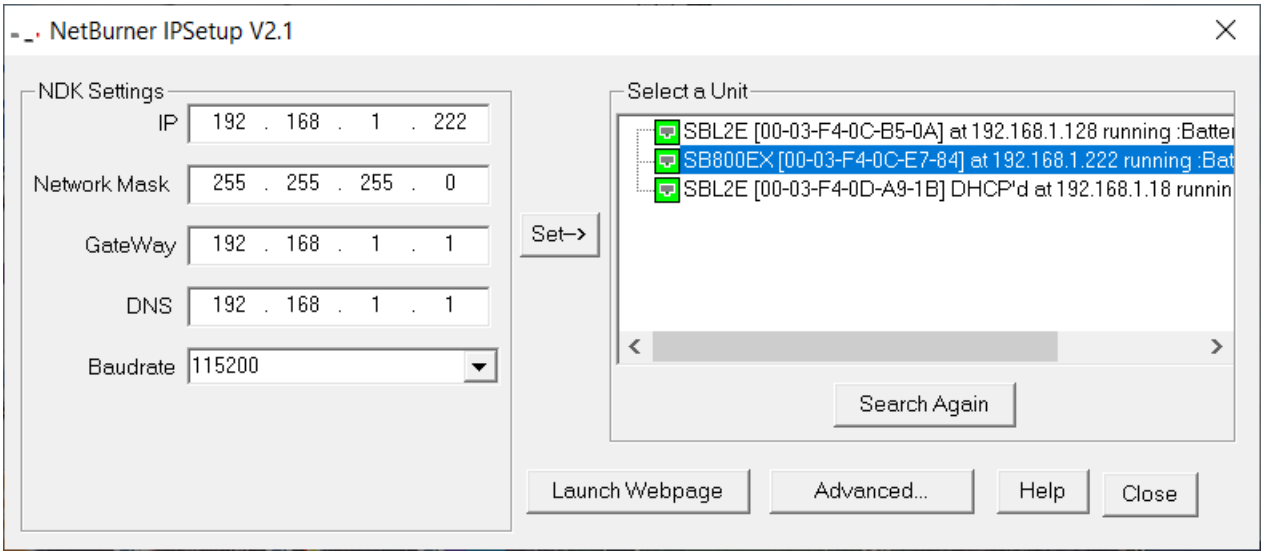
In order for DTU to work in a network, the IP address/Mask/Gateway/DNS must be set correctly.

Use a laptop, direct connect its Ethernet port to DTU with a regular or crossover Cat5/6 cable.

Run IPSetup.exe to search for DTU (SB800EX).

IPSetup.exe in the software disk \Ethernet DTU Tool\ folder. Or, download from this link:

http://batterydaq.com/tech/IPSetup.exe

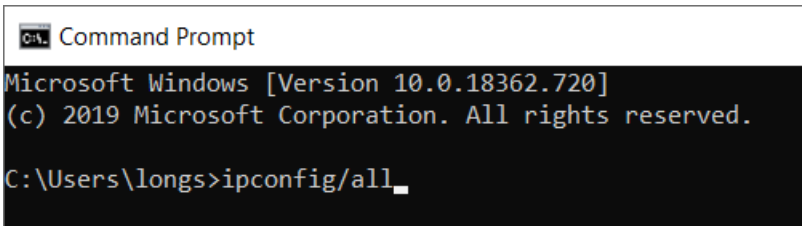


The default IP address/Gateway/DNS are for 192.168.1.x network.

Change them to match your network environment.

In case you just need it to work with your laptop, leave DTU IP as 192.168.1.x.

Check your laptop IP configuration with command (cmd).

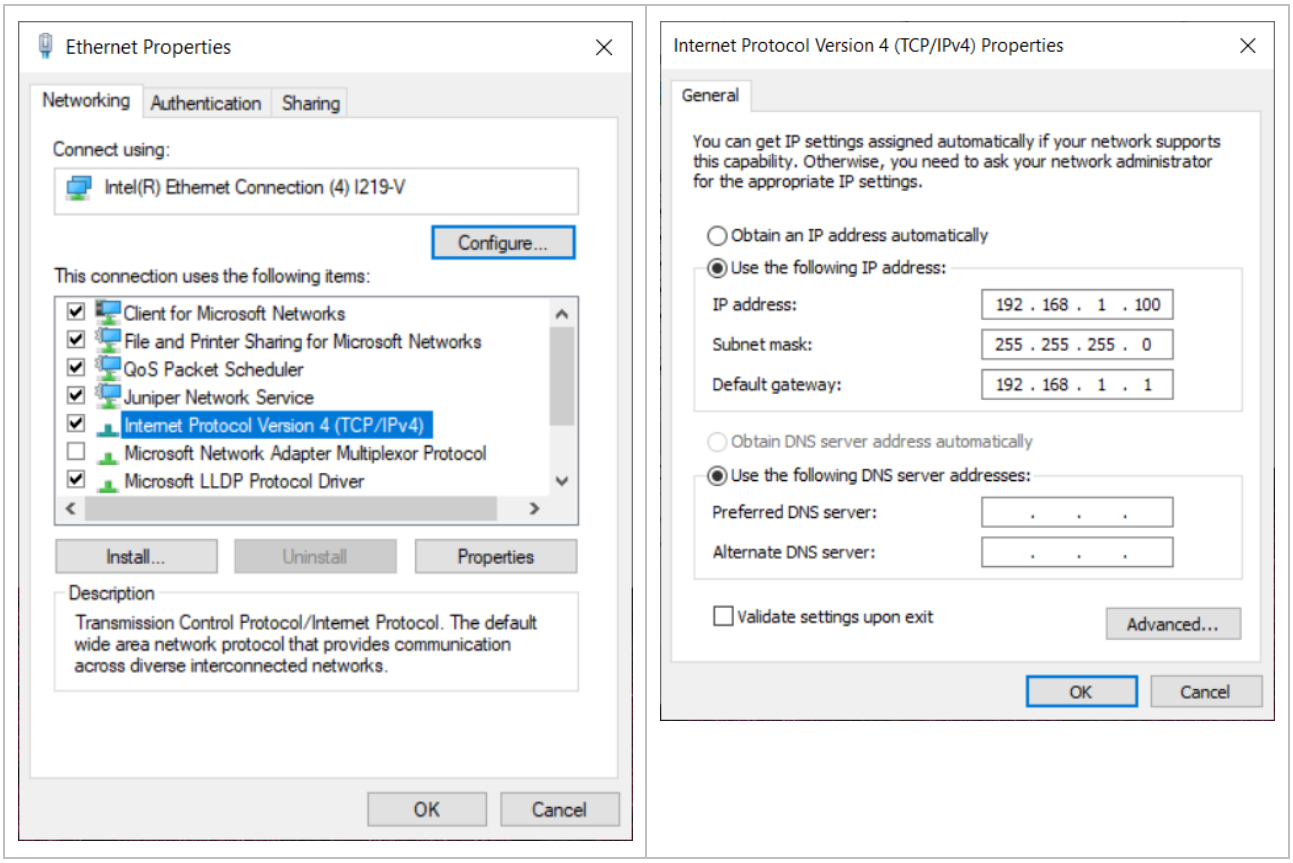



```
   IPv4 Address. . . . . . . . . . . : 192.168.1.6(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : Thursday, April 9, 2020 1:33:29 PM
   Lease Expires . . . . . . . . . . : Friday, April 9, 2021 1:33:30 PM
   Default Gateway . . . . . . . . . : 192.168.1.1
   DHCP Server . . . . . . . . . . . : 192.168.1.1
```

5 DTU Network Setting

In case it is not 192.168.1.x, change network adpter propeties.

“Network Connections” → “Ethernet”, right click to change properties



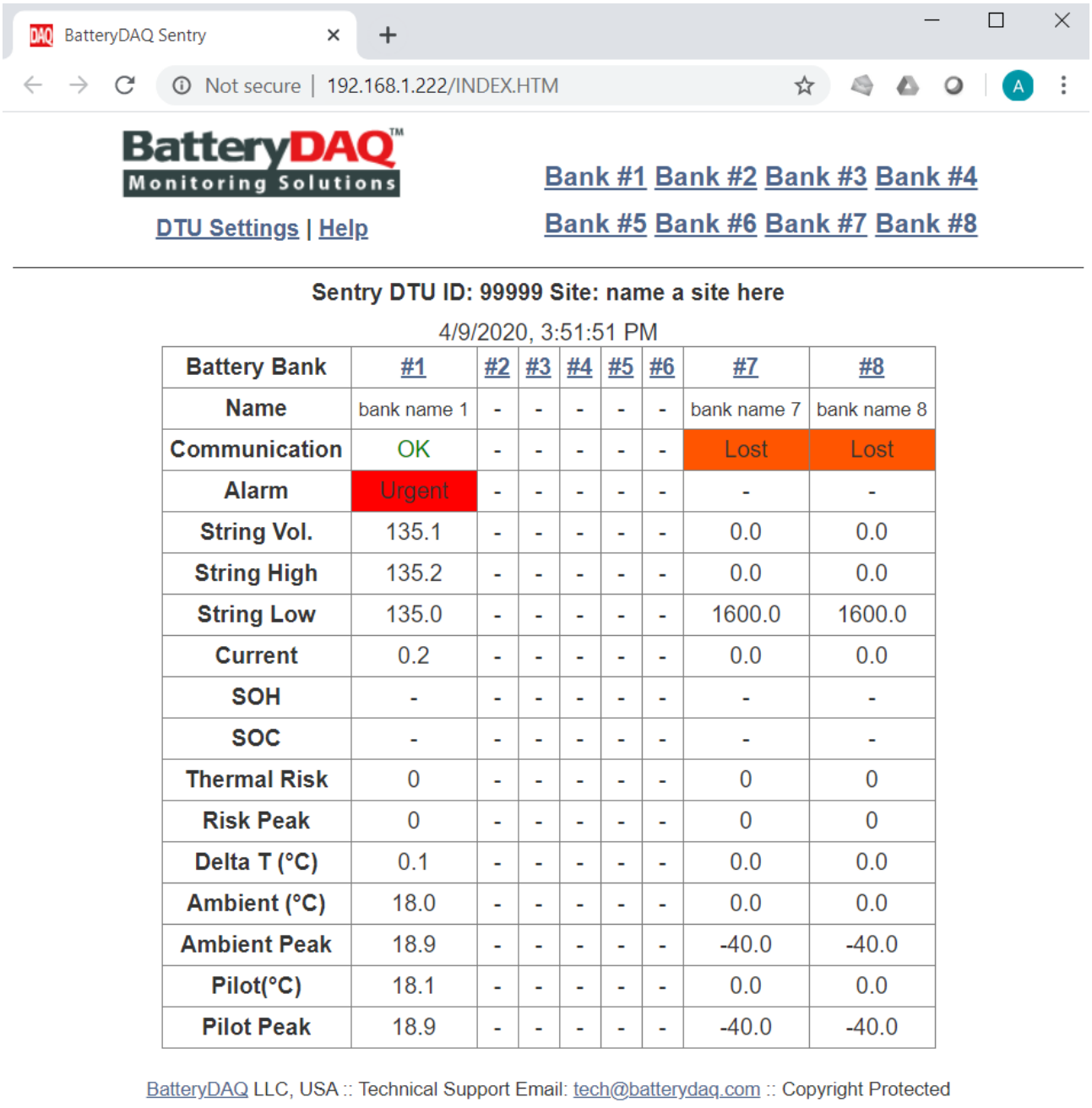
Now, your laptop and DTU are using the same gateway.

Launch Webpage, you shall see the web content for battery data and configuration.

[*For security reason, alarm thresholds in Sentry unit cannot be changed remotely through webpage. They can only be changed with a HMI tool.*]

5.2 Web Home Page

The home page displays battery bank data and alarm status for up to 8 connected Sentry units.



Battery Bank	#1	#2	#3	#4	#5	#6	#7	#8
Name	bank name 1	-	-	-	-	-	bank name 7	bank name 8
Communication	OK	-	-	-	-	-	Lost	Lost
Alarm	Urgent	-	-	-	-	-	-	-
String Vol.	135.1	-	-	-	-	-	0.0	0.0
String High	135.2	-	-	-	-	-	0.0	0.0
String Low	135.0	-	-	-	-	-	1600.0	1600.0
Current	0.2	-	-	-	-	-	0.0	0.0
SOH	-	-	-	-	-	-	-	-
SOC	-	-	-	-	-	-	-	-
Thermal Risk	0	-	-	-	-	-	0	0
Risk Peak	0	-	-	-	-	-	0	0
Delta T (°C)	0.1	-	-	-	-	-	0.0	0.0
Ambient (°C)	18.0	-	-	-	-	-	0.0	0.0
Ambient Peak	18.9	-	-	-	-	-	-40.0	-40.0
Pilot(°C)	18.1	-	-	-	-	-	0.0	0.0
Pilot Peak	18.9	-	-	-	-	-	-40.0	-40.0

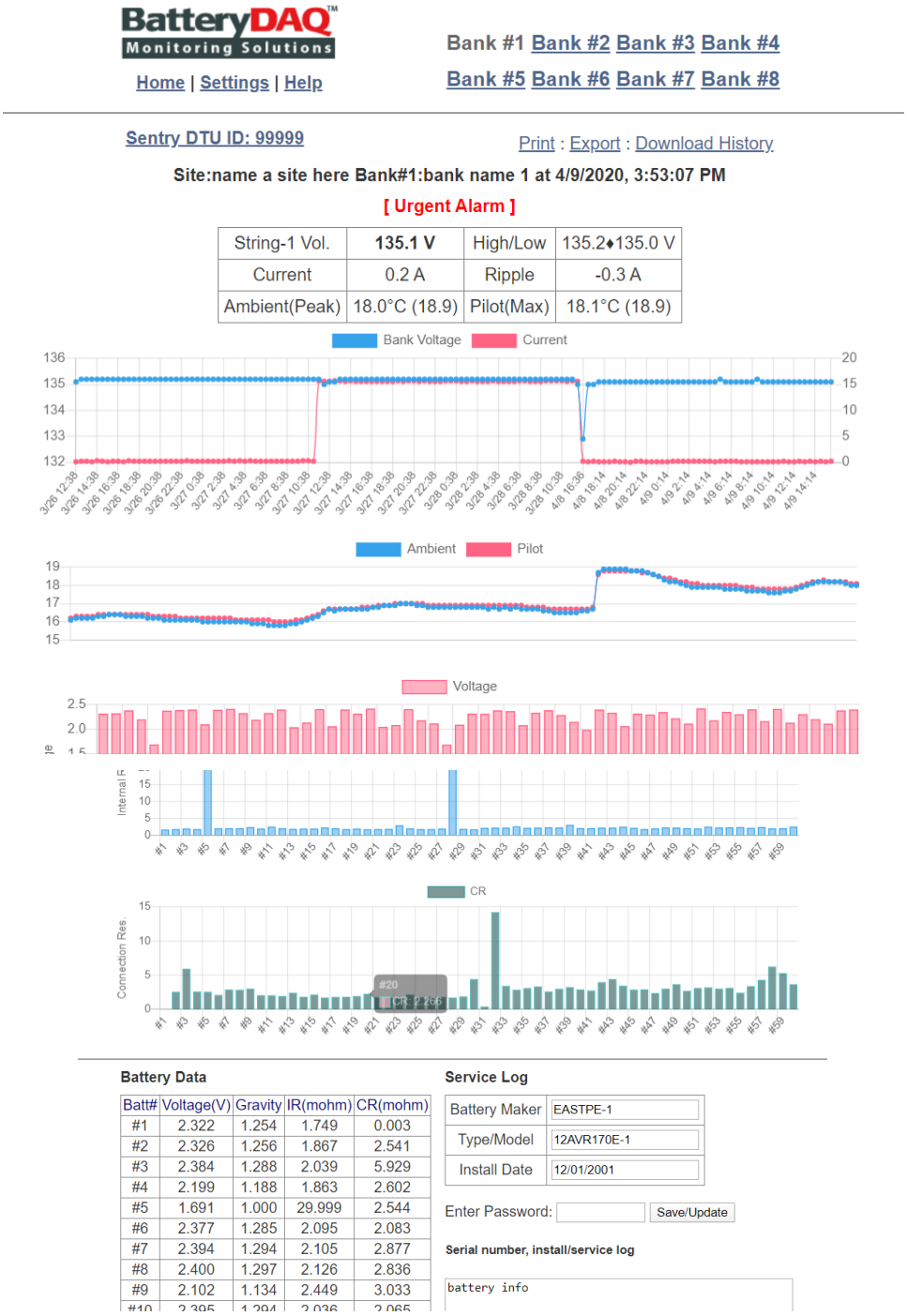
5.3 *Battery Data View*

Click on Bank# to access detailed data and history.

Recent 3-day history is plotted for quick troubleshooting in case of alarm or power system failure.

Data can be printed or exported to csv file.

History is achieved in SD card. It can be downloaded remotely.



5.4 DTU Settings

BatteryDAQ™ Monitoring Solutions

Home | Settings | Help

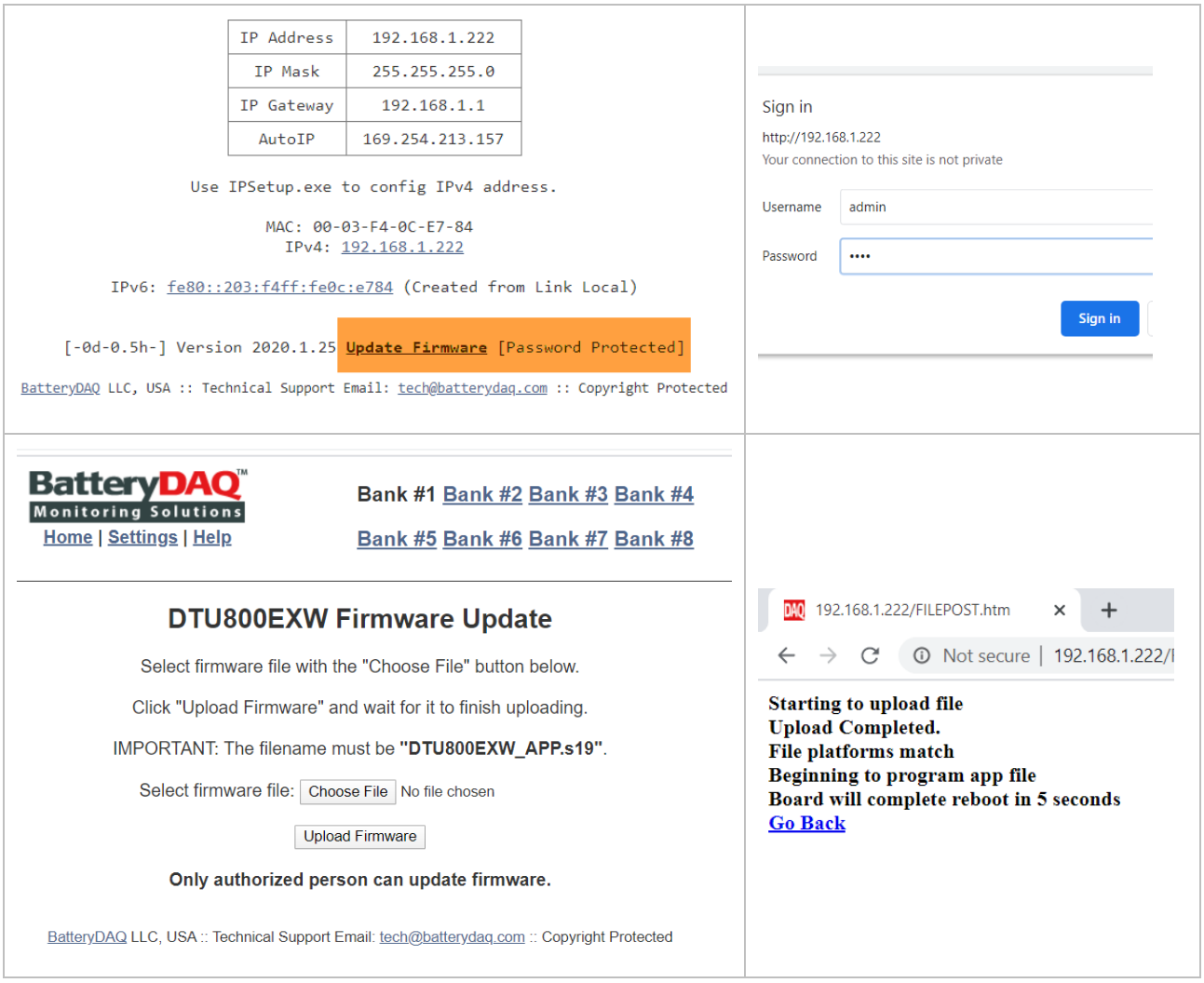
Bank #1 Bank #2 Bank #3 Bank #4
Bank #5 Bank #6 Bank #7 Bank #8

Sentry DTU ID: 99999

#	Description	Value	New Value
1	DTU ID	99999	99999
2	Site Name	name a site here	name a site here
3	Host Name	www.thisbattery.com	www.thisbattery.com
4	Host IP	72.167.223.197	72.167.223.197
5	Host UDP Port	5566	5566
6	Report Interval(mins)	60	60
7	Specific Gravity(x0.001)	1230	1230
8	0:Celsius/1:Fahrenheit	0	0
9	0:Resistance/1:Conductance	0	0
10	0:RS485/1:Wireless	0	0
11	Monitor 1 Code	6,2,60,20,10,0	6,2,60,20,10,0
-	Battery Bank 1	bank name 1	bank name 1
12	Monitor 2 Code	0,0,0,0,0,0	0,0,0,0,0,0
-	Battery Bank 2	bank name 2	bank name 2
13	Monitor 3 Code	0,0,0,0,0,0	0,0,0,0,0,0
-	Battery Bank 3	bank name 3	bank name 3
14	Monitor 4 Code	0,0,0,0,0,0	0,0,0,0,0,0
-	Battery Bank 4	bank name 4	bank name 4

5.5 DTU Firmware Update

In case it needs to update firmware for new functions, it can be done remotely in the same network/ inside firewall.



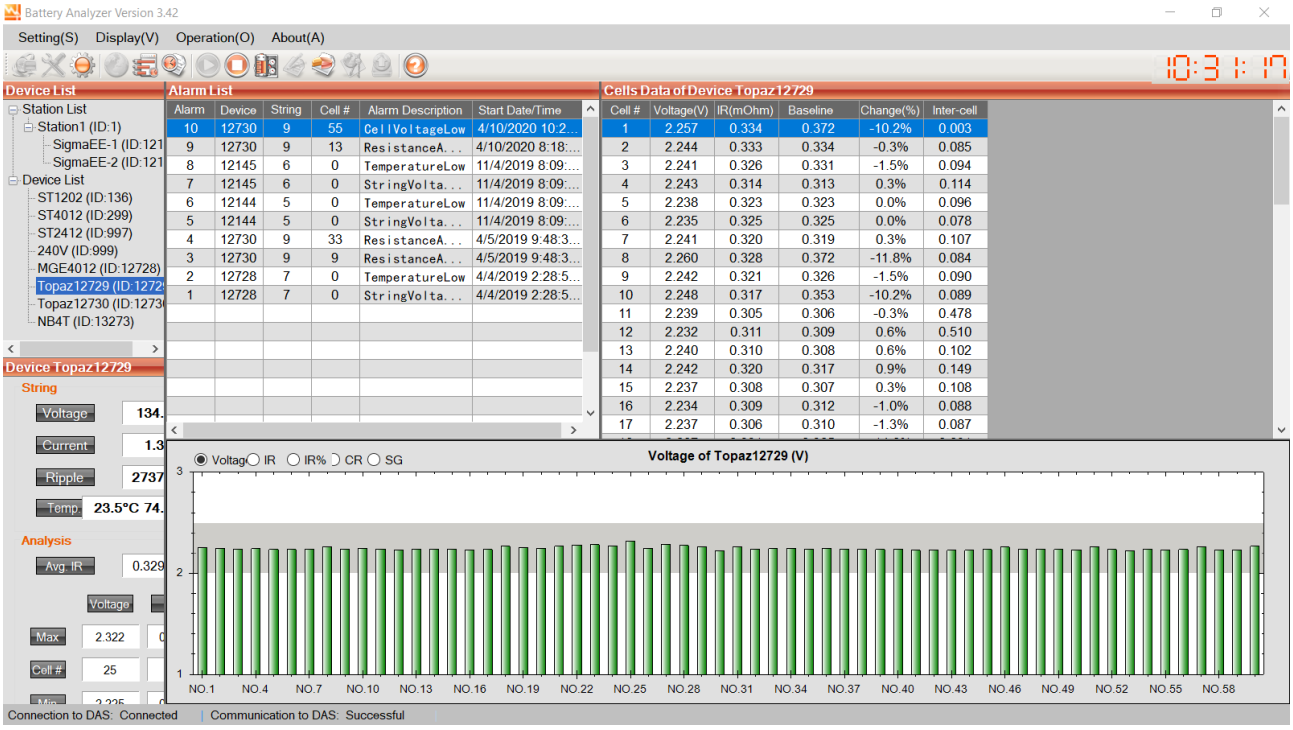
6 Battery Analyzer Software Setup

Please have Battery Analyzer software installed and tested on your laptop before your on-site BMS installation. It will be very difficult to have efficient remote support from BatteryDAQ while you are on busy/noisy site.

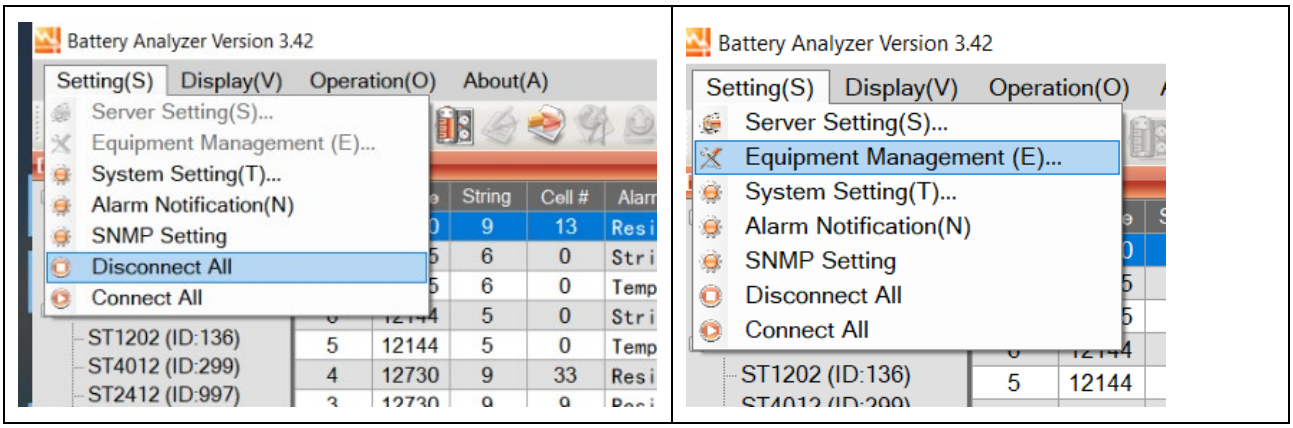
INSTALL AND TEST SOFTWARE IN YOUR OFFICE!

For software installation and full functions, please refer to software manual.

Depending on security setting on a computer, you may need to run the software as administrator in order to make changes.



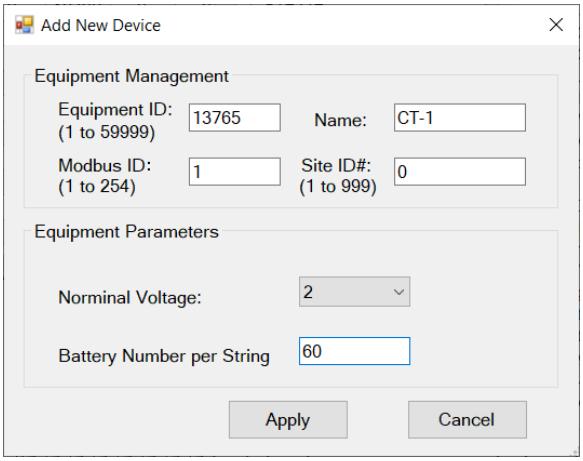
Setting(S) → Disconnect All to add new device or make any change to configurations.



6 Battery Analyzer Software

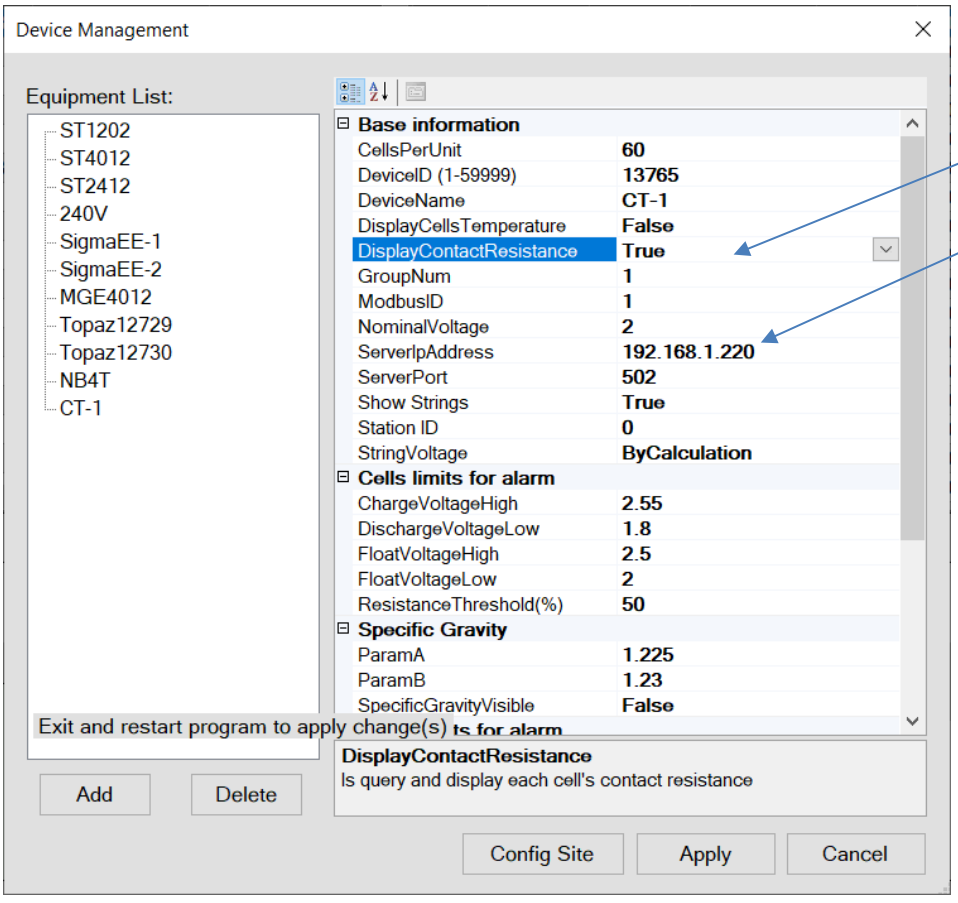
6.1 Equipment (Device) Management

In the Device Manage, you can add new device.



Click “Add” on Device Management

Select 2V to automatically generate default parameters. Later you can make changes to those numbers/parameters.



Set “DisplayContactResistance” to True

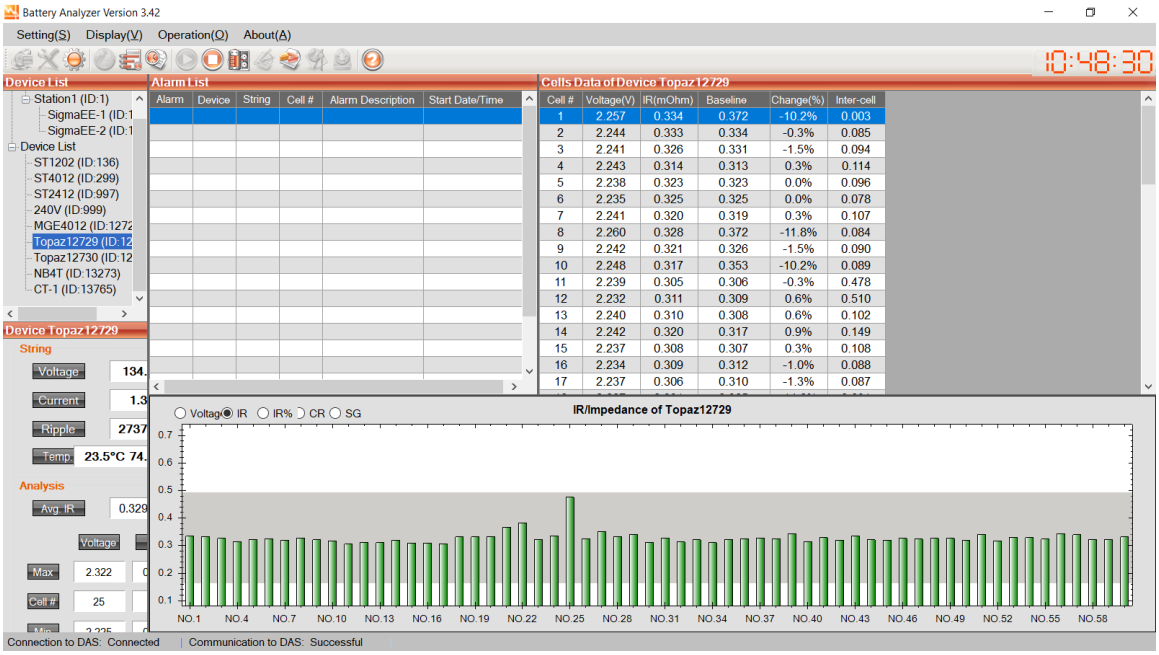
Set correct IP address

Set ModbusID to 1 for Bank#1

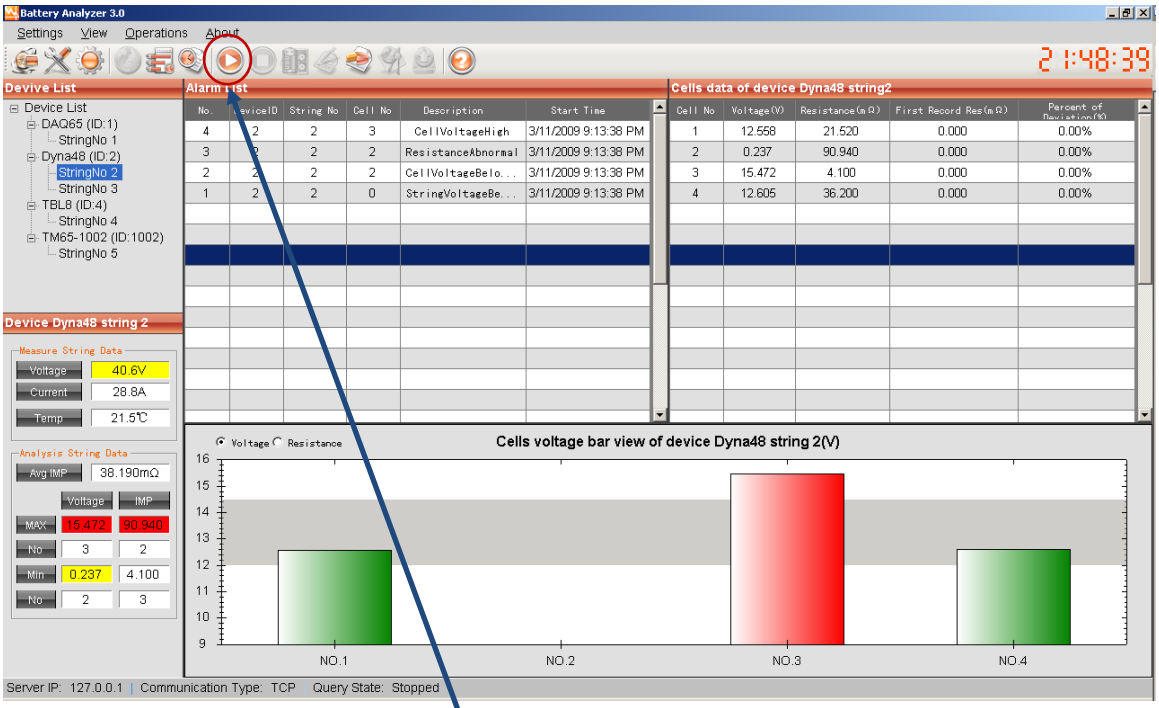
Battery alarm parameters shall be adjusted for battery type and charger settings.

6.2 Data Viewer

Apply to save settings. If the setting is correct, select the device and start it. The real-time data should show on the screen.

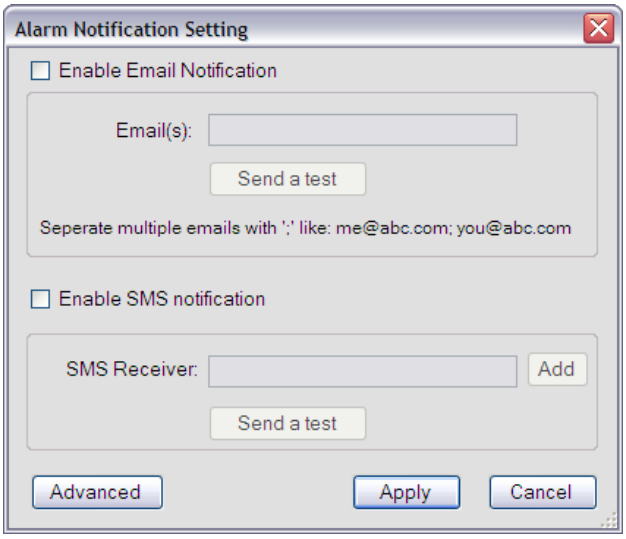


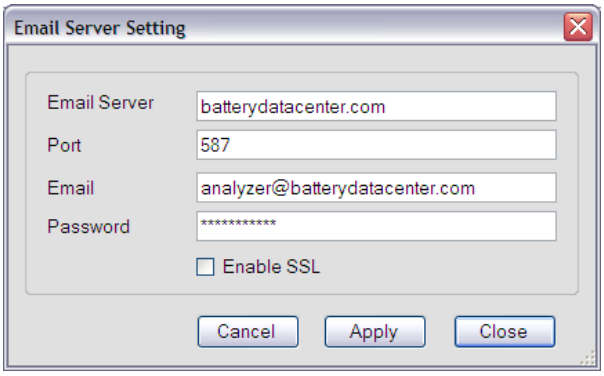
If the link is not correct, or battery data is out of range, the color will change with alarm highlighted.



If you need to change any setting, click “Stop” to make the setting visible.
Right click data window to export data to Excel sheet. If you are not sure the data is within correct range, you can send the file to BatteryDAQ technical support.

6.3 Alarm Notification

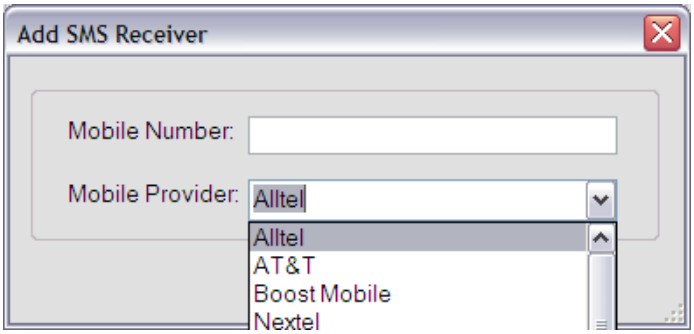




Click “Advanced” to configure mail server. You may continue to use our server for email if you don’t have one. However, no performance or availability guaranty is made by BatteryDAQ.

SMS (mobile phone message) may only work for certain carriers. After setting, send a test to confirm.

.



Alltel

AT&T

Boost Mobile

Nextel

Sprint PCS (now Sprint Nextel)

T-Mobile

US Cellular

Verizon

Virgin Mobile

For other functions not mentioned in this manual, please refer to Battery Analyzer software manual.

7 Master-800 Dashboard

Master-800 provides a centralized dashboard to manage hundreds of battery banks per unit.

BatteryDAQ Monitoring Solutions

Master-800 Server

Home | Full Table | Report | Settings | Help

name a site here at 5/22/2019, 3:37:20 PM

Show 10 entries Search:

#	Alarm	Status	DTU#	Name	BusV	Amp	Ripple	Room(°)	Pilot(°)	AvgV	MaxV	MinV	AvgIR	MaxIR	Above(%)	SOH(%)
11	1	Service	12111	Topaz-12730	132.9	-0.1	0.0	25.4	25.0	2.215	2.284	1.920	0.481	0.866	80.0	57.2
1	0	Normal	12101	SigmaEE-1	52.5	33.0	0.0	21.8	23.8	2.191	2.219	2.164	0.345	0.388	12.4	86.1
2	0	Normal	12102	Topaz-12729	134.8	1.5	0.0	24.9	24.6	2.247	2.302	2.220	0.333	0.464	39.3	85.6
6	0	Normal	12106	SigmaEE-2	52.5	35.1	0.0	24.6	25.4	2.190	2.209	2.175	0.348	0.385	10.6	89.7
3	-1	192.168.1.184	12103	Substation-3	-	-	-	-	-	-	-	-	-	-	-	-
4	-1	10.16.100.22	12104	Substation-4	-	-	-	-	-	-						
5	-1	10.16.100.22	12105	Substation-5	-	-	-	-	-	-						
7	-1	10.16.100.22	12107	Substation-7	-	-	-	-	-	-						
8	-1	10.16.100.22	12108	Substation-8	-	-	-	-	-	-						
9	-1	10.16.100.22	12109	Substation-9	-	-	-	-	-	-						

Showing 1 to 10 of 99 entries

BatteryDAQ LLC, USA Technical Support: tech@batterydaq.com Copyright Protected

Key Features:

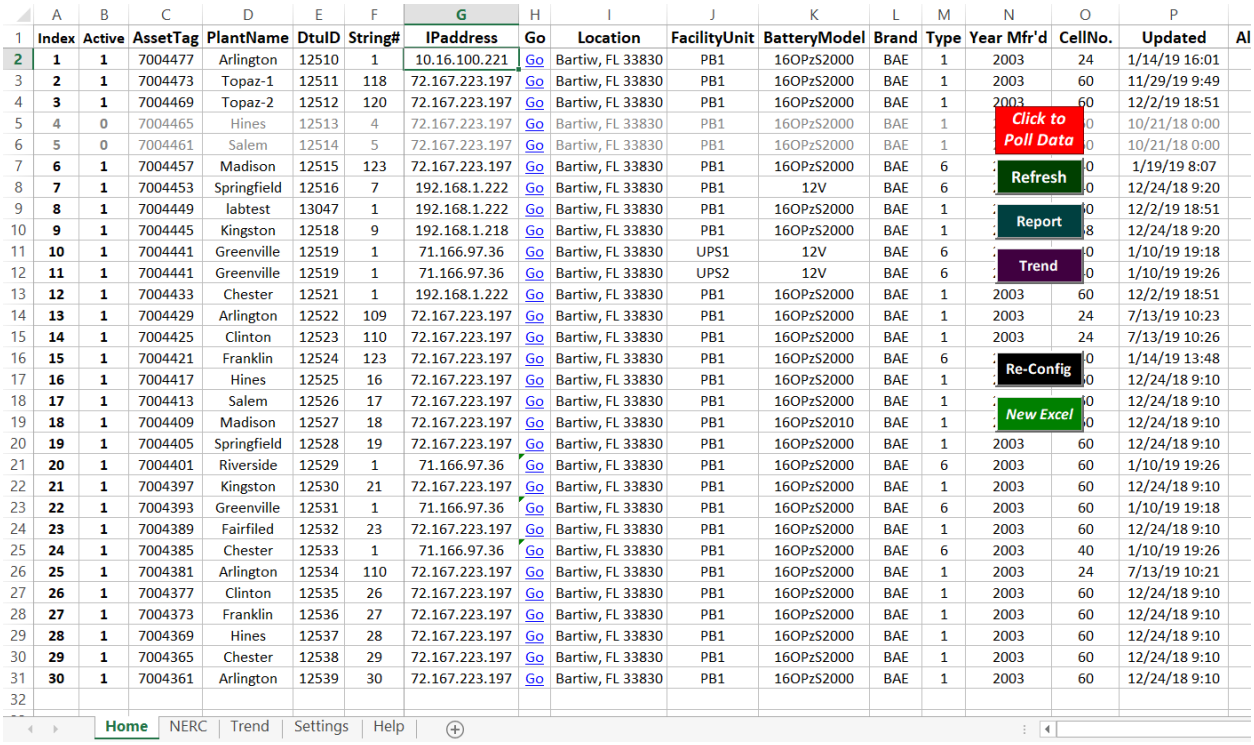
1) Faster than PC software.
2) Automated pulling data from remote units in a network.
3) Analyze realtime data and presents on a summary table for all battery banks.
4) Generate alarms against set thresholds.
5) Highlight battery banks with SERVICE and UREGNT alarms.
6) Deliver alarm via email to multiple receipts.
7) Log and display recent 100 alarms.
8) Sort all battery banks with each column to prioritize service.
9) Access from anywhere in the same network with any web browser.
10) Allows multiple users at the same time without installation of software.
11) IPv4 and IPv6 compatible.
12) Easy to silence alarm for a battery bank for a known situation.

As BatteryDAQ continues to develop more convenient functions, user can upgrade firmware once new version is released.

Please refer to Master-800 Quick Guide for setup.

8 NERC Auto-fill Excel Workbook

Objectives: to provide a reliable and transparent battery management and NERC report software for stringent IT security environment.



Index	Active	AssetTag	PlantName	DtuID	String#	IPaddress	Go	Location	FacilityUnit	BatteryModel	Brand	Type	Year Mfr'd	CellNo.	Updated
1	1	7004477	Arlington	12510	1	10.16.100.221	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1	2003	24	1/14/19 16:01
2	1	7004473	Topaz-1	12511	118	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1	2003	60	11/29/19 9:49
3	1	7004469	Topaz-2	12512	120	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1	2003	60	12/2/19 18:51
4	0	7004465	Hines	12513	4	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1		0	10/21/18 0:00
5	0	7004461	Salem	12514	5	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1		0	10/21/18 0:00
6	1	7004457	Madison	12515	123	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	6		0	1/19/19 8:07
7	1	7004453	Springfield	12516	7	192.168.1.222	Go	Bartiw, FL 33830	PB1	12V	BAE	6		0	12/24/18 9:20
8	1	7004449	labtest	13047	1	192.168.1.222	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1		0	12/2/19 18:51
9	1	7004445	Kingston	12518	9	192.168.1.218	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1		8	12/24/18 9:20
10	1	7004441	Greenville	12519	1	71.166.97.36	Go	Bartiw, FL 33830	UPS1	12V	BAE	6		0	1/10/19 19:18
11	1	7004441	Greenville	12519	1	71.166.97.36	Go	Bartiw, FL 33830	UPS2	12V	BAE	6		0	1/10/19 19:26
12	1	7004433	Chester	12521	1	192.168.1.222	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1	2003	60	12/2/19 18:51
13	1	7004429	Arlington	12522	109	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1	2003	24	7/13/19 10:23
14	1	7004425	Clinton	12523	110	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1	2003	24	7/13/19 10:26
15	1	7004421	Franklin	12524	123	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	6		0	1/14/19 13:48
16	1	7004417	Hines	12525	16	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1		0	12/24/18 9:10
17	1	7004413	Salem	12526	17	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1		0	12/24/18 9:10
18	1	7004409	Madison	12527	18	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2010	BAE	1		0	12/24/18 9:10
19	1	7004405	Springfield	12528	19	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1	2003	60	12/24/18 9:10
20	1	7004401	Riverside	12529	1	71.166.97.36	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	6	2003	60	1/10/19 19:26
21	1	7004397	Kingston	12530	21	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1	2003	60	12/24/18 9:10
22	1	7004393	Greenville	12531	1	71.166.97.36	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	6	2003	60	1/10/19 19:18
23	1	7004389	Fairfiled	12532	23	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1	2003	60	12/24/18 9:10
24	1	7004385	Chester	12533	1	71.166.97.36	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	6	2003	40	1/10/19 19:26
25	1	7004381	Arlington	12534	110	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1	2003	24	7/13/19 10:21
26	1	7004377	Clinton	12535	26	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1	2003	60	12/24/18 9:10
27	1	7004373	Franklin	12536	27	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1	2003	60	12/24/18 9:10
28	1	7004369	Hines	12537	28	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1	2003	60	12/24/18 9:10
29	1	7004365	Chester	12538	29	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1	2003	60	12/24/18 9:10
30	1	7004361	Arlington	12539	30	72.167.223.197	Go	Bartiw, FL 33830	PB1	16OPzS2000	BAE	1	2003	60	12/24/18 9:10

Battery data is pulled from remote site and analyzed with prameters on “settings” page.

Updated	Alarm	Voltage	Current	Ripple	Room(°F)	Pilot(°F)	AvgVol.	MinVol.	MaxVol.	RefIR	AveIR	MaxIR	Above%	StdevIR%	InterTier	InterRack	Notes
1/14/19 16:01	-1	0	0	0	0	0	0.000	0	0	0.35	0	0	0.0	0.0	16,46	31	.
12/6/19 14:03	1	134.9	1.2	-1159.9	72.14	71.24	2.249	2.231	2.303	0.35	0.327	0.386	10.3	4.1	16,46	31	.

Here is a link to a demo: https://youtu.be/Q6a_dW6WqnQ(Video needs to update)

Features

- To manage hundreds of battery banks in one Excel workbook
- To collect real-time battery data from remote BatteryDAQ monitoring systems
- To automatically analyze battery data with set thresholds and highlight rows with alarm
- To prepare NERC report automatically with real-time battery data and date/time stamp
- To highlight weak cells on NERC report
- To plot trending chart with remote archived data, which is stored in SD card in Sentry units.
- No database required
- Transparent code for IT security inspection
- Easy to add/remove/enable/disable a battery bank
- Easy to set alarm thresholds for different battery types without tedious setting to each battery bank.
- Easy to sort at any column with all Excel convenience.

Please refer to “Excel NERC Book Guide” for details.

9 Alarm Handling

Alarm(s) will be triggered for a variety of reasons, some are from battery conditions, some may come from wrong settings.

If there is a alarm, there must be a cause.

Alarm thresholds are set at different layer. Each layer is independent.

Layer	Device and Interface	Alarm indication and output	Notes
1	**Monitoring Unit**	LEDs on the unit Modbus-RTU HMI	A normal operating battery shall not have any alarm. The alarm threshold shall be set to correct range so it can catch abnormal condition such voltage, temperature, internal resistance, and connection resistance. Internal resistance range is absolute value, not percentage. This threshold can be wider than the settings on DTU and Analyzer to catch extreme situation such as battery failure. For example, average IR is 450 micro-ohm, the threshold can be set to HIGH 600, LOW 300. With HMI, to check if any alarm, what is the alarm, make a record of the threshold settings.
2	**DTU**	Web page, Modbus-TCP	On DTU settings page, monitor code, the last digital is for the battery alarm type. If set to 0, there is no alarm process for DTU. Modbus-TCP digital I/O alarm signal is from monitoring unit. If set to certain type, it will generate alarm, and the alarm can be fetched by Modbus-TCP. Refer to register table for details.
3	**Master-800**	Web page, email alert	Alarm settings are classified up to 8 types of batteries. The alarm type shall match the column “AlarmType” on Banks.csv. Web page //AlarmSettings.htm Adjust threshold for each type and make sure they are in a reasonable range.
4	**Analyzer Software**	PC software, email alert	Analyzer software gets data from DTU. The alarm settings shall be adjusted on PC software, not the monitoring unit.

10 BMS Installation Acceptance Report

Client Name:	Client Representative:
Installation Address:	Installer: Date:
Site Name:	DTU ID:
Static IP: Mask: Gateway:	Sentry Monitor Serial No:
Battery type/Model:	Capacity: Ah
Cell Voltage: V	Battery Number in This String:
Bus Voltage: V	Designed Maximum Current: A

Current and Temperature Measurement

Current Sensor model:	**Calibration Offset:**		**Calibration Gain:**	
	Current Test 1(open circuit)	Current Test 2	Ambient Temperature	Pilot Temperature
Meter Measured Value				
Sentry Readout				
Pass	☐	☐	☐	☐

Voltage Measurement

Calibration Offset:					**Calibration Gain:**					
Sample		1	2	3	4	5	6	7	8	9	10
Cell #	String										
Hand Meter											
Sentry Readout											
Pass	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Internal Resistance Measurement Comparing to Reference

Instrument name/model:				**IR Calibration:**						
Sample	1	2	3	4	5	6	7	8	9	10
Cell #										
Hand Meter										
Sentry Readout										
Pass	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Alarm Threshold Setting with HMI

Parameters	Low Value	High Value	Note
Cell Voltage Abnormal			
Cell IR Threshold (Absolute setting with HMI to Sentry)			
Cell IR Abnormal (Percentage setting to PC software)	N/A		
Bus Voltage Abnormal			
Discharge Current	N/A		
Charge Current	N/A		
Temperature Alarm			

Other Notes

Installer Signature	Client Signature

If there is any concern of accuracy, please send this report to tech@batterydaq.com

Records

Note: