# NetSure™ Lithium Batteries for Telecom

## Application Guide

For Use with NetSure™ DC Power Systems in North America

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## Technical Support Site

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures.

Visit https://www.vertiv.com/en-us/support/ for additional assistance.

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# 1 Lithium Battery Standard vs. Monitoring Mode

## 1.1 Standard Mode

Standard Mode is when the power system and Lithium-Ion Battery (LIB) are connected with power cables only, just like a Valve Regulated Lead Acid (VRLA) battery. To ensure the power system works with the battery correctly, it is necessary to adjust various parameters in the NetSure Control Unit (NCU) based on the battery manufacturer's specifications. Some of those parameters are:

Set Float and Equalize Voltage

Confirm Equalize and Temp Comp are Off

Enter Battery String Capacity

Set Charge Current Limit

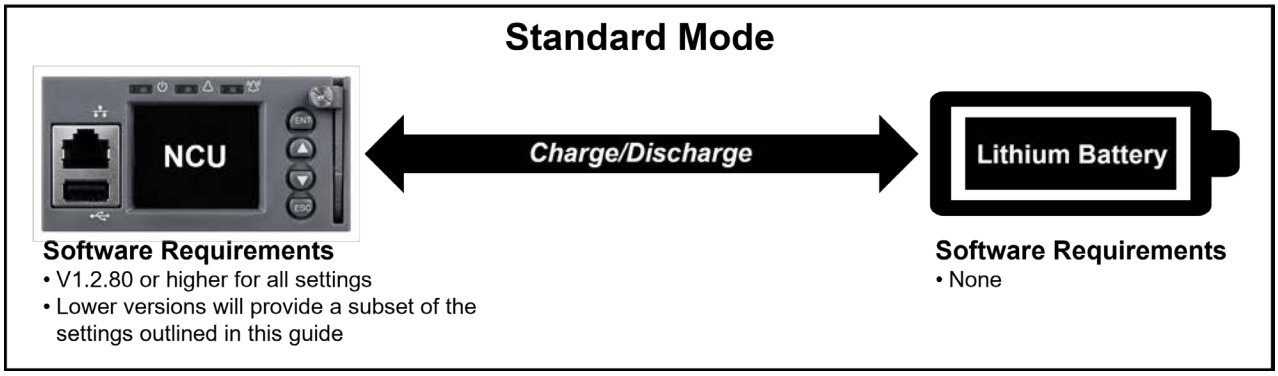
Update LVD Voltage

Adjust Rectifier Walk-In Time

In Standard Mode, no specific NCU software or communication cabling is required. Detailed information regarding Standard Mode adjustments for LIBs are located in section “Standard Mode Set-up Procedure” starting on page 11.

Standard Mode will work with just about any brand of LIB. See Figure 1.1.

**Figure 1.1 Standard Mode**




## 1.2 Monitoring Mode

Monitoring Mode is when the power system and LIB are connected with power and communication cables. The communication cabling enables key Battery Management System (BMS) data and alarms to be viewed in the NCU. Below is the type of BMS Data that can be *viewed locally or remotely* via the NCU.

Asset Management: model #, serial #, SW version, etc.

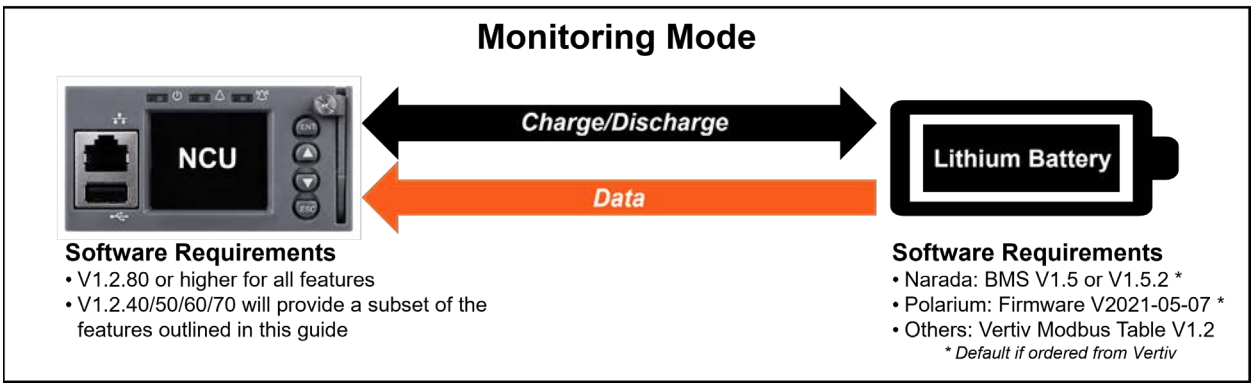
Operational Performance and History: SOC (state of change), cycle count, temperature, SOH (state of health), etc.

Alarms: Displays key battery alarms and assigns criticality level.

NCU screen shots of Monitoring Mode for Narada Batteries are available in Section 1.3 starting on page 2 of this document. Polarium Monitoring Mode screen shots are available in Section 1.4 starting on page 6 of this document. Other brands of batteries loaded with Vertiv Modbus Table V1.2 will provide data and alarms similar to what is shown/described for Narada and Polarium batteries.

In North America, Monitoring Mode will work with only Narada, Polarium, or other brands of batteries loaded with Vertiv Modbus Table V1.2. Detailed information regarding Monitoring Mode adjustments, cabling and other requirements are located in section “Monitoring Mode Set-up Procedure” starting on page 21. See Figure 1.2.

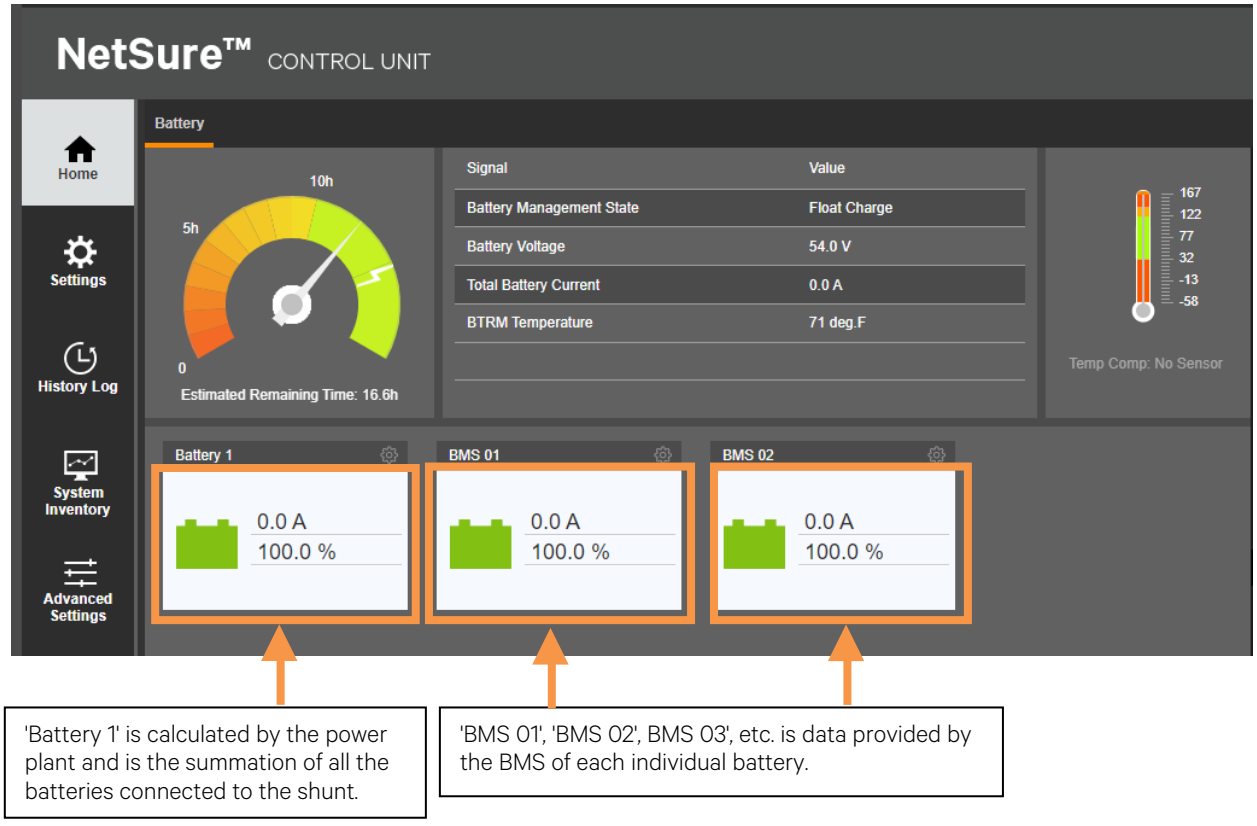
**Figure 1.2 Monitoring Mode**




## 1.3 NCU Monitoring Mode Screen Shots for Narada Batteries

### 1.3.1 Battery Dashboard

Image is representative and subject to change.




Note: Data for ‘Battery 1’ and ‘BMS 01’, ‘BMS 02’, etc. are derived from different algorithms and sensors; therefore, it is likely there will be differences in the values shown.

## Battery Details

Image is representative and subject to change.

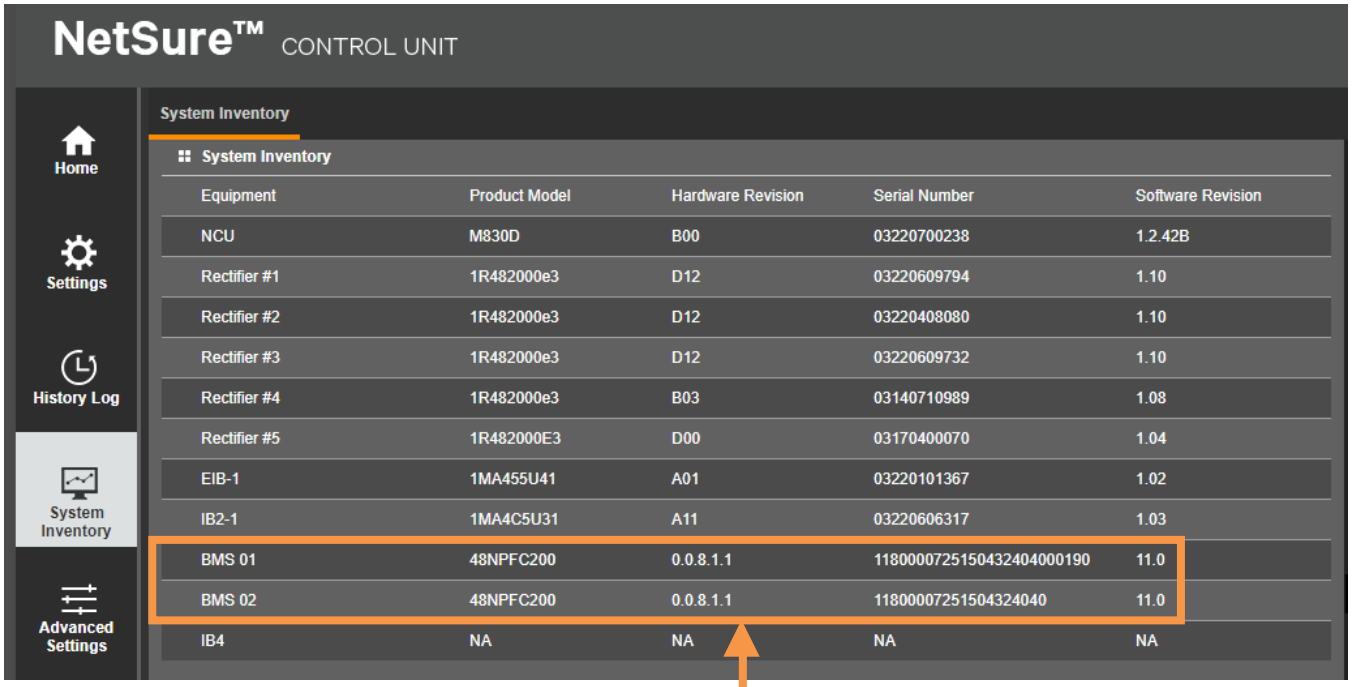

This data will be available for each individual battery.

If data for a parameter is not available from the BMS of the battery it will be displayed as 'N/A'.

Temperature scale (C°/F°) will be the same as the power system setting.

### 1.3.2 Battery Product Information in System Inventory Screen

Image is representative and subject to change.

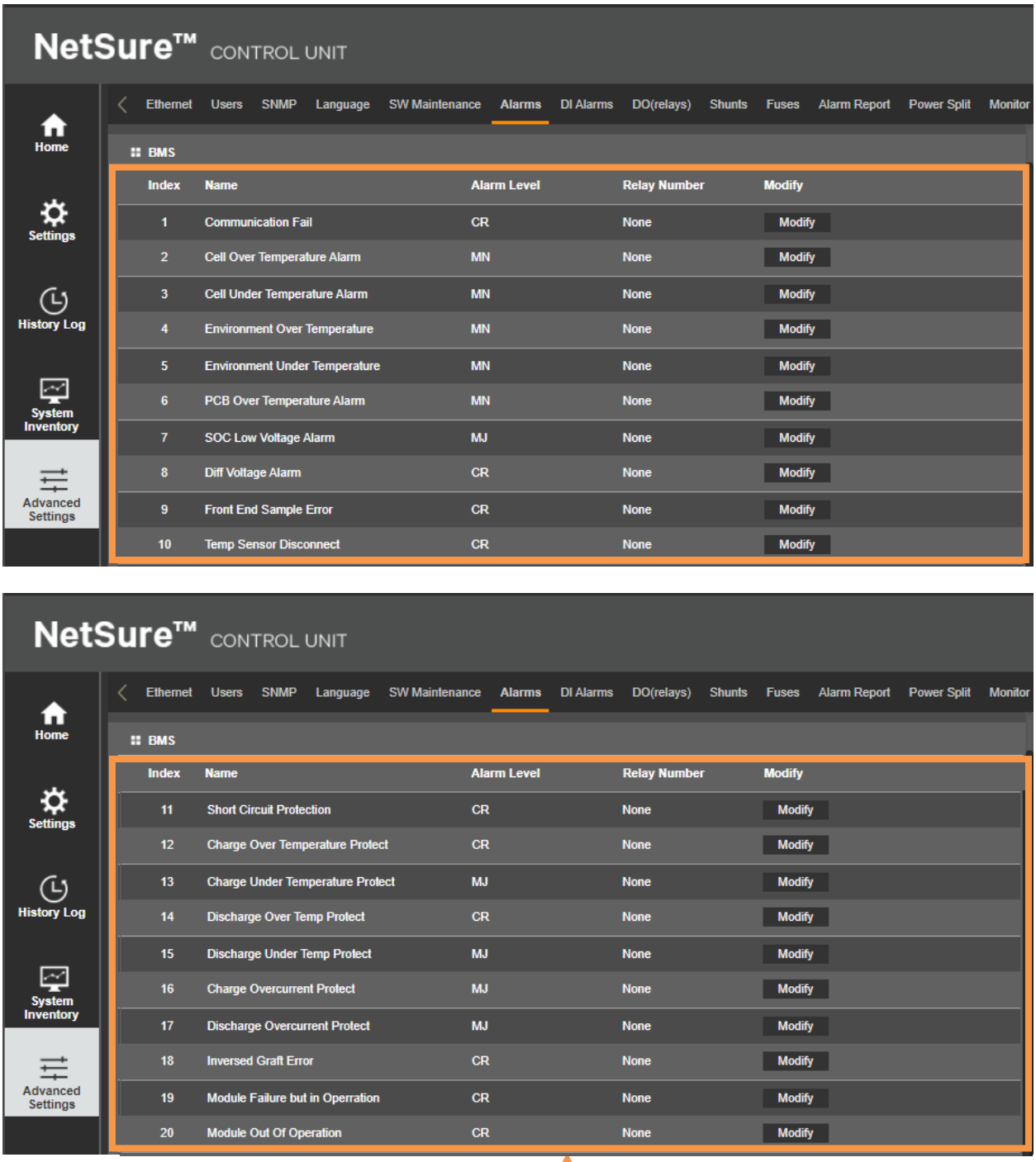



This data will be available for each individual battery.

If data for a parameter is not available from the BMS of the battery it will be displayed as 'N/A'.

### 1.3.3 Alarms and Severity Level Settings

Image is representative and subject to change.



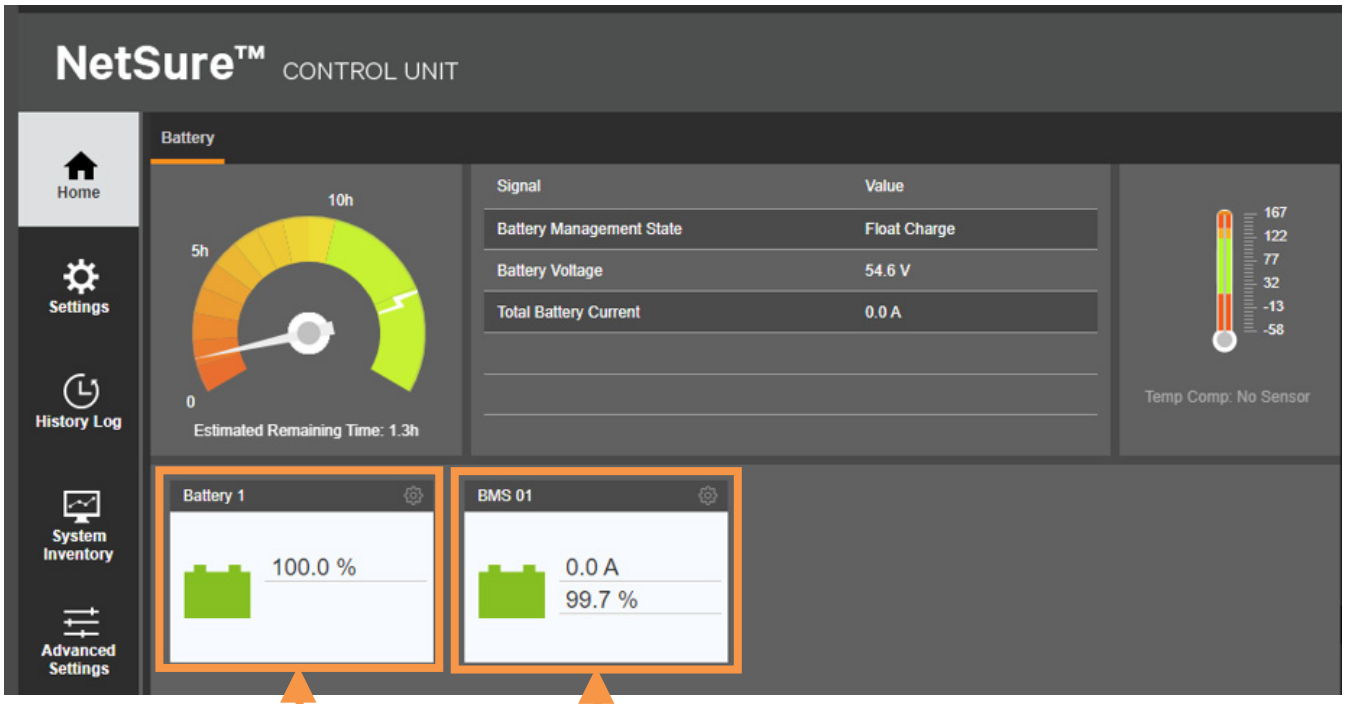

These alarms and their associated criticality levels are automatically mapped.

Alarm criticality level can be adjusted by the operator.

## 1.4 NCU Monitoring Mode Screen Shots for Polarium Batteries

### 1.4.1 Battery Dashboard

Image is representative and subject to change.




'Battery 1' is calculated by the power plant and is the summation of all the batteries connected to the shunt.

'BMS 01', 'BMS 02', 'BMS 03', etc. is data provided by the BMS of each individual battery.

Note: Data for 'Battery 1' and 'BMS 01', 'BMS 02', etc. are derived from different algorithms and sensors; therefore, it is likely there will be differences in the values shown.

## 1.4.2 Battery Details

Image is representative and subject to change.

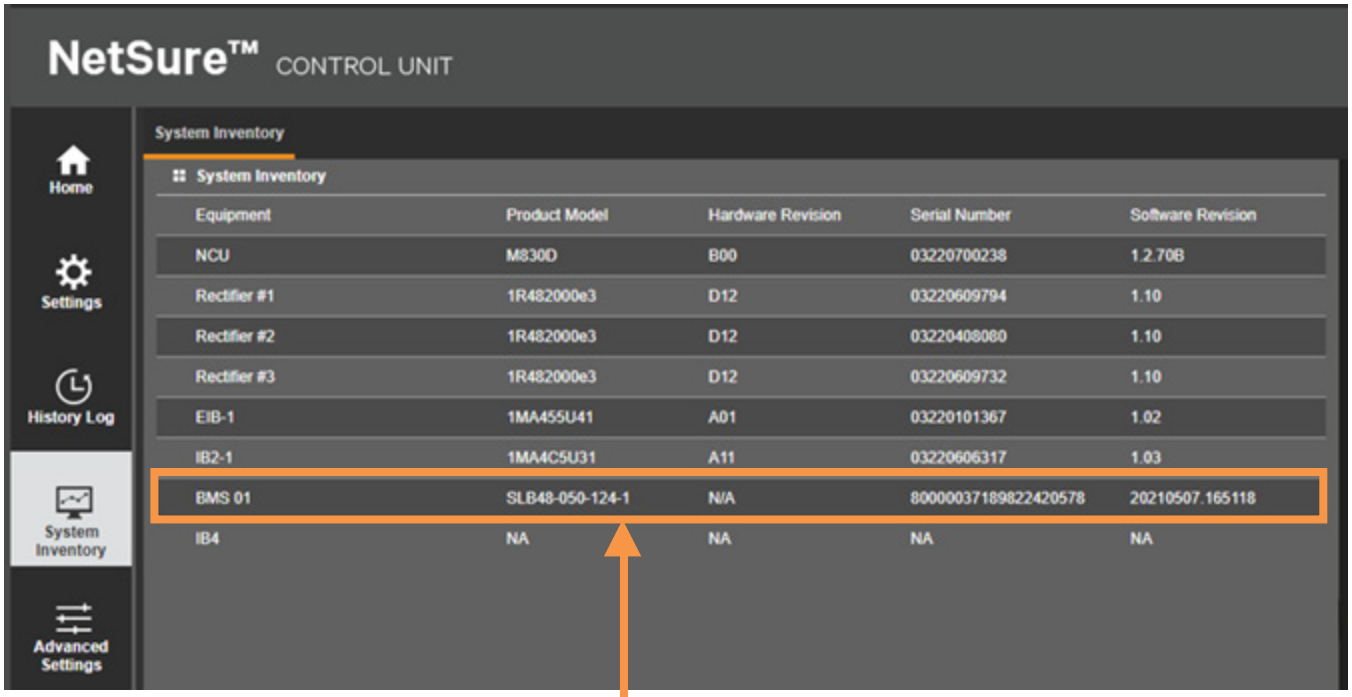

This data will be available for each individual battery.

If data for a parameter is not available from the BMS of the battery it will be displayed as 'N/A'.

Temperature scale (C°/F°) will be the same as the power system setting.

### 1.4.3 Battery Product Information in System Inventory Screen

Image is representative and subject to change.

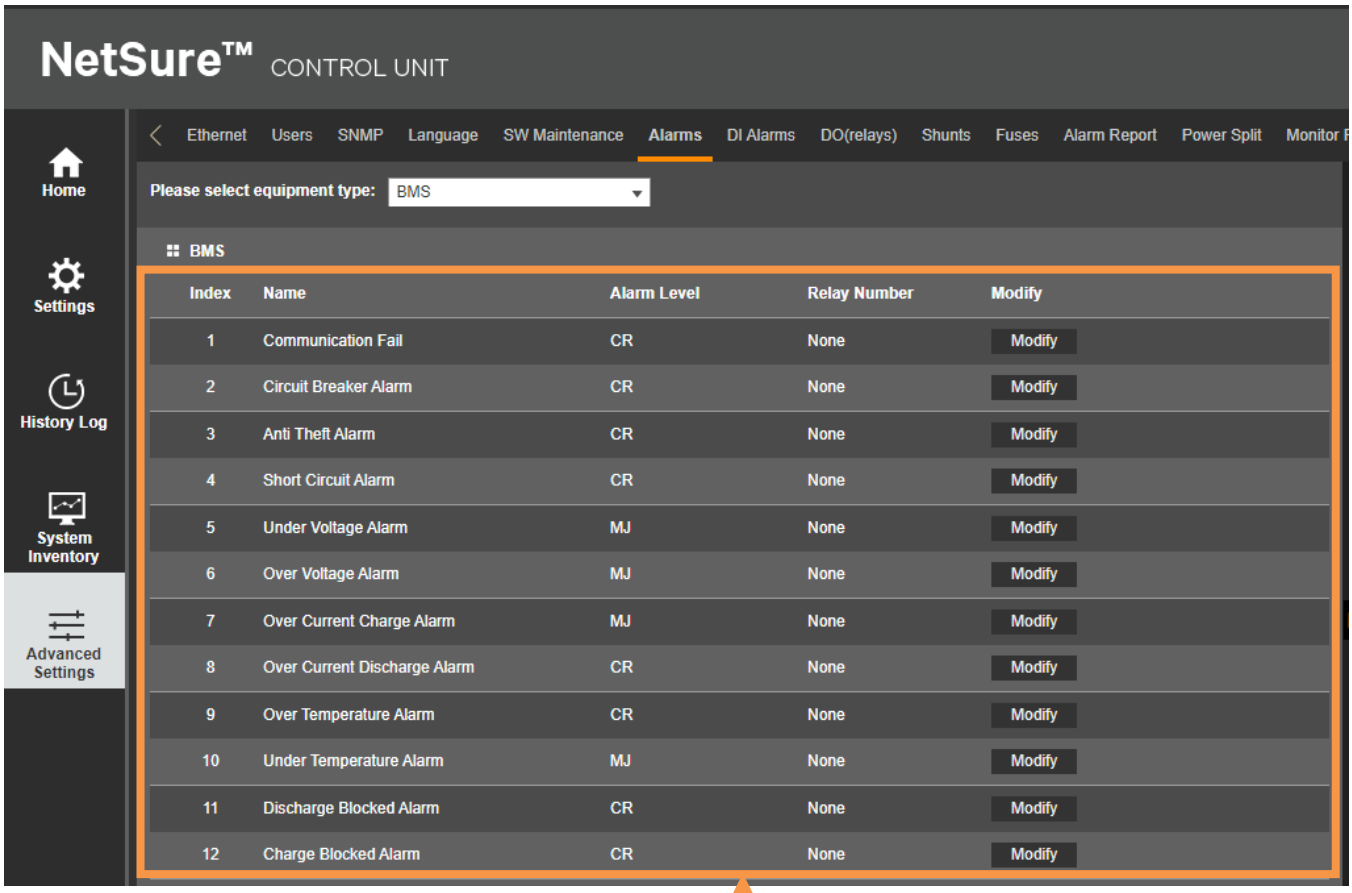



This data will be available for each individual battery.

If data for a parameter is not available from the BMS of the battery it will be displayed as 'N/A'.

### 1.4.4 Alarms and Severity Level Settings

Image is representative and subject to change.




These alarms and their associated criticality levels are automatically mapped.

Alarm criticality level can be adjusted by the operator.

## 1.5 Standard vs. Monitoring Mode Reference Guide

| Standard Mode Parameters | Narada | Polarium |
|---|---|---|
| View Detailed BMS Data Locally | Yes (see "Narada Detailed BMS Data via Viewer Software - Screen Shots" starting on page 41.) | Yes (see "Polarium Detailed BMS Data via Studio Software - Screen Shots" starting on page 44.) |
| Battery To Laptop Cable for Local BMS Access | RJ45 to USB Cable (acquire from Narada) | RJ45 to USB Cable (acquire from Vertiv) |
| View Detailed BMS Data Remotely | No | No |
| NCU Software Version | V1.2.80/6.2.80 (or later) preferred | V1.2.80/6.2.80 (or later) preferred |
| Inter-Battery Communications Cabling | Not Required | RJ45 Patch Cable (included with battery) |
| First and Last Battery Communication Port Termination | Not Required | Terminator Plug (included with battery) |
| **Monitoring Mode Parameters** | **Narada** | **Polarium** |
| View Detailed BMS Data Locally | Yes (see "Narada Detailed BMS Data via Viewer Software - Screen Shots" starting on page 41.) | Yes (see "Polarium Detailed BMS Data via Studio Software - Screen Shots" starting on page 44.) |
| Battery To Laptop Cable for Local BMS Access | RJ45 to USB Cable (acquire from Narada) | RJ45 to USB Cable (acquire from Vertiv) |
| View Detailed BMS Data Remotely | No | No |
| View Summary BMS Data Locally and Remotely via NCU | Yes (see "NCU Monitoring Mode Screen Shots for Narada Batteries" starting on page 2.) | Yes (see "NCU Monitoring Mode Screen Shots for Polarium Batteries" starting on page 6.) |
| Battery BMS | Modbus V1.5 or V1.5.2 | Gen 5 battery w/ FW V2021-05-07 |
| NCU Software Version | Min: V1.2.40 / Prefer V1.2.80 (or later) | Min: V1.2.40 / Prefer V1.2.80 (or later) |
| Maximum Devices (batteries + other) Supported by NCU | 16 | 16 |
| Maximum Batteries Supported | 16 | 16 |
| Battery Baud Rate Setting | 9600 (default) | 9600 (needs to be changed from default setting) |
| NetSure™ Power System to Battery Cabling | RJ45 Patch Cable (customer provided) (for Vertiv™ NetSure™ 211, Vertiv™ NetSure™ 502, Vertiv™ NetSure™ 5100 Integrated; Vertiv™ P/N 547674 cable also required.) | RJ45 Patch Cable (customer provided) (for Vertiv™ NetSure™ 211, Vertiv™ NetSure™ 502, Vertiv™ NetSure™ 5100 Integrated; Vertiv™ P/N 547674 cable also required.) |
| Inter-Battery Communications Cabling | RJ45 Patch Cable (customer provided) | RJ45 Patch Cable (included with battery) |
| Last Battery Communication Port Termination | RJ45 Patch Cable (customer provided) | Terminator Plug (included with battery) |

# 2 Standard Mode Set-up Procedure

## 2.1 Important Notice

This procedure highlights the main parameters within the NCU that need to be adjusted when utilizing lithium-ion batteries. The technician still needs to set all other appropriate power system and battery parameters as normally required per the operator's procedures and requirements.

Before proceeding, please ensure the following:

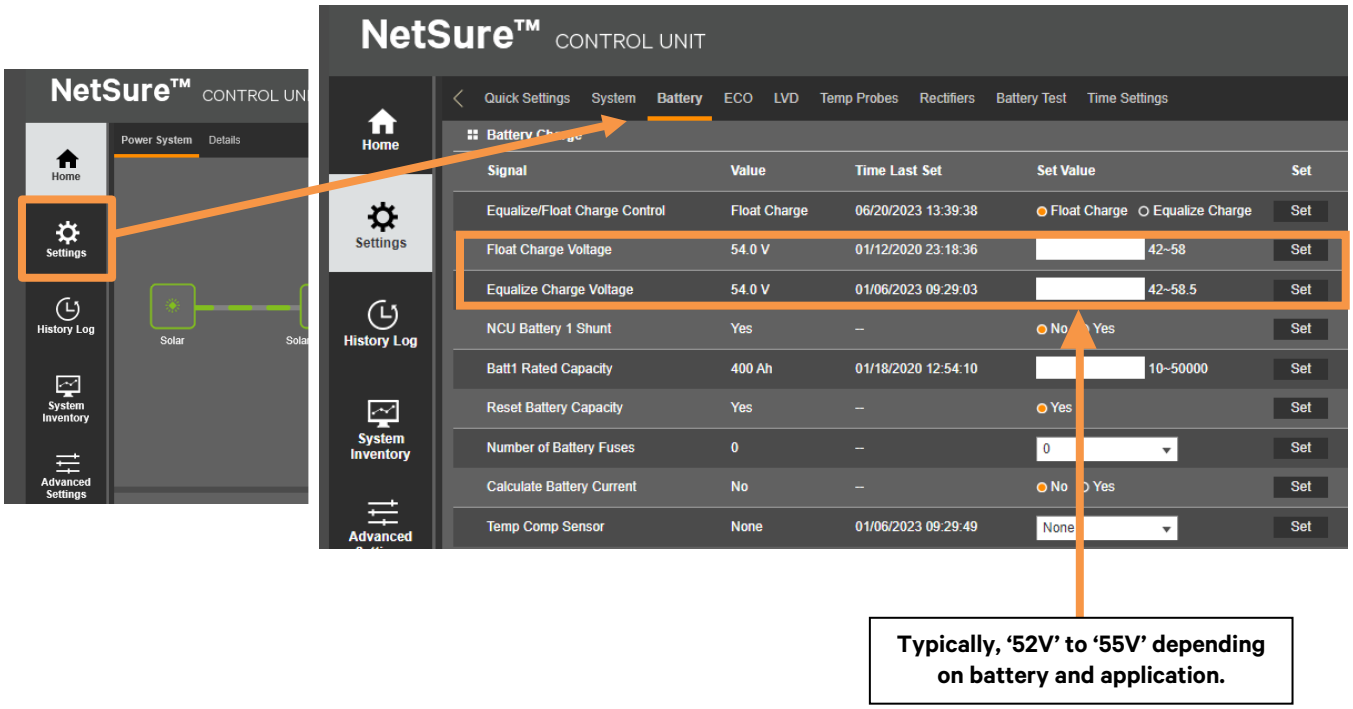
NCU V1.2.80/V6.2.80 software or later is loaded. Other software versions will support Standard Mode but without all the settings outlined in this application guide (refer to NCU manual for software loading instructions).

Battery power and ground connections have been made (refer to battery installation manual).

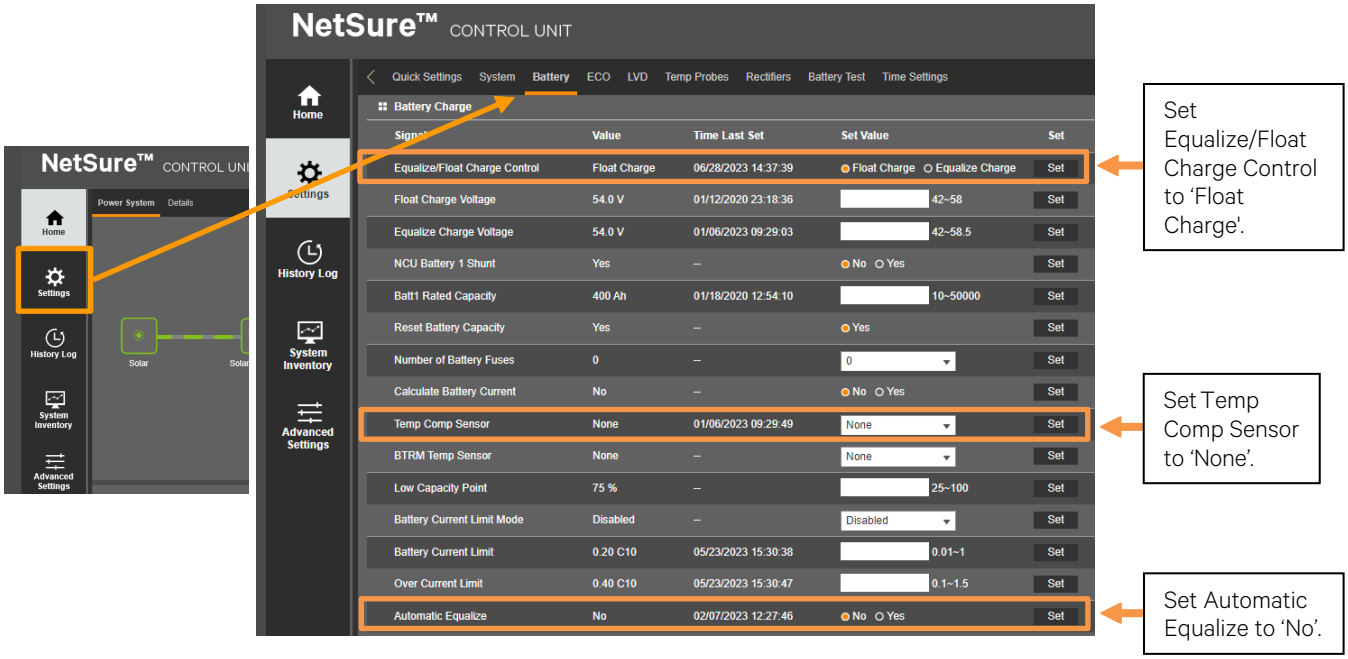
Detailed specification and settings for battery are readily available.

## 2.2 Set Float Voltage and Equalize Voltage to Same Value

Refer to battery datasheet, manual and warranty statement to determine proper setting for your battery.



## 2.3 Confirm Equalize and Temperature Compensation are 'Off'

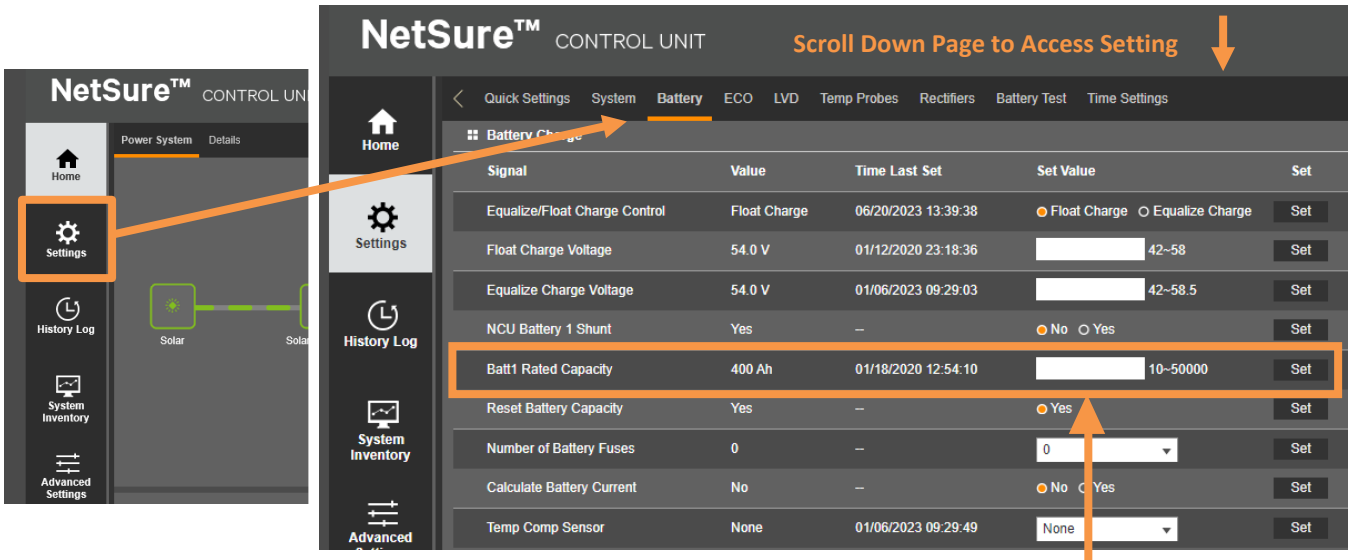



For cyclic applications where the NCU will control the start/stop of an AC Generator, follow these steps:

1. Set Equalize/Float Charge Current to 'Equalize Charge'.
2. Set Temp. Comp. Sensor to 'None'.
3. Set Automatic Equalize to 'Yes'.
4. Ensure Float Voltage and Equalize Voltage are set to the same value (see step 2.2).
5. Refer to the 'AC Generator Function' section in the NCU User Manual.
6. Follow the instructions for NCU AC generator control by ***'battery capacity threshold'***.

Note: NCU control by 'voltage threshold' can be used in place of 'battery capacity threshold' with **NMC** lithium batteries **ONLY**.

## 2.4 Set Battery String Capacity



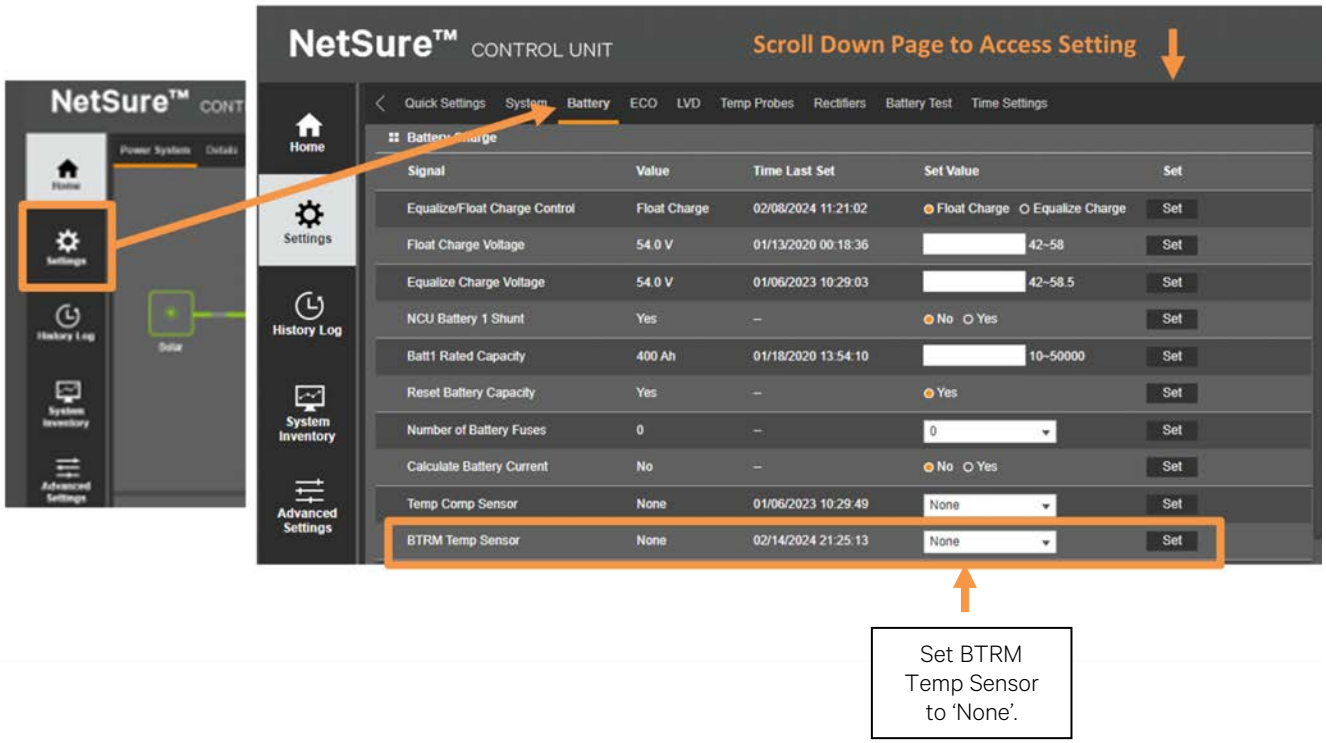

Calculate Total Battery String Capacity:

1. Determine Ah size of battery.
2. Determine total quantity of batteries.
3. Ah x Quantity = String Capacity.

Example:

1. 100 Ah battery.
2. Four batteries.
3. 100 x 4 = Set to '400'.

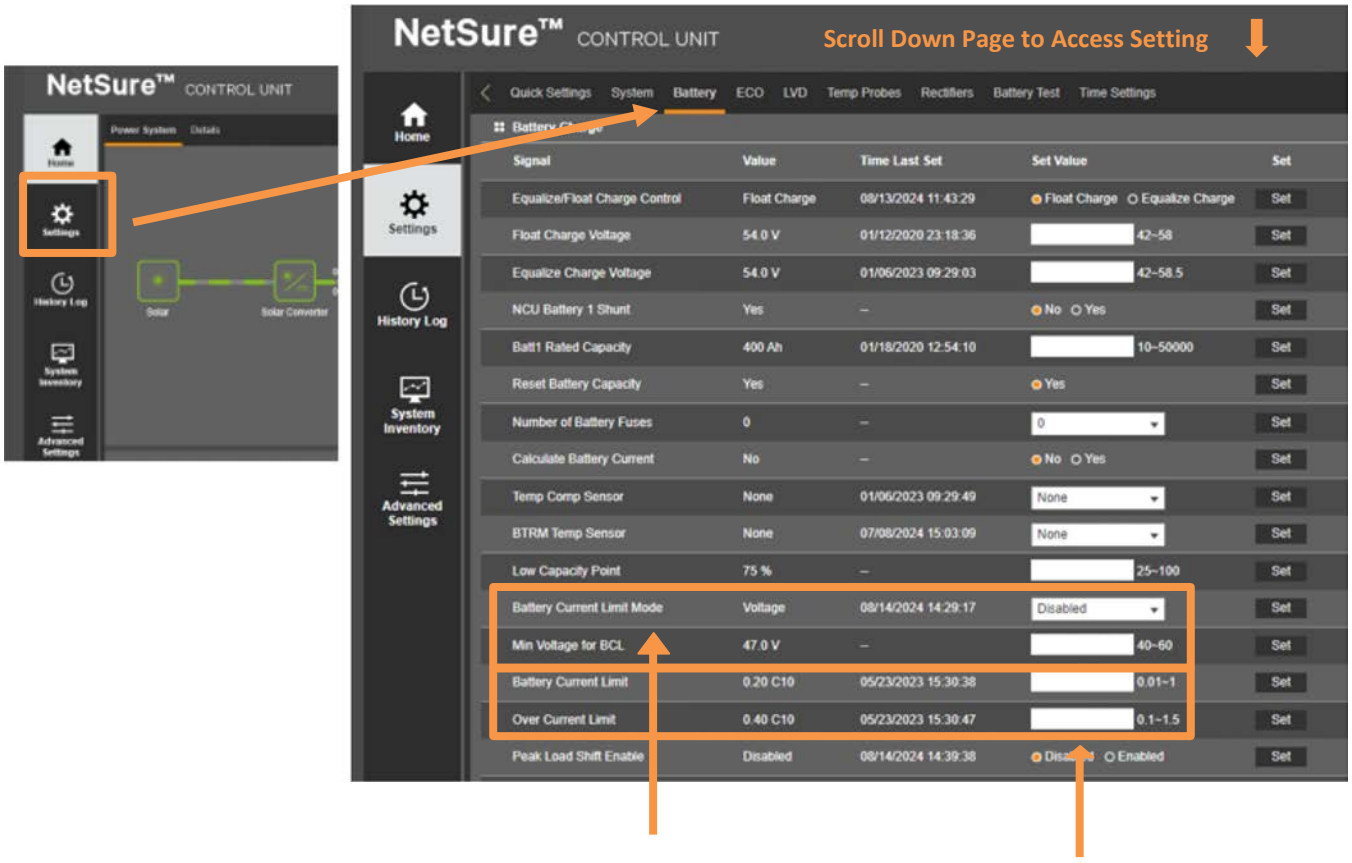
## 2.5 Disable Battery Thermal Runaway Management (BTRM)




Set BTRM Temp Sensor to 'None'.

## 2.6 Turn On and Set Battery Charge Current Limit

Refer to battery datasheet, manual and warranty statement to determine proper setting for your battery.



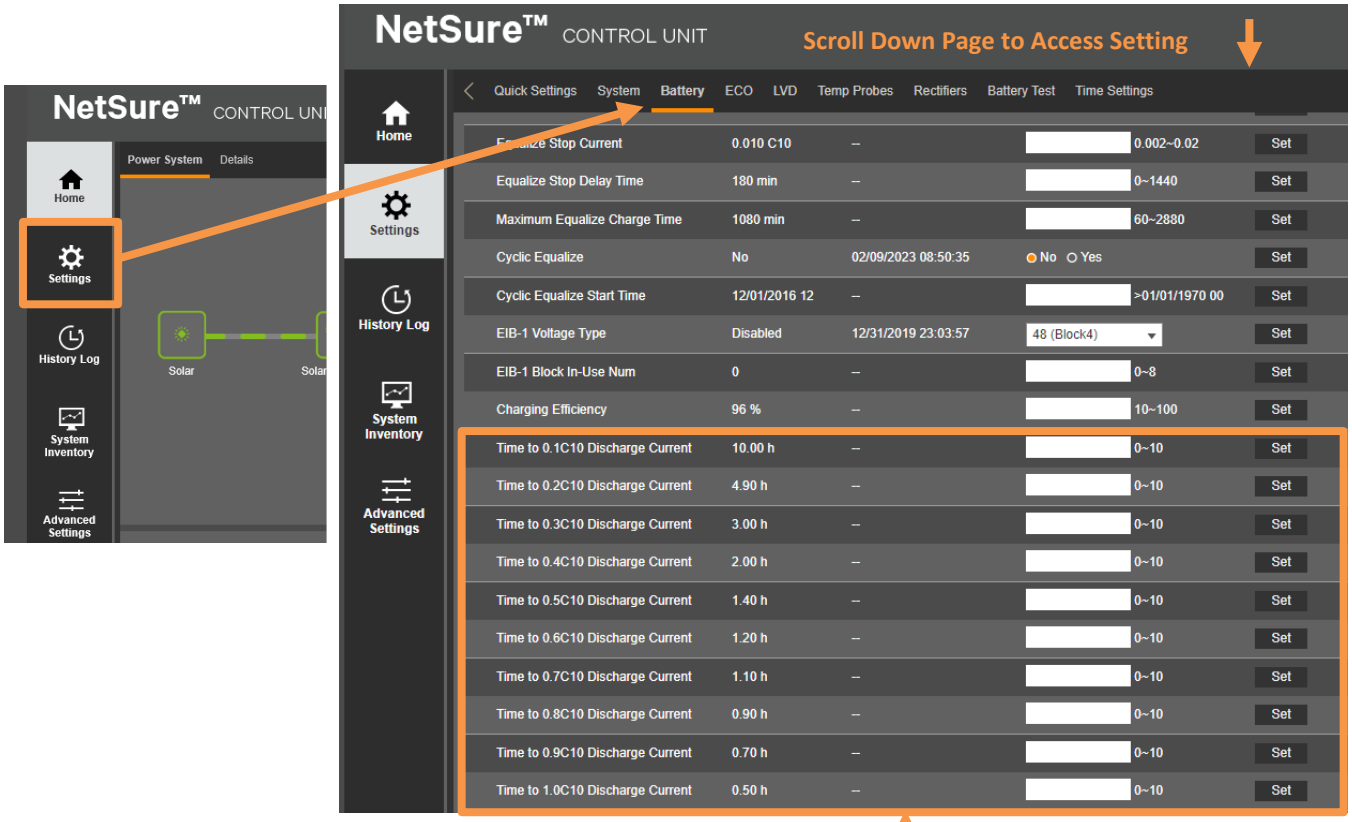

Set Battery Current Limit Mode to 'Voltage'

Set Min Voltage for BCL to '40' or the Low Voltage Battery Disconnect value ***of the battery***, whichever is higher.

Set Battery Current Limit (typically 0.1C to 0.5C). If a value of >.25C is desired, NCU V1.2.40/6.2.40 software or later must be loaded.

Set Over Current Limit higher than the charge current limit of the battery.

## 2.7 Input Battery Discharge Current Times

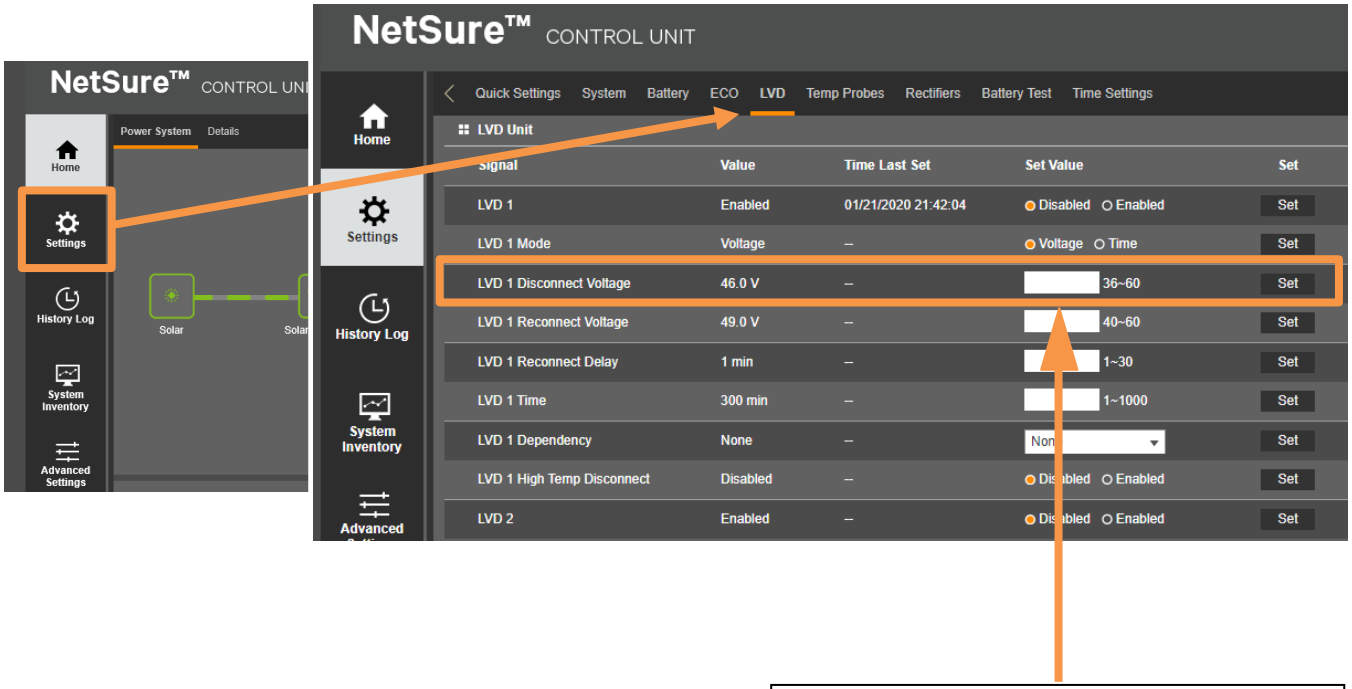



Input the following values into the corresponding location in the NCU.

| Discharge (xC10) | Time (hours) |
|---|---|
| 0.1 | 10.00 |
| 0.2 | 5.00 |
| 0.3 | 3.31 |
| 0.4 | 2.46 |
| 0.5 | 1.96 |
| 0.6 | 1.63 |
| 0.7 | 1.42 |
| 0.8 | 1.22 |
| 0.9 | 1.07 |
| 1.0 | 0.90 |

## 2.8 Input LVD Voltage

Refer to battery datasheet, manual and warranty statement to determine proper setting for your battery.



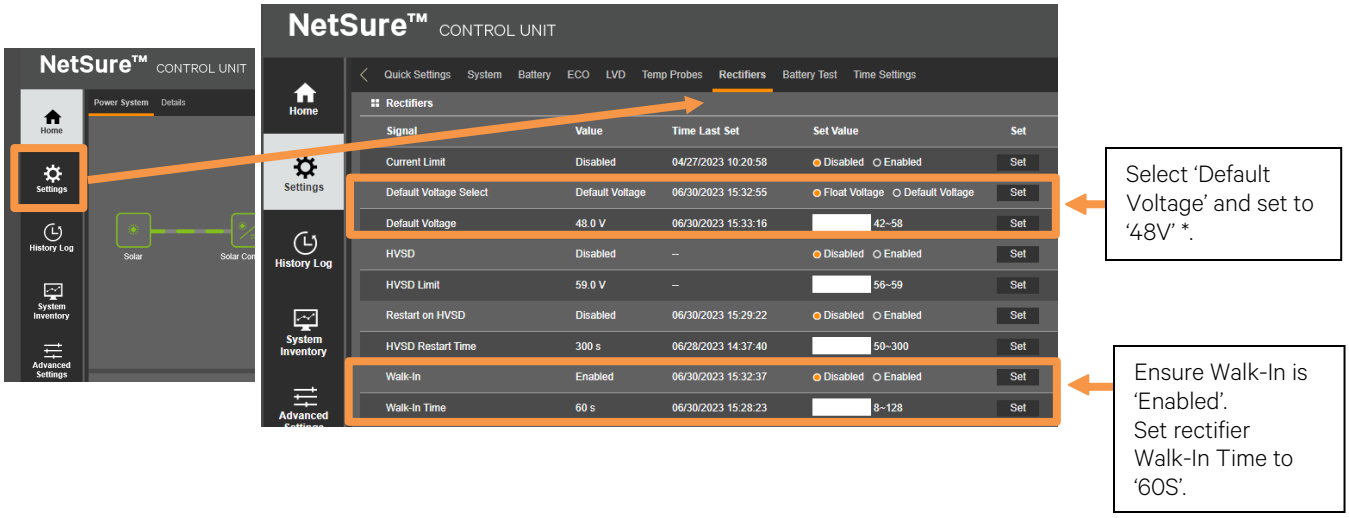

Determine which LVD has been designated as the last to open (in this example LVD1).

Set the disconnect voltage at least 0.5V higher than the LVBD level of the battery.

If the LVD is monostable, do not set below '38V'.

For cyclic applications with a generator, the LVD voltage should be set to at least '0.5V' below the generator start voltage.

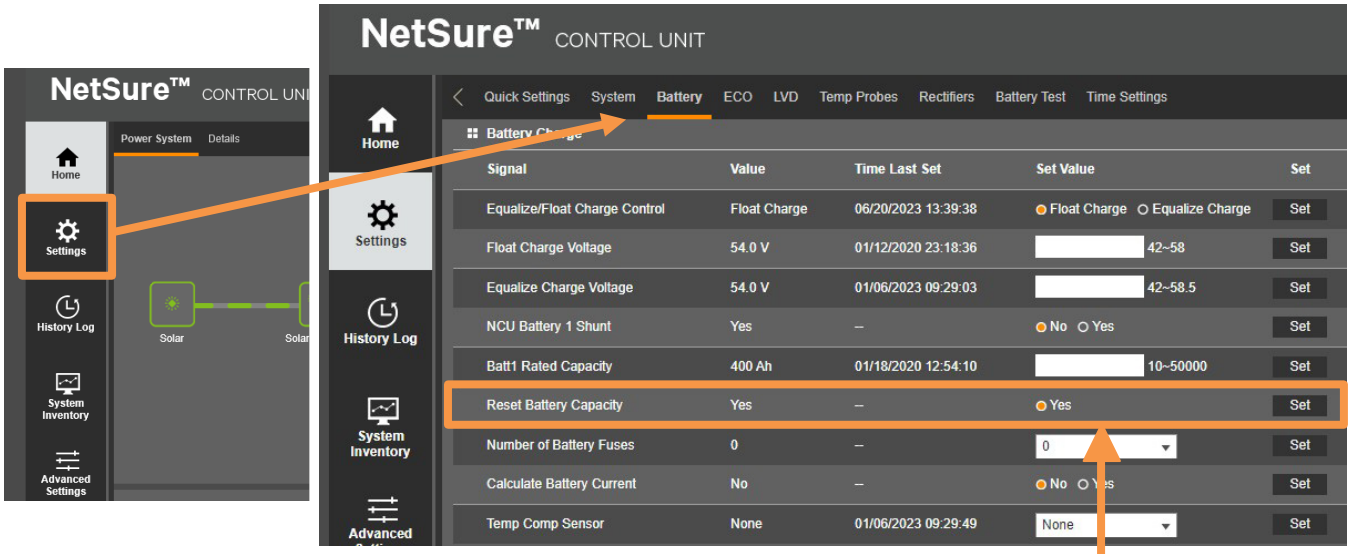
## 2.9 Adjust Rectifier Default Voltage and Walk-In Time




* NCU V1.2.50/V6.2.50 software or later must be loaded.

## 2.10 Calibrate ‘Estimated Remaining Time’ Gauge *

* Even though some customer specific configurations may not include this gauge, this calibration/reset should still be completed.


After all batteries reach 100% charge,

Set ‘Reset Battery Capacity’.

## 2.11 After The Settings Have Been Made...

| | |
|---|---|
| | Wait two to three minutes for changes to be implemented. |
| | Confirm there are no unexpected alarms. |
| | Set-up complete for non-Polarium batteries. See next section for Polarium batteries. |

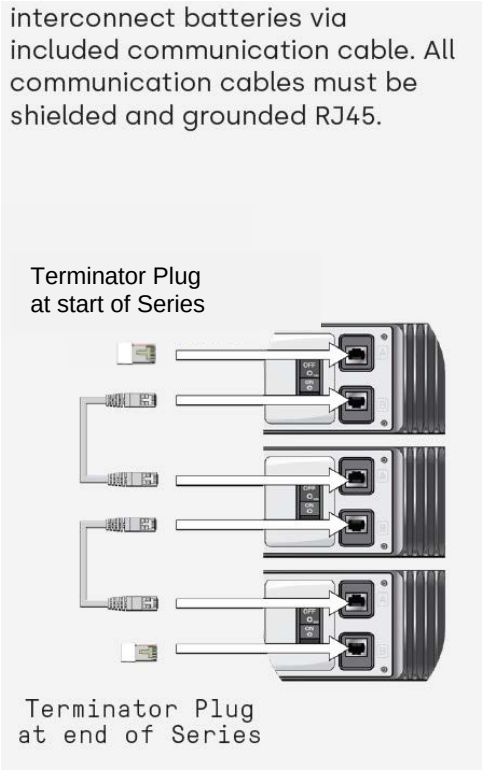
## 2.12 Polarium Communication Cable Connections

Applies to Polarium Batteries Only!!

Utilize RJ45 cables and terminator plugs provided with the batteries.

Daisy chain batteries together as illustrated below.

Use terminator plugs at the start and end of each battery array.



# 3 Monitoring Mode Set-up Procedure

## 3.1 Important Notice

Before proceeding, please ensure the following:

Battery power and ground connections have been made (refer to battery installation manual).

NCU V1.2.80/V6.2.80 software or later is loaded. V1.2.40/V6.2.40 software or later will support Monitoring Mode but without all the features outlined in this application guide (refer to NCU manual for software loading instructions).

Where applicable, Vertiv™ jumper cable 547674 has been ordered and is available on site. See "NetSure™ RS485 Cabling Diagrams" starting on page 26 to determine when the jumper cable is required.

'Standard Mode' set-up has been completed - see section 2 starting on page 11 in this guide.

For Narada ONLY: Customer supplied RJ45 patch cables are available on site. The quantity and length of cables will depend on the number of batteries being connected and the distance between the power system and the first battery in the string. See remaining connection instructions to determine quantity and length(s) needed.

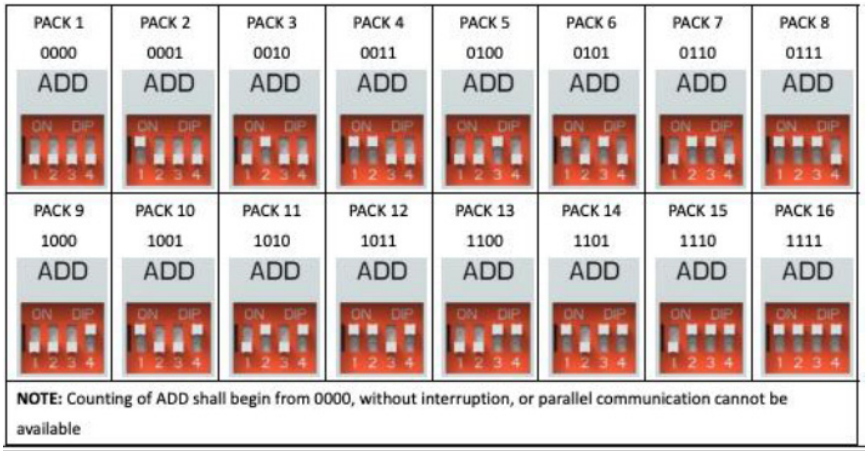
For Polarium ONLY: Polarium supplies an RJ45 patch cable with each battery. A longer, customer supplied, patch cable may be necessary depending on the distance between the power system and the first battery in the string.

## 3.2 Narada Monitoring Mode Set-Up Procedure

### 3.2.1 Battery Set-Up

Confirm battery has BMS Modbus Version V1.5 or V1.5.2 (default if ordered via Vertiv).

Set battery addresses as outlined in Narada Installation and Operations Manual (summarized in photo below).



### 3.2.2 Power System to Battery Cable Preparation

Cut off the RJ45 connector on one patch cable.

Strip jacketing back to expose conductors.

### 3.2.3 Last Battery Modbus Termination Cable Preparation

Cut a patch cable ~4-6” inches away from one of the connectors.

Tape raw end with electrical tape.

### 3.2.4 Cabling Sequence

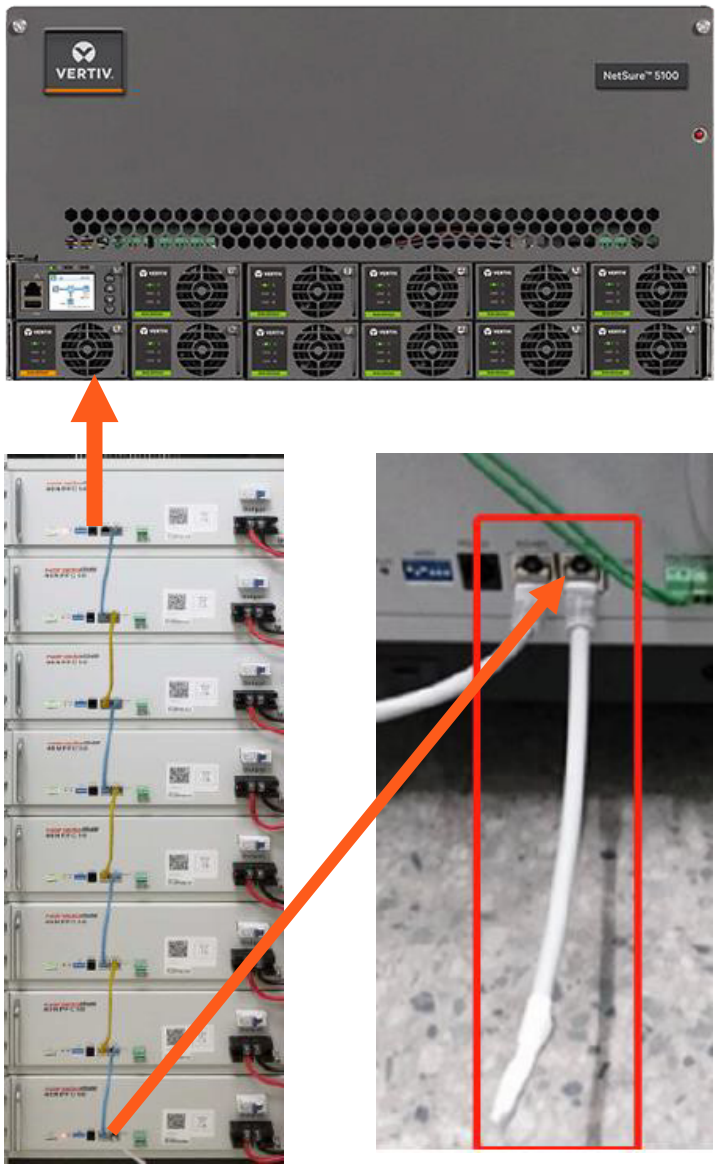
See also Figure 3.1.

1. Terminate 'Power System to Battery Cable' to Vertiv™ NetSure™ Power System based on type of power system (see “NetSure™ RS485 Cabling Diagrams” starting on page 26).
2. Plug 'Power System to Battery Cable' into the left RS485 jack on first battery.
3. Daisy chain RS485 jacks on batteries together using RJ45 patch cables.
4. Plug 'Last Battery Modbus Termination Cable' into the right RS485 jack on last battery of string.

### 3.2.5 NCU Setting Adjustments

Continue with “Post Cabling NCU Adjustments” starting on page 37.

**Figure 3.1 Cabling Sequence**



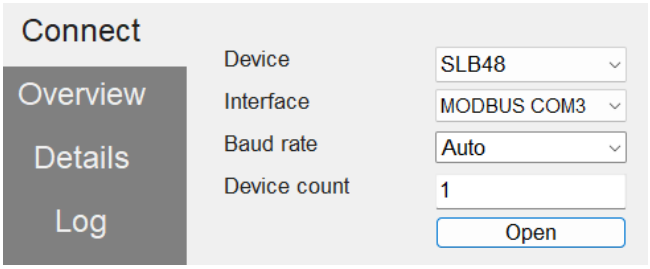
## 3.3 Polarium Monitoring Mode Set-Up Procedure

### 3.3.1 Battery Set-up

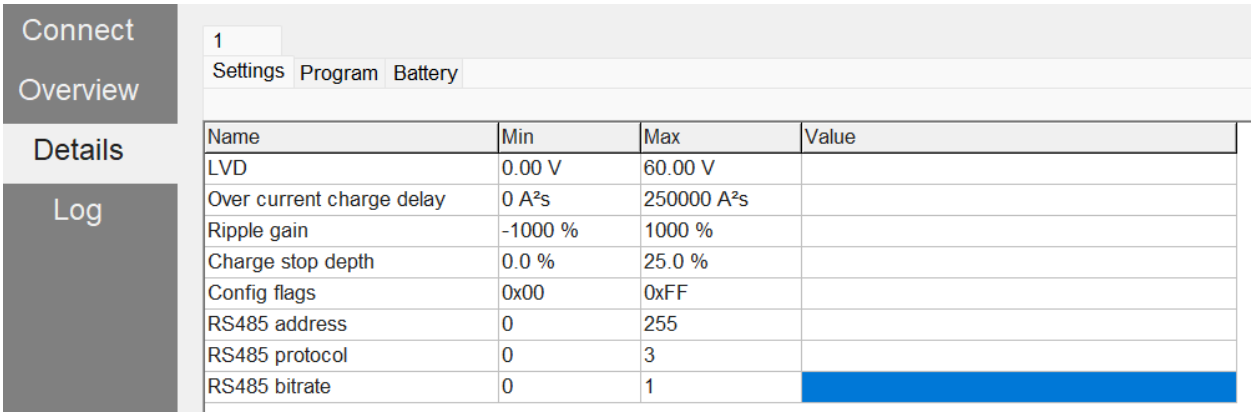
Confirm battery is an SLB48 Generation 5 with firmware version 2021-05-07 (default if ordered via Vertiv).

The BMS on Polarium batteries need to be changed from 115,200 to 9600 baud rate by following the procedure outlined below:

1. Download Polarium Studio Software and Studio User Guide from this link: https://polarium.com/studio/. It is suggested that this software be loaded prior to going to the field to change the baud rate.
2. Connect Polarium USB/RJ45 Communication Cable (Polarium p/n: 105-00006 - Vertiv p/n: 10020692) to the top RJ45 port on the battery and the USB port on your computer.
3. Open Device Manager on your computer and note the number of the COM port being used by the USB Serial Port.
4. Turn on the battery by turning on the battery circuit breaker and pushing the power button for five seconds.
5. Open Studio and choose the 'Connect' Section of the menu. Make the following selections:
   - For 'Device' choose 'SLB48'.
   - For 'Interface' choose 'MODBUS COMx' (x=the COM port noted in Step 3 above).




6. Click on 'Open'.
7. Choose the 'Details' Section. On the 'Settings' Tab, double-click on the 'Value' cell (blue highlight) on the 'RS485 bitrate' row.




| Name | Min | Max | Value |
|---|---|---|---|
| LVD | 0.00 V | 60.00 V | |
| Over current charge delay | 0 A²s | 250000 A²s | |
| Ripple gain | -1000 % | 1000 % | |
| Charge stop depth | 0.0 % | 25.0 % | |
| Config flags | 0x00 | 0xFF | |
| RS485 address | 0 | 255 | |
| RS485 protocol | 0 | 3 | |
| RS485 bitrate | 0 | 1 | |

8. Change the value from '0' to '1' and press ENTER.
9. The 'Value' cell should now show '9600 bps'.

10. Disconnect cable from battery and perform these steps on each battery in the string.

Note: Battery addresses are automatically set when the batteries are connected via the RJ45 communication cable(s) outlined later in this manual.

Note: For more detailed instructions and troubleshooting, please see Polarium Studio User Guide downloaded in Step 1.

### 3.3.2 Power System to Battery Cable Preparation

Cut off the RJ45 connector on one patch cable.

Strip jacketing back to expose conductors.

### 3.3.3 Cabling Sequence

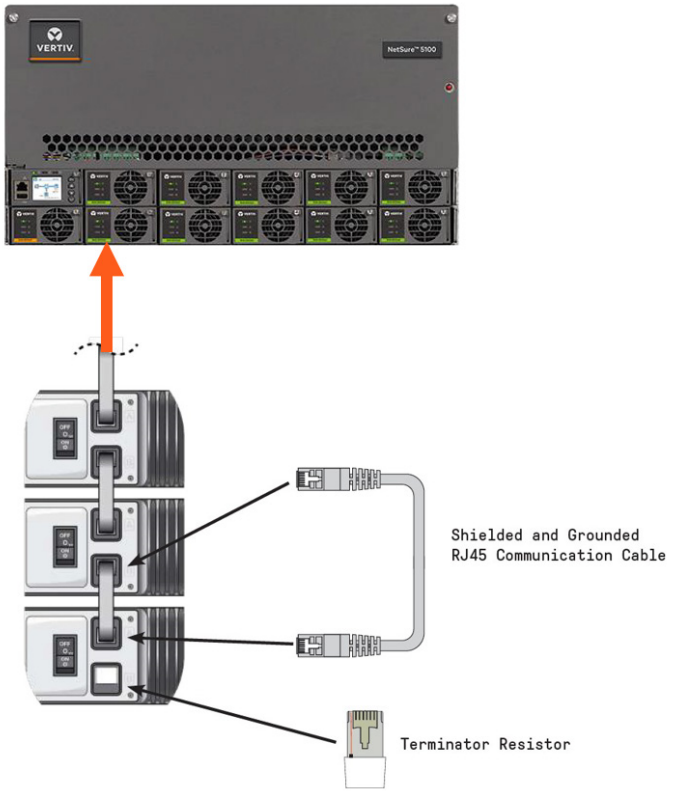
See also Figure 3.2.

1. Terminate 'Power System To Battery Cable' to Vertiv™ NetSure™ Power System based on type of power system (see “NetSure™ RS485 Cabling Diagrams” starting on page 26).
2. Plug 'Power System to Battery Cable' into the ‘A’ RJ45 jack on first battery.
3. Daisy chain RJ45 jacks on batteries together using supplied RJ45 cables.
4. Plug Terminator Resistor supplied with battery into the ‘B’ RJ45 jack on last battery of string.

### 3.3.4 NCU Setting Adjustments

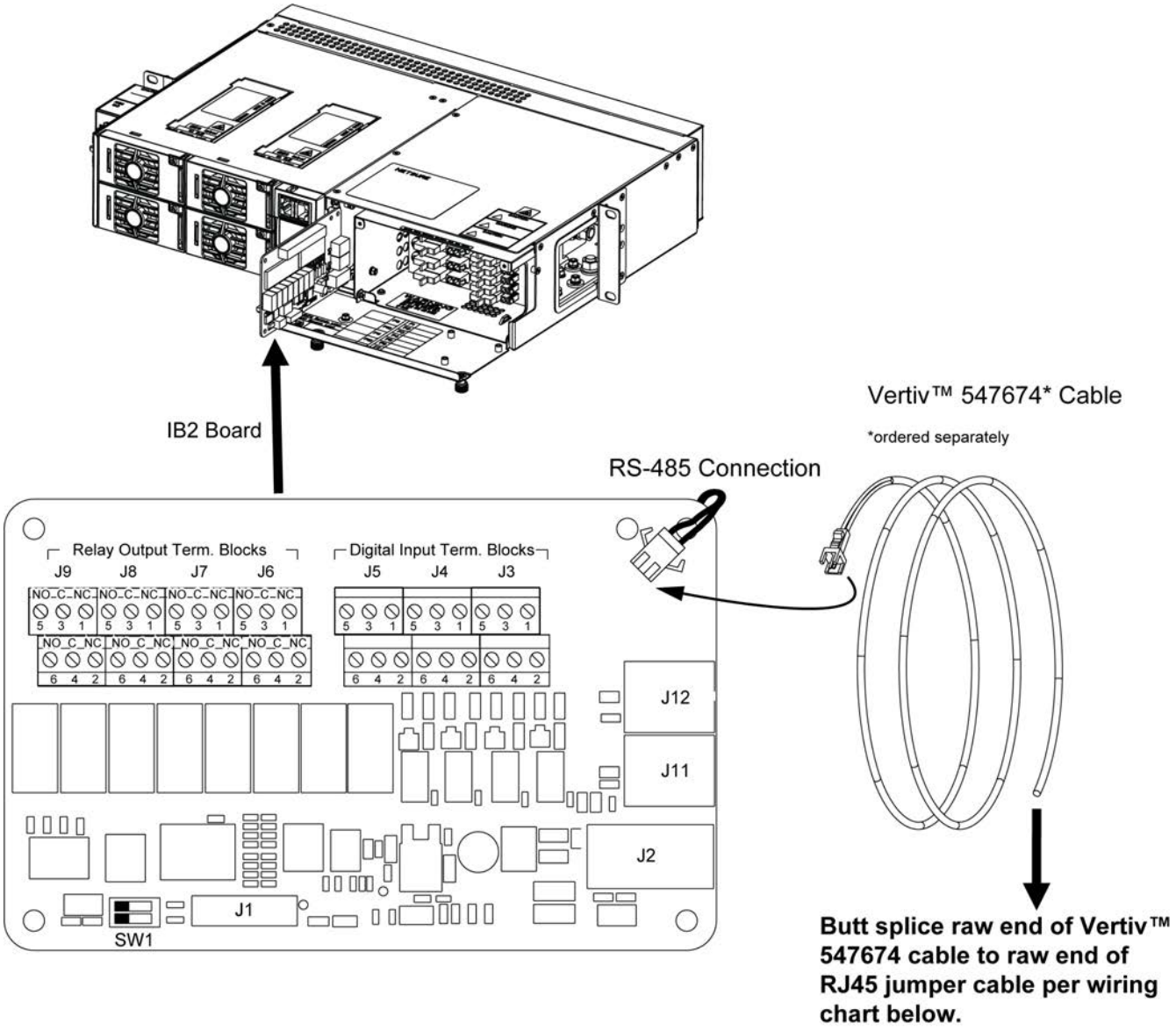
Continue with “Post Cabling NCU Adjustments” starting on page 37.

**Figure 3.2 Cabling Sequence**



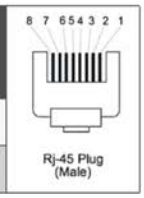
## 3.4 NetSure™ RS485 Cabling Diagrams

### 3.4.1 Vertiv™ NetSure™ 211 (582136600) Modbus Connection Location and Wiring

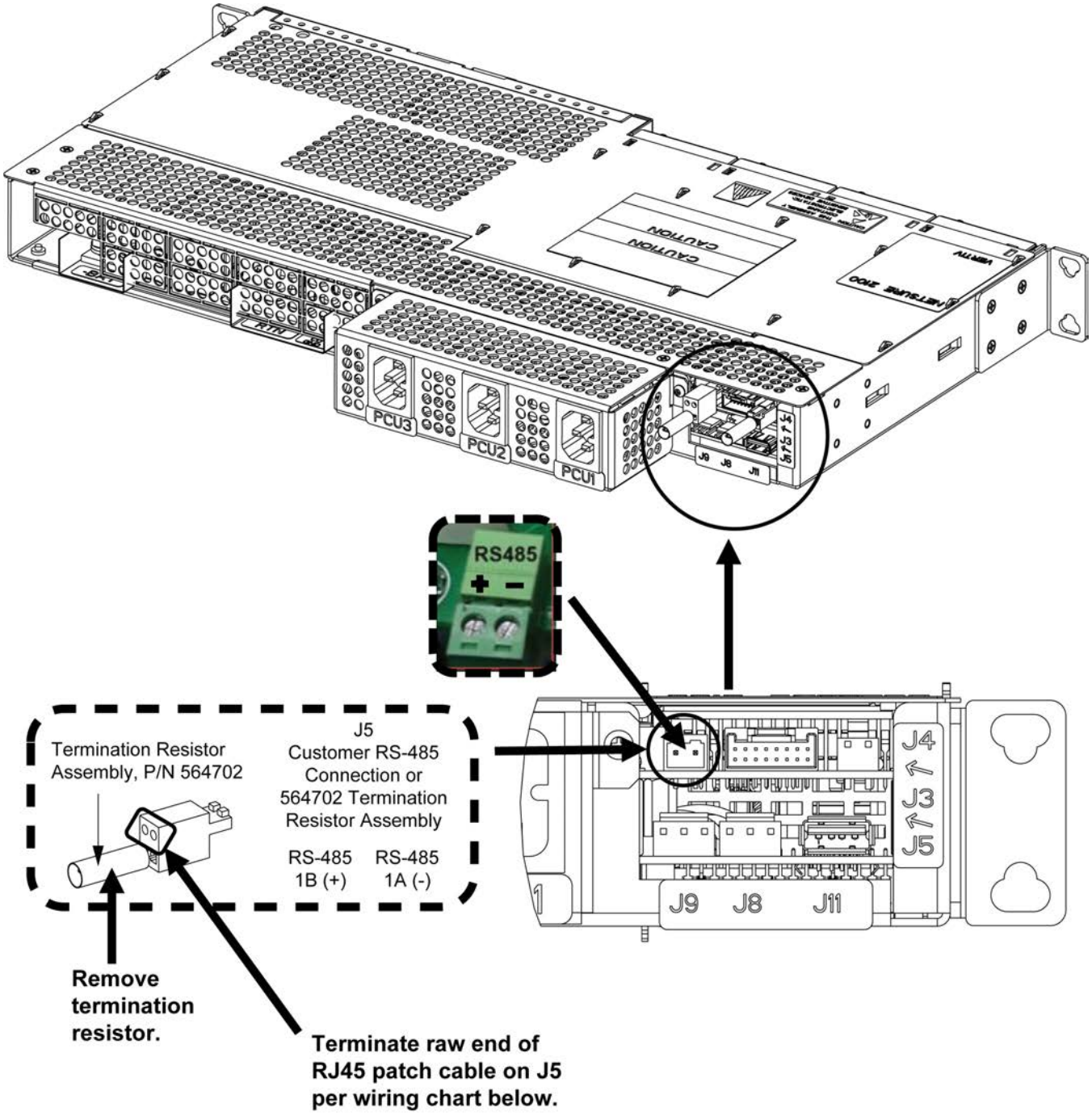



RJ45 Cable Wiring Chart

| Signal | Vertiv™ P/N 547674 Cable | Narada (RJ45 Plug) | Polarium (RJ45 Plug) |
|---|---|---|---|
| RS485 (+) | Red Wire (Pin 1) | Pin 2 | Pin 4 |
| RS485 (-) | Black Wire (Pin 2) | Pin 3 | Pin 5 |

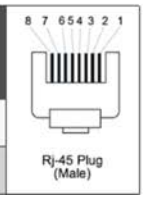


### 3.4.2 Vertiv™ NetSure™ 2100 (582138000) Modbus Connection Location and Wiring

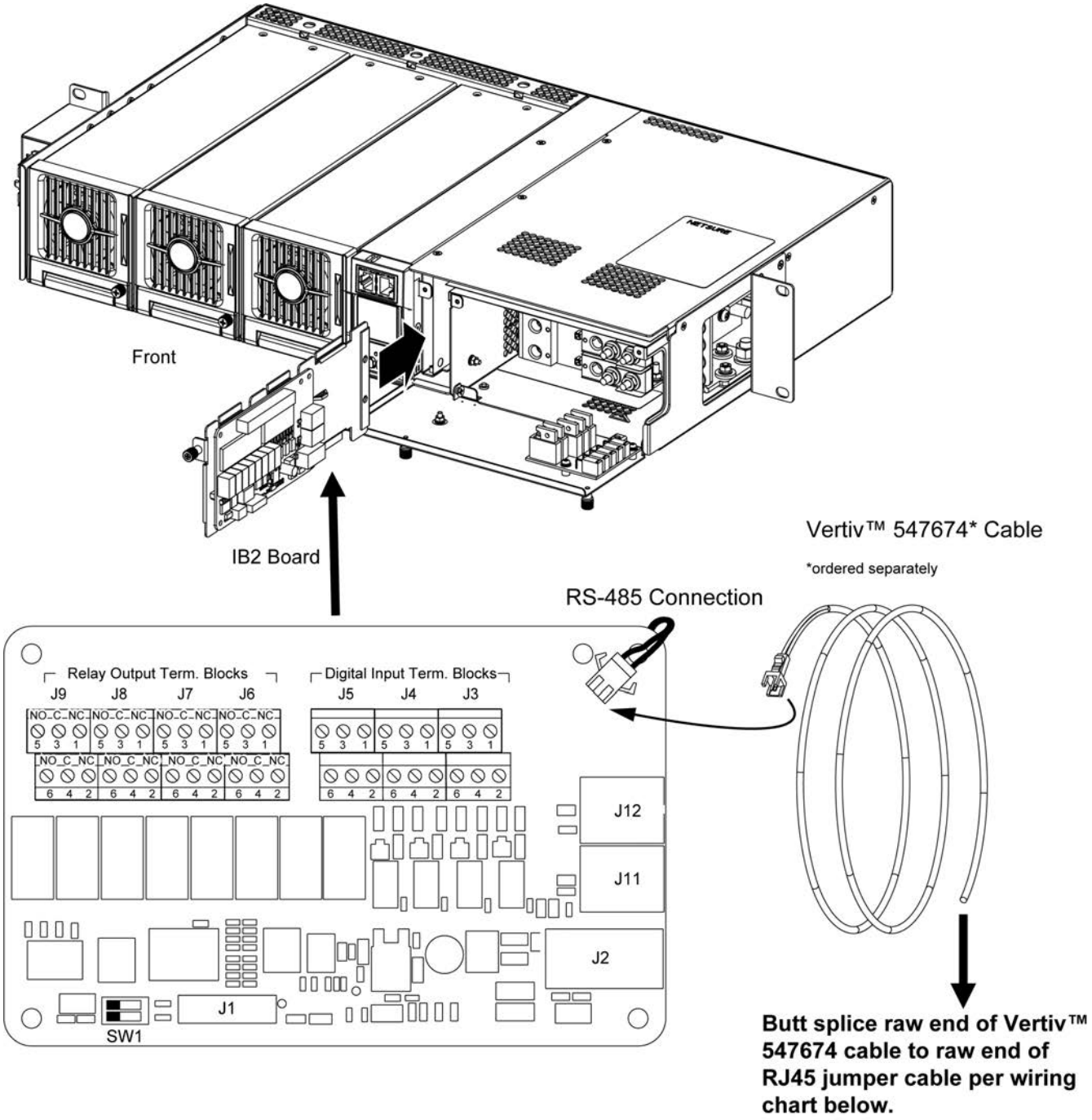



RJ45 Cable Wiring Chart

| Signal | Vertiv™ NetSure™ 2100 System | Narada (RJ45 Plug) | Polarium (RJ45 Plug) |
|---|---|---|---|
| RS485 (+) | J5-1B (left side) | Pin 2 | Pin 4 |
| RS485 (-) | J5-1A (right side) | Pin 3 | Pin 5 |

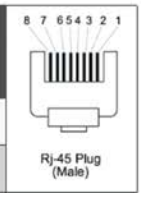


### 3.4.3 Vertiv™ NetSure™ 502 (582136700) Modbus Connection Location and Wiring

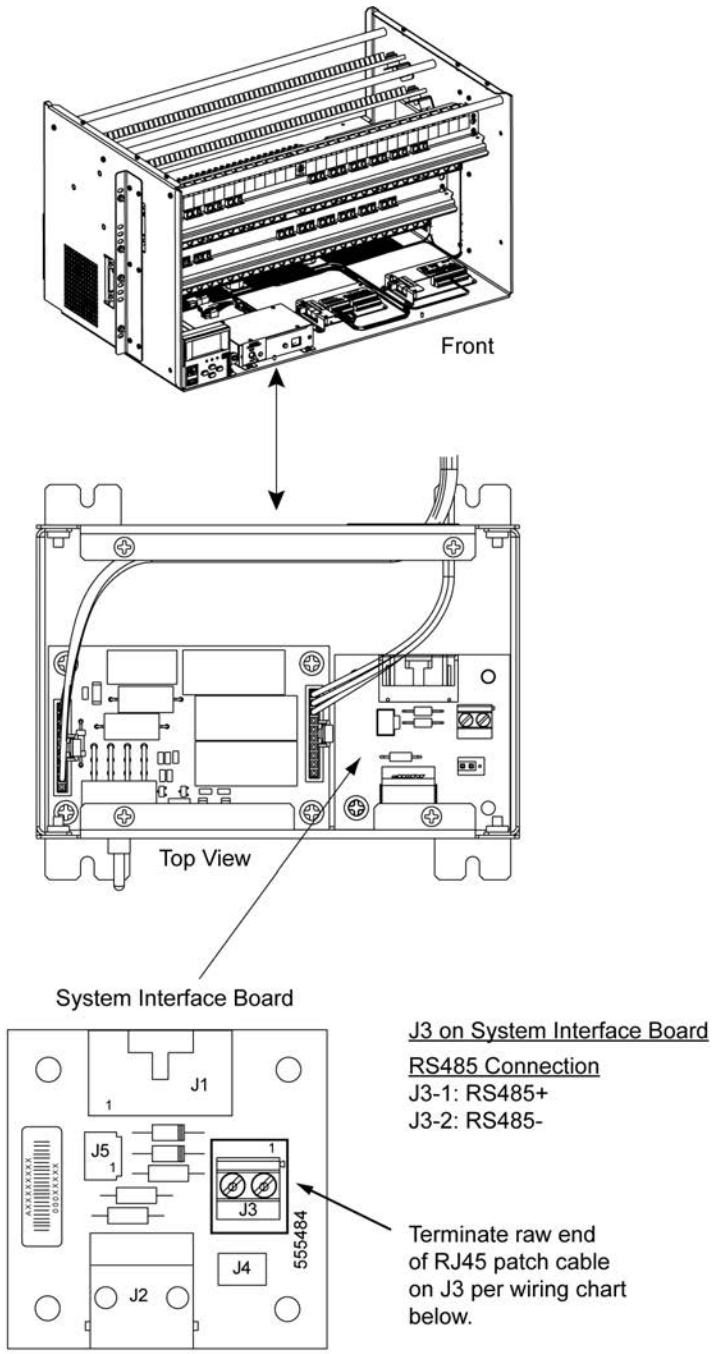



RJ45 Cable Wiring Chart

| Signal | Vertiv™ P/N 547674 Cable | Narada (RJ45 Plug) | Polarium (RJ45 Plug) |
|---|---|---|---|
| RS485 (+) | Red Wire (Pin 1) | Pin 2 | Pin 4 |
| RS485 (-) | Black Wire (Pin 2) | Pin 3 | Pin 5 |

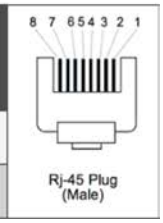


### 3.4.4 Vertiv™ NetSure™ 512 (58213700027) Modbus Connection Location and Wiring

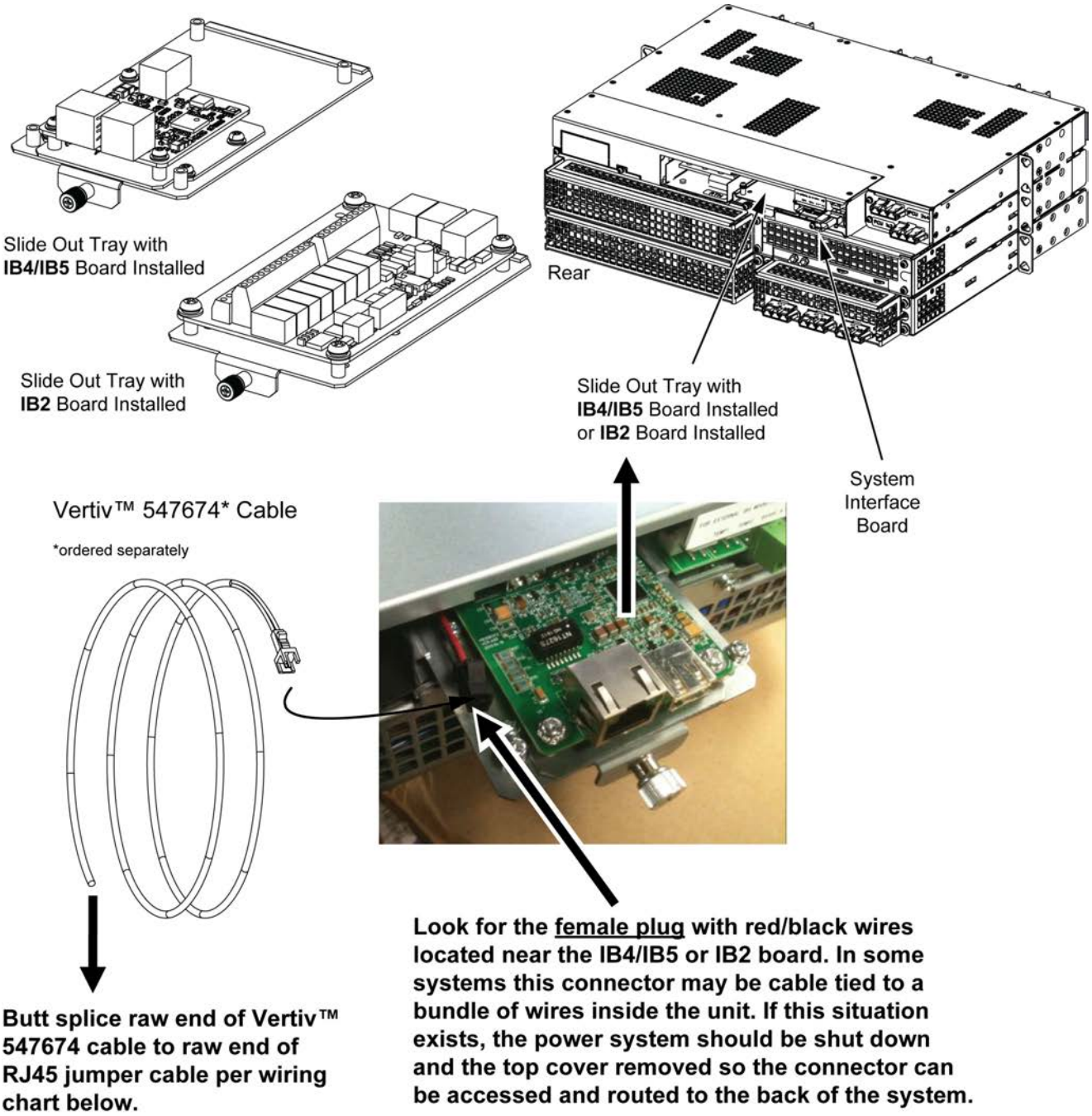



RJ45 Cable Wiring Chart

| Signal | Vertiv™ NetSure™ 512 System | Narada (RJ45 Plug) | Polarium (RJ45 Plug) |
|---|---|---|---|
| RS485 (+) | J3-1 | Pin 2 | Pin 4 |
| RS485 (-) | J3-2 | Pin 3 | Pin 5 |



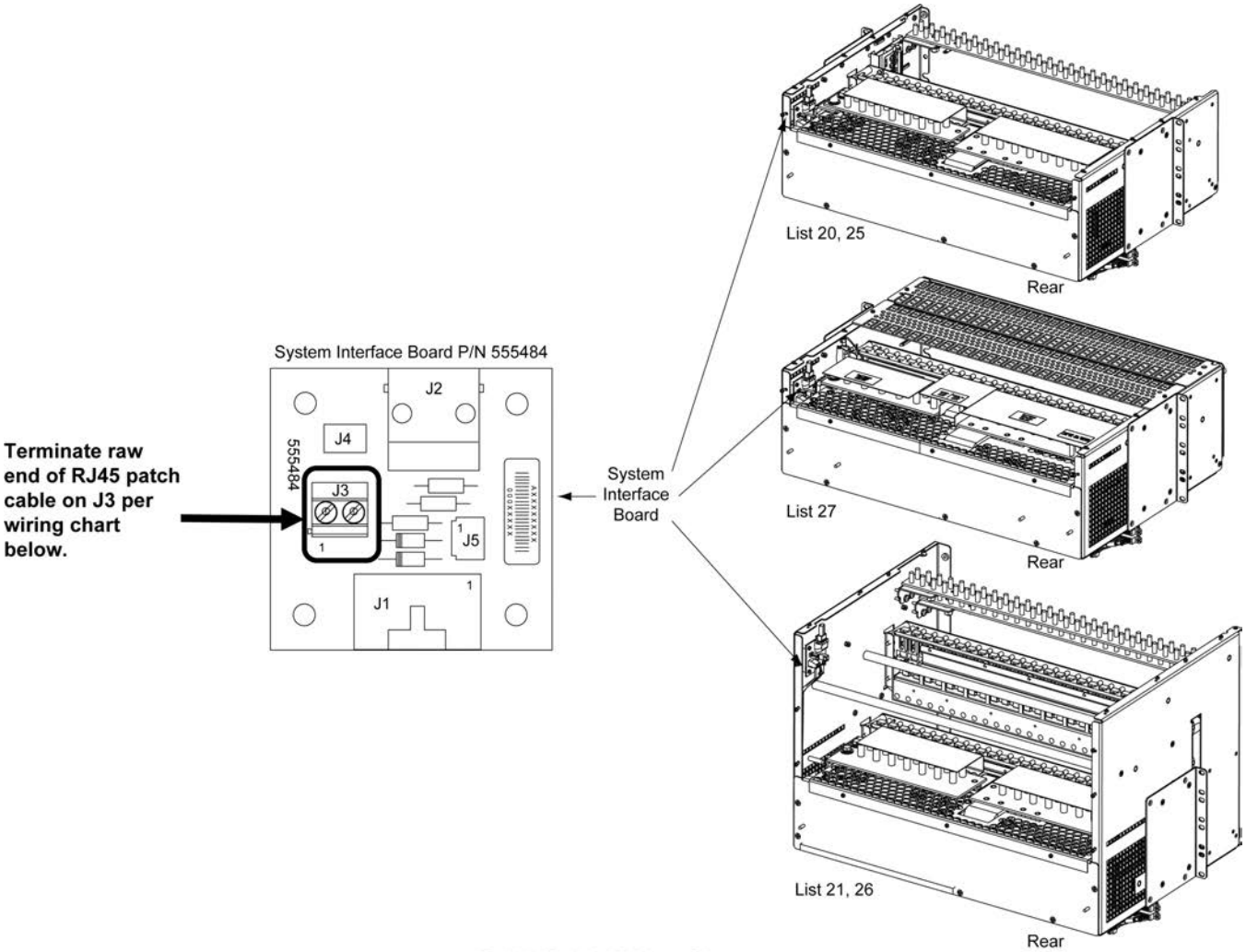
### 3.4.5 Vertiv™ NetSure™ 5100 Integrated (582137200) Modbus Connection Location and Wiring




RJ45 Cable Wiring Chart

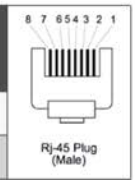
| Signal | Vertiv™ P/N 547674 Cable | Narada (RJ45 Plug) | Polarium (RJ45 Plug) | 8 7 6 5 4 3 2 1 Rj-45 Plug (Male) |
|---|---|---|---|---|
| RS485 (+) | Red Wire (Pin 1) | Pin 2 | Pin 4 | |
| RS485 (-) | Black Wire (Pin 2) | Pin 3 | Pin 5 | |

### 3.4.6 Vertiv™ NetSure™ 5100 (582137100) Modbus Connection Location and Wiring

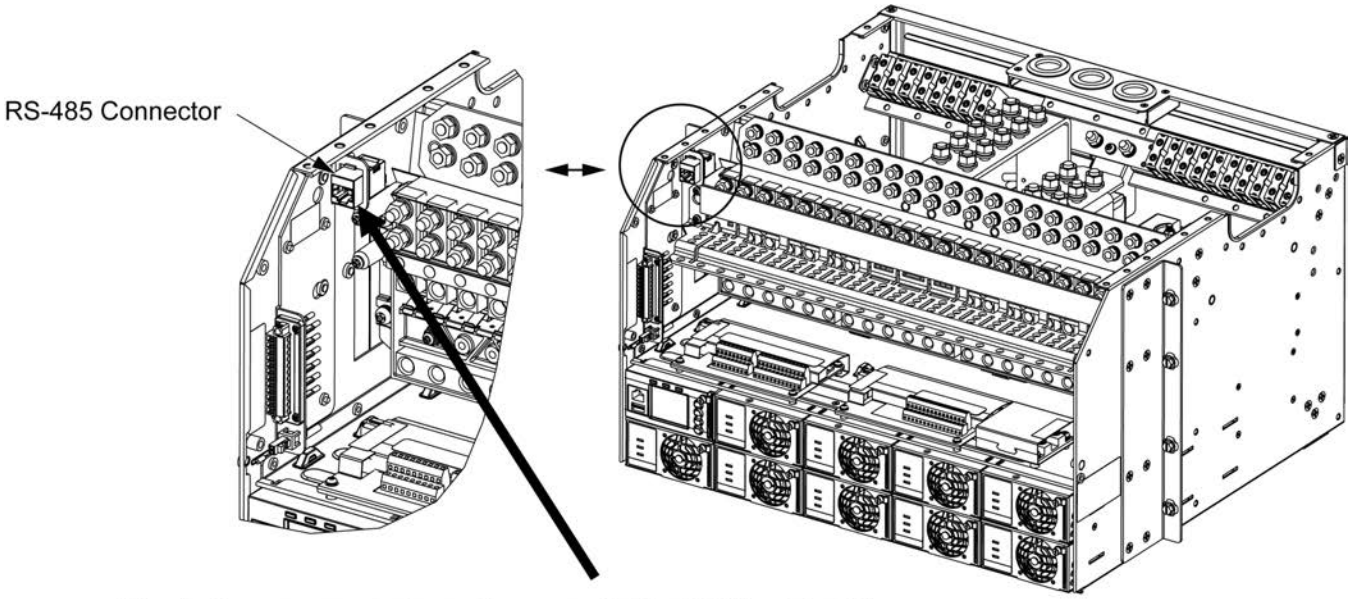



RJ45 Cable Wiring Chart

| Signal | Vertiv™ NetSure™ 5100 System | Narada (RJ45 Plug) | Polarium (RJ45 Plug) |
|---|---|---|---|
| RS485 (+) | J3-1 | Pin 2 | Pin 4 |
| RS485 (-) | J3-2 | Pin 3 | Pin 5 |



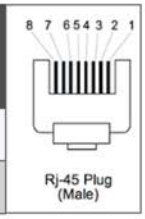
### 3.4.7 Vertiv™ NetSure™ 7100 Compact (582137100101, 582137100102, 582137100103, 582137100104, 582137100105, 582137100106) Modbus Connection Location and Wiring




**Terminate a new connector on the raw end of the RJ45 patch cable but connect ONLY the TWO applicable pins based on the brand of battery, as outlined in the table below. Plug the patch cable into the RJ45 jack on the power system and the first battery in the string.**

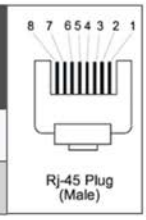
Narada RJ45 Cable Wiring Chart

| Signal | Vertiv™ NetSure™ 7100 System | Narada (RJ45 Plug) |
|---|---|---|
| RS485 (+) | Pin 2 | Pin 2 |
| RS485 (-) | Pin 3 | Pin 3 |



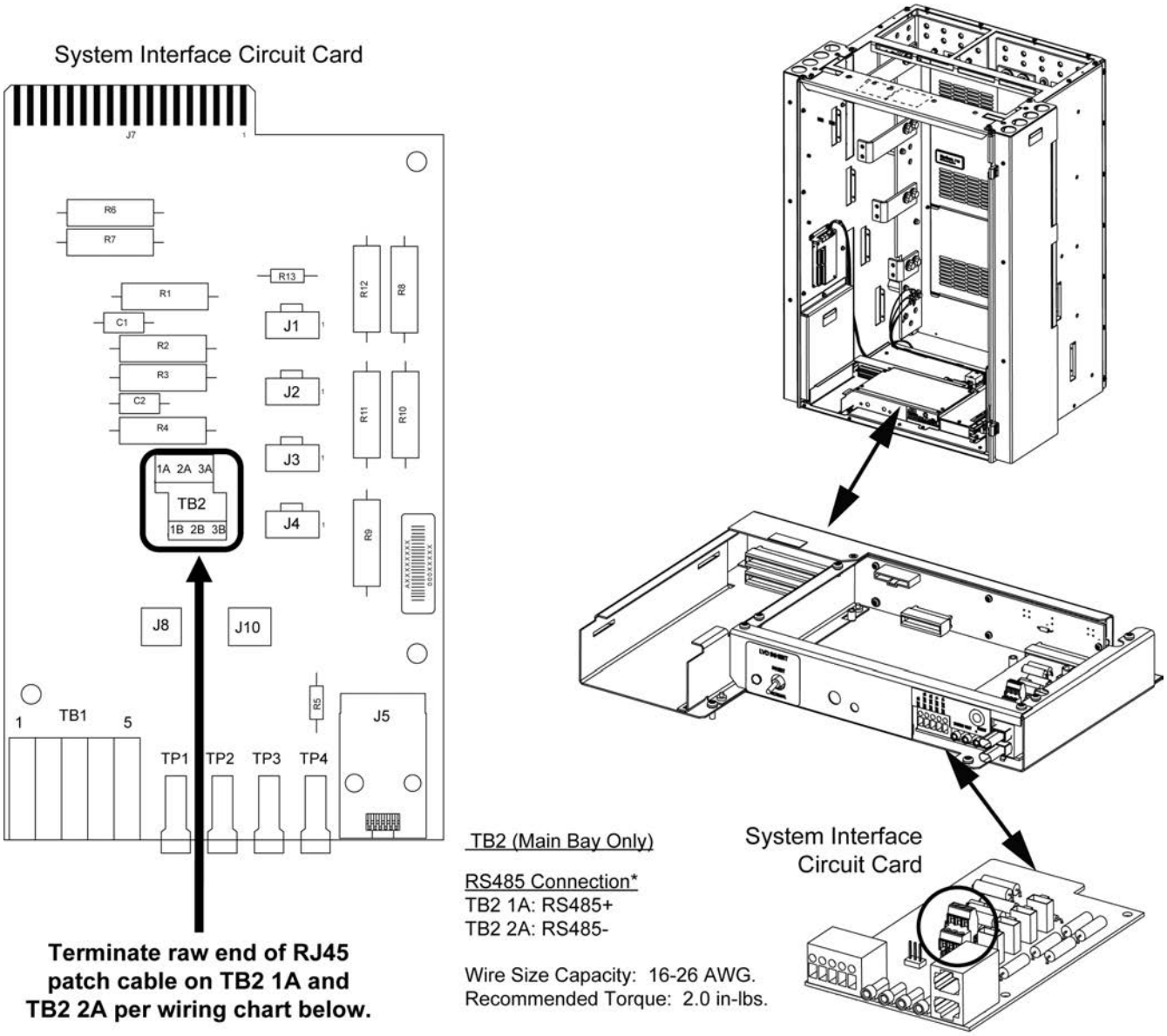

Polarium RJ45 Cable Wiring Chart

| Signal | Vertiv™ NetSure™ 7100 System | Polarium (RJ45 Plug) |
|---|---|---|
| RS485 (+) | Pin 4 | Pin 4 |
| RS485 (-) | Pin 5 | Pin 5 |

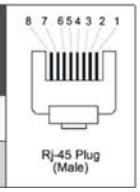


### 3.4.8 Vertiv™ NetSure™ 721 / Vertiv™ NetSure™ 7100 (582127000) Modbus Connection Location and Wiring

Note: For all other NetSure™ 7100 list numbers, please see sections 3.4.9 and 3.4.10 for Modbus connection location and wiring.



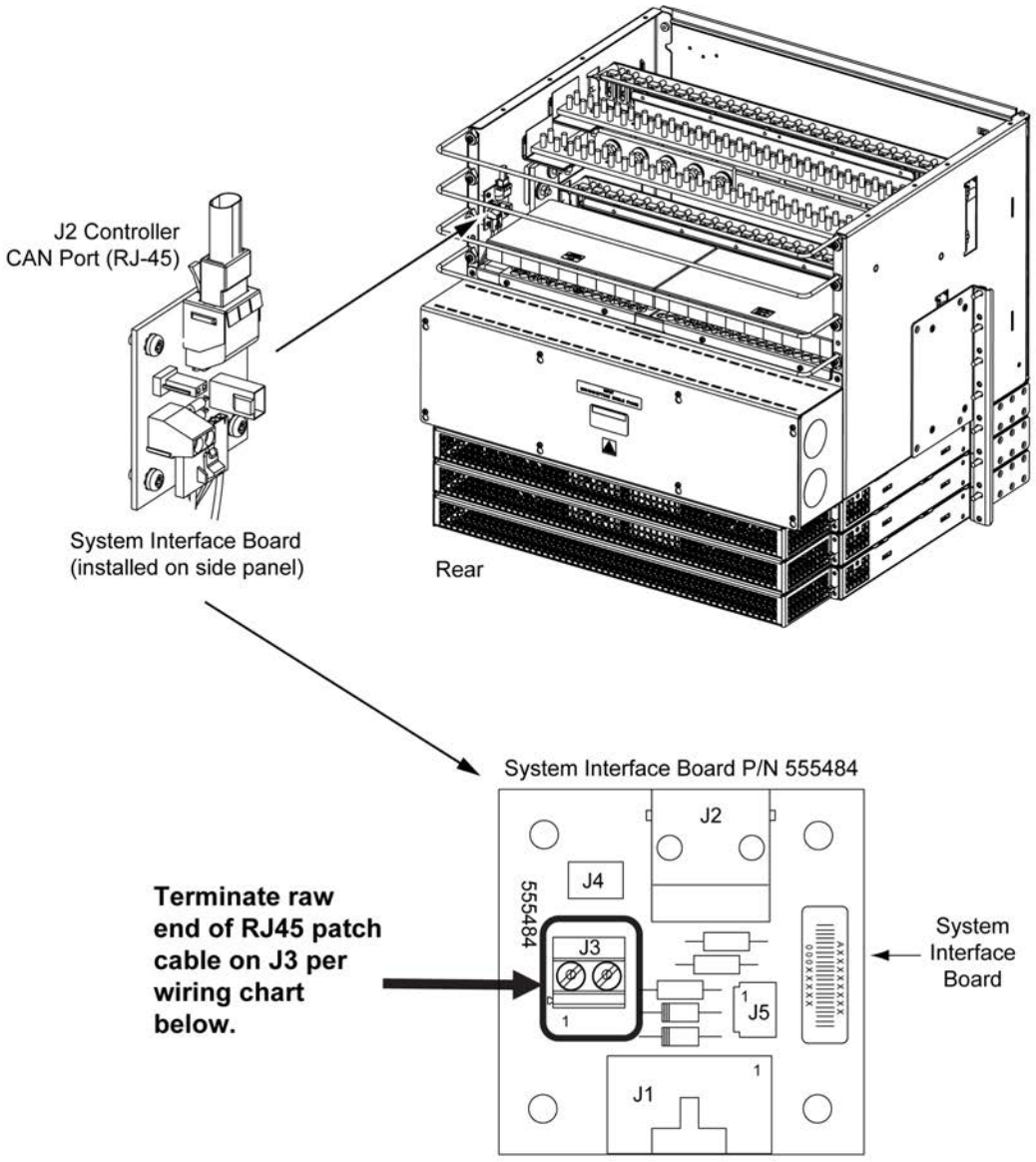

RJ45 Cable Wiring Chart

| Signal | Vertiv™ NetSure™ 7100 System | Narada (RJ45 Plug) | Polarium (RJ45 Plug) |  |
|---|---|---|---|---|
| RS485 (+) | TB2-1A | Pin 2 | Pin 4 | |
| RS485 (-) | TB2-2A | Pin 3 | Pin 5 | |

### 3.4.9 Vertiv™ NetSure™ 7100 (582127000600, 582127000601, 582127000900, 582127000901) Modbus Connection Location and Wiring

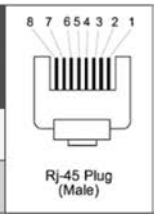
Note: Only available in systems manufactured on or after July 1, 2026.

Note: For all other NetSure™ 7100 list numbers, please see sections 3.4.8 and 3.4.10 for Modbus connection location and wiring.



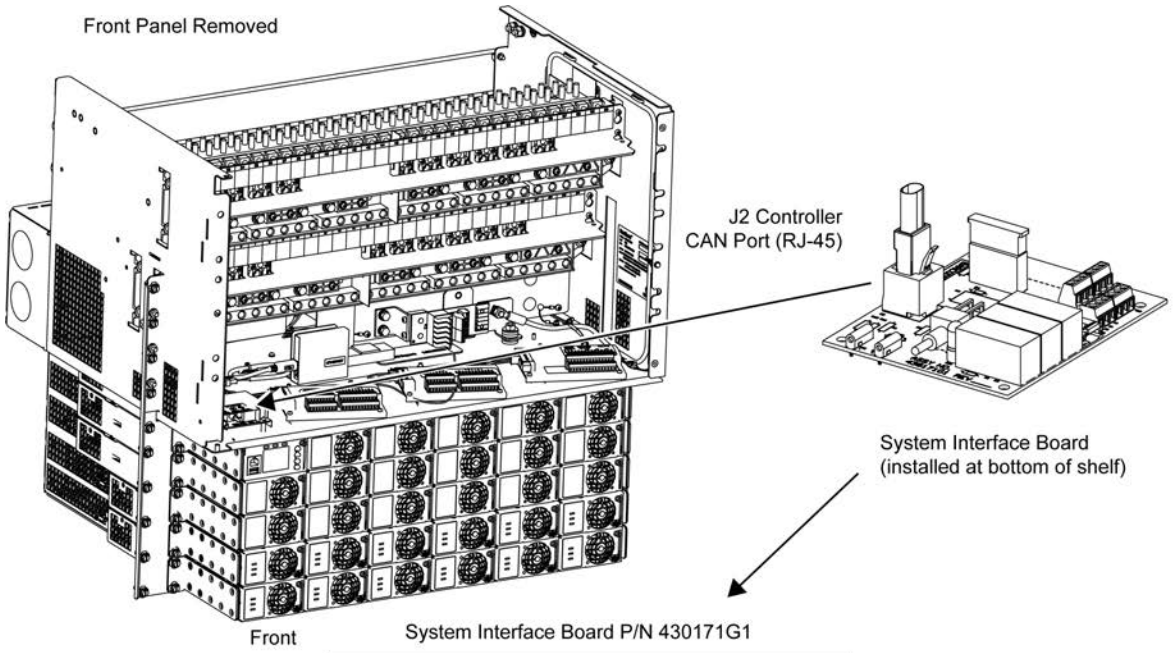

RJ45 Cable Wiring Chart

| Signal | Vertiv™ NetSure™ 7100 System | Narada (RJ45 Plug) | Polarium (RJ45 Plug) |
|---|---|---|---|
| RS485 (+) | J3-1 | Pin 2 | Pin 4 |
| RS485 (-) | J3-2 | Pin 3 | Pin 5 |

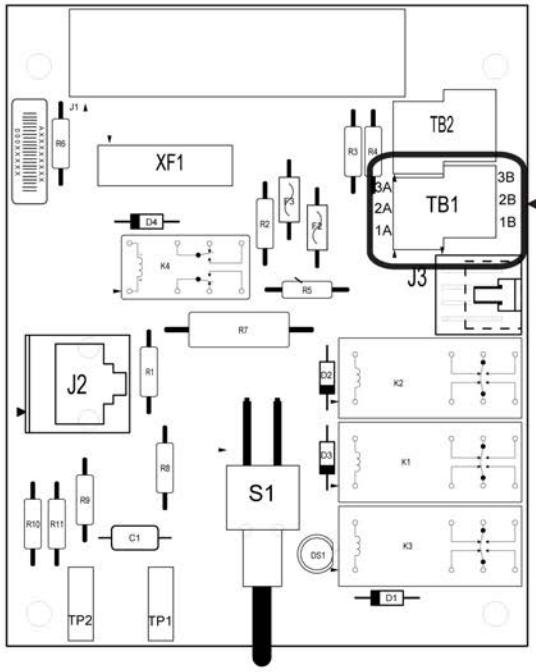


### 3.4.10 Vertiv™ NetSure™ 7100 (582127000930, 582127000931, 582127000990) Modbus Connection Location and Wiring

Note: For all other NetSure™ 7100 list numbers, please see sections 3.4.8 and 3.4.9 for Modbus connection location and wiring.



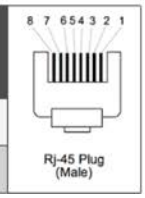

System Interface Board P/N 430171G1



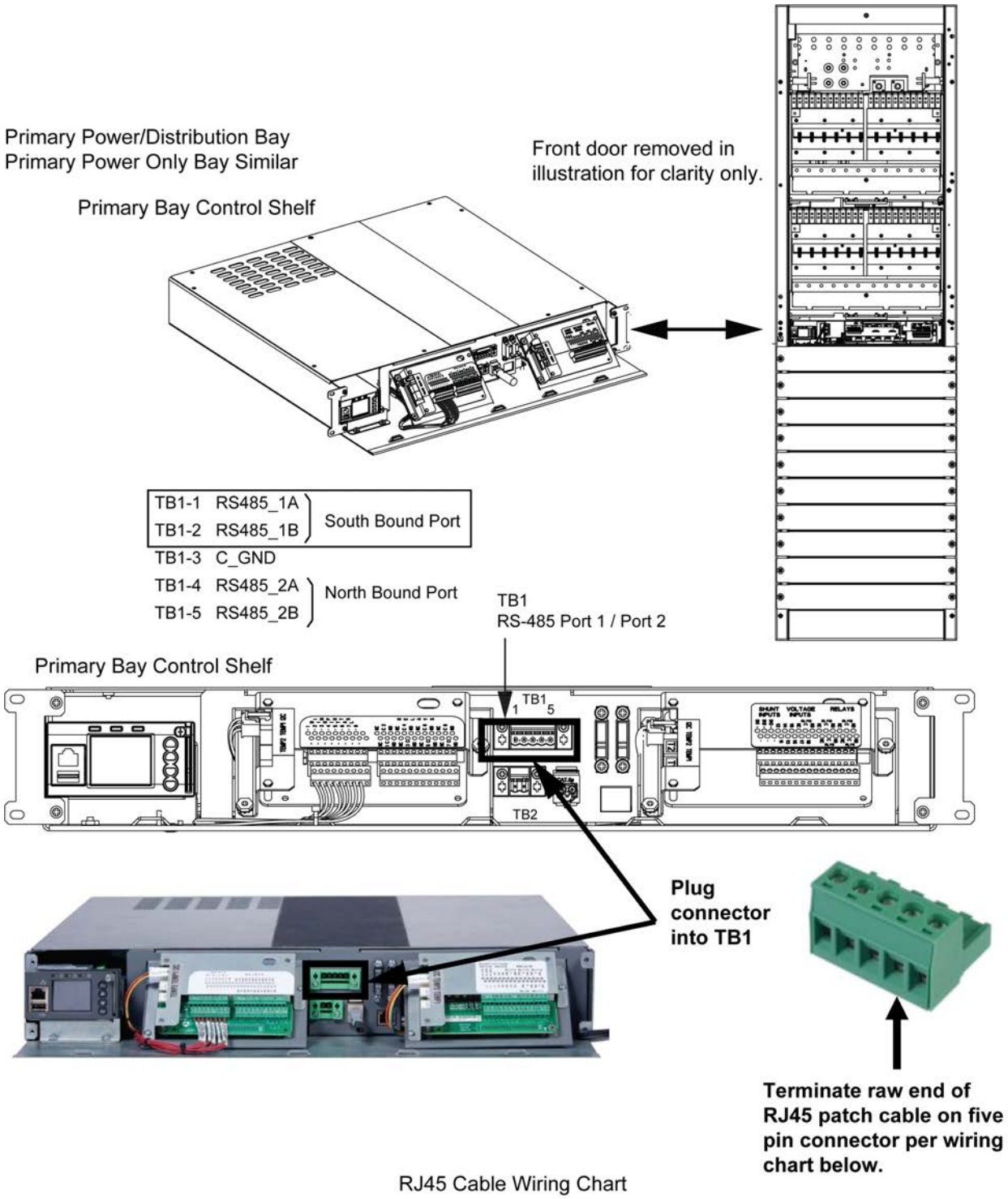

**Terminate raw end of RJ45 patch cable on TB1 per wiring chart below.**

RJ45 Cable Wiring Chart

| Signal | Vertiv™ NetSure™ 7100 System | Narada (RJ45 Plug) | Polarium (RJ45 Plug) |
|---|---|---|---|
| RS485 (+) | TB1-1A | Pin 2 | Pin 4 |
| RS485 (-) | TB1-1B | Pin 3 | Pin 5 |

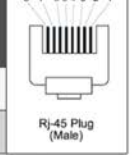


### 3.4.11 Vertiv™ NetSure™ 802 NCU Retrofit and Vertiv™ NetSure™ 8200 (582140000) Modbus Connection Location and Wiring




RJ45 Cable Wiring Chart

| Signal | Vertiv™ NetSure™ 8200 (TB1) | Narada (RJ45 Plug) | Polarium (RJ45 Plug) |
|---|---|---|---|
| RS485 (+) | TB1-1 RS485_1A | Pin 2 | Pin 4 |
| RS485 (-) | TB1-2 RS485_1B | Pin 3 | Pin 5 |



## 3.5 Post Cabling NCU Adjustments

### 3.5.1 Run Auto Config

Note: Auto Config needs to be re-run in the following situations:

If a battery is replaced in the string.

If a battery is removed from the string.

If a battery is added to the string.

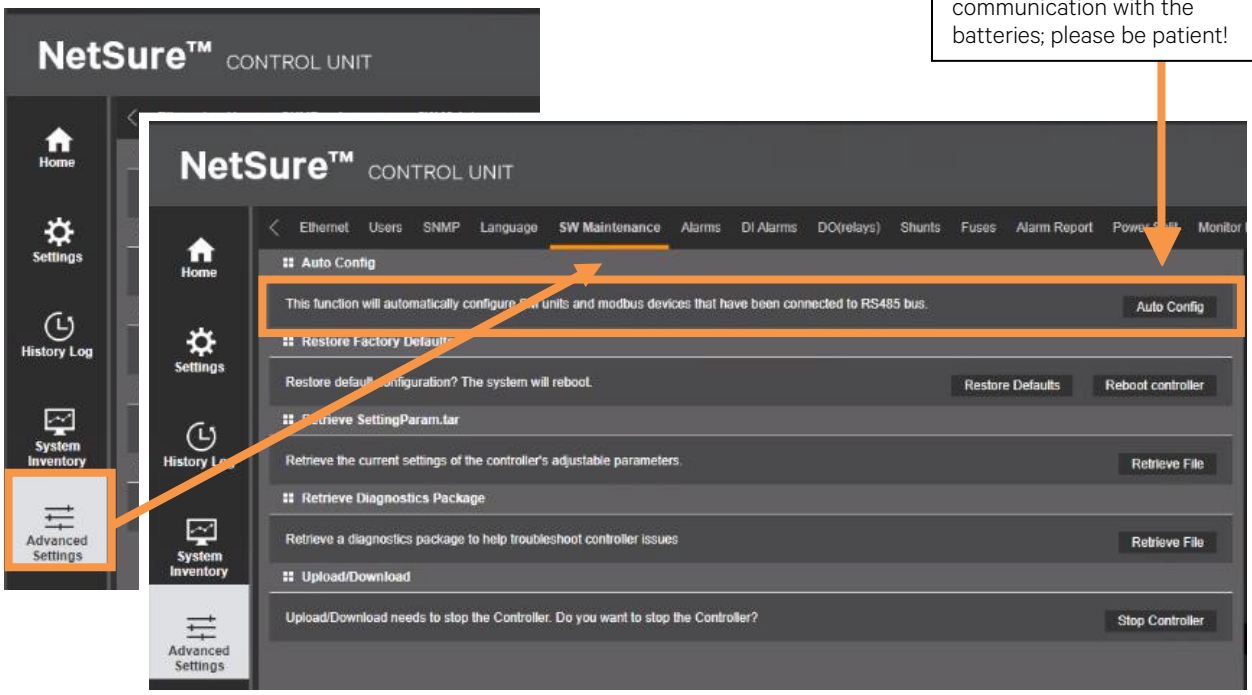
If NCU software is updated.

If the batteries have been turned off / fully discharged and the power plant has lost grid power.

Run 'Auto Config'

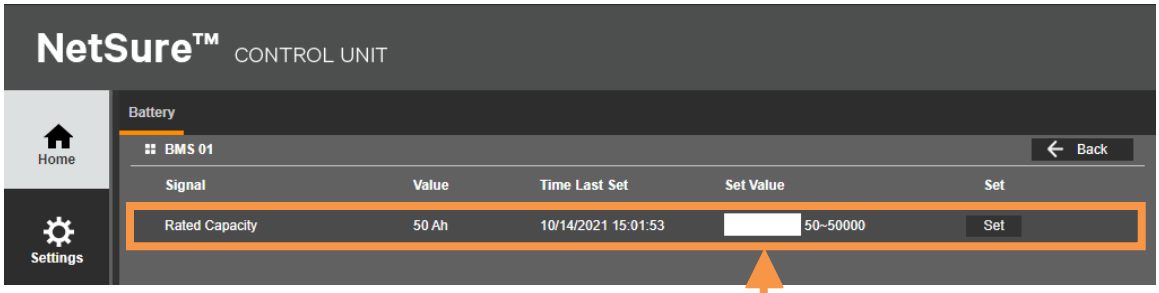
It may take up to eight (8) minutes for the battery icons 'BMS01', 'BMS02', etc. to appear on the battery page AFTER Auto Config is complete and you have logged back into the system.

During this time, there will be no indication on the screen that the NCU is establishing communication with the batteries; please be patient!



### 3.5.2 Enter Battery Ah Rating for Each Battery

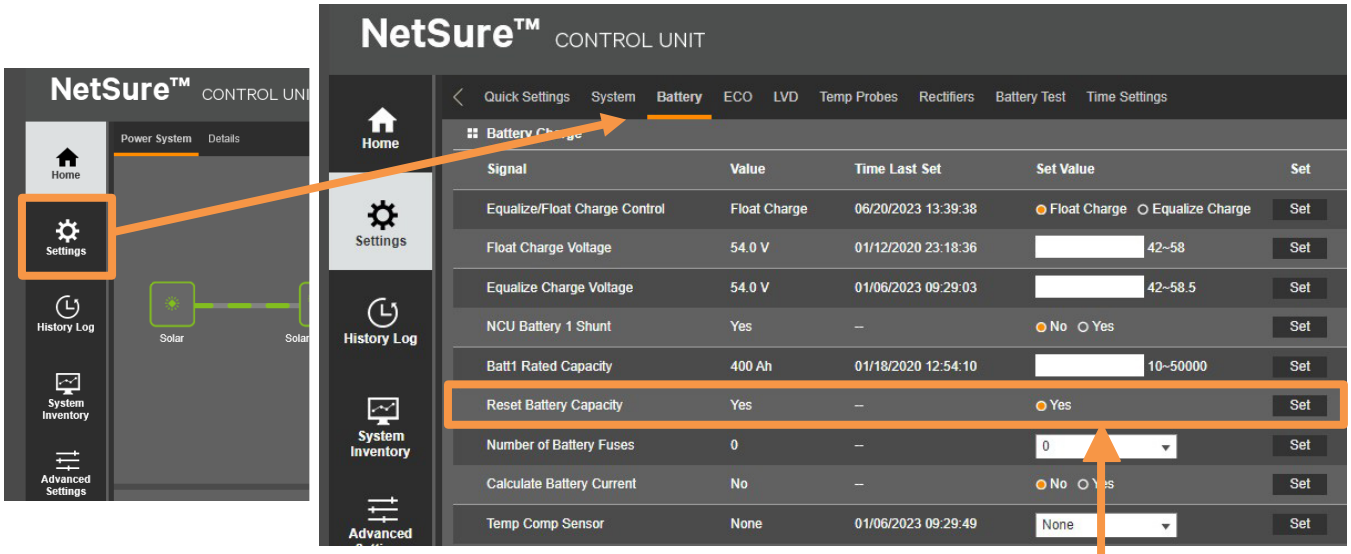

Click on gear icon for each battery.




Enter the Ah rating for each battery in the string – BMS 01, BMS 02, BMS 03, etc.

## 3.6 Calibrate 'Estimated Remaining Time' Gauge *

* Even though some customer specific configurations may not include this gauge, this calibration/reset should still be completed.


After all batteries reach 100% charge,

Set 'Reset Battery Capacity'.

## 3.7 After The Settings Have Been Made...

| | |
|---|---|
| | Wait one to two minutes for changes to be implemented. |
| | Confirm there are no unexpected alarms. |
| | Set-up complete. |

## 3.8 Monitoring Mode Reference Guide

| Monitoring Mode Parameters | Narada | Polarium |
|---|---|---|
| View Detailed BMS Data Locally | Yes (see "Narada Detailed BMS Data via Viewer Software - Screen Shots" starting on page 41.) | Yes (see "Polarium Detailed BMS Data via Studio Software - Screen Shots" starting on page 44.) |
| Battery To Laptop Cable for Local BMS Access | RJ45 to USB Cable (acquire from Narada) | RJ45 to USB Cable (included with battery) |
| View Detailed BMS Data Remotely | No | No |
| View Summary BMS Data Locally and Remotely via NCU | Yes (see "NCU Monitoring Mode Screen Shots for Narada Batteries" starting on page 2.) | Yes (see "NCU Monitoring Mode Screen Shots for Polarium Batteries" starting on page 6.) |
| Battery BMS | Modbus V1.5 or V1.5.2 | Gen 5 battery w/ FW V2021-05-07 |
| NCU Software Version | Min: V1.2.40 / Prefer V1.2.80 (or later) | Min: V1.2.40 / Prefer V1.2.80 (or later) |
| Maximum Devices (batteries + other) Supported by NCU | 16 | 16 |
| Maximum Batteries Supported | 16 | 16 |
| Battery Baud Rate Setting | 9600 (default) | 9600 (needs to be changed from default setting) |
| NetSure™ Power System to Battery Cabling | RJ45 Patch Cable (customer provided) (for Vertiv™ NetSure™ 211, Vertiv™ NetSure™ 502, Vertiv™ NetSure™ 5100 Integrated; Vertiv™ P/N 547674 cable also required.) | RJ45 Patch Cable (customer provided) (for Vertiv™ NetSure™ 211, Vertiv™ NetSure™ 502, Vertiv™ NetSure™ 5100 Integrated; Vertiv™ P/N 547674 cable also required.) |
| Inter-Battery Communications Cabling | RJ45 Patch Cable (customer provided) | RJ45 Patch Cable (included with battery) |
| Last Battery Communication Port Termination | RJ45 Patch Cable (customer provided) | Terminator Plug (included with battery) |

# 4 Appendix - Battery Management System (BMS) Access Overview

In some situations, access to the data contained in the Battery Management System (BMS) may be required. This section provides screen shots of the type of data that can be viewed along with what cables and software are required. to gain access.

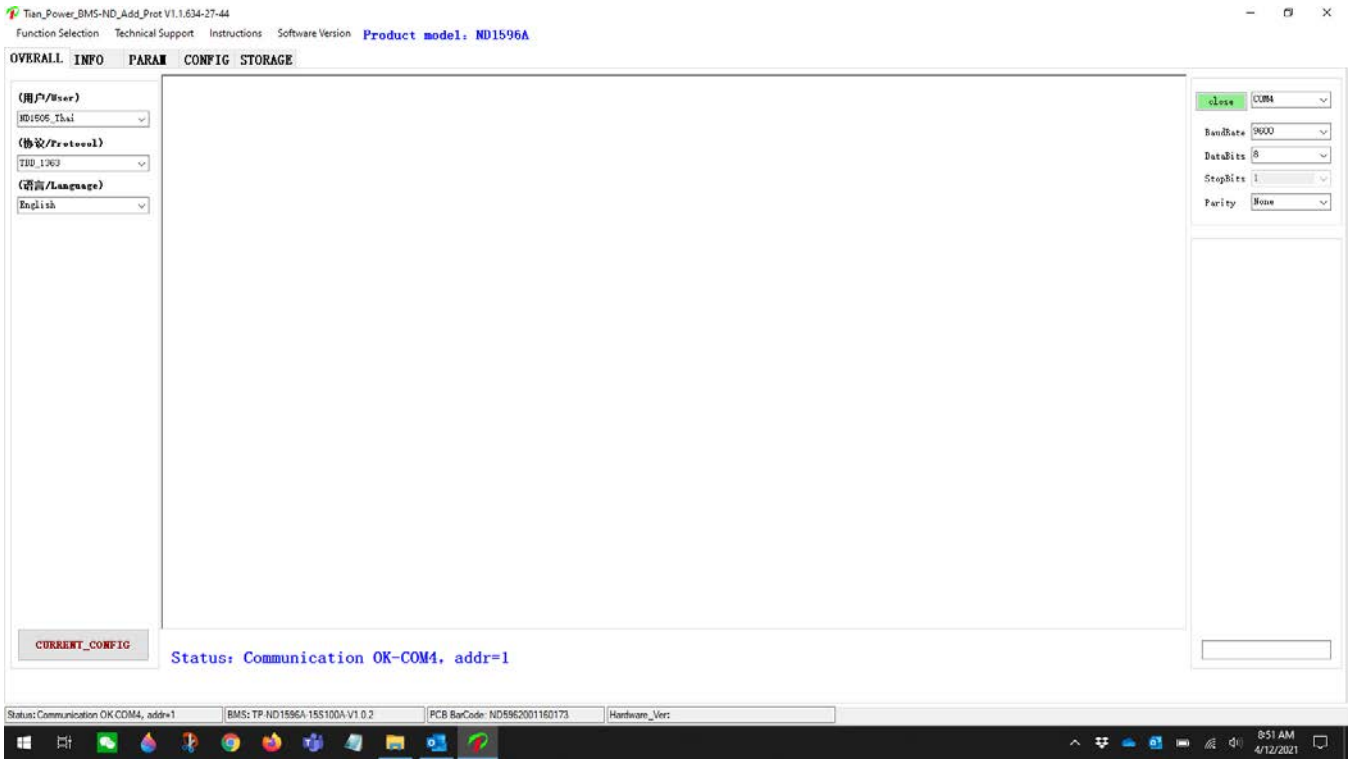
## 4.1 Narada Detailed BMS Data via Viewer Software - Screen Shots

Data can only be viewed locally.

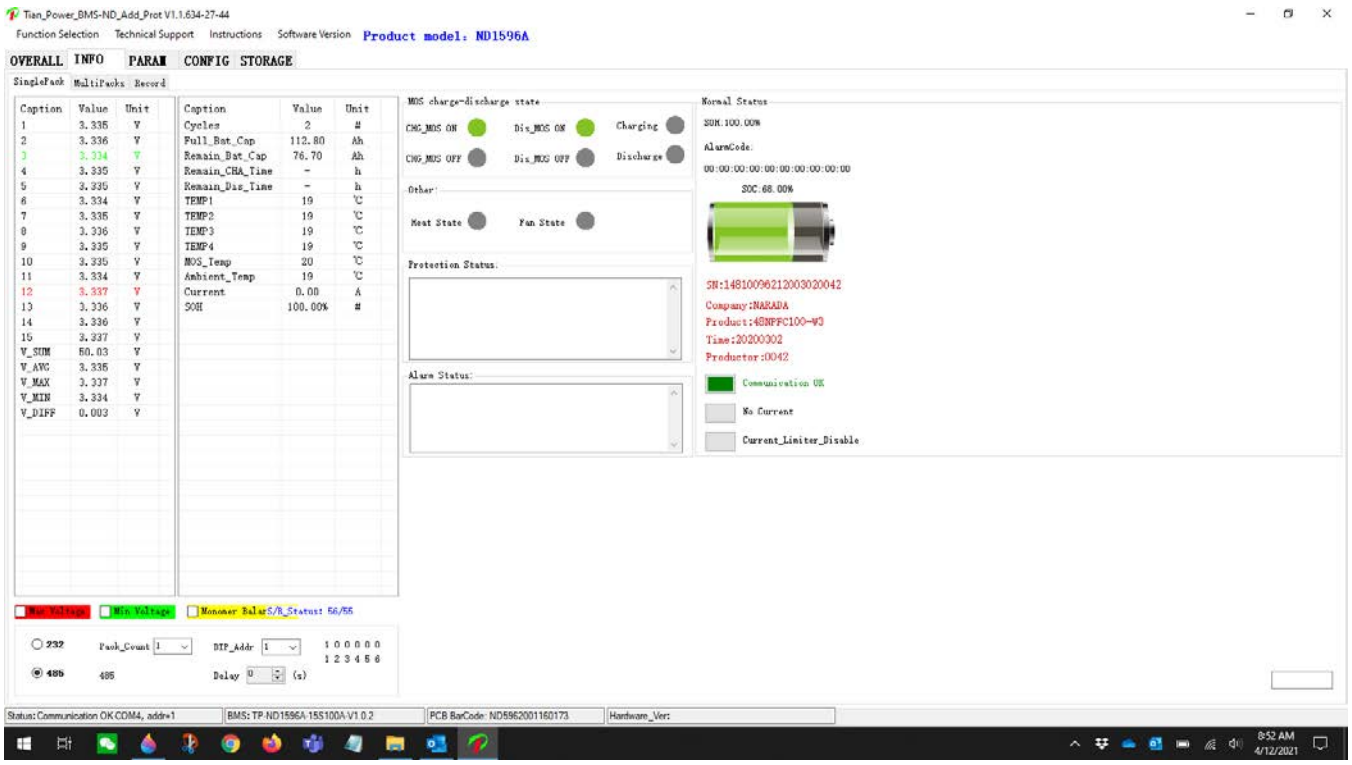
Narada Viewer Software required

Narada Communication Cables required (Narada P/N 31120200011 and 31120100032).

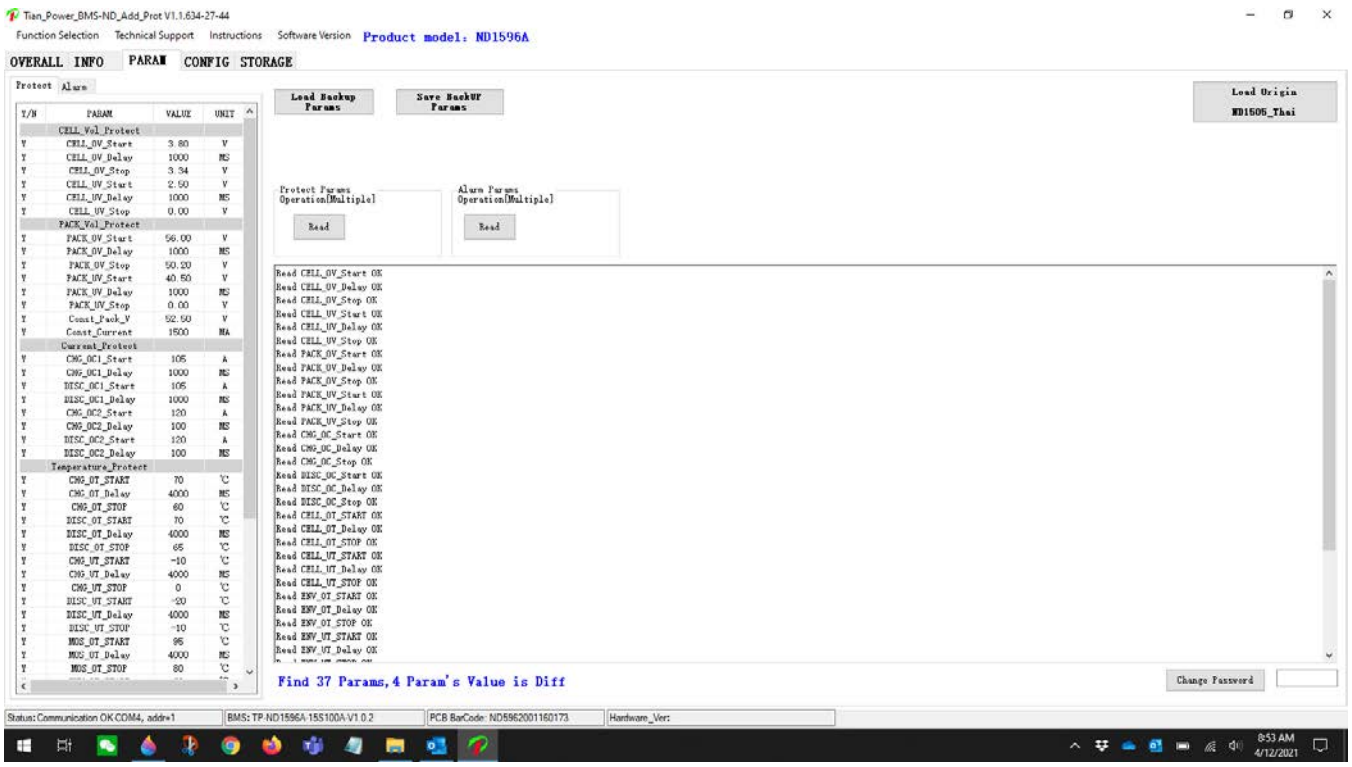
### Battery Connection Settings



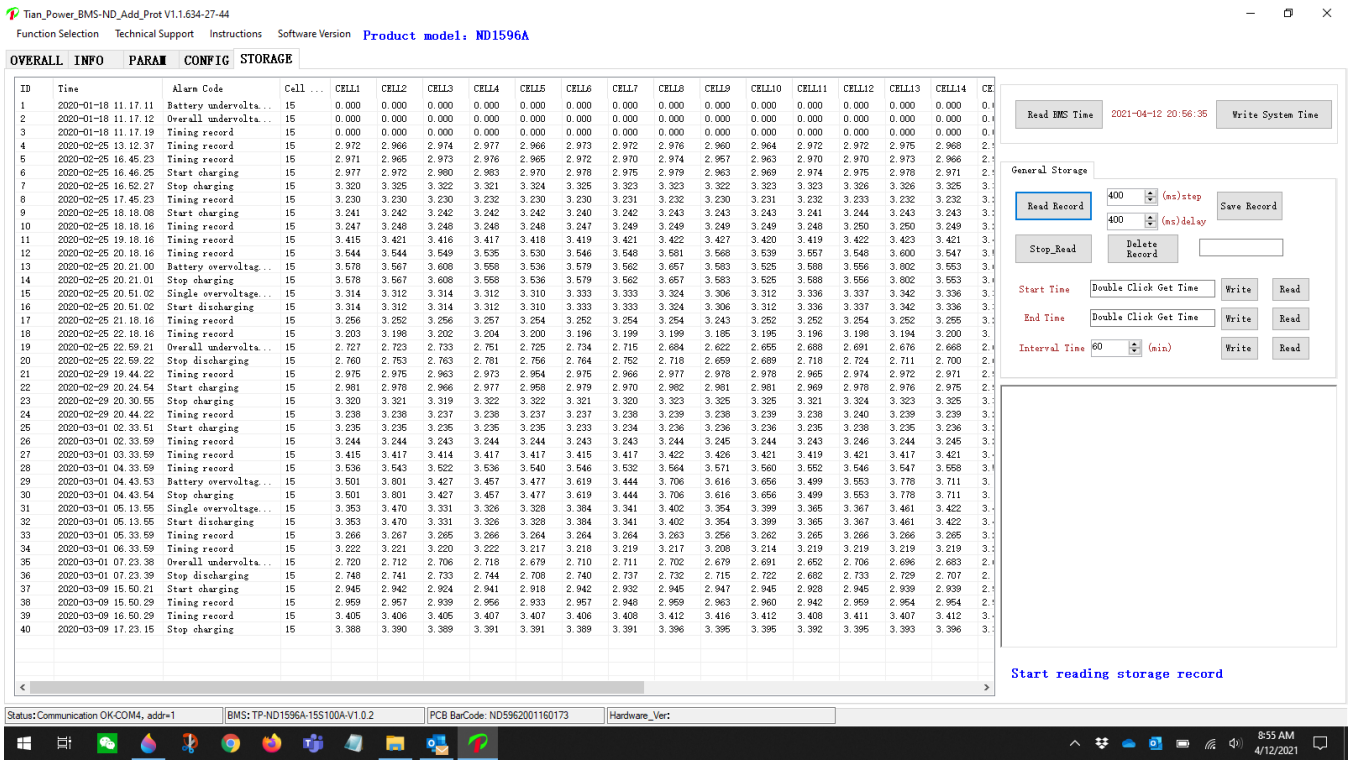
## Battery Dashboard




## Battery Details



## Battery Data Logging/Reporting



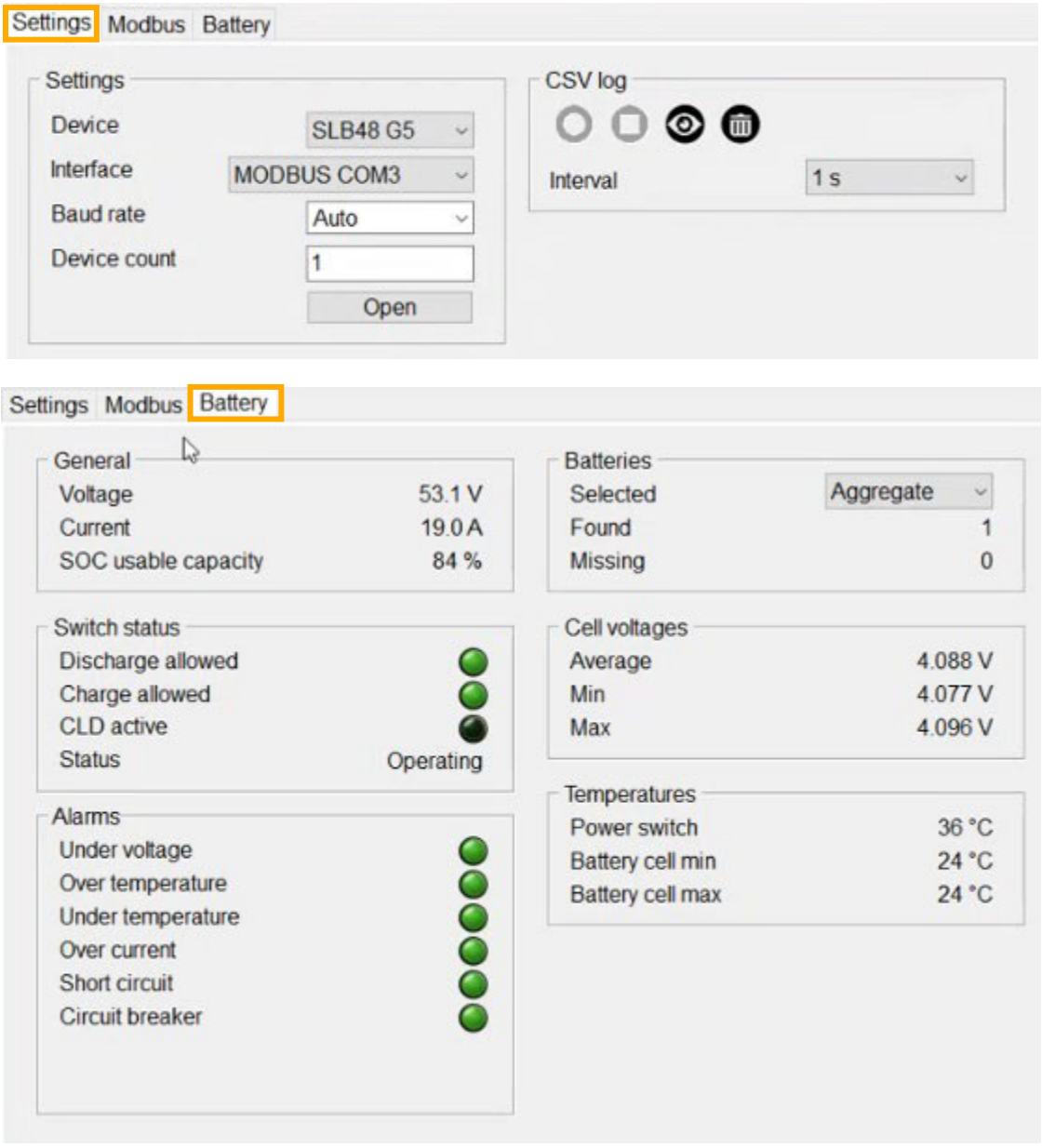
## 4.2 Polarium Detailed BMS Data via Studio Software - Screen Shots

Data can only be viewed locally.

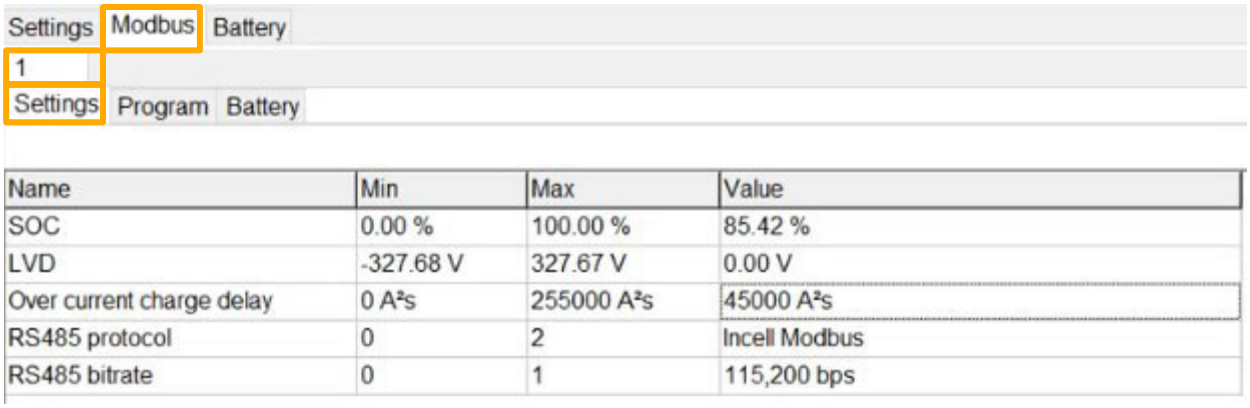
Polarium Studio Software required.

Polarium Modbus Communication Cable required (Polarium P/N 105-00006 - Vertiv™ P/N 10020692).

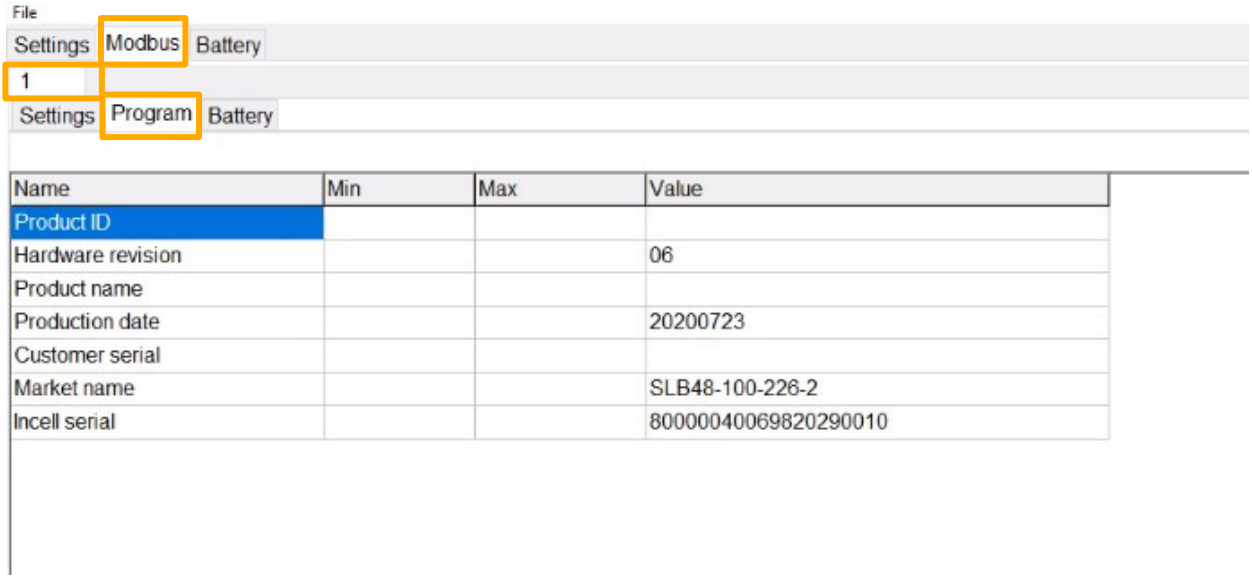
### BMS Connection Settings and Battery String Dashboard



## Battery Product Information, Dashboard and Details




| Name | Min | Max | Value |
|---|---|---|---|
| SOC | 0.00 % | 100.00 % | 85.42 % |
| LVD | -327.68 V | 327.67 V | 0.00 V |
| Over current charge delay | 0 A²s | 255000 A²s | 45000 A²s |
| RS485 protocol | 0 | 2 | Incell Modbus |
| RS485 bitrate | 0 | 1 | 115,200 bps |




| Name | Min | Max | Value |
|---|---|---|---|
| Product ID | | | |
| Hardware revision | | | 06 |
| Product name | | | |
| Production date | | | 20200723 |
| Customer serial | | | |
| Market name | | | SLB48-100-226-2 |
| Incell serial | | | 80000040069820290010 |


| Name | Min | Max | Value |
|---|---|---|---|
| SOC | | | 89.84 % |
| Capacity | | | 209.89 Ah |
| Battery voltage | | | 51.96 V |
| Rail voltage | | | 51.61 V |
| Current | | | -98.49 A |
| Min cell voltage | | | 3.942 V |
| Max cell voltage | | | 4.021 V |
| Min cell temp | | | 22.1 °C |
| Max cell temp | | | 22.7 °C |
| FET temp | | | 57.3 °C |
| Model | | | SLB48-210-1-21700 |

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