NetSure™ 801 Series NCU Retrofit Kit

User Manual

Kit Specification Number: 60172578
For Use in Spec. No. 582140001 Power System (Model 801NLEB (List 01, 02, 04, 05, 06), Model 801NLDB (List 04, 05))
Kit Specification Number: 60175008
For Use in Spec. No. 582140001 Power System (Model 801NLEB (List 09, 10, 12, 13, 14), Model 801NLDB (List 12, 13, 14))
Kit Specification Number: 566156_NS801
For use in Spec. No. 582140001 Power System (List 16 distribution only bay)

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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/support/ for additional assistance.

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Admonishments Used in this Document

DANGER! Warns of a hazard the reader ***will*** be exposed to that will ***likely*** result in death or serious injury if not avoided. (ANSI, OSHA)

WARNING! Warns of a potential hazard the reader ***may*** be exposed to that ***could*** result in death or serious injury if not avoided. This admonition is not used for situations that pose a risk only to equipment, software, data, or service. (ANSI)

CAUTION! Warns of a potential hazard the reader ***may*** be exposed to that ***could*** result in minor or moderate injury if not avoided. (ANSI, OSHA) This admonition is not used for situations that pose a risk only to equipment, data, or service, even if such use appears to be permitted in some of the applicable standards. (OSHA)

ALERT! Alerts the reader to an action that ***must be avoided*** in order to protect equipment, software, data, or service. (ISO)

ALERT! Alerts the reader to an action that ***must be performed*** in order to prevent equipment damage, software corruption, data loss, or service interruption. (ISO)

FIRE SAFETY! Informs the reader of fire safety information, reminders, precautions, or policies, or of the locations of fire-fighting and fire-safety equipment. (ISO)

SAFETY! Informs the reader of general safety information, reminders, precautions, or policies not related to a particular source of hazard or to fire safety. (ISO, ANSI, OSHA)

Important Safety Instructions

Safety Admonishments Definitions

Definitions of the safety admonishments used in this document are listed under “Admonishments Used in this Document” on page iv.

Safety and Regulatory Statements

Refer to Section 4154 (provided with your customer documentation) for Safety and Regulatory Statements.

Déclarations de Sécurité et de Réglementation

Reportez-vous à la Section 4154 (fourni avec les documents de votre client) pour les déclarations de sécurité et de réglementation.

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1 Description

This document (UM60172578) provides User Instructions for Vertiv™ NetSure™ 801 Series NCU Retrofit Kit, Spec. Nos. 60172578, 60175008, and 566156_NS801. Refer to the corresponding Retrofit Kit Installation Instructions (IM60172578, IM60175008, IM566156_NS801) for installation instructions.

Refer to Table 1.1 for list of replacement parts.

Table 1.1 Replacement Parts

P/N	Description	Qty.
60172578	Main Bay NCU Retrofit Kit, NS801 System	1
60175008	Supplemental Bay Retrofit Kit, NS801 System	1
566156_NS801	Distribution Only Bay Retrofit Kit, NS801 System	1
1M830BNA565806	NCU Controller	1
10146319	IB5 Second Ethernet Port Board	1
SXK2300238/1	Backplane, Assembly, EIB Board Kit	1
SXK2300129/1	Assembly, IB2 Board, with Cover	1
10180008	Assembly, M241S W/ CIB1, For NS801 Retrofit Kits	1
152049	Power Converter, 20W, 48V/12V	1
565309	CAN Power Assembly Board	1
566196	Assembly, Raspberry PI W/ Micro SD, NS8200	1
152045	Display, 10.1#, Touchscreen	1
ROA1190937/1	SMDUE Board	1

2 Physical Security

This product is designed and intended to be deployed and operated in a physically secure and network firewall-protected location. Vertiv recommends a review of the physical security and operating environment of the unit. Since an attacker or disgruntled user can cause serious disruption, below are some recommended best practices that include, but are not limited to:

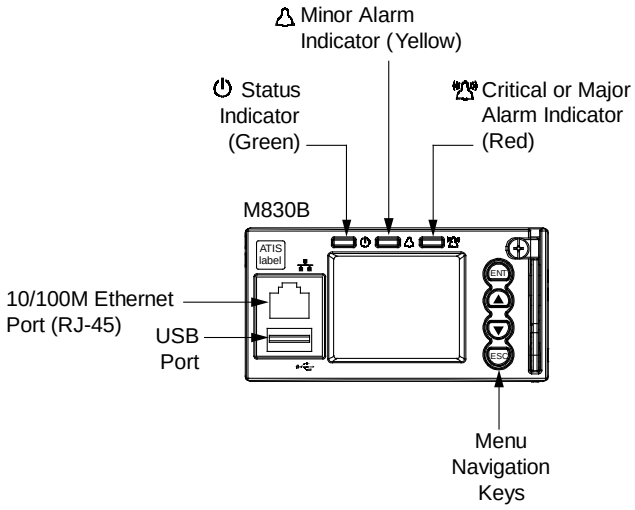
- Restrict access to areas, racks, and units with encrypted card RFID/badges, unique multi-factor passcode authentication for access, man traps, and biometric scanners for physical access to the equipment.
- Have trusted and background-checked security guards with 24x7x365 physical presence and written logs to help document and note physical access to a data center, building, rack, and so on.
- Restrict physical access to telecommunications equipment and network cabling. Physical access to the telecommunications lines and network cabling should be restricted to protect against attempts to intercept or sabotage communications. Best practices include use of metal conduits for the network cabling running between equipment cabinets.
- All USB, RJ45, and/or any other physical ports should be restricted on the units.
- Do not connect removable media (such as USB devices, SD cards, and so on) for any operation (such as firmware upgrade, configuration change, or boot application change) unless the origin of media is known and trusted. Before connecting any portable device through a USB port or SD card slot, scan the device for malware and viruses.

3 Configuring the System

3.1 NCU Controller Initialization

Refer to the NCU Instructions (UM1M830BNA) for detailed instructions.

Figure 3.1 NCU Local Indicators and Navigation Keys

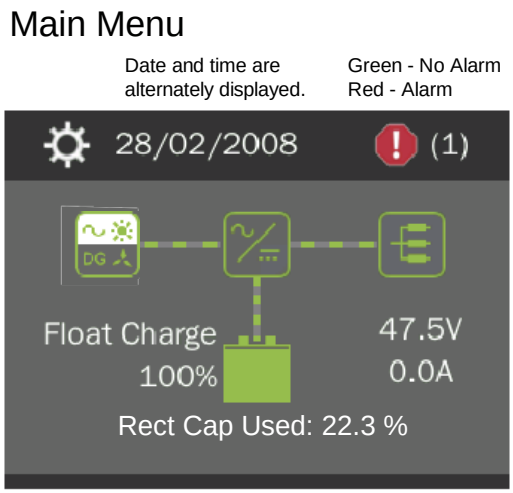


Procedure

NOTE! *The initialization routine takes several minutes. During that time various alarm indicators may illuminate on the NCU front panel and an audible alarm may sound. Disregard all alarms. An audible alarm can be silenced at any time by momentarily depressing any key on the NCU Controller.*

1. After the NCU is powered on, the display shows the "logo" screen. The controller is initializing.
2. When initialization is complete, the language screen appears. Press the up or down arrow key to select the desired language. Press the ENT key to confirm the selection.

Figure 3.2 NCU Local Display Main Menu



Graphics	Menu Name	Description
	Alarm (Green - No Alarm) (Red - Alarm)	View active alarms and alarm history.
	Settings	Gain access to the NCU Controller's settings menus.
	Input Power	View AC, Solar, DG, and Wind related information.
	Module	View rectifier, solar converter, and converter module related information.
	DC	View DC equipments related information.
	Battery	View battery related information.

NOTE! *"Rect Cap Used" is based on the number of installed rectifiers and solar converters (if furnished).*

3. System information is displayed in multiple screens. Press the ESC key to view other system information. Press the down arrow key to view the next screen. Press the ESC key to return to the Main Menu.
4. From the Main Menu, press the UP and DOWN keys to highlight the desired Menu graphic in the Main Menu. Press the ENT key to enter the selected menu.

NOTE! *Repeatedly press the "ESC" key to return in reverse order level by level from any submenu until the Main Menu appears.*

5. Refer to the following procedures to verify and set the NCU controller as required for your application.

3.2 Verifying and Setting the NCU Controller as Required for Your Application

Refer to the MCA settings recorded at the beginning of the installation procedure. The NCU web interface will be used to make adjustments as needed. Refer to the NCU Instructions (UM1M830BNA) for procedures.

Note that you will have to program the NCU for any temperature probes and external inputs/outputs connected to the IB2 board, optional EIB board, and optional SM-DU+ Shunt Interface Board.

Refer also to "NCU Start Wizard" on page 4.

NOTE! *When setting total rectifier or total converter current limit, the set point to each unit is the total set point divided by the number of units. For example, if the system contains five rectifiers and the current limit is set to 150 amps then each rectifier has a current limit set point of 30 amps. If one or more rectifiers or converters are removed or fail it will take several seconds for the individual set points to the remaining rectifiers or converters to be reset. In the example given, if one rectifier is removed the current limit set point will drop to 120 amps (30 amps times four remaining rectifiers) until the controller can send updated set points to the remaining rectifiers. This takes a couple communication cycles (several seconds) after which each rectifier would have a new set point of 37.5 amps for a total of 150 amps. The total current limit of the rectifiers and converters should not be set such that the loss of the redundant rectifiers or converters will cause this temporary set point to drop below the actual maximum expected load. If batteries are used on the rectifier output, the batteries should support the load until the current limit set points can be re-established due to loss of a rectifier.*

NCU Start Wizard

For initial startup, you can perform the Start Wizard from the local keypad and display to enter basic programmable parameters in one session. Refer to the "Start Wizard" section in the NCU Instructions (UM1M830BNA).

Verifying the Configuration File

Your NCU was programmed with a configuration file that sets all adjustable parameters. The version number of the configuration file can be found on the configuration drawing (C-drawing) that is supplied with your controller documentation, and on a label located on the NCU. You can verify that the correct configuration file has been loaded into your NCU by performing the following procedure.

NOTE! *The quantity of LVD's and shunt values for your specific system may be different from the values shown on the C-drawing.*

Procedure

1. With the Main Menu displayed, press ESC. A screen displays the NCU name, serial number, IP number, software version, hardware version, and configuration version number.
2. Press ESC to return to the Main Menu.

Checking Basic System Settings

Navigate through the controller menus and submenus to check system settings. You can adjust any parameter as required. Note that these settings can also be checked (and changed if required) via the WEB Interface. Refer also to "NCU Start Wizard" on page 4.

NOTE! *Repeatedly press the "ESC" key to return in reverse order level by level from any submenu until the Main Menu appears.*

Procedure

1. To Select a Sub-Menu:
   Press the UP and DOWN keys to highlight the desired sub-menu. Press the ENT key to enter the selected sub-menu.
2. To Select a User:
   To select a User, use the UP and DOWN keys to move the cursor to the Select User field. Press ENT. Use the UP and DOWN keys to select a User previously programmed into the NCU. Press ENT to select the User. Note that only Users programmed into the NCU are shown. Users are programmed via the Web Interface. The default User is admin.
3. To Enter a Password:
   To enter a password, use the UP and DOWN keys to move the cursor to the Enter Password field. Press ENT. Use the UP and DOWN keys to choose a character. Press ENT to accept and move to the next character. Continue this process until all characters are entered. Press ENT again to accept the password. The default password is 640275.

4. To Change a Parameter:
   Press the UP and DOWN keys to move up and down the list of parameters. Press ENT to select the parameter. Press the UP and DOWN keys to change the parameter. Press ENT to make the change. Press ESC to cancel the change.

5. Table 3.1 shows the menu navigation for some basic settings. Refer to the separate NCU Manual (UM1M830BNA) supplied with your power system for complete Local Display menus.

NOTE! *When a List 5 is cabled to the main battery term bars in the List 1, the battery shunt should be turned off and "Calculate Battery Current" can be turned on.*

NOTE! *If an NCU configuration is furnished that enables NCU capability to receive status information sent from Fiamm SoNick (Sodium Nickel) batteries, some NCU parameters cannot be changed. Refer to the NCU controller manual UM1M830BNA for details.*

Table 3.1 NCU Basic Settings Local Display Menu Navigation

Parameter	Menu Navigation
Date	Main Menu / Settings Icon / Sys Settings / Date.
Time	Main Menu / Settings Icon / Sys Settings / Time.
IP Communications Parameters (IP address, subnet mask address, gateway address)	Main Menu / Settings Icon / Comm Settings / enter parameters.
Float Voltage	Main Menu / Settings Icon / Batt Settings / Charge / Float Voltage.
Equalize Voltage	Main Menu / Settings Icon / Batt Settings / Charge / EQ Voltage.
Battery Current Limit	Main Menu / Settings Icon / Batt Settings / Charge / Curr Limit Mode and Batt Curr Limit.
Battery Capacity	Main Menu / Settings Icon / Batt Settings / Batt1 Settings or Batt2 Settings / Rated Capacity.
Reset Battery Capacity	Main Menu / Settings Icon / Batt Settings / Basic Settings / Reset Batt Cap
BTRM Feature	**Web Menu Navigation Only:** Settings Menu / Battery Tab.
Battery Charge Temperature Compensation	Main Menu / Settings Icon / Batt Settings / Temp Comp (enter parameters).
HVSD Limit	**Web Menu Navigation Only:** Settings Menu / Rectifiers Tab / HVSD (set to enabled) then set HVSD Limit.
Rectifier Current Limit	Main Menu / Settings Icon / Rect Settings / Current Limit (set to enabled) then set Curr Limit Pt.
Over Voltage Alarm 1	Main Menu / Settings Icon / Other Settings / Over Voltage 1.
Over Voltage Alarm 2	Main Menu / Settings Icon / Other Settings / Over Voltage 2.
Under Voltage Alarm 1	Main Menu / Settings Icon / Other Settings / Under Voltage 1.
Under Voltage Alarm 2	Main Menu / Settings Icon / Other Settings / Under Voltage 2.

Changing Battery Capacity Rating in the NCU

1. Change the battery capacity setting of the NCU to match the battery connected to the power system.

NOTE! *After setting the battery capacity, the User should also reset the battery capacity (battery must be fully charged).*

Local Menu Navigation:
Main Menu / Settings Icon / Batt Settings / Batt1 Settings or Batt2 Settings / Rated Capacity.

Web Menu Navigation:
Settings Menu / Battery Tab / Batt1 Rated Capacity and Batt2 Rated Capacity.

2. Reset the battery capacity (resets the battery capacity calculation).

NOTE! *Only reset the battery capacity when the battery is fully charged; otherwise, the battery charge status may not be accurate.*

Local Menu Navigation:
Main Menu / Settings Icon / Batt Settings / Basic Settings / Reset Batt Cap.

Web Menu Navigation:
Settings Menu / Battery Tab / Reset Battery Capacity.

Refer to the NCU Instructions (UM1M830BNA) for detailed instructions.

Configuring the NCU Identification of Rectifiers and Assigning which Input Feed is Connected to the Rectifiers (optional)

When rectifiers are all installed prior to applying power and starting the system, the order in which the NCU identifies the rectifiers is by serial number (lowest serial number is Rect 1, next lowest is Rect 2, etc.). If you prefer the NCU to identify the rectifiers by position in the system, perform the following procedure.

Upon power up, the NCU arbitrarily assigns Feed V1, V2, or V3 to each rectifier. This assignment is used to display rectifier AC input feed voltage(s). The User may reassign the feed to each rectifier per your specific installation by following the procedure below.

Local Menu Navigation:
None.

Web Menu Navigation:
Refer to the NCU Instructions (UM1M830BNA) for detailed instructions.

Configuring the NCU Identification of Converters

When converters are all installed prior to applying power and starting the system, the order in which the NCU identifies the converters is by serial number (lowest serial number is Conv 1, next lowest is Conv 2, etc.). If you prefer the NCU to identify the converters by position in the system, perform the following procedure.

Local Menu Navigation:
None.

Web Menu Navigation:
Refer to the NCU Instructions (UM1M830BNA) for detailed instructions.

NCU Alarm Relay Check

To verify operation of the external alarm relays, use the NCU alarm relay test feature. Refer to the NCU Instructions (UM1M830BNA) for instructions in using this feature.

NOTE! *The relays may be preprogrammed for specific functions. Refer to the configuration drawing (C-drawing) supplied with your system for your system's specific configuration.*

3.3 Programming the Controller for any NetSure 801 Supplemental and Distribution Only Bays

Procedure

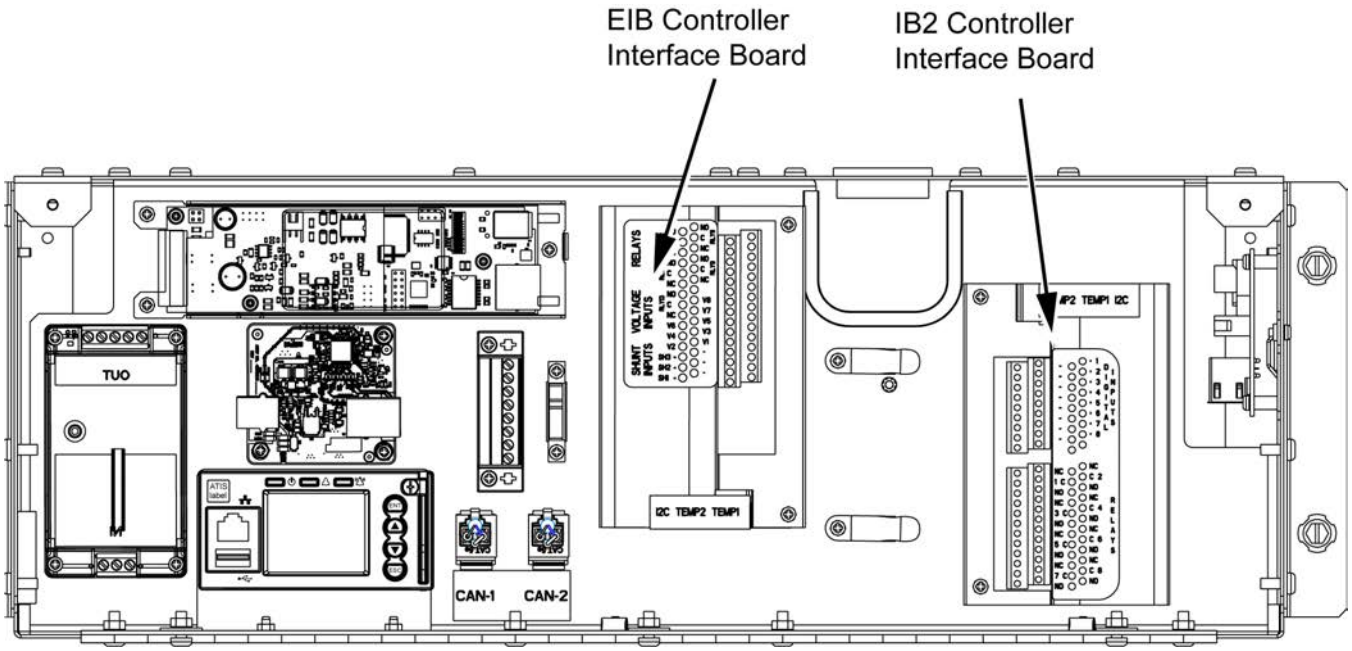
Supplied with the NetSure 801 main and supplemental bays is a USB drive which contains the product documentation along with a document file that provides a listing of the SM-DUE settings required for that particular supplemental bay. Refer to this document file (chart) and program the SM-DUE settings in the controller with the specific values listed in the chart. Refer to the NCU Instructions (UM1M830BNA) for programming details. There are also labels located near the SM-DUE in the supplemental bay that detail the controller's settings for this bay.

Once the controller has been programmed for the newly installed supplemental bay, refer to the NCU Instructions (UM1M830BNA) and save a copy of the "SettingParam.tar" file.

4 External Alarm, Reference, Monitoring, and Control Connections

4.1 Circuit Card Locations

Figure 4.1 Circuit Card Locations (Main Bay)



4.2 IB2 (Controller Interface Board) Connections (if required) (Main Bay Only)

NOTE! *The system includes one (1) IB2 board.*

NOTE! *The alarm relay wiring previously disconnected (if applicable) will be reconnected to the IB2 card and/or EIB card provided with the retrofit.*

The IB2 board provides connection points for digital inputs, programmable relay outputs, and temperature probes.

Digital Inputs and Programmable Relay Outputs

Digital input and relay output leads are connected to screw-type terminal blocks located on IB2. Recommended torque for these connections is 2.2 in-lbs. Refer to Figure 4.2 for terminal locations. Refer to Table 4.1 and Table 4.2 for pin-out information.

Digital Inputs

Connect up to eight (8) digital inputs to IB2. Note that you must supply both paths for the digital input (either a positive or negative signal and the opposite polarity return path). Observe proper polarity. Refer to Figure 4.2 for terminal locations and Table 4.1 for pin-out information.

NOTE! *For the NetSure 801 system, -48V is factory wired to all eight (8) Digital Input (-) terminals for your convenience and function predefined for ESTOP. Customer-furnished system return (0V potential) applied to terminal Digital Input #8 (+) activates the ESTOP function.*

The digital inputs can be programmed to provide an alarm when the signal is applied (HIGH) or removed (LOW). Refer to the NCU Instructions (UM1M830BNA) for programming information.

Digital Input Ratings: Refer to the following.

a) Maximum Voltage Rating: 60V DC.

a) Active High: > 19V DC.

b) Active Low: < 1V DC.

The digital inputs may be preprogrammed for specific functions. Refer to the configuration drawing (C-drawing) supplied with your system for your system's specific configuration.

Power System ESTOP Function

The ESTOP function shuts down and locks out the rectifiers, shuts down and locks out the optional converters, and opens the optional low voltage disconnect (LVD) contactors (battery and load type). If the system has battery connected and does not contain a battery LVD or the controller power option is set to Battery Pwr, the controller will remain operational. If the system does not contain battery or load LVD(s) and has battery connected, the loads will be sustained by the battery voltage.

For Systems NOT Containing a Battery LVD: When the ESTOP signal is removed, LVD contactors (battery and load type) will close after the "LVD Reconnect Delay" has elapsed (customer configurable via the controller) if battery voltage is present on the bus. Rectifiers and optional converters will remain off. The rectifiers will restart when the input power is removed and restored after 30 seconds or more (until the LEDs on the modules extinguish). To restart the converters: remove the converter, wait 30 seconds or more (until the LEDs on the converter extinguish), then re-insert the converter.

For Systems Containing a Battery LVD: When the ESTOP signal is removed, LVD contactors (battery and load type) will remain open. Rectifiers and optional converters will remain off. The rectifiers will restart when the input power is removed and restored after 30 seconds or more (until the LEDs on the modules extinguish). When the rectifiers restart, LVD contactors (battery and load type) will close, and the converters will restart.

NOTE! *If a customer-furnished method to disconnect the input power to the system is not provided, the rectifiers will stay locked OFF until the input power is recycled. If the ESTOP signal is removed without recycling the input power, the rectifiers will remain off and have a local alarm visible on the module. The ESTOP alarm from the controller will extinguish. The controller will not issue an alarm for this condition.*

Programmable Relay Outputs

The IB2 provides eight (8) programmable alarm relays with dry Form-C contacts. Connect up to eight (8) relay outputs to IB2. Refer to Figure 4.2 for terminal locations and Table 4.2 for pin-out information.

NOTE! *The relay assigned to "Critical Summary" alarm (Relay 1 on first IB2 by default) will operate in the "Fail Safe Mode". "Fail Safe Mode" means Relay 1 is de-energized during an alarm condition, opening the contacts between the C and NO terminals, and closing the contacts between the C and NC terminals.*

The remaining 7 relays energize during an alarm condition, closing the contacts between the C and NO terminals, and opening the contacts between the C and NC terminals.

Refer to the NCU Instructions (UM1M830BNA) for programming information.

Relay Ratings: Refer to the following:

a) Steady State : 0.5A @ 60V DC; 1.0A @ 30V DC.

b) Peak : 3A @ 30V DC.

The relays may be preprogrammed for specific functions. Refer to the configuration drawing (C-drawing) supplied with your system for your system's specific configuration.

Temperature Probes

NOTE! *Each temperature probe consists of two or three pieces that plug together to make a complete probe. See SAG582127000 for part numbers and descriptions.*

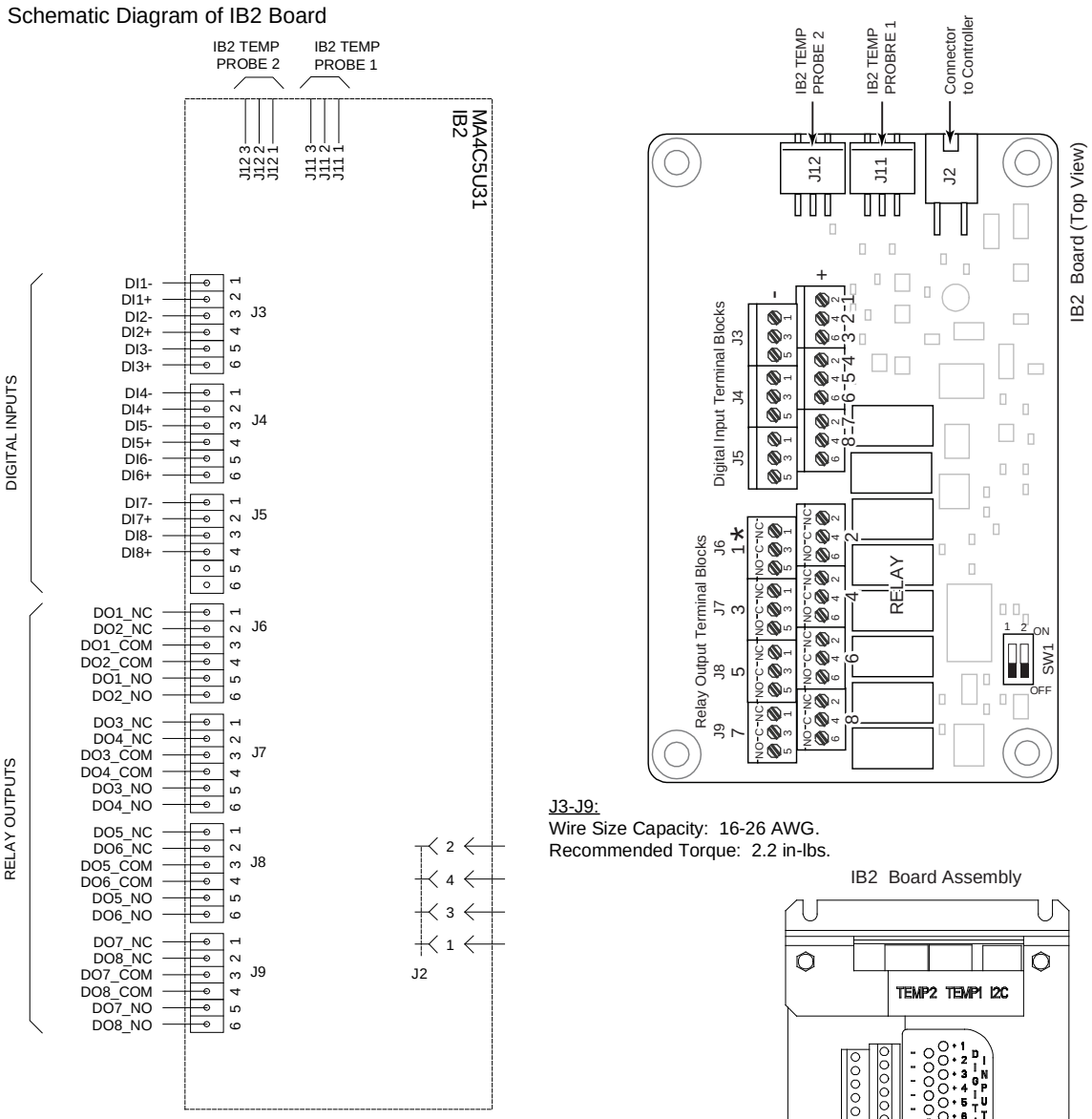
Temperature probes can be connected to IB2 board and/or EIB board mounted inside the distribution cabinet. See Figure 4.2 and Figure 4.4.

The IB2 and EIB boards each allow for the connection of two (2) temperature probes. Any combination of the temperature probes can be programmed to monitor ambient temperature and/or battery temperature. A temperature probe set to monitor battery temperature can also be used for the rectifier battery charge temperature compensation feature, or the battery charge temperature compensation feature can be programmed to use the average or highest value of all battery temperature probes. The battery charge temperature compensation feature allows the controller to automatically increase or decrease the output voltage of the system to maintain battery float current as battery temperature decreases or increases, respectively. Battery life can be extended when an optimum charge voltage to the battery with respect to temperature is maintained. A temperature probe set to monitor battery temperature can also be used for the BTRM (Battery Thermal Runaway Management) feature. The BTRM feature lowers output voltage when a high temperature condition exists to control against battery thermal runaway.

The temperature sensor end of the probe contains a tab with a 5/16" clearance hole for mounting.

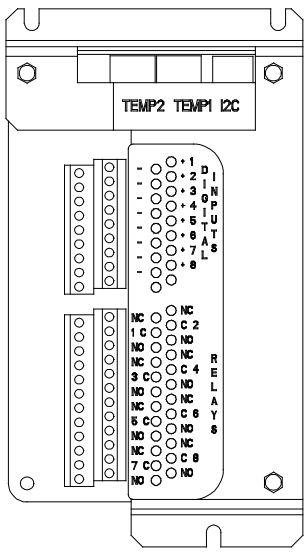
A temperature probe programmed to monitor battery temperature should be mounted on the negative post of a battery cell to sense battery temperature. A temperature probe used for battery charge temperature compensation and/or BTRM (Battery Thermal Runaway Management) should also be mounted on the negative post of a battery cell. A temperature probe programmed to monitor ambient temperature should be mounted in a convenient location, away from direct sources of heat or cold.

Figure 4.2 IB2-1 and IB2-2 Board Connections



J3-J9:
Wire Size Capacity: 16-26 AWG.
Recommended Torque: 2.2 in-lbs.

IB2 Board Assembly



* The relay assigned to “Critical Summary” alarm (Relay 1 on first IB2 by default) will operate in the “Fail Safe Mode”. “Fail Safe Mode” means Relay 1 is de-energized during an alarm condition, opening the contacts between the C and NO terminals, and closing the contacts between the C and NC terminals.

The remaining seven (7) relays energize during an alarm condition, closing the contacts between the C and NO terminals, and opening the contacts between the C and NC terminals.

Refer to the configuration drawing (C-drawing) supplied with your system for your system’s specific relay labeling.

Not all I/O points are available for customer connection (some are used for factory system connections).

Table 4.1 Programmable Digital Inputs – IB2 Board

Programmable Digital Input	IB2 Pin No.		Factory Wiring	Default Digital Input Function	Customer Defined Digital Input Function
1	J3-2	+	The digital inputs may be preprogrammed for specific functions and have factory wiring connected. Refer to the configuration drawing (C-drawing) supplied with your system for your system's specific configuration.	The digital inputs may be preprogrammed for specific functions. Refer to the configuration drawing (C-drawing) supplied with your system for your system's specific configuration.	
	J3-1	–			
2	J3-4	+			
	J3-3	–			
3	J3-6	+			
	J3-5	–			
4	J4-2	+			
	J4-1	–			
5	J4-4	+			
	J4-3	–			
6	J4-6	+			
	J4-5	–			
7	J5-2	+			
	J5-1	–			
8	J5-4	+	(to customer ESTOP switch)	ESTOP	
	J5-3	–	-48 VDC		
--	J5-5		not used	not used	not used
--	J5-6				

NOTE! *For the NetSure 801 system, -48V is factory wired to all eight (8) Digital Input (-) terminals for your convenience and function predefined for ESTOP. Customer-furnished system return (0V potential) applied to terminal Digital Input #8 (+) activates the ESTOP function.* *See "Power System ESTOP Function" on page 8.*

Table 4.2 Programmable Relay Outputs – IB2 Board

Programmable Relay Output		IB2 Pin No.	Alarms Assigned to this Relay (Default)	Alarms Assigned to this Relay (Custom)
1	NO	J6-5	The relays may be preprogrammed for specific functions. Refer to the configuration drawing (C-drawing) supplied with your system for your system's specific configuration.	
	COM	J6-3		
	NC	J6-1		
2	NO	J6-6		
	COM	J6-4		
	NC	J6-2		
3	NO	J7-5		
	COM	J7-3		
	NC	J7-1		
4	NO	J7-6		
	COM	J7-4		
	NC	J7-2		
5	NO	J8-5		
	COM	J8-3		
	NC	J8-1		
6	NO	J8-6		
	COM	J8-4		
	NC	J8-2		
7	NO	J9-5		
	COM	J9-3		
	NC	J9-1		
8	NO	J9-6		
	COM	J9-4		
	NC	J9-2		

NOTE! *The relay assigned to "Critical Summary" alarm (relay 1 on first IB2 by default) will operate in the "Fail Safe Mode". "Fail Safe Mode" means Relay 1 is de-energized during an alarm condition, opening the contacts between the C and NO terminals, and closing the contacts between the C and NC terminals.*

The remaining 7 relays energize during an alarm condition, closing the contacts between the C and NO terminals, and opening the contacts between the C and NC terminals.

Refer to the configuration drawing (C-drawing) supplied with your system for your system's specific relay labeling.

4.3 EIB (Controller Extended Interface Board) Connections (if required) (Main Bay Only)

NOTE! *The system has one (1) EIB board installed.*

NOTE! *The alarm relay wiring previously disconnected (if applicable) will be reconnected to the IB2 card and/or EIB card provided with the retrofit.*

The EIB board provides additional connection points for voltage and current inputs, programmable relay outputs, and temperature probes. Refer to Figure 4.1.

Current Inputs, Voltage Inputs, and Programmable Relay Outputs

Current input, voltage input, and relay output leads are connected to screw-type terminal blocks located on EIB. Recommended torque for these connections is 2.2 in-lbs. Refer to Figure 4.4 for terminal locations. Refer to Table 4.3, Table 4.4, and Table 4.5 for pin-out information.

Current Inputs

The three shunt inputs are wired to and programmed for up to three shunts within the power system's distribution cabinet, one shunt per row of distribution. Refer to Figure 4.4 for terminal locations and Table 4.3 for pin-out information.

Voltage Inputs for Battery Block and Battery Midpoint Monitoring

The controller can monitor battery blocks (12V blocks) or midpoint battery voltage of battery strings connected to the EIB. The EIB provides a total of eight (8) DC voltage inputs for these connections. An alarm is Issued when either battery block voltage or battery midpoint voltage is abnormal. Refer to Figure 4.4 for terminal locations and Table 4.4 for pin-out information.

Refer to Figure 4.3 for connection details. Refer to the NCU Instructions (UM1M830BNA) and program the following parameters.

- **Battery Block Monitoring**

  Voltage Type: For the NetSure 801 system, this can be set to “48 (Block 4)”. This selects the EIB to monitor up to two (2) 48V battery strings with four (4) 12V blocks per string. For the NetSure 801 system, this can be set to “24 (Block 2)”. This selects the EIB to monitor up to four (4) 24V battery strings with two (2) 12V blocks per string.

  BlockVDiff(12V): This menu item appears if “48 (Block 4)” or "24 (Block 2)" is selected above. Set to the alarm threshold for battery block monitoring per site requirements. The controller issues an alarm when any block voltage of any battery string has an abnormal value. The alarm is Issued when the difference between any block voltage and a reference voltage is greater than the value of the block voltage difference setting.

  Block In-Use: Set to the number of battery strings being monitored.

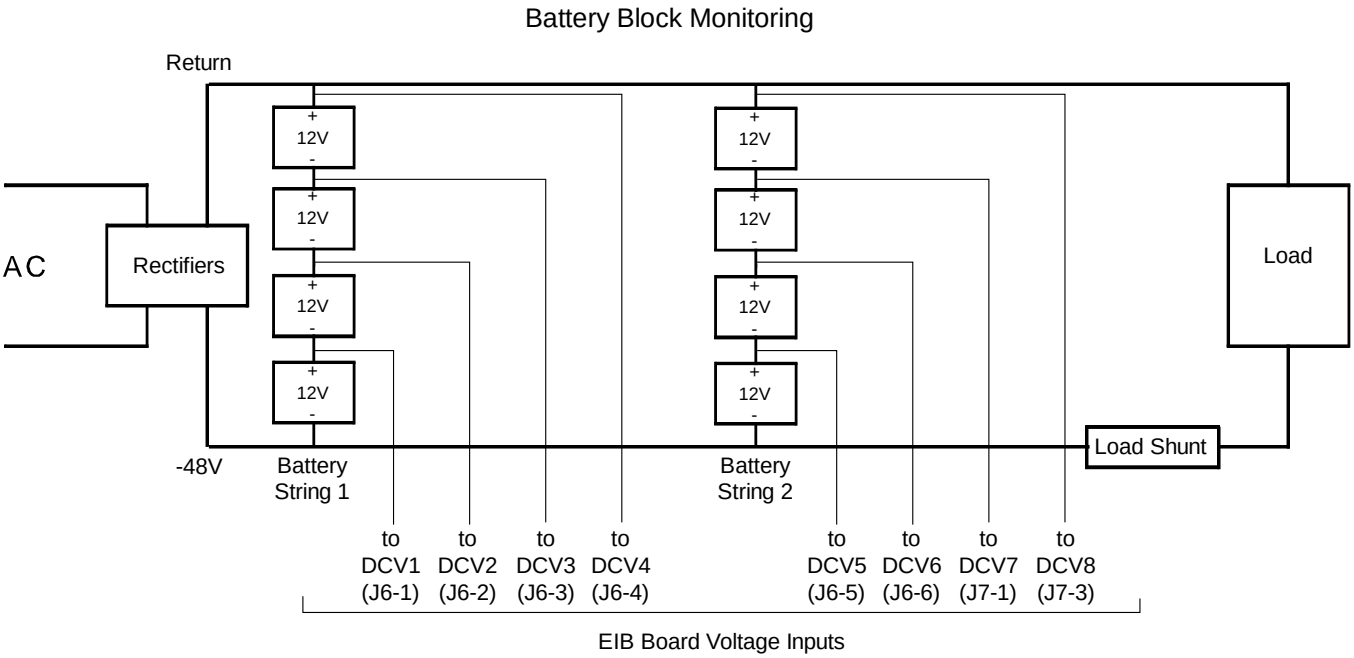
- **Midpoint Monitoring**

  Voltage Type: Set to “Midpoint”. This selects the EIB to monitor the midpoint voltage of up to eight (8) battery strings.

  BlockVDiff(Mid): This menu item appears if “Midpoint” is selected above. Set to the alarm threshold for battery midpoint monitoring per site requirements. The controller issues an alarm when any battery midpoint voltage of any battery string has an abnormal value. The alarm is Issued when the difference between any battery midpoint voltage and a reference voltage is greater than the value of the block voltage difference setting.

  Block In-Use: Set to the number of battery strings being monitored.

Figure 4.3 Sample Battery Block or Battery Midpoint Monitoring Connections (cont'd on next page)



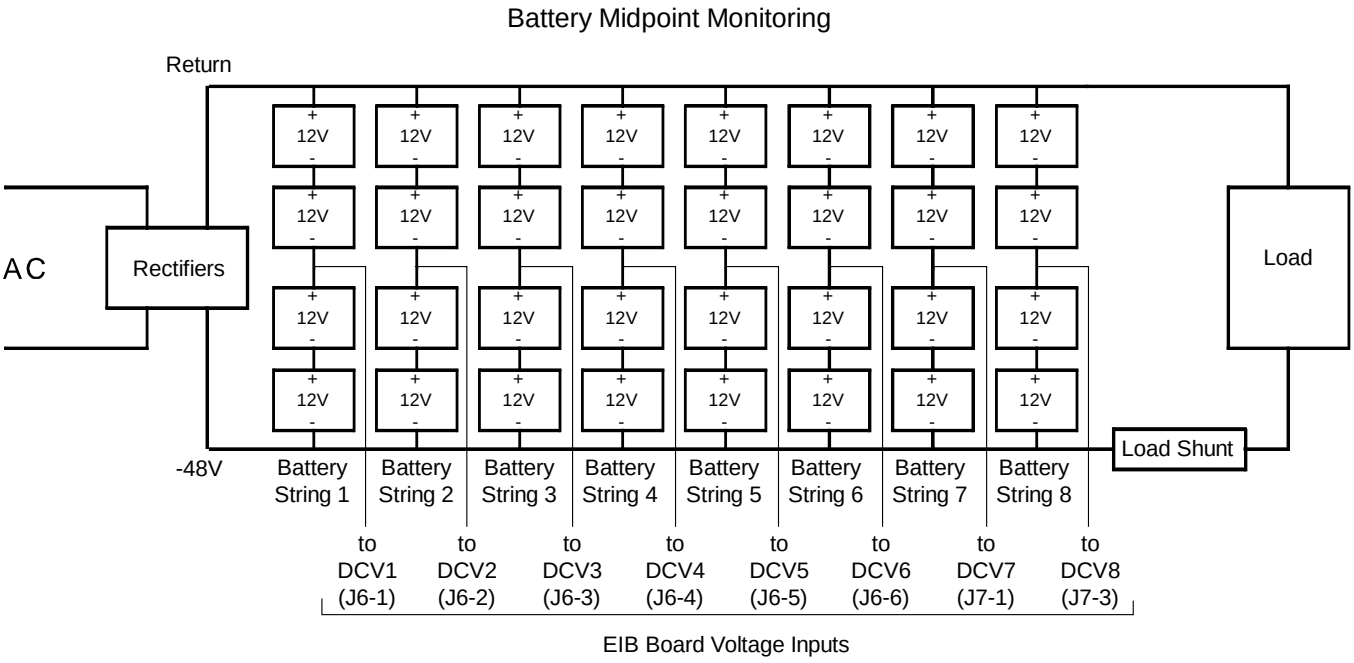
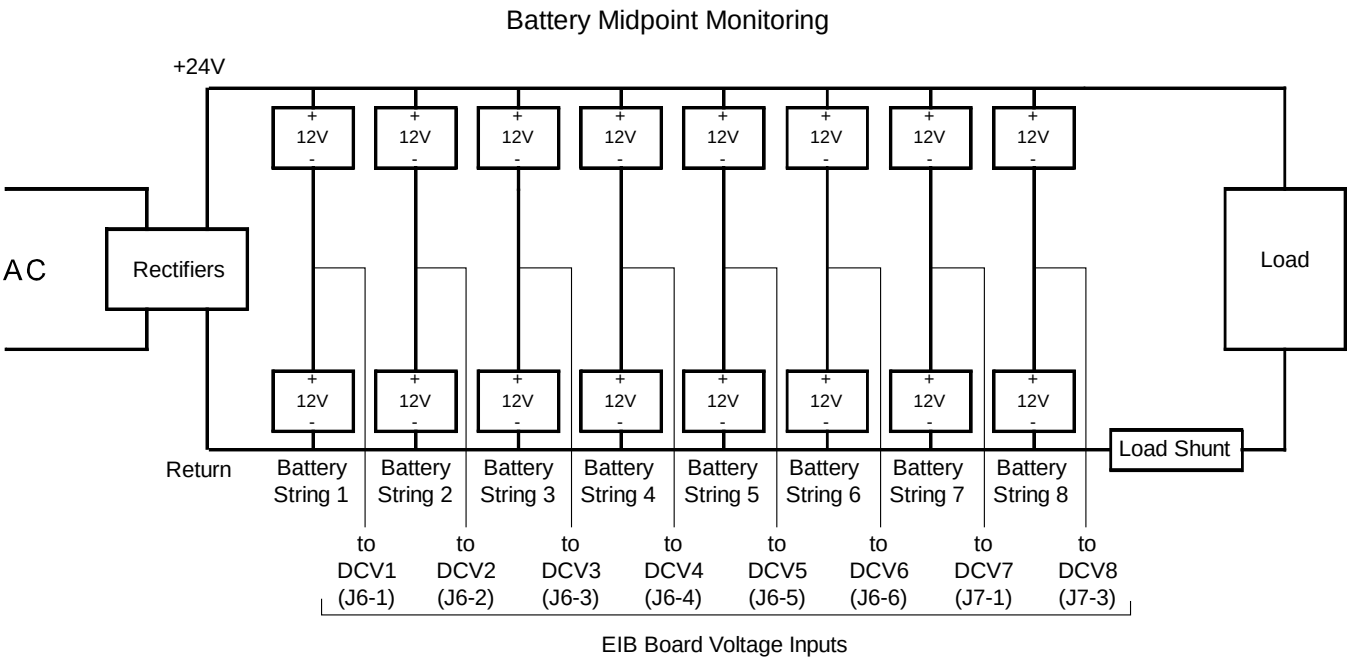


Figure 4.3 Sample Battery Block or Battery Midpoint Monitoring Connections (cont'd from previous page)



Programmable Relay Outputs

The EIB provides five (5) programmable alarm relays with dry Form-C contacts. Connect up to five (5) relay outputs to the EIB. Refer to Figure 4.4 for terminal locations and Table 4.4 for pin-out information.

Refer to the NCU Instructions (UM1M830BNA) for programming information.

Relay Ratings: Refer to the following:

a) Steady State : 0.5A @ 60V DC; 1.0A @ 30V DC.

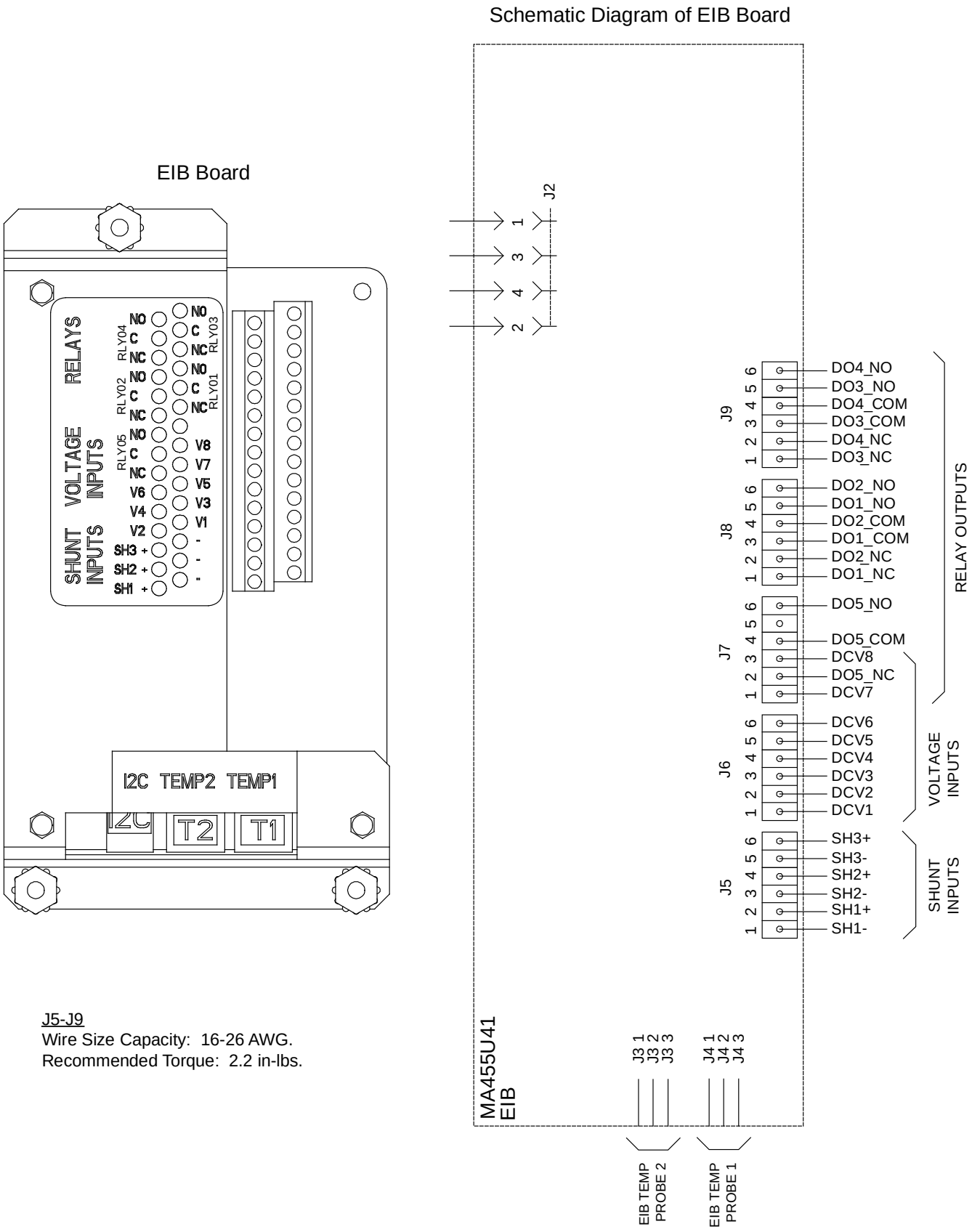
b) Peak : 3A @ 30V DC.

The relays may be preprogrammed for specific functions. Refer to the configuration drawing (C-drawing) supplied with your system for your system's specific configuration.

Temperature Probes

Temperature probes can be connected to the EIB board mounted inside the distribution cabinet. Refer to "Temperature Probes" on page 9.

Figure 4.4 EIB-1 and EIB-2 Board Connections



J5-J9
Wire Size Capacity: 16-26 AWG.
Recommended Torque: 2.2 in-lbs.

Table 4.3 Shunt Inputs – EIB

Shunt Input	EIB Pin No.		Factory Wiring	Default Function	Customer Defined Function
Sh1	J5-2	+	Row 2 Shunt	Row 2 Shunt - 500A, 75mV	
	J5-1	–	--		
Sh2	J5-4	+	Row 3 Shunt	Row 3 Shunt - 500A, 75mV	
	J5-3	–	--		
Sh3	J5-6	+	Row 4 Shunt	Row 4 Shunt - 500A, 75mV	
	J5-5	–	--		

Table 4.4 Voltage Inputs – EIBs

Voltage Input	EIB Pin No.	Default Function
1	J6-1	Battery Block Monitoring
2	J6-2	
3	J6-3	
4	J6-4	
5	J6-5	
6	J6-6	
7	J7-1	
8	J7-3	

Table 4.5 Programmable Relay Outputs – EIB

Programmable Relay Output		EIB Pin No.	Alarms Assigned to this Relay (Default)	Alarms Assigned to this Relay (Custom)
9	NO	J8-5	The relays may be preprogrammed for specific functions. Refer to the configuration drawing (C-drawing) supplied with your system for your system's specific configuration.	
	COM	J8-3		
	NC	J8-1		
10	NO	J8-6		
	COM	J8-4		
	NC	J8-2		
11	NO	J9-5		
	COM	J9-3		
	NC	J9-1		
12	NO	J9-6		
	COM	J9-4		
	NC	J9-2		
13	NO	J7-6		
	COM	J7-4		
	NC	J7-2		

NOTE! *The relays energize during an alarm condition, closing the contacts between the C and NO terminals, and opening the contacts between the C and NC terminals.*

Refer to the configuration drawing (C-drawing) supplied with your system for your system's specific relay labeling.

4.4 Controller Ethernet Connection (if required)

The controller provides a Web Interface via an Ethernet connection to a TCP/IP network. This interface can be accessed locally on a computer or remotely through a network. An RJ-45 10BaseT jack is provided on the IB5 Ethernet card connected to the NCU for connection into a customer's network. This jack has a standard Ethernet pin configuration scheme, twisted pair. Refer to Figure 4.5 for location and Table 4.6 for pin outs. Use shielded Ethernet cable (grounded at both ends). Refer to the NCU Instructions (UM1M830BNA) for operational details.

NOTE! *IB5 boards with a 10M/100M/1G Ethernet port replaced IB4 boards with a 10M/100M Ethernet port. This transition enables the support of connected devices that communicate up to 1G. While both boards are physically interchangeable, the IB5 board does require the NCU to have V1.2.80 or higher software loaded.*

NOTE! *You can access the Web pages of the power system locally by using a "crossover" or "straight" cable connected directly between your PC and the Ethernet cards.*

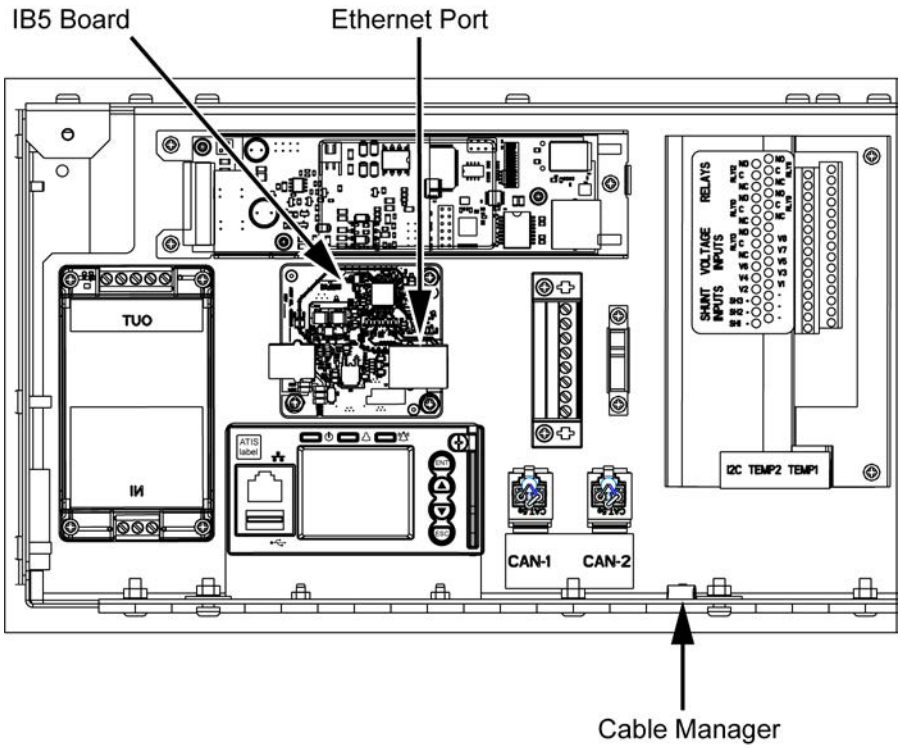
WARNING! The intra-building port(s) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment or subassembly MUST NOT be metallically connected to the interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Revision 4) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

The intra-building port (RJ-45) of the equipment or subassembly must use shielded intra-building cabling/wiring that is grounded at both ends.

Table 4.6 Controller RJ-45 Ethernet Port Pin Configuration

Port Pin Number	Name	Definition
1	Tx+	Write Signal +
2	Tx-	Write Signal -
3	Rx+	Read Signal +
4	--	No connection
5	--	No connection
6	Rx-	Read Signal -
7	--	No connection
8	--	No connection

Figure 4.5 Controller Ethernet Port



NOTE! *This system has an IB5 board. DO NOT connect your Local Area Network (LAN) to the NCU controller's front Ethernet port.*

NOTE! *NCU controller's front Ethernet port is dedicated to the front display screen. Do not attempt to use this for remote communication.*

4.5 Connecting a Secondary Bay or Distribution only Bay to the System Controller's CAN Bus

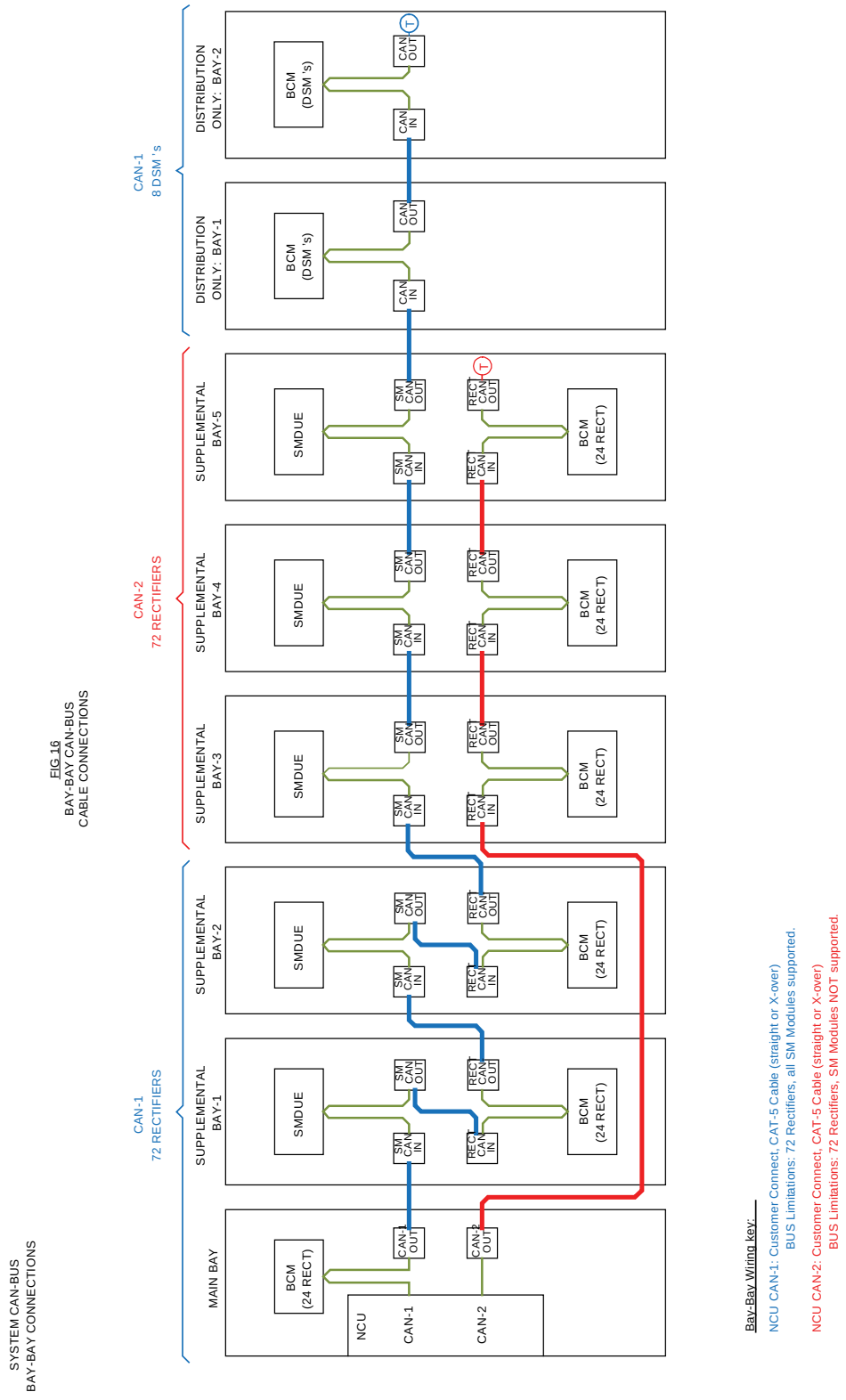
A supporting device or system may be connected to the Controller's CAN Port. Refer to Figure 5.1 for location. Refer also to the external device's or system's instruction manual.

General Procedure

1. Remove the terminator, plug in CAT5 cable, and add removed terminator at the end of the line. When more than two supplemental bays are used, CAN 1 and CAN 2 will need to be used. Refer to Supplemental Bay Installation Manual (IM60175008) for more details.
2. When making connections to new bays and the NCU is operating, you will need to reboot the NCU.
3. Reboot the Controller (NCU)
   Local Menu Navigation: At the Main Screen, press ENT and ESC at the same time to reset the NCU Controller.
   Web Menu Navigation: Go to Advantage Settings Menu / SW Maintenance Tab / Reboot Controller button.

5 Bay-to-Bay Communications Cable Connections

Figure 5.1 Bay to Bay Connection

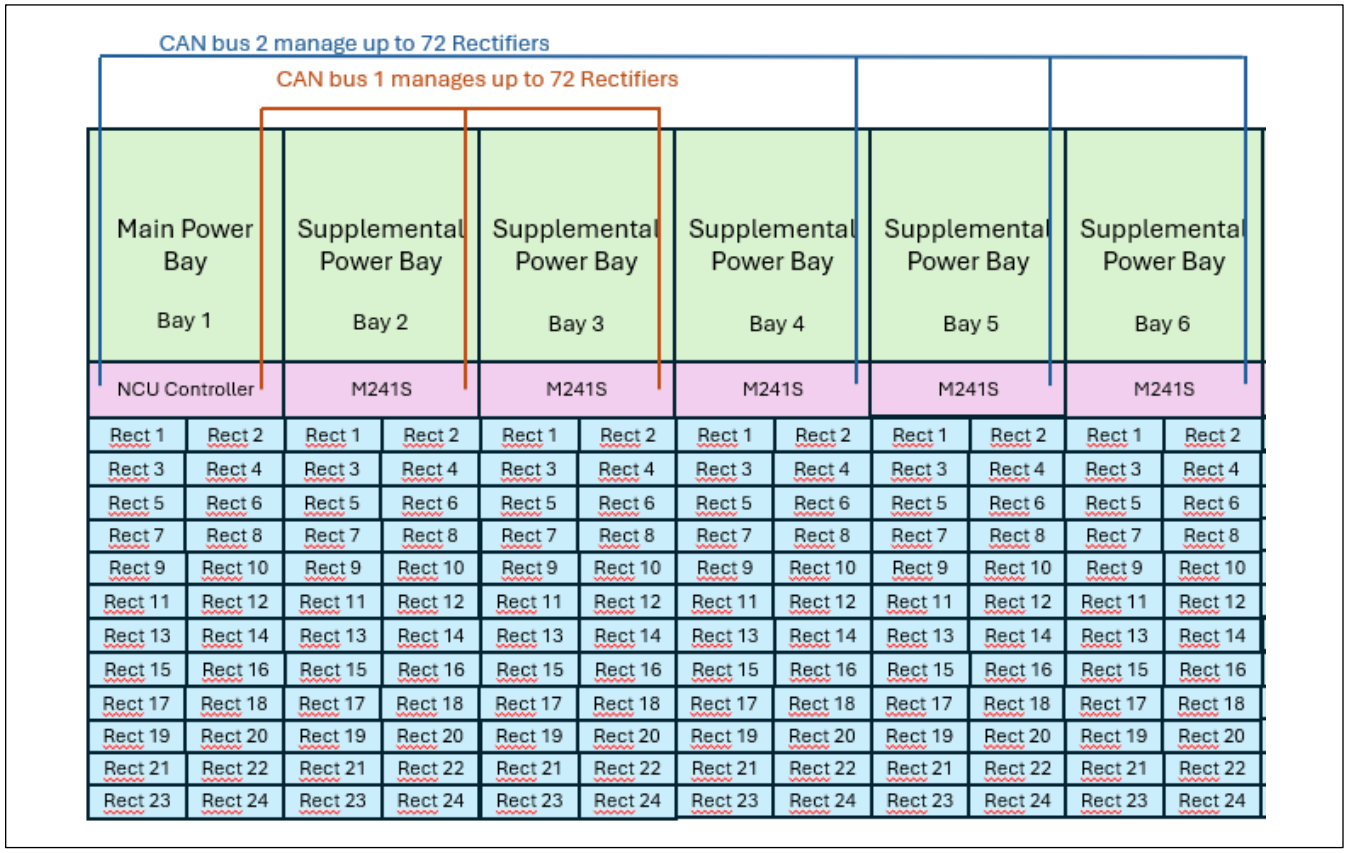


6 Rectifier Limitations

There are two CAN bus communication lines that extend from the main power bay, CAN1 and CAN2. The CAN busses are required to communicate between the NCU controller, the rectifiers, and other equipment in the supplemental power bays.

The maximum number of rectifiers allowable in the NS801 NCU Upgrade is 144 (72 rectifiers maximum on each of two CAN busses). This will limit the NS801 plant to 14,400A of nominal rectification. See Figure 6.1 below.

Figure 6.1 Example of 144 Rectifier Limitation and Rectifier Placement



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