Eaton® PDI WaveStar BCMS Hub

Installation and Operation Manual

Eaton

Powering Business Worldwide

Thank you for your recent purchase of an Eaton PDI WaveStar BCMS Hub.

NOTICE

For safety reasons as well as to ensure optimal performance of your Eaton PDI WaveStar BCMS Hub, please carefully read the instructions before trying to install, operate, service or maintain the system.

For any questions regarding the installation, operation, service or maintenance, contact the Eaton Help Desk. See paragraph 2.7 *Getting Help* for details.

Please use the following e-mail for manual comments, suggestions, or to report a technical error in this manual.

E-ESSDocumentation@eaton.com

You can download the most recent version of this product manual from the Eaton web site's Product page, Resources section:

https://www.eaton.com/us/en-us/catalog/low-voltage-power-distribution-controls-systems/eaton-pdi-busway.resources.html

Eaton PDI WaveStar BCMS Hub Installation and Operation Manual

Cover Photo: Eaton PDI WaveStar BCMS Hub

EAT•N

Dear Customer,

On behalf of everyone at Eaton, we thank you for partnering with us, for trusting us to maintain your business continuity and for preventing downtime at your facility.

Our suite of backup power, power distribution and power management products are designed to protect you from a host of threats including power outages, surges, and lighting strikes, and enable you to monitor and control your power infrastructure.

We trust that our products will deliver high quality, reliable power for your business, and we are committed to your success.

Please read this manual, which details the installation and operation processes for your new Eaton product.

Thank you for choosing Eaton!

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Chapter 1 Safety

Please pay special attention to the use of "Danger" symbols throughout this manual indicating electrical or other safety hazards. Following these safety instructions is extremely important to avoid possible injury or death.

⚠ **DANGER**

This symbol is used throughout this manual to indicate the presence of high voltages, representing a hazard for electric shock, burn or explosion. Follow the instructions carefully to avoid serious or fatal injury.

Follow safe electrical work practices:

- Disconnect and lock-out all power supplying equipment before working on or installing WaveStar® BCMS Hub components. Use a properly rated voltage sensing device to confirm power is OFF.

- Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel and in accordance with all local safety codes. Eaton assumes no responsibility for any consequences arising out of the use of this manual. This document should not be viewed as sufficient by otherwise non-qualified personnel to operate, service, or maintain the equipment discussed.

- Read, understand, and follow the instructions before installing this product.

- Install device in an appropriate electrical enclosure per local regulations.

- ESD sensitive equipment. Ground yourself, discharge any static charge and ensure that the device is effectively grounded before handling the unit.

Safety

Chapter 2   Installation Planning

The Eaton® PDI WaveStar® BCMS Hub provides a consolidated power monitoring station for viewing the status of numerous devices, such as branch circuit panel boards or Bus System End Feeds and Tap-Off Boxes that use Eaton's Branch Circuit Monitoring System (BCMS). Monitoring data is displayed on a 10.4-in color touchscreen. Monitoring data can also be displayed remotely on web pages using a TCP/IP link.

Each BCMS Hub has a single downstream Modbus RTU link to its monitored devices with up to (32) connections or drops and up to (246) total Modbus addresses. The maximum configuration varies depending on the type of equipment being monitored. See paragraph 2.6 *Electrical Loads and Modbus Addresses* for examples.

A BCMS Dual Hub doubles the monitoring capacity within the same size enclosure using a second Monitor.

ⓘ	**NOTE**	Eaton now handles all service and support for products previously manufactured by Power Distribution, Inc (PDI). See paragraph 2.7 *Getting Help* for contact information.

2.1   BCMS Hub and BCMS Dual Hub

A BCMS Hub enclosure can house a single BCMS Hub or a BCMS Dual Hub. The BCMS Dual Hub has two (2) BCMS Hub systems, which operate independently except for sharing the same power supply.

Figure 1. WaveStar BCMS Hub and BCMS Dual Hub

BCMS Hub and BCMS Dual Hub have the same enclosure size (24" x 24" x 5").

Each display is a 10.4" diagonal color touchscreen.
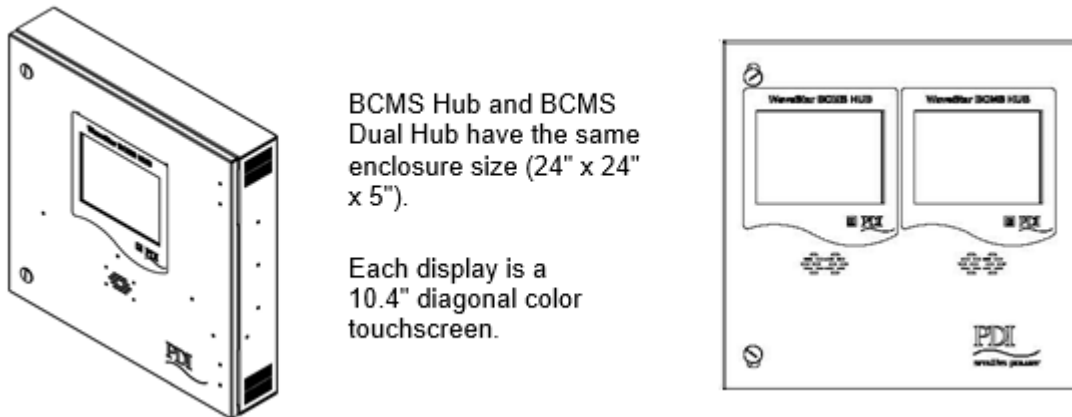
2.2   Communications

The BCMS Hub has a single underdownstream link to monitored BCMS devices that uses Modbus RTU at 9600 bps.

The BCMS Hub can have one (1) or two (2) upstream links to a Building Management System (BMS) or Data Center Infrastructure Management (DCIM) system:

- (1) Modbus RTU link at 19,200 or 9600 bps
- (1) TCP/IP using Ethernet cable, providing
    - Web server connection for remotely viewing BCMS Hub web pages, and/or
    - Modbus TCIP/IP connection to BMS or DCIM system

The Modbus RTU and the TCP/IP links can be used simultaneously. A BMS system can use Modbus RTU to the BCMS Hub and a DCIM system can use TCP/IP while web pages are simultaneously displayed over the TCP/IP link.

Distances restrictions:

- For Modbus RTU, cable lengths should be ≤ 2000 ft.

- For upstream Ethernet links, apply standard Ethernet length restrictions for the cable used (Cat5, Cat5e, etc.)

The BCMS Dual Hub has (2) separate BCMS Hub systems in the same enclosure, each with its own Monitor. Each system has exactly the same capacity, options, and restrictions as a single BCMS Hub.

Figure 2. BCMS Hub and BCMS Dual Hub Networks

2.3 Supported Devices

The BCMS Hub collects monitoring data from **BCMS devices**. Technically a BCMS device is a **BCMS points list** (or Modbus register map), representing a physical component, such as a panelboard. A single BCMS PCB can have multiple points lists and appear as multiple devices. For example, a BCMS PCB for panelboards typically has two (2) points lists, one for each panelboard it supports.

The following equipment and BCMS devices can be monitored by a BCMS Hub, if BCMS is installed with the monitored equipment:

- **RPPs** and **JCOMMs**, monitoring panelboards and their input feeds with any of these points lists:

- BCMS Normal, the default points list for North American panelboards

- BCMS KWH, a points list providing branch circuit power usage information for standard North American panelboards

- BCMS IEC, the points list providing power information from IEC panel boards

- **Busway Products** (PowerWave Bus Systems™, PowerWave 2™ Bus Systems, and PowerWave Silver™ Bus Systems):

- End Feeds using the PM Input Board points list

- Tap-Off Boxes, using the iBus points list

2.4 Excluded Devices

The BCMS Hub does not support data collection and display from the following devices:

- WaveStar Power Distribution Units (PDUs) (PowerPak, PowerHub, or PowerHub 2 PDUs)

- BCMS using the Enhanced Subfeeds points list (large PDU feeds)

- WaveStar Static Transfer Switch

- Non-Eaton equipment, except for panelboards monitored through a JCOMM

2.5 Monitors

WaveStar Color Monitors and WaveStar Monitors (monochrome) can be included in the downstream device chain from the BCMS Hub. However, the PowerWave Bus Systems™ 7-inch Local Display, which is also used with PowerWave 2™ Bus Systems and PowerWave Silver™ Bus Systems, cannot be used on the Hub's downstream Modbus chain.

2.6 Electrical Loads and Modbus Addresses

The downstream link from the BCMS Hub to its monitored devices has standard Modbus RTU restrictions:

- Up to (32) electrical loads or drops along the downstream device chain. Each connection along the Modbus RTU bus is an electrical load.

- Up to (246) total Modbus addresses on the downstream device chain. Each points list has a Modbus address, including Monitors.

2.6.1 Modbus Segments

Monitors create Modbus segments consisting of the Monitor and its downstream devices. Monitors are Modbus clients on their own Modbus segments:

- The BCMS Hub is the client on its downstream segment.

- A Monitor on a RPP or JCOMM is the client on its Modbus segment, which usually has just the BCMS devices (panelboards) in the RPP or JCOMM. Because these devices are in a separate Modbus segment, they are not directly addressable from the BCMS Hub; the Hub retrieves data from these devices by addressing the Monitor.

If an RPP or JCOMM has a Monitor, the Monitor connection is the electrical load, and the BCMS cards in the RPP or JCOMM are not electrical loads. However, if there is no Monitor, each BCMS card is an electrical load because the BCMS cards are directly addressable from the Hub and is part of the Hub's downstream Modbus segment.

For Bus Systems, the Accumulator Board in End Feed is Modbus client to its Tap-Off Boxes. (The 7" Local Busway Display cannot be used with the BCMS Hub.)

2.6.2 Counting Electrical Loads and Modbus Addresses

You must be sure to stay within the Modbus limits. Figure 3 illustrates counting electrical loads and Modbus addresses on the BCMS Hub downstream link to its devices.

2.6.3 Examples, Maximum Configurations

The following are examples of maximum configurations for either electrical loads or Modbus addresses:

(32) RPPs or JCOMMs each <u>with</u> Monitors, (2) BCMS PCBs, and (4) panelboards (Monitors are the electrical loads):

- (32) RPPs or JCOMMs with Monitors = **(32) Electrical Loads** (maximum)

- (32) RPP or JCOMMs each with (1) Monitor and (4) PBs = 32 x 5 = (160) Modbus addresses

(16) RPPs or JCOMMs <u>without Monitors,</u> each with (2) BCMS PCBs and (4) panelboards (BCMS PCBs are the electrical loads):

- (2) BCMS PCBs per RPP or JCOMM: 16 RPPs/JCOMMs x 2 PCBs = **(32) Electrical Loads** (maximum)

- (4) Panelboards per RPP or JCOMM: 16 RPPs/JCOMMs x 4 PBs = (64) Modbus addresses

(24) Bus System End Feeds with (9) Tap-Off Boxes each:

- (24) End Feeds = (24) Electrical Loads

- (24) Bus Runs with (10) addresses each (1 End Feed + 9 Tap-Off Boxes) = **(240) Modbus Addresses** (near maximum)

2.6.4 Determining Modbus Addresses

Monitors are Modbus clients on their segment and adjust the Modbus addresses of their downstream devices based on their own address. Because the BCMS Hub is a Modbus client and Monitors downstream in RPPs or JCOMMs are also Modbus clients on their own segments, multiple address adjustments can occur. These address adjustments can be confusing.

On the BCMS Hub **Home** screen you have a choice of showing devices Modbus addresses as seen from the BCMS Hub or Modbus addresses as seen from the BMS or DCIM system (assuming the BMS or DCIM is next upstream from the Hub). Using Offset = √ on **Modbus Settings** will show addresses on the **Home** screen as seen from the BMS. This setting is <u>recommended</u> because it makes it easy to coordinate Modbus addresses between the BCMS Hub and the BMS. See paragraph <u>4.2.1 *ModBus Settings*</u>.

Figure 3. Counting Electrical Loads and Modbus Addresses

To BMS

Downstream Modbus RTU Link ≤ 32 connections or electrical loads

BCMS = Branch Circuit Monitoring System
EF = End Feed
EL = Electrical Load
Mon = Monitor
PB = Panelboard
PCB = Printed Circuit Board
TOB = Tap-Off Box

RPP or JCOMM with Monitor

EL 1

Mon	BCMS PCB		BCMS PCB	
	PB1	PB2	PB3	PB4

Modbus Address Count: 1   2   3   4   5

1 Electrical Load (Monitor)

5 Modbus Addresses

Only the Monitor is directly connected to the BCMS Hub downstream Modbus segment.

RPP or JCOMM without Monitor

EL 1		EL 2	
BCMS PCB		BCMS PCB	
PB1	PB2	PB3	PB4

Modbus Address Count: 1   2   3   4

2 Electrical Loads (BCMS PCBs)

4 Modbus Addresses

BCMS PCBs are directly connected to the BCMS Hub downstream Modbus segment.

EL 1

Bus System Bus Run

Bus System End Feed	TOB1	TOB2	TOB3	TOB4	TOB5	TOB6

Modbus Address Count:
1   2   3   4   5   6   7

1 Electrical Load (End Feed Accumulator PCB)

7 Modbus Addresses (1 EF + 6 TOBs)

End Feed Accumulator PCB is always the Electrical Load for a bus run.

2.7   Getting Help

If help is needed with any of the following:

- Scheduling initial startup

- Regional locations and telephone numbers

- A question about any of the information in this manual

- A question this manual does not answer

Please call the Eaton Help Desk at:

United States: **1-800-843-9433** or **1-919-870-3028**

Canada: **1-800-461-9166 ext 260**

All other countries: **Call your local service representative**

Please use the following e-mail for manual comments, suggestions, or to report a technical error in this manual.

E-ESSDocumentation@eaton.com

2.8   Warranty

To view the warranty please click on the link or copy the address to download from the Eaton website:

[Eaton Product Warranty](https://www.eaton.com/content/dam/eaton/products/backup-power-ups-surge-it-power-distribution/backup-power-ups/portfolio/eaton-three-phase-ups-warranty.pdf)

https://www.eaton.com/content/dam/eaton/products/backup-power-ups-surge-it-power-distribution/backup-power-ups/portfolio/eaton-three-phase-ups-warranty.pdf

Chapter 3   Installation

This product must be installed and inspected by licensed electricians or by Eaton-authorized technicians. This document should not be viewed as sufficient by otherwise non-qualified personnel to operate, service, or maintain this equipment.

Severe or fatal injury can result from electrical shock during contact with high voltage conductors, monitoring PCBs, or similar equipment!

- Disconnect power before drilling holes, making cutouts, attaching conduit, or connecting to PDUs, RPPs, or other power distribution equipment.

- Use Lock Out/Tag Out procedures.

- Wear suitable personal protective clothing and use protective equipment for performing mechanical and electrical installations.

- Leave ample space for attaching and routing wires.

3.1   Mounting and Conduit

The enclosure for both the BCMS Hub and the BCMS Dual Hub is 24"W x 24"H x 5"D. The BCMS Hub or BCMS Dual Hub must be securely mounted on a wall or mounted on a frame attached to poles or another solid surface. Customers must make their own conduit cutouts on the enclosure.

Figure 4. BCMS Hub and BCMS Dual Hub Enclosures
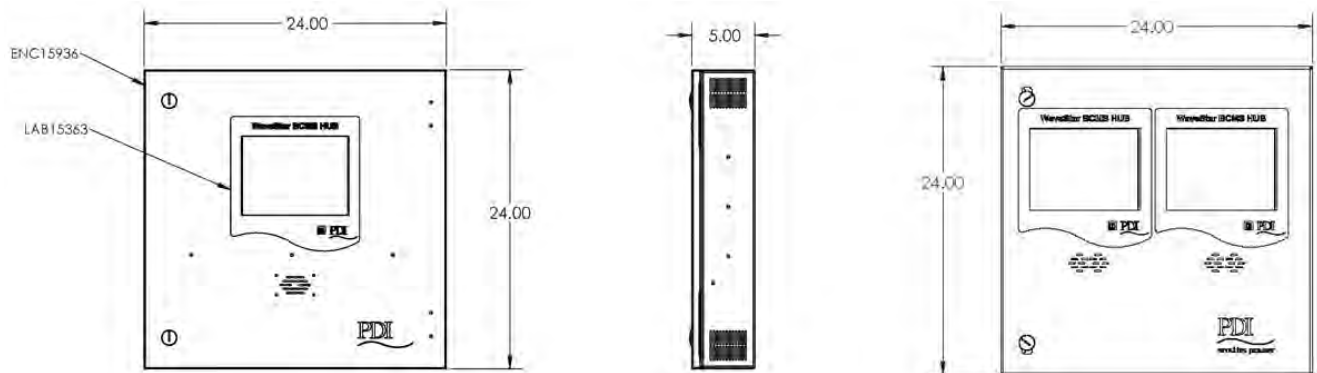
3.2   Customer Connections BCMS Hub

Customer connections are mostly made to the left inside panel. Figure 5 shows inside panels as manufactured. Figure 6 and Figure 7 show the BCMS Hub wired for a TCP/IP upstream link to a BMS or DCIM system using the optional Ethernet connection while the upstream Modbus RTU link is not used.
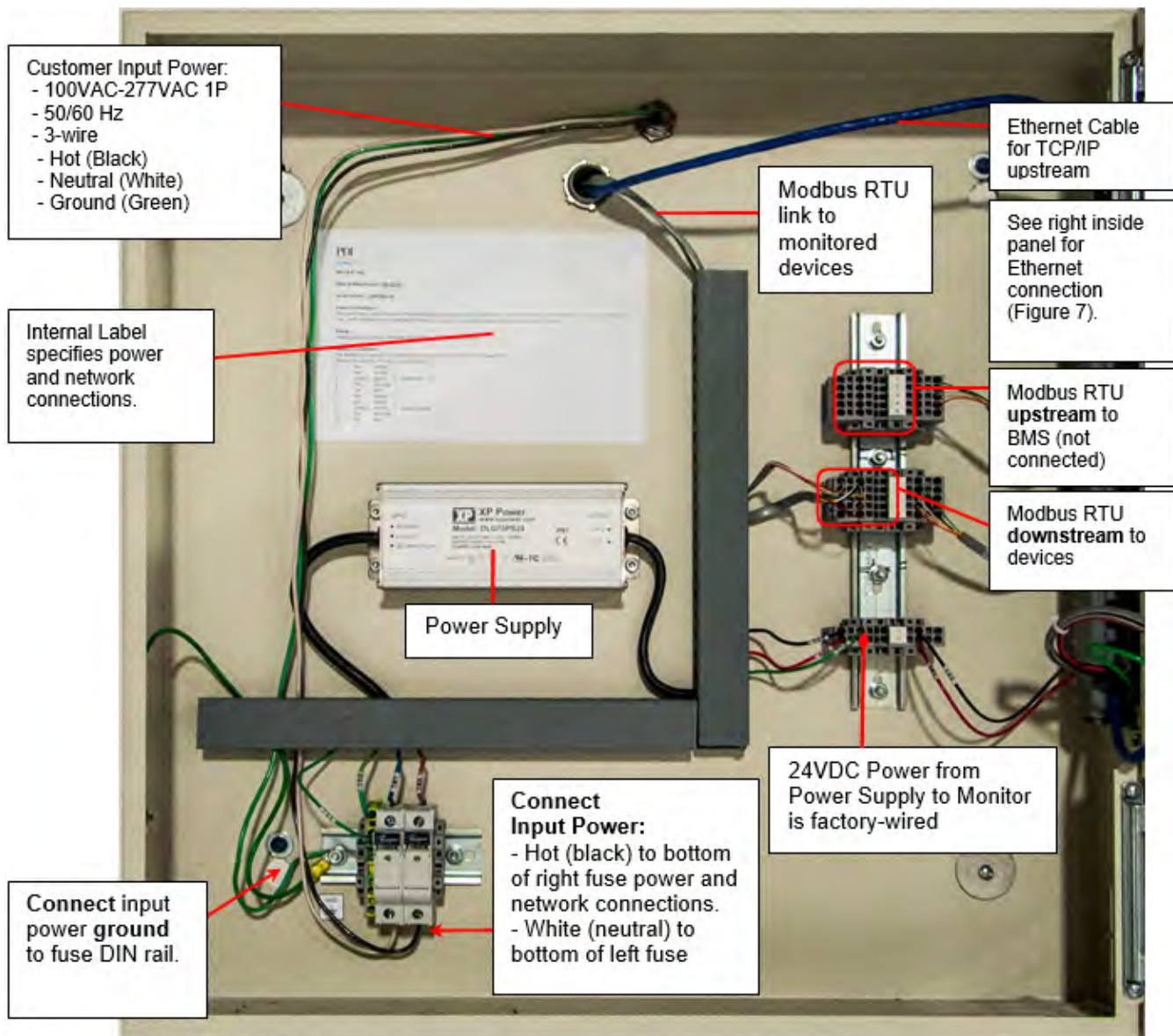
Figure 5. Internal Panels as Manufactured
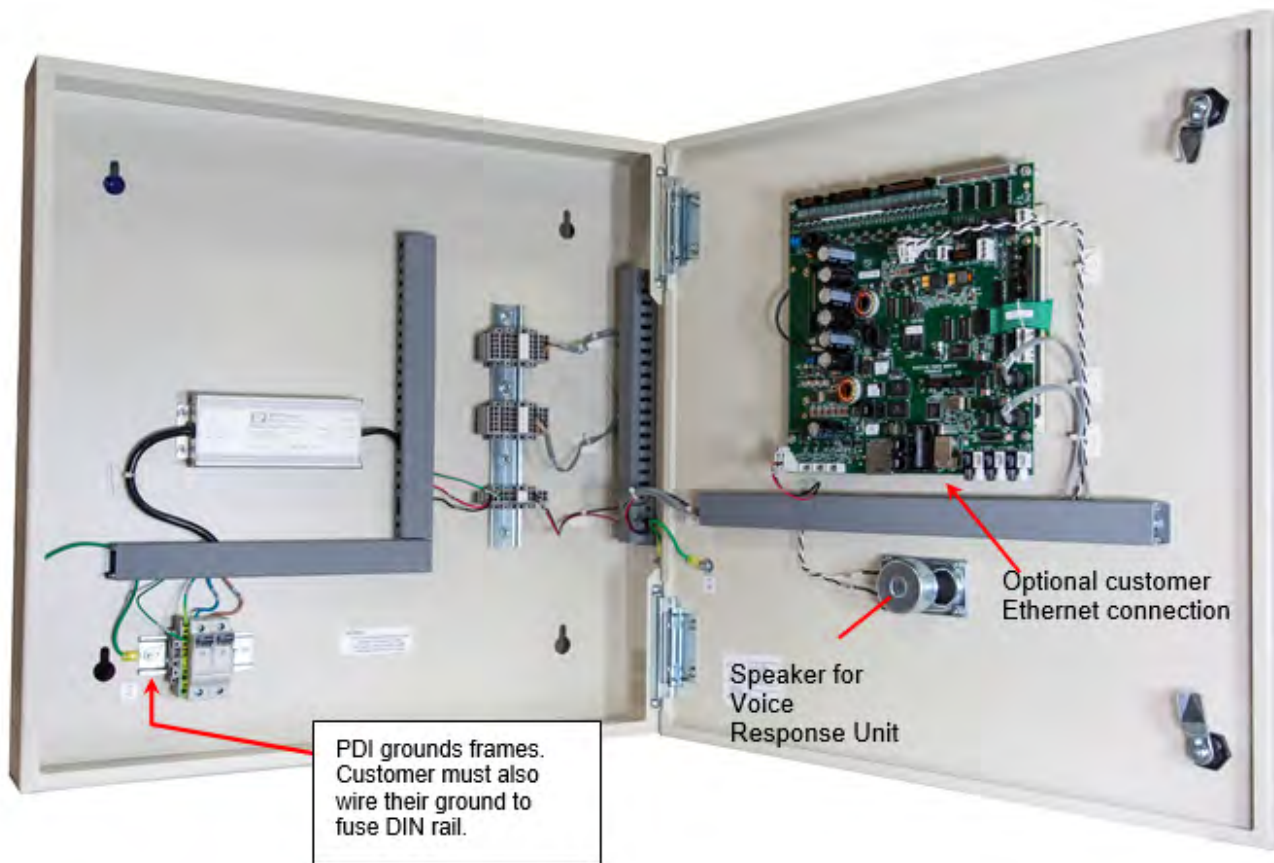
3.2.1 Customer Power Connections

Customer provides input 1P 3-wire power, 100VAC – 277VAC, 50 or 60 Hz. (Figure 6)

1. Connect hot wire (black) to bottom of right fuse.

2. Connect neutral (white) to bottom of left fuse.

3. Connect ground (green) to the fuse DIN rail. Ground from the fuse DIN rail to the BCMS Hub frame is wired at the factory.

Figure 6. Customer Connections, Power and Communications, Left Inside Panel

Customer Input Power:
- 100VAC-277VAC 1P
- 50/60 Hz
- 3-wire
- Hot (Black)
- Neutral (White)
- Ground (Green)

Ethernet Cable for TCP/IP upstream

Modbus RTU link to monitored devices

See right inside panel for Ethernet connection (Figure 7).

Internal Label specifies power and network connections.

Modbus RTU **upstream** to BMS (not connected)

Modbus RTU **downstream** to devices

Power Supply

24VDC Power from Power Supply to Monitor is factory-wired

Connect Input Power:
- Hot (black) to bottom of right fuse power and network connections.
- White (neutral) to bottom of left fuse

Connect input power **ground** to fuse DIN rail.

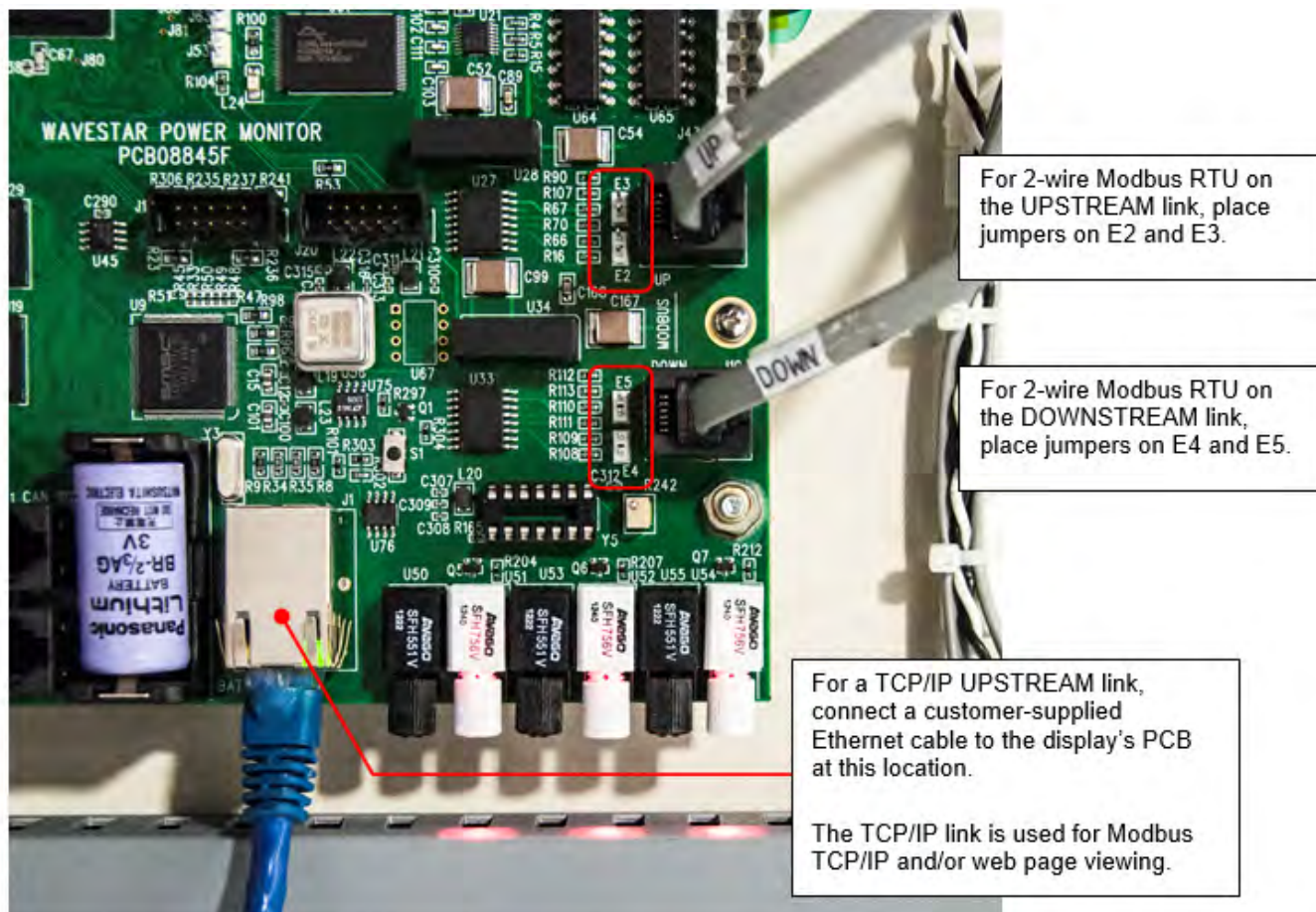### 3.2.2 Customer Communications Connections

Modbus RTU protocol can be used upstream to the BMS or DCIM system as the single upstream link or with a TCP/IP upstream link.

Modbus RTU protocol is used downstream from the BCMS in a single daisy chain to all devices.

1		GREEN
2	RX+ RX-	BLACK
3	SHIELD TX+	WHITE
4	TX-	YELLOW
5		RED

UPSTREAM

6	RX+	GREEN
7	RX-	BLACK
8	SHIELD	WHITE
9	TX+	YELLOW
10	TX-	RED

DOWNSTREAM

**Figure 7. Customer Communications Connections, Right Inside Panel**

For 2-wire Modbus RTU on the UPSTREAM link, place jumpers on E2 and E3.

For 2-wire Modbus RTU on the DOWNSTREAM link, place jumpers on E4 and E5.

For a TCP/IP UPSTREAM link, connect a customer-supplied Ethernet cable to the display's PCB at this location.

The TCP/IP link is used for Modbus TCP/IP and/or web page viewing.

Upstream and downstream are independent: one can be 2-wire and the other 4-wire. By default, Modbus RTU is 4-wire. For 2-wire Modbus RTU, install jumpers at the Modbus upstream and/or downstream connections on the display's backpanel as shown in Figure 7.

Customer Ethernet connection for an upstream TCP/IP link is made to the display's backpanel (Figure 7).

3.3   Customer Connections BCMS Dual Hub

The BCMS Dual Hub has two BCMS Hub systems in a single enclosure. The two BCMS Hub systems are completely independent of each another, with separate upstream links and downstream device chains, but they share a common power supply.

Figure 8. Customer Connections, BCMS Dual Hub, Left Inside Panel
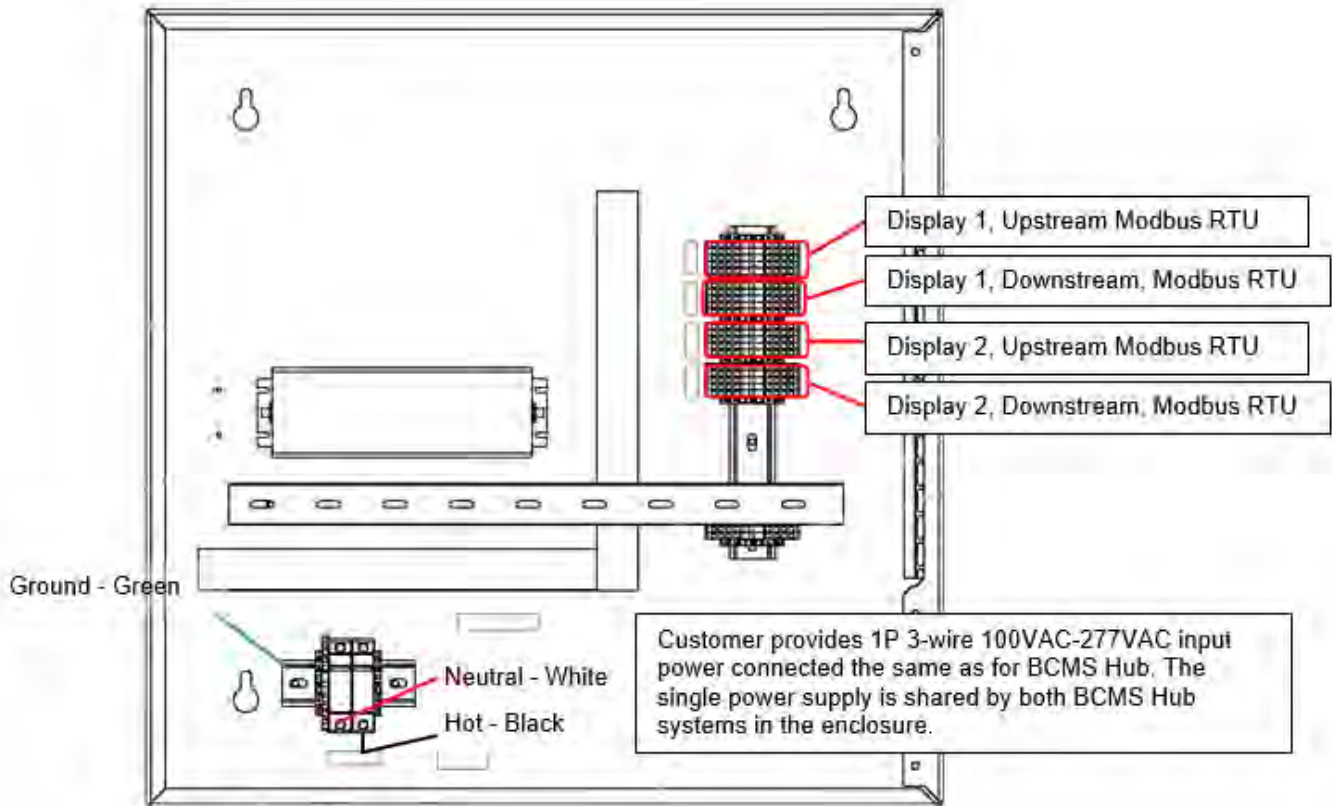
3.3.1 Customer Power Connections, BCMS Dual Hub

Because both BCMS Hub systems share a common power supply, customer power connections are exactly the same as for the single BCMS Hub system (Figure 8).
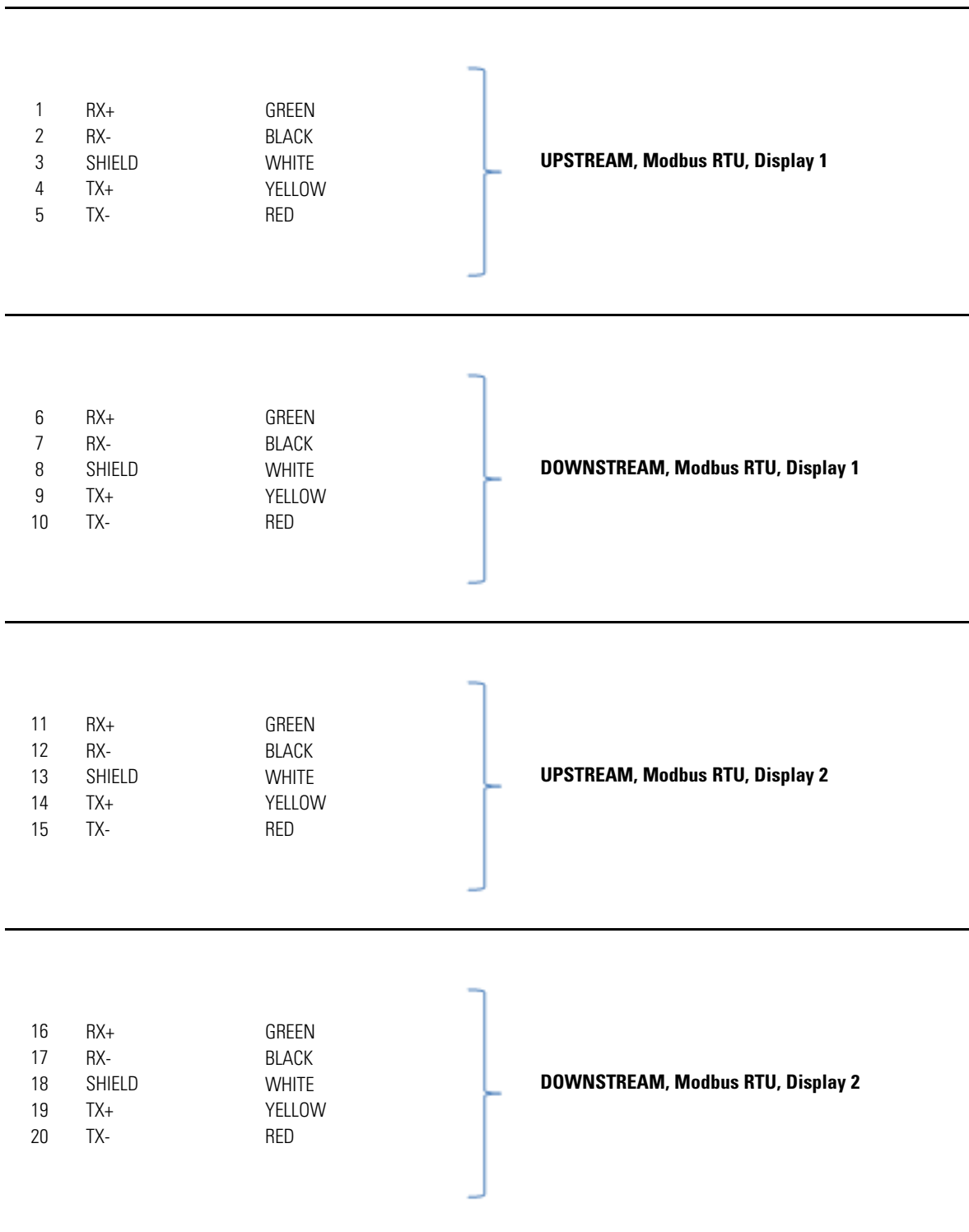
Customer provides input 1P 3-wire power, 100VAC – 277VAC:

1. Connect hot wire (black) to bottom of right fuse.

2. Connect neutral (white) to bottom of left fuse.

3. Connect ground (green) to the fuse DIN rail. Ground to the frame from the DIN rail is wired at the factory.

3.3.2 Customer Communications Connections, BCMS Dual Hub

The network connections on both BCMS Hub systems within a BCMS Dual Hub are separate and independent of each other. For example, one uplink to a BMS from one of the Hub systems can be 2-wire and the other 4-wire.

Modbus RTU protocol is used downstream of each BCMS Hub system in a single daisy chain to all drops or electrical loads (Figure 8).

1	RX+	GREEN
2	RX-	BLACK
3	SHIELD	WHITE
4	TX+	YELLOW
5	TX-	RED

UPSTREAM, Modbus RTU, Display 1

6	RX+	GREEN
7	RX-	BLACK
8	SHIELD	WHITE
9	TX+	YELLOW
10	TX-	RED

DOWNSTREAM, Modbus RTU, Display 1

11	RX+	GREEN
12	RX-	BLACK
13	SHIELD	WHITE
14	TX+	YELLOW
15	TX-	RED

UPSTREAM, Modbus RTU, Display 2

16	RX+	GREEN
17	RX-	BLACK
18	SHIELD	WHITE
19	TX+	YELLOW
20	TX-	RED

DOWNSTREAM, Modbus RTU, Display 2

Upstream and downstream are independent: one can be 2-wire and the other 4-wire. By default, Modbus RTU is 4-wire. For 2-wire Modbus RTU, install jumpers at the Modbus upstream and/or downstream connections on the display's backpanel as shown in <u>Figure 7</u>.

Customer Ethernet connection for an upstream TCP/IP link is made to the display's backpanel (Figure 7).

3.4 Customer Connections for Monitored Equipment

The BCMS Hub has a single Modbus RTU downstream link to its monitored devices, and Modbus allows (32) downstream electrical loads or drops on this bus. These drops or connection points are where RPPs, JCOMMs, and PowerWave, PowerWave 2, or PowerWave Silver Bus Systems are connected. How these connections are made vary by the type of equipment that is monitored and whether it has its own Monitor.

Modbus wiring at each connection can also vary. For example, most units have Modbus Shield or Common in position 3 on the plug, but JCOMM has Modbus Shield or Common in position 1.

3.4.1 Remote Power Panel (RPP) Modbus RTU Connections

If an RPP has a WaveStar Color Monitor or a WaveStar Monitor (monochrome), the Monitor's downstream link connects to (1) or (2) BCMS Boards, which can monitor up to (4) panelboards.

An RPP typically has a terminal block (TB) with (4) connections that allow the RPP to be conveniently wired into the BCMS Hub Modbus device chain (Figure 9):

1. Monitor or BCMS board connection to TB

2. TB connection towards BCMS Hub

3. TB connection towards additional electrical loads or Modbus drops

4. Unused connection

Figure 9. RPP Modbus Connections
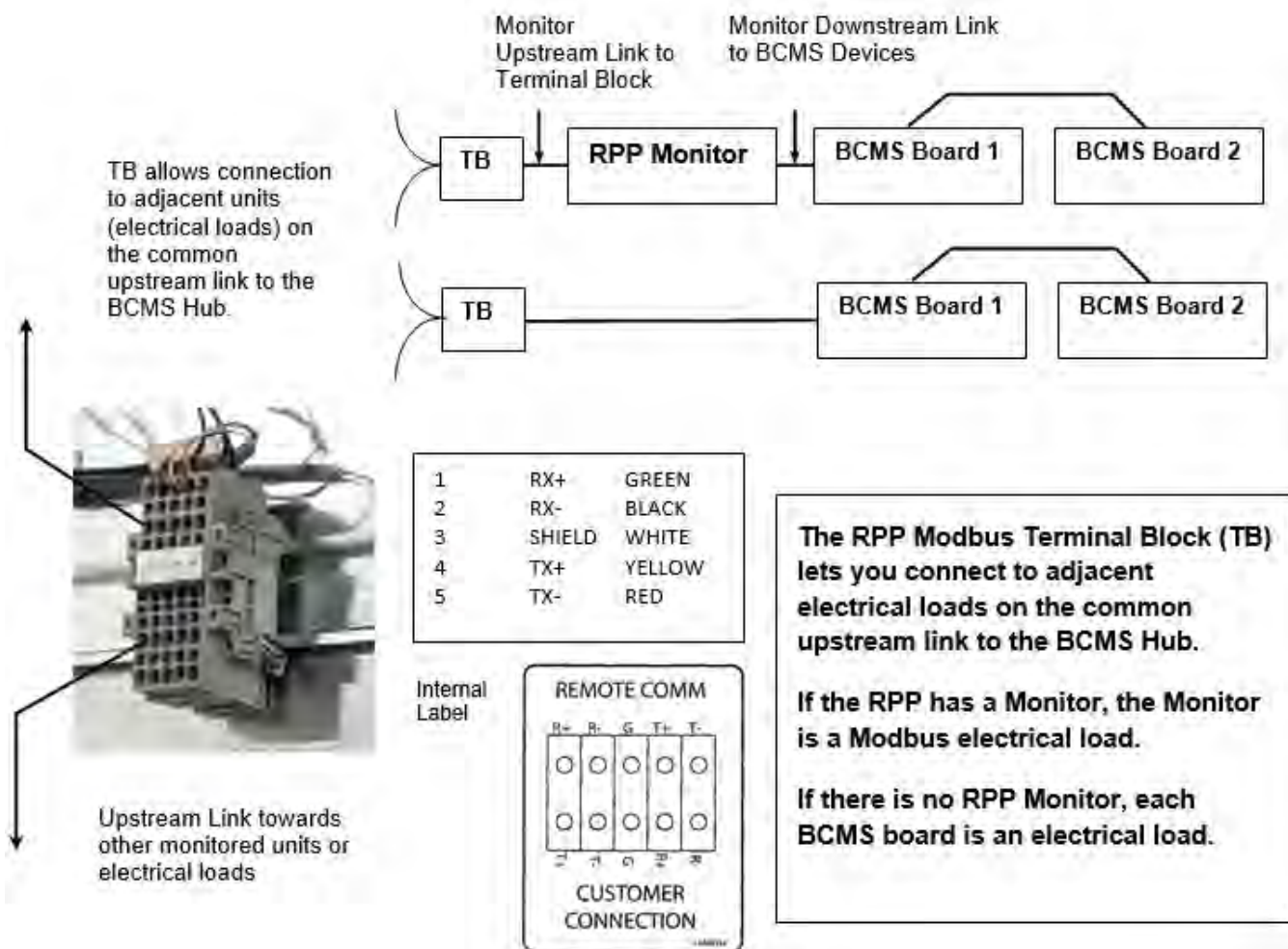
3.4.2   JCOMM Modbus RTU Connections

JCOMMs are used to retrofit BCMS to Eaton equipment or other vendors' equipment that is already installed. If the JCOMM has a Monitor, the Monitor is the electrical load. Otherwise, each BCMS card is an electrical load (Figure 3 and Figure 10).

The JCOMM Connections Panel (Figure 11) on the left side of the unit provides Modbus connectors to daisy-chain the JCOMM into the Hub's Modbus (electrical load) chain.
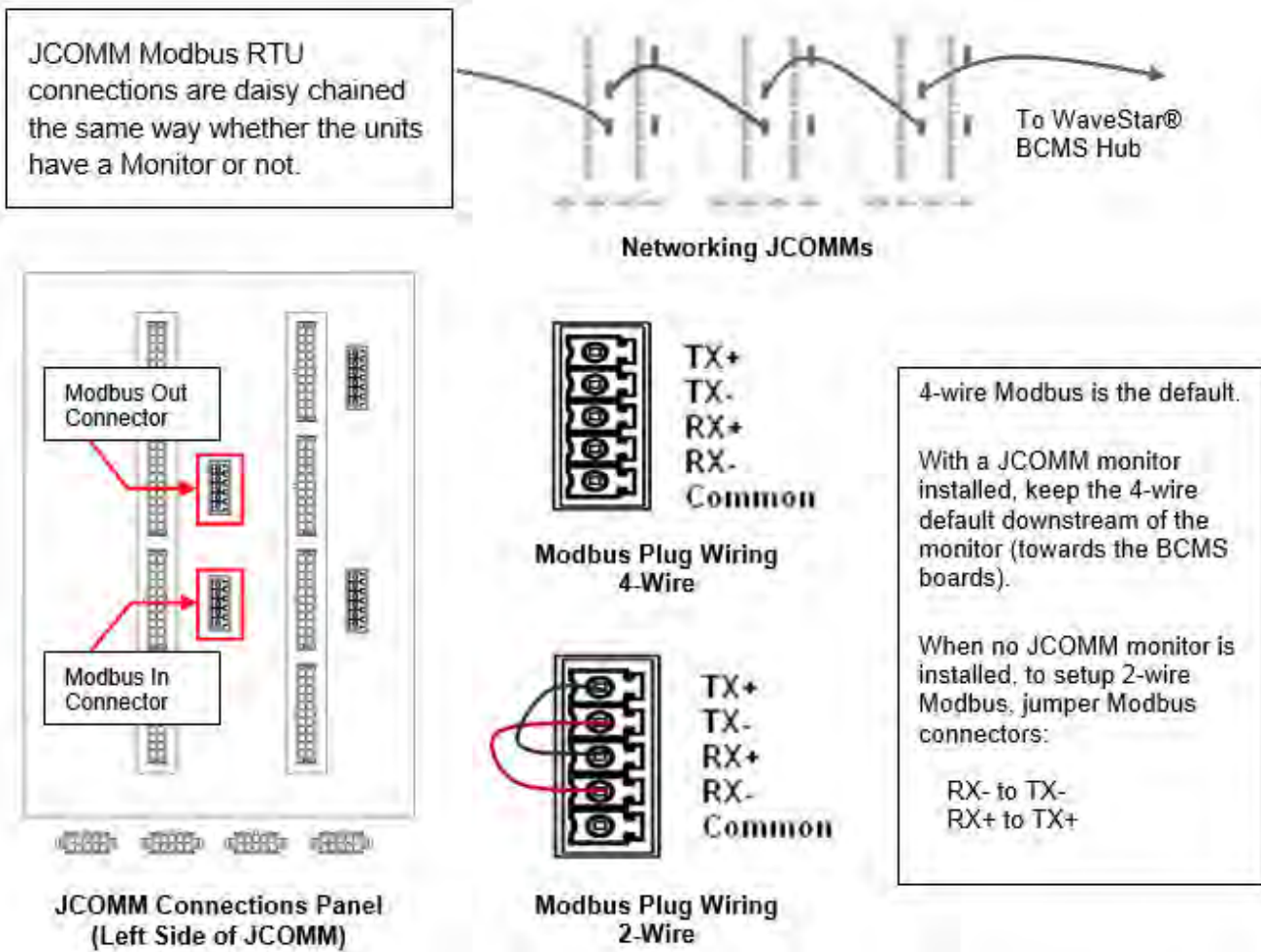
Figure 10. JCOMMs with and without Monitor

When a JCOMM has a Monitor, the Monitor is an electrical load in the device chain to the BCMS Hub.

Without a Monitor, each BCMS card in the JCOMM is an electrical load.

Figure 11. JCOMM Modbus Connections

3.4.3   Bus System End Feed Modbus RTU Connections

Eaton Bus System products are connected to the BCMS Hub Modbus device chain from the Accumulator PCB (Figure 12 and Figure 13) in the BCMS compartment of the End Feed. The Accumulator PCB location varies by Bus System product. PowerWave 2 Bus Systems are shown in Figure 12. Other Eaton Bus Systems are similar.

Figure 12. Accumulator PCB Locations, PowerWave 2 Bus Systems

Accumulator PCB

BCMS Extension,
Compact End Feed,
PowerWave 2 Bus System
(Top View)

BCMS Extension,
Standard End Feed,
PowerWave 2 Bus System
(Side View)
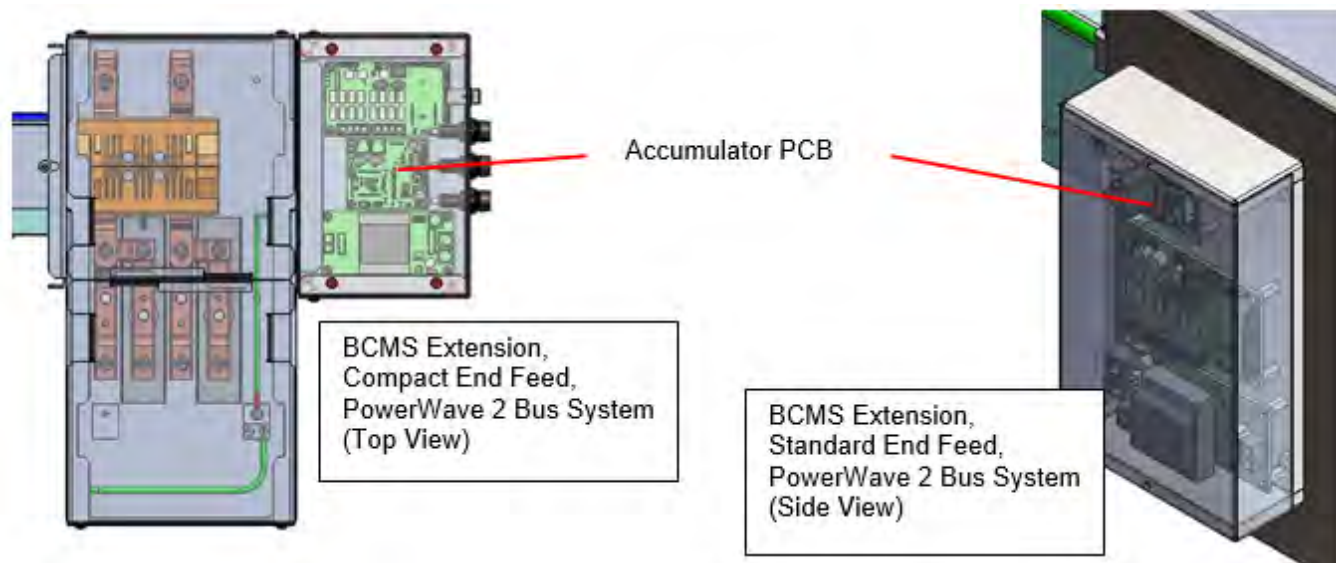
Figure 13. Accumulator PCB Modbus Connections

4-wire Modbus RTU is the default
configuration.

For 2-wire Modbus install jumpers on
J1 and **J2**.

J5 is the upstream Modbus connection
for the BCMS Hub primary chain
(electrical loads)

J6 is input from another daisy-chained
Accumulator PCB or other unit in the
BCMS Hub's electrical load chain.
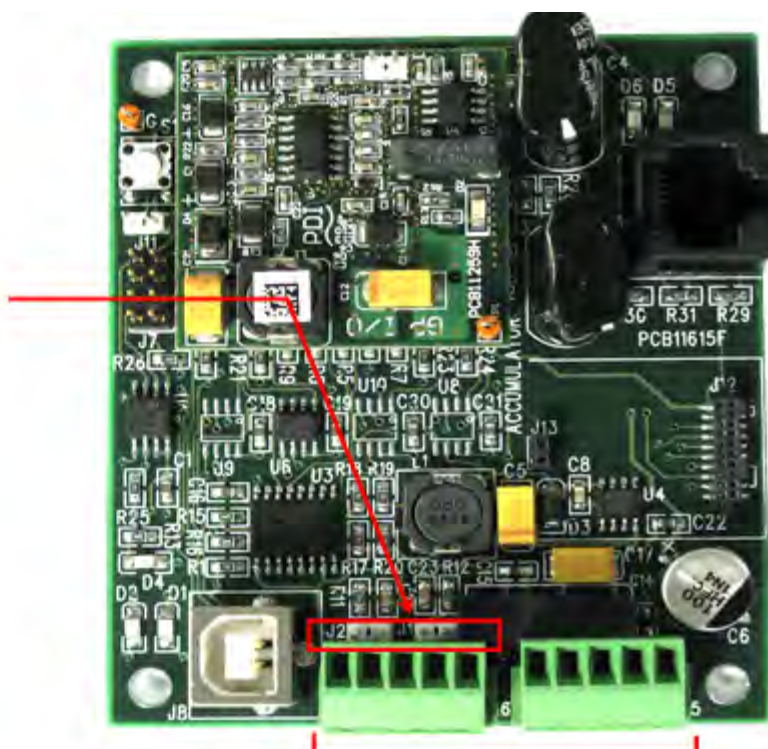
J6: G RX⁻ RX⁺ TX⁻ TX⁺   J5: G RX⁻ RX⁺ TX⁻ TX⁺

Customer Modbus Connections

Installation

Chapter 4 System Setup

4.1   Administrative Setup

4.1.1   Logging In/Logging Out

Anyone can view the different display screens without logging in, but a user with an appropriate access level must log in to use controls or make changes to other parameters.

Figure 14. Logging In and Out from Home Screen
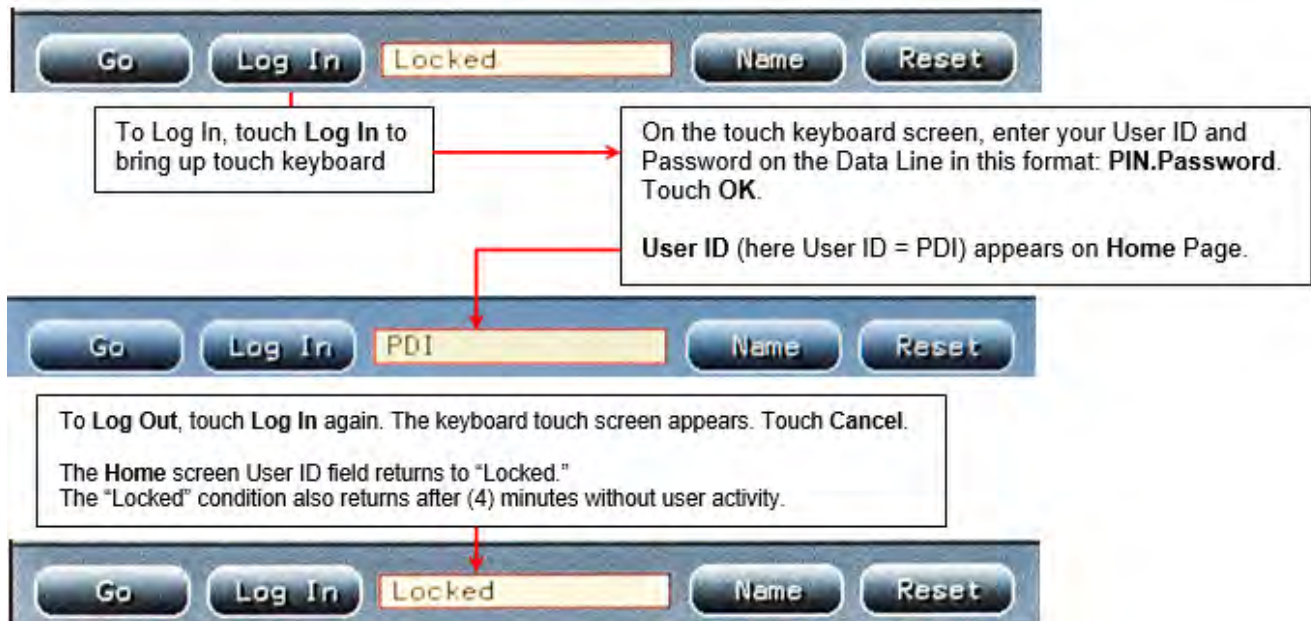
4.1.2   Access Level

BCMS Hub security is based on the identification of each user by a PIN with an associated password. The PIN identifies the user and the password allows access. The **user name** associated with the PIN is displayed on the **Home** page when a user logs in. This scheme provides a login history and accurate forensics if there is problem with the BCMS Hub.

The BCMS Hub has three access levels that require logging in:

1. **Eaton:** This level has authorization for all actions except clearing the Event Log. Eaton access is required to use the Configuration screen.

2. **Service:** This access level is for Eaton-authorized service representatives. This level has authorization for all actions except using the **Configuration Screen** and clearing the **Event Log**.

3. **Administrator:** This access level has authorization for all actions except using the **Configuration Screen**, which is not available to users. The Administrator is the <u>only</u> user who can clear the **Event Log**.

If you attempt to use a screen control without correct authorization, the BCMS Hub Voice Response Unit will state, "You do not have access to this function."

### 4.1.3 Initial Administrator Access

To initially set up BCMS Hub users, Eaton provides a temporary Administrator PIN and password. The initial **PIN.password** is 100.23223. The administrator should:

1. Log in on the **Home** screen.

2. Navigate to the **Users** screen.

3. Change the administrator **PIN** and **password** and then keep them secure.

4. Set up each user's security information as described in the following sections.

After initial startup, commissioning, testing, or restart, the administrator should clear any alarms that occurred. Alarms must be separately cleared on each device that has alarms.

4.1.4 Users Screen

Figure 15. Users Screen
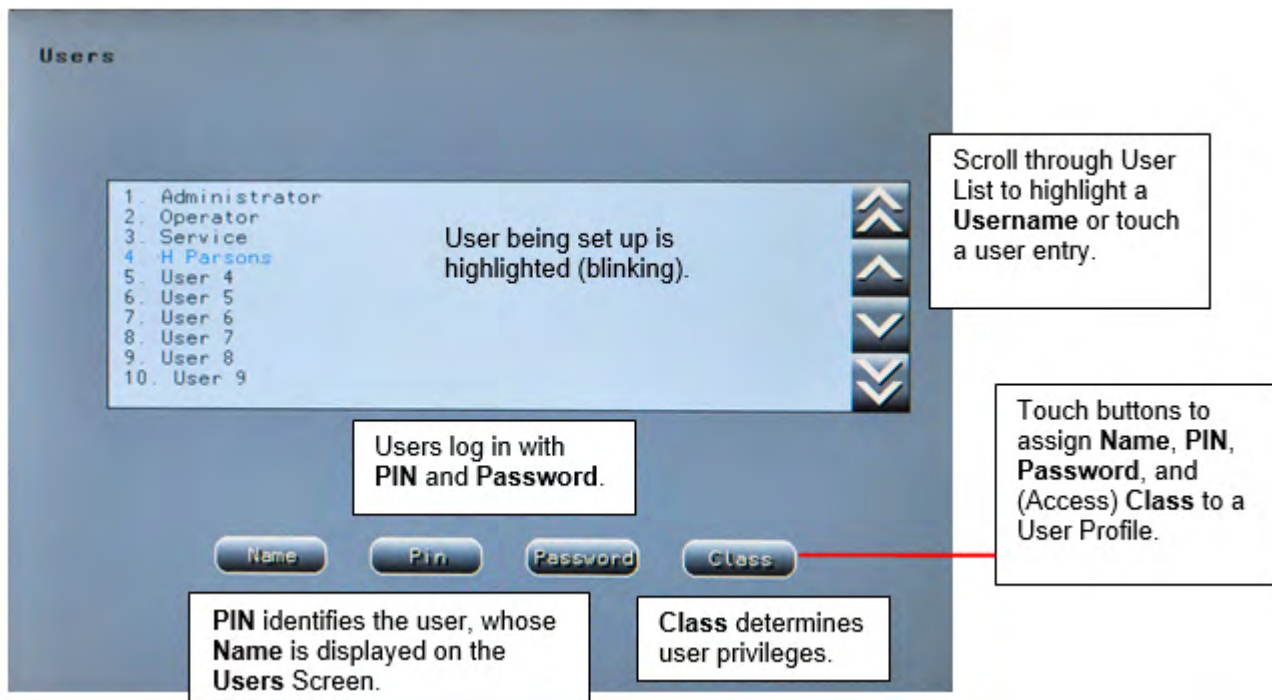
Touch the **User** button at the bottom of a display screen to display the **Users** Screen (Figure 15).

The **Users** screen

- lets the Administrator set up new users and their level of access to the BCMS Hub, and

- displays the names of registered users and unassigned slots.

Scroll through the user list using the scroll bar on the right side of the screen to highlight a user name.

Set up or modify a user's profile using the **Name**, **PIN**, **Password,** and **Class** buttons. Each user must be assigned a password and PIN.

- The Administrator sets a user's access class by touching the **Class** button and entering the first letter of the class:

- A: Administrator

- S: Service

The Eaton class is hardcoded and cannot be assigned by the administrator.

4.2   Settings Screen

The Settings screen has panels for Modbus RTU, Ethernet, manual Time setting, and the Home page banner heading.

Touch the **Setup** tab to display the **Settings** screen.

Figure 16. Settings Screen
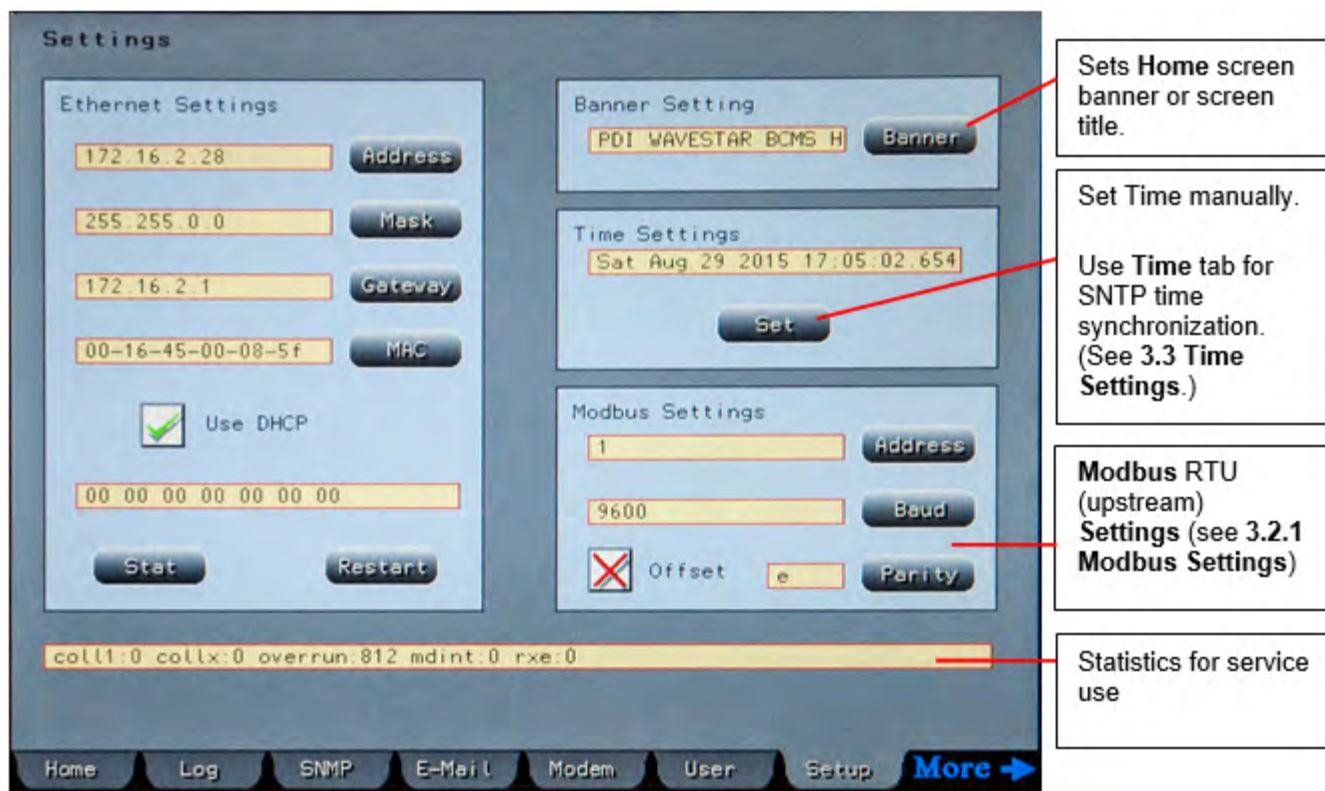
4.2.1   ModBus Settings

The <u>downstream</u> link from the BCMS Hub to its monitored devices is always Modbus RTU at 9600 bps.

Modbus RTU parameters for <u>upstream</u> link from the BCMS Hub to the BMS or other Modbus client device is specified in the **Modbus Settings** panel:

- **Address** The Modbus address of the BCMS Hub as addressed from the upstream Modbus client device can be changed by touching the Address button and entering a value from 1 to 246. Default address is 1.

- Baud rate <u>upstream</u> from the BCMS Hub can be 9600 or 19200 bps.

- Modbus RTU upstream parity can be even (e), odd (o) or none (n).

- **Offset** determines whether the BCMS Hub Modbus address is added to downstream device addresses when displayed on the **Home** page device list.

- If Offset = X, the Modbus addresses of downstream devices as seen from the Hub are shown.

- If Offset = √, the Modbus address of the BCMS Hub is added to downstream device addresses for display. These are Modbus addresses as seen from the upstream client device, such as a BMS or DCIM system.

Figure 17. Modbus Settings: Modbus Address Offset

4.2.2   Ethernet Settings

IMPORTANT! After changing any Ethernet settings, you must restart the BCMS Hub. Touch **Restart** in Ethernet Settings (Figure 16) and wait for the system to reinitialize itself.

The Monitor backpanel has an Ethernet port. A customer-supplied Ethernet cable must be physically attached to the customer network and an Ethernet IP address must be set before Modbus TCP/IP or SNTP Time Synchronization is configured.

The **Ethernet Settings** panel in the **Settings** screen (Figure 16) allows the operator to set an IP address if a different address than the DHCP address is required.

- Toggle **Use DHCP** button:

- Green check mark(√) : Use DHCP to assign IP address

- Red X: Do not use DHCP; provide IP value in **Address**.

- **Address** is the Ethernet IP address of the Switch, which can be set directly or by DHCP.

- If **Use DHCP** has a green check mark (√), the DHCP-provided address will be shown as the IP address in **Address**.

- If **Use DHCP** has a red X, DHCP is not used to set the IP address. Enter an IP address in **Address** for the BCMS Hub.

- Press **Mask** to enter Ethernet IP mask address.

- Press **Gateway** to enter Ethernet Gateway.

- **MAC ID** is set in the factory and cannot be changed.

- **Stat** button: shows communications statistics (a service diagnostic function).

- **Restart** button: restarts the Monitor. The Monitor must be restarted when **Ethernet Settings** change.

4.3 Time Settings

Time stamps are important data for log entries and alarms. The BCMS Hub's clock should be synchronized with clocks in monitored equipment to accurately diagnose problems affecting multiple units. You can set the BCMS Hub's clock manually or with the Time Synchronization feature.

4.3.1 Manual Time Setting

To manually set the clock, enter a date and time in **Time Settings** on the **Settings** screen.

Press the **Set** button, which will bring up the **Keyboard** Screen. Enter time and date.

4.3.2 Time Synchronization Settings Screen (SNTP)

The Time Synchronization feature with SNTP requires an Ethernet connection.

Prerequisites:

1. The **Ethernet Settings** on the **Settings** screen must be configured.

2. The Ethernet port must be connected to a network with a reachable time server supporting SNTP.

3. You must have the IP address of the time server. The time server could be a dedicated time server possibly with a GPS receiver, a local computer running time server software, or a time server on the Internet. You should preferably use a local time server. All equipment related to the BCMS Hub should use the same time server if they have access.

Figure 18. TIME Screen
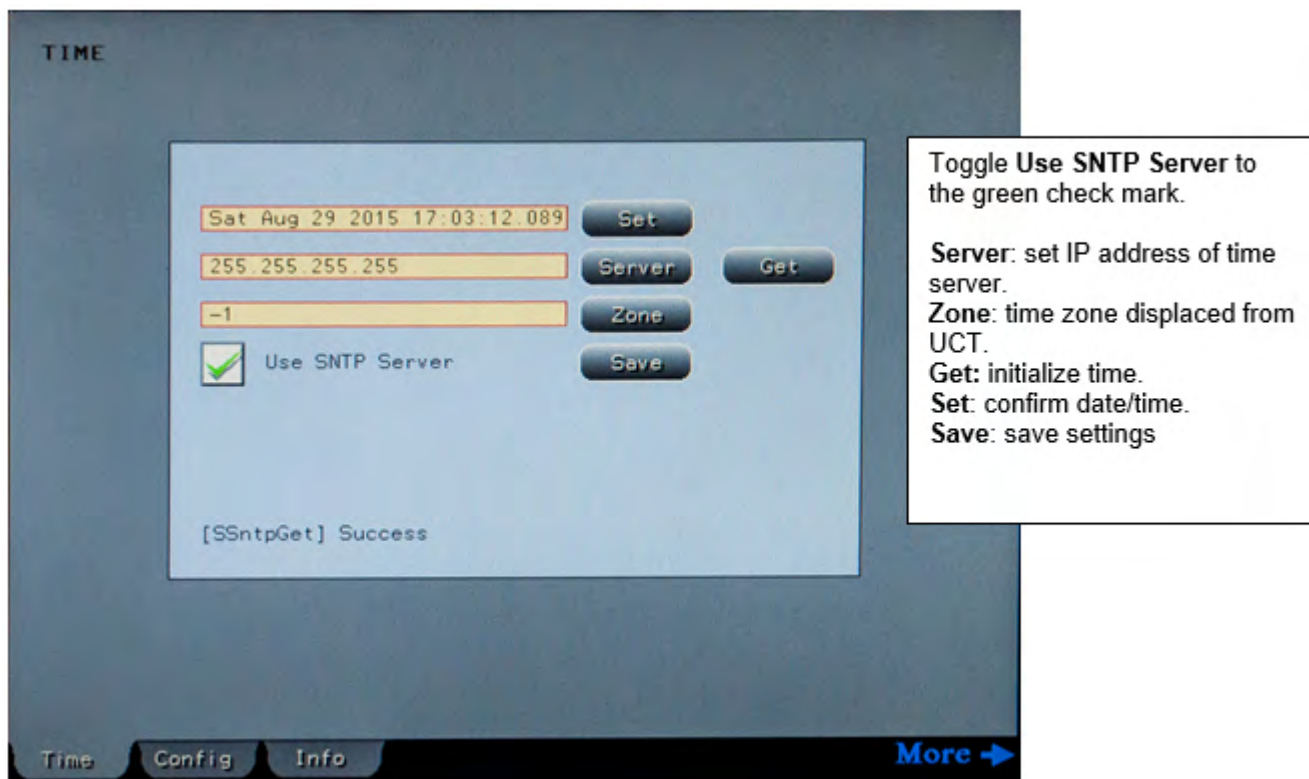
To have the BCMS Hub use Simple Network Time Protocol (SNTP), follow these steps:

1. Press **Time** button at the bottom of the screen. The **TIME** screen displays (Figure 18).

2. Press the **Server** button. Enter the time server's IP address.

3. Press the **Zone** button. Enter the time zone offset from Coordinated Universal Time (UCT) (-4 is Eastern Daylight time).

4. Make sure the **Use SNTP Server** checkbox has a green check. Touch **Use SNTP Server** to toggle between the green check (use SNTP Server) and red X (do not use SNTP Server).

5. Press **Get** to initialize time and verify that Time Synchronization is working.

6. Touch **Set** to confirm date/time.

7. Touch **Save** to save settings.

4.4 Alarm Notification

When an alarm or warning is raised on any device monitored by the BCMS Hub, it is logged in the **Event Log** and an alarm or warning symbol appears on the device line on the **Home** screen. Notification of new alarms or warnings can also be sent by email or modem dial-out as a summary alarm, indicating simply that a new alarm or warning has occurred somewhere in the Hub's device chain. The user should check the **Event Log** and **Home** screen for affected devices.

4.4.1 Alarm Notification by Email

The BCMS Hub can email a summary alarm notification by Simple Mail Transfer Protocol (SMTP). A TCP/IP connection to the BCMS Hub must be connected and initialized. The IP address of the SMTP server, domain, name, "from" email address, and the recipient's email address are set on the **E-Mail** screen.

The user can check that device for more specific information. The **Event Log** will also describe the alarm condition.

Figure 19. Email Setup Screen
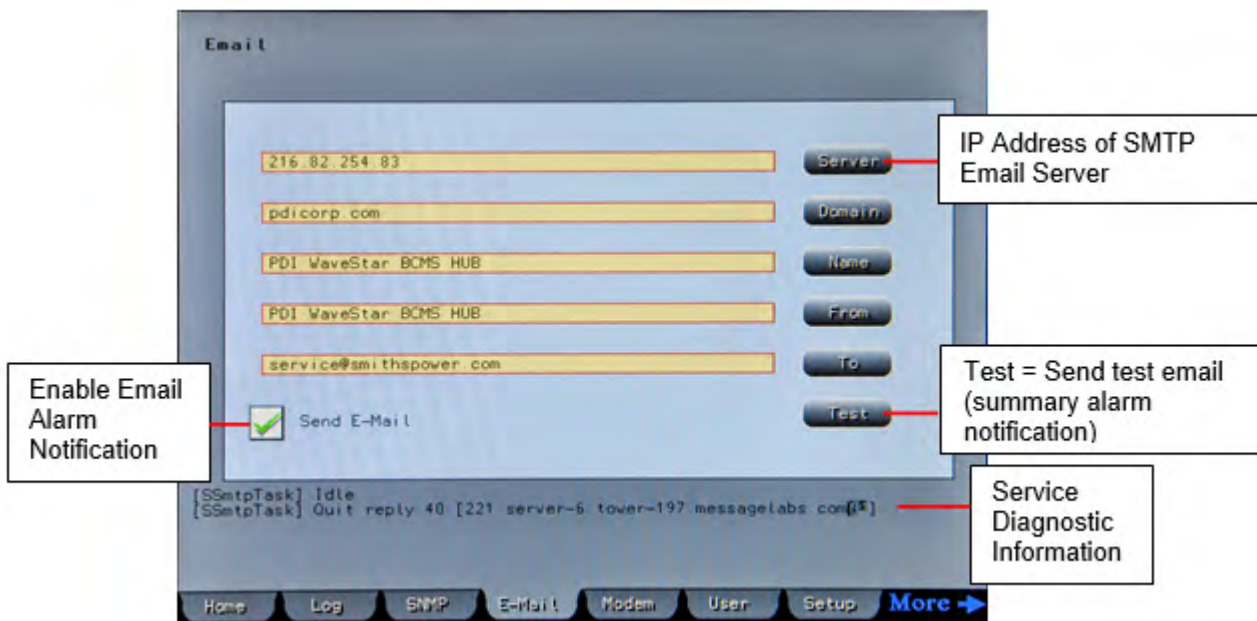
To setup Email Notification, touch the **E-Mail** tab on any screen (Figure 19). Enter email Server, Domain, Name, and email to/from names using screen buttons.

To have emails sent to a list of contacts within an organization, setup a group email address through your mail portal and use this address as the **To** address on the **Email** screen.

The **Send Email** box has a red X when email notification is not enabled. Toggle the box to a green check mark to send email alarm notifications.

4.4.2 Alarm Notification by Modem

A 9600 bps dial-out modem is a configurable option. When this option is selected, the modem is installed on the Monitor backpanel. Touch the Modem tab to display the Modem screen (Figure 20). The modem can be used to send a summary alarm to one or two specified destinations.

Figure 20. Modem Setup Screen
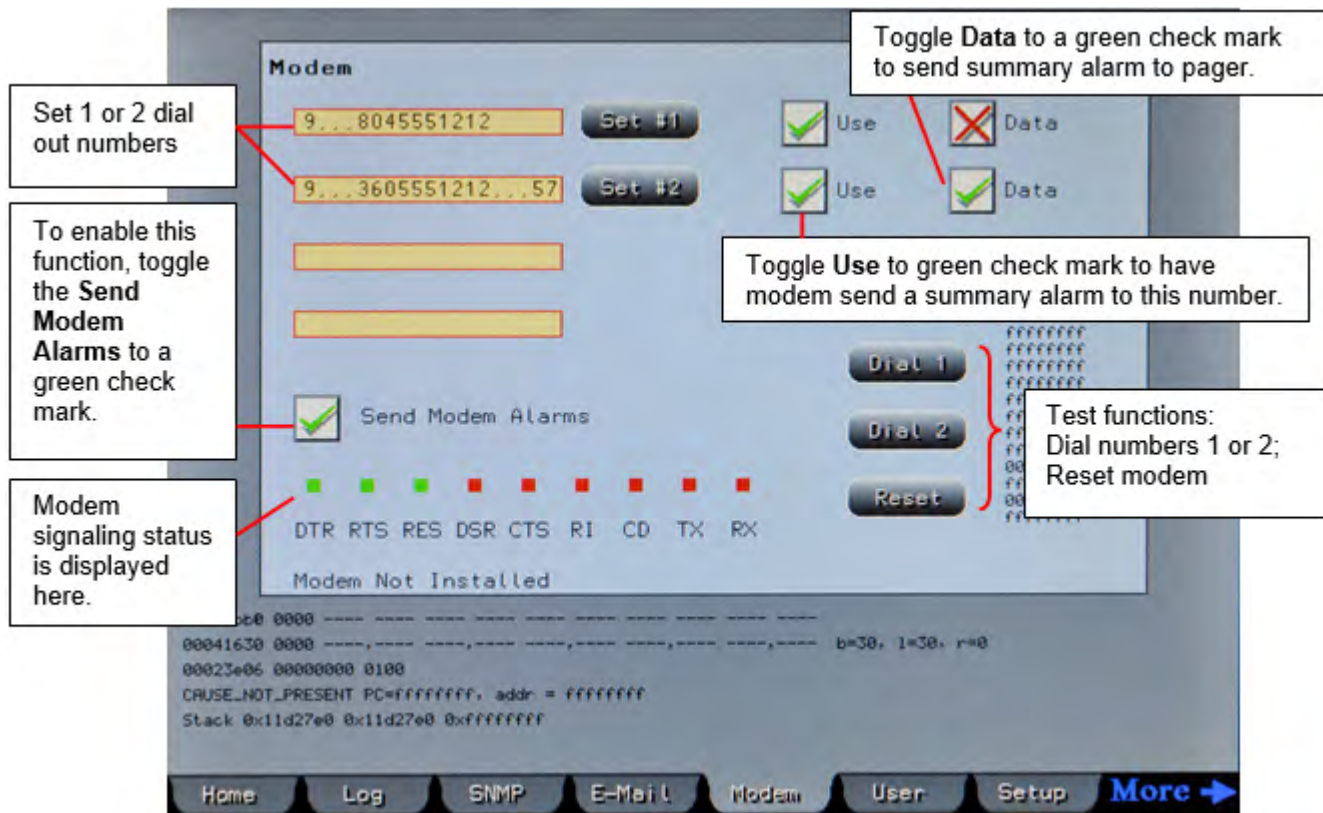
Touch **Set #1** to enter the number for destination 1. If dialing out with a 9, add commas to pause the modem slightly before it dials the outside number. **Set #2** lets you set a second number.

Toggle **Use** to a green check mark to enable the number.

Toggle **Data** to a green check mark to send data to a pager. Add commas after the telephone number (to pause the modem) and then add numbers to be sent to a pager. The data in the **Modem** field for dial-out number 1 or 2 will have this format:

9,,,8045551212,,,579802(Dial out code/commas to pause modem/pager number/commas to pause modem/ numeric data to be sent to pager)

After numbers are set up, toggle **Send Modem Alarms** to a green check mark to enable sending a summary alarm via modem.

To test the modem dial out feature, touch **Dial 1** or **Dial 2** to force the modem to dial number 1 or 2.

Touch **Reset** to reset the modem.

4.5 Other Screens

These screens are not for customer use:

- **Config** tab: the **Configuration** screen (Figure 21) is setup by Eaton at the factory and requires Eaton authorization to make changes, but any user can view the screen. Eaton uses the **Configuration** screen to describe the system to the display software. Touch the **Config** button to view. The screen must be configured as shown.

- **Info** tab: the **Info** screen is for use by Eaton Service personnel.
- **SNMP** tab**:** SNMP is not supported on the BCMS Hub at this time.

Figure 21. Configuration Screen

System Setup

Chapter 5 Operation: Device Information

The BCMS Hub retrieves and displays information from the points list of each of its monitored devices. Information includes alarms, warnings, power measurements, and device parameters, such as circuit breaker amperage and alarm thresholds.

5.1   Home Screen

Figure 22. Home Screen

5.2   Startup Scans

At startup, the BCMS Hub scans for devices in the Hub's device chain. The Hub recognizes device types from device IDs on PCBs, which are then displayed under the "Device" header on the Home screen. The first scan after startup is slow as the Hub builds its device chain; subsequent scans are faster. "No Device" is displayed when the Hub receives no response from a Modbus address.

An authorized user can touch Reset to require the Hub to rebuild its device chain from scratch.

5.3 Viewing Device Information

The BCMS Hub displays formatted information from each device's points list.

To view device information, highlight the device line on the **Home** screen (by touching the line or scrolling to it) and touch **Go**. The first screen for that device appears. Device screens form a looped chain. Touching **More** or **Next** on a device screen advances to the next screen in the loop.

Using controls requires user login with correct authorization. If you attempt to use a control without correct authorization, the Voice Response Unit will state, "You do not have access to this function."

5.4 Clearing Alarms and Warnings

Alarms and warnings must be cleared from device screens. Alarms cannot be cleared individually. All alarms and warnings for a device are cleared together.

5.5 Bus System Device Information

5.5.1 End Feed

End Feed BCMS screens are the same for PowerWave Bus Systems™, PowerWave 2™ Bus Systems, and PowerWave Silver™ Bus Systems. Point values in the End Feed screens correspond to point values in the End Feed **PM Input Board** points list.
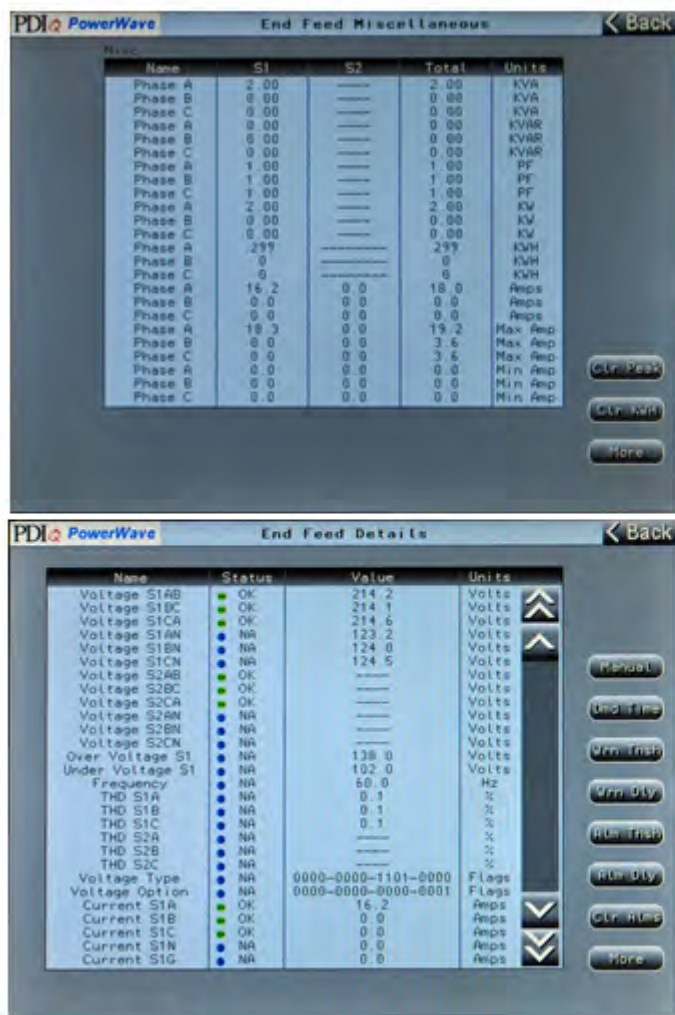
The first screen to display is the **End Feed Summary**. Device screens form a loop: touch **More** on each screen to cycle through the screen loop, returning to **End Feed Summary** (Figure 23 and Figure 24).

Figure 23. End Feed Summary Screen
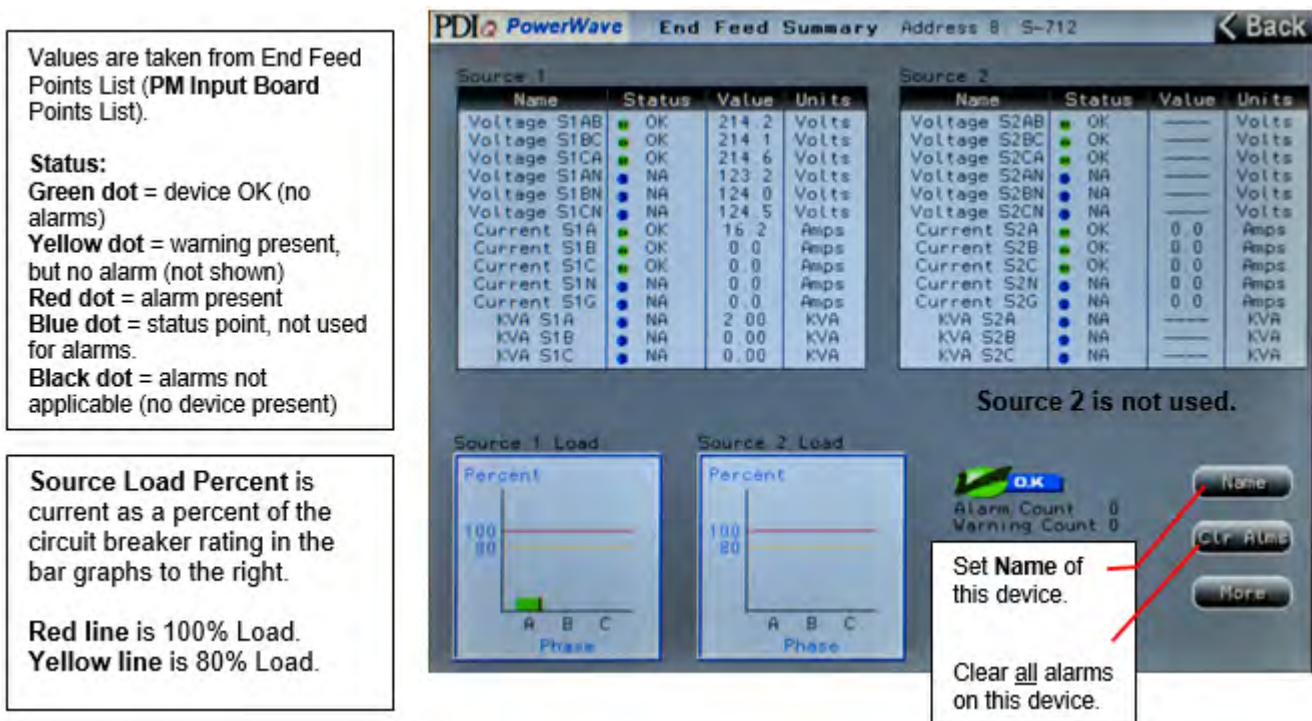
If a control is not present for a desired operation, you can use the Manual control to set the register value for a point.

Figure 24. End Feed Additional Device Screens
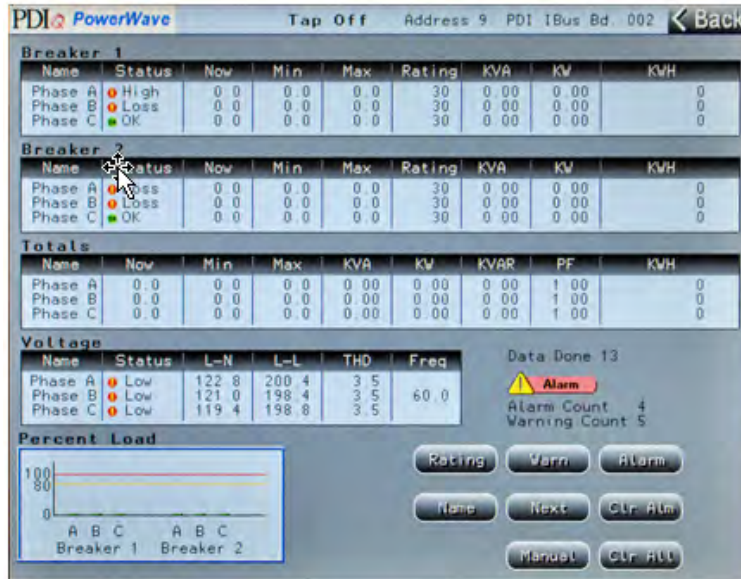

5.5.2 Tap-Off Box

A Bus System Tap-Off Box has two (2) device screens (Figure 25). Point values on the screens correspond to point values in the Tap-Off Box **iBus points list**.

Commonly used operations are available as screen controls.

If a control is not present for a desired operation, you can use the **Manual** control to set the register value for a point.

Figure 25. Tap-Off Box Screens

Controls require user login with authorization:

Name: Set name for this Tap-Off Box shown on Tap-Off Box banner line.

Rating: Set circuit breaker rating for specified breaker.

Warn: Set warning threshold for a circuit.

Alarm: Set alarm threshold for a circuit.

Manual: Set point value manually in format:
Register number point value.

Clr Alm: Clear alarms for this device only.

Clr All: Clear alarms and all accumulated readings for this device only, such as Min/Max and KWH.

Next: Advance to next device screen for this TOB (screens form loop).

Percent Load is current as a percent of the circuit breaker rating in the bar graph above.

Red line is 100% Load.
Yellow line is 80% Load.

Tap-Off Box Screen 2

Status:
Green dot = device OK (no alarms)
Yellow dot = warning present, but no alarm (not shown)
Red dot = alarm present
Blue dot = status point, not used for alarms.
Black dot = alarms not applicable (no device present)

Scroll through point information.
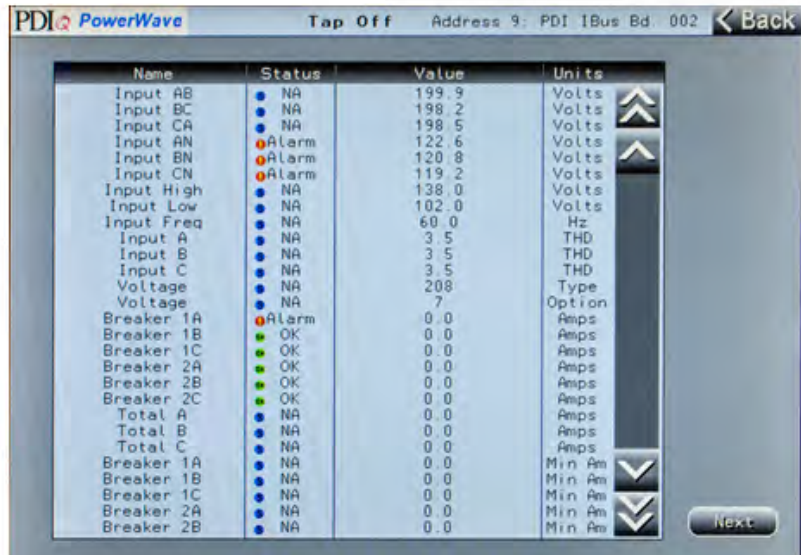
5.6   Panelboard Device Information

RPPs and JCOMMs have points lists representing panelboards. The following points lists can be used with BCMS Hub:

- **Normal** or **Standard** allows customization of warning and alarm levels for each panelboard circuit.

- **KWH** provides for accumulation of KWH data for each circuit, but warning and alarm levels are the same for all panelboard circuits.

- **IEC** is specialized for IEC panelboards.

5.6.1 BCMS Normal/KWH Points Lists

Figure 26. Panelboard BCMS: KWH Points List

A panelboard device screen provides a complete view of the panelboard and all circuits.

Touch **Next** to cycle through headings showing different points.
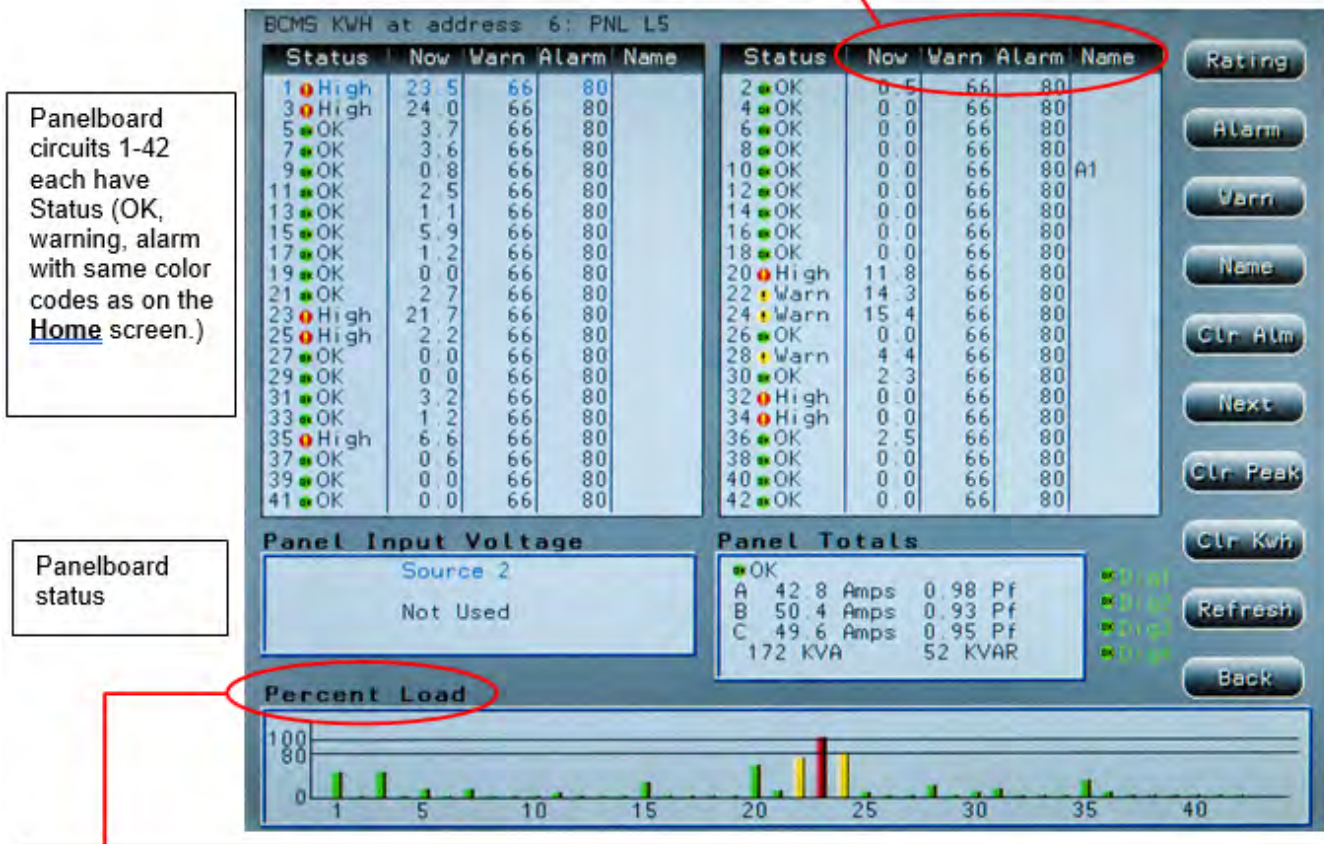
Panelboard circuits 1-42 each have Status (OK, warning, alarm with same color codes as on the <u>Home</u> screen.)

Panelboard status

Circuit Percent Load

The last **current** measurement is shown for each panelboard circuit (1-42) as a percent of the circuit breaker rating.

- **Green bar** shows current in is in acceptable range for the circuit.
- **Yellow bar** shows the circuit has crossed the <u>warning</u> value, shown in **Warn** column.
- **Red bar** shows the circuit has crossed the <u>alarm</u> value, shown in **Alarm** column.

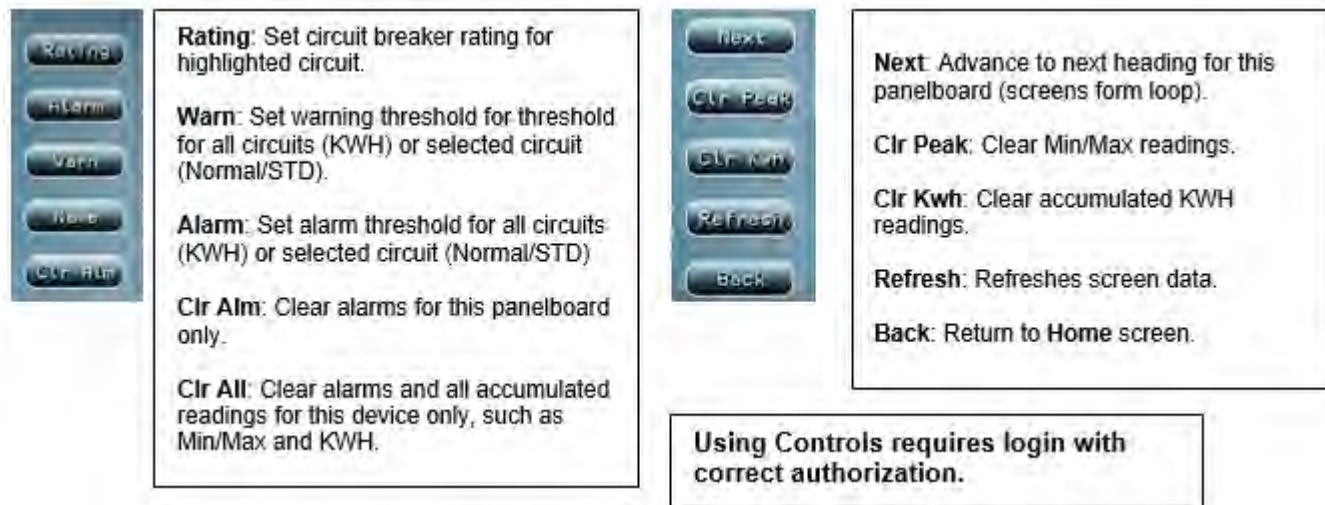In the bar graph above, circuit 22 and 24 are shown in warning, while circuit 23 is in alarm.

Panelboards monitored by BCMS Normal Points Lists and BCMS KWH Points Lists are similar in layout and controls (<u>Figure 26</u> and <u>Figure 27</u>).

The **Warn** and **Alarm** buttons set warning and alarm threshold values:

- For **KWH** points list, the same warning and alarm values are set for <u>all circuits</u>.

- For the **Standard** or **Normal** points list, warning and alarm values are set for <u>each circuit</u> individually.

Figure 27. Panelboard BCMS: Screen Controls for KWH Points List

Rating: Set circuit breaker rating for highlighted circuit.

Warn: Set warning threshold for threshold for all circuits (KWH) or selected circuit (Normal/STD).

Alarm: Set alarm threshold for all circuits (KWH) or selected circuit (Normal/STD)

Clr Alm: Clear alarms for this panelboard only.

Clr All: Clear alarms and all accumulated readings for this device only, such as Min/Max and KWH.

Next: Advance to next heading for this panelboard (screens form loop).

Clr Peak: Clear Min/Max readings.

Clr Kwh: Clear accumulated KWH readings.

Refresh: Refreshes screen data.

Back: Return to **Home** screen.

Using Controls requires login with correct authorization.

5.6.2 BCMS IEC Points List

IEC panelboards can have (72) circuit breakers, requiring a denser screen layout than standard North American 42-circuit panelboards (Figure 28). However, the general layout of the screen, meanings of fields, and screen controls is the same as for KWH Points Lists.

Figure 28. Panelboard BCMS: IEC Points List

Touch **Next** to change column heading. Only (1)
column heading is changed per touch.
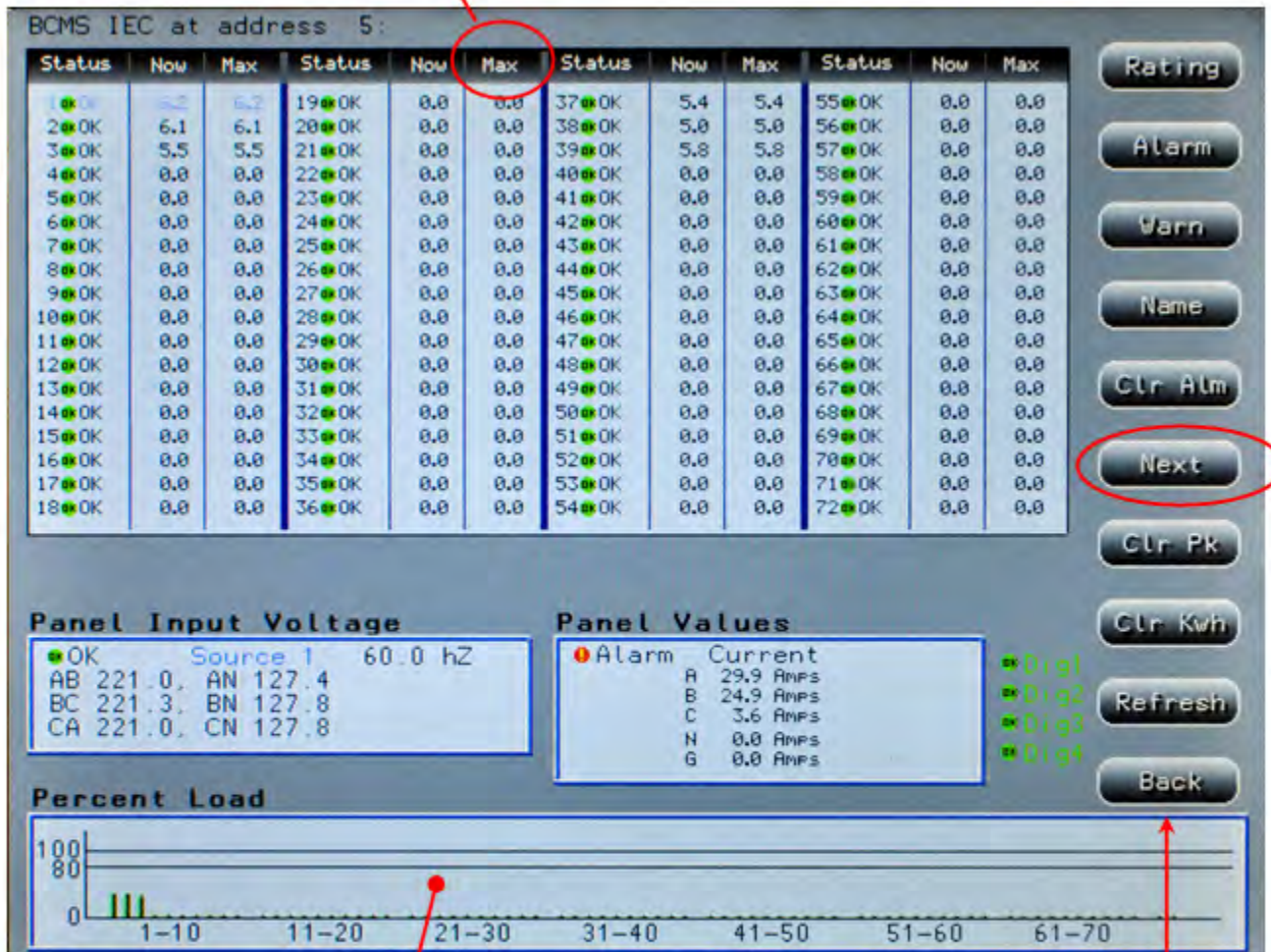
Circuit Percent Load

The last **current** measurement is shown for each panel
board circuit (1-42) as a percent of the circuit breaker rating.

- **Green bar** shows current in is in acceptable range for the
circuit.
- **Yellow bar** shows the circuit has crossed the warning
value, which is 80% of the circuit breaker rating.
- **Red bar** shows the circuit has crossed the alarm value,
which is 100% of the circuit breaker rating.

See **Figure 27, Panelboard BCMS,
Screen Controls for KWH Points
List.** Screen controls are nearly
identical for IEC BCMS.

5.7 Event Log

Touch the **Log** tab to display the **Event Log** ([Figure 29](#)). **The Event Log** is a record of all events that have taken place while the BCMS Hub has been operational or since the **Log** was last cleared. Events include alarms, warnings, clearing alarms, and clearing the Event Log. The **Event Log** records a maximum of 512 entries and is stored in nonvolatile memory.

The **Clear** button clears the **Event Log** completely. Events cannot be cleared individually. *Only a user with Administrator authorization can clear the log.*

Figure 29. Event Log
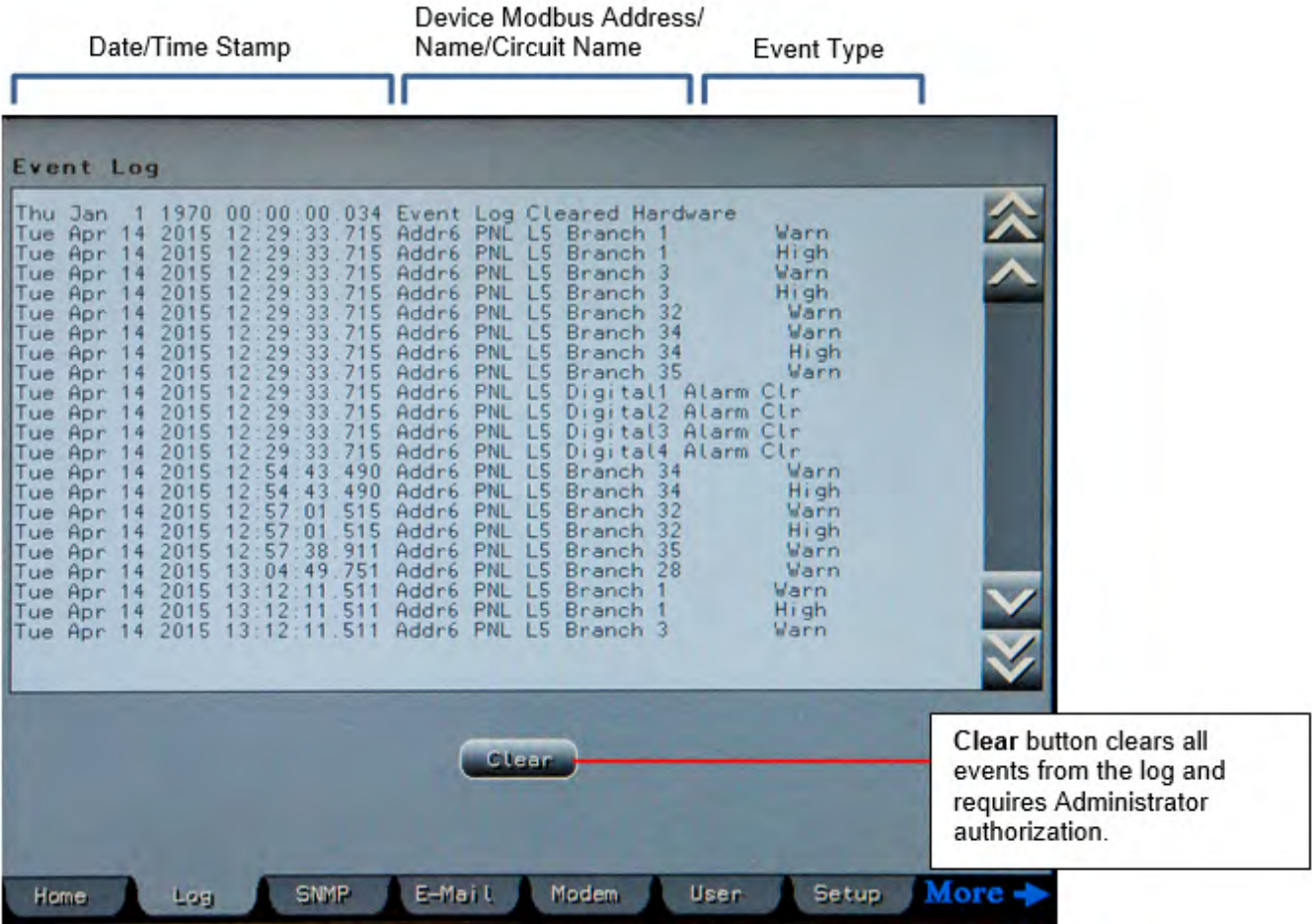
5.7.1 Download Event Log to PC

The front panel has a USB connection, which lets you connect a PC to the BCMS Hub and download the Event Log. Connect the male end of a USB cable to the connector on the front panel. The Event Log is downloaded as a spreadsheet to the PC. No other function can be performed: the PC cannot request information or send commands to the BCMS Hub.

This feature can be used by service personnel to download the Event Log and transmit it for analysis without connecting to the customer's own network.

Chapter 6 Glossary

BCMS	Branch Circuit Monitoring System.
BMS	Building management system.
DCIM	Data Center Infrastructure Management.
IEC points list	BCMS panelboard points list or Modbus register map that provides power measurements and accumulations similar to KWH points list for IEC-type panelboards.
JCOMM	Eaton product to retrofit BCMS to installed Eaton or non-Eaton equipment.
KWH points list	BCMS panelboard points list or Modbus register map that emphasizes the accumulation of power measurements.
Normal Points List	BCMS panelboard points list or Modbus register map that allows customization of alarms and warnings by panelboard circuit.
RPP	Remote Power Panel.
Points List	Modbus register map; ordered collection of "points," where each point is a Modbus register or a pair of adjacent Modbus registers.
Summary Alarm	Notification that a new alarm has occurred something in the set of monitored devices.

Glossary

Chapter 7 Bibliography

Eaton manufactures a variety of power distribution products. Product documentation can be downloaded from Eaton website:

https://www.eaton.com/us/en-us/products/backup-power-ups-surge-it-power-distribution/power-distribution-for-it-equipment.html