Eaton® PDI WaveStar Color Monitor

Setup and Operation Manual

Powering Business Worldwide

p/n: P-164001109
Revision 02

Thank you for your recent purchase of an Eaton PDI WaveStar Color Monitor.

NOTICE

For safety reasons as well as to ensure optimal performance of your Eaton PDI WaveStar Color Monitor, 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, see paragraph 2.5 *Getting Help*.

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 Color Monitor Setup and Operation

Cover Photo: Eaton PDI WaveStar Color Monitor Home Screen

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.

⚠CAUTION

The WaveStar® Color Monitor must be installed by licensed electricians or by Eaton-authorized technicians.

Follow safe electrical work practices:

- Read, understand, and follow the instructions before installing this product.
- Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel and in accordance with all local safety codes. This document should not be viewed as sufficient by otherwise non-qualified personnel to operate, service, or maintain the equipment discussed.
- Disconnect and lock-out all power supplying equipment before working on or installing WaveStar® Color Monitor components. Use a properly rated voltage sensing device to confirm power is OFF.
- 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.

⚠DANGER

- 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, attaching conduit, and attaching WaveStar Color Monitors 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.

Chapter 2 Introduction

2.1 WaveStar Color Monitor Summary

The Eaton® PDI WaveStar® Color Monitor is a 7-inch color touchscreen which displays power management information for up to twenty (20) Branch Circuit Monitoring System (BCMS) devices and other Eaton devices in the Monitor's downstream Modbus network.

The Color Monitor is incorporated into Eaton products, such as Power Distribution Units (PDUs), Remote Power Panels (RPPs), or JCOMM®s, and can also function as a stand-alone power monitoring station.

Figure 1 shows the Monitor used in a JCOMM.

Figure 1. WaveStar Color Monitor Installed in a JCOMM

NOTE The term PDI in this manual refers to products previous manufactured by Power Distribution, Inc. All service and support for these features are now supplied by Eaton.

2.2 Power On and Access

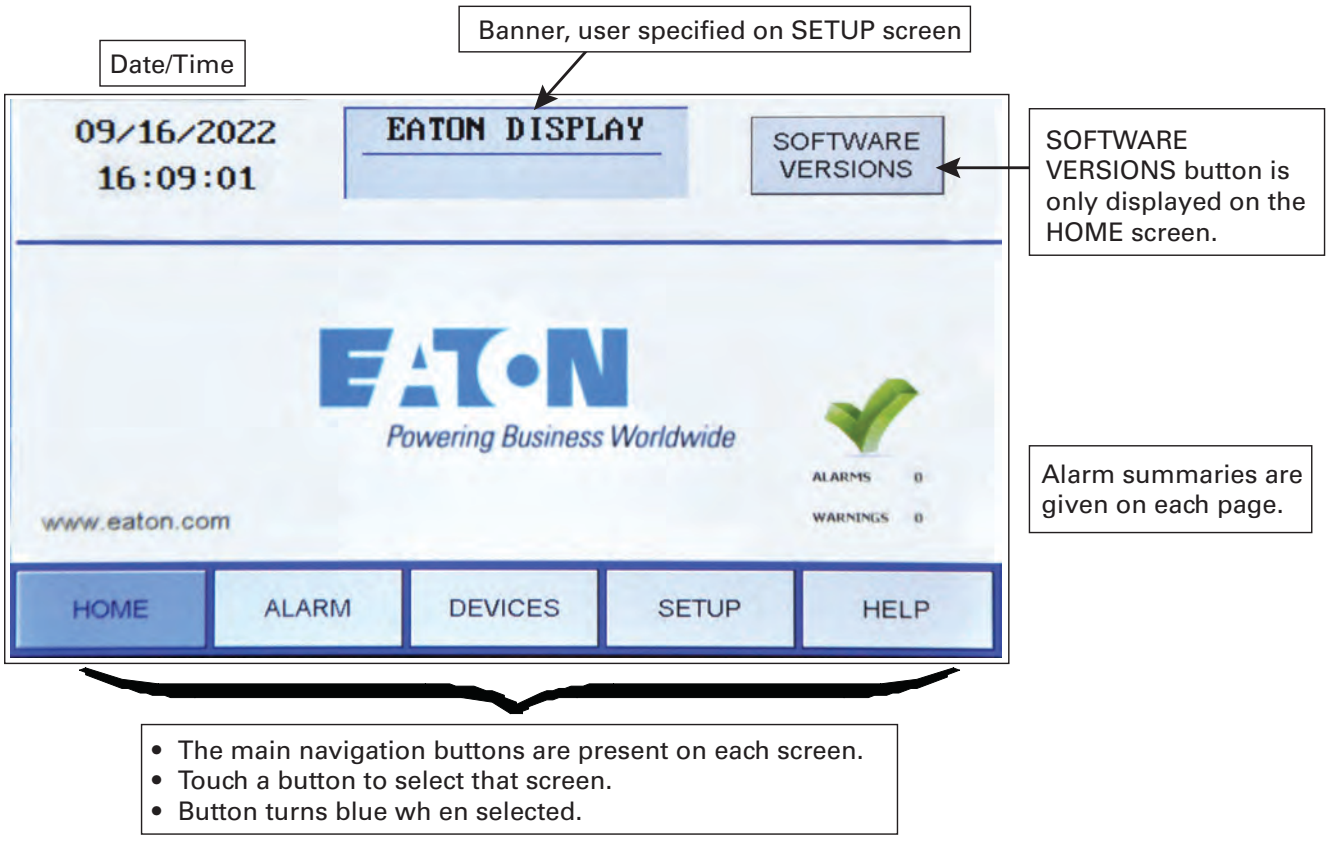
The Color Monitor does not have an on/off switch. The Monitor automatically powers-on whenever power is applied to the unit in which it is installed.

When the unit is powered on for the first time, the Home Screen appears (see Figure 2).

The Color Monitor is accessed by touching the screen. If the unit is powered up and is not touched for 15 minutes, the backlight will turn off to save power. The backlight turns back on when the operator again touches the screen, showing the last displayed screen.

2.3 Screen Summary and Navigation

Figure 2. Screen Summary and Navigation



Setup and configuration information for the Color Monitor are on these screens:

- **SETUP**: system parameters, such as number of devices in Monitor's chain
- Device **SETTINGS**: Device-specific parameters, such as user-specified device name (DEVICES —>Device Name —>SETTINGS)
- **SOFTWARE VERSIONS:** a list of software versions for each device, accessible only from the **HOME** screen.
- **DEVICES** screen gives a list of all devices in the Monitor's chain.
- **SETTINGS** screen lets you set device name and parameters specific to the device.

Setpoints in the device's points list, such as breaker alarm thresholds, are not viewable or modifiable on the Monitor.

Power monitoring information as it is stored in each device's points list (or Modbus register map) is in each **DEVICE READINGS** screen.

Alarms and warnings are displayed on these screens:

- **ALARM:** List of all extant warnings and alarms by device name

- All screens: Warning and alarm summary counts

HELP screen contains Modbus information.

2.4 Entering Data

When you touch a field that requires alphanumeric data, such as device names, passwords, or version numbers, a touchscreen keyboard will appear, prompting you for information based on context. You can toggle between LETTERS and SYMBOLS keyboards, for entering text or numbers (see Figure 3).

Figure 3. Entering Alphanumeric Data

Touch **Cancel** to terminate the operation.

Touch **ENTER** to complete the operation.

Touch here to toggle between **Symbol** and **Letters** keyboards.

2.5 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.

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2.6 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

Chapter 3 Color Monitor Networking

3.1 Supported Protocols

All protocols supported by the Color Monitor can be used simultaneously.

Downstream Protocol The downstream device network has fixed parameters of Modbus RTU, 9600 baud, EVEN parity.

Upstream Protocols There are separate upstream ports for Modbus RTU and Ethernet, supporting these protocols:

- Modbus RTU
- Ethernet port
  - TCP/IP, used by the web page server (see)
  - Modbus TCP/IP
  - SNMP Version 1

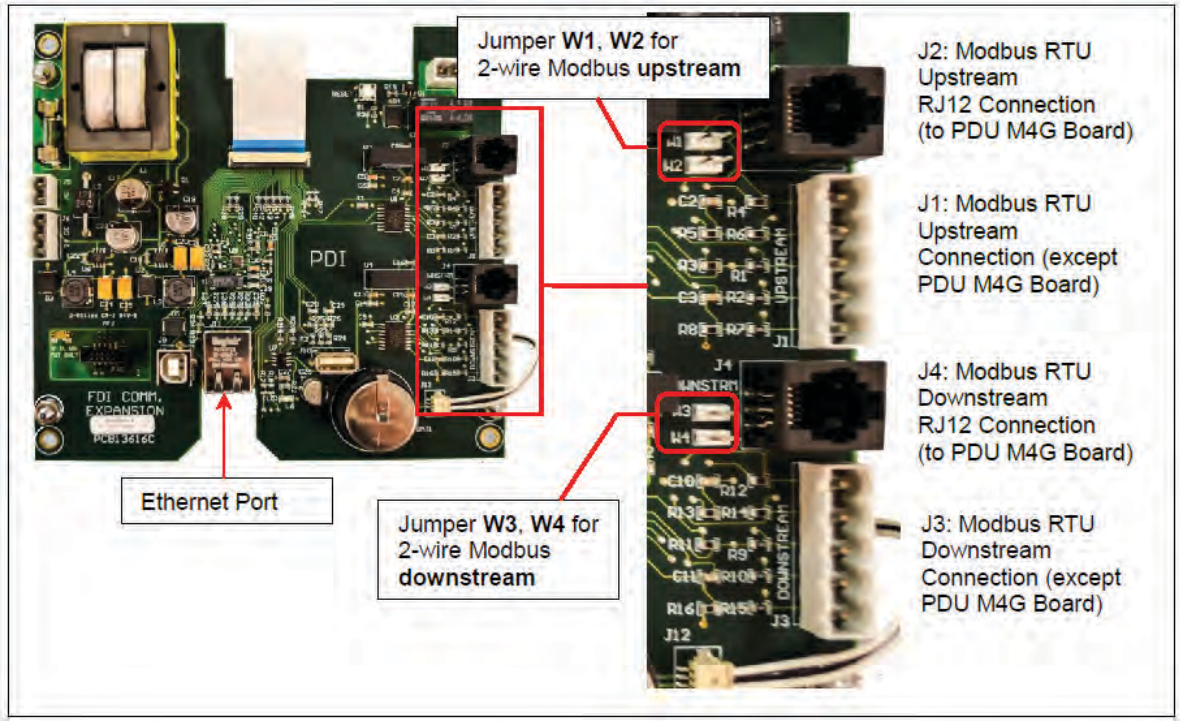
3.2 Monitor Network Connections

The Color Monitor's backpanel has Modbus RTU and Ethernet ports (see Figure 4).

For Color Monitors embedded in Eaton products (PDUs, RPPs, or JCOMMs), Modbus RTU backpanel connections are typically made in manufacturing and extended to a terminal block or external panel for convenient customer access. See paragraph 3.5 *Customer Modbus RTU Connections*.

The customer's Ethernet cable is connected directly to the Monitor's Ethernet port.

Figure 4. Color Monitor Network Connections



3.2.1 Modbus RTU Ports

The Color Monitor has four (4) paralleled Modbus ports:

- J1 and J3 are header/plug connections for connecting to most devices.
  - J1 is the upstream port.
  - J3 is the downstream port.
- J2 and J4 accept standard RJ12 phone cable plugs for connection to an M4G PDU board.
  - J2 is the upstream port.
  - J4 is the downstream port.

The Modbus RTU interface is isolated, and pin designations are given in Table 1:

Table 1. Pin-Out for Modbus Headers

Pin	J1, J3	J2 (for RJ12 plugs)	J4 (for RJ12 plugs)
1	Ground	Not used	Not used
2	RX-	RX-	TX-
3	RX+	TX-	RX-
4	TX-	RX+	TX+
5	TX+	TX+	RX+
6	NA	Ground	Ground

3.2.2 Modbus RTU 2-Wire vs. 4-Wire Configuration

Eaton devices have two (2) jumpers near their Modbus ports for configuring 2-wire vs. 4-wire Modbus RTU (see Figure 4). The Monitor's 2-wire configuration jumpers are W1 and W2 (upstream) and W3 and W4 (downstream). Upstream and downstream chains can be differently configured.

For 2-wire configuration:

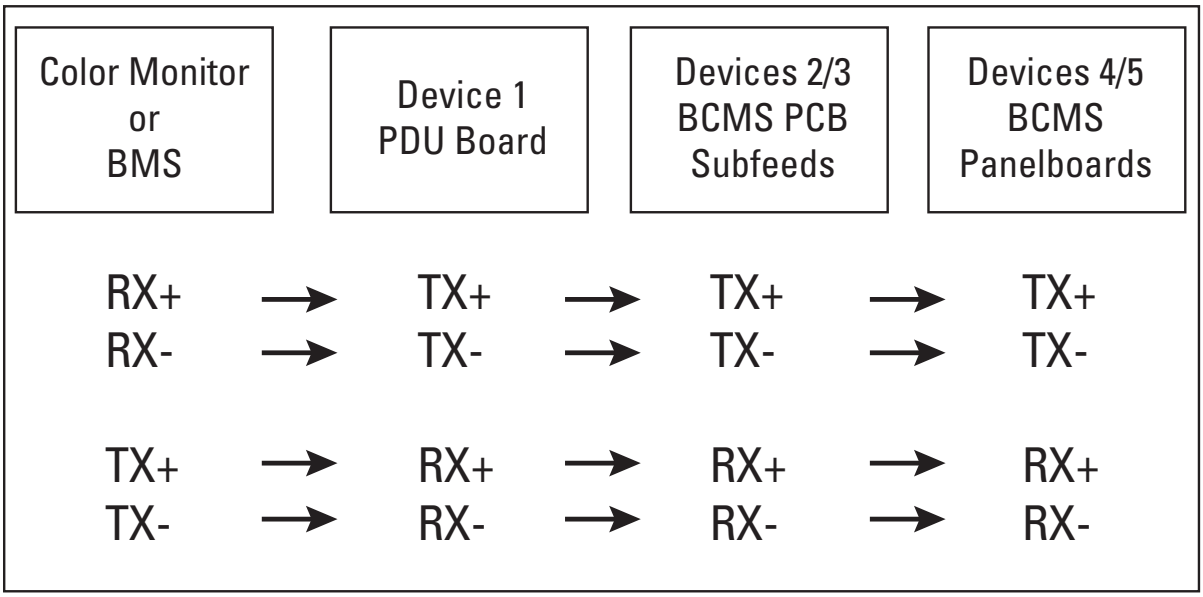
- At least one device in a device chain must have both jumpers jumped on its Modbus connection. If any device in the chain has jumpers installed for 2-wire, all of the device chain is 2-wire. To avoid confusion when troubleshooting, all of the devices in the chain should be jumped in the same way.
- TX+ or RX+ on the Monitor (either one, because the on-board 2-wire jumpers short them together) wires to TX+ or RX+ on downstream devices.
- TX- or RX- on the Monitor wires to TX- or RX- on downstream devices.
- The + and - signal wires should comprise of a (twisted) wire pair residing in the same shield.

For 4-wire configuration:

- All of these jumpers must be removed from every device in the chain.
- TX+ on the Monitor's PCB or on the customer Building Management System (BMS) wires to RX+ on a device PCB (see Figure 5).
- TX- from the Monitor or BMS wires to RX- on device PCB (see Figure 5).
- A second pair of wires connects the other pair of TX+ / RX+ and TX- / RX-.
- The TX+ and TX- going to the RX+ and RX- should be in the same shield. Do not run the +'s in one shield and the -'s in another. Doing so may lead to sporadic communication.

- Run a dedicated ground wire with the signal wires and only ground the shield at one end.

Figure 5. Color Monitor 4-wire Modbus Connections



3.3 Modbus RTU Cables

3.3.1 Cable Specification

RS485/RS422 cable length can be up to 4000 ft. if you use the proper cable:

- The cable resistance should be ≤ 27 ohms/1000ft @ 1 kHz and the mutual capacitance should be ≤ 14pf/ft @ 1 kHz.
- 4-wire cabling:
  - RS422 is typically 4-wire.
  - Use a shielded cable with two (2) twisted pairs and a shield/ground wire.
  - The two transmit lines must be in one twisted pair and the two receive lines in the other twisted pair.
- 2-wire cabling:
  - RS485 is typically 2-wire and is slower than RS422.
  - Use a shielded cable with one (1) twisted pair and a shield/ground wire.

3.3.2 Cable Biasing and Termination

Eaton devices have soft biasing (27K pull-up and pull-down resistors) on the + and – transmit and receive lines. Therefore, if the customer's client device allows for control, Eaton recommends that the user turn on biasing and turn off termination, which may "fight" the biasing. Biasing the client device's lines is not critical because the Color Monitor is already biasing the lines. If termination is needed because of an extremely long cable run, Eaton recommends that a small capacitor be put in series with the terminating resistor.

3.4 Ethernet Cables

The maximum length of Ethernet cable depends upon the customer's choice of Ethernet cable.

3.5 Customer Modbus RTU Connections

When a Color Monitor is embedded in a Eaton product (PDU, RPP, or JCOMM), the customer does not typically wire Modbus RTU directly to the Monitor. Downstream Modbus RTU links are typically to internal devices and are wired at the factory. The upstream Modbus RTU link is extended from the Monitor to a customer connection port, which differs by unit.

3.5.1 Power Distribution Unit (PDU)

On Eaton PDUs, customers make Modbus RTU connections to the PDU's Contractor Board. Basic and Enhanced Contractor Boards are shown in Figure 6 and, Figure 7.

Figure 6. Modbus RTU Connections: PDU Basic Contractor Board

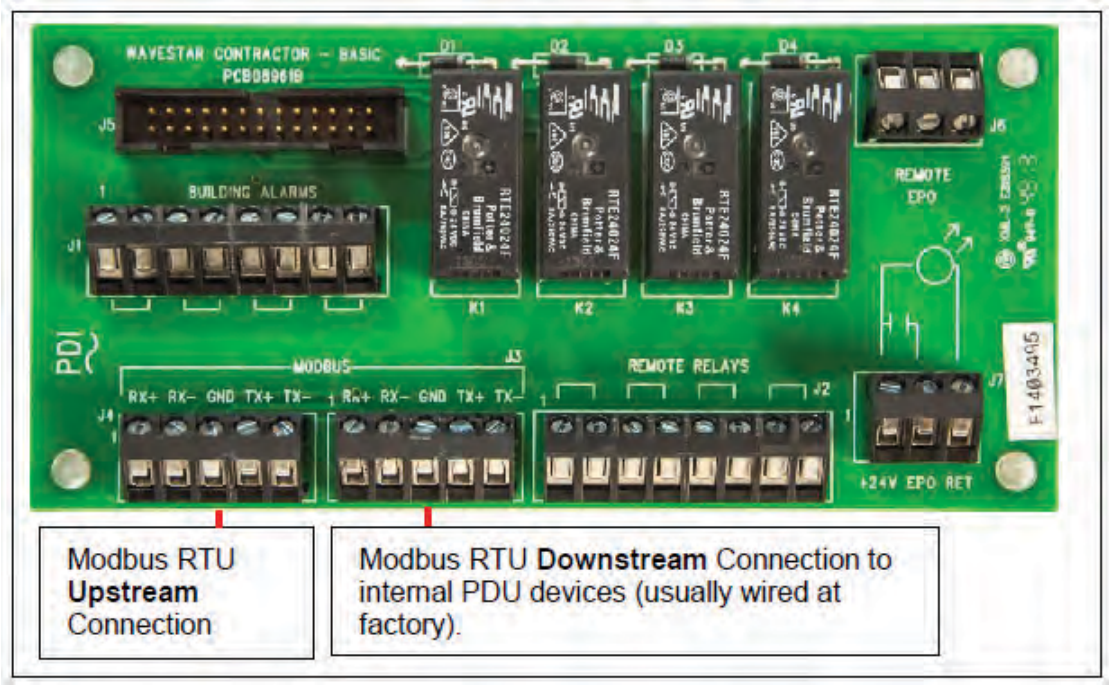
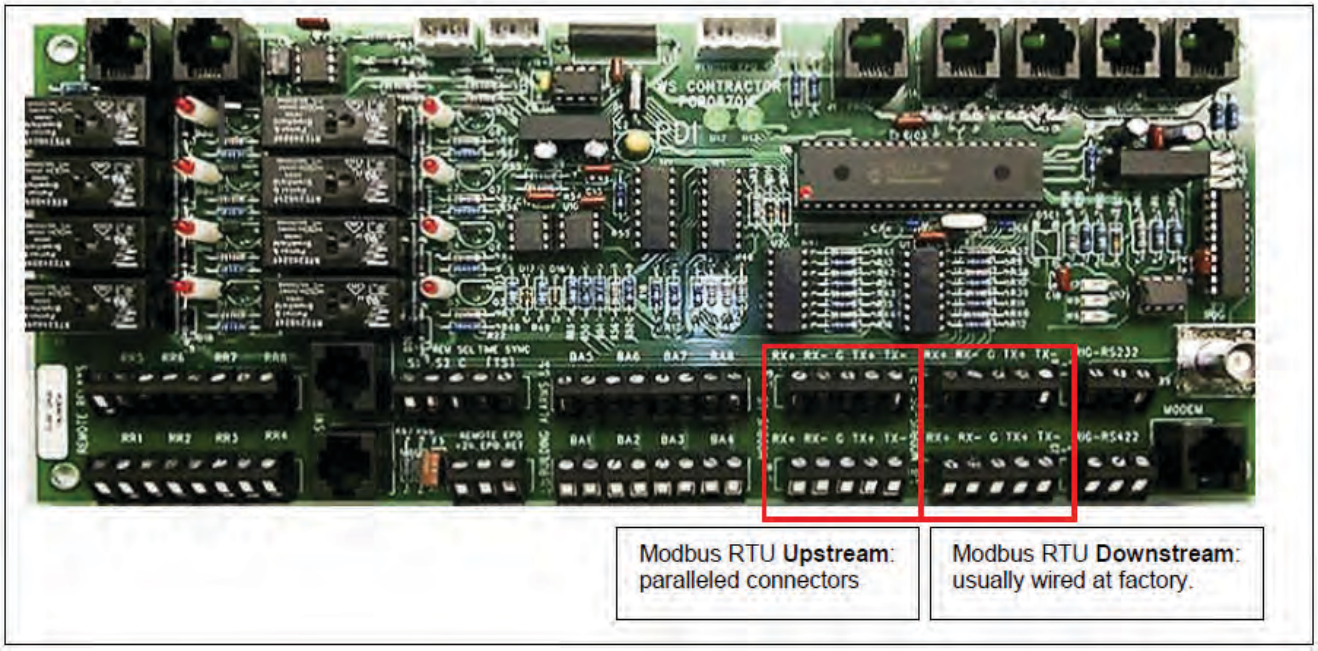
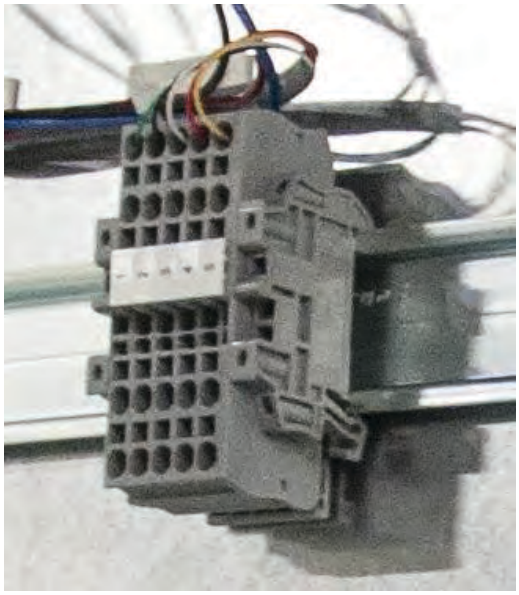


Figure 7. Modbus RTU Connections: PDU Enhanced Contractor Board



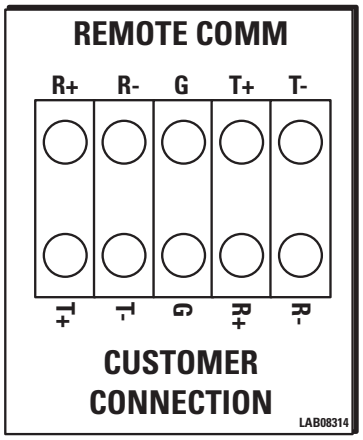
3.5.2 Remote Power Panel (RPP)

Figure 8. Modbus RTU Customer Connection: RPP Upstream



In RPPs, the Color Monitor upstream Modbus connection is brought to a terminal block for convenient customer connection.

Downstream connections are internal to the RPP and are wired at the factory.

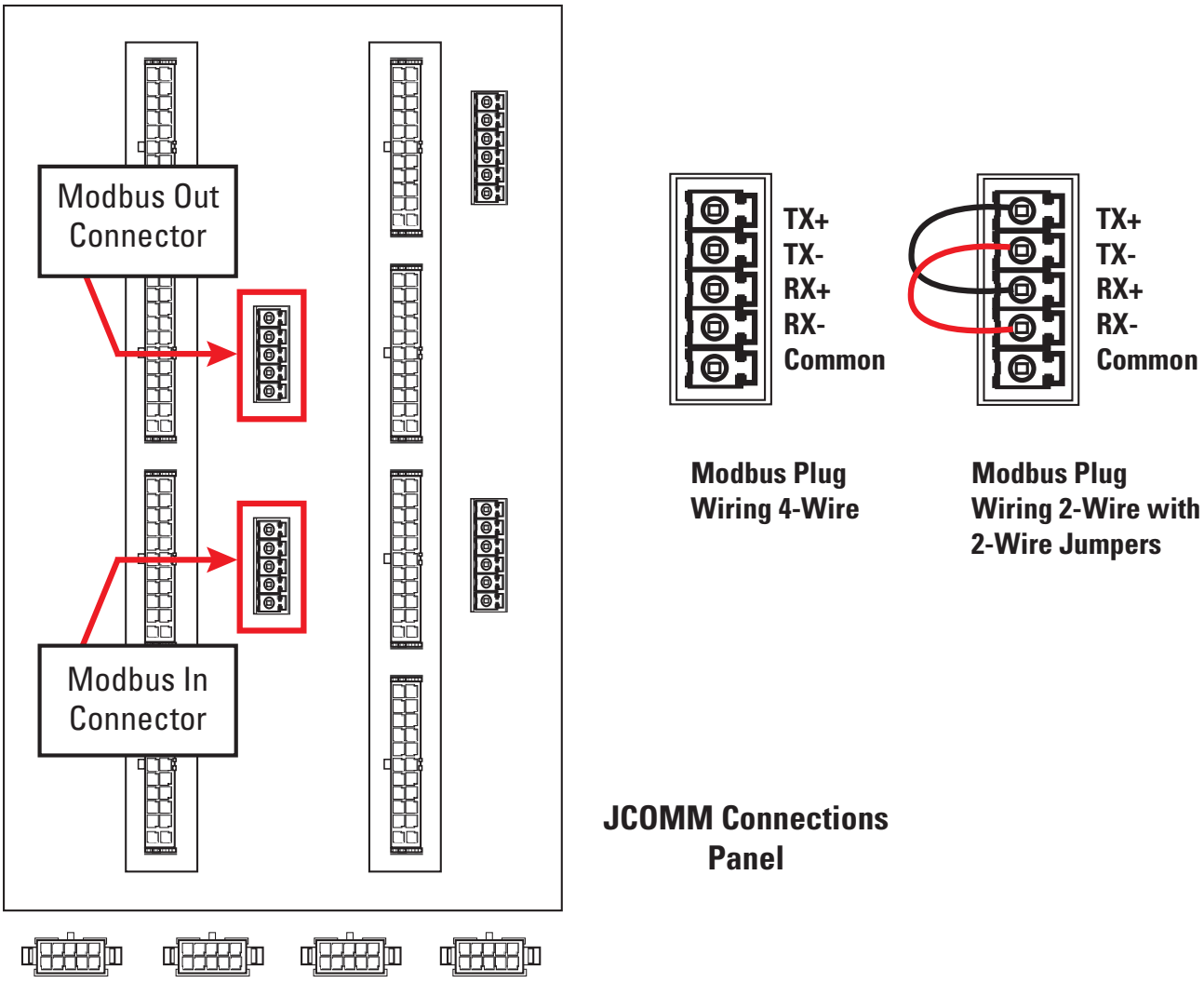


Internal Label shows Modbus RTU wiring.

3.5.3 JCOMM

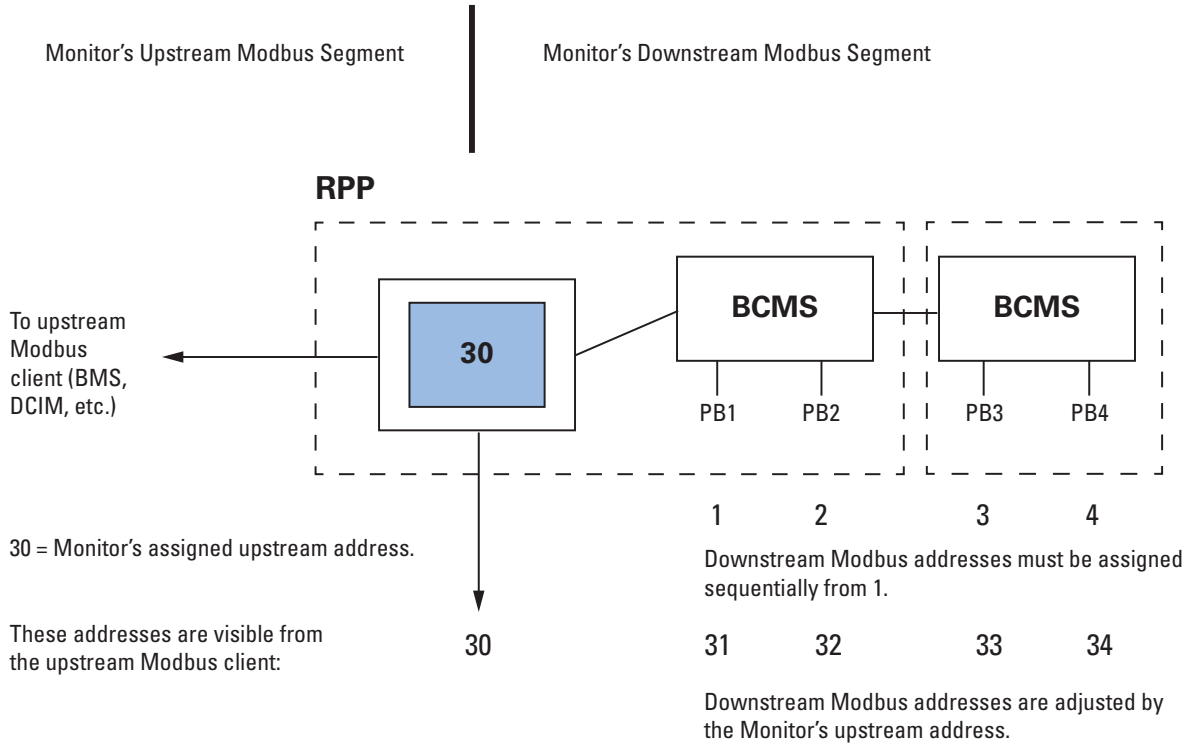
When a JCOMM has a Color Monitor, the customer Modbus RTU connections are made to the JCOMM Connections Panel on the left inside of the unit.

Figure 9. JCOMM Modbus Connections



3.6 Modbus Addressing

Figure 10. Modbus Addressing



Refer to Figure 10, "Modbus Addressing," with the following bullet points:

- The Monitor is a Modbus client to its downstream devices. The upstream Modbus client cannot directly address these devices, but rather addresses them through the Monitor. Upstream and downstream are separate Modbus segments.
- The Monitor's upstream address can be set to from 1 to 255, but you must leave enough addressing capacity for downstream devices. The monitor will not respond to a command sent to address 0. The address is set in Monitor Setup. See paragraph 4.2.3 *TCP/IP and Modbus TCP/IP Setup*.
- The Monitor's downstream devices must be assigned consecutive addresses starting at address 1.
- For upstream addressing these device addresses are remapped as successor addresses to the Monitor. If the Monitor has upstream address 30, the downstream addresses 1, 2, 3, 4 are remapped to 31, 32, 33, 34 as seen from the BMS or other Modbus client.
- Modbus addressing is the same for Modbus RTU and Modbus TCP/IP.

3.7 Communicating with the Monitor: Commands and Replies

3.7.1 Modbus Commands and Replies

Upstream Modbus on the Color Monitor supports three (3) Modbus commands only (with typical flag and data values shown in hexadecimal) for communicating with the points lists of the Monitor or devices in its chain:

1. Read Server ID (command 11)

Sent Hex: 01 11 C0 2C

Reply Hex: 01 11 0D EA FE 52 50 50 20 44 69 73 70 6C 61 79 A3 A6

2. Read Multiple Holding Registers (command 3)

   Sent Hex: 01 03 00 00 00 01 84 0A

   Reply Hex: 01 03 02 00 00 B8 44

3. Write to a Single Register (command 6)

   Sent Hex: 01 06 00 00 00 00 89 CA

   Reply Hex: 01 06 00 00 00 00 89 CA

It is important to carefully verify early in system bring-up that the registers you are addressing are the correct ones. In a points list or Modbus register map, the first analog channel is numbered 1 but is accessed in software with an index value of 0. Consequently, it is common for a system to be one register off. Because adjacent registers often have similar readings, being one register off is not necessarily apparent.

Most analog values are 2-byte integers representing a measured parameter such as input voltage or current. KWH uses two (2) adjacent 2-byte integers. Some parameters require scaling and are so noted in the points list.

3.7.2 Limit on Open Sockets

When using Modbus TCP/IP, the Color Monitor can have at most five (5) sockets open at any one time.

3.7.3 SNMP Commands

Only SNMP version 1 is supported.

The following commands are supported and are typical for the product:

- snmpget
- snmpgetnext
- snmpset

See the MIB file for specifics. The MIB can be downloaded from the Eaton website. Reference the Bibliography in this manual.

Chapter 4 Setup: Monitor and Network

You set configuration parameters and other information for the Color Monitor in three ways:

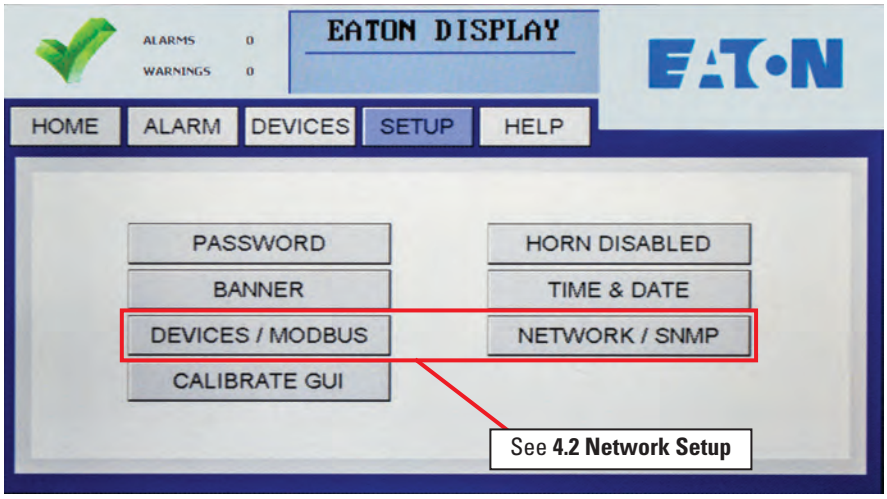
- The **SETUP** screen has system parameters, such as banner name, password, and network addresses.
- Device **SETTINGS** screens let you set device names, specific device configurations, and software versions for each BCMS device in the Monitor's chain. (See Chapter 5 *Device Chain: Settings*.)
- The **SOFTWARE VERSIONS** screen lets you add the model information for the unit mounting the Color Monitor.

4.1 SETUP: Miscellaneous Parameters

Touch **SETUP** to display buttons for several configuration items (see Figure 11).

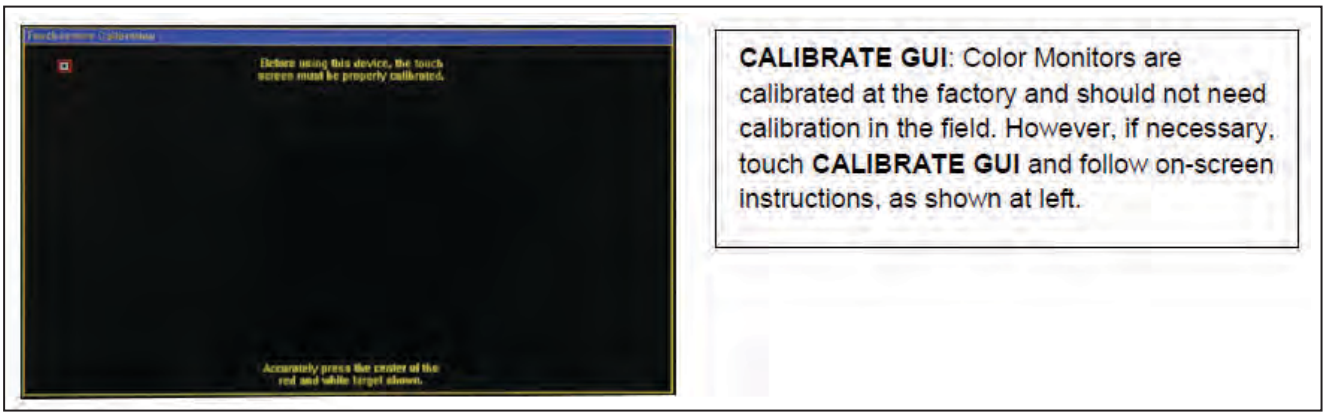
A password is required to access and change setup parameters. Enter the password (default is "PDI"). The user can navigate through any of the screens and come back to **SETUP** without having to re-enter the password for 10 minutes. Touch **PASSWORD** to change to a new password.

Figure 11. SETUP Screen



Touch buttons in the initial **SETUP** screen to link to miscellaneous setup functions:
PASSWORD: Keyboard appears, enter password, then type new password.
HORN DISABLED: Toggle Monitor's audible alarm to ENABLED/DISABLED.
BANNER: Banner setup (here shown as "Eaton DISPLAY") is on same screen as Modbus setup.
TIME & DATE: Set time and date; used on HOME screen and alarm timestamps.
CALIBRATE GUI: See next figure.

Figure 12. Calibrating the Touchscreen



4.2 Network Setup

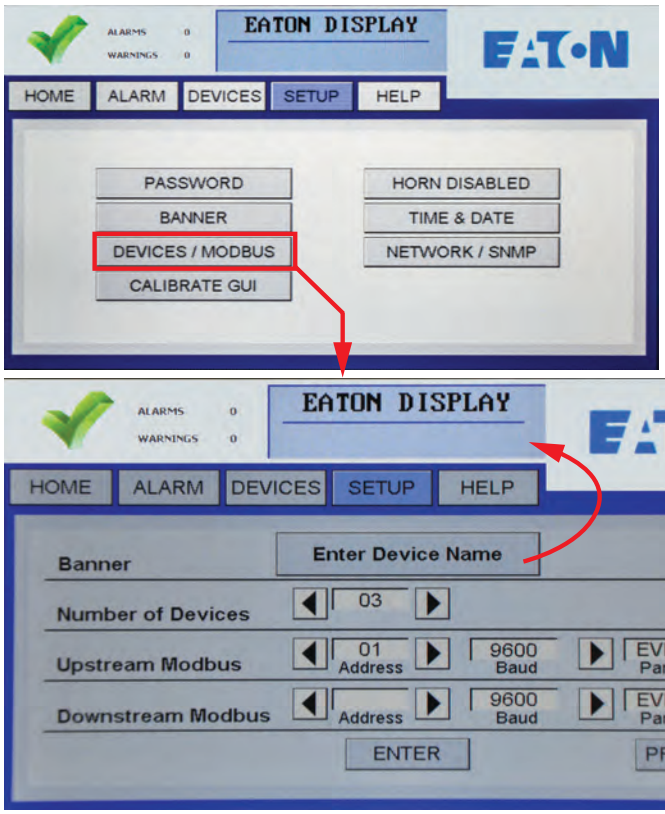
NOTE Improper configuration of a WaveStar Color Monitor may conflict with other monitors or devices on the network.

4.2.1 Downstream Modbus Device Chain Setup

To set Modbus device chain parameters, touch **DEVICES/MODBUS** (see Figure 13):

- **Number of Devices** should equal the number of devices in the Monitor's device chain. Up to twenty (20) devices are allowed. The Monitor uses this number to determine how many devices to search for in its downstream chain.
- When you add new devices, increment this counter, then press "ENTER". The Monitor will automatically start a new search and find all of the downstream devices. The devices will then be listed in the **DEVICES** Screen, where the added devices will initially show up as generic device names.
- For each new device the user should then enter a unique device name. Unique device names are needed to isolate alarms and measurements to specific devices.

Figure 13. Modbus RTU Setup



On **SETUP** screen, touch **DEVICES/MODBUS**

The **DEVICES/MODBUS** screen defines the Modbus network and device chain as well as set the banner name for the header.

Modbus Device Chain:
Banner Name displayed on top line.

Number of Devices should equal number of devices connected in Monitor's downstream device chain.

Upstream Modbus:
Address of Monitor on upstream side
Baud rate (9600/19200/38400)
Parity (even/odd/none)

Downstream Modbus Network characteristics are fixed and cannot currently be modified.

4.2.2 Modbus RTU Setup

Downstream Modbus settings cannot be changed.

Upstream Modbus provides network characteristics on the upstream side of the Monitor.

- Address is the address that the upstream Modbus client, such as the Building Management System (BMS), uses to address the Monitor. The downstream device addresses are incremented sequentially from this address. So if the Monitor has address 20, the next three devices will appear 21, 22, and 23 to the upstream client device. (See Figure 10, "Modbus Addressing".)
- **Upstream Modbus** settings for **Baud** rate and **Parity** must match those for the upstream Modbus client.

4.2.3 TCP/IP and Modbus TCP/IP Setup

For TCP/IP, the customer must provide an Ethernet cable connected to the Ethernet port (RJ45 header J11) on the Monitor. (See Figure 4, "Color Monitor Network Connections".)

On the **SETUP** screen, touch **NETWORK/SNMP** to display the network parameters for TCP/IP (11, 14).

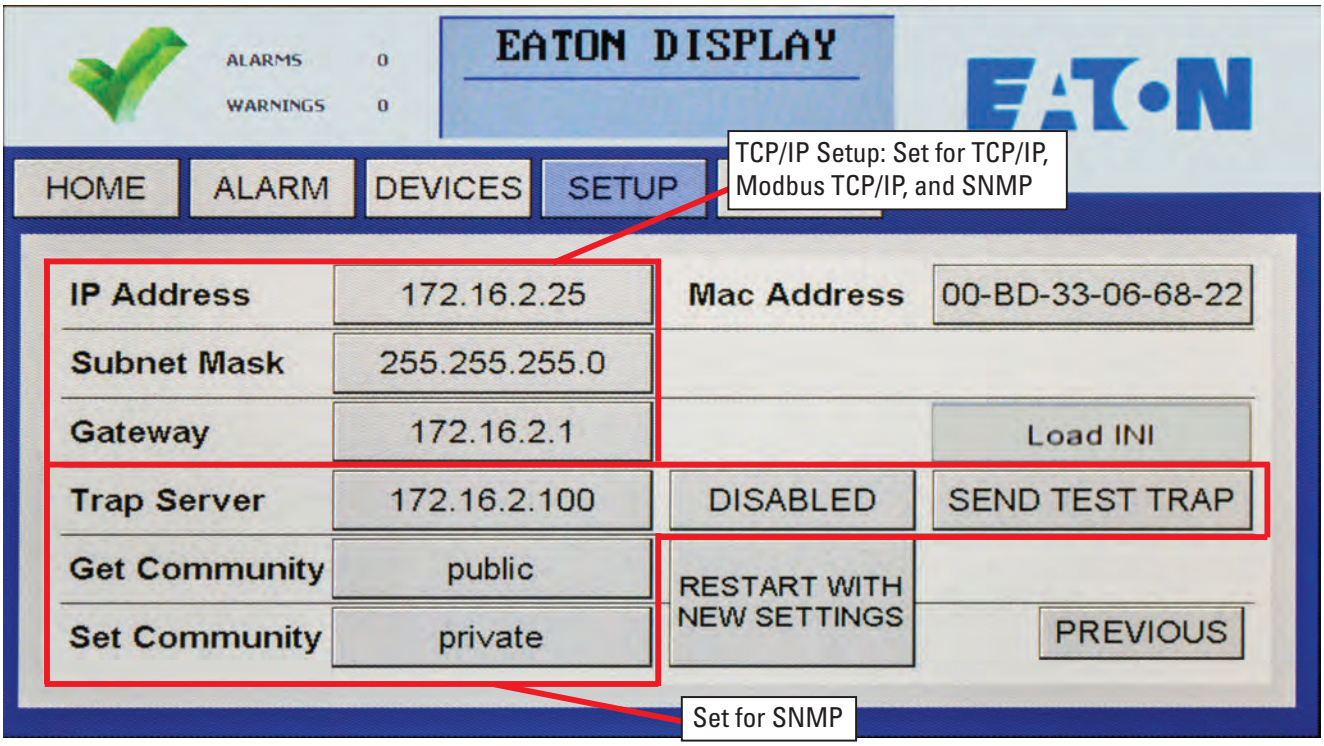
The following must be specified for Modbus TCP/IP:

- **IP Address**
- **Subnet Mask**
- **Gateway**

Each connected monitor must be assigned a unique address. DHCP is not supported.

Touch **RESTART WITH NEW SETTINGS** if any parameter is changed on this screen. The processor will reboot and search the network for connections.

Figure 14. Modbus TCP/IP and SNMP Setup



4.2.4 SNMP Setup

To use SNMP, the customer must connect an Ethernet link to the RJ45 header J11 (see Figure 4) on the Monitor using a standard Ethernet cable.

For SNMP setup, on the **SETUP** screen, touch **NETWORK/SNMP** to display the network parameters for SNMP (see Figure 11 and, Figure 14).

In addition to the TCP/IP specification, the following must be specified for SNMP:

- Specify the **Trap Server** IP address
- Toggle **ENABLED/DISABLED** for the trap server.
- Touch **SEND TEST TRAP** to verify operation.
- **Get Community** security string for Get operations.
- **Set Community** security string for Set operations.

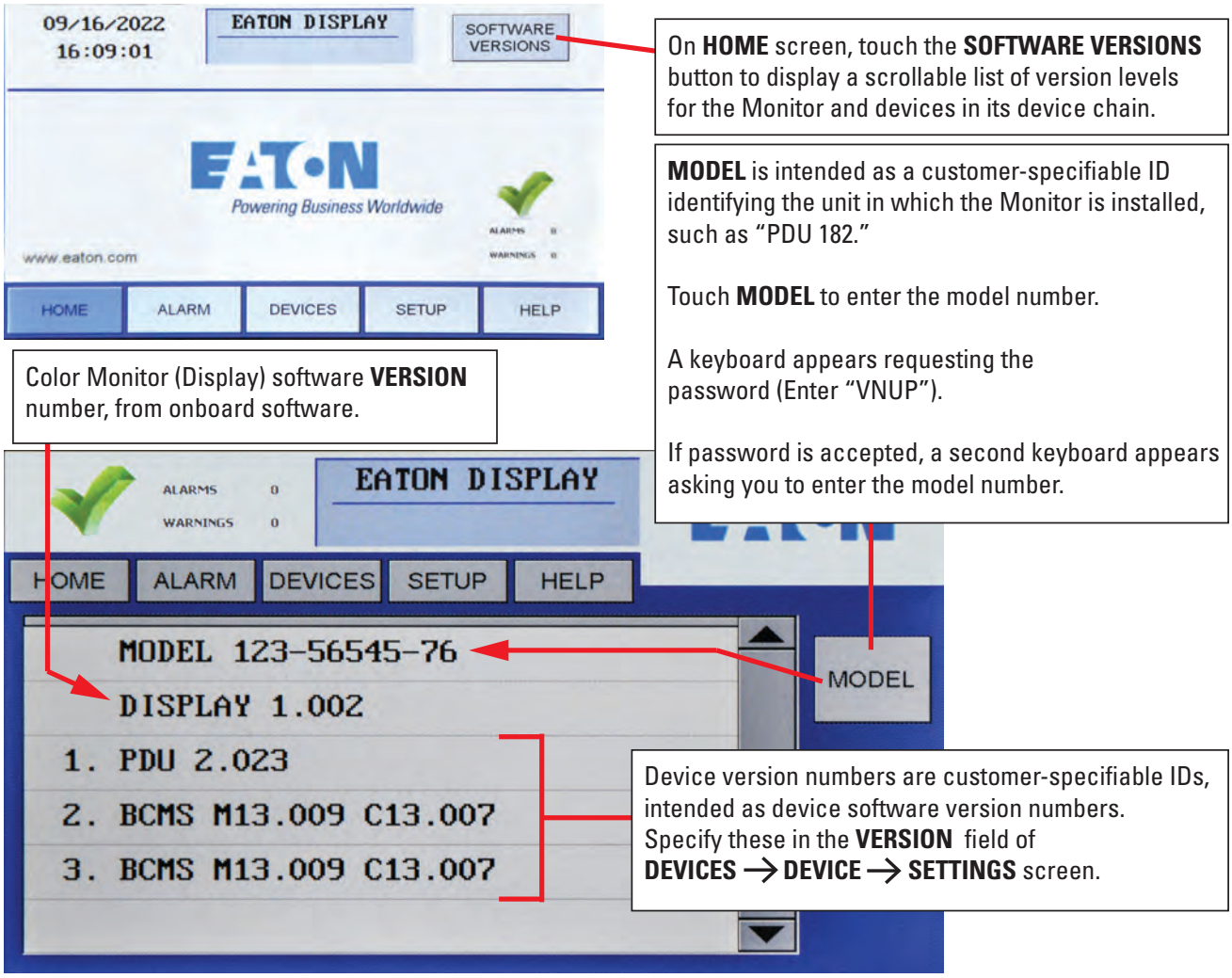
Touch **RESTART WITH NEW SETTINGS** if any parameter is changed on this screen. The processor will reboot and search the network for connections.

4.2.5 Loading INI Parameters from an SD Card

Touching **Load INI** loads configuration parameters from an SD card inserted into the Monitor. This function makes it easy to initialize a set of Monitors using common parameters. It is intended for manufacturing and service use.

4.3 Software Versions

Figure 15. Model Information



The **SOFTWARE VERSIONS** list (see Figure 15) lists information about software levels for the Monitor and its device chain and a customer-specified model number for the unit in which the Monitor is installed, such as a PDU or RPP. The list has no configuration use: it does not have parameters that determine Monitor operation.

- **MODEL number**: Touch **MODEL** and enter model number with the pop-up keyboard.
- **Display Version Number** is given by the Monitor's onboard software.
- **Device Version Numbers** are entered in device setup: Go to **DEVICES** screen, select device, select **VERSION** field, and enter data.

Chapter 5 Device Chain: Settings

A "device" is a points list (or Modbus register map) representing a physical monitored entity, such as a panelboard. Each points list instance has a single Modbus address.

A single PCB can have multiple devices with their own Modbus addresses. A BCMS Data Acquisition Board, for example, can have two panelboard devices plus a small two-subfeed device, or up to three Modbus addresses.

A device may also encompass more than one PCB. A PDU device with a single Modbus address represents both a PDU M4G board and a PDU contractor board.

Points lists are loaded onto PCBs during manufacturing.

5.1 Initial Device Chain

Upon initial power-on, the Monitor searches its Modbus device chain for devices up to the device count given in **SETUP**. The **DEVICES** screen lists all devices in the Monitor's downstream chain (see Figure 16). Each device in the Monitor's device chain has

- a unique Modbus address,
- a device type that is identified by its Modbus server ID, and
- its own points list (Modbus register map).

Figure 16. Initial Device List

The initial device list shows the generic device types discovered by the Monitor in its device chain.

In this example, there is a PDU with two BCMS-monitored panelboards and the generic BCMS device name appears twice.

Users should change these generic device names to unique names, in device SETTINGS, which is necessary to isolate alarms to specific devices.

In the **DEVICES** screen device list, the Monitor displays the devices it finds in order of discovery using these device types and default generic names:

1. **PDU** (Power Distribution Unit) with PDU transformer measurements and contractor board alarms and relays
2. **BCMS ESF** (BCMS Enhanced Subfeeds) for large PDU subfeeds (e.g., 250A)
3. **BCMS** (BCMS Normal panelboard points list), which lets you customize alarm settings for individual circuits)
4. **BCMS KWH** (BCMS KWH panelboard points list), which provides power usage measurements for individual panelboard circuits
5. **BCMS CB**, a small points list, associated with BCMS Normal or KWH points lists, with current measurements for two subfeeds from a PDU or RPP.

6. **BCMS IEC**, a points list similar to BCMS KWH, for IEC 36 or 72 circuit panelboards.

The downstream devices should be addressed 1 to N where N is the number of devices, not to exceed 20. See Figure 10, "Modbus Addressing".

If devices are later added to the device chain,

- the user's administrator must increase the Modbus device count in SETUP, which causes the Monitor to search its device chain to fill the increased device count; and
- the Monitor will display the additional devices as generic device types, (see Figure 16), until the administrator assigns them unique device names.

5.2 Device Settings

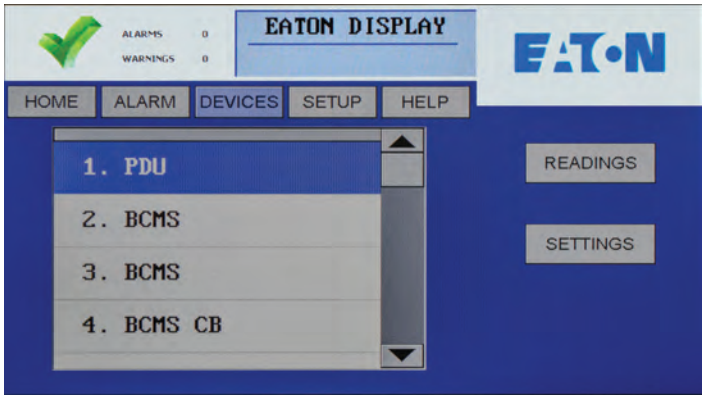
Each device has a **SETTINGS** screen for changing device name, software version, and device configuration. These settings provide information to the Monitor in addition to each device's own internal setup.

Device settings will usually be entered by PDI manufacturing or service representatives, but can be entered by customer administrators.

5.2.1 PDU Device Settings

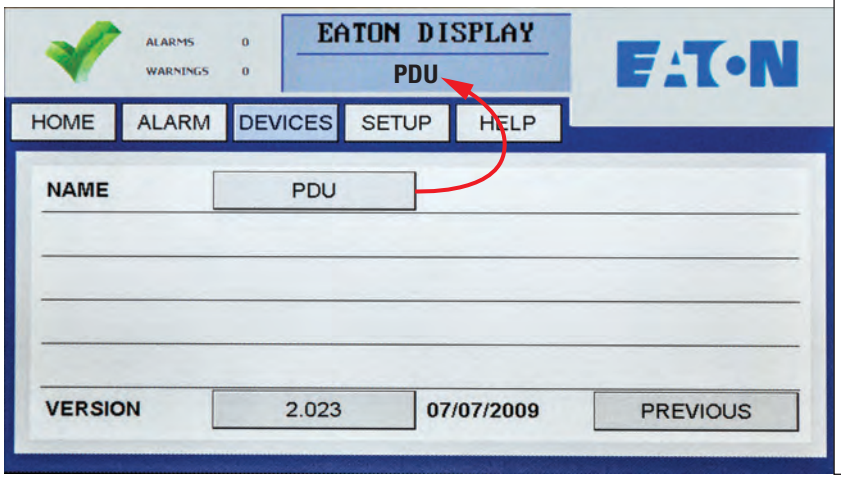
PDU devices (see Figure 17) have only two settings: device **NAME** and **VERSION**.

Figure 17. Settings: PDU Device



Touch **PDU** (generic name) in device list. Device name turns blue when selected.

Touch **SETTINGS** to set device name or software versions.



Set **NAME**:

- Touch NAME field ("PDU" in this example):
- A keyboard appears.
- User may be requested to enter password (default is "PDI").
- Type in device name (up to 16 characters); touch ENTER.
- Device Name is put in header under banner and in DEVICES screen device list.

Set **VERSION**:

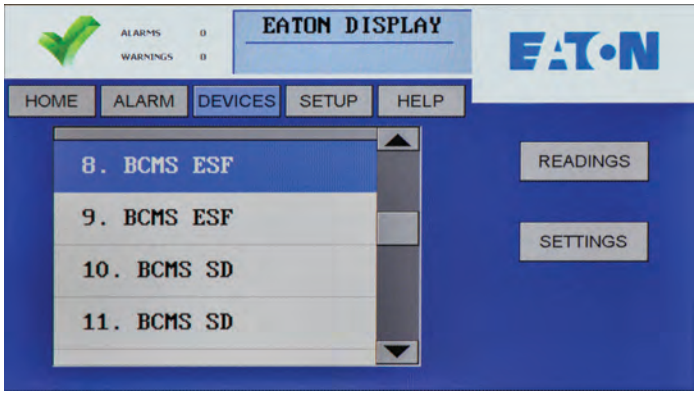
- Touch VERSION field.
- A keyboard appears.
- If requested, enter version number update password ("VNUP") + touch ENTER.
- Enter Version number for PDU board + touch ENTER.

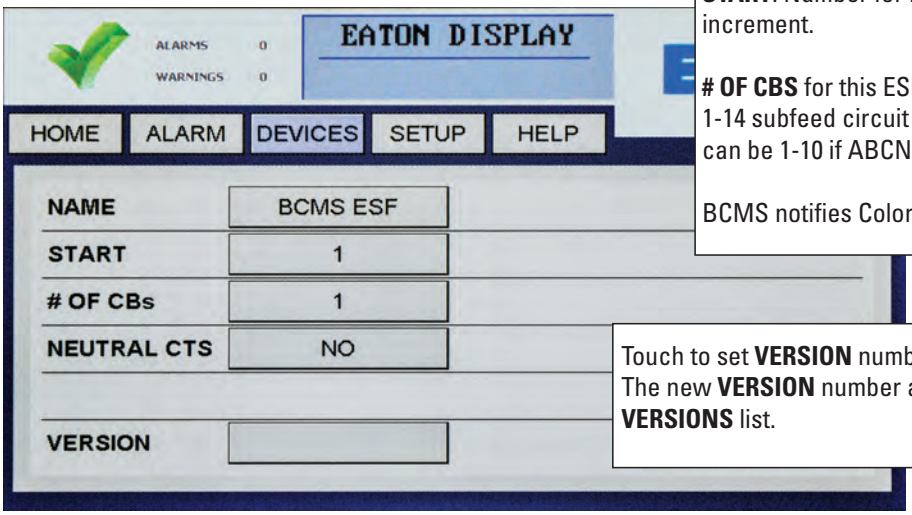
5.2.2 Enhanced Subfeeds Settings

BCMS Enhanced Subfeeds (ESF) devices are for large PDU subfeeds to other PDUs and RPPs. A single ESF Points List can monitor 1-14 subfeeds (see Figure 18):

- If CTs on installed on ABC-phases only, 14 subfeeds can be monitored.
- If CTs are also installed on neutrals (ABCN), at most 10 subfeeds can be monitored.

Figure 18. Settings: Enhanced Subfeeds (ESF)





Touch fields to change parameters:
NAME: Enter a unique device name (up to 16 characters); device name is propagated to header and device list.

START: Number for first ESF Circuit Breakers, touch to increment.

 # OF CBS for this ESF: Touch to increment; can be from 1-14 subfeed circuit breakers if phases ABC have CTs; can be 1-10 if ABCN have CTs.

BCMS notifies Color Monitor if neutrals have CTs.

Touch to set **VERSION** number for ESF board software. The new **VERSION** number appears in the **SOFTWARE VERSIONS** list.

5.2.3 BCMS Normal and KWH Settings

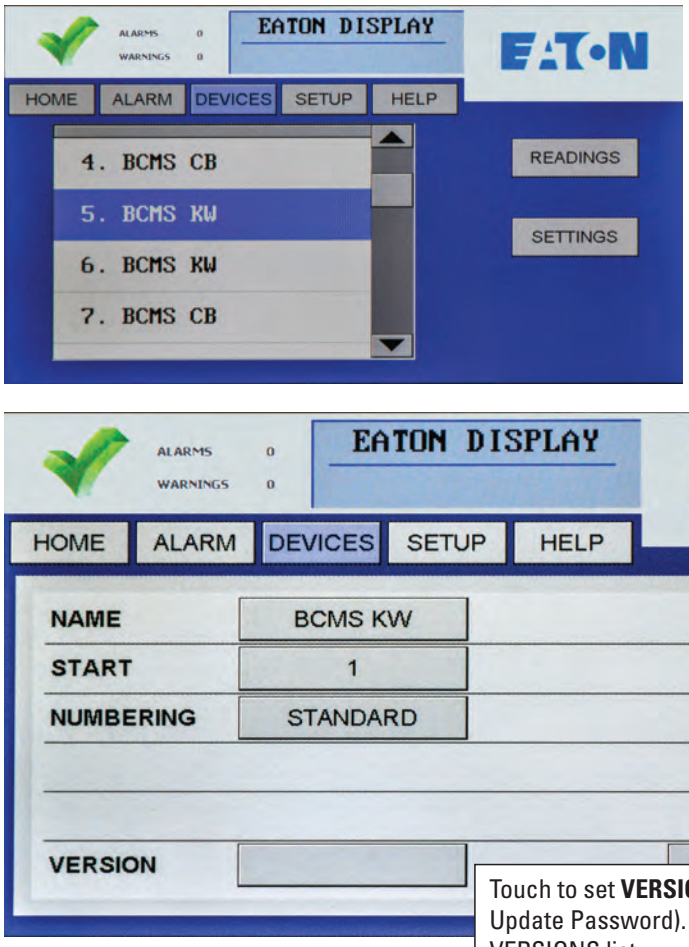
BCMS panelboard devices —**BCMS KWH** and **BCMS (Normal)**— have the same settings. **BCMS KW** and **BCMS KWH** are default names used in different software versions for the same points list, shown in Figure 19.

You can set the device **NAME** and software **VERSION** with the pop-up keyboards. You may have to enter a password first.

You can sequentially number panelboard circuits for up to eight (8) 42-circuit panelboards, allowing measurement and alarm identification for all 336 circuits in an 8-panelboard PDU.

Standard panelboards are always laid out 1, 3, 5… 41 down the left side and 2, 4, 6… 42 down the right side. Select ODD/EVEN to display them in this order or select STANDARD to display them as consecutive numbers (1, 2, 3... 42) down left then down right side.

Figure 19. Settings: BCMS Device



Select (touch) **BCMS KWH** device name in **DEVICES** list. Device name turns blue when selected.

NAME: Enter a unique device name (up to 16 characters); device name is propagated to header and device list.
START: Number for first panelboard circuit, touch to increment +42 to next panelboard. Up to eight (8) PBs are allowed:
1 (1-42), **43** (43-84)… **295** (295-336).

NUMBERING: Toggle panelboard numbering layout

- **STANDARD** = Numbers increment in numerical order (1, 2, 3… 42) down left side first (1-21), then right side (22-42).
- **ODD/EVEN** = List circuits as they are laid out on panelboard, odd numbered circuits on left side, even numbered circuits on right side (such as 1, 3, 5, …, 41 on left side, and 2, 4, 6, …, 42 on right side).

Touch to set **VERSION** number for BCMS software (requires Version Number Update Password). The new VERSION number appears in the SOFTWARE VERSIONS list.

5.2.4 BCMS CB Subfeeds Settings

In addition to its panelboard distribution, an RPP can have a two-subfeed distribution with its own points list. (These are not the same as the Enhanced Subfeeds (ESF) points list which is for a subfeed-type PDU.)

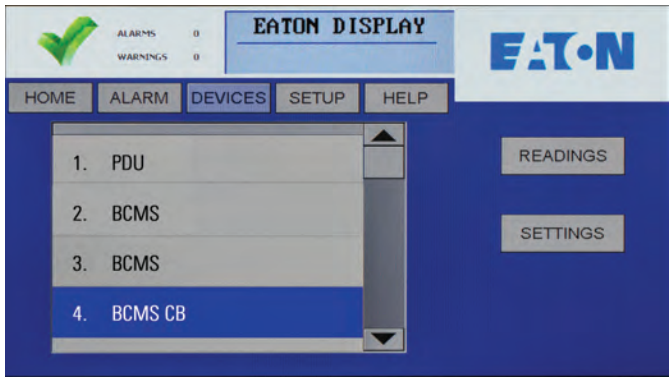
You can set only the device **NAME** and the software **VERSION** in **BCMS CB SETTINGS** (see Figure 20).

A BCMS Data Acquisition Board—the physical BCMS PCB— can have three BCMS devices with their own points lists:

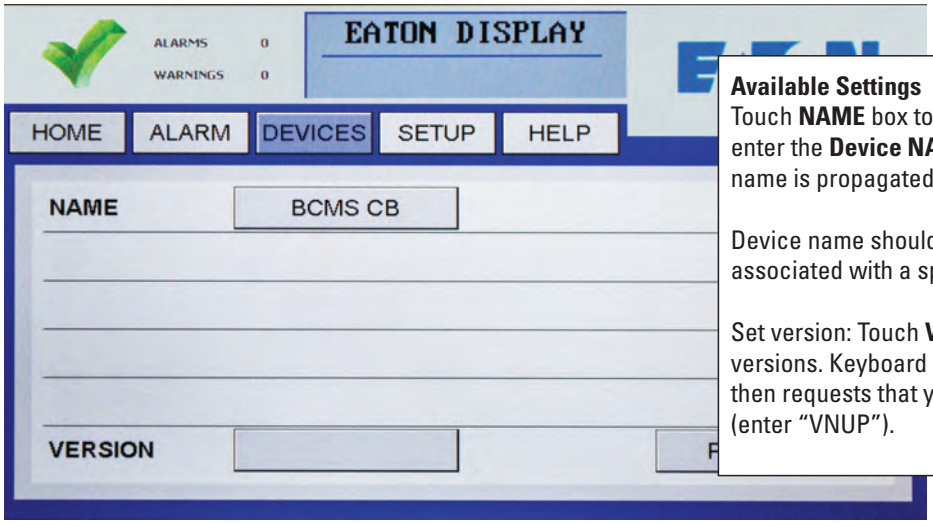
- Panelboard 1 points list, BCMS (Normal), BCMS KWH, or BCMS IEC
- Panelboard 2 points list, using the type of points list as for Panelboard 1
- Subfeed points list for two subfeed circuits (This short points list is described at the end of the BCMS Normal and BCMS KWH points lists, but when used is a separate list with its own Modbus address.)

Each BCMS device gets its own device entry in the Monitor's device chain, its own points list, and its own Modbus address.

Figure 20. Settings: BCMS Subfeeds



Select (touch) **BCMS CB** device name in **DEVICES** list. Device name turns blue when selected.



Available Settings

Touch **NAME** box to bring up keyboard where you can enter the **Device NAME** (up to 16 characters). The device name is propagated to the header and device list.

Device name should be unique, so that alarms can be associated with a specific device.

Set version: Touch **VERSION** box to enter software versions. Keyboard appears requesting password and then requests that you enter the version code (enter "VNUP").

5.2.5 BCMS IEC Settings

IEC panelboards with up to 72 individual circuits use the BCMS IEC points list. The initial generic device type is BCMS IEC. Settings are only Device Name and Software Version.

Figure 21. Settings: BCMS IEC

Select (touch) **BCMS IEC** device name in **DEVICES** list. Device name turns blue when selected.

Available Settings

Touch **NAME** box to bring up keyboard where you can enter the **Device NAME** (up to 16 characters). The device name is propagated to the header and device list.

Device name should be unique, so that alarms can be associated with a specific device.

Set version: Touch **VERSION** box to enter software versions. Keyboard appears requesting password and then requests that you enter the version code (enter "VNUP").

Chapter 6 Device Chain: Readings

Each device in the Monitor's device chain has a **READINGS** screen chain, providing power monitoring information.

- Select (touch) **DEVICES** to see the device list and then **READINGS**.
- Use **PREVIOUS/NEXT** to step through the screen chain.

6.1 PDU Device Readings

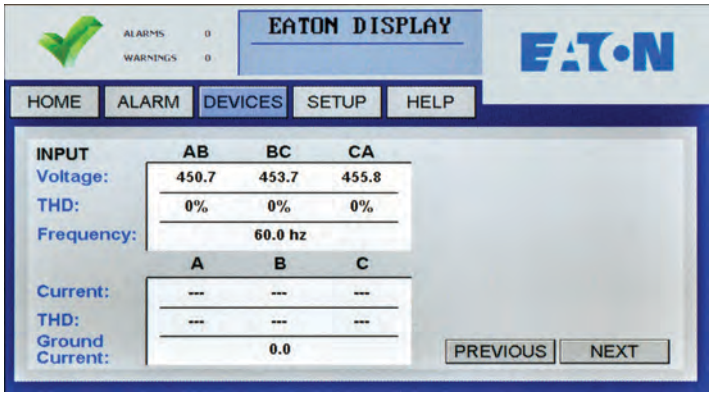
READINGS from the PDU are power measurements at input to and output from the PDU transformer (see Figure 22).

Figure 22. Readings: PDU

Select (touch) **PDU device name** in the device list. Device name turns blue when selected and device name displays in header.

PDU is the default generic device name.
Users can change the device name in **SETTINGS**.

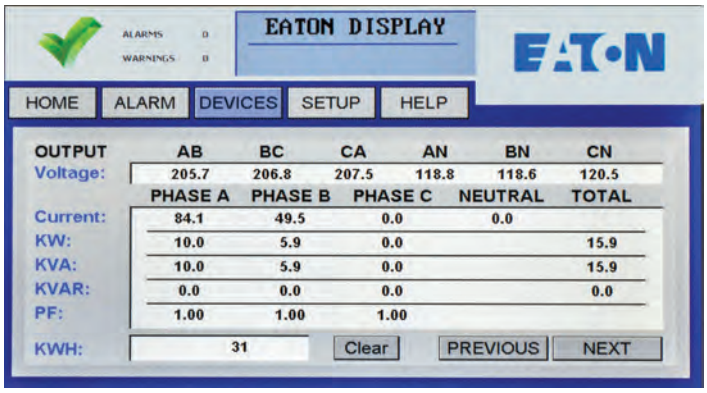
Touch **READINGS** to see PDU power monitoring data.



INPUT to the PDU transformer:

Voltage: AB BC CA
THD (total harmonic distortion):
AB BC CA
Frequency: in Hz

Current A B C (optional)
THD A B C (optional)
Ground Current



OUTPUT from the PDU transformer:

Instantaneous measurements:
Voltage: AB BC CA AN BN CN

ABC(N) phase readings and totals:
Current
KW
KVA
KVAR
PF

Cumulative Measurement:
KWH
Touch **Clear** to set KWH to 0.

6.2 Enhanced Subfeeds (ESF) Readings

Readings from an Enhanced Subfeeds (ESF) device are typically power measurements and alarms for high amperage PDU circuits that are subfeeds to other PDUs or RPPs (see and).

Enhanced Subfeeds devices can monitor

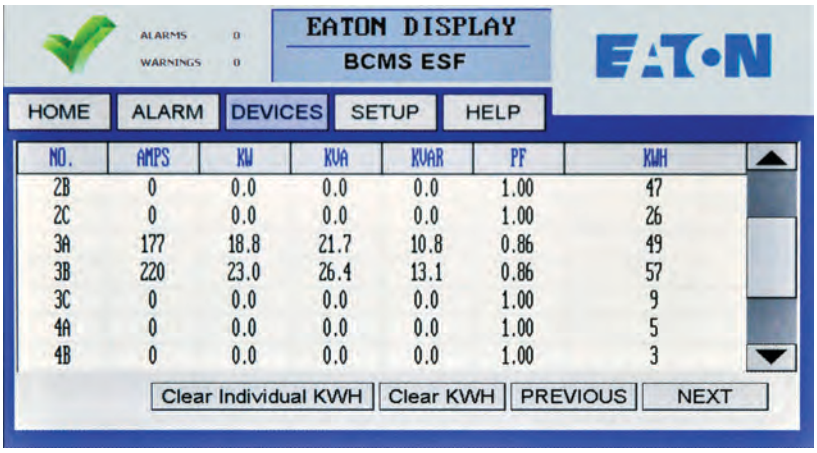
- Up to (14) 3-phase circuits (ABC)
- Up to (10) 3-phase plus neutral circuits (ABCN)

Figure 23. Readings: Enhanced Subfeeds (ESF) (Part 1)

Select (touch) **ESF device name** in the device list (**PDU** in this list). Device name turns blue when selected and device name appears in header.

BCMS ESF is the default generic device name. Users can change the device name in **SETTINGS**.

Touch **READINGS** to see the first screen of **ESF** power monitoring data.



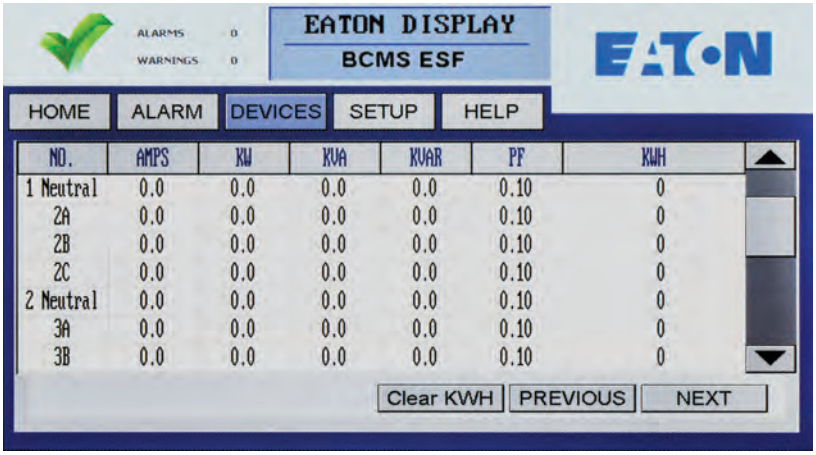
NO: Circuits are numbered 1-14 and broken out by phase (1A, 1B, 1C).

Instantaneous measurements:

- **AMPS**
- **KW**
- **KVA**
- **KVAR**
- **PF** Power factor per phase

Cumulative measurements:

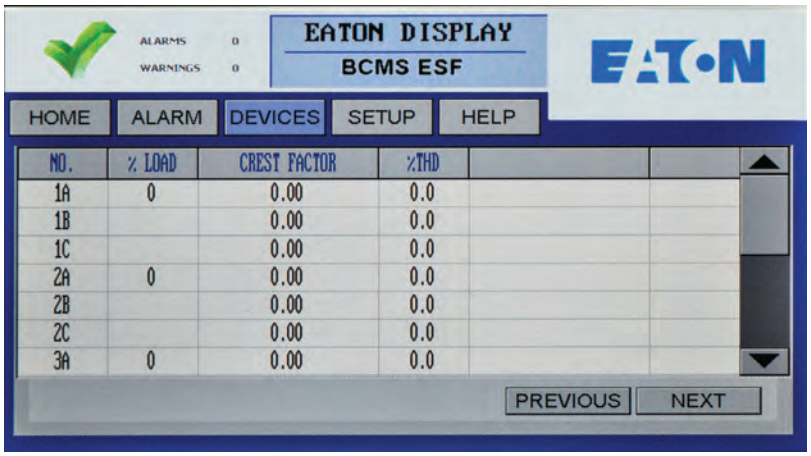
- **KWH** (KWH can be reset to 0 on the third **READINGS** screen.)



If neutrals are also monitored:

- Only 10 circuits total can be monitored with this ESF device.
- There is an extra line for each neutral circuit (shown at left).

Figure 24. Readings: Enhanced Subfeeds (ESF) (Part 2)



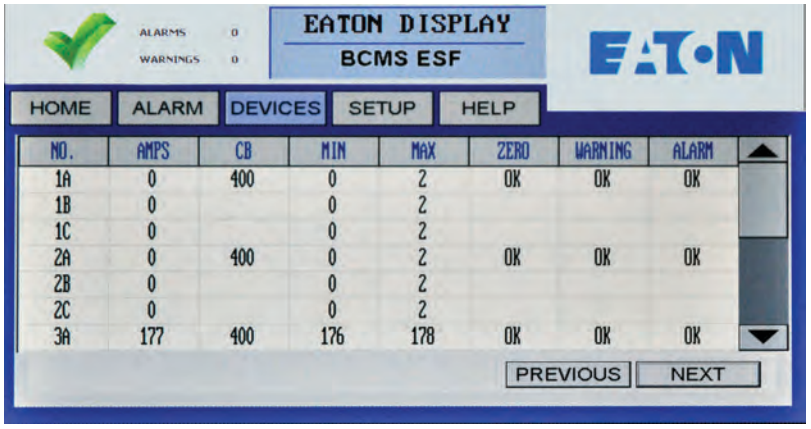
NO: Subfeed circuit by number and phase

Instantaneous measurements by phase:

% LOAD: %Load is a percent of the Full Load amperage for this breaker; "Full Load" is a user-specified percent of breaker size, given in Modbus register 494 ("Full Load Percentage") in the ESF Points List.

CREST FACTOR: Peak current/RMS current

%THD: Total Harmonic Distortion as percent



Measurements and alarms:

NO: Circuit by number and phase

AMPS: Instantaneous current in Amperes (A)

CB: Circuit breaker rating (A)

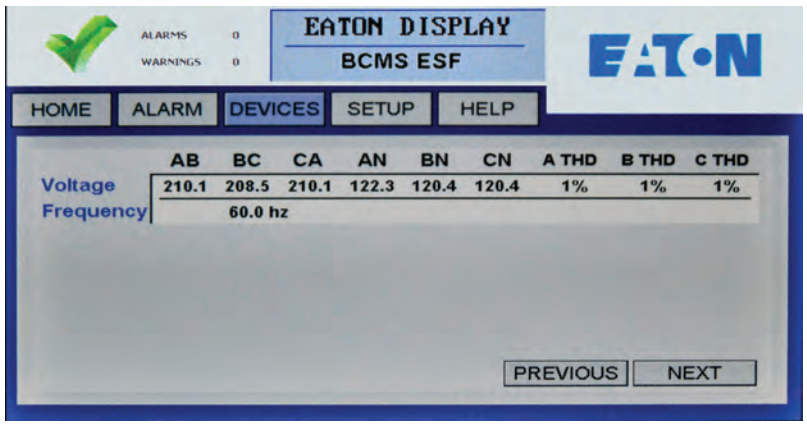
MIN: Minimum current read (A) after first registering minimum current

MAX: Maximum current read (A)

ZERO: OK = Current has not read 0 after registering a current; ACTIVE = Current has read 0 after registering a current.

WARNING: OK = No warnings outstanding for this circuit; ACTIVE = warning outstanding.

ALARM: OK = No warnings outstanding for this circuit; ACTIVE = alarm outstanding



Instantaneous measurements:

Voltage
Frequency

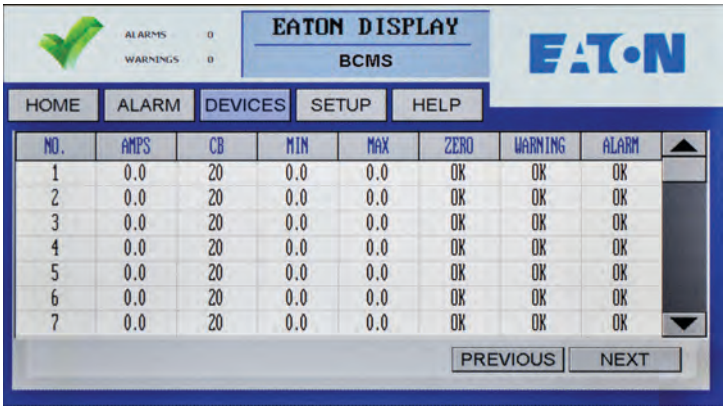
6.3 BCMS (Normal) Panelboard Readings

BCMS Normal points list allows customization of thresholds and alarm level for each individual circuit, which is done in BCMS setup, not in the Color Monitor. KWH Power measurements are available only for panelboard totals. See , "Readings: BCMS Normal".

Figure 25. Readings: BCMS (Normal)

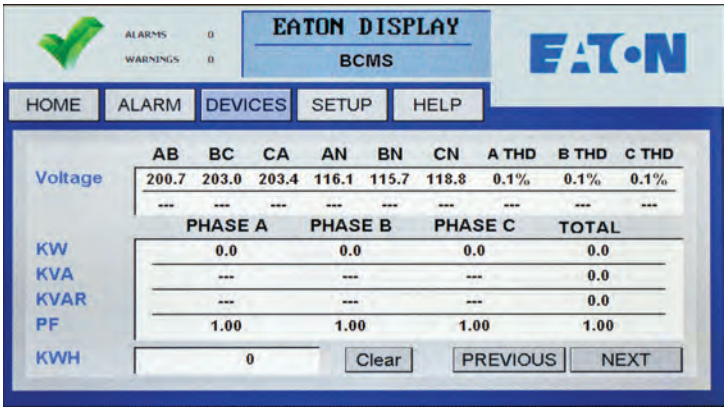
Select **BCMS device name** in list (**BCMS** in this list). Device name turns blue when selected and device name displays in header.

Touch **READINGS** to see BCMS power monitoring data.



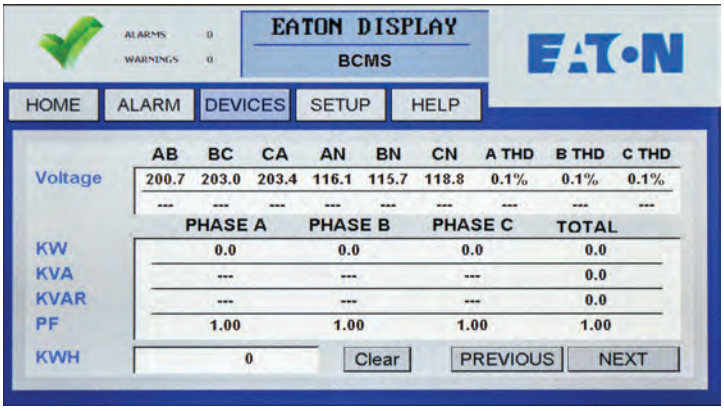
Measurements and Alarms, individual panelboard circuits (42 circuits):

NO = Circuit Number
AMPS = Amperes
CB = Circuit breaker rating (Amps)
MIN = Lowest current read
MAX = Highest current read
ZERO: OK = Current has not dropped to 0 since last reset; ACTIVE = Current has read 0 after having read a minimum current
WARNING: OK = No warning outstanding; ACTIVE = warning outstanding
ALARM: OK = No alarm outstanding; ACTIVE = Alarm is outstanding



Panelboard totals, using main feeds or BCMS computed measurements:

PB Amps: Total panelboard measurements, phases ABCNG
% Load: Percent of maximum PB load as specified by user in points list
Both PBs: Sum of phase ABCN measurements for both panelboards (not available if PBs operate at different voltages)
Frequency: Measurement in Hz



Panelboard instantaneous readings:
Voltage AB, BC, etc., to panelboard with THD (Total Harmonic Distortion %) by phase:
Line 1 = voltage source 1
Line 2 = voltage source 2, if present
Panelboard power measurements by phases ABC and total:
KW
KVA
KVAR
PF
Panelboard cumulative reading:
KWH panelboard total
Clear = Reset KWH to 0.

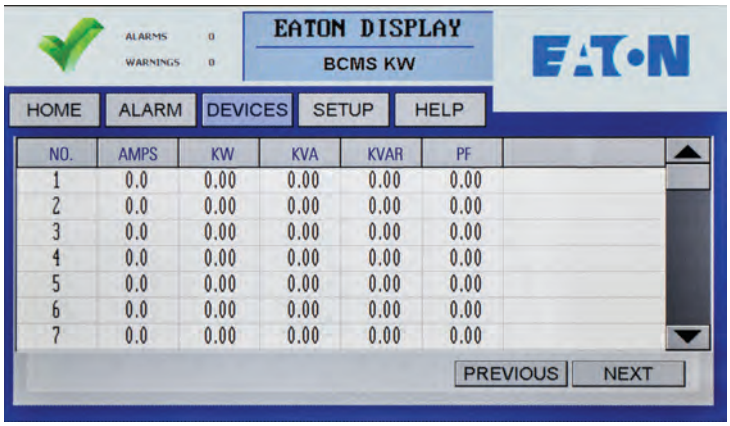
6.4 BCMS KWH Readings

Compared to BCMS Normal, BCMS KWH panelboard devices have one additional screen showing power measurements (KWH, etc.) for individual circuits. The first screen in the device's chain provides KW, KVA, KVAR, and power factor readings for each panelboard circuit (see and).

Figure 26. Readings: BCMS KWH (Part 1)

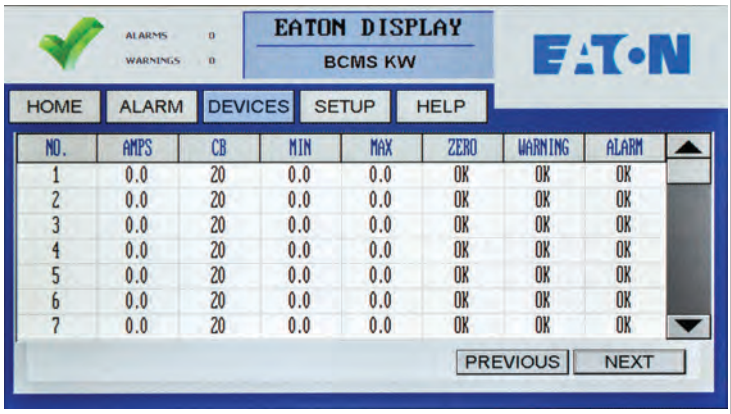
Select device name. Device name will highlight in blue.

Users can change the device name in **SETTINGS**.
Select **READINGS** to display panelboard power data.
Scroll among **READINGS** pages using **PREVIOUS/NEXT** buttons.



Panelboard Circuits Instantaneous Readings:

NO = Circuit Number (scroll through 42 circuits)
AMPS = Amperes
KW = Kilowatts
KVA = Kilovolt-Amperes
KVAR = Kilovolt-Amperes Reactive
PF = Power Factor

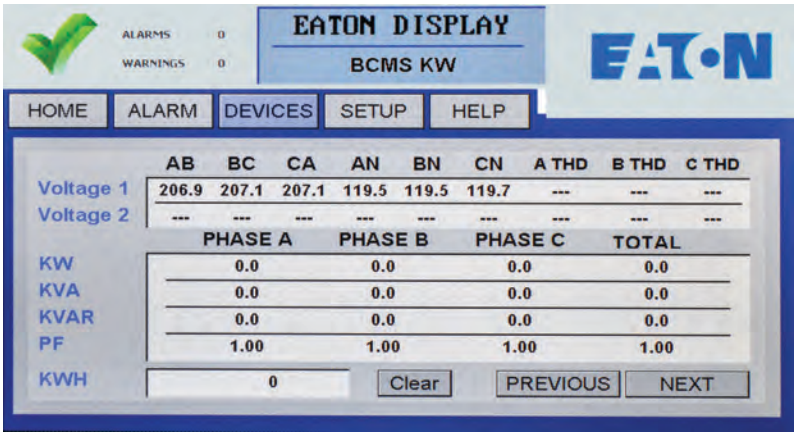


Panelboard Circuits, Measurements and Alarms:

NO = Circuit Number
AMPS = Amperes
CB = Circuit breaker rating (Amps)

MIN = Lowest current read
MAX = Highest current read
ZERO: OK = Current has not dropped to 0 since last reset; ACTIVE = Current has read 0 after having read a minimum current
WARNING: OK = No warning outstanding; ACTIVE = warning outstanding
ALARM: OK = No alarm outstanding; ACTIVE = Alarm is outstanding

Figure 27. Readings: BCMS KWH (Part 2)

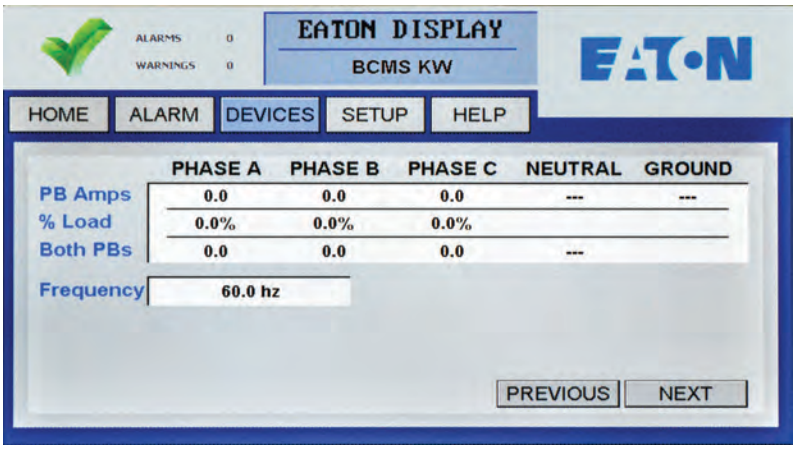


Panelboard instantaneous readings:

Voltage AB, BC, etc., to panelboard with THD (Total Harmonic Distortion %) by phase:
Line 1 = voltage source 1
Line 2 = voltage source 2, if present

Panelboard power measurements by phases ABC and total:
KW
KVA
KVAR
PF

Panelboard cumulative reading:
KWH to panelboard as whole
Clear = Reset KWH to 0.



Panelboard totals, instantaneous readings, using main feed or BCMS computed measurements:

PB Amps: Total panelboard measurements, phases ABCNG
% Load: Percent of maximum PB load as specified by user in points list
Both PBs: Sum of phase ABCN measurements for both panelboards (not available if PBs operate at different voltages)
Frequency: Measurement in Hz

6.5 BCMS CB (Subfeeds) Readings

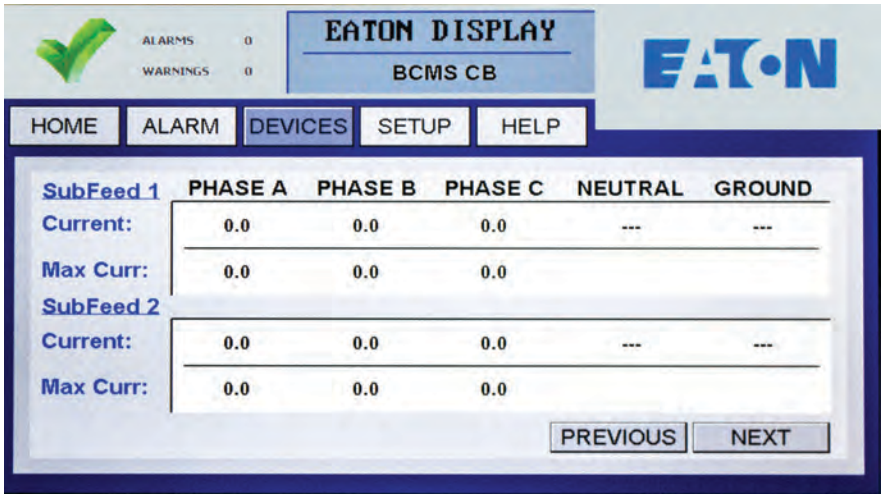
The short BCMS CB (Subfeeds) points list is associated with panelboard BCMS Normal or KWH points lists and provides current readings for two subfeeds (see). It is typically used with an RPP, which can have subfeeds to other power distribution equipment in addition to its panelboards. It is not used with large subfeed PDUs, which use the Enhanced Subfeeds (ESF) points list.

A BCMS Data Acquisition PCB can have three Modbus addresses: two panelboards with BCMS Normal or KWH points list and a third BCMS CB subfeeds points list.

Figure 28. Readings: BCMS CB (Two Subfeeds)

Touch **BCMS Subfeeds** generic device name in the device name list (**BCMS CB** in this case). Device name turns blue when selected and device name displays in header.

Touch **READINGS** to see BCMS Subfeeds power monitoring data.



The **BCMS CB** device for panelboard subfeeds has current readings for one or two subfeeds:

- Current, phases ABCNG
- Maximum current, phases ABC

Points list options let you choose monitoring for

- Sub-distribution feeds 1 and/or 2
- Phases ABC
- Neutral (optional)
  Ground (optional)

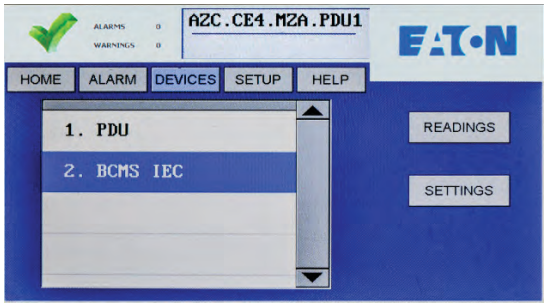
In this example, subfeeds 1 and 2 are monitored for phases ABC, but not NG.

6.6 BCMS IEC Readings

BCMS IEC panelboards have three readings screens (see). For panelboard 1, individual circuits are numbered 1L1 to 1L72. Panelboard circuits are numbered sequentially down the left side (1L1-1L36) and then down the right side (1L37-1L72).

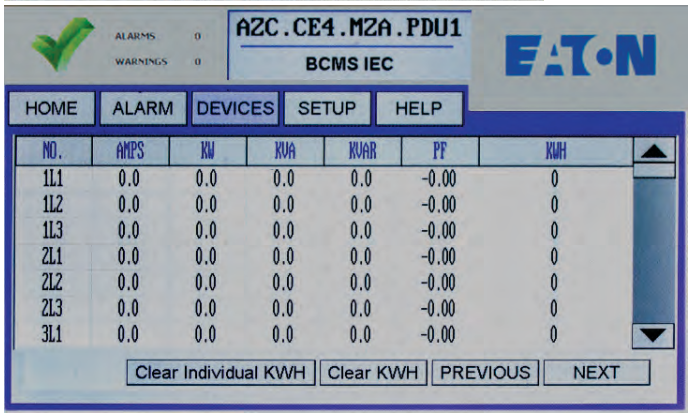
BCMS IEC points list does not have the BCMS CB subfeeds option.

Figure 29. Readings: BCMS IEC Panelboard



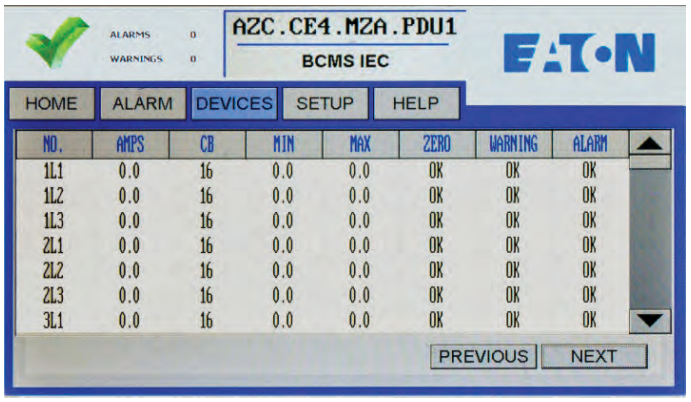
Touch **BCMS IEC** device name in the device name list.
Device name turns blue when selected and device name displays in header. (Device name can be changed in **SETTINGS**.)

Touch **READINGS** to see BCMS IEC panelboard power monitoring data in three screens.



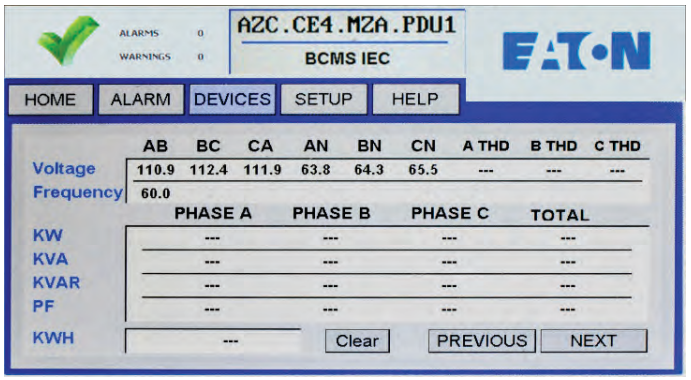
Panelboard Individual Circuits Instantaneous Measurements:

NO = circuit number (scroll through 42 circuits)
AMPS = Amperes
KW = Kilowatts
KVA = kilovolt-amperes
KVAR = kilovolt-amperes reactive
PF = power factor
KWH = Kilowatt Hours



Panelboard Circuits, Measurements and Alarms:

NO = Circuit Number
AMPS = Amperes
CB = Circuit breaker rating (Amps)
MIN = Lowest current read
MAX = Highest current read
ZERO: OK = Current has not dropped to 0 since last reset; ACTIVE = Current has read 0 after having read a minimum current
WARNING: OK = No warning outstanding; ACTIVE = warning outstanding
ALARM: OK = No alarm outstanding; ACTIVE = Alarm is outstanding



Panelboard totals, instantaneous measurements:
Voltage AB, BC, etc., to panelboard with THD (Total Harmonic Distortion %) by phase:
Voltage source
Frequency

Panelboard totals instantaneous power measurements by phases ABC and total:
KW
KVA
KVAR
PF

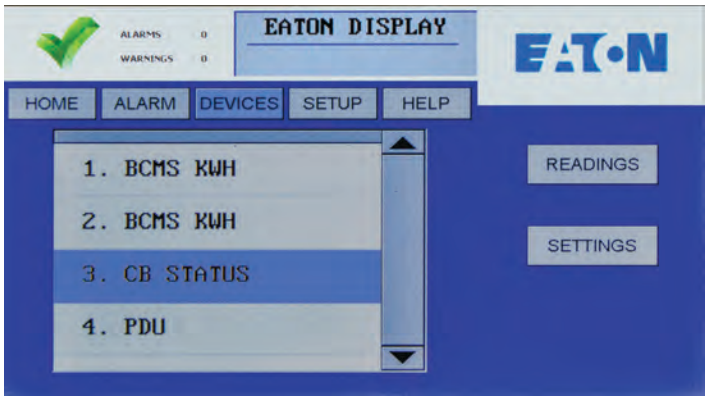
Panelboard cumulative reading:
KWH to panelboard as whole
Clear = Reset KWH to 0.

6.7 Circuit Breaker Status Board Readings

A Circuit Breaker Status Board reports circuit breaker status:

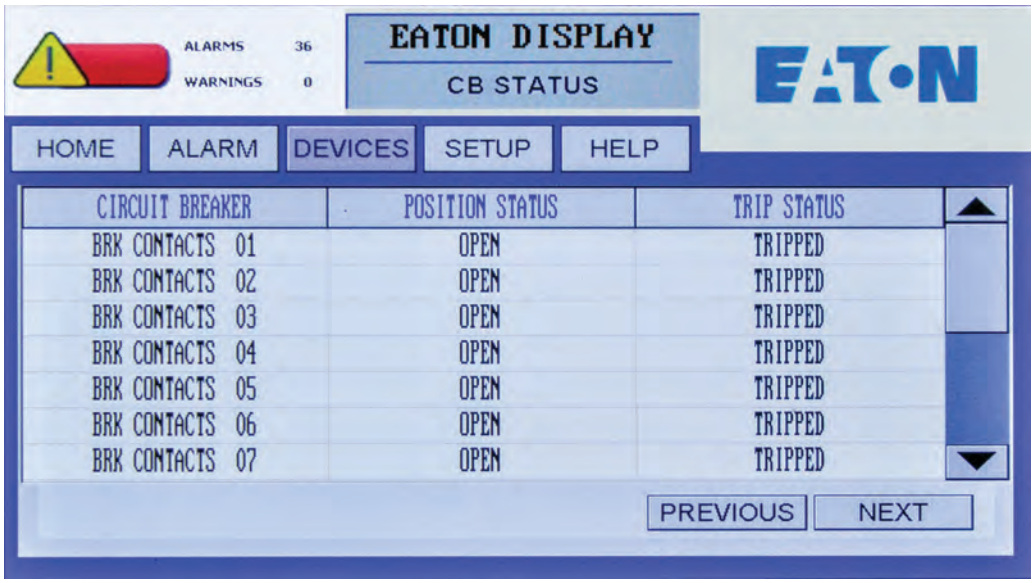
- Auxiliary Contacts, which indicate breaker open or closed status.
- Bell Alarm Contacts, which change status when a breaker is tripped.

Figure 30. Readings: Circuit Breaker Status Board



Touch the **Circuit Breaker Status Board** device name in the device name list ("CB Status").
Device name turns blue when selected and device name displays in header. (Device name can be changed in **SETTINGS**.)

Touch **READINGS** to see status.



Circuit Breaker names are from the Modbus points list or SNMP MIB.

Auxiliary Contacts Circuit Breaker Status: Open or Closed

Bell Alarm Contacts: Circuit Breaker Status Tripped/Not Tripped

Contacts not listed as "Active" in the Modbus points list or MIB are not shown.

Chapter 7 Alarms and Troubleshooting

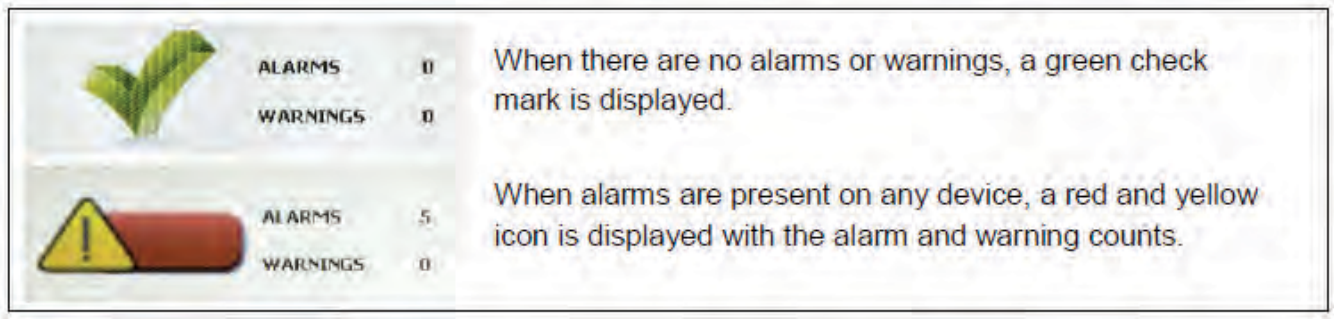
The Color Monitor displays alarms and warnings for all devices in the Monitor's device chain. The Monitor reads the alarms and warnings from the points list (Modbus register map) of each device.

7.1 Summary Alarm Indicators

The Color Monitor indicates that there are extant alarms with three general indicators:

- The summary count of warnings and alarms for the Monitor's entire device chain is shown on every screen (see Figure 31).

Figure 31. Alarm and Warning Summary Status Icons



- There is also a light under the screen that glows green if none of the devices in the Monitor's chain has warnings or alarms and red if there are outstanding warnings or alarms (see Figure 1).
- In addition, the Monitor has a dry contact (NO) connection on the backpanel that signals a summary alarm whenever any alarm is present in the Monitor's device chain (see Figure 34).

7.2 Alarm Screen and Alarm List

On any screen, touch the **ALARM** button to show the **ALARM** screen.

The **ALARM** Screen (see Figure 32) lists all outstanding warning and alarms by device name with a date-time stamp in a scrollable list. If no alarms are outstanding, there will be only one line, "No Alarms".

The warning or alarm gives the device name and locates the device component that is the alarm source. For example, for a BCMS panelboard device, the alarm may be located to

- the panelboard, such as "Over Current PB", or
- the main voltage feed to the panelboard, such as "Over Volt Main," or
- the individual panelboard circuit, such as "CB 19 Zero Current".

To further investigate individual circuits in warning/alarm state (see Figure 33):

1. Note the device name and the warning/alarm.
2. Touch the **DEVICES** button to show the device list.
3. In the device list, scroll to the **device name** that has the warning/alarm. Touch the device name to show the device's circuit list.
4. Step through the device's screen chain with **PREVIOUS/NEXT** to find the **ALARM** heading.

5. Scroll within the circuit list on the first device screen to find circuit or other component in warning/alarm. An alarm may apply to a circuit or to the entire device, such as "Under Current PB."

Figure 32. ALARM Screen with Alarm List

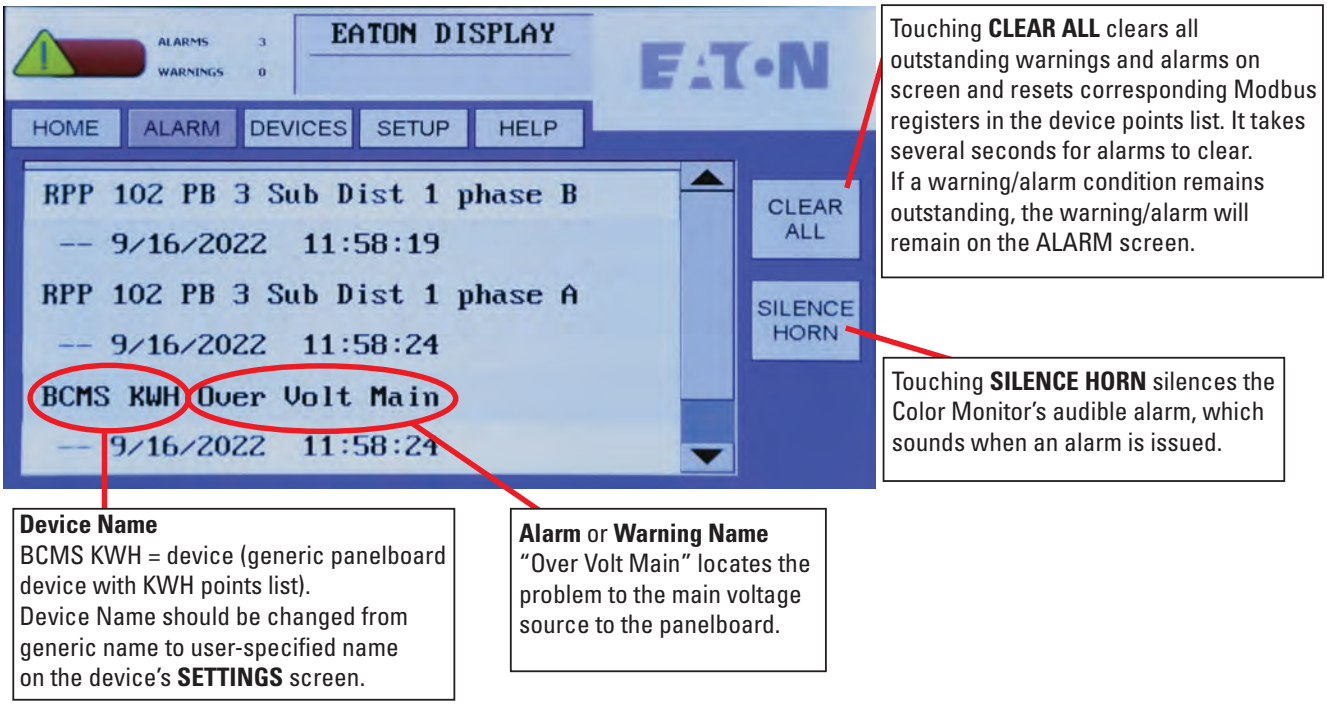
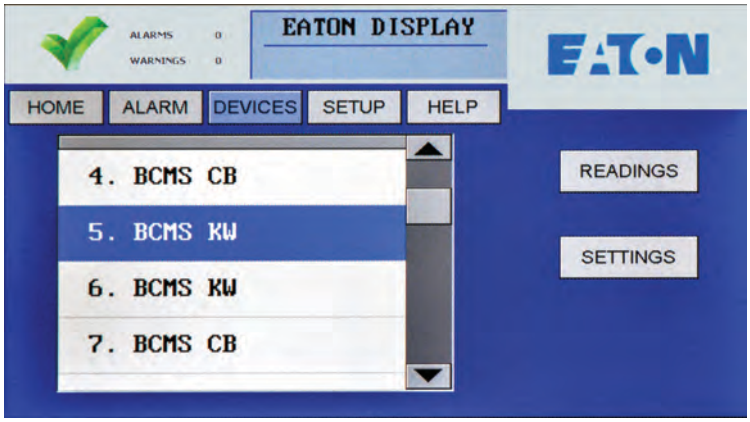


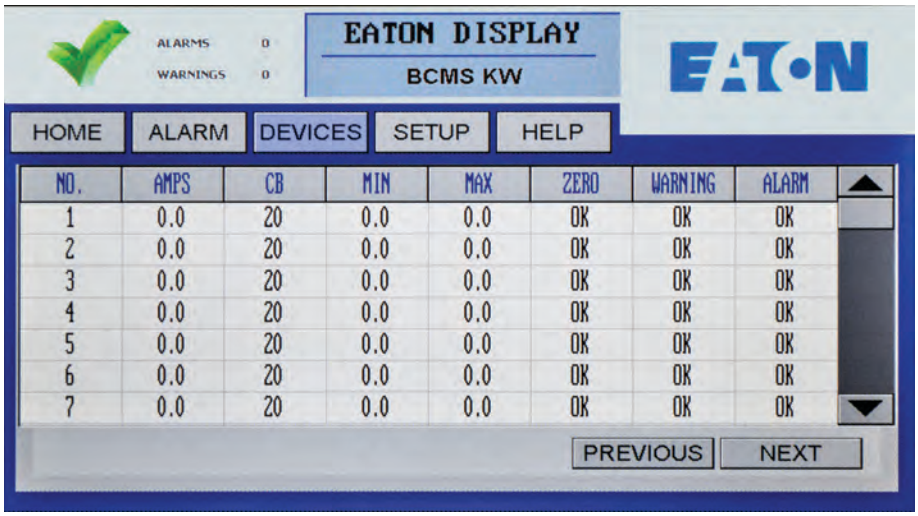
Figure 33. Find the Circuits in an Alarm Condition



Touch **DEVICES** button to display the device list.

Find the **Device Name** noted in the alarm in the device list.

Touch the **Device Name** to display its screen chain.



Step through the device's screen chain (using **NEXT**) to find the screen with the **ALARM** column.

Scroll through the device's circuits to find the component in alarm. (Alarm shows as **ACTIVE** under **ZERO**, **WARNING**, or **ALARM**.)

Review information for that circuit on all of the device's screens.

7.3 Alarms by Device Type

Each device has its own alarm set based on its points list. Warnings and alarms that can be viewed on the Monitor are listed below. The Monitor does not display setpoints from the points lists, such as alarm thresholds.

7.3.1 Color Monitor Alarms

Table 2. Monitor Alarms

Alarm	Alarm Description
DISPLAY Comm. N Error (N is device number from 1-20):	Communication error with one of the devices in the Monitor's downstream device chain

7.3.2 PDU Alarms

Table 3. General PDU Alarms

Warning or Alarm	Alarm Description
EPO	Emergency Power Off on PDU has been engaged. When EPO button is pushed, the alarm is activated and the unit's main input circuit breaker will then be shunt-tripped off line.
Remote EPO	Remote EPO on PDU can be activated in by closing the contacts on the contractor board. When Remote EPO button is activated, the alarm is activated and the unit's main input circuit breaker will then be shunt-tripped off line.
Thermal Overtemp	Stage 1 transformer temperature alarm: 180ºF or higher temperature registered in the transformer windings.
Thermal Hightemp	Stage 2, PDU shutdown on transformer temperature alarm by tripping main PDU input circuit breaker when 195ºF or higher temperature is registered in the transformer windings. (Temperature threshold can vary by transformer and PDU.)
Phase Rotation	Input phase rotation is incorrect.
S1-S2 Phase Angle	Dual input sources are not synchronized; cannot shutdown one source and transfer load to the alternate source.
Ground Curr Trip	Ground current above preset level (10A) causes breaker trip (normally disabled, enable as option).
Phase Rotation Trip	Incorrect phase rotation causes breaker trip (normally disabled, enable as option).
Over Voltage Trip	Over voltage causes breaker trip (normally disabled, enable as option).

Table 4. PDU Transformer Input

Alarm	Alarm Description
NOTE: If the PDU is configured for dual inputs, "Input 1" or "Input 2" will prefix the alarm instead of "Input."	
Input Voltage AB High	Input voltage AB measures above threshold level in points list.
Input Voltage AB Low	Input voltage AB measures below threshold level in points list.
Input Voltage BC High	Input voltage BC measures above threshold level in points list.
Input Voltage BC Low	Input voltage BC measures below threshold level in points list.
Input Voltage CA High	Input voltage CA measures above threshold level in points list.
Input Voltage CA Low	Input voltage CA measures below threshold level in points list.
Input Frequency High	Input frequency measures above threshold level.
Input Frequency Low	Input frequency measures below threshold level.
Input Current A High	Input current phase A measures above threshold level (optional).
Input Current A Low	Input current phase A measures below threshold level (optional).
Input Current B High	Input current phase B measures above threshold level (optional).

Table 4. PDU Transformer Input (Continued)

Alarm	Alarm Description
Input Current B Low	Input current phase B measures below threshold level (optional).
Input Current C High	Input current phase C measures above threshold level (optional).
Input Current C Low	Input current phase C measures below threshold level (optional).

Table 5. PDU Transformer Output

Alarm	Alarm Description
NOTE: If the PDU is configured for dual outputs, "Output 1" or "Output 2" will prefix alarm instead of "Output."	
Output Voltage AB High	Output voltage AB measures above threshold level in points list.
Output Voltage AB Low	Output voltage AB measures below threshold level in points list.
Output Voltage BC High	Output voltage BC measures above threshold level in points list.
Output Voltage BC Low	Output voltage BC measures below threshold level in points list.
Output Voltage CA High	Output voltage CA measures above threshold level in points list.
Output Voltage CA Low	Output voltage CA measures below threshold level in points list.
Output Voltage AN High	Output voltage AN measures above threshold level in points list.
Output Voltage AN Low	Output voltage AN measures below threshold level in points list.
Output Voltage BN High	Output voltage BN measures above threshold level in points list.
Output Voltage BN Low	Output voltage BN measures below threshold level in points list.
Output Voltage CN High	Output voltage CN measures above threshold level in points list.
Output Voltage CN Low	Output voltage CN measures below threshold level in points list.
Output Current A High	Output current phase A measures above threshold level in points list.
Output Current A Low	Output current phase A measures below threshold level in points list.
Output Current B High	Output current phase B measures above threshold level in points list.
Output Current B Low	Output current phase B measures below threshold level in points list.
Output Current C High	Output current phase C measures above threshold level in points list.
Output Current C Low	Output current phase C measures below threshold level in points list.
Output KW A High	Output KW phase A measures above preset level.
Output KW B High	Output KW phase B measures above preset level.
Output KW C High	Output KW phase C measures above preset level.
Output KW Total High	Output KW total measures above threshold level in points list.
Output KVA A High	Output KVA phase A measures above preset level.

Table 5. PDU Transformer Output (Continued)

Alarm	Alarm Description
Output KVA B High	Output KVA phase B measures above preset level.
Output KVA C High	Output KVA phase C measures above preset level.
Output KVA Total High	Output KVA Total measures above preset level.
Neutral Current High	Neutral current measures above preset level.
Neutral Current Low	Neutral current measures below preset level.
Ground Current High	Ground current measures above preset level.
Ground Current Low	Ground current measures below preset level.

Table 6. Contractor Board Alarms

Alarms	Alarm Description
Build N (N = 1-8)	Building alarms, customizable names up to 8 characters can be set in software.
Digit N (N = 1-4)	Digital alarms, customizable names up to 8 characters can be set in software.

7.3.3 Enhanced Subfeeds Alarms

Alarm	Alarm Description
CB N Zero Current (N = 1-14)	Circuit N has lost current after previously measuring a minimum current.
CB N High Current Warning (N = 1-14)	Circuit N has exceeded current warning threshold.
CB N High Current Alarm (N = 1-14)	Circuit N has exceeded current alarm threshold.
Over Voltage	Over voltage measured to ESF board as specified in points list.
Under Voltage	Under voltage measured to ESF board as specified in points list.

7.3.4 BCMS Panelboard—Typical Alarms

Table 7. Circuit Alarms

Alarm	Alarm Description
Note: The Color Monitor can number panelboard circuits sequentially for up to 336 circuits (8 x 42-circuit panelboards) as specified in device setup. Circuit alarms are identified by this number.	
CB N Zero Current (N = 1-336)	Circuit N has lost current after measuring a minimum current.
CB N High Current Warning (N = 1-336)	Circuit N exceeds high current warning threshold.
CB N High Current Alarm (N = 1-336)	Circuit N exceeds high current alarm threshold.

Table 8. Panelboard Alarms

Alarm	Alarm Description
Over Current PB	Current feeding one panelboard is above alarm threshold.
Under Current PB	Current feeding one panelboard is below alarm threshold.
Over Curr both PBs	A common circuit feeding both panelboards is over alarm threshold.
Under Curr both PBs	A common circuit feeding both panelboards is under alarm threshold.
Over Volt Main	Over voltage measured on main voltage source to panelboard.
Under Volt Main	Under voltage measured on main voltage source to panelboard.
Over Volt Alt	Over voltage measured on alternate voltage source to panelboard.
Under Volt Alt	Under voltage measured on alternate voltage source to panelboard.

7.3.5 Circuit Breaker Status Board Alarms

Table 9. CB Status Board Alarms

Alarm	Alarm Description
Circuit Breaker N Open	Circuit Breaker has opened.
Circuit Breaker N Tripped	Circuit Breaker has tripped.

7.4 Troubleshooting

Table 10. Troubleshooting Guide

Symptom	Probable Cause	Remedy
Touch Screen does not respond to touch.	The object on the touch screen was not touched long enough.	The touch screen is set up so that an object must be pushed firmly for a moment. A quick "peck" with a finger or stylus may not be registered.
Monitor hangs: Monitor is locked up and there is no response to touches.		Press RESET button on backpanel.
No power to unit.	Main unit is not powered up. Plug is not seated in J5 or J6 of the Monitor's backpanel. Backlight turned off.	Turn on or reset main circuit breaker to the Monitor. Re-seat Monitor backpanel power plugs J5 (120 VAC) or J6 (24 VDC). Touch the screen anywhere to turn the backlight on.
Monitor has communication errors.	Open connection or lose wire on the Modbus chain. Display may not be properly setup.	Check wiring. Refer to "Modbus" AND "Setup" previously in this manual. Refer to initial setup to setup downstream units. Go to the Setup screen and press RESTART WITH NEW SETTINGS to force the display to search for downstream devices.

Table 10. Troubleshooting Guide (Continued)

Symptom	Probable Cause	Remedy
Monitor is in Active alarm state.	Red LED is solid and alarms are listed under Active alarms.	Go to the Alarms Screen and press "CLEAR ALL". (It takes a few seconds to clear all alarms.) If the Alarms persist, check the downstream device.
Monitor displays "—" or 65536.	The downstream device's options are not setup properly or the downstream device is reading an analog value that is outside of its expected range.	Check the downstream device's setup.

Chapter 8 Glossary

BCMS	Branch Circuit Monitoring System.
BCMS CB	Small points for measuring current in RPP subfeeds with CTs. When used, it has its own Modbus address, but its description or mapping is contained in the BCMS Normal and BCMS KWH points lists.
BCMS device	Power distribution elements monitored by a single points list (or Modbus register map) and addressed by a single Modbus address. Example: a panelboard is a BCMS device because it is monitored with one points list and has one Modbus address. An acquisition board can monitor three BCMS devices—two panelboards and one set of sub-distribution feeds.
BCMS ESF	Enhanced Subfeeds Points list for large PDU subfeeds (e.g., 250A).
BCMS IEC	BCMS points list for IEC format panelboards with 36 or 72 1P circuits.
BCMS KWH	Points list specialized for power measurement at the individual circuit level. Warnings and alarms thresholds are set the same for all panelboard circuits.
BCMS Normal	Standard points list allowing individual circuits to be customized for warning and alarm thresholds. KWH measurements are available at the panelboard level.
BMS	Building management system.
M4G	Points list for a PDU M4G data acquisition board and associated contractor board.
Modbus RTU	An industrial communications protocol.
Modbus TCP/IP	Modbus protocol send over TCP/IP, which provides higher transmission speeds.
Points List	Modbus register map.
PDU	Power Distribution Unit.
RPP	Remote Power Panel.
SNMP	Simple Network Management Protocol.

Chapter 9 Bibliography

Modbus Points Lists

For BCMS points lists, Contact Eaton Service, See paragraph :

Once the software file is received, unzip the file and open the directory \Points List for BCMS Version to find the following points lists and use the latest revision given:

- **BCMS Normal** panelboard points list is "BCMSII points list".
- **BCMS KWH** panelboard points list is "BCMSII plus points list Power KWH".
- **BCMS CB** points list for small RPP subfeeds is given at the end of the **BCMS Normal** and **BCMS KWH** points lists.
- **BCMS Enhanced Subfeeds (ESF)** points list, for large PDU subfeeds, is "BCMSII plus points list Fourteen Sub".
- **BCMS IEC** panelboard points list (for IEC format panelboards with 36 or 72 1P circuits) is "72 BCMSII plus points list Europe KWH".

For **PDU** points lists, Contact Eaton Service, See paragraph :

Once the software file is received, unzip the file and open the directory \Points List for BCMS Version to find the following points lists and use the latest revision given:

- **PDU board** points list is "M4G acquisition Points list".
- Other points lists are the same as on the **BCMS II Customer CD**.

SNMP MIBs

SNMP MIB for the Color Monitor and PDUs, Contact Eaton Service, See paragraph

For SNMP MIBs, download **SNMP Product Points Lists**, a zip file. Unzip the file and open the directory **\SNMP Product MIB Files**. The MIB for a Color Monitor with PDUs or RPPs is in **Wavestar Color Monitor PDU-RPP** and is named "PDI-FDI-DISPLAY-14-a.mib".

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

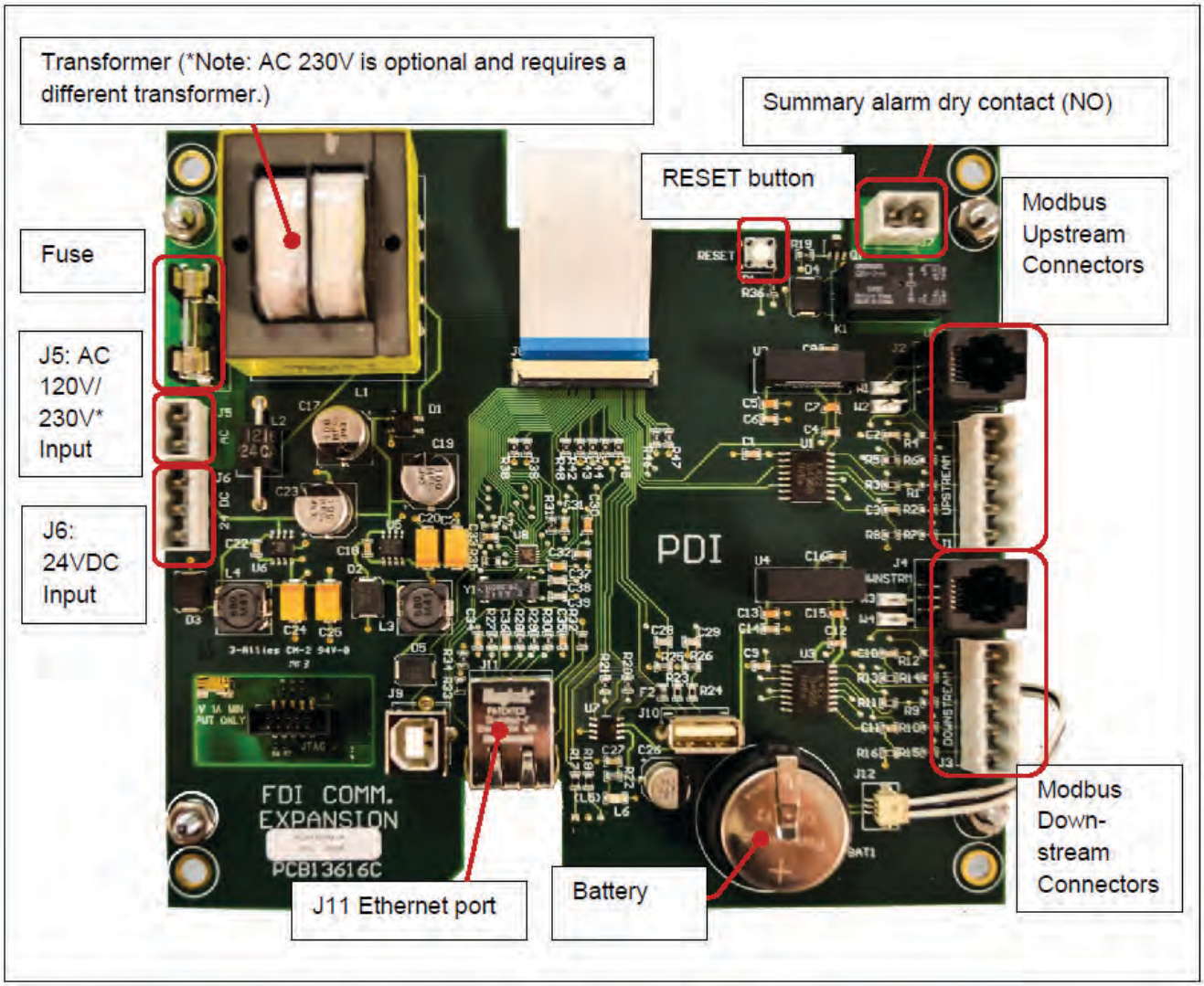
Chapter 10 Appendix: Color Monitor Backpanel

The Color Monitor backpanel has these connections:

- Power connections: 120V AC, 230V AC, and 24VDC (230V is optional and requires a different transformer.)
- Modbus connections:
  - Downstream (to Monitor device chain) is always 4-wire Modbus
  - Upstream is 4-wire or 2-wire, jumper selected
- Summary Alarm: Dry contact (NO) signals when the Monitor has an alarm condition. Dry contact specification: 0.5A at 120VAC or 30VDC.

The backpanel also has a RESET button: If the Monitor hangs, you can reset it by pressing this button.

Figure 34. Color Monitor Backpanel



Replaceable parts:

- Fuse: 200 mA, 250V; replace fuse with a UL recognized, IEC compliant fuse of the same type.
- Battery: Lithium ion, Panasonic-BSG (CR2477), 3V, 1 AH (PDI Part Number 15174)

  Caution: The battery used in this device may present a risk of fire or chemical burn hazard if mistreated. Do not recharge, disassemble, heat above 100°C (212°F) or incinerate. Replace battery with Panasonic-BSG (CR2477), 3V, 1 AH (PDI Part Number 15174) only. Use of another battery may present a risk of fire or explosion.

  Dispose of used battery promptly. Keep away from children. Do not disassemble and do not depose of in fire.

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