PowerLogic®
Circuit Monitor
Series 2000

Installation and Operation
NOTICE

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this bulletin to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

⚠️ DANGER

Used where there is hazard of serious injury or death. Failure to follow a “DANGER” instruction will result in death or serious injury.

⚠️ WARNING

Used where there is hazard of serious injury or death. Failure to follow a “WARNING” instruction can result in death or serious injury.

⚠️ CAUTION

Used where there is hazard of equipment damage. Failure to follow a “CAUTION” instruction can result in damage to equipment.

Note: Provides additional information to clarify or simplify a procedure.

PLEASE NOTE: Electrical equipment should be serviced only by qualified electrical maintenance personnel, and this document should not be viewed as sufficient for those who are not otherwise qualified to operate, service, or maintain the equipment discussed. Although reasonable care has been taken to provide accurate and authoritative information in this document, no responsibility is assumed by Square D for any consequences arising out of the use of this material.

FCC NOTICE: This equipment complies with the requirements in Part 15 of FCC rules for a Class A computing device. Operation of this equipment in a residential area may cause unacceptable interference to radio and TV reception, requiring the operator to take whatever steps are necessary to correct the interference.

TECHNICAL SUPPORT

For technical support, contact the Power Management Operation Technical Support Center. Hours are 7:30 A.M. to 4:30 P.M., Central Time, Monday through Friday.

Phone: (615) 287-3400 Fax: (615) 287-3404
BBS: (615) 287-3414 Email: PMOSUPRT@SquareD.com

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Registration Card

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• Free expert technical phone support—just call (615) 287-3400
• Notice of product upgrades and new product releases
• Notice of special product offers and price discounts

Name _______________________________ Dept./Title _________________________________
Company ________________________________________________________________________
Mailing Address ___________________________________________________________________
City __________________ State ___________________ Country _________________________
Zip/Postal Code _________________ Email Address ____________________________________
Telephone _______________________________ Fax ___________________________________
Product Purchased Through (Distributor) _______________________________________________

Please tell us how many of each of the following products you have:
Circuit Monitors:  □ 1–5 □ 6–20 □ 21–50 □ 51–100 □ 100+
Power Meters:  □ 1–5 □ 6–20 □ 21–50 □ 51–100 □ 100+

Are you interested in receiving information on POWERLOGIC Application Software?
□ Yes      □ No

Please fill out, detach, and mail the postage paid card below. Fill out only one registration card, even if you have purchased multiple POWERLOGIC devices.
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CHAPTER 1—INTRODUCTION

CHAPTER CONTENTS

This chapter offers a general description of the circuit monitor, describes important safety precautions, tells how to best use this bulletin, and lists related documents. Topics are discussed in the following order:

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Note: This edition of the circuit monitor instruction bulletin describes features available in series G4 or later and firmware version 17.009 (or higher). Series 2000 circuit monitors with older series numbers or firmware versions will not include all features described in this instruction bulletin. If you have Series 2000 circuit monitors that do not have the latest firmware version and you want to upgrade their firmware, contact your local Square D representative for information on purchasing the Class 3020 Type CM-2000U Circuit Monitor Firmware Upgrade Kit.

WHAT IS THE CIRCUIT MONITOR?

The POWERLOGIC® Circuit Monitor is a multifunction, digital instrumentation, data acquisition and control device. It can replace a variety of meters, relays, transducers and other components. The circuit monitor is equipped with RS-485 communications for integration into any power monitoring and control system. However, POWERLOGIC System Manager application software—written specifically for power monitoring and control—best supports the circuit monitor’s advanced features.

The circuit monitor is a true rms meter capable of exceptionally accurate measurement of highly nonlinear loads. A sophisticated sampling technique enables accurate, true rms measurement through the 31st harmonic. Over 50 metered values plus extensive minimum and maximum data can be viewed from the six-digit LED display. Table 1-1 on page 3 provides a summary of circuit monitor instrumentation.

The circuit monitor is available in several models to meet a broad range of power monitoring and control applications. Table 1-2 on page 3 lists the circuit monitor models. Table 1-3 compares the features available by model.

Circuit monitor capabilities can be expanded using add-on modules that mount on the back of the circuit monitor. A voltage/power module and several input/output modules are available. See I/O Capabilities in the Circuit Monitor Reference Manual for a description of the available I/O modules.
Using POWERLOGIC application software, users can upgrade circuit monitor firmware through either the RS-485 or front panel optical communications ports. This feature can be used to keep all circuit monitors up to date with the latest system enhancements.

Some of the circuit monitor’s many features include:

- True rms metering (31st harmonic)
- Accepts standard CT and PT inputs
- Certified ANSI C12.16 revenue accuracy
- High accuracy—0.2% current and voltage
- Over 50 displayed meter values
- Min/Max displays for metered data
- Power quality readings—THD, K-factor, crest factor
- Real time harmonic magnitudes and angles
- Current and voltage sag/swell detection and recording
- On-board clock/calendar
- Easy front panel setup (password protected)
- RS-485 communications standard
- Front panel, RS-232 optical communications port standard
- Modular, field-installable analog and digital I/O
- 1 ms time stamping of status inputs for sequence-of-events recording
- I/O modules support programmable KYZ pulse output
- Setpoint-controlled alarm/relay functions
- On-board event and data logging
- Waveform and event captures, user-selectable for 4, 12, 36, 48, or 60 cycles
- 64 and 128 point/cycle waveform captures
- High-speed, triggered event capture
- Programming language for application specific solutions
- Downloadable firmware
- System connections
  - 3-phase, 3-wire Delta
  - 3-phase, 4-wire Wye
  - Metered or calculated neutral
  - Other metering connections
- Optional voltage/power module for direct connection to 480Y/277V
- Optional control power module for connecting to 18–60 Vdc control power
- Wide operating temperature range standard (-25 to +70°C)
- UL Listed, CSA certified, and CE marked
- MV-90™ billing compatible
- Pre-configured data log and alarms
EXPANDED MEMORY

New Series G4 (or higher) circuit monitor models CM-2150 and higher now are factory-equipped with 100 kilobytes (100K) of nonvolatile memory. (Earlier Series G3 models CM-2150 and CM-2250 shipped with 11K of memory, models CM-2350 and CM-2450 with 100K of memory.)
EXPANDED MEMORY (cont.) For applications where additional memory is required, you can order a circuit monitor with an optional 512K or 1024K memory expansion card, resulting in 612K or 1124K, respectively, total nonvolatile memory (100K base memory plus the expansion card memory). Memory upgrade kits are also available for most earlier circuit monitors. See Upgrading Existing Circuit Monitors, page 5.

Requirements for Using Expanded Memory System Manager software version 3.02 with Service Update 1, 3.02a with Service Update 1, or 3.1 (or higher) is required to take advantage of expansion card memory or the 100K of memory standard on G4 circuit monitors. Earlier versions of System Manager software will recognize only 11K (the Series G3 and earlier memory capacity) of available memory.

Also, your circuit monitor must be equipped with firmware version 17.008 or later to take advantage of expanded memory. The following section tells how to determine the firmware version shipped with your circuit monitor.

To determine if your circuit monitor firmware version has been updated with downloadable firmware, see Viewing Configuration Data in Protected Mode, page 45.

To obtain the latest available firmware revision contact your local Square D representative (see Note, page 1.)

Identifying the Series and Firmware Revisions The circuit monitor series and firmware revision number are printed on a sticker on the top of the circuit monitor enclosure. Figure 1-1 shows a sample sticker.

![Figure 1-1: Circuit monitor series/firmware revision sticker](image)

Model Numbers Circuit monitor models equipped with an optional memory expansion card are differentiated from standard models by a suffix—either -512k or -1024k—added to the model number (table 1-4). As shown in the table, the memory expansion option is available for model numbers CM-2150, CM-2250, CM-2350, and CM-2450. The CM-2452 circuit monitor is now obsolete and has been replaced by the CM-2450-512k, which has more memory at a lower price than the CM-2452. However, existing CM-2452 circuit monitors can be upgraded as detailed on the following page.

<table>
<thead>
<tr>
<th>Standard Models</th>
<th>Models with 512k Option</th>
<th>Models with 1024k Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>3020 CM-2050</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>3020 CM-2150</td>
<td>3020 CM-2150-512k</td>
<td>3020 CM-2150-1024k</td>
</tr>
<tr>
<td>3020 CM-2250</td>
<td>3020 CM-2250-512k</td>
<td>3020 CM-2250-1024k</td>
</tr>
<tr>
<td>3020 CM-2350</td>
<td>3020 CM-2350-512k</td>
<td>3020 CM-2350-1024k</td>
</tr>
<tr>
<td>3020 CM-2450</td>
<td>3020 CM-2450-512k</td>
<td>3020 CM-2450-1024k</td>
</tr>
</tbody>
</table>
Memory upgrade kits are available for field installation by a qualified electrician. No special tools are required.

### HAZARD OF ELECTRIC SHOCK, BURN, OR EXPLOSION

Only qualified electrical workers should install a memory upgrade kit in a circuit monitor. Perform the upgrade only after reading the installation instructions shipped with the upgrade kit. Before removing the cover of the circuit monitor to install the memory board:
- Disconnect all voltage inputs to the circuit monitor
- Short the CT secondaries
- De-energize the control power inputs

Failure to observe this precaution will result in death or serious injury.

For Series G3 and earlier circuit monitors, the memory upgrade kit can be installed only in circuit monitor models CM-2350 and CM-2450.

**Note:** Model CM-2452 was factory-equipped with 100K of memory and a 256K memory expansion card, for a total of 356K of memory. The 256K card can be removed and replaced with a 512K or 1024K expansion card, for total memory of either 612K or 1124K.

The memory upgrade kit can be installed in Series G4 models CM-2150 and higher. Memory upgrade kits are available with either the 512k or 1024k memory card (see table 1-5). No special tools are required for installation.

### Table 1-5

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3020 CM-MEM-512K</td>
<td>512K Memory Upgrade Kit for Series 2000 Circuit Monitors</td>
</tr>
<tr>
<td>3020 CM-MEM-1024K</td>
<td>1024K Memory Upgrade Kit for Series 2000 Circuit Monitors</td>
</tr>
</tbody>
</table>

### Memory Options Summary

Table 1-6 summarizes the memory options now available for Series 2000 Circuit Monitors. To obtain price and availability on circuit monitors with expanded memory and circuit monitor memory upgrade kits, contact your local sales representative.

### Table 1-6

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Total Memory Capacity</th>
<th>Series G3 or Earlier</th>
<th>Series G4 or Later</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Standard</td>
<td>512K Expansion</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------------------</td>
<td>----------</td>
<td>----------------</td>
</tr>
<tr>
<td>CM-2050</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>CM-2150</td>
<td>11K</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>CM-2225</td>
<td>11K</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>CM-2350</td>
<td>100K</td>
<td>612K</td>
<td>1124K</td>
</tr>
<tr>
<td>CM-2450</td>
<td>100K</td>
<td>612K</td>
<td>1124K</td>
</tr>
<tr>
<td>CM-2452</td>
<td>356K</td>
<td>612K ⚠</td>
<td>1124K ⚠</td>
</tr>
</tbody>
</table>

⚠ CM-2452 256K memory expansion card removed and replaced with 512K or 1024K memory expansion card.
SAFETY PRECAUTIONS

DANGER

HAZARD OF BODILY INJURY OR EQUIPMENT DAMAGE

• Only qualified electrical workers should install this equipment. Such work should be performed only after reading this entire set of instructions.

• The successful operation of this equipment depends upon proper handling, installation, and operation. Neglecting fundamental installation requirements may lead to personal injury as well as damage to electrical equipment or other property.

• Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, grounded, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding.

Failure to observe this precaution will result in death, serious injury or equipment damage.

USING THIS BULLETIN

This document provides the information required to install and operate the circuit monitor. The document consists of a table of contents, five chapters, and three appendices. Chapters longer than a few pages begin with a chapter table of contents. To locate information on a specific topic, refer to the table of contents at the beginning of the document, or the table of contents at the beginning of a specific chapter.

Notational Conventions

This document uses the following notational conventions:

• Procedures. Each procedure begins with an italicized statement of the task, followed by a numbered list of steps. Procedures require you to take action.

• Bullets. Bulleted lists, such as this one, provide information but not procedural steps. They do not require you to take action.

• Cross-References. Cross-references to other sections in the document appear in boldface. Example: see Mounting the Circuit Monitor in Chapter 3.
Topics Not Covered Here

Some of the circuit monitor’s advanced features, such as on-board data log and event log files, must be set up over the communications link using POWERLOGIC application software. This circuit monitor instruction bulletin describes these advanced features, but does not tell how to set them up. For instructions on setting up these advanced features, refer to the appropriate application software instruction bulletin listed below.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows NT®</td>
<td>SMS-3000 System Administrator’s Guide (client/server)</td>
<td>3080IM9602</td>
</tr>
<tr>
<td>Windows NT®</td>
<td>SMS-3000 User’s Manual (client/server)</td>
<td>3080IM9601</td>
</tr>
<tr>
<td>Windows NT/Windows® 95</td>
<td>System Manager Standalone (SMS-1500/PMX-1500/SMS-121)</td>
<td>3080IM9702</td>
</tr>
<tr>
<td>Windows 3.1</td>
<td>SMS-770/700</td>
<td>3080IM9305</td>
</tr>
<tr>
<td>Windows 3.1</td>
<td>EXP-550/500</td>
<td>3080IM9501</td>
</tr>
<tr>
<td>DOS</td>
<td>PSW-101</td>
<td>3080IM9302</td>
</tr>
</tbody>
</table>

See Related Documents in this section for information on obtaining instruction bulletins.

RELATED DOCUMENTS

Several optional add-on modules are available for use with the circuit monitor. Each module is shipped with an instruction bulletin detailing installation and use of the product. Available add-on modules for the circuit monitor are listed below.

<table>
<thead>
<tr>
<th>Instruction Bulletin Title</th>
<th>Reference No.(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• POWERLOGIC Control Power Module (CPM-48)</td>
<td>3090IM9305</td>
</tr>
<tr>
<td>• POWERLOGIC Ride-Through Module</td>
<td>3090IM9701</td>
</tr>
<tr>
<td>• I/O Modules (IOM-11/44/18)</td>
<td>3020IM9304</td>
</tr>
<tr>
<td>• I/O Modules (IOM-4411/4444)</td>
<td>3020IM9401</td>
</tr>
<tr>
<td>• Voltage/Power Module</td>
<td>3090IM9302</td>
</tr>
<tr>
<td>• Optical Communications Interface (OCI-2000)</td>
<td>3090IM9303</td>
</tr>
<tr>
<td>• Ethernet Communications Module (ECM-2000/ECM-RM)</td>
<td>3020IB9818</td>
</tr>
</tbody>
</table>

Fax-On-Demand

In addition, the software and add-on module instruction bulletins listed in this chapter are available through D-Fax, the Square D fax-on-demand system. Phone 1-800-557-4556(2) and request a POWERLOGIC/Power Monitoring index. Then call back and order the document(s) you want by specifying the Fax Document Number(s) from the index. The document(s) will be faxed to your fax machine. This service is accessible seven days a week, 24 hours a day.

---

1 Reference numbers listed are the original document numbers. If a document has been revised, the listed number will be followed by a revision number, for example R10/97.
2 In some instances, this toll-free number may not work if dialed from outside of the United States. In such instances, phone 1-919-217-6344 to speak to the D-Fax administrator.
Reference Manual

This Installation and Operation manual provides the information necessary to install and operate the circuit monitor. Additional information on the circuit monitor’s advanced features is available in English only in the POWERLOGIC Circuit Monitor Reference Manual. The reference manual includes information on the following topics:

- Metering Capabilities
- Input/Output Capabilities
- Alarm Functions
- Logging
- Waveform Capture
- Disturbance Monitoring
- CM-2450 with Programming Language
- Advance Topics
- Communication Cable Pinouts
- Abbreviated Register Listing
- Calculating Log File Sizes
- Alarm Setup Information
- Reading and Writing Registers from the Front Panel

There are two ways to obtain the reference manual:

- Download an electronic version (Acrobat PDF format) from the POWERLOGIC web site at www.powerlogic.com.
- Order a printed copy from the Square D Literature Center at 1-800-888-2448. Ask for document #3020IM9806.
CHAPTER 2—HARDWARE DESCRIPTION

FRONT PANEL

The circuit monitor front panel is designed for maximum ease of use. The circuit monitor has five modes of operation:

- METERS — for viewing real-time metered data
- MIN — for viewing the minimum of the selected metered value
- MAX — for viewing the maximum of the selected metered value
- ALARM — for viewing the status of on-board alarms
- [Setup] — for setting up the circuit monitor

The general procedure for displaying data is simple:

1. Press the MODE button to select one of the five available modes.
2. Press the SELECT METER buttons to select a metered value.
3. Press the PHASE button to select a phase.

In [Setup] mode, use the alternate descriptions in grey to the right of the LEDs. In SETUP mode, the PHASE, MODE, and SELECT METER buttons function differently than in the other display modes. For details see Chapter 4—Front Panel Operation.

Figure 2-1 shows the front panel of the circuit monitor. A description of the front panel follows.

1. **6-Digit LED display.** For local display of metered values.
2. **Kilo/Mega LEDs.** The Kilo LED lights when the displayed value is in Kilo units. The Mega LED lights when the displayed value is in Mega units.
3. **Meter Indication LEDs.** The lit LED indicates the value being displayed.
4. **Setup/Reset Parameters.** These grey, bracketed values are used to set up the circuit monitor and perform resets. Refer to these values when in [Setup] mode.
5. **Phase Indication LEDs.** Indicate the phase for the displayed value. 
   **Note:** If you select a metered value that does not provide a reading for the selected phase, the circuit monitor automatically jumps to a phase for which a reading exists. For example, assume that you are viewing Phase A Power Factor, then change to Frequency; the circuit monitor automatically jumps from Phase A to 3-Phase, since the circuit monitor does not provide a Phase A Frequency reading.
6. **PHASE Select Button.** Press to select the phase for the selected meter value. 
   **Note:** In [Setup] mode, press this button to move from one setup parameter to the next. See Chapter 4—Front Panel Operation for details.
7. **SELECT METER buttons.** Press to change the metered value being displayed. 
   **Note:** In [Setup] mode, press these buttons to change the value of the displayed setup parameter. See Chapter 4—Front Panel Operation for details.
Mode Indication LEDs. These LEDs indicate the present display mode. The Alarm LED flashes when an alarm is active.

MODE Select Button. Press to select the display mode.

Optical Communications Port. This port allows the circuit monitor to communicate to a portable computer using the optional optical communications interface (Class 3090 Type OCI-2000). The OCI-2000 mounts magnetically to the circuit monitor and provides a standard RS-232 interface. Anything that can be done over the RS-485 communications link—including circuit monitor setup—can also be done using the optical communications port.

Figure 2-1: Circuit monitor front panel
REAR CONNECTIONS

Figure 2-2 shows the rear of the circuit monitor. Identified parts are as follows:

① Auxiliary Current Inputs
② 3-Phase Current Inputs
③ 3-Phase Voltage Inputs
④ RS-485 Communications Terminals
⑤ Input/Output Module Connector
⑥ Control Power Terminals

Note: See Chapter 3—Installation for wiring instructions.
CHAPTER 3—INSTALLATION

CHAPTER CONTENTS

This chapter tells how to mount and wire the circuit monitor. Refer to the table of contents below to locate a specific topic.

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⚠️ DANGER

HAZARD OF PERSONAL INJURY OR DEATH

Only qualified electrical workers should install and wire this equipment. Such work should be performed only after reading this complete set of instructions.

Failure to observe this precaution will result in death, serious injury or equipment damage.
CE COMPLIANCE

To comply with CE Electromagnetic Compatibility requirements, the circuit monitor must be installed in a metallic enclosure (switchgear, for example).

For CE compliance, Merlin Gerin Disconnect Breakers Type P25M #21104 or IEC 947 equivalent must be connected directly to the metering voltage and control power inputs (figure 3-1).

*Note:* The disconnect switch must be placed within reach of the circuit monitor and labeled “Disconnect Switch for Circuit Monitor.”

Figure 3-1: Example of disconnect breaker for CE compliance
MOUNTING THE CIRCUIT MONITOR

The circuit monitor is a flush-mounted device that projects through the back of a panel or breaker cell door. Table 3-1 lists typical mounting locations in various power equipment designs.

Note: Series 2000 circuit monitors use the same cutout dimensions and hole patterns as the Series 100, 200 circuit monitors, but the required rear clearances have increased.

When choosing a mounting location, consider the following points:

- Allow for easy access to the rear of the circuit monitor.
- Allow extra space for all wires, shorting blocks, or other components.
- Consider the depth of the circuit monitor. Include extra depth for add-on modules that you might add in the future. See Appendix A for circuit monitor dimensions.
- Be sure that ambient conditions fall within the acceptable range: operating temperature –25°C to +70°C, relative humidity, 5–95% non-condensing.

For CE mounting requirements, see CE Compliance, page 14.

Note: Before preparing the cutout, refer to Appendix A and verify that the required clearances exist.

To mount the circuit monitor, complete the following steps:

1. Prepare the cutout and mounting holes. Refer to figure 3-2 for exact dimensions.
2. Insert the circuit monitor through the cutout from the front of the panel or breaker cell door. Guide the circuit monitor mounting studs through the holes in the panel.
3. Secure the circuit monitor to the panel using four #10-32 hex nuts included in the circuit monitor hardware kit (63230-204-16). Figure 3-3 shows the circuit monitor mounted in an electrical panel.

### Table 3-1
Typical Circuit Monitor Mounting Locations

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Mounting Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>QED Switchboards, Model 6 MCCs</td>
<td>Main Meter Location or Aux. Section</td>
</tr>
<tr>
<td>POWER-ZONE® III Switchgear</td>
<td>Main Instrument Compartment Door</td>
</tr>
<tr>
<td>HVL and VISI/VAC® Switchgear</td>
<td>9-inch Front Panel or Instrument Door</td>
</tr>
<tr>
<td>Metal-Clad and Substation CBs</td>
<td>Standard Relaying Locations</td>
</tr>
<tr>
<td>ISO-FLEX® Medium Voltage MCCs</td>
<td>Standard Relaying Locations</td>
</tr>
</tbody>
</table>
Figure 3-2: Panel preparation

Figure 3-3: Circuit monitor mounted in electrical panel

Secure to panel using #10-32 hex nuts (4 required)
WIRING CTs, PTs, AND CONTROL POWER

The circuit monitor supports a variety of 3-phase power system wiring connections, including 3-wire delta, and 4-wire wye. Table 3-2 lists the supported system connections. Figures 3-4 through 3-9 show CT, PT, and control power wiring. Figure 3-10 on page 24 shows dc control power.

Notes:

• When wiring the circuit monitor, route wires outward to make room for add-on modules that you might install in the future.
• Wiring instructions are also included in CM hardware kit.
• For CE wiring requirements, see CE Compliance, page 14.

To wire the circuit monitor, complete the following steps:

1. Using a suitable crimping tool, crimp the blue spade connectors included with the circuit monitor onto the wires for the voltage, current, and control power inputs.

2. Connect the spade connectors to the circuit monitor terminals as shown in the appropriate wiring diagram. (Figures 3-4 through 3-10 show wiring connections.) Do not overtighten screws, but ensure that they are snug.

3. Ground the circuit monitor. See Grounding the Circuit Monitor in this chapter for instructions.

4. Install protective terminal strip covers. See Appendix C for instructions.

DANGER

HAZARD OF PERSONAL INJURY OR DEATH

Only qualified electrical workers should install and wire this equipment. Such work should be performed only after reading this complete set of instructions. Follow proper safety procedures regarding CT secondary wiring. Never open circuit the secondary of a CT.

Failure to observe this precaution will result in death, serious injury or equipment damage.

Table 3-2

Supported System Wiring Connections

<table>
<thead>
<tr>
<th>System Type</th>
<th>Sys ID</th>
<th># CTs</th>
<th>Aux. CT</th>
<th># PTs</th>
<th>PT Conn.</th>
<th>Currents</th>
<th>Voltages</th>
<th>Figure #</th>
</tr>
</thead>
<tbody>
<tr>
<td>3Ø, 3-wire Delta</td>
<td>30</td>
<td>2</td>
<td>None</td>
<td>2</td>
<td>Open Delta</td>
<td>A, B, C</td>
<td>A-B, B-C, C-A&lt;sup&gt;2&lt;/sup&gt;</td>
<td>3-4</td>
</tr>
<tr>
<td>3Ø, 4-wire Wye, Ground</td>
<td>40</td>
<td>3</td>
<td>None</td>
<td>3</td>
<td>Wye-Wye</td>
<td>A, B, C, N&lt;sup&gt;2&lt;/sup&gt;</td>
<td>A-N, B-N, C-N</td>
<td>A-B&lt;sup&gt;2&lt;/sup&gt;, B-C&lt;sup&gt;2&lt;/sup&gt;, C-A&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>3Ø, 4-wire Wye, Ground</td>
<td>41</td>
<td>3</td>
<td>Neut</td>
<td>3</td>
<td>Wye-Wye</td>
<td>A, B, C, N, G&lt;sup&gt;2&lt;/sup&gt;</td>
<td>A-N, B-N, C-N</td>
<td>A-B&lt;sup&gt;2&lt;/sup&gt;, B-C&lt;sup&gt;2&lt;/sup&gt;, C-A&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>3Ø, 4-wire Wye, Ground&lt;sup&gt;3&lt;/sup&gt;</td>
<td>40</td>
<td>2</td>
<td>None</td>
<td>3</td>
<td>Wye-Wye</td>
<td>A, B, C, N&lt;sup&gt;2&lt;/sup&gt;</td>
<td>A-N, B-N, C-N</td>
<td>A-B&lt;sup&gt;2&lt;/sup&gt;, B-C&lt;sup&gt;2&lt;/sup&gt;, C-A&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>3Ø, 4-wire Wye, Ground</td>
<td>42</td>
<td>3</td>
<td>None</td>
<td>2</td>
<td>Open Wye</td>
<td>A, B, C, N&lt;sup&gt;2&lt;/sup&gt;</td>
<td>A-N, B-N, C-N</td>
<td>A-B&lt;sup&gt;2&lt;/sup&gt;, B-C&lt;sup&gt;2&lt;/sup&gt;, C-A&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>3Ø, 4-wire Wye, Ground</td>
<td>43</td>
<td>3</td>
<td>Neut</td>
<td>2</td>
<td>Open Wye</td>
<td>A, B, C, N, G&lt;sup&gt;2&lt;/sup&gt;</td>
<td>A-N, B-N, C-N</td>
<td>A-B&lt;sup&gt;2&lt;/sup&gt;, B-C&lt;sup&gt;2&lt;/sup&gt;, C-A&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>1</sup> The System ID is used during setup to specify the system type.
<sup>2</sup> Indicates a value that is calculated rather than measured directly.
<sup>3</sup> For 3-wire loads only.
CTs (5 Amp Secondaries)

Line AØ

CT Shorting Block

BØ

CØ

Load

Fuses

OPEN DELTA PT
CONNECTION
(120 V L-L
Secondaries)

Fuses

VDS

CPT
(120 or 240 Vac
Secondary, 14 VA)

Disconnect
Switch

Fuse

True Earth
Ground

Notes:
• Pay close attention to polarity marks (■) when connecting CTs and PTs.
• Installation Category II

Note: Control power can be drawn from phase PT inputs. See Deriving Control Power from Phase PT Inputs in this chapter. For DC control power connections, see figure 3-10.

Figure 3-4: 3-phase, 3-wire delta connection
Figure 3-5: 3-phase, 4-wire wye, ground connection

Notes:
- Pay close attention to polarity marks (■) when connecting CTs and PTs.
- Installation Category II

Note: Control power can be drawn from phase PT inputs. See Deriving Control Power from Phase PT Inputs in this chapter. For dc control power connections, see figure 3-10.
CTs (5 Amp Secondaries)

CT Shorting Block

WYE PT CONNECTION (120 V L-N Secondaries)

Note: Control power can be drawn from phase PT inputs. See Deriving Control Power from Phase PT Inputs in this chapter. For dc control power connections, see figure 3-10.

Notes:
- Pay close attention to polarity marks (■) when connecting CTs and PTs.
- Installation Category II

Figure 3-6: 3-phase, 4-wire wye, ground connection, metered neutral
Figure 3-7: 3-phase, 4-wire wye, 3-wire load

Notes:
- Pay close attention to polarity marks (▲) when connecting CTs and PTs.
- Installation Category II

Note: Control power can be drawn from phase PT inputs. See Deriving Control Power from Phase PT Inputs in this chapter. For dc control power connections, see figure 3-10.
Notes:
- Pay close attention to polarity marks (■) when connecting CTs and PTs.
- Installation Category II

Figure 3-8: 2-1/2 element metering system type 42 (calculated neutral)
Chapter 3—Installation

CTs (5 Amp Secondaries)
AØ
BØ
CØ
Line
N

WYE PT CONNECTION (120 V L-N Secondaries)
VDS
Fuses
Fuses
CPT (120 or 240 Vac Secondary, 14 VA)
Fuses
CT Shorting Block
Disconnection Switch
True Earth Ground

Note: Control power can be drawn from phase PT inputs. See Deriving Control Power from Phase PT Inputs in this chapter. For dc control power connections, see figure 3-10.

Notes:
- Pay close attention to polarity marks (■) when connecting CTs and PTs.
- Installation Category II

Figure 3-9: 2-1/2 element metering system type 43
Figure 3-10: DC control power connections

Note: Installation Category II
Multiple circuit monitors can share one set of 3-phase PTs. Also, multiple circuit monitors can share a single control power transformer (CPT). In all cases, each circuit monitor must use a separate set of CTs. Figure 3-11 shows how to connect multiple circuit monitors to a single set of PTs and CPT.

**Note:** When using this wiring method, ground the PT secondaries in only one location.

![Figure 3-11: Circuit monitors connected to one set of PTs and one CPT](image)

---

**Wiring Multiple Circuit Monitors to a Single Set of PTs/CPT**

Multiple circuit monitors can share one set of 3-phase PTs. Also, multiple circuit monitors can share a single control power transformer (CPT). In all cases, each circuit monitor must use a separate set of CTs. Figure 3-11 shows how to connect multiple circuit monitors to a single set of PTs and CPT.

**Note:** When using this wiring method, ground the PT secondaries in only one location.
Deriving Control Power from Phase PT Inputs

Whenever possible, derive circuit monitor control power from a stable voltage source. If such a source is unavailable, the circuit monitor can derive control power from its phase PT inputs. Due to the wide range of permissible control power inputs, the circuit monitor can accept either L-N or L-L control power inputs up to 240 V nominal. Using the L-L control power option increases the circuit monitor ride-through time and enables more reliable operation during voltage disturbances.

Referring to figures 3-12 and 3-13, complete the following steps to derive control power from phase PT inputs:

1. Connect the Va terminal (terminal 12) to the L terminal (terminal 25).
2. For L-N control power, connect the Vn terminal (terminal 9) to the N terminal (terminal 27). For L-L control power, connect the Vc terminal (terminal 10) to the N terminal (terminal 27).
3. Install protective terminal strip covers. See Appendix C for instructions.

---

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
</table>

HAZARD OF EQUIPMENT DAMAGE

When deriving control power from the phase PT inputs, the phase PT used must have a VA rating sufficient for all connected burdens. If the VA rating is exceeded, it could reduce the voltage transformer's accuracy or damage the PT.

Failure to observe this precaution can result in equipment damage.
GROUNDING THE CIRCUIT MONITOR

For optimal grounding, connect the circuit monitor to a true earth ground.

To ground the circuit monitor, complete the following steps:

1. Connect the Ground terminal (terminal 26) to a true earth ground, using #14 AWG wire or larger with spade connector (see figure 3-14).
2. Install protective terminal strip cover. See Appendix C for instructions.

HAZARD OF ELECTRIC SHOCK

Ground the circuit monitor as described in these instructions. Failure to properly ground the circuit monitor may allow hazardous voltages to be present on the circuit monitor chassis, and may result in equipment damage.

Failure to observe this precaution will result in death, serious injury or equipment damage.
COMMUNICATIONS WIRING

POWERLOGIC devices are equipped with RS-485 communications. The RS-485 standard lets you daisy-chain up to 32 POWERLOGIC-compatible devices to a single communications port. This document refers to a chain of POWERLOGIC devices connected by communications cable as a communications link.

A POWERLOGIC communications link can consist of up to 32 POWERLOGIC-compatible devices connected to a communications port on one of the following:

- POWERLOGIC System Display
- Personal computer
- POWERLOGIC Network Interface Module
- SY/MAX® programmable controller
- Other host devices with a POWERLOGIC-compatible port

Figures 3-15 through 3-19 show circuit monitors and other POWERLOGIC compatible devices connected in typical systems. The accompanying text describes important considerations for each connection alternative.

The figures also show the placement of communications adapters and terminators. For additional information on using the communications adapter and terminator, see Terminating the Communications Link and Biasing the Communications Link in this chapter.
Connecting to a System Display

- Connect up to 32 circuit monitors to the system display for Circuit Monitors (Class 3050 Types SD-200, SD-220). See Length of the Communications Link in this chapter for distance limitations at varying baud rates.
- Connect circuit monitors to the RS-485 port on the bottom of the system display.
- Configure the system display’s baud rate to match the baud rate of circuit monitors on the communications link.
- Refer to the instruction bulletin for the system display for circuit monitors (Class 3050 Types SD-200, SD-220) for detailed instructions on configuring the system display.

![Diagram of Circuit Monitors Connected to a System Display](image-url)

*Figure 3-15: Circuit monitors connected to a system display for circuit monitors*
Connecting to a Personal Computer

- Connect up to 32 POWERLOGIC devices to a personal computer. See Length of the Communications Link in this chapter for distance limitations at varying baud rates.

- POWERLOGIC devices can be connected to a SY/LINK card installed in the personal computer. To do this, connect the POWERLOGIC devices to the RS-422 port (female DB-9 connector) of the SY/LINK card.

- POWERLOGIC devices can be connected to a serial COMM port on the personal computer. To do this, the POWERLOGIC devices must be connected to an RS-232 to RS-422/RS-485 converter which is connected to the personal computer. POWERLOGIC offers a converter kit for this purpose (Class 3090 Type MCI-101). Refer to the instruction bulletin included with the MCI-101 for connection instructions.

**Figure 3-16: POWERLOGIC devices connected directly to a personal computer**
Connecting to a POWERLOGIC Ethernet Gateway (EGW)

- There are two models of the POWERLOGIC Ethernet Gateway: a single port version (EGW1) and a dual port version (EGW2).
- The serial port on the EGW1 can support up to 8 POWERLOGIC devices.
- Each serial port on the EGW2 can support up to 32 POWERLOGIC devices on a daisy-chain, or up to 64 devices when a signal repeater is used.
- Connection to the Ethernet can be made via a UTP or AUI port.

Figure 3-17: POWERLOGIC devices connected to an Ethernet gateway
Connecting to a POWERLOGIC Network Interface Module (PNIM)

Connect up to 32 POWERLOGIC devices to a PNIM. See Length of the Communications Link in this chapter for distance limitations at different baud rates.

- Connect POWERLOGIC devices to PNIM port 0 (top RS-485 port) only.
- Configure PNIM port 0 for “POWERLOGIC” mode. (See side of PNIM for instructions on setting dip switches.
- Configure the baud rate of PNIM port 0 to match the baud rate of the POWERLOGIC devices on the communications link.
- Refer to the PNIM instruction bulletin for detailed instructions on configuring the PNIM.

![Diagram showing POWERLOGIC devices connected to a PNIM](image)

Figure 3-18: POWERLOGIC devices connected to a PNIM
Connecting to a SY/MAX Programmable Controller

- Connect up to 32 POWERLOGIC devices to a programmable controller. See Length of the Communications Link in this chapter for distance limitations at different baud rates.
- Connect POWERLOGIC devices to the RS-422 port of the programmable controller.
- The programmable controller must contain a program to access POWERLOGIC device data.
- Configure the baud rate of the programmable controller’s port to match the baud rate of the POWERLOGIC devices on the communications link.
- Refer to the programmable controller instruction manual for detailed instructions on configuring the programmable controller.

**Note:** POWERLOGIC devices can be connected to other manufacturer’s systems using available communication interfaces. For further information, contact the POWERLOGIC Technical Support Center. See Getting Technical Support in Chapter 5.

![Diagram of POWERLOGIC devices connected to a SY/MAX programmable controller](image)

*Figure 3-19: POWERLOGIC devices connected to a SY/MAX programmable controller*
Length of the Communications Link

The length of the communications link cannot exceed 10,000 feet (3,050 m). This means that the total length of the communications cable from the PNIM, personal computer, system display, or processor, to the last device in the daisy-chain, cannot exceed 10,000 feet. When 17 or more devices are on a communications link, the maximum distance may be shorter, depending on the baud rate. Table 3-3 shows the maximum distances at different baud rates.

Table 3-3
Maximum Distances of Comms Link at Different Baud Rates

<table>
<thead>
<tr>
<th>Baud Rate</th>
<th>1–16 devices</th>
<th>17–32 devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200</td>
<td>10,000 ft (3,050 m)</td>
<td>10,000 ft (3,050 m)</td>
</tr>
<tr>
<td>2400</td>
<td>10,000 ft (3,050 m)</td>
<td>5,000 ft (1,525 m)</td>
</tr>
<tr>
<td>4800</td>
<td>10,000 ft (3,050 m)</td>
<td>5,000 ft (1,525 m)</td>
</tr>
<tr>
<td>9600</td>
<td>10,000 ft (3,050 m)</td>
<td>4,000 ft (1,220 m)</td>
</tr>
<tr>
<td>19200</td>
<td>10,000 ft (3,050 m)</td>
<td>2,500 ft (762.5 m)</td>
</tr>
</tbody>
</table>
Daisy-Chaining
POWERLOGIC Devices

Note: To daisy-chain POWERLOGIC devices, use communications cable containing two twisted-shielded pairs (Belden 8723 or equivalent). Connect the wires to the circuit monitor’s terminals using the red spade connectors included with the circuit monitor. Using a suitable crimping tool, crimp the red connectors onto the communications wires.

Each communicating POWERLOGIC device has five RS-485 terminals for connection to a POWERLOGIC communications link. On all devices, the terminals are labeled IN+, IN-, OUT+, OUT-, and SHLD. On the circuit monitor, the IN+, IN-, OUT+, OUT-, and SHLD terminals are numbered 20, 21, 22, 23, and 24, respectively.

To daisy-chain the circuit monitor to another POWERLOGIC device, wire the circuit monitor’s RS-485 communications terminals to the matching communications terminals of the next device. In other words, wire the IN+ terminal of the circuit monitor to the IN+ terminal of the next device, wire IN- to IN-, OUT+ to OUT+, OUT- to OUT-, and SHLD to SHLD. See Figure 3-20.

If the circuit monitor is the last device on the daisy-chain, terminate it. See Terminating the Communications Link in this chapter for instructions. If the circuit monitor is the first device on the daisy-chain, connect it to the PNIM, personal computer, system display, or programmable controller using a CAB-107 or equivalent cable and a Multipoint Communications Adapter. See Biasing the Communications Link in this chapter for instructions. See Communication Cable Pinouts in the Circuit Monitor Reference Manual for the CAB-107 pinout.

* Standard conductor color convention

Figure 3-20: Daisy-chaining the RS-485 communications terminals
Terminating the Communications Link

To ensure reliable communications, terminate the last device on a POWERLOGIC communications link. To terminate the last device, use a POWERLOGIC Multipoint Communications Terminator (Class 3090 Type MCT-485).

To terminate a circuit monitor, slide the terminator’s four spade connectors under the IN+, IN-, OUT+, and OUT- terminals on the back of the circuit monitor and tighten. Figure 3-20 shows proper placement of the terminator. Figures 3-15 to 3-19 show the terminator applied in typical systems.

Notes:

- Terminate only the last device on the link. If a link has only one device, terminate that device.

- Some POWERLOGIC devices use a removable communications connector. If the last device on the communications link is not a circuit monitor, refer to the instruction bulletin for that device for termination instructions.

Figure 3-21: Terminator placement when last device on the link is a circuit monitor
Biasing the Communications Link

To ensure reliable communications, bias the communications link. To bias the communications link, use a POWERLOGIC Multipoint Communications Adapter (Class 3090 Type MCA-485).

To bias the communications link, plug the adapter into the communications port of the device to which one or more POWERLOGIC devices are connected. Plug the CAB-107 cable connected to the first POWERLOGIC device on the link into the other end of the adapter.

Figure 3-22 shows the adapter connected to a POWERLOGIC Network Interface Module (PNIM). Figures 3-15, 3-16, 3-18, and 3-19 show the adapter applied in typical systems.
CHAPTER 4—FRONT PANEL OPERATION

CHAPTER CONTENTS

This chapter tells how to set up the circuit monitor from the front panel only. Some advanced circuit monitor features, such as event log/data log configuration, must be set up over the communications link. You can set up these advanced features using POWERLOGIC software. Refer to the software instruction bulletin for instructions on setting up advanced features.

The Setup Mode ...................................................................................................... 40

The Configuration Option ............................................................................. 40
The Resets Option ........................................................................................... 40
The Alarm/Relay Option .............................................................................. 40
The Diagnostics Option ................................................................................. 40
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Setting the Watthour/Pulse Output ............................................................ 51
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Setting the Baud Rate ..................................................................................... 53
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THE SETUP MODE

To access the Setup Mode, press the MODE button until the red LED next to [Setup] is lit. The circuit monitor displays “Config”—the first of four setup options. The circuit monitor displays the options as abbreviated combinations of uppercase and lowercase letters. The abbreviations displayed by the circuit monitor, and their full names are shown below.

<table>
<thead>
<tr>
<th>Full Name</th>
<th>CM Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration Option</td>
<td>ConFig</td>
</tr>
<tr>
<td>Resets Option</td>
<td>rESETs</td>
</tr>
<tr>
<td>Alarm/Relay Option</td>
<td>AL.rLy</td>
</tr>
<tr>
<td>Diagnostics Option</td>
<td>diAG</td>
</tr>
</tbody>
</table>

The Configuration Option

The Configuration option lets you configure the following values: CT and PT primaries, system type, demand interval, WH/pulse output, device address, baud rate, nominal frequency, and password. You can also reset energy, demand, and min/max values. See Configuring the Circuit Monitor, page 42, for more information.

The Resets Option

The Resets option lets you reset energy, demand and min/max values. These same reset operations can be done using the Configuration option. The difference is that using the Resets option, you cannot change circuit monitor configuration values. See Performing Resets Using the Resets Option in this chapter for more information.

The Alarm/Relay Option

The Alarm/Relay option lets you configure the circuit monitor’s on-board alarm/relay functions. (See Alarm Setup Information in the Circuit Monitor Reference Manual for a complete listing of the circuit monitor’s predefined alarm conditions.) For each of the circuit monitor’s predefined alarm conditions, you can:

- Enable or disable it
- Assign a priority to it
- Define any required pickup and dropout setpoints, and pickup and dropout time delays
- Setup the circuit monitor to operate up to three relay outputs when the alarm condition occurs

See Setting Up Alarm/Relay Functions in the Circuit Monitor Reference Manual for details on how to use this option.

The Diagnostics Option

The Diagnostics option lets you read and write circuit monitor registers. Use this feature with caution. Writing an incorrect value, could cause the circuit monitor to operate incorrectly. See Reading and Writing Registers from the Front Panel in the Circuit Monitor Reference Manual for instructions on reading and writing registers using the Diagnostics option.
Chapter 4—Front Panel Operation

Choosing a Setup Option

To enter the [Setup] mode, press the MODE button until the [Setup] LED is lit. The circuit monitor displays “ConFig.” To move to a specific option, use the SELECT METER [Value] buttons. To select an option, press the PHASE [Enter] button (see figure 4-1).

![Figure 4-1: Choosing a Setup option](image)

How the Buttons Work

The circuit monitor’s front panel buttons perform different functions in Setup mode than in Meters mode. In Setup mode, the buttons work as described below.

The PHASE [Enter] button. In Setup mode, use this button as an “Enter” key to accept a new configuration value and move to the next configuration item. For example, after changing the CT Primary value, press this button to enter the new value and move to the next configuration item (PT Primary). Also, press this button to move through configuration items that don’t need to be changed, to reach a specific item.

SELECT METER [Value] buttons. In Setup mode, use these buttons to increase or decrease the displayed value. Also, use these buttons to toggle between Yes and No when required.

MODE button. Use this button to exit a setup option after making all desired changes. For example, after making all desired changes within the Configuration option, press the mode key. The circuit monitor then asks you to accept or reject your changes.
CONFIGURING THE CIRCUIT MONITOR

This section tells how to use the Configuration option to define the following values: CT and PT ratios, system type, demand interval, WH/pulse output, device address, baud rate, nominal frequency, and password. It also tells how to reset energy, demand and min/max values.

The section General Configuration Procedure describes the general steps required to configure the circuit monitor. The remaining sections tell how to configure specific values.

Factory Defaults

Table 4-1 lists the front panel configuration parameters, their allowed values, and their factory defaults.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Allowed Values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT Primary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary, 3-Phase</td>
<td>1 to 32,767</td>
<td>5</td>
</tr>
<tr>
<td>Primary, Neutral</td>
<td>1 to 32,767</td>
<td>5</td>
</tr>
<tr>
<td>PT Primary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary, 3-Phase</td>
<td>1 to 1,700,000</td>
<td>120</td>
</tr>
<tr>
<td>System Type</td>
<td>30, 40, 41</td>
<td>40</td>
</tr>
<tr>
<td>Demand Interval</td>
<td>5 to 60 min.</td>
<td>15</td>
</tr>
<tr>
<td>WH/Pulse output</td>
<td>0 to 3276.7 kWh</td>
<td>0</td>
</tr>
<tr>
<td>Device Address</td>
<td>0 to 199</td>
<td>1</td>
</tr>
<tr>
<td>Baud Rate</td>
<td>1,200–19,200</td>
<td>9,600</td>
</tr>
<tr>
<td>Frequency (Nom.)</td>
<td>50, 60, 400</td>
<td>60</td>
</tr>
<tr>
<td>Password</td>
<td>0 to 9998</td>
<td>0</td>
</tr>
</tbody>
</table>

General Configuration Procedure

This section describes the general steps required to configure the circuit monitor from the front panel. The configuration items (and reset items) are the grey items in square brackets on the front panel of the circuit monitor. Refer to these items when configuring the circuit monitor.

The front panel configuration procedure is described below. Alternately, figure 4-2 on page 44 shows the configuration procedure, with less detail, as a flow chart.

To configure the circuit monitor, complete the following steps:

1. Press the MODE button until the red LED next to [Setup] is lit.
   The circuit monitor displays “ConFig”.

2. Press the PHASE [Enter] button to select the Configuration option.
   The circuit monitor displays the password prompt “P - - - -.”
3. Enter the password.
   To enter the password, use the SELECT METER [Value] buttons to increase or decrease the displayed value until it reaches the password value. Then press the PHASE [Enter] button. (The circuit monitor’s default password is 0.)
   The red LED next to [CT Primary] flashes.

4. Press the PHASE [Enter] button to select a configuration item.
   The red LED next to the selected configuration item flashes.

5. Press the SELECT METER [Value] buttons to increase or decrease the displayed value until the desired value is displayed.
   In the case of the [Reset] items, use the SELECT METER [Value] buttons to toggle between Yes and No. See **Resetting Demand, Energy, and Min/Max Values** in this chapter for more on resets.

6. Repeat steps 4 and 5 until you’ve made all desired configuration changes.

7. After making all desired configuration changes, press the MODE button once.
   The red LED next to [Accept] flashes. The circuit monitor display reads No, and the red LEDs next to the items that you have changed are lit. Verify that only the LEDs next to the setup items you wish to change are lit.

8. To reject the changes, press the PHASE [Enter] button once.
   The circuit monitor returns to Meters mode.

9. To accept the changes, press the SELECT METER [Value] button to change from No to Yes. Then, press the PHASE [Enter] button.
   The circuit monitor goes through its restart procedure. This indicates that the changes have been made.
START

Press the MODE key until the [Setup] LED is lit.

Press the PHASE [Enter] key to enter Configuration mode.

Use the SELECT METER keys to display the password. Then press the PHASE [Enter] key.

The CM enters Configuration mode.

Press the PHASE [Enter] key to move to the value to be changed.

Use the SELECT METER keys to change the value.

Do you want to change another value?

YES

Press the PHASE [Enter] key.

The CM leaves Configuration mode.

NO

Press the MODE key once.

Do you want to accept the changes?

NO

Press the PHASE [Enter] key.

The CM leaves Configuration mode.

YES

Press the SELECT METER key.

Press the PHASE [Enter] key.

CM accepts changes and restarts.

Figure 4-2: Flowchart for front panel configuration
**Viewing Configuration Data**

**In Protected Mode**

The circuit monitor provides a special protected viewing mode that lets you view, but not change, configuration data.

*To view configuration data, complete the following steps:*

1. Press the MODE button until the red LED next to [Setup] is lit.
   The circuit monitor displays “ConFig”.
2. Press the PHASE [Enter] button.
   The circuit monitor displays the password prompt “P - - - -.”
3. Enter 9999 for the password.
   To enter 9999, use the SELECT METER [Value] buttons to decrease the displayed value until it reaches 9999. Then press the PHASE [Enter] button.
   The circuit monitor enters the protected viewing mode and scrolls through the following device information:
   - d=2350 (the number after “d=” represents the device model number)
   - s=0345 (the numbers following “s=” represent the last four digits of the device serial number)
   - r=1516 (the first two digits after “r=” represent the reset code revision and the last two digits represent the circuit monitor firmware revision level)
   - 1=001 (the digits following “1=” represent the circuit monitor firmware sub-revision level, as in firmware version 17.002)

After this scrolling sequence, the display shows the present CT ratio.

4. Press the PHASE [Enter] button to move from one configuration item to the next.

5. To exit the protected viewing mode, press the MODE button.
   The circuit monitor returns to METERS mode.
Setting the Master Password

The circuit monitor’s four setup modes are password protected. A *master password* can be used to access any of the four setup modes. In addition to the master password, the circuit monitor provides a *reset password*. The reset password provides access to the Resets option only. Until you define a unique reset password, the reset password defaults to the master password. For instructions on defining and using the reset password see **Performing Resets Using the Resets Option** in this chapter.

The master password can be any value in the range 0 to 9998. The factory default is 0.

To change the master password, complete the following steps:

1. Press the MODE button until the red LED next to [Setup] is lit.
   - The circuit monitor displays “ConFig.”
2. Press the PHASE [Enter] button to select the Configuration option.
   - The circuit monitor displays the password prompt “P - - - -.”
3. Enter the existing master password.
   - To enter the password, use the SELECT METER [Value] buttons to increase or decrease the displayed value until it reaches the password value. Then press the PHASE [Enter] button. (The circuit monitor’s default password is 0.)
4. Press the PHASE [Enter] button until the red LED next to [Set Password] flashes.
5. Press the SELECT METER [Value] buttons until the desired password value is displayed.
   - The password can be any value from 0 to 9998.
6. Press the MODE button once.
7. To reject the new password, press the PHASE [Enter] button once.
   - The circuit monitor returns to METERS mode.
8. To accept the new password, press the up arrow SELECT METER [Value] button to change from *No* to *Yes*. Then, press the PHASE [Enter] button.
   - The circuit monitor returns to METERS mode.
Setting the CT Ratios

The circuit monitor supports two primary CT ratings: one for the phase CTs and one for the neutral CT. The allowable range is 1 to 32,767. The factory default for both CT secondaries is 5.

Note: The neutral CT is optional. If the circuit monitor is set up for any system type that does not require a neutral CT, the circuit monitor ignores the neutral CT rating (even if neutral currents are reported).

To change the primary CT ratings, complete the following steps:

1. Press the MODE button until the red LED next to [Setup] is lit.
   The circuit monitor displays “ConFig”.
2. Press the PHASE [Enter] button to select the Configuration option.
   The circuit monitor displays the password prompt “P - - - -.”
3. Enter the master password.
   To enter the password, use the SELECT METER [Value] buttons to increase or decrease the displayed value until it reaches the password value. Then press the PHASE [Enter] button.
   The red LED next to [CT Primary] flashes indicating that the circuit monitor is in Configuration mode. The 3-PHASE LED also lights indicating that the circuit monitor is displaying the 3-phase, primary CT rating.
4. Press the SELECT METER [Value] buttons until the desired 3-phase, primary CT rating is displayed.
5. Press the PHASE [Enter] button once.
   The N (Neutral) phase LED lights, and the circuit monitor displays the primary CT rating for the neutral CT.
6. Press the SELECT METER [Value] buttons until the desired neutral primary CT rating is displayed.
7. Press the MODE button once.
   The red LED next to [Accept] flashes. The red LED next to [CT Primary] glows steadily.
8. To reject the new CT rating(s), press the PHASE [Enter] button once.
   The circuit monitor returns to METERS mode.
9. To accept the new CT rating(s), press the UP ARROW SELECT METER [Value] button to change from No to Yes. Then, press the PHASE [Enter] button.
   The circuit monitor restarts.
**Setting the PT Ratio**

The circuit monitor supports one primary PT rating. The allowable range is 1 to 1,700,000 volts. The factory default PT secondary is 120 V.

*To change the primary PT rating, complete the following steps:*

1. Press the MODE button until the red LED next to [Setup] is lit.
   - The circuit monitor displays “ConFig”.
2. Press the PHASE [Enter] button to select the Configuration option.
   - The circuit monitor displays the password prompt “P - - - -.”
3. Enter the master password.
   - To enter the password, use the SELECT METER [Value] buttons to increase or decrease the displayed value until it reaches the password value. Then press the PHASE [Enter] button.
3. Press the PHASE [Enter] button twice.
   - The red LED next to the [PT Primary] item flashes. The 3-PHASE LED lights, and the circuit monitor displays the primary PT rating for the 3-Phase PTs.
4. Press the SELECT METER [Value] buttons until the desired primary PT rating is displayed.
5. Press the MODE button once.
   - The red LED next to [Accept] flashes. The red LED next to [PT Primary] glows steadily.
6. To reject the new PT rating, press the PHASE [Enter] button once.
   - The circuit monitor returns to METERS mode.
7. To accept the new PT rating, press the up arrow SELECT METER [Value] button to change from No to Yes. Then, press the PHASE [Enter] button.

**Setting the System Type**

For the circuit monitor to meter correctly, you must specify the system connection type. The circuit monitor supports three system wiring connections. Table 4-2 shows the system connection types. The factory default is 40.

**Table 4-2**

*Supported System Type System Code Selections*

<table>
<thead>
<tr>
<th>System Type</th>
<th># Phase CTs</th>
<th>Aux CT</th>
<th># PTs</th>
<th>PT Conn.</th>
<th>System Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>3Ø, 3-wire Delta</td>
<td>2</td>
<td>None</td>
<td>2</td>
<td>Open Delta</td>
<td>30</td>
</tr>
<tr>
<td>3Ø, 4-wire Wye, Grounded</td>
<td>3</td>
<td>None</td>
<td>3</td>
<td>Wye-Wye</td>
<td>40</td>
</tr>
<tr>
<td>3Ø, 4-wire Wye, Grounded</td>
<td>3</td>
<td>1 (Neut)</td>
<td>3</td>
<td>Wye-Wye</td>
<td>41</td>
</tr>
<tr>
<td>3Ø, 4-wire Wye, Grounded</td>
<td>3</td>
<td>None</td>
<td>2</td>
<td>Open Wye</td>
<td>42</td>
</tr>
<tr>
<td>3Ø, 4-wire Wye, Grounded</td>
<td>3</td>
<td>1 (Neut)</td>
<td>2</td>
<td>Open Wye</td>
<td>43</td>
</tr>
</tbody>
</table>
To change the system type, complete the following steps:

1. Press the MODE button until the red LED next to [Setup] is lit.
   The circuit monitor displays “ConFig.”
2. Press the PHASE [Enter] button to select the Configuration option.
   The circuit monitor displays the password prompt “P - - - -.”
3. Enter the password.
   To enter the password, use the SELECT METER [Value] buttons to increase or decrease the displayed value until it reaches the password value. Then press the PHASE [Enter] button.
4. Press the PHASE [Enter] button until the red LED next to [Sys. Type] flashes.
5. Press the SELECT METER [Value] buttons until the system code matching your system type is displayed.
   Refer to table 4-2 to determine the system code for your system type.
6. Press the MODE button once.
   The red LED next to [Accept] flashes. The red LED next to [Sys. Type] glows steadily.
7. To reject the new system type, press the PHASE [Enter] button once.
   The circuit monitor returns to METERS mode.
8. To accept the new system type, press the SELECT METER [Value] button to change from No to Yes. Then, press the PHASE [Enter] button.
   The circuit monitor restarts.

### Setting the Demand Interval

The circuit monitor supports several methods to calculate average demand real power. The default method is the thermal demand method. For a description of available demand calculation methods, see **Demand Readings** in the *Circuit Monitor Reference Manual*.

One optional method is the demand synch pulse input method. In this method, the circuit monitor accepts an external synch pulse from another demand meter. The circuit monitor then uses the same time interval as the other meter for each demand calculation. For a more detailed description of the demand synch pulse input method, see **Demand Synch Pulse Input** in the *Circuit Monitor Reference Manual*.

**Note:** The circuit monitor must be equipped with an input/output module to use the Demand Synch Pulse Input feature.

The thermal demand (default) method and the demand synch pulse input method can be set up from the circuit monitor front panel. Other methods must be set up over the communications link, or using the front panel diagnostics feature (see **Reading and Writing Registers from the Front Panel** in the *Circuit Monitor Reference Manual* for instructions on using this feature).
To set up the circuit monitor for the default thermal demand method, complete the procedure below—entering a demand interval from 5 to 60 minutes (the factory default is 15). To set up the circuit monitor for the demand synch pulse input method, follow the procedure below and set the demand interval to 0 minutes.

To change the demand interval, complete the following steps:

1. Press the MODE button until the red LED next to [Setup] is lit.
   The circuit monitor displays “ConFig.”
2. Press the PHASE [Enter] button to select the Configuration option.
   The circuit monitor displays the password prompt “P - - - -.”
3. Enter the password.
   To enter the password, use the SELECT METER [Value] buttons to increase or decrease the displayed value until it reaches the password value. Then press the PHASE [Enter] button.
4. Press the PHASE [Enter] button until the red LED next to [Dmd. Int.] flashes.
5. Press the SELECT METER [Value] buttons until the desired demand interval is displayed.
   Select 0 for the demand synch pulse input method.
6. Press the MODE button once.
7. To reject the new demand interval, press the PHASE [Enter] button.
   The circuit monitor returns to METERS mode.
8. To accept the new demand interval, press the SELECT METER [Value] button to change from No to Yes. Then, press the PHASE [Enter] button.
   The circuit monitor restarts.
**Setting the Watthour/Pulse Output**

The allowable range for the watthours-per-pulse output is 0 to 3,276.7 kWh. The watthours per pulse can be set in one-tenth kWh increments, generating a pulse as often as every 0.1 kWh (not to exceed 10 pulses per second), or as seldom as every 3276.0 kWh. Setting the watthours per pulse to 0 disables the pulse. The factory default is 0.

*Note:* The circuit monitor must be equipped with an input/output module to use this feature. For a more detailed description of the watthour pulse output feature, see *Solid-State KYZ Pulse Output* in the *Circuit Monitor Reference Manual*.

To change the Watthour/Pulse output, complete the following steps:

1. Press the **MODE** button until the red LED next to [Setup] is lit. The circuit monitor displays “ConFig.”
2. Press the **PHASE** [Enter] button to select the Configuration option. The circuit monitor displays the password prompt “P - - - -.”
3. Enter the password.
   To enter the password, use the **SELECT METER** [Value] buttons to increase or decrease the displayed value until it reaches the password value. Then press the **PHASE** [Enter] button.
4. Press the **PHASE** [Enter] button until the red LED next to [WH/Pulse] flashes.
5. Press the **SELECT METER** [Value] buttons until the desired kilowatthours per pulse value is displayed.
6. Press the **MODE** button once.
   The red LED next to [Accept] flashes. The red LED next to [WH/Pulse] glows steadily.
7. To reject the new pulse interval, press the **PHASE** [Enter] button once. The circuit monitor returns to METERS mode.
8. To accept the new pulse interval, press the **SELECT METER** [Value] button to change from *No* to *Yes*. Then, press the **PHASE** [Enter] button. The circuit monitor restarts.
Setting the Device Address

Each POWERLOGIC device on a communications link must have a unique device address. (The term communications link refers to 1-32 POWERLOGIC compatible devices daisy-chained to a single communications port.) The allowable range of addresses is 1 to 198. The factory default address is 1. (The circuit monitor will actually accept address 199, but address 199 is a special reserved address and we recommend that you not use it.)

Note: By networking groups of devices, POWERLOGIC systems can support a virtually unlimited number of devices.

When addressing POWERLOGIC devices, remember the following points:

- Each device on a single communications link—including the PNIM or SY/LINK card—must be assigned a unique address.
- Normally, the last device on a communications link—the device farthest from the communications port—should be assigned device address 1.
- If a communications link has only a single device, assign it address 1.
- If you add devices to the communications link, the last device should retain the address 1.

To change the device address, complete the following steps:

1. Press the MODE button until the red LED next to [Setup] is lit.
   The circuit monitor displays “ConFig.”
2. Press the PHASE [Enter] button to select the Configuration option.
   The circuit monitor displays the password prompt “P - - - -.”
3. Enter the password.
   To enter the password, use the SELECT METER [Value] buttons to increase or decrease the displayed value until it reaches the password value. Then press the PHASE [Enter] button.
4. Press the PHASE [Enter] button until the red LED next to [Address] flashes.
5. Press the SELECT METER [Value] buttons until the desired address is displayed.
6. Press the MODE button once.
   The red LED next to [Accept] flashes. The red LED next to [Address] glows steadily.
7. To reject the new address, press the PHASE [Enter] button once.
   The circuit monitor returns to METERS mode.
8. To accept the new address, press the SELECT METER [Value] button to change from No to Yes. Then, press the PHASE [Enter] button.
   The circuit monitor restarts.
Setting the Baud Rate

Set the circuit monitor’s baud rate to match the baud rate of all other devices on the communications link. The available baud rates are 1200, 2400, 4800, 9600, and 19200. The factory default is 9600 bps.

The maximum baud rate may be limited by the number of devices and total length of the communications link. Table 4-3 shows distance restrictions at varying baud rates.

To change the baud rate, complete the following steps:

1. Press the MODE button until the red LED next to [Setup] is lit.
   The circuit monitor displays “ConFig.”
2. Press the PHASE [Enter] button to select the Configuration option.
   The circuit monitor displays the password prompt “P - - - -.”
3. Enter the password.
   To enter the password, use the SELECT METER [Value] buttons to increase or decrease the displayed value until it reaches the password value. Then press the PHASE [Enter] button.
4. Press the PHASE [Enter] button until the red LED next to [Baud Rate] flashes.
5. Press the SELECT METER [Value] buttons until the desired baud rate is displayed.
6. Press the MODE button once.
   The red LED next to [Accept] flashes. The red LED next to [Baud Rate] glows steadily.
7. To reject the new baud rate, press the PHASE [Enter] button once.
   The circuit monitor returns to METERS mode.
8. To accept the new baud rate, press the SELECT METER [Value] button once to change from No to Yes. Then, press the PHASE [Enter] button.
   The circuit monitor restarts.

<table>
<thead>
<tr>
<th>Baud Rate (bps)</th>
<th>1–16 devices</th>
<th>17–32 devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200</td>
<td>10,000 ft (3,050 m)</td>
<td>10,000 ft (3,050 m)</td>
</tr>
<tr>
<td>2400</td>
<td>10,000 ft (3,050 m)</td>
<td>5,000 ft (1,525 m)</td>
</tr>
<tr>
<td>4800</td>
<td>10,000 ft (3,050 m)</td>
<td>5,000 ft (1,525 m)</td>
</tr>
<tr>
<td>9600</td>
<td>10,000 ft (3,050 m)</td>
<td>4,000 ft (1,220 m)</td>
</tr>
<tr>
<td>19200</td>
<td>10,000 ft (3,050 m)</td>
<td>2,500 ft (762.5 m)</td>
</tr>
</tbody>
</table>
Setting the Nominal Frequency

The circuit monitor supports three nominal frequencies: 50 Hz, 60 Hz, and 400 Hz. The factory default is 60 Hz.

To change the nominal frequency, complete the following steps:

1. Press the MODE button until the red LED next to [Setup] is lit.
   The circuit monitor displays “ConFig.”
2. Press the PHASE [Enter] button to select the Configuration option.
   The circuit monitor displays the password prompt “P - - - -.”
3. Enter the password.
   To enter the password, use the SELECT METER [Value] buttons to increase or decrease the displayed value until it reaches the password value. Then press the PHASE [Enter] button.
4. Press the PHASE [Enter] button until the red LED next to [Nom. Freq.] flashes.
5. Press the SELECT METER [Value] buttons until the desired frequency is displayed.
6. Press the MODE button once.
7. To reject the new nominal frequency, press the PHASE [Enter] button once.
   The circuit monitor returns to METERS mode.
8. To accept the new nominal frequency, press the SELECT METER [Value] button once to change from No to Yes. Then, press the PHASE [Enter] button.
   The circuit monitor restarts.

Note: If the circuit monitor cannot measure a valid frequency, it uses the nominal frequency to perform metering calculations. For example, with no voltage present, the circuit monitor will meter amps using the nominal frequency in place of the missing measured frequency. Some metered values—such as THD and K-Factor—require a valid frequency. When a valid frequency cannot be measured, the circuit monitor displays dashes in place of values.
Resetting Demand, Energy, and Min./Max. Values

The following values can be reset from the circuit monitor front panel: Demand Ammeter (A), Demand Power (W), Demand Power (VA), Watthour Meter, Varhour Meter, and Minimums and Maximums.

Demand Power (W) and Demand Power (VA) are reset together; you cannot reset one without resetting the other. Likewise, the Watthour Meter and Varhour Meter are reset together.

**Note:** You can also reset energy, demand, and min/max values using the Resets option. The Resets option lets you perform resets but not change configuration values. See Performing Resets Using the Resets Option on the next page for more information.

To reset data, complete the following steps:

1. Press the MODE button until the red LED next to [Setup] is lit. The circuit monitor displays “ConFig.”

2. Press the PHASE [Enter] button to select the Configuration option. The circuit monitor displays the password prompt “P - - - -.”

3. Enter the password.
   - To enter the password, use the SELECT METER [Value] buttons to increase or decrease the displayed value until it reaches the password value. Then press the PHASE [Enter] button.

4. Press the PHASE [Enter] button until the red LED next to the desired reset item flashes.
   - Remember, if you choose Demand Power (W), the LED for Demand Power (VA) also lights, and vice versa. Likewise, if you choose Watthour Meter, the LED for Varhour Meter also lights, and vice versa.

5. Press the up arrow SELECT METER [Value] button to change the circuit monitor display from No to Yes.

6. Repeat steps 4 and 5 until you’ve said Yes to all items to be reset.

7. Press the MODE button once. The red LED next to [Accept] flashes. The red LEDs next to the selected reset items glow steadily.

8. To cancel the reset(s), press the PHASE [Enter] button once. The circuit monitor display flashes and the circuit monitor returns to METERS mode.

9. To perform the reset(s), press the SELECT METER [Value] button once to change from No to Yes. Then, press the PHASE [Enter] button. The circuit monitor performs the resets and returns to METERS mode.
PERFORMING RESETS USING THE_RESETS OPTION

The Resets option lets you reset energy, demand, and min/max values. The same reset operations can be done using the Configuration option (described on the previous page). The difference is that using the Resets option, you can perform resets only—you cannot change configuration values.

The Resets option is password protected. To access the Resets option, you must enter either the master password, or a special reset password. (See Setting the Master Password in this chapter for instructions on defining the master password.)

The reset password can be used to prevent accidental changes to configuration values. For example, you could provide an operator with the reset password only, allowing the operator to perform resets, but not change configuration values.

The reset password defaults to the master password. The circuit monitor’s factory default master password is 0. Therefore, when you receive a new circuit monitor, its reset password is also 0. When you change the master password, the reset password changes to match it. To define a reset password different than the master password, you must write a unique value—in the range 1–9998—to circuit monitor register 2031. You can write to register 2031 in one of two ways:

- From a remote PC, using POWERLOGIC application software. (Refer to the software instruction manual for specific instructions on writing to circuit monitor registers.)
- From the front panel of the circuit monitor, using the Diagnostics option. (See Reading and Writing Registers from the Front Panel in the Circuit Monitor Reference Manual for instructions on reading and writing registers using the Diagnostics option.)

**Important:** After you’ve defined a reset password, you can access the Resets option using either the reset password or the master password.

To perform resets using the Resets option, refer to figure 4-3 and complete the following steps:

1. Press the MODE button until the red LED next to [Setup] is lit.
   The circuit monitor displays “ConFig.”
2. Press the down arrow SELECT METER button once.
   The circuit monitor displays “rESETS.”
3. Press the PHASE [Enter] button to select the Resets option.
   The circuit monitor displays the password prompt “P - - - -.”
4. Enter either the master password or the reset password.
   To enter a password, use the SELECT METER [Value] buttons to increase or decrease the displayed value until it reaches the password value. Then press the PHASE [Enter] button.
5. Follow steps 4–9 of the reset procedure described on the previous page.
Start

Press MODE key until [Setup] LED is lit.

Press the ▼ SELECT METER key until “RSETS” is displayed.

Press the PHASE (Enter) key to select the “RSETS” option.

Press the PHASE (Enter) key until the LED next to the value to be reset is lit.

Press the ▲ SELECT METER (Value) key to change from No to Yes.

Do you want to select another reset option?

YES

NO

Press the MODE key once.

Circuit Monitor displays No.

Execute the selected resets?

NO

Press the PHASE (Enter) key
Circuit Monitor returns to METERS mode.

YES

Press the ▲ SELECT METER (Value) key to select Yes

Press PHASE (Enter) key
Circuit Monitor performs resets

Figure 4-3: Flowchart for performing resets using the Resets option
SETTING UP ALARM/RELAY FUNCTIONS

The circuit monitor (models CM-2150 and higher) can detect over 100 alarm conditions, including over/under conditions, status input changes, phase unbalance conditions, and more. (See Alarm Conditions and Alarm Codes in the Circuit Monitor Reference Manual for a complete listing.)

Each alarm condition can be set up to automatically operate one or more circuit monitor relays. Also, multiple alarm conditions can be assigned to operate the same relay(s). For a description of the circuit monitor’s alarm/relay functions, see Alarm Functions in the Circuit Monitor Reference Manual.

If you do not have POWERLOGIC application software, you can set up the circuit monitor’s on-board alarm/relay functions from the circuit monitor’s front panel. Perform this set up using the Alarm/Relay (AL.rLY) option, one of the circuit monitor’s four setup options. For each alarm condition you can:

- Enable or disable the alarm condition
- Assign a priority level to the alarm condition
- Define any required pickup and dropout setpoints, and pickup and dropout time delays
- Set up the circuit monitor to operate up to three relay outputs when the alarm condition occurs

The circuit monitor’s relay outputs provide ten operating modes. (See Relay Output Operating Modes in the Circuit Monitor Reference Manual for descriptions of the modes.) When you assign an alarm condition to operate a relay from the front panel of the circuit monitor, the circuit monitor configures the relay to operate in Normal mode. If Normal mode is not acceptable, you’ll need to do one of the following:

- Set up the circuit monitor’s alarm/relay functions over the communications link, using POWERLOGIC application software (which lets you choose from the 10 available modes)
- First set up the alarm/relay functions from the circuit monitor’s front panel, then change the relay’s operating mode by performing register read/writes using either POWERLOGIC application software or the circuit monitor’s Diagnostics option (see Reading and Writing Registers from the Front Panel in the Circuit Monitor Reference Manual for instructions on reading and writing registers using the Diagnostics option)
**General Setup Procedure**

The procedure below describes the general steps required to set up alarm/relay functions. Figure 4-4 illustrates the procedure. For detailed steps, see **Detailed Setup Procedure** on the following page.

The general steps required to set up alarm/relay functions are:

2. Choose the Alarm/Relay (AL.rLy) option.
3. Select an alarm number to configure. (See **Alarm Setup Information** in the Circuit Monitor Reference Manual for a list of alarm numbers.)
4. Define the required alarm/relay configuration items (priority level, pickup setpoint, pickup delay, and so on).
5. Accept or reject the changes just made.
6. Repeat steps 3–5 until you’ve configured all desired alarms.
7. Exit to Meters mode.

---

**Figure 4-4: Alarm/Relay setup**
**Detailed Setup Procedure**

This section offers detailed steps on how to set up alarm/relay functions from the front panel. Figure 4-4 illustrates the general flow of the setup procedure.

To set up alarm/relay functions, complete the following steps:

1. Press the MODE button until the red LED next to [Setup] is lit.
   The circuit monitor displays “ConFig.”

2. Press the down arrow SELECT METER button until the Circuit Monitor displays “AL.rLy.”

3. Press the PHASE [Enter] button to select the Alarm/Relay option.
   The circuit monitor displays the password prompt “P - - - -.”

4. Enter the master password.
   To enter the password, use the SELECT METER [Value] buttons to increase or decrease the displayed value until it reaches the password value. Then press the PHASE [Enter] button.
   The display alternates between “ALr No” (an abbreviation for alarm number) and “1”. Appendix I shows that alarm number 1 corresponds to the alarm condition “Over Current Phase A.” Refer to Alarm Setup Information in the Circuit Monitor Reference Manual while setting up alarm/relay functions.

5. Use the SELECT METER [Value] buttons to increase or decrease the displayed alarm number until you reach the desired number.
   The circuit monitor display stops alternating while you change the alarm number. If an alarm condition is enabled, the circuit monitor displays the alarm condition’s priority to the left of the alarm number. For example, if you had previously enabled alarm number 1 and assigned it priority 0, the circuit monitor would display “P0 1”.

6. Press the PHASE [Enter] button to select the alarm number.
   If you have not previously enabled this alarm condition, the display alternates between “ENAbLE” and “OFF.” If you’ve previously enabled this alarm condition, the display alternates between “ENAbLE” and the chosen alarm priority (P0, P1, P2, or P3).

7. To enable the selected alarm condition, and to assign the alarm condition a priority level, press the down arrow SELECT METER [Value] button until the desired priority level is displayed.

**Note:** Using POWERLOGIC software, you can assign one or more of the following actions for each alarm condition. The circuit monitor performs the assigned actions each time the alarm condition occurs, no matter what the priority level.
- Operate one or more relay outputs
- Force data log entries into 1–14 user-defined data log files
- Perform a 4-cycle waveform capture
- Perform a 12-cycle event capture
Detailed Setup Procedure (cont.)

You must assign these actions to alarm conditions using POWERLOGIC software.

Depending on the chosen priority level, the circuit monitor also performs the actions described below.

**P0**—No priority. On the occurrence of a P0 alarm, the circuit monitor does the following:
- Performs any assigned actions

**P1**—Highest priority level. On the occurrence of a P1 alarm, the circuit monitor does the following:
- Puts the alarm number in the list of active alarms, accessible from the front panel (see Viewing Active Alarms in the Circuit Monitor Reference Manual for instructions on viewing active alarms)
- Records the occurrence in the circuit monitor’s event log file
- Enters the alarm number in the P1 log, accessible from the front panel (see Viewing the Priority 1 Log in the Circuit Monitor Reference Manual for instructions on viewing the P1 log)
- Performs any assigned actions

**P2**—Middle priority level. On the occurrence of a P2 alarm, the circuit monitor does the following:
- Puts the alarm number in the list of active alarms, accessible from the front panel (see Viewing Active Alarms in the Circuit Monitor Reference Manual for instructions on viewing active alarms)
- Records the alarm occurrence in the circuit monitor’s event log file
- Performs any assigned actions

**P3**—Lowest priority level. On the occurrence of a P3 alarm, the circuit monitor does the following:
- Puts the alarm number in the list of active alarms, accessible from the front panel (see Viewing Active Alarms in the Circuit Monitor Reference Manual for instructions on viewing active alarms)
- Records the alarm occurrence in the circuit monitor’s event log file
- Performs any assigned actions

8. Press the PHASE [Enter] button to select the priority level.
The display alternates between “PU SP” (an abbreviation for pickup setpoint) and the setpoint value.

9. Use the SELECT METER [Value] buttons to increase or decrease the displayed value until you reach the desired pickup setpoint.

If you are configuring an alarm condition that does not require some or all of the pickup and dropout setpoints and delays, for example status
input transition alarm conditions, the circuit monitor allows you to enter setpoints and delays, but it ignores any values that don’t apply.

10. Press the PHASE [Enter] button.
   The display alternates between “PU dLy” (an abbreviation for pickup delay) and the delay value.

11. Use the SELECT METER [Value] buttons to increase or decrease the displayed value until you reach the desired pickup delay (in seconds).

12. Press the PHASE [Enter] button.
   The circuit monitor display alternates between “do SP” (an abbreviation for dropout setpoint) and the setpoint value.

13. Use the SELECT METER [Value] buttons to increase or decrease the displayed value until you reach the desired dropout setpoint.

14. Press the PHASE [Enter] button.
   The display alternates between “do dLy” (an abbreviation for dropout delay) and the delay value.

15. Use the SELECT METER [Value] buttons to increase or decrease the displayed value until you reach the desired dropout delay (in seconds).

16. Press the PHASE [Enter] button.
   The circuit monitor displays “r1 No”. “r1” stands for relay 1.

17. If you want the circuit monitor to operate relay R1 each time the alarm condition occurs, press the up arrow SELECT METER [Value] button to change from “No” to “Yes.” Then press the PHASE [Enter] button.
   The circuit monitor displays “r2 No”.

18. If you want the circuit monitor to operate relay R2 each time the alarm condition occurs, press the up arrow SELECT METER [Value] button to change from “No” to “Yes.” Then press the PHASE [Enter] button.
   The circuit monitor displays “r3 No”.

19. If you want the circuit monitor to operate relay R3 each time the alarm condition occurs, press the up arrow SELECT METER [Value] button to change from “No” to “Yes.” Then press the PHASE [Enter] button.
   The display alternates between “ENAbLE” and the priority level.

20. Press the MODE button.
   The circuit monitor displays “No.”

21. To save the configuration changes you just made, press the up arrow SELECT METER [Value] button to change from “No” to “Yes.” Then press the PHASE [Enter] button. To discard the changes, press the PHASE [Enter] button.
   The circuit monitor displays the alarm number. At this point you’ve completed the configuration process for one alarm condition.
Detailed Setup Procedure (cont.)

22. Repeat steps 5-21 above for each additional alarm condition that you’d like to configure.

23. To leave the Alarm/Relay setup option, press the MODE button while the circuit monitor is displaying the “ALr No” prompt.

The circuit monitor returns to METERS mode.

VIEWING ACTIVE ALARMS

Each of the circuit monitor’s alarm conditions has an associated alarm code. The alarm codes of the active alarms can be viewed from the front panel. (The alarm conditions and their associated alarm codes are listed in Alarm Setup Information in the Circuit Monitor Reference Manual.)

Note: The ALARM mode LED, on the circuit monitor’s front panel, flashes while at least one of the following conditions is true: a nonzero priority alarm is active, or a priority one alarm has occurred since the last time the priority 1 log was cleared.

To view the active alarm codes, complete the following steps:

1. Press the MODE button until the red LED next to Alarm glows steadily.
   The circuit monitor displays “P1.Log.”

2. Press the up arrow SELECT METER [Value] button until “AL.CodE” (an abbreviation for alarm code) is displayed.

3. Press the PHASE [Enter] button.
   The circuit monitor displays the lowest active alarm code. If there are no active alarms, the circuit monitor displays -None-.

   Each alarm code is displayed with either an “rLY” extension or an “AL” extension. If you have set up the alarm condition to operate one or more relays, the code appears with an rLY extension (for relay). If you did not set up the alarm condition to operate a relay, the code appears with an AL extension (for alarm only).

4. Press the down arrow SELECT METER [Value] button to cycle through the active alarms.
   The circuit monitor displays the codes from lowest to highest.
To provide a record of high priority alarm occurrences, the circuit monitor maintains a **priority 1 log** (P1 log). See **Setting Up Alarm/Relay Functions** in this chapter for a complete description of the priority levels, and instructions on assigning priority levels from the front panel.

The P1 log stores up to 10 of the last priority 1 alarms. The log operates in a first-in-first-out (FIFO) manner. In other words, when the log is full, the oldest log entry (the *first in*) is removed to make room for the new entry.

When a priority 1 alarm occurs, the circuit monitor records it in the P1 log. The alarm remains in the P1 log until one of the following occurs: 10 new P1 alarms occur pushing it out of the log, or you manually clear the P1 log (see **Clearing the Priority 1 Log** on the next page).

**Note:** The ALARM mode LED, on the circuit monitor’s front panel, flashes while at least one of the following conditions is true: a nonzero priority alarm is active, or a priority one alarm has occurred since the last time the priority 1 log was cleared.

You can view the P1 log from the circuit monitor’s front panel. The following procedure tells how.

**To view the P1 log, complete the following steps:**

1. Press the MODE button until the red LED next to ALARM glows steadily.
   The circuit monitor displays “P1.Log.”

2. Press the PHASE [Enter] button.
   The circuit monitor displays the alarm code of the lowest priority 1 alarm. If no priority 1 alarms have occurred since the P1 log was last cleared, the circuit monitor displays **-None-**.
   Each alarm code is displayed with either an “rLY” extension or an “AL” extension. If you have set up the alarm condition to operate one or more relays, the code appears with an rLY extension (for relay). If you did not set up the alarm condition to operate a relay, the code appears with an AL extension (for alarm only).

3. Press the down arrow SELECT METER [Value] button to cycle through the alarm codes.
   The circuit monitor displays the codes from lowest to highest.

4. To exit the P1 log but remain in the ALARM mode, press the PHASE [Enter] button. To exit the ALARM mode altogether, press the MODE button.
CLEARING THE PRIORITY 1 LOG

To provide a record of high priority alarm occurrences available for display from the front panel, the circuit monitor maintains a priority 1 log (P1 log). See Setting Up Alarm/Relay Functions in this chapter for a complete description of the priority levels, and instructions on assigning priority levels from the front panel. See Viewing the Priority 1 Log on the previous page for instructions on viewing the P1 log.

The P1 log stores up to 10 of the last priority 1 alarms. The log operates in a first-in-first-out (FIFO) manner. In other words, when the log is full, the first alarm entry in (the oldest) is the first out.

When a priority 1 alarm occurs, the circuit monitor records it in the P1 log. The alarm remains in the P1 log until one of the following occurs: 10 new P1 alarms occur (pushing it out of the log), or you manually clear the P1 log. The procedure below tells how to clear the P1 log.

IMPORTANT: Clearing the P1 log causes the circuit monitor to release all relays that meet the following conditions:

• The relay must be configured to operate in latched mode.
• The relay must be configured for internal control. In other words, you must have set up the circuit monitor to operate the relay in response to an alarm condition.
• All alarms assigned to operate the latched relay must not be in their alarm state.

To clear the P1 log, complete the following steps:

1. Press the MODE button until the red LED next to ALARM glows steadily.
   The circuit monitor displays “P1.Log.”
2. Press the SELECT METER [Value] buttons until “CLEAr” is displayed.
3. Press the PHASE [Enter] button.
   The circuit monitor displays “CLr. No”.
4. To abort the clear, press the PHASE [Enter] button.
5. To clear the log, press the up arrow SELECT METER [Value] button to change from “CLr. No” to “CLr.YES.” Then press the PHASE [Enter] button.
   The circuit monitor clears the P1 Log, and releases any relays that meet the conditions described above.
CHAPTER 5—MAINTENANCE AND TROUBLESHOOTING

MAINTENANCE
The circuit monitor does not require regular maintenance, nor does it contain any user-serviceable parts. If the circuit monitor requires service, contact your local Square D sales representative, or call the POWERLOGIC Technical Support Center for assistance. See Getting Technical Support in this chapter. Do not open the circuit monitor. Opening the circuit monitor voids the warranty.

Battery-Backed RAM
The circuit monitor uses battery-backed nonvolatile RAM to retain all data except calibration constants. Calibration constants are stored in nonvolatile EEPROM, which requires no battery. The circuit monitor’s battery-backed RAM lasts many decades under typical operating conditions. The battery-backed RAM is activated when the circuit monitor is manufactured. With no control power applied to the circuit monitor, the battery can back up RAM for a continuous period of 7 years at 70°C. Once control power is applied, the RAM battery is no longer under load. Under no load, the life of the battery-backed RAM is 100 years at 55°C continuous, 40 years at 60°C continuous, and 10 years at 70°C continuous. Should the RAM ever need replacement, contact your Square D representative.

⚠️ DANGER

HAZARD OF ELECTRIC SHOCK
Do not attempt to service the circuit monitor. CT and PT inputs may contain hazardous currents and voltages. Only authorized Square D service personnel should service the circuit monitor.

Failure to observe this precaution will result in death or serious injury.

⚠️ CAUTION

HAZARD OF EQUIPMENT DAMAGE
Dielectric (Hi-Pot) testing of the circuit monitor may damage the unit. Do not Hi-Pot or Megger. Before Hi-Pot or Megger testing any equipment in which the circuit monitor is installed, disconnect all input and output wires to the circuit monitor.

Failure to observe this precaution can result in equipment damage.
TROUBLESHOOTING

This section describes three potential problems, their possible causes, and checks and/or cure for each. If, after completing the listed checks, you cannot solve the problem, contact the POWERLOGIC Technical Support Center for assistance. See Getting Technical Support on the next page.

PROBLEM: After applying control power to the circuit monitor, the display is still blank.

Possible Cause: The circuit monitor is not receiving the necessary power.

Check or Cure: Verify that circuit monitor L and N terminals (terminals 25 and 27) are receiving the necessary power. If you are using an optional Voltage/Power Module (VPM), check to see that the module is properly installed on the circuit monitor. Refer to your VPM instruction bulletin.

PROBLEM: The data being displayed is inaccurate or not what you expect.

Possible Cause: Incorrect setup values.

Check or Cure: Check to see that the correct values have been entered for circuit monitor setup parameters (CT and PT ratings, System Type, Nominal Frequency, and so on). See Configuring the Circuit Monitor in Chapter 4 for setup instructions.

Possible Cause: Circuit monitor is wired improperly.

Check or Cure: Check that CTs and PTs are connected correctly (proper polarity observed) and energized. Check shorting terminals. See Wiring CTs, PTs, and Control Power in Chapter 3 for wiring diagrams.

Possible Cause: Incorrect voltage inputs.

Check or Cure: Check circuit monitor voltage input terminals (terminals 9, 10, 11,12) to verify that adequate voltage is present.

Possible Cause: Circuit monitor is grounded incorrectly.

Check or Cure: Verify that the circuit monitor is grounded as described in Grounding the Circuit Monitor in Chapter 3.
Troubleshooting (cont.)

PROBLEM: Cannot communicate with circuit monitor from a remote personal computer.

Possible Cause: Circuit monitor address is incorrect.

Check or Cure: Check to see that the circuit monitor is correctly addressed. See Setting the Device Address in Chapter 4 for instructions.

Possible Cause: Circuit monitor baud rate is incorrect.

Check or Cure: Verify that the baud rate of the circuit monitor matches the baud rate of all other devices on its communications link. See Setting the Baud Rate in Chapter 4 for instructions.

Possible Cause: Communications lines are improperly biased.

Check or Cure: Check to see that a multipoint communications adapter is being properly used to bias the communication lines. See Biasing the Communications Link in Chapter 3 for instructions.

Possible Cause: Communications lines are improperly terminated.

Check or Cure: Check to see that a multipoint communications terminator is properly installed. See Terminating the Communications Link in Chapter 3 for instructions.

Possible Cause: Incorrect route statement to circuit monitor.

Check or Cure: Check route statement. Refer to the software instruction bulletin for instructions on defining route statements.

GETTING TECHNICAL SUPPORT

When you register your circuit monitor, you are entitled to 6 months of free technical phone support. If you have questions about this product, or other POWERLOGIC and POWERLINK products, contact the Power Management Operation Technical Support Center. The hours are Monday–Friday, 7:30 AM–4:30 PM (CST). The fax is available 7 days a week, 24 hours a day. If you send your fax outside of the business hours listed above, you’ll receive a response on the next business day.

Phone: (615) 287-3400
Fax: (615) 287-3404
BBS: (615) 287-3414
Email: PMOSUPRT@SquareD.com

To get the most from your POWERLOGIC and POWERLINK systems, consider attending POWERLOGIC University. POWERLOGIC University offers a series of customer training courses designed to improve your skills using the POWERLOGIC and POWERLINK systems. For registration information or to request a catalog call (615) 287-3304 or fax (615) 287-3404.
APPENDIX A—CIRCUIT MONITOR DIMENSIONS

Figure A-1: Circuit monitor dimensions
APPENDIX A (cont.)

Figure A-2: Circuit monitor with Input/Output and Voltage/Power modules

Figure A-3: Circuit monitor with Input/Output module

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Inches</th>
<th>Millimeters</th>
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<tbody>
<tr>
<td>10.35</td>
<td>263</td>
<td></td>
</tr>
<tr>
<td>.83</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>5.65</td>
<td>144</td>
<td></td>
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<tr>
<td>.56</td>
<td>14</td>
<td></td>
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<tr>
<td>5.09</td>
<td>129</td>
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<tr>
<td>4.58</td>
<td>116</td>
<td></td>
</tr>
<tr>
<td>5.14</td>
<td>131</td>
<td></td>
</tr>
<tr>
<td>.56</td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B—SPECIFICATIONS

Metering Specifications

Current Inputs (Each Channel)
- Current Range ......................................................... 0–7.4 A ac
- Nominal Current ...................................................... 5 A ac

Voltage Inputs (Each Channel)
- Voltage Range ......................................................... 0–180 Vac
- Nominal Voltage (typical) ........................................... 120 Vac
- Frequency Range .................................................... 45 to 65 Hz
  ........................................................................ 350 to 400 Hz

Harmonic Response—Phase Voltages and Currents
- Frequency 45 Hz to 65 Hz ........................................ 31st Harmonic

Data Update Rate ......................................................... 1 second typical

Accuracy (CM-2150 and higher)
- Current\(\textsuperscript{5}\) .................................................. ±0.15% reading + 0.05% full scale
- Voltage ................................................................. ±0.15% reading + 0.05% full scale
- Power ................................................................. ±0.30% reading + 0.05% full scale
- True Power Factor .................................................. ±1% (0.5 lag to 0.5 lead)
- Displacement Power Factor ..................................... ±1% (0.5 lag to 0.5 lead)
- Energy ................................................................. ±0.30%
- Demand ................................................................. ±0.30%
- Frequency 50/60 Hz .................................................. ±0.01 Hz
- Temperature (Unit Temperature –25°C to 75°C) .......... ±1°C
- Time of Day Clock (At 25°C) ................................. ±1.5 second in 24 hours
- THD ........................................................................ 1.0%
- K-Factor ................................................................. 1.0%
- Crest Factor ............................................................. 1.0%

Accuracy (CM-2050 only)
- Current\(\textsuperscript{5}\) .................................................. ±0.5% reading + 0.25% full scale
- Voltage ................................................................. ±0.5% reading + 0.25% full scale
- Power ................................................................. ±1.0% reading + 0.25% full scale
- True Power Factor .................................................. ±1% full scale
- Displacement Power Factor ..................................... ±1% full scale
- Energy and Demand .............................................. ±0.5% reading above 50% full scale
  ±1.0% reading above 20% full scale
- Frequency 50/60 Hz .................................................. ±0.05 Hz
- Temperature (Unit Temperature –25°C to 75°C) .......... ±1°C
- Time of Day Clock (At 25°C) ................................. ±1.5 second in 24 hours
- THD ........................................................................ 2.0%
- K-Factor ................................................................. 2.0%
- Crest Factor ............................................................. 2.0%

\(\textsuperscript{5}\) Any CT secondary currents less than 20 mA are reported as zero.
Metering Input
Electrical Specifications

Current Inputs
Nominal Full Scale ............................................................ 5.0 Amps rms
Metering Over-range .......................................................... 145%
Overcurrent Withstand ........................................................ 15 A rms Continuous
50 A rms 10 seconds in 1 hour
500 A rms 1 second in 1 hour
Input Impedance .................................................................... Less than 0.1 Ohm
Burden ........................................................................... Less than 0.15 VA
Isolation ........................................................................ 1500 V, 1 MIN

Voltage Inputs
Nominal Full Scale .................................................. 120 Vac Line to Neutral
Metering Over-range ..................................................... 150%
Dielectric Withstand ......................................................... 180 V Continuous
1500 V 1 Second
Input Impedance ......................................................... Greater than 2 Megohm

Control Power Input Specifications

120/240 Vac Nominal
Operating Input Range .................................................. 100–264 Vac
Burden ............................................................................. 11 VA–15 VA
Burden, max. ................................................................. 27 VA
Frequency Range .......................................................... 47 to 65 Hz
Isolation ........................................................................ 1500 V, 1 min
Ride-through on Power Loss ......................................... 0.1 sec at 120/240 Vac

125/250 Vdc Nominal
Operating Input Range .................................................. 100–300 Vdc
Burden ............................................................................. 0.12 A
Isolation ........................................................................ 1500 V, 1 minute
Ride-through on Power Loss ......................................... 0.1 sec at 120 Vdc

Main’s Supply Voltage Fluctuations .................................. not to exceed +/-10%

Environmental Specifications

Operating Temperature .................................................. –25 to +70°C
Storage Temperature .................................................... –40 to +85°C
Humidity Rating .... 5–95% Relative Humidity (non-condensing) at 40°C
Pollution Degree ...................................................................... II
Altitude Range .................................................................. 0 to 4,570 m (15,000 ft.)

Physical Specifications

Weight (approximate, without add-on modules) ................. 7 lbs
Dimensions .................................................................. See Appendix A

Regulatory/Standards Compliance

Electromagnetic Interference
Radiated .............................................................. FCC Part 15 Class A
Conducted ............................................................ FCC Part 15 Class A
Electrostatic Discharge (Air Discharge) ......................... IEC 1000-4-2 Level 4
Electrical Fast Transient ............................................ IEC 1000-4-4 Level 3
Immunity to Surge .................................................... IEC 1000-4-5 Level 4
Dielectric Withstand .................................................... CSA, UL 508
Safety ........................................................................ CSA, UL 508

CE Marking

\(^\text{\textsuperscript{1}}\) See table 3-1, page 17, in the Circuit Monitor Reference Manual for burden with input/output modules present.
APPENDIX C—INSTALLING TERMINAL STRIP COVERS

The hardware kit provided with the circuit monitor includes several grey protective terminal strip covers. After wiring the circuit monitor, install these terminal strip covers for protection.

Figure F-1 illustrates terminal strip cover installation. Refer to this figure when completing the procedure below.

To install the terminal strip covers, complete the following steps:

1. Bend the terminal strip covers at the crease so they form a right angle.

2. Install each terminal strip cover using two #8-32 SEMS screws, provided in the circuit monitor hardware kit.
   Be certain to orient the covers so that you can route wires outward.
   Wires should be routed outward to provide room for future addition of optional modules.

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Figure C-1: Installing terminal strip covers
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