

Energy Management Connected Components Building Block - Capacitor Bank Controller Application



Allen-Bradley

Quick Start



Allen-Bradley • Rockwell Software

**Rockwell
Automation**

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication [SGI-1.1](#) available from your local Rockwell Automation sales office or online at <http://www.rockwellautomation.com/literature/>) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

WARNING



Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.

IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

ATTENTION



Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence

SHOCK HAZARD



Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.

BURN HAZARD



Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.

Follow the path below to complete your connected components building block.

Connected Components
Building Blocks, publication
[CC-QS001](#)

[Chapter 1 Powermonitor 1000 Device Configuration](#)

Element	Item Name	Value
0	Password Range 0 to 9999	..
	Byte	
	xx,xxx	192
2	IP Address Byte b (xxx.bbb.xxx.xxx) Range 0 to 255	168
3	IP Address Byte c (xxx.xxx.ccc.xxx) Range 0 to 255	1
4	IP Address Byte d (xxx.xxx.xxx.ddd) Range 0 to 255	7

[Chapter 2 System Validation and Application Tips](#)

Device Setup

Layout: [Save](#) [Restore](#) [Collapse](#)

System Status

- Groups
- Devices
 - Efficient Industries Plant 1
 - Accounting
 - Data Center
 - Production 1
 - Production 2
 - Shipping/Receiving
 - Utilities
 - Engineering
 - Air
 - Electricity
 - Boiler House**
 - Electric Main
 - Fuels
 - Steam
 - Water

Device Information

[Device Configuration](#)
[Device Viewer](#)

☒ Enable device
☒ Enable real-time logging
☒ Enable auto data repopulation

Parent group: --Electricity

Device class: Powermonitor 1000 (EM3) on EtherNet/IP

Name: Boiler House

Notes:

Time zone: (GMT-06:00) Central Time (US & Canada)

Time sync: Daily

Device password: *****

Notes:

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Introduction

This quick start is designed to provide a way to implement and use a connected component for energy management. To assist in the design and installation of your system, application files and other information are provided on the Connected Components Building Blocks Overview CD, publication CC-QR001. The CD provides bills of materials (BOM), CAD drawings for panel layout and wiring, control programs, Human Machine Interface (HMI) screens, and more. With these tools and the built-in best-practices design, the system designer is free to focus on the design of their machine control and not on design overhead tasks. The beginning of each chapter contains the following information. Read these sections carefully before beginning work in each chapter:

- **Before You Begin** - This section lists the steps that must be completed and decisions that must be made before starting that chapter. The chapters in this quick start do not have to be completed in the order in which they appear, but this section defines the minimum amount of preparation required before completing the current chapter.
- **What You Need** - This section lists the tools and equipment that are required to complete the steps in the current chapter. This includes, but is not limited to, hardware and software.
- **Follow These Steps** - This illustrates the steps in the current chapter and identifies the steps required to complete the examples.

Use this Energy Management Connected Components Building Block Quick Start in conjunction with the Connected Components Building Blocks Quick Start, publication [CC-QS001](#).

Refer to Additional Resources on [page 8](#) for a listing of quick starts.

ATTENTION



Rockwell Automation has no liability on Capacitor Bank controller application. Rockwell Automation is not the supplier of the Capacitor Bank. This guide is written for a qualified engineer that understands power quality and power correction application.

Conventions Used in This Manual

This manual uses these conventions.

Convention	Meaning	Example
Check or uncheck	To activate or deactivate a checkbox.	Check Disable Keying.
Click	Click the left mouse button once while the cursor is positioned on object or selection.	Click Browse.
Select	Use the mouse to highlight a specific option.	Select the New Module folder.
Enter	What you type.	Enter your choice.
>	Use this symbol to indicate the sub-menu name.	Choose File > Menu > Options.

Additional Resources

Resource	Description
Connected Components Building Blocks Quick Start, publication CC-QS001	Provides information on how to select products and gain access to panel and wiring information.
Connected Component Building Blocks Overview CD, publication CC-QR001	Provides files for the Connected Component Building Blocks.
http://www.ab.com	Provides access to the Allen-Bradley website.
Powermonitor 1000 User Manual, publication 1408-UM001	Provides information for using the Powermonitor 1000 device.
Powermonitor 1000 Installation Instructions, publication 1408-IN001	Provides information for installing the Powermonitor 1000 device.
Capacitor Bank Controller User Manual, publication 1413-UM001	Provides information for using the Capacitor Bank Controller.
PanelView Component Operator Terminals User Manual, publication 2711C-UM001	Provides information on using the PanelView Component HMI terminals.
PanelView Component Installation Instructions, publication 2711C-IN001	Provides installation information for the PanelView Component terminal.
MicroLogix 1400 Programmable Controllers Installation Instructions, publication 1766-IN001	Provides installation information for the MicroLogix 1400 programmable controller.
MicroLogix 1400 Programmable Controllers User Manual, publication 1766-UM001	Provides information on using the MicroLogix 1400 programmable controller
RSEnergyMetrix Getting Results Guide, publication ENEMTX-GR001	Provides information about using RSEnergyMetrix software.
Current Transformer Selection Matrix, publication 1411-SG001	Provides a selection matrix for choosing your current transformer.
http://www.rockwellautomation.com/knowledgebase	Provides access to self-service support.
http://www.rockwellautomation.com/components/connected	Provides access to the Connected Components website.

Powermonitor 1000 Device Configuration

Introduction

In this chapter, you will learn to configure a Powermonitor 1000 device.

For other configuration parameters such as, Wiring Mode WYE, Delta, Potential/Current Transformer ratios, Demand periods, and advanced configuration, you need to consult these Powermonitor 1000 publications:

- Bulletin 1408 Powermonitor 1000 User Manual, publication [1408-UM001](#)
- Powermonitor 1000 Unit Installation Instructions, publication [1408-IN001](#)

Before You Begin

- Review the Energy Management Connected Component Building Blocks common folder to understand important background information regarding your Powermonitor device and software package.
- Select hardware and wire your Powermonitor 1000 device. Refer to the Powermonitor 1000 Unit Installation Instructions, publication [1408-IN001](#), for reference.

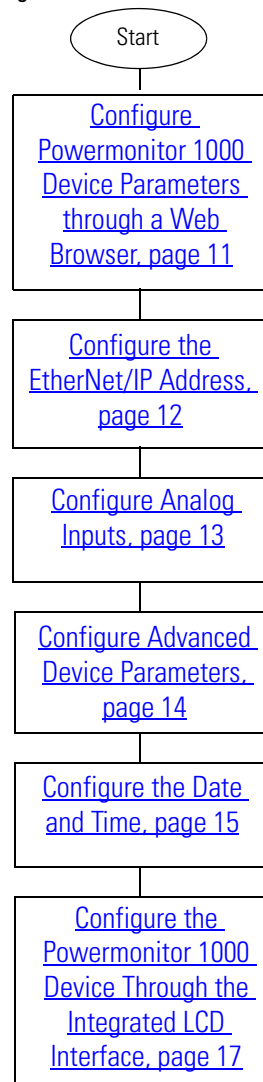
What You Need

- Powermonitor 1000 unit
- Current transformers and potential transformers (if required, refer to the Powermonitor 1000 User Manual, publication [1408-UM001](#))
- Product manuals
 - Bulletin 1408 Powermonitor 1000 User Manual, publication [1408-UM001](#)
 - Powermonitor 1000 Unit Installation Instructions, publication [1408-IN001](#)
 - PanelView Component User Manual, publication [2711C-UM001](#)

Follow These Steps

Follow these paths to configure the Powermonitor device and PanelView Component device in your energy system management.

Configure a Powermonitor 1000 Device



Configure a Powermonitor 1000 Device

This section shows you how to configure parameters of a Powermonitor 1000 device by using the internal LCD display and configuration web page. Certain settings are needed for the Powermonitor 1000 device to meter, communicate, and work with RSEnergyMetrix software. You will set the network configuration, Voltage mode, PT and CT ratios, demand values, and the date and time. Your application may require additional configuration.

TIP

Network configuration is provided for the Powermonitor 1000 device on the Ethernet network. For other communication options, refer to the Powermonitor 1000 Unit Installation Instructions, publication [1408-IN001](#).

Configure Powermonitor 1000 Device Parameters through a Web Browser

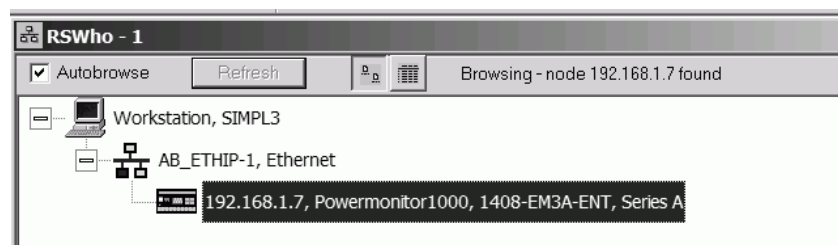
Follow these steps to configure Powermonitor 1000 device parameters.

1. Launch the Internet browser on your computer.
2. In the Address field, type the IP address of your Powermonitor 1000 device.

The default IP address is 192.168.254.xxx, where xxx is the unit's ID. The default address simplifies the task of making the initial connection to the unit from a personal computer.

**TIP**

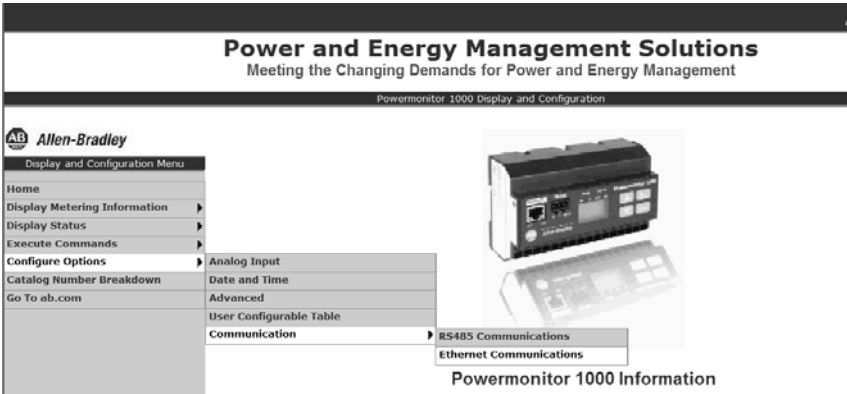
You can check the IP address of the Powermonitor 1000 device from its display or by using RSLinx Classic software and configuring an EtherNet/IP driver.



Configure the EtherNet/IP Address

Follow these steps to configure the EtherNet/IP address of a Powermonitor 1000 device.

1.
- Choose Configure Options> Communication > Ethernet Communications to access the Ethernet Configuration page.



2.
- Enter the default password of 0 or another valid password to access Edit mode.

TIP

The password appears as asterisks (*). If you don't know the password, call Rockwell Automation technical support for assistance.

Ethernet Configuration		
Element	Item Name	Value
0	Password Range 0 to 9999	0
1	IP Address Byte a (aaa.xxx.xxx.xxx) Range 0 to 255	10
2	IP Address Byte b (xxx.bbb.xxx.xxx) Range 0 to 255	10
3	IP Address Byte c (xxx.xxx.ccc.xxx) Range 0 to 255	10
4	IP Address Byte d (xxx.xxx.xxx.ddd) Range 0 to 255	01
5	Subnet Mask Byte a Range 0 to 255	255
6	Subnet Mask Byte b Range 0 to 255	255
7	Subnet Mask Byte c Range 0 to 255	255

3.
- Enter appropriate values in the IP Address Byte fields.

For this example, the IP address is 10.10.10.1 for the first Powermonitor 1000 device.

4.
- Enter the Subnet Mask and Gateway IP addresses as required.
5.
- Click Submit to send the parameter changes to the Powermonitor 1000 device.

TIP

You will lose communication to the Powermonitor 1000 device. You must enter the new IP address in the Address field of your web browser to re-establish communication with the device.

6.
- Browse to the new IP address from your web browser.

The IP address is shown on the default LCD display screen.

Configure Analog Inputs

Follow these steps to configure the Voltage mode, PT ratios, and CT ratios for the Powermonitor 1000 device. The Analog Input Set-up Parameters table on [page 14](#) shows the analog input parameters and example settings.

1. From the Configure Options menu, choose Analog Input to display the Analog Input Configuration page.

Power and Energy Management Solutions
Meeting the Changing Demands for Power and Energy Management

Powermonitor 1000 Display and Configuration

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Display and Configuration Menu

- Home
- Display Metering Information
- Display Status
- Execute Commands
- Configure Options
- Catalog Number Breakdown
- Go To ab.com

Analog Input Configuration

Element	Item Name	Value
0	Password Range 0 to 9999	••
1	Voltage Mode 0 = Direct Delta 1 = Open Delta 2 = Wye 3 = Single Phase 4 = Demo 5 = 1PT1CT-LL 6 = 1PT1CT-LN	2
2	PT Primary Range 1 to 50000	480
3	PT Secondary Range 1 to 600	480
4	CT Primary Range 5 to 50000	600
5	System PF Setting 0 = Leading -97 to +89	

2. Enter the default password of 0 or another valid password to access Edit mode.

TIP

The password appears as asterisks (*). If you don't know the password, call Rockwell Automation technical support for assistance.

3. Enter the value of the Voltage Mode you are using.
4. Set elements 2, 3, and 4 to configure the PT and CT parameters.
5. Click Submit to send the parameter changes to the Powermonitor 1000 device.

Analog Input Configuration		
Element	Item Name	Value
0	Password Range 0 to 9999	•
1	Voltage Mode 0 = Direct Delta 1 = Open Delta 2 = Wye 3 = Single Phase 4 = Demo 5 = 1PT1CT-LL 6 = 1PT1CT-LN	2
2	PT Primary Range 1 to 50000	480
3	PT Secondary Range 1 to 600	480
4	CT Primary Range 5 to 50000	600

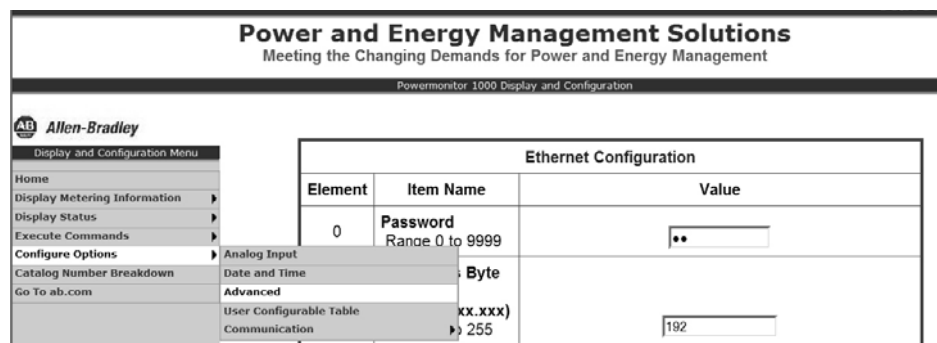
Analog Input Set-up Parameters

Parameter	Range	Default	Example Settings
Password	0...9999	0	0
Voltage Mode	0...6 0 = Direct Delta 1 = Open Delta 2 = Wye 3 = Single Phase 4 = Demo, simulated results 5 = 1PT1CT-LL 6 = 1PT1CT-LN	2	2
PT Primary	1.0...50,000	480	480
PT Secondary	5.00...50,000	480	480
CT Primary	5.00...50,000	5	600
System PF Setting	0 = Lead (-97...89) 1 = High (-85...98) 2 = Low (-52...-95)	2 = Low	2

Configure Advanced Device Parameters

Follow these steps to configure advanced demand parameters for the Powermonitor 1000 device. These settings include demand source, demand period length, and the number of demand periods to average for the demand calculation. The Advanced Device Configuration Parameters table on [page 15](#) shows the demand parameters and example settings.

1. From the Configure Options menu, choose Advanced to access the Advanced Configuration page.



2. Enter the default password of 0 or another valid password to access Edit mode.

TIP

The password appears as asterisks (*). If you don't know the password, call Rockwell Automation technical support for assistance.

14	Demand Source 0 = Internal Timer 1 = Status Input 2 2 = Controller Command 3 = Ethernet Broadcast	0
15	Demand Period Length (minutes) Range 0 to 99	15
16	Number of Demand Periods Range 1 to 15	1

- Set appropriate values for the demand parameters (elements 14, 15, and 16).

For this example, accept the default parameters as shown.

- Click Submit to send the parameter changes to the Powermonitor 1000 device.

Advanced Device Configuration Parameters

Parameter	Range	Default	Example Settings
Password	0...9999	0	0
Demand Source	0...3 0 = Internal Timer 1 = Status Input 2 2 = Controller Command 3 = Ethernet Demand Broadcast	0	0
Demand Period Length	0...99 min	15 min	15
Number of Demand Periods	1...15	1	1
Forced Demand Sync Delay	0...90 s	10	
Demand Broadcast Master Select	0...1	0	
Broadcast Port Number (Ethernet Setup)	300...400	300	

Configure the Date and Time

Follow these steps to configure the date and time for the Powermonitor 1000 device. The Date and Time Set-up Parameters table on [page 16](#) shows the date and time parameters, and example settings.

- From the Configure Options menu, choose Date and Time to access the Date and Time Configuration page.

Power and Energy Management Solutions
Meeting the Changing Demands for Power and Energy Management

Powermonitor 1000 Display and Configuration

Element	Item Name	Value
0	Password Range 0 to 9999	
1	New Password Range 0 to 9999	
	Metering Result Averaging OFF = 0 ON = 1	1
3	Log Status Input Changes NO = 0 YES = 1	0

Allen-Bradley
Display and Configuration Menu

- Home
- Display Metering Information
- Display Status
- Execute Commands
- Configure Options
 - Analog Input
 - Date and Time
 - Advanced
 - User Configurable Table
 - Communication
- Catalog Number Breakdown
- Go To ab.com

2. Enter the default password of 0 or another valid password to access Edit mode.

TIP

The password appears as asterisks (*). If you don't know the password, call Rockwell Automation technical support for assistance.

3. Configure the date and time parameters accordingly.
4. Click Submit to send the parameter changes to the Powermonitor 1000 device.

Date and Time Configuration		
Element	Item Name	Value
0	Password Range 0 to 9999	0
1	Date: Year Range 2001 to 2100	2009
2	Date: Month Range 1 to 12	8
3	Date: Day Range 1 to 31	31
4	Time: Hour Range 0 to 23	7
5	Time: Minute Range 0 to 59	44
6	Time: Seconds Range 0 to 59	39
7	Time: Hundredths Range 0 to 99	46

Submit

Refresh

Date and Time Set-up Parameters

Parameter	Range	Default	Example Settings
Password	0...9999	0	0
Date: Year	2001...2100	2005	
Date: Month	1...12	1	
Date: Day	1...31	0	
Time: Hour	0...23	0	
Time: Minute	0...59	0	
Time: Seconds	0...59	0	
Time: Hundredths	0...59	0	

TIP

For a full Powermonitor 1000 LCD screen display and configuration map, see pages 30...32 of the Powermonitor 1000 Installation Instructions, publication [1408-IN001](#).

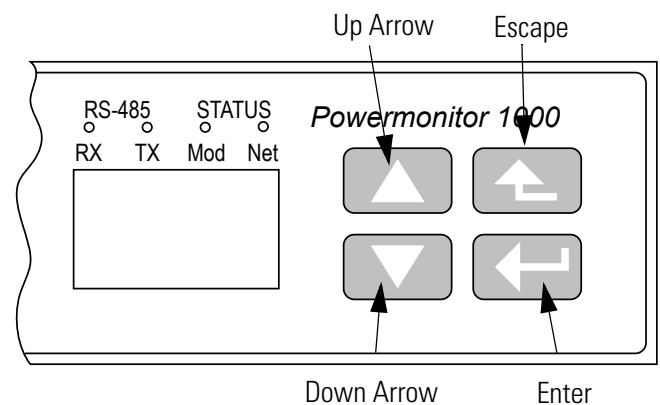
Configure the Powermonitor 1000 Device Through the Integrated LCD Interface

The Powermonitor 1000 device has an onboard LCD for viewing and configuration. Buttons are provided to control the display. The display has three modes of operation:

- Display mode lets you select and view parameters including metering, event log, and self-test information.
- Program mode lets you change configuration parameters, with security against unauthorized configuration changes. Each Powermonitor 1000 device is password protected.
- Edit mode lets you modify the selected parameters. In Edit mode, a highlight cursor appears under the value of the parameter being modified, starting at the right-hand (least significant) digit.

The diagram and table shows the LCD interface buttons and their functions.

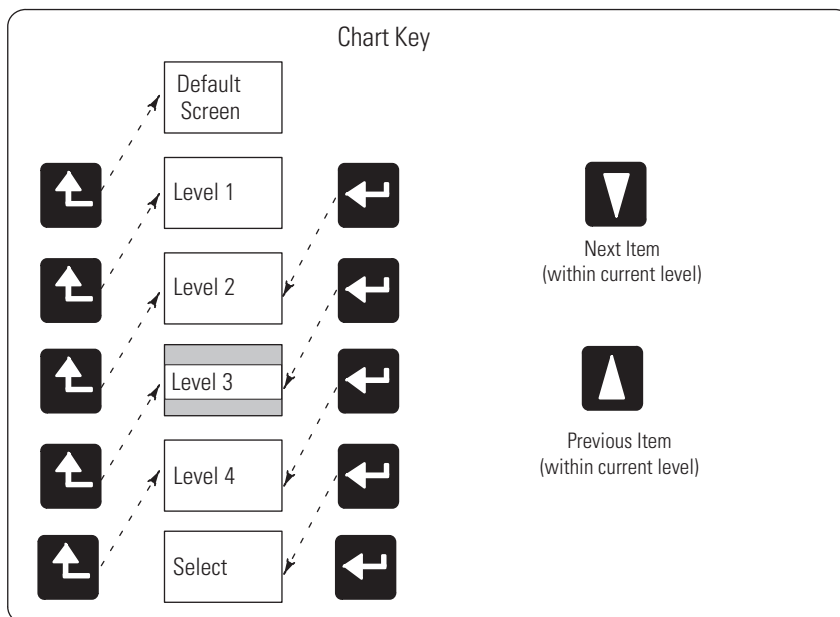
The buttons function differently in each mode. The power monitor enters into Display mode by default.



Button	Mode		
	Display	Program	Edit
Escape	Returns to parent menu At top menu, selects default screen		Cancels changes to the parameter and returns to Program mode
Up arrow	Steps back to the previous parameter or menu item		Increments the value of the highlighted digit
Down arrow	Steps forward to the next parameter or menu item		Decrements the value of the highlighted digit
Enter	Steps into a sub-menu or sets default screen	Steps into a sub-menu, selects the parameter to be modified or changes to Edit mode	Saves the parameter change and returns to Program mode
Up and down arrows together	Refreshes the display	No effect	Moves the highlight cursor one character to the left

User choices for display and configuration are organized in a hierarchical menu system within the Powermonitor 1000 device.

This diagram shows how to navigate in the display and configuration menu.



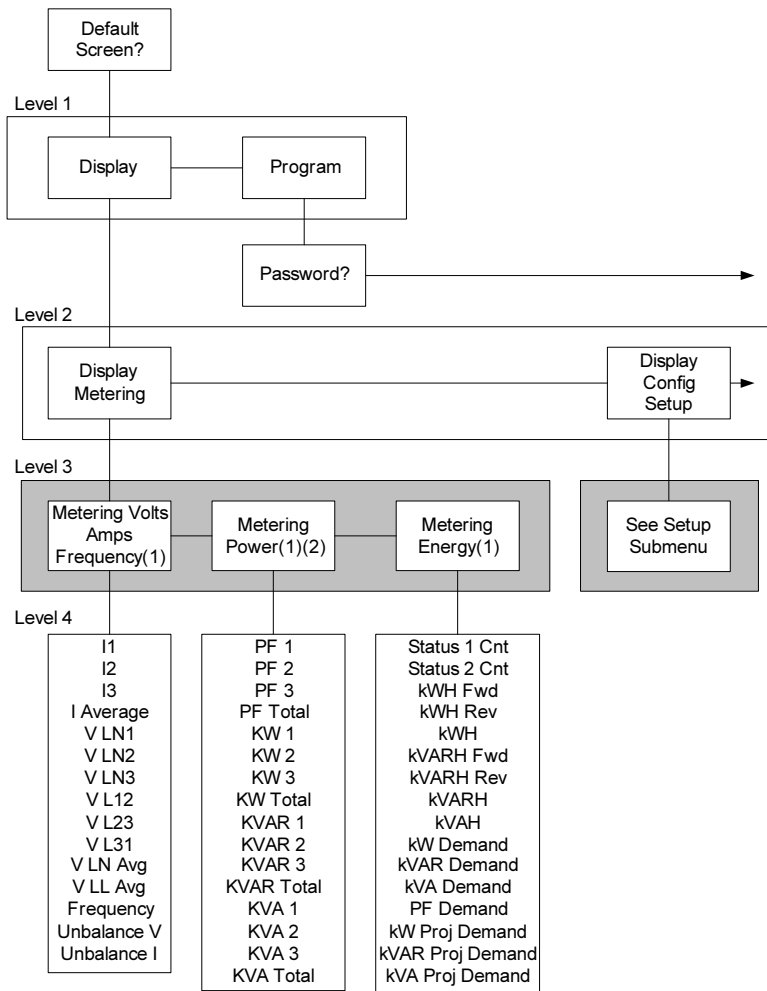
LCD Screen Display and Configuration Menu Map

The Powermonitor 1000 device lets you select and navigate to a default screen. The default screen displays at startup and is displayed after the display has been dormant for approximately 30 minutes.

To set the current screen as the default, press Enter and click Yes.

If you're in another menu and want to get back to the default screen, continue pressing Escape until you are prompted 'To Default Screen?' Click Yes to display the default screen.

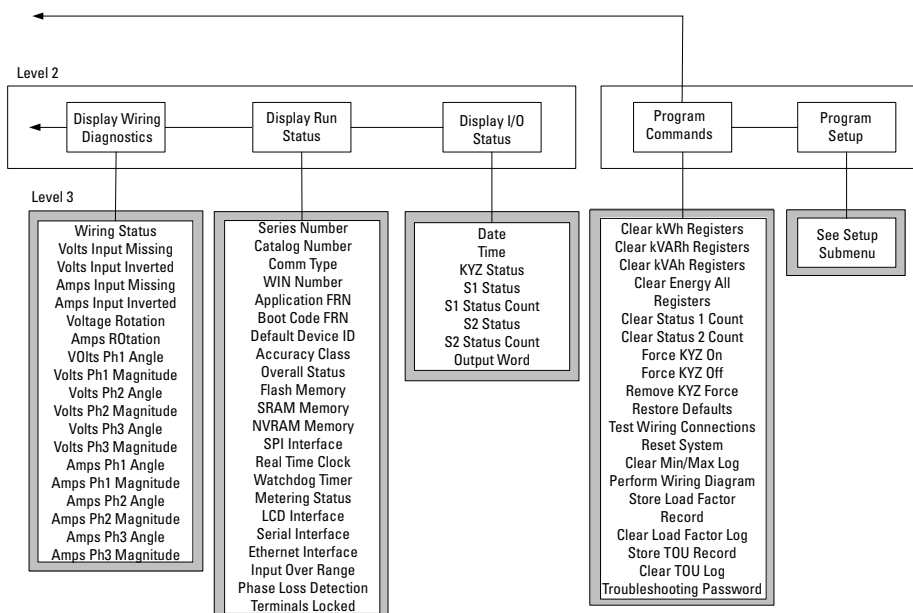
Main Menu, Page 1



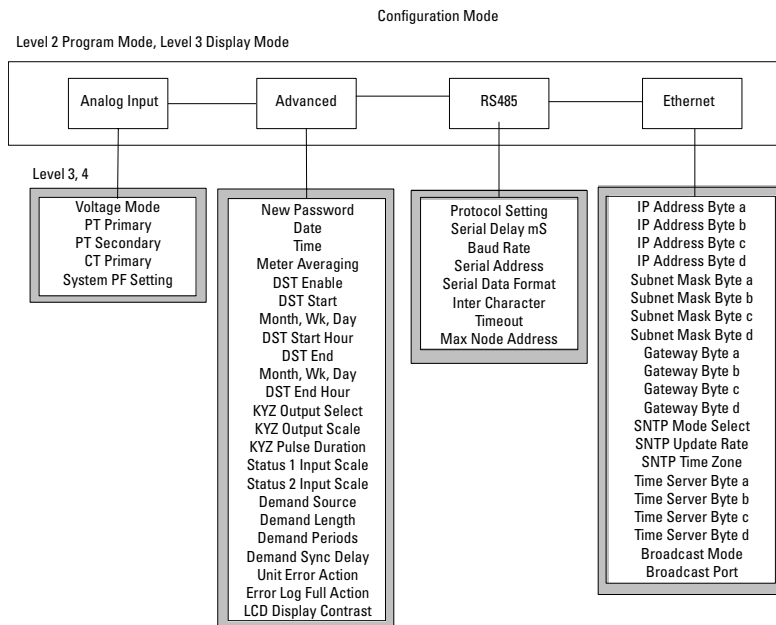
(1) The Catalog Number and Voltage mode determine which parameters are displayed.

(2) Individual phase parameters are not displayed in Delta modes.

Main Menu, Page 2



Setup Submenu



Edit a Parameter

Follow these guidelines to edit a parameter:

- Press <up> or <down> to change the highlighted digit.
- Press <up> and <down> together to move the highlight cursor one place to the left, and press <up> or <down> to set the selected digit's value.

Continue in the same way until the correct value is entered, then press <enter> when done.

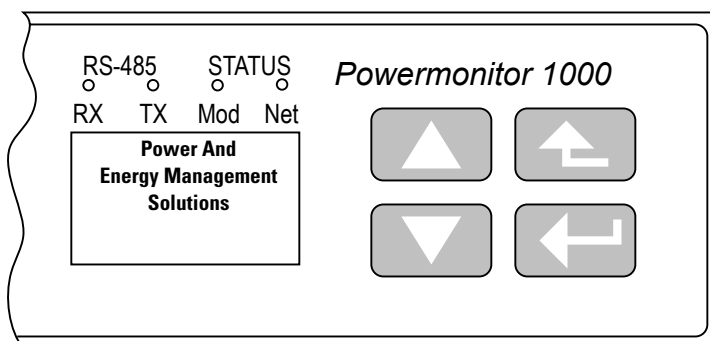
Setup Example

This example steps through setting the unit date to demonstrate use of the display and buttons to navigate through the setup menu and make changes to parameters.

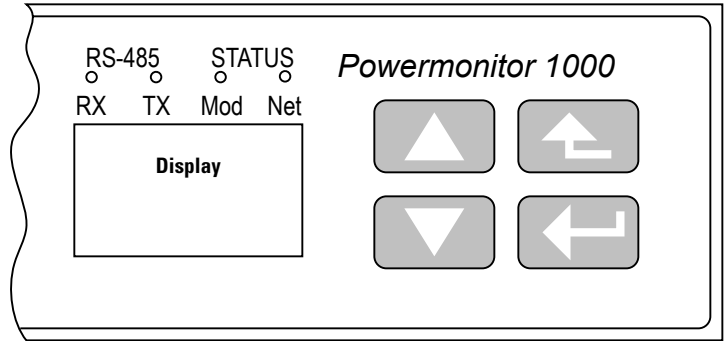
1. Navigate to the initial screen.

The screen shown is the top level screen. If it is not present, press <escape> until it appears.

If you press <escape> once too often, the "To Default Screen?" message appears. Press <escape> once more if this occurs.



2. Press <enter> and this screen appears.

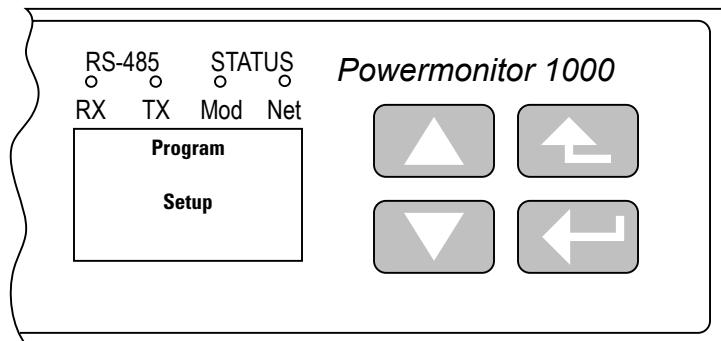
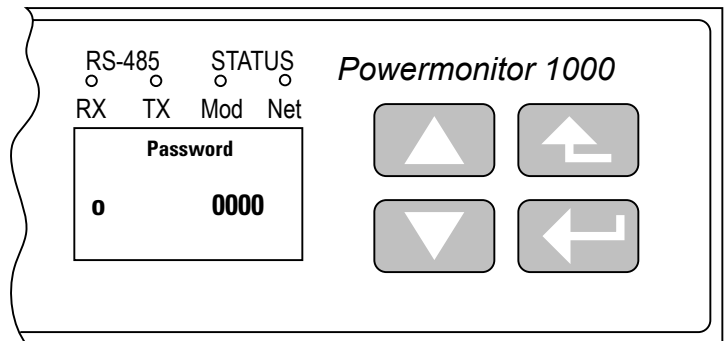


3. Press <up> or <down> once, Program appears in the display, then Press <enter>.
4. Press <enter> if the password has not been changed from the default (0000).

If the password has been changed, then enter the correct password.

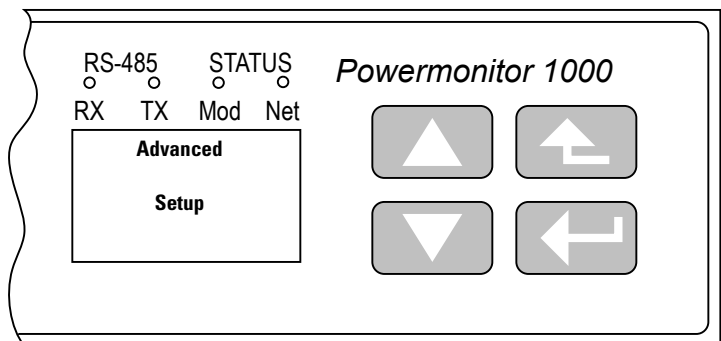
When the correct password is entered, Program Setup appears in the display. The Powermonitor 1000 device is now in Program mode.

If an incorrect password is entered, Invalid Password appears. Press any button to try again.

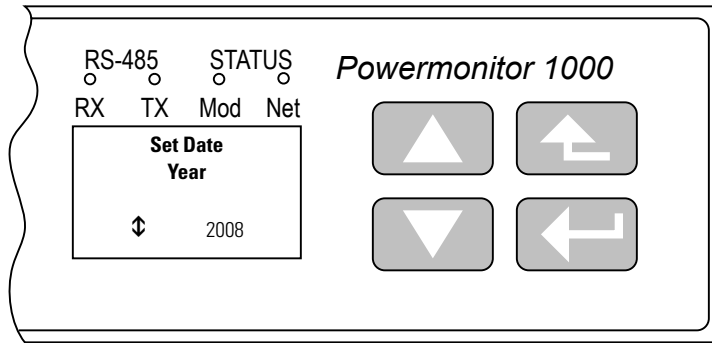


5. Press <enter>.

Analog Input appears in the display. Press <down>.

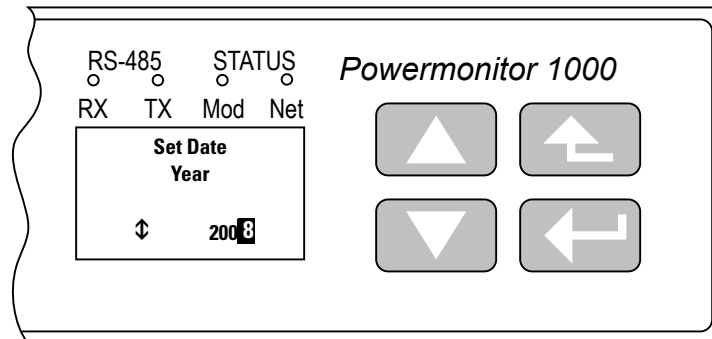


6. With Advanced Setup displayed, press <enter>, then press <down> until Set Date Year appears.



7. Press <enter> to change the value of the year.

The Powermonitor 1000 device is now in Edit mode, indicated by the presence of the highlight cursor. Change the year value and press <enter> to save it or <escape> to discard changes.



See [Edit a Parameter, page 20](#) if you need help with this.

8. Select the next item in the configuration menu by pressing <down>.

Set the month in the same way.

9. Continue setting the remaining parameters in the same way.
- Navigate to the top menu display.
 - Press <enter> then <down> then <enter> to access the password screen.
 - Enter the correct password to access Program mode.
 - Navigate to the desired menu using <enter>, <up> and <down>.
 - Press <enter> selects a parameter for editing.
 - Press <up> or <down> increments or decrements the value of the highlighted digit.
 - Press <up> and <down> together move the highlight cursor.
 - Press <enter> saves your changes; <escape> discards them.
 - Press <escape> several times to the top menu to access Display mode.

Additional Resources

Refer to [page 8](#) for a listing of product and information resources.

System Validation and Application Tips

Introduction

The Capacitor Bank controller is intended for standard, fixed-function Capacitor Banks. The controller consists of standard, off-the-shelf, Allen-Bradley hardware with the application ladder code necessary to perform power factor correction. The controller is designed to provide the same base functionality as a fixed function Capacitor Bank controller. This application provides the control scheme for Capacitor Banks through a MicroLogix 1400 controller with a PanelView Component C600 HMI terminal interface. Rockwell Automation is not the supplier of the Capacitor bank.

In this chapter, you will configure the communication for your application. You will learn how to do the following:

- Connect and configure a MicroLogix 1400 controller to a PanelView Component terminal for Capacitor Bank controller application.
- Configure RSEnergyMetrix software to log your Powermonitor 1000 device data and the MicroLogix 1400 controller data.

Before You Begin

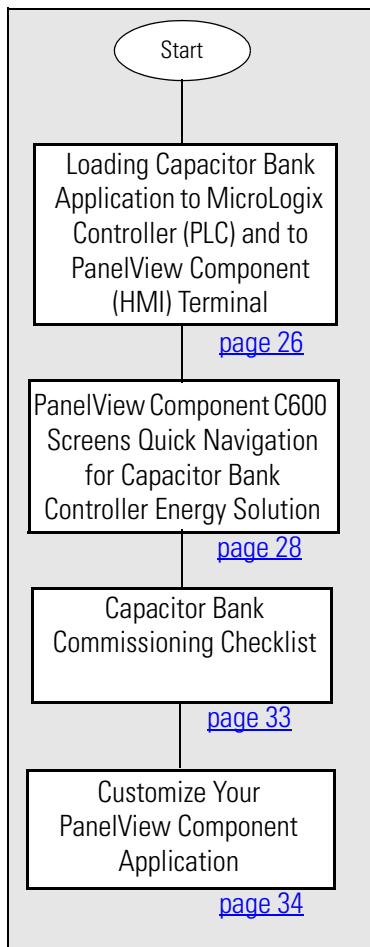
- Review the MicroLogix 1400 User Manual, publication [1766-UM001](#)
- Review the PanelView Component User Manual, publication [2711C-UM001](#)
- Review the Capacitor Bank Controller User Manual, publication [1413-UM001](#)
- Optional - Install RSEnergyMetrix software (Review the RSEnergyMetrix Getting Results Guide, publication [ENEMTX-GR001](#))
- Optional - Install RSLogix 500 software version 8.1 or later (Review the RSLogix 500 Getting Results Guide, publication [LG500-GR002](#))
- Configure Powermonitor 1000 devices, refer to [Chapter 1](#)
- Configure the PanelView Component terminal

What You Need

- MicroLogix 1400 controller hardware and RSLogix 500 software, version 8.1 or later, for downloading the CAP Bank Controller program to the controller connected over the same Ethernet network as the PanelView Component terminal and the Powermonitor 1000 device
- Powermonitor 1000 device
- PanelView Component 600 Touch terminal
- USB flash drive (for loading the PanelView application)
- Personal computer with Internet access for launching and using RSEnergyMetrix software
- RSEnergyMetrix CD, catalog number 9307-ENEMTXCD
- RSEnergyMetrix online help and Getting Results Guide, publication [ENEMTX-GR001](#)

Follow These Steps

Follow these steps to verify that communication is occurring between your devices.



PanelView Component Configuration

Loading Capacitor Bank Application to MicroLogix Controller (PLC) and to PanelView Component (HMI) Terminal

Follow these steps to download the Capacitor Bank controller preconfigured with the PanelView Component project to the 6-inch touch terminal.

1. Power up the PanelView Component 6-inch touch terminal, the MicroLogix1400 controller, and the Powermonitor 1000 unit.

TIP

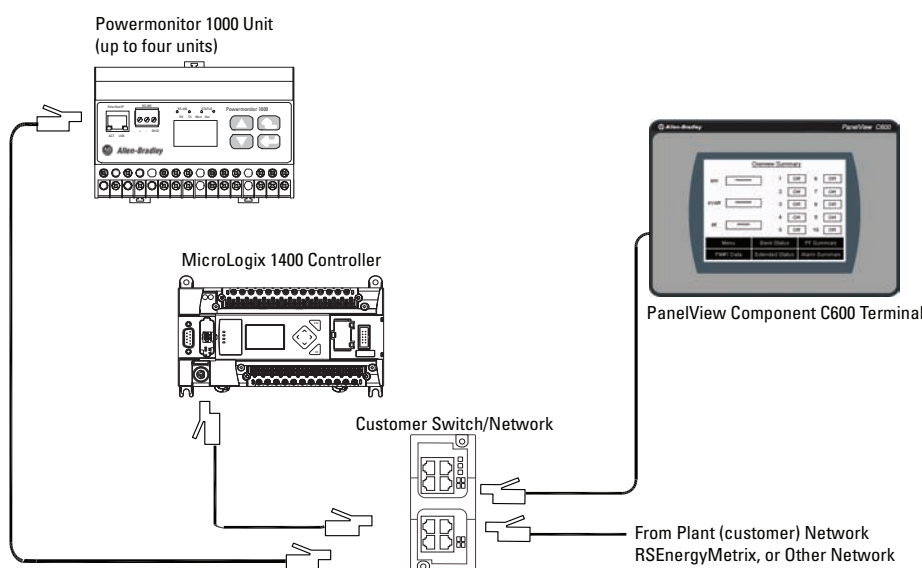
The PanelView Component terminal is powered with a 24V DC supply. The PanelView Component HMI power wiring is illustrated in the Connected Building Block CD.

The MicroLogix 1400 controller, catalog number 1766-L32BWA, and Powermonitor 1000 unit are powered with 110/240V AC.

IMPORTANT

It is very critical that the Powermonitor 1000 unit is wired correctly with PT/CT arrangements. Incorrectly wiring the CT's polarity and/or misalignment with respective voltage channel will result in wrong metering data information that will cause unexpected control of Capacitor Banks.

2. Verify that all Powermonitor 1000 units and the MicroLogix 1400 controller are online and reside on same network as the PanelView C600 terminal.



TIP

Powermonitor 1000 firmware revision 3.x is supported. You can update the Powermonitor 1000 unit by using ControlFLASH software. The latest upgrade can be obtained from firmware update site <http://www.ab.com/PEMS/downloads.html>.

The PanelView C600 application is preconfigured for the following:

- MicroLogix 1400 IP address = 192.168.254.100
- PanelView C600 IP address = 192.168.254.105

The MicroLogix 1400 controller communicates with the Powermonitor 1000 unit (default Powermonitor unit IP address 192.168.254.63). There is no direct communication data exchange between the PanelView Component terminal and the Powermonitor 1000 unit.

Assign an IP address for the personal computer workstation for downloading the PLC program and/or transferring the HMI project to the HMI.

IMPORTANT

RSLogix 500 software, version 8.1 or later, RSLinx software, version 2.56 or later, and the Internet Explorer web browser, version 7.0 or later, should be installed with IP address 192.168.254.110.

3. Copy the PanelView Component application '1413_CAP_V3.cha' from the Connected Component Building Block CD to the root of USB flash drive.

TIP

PanelView Component terminal firmware revision 1.3x is supported. If your terminal is at an earlier revision, a firmware upgrade is included in this Building Block content.

4. Copy the MicroLogix application '1413_CAP_v3.RSS' to the workstation and download it to the MicroLogix 1400 controller.
5. Plug the USB drive into the PanelView Component terminal.

The USB connection is on the back side of PanelView C600 terminal.

TIP

This application was developed for a PanelView Component 6-inch touch screen unit only. To transfer the application to the PanelView Component terminal, see the PanelView Component HMI Terminals Quick Start, publication [2711C-QS001](#).

Go to Config > File Manager > Source (USB) > Select 1413_CAP_V3.cha file, and copy it to the internal memory of the PanelView Component terminal.

6. Configure the Screensaver/Start-up application as desired from the PanelView Component terminal settings, then run the 1413_CAP_v3 Capacitor Bank application file.
7. Verify that the PanelView Component terminal is displaying Capacitor Bank controller data.

TIP

An asterisk '*' indicates the following:

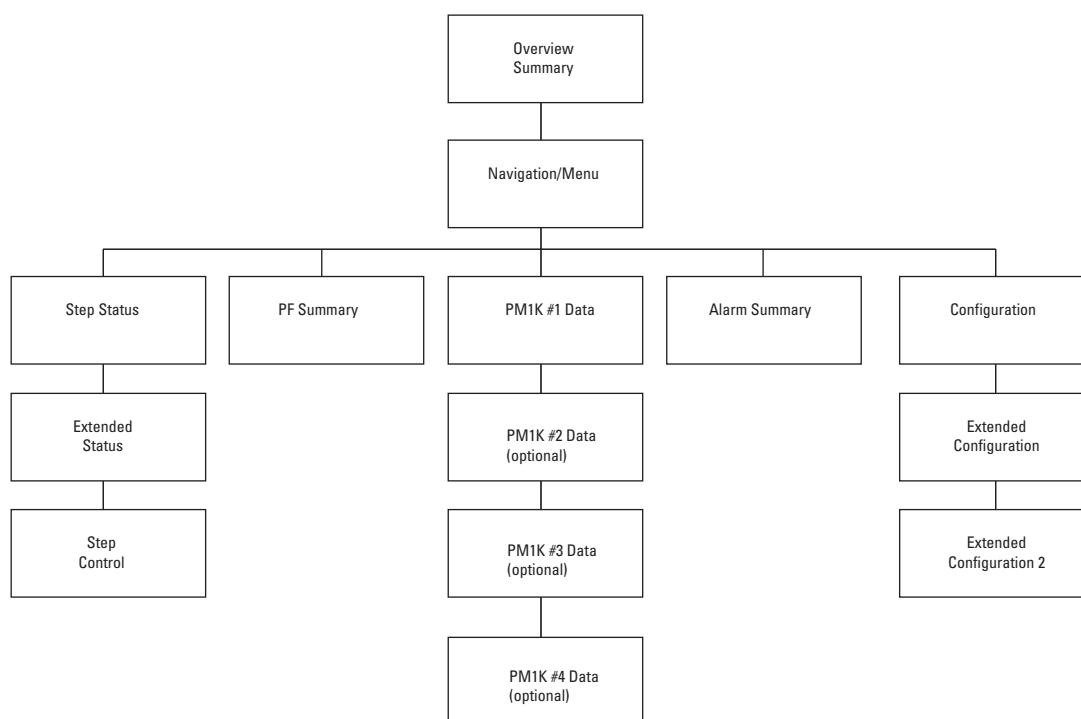
- A communication error
- The value has more significant digits than HMI applications

TIP

PanelView Component firmware revision 1.3, and Powermonitor firmware revision 3.1 is included on the building block CD.

The PanelView Component C600 terminal provides easy navigation in configuring and/or viewing the Capacitor Bank application through its touch screen.

This flowchart illustrates a high-level navigation through different screens in the Capacitor Bank of the PanelView Component terminal.



TIP

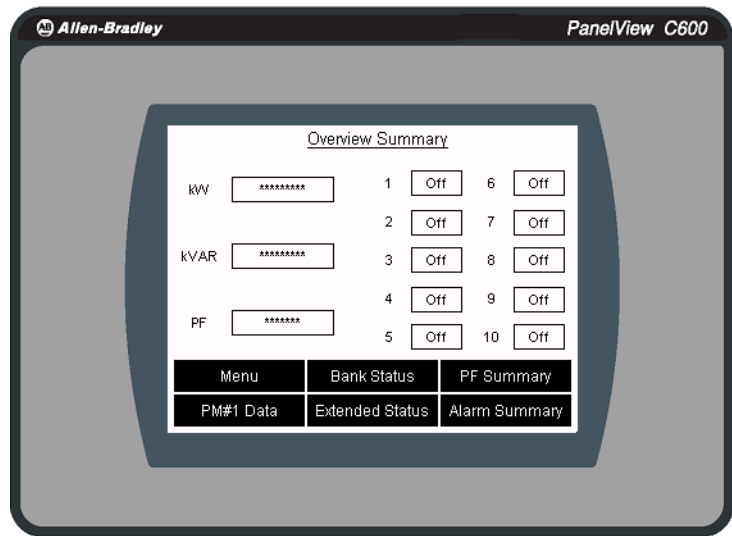
Only solid fields are configurable; that is, the values in solid fields can be changed.

These images show the navigation through the PanelView Component terminal.

Clicking each button provides navigation to the configuration and metering screens.

This screen shows current realtime Power (kW, kVAR, and powerfactor) and displays the status of which Capacitor Bank steps are currently On or OFF.

Home Screen



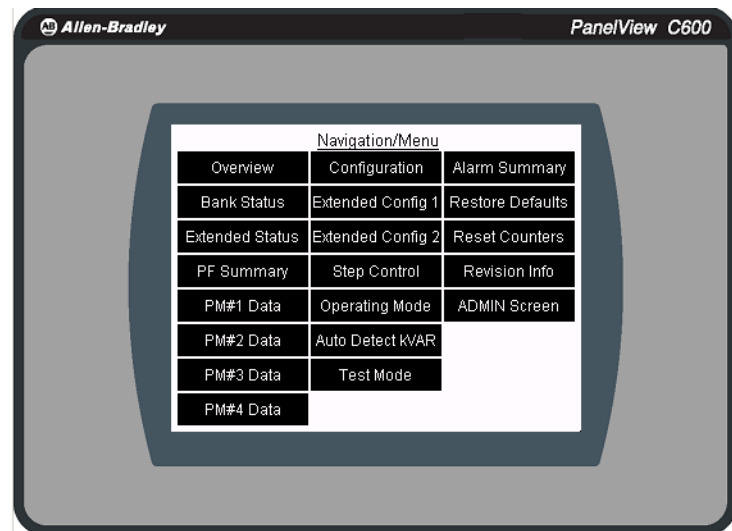
TIP

Each screen, except the menu screen, has six buttons as a footer that provides navigation. For example, on the overview screen 'PM#1 Data' will navigate to the Powermonitor data screen.

Use the Prev navigation link to all screens (except Menu/Overview) to go back.

Navigation/Menu Screen

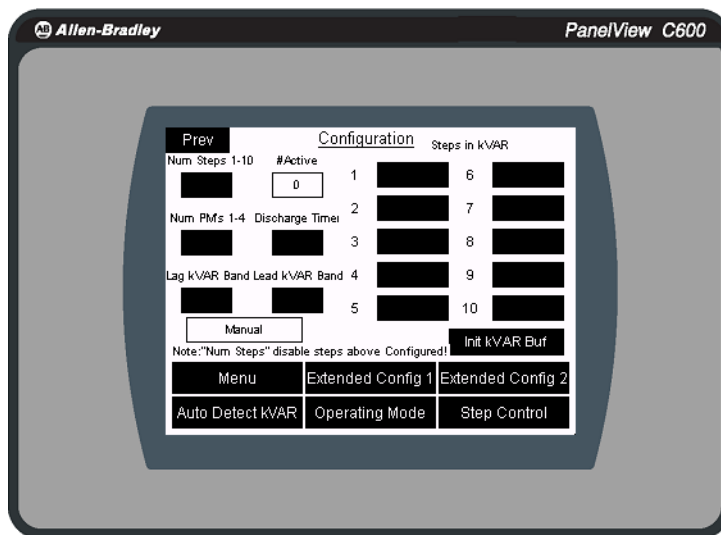
This screen provides navigation to the different screens.



In this screen you can configure:

- the number of steps. The default value is 10; that will show all 10 steps. **Num Step** is between 1 and 10.
- Number of Powermonitors** from 1...4. Default is 1. At least one Powermonitor unit must be configured.
- Steps in kVAR**. This is the size of each capacitor. Step 1 is wired to Output 1 (Capacitor Bank step 1 contact) of the MicroLogix controller and step 10 is wired to output 10 (Capacitor Bank step 10 contact).

Configuration

**IMPORTANT**

Stages and/or sizes of the Capacitor Bank typically require a Power Quality study. The Capacitor Bank modes are Manual, FILO, Balanced, and Best Fit.

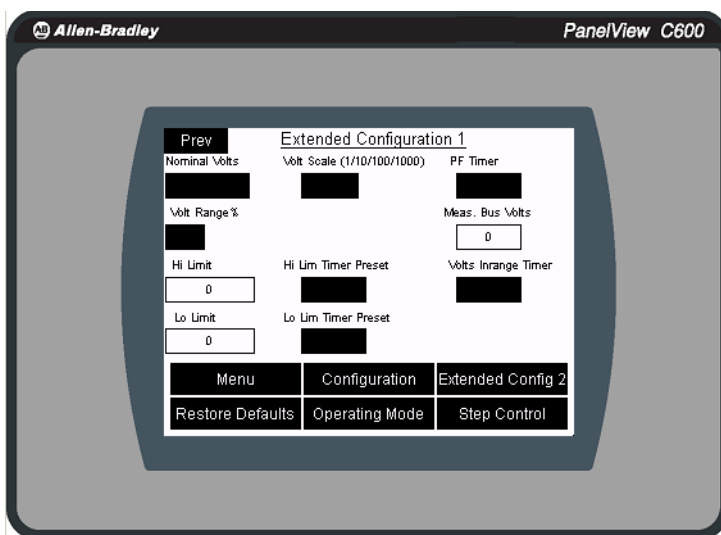
IMPORTANT

For **Discharge Time**, check with the Capacitor Bank vendor for the appropriate value. One discharge Capacitor Bank value applies to all capacitor steps.

These guidelines apply in the Configuration screen:

- Nominal Volts** is a number between 0 and 9999 using the scale 1/10/100/1000. Therefore, a voltage of 13,400V would be entered as 1340.
- Volt Range %** is used for voltage high/low alarms.
- Timer** preset is for **high and low values** for the high/low voltage alarms.
- PF timer** is used to generate alarm if Powerfactor is not achieve in that time.

Configuration

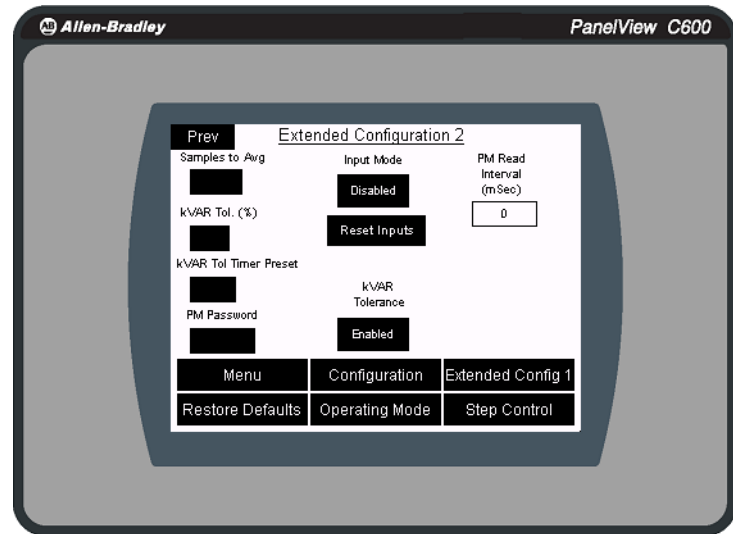
**TIP**

All timers are in seconds.

These guidelines apply in the Configuration screen:

- The **Samples to Avg** number is between 5 and 10.
- The **kVAR tolerance %** of each capacitor to trigger alarming.
- **Input mode** is disabled by default. If you are using fault relays for respective steps, we recommend that you use Input mode. Reset inputs will clear controller alarms.

Configuration



TIP

The leading kVAR limit allowed for the system, before the controller acts to correct lead, typically is 33% of smallest capacitor step. The lagging kVAR limit allowed for the system, before the controller acts to correct lag, typically is 66% of largest capacitor step.

Step Control

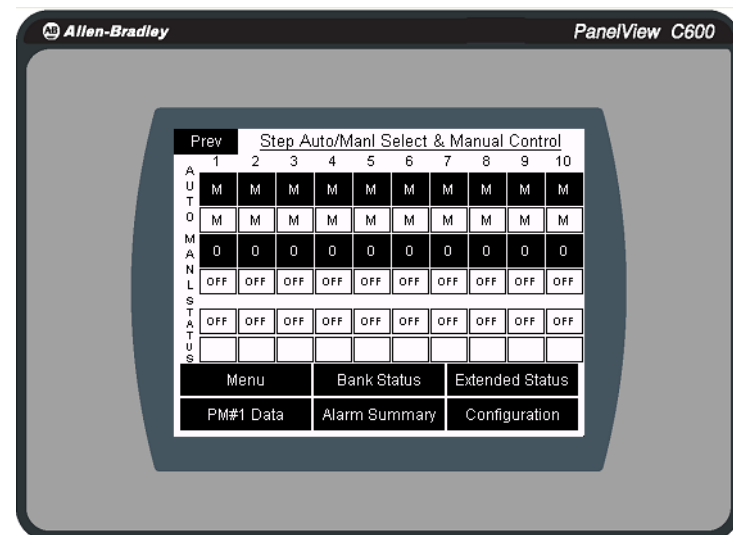
This screen shows the step control of the Capacitor Bank controller. Step Control screens let you place a step in Auto (A) or Manual (M) mode.

When using the Balanced, Best Fit, or FILO operating mode, make sure all the steps are in Auto mode. Just pressing the step will toggle the step in Auto (A) or Manual (M) mode.

The first row (from the left) is to configure the step; the second row is the status of step (A or M).

The third row is Manual command. You can press the respective step and if it is in Manual mode you can turn that step On or Off.

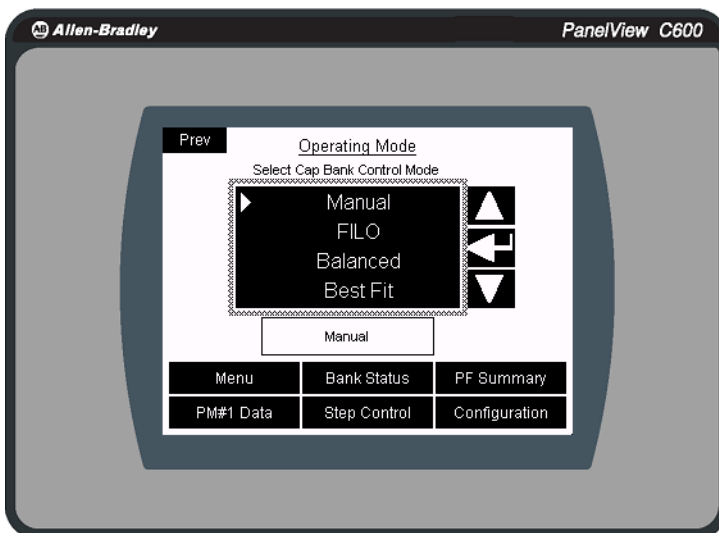
The second-last row indicates On/Off status of each step. The last row shows discharging status. If a Capacitor Bank is discharging, it will show a flashing 'D'.



Operating Mode Screen

This screen shows the Operating mode. Verify your steps are configured properly before making Operating mode selections:

- Manual (mode = 0) – This mode disables all automatic operating modes. Manual mode is the default configuration. All capacitor steps have a default configuration of auto.
- FILO (mode = 1) – This mode of operation switches the capacitor steps on and off in first-in, last-out (FILO) order. That is, the first step on is the last step turned off. This is most useful when all the capacitor steps are of similar size.



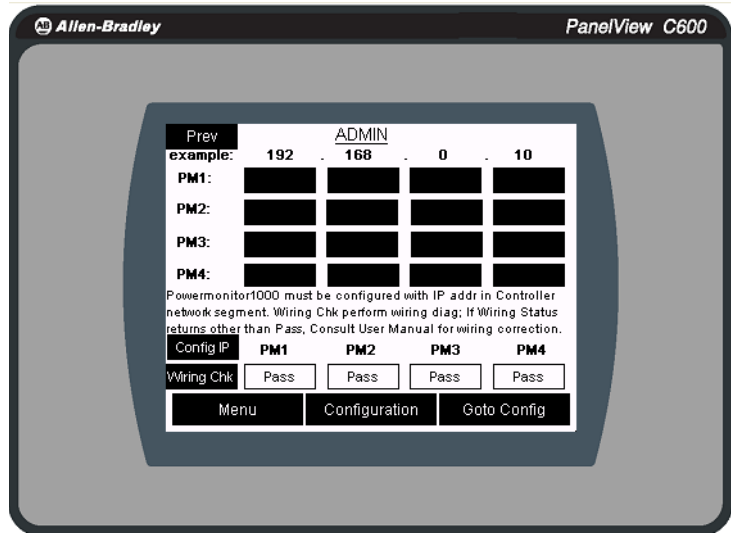
Balanced (mode = 2) – This mode counts the number of opening operations on each capacitor step and switch-capacitor steps to balance the number of opening operations equally across all of the employed capacitor steps. This mode is also most useful when all of the steps are of similar size.

- Best Fit (mode = 3) – This mode selects capacitor steps to be switched on and off to most closely achieve the target power factor and kVAR needs of the system. When the system's kVAR needs to increase, the available step or steps with the closest (aggregated) kVAR rating is added. On decreasing kVAR demand, steps are switched off in similar fashion.

Administration Screen

The Admin screen provides the IP address of the Powermonitor units used in the Capacitor Bank controller.

The default IP address for the Powermointor 1000 unit in this application is 192.168.254.63. After changing the IP address, you must press Config IP for the controller to change the IP address in the explicit messaging.

**ATTENTION**

Changing the IP address causes all of the capacitors to turn off and that can cause a power disturbance.

**ATTENTION**

Rockwell Automation has no liability on Capacitor Bank controller applications. Rockwell Automation is not the supplier of the Capacitor Bank. This document is written for a qualified engineer that understands power quality and power correction application.



Capacitor Bank Commissioning Checklist

Follow this checklist prior to using the Capacitor Bank:

- Wear proper personal protective equipment (PPE).
- Complete a Power Quality study to understand the power profile to staging the right step sizes of the Capacitor Bank.
- Check that the Powermonitor unit is wired correctly.
- Check that the Overview screen shows valid Power data (kW, kVar, and Powerfactor). If no data is displayed, go to the Admin screen and verify the IP address of the Powermonitor unit.

As a minimum, the following configurations are required.

- Configuration is the number of steps configured with Discharge time, lead and/or lag settings.
- Configuration 1 and 2 are Nominal voltage, Voltage high/low limits, Powerfactor timers, samples to average, and Input modes.
- Step Control configures all the steps in the appropriate mode.
- Operating mode is one of the three Automatic modes, FILO, Balanced, or Best Fit.

Customize Your PanelView Component Application

The text (units and meter names) and IP address of the Capacitor Bank controller can be configured through the design environment.

TIP

For complete customization processes, see the PanelView Component HMI Terminals Quick Start, publication [CC-QS001](#).

Follow these steps to change the IP address of a Capacitor Bank controller in your PanelView Component application.

1. Connect to the PanelView Component terminal through a web browser.

Use Mozilla FireFox, version 2.x or later, or Internet Explorer, version 7.0 or later, web browsers.

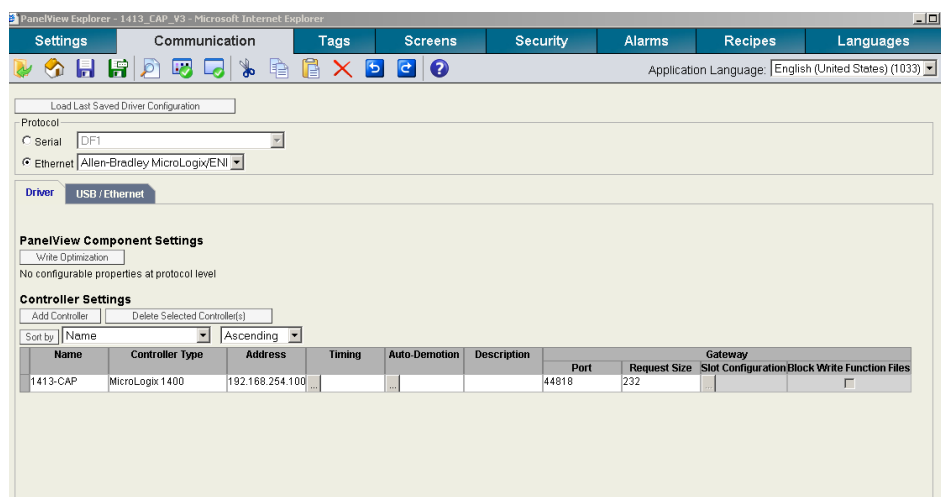
2. Type the IP address of your PanelView Component terminal.
3. On the home page, select the Capacitor Bank application and click Edit.

IMPORTANT

Make sure the pop ups are not blocked, as it will launch a new window.

4. Click the Communication tab and change the IP address as needed.

The MicroLogix 1400 controller is configured with 192.168.254.100 in the 1413-CAP_v3.RSS.



Additional Resources

Refer to [page 8](#) for a listing of product and information resources.

Notes:

Frequently Asked Questions

Introduction

This appendix provides some frequently asked questions regarding Capacitor Bank application and provides some simple system troubleshooting.

1. When I click the Navigation links in the PanelView Component HMI, why doesn't it bring up the correct display?

A: Calibrate the touch screen on your PanelView Component HMI. Detailed instructions to recalibrate the touch screen can be found in the PanelView Component HMI User Manual, publication [2711C-UM001](#). ([Refer to Additional Resources on page 8.](#))

2. What does 'Data Access Error for Alias...' mean? (My terminal does not refresh and the data fields are filled with '*'.)

A: Check the communication media (Ethernet Cat-5 cable). Verify proper wiring and communication protocol settings on your PanelView Component HMI, MicroLogix controller, and Powermonitor 1000 device (IP addresses, default gateway, subnet mask).

3. I see some of the data for the metering parameters, but it shows '*' on the least significant digit. What is causing that?

A: The metering parameter in the PanelView Component application is programmed with a fixed number of digits. Your data value is outside of the fixed digits. You need to customize the PanelView Component application for your specific situation.

4. When I change screens in my PanelView Component application, I see asterisks in some of the data boxes for a few seconds, but then the values become numbers. Why is this happening?

A: The default application is set for a 500 ms update rate for all tags. You can change the configuration to 50 ms in the design environment to improve performance.

5. How do I configure the lead and lag settings?

A: The leading kVAR limit allowed for the system, before the controller acts to correct lead, typically is 33% of smallest capacitor step. The lagging kVAR limit allowed for the system, before the controller acts to correct lag, typically is 66% of largest capacitor step.

6. How many capacitor steps and Powermonitor units can be utilized in this application?

A: Up to 10 Capacitor Banks can be controlled with MicroLogix Capacitor Bank application. Up to four Powermonitor 1000 units can be used, however they must all be on the same bus voltage

7. What does leading and lagging powerfactor mean?

A: Powerfactor is a value between -1 to 1 and it's shown in percentage (-100% to 100%). Leading powerfactor is indicated with no sign value, that means there is reactive power in the system. Lagging powerfactor is indicated with negative sign '-' value. It means system is inductive, that means there is more kVAR coming from the utility/power source. kVAR is often refer as magnetizing power used in induction motor.

A unity powerfactor is desired, a bad powerfactor -85 or lower can cause powerfactor penalties from your utility. Capacitor adds the reactive power to line to improve lagging powerfactor towards unity.

8. Why are the capacitor steps not turning on?

A: Check the following:

- Verify Power metering information is correct
- Lead / Lag kVAR settings are configured properly
- If using input mode, check the fault relay status. Reset input through Configuration screen
- Check operating mode
- Check all the capacitor steps are configured properly in Auto/Manual mode.

9. How should I configure multiple Capacitor Banks with different discharge time?

A: There is only one discharge timer. It takes five time constants for a capacitor to be discharged 99%. Select the longest discharge timer to cover all of your capacitors. All the timers in Capacitor Bank applications are in seconds.

10. How do I configure a Capacitor Bank controller?

A: STOP! It's strongly recommended that you have basic power background and follow best safety practices (PPE). A Power quality study must be done to stage the Capacitor Banks that meets your plant power profile the best way. [Refer to Capacitor Bank Commissioning Checklist on page 33.](#)

11. What is Rockwell Automation 1413-CAP-ME-PE C 'Capacitor Bank Controller Application'?

A: These are essentially the same PLC/HMI application. PanelView Component and MircoLogix controller are sent with application loaded, along with the Powermonitor 1000 unit. This option gets you the controller hardware with least amount of your efforts on loading up PLC/HMI.

12. How can I see the PLC program and HMI program?

A: The HMI development environment is a web browser (Internet Explorer 7.0 or Mozilla Firefox).

Access the PLC through RSLogix 500 software and use RSLinx Classic software to communicate to the controller to upload and/or download the code. The HMI application was developed for PanelView Component 600C terminals with firmware revision 1.30. The PLC code is for the MicroLogix 1400 series A controllers.

13. How can I transfer Capacitor Bank data to RSEnergyMetrix software?

A: Refer to Energy Management Connected Components Building Block - W.A.G.E.S. Energy Solution, publication CC-QS021 for information on setting up communication between devices and RSEnergyMetrix software over a network.

Notes:

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Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At <http://www.rockwellautomation.com/support/>, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration, and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit <http://www.rockwellautomation.com/support/>.

Installation Assistance

If you experience an anomaly within the first 24 hours of installation, review the information that is contained in this manual. You can contact Customer Support for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/support/americas/phone_en.html , or contact your local Rockwell Automation representative.

New Product Satisfaction Return

Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

United States	Contact your distributor. You must provide a Customer Support case number (call the phone number above to obtain one) to your distributor to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

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Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete this form, publication [RA-DU002](#), available at <http://www.rockwellautomation.com/literature/>.

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