

# Eaton® Power Xpert® Gateway PXGX PDP Card

## User's Guide



*Powering Business Worldwide*

## Class A EMC Statements

### FCC Part 15

**Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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- Harmonized Standards: EN 62040-2:2006  
EN 55022:2006 Class A, EN 55024:1998+A1:2001:A2:2003
- EU Directive: 2004/108/EC, Council Directive relating to electromagnetic compatibility

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# Table of Contents

<b>1</b>	<b>INTRODUCTION</b>	
	Eaton Power Xpert Architecture . . . . .	1
<b>2</b>	<b>GETTING STARTED</b>	
	Installation Checklist . . . . .	2
	Installing the Card . . . . .	3
	Connecting the Card to the Computer . . . . .	6
	Installing the USB Driver Software (Windows XP) . . . . .	8
	Installing the USB Driver Software (Windows 7) . . . . .	13
	IP Address Assignments . . . . .	17
	Verifying IP Addresses . . . . .	17
	Assigning an IP Address . . . . .	19
	IPv6 Address Assignments . . . . .	20
	Network Configuration . . . . .	21
	Important Security Information . . . . .	22
<b>3</b>	<b>CONFIGURING THE CARD</b>	
	Navigating the Card's Web Page . . . . .	24
	View and Configure Tasks Essential to Initial Configuration . . . . .	25
	Changing the Passwords . . . . .	26
	Setting the Date and Time . . . . .	26
	Configuring SNMP Options . . . . .	27
	Community Strings and Trap Recipients . . . . .	27
	Changing SNMP Access . . . . .	27
	System Location and System Contact . . . . .	28
	Management from an SNMP NMS . . . . .	29
	Configuring Modbus TCP/IP Options . . . . .	29
	Configuring HTTP and HTTPS . . . . .	30
	Configuring the Energy Management System (EMS) . . . . .	30
	Configuring E-Mail Notification . . . . .	31
	Configuring EMP Settings . . . . .	32
	Saving and Restoring Configuration Settings . . . . .	33
	Creating a Backup . . . . .	33
	Restoring a Backup . . . . .	33
<b>4</b>	<b>OPERATION AND MAINTENANCE</b>	
	PXGX PDP Card Panel Details . . . . .	34
	Indicator Descriptions . . . . .	34
	DIP Switch Description . . . . .	35
	Open Alarms . . . . .	35
	Generating Log Files . . . . .	37
	Data Log . . . . .	37
	Interval Log . . . . .	37
	Event Log . . . . .	37
	System Log . . . . .	38
	Erasing a Log . . . . .	38
	Upgrading the Card's Firmware . . . . .	38

- 5 ROOT CERTIFICATE AUTHORITY INSTALLATION**
  - Installing Root CA with Windows Internet Explorer 7 and Internet Explorer 8 . . . 39
  - Installing Root CA with Mozilla Firefox . . . . . 44
  - Installing Root CA with Google Chrome . . . . . 45
  
- 6 MIB FILES**
  - Eaton PDU MIB . . . . . 52
    - mainPDU . . . . . 52
    - pduPanel . . . . . 52
    - pduBreaker . . . . . 53
  - Eaton EMP MIB . . . . . 53
  - Eaton Power Meter MIB . . . . . 53
  - Eaton PowerChain Device MIB . . . . . 53
  - Eaton Alarms+Traps MIB . . . . . 53
  - Eaton OID Assignments . . . . . 53
  - Entity MIB Files . . . . . 54
  
- 7 MODBUS REGISTERS**
  - Identifying the Breakers . . . . . 56
    - PDU/RPP Breakers . . . . . 56
    - RPM Breakers . . . . . 56
  - Pole Data . . . . . 57
  - Obtaining the Modbus Register Map . . . . . 57
  - Returning Error Codes . . . . . 57
  - Modbus Register Addressing . . . . . 58
    - Modbus Function Codes . . . . . 58
    - Data Formats . . . . . 58
    - Data Addressing . . . . . 58
  - PDP Unit ID Numbers . . . . . 59
  - PDP Registers and Alarms . . . . . 61
    - PDP Registers (FC 04) . . . . . 61
    - PDP Alarms (FC 02) . . . . . 61
  - Panel Registers and Alarms . . . . . 62
    - Panel Summary Registers (FC 04) . . . . . 62
    - Panel Alarms (FC 02) . . . . . 63
  - Breaker Data and Alarms . . . . . 64
    - Breaker #1 Data Registers (FC 04) . . . . . 64
    - Calculating Breaker Register Numbers . . . . . 65
    - Breaker Alarms (FC 02) . . . . . 65
  - EMP (FC 04) . . . . . 66
  - Time or Date (FC 04) . . . . . 67
  
- 8 SPECIFICATIONS**
  
- 9 SERVICE AND SUPPORT**
  - Two-Year Limited Warranty (US and Canada) . . . . . 69

## Chapter 1 Introduction

The Eaton® Power Xpert® Gateway Card provides Web-enabled, real-time monitoring of Eaton power distribution products (PDPs) through standard Web pages, Power Xpert Software, or third-party software. An integral part of the Eaton Power Xpert Architecture, which provides end-to-end PowerChain Management™ solutions, the PXGX PDP Card provides a central point to connect PDPs to the Ethernet network.

The PXGX PDP Card supports the following PDPs:

- Power Distribution Units (PDUs)
- Remote Power Panels (RPPs)
- Rack Power Modules (RPMs)
- Energy Management System Upgrade Kits (EMS-UGKs)
- Power Distribution Racks (PDRs)

**Note:** In this guide, “PDP” refers to the power distribution products listed above.

Network managers can view critical downstream device information, such as status, power, energy, and power quality data with an easy-to-use interface.

The PXGX PDP Card has the following features:

- Web-enabled PDPs – view data from any location with a Web browser.
- Real-time power monitoring – view critical power data and make informed network management decisions.
- Integrated communications with Eaton’s Power Xpert Software – monitor power devices in real time through Power Xpert Software.
- Simple Network Management Protocol (SNMP) support – integrate and manage your PDP with third-party network management software.
- Power quality data using Modbus® Transmission Control Protocol (TCP) – use this open communication protocol to communicate with standard building management systems.
- Easy installation – install the PXGX PDP Card while the PDP is online, maintaining the highest system availability.
- Field upgradeable – use the Web interface to easily upgrade the card's firmware in the field.

### Eaton Power Xpert Architecture

Eaton Power Xpert Architecture provides the framework to unify the entire power system. It connects power systems with communication and management systems to provide a holistic approach to the entire power system. This strategic system-level focus is integral to PowerChain Management Solutions. It provides increased reliability, cost efficiencies, enhanced safety and risk mitigation, and allows for the more effective use of capital. Eaton Power Xpert Architecture is comprised of both software and hardware components including meters, gateways, time servers, and connectivity devices.

## Chapter 2 Getting Started

**Note:** If you have completed all sections in the Power Xpert Gateway PXGX PDP Card Quick Start Instructions, proceed to Chapter 3, “Configuring the Card” on page 23.

This section explains:

- Checklist items needed for installation
- Installing the card
- Connecting the card to the computer
- Installing the USB Driver Software (Windows XP and Windows 7)
- Verifying or assigning the IP address
- Configuring the network settings

### Installation Checklist

1. Verify that all of the following items are available:
  - o PXGX PDP Card package contents (card, USB cable, and quick start instructions)
  - o Phillips® screwdriver
  - o Available USB port on a computer running Microsoft® Windows®
  - o Web browser (Windows Internet Explorer®, Mozilla® Firefox®, or Google Chrome™ are recommended)
2. Set your computer screen resolution to 1280 by 1024 pixels or better for optimum viewing.
3. If you are going to use Dynamic Host Configuration Protocol (DHCP), provide your local network administrator with the card's MAC address. The MAC address is located on a label on the bottom of the card.
  - o MAC Address \_\_\_\_\_
4. If you are not going to use DHCP to provide any of the settings listed below, contact your local network administrator for the settings. Select DHCP or enter the values for manual configuration in the table below:

Item	Either Provided by DHCP*	Or Manual Configuration
IPv4	<input type="radio"/>	Card IP Address: _____ Netmask: _____ Gateway: _____
DNS – Name Servers	<input type="radio"/>	Name Server #1: _____ Name Server #2: _____ Name Server #3: _____
DNS – Domain	<input type="radio"/>	Domain: _____

\* The network administrator normally sets up the DHCP server to provide a static IP address each time the card makes a DHCP request.

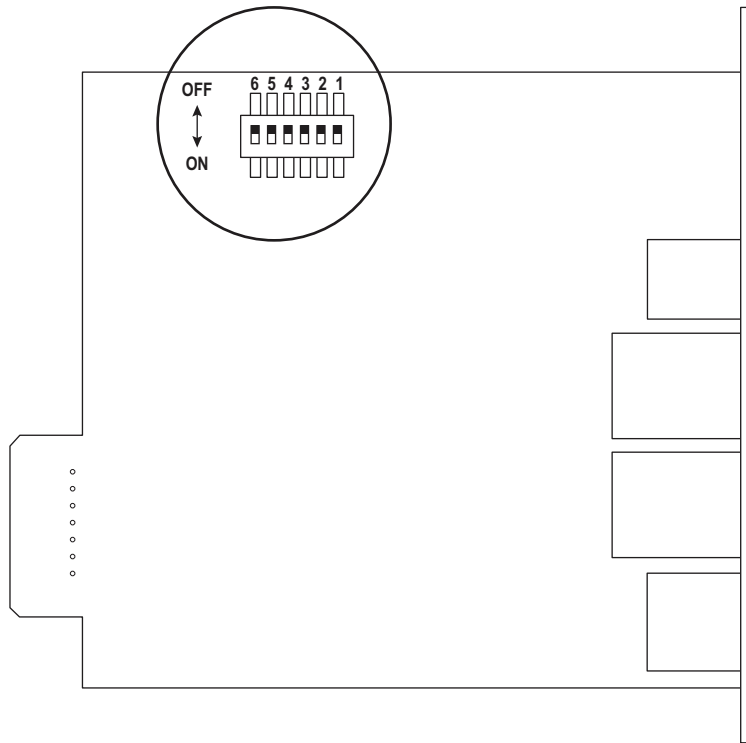
5. If you need e-mail functionality, obtain the SMTP server IP address or host name. If using the SMTP server host name, verify that you also have the Name Server IP address (see Step 4).
  - o SMTP (mail) server IP Address  
or Host Name \_\_\_\_\_

## Installing the Card

The hot-swappable PXGX PDP Card can be installed without turning off the PDP, or disconnecting the load.

To install the PXGX PDP Card:

1. Verify that all six DIP switches on the card are in the OFF position (see Figure 1).



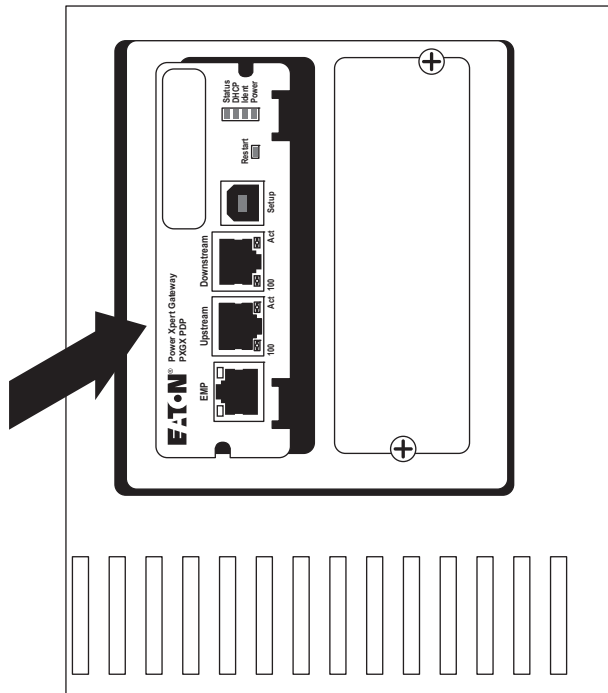
**Figure 1. Verify DIP Switches are OFF**

2. Remove the X-Slot® cover from the PDP. Retain the screws.

**Note:** If there is another card already installed with an attached communication cable, disconnect the cable and then remove the card.

3. If not already done, record the MAC address for future reference (see Step 3 of the “Installation Checklist”).
4. To prevent electrostatic discharge (ESD), place one hand on a metal surface such as the PDP panel.

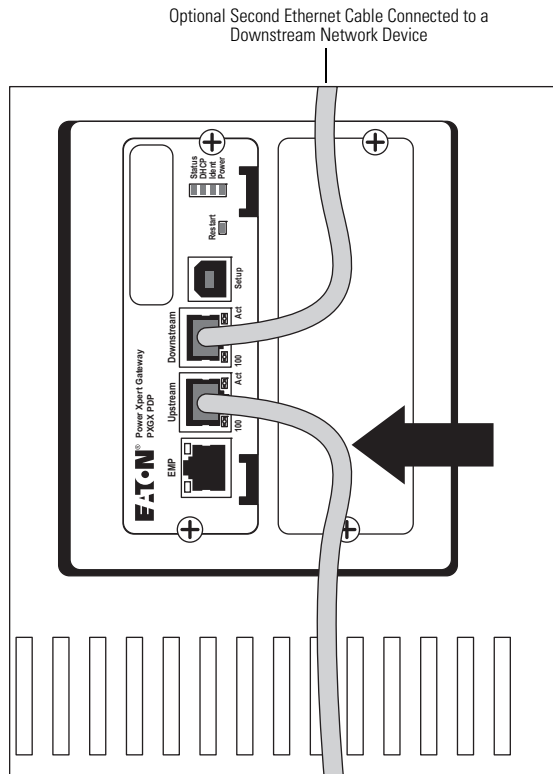
- Slide the card into the open slot and secure with the screws removed in Step 2 (see Figure 2 and Figure 3).



**Figure 2. Install the PXGX PDP Card**



6. Connect an active Ethernet cable (not supplied) to the Upstream Ethernet connector on the PXGX PDP Card (see Figure 3).
7. If you are connecting to another PXGX PDP Card or other Ethernet device, connect an Ethernet cable (not supplied) to the Downstream Ethernet connector on the PXGX PDP Card.

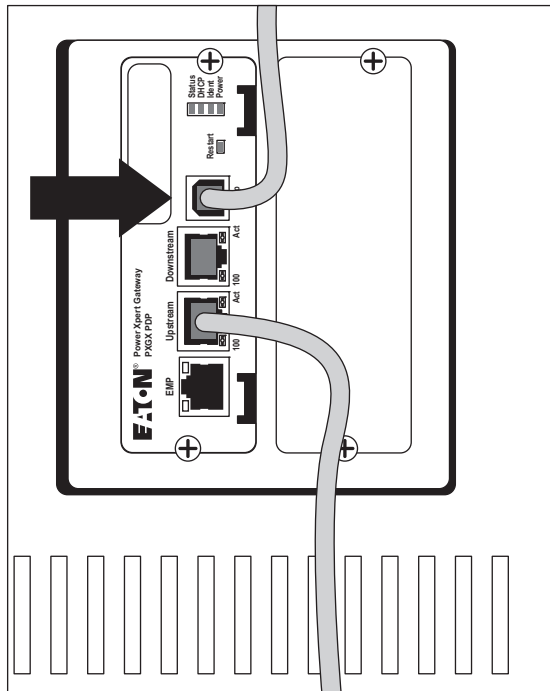


**Figure 3. Secure the Card and Install the Ethernet Cable**

## Connecting the Card to the Computer

To connect the card to the computer and start the configuration:

1. Go to [www.eaton.com/pxgx](http://www.eaton.com/pxgx) and download the powerxpert.inf file. Note the location of the file.
2. Plug the supplied USB cable into the Setup port on the card (see Figure 4).



**Figure 4. Install the USB Cable**

3. Plug the other end of the USB cable into the USB port on the computer. The Windows operating system detects new hardware.

4. The steps for installing the USB driver software are determined by the type of operating system running on your computer:
  - For Windows XP, go to Step 5.
  - For Windows 7, go to Step 6.
5. The Found New Hardware Wizard – Welcome window opens (see Figure 5). Continue to “Installing the USB Driver Software (Windows XP)” on page 8.



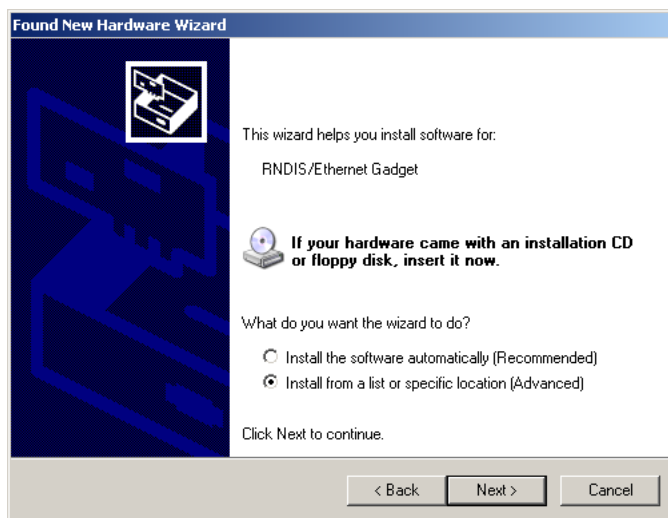
**Figure 5. Found New Hardware Wizard – Welcome Window**

6. If a message displays indicating that the device driver software was not successfully installed, click **Ignore**.
7. Continue to “Installing the USB Driver Software (Windows 7)” on page 13.

## Installing the USB Driver Software (Windows XP)

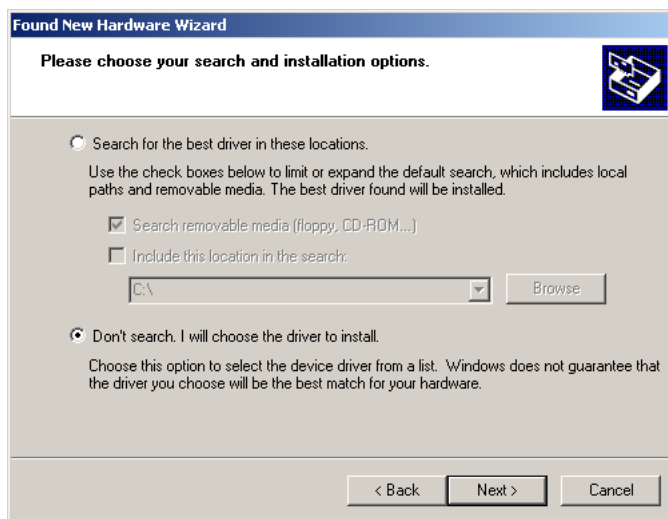
To install the USB driver software on a computer running Windows XP:

1. Select **No, not this time** and click **Next**. The Found New Hardware Wizard – Install Software window opens (see Figure 6).



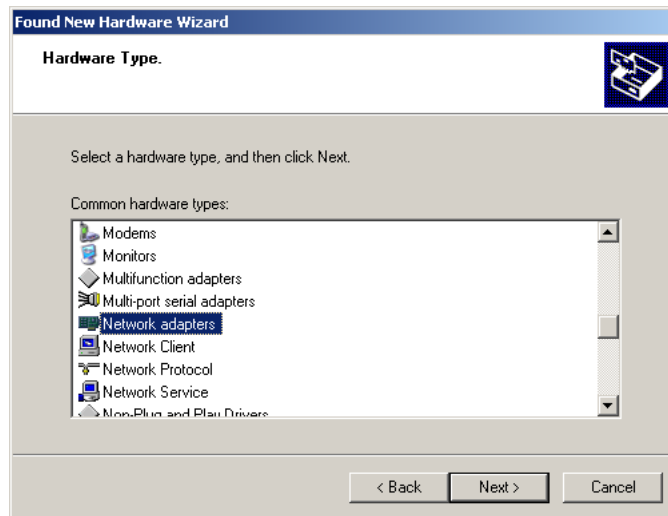
**Figure 6. Found New Hardware Wizard – Install Software Window**

2. Select **Install from a list or specific location (Advanced)** and click **Next**. The Found New Hardware Wizard – Installation Options window opens (see Figure 7).



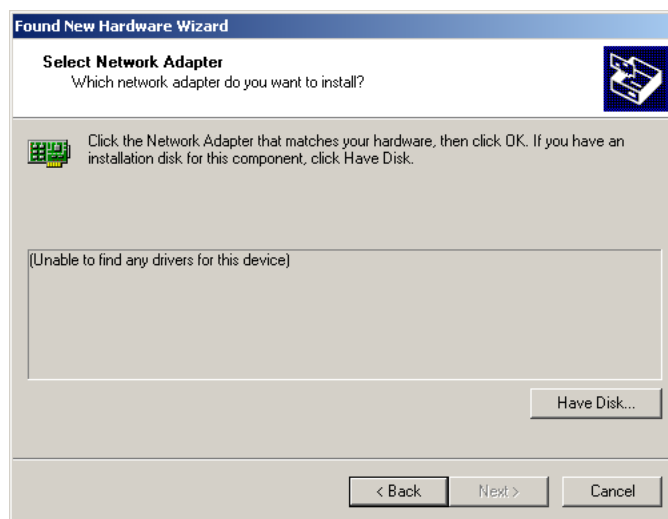
**Figure 7. Found New Hardware Wizard – Installation Options Window**

3. Select **Don't search. I will choose the driver to install.** and click **Next.** The Found New Hardware Wizard – Hardware Type window opens (see Figure 8).



**Figure 8. Found New Hardware Wizard – Hardware Type Window**

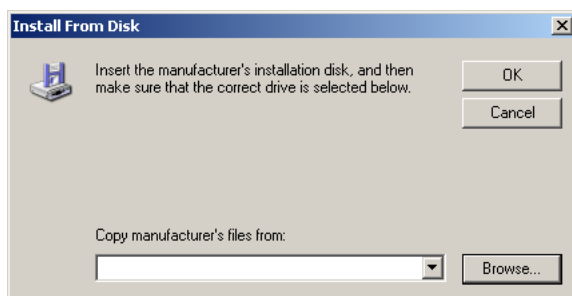
4. Select **Network adapters** and click **Next.** The Found New Hardware Wizard – Select Network Adapter window opens (see Figure 9).



**Figure 9. Found New Hardware Wizard – Select Network Adapter Window**

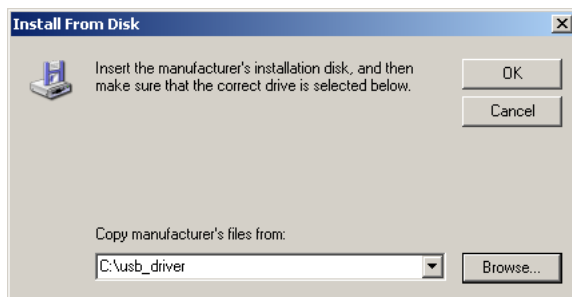
5. Select **Have Disk**. The Install From Disk window opens (see Figure 10).

**Note:** Disregard the instruction to insert the manufacturer's installation disk in the window. The driver is installed from the powerxpert.inf file downloaded in "Connecting the Card to the Computer" on page 6.



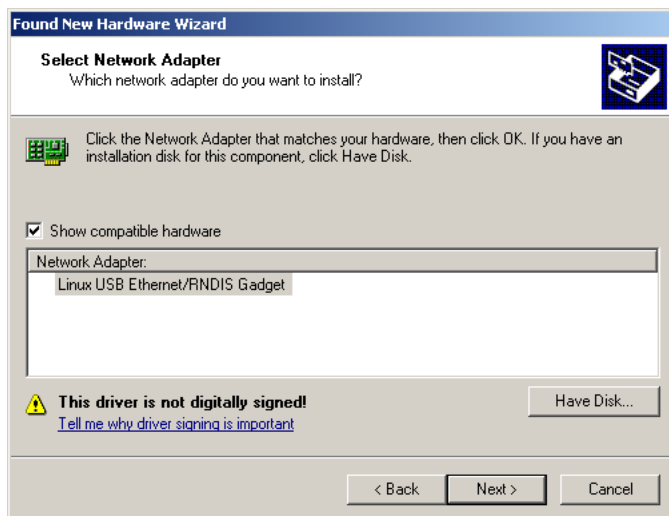
**Figure 10. Install From Disk Window**

6. Click **Browse**. The Locate File window opens.
7. Go to the folder containing the powerxpert.inf file that you downloaded in Step 1 of "Connecting the Card to the Computer" on page 7.
8. Select **powerxpert.inf** and click **Open**. The folder containing the powerxpert.inf file displays in the **Copy manufacturer's file from** box (see Figure 11).



**Figure 11. Install From Disk Window**

9. Click **OK**. The Network Adapter displays in The Found New Hardware Wizard – Select Network Adapter window (see Figure 12).



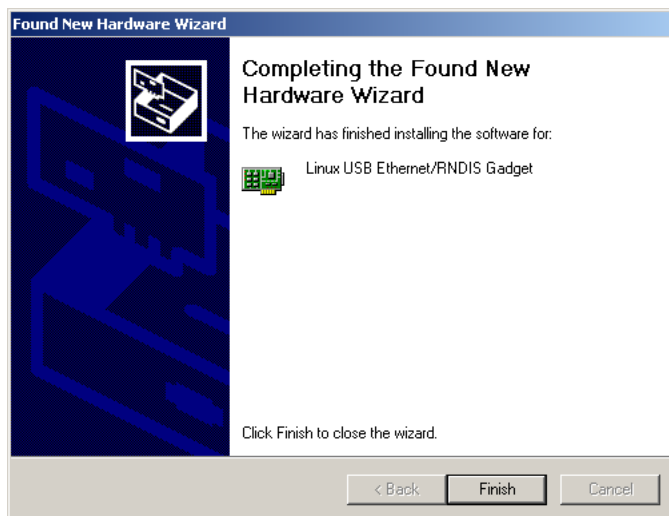
**Figure 12. Found New Hardware Wizard – Select Network Adapter Window**

10. Select **Linux USB Ethernet/RNDIS Gadget** and click **Next**.
11. If the caution message shown in Figure 13 displays, click **Continue Anyway**.



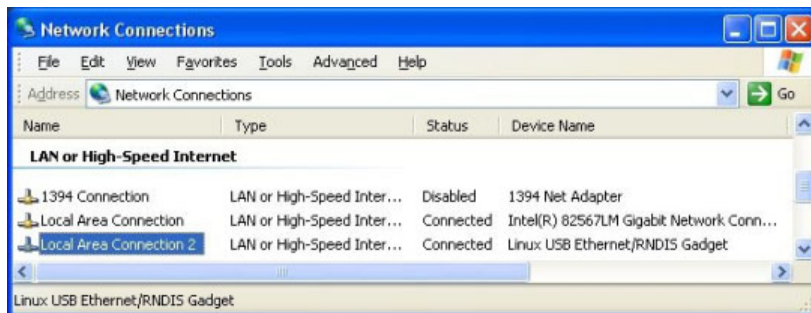
**Figure 13. Caution Message**

12. The wizard installs the software for the USB driver. The Found New Hardware Wizard – Completing the Found New Hardware Wizard window opens (see Figure 14).



**Figure 14. Found New Hardware Wizard – Completing the Found New Hardware Wizard Window**

13. Click **Finish** to close the wizard.
14. Open the Network Connections window to verify that the installation was successful (see Figure 15). If “Linux USB Ethernet/RNDIS Gadget” is listed in the Device Name column, the USB driver has been successfully installed.



**Figure 15. Network Connections Window**

15. To verify the IP address assigned through DHCP, continue to “Verifying IP Addresses” on page 17.
16. To manually enter a fixed IP address for the card’s network connection, continue to “Assigning an IP Address” on page 19.

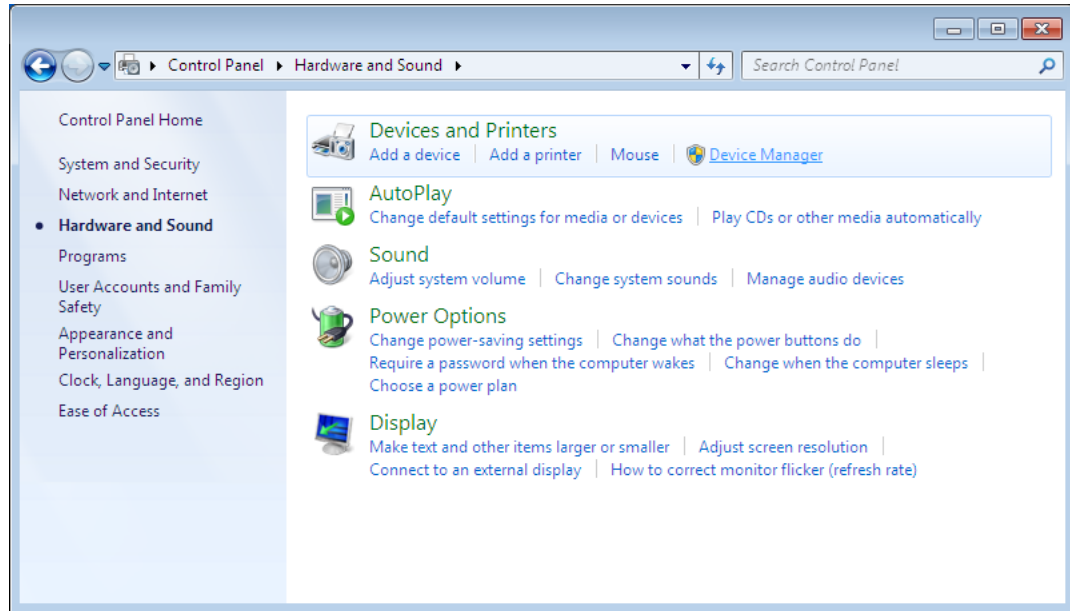
**Note:** By default, the PXGX PDP Card requests an IP address through DHCP when the card is connected to a network.



## Installing the USB Driver Software (Windows 7)

To install the USB driver software on a computer running Windows 7:

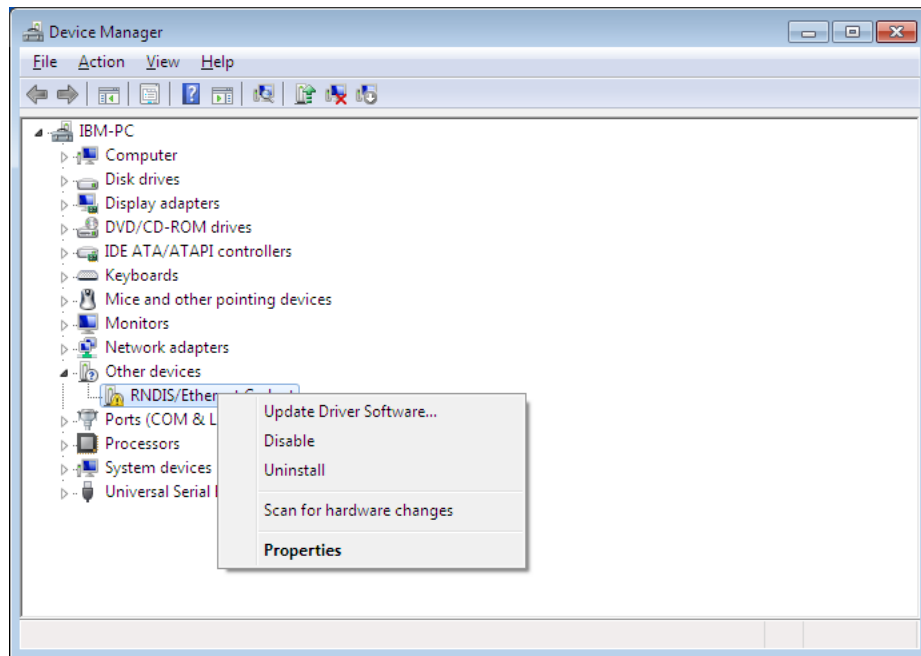
1. Open the Control Panel and select **Hardware and Sound > Devices and Printers** (see Figure 16).



**Figure 16. Control Panel Window – Hardware and Sound**

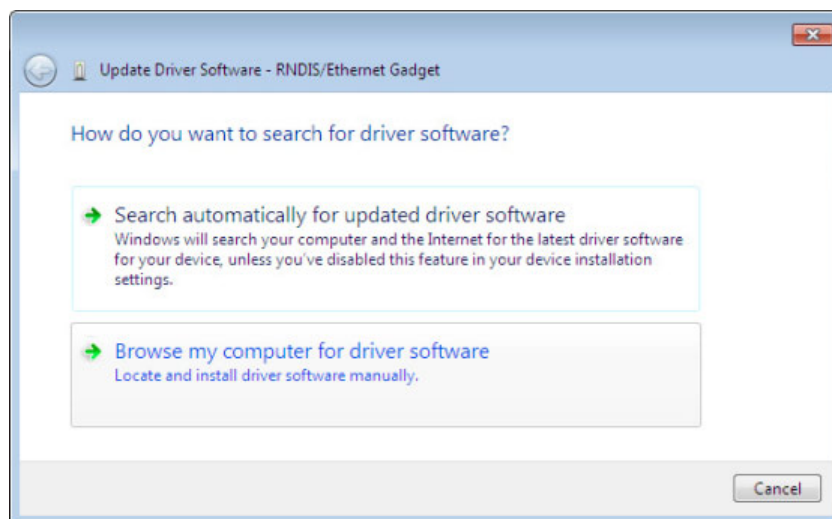
2. Select **Device Manager** to open the Device Manager window.

3. Expand **Other devices** and select **RNDIS/Ethernet Gadget** (see Figure 17).
4. Right-click and select **Update Driver Software**.



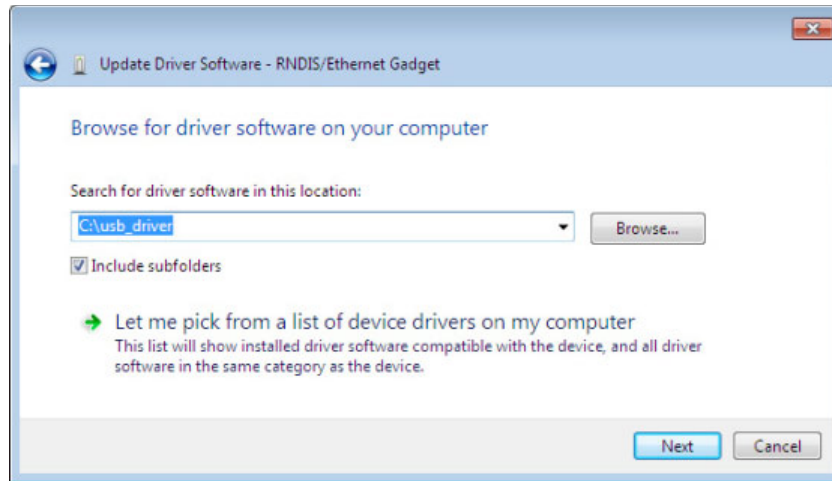
**Figure 17. Device Manager Window**

5. Select **Browse my computer for driver software** (see Figure 18).



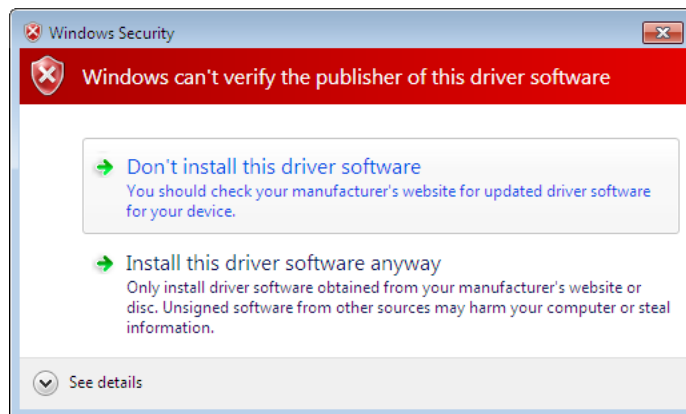
**Figure 18. Update Driver Software Window – Search Method**

6. Click **Browse**. The Locate File window opens.
7. Locate and select the folder containing the powerxpert.inf file that you downloaded in Step 1 of “Connecting the Card to the Computer” on page 7.
8. Click **Open**. The folder displays in the **Search for driver software in this location** box (see Figure 19).



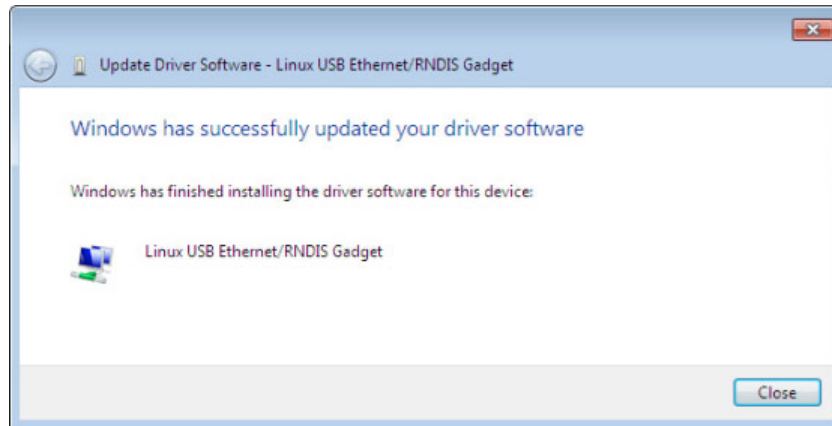
**Figure 19. Update Driver Software Window – Browse for Driver Software**

9. Click **Next**.
10. If the message “Windows can't verify the publisher of this driver software” displays, select **Install this driver software anyway** (see Figure 20).



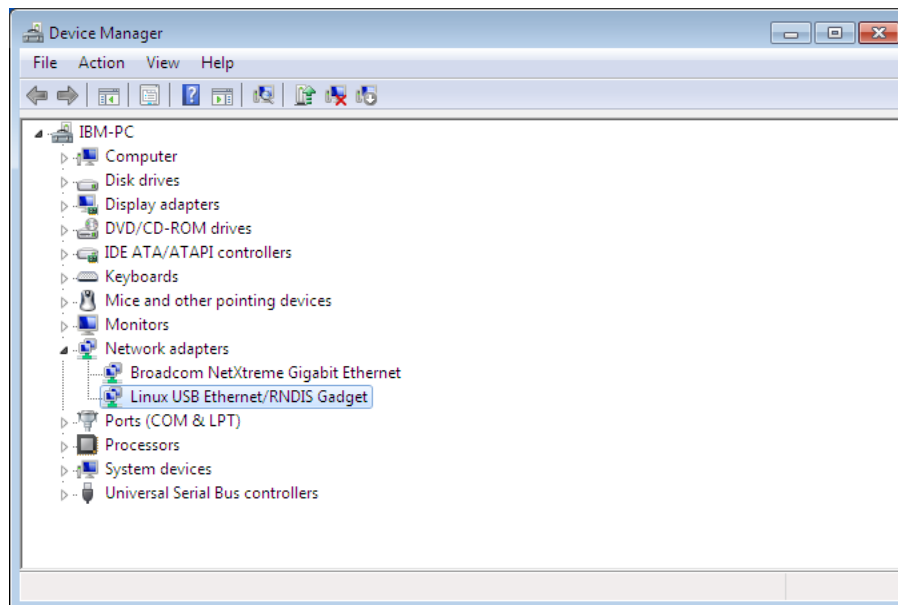
**Figure 20. Windows Security Message**

11. The message “Windows has successfully updated your driver software” displays (see Figure 21).



**Figure 21. Update Driver Software Window – Update Successful**

12. To verify the device is installed:
  - a. Go to **Control Panel > Hardware and Sound > Devices and Printers > Device Manager**.
  - b. Expand **Network adapters**.
  - c. Verify that **Linux USB Ethernet/RNDIS Gadget** is listed under Network adapters (see Figure 22).



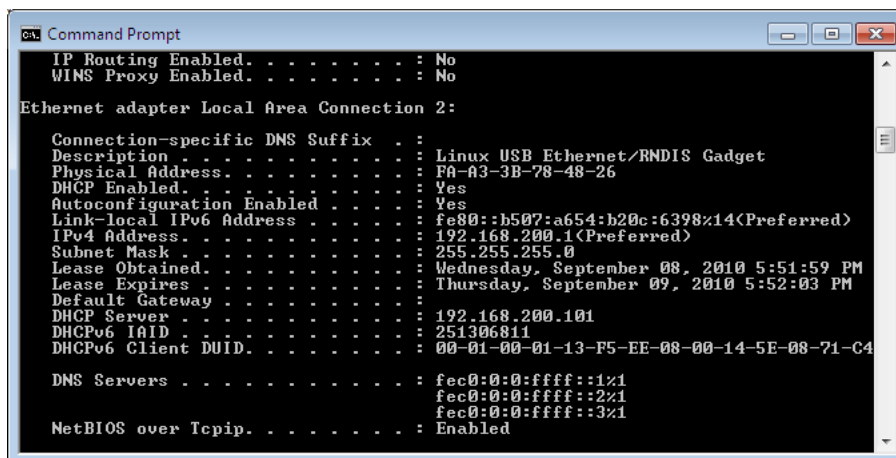
**Figure 22. Device Manager Window – Verify Device Installation**

13. From the **Start** menu, go to **All Programs > Accessories > Command Prompt** to open a Command Prompt window.

14. Enter **ipconfig /all**.

The adapter IP addressing information displays. Verify that the assigned IPv4 address is in the 192.168.200.x range (where “x” is typically “1”). See Figure 23.

The USB driver software installation is complete.



```

c:\> Command Prompt
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No

Ethernet adapter Local Area Connection 2:

    Connection-specific DNS Suffix  . : 
    Description . . . . . : Linux USB Ethernet/RNDIS Gadget
    Physical Address. . . . . : FA-A3-3B-78-48-26
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes
    Link-local IPv6 Address . . . . . : fe80::b507:a654:b20c:6398%14(Preferred)
    IPv4 Address. . . . . : 192.168.200.1(Preferred)
    Subnet Mask . . . . . : 255.255.255.0
    Lease Obtained. . . . . : Wednesday, September 08, 2010 5:51:59 PM
    Lease Expires . . . . . : Thursday, September 09, 2010 5:52:03 PM
    Default Gateway . . . . . : 
    DHCP Server . . . . . : 192.168.200.101
    DHCPv6 IAID . . . . . : 251306811
    DHCPv6 Client DUID. . . . . : 00-01-00-01-13-F5-EE-08-00-14-5E-08-71-C4

    DNS Servers . . . . . : fec0:0:0:ffff::1%1
                           fec0:0:0:ffff::2%1
                           fec0:0:0:ffff::3%1
    NetBIOS over Tcpip. . . . . : Enabled
  
```

**Figure 23. Command Prompt Window – Adapter IP Address Information**

## IP Address Assignments

Many IT managers prefer the convenience of DHCP for managing the IP addresses of networked devices. With DHCP, IT managers can easily reassign IP addresses as the network structure changes. In some cases, DHCP may not be available, or fixed IP addresses may be preferred for the PXGX PDP Card (for example, if some other networked device needs to reach the card at a fixed address).

To verify the IP addresses assigned through DHCP, continue to “Verifying IP Addresses.” To manually enter fixed IP addresses for the card's network connection, continue to “Assigning an IP Address” on page 19.

**Note:** By default, the PXGX PDP Card requests an IP address through DHCP when connected to a network.

### Verifying IP Addresses

To verify the IP address assignment:

1. Connect to the card over the USB cable:
  - a. Open your Web browser.
  - b. Enter: **http://192.168.200.101**  
You are prompted to log on.
2. Log on as administrator. The user name and default password is **admin**. The PXGX PDP Card Web page displays.
3. Select **Network** from the Configuration menu. The Network page displays (see Figure 24).

The screenshot displays the Eaton Power Xpert Gateway PDP Card Network configuration page. The browser window title is "Eaton Power Xpert Gateway PDP Card - Windows Internet Explorer" and the address bar shows "http://10.222.49.71/corbertk/". The page header includes the Eaton logo, the text "Power Xpert GATEWAY", and the date/time "11/15/2010 19:13:37 UTC".

The left sidebar contains a "Menu" with sections for "Device Data", "Open Alarms", "Logs", "Configuration (8)", and "Documentation". The "Configuration (8)" section is expanded to show "Essential Configuration Tasks" with sub-items: "Access Control", "Network", "Date/Time", "Environmental Monitoring Probe", "Email", "Modbus TCP", "SNMP", "EMS", "Save and Restore", "Firmware", and "Log on as 'user'".

The main content area is titled "Overview" and "Network". It contains the following sections:

- System Information:**
  - System location: Your Location
  - System contact: Your Contact
- Network:**
  - MAC: 00:20:85:FC:08:5D
  - IPv4:**
    - Automatic Configuration: DHCP Enabled:  DHCP Lease Obtained: Yes
    - Manual Configuration:**
      - IP Address: 10.222.49.71
      - Netmask: 255.255.252.0
      - Gateway: 10.222.51.254
    - IPv6:**
      - Gateway:
      - Link-Local Address: fe80::220:85ff:fc:85d/64
      - Automatic Address: 2002:c0a8:1010:220:85ff:fc:85d/64
      - Static Address:
  - Name Service Settings:**
    - Use DHCP (when enabled) to get name servers:
    - Name Server #1: 10.222.48.1
    - Name Server #2: 10.222.1.80
    - Name Server #3: 151.110.50.117
    - Use DHCP (when enabled) to get domain name:
    - Domain: raleigh.software.ch.eaton.co
    - Hostname:
  - Actions:**
    - Ping Test: [input] [Test]
    - HTTP Get Test: http:// [input] [Test]
    - Reboot Network card: [Reboot Now]

At the bottom of the configuration area are "Apply" and "Discard" buttons. The status bar at the bottom of the browser shows "Local intranet" and "100%" zoom.

Figure 24. PXGX PDP Card Network Page

4. Verify that the network settings match those on the “Installation Checklist” on page 2. If you are manually configuring the network settings, go to “Assigning an IP Address” on page 19.
5. Verify network communication:
  - a. Clear the **DHCP Enabled** check box. The text fields that were dimmed in the Manual Configuration section are now available.
  - b. Copy the IP address.
  - c. Open a second browser and paste the IP address in the Address bar and click **Go**. If the assigned IP address is working, you will be prompted to log on.
  - d. Log on as administrator. The user name and default password is **admin**. The PXGX PDP Card Web page displays.

### Assigning an IP Address

To manually enter a fixed IP address for the card:

1. Open your Web browser and enter: **http://192.168.200.101/**. You are prompted to log on.
2. Log on as administrator. The user name and default password is **admin**. The PXGX PDP Card Web page displays.
3. Select **Network** from the Configuration menu. The Network page displays (see Figure 24 on page 18).
4. Clear the **DHCP Enabled** check box to enable manual configuration.
5. Enter the IP, Netmask, and Gateway addresses in the Manual Configuration section and click **Apply**.
6. Click **OK** to confirm.
7. If you will be using a host name, or host names, for controlling access to the card, type the server IP address in the Name Server field. Up to three IP addresses can be entered.
8. Click **Apply**.
9. Click **OK** to confirm.
10. Verify network communication:
  - a. Copy the IP address you entered in Step 5.
  - b. Open a second browser and paste the IP address in the Address bar and click **Go**. You are prompted to log on.
  - c. Log on as administrator. The user name and default password is **admin**. If the if the PXGX PDP Card Web page displays, the fixed IP Address is correct.
11. If you logged on as administrator, continue to “Network Configuration” or Chapter 3, “Configuring the Card” on page 23 for additional configuration options.

**Note:** You must be logged on as **admin** to configure the card. To prevent unauthorized access after you are done configuring the card, close the browser or log off as **admin**. To log off as **admin**, select **Log on as 'user'** from the Configuration menu. Logging on as user sets the security level to read-only.

## IPv6 Address Assignments

There are three sets of IPv6 addresses that can be assigned to the card:

- **Gateway.** Manually assigned IPv6 Gateway address.
- **Link-Local Address.** The Link-Local Address is a permanent address assigned to the card.
- **Automatic Address.** This address only displays if the card is connected to a network router that supports stateless address autoconfiguration.
- **Static Address.** Manually assigned fixed IPv6 address.

**Note:** Only the Gateway and Static addresses are user-configurable. The Link-Local and Automatic addresses are automatically populated.

**Note:** Dynamic Host Configuration Protocol for IPv6 (DHCPv6) is not supported.

To manually enter a fixed IP address for the card:

1. Open your Web browser and enter: **http://192.168.200.101/**. You are prompted to log on.
2. Log on as administrator. The user name and default password is **admin**. The PXGX PDP Card Web page displays.
3. Select **Network** from the Configuration menu. The Network page displays (see Figure 24 on page 18).
4. Enter the Static and Gateway addresses in the IPv6 section.
5. Click **Apply**.
6. Click **OK** to confirm.



## Network Configuration

If you know the card's IP address, you can configure the network settings from the card's Web page. To configure the network settings:

1. Open a Web browser, type the IP address of the card, and select **Go**.
2. Log on as administrator. The user name and default password is **admin**.

The PXGX PDP Card's initial page displays (see page 21).

The screenshot shows the web interface of an Eaton Power Xpert Gateway PDP Card. The browser window is titled "Eaton Power Xpert Gateway PDP Card - Windows Internet Explorer". The address bar contains the text "Enter the card's IP address here." which is circled in red. The page header includes the Eaton logo and the text "Power Xpert GATEWAY" and "EATON". The date and time "11/18/2010 01:13:45 UTC" and "Your Location" are also visible. The left sidebar contains a "Menu" with options like "Device Data", "Power Xpert Gateway Card", "EATON EMS-UGK", "Environmental Monitoring Prob", "Open Alarms", "Log", "Configuration (6)", and "Documentation". The main content area is titled "Overview" and shows "Input" data for "Panel 1". The "Input" section includes fields for Input 1 VA (0 volt-amperes), Input 1 Watts (0 watts), Input 1 Demand Energy (0 kilowatt-hours), Input 1 KW Hours (277939616 kilowatt-hours), Input 1 Monthly KW Hours (0 kilowatt-hours), and Input 1 Yearly KW Hours (0 kilowatt-hours). Below this is a "Summary" section for "EATON EMS-UGK" with sub-sections for Energy, Identification, Identification/General Information, Measure/Input 1, Measure/Status, and Power/Input 1. The "Energy" section shows Input 1 Demand Energy (0 kilowatt-hours), Input 1 KW Hours (277939616 kilowatt-hours), Input 1 Monthly KW Hours (0 kilowatt-hours), and Input 1 Yearly KW Hours (0 kilowatt-hours). The "Identification" section shows Display Name (EATON EMS-UGK), Mode Name (EATON EMS-UGK Single Input), and Serial Number (00000000C00000). The "Identification/General Information" section shows System VARating (20000 volt-amperes) and System Watts Rating (20000 watts). The "Measure/Input 1" section shows Input 1 Frequency (60 hertz), Input 1 Ia (0 amperes), Input 1 Ib (0 amperes), Input 1 Ic (0 amperes), and Input 1 In (0 amperes). The "Measure/Status" section shows System Status (On). The "Power/Input 1" section shows Input 1 VA (0 volt-amperes) and Input 1 Watts (0 watts).

**Figure 25. Initial Page – Device Overview and Summary**

3. Select **Network** from the Configuration menu to open the Network configuration page.
4. You can enable or disable DHCP control by selecting or clearing the check box. The default is **DHCP enabled**.
5. If you want the card to access other network servers (such as an SMTP server) by host name, type the server IP address in the **Name Server** field. Up to three IP addresses can be entered.

6. If you will be using Simple Network Management Protocol (SNMP), identify the physical location of the installed card in the **System location** field. This value also displays in the banner.
7. Enter the information to identify someone to contact with questions about this device in the **System contact** field. For example, you can type a person's name, phone number, department, e-mail address, or physical location.
8. You can also modify the card's IP address, the subnet mask, and the gateway address (**IP Address**, **Netmask**, and **Gateway** fields).
9. To test the card's network connection to other network servers, such as an SMTP server, you can ping (request acknowledgement from) the host. Enter the IP address or hostname in the **Ping test** field and then click **Test**.
10. Click **Apply** to save the settings or **Discard** to cancel the changes.
11. Continue to Chapter 3, "Configuring the Card" on page 23 for additional configuration options.

### Important Security Information

By default, the PXGX PDP Card is configured to prevent unauthorized SNMP and Modbus TCP access by computers that are not on the Trusted IPs/Hostnames list.

If you are using SNMP or Modbus TCP, see "Changing SNMP Access" on page 27 to add specific IP addresses or host names of trusted computers.

## Chapter 3 Configuring the Card

**Note:** If DHCP is disabled and you will be using host names for servers, such as the mail server, Network Time Protocol (NTP) server, SNMP hosts, Modbus/TCP hosts, or trap recipients, enter the IP address of your network Name Server (see “Network Configuration” on page 21).

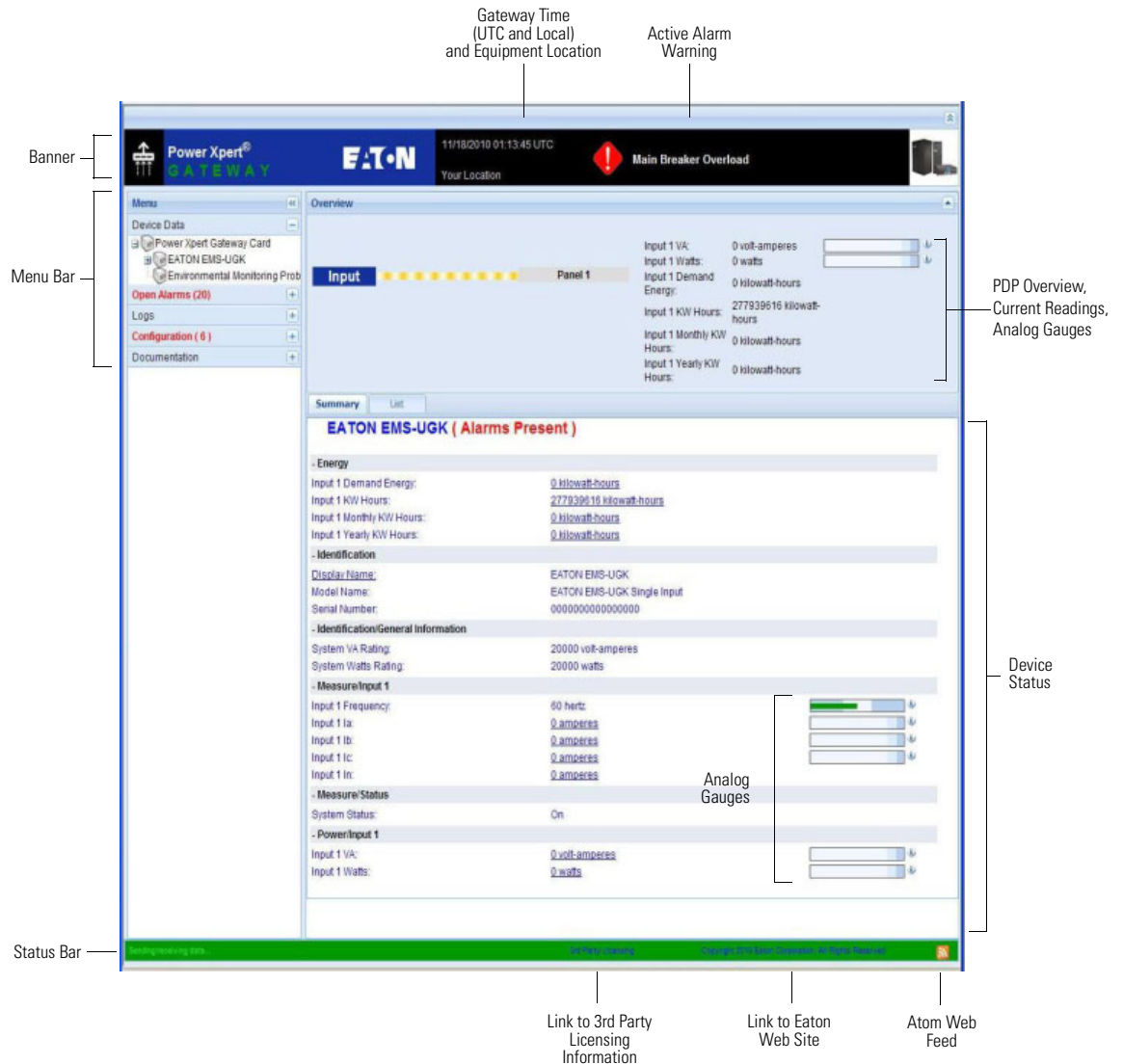
**Note:** You must be logged on as **admin** to configure the card. To prevent unauthorized access after you are done configuring the card, close the browser or log off as **admin**. To log off as **admin**, select **Log on as 'user'** from the Configuration menu. Logging on as user sets the security level to read-only.

This section explains:

- † Navigating the card's Web page
- † Identifying monitored equipment
- † Configuring essential tasks
- † Changing the passwords
- † Setting the date and time
- † Configuring SNMP options and managing from an SNMP Network Management System (NMS)
- † Configuring Modbus TCP/IP options
- † Configuring the Energy Management System (EMS)
- † Configuring HTTP and HTTPS
- † Configuring e-mail notification
- † Configuring the Environmental Monitoring Probe (EMP)
- † Saving and restoring configuration settings

## Navigating the Card's Web Page

Figure 26 shows an example of the overview page that displays when you log on to the card's interface.



**Figure 26. Navigating the Card's Web Page**

Areas and features of the card's Web page:

- 1 **Banner.** The page banner displays the gateway time in UTC (Coordinated Universal Time). The local time and system location can be configured to also display in the banner.

If there is an active alarm in the hardware, a flashing alarm icon with an alarm message displays in the banner. Click the alarm message in the banner to display the Open Alarms page.

The highest level of an alarm active in the PDP displays as follows:

- 1 Red for critical
- 1 Yellow for caution
- 1 Blue for acknowledged, but not closed (still alarming)

**Note:** An active alarm is different from an open alarm:

- **Active Alarm.** An alarm is active when an alarming condition exists in the PDP. Messages display on the PDP LCD panel and on the card interface banner when alarms go active and disappear when the alarming condition clears.
- **Open Alarm.** When an alarm goes active, it is also considered open and remains open (even after the condition clears in the PDP hardware) until it is closed by an operator. Operators are required to close alarms to ensure they are seen. While the PDP LCD panel and the card interface banner display the alarms that are active in the PDP, other areas of the card interface, (such as the Open Alarms page, device data pages, and the alarm log), display any alarms that have not been closed by the operator. Since closing an alarm that is still active in the hardware quickly results in the generation of a new alarm, an operator has the option to mark an alarm as acknowledged to indicate it has been seen.

To close or acknowledge an open alarm, see “Open Alarms” on page 35.

- **Menu Bar.** The menu bar contains links to additional pages for status information and configuration options. Menus are expandable and collapsible. The Device Data menu is expanded when you first log on. If an alarm is active, the Open Alarms menu category turns red and the number of open alarms displays in parenthesis, so that alarms are never hidden even if the menu is collapsed. Use the menu bar to move through the card's Web pages.
- **Analog Gauges.** Analog gauges display on the Overview and Device Data pages next to metered items that have a set minimum and maximum value.  
  
The gauge is green for the normal operating range (white background) and gradually changes to yellow and then red as it moves to the caution range (light blue background) to critical (darker blue background).  
  
Pause the pointer over the information icon to display numerical limits.
- **Overview.** The Overview displays a functional status diagram of the PDP. The animated yellow line shows the direction of the energy flow. To the right of the diagram, a list of the most relevant current readings displays. The List tab page displays a complete list of current readings.
- **Summary Tab.** The Summary tab page displays essential data most often used to determine the overall status of the device. Alarms display in red text. Pause the pointer over items for additional detail or help.
- **List Tab.** The List tab page displays an expanded list of configurable and measureable items and alarms. The categories on the List tab page are expandable and collapsible. Alarms display in red text. Pause the pointer over items for additional detail or help.
- **Atom Web Feed.** The card supports Atom Syndication Format (Atom) for Web feeds. The orange Atom icon is in the status bar. Click the Atom Feed icon to view new content or subscribe to the Power Xpert Gateway PXGX PDP Card feed data. Some browsers also display the Atom Feed icon in the address bar.
- **3rd Party Licensing link.** The 3rd Party Licensing link in the status bar directs you to a list of all licenses used with the PXGX PDP Card. Each listing links to the full license text.

## View and Configure Tasks Essential to Initial Configuration

The Essential Configuration Tasks page provides a summary of important tasks relating to the card's initial setup and configuration. If essential tasks have not been configured, the Configuration category on the menu bar displays in red along with the number of unconfigured essential tasks. Other unconfigured tasks display in blue on the Essential Configuration Tasks page.

To configure essential tasks:

1. Select **Essential Configuration Tasks** from the Configuration menu.  
  
The Essential Configuration page displays. Unconfigured tasks have links to the associated configuration page. Configured tasks are identified as “Ok.”
2. Click the link for the task you want to configure. The associated configuration page displays.
3. Complete the configuration and click **Apply**.

**Note:** Refer to the related procedure in this user's guide for detailed instructions on completing the task.

## Changing the Passwords

The user name and default password is **user** for read-only privileges. The user name and default password is **admin** for configuration (read/write) options. The characters in the password fields appear as asterisks (\*).

To change the passwords:

1. Click **Access Control** from the Configuration menu.  
The Access Control Configuration page displays with the password fields.
2. To change the user password, enter the new password twice (replace existing asterisks) in the **Password for the 'user' account** fields.  
To change the admin password, log on as **admin** and enter the new password twice (replace existing asterisks) in the **Password for the admin account** fields.
3. Click **Apply** and then **OK** to save the settings. The logon prompt displays.
4. Log on to the card using the new password.

**Note:** You must be logged on as **admin** to configure the card. To prevent unauthorized access after you are done configuring the card, close the browser or log off as admin. To log off as admin, select **Log on as 'user'** from the Configuration menu. Logging on as user sets the security level to read-only.

## Setting the Date and Time

The PXGX PDP Card can be configured to synchronize the date and time with one or more NTP servers, or the date and time can be manually set. In addition, the temperature unit of measure can be set to display as Fahrenheit or Celsius. Changes made to these fields are updated everywhere they appear.

**Note:** All date and time selections are automatically converted to Coordinated Universal Time (UTC).

To set the date and time, and temperature unit of measure:

1. Select **Date/Time** from the Configuration menu.  
The default is to synchronize the date and time from the PC clock.
2. To synchronize the card with Network Time Protocol servers, select **Synchronize with NTP server(s)** and type the IP addresses or host names. You can synchronize the card with up to three NTP servers.

The NTP status displays as one of the following:

- **Not running** – Indicates that NTP is not running.
- **Started, not synchronized** – Indicates that NTP is running, but is not yet synchronized with an NTP server or controlling the local clock.
- **Synchronizing with NTP server** – Indicates that NTP has synchronized with the local clock, but is not yet synchronized with an NTP server.
- **Synchronized to XX, NTP stratum YY** – Indicates that the card is synchronized with an NTP server at IP address XX that is operating at NTP Stratum YY.

**Note:** When using host names, verify that the IP address of your network DNS Server is configured (see “Network Configuration” on page 21).

**Note:** When NTP status is Synchronized and there is a large discrepancy between the PXGX PDP Card time and the actual time, it may take 5–30 minutes for NTP to reset the card to the proper time.

3. To set the time manually, select **Set date/time manually** and type or select the local date in mm/dd/yyyy format and the local time in hh/mm/ss format.
4. To customize how the date displays in the card's data and event logs, select a **Date format for logs** option (mm/dd/yyyy, dd/mm/yyyy, yyyy-mm-dd, or dd mmm yyyy). The default is mm/dd/yyyy.
5. To select the time zone for the card, specify the **Time zone for logs, email, and connected device**.
6. To specify how the temperature displays on the Web page, select **Fahrenheit** (default) or **Celsius**.

7. Click **Apply** and then **OK** to save the settings.
8. Refresh the Web page to view the updated formats.

## Configuring SNMP Options

This section describes the following SNMP configuration options:

- Configuring community strings and trap recipients
- Restricting SNMP access
- Setting system location and system contact
- Managing from an SNMP NMS

### Community Strings and Trap Recipients

The PXGX PDP Card supports several event-related traps that can be reported to the SNMP network management software. See Chapter 6, “MIB Files” on page 52 for more information.

To configure the SNMP options:

1. Select **SNMP** from the Configuration menu.
2. SNMPv1 and SNMPv3 are supported and both versions are enabled by default. To modify, clear the check box for the version to be disabled. The fields associated with the disabled version become unavailable (dimmed).
3. For SNMPv1 configuration, type a new community string in the appropriate field to change the community strings.

The default community strings are **public** for read-only, **private** for read-write.

4. For SNMPv3 configuration, enter a new read-only username and password and read-write username and password in the appropriate fields. Passwords for SNMPv3 must be at least 8 characters long.
5. To modify the **Trap recipient community** string field, type a new name. The default is “public”.
6. Click **Add** to add a new trap recipient entry to the list. The Recipient field populates with the next available number.
7. Enter the trap recipient IP address or host name in the **IP/hostname** field.

**Note:** When using host names, verify that the IP address of your network DNS Server is configured (see “Network Configuration” on page 21).

8. Click **Apply** and then **OK** to save the settings.

**Note:** Select the Recipient drop-down menu to view all assigned trap recipients,

9. Repeat Steps 6 through 8 for each additional trap recipient.
10. To remove a trap recipient:
  - a. Click **Delete Last**.
  - b. Click **OK** when prompted to remove the settings for the trap recipient entered last.

### Changing SNMP Access

The default is to limit access to the card to trusted SNMP NMS hosts only.

To allow access that is unrestricted by hostname (though still qualified by community names or SNMPv3 passwords):

1. Select **Access Control** from the Configuration menu.
2. Clear the check box for **SNMP access restricted by IP/hostname**.
3. Click **Apply** and then **OK** to save the settings.

To add a host to the Trusted Host List for restricted access:

1. Select **Access Control** from the Configuration menu.
2. Verify that the check box for **SNMP access restricted by IP/hostname** is selected.
3. Type the trusted NMS host's IP addresses or host names, separated by a semicolon, in the **Trusted IPs/hostnames** field.

**Note:** When using host names, verify that the IP address of your network DNS Server is configured (see "Network Configuration" on page 21).

4. Click **Apply** and then **OK** to save the settings.

### **System Location and System Contact**

To set the system location and system contact:

1. Select **Network** from the Configuration menu.
2. Enter the physical location of the installed PDP in the **System location** field. This value also displays on the card's Web page banner.
3. Enter the information to identify someone to contact with questions about this device (sysContact string) in the **System contact** field. For example, type a person's name, phone number, department, e-mail address, physical location, or combination of these items, such as "John Smith x123."
4. Click **Apply** and then **OK** to save the settings.



### Management from an SNMP NMS

To access the PXGX PDP Card using SNMP:

1. Verify that the NMS is configured for the correct community strings or SNMPv3 user names and passwords, as shown on the SNMP Web page. See “Community Strings and Trap Recipients” on page 27.
2. Verify that the NMS is a Trusted Host, or that your PXGX PDP Card is configured for unrestricted SNMP access on the Access Control Configuration Web page. See “Changing SNMP Access” on page 27.
3. Select the **MIB Files** folder from the **Documentation** menu (or visit [www.eaton.com/powerxpert](http://www.eaton.com/powerxpert)) for the following MIB files for the PXGX PDP Card:

MIB Name	Filename	Description
Eaton PDU MIB	EATON-PDU-MIB.txt	Meters available from the PDP, including identification, input, output, configuration, tests, alarms, bypass, traps, panel data, and circuit breaker data
Eaton EMP MIB	EATON-EMP-MIB.txt	Meters and settings for the EMP
Eaton Power Meter MIB	EATON-PWR-MIB.txt	Meters for: <ul style="list-style-type: none"> <li>▸ Power quality</li> <li>▸ Real-time measures of voltage, currents, and power</li> <li>▸ Minimum, average, and maximum measures for voltage, currents, frequency, and power factor</li> <li>▸ Energy measures and power demand</li> </ul>
Eaton PowerChain Device MIB	EATON-PCD-MIB.txt	Provides commonly supported voltage, current, frequency, and percent load measures, as well as digital inputs/outputs and generic sensor readings for PowerChain devices.
Eaton Alarms+Traps MIB	EATON-PXG-MIB.txt	Alarms and notifications (traps)
Eaton Object Identifier (OID) assignments	EATON-OIDS.txt	Base document for all OID assignments for Eaton's MIBs
RFC 4133 Entity MIB	ENTITY-MIB.txt	Identification and description of each device attached to the card
RFC 4268 Entity State MIB	ENTITY-STATE-MIB.txt	Five availability status meters for each device attached to the card
RFC 4268 Entity State MIB Part 2	ENTITY-STATE-TC-MIB.txt	Possible state values for the Entity State MIB

4. Add these files to the MIB database of your SNMP management software (such as HP OpenView™ and IBM® Systems Director).
5. Use the facilities provided by the SNMP management software to access the individual MIB objects. See Chapter 6, “MIB Files” on page 52 for more information.

### Configuring Modbus TCP/IP Options

To limit access to the card from trusted Modbus Transmission Control Protocol/Internet Protocol (TCP/IP) addresses only:

1. Select **Access Control** from the Configuration menu.
2. Select the **Modbus TCP access restricted by IP/hostname** check box.
3. Type the trusted host's IP addresses or host names, separated by a semicolon, in the **Trusted IPs/hostnames** field.

**Note:** When using host names, verify that the IP address of your network DNS Server is configured (see “Network Configuration” on page 21).

4. Click **Apply** and then **OK** to save the settings.

For information on Modbus registers, see Chapter 7, “Modbus Registers” on page 55. See “Returning Error Codes” on page 57 to change how error codes are returned.

## Configuring HTTP and HTTPS

To configure the ports for Hypertext Transfer Protocol (HTTP) and HTTP over Secure Socket Layer (HTTPS):

1. Select **Access Control** from the Configuration menu.
2. Type the TCP port number for HTTP in the **HTTP port** field (the default is 80).
3. Type the TCP port number for HTTPS in the **HTTPS port** field (the default is 443).
4. To require a secure connection to the card, select the **Require HTTPS** check box.
5. Click **Apply** and then **OK** to save the settings.

## Configuring the Energy Management System (EMS)

Use the Configuring EMS option to enter panel settings and save them easily to the PDP instead of configuring through the front panel display.

To configure the EMS:

1. Select **EMS** from the Configuration menu.
2. Select a panel number and click **Retrieve**.  
The data from the PDP displays in a panel map.
3. Enter a panel name and specify the percentage of the rating to cause a warning and the percentage of the rating to cause an alarm.
4. **PDU/RPP only.** The odd numbered breakers display to the left and the even numbered breakers display to the right. The phases for each breaker are also displayed.

(Optional) Name the breakers for easy identification. The breaker names are saved on the PXGX PDP Card, but they are not supported on the LCD panel of the hardware.

In the Ganging column, select the type of breaker installed. Select **0 of 0** if the breaker is not configured. Select **1 of 1** for a single-pole breaker, **1 of 2** for a two-pole breaker, or **1 of 3** for a three-pole breaker. The fields automatically update for multi-phase breakers.

Set the rating for each breaker, set the limits for warnings and alarms based on a percentage of the rating, and set the CT (current transformer) ratio.

5. **RPM only.** The breakers display in a vertical column. The phases for each breaker are also displayed.

(Optional) Name the breakers for easy identification. The breaker names are saved on the PXGX PDP Card, but they are not supported on the LCD panel of the hardware.

Set the limits for warnings and alarms based on a percentage of the rating and set the CT ratio.

**Note:** If you make a mistake, click **Retrieve** again to restore the original values. The values are not saved until you click Apply and then OK to save the settings.

6. Click **Apply** and then **OK** to save the settings to the PXGX PDP Card.
7. If you are configuring several panels, click **Cancel** when prompted to send the configuration down to the EMS hardware. Repeat Step 2 through Step 6 for each panel.
8. After completing all panels, click **OK** when prompted to send the configuration down to the EMS hardware. The PXGX PDP Card transfers the panel data to the PDP. The transfer may take several minutes.

## Configuring E-Mail Notification

Use the PXGX PDP Card to inform selected e-mail accounts of events and changes in status as they occur in the PDP or to provide a status message at a predetermined time.

To configure e-mail notification:

1. Select **Email** from the Configuration menu.
2. Enter the IP address or host name of the **SMTP Server IP/hostname** (mail server) that will be used to send the e-mail messages.
3. If you need to enter a user name and password for the SMTP server:
  - a. Click **Advanced SMTP configuration**.  
If you have made changes to the Email page, a confirmation box opens. Click **OK** to save the settings; otherwise, click **Cancel**. The Advanced SMTP Configuration page displays.
  - b. Enter the user name and password in the **SMTP username** and **SMTP password** fields.
  - c. Specify a "from" e-mail address in the **SMTP From address** field (for example, PDU\_1@10.222.10.111).
  - d. Click **Apply** to save the e-mail settings.
4. Click **Test SMTP server connection** to test the configuration for the SMTP server. The SMTP Test Results window opens. Close the window when you are done viewing.

**Note:** If the SMTP test is successful, the confirmation displays immediately. A failed test response can take a longer to display. Close the window if you want to terminate the test.

5. Specify events to trigger an e-mail to be sent to all recipients:
  - a. Click **Configure** to open the Email Event Trigger Configuration page.
  - b. Select **Select All Unbatched**, **De-select All**, or select specific event check boxes to indicate which events are to be included for e-mail notification.
  - c. Click **Apply** and **OK** to save the settings.
  - d. Test the event e-mail function by selecting **Test Event Email**. A sample e-mail is sent for the first trigger event that is selected and saved.
  - e. Select **Email** in the Email folder to return to the Email configuration page.
6. To create a new recipient:
  - a. Select an unassigned number from the **Recipients** list.
  - b. Enter the recipient's e-mail address in the **To** field.
  - c. Click **Apply**. The e-mail address is added to the **Recipients** list.

**Note:** Up to ten recipients can be configured to receive event e-mail messages.

- To modify the options for a recipient, select the e-mail address from the **Recipients** list and select options for the recipient. See Table 1 for a description of options.

**Table 1. E-Mail Options for Receiving Event Notification**

Option	Description
Send on event active	Sends an e-mail message when an event occurs
Send on event clear	Sends an e-mail message when an event clears
Attach event log file to event emails	Attaches the event log to the event e-mail message (the log is always attached to status e-mail messages)
Attach interval log file to event emails	Attaches the interval log to the event e-mail message
Attach ID file to event emails	Attaches the identification files to the event e-mail message
Send periodic status emails	Sends periodic status e-mail messages
Days between periodic status emails	Sets the number of days between the periodic status e-mail messages
Time of day (gateway time) for periodic status email (HH:MM)	Set the time of day for periodic status e-mail messages to be send (in 24-hour format, PXGX PDP Card UTC time)

- Click **Apply** and then **OK** to save the settings.

**Note:** Apply changes before modifying or creating another e-mail recipient.

## Configuring EMP Settings

The optional Environmental Monitoring Probe (EMP) allows remote monitoring of the PDP's environment through regular measurements of temperature and humidity through two external contacts.

The EMP is connected to the EMP port directly on the card with a standard Ethernet cable. Recognition is automatic. The Environmental Monitoring Probe selection is added to the Device Data and Configuration menus of the Web interface.

To configure the EMP settings:

- Select Environmental Monitoring Probe from the Configuration menu.
- For Contact #1 and #2, enter the **Contact Description**, such as External Contact #1 and External Contact #2.
- For Contact #1 and #2, select the **Contact Type** as Normally Open or Normally Closed from the pull-down menu. Disabled is the default.
- To set the temperature alarm limits of the EMP, enter 32 to 158 degrees Fahrenheit (0 to 70 degrees Celsius) for the **Temperature Upper Limit** and the **Temperature Lower Limit**.
- Use the **Temperature Hysteresis** to control the alarm when the current value is hovering around the limit. When the EMP temperature measure activates the alarm, it can come out of the alarm state only by dropping below the Temperature Hysteresis value. Enter a value between 0 and 10 percent. The default is 2 percent.
- To set the humidity limits of the EMP, enter 0 to 90 percent for the **Humidity Upper Limit** and the **Humidity Lower Limit**. The default for the upper limit is 90; the default for the lower limit is 0.
- Use the **Humidity Hysteresis** to control the alarm when the humidity percentage is hovering around the alarm limit. When the EMP humidity measure activates the alarm, it can come out of the alarm state only by dropping below the Humidity Hysteresis value. Enter a value between 0 and 20 percent.
- Click **Apply** and then **OK** to save the settings.

## Saving and Restoring Configuration Settings

You can create a backup of the PXGX PDP Card settings and the EMS configuration and restore them at a later date.

### Creating a Backup

To create a backup:

1. Select **Save and Restore** from the Configuration menu.
2. To save the panel and breaker settings in the EMS configuration
  - a. Click **Save EMS configuration**.  
The card exports an XML file containing the EMS configuration settings.
  - b. Click **Save** and enter a file name and location to save the XML file.
3. To save the PXGX PDP Card settings and preferences:
  - a. Click **Save gateway configuration**.  
The card exports an XML file containing the PXGX PDP Card configuration settings.
  - b. Click **Save** and enter a file name and location to save the XML file.

### Restoring a Backup

**Note:** Restoring configuration settings overrides all changes made to the configuration settings since the backup file was created.

To restore the configuration settings from a backup file:

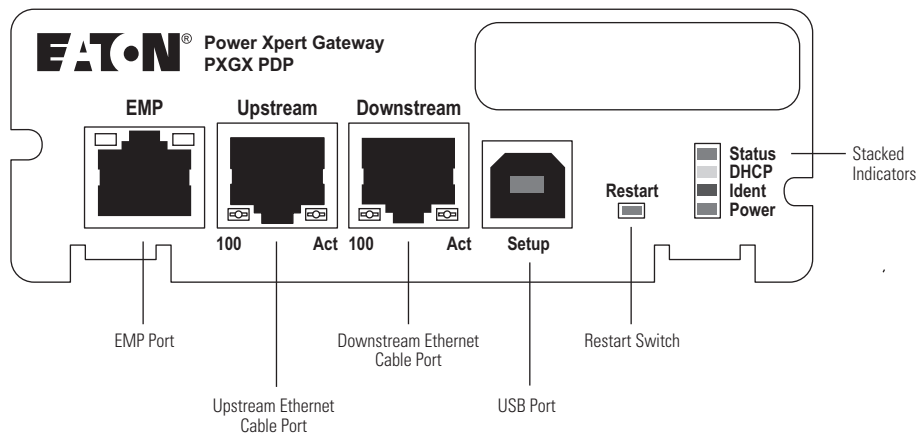
1. Select **Save and Restore** from the Configuration menu.
2. Click **Browse** to select the file name and then click **OK**.
3. When prompted, confirm that you want to override the configuration settings with the backup file. Click **OK** or **Cancel**.
4. Update the Web page if the Device Data does not automatically display after the backup is complete.

## Chapter 4 Operation and Maintenance

This section explains:

- PXGX PDP Card panel details
- Indicator descriptions
- DIP switch settings
- Open alarms
- Generating log files
- Firmware upgrade instructions

### PXGX PDP Card Panel Details



**Figure 27. PXGX PDP Card Panel Details**

### Indicator Descriptions

The Ethernet port indicator descriptions for the PXGX PDP Card are listed in Table 2; the stacked indicator descriptions are listed in Table 3.

**Table 2. Ethernet Port Indicators**

	Indicator Label	Illuminated	Not Illuminated
Upstream Ethernet Port	100	Indicates a valid 100 Mb Connection (Link).	Indicates a valid 10 Mb Connection (Link) as long as the corresponding ACT indicator is illuminated.
	ACT	Indicates network activity when the indicator is on or blinking.	Indicates no network activity.
Downstream Ethernet Port	100	Indicates a valid 100 Mb Connection (Link).	Indicates a valid 10 Mb Connection (Link) as long as the corresponding ACT indicator is illuminated.
	ACT	Indicates network activity when the indicator is on or blinking.	Indicates no network activity.

**Table 3. Stacked Indicator Descriptions**

Label	Color	Illuminated	Not Illuminated
STATUS	Green	Communication with the Power Distribution Unit (PDU), Remote Monitor Panel (RPP), Rack Power Module (RPM), Energy Management System Upgrade Kit (EMS-UGK), or Power Distribution Rack (PDR) has been established.	Communication with the PDP has not been established. As the card boots, the indicator remains off. However, if it remains off after two minutes, there is a communication problem between the card and the PDP.
DHCP	Amber	The PXGX PDP Card is configured for DHCP and has obtained IP address information.	The use of DHCP has been disabled by the user, or all ports configured for DHCP have failed to obtain IP address information.
IDENT	Red	A firmware update is in progress. Do not remove the card from the PDP.	A firmware update is not in progress.
POWER	Green	DC power is available to the card from the PDP.	If all indicators are not illuminated, DC power is not available from the PDP. This may indicate that the PDP is off and unplugged.

**Note:** During the power-on sequence, all four indicators illuminate briefly. Wait at least two minutes for the card's boot process to complete before comparing the indicators to the table above because indicators may turn on and off at different times in the boot process.

### DIP Switch Description

DIP switch definitions for the PXGX PDP Card are listed in Table 4.

**Table 4. DIP Switch Definitions**

S1 Position Number	OFF Position (Default)	ON Position
1	Enable previously stored network configuration settings (Normal mode)	Override the existing network settings and assign the local IP address 169.254.1.1.
2	Reserved	Reserved.
3	Normal behavior	Reset the HTTP passwords to the defaults on boot ( <b>user</b> and <b>admin</b> ). After a successful boot, the switch should be turned back off before rebooting the card.
4	Reserved	Reserved.
5	Reserved	Reserved.
6	Normal behavior	Reset the card to factory defaults on boot (after a successful boot, the switch should be turned back off before rebooting the card).

### Open Alarms

Alarm notices display in three areas of the Web interface:

- ▮ **Banner:** If there is an active alarm(s) present on the PDP (Condition Active: true), a flashing alarm icon and an alarm message display in the banner. The alarm icon and message reflect the actual condition of the highest active alarm in the PDP. Clicking the alarm message displays the Open Alarms page.
- ▮ **Device Data Summary and List page:** If there is an open alarm(s), the "(Alarms Present)" message displays at the top of the Device Data Summary and List page and the alarmed data value(s) is highlighted in red text and continues to display in the alarm state until the alarm is closed.
- ▮ **Menu bar:** If there is an open alarm(s), "Open Alarms" and the number of active alarms display in red under the Alarms menu. Clicking Open Alarms displays the Open Alarms page.

**Note:** An active alarm is different from an open alarm:

- **Active Alarm.** An alarm is active when an alarming condition exists in the PDP. Messages display on the PDP LCD panel and on the card interface banner when alarms go active and disappear when the alarming condition clears.
- **Open Alarm.** When an alarm goes active, it is also considered open and remains open (even after the condition clears in the PDP hardware) until it is closed by an operator. Operators are required to close alarms to ensure that they are seen. While the PDP LCD panel and the card interface banner display the alarms that are active in the PDP, other areas of the card interface (such as the Open Alarms page, device data pages, and the alarm log), display any alarms that have not been closed by the operator. Since closing an alarm that is still active in the hardware quickly results in the generation of a new alarm, an operator has the option to mark an alarm as acknowledged to indicate it has been seen.

The Open Alarms page displays a list of the latest alarms. Inactive alarms continue to display until they are closed.

To view, acknowledge, or close alarms:

1. Select **Open Alarms** from the Open Alarms menu.

The Open Alarms page displays with the following information for each alarm:

- The alarm level (caution, critical, or major).
- Time and date when the error occurred.
- The parameter that is in alarm.
- The alarm message that displays on the PDP control panel (displays as a link).
- The condition of the alarm (active is true, inactive is false). The condition of the alarm indicates the actual condition of the PDP.

2. To view the specific alarm parameter data, click the Alarm Message link. The Summary page displays and the value in error displays in red text.
3. Select the alarm or alarms you want to acknowledge, unacknowledge, or close. Select the top check box to select all alarms, or select one or more alarms individually.

**Note:** If the Alarm page updates, selections could be lost. Selecting an alarm row, or selecting **Pause Auto-Update**, prevents the page from automatically updating.

4. Select one of the following:
  - a. Select **Acknowledge Selected** to acknowledge that you are aware of the alarm.
  - b. Select **Un-Acknowledge Selected** to reverse a previous acknowledgement.
  - c. Select **Close Selected** to close the alarm and remove it from the Open Alarms list.

**Note:** If a PDP alarm is still active in the PDP (Condition Active: true) and you close the alarm, a new alarm and event ID is entered into the Open Alarms list.

**Note:** If a PDP alarm clears automatically, close the alarm to remove it from the Open Alarms list.

5. You have the option to add a note when prompted. Click **OK** to apply the selection.

**Note:** This note is optional and is entered into the Event log and displays in the Power Xpert software. The note applies to all selected alarms.

6. Click **Continue Auto-Update** to resume page updating.



## Generating Log Files

**Note:** Log files are comma-separated values (\*.csv) files that can be opened in Microsoft Excel® software. Some computer configurations automatically open the files in the Excel software instead of prompting you to save. Excel may default to a date format specific to the country the product is being used in, overriding the card specified format.

### Data Log

The data log contains a history of the data value changes recorded by the gateway. To generate a data log:

1. Select **Data Log** from the Logs menu.
2. To limit the number of records, type or select one or more of the following optional values:
  - a. Maximum number of records to return
  - b. Start Date
  - c. End Date
3. Click **View log**.
4. Select a name and location for the file (if you chose to save the file when prompted).

### Interval Log

The interval log contains a set of samples of data values taken at regular intervals by the gateway. To generate an interval log:

1. Select **Interval Log** from the Logs menu.
2. Select the name of the device.
3. Select the interval (5, 15, or 60 minutes).
4. To limit the number of records, type or select one or more of the following optional values:
  - a. Maximum number of records to return
  - b. Start Date
  - c. End Date
5. Click **View log**.
6. Select a name and location for the file (if you chose to save the file when prompted).

### Event Log

The event log contains a history of the events recorded by the gateway. To generate an event log:

1. Select **Event Log** from the Logs menu.
2. To limit the number of records, enter one or more of the following optional values:
  - a. Maximum number of records to return
  - b. Start Date
  - c. End Date
3. Click **View log**.
4. Select a name and location for the file (if prompted to save).

### System Log

The system log contains the history of the gateway administration activity. To generate a system log:

1. Select **System Log** from the Logs menu.
2. To limit the number of records, enter one or more of the following optional values:
  - a. Maximum number of records to return
  - b. Start Date
  - c. End Date
3. Click **View log**.
4. Select a name and location for the file (if prompted to save).

### Erasing a Log

To erase a data, interval, event, or system log:

1. Click **Erase log** from the Data Log, Interval Log, Event Log, or System Log page.
2. Click **OK** to erase the log; otherwise, click **Cancel**.

### Upgrading the Card's Firmware

The card's firmware may be updated by downloading the appropriate file from [www.eaton.com/powerxpert](http://www.eaton.com/powerxpert). During the upgrade process, the PXGX PDP Card does not monitor the PDP status.

To upgrade the firmware:

1. Select **Firmware** from the Configuration menu.
2. Select the **Reboot when complete** check box to automatically reboot after updating the firmware.

**Note:** If the **Reboot when complete** check box is not selected, you will be prompted to select **Reboot** when the update is done.

3. Click **Browse**.
4. Download the pxgx\_pdu\_xxx.rom firmware file, available on the Web at [www.eaton.com/powerxpert](http://www.eaton.com/powerxpert).  
The Web page reloads when the firmware upgrade is complete.

## Chapter 5 Root Certificate Authority Installation

Improve the security of your PXGX PDP Card on the Web by installing its root certificate authority (CA) into your browser's CA cache. A CA is a trusted third party that issues digital certificates for use with encrypted digital transactions. The digital certificate guarantees the identity of the Web site of the company that holds the certificate. In this case, the PXGX PDP Card functions as both the CA and the certificate holder.

You can use the card without installing its root CA (using HTTP), but the transactions will not be as secure as with the root CA (using HTTPS). You can require secure transactions by configuring the card for HTTPS (see "Configuring HTTP and HTTPS" on page 30). The performance of the card is not impacted by using secure transactions.

This section explains root CA installation for:

- Windows Internet Explorer 7 and Internet Explorer 8
- Mozilla Firefox
- Google Chrome

### Installing Root CA with Windows Internet Explorer 7 and Internet Explorer 8

To install a certificate for the PXGX PDP Card with Windows Internet Explorer 7 or Internet Explorer 8:

1. Open the browser and type the IP address of the card followed by the path /ca.html in the address bar. For example: `http://10.222.49.63/ca.html`.

The Root CA Installation page displays (see Figure 28).

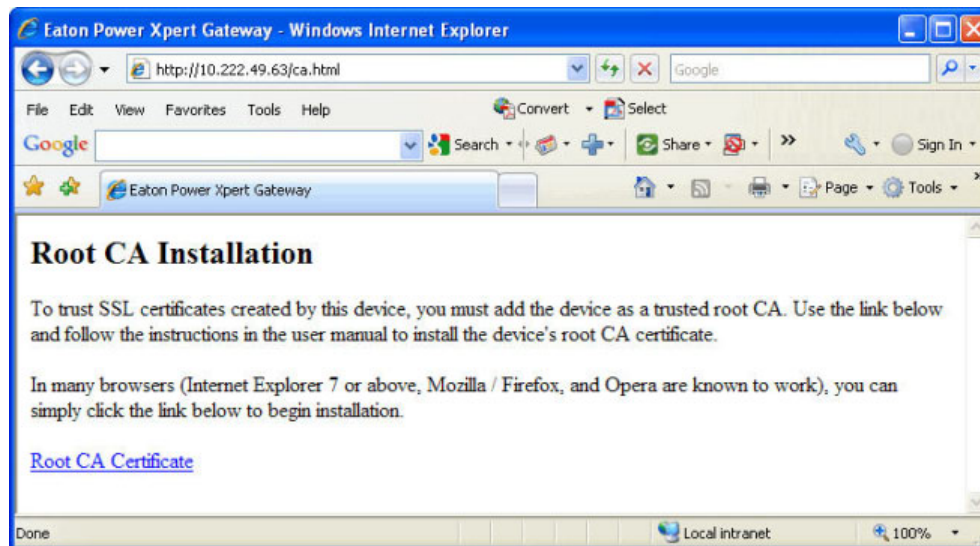


Figure 28. Internet Explorer – Root CA Installation Page

- 2. Click **Root CA Certificate**.  
A File Download warning message displays (see Figure 29).



Figure 29. File Download Warning

- 3. Click **Open**.  
The Certificate Window opens (see Figure 30).



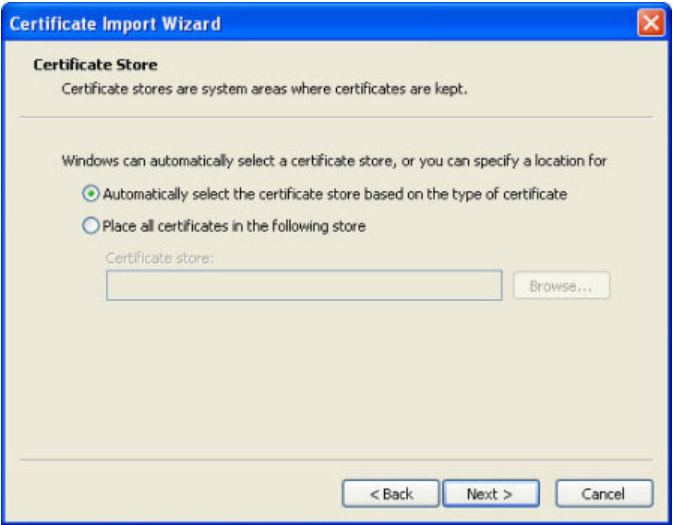
Figure 30. Certificate Window for the PXGX PDP Card

- 4. Click **Install Certificate**.  
The Certificate Import Wizard opens (see Figure 31).



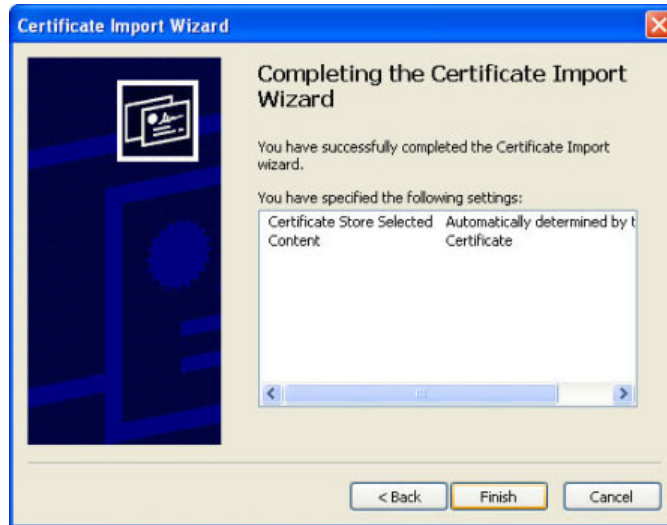
**Figure 31. Certificate Import Wizard**

- 5. Click **Next**.  
The Certificate Store window opens, prompting you to specify a certificate store (see Figure 32).



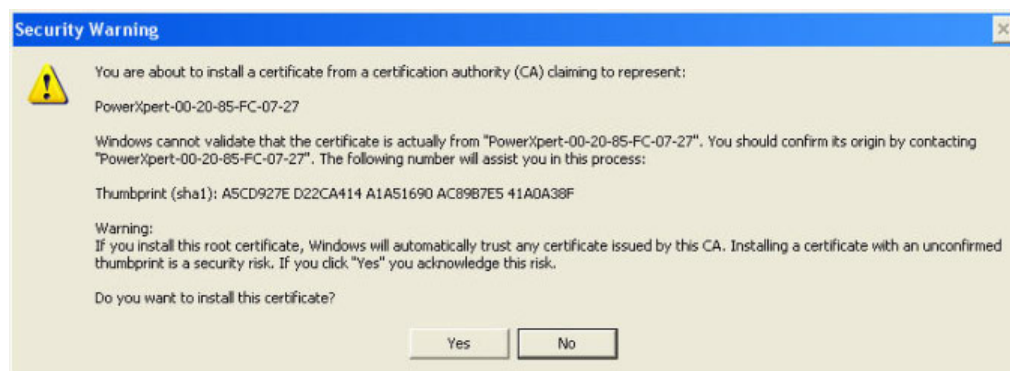
**Figure 32. Certificate Store Window**

6. Verify that the default setting, **Automatically select the certificate store ...**, is selected.
7. Click **Next**.  
The Certificate Import Wizard displays a final verification (see Figure 33).



**Figure 33. Verifying the Certificate Import Settings**

8. Click **Finish** to complete the wizard.  
A message displays informing you that Windows will automatically trust any certificate issued by this CA (see Figure 34).

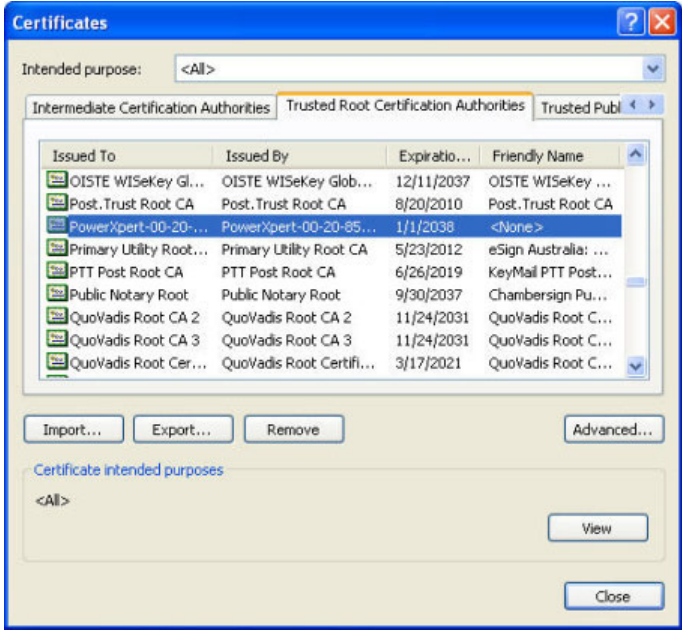


**Figure 34. Security Warning Message**

9. Click **Yes** to install the CA.  
A new message displays to verify that the import was successful.
10. Click **OK** to close the message.
11. Click **OK** to close the Certificate window.
12. The installation process is complete. You can now access the card using the HTTPS protocol (for example, `https://10.222.49.63`).

- 13. To view the certificate:
  - a. Select **Internet Options** from the **Tools** menu.
  - b. Click the **Content** tab.
  - c. Click **Certificates**.
  - d. Click the **Trusted Root Certification Authorities** tab, and then locate and select the certificate name on the list (see Figure 35).

**Note:** The name of the certificate starts with "PowerXpert" followed by the MAC address of the card.



**Figure 35. Trusted Root Certification Authorities Tab**

- e. Click **View** to open the Certificate window (see Figure 36).

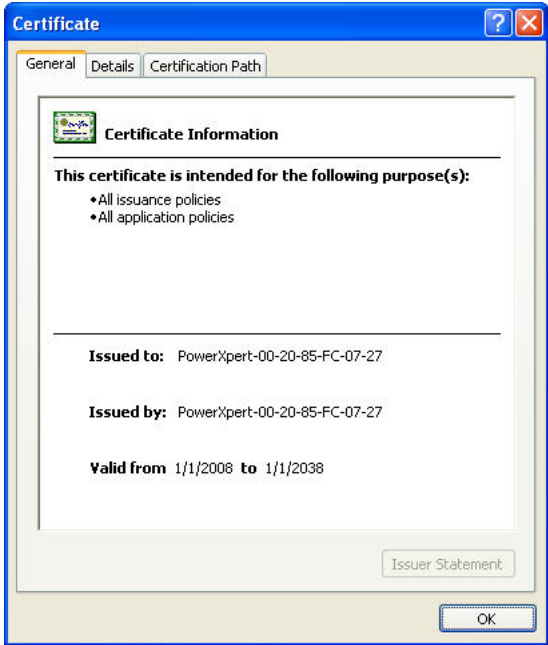


Figure 36. View Certificate Window

- f. When you are finished viewing the information, click **OK** to close the Certificate window, click **Close** to close the Certificates window, and click **OK** to close the Internet Options window.

### Installing Root CA with Mozilla Firefox

To install a certificate for the PXGX PDP Card with Mozilla Firefox:

1. Open the browser and type the IP address of the card followed by the path **/ca.html** in the address bar. For example: `http://10.222.49.63/ca.html`.

The following window opens (see Figure 37):

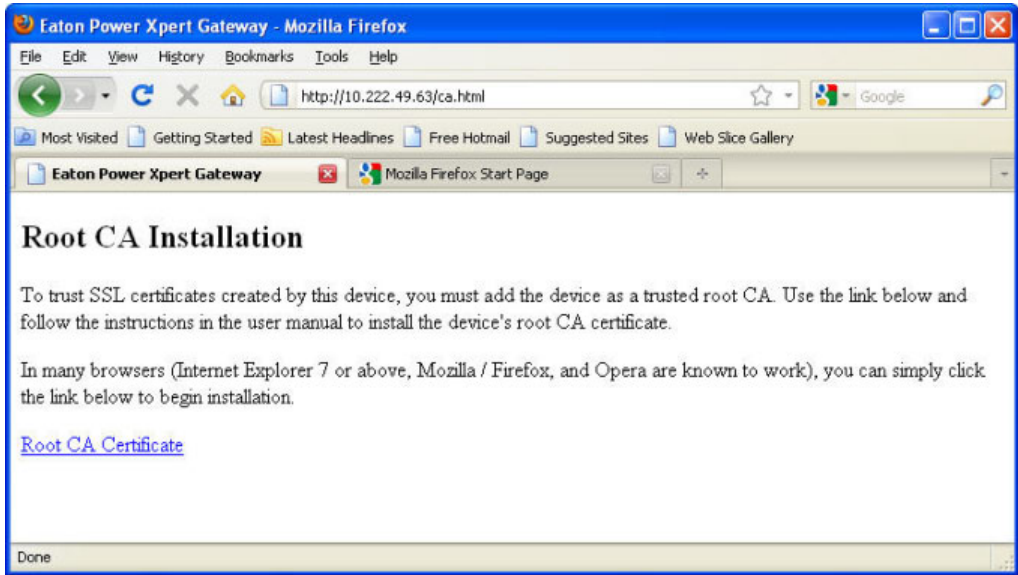


Figure 37. Mozilla Firefox – Root CA Installation Window



- 2. Click **Root CA Certificate**.  
Firefox opens the Downloading Certificate window (see Figure 38).



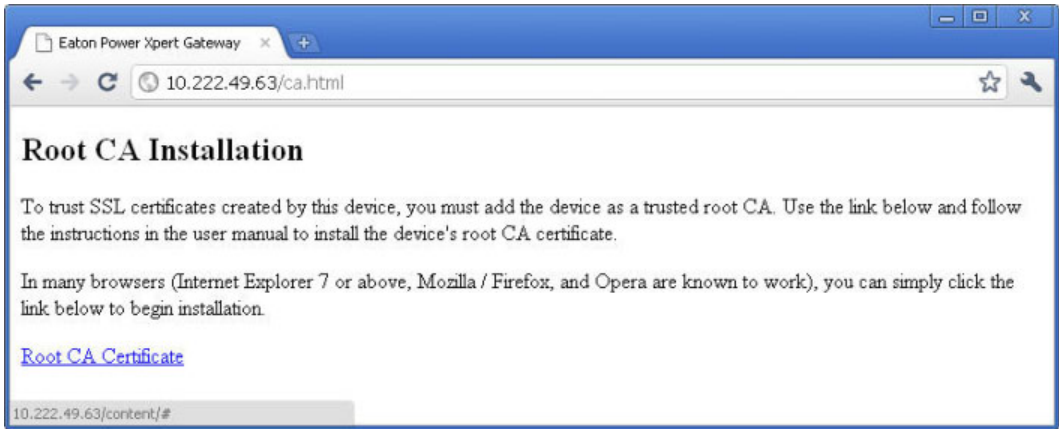
**Figure 38. Downloading Certificate Window**

- 3. If desired, click **View** to manually examine the contents of the certificate.
  - 4. Select the **Trust this CA to identify web sites** check box.
  - 5. Click **OK** to complete the installation process.
- The installation process is complete. You can now access the card using the HTTPS protocol (for example, `https://10.222.49.63`).

**Installing Root CA with Google Chrome**

To install a certificate for the PXGX PDP Card with Google Chrome:

- 1. Open the browser and type the IP address of the card followed by the path **/ca.html** in the address bar.  
For example: `http://10.222.49.63/ca.html`.  
The following window opens (see Figure 39):



**Figure 39. Google Chrome – Root CA Installation Window**

- 2. Click **Root CA Certificate**.  
A File Download warning message displays at the bottom of the window (see Figure 40).

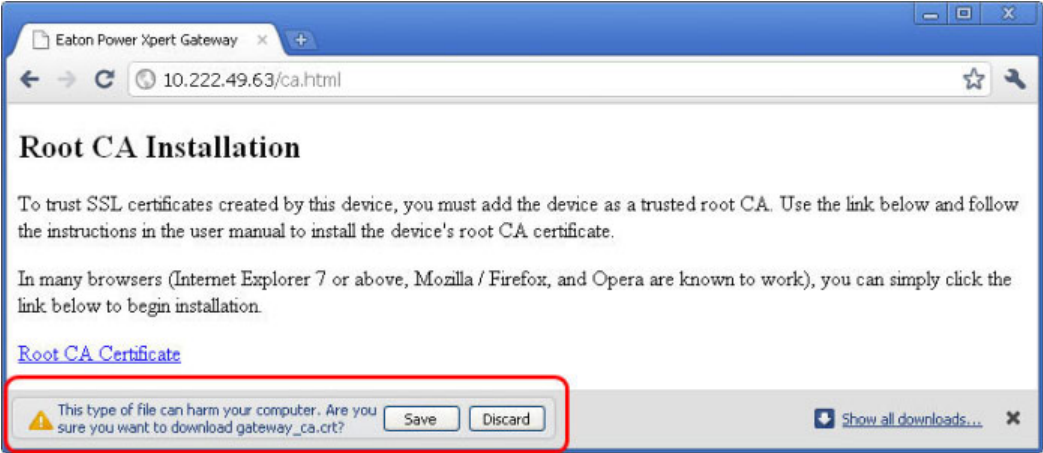


Figure 40. File Download Warning

- 3. Click **Save**.  
The CRT (Security Certificate) file name displays at the bottom of the window (see Figure 41).

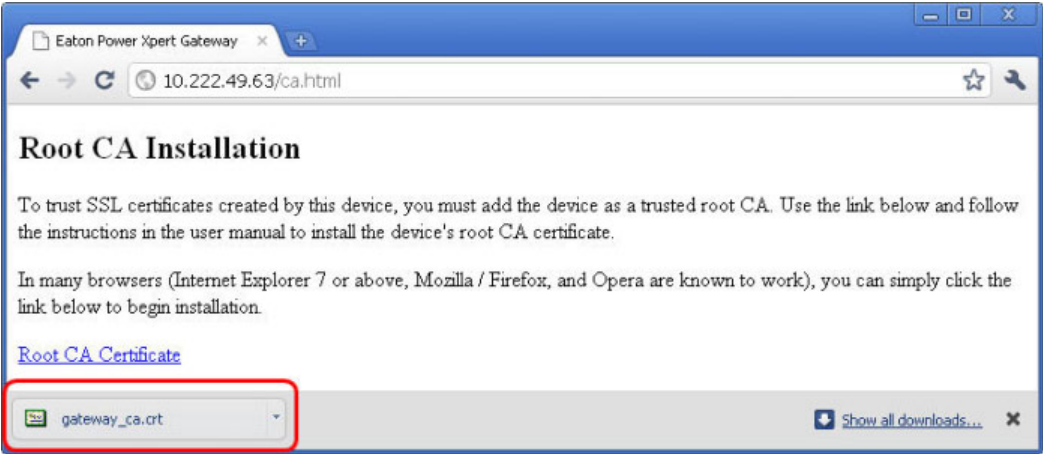


Figure 41. Security Certificate File

- 4. Click **gateway\_ca.crt**.  
An Open File warning message displays (see Figure 42).

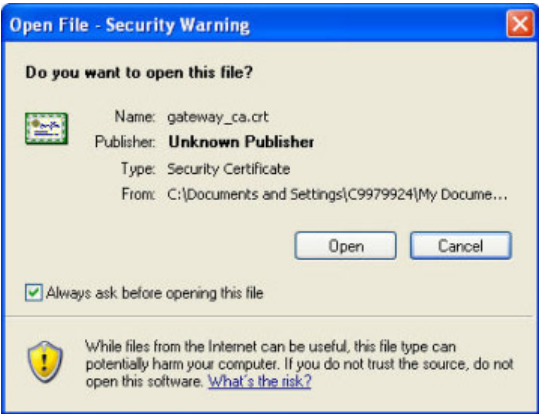


Figure 42. Open File Warning

- 5. Click **Open**.  
The Certificate Window opens (see Figure 43).

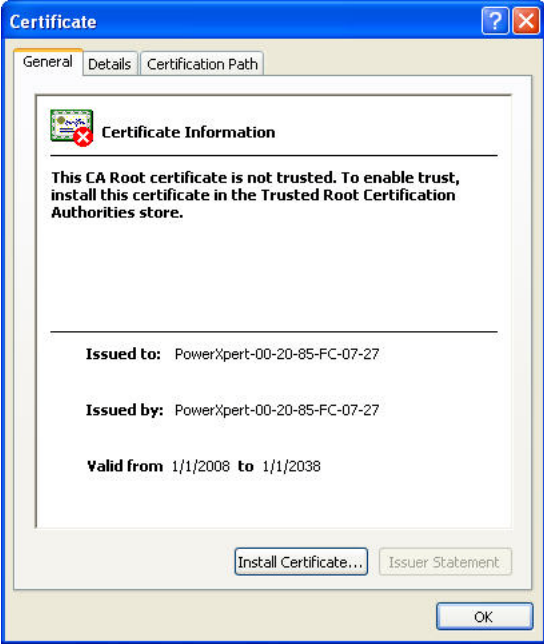


Figure 43. Certificate Window

- 6. Click **Install Certificate**.  
The Certificate Import Wizard – Welcome window opens (see Figure 44).



Figure 44. Certificate Import Wizard – Welcome Window

- 7. Click **Next**.  
The Certificate Import Wizard – Certificate Store window opens, prompting you to specify a certificate store (see Figure 45).

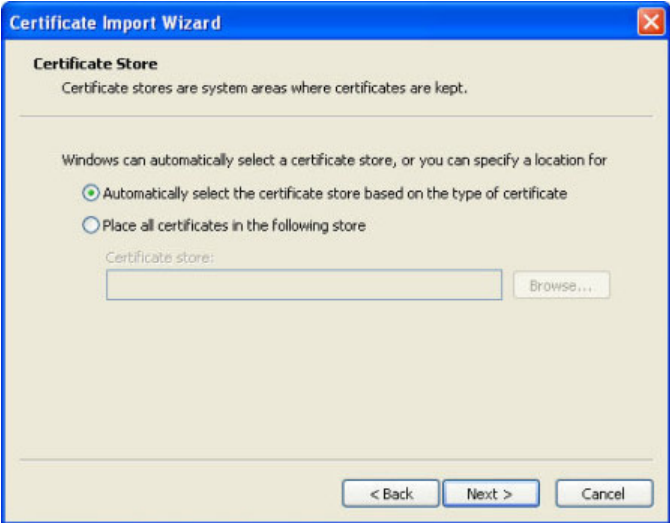
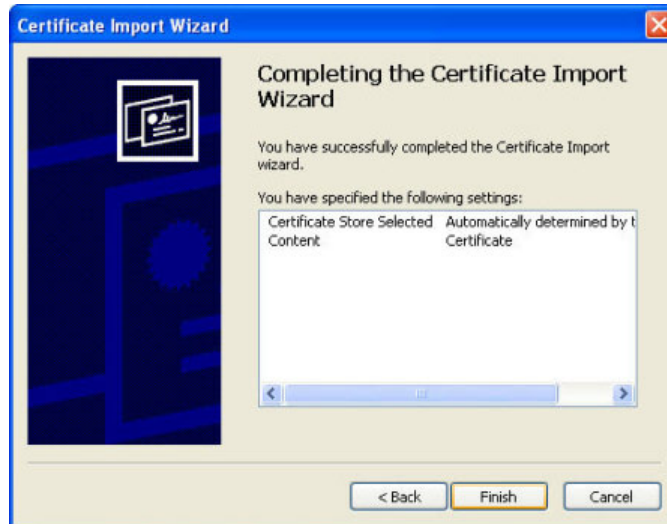



Figure 45. Certificate Store Window – Certificate Store Window

8. Verify that the default setting, **Automatically select the certificate store ...**, is selected.
9. Click **Next**.  
The Certificate Import Wizard – Completing the Certificate Import Wizard window certificate displays a final verification (see Figure 46).

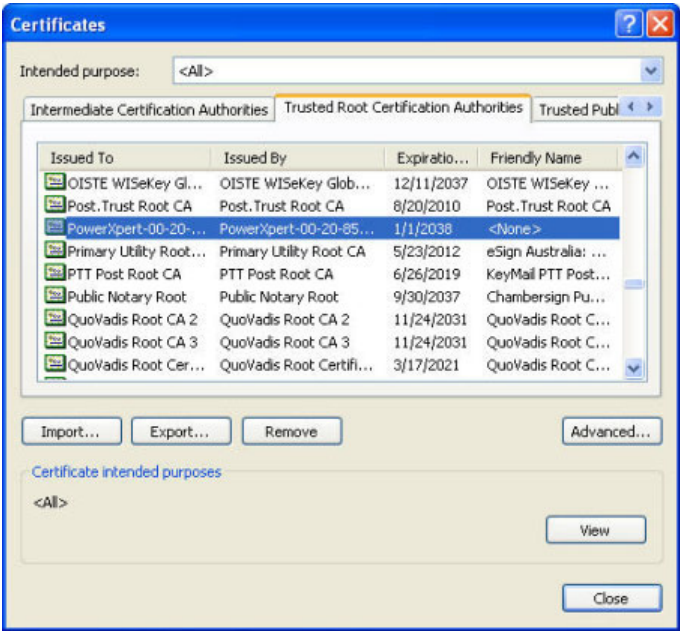


**Figure 46. Certificate Import Wizard – Completing the Certificate Import Wizard Window**

10. Click **Finish** to complete the wizard.
11. Click **Yes** to install the CA.  
A new message displays to confirm that the import was successful.
12. Click **OK** to close the message.
13. Click **OK** to close the Certificate window.  
The installation process is complete. You can now access the card using the HTTPS protocol (for example, `https://10.222.49.63`).

- 14. To view the certificate:
  - a. On the **Wrench**  menu, click **Options**, and then click the **Under the Hood** tab.
  - b. Scroll to the bottom of the window and click **Manage Certificates**.
  - c. Click the **Trusted Root Certification Authorities** tab and locate and select the certificate name on the list (see Figure 47).

**Note:** The name of the certificate starts with "PowerXpert" followed by the MAC address of the card.



**Figure 47. Certificates Window – Trusted Root Certification Authorities Tab**

- d. Click **View** to open the Certificate window (see Figure 48).

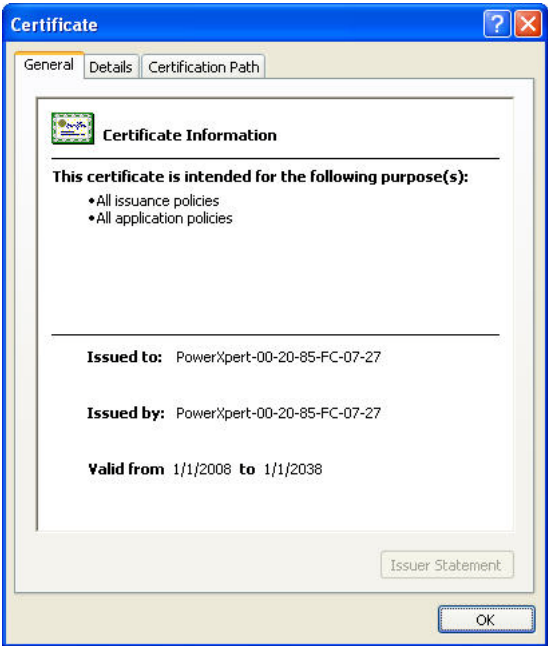


Figure 48. View Certificate

- e. When you are finished viewing the information, click **OK** to close the Certificate window, click **Close** to close the Certificates window, and click **Close** again to close the Google Chrome Options window.

## Chapter 6 MIB Files

This chapter describes the Management Information Base (MIB) files available with the card. A MIB is an information repository residing on a device in a communication network. Network management software uses a device's MIB to manage the device. Every manageable device on a network has a MIB consisting of one or more files that list information about the device.

Use the facilities provided by your Simple Network Management Protocol (SNMP) management software to access the individual MIB objects. The objects define the information available about your Power Distribution Unit (PDU), Remote Monitor Panel (RPP), Rack Power Module (RPM), Energy Management System Upgrade Kit (EMS-UGK), or Power Distribution Rack (PDR).

You can configure a device so that it generates a trap if a certain condition occurs, such as an alarm clearing. The trap is sent to the management station to inform it of the occurrence.

This chapter contains an overview of MIB definitions for each of the MIB files:

- Eaton PDU MIB
- Eaton EMP MIB
- Eaton Power Meter MIB
- Eaton PowerChain Device MIB
- Eaton Alarms+Traps MIB
- Eaton OID Assignments
- RFC 4133 Entity MIB
- RFC 4268 Entity State MIB
- RFC 4268 Entity State MIB Part 2

See the MIB files for detailed information about each MIB object.

### Eaton PDU MIB

The Eaton PDU MIB module contains objects and notifications for PDP, Panel, and Breaker information levels:

- mainPDU
- pduPanel
- pduBreaker

#### mainPDU

Objects in this group describe the main PDP in the system. This group has three subgroups:

- Nameplate Ratings subgroup. These objects provide the nominal rating values for the PDP.
- Input Meters subgroup. These objects provide input meter values for the PDP. The subgroup contains a table of meters by phase (normally three-phase).
- Output Meters subgroup. These objects provide output meter values for the PDP. The subgroup contains a table of meters by phase (normally three-phase).

#### pduPanel

For each panel in the system, there are subtables for:

- Panel Ratings. These objects provide the nominal rating values for each panel.
- Panel Meters. These objects provide total readings for all phases of the panel.
- Panel Phase Meters. These objects provide meter readings for the panel, by phase (normally three-phase).



**pduBreaker**

For each breaker in the system, there are subtables for:

- Breaker Ratings. These objects provide the nominal rating values for each breaker.
- Breaker Meters. These objects provide energy accumulators for the breaker, independent of phase.
- Breaker Phase Meters. These objects provide meter readings for the breaker, by phase (one, two, or three phases).

The Breaker tables are indexed by the panel number, breaker number, and sometimes the phase. The breaker number corresponds to the first physical panel position (or slot) it occupies. For example, a three-phase breaker at positions 2, 4, and 6 would have a breaker number of 2.

**Eaton EMP MIB**

Objects in this group are provided by the Environmental Monitoring Probe (EMP) and include temperature and humidity readings, alarming limits, the two contacts readings, and setup information. The group contains a table of values for environmental contact sensing (normally two digital inputs for monitoring all contacts).

Traps are sent in response to EMP changes to indicate the type of alarm, alarm acknowledgement, and alarm clearing.

**Eaton Power Meter MIB**

The Eaton Power Meter MIB provides five groups of power metering measures potentially provided by Eaton PDPs:

- Power quality. Power quality (PQ) index, percentage of total harmonic distortion (THD) for current and volts, Information Technology Industry Council (ITIC) performance curve
- Real-time measures. Voltage, currents, and power measures
- Minimum, average, and maximum. Voltage, currents, frequency, and power factor
- Energy measures. Watt-, VAR-, and VA-hours
- Power demand. KW, KVA, and KVAR over the meter's demand period

All objects are indexed by the PDP or panel device number. The powerMeterIndex is normally the same as the entPhysicalIndex for the PDP or panel as a device.

**Eaton PowerChain Device MIB**

The Eaton PowerChain Device MIB provides commonly supported voltage, current, frequency, and percent of load measures, as well as digital inputs/outputs and generic sensor readings, for power chain devices. Portions of this MIB are supported by Eaton PDPs.

This MIB covers three areas:

- Voltage, current, frequency, and percentage of load measures
- Digital (binary) inputs and outputs
- Generic (non-specific) sensor readings

All objects are indexed by a device number, since some agents present data from more than one power chain device. The powerChainDeviceIndex is normally the same as entPhysicalIndex.

**Eaton Alarms+Traps MIB**

Objects in this group provide a table of active alarms and a count of alarms currently active. The notification traps provided are triggered by the publishing of an alarm or event.

**Eaton OID Assignments**

These objects document all the object identifier assignments for Eaton products.

**Entity MIB Files**

The objects in these MIB files provide information standard in the industry:

- The RFC 4133 Entity MIB provides standard objects for identifying and describing devices attached to the card. The PXGX PDP Card is the first device entity, the PDP is the second. Panels and circuit breakers are assigned as individual device entities.
- The RFC 4268 Entity State MIB provides availability status measures for each device.
- The RFC 4268 Entity State MIB Part 2 provides possible state values for the Entity State MIB.

## Chapter 7 Modbus Registers

This chapter describes how to address each of the following PDPs using Modbus TCP/IP:

- Power Distribution Unit (PDU)
- Remote Monitor Panel (RPP)
- Rack Power Module (RPM)
- Energy Management System Upgrade Kit (EMS-UGK)
- Power Distribution Rack (PDR)
- Or a specific panel in a PDU, RPP, RPM, EMS-UGK, or PDR, and a specific breaker in a panel

**Note:** To obtain the panel or circuit breaker data, the PDP must have the Energy Management System (EMS) Level 3 option installed.

A PDP distributes power through one or more circuit breaker panels. Each panel consists of several circuit breakers. Each circuit breaker contains more than 30 parameters, such as voltage, current, power, and alarms. The value of each parameter is stored in a corresponding Modbus data register.

Because there are many panels in a PDP, it is necessary to identify a specific breaker and specify the panel containing that breaker. It is likely that Breaker #5 in Panel #1 has different data than Breaker #5 in Panel #7.

The tables in this chapter list sample names of the PDP parameters and their corresponding Modbus registers for:

- PDP summary data
- Panel summary data
- Breaker data

The values of the parameters can be read over an Ethernet network by using Modbus TCP/IP building management programs or Modbus TCP/IP analyzer programs.

**Note:** Some Modbus programs provide an option for zero- or one-based addressing. Select the option for zero-based addressing. The Modbus numbering scheme for the PDP starts at 0, so physical coil number 1 corresponds to Modbus register number 0, coil number 2 corresponds to Modbus register number 1, and so on.

**Note:** If your Modbus program requires one-based addressing, add a one to the register addresses listed in Table 7 on page 61. For example, one-based addressing for the vendor name would be 1033 (1032 + 1).

## Identifying the Breakers

To identify the breakers in a PDU/RPP panel, see the following section. To identify the breakers in an RPM, see “RPM Breakers” on page 56.

### PDU/RPP Breakers

A PDU/RPP panel can contain a mix of single-, two-, or three-pole breakers. Each pole takes one position (or slot) in the panel.

Figure 49 shows a partial map of a panel with a mix of breaker sizes. Unoccupied positions are shown in gray. Odd numbered positions are on the left and even numbered positions are on the right.

Panel Position	Breaker #	Breaker Rating	Phase	Breaker Rating	Breaker #	Panel Position
1	01	20	A	20	02	2
3	03	50	B	20	04	4
5			C	20	06	6
7			A	40	08	8
9	09	B			10	
11			C			12
13			A			14
15	15	20	B			16
17			C			18

**Figure 49. Sample PDU/RPP Panel Map**

A single-pole breaker occupies one position; a two-pole breaker occupies two positions; and a three-pole breaker occupies three positions. The breaker number corresponds to the position in the panel. For example, Breaker 01 is in position 1 and is a single-pole, 20A breaker connected to Phase A. Breaker 02 is in position 2 and is a single-pole, 20A breaker connected to Phase A.

For multiple-pole breakers, the breaker number corresponds to the lowest number of the grouped panel positions. Because Breaker 03 is configured as a three-pole breaker, it occupies three positions (3, 5, and 7). Breaker 03 is a three-pole, 50A breaker and is connected to all three phases; positions 5 and 7 cannot be addressed as a single breaker. Breaker 08 is configured as a two-pole breaker and occupies two positions (8 and 10), so position 10 cannot be addressed.

The breaker map for your specific PDU/RPP is available from the card's Web page (see “Obtaining the Modbus Register Map” on page 57).

When reading the breaker registers, only the data associated with the configured breaker is available. Reading a single-pole breaker returns only the data associated with the single pole. In Figure 49, reading Breaker 01 returns only the data associated with Phase A. Attempting to read Breaker 01 for Phase B or Phase C data will return an error. Reading multiple-phase breakers returns the data for all connected phases. For example, Breaker 03 returns the data for Phases A, B, and C, while Breaker 08 returns data for Phases A and B.

### RPM Breakers

An RPM panel can contain a maximum of 12 single-phase breakers.

Figure 50 shows a sample map of an RPM panel. Breaker positions are numbered sequentially from the bottom left. Some positions may not have a breaker and are shown in gray.

Phases	A	B	C	A	B	C	A	B	C	A	B	C
<b>Current Rating</b>	20A			20A			20A	60A	45A			
<b>Breaker #</b>	01			04			07	09	10			12

**Figure 50. Sample RPM Panel**

Breakers can be combined (or ganged) into one physical breaker covering two or three positions. When breakers are combined, the breaker number corresponds to the lowest number of the grouped breakers.

In Figure 50, Breaker 01 is a three-phase, 20A breaker and occupies three positions (1, 2, and 3). Data returned from Breaker 01 contains the data associated with all three phases. The next breaker is Breaker 04 (because Breaker 01 occupies three positions). Breaker 07 is a two-phase, 20A breaker. A request for data from Breaker 07 returns data covering Phases A and B. A single-phase, 60A breaker is shown in position 9. Data returned from Breaker 09 contains only data from Phase C. Position 12 is unoccupied.

The breaker map for your specific RPM is available from the card's Web page (see "Obtaining the Modbus Register Map" on page 57).

Attempting to read data from a nonexistent breaker results in an error code. For example, requesting the Phase B voltage from ganged Breaker 05 results in a returned error code. The Phase B voltage from the ganged breaker is obtained by reading Breaker 04.

## Pole Data

Sometimes it is advantageous to address the individual poles of a breaker instead of a ganged breaker, which returns data for all the poles in the breaker. The individual poles can be addressed using the Unit IDs for EMS Pole Data or RPM Pole Data as shown in Table 6 beginning on page 59.

To obtain a comma-separated values (\*.csv) file, see the following section "Obtaining the Modbus Register Map," and select the pole data when prompted from a device.

**Note:** Either EMS Pole Data or RPM Pole Data register maps are available on the Web page, depending on the product type, but not both.

## Obtaining the Modbus Register Map

To view a list of the Modbus registers in your PDP:

1. Select **Modbus TCP Register Maps** from the Documentation menu.
2. Select the hardware type from the **Select a map to generate** pull-down menu.
3. Most Modbus-TCP clients automatically decrement addresses by one before using them. If your client does not alter addresses in this way, clear the **Use 1-based addressing** check box.
4. Click **View Register Map**. A dialog box opens.
5. Click **Open** to view or **Save** to save the file.

**Note:** The Modbus file is a comma-separated values (\*.csv) file that can be opened in Microsoft Excel software. Some computer configurations automatically open the files in the Microsoft Excel software instead of prompting you to save the file.

6. If you select **Save**, select a location for the file.

**Note:** Some browsers leave a blank window open after you save or view the file. Close the window.

## Returning Error Codes

By default, the PXGX PDP Card returns a Modbus error code when it receives an incoming register/discrete/coil READ request for an address that is not currently valid. To improve performance in some situations, you can configure the card to disable this error response and instead return zero-filled data in all of the invalid address ranges.

To change how error codes are returned:

1. Select **Modbus TCP** from the configuration menu.
2. Clear the **Return error (vs. zeros) on unsupported read request** check box to disable the error code or select the check box to enable the error code.
3. Click **Apply** and then **OK** to save the setting.

## Modbus Register Addressing

This section describes Modbus function codes, data formats, and data addressing.

### Modbus Function Codes

The PDP registers are read using Modbus Function Codes (FC). For most PDP registers, FC 04 is used. For alarms, FC 02 is used. The PDP supports the following hex function codes:

**Table 5. Function Codes**

FC	Hex	Description	Use
01	0x01	Read Coil Status	Supported for compatibility purposes
02	0x02	Read Discrete Inputs	Single input data, such as alarms and discrete contacts
03	0x03	Read Holding Registers	Supported for compatibility purposes
04	0x04	Read Input Registers	Analog data (most string and numeric data types), such as voltage
05	0x05	Write Single Coil	For future use
06	0x06	Write Single Register	For future use
0F	0x0F	Write Multiple Coils	For future use
10	0x10	Write Multiple Registers	For future use

### Data Formats

Modbus programs usually provide an option for viewing various data types. Refer to your Modbus program documentation for detailed information on viewing data options.

A register is 16 bits (two bytes). The PDP supports the following data types:

- ▮ **STRING** – A string of ASCII characters (two per register). Consult the Size parameter to find the string's length for a given entry (it is a multiple of two so that entries are register-aligned).
- ▮ **FLOAT** – A 32-bit IEEE754 floating point number. FLOATs are always two registers.
- ▮ **UINT** – An unsigned integer. Consult the Size parameter to find the integer's size (in bytes) for a given entry (it is a multiple of two so that entries are register-aligned).
- ▮ **TIME** – The Time type (ym dh ms) consists of six bytes specifying the year, month, day, hour, minutes, and seconds. The bytes are stored in hexadecimal format. If your Modbus application displays the individual bytes in a register, view the bytes using the decimal option. Otherwise, the bytes are best viewed by displaying the two-byte register in a binary format and translating each byte to decimal.

For example, if today is May 17, 2010 and the time is 10:45 and 20 seconds, viewing each hex byte in decimal would yield the following data, which is viewable as the year (10), month (05), day (17), hour (10), minutes (45), and seconds (20):

10 05	17 10	45 20
-------	-------	-------

See "Time or Date (FC 04)" on page 67 for more information.

- ▮ **BOOL** – A binary (Boolean) value of 0 or 1. BOOL is usually assigned to discrete input alarms.

### Data Addressing

The register addresses and sizes listed in Table 7 through Table 13, starting on page 61, specify an address for each entry. If a data type spans multiple registers (such as a FLOAT), lower addressed registers map to higher-order parts of the value. Within each register, data is in most significant bit (MSB) first format.

**Note:** A Modbus register contains two bytes. Therefore, the number of registers containing the information can be obtained by dividing the bytes by two. For example, the vendor name in Table 7 on page 61 can be obtained by reading 32 Modbus registers starting at register 1032.

**Note:** If a register is not supported in a particular device, an exception response is returned.

## PDP Unit ID Numbers

Because the PDP consists of several panels of circuit breakers, set the Unit ID in the Modbus program to specify a specific PDP, a specific panel, or a specific breaker (see Table 6).

The PDP has a Unit ID of 0, 1, or 255. The same information can be obtained from any of these IDs. See “PDP Registers and Alarms” on page 61 for more information.

The panel Unit IDs range from 2 to 17. These summary data panel registers contain the total information for all the breakers in a specific panel. For example, the registers show the sum total current for each phase distributed by all the breakers. See “Panel Registers and Alarms” on page 62 for more information.

The breaker Unit IDs range from 18 to 33. These registers provide individual breaker data for the specified panel. See “Breaker Data and Alarms” on page 64 for more information on identifying specific breaker registers.

**Note:** Selecting panel and breaker Unit IDs that are not available will return an error code. Currently available PDP model configurations are limited to eight panels, so only eight panel Unit IDs are used. Future models may be configured for up to 16 panels.

If there is an optional Environmental Monitoring Probe (EMP) installed, use Unit ID 254 to obtain EMP data. See “EMP (FC 04)” on page 66 for more information.

**Table 6. PDP Unit ID Numbers**

Unit ID	Description
0, 1, and 255	PDP Summary Data
2	Panel #1 Summary Data
3	Panel #2 Summary Data
4	Panel #3 Summary Data
5	Panel #4 Summary Data
6	Panel #5 Summary Data
7	Panel #6 Summary Data
8	Panel #7 Summary Data
9	Panel #8 Summary Data
10	Panel #9 Summary Data
11	Panel #10 Summary Data
12	Panel #11 Summary Data
13	Panel #12 Summary Data
14	Panel #13 Summary Data
15	Panel #14 Summary Data
16	Panel #15 Summary Data
17	Panel #16 Summary Data
18	Panel #1 Breaker Data
19	Panel #2 Breaker Data
20	Panel #3 Breaker Data
21	Panel #4 Breaker Data
22	Panel #5 Breaker Data
23	Panel #6 Breaker Data
24	Panel #7 Breaker Data
25	Panel #8 Breaker Data
26	Panel #9 Breaker Data
27	Panel #10 Breaker Data

**Table 6. PDP Unit ID Numbers (Continued)**

<b>Unit ID</b>	<b>Description</b>
28	Panel #11 Breaker Data
29	Panel #12 Breaker Data
30	Panel #13 Breaker Data
31	Panel #14 Breaker Data
32	Panel #15 Breaker Data
33	Panel #16 Breaker Data
34	EMS Panel #1 Pole Data
35	EMS Panel #2 Pole Data
36	EMS Panel #3 Pole Data
37	EMS Panel #4 Pole Data
38	EMS Panel #5 Pole Data
39	EMS Panel #6 Pole Data
40	EMS Panel #7 Pole Data
41	EMS Panel #8 Pole Data
42	EMS Panel #9 Pole Data
43	EMS Panel #10 Pole Data
44	EMS Panel #11 Pole Data
45	EMS Panel #12 Pole Data
46	EMS Panel #13 Pole Data
47	EMS Panel #14 Pole Data
48	EMS Panel #15 Pole Data
49	EMS Panel #16 Pole Data
50	RPM Panel #1 Pole Data
51	RPM Panel #2 Pole Data
52	RPM Panel #3 Pole Data
53	RPM Panel #4 Pole Data
54	RPM Panel #5 Pole Data
55	RPM Panel #6 Pole Data
56	RPM Panel #7 Pole Data
57	RPM Panel #8 Pole Data
58	RPM Panel #9 Pole Data
59	RPM Panel #10 Pole Data
60	RPM Panel #11 Pole Data
61	RPM Panel #12 Pole Data
62	RPM Panel #13 Pole Data
63	RPM Panel #14 Pole Data
64	RPM Panel #15 Pole Data
65	RPM Panel #16 Pole Data
254	Environmental Monitoring Probe



## PDP Registers and Alarms

This section contains information for the PDP Registers (FC 04) and PDP Alarms (FC 02).

The register and alarm tables contain sample register lists and may not be the same as the registers in your PDP.

### PDP Registers (FC 04)

Figure 7 provides a partial list of data registers that are available from a PDP. Not all registers may be available in your PDP.

To read the vendor name in the PDP, set the Modbus program to Unit ID 1 and register 1032:

```
IP: <IP address of PDP>
Unit ID: 1
Starting Register: 1032
Number of registers: 32
Function Code: 04
```

The PDP returns 32 registers containing up to 64 characters. There are two ASCII characters per register, so the vendor name could be displayed as Eaton.

**Table 7. PDP Sample Registers (FC 04)**

Name	Register	Data Type	Bytes
Vendor Name	1032	STRING	64
Model Name	1064	STRING	64
Display Name	1096	STRING	64
Device Type	1128	STRING	64
Device ID	1192	STRING	64
Device Guide	1225	STRING	40
Serial Number	1276	STRING	64
Conn Style	1312	UINT	2
Device Comm Address	1313	STRING	64
Device Baud Rate	1345	UINT	4
Time Sync Period	1347	UINT	4
Data Update Period	1349	UINT	4
Device VAR Rating	1351	UINT	4
Device Volts In Rating	1357	UINT	4
Device Volts Out Rating	1359	UINT	4

### PDP Alarms (FC 02)

Table 8 provides a partial list of example PDP alarms. Your PDP may have different alarms. PDP alarms are not registers, but are discrete inputs and are read using FC 01 or FC 02.

The PDP monitors the condition of several parameters and can activate an alarm status if a parameter is out of range. For example, if the input frequency is too high or too low, the PDP can set the Input Frequency Fault Alarm.

To read the Input Frequency Fault Alarm, set the Modbus program to Unit ID 1 and coil address 1008:

```
IP: <IP address of PDP>
Unit ID: 1
Starting Register: 1008
Number of Registers: 1
Function Code: 02
```

The PDP returns a single register that is a BOOL value (0 or 1), indicating if the alarm is active or not active.

**Table 8. PDP Sample Alarms (FC 02)**

<b>Name</b>	<b>Register</b>	<b>Data Type</b>
AC Input Over Volts	1006	BOOL
AC Input Under Volts	1007	BOOL
Input Frequency Fault	1008	BOOL
AC Output Over Volts	1009	BOOL
AC Output Under Volts	1010	BOOL
AC Output Frequency Fault	1011	BOOL
Remote EPO	1012	BOOL
Building Alarm 4	1016	BOOL
Building Alarm 3	1017	BOOL
Building Alarm 2	1018	BOOL
Building Alarm 1	1019	BOOL
Output Overload	1025	BOOL
System Bus Overload	1050	BOOL
NV Memory Failure	1053	BOOL

## Panel Registers and Alarms

This section contains information for the Panel Summary Registers (FC 04) and the Panel Alarms (FC 02).

### Panel Summary Registers (FC 04)

**Note:** The panel can be wired for either a wye (phase to neutral) or a delta (phase-to-phase) configuration. The registers contain only the data supported by the wired configuration. For example, if the panel is wired in a wye configuration, the voltages AN, BN, and CN are available, but the voltages AB, BC, and CA are not available (an exception code is returned). Refer to the actual panel for the wiring configuration.

Table 9 shows the registers that contain summary data for the panel. The registers contain the total information for all the breakers in the panel.

For example, the AC Voltage between Phase A and Neutral is available in register 4010. To read the AC Voltage in Phase A at Panel #1, set the Modbus program to Unit ID 2 and register 4010:

```
IP: <IP address of PDP>
Unit ID: 2
Starting Register: 4010
Number of Registers: 2
Function Code: 04
```

To read the AC Voltage in Phase A at Panel #4, set the Modbus program to Unit ID 5 and register 4010:

```
IP: <IP address of PDP>
Unit ID: 5
Starting Register: 4010
Number of Registers: 2
Function Code: 04
```

**Table 9. Panel Sample Summary Registers (FC 04)**

<b>Name</b>	<b>Register</b>	<b>Data Type</b>	<b>Bytes</b>
Display Template	1000	UINT	2
Vendor Name	1032	STRING	64
Model Name	1064	STRING	64
Display Name	1096	STRING	64
Serial Number	1276	STRING	64
Device Volts Rating	1355	UINT	4
Number of Phases	1361	UINT	2
Asset ID	1477	STRING	128
Breaker Rating	1607	UINT	2
Breaker Warning	1609	UINT	2
Breaker Overload	1610	UINT	2
Neutral Current Alarm	1612	UINT	2
Entity Admin State	3047	UINT	2
Entity Operating State	3048	UINT	2
Entity Readiness State	3049	UINT	2
Entity Alarm State	3050	UINT	2
Entity Standby State	3051	UINT	2
AC V AN	4010	FLOAT	4
AC V BN	4012	FLOAT	4
AC V CN	4014	FLOAT	4
AC V MAX AN	4296	FLOAT	4
AC V MAX BN	4298	FLOAT	4
AC V MAX CN	4300	FLOAT	4
AC I in A	5002	FLOAT	4
AC I in B	5004	FLOAT	4
AC I in C	5006	FLOAT	4
AC I in N	5010	FLOAT	4
AC I MAX A	5164	FLOAT	4
AC I MAX B	5166	FLOAT	4
AC I MAX C	5168	FLOAT	4
AC I MAX N	5170	FLOAT	4

**Panel Alarms (FC 02)**

Table 10 lists the panel alarms. They are not registers, but are discrete inputs and are read using FC 02.

To read the Main Breaker Overload alarm at Panel #4, set the Modbus program to Unit ID 5 and coil address 1254:

```

IP: <IP address of PDP>
Unit ID: 5
Starting Register: 1254
Number of Registers: 1
Function Code: 02

```

**Table 10. Panel Sample Alarms (FC 02)**

Name	Coil/Status Address	Data Type
Neutral Overload	1219	BOOL
Panel Under Voltage	1238	BOOL
Panel Over Voltage	1242	BOOL
Panel Under Over Frequency	1248	BOOL
Branch Breaker Overload Warning	1249	BOOL
Branch Breaker Overload	1250	BOOL
Main Breaker Overload Warning	1253	BOOL
Main Breaker Overload	1254	BOOL

## Breaker Data and Alarms

This section contains:

- Sample names of breaker parameters along with the register numbers for Breaker #1
- Instructions for calculating the register numbers for other breakers
- Breaker alarms

### Breaker #1 Data Registers (FC 04)

To specify a specific breaker, use a Unit ID for breaker data along with the register number for the specific breaker.

For example, “Watts in Phase A” is register 1055 for Breaker #1. This statement is true for any panel. To specify a specific panel for breaker data, use the panel's Unit ID in the Modbus program. For Panel #6 (Unit ID 23), the Modbus program would be set as follows:

```
IP: <IP address of PDP>
Unit ID: 23
Starting Register: 1055
Number of registers: 2
Function code: 04
```

The Modbus program would return a value of the watts in Phase A for Breaker #1 in Panel #6 of the PDP at the specified IP address.

**Table 11. Breaker #1 Sample Data Registers (FC 04)**

Name	Register	Data Type	Bytes
Display Name	1000	STRING	64
Number of Phases	1032	UINT	2
Breaker Rating	1033	UINT	4
Breaker Warning	1035	UINT	2
Breaker Overload	1036	UINT	2
AC Current Phase A	1037	FLOAT	4
AC Current Phase B	1039	FLOAT	4
AC Current Phase C	1041	FLOAT	4
AC MAX Current Phase A	1043	FLOAT	4

**Table 11. Breaker #1 Sample Data Registers (FC 04) (Continued)**

Name	Register	Data Type	Bytes
AC MAX Current Phase B	1045	FLOAT	4
AC MAX Current Phase C	1047	FLOAT	4
Percent FL Current A	1049	FLOAT	4
Percent FL Current B	1051	FLOAT	4
Percent FL Current C	1053	FLOAT	4
Watts Phase A	1055	FLOAT	4

**Calculating Breaker Register Numbers**

Table 11 shows the sample register numbers for Breaker #1. There can be many breakers in a panel. Determine the corresponding register numbers for other breakers in the panel by using the following formula:

$$\text{Breaker register \#} = \text{Breaker \#1 register} + ((\text{Breaker \#} - 1) \times 200)$$

For example:

$$\begin{aligned} \text{Breaker \#2 starts at 1200:} & \quad 1000 + ((2 - 1) \times 200) \\ & \quad 1000 + (1 \times 200) \\ & \quad 1000 + 200 \\ & \quad 1200 \end{aligned}$$

$$\begin{aligned} \text{Breaker \#3 starts at 1400:} & \quad 1000 + ((3 - 1) \times 200) \\ & \quad 1000 + (2 \times 200) \\ & \quad 1000 + 400 \\ & \quad 1400 \end{aligned}$$

$$\begin{aligned} \text{Breaker \#14 starts at 3600:} & \quad 1000 + ((14 - 1) \times 200) \\ & \quad 1000 + (13 \times 200) \\ & \quad 1000 + 2600 \\ & \quad 3600 \end{aligned}$$

This formula works for any register. For example, for Breaker #1, the register number of "Watts Phase A" is 1055. The corresponding address for Breaker #18 is:

$$\begin{aligned} & \quad 1055 + ((18 - 1) \times 200) \\ & \quad 1055 + (17 \times 200) \\ & \quad 1055 + 3400 \\ & \quad 4455 \end{aligned}$$

**Breaker Alarms (FC 02)**

There are two alarms for each circuit breaker: Overload Warning and Overload. Each alarm has a unique address similar to the data registers, but these alarms are not data registers. The alarms are discrete inputs and are read using FC 02 in the Modbus program.

**Table 12. Breaker Alarms (FC 02)**

Name	Coil/Status Address	Data Type
Branch Breaker 1 Overload Warning	1000	BOOL
Branch Breaker 1 Overload	1001	BOOL

Table 12 shows the alarms for Breaker #1. Determine the corresponding alarms for other breakers by using the following formula:

$$\text{Breaker \#5 address} = ((\text{Breaker number} - 1) \times 2) + \text{Breaker \#1 address}$$

For example, to find the Overload Warning alarm address for Breaker #5:

$$\begin{aligned} \text{Breaker \#5 Overload Warning} &= ((5 - 1) \times 2) + 1000 \\ &= ((4) \times 2) + 1000 \\ &= (8) + 1000 \\ &= 1008 \end{aligned}$$

To find the Overload alarm address for Breaker #20

$$\begin{aligned} \text{Breaker \#20 Overload} &= ((20 - 1) \times 2) + 1001 \\ &= ((19) \times 2) + 1001 \\ &= (38) + 1001 \\ &= 1039 \end{aligned}$$

To read the Overload Warning alarm for Breaker #5 in Panel #8, the Modbus program would be set as follows:

```
IP: <IP address of PDP>
Unit ID: 25
Starting Register: 1008
Number of registers: 1
Function code: 02
```

The Modbus program would return a true/false value of the Overload Warning alarm for Breaker #5 in Panel #8 of the PDP at the specified IP address.

## EMP (FC 04)

**Note:** See “Configuring EMP Settings” on page 32 for more information.

The optional EMP for the PDP can measure temperature and humidity. Because the device can be located outside the PDP, the reference is to auxiliary data. In addition, it contains two connections for monitoring the condition of auxiliary input contacts, such as a door switch. See Table 13 for a list of EMP registers.

An exception code is returned if the EMP is not installed.

To read the temperature at the PDP, set the Modbus program to Unit ID 254 and coil address 12028:

```
IP: <IP address of PDP>
Unit ID: 254
Starting Register: 12028
Number of registers: 2
Function Code: 04
```

**Table 13. EMP Registers (FC 04)**

Name	Register	Data Type	Bytes
Vendor Name	1032	STRING	64
Model Name	1064	STRING	64
Display Name	1096	STRING	64
Serial Number	1276	STRING	64
Device ID	1192	STRING	64
Auxiliary Input 1	10275	UINT	2
Auxiliary Input 2	10276	UINT	2
Auxiliary Temperature	12028	FLOAT	4
Auxiliary Humidity	12030	FLOAT	4

**Time or Date (FC 04)**

Some PDP models support a time and/or date function. This format has a DATE data type and contains six bytes. Each byte represents the year, month, day, hour, minutes, and seconds (see page 58 for more information).

To read the PDP date and time, set the Modbus program to Unit ID 1 and register 12203:

```

IP: <IP address of PDP>
Unit ID: 1
Starting Register: 12203
Number of registers: 3
Function Code: 04

```

The PDP would return three registers containing hexadecimal data in the ym dh ms format (for example, May 17, 2007 at 10:45 and 20 seconds).

07 05	11 0A	2D 14
-------	-------	-------

Viewing each hex byte in decimal would yield the following data, which is viewable as the year (07), month (05), day (17), hour (10), minutes (45), and seconds (20):

07 05	17 10	45 20
-------	-------	-------

Viewing each hex byte as two-byte unsigned integers would yield the following data:

1797	4362	11540
------	------	-------

Viewing each hex byte as binary would yield the following data:

00000111 00000101	00010001 00001010	00101101 00010100
-------------------	-------------------	-------------------

**Table 14. Time or Date Register (FC 04)**

Parameter Name	Display Name	Register	Discrete	Units	Data Type	Bytes
mCurrentTime	Time	12203	No	No	DATE	6

## Chapter 8 Specifications

**Table 15. Technical Specifications**

<b>CPU</b>	Freescale™ MPC8313
<b>Memory</b>	128 MB RAM, 1 GB NAND Flash
<b>LAN Controller</b>	Micrel® 3-port 10/100 Ethernet Switch
<b>Network Connections</b>	10/100BaseT RJ-45 Upstream port, plus 10/100BaseT RJ-45 Downstream port to optional daisy-chained Ethernet device USB 1.0 device port (used for initial network connection through a standard RNDIS driver)
<b>Energy Management System (EMS) Protocol</b>	Power Distribution Unit (PDU), Remote Monitor Panel (RPP), Rack Power Module (RPM), Energy Management System Upgrade Kit (EMS-UGK), or Power Distribution Rack (PDR) XCP communication protocol
<b>Network Protocols (not limited to)</b>	SNMP v1 or v3 over UDP/IP Modbus TCP/IP HTTP/HTTPS BACnet/WS NTP SMTP DHCP TCP/IP (including IPv4 and IPv6)
<b>Supported SNMP MIBs</b>	Eaton PDU MIB Eaton EMP MIB Eaton Power Meter MIB Eaton PowerChain MIB Eaton Alarms+Traps MIB Eaton Object Identifier (OID) assignments RFC 4133 Entity MIB RFC 4268 Entity State MIB RFC 4268 Entity State MIB Part 2
<b>Operating Temperature</b>	0–40°C (32–104°F)
<b>Operating Humidity</b>	10–80%, noncondensing
<b>Power Input</b>	7–28 Vdc unregulated (12 Vdc nominal)
<b>Power Consumption</b>	3.5 watts maximum
<b>Size (L x W x H)</b>	12 cm x 11.4 cm x 3.9 cm (4.7" x 4.5" x 1.5")
<b>Weight</b>	113 gm (4 oz)
<b>EMC Statements</b>	Class A: FCC Part 15 EU Standard: EN 55022:2006 Class A, EN 55024:1998+A1:2001:A2:2003



## Chapter 9 Service and Support

If you have any questions or problems with the PXGX PDP Card, call your **Local Distributor** or the **Help Desk** at one of the following telephone numbers and ask for a PXGX PDP Card technical representative.

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

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

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

Please have the following information ready when you call the Help Desk:

- Model number
- Serial number
- Version number (if available)
- Date of failure or problem
- Symptoms of failure or problem
- Customer return address and contact information

If repair is required, you will be given a Returned Material Authorization (RMA) Number. This number must appear on the outside of the package and on the Bill Of Lading (if applicable). Use the original packaging or request packaging from the Help Desk or distributor. Units damaged in shipment as a result of improper packaging are not covered under warranty. A replacement or repair unit will be shipped, freight prepaid for all warranted units.

**Note:** For critical applications, immediate replacement may be available. Call the **Help Desk** for the dealer or distributor nearest you.

### Two-Year Limited Warranty (US and Canada)

#### Eaton Connectivity Devices

**WARRANTOR:** The warrantor for the limited warranties set forth herein is Eaton Corporation, a Delaware Corporation company ("Company").

**LIMITED WARRANTY:** This limited warranty (this "Warranty") applies only to the original End-User (the "End-User") of any Eaton-branded Connectivity Devices (the "Product") purchased on or after June 1, 2004 and cannot be transferred. This Warranty applies even in the event that the Product is initially sold by Company for resale to an End-User.

**LIMITED WARRANTY PERIOD:** The period covered by this Warranty for the Product installed [and currently located] in the fifty (50) United States, the District of Columbia, and Canada is twenty-four (24) months from the date of purchase.

**WHAT THIS LIMITED WARRANTY COVERS:** The warrantor warrants that the Product (the "Warranted Item") is free from defects in material and workmanship. If, in the opinion of Company, a Warranted Item is defective and the defect is within the terms of this Warranty, Company's sole obligation will be to repair or replace such defective Warranted Item (including by providing service, parts and labor, as applicable), at the option of Company.

**PROCEDURES FOR REPAIR OR REPLACEMENT OF WARRANTED ITEMS:** The Warranted Item will be repaired or replaced at a Company site or such other location as determined by Company.

If the Warranted Item is to be replaced by Company, and the End-User supplies a credit card number or purchase order for the value of the replacement Product, Company will use commercially reasonable business efforts to ship (via standard ground shipment and at no cost to the End-User) the replacement Warranted Item to the End-User within one (1) business day after Company receives notice of the warranty claim. In such case, the End-User must return (at Company's expense) the defective Warranted Item to Company in the same packaging as the replacement Warranted Item received by the End-User or as otherwise instructed by Company. If Company does not receive the defective Warranted Item, Company will either charge the End-User's credit card, or send the End-User an invoice (which the End-User agrees to pay), for the value of the replacement Product.

If the Warranted Item is to be replaced by Company, but the End-User is unwilling or unable to supply a credit card number or purchase order for the value of the replacement Product, Company will use commercially reasonable business efforts to ship (via standard ground shipment and at no cost to the End-User) the replacement Warranted Item to the End-User within one (1) business day after Company receives the defective Product from the End-User.

In any case, Company will provide shipping instructions and will pay its designated carrier for all shipping charges for return of defective equipment and replacement of Warranted Items. Any returned Warranted Item or parts that are replaced may be new or reconditioned. All Warranted Items returned to Company and all parts replaced by Company shall become the property of Company.

**WHAT THIS LIMITED WARRANTY DOES NOT COVER:** This Warranty does not cover any defects or damages caused by: (a) failure to properly store the Product before installation; (b) shipping and delivery of the Product if shipping is FOB Factory; (c) neglect, accident, abuse, misuse, misapplication, or incorrect installation; (d) repair or alteration not authorized in writing by Company personnel or performed by an authorized Company Customer Service Engineer or Agent; (e) improper testing, operation, maintenance, adjustment, or modification of any kind not authorized in writing by Company personnel or performed by an authorized Company Customer Service Engineer or Agent; or (f) use of the Product under other than normal operating conditions or in a manner inconsistent with the Product's labels or instructions.

This Warranty is not valid if the Product's serial numbers have been removed or are illegible. Any Warranted Items repaired or replaced pursuant to this Warranty will be warranted for the remaining portion of the original Warranty subject to all the terms thereof.

Company shall not be responsible for any charges for testing, checking, removal or installation of Warranted Items.

**COMPANY DOES NOT WARRANT EQUIPMENT NOT MANUFACTURED BY COMPANY. IF PERMITTED BY THE APPLICABLE MANUFACTURER, COMPANY SHALL PASS THROUGH SUCH MANUFACTURER'S WARRANTIES TO END-USER.**

**COMPANY DOES NOT WARRANT SOFTWARE (IF APPLICABLE TO THE PRODUCT), INCLUDING SOFTWARE EMBEDDED IN PRODUCTS, THAT IS NOT CREATED BY COMPANY. WITHOUT LIMITING THE FOREGOING, COMPANY SPECIFICALLY DOES NOT WARRANT SOFTWARE (SUCH AS LINUX) THAT WAS CREATED USING AN "OPEN SOURCE" MODEL OR IS DISTRIBUTED PURSUANT TO AN OPEN SOURCE LICENSE.**

**THIS WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY OFFERED BY COMPANY WITH RESPECT TO THE PRODUCTS AND SERVICES AND, EXCEPT FOR SUCH FOREGOING WARRANTY COMPANY DISCLAIMS ALL OTHER WARRANTIES INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY, TITLE, NON-INFRINGEMENT, AND FITNESS FOR A PARTICULAR PURPOSE. CORRECTION OF NON-CONFORMITIES IN THE MANNER AND FOR THE PERIOD OF TIME PROVIDED ABOVE SHALL CONSTITUTE COMPANY'S SOLE LIABILITY AND END-USER'S EXCLUSIVE REMEDY FOR FAILURE OF COMPANY TO MEET ITS WARRANTY OBLIGATIONS, WHETHER CLAIMS OF THE END-USER ARE BASED IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY), OR OTHERWISE.**

**LIMITATION OF LIABILITY:** The remedies of the End-User set forth herein are exclusive and are the sole remedies for any failure of Company to comply with its obligations hereunder. In no event shall Company be liable in contract, in tort (including negligence or strict liability) or otherwise for damage to property or equipment other than the Products, including loss of profits or revenue, loss of use of Products, loss of data, cost of capital, claims of customers of the End-User or any special, indirect, incidental or consequential damages whatsoever. The total cumulative liability of Company hereunder whether the claims are based in contract (including indemnity), in tort (including negligence or strict liability) or otherwise, shall not exceed the price of the Product on which such liability is based.

Company shall not be responsible for failure to provide service or parts due to causes beyond Company's reasonable control.

**END-USER'S OBLIGATIONS:** In order to receive the benefits of this Warranty, the End-User must use the Product in a normal way; follow the Product's user's guide; and protect against further damage to the Product if there is a covered defect.

**OTHER LIMITATIONS:** Company's obligations under this Warranty are expressly conditioned upon receipt by Company of all payments due to it (including interest charges, if any). During such time as Company has not received payment of any amount due to it for the Product, in accordance with the contract terms under which the Product is sold, Company shall have no obligation under this Warranty. Also during such time, the period of this Warranty shall continue to run and the expiration of this Warranty shall not be extended upon payment of any overdue or unpaid amounts.

**COSTS NOT RELATED TO WARRANTY:** The End-User shall be invoiced for, and shall pay for, all services not expressly provided for by the terms of this Warranty, including without limitation, site calls involving an inspection that determines no corrective maintenance is required. Any costs for replacement equipment, installation, materials, freight charges, travel expenses or labor of Company representatives outside the terms of this Warranty will be borne by the End-User.

**OBTAINING WARRANTY SERVICE:** In the USA, call the Customer Reliability Center 7x24 at 800-356-5737. Outside of the USA, contact your local Eaton product sales or service representative, or call the Customer Reliability Center in the USA at 919-870-3149. For comments or questions about this Warranty, write to the Customer Quality Representative, 3301 Spring Forest Road, Raleigh, North Carolina 27616 USA.

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