EAT•N

**Power Xpert® Gateway Series 1000 Card
User's Guide**

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.

Requesting a Declaration of Conformity

Units that are labeled with a CE mark comply with the following harmonized standards and EU directives:

- Harmonized Standards: EN 50091-1-1 and EN 50091-2; IEC 60950 Third Edition

- EU Directives: 73/23/EEC, Council Directive on equipment designed for use within certain voltage limits
  93/68/EEC, Amending Directive 73/23/EEC
  89/336/EEC, Council Directive relating to electromagnetic compatibility
  92/31/EEC, Amending Directive 89/336/EEC relating to EMC

- EU Standard: EN 55022:1988+A1:2000+A2:2003, Class A/EN55022:1988+A1:2000+A2:2003

The EC Declaration of Conformity is available upon request for products with a CE mark. For copies of the EC Declaration of Conformity, contact:

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Table of Contents

Chapter 1   Getting Started

> ℹ️ **NOTE** *If you have completed all sections in the* Power Xpert Gateway Series 1000 Card Quick Start Instructions, *proceed to Chapter 2, "Configuring the Card," on page 19.*

This section explains:

- Checklist items needed for installation
- Installing the card
- Connecting the card
- Verifying or assigning the IP address
- Configuring the network settings

Installation Checklist

1. Verify that all of the following items are available:

   ❑ Eaton® Power Xpert Gateway (PXGX) Series 1000 Card package contents (card, configuration cable, Ethernet cable, and quick start instructions)

   ❑ Phillips screwdriver

   ❑ Available serial port (RS-232)

   ❑ HyperTerminal® (ships with Microsoft® Windows®) or equivalent terminal emulation application

   ❑ Web browser (Internet Explorer or Mozilla® Firefox® recommended)

2. Provide your local network administrator with the card's MAC address:

❑ MAC Address Port 1   _____

❑ MAC Address Port 2   _____

The MAC address for Port 1 is located on a label on top of the card. To determine the MAC address of Port 2, increase the Port 1 address by one. For example: 0060261089A8 (Port 1), 0060261089A9 (Port 2).

3. Contact the local network administrator for the following network settings:

❑ IP Address Port 1 (static address*) _____

❑ IP Address Port 2 (static address*) _____

❑ Gateway Address   _____

❑ Subnet Mask   _____

❑ DNS (name server) IP Address**   _____

* The PXGX Series 1000 Card provides two network connections (Port 1 and Port 2), each accessed with separate IP addresses. If you are setting up the PXGX Series 1000 Card in a dynamic host configuration protocol (DHCP) environment (default), the network administrator must set up the DHCP server to provide a static address each time the card makes a DHCP request. Use Port 2 only if you need a redundant connection using a separate subnet.

** Obtain the Domain Name Server (DNS) IP address if you plan to use host names.

4. If you need e-mail functionality, obtain the SMTP IP address or host name. If using the SMTP host name, verify that you also have the DNS IP address (see Step 3).

❑ SMTP (mail server) IP Address or
   Host Name   _____

Installing the Card

The hot-swappable PXGX Series 1000 Card can be installed without turning off the Powerware® Power Distribution Unit (PDU) or disconnecting the load.

To install the PXGX Series 1000 Card:

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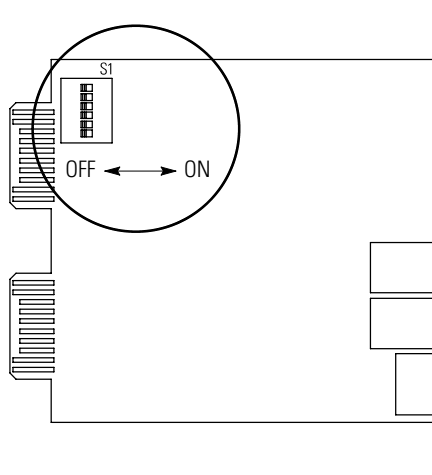
Figure 1. Verify DIP Switches are OFF

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

> *i* **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 Port 1 and Port 2, for future reference (see "Installation Checklist" on page 1).

4. To prevent electrostatic discharge (ESD), place one hand on a metal surface such as the PDU panel.

5. Slide the card into the open slot and secure with the screws removed in Step 2 (see Figure 2 and Figure 3).
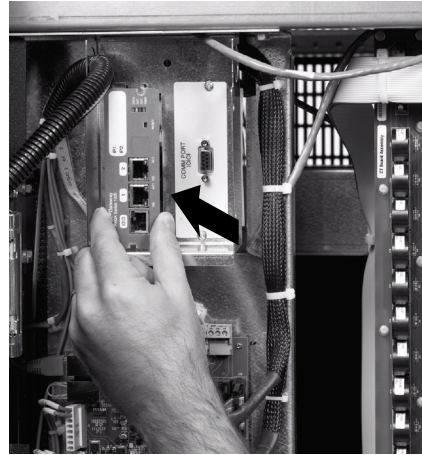
Figure 2. Install the PXGX Series 1000 Card

6. Connect an active Ethernet cable (supplied) to the Port 1 Ethernet connector on the PXGX Series 1000 Card (see Figure 3).

If you are connecting a second network connection (separate subnet), connect an active Ethernet cable (not supplied) to the Port 2 Ethernet connector on the PXGX Series 1000 Card.
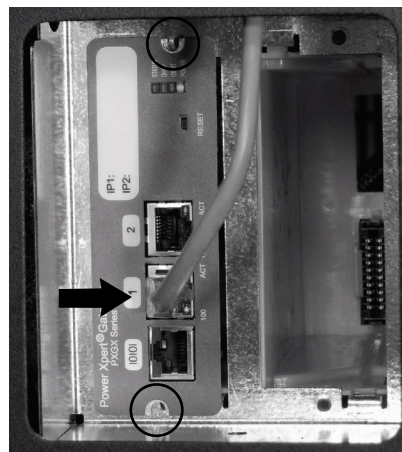
Figure 3. Secure the Card and Install the Ethernet Cable

7. If you know the card's IP address, continue to "Network Configuration" on page 16; otherwise, continue to the following section, "Connecting the Card."

Connecting the Card

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

1. Plug the RJ-45 end of the supplied configuration cable into the configuration port on the card labeled "10101" (see Figure 4).

> **NOTE** *Verify that you have used the port labeled "10101." The other ports on the card do not work for configuration.*

Figure 4. Install Configuration Cable

2. Plug the other end of the serial cable into the serial COM port on the computer.

3. Open your terminal emulation program (such as HyperTerminal).

4. Select the serial connection (such as COM1). See Figure 5.

Figure 5. Select Serial Connection

5. Set the serial line to 9600 baud, No parity, 8 data bits, 1 stop bit, and no flow control (see Figure 6).
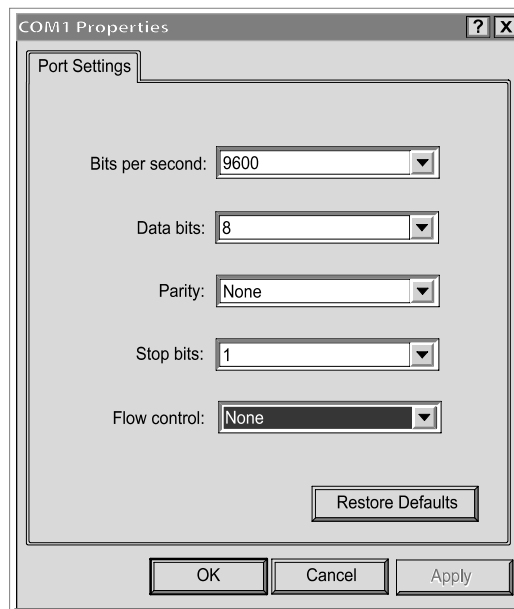
Figure 6. Configure Port Settings

6. Verify that the PDU is turned on.

7. After a few seconds, press **Enter**. The Network Settings menu appears in approximately one minute (see Figure 7).

```
--------------------------------------------------------
---------------- Network Settings ----------------
--------------------------------------------------------
1. Ethernet Port 1 Settings
2. Ethernet Port 2 Settings
3. DNS Server (Primary)       :  [None]
4. DNS Server (Secondary)  :  [None]
5. Reset to Factory Defaults and Exit
0. Exit

Select an option ==> 1
```
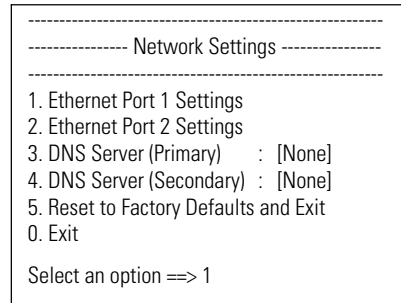
Figure 7. Network Settings Menu

If the menu does not appear, press **Enter** again. If it still does not appear, check the following conditions:

• Verify the serial line is set to 9600 baud, No parity, 8 data bits, 1 stop bit, and no flow control.

• If the serial line settings are correct, check the cabling to verify all connections are secure.

• Verify that your terminal program is on the correct communication port for the serial connection.

• Verify that the card has power (one or more LEDs on the card are illuminated). The PDU should be on.

8. Continue to the following section, "IP Address Assignments."

IP Address Assignments

Many IT managers prefer the convenience of DHCP for managing the IP addresses of networked devices. With DHCP, the 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 Series 1000 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 (DHCP enabled)." To manually enter fixed IP addresses for the card's network connection, continue to "Assigning IP Addresses (DHCP disabled)," on page 11.

NOTE *By default, the PXGX Series 1000 Card requests an IP address via DHCP when connected to a network.*

Verifying IP Addresses (DHCP Enabled)

To verify the IP address assignments:

1. Type **1** and press **Enter** on the Network Settings menu (see Figure 7 on page 7) to display the Network Settings: Ethernet Port 1 menu (see Figure 8).

```
--------------------------------------------------------
------ Network Settings: Ethernet Port 1 ------
--------------------------------------------------------
1. Dynamic Addressing (DHCP)   Enabled
2. IP Address                  10.222.51.250
3. Subnet Mask                 255.255.255.0
4. Default Gateway             10.222.51.254

 MAC Address                   00:60:26:10:89:A8
 Link Status                   Enabled

0. Exit to previous menu

Select an option ==>
```

Figure 8. Ethernet Port 1 Menu

2. Verify and record the IP address for Port 1*.

3. Type **0** and press **Enter** to return to the Network Settings menu.

4. If you connected Ethernet Port 2 to a separate network, continue to Step 5 to verify the assigned IP address. Otherwise, continue to Step 8.

5. Type **2** and press **Enter** on the Network Settings menu to display the Network Settings: Ethernet Port 2 menu.

6. Verify and record the IP address for Port 2*.

7. Type **0** and press **Enter** to return to the Network Settings menu.

8. Type **0** and press **Enter** to exit the utility.

---

* If the IP address field contains **[None]**, press **Enter** to return to the Network Settings menu and wait 60 seconds. Repeat Steps 1 through 8. If the field remains **[None]**, contact your local network administrator to verify that the DHCP server is responding to requests.

9. Verify network communication by using a Web browser (see Figure 9). Type the IP address of the card and select **Go**.

10. The login prompt appears. The user name and default password is *user* for read-only information and *admin* for configuration (read/write) options.

The PXGX Series 1000 Card Web page opens (see Figure 9).
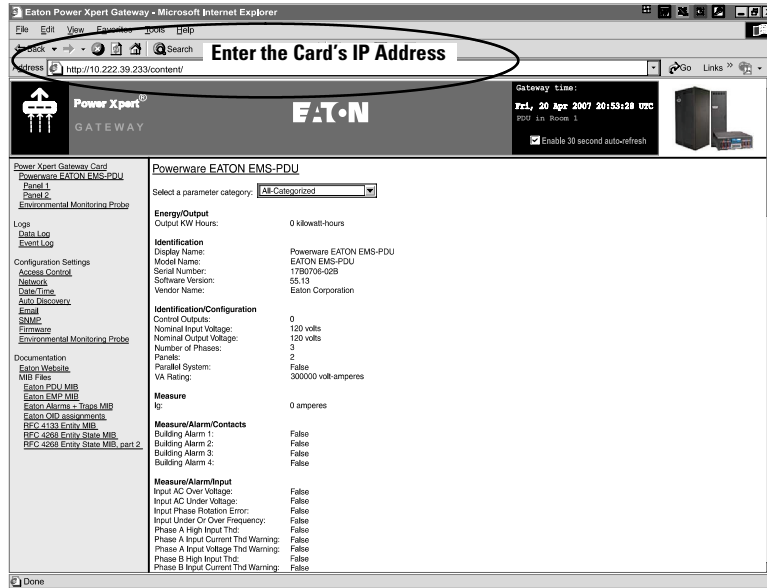
Figure 9. PXGX Series 1000 Card Web Page

11. If you logged in as *admin*, continue to Chapter 2, "Configuring the Card" on page 19 for additional configuration options.

NOTE *Once you have logged in as admin, it is important to completely exit the browser to set the security level back to the standard read-only level.*

Assigning IP Addresses (DHCP Disabled)

NOTE *You can also set network settings via the PXGX Series 1000 Card's Web page Network link (see "Network Configuration" on page 16).*

To manually enter fixed IP addresses for the card after you have connected it:

1. Type **1** and press **Enter** on the Network Settings menu (see Figure 10) to display the Network Settings: Ethernet Port 1 menu (see Figure 11).

```
---------------------------------------------------------
---------------- Network Settings ----------------
---------------------------------------------------------
1. Ethernet Port 1 Settings
2. Ethernet Port 2 Settings
3. DNS Server (Primary)      : [None]
4. DNS Server (Secondary)  : [None]
5. Reset to Factory Defaults and Exit
0. Exit

Select an option ==> 1
```

Figure 10. Network Settings Menu

```
---------------------------------------------------------
------ Network Settings: Ethernet Port 1 ------
---------------------------------------------------------
1. Dynamic Addressing (DHCP)   Enabled
2. IP Address                  [None]
3. Subnet Mask                 [None]
4. Default Gateway             [None]

 MAC Address          00:60:26:10:89:A8
 Link Status          Enabled

0. Exit to previous menu

Select an option ==>
```

Figure 11. Ethernet Port 1 Menu

2. Type **1** and press **Enter** to display the DHCP control option (see Figure 12).

```
-------------------------------------------------------
------ Network Settings: Ethernet Port 1 ------
-------------------------------------------------------
1. Dynamic Addressing (DHCP)   Disabled
2. IP Address                  [None]
3. Subnet Mask                 [None]
4. Default Gateway             [None]

 MAC Address          00:60:26:10:89:A8
 Link Status          Enabled

0. Exit to previous menu

Select an option ==> 1

Enable DHCP? (y/n): n
```

Figure 12. DHCP Control Option

3. Type **n** and press **Enter** to disable DHCP control.

4. To set the IP address, type **2** and press **Enter**. Type the IP address and press **Enter**.

5. To set the subnet mask, type **3** and press **Enter**. Type the subnet mask address and press **Enter**.

6. To set the gateway, type **4** and press **Enter**. Type the gateway address and press **Enter**.

7. Type **0** to return to the Network Settings menu (see Figure 13).

```
-------------------------------------------------------
---------------- Network Settings ----------------
-------------------------------------------------------
1. Ethernet Port 1 Settings
2. Ethernet Port 2 Settings
3. DNS Server (Primary)      :  [None]
4. DNS Server (Secondary)    :  [None]
5. Reset to Factory Defaults and Exit
6. Save & apply all settings
0. Exit without saving

Select an option ==>
```

Figure 13. Network Settings Menu

8. If you connected Ethernet Port 2 to a separate network, continue to Step 9 to assign the IP address for Port 2. Otherwise, continue to Step 11.

9. Type **2** and press **Enter** on the Network Settings menu (see Figure 10 on page 11) to display the Network Settings: Ethernet Port 2 menu (see Figure 14).

```
------------------------------------------------------------
------ Network Settings: Ethernet Port 2 ------
------------------------------------------------------------
1. Dynamic Addressing (DHCP)   Enabled
2. IP Address                  [None]
3. Subnet Mask                 [None]
4. Default Gateway             [None]

 MAC Address                   00:60:26:10:89:A8
 Link Status                   Enabled

0. Exit to previous menu

Select an option ==>
```

Figure 14. Ethernet Port 2 Menu

10. Repeat Steps 2 through 7 to assign the IP address and other options for Port 2.

11. If you will be using host names for controlling access to the card, type **3** and press **Enter**. Type the primary DNS server IP address and press **Enter**.

    Type **4** and press **Enter**. Type the secondary DNS server IP address and press **Enter** (see Figure 15).

```
------------------------------------------------------------
---------------- Network Settings ----------------
------------------------------------------------------------
1. Ethernet Port 1 Settings
2. Ethernet Port 2 Settings
3. DNS Server (Primary)     :   10.222.51.8
4. DNS Server (Secondary)   :   [None]
5. Reset to Factory Defaults and Exit
6. Save & apply all settings
0. Exit without saving
Select an option ==> 4
```

Figure 15. DNS Server Settings

12. Type **6** and press **Enter** to save and apply all settings (see Figure 16).

13. Type **y** and press **Enter** to confirm that you want to save and apply all settings and exit the utility.

```
---------------------------------------------------------
---------------- Network Settings ----------------
---------------------------------------------------------
1. Ethernet Port 1 Settings
2. Ethernet Port 2 Settings
3. DNS Server (Primary)      :  10.222.51.8
4. DNS Server (Secondary)  :  10.222.1.75
5. Reset to Factory Defaults and Exit
6. Save & apply all settings
0. Exit without saving
Select an option ==> 6
Save & apply all settings? (y/n): y
```

Figure 16. Save and Apply All Settings

14. Verify network communication by using a Web browser (see Figure 17). Type the IP address of the card and select **Go**.

15. The login prompt appears. The user name and default password is *user* for read-only information and *admin* for configuration (read/write) options.

The PXGX Series 1000 Card Web page opens (see Figure 17).
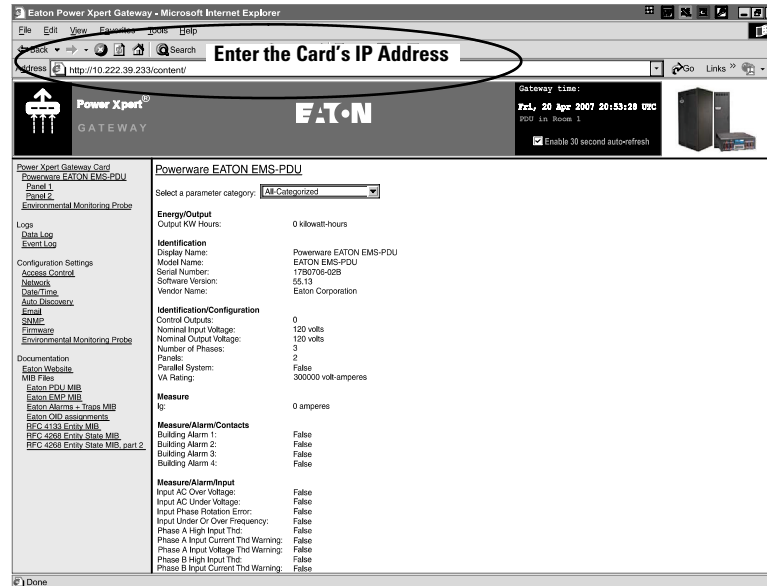
Figure 17. PXGX Series 1000 Card Web Page

16. If you logged in as *admin*, continue to Chapter 2, "Configuring the Card" on page 19 for additional configuration options.

i **NOTE** *Once you have logged in as admin, it is important to completely exit the browser to set the security level back to the standard read-only level.*

Network Configuration

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

1. Open a Web browser, type the IP address of the card, and select **Go**.

2. The login prompt appears. The user name and default password is *user* for read-only information and *admin* for configuration (read/write) options. Log in as *admin*.

The PXGX Series 1000 Card Web page opens (see Figure 18).
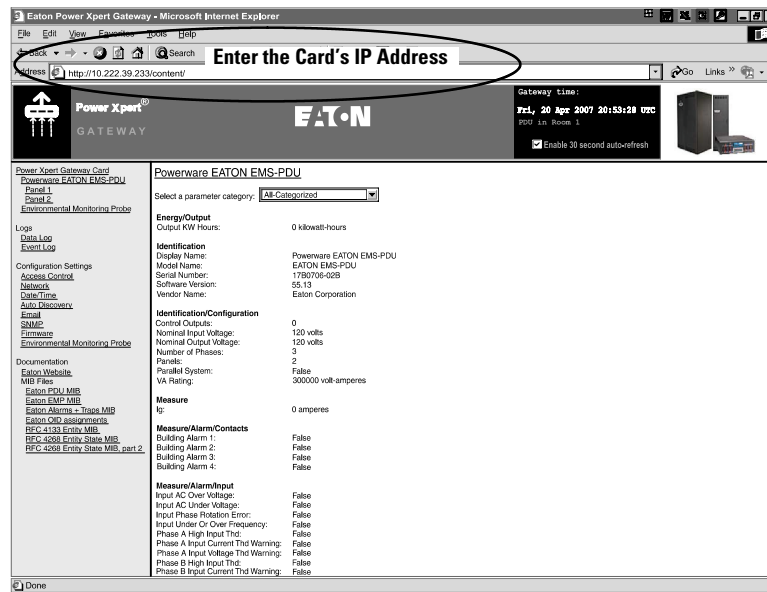
Figure 18. PXGX Series 1000 Card Web Page

3. Select the **Network** link from the menu bar.

The Network Configuration Settings page appears. The page shows the current network status for each port on the card (green indicates the network is connected; red indicates the network is disconnected).

4. You can enable or disable the DHCP control by activating or deactivating the check box. The default is **DHCP enabled**.

5. If you will be using host names for controlling access to the card, enter the **Domain**, as well as the DNS IP addresses in the **Nameserver** fields.

6. If you will be using Simple Network Management Protocol (SNMP), identify the physical location of the installed PDU/card (sysLocation string) in the **System location** field. This value also appears in the card's Web page header bar.

   Enter the information to identify someone to contact with questions about this device (sysContact string) in the **System contact** field. For example, you can type a person's name, phone number, department, e-mail address, or physical location.

7. You can also modify the card's IP address, the subnet mask, and the gateway address for Port 1 and Port 2 (**IP address**, **Netmask**, and **Gateway** fields).

8. Click **Apply** to save the settings or **Discard** to cancel the changes.

9. Continue to Chapter 2, "Configuring the Card" on page 19 for additional configuration options.

NOTE *Once you have logged in as admin, it is important to completely exit the browser to set the security level back to the standard read-only level.*

Chapter 2   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 DNS Server (see "Network Configuration" on page 16).*

> **NOTE** *You must be logged in as admin to configure the card. Once you have logged in as admin, it is important to completely exit the browser to set the security level back to the standard read-only level.*

This section explains:

- Changing the passwords
- Setting the date and time
- Configuring SNMP options and managing from an SNMP NMS
- Configuring Modbus TCP/IP options
- Configuring e-mail notification
- Configuring the Powerware Environmental Monitoring Probe (EMP)
- Configuring auto discovery settings

Changing the Passwords

The user name and default password is *user* for read-only information and *admin* for configuration (read/write) options.

To change the passwords:

1. From the card's Web page, click the **Access Control** link from the menu bar.

2. To change the user password, enter the new password in the **'user' password** field. The characters appear as asterisks (*).

    To change the admin password, log in as *admin* and enter the new password in the **'admin' password** field. The characters appear as asterisks (*).

3. Click **Apply** and then **OK** to save the settings. The password updates and displays as a full row of asterisks.

NOTE *Once you have logged in as admin, it is important to completely exit the browser to set the security level back to the standard read-only level.*

NOTE *After you change the password, you will be prompted to enter the new password the next time you navigate through the card's Web page.*

Setting the Date and Time

i **NOTE** *All selections are automatically converted to Coordinated Universal Time (UTC).*

To set the date and time:

1. From the card's Web page, click the **Date/Time** link from the menu bar.

    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 is indicated in parentheses:

    *   **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.

i **NOTE** *When using host names, verify that the IP address of your network DNS Server is configured (see "Network Configuration" on page 16).*

NOTE *When NTP status is Synchronized and there is a large discrepancy between the PXGX Series 1000 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 use the pull-down menus to select the local date in *mm/dd/yyyy* format and the local time in *hh/mm/ss* format.

4. To customize how the date appears 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 **Timezone for Logs, email, and connected device**.

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

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 default community strings are "public" for read-only, "private" for read-write, and "public" for receiving traps.

The PXGX Series 1000 Card supports several event-related traps that can be reported to the SNMP network management software. See Chapter 4, "MIB Files," on page 45 for more information.

To configure the SNMP options:

1. From the card's Web page, click the **SNMP** link from the menu bar.

2. To change the community strings, type a new community string in the appropriate field.

3. Click **Add** to add a new trap recipient entry to the list. An IP/hostname field appears. Enter the IP address or host name for the trap recipient.

i ***NOTE*** *When using host names, verify that the IP address of your network DNS Server is configured (see "Network Configuration" on page 16).*

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

5. Repeat Steps 3 and 4 for each additional trap recipient.

    To remove a trap recipient, click **Delete Last**. Click **OK** when prompted to remove the settings for the trap recipient entered last.

Restricting SNMP Access

To limit access to the card from trusted SNMP NMS hosts only:

1. From the card's Web page, click the **Access Control** link from the menu bar.

2. Activate the check box for **SNMP access restricted by IP/hostname**.

3. Type the trusted NMS host's IP addresses or host names, separated by a semi-colon, in the **Trusted IPs/hostnames** field.

i **NOTE** *When using host names, verify that the IP address of your network DNS Server is configured (see "Network Configuration" on page 16).*

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

System Location and System Contact

To set the system location and system contact:

1. From the card's Web page, click the **Network** link from the menu bar.

2. Enter the physical location of the installed Power Distribution Unit (PDU)/card (sysLocation string) in the **System location** field. This value also appears in the card's Web page header bar.

3. Enter the information to identify someone to contact with questions about this device (sysContact string) in the **System contact** field. For example, you can 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 Series 1000 Card via SNMP:

1. Use these default Community strings:

GET Community string: *public*
SET Community string: *private*

2. From the card's Web page, click the **Documentation** link from the menu bar (or visit www.eaton.com/powerxpert) for the following MIB files for the PXGX Series 1000 Card:

MIB Name	Filename	Description
Eaton PDU MIB	EATON-PDU-MIB.txt	Meters available from the PDU, 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 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 Eatons 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

Add these files to the MIB database of your SNMP management software (such as HP OpenView,™ IBM® Director, and Sun NetManager).

3. Use the facilities provided by the SNMP management software to access the individual MIB objects. See Chapter 4, "MIB Files," on page 45 for more information.

Configuring Modbus TCP/IP Options

To limit access to the card from trusted Modbus TCP/IP addresses only:

1. From the card's Web page, click the **Access Control** link from the menu bar.

2. Activate the check box for **Modbus-TCP access restricted by IP/hostname**.

3. Type the trusted host's IP addresses or host names, separated by a semi-colon, 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 16).*

NOTE *If the SMTP server does not use Port 25, append the port to the IP address (for example, mysmtpserver:33).*

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

For information on Modbus registers, see Chapter 5, "Modbus Registers," on page 49.

Configuring E-mail Notification

You may use the PXGX Series 1000 Card to inform selected e-mail accounts of events and changes in status as they occur in the PDU or to provide a status message at a predetermined time.

To configure e-mail notification:

1. From the card's Web page, click the **Email** link from the menu bar.

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, click **Advanced SMTP settings...**.

If you have made changes to the E-mail page, click **OK** to save the settings; otherwise, click **Cancel**. The Advanced SMTP Configuration Settings page appears.

Enter the user name and password in the **SMTP username** and **SMTP password** fields.

You can specify a "from" e-mail address in the **SMTP "From" Address** field (for example, PDU_1@10.222.10.111).

Click **Apply** to save the settings and return to the previous screen.

4. You can specify events to trigger an e-mail to be sent to all recipients. Click **Configure** to select the events.

Click **OK** to save the settings; otherwise, click **Cancel**. The Email Event Trigger Configuration Settings page appears.

You can select all, deselect all, or select specific event check boxes for e-mail notification.

Click **Apply** to save the settings and return to the previous screen.

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.

5. The e-mail **Recipients** are numbered. Select a number for a recipient. You can select different options for each recipient (Steps 6 through 10).

   After you enter and save an e-mail address, the Recipients list updates to show the recipient number and the corresponding e-mail address.

6. The default (**True**) is to send an e-mail when an event is activated and when it clears. Select **False** in the appropriate **Send on event...** fields to change these notification settings.

7. The default (**True**) is to attach an event log file, a data log file, and a PDU identification file to the Event e-mails. (These files are always attached to the Daily e-mails.) Select **False** in the appropriate **Attach...** fields to remove these attachments from the Event e-mails.

8. The default (**True**) is to send a daily status report. Select **False** in the **Send periodic status** field to cancel the status e-mails, or change the number of **Days between periodic status email** to receive them less frequently.

9. Specify the **Time of day** to send the e-mail (in 24-hour format, PXGX Series 1000 Card time).

10. Enter the recipient's e-mail address in the **To** field.

11. Click **Apply** to save the e-mail settings.

12. Select the next number in the Recipients pull-down menu to add another e-mail recipient.

    Repeat Steps 6 through 11 for each additional e-mail recipient.

Configuring EMP Settings

> *i* **NOTE** *Verify that the Power Xpert Gateway Card DIP switch #2 is set to the ON position, enabling the card for communication with an EMP.*

To configure the EMP settings:

1. From the card's Web page, click the **Environmental Monitoring Probe** link from the menu bar.

2. For Contact #1 and #2, enter the **Contact Description**, such as External Contact #1 and External Contact #2.

3. For Contact #1 and #2, select the **Contact Type** as Normally Open or Normally Closed from the pull-down menu. Disabled is the default.

4. To set the temperature limits of the EMP, enter 0 to 70 degrees Celsius for the **Temperature Upper Limit** and the **Temperature Lower Limit**. The default for the upper limit is 70; the default for the lower limit is 0.

5. 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.

6. 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.

7. Use the **Humidity Hysteresis** to control the alarm when the current value is hovering around the 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. The default is 2 percent.

8. Click **Apply** to save the settings.

Configuring Auto Discovery Settings

Configure the Auto Discovery settings so that the Power Xpert Software can find the PXGX Series 1000 Card on the network automatically. The card sends multicast discovery messages to any control Power Xpert host monitoring the specified Listen port.

To configure the auto discovery settings:

1. From the card's Web page, click the **Auto Discovery** link from the menu bar.

2. The default **Listen port** is 1900. To modify, enter a value between 10000 and 65535.

3. The default **Announce period** is 600 seconds. To modify, enter a value between 60 and 1800 seconds.

4. The default **Announce TTL** is 4 hops. To modify, enter a value between 1 and 254.

Chapter 3   Root Certificate Authority Installation

Improve the security of your PXGX Series 1000 Card on the Web by installing a root certificate authority (CA). A CA is a trusted third-party organization that issues digital certificates for use with encrypted digital transactions. The digital certificate guarantees that the company holding a certificate is who it claims to be.

You can use the card without installing a root CA (using http), but the transactions will not be as secure as with the root CA (using https). The performance of the card is not impacted by using secure transactions.

This section explains root CA installation for:

- Microsoft Internet Explorer 6
- Microsoft Internet Explorer 7
- Mozilla Firefox

Installing Root CA with Microsoft Internet Explorer 6

To install a certificate for the PXGX Series 1000 Card with Microsoft Internet Explorer 6:

1. Open the browser, type the IP address of the card in the address bar, and select **Go**. For example: `https://10.222.51.236/`

The Security Alert window opens (see Figure 19).

Figure 19. Security Alert Window

2. Click the **View Certificate** button.

The Certificate window opens (see Figure 20).

```
┌─────────────────────────────────────────────────────────┐
│ Certificate                                    [ ? ][ ✕ ] │
│                                                           │
│  General │ Details │ Certification Path                   │
│  ┌─────────────────────────────────────────────────────┐ │
│  │                                                      │ │
│  │   [icon]    Certificate Information                  │ │
│  │  ─────────────────────────────────────────────────  │ │
│  │   This certificate cannot be verified up to a trusted│ │
│  │   certification authority.                           │ │
│  │                                                      │ │
│  │                                                      │ │
│  │  ─────────────────────────────────────────────────  │ │
│  │      Issued to:  10.222.51.236                       │ │
│  │                                                      │ │
│  │      Issued by: Power Xpert Gateway Card             │ │
│  │                                                      │ │
│  │      Valid from  3/26/2007 to 8/11/2034              │ │
│  │                                                      │ │
│  │              [ Install Certificate... ][ Issuer Statement ] │
│  │                                                      │ │
│  │                              [      OK      ]        │ │
│  └─────────────────────────────────────────────────────┘ │
└─────────────────────────────────────────────────────────┘
```

Figure 20. Certificate Window

---

[i]   **NOTE**   *The certificate cannot be verified yet because it is issued by a nontrusted CA.*

---

3. Select the **Certification Path** tab.

The root CA is displayed as "Power Xpert Gateway Card" and the issued certificate is shown as the device's IP address (see Figure 21).

4. Select **Power Xpert Gateway Card**.
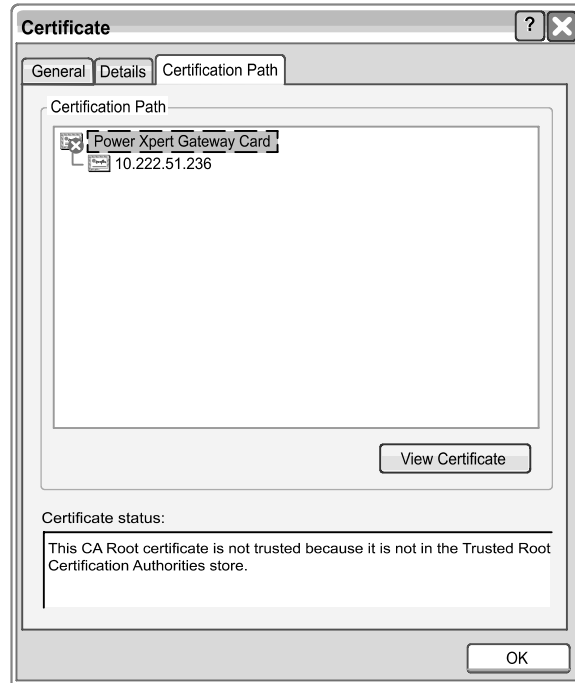
Figure 21. Certification Path Window

5. Click **View Certificate**.

A new Certificate window opens for the CA (see Figure 22).

Figure 22. Certification Window for the Power Xpert Gateway Card

6. Click **Install Certificate...**.

The Certificate Import Wizard window opens (see Figure 23).

Figure 23. Certificate Import Wizard

7. Click **Next**.

The Certificate Store window opens, prompting you to specify a certificate store (see Figure 24).

Figure 24. Certificate Store Window

8. Verify that the default setting, **Automatically select the certificate store ...**, is selected.

9. Click **Next**.

The certificate wizard displays a final verification (see Figure 25).

Figure 25. Verifying the Certificate Import Settings

10. Click **Finish** to complete the wizard.

A message box similar to Figure 26 opens:

Figure 26. Security Warning Message

11. Click **Yes** to install the CA.

A new dialog box window opens to verify that the import was successful.

12. Close all windows except for the original Security Alert window (see Figure 19 on page 32).

13. Click **View Certificate**.

An updated Certificate window opens showing a trusted certificate (see Figure 27).

14. Click **OK**.
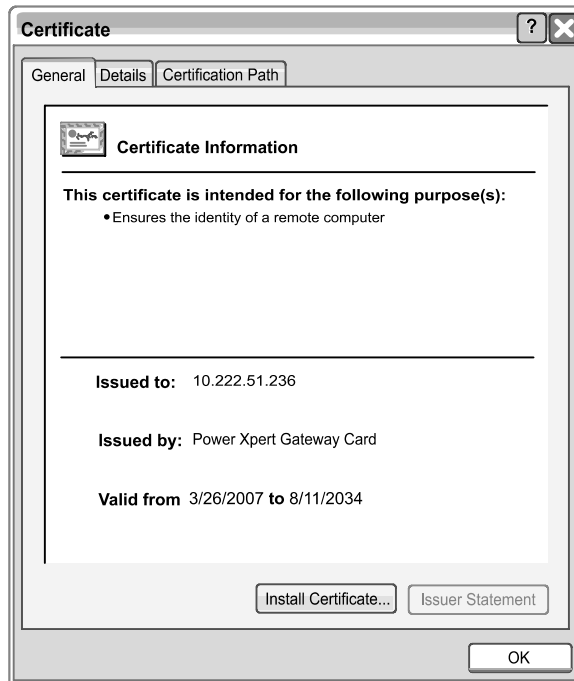
Figure 27. Updated Certificate Window

15. The installation process is complete. You can now access the card using the https protocol (for example, https://10.222.51.236).

Installing Root CA with Microsoft Internet Explorer 7

To install a certificate for the PXGX Series 1000 Card with Microsoft Internet Explorer 7:

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://10.222.51.236/ca.html`

The following window displays (see Figure 28):
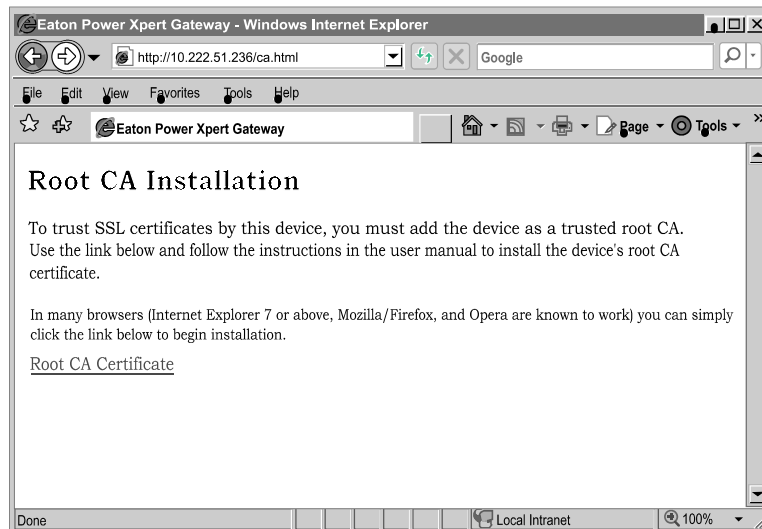
Figure 28. Internet Explorer 7 Window

2. Click **Root CA Certificate**.

A File Download warning window opens (see Figure 29).

File Download - Security Warning [×]

Do you want to open or save this file?

Name: gateway_ca.cer

Type: Security Certificate, 1.29KB

From: 10.222.51.236

[Open]   Save   Cancel

While files from the Internet can be useful, this file type can potentially harm your computer. If you do not trust the source, do not open or save this software. What's the risk?

Figure 29. File Download Warning

3. Click **Open**.

The Certificate Window opens (see Figure 20 on page 33).

4. Follow the remaining steps for using Internet Explorer 6 (Step 3 on page 34 through Step 15 on page 39).

Installing Root CA with Mozilla Firefox

To install a certificate for the PXGX Series 1000 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://10.222.51.236/ca.html`

The following window displays (see Figure 30):

Figure 30. Mozilla Firefox Window

2. Click **Root CA Certificate**.

Firefox opens the Downloading Certificate window (see Figure 31).

Downloading Certificate   ☒
You have been asked to trust a new Certificate Authority (CA).
Do you want to trust "Power Xpert Gateway Card" for the following purposes?
☑ Trust this CA to identify web sites.
☐ Trust this CA to identify email users.
☐ Trust this CA to identify software developers.
Before trusting this CA for any purpose, you should examine its certificate and its policy and procedures (if available).
[View]   Examine CA certificate
[OK]   [Cancel]

Figure 31. Downloading Certificate Window

3. If desired, click **View** to manually examine the contents of the certificate.

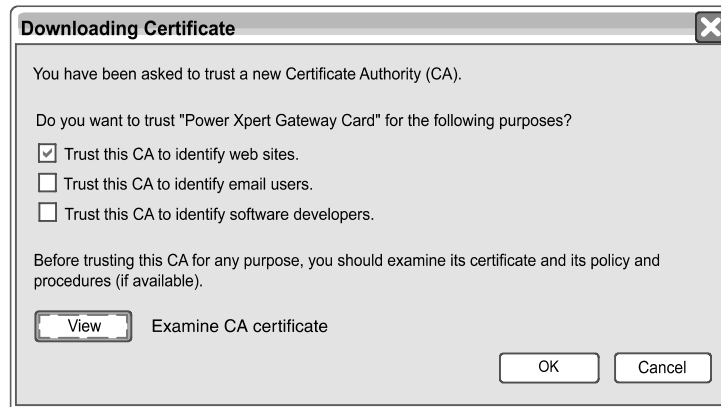**4.** Click the **Trust this CA to identify web sites** check box option.

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://10.222.51.236).

Chapter 4   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) or Remote Power Panel (RPP).

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 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 PDU, Panel, and Breaker information levels:

- mainPDU
- pduPanel
- pduBreaker

mainPDU

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

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

pduPanel

Objects in this group provide the nominal values for each panel. The group contains a table of meters by phase (normally three-phase) and tables of meters and ratings that are not dependent on an individual phase.

pduBreaker

Objects in this group provide the nominal values for each breaker. The group contains a table of meters by phase (normally three-phase) and tables of meters and ratings that are not dependent on an individual phase.

Eaton EMP MIB

Objects in this group are provided by the 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 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 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 5   Modbus Registers

This chapter describes how to address a specific Power Distribution Unit (PDU) or Remote Power Panel (RPP), a specific panel in a PDU or RPP, and a specific breaker in a panel using Modbus TCP/IP.

> ⓘ **NOTE** *To obtain the panel or circuit breaker data, the PDU/RPP must have the Energy Management System (EMS) Level 3 option installed.*

A PDU/RPP distributes power through one or more circuit breaker panels. Each panel consists of several circuit breakers. Each circuit breaker monitors 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 PDU/RPP, 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 the names of the PDU/RPP parameters and their corresponding Modbus registers for:

- PDU/RPP 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 monitoring 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 PDU/RPP 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.*

Modbus Register Addressing

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

Modbus Function Codes

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

Table 1. 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 PDU/RPP 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 for a given entry (it is a multiple of two so that entries are register-aligned).

- **TIME** – The Time type (*ymdhms*) 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, 2007 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 (07), month (05), day (17), hour (10), minutes (45), and seconds (20):

07 05	17 10	45 20

- **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 3 through Table 9, starting on page 54, 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.

i **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 3 on page 54 can be obtained by reading 32 Modbus registers starting at register 1001.*

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

PDU/RPP Unit ID Numbers

Because the PDU/RPP consists of several panels of circuit breakers, set the Unit ID in the Modbus program to specify a specific PDU/RPP, a specific panel, or a specific breaker (see Table 2).

The PDU/RPP has a Unit ID of 0, 1, or 255. The same PDU/RPP information can be obtained from any of these IDs. See "PDU/RPP Registers and Alarms" on page 54 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 60 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.

If there is an optional Environmental Monitoring Probe (EMP) installed, use Unit ID 254 to obtain EMP data. See "Environmental Monitoring Probe (FC 03 or 04)" on page 68 for more information.

Table 2. PDU/RPP Unit ID Numbers

Unit ID	Description
0	PDU/RPP Summary Data
1	PDU/RPP 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

Table 2. PDU/RPP Unit ID Numbers (continued)

Unit ID	Description
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
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
254	Environmental Monitoring Probe
255	PDU/RPP Summary Data

PDU/RPP Registers and Alarms

This section contains information for the PDU/RPP Registers (FC 04) and PDU/RPP Alarms (FC 02).

PDU/RPP Registers (FC 04)

To read the vendor name in the PDU/RPP, set the Modbus program to Unit ID 1 and register 1001:

```
IP: <IP address of PDU/RPP>
Unit ID: 1
Starting Register: 1001
Number of registers: 32
Function Code: 04
```

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

Table 3. PDU/RPP Registers (FC 04)

Name	Register	Data Type	Bytes
Vendor Name	1001	STRING	64
Model Name	1033	STRING	64
Display Name	1065	STRING	64
Device Type	1097	UINT	4
Device ID	1099	UINT	4
Device Guid	1103	STRING	40
Serial Number	1123	STRING	64
Conn Style	1159	UINT	2
Device Comm Address	1160	STRING	64
Device Baud Rate	1192	UINT	4
Time Sync Period	1194	UINT	4
Data Update Period	1196	UINT	4
Device VAR Rating	1198	UINT	4
Device Volts In Rating	1204	UINT	4
Device Volts Out Rating	1206	UINT	4

Table 3. PDU/RPP Registers (FC 04) (continued)

Name	Register	Data Type	Bytes
Number of Phases	1208	UINT	2
Parallel System Flag	1209	UINT	2
Number of Controlled Banks	1210	UINT	2
Device Topology	1211	UINT	2
Asset ID	1324	STRING	128
Number of Panels	1453	UINT	2
Status	3000	UINT	2
Redundant State	3004	UINT	2
Horn Status	3005	UINT	2
Enter Admin State	3047	UINT	2
Enter Operating State	3048	UINT	2
Enter Readiness State	3049	UINT	2
Enter Alarm State	3050	UINT	2
Enter Standby State	3051	UINT	2
AC V in Phase AB	4028	FLOAT	4
AC V in Phase BC	4030	FLOAT	4
AC V in Phase CA	4032	FLOAT	4
AC V in Phase A	4040	FLOAT	4
AC V in Phase B	4042	FLOAT	4
AC V in Phase C	4044	FLOAT	4
AC V out Phase A	4046	FLOAT	4
AC V out Phase B	4048	FLOAT	4
AC V out Phase C	4050	FLOAT	4
AC V ratio A in	4154	FLOAT	4
AC V ratio B in	4156	FLOAT	4
AC V ratio C in	4158	FLOAT	4
AC V ratio A out	4160	FLOAT	4
AC V ratio B out	4162	FLOAT	4

Table 3. PDU/RPP Registers (FC 04) (continued)

Name	Register	Data Type	Bytes
AC V ratio C out	4164	FLOAT	4
AC I Gnd	5008	FLOAT	4
AC I in A	5022	FLOAT	4
AC I in B	5024	FLOAT	4
AC I in C	5026	FLOAT	4
AC I out A	5028	FLOAT	4
AC I out B	5030	FLOAT	4
AC I out C	5032	FLOAT	4
AC I out N	5034	FLOAT	4
AC I out A Limit	5038	FLOAT	4
AC I out B Limit	5040	FLOAT	4
AC I out C Limit	5042	FLOAT	4
AC I ratio A in	5094	FLOAT	4
AC I ratio B in	5096	FLOAT	4
AC I ratio C in	5098	FLOAT	4
AC I ratio A out	5100	FLOAT	4
AC I ratio B out	5102	FLOAT	4
AC I ratio C out	5104	FLOAT	4
Watts in Total	6022	FLOAT	4
Watts out Total	6024	FLOAT	4
VA in Total	6086	FLOAT	4
VA out Total	6088	FLOAT	4
PF Disp out	6202	FLOAT	4
PF Disp in	6204	FLOAT	4
Output kW Hours	7002	FLOAT	4
I A in THD	8008	FLOAT	4
I B in THD	8010	FLOAT	4
I C in THD	8012	FLOAT	4

Table 3. PDU/RPP Registers (FC 04) (continued)

Name	Register	Data Type	Bytes
I A out THD	8014	FLOAT	4
I B out THD	8016	FLOAT	4
I C out THD	8018	FLOAT	4
VA in THD	8042	FLOAT	4
VB in THD	8044	FLOAT	4
VC in THD	8046	FLOAT	4
VA in THD	8048	FLOAT	4
VB in THD	8050	FLOAT	4
VC in THD	8052	FLOAT	4
CFph A out	8312	FLOAT	4
CFph B out	8314	FLOAT	4
CFph C out	8316	FLOAT	4
Output Frequency	11002	FLOAT	4
Input Frequency	11004	FLOAT	4
Current Time	12203	TIME	6

PDU/RPP Alarms (FC 02)

The PDU/RPP 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 PDU/RPP 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 PDU>
Unit ID: 1
Starting Register: 1008
Number of Registers: 1
Function Code: 02
```

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

Table 4. PDU/RPP Alarms (FC 02)

Name	Register	Data Type
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
Internal Comm Failure	1062	BOOL
Input Phase Rotation	1089	BOOL
Emergency Shutdown	1093	BOOL
Overload A	1139	BOOL
Overload B	1140	BOOL
Overload C	1141	BOOL
Overload High Phase A	1142	BOOL
Overload High Phase B	1143	BOOL
Overload High Phase C	1144	BOOL
Overload Extreme Phase A	1145	BOOL
Overload Extreme Phase B	1146	BOOL
Overload Extreme Phase C	1147	BOOL
Xformer Over Temperature	1164	BOOL
Check Modem	1174	BOOL
Configuration Error	1182	BOOL
System Notice Active	1185	BOOL

Table 4. PDU/RPP Alarms (FC 02) (continued)

Name	Register	Data Type
System Alarm Active	1186	BOOL
Inverter Rotation	1192	BOOL
Invalid Board ID	1195	BOOL
Output Watts Overload	1197	BOOL
Xformer Over Temp Warning	1210	BOOL
Input THD High A	1212	BOOL
Input THD High B	1213	BOOL
Input THD High C	1214	BOOL
Output THD High A	1215	BOOL
Output THD High B	1216	BOOL
Output THD High C	1217	BOOL
Neutral Overload Warning	1218	BOOL
Neutral Overload	1219	BOOL
Ground Current Warning	1220	BOOL
Ground Current Overload	1221	BOOL
V Input THD Warning A	1222	BOOL
V Input THD Warning B	1223	BOOL
V Input THD Warning C	1224	BOOL
I Input THD Warning A	1225	BOOL
I Input THD Warning B	1226	BOOL
I Input THD Warning C	1227	BOOL
V Output THD Warning A	1228	BOOL
V Output THD Warning B	1229	BOOL
V Output THD Warning C	1230	BOOL
I Output THD Warning A	1231	BOOL
I Output THD Warning B	1232	BOOL
I Output THD Warning C	1233	BOOL
Panel Phase A Loss	1235	BOOL
Panel Phase B Loss	1236	BOOL
Panel Phase C Loss	1237	BOOL

Table 4. PDU/RPP Alarms (FC 02) (continued)

Name	Register	Data Type
Branch Breaker Overload Warning	1249	BOOL
Branch Breaker Overload	1250	BOOL
Branch Breaker Disconnected	1252	BOOL
Main Breaker Overload Warning	1253	BOOL
Main Breaker Overload	1254	BOOL
Primary Breaker Open	1256	BOOL
Primary Breaker Tripped	1257	BOOL
Secondary Breaker Open	1258	BOOL
Secondary Breaker Tripped	1259	BOOL
Input Phase Rotation	1477	BOOL

Panel Registers and Alarms

This section contains information for the Panel Summary Registers (FC 04) and the Panel Alarms (FC 01 or 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 5 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 PDU/RPP>
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 PDU/RPP>
Unit ID: 5
Starting Register: 4010
Number of Registers: 2
Function Code: 04
```

Table 5. Panel Summary Registers (FC 04)

Name	Register	Data Type	Bytes
Display Template	1000	UINT	2
Vendor Name	1001	STRING	64
Model Name	1033	STRING	64
Display Name	1065	STRING	64
Serial Number	1123	STRING	64
Device Volts Rating	1202	UINT	4
Number of Phases	1208	UINT	2
Asset ID	1324	STRING	128
Breaker Rating	1453	UINT	2
Breaker Warning	1456	UINT	2
Breaker Overload	1457	UINT	2
Neutral Current Alarm	1459	UINT	2
Enter Admin State	3047	UINT	2
Enter Operating State	3048	UINT	2
Enter Readiness State	3049	UINT	2
Enter Alarm State	3050	UINT	2
Enter Standby State	3051	UINT	2

Table 5. Panel Summary Registers (FC 04) (continued)

Name	Register	Data Type	Bytes
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
Percent Full Load Current A	5185	FLOAT	4
Percent Full Load Current B	5186	FLOAT	4
Percent Full Load Current C	5188	FLOAT	4
Watts Total	6006	FLOAT	4
Watts Total MAX	6014	FLOAT	4
VA Total	6070	FLOAT	4
VA Total MAX	6078	FLOAT	4
PF Disp Total	6219	FLOAT	4
PF Disp Sys MIN	6268	FLOAT	4
PF Disp Sys MAX	6288	FLOAT	4
Watts Total MIN	6356	FLOAT	4
VA MIN	6364	FLOAT	4
kW Hour	7618	FLOAT	4
Monthly kW Hour	7620	FLOAT	4
Yearly kW Hour	7622	FLOAT	4
Frequency	11000	FLOAT	4

Table 5. Panel Summary Registers (FC 04) (continued)

Name	Register	Data Type	Bytes
MIN Frequency	11022	FLOAT	4
MAX Frequency	11027	FLOAT	4

Panel Alarms (FC 01 or 02)

Table 6 lists the panel alarms. They are not registers, but are discrete inputs and are read using FC 01 or 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 PDU/RPP>
Unit ID: 5
Starting Register: 1254
Number of Registers: 1
Function Code: 02
```

Table 6. Panel Alarms (FC 01 or 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:

- 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 PDU/RPP>
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 PDU/RPP at the specified IP address.

Table 7. Breaker #1 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
AC MAX Current Phase B	1045	FLOAT	4

Table 7. Breaker #1 Data Registers (FC 04) (continued)

Name	Register	Data Type	Bytes
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
Watts Phase B	1057	FLOAT	4
Watts Phase C	1059	FLOAT	4
Watts Phase A MAX	1061	FLOAT	4
Watts Phase B MAX	1063	FLOAT	4
Watts Phase C MAX	1065	FLOAT	4
VA Phase A	1067	FLOAT	4
VA Phase B	1069	FLOAT	4
VA Phase C	1071	FLOAT	4
VA Phase A MAX	1073	FLOAT	4
VA Phase B MAX	1075	FLOAT	4
VA Phase C MAX	1077	FLOAT	4
PF Displacement Phase A	1079	FLOAT	4
PF Displacement Phase B	1081	FLOAT	4
PF Displacement Phase C	1083	FLOAT	4
PF Displacement A Minimum	1085	FLOAT	4
PF Displacement B Minimum	1087	FLOAT	4
PF Displacement C Minimum	1089	FLOAT	4
PF Displacement A Maximum	1091	FLOAT	4
PF Displacement A Maximum	1093	FLOAT	4
PF Displacement A Maximum	1095	FLOAT	4
kW Hours	1097	FLOAT	4
kW Hours Monthly	1099	FLOAT	4
kW Hours Yearly	1101	FLOAT	4

Calculating Breaker Register Numbers

Table 7 shows the 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:

Breaker register # = Breaker #1 register + ((Breaker # – 1) x 200))

For example:

Breaker #2 starts at 1200:

1000 + ((2 – 1) x 200)
1000 + (1 x 200)
1000 + 200
1200

Breaker #3 starts at 1400:

1000 + ((3 – 1) x 200)
1000 + (2 x 200)
1000 + 400
1400

Breaker #14 starts at 3600:

1000 + ((14 – 1) x 200)
1000 + (13 x 200)
1000 + 2600
3600

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:

1055 + ((18 – 1) x 200)
1055 + (17 x 200)
1055 + 3400
4455

Breaker Alarms (FC 01 or 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 01 or FC 02 in the Modbus program.

Table 8. Breaker Alarms (FC 01 or 02)

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

Table 8 shows the alarms for Breaker #1. Determine the corresponding alarms for other breakers by using the following formula:

Breaker #5 address = ((Breaker number – 1) x 2) + Breaker #1 address

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

Breaker #5 Overload Warning
$$= ((5 – 1) \times 2) + 1000$$
$$= ((4) \times 2) + 1000$$
$$= (8) + 1000$$
$$= 1008$$

To find the Overload alarm address for Breaker #20:

Breaker #20 Overload
$$= ((20 – 1) \times 2) + 1001$$
$$= ((19) \times 2) + 1001$$
$$= (38) + 1001$$
$$= 1039$$

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

```
IP: <IP address of PDU/RPP>
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 PDU/RPP at the specified IP address.

Environmental Monitoring Probe (FC 03 or 04)

The optional Environmental Monitoring Probe for the PDU/RPP can measure temperature and humidity. Because the device can be located outside the PDU/RPP, 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 9 for a list of EMP registers.

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

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

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

Table 9. Environmental Monitor (FC 03 or 04)

Name	Register	Data Type	Bytes
Vendor Name	1001	STRING	64
Model Name	1033	STRING	64
Display Name	1065	STRING	64
Serial Number	1123	STRING	64
Device ID	1099	UINT	4
Auxiliary Input 1	10275	UINT	2
Auxiliary Input 2	10276	UINT	2
Auxiliary Temperature	12028	FLOAT	4
Auxiliary Humidity	12030	FLOAT	4

Chapter 6 Specifications

Table 10. Technical Specifications

CPU	Atmel AT91RM9200 ARM-9
Memory	32 MB Static DRAM 32 MB Flash ROM
LAN Controller	AT91RM9200 Integrated – Port 1 SMSC LAN91C113I – Port 2
Network Connection	(2) 10/100BaseT RJ-45 network connectors
PDU Protocol	Powerware Power Distribution Unit (PDU) communication protocol
Network Protocols (not limited to)	SNMP v1 over UDP/IP Modbus TCP/IP HTTP/HTTPS BACnet/WS BOOTP, DHCP TCP/IP
Supported SNMP MIBs	Eaton PDU MIB Eaton EMP MIB Eaton Alarms+Traps MIB Eaton OID assignments RFC 1213 (MIB-II) RFC 4133 (Entity MIB) RFC 4268 (Entity State MIB)
Operating Temperature	0–40°C (32–104°F)
Operating Humidity	10–80%, noncondensing
Power Input	8–25 Vdc unregulated (12 Vdc nominal)
Power Consumption	2.0 watts maximum
Size (L x W x H)	12 cm x 11.4 cm x 3.9 cm (4.7″ x 4.5″ x 1.5″)
Weight	200 gm (7 oz)
EMC Statements	Class A: FCC Part 15 EU Standard: EN 55022:1988+A1:2000+A2:2003, Class A/EN55022:1988+A1:2000+A2:2003

Chapter 7   Operation and Maintenance

This section explains:

- Indicator descriptions
- DIP switch settings
- Generating log files
- Firmware upgrade instructions

Front-Panel Indicator Descriptions

The Ethernet port indicator descriptions for the PXGX Series 1000 Card are listed in Table 11; the stacked indicator descriptions are listed in Table 12.

Table 11. Ethernet Port Indicators

	Indicator Label	Illuminated	Not Illuminated
Ethernet Port 1	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 network activity when the indicator is on or blinking.
Ethernet Port 2	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 network activity when the indicator is on or blinking.

Table 12. Stacked Indicator Descriptions

Label	Color	Illuminated	Not Illuminated
STATUS	Green	Communication with the PDU has been established.	Communication with the PDU has not been established. As the card boots, the indicator remains off. However, if it remains off after one minute, there is a communication problem between the card and the PDU.
DHCP	Amber	At least one port is configured for DHCP and has obtained IP address information.	The use of DHCP/BOOTP 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 PDU.	A firmware update is not in progress.
POWER	Green	DC power is available to the card from the PDU.	If all indicators are not illuminated, DC power is not available from the PDU. This may indicate that the PDU is off and unplugged.

NOTE During the power-on sequence, all four indicators are illuminated for approximately 20 seconds. Wait at least one minute 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 Series 1000 Card are listed in Table 13.

Table 13. DIP Switch Definitions

S1 Position Number	OFF Position (Default)	ON Position
1	Enable previously stored network configuration settings (Normal mode)	Override network settings to assign private IP addresses (Configuration mode); Port 1 is set to 192.168.1.1 and Port 2 is set to 192.168.1.2
2	Enable the front panel RJ-45 for serial communication	Enable the front panel RJ-45 port for communication with an Environmental Monitoring Probe (EMP) device for immediate or future use
3	Normal behavior	Reset the HTTP passwords to the defaults on boot (*user* and *admin*). 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)

Generating Log Files

NOTE *The data log and event log files are comma-separated values (*.csv) files that can be opened in Microsoft Excel software. Some computer configurations will automatically open the files in the Microsoft Excel software instead of prompting you to save.*

To generate a data log:

1. From the card's Web page, click the **Data Log** link from the menu bar.

2. Click the **Click to generate** button.

3. Select a name and location for the file (if prompted to save).

To generate an event log:

1. From the card's Web page, click the **Event Log** link from the menu bar.

2. Click the **Click to generate** button.

3. Select a name and location for the file (if prompted to save).

Upgrading the Card's Firmware

The card's firmware may be updated by downloading the appropriate file from www.eaton.com/powerxpert. During the upgrade process, the PXGX Series 1000 Card does not monitor the PDU status.

To upgrade the firmware:

1. From the card's Web page, click the **Firmware** link from the menu bar.

2. Click the **Browse** button.

3. Download the *pxgx_pdu_xxx.rom* firmware file, available on the Web at www.eaton.com/powerxpert.

4. After updating the firmware, the card prompts you to reboot. Click **OK** to reboot the card. An audible alarm sounds as the card reboots, and the Web page shows the "Gateway rebooting, please wait..." message. The Web page refreshes after approximately 75 seconds.

Chapter 8   Service and Support

If you have any questions or problems with the PXGX Series 1000 Card, call your **Local Distributor** or the **Help Desk** at one of the following telephone numbers and ask for a PXGX Series 1000 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 warrantied 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)

Power Xpert Gateway (PXGX) Series 1000 and Series 2000 Cards

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

LIMITED WARRANTY: This limited warranty (this "Warranty") applies only to the original End-User (the "End-User") of the Power Xpert Gateway (PXGX) Series 1000 or Series 2000 Card (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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