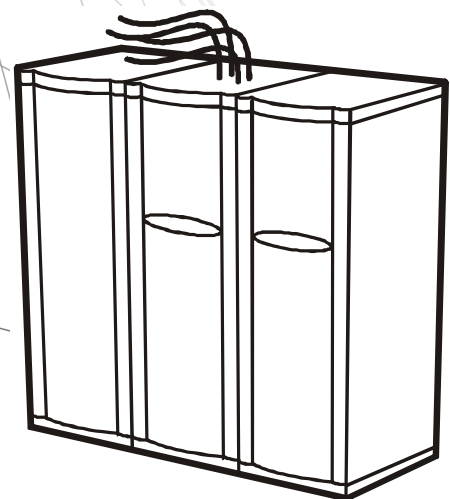www.apc.com

Operation and Maintenance

InfraStruXure®
For Medium Data Centers

40 kW 208/480/600 V

About This Manual

Audience

This manual provides information on operation and configuration of the InfraStruXure System. It also includes basic information on InfraStruXure system operation.

Companion manuals

For additional information about the InfraStruXure system, see the following manuals, included with the PDU:

- *InfraStruXure 40kW Installation and Start-Up* (990-1483) covers installation and start-up information on UPS power distribution to a rack and within a rack.

For information about specific components in your InfraStruXure system, see the documentation included with each component. Before installing or operating any component, refer to the safety instructions in each manual or an included safety sheet.

The illustrations of products in this manual may vary slightly from the products in your InfraStruXure system.

How to find updates to this manual

You can check for updates to this manual by going to the APC Web site (**www.apc.com**). Select the appropriate category under **Products and Services**, and then **User Manuals**. In the list of InfraStruXure manuals, look for the latest letter revision (A, B, etc.) of the part number on this manual.

Contents

Safety

Overview

Symbols used in this manual

Electrical Hazard: Indicates an electrical hazard which, if not avoided, could result in injury or death.

Danger: Indicates a hazard which, if not avoided, could result in severe personal injury or death.

Warning: Indicates a hazard which, if not avoided, could result in personal injury or damage to product or other property.

Heavy: Indicates a heavy load that should not be lifted without assistance.

Caution: Indicates a potential hazard which, if not avoided, could result in damage to the equipment or other property.

Tip Hazard: This equipment is easily tipped. Use extreme caution when unpacking or moving.

Note: Indicates important information.
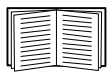
Indicates that more information is available on the same subject.

EMI

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 this user manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference. The user will bear sole responsibility for correcting such interference.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

System Overview

InfraStruXure PDU

Front View
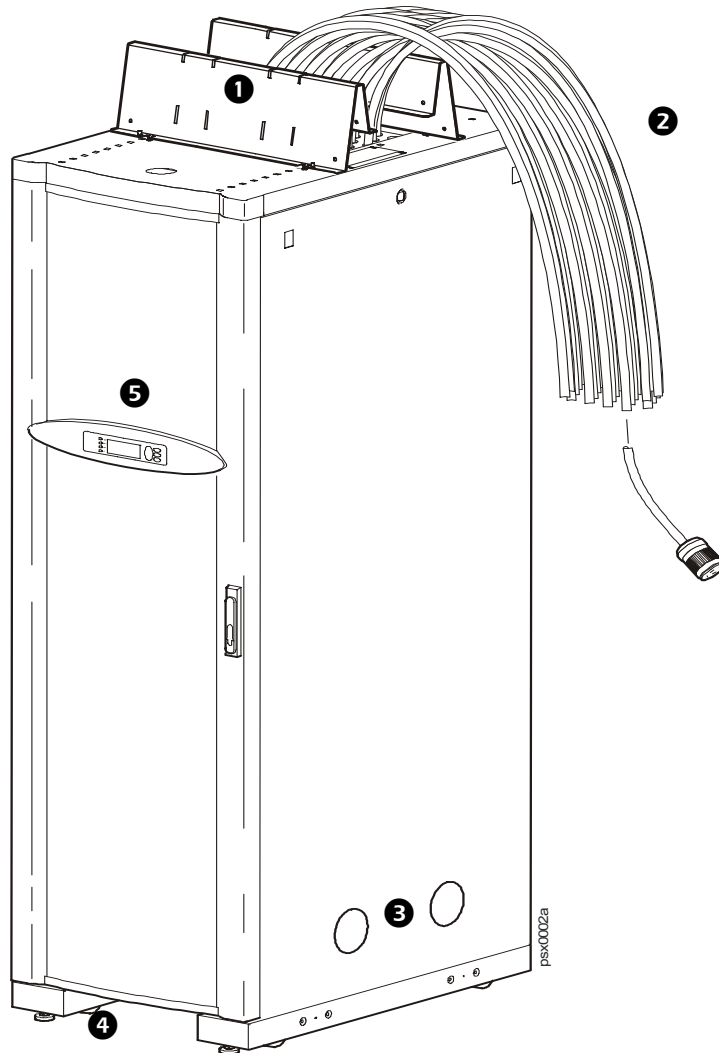
❶   PDU shielding trough

❷   The **PDU power cables** supply power to equipment racks; they are fed through knockouts on the top of the PDU. The following two options are available for PDU power cables:
    • Multi-circuit power cable that terminates with an L21-20 outlet (shown).
    • Single-circuit power cable that terminates with an L6-30 outlet.

❸   Cable access holes

❹   Leveling feet

❺   Display Interface

Front (interior view)
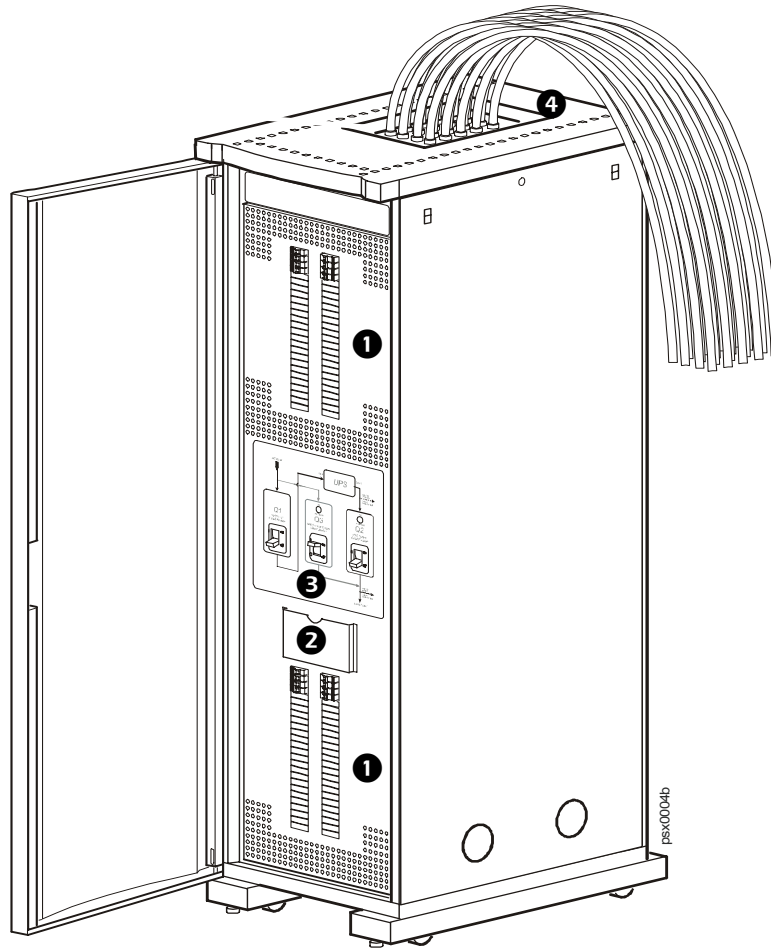
❶ **42-position circuit breaker panels**—each pole provides power at 120 V L-N or two single poles provide 208 V L-L. The amperage each position provides depends on the size of the circuit breaker used.

❷ The **document pocket** provides storage of documents relating to the circuit breaker panels, such as the PDU Panel Board Schedules (provided).

❸ The **wraparound maintenance bypass panel** holds three circuit breakers that allow the UPS to be electrically isolated from the main power source, while maintaining the power panels. The input circuit breaker is labeled Q1, the output circuit breaker is labeled Q2, and the maintenance bypass circuit breaker is labeled Q3. The label on the maintenance bypass panel of the PDU illustrates the power flow, and the H2 and H3 LEDs indicate it is safe to operate the Q2 and Q3 circuit breakers.

❹ The **user connection plate** is connected to the PDU monitoring unit, and provides easy access to input contact, relay output, network, and EPO connections. Make connections from inside the enclosure, and route wires through the knockout provided on the plate.

Rear view (interior)
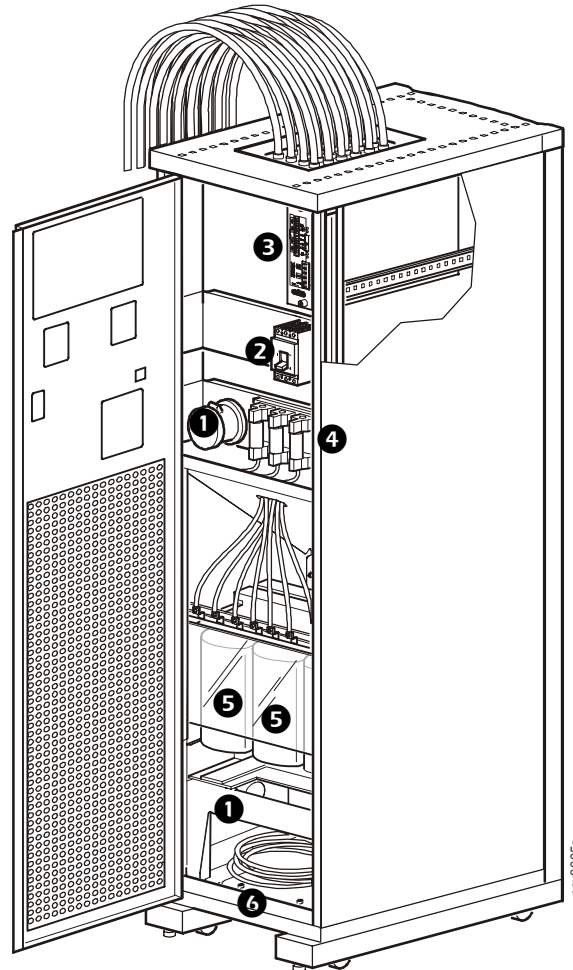
❶ The **load test port** allows a UPS system to be load-tested to ensure that the system will operate according to specifications if a power outage occurs (optional).

❷ The **main input switch** connects to the main power source. The switch accepts 208 V, 480 V, or 600 V input and requires 3-wire input conductors for PDUs with a transformer and 4-wire input conductors for PDUs without a transformer.

❸ The **PDU monitoring unit** has several current and voltage monitoring boards that report to a central board assembly located in the PDU monitoring unit. The monitoring unit has one 10Base-T (Cat-5) connection to the InfraStruXure Manager switch (or hub), four relay output connections, four input contact connections, and one EPO input connection.

❹ These **fuses** protect the silicon-controlled rectifiers in the UPS bypass static switch. The fuses are present only on PDUs without a transformer.

❺ The delta-wye **input transformer** is based on the input voltage of the PDU input voltage (208 V, 480 V, or 600 V input). The output of the transformer feeds the input circuit breaker of the maintenance bypass panel. (APC also offers a 208 V PDU without a transformer.)

❻ The **UPS input and output cables** connect the PDU to the UPS and are shipped coiled on the floor of the PDU. The input cables consist of five wires: 3 phases, 1 neutral, and one ground. The output cables consist of four wires: 3 phases and 1 neutral. Each wire is labeled and corresponds to a terminal on the Symmetra PX UPS. During installation, the Field Service Engineer will connect the PDU to the UPS.

PDU monitoring unit

❶ This connection provides the **input power** for the PDU monitoring unit. The power is supplied by the monitoring unit circuit breaker on the front of the PDU. If the panel is on, and the monitoring unit circuit breaker is closed, the monitoring unit is powered.

❷ Connects to sensors, which monitor values such as voltage, current, and power.

❸ Digital input sensing for monitoring such as circuit breaker status, transformer temperature, fans, etc.

❹ The **Display port** (RJ-45) connects the PDU monitoring unit to the PDU display interface.

❺ The **Power LED** indicates wether the monitoring unit is receiving power from the AC ouput of the UPS. If the UPS is powered off, the LED remains lit—the EPO function is still available, however the monitoring unit is not powered.

❻ Use the **Console port** (DB-9) to connect a laptop computer to the monitoring unit using an appropriate communcation cable (APC part number 940-0103). This port is used to configure items relating to servicing the PDU.

❼ **EPO DIP switches** configure the EPO input for the type of EPO switch that is connected—Normally Open (NO) or Normally Closed (NC).

❽ When the **EPO Arm/Test rocker** is in the **Test** position, engaging the EPO switch will not cause the load to be powered off. When the rocker is in the **Armed** position, engaging the EPO switch will cause the PDU's main input switch and the Symmetra PX UPS to be switched **OFF**. See "How to Test the EPO Switch" on page 44 for more information on testing the EPO switch.

❾ The EPO **Armed LED** is green when the rocker is in the **Armed** position. The LED is dark when the rocker is in the **Test** position.

❿ The EPO **Tripped LED** is red when the EPO switch is engaged (the EPO button is pressed), regardless of the state of the **EPO Arm/Test rocker**.

⓫ The **Reset button** resets the network processor; it does not reset the PDU

⓬ Connects to the InfraStruXure Manager through the **network port**.

⓭ The **To UPS** port connects the PDU monitoring unit to the Maintenance E inside the Symmetra PX UPS. This port is connected to wire harnesses, which are secured inside the PDU and connected to the Symmetra PX UPS during installation of the system.

⓮ The optional **User/EPO Contacts** port is connected to wire harnesses that connect to the user connection plate in the roof (or floor) of the PDU. The port allows for output relays (4), input contacts (4), and an EPO input (1). See "Contacts Screen" on page 22 and "How to Test the EPO Switch" on page 44 for more information.
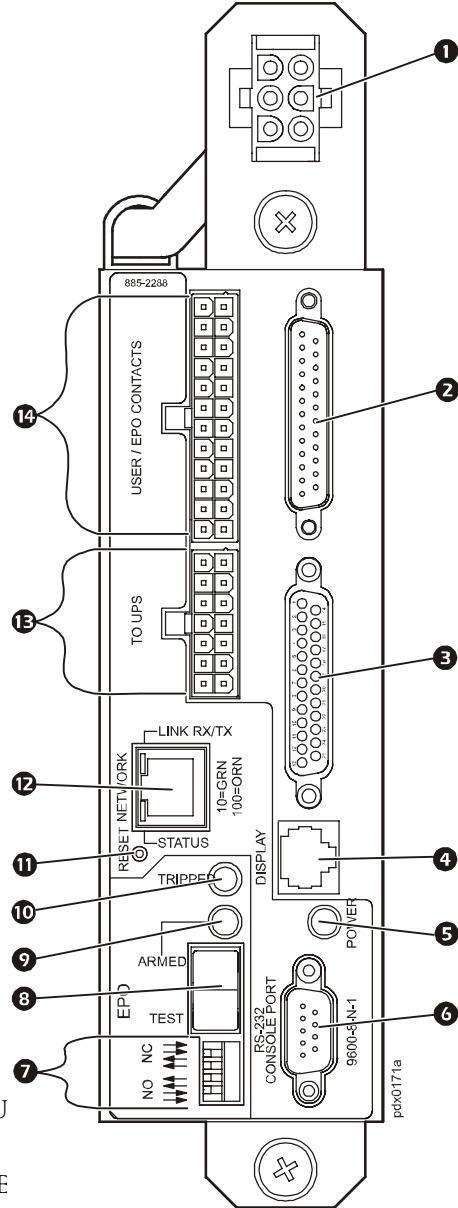
> **Note:** The branch current monitoring boards connect to the **branch current monitor** ports (RJ-11). These ports are on the top side of the PDU monitoring unit, and are labled on the face of the unit. Each port corresponds to a section of circuit breakers on the PDU distribution circuit breaker panel: upper left=[01..41]; upper right=[02..42]; lower left=[43..83]; lower right=[44..84].

User connection plate

For a description and location of the user connection plate, see (❹) on page 4. For clarity, the user connection plate in the following illustration is shown in greater detail.
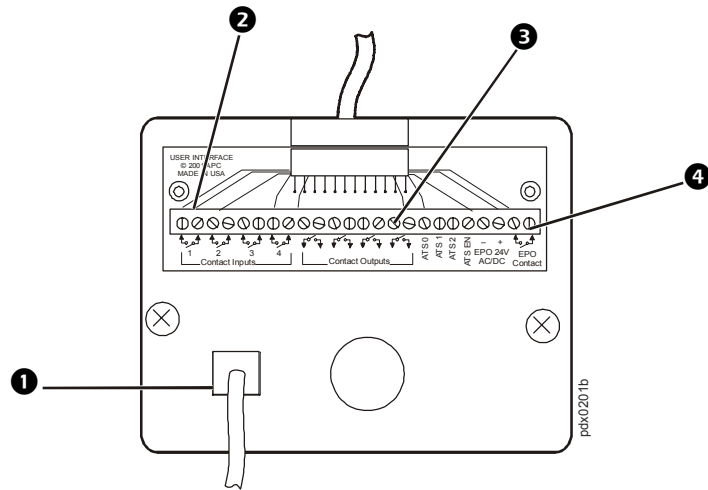
❶ Connect the InfraStruXure PDU to the network or the InfraStruXure Manager through the **ethernet port**.

❷ The user connection plate has four **input contact connections** for monitoring Normally Open (NO) or Normally Closed (NC) dry contacts. See page 46 for more information.

❸ The user connection plate has four **relay output connections** for connection of Normally Open (NO) or Normally Closed (NC) dry contacts.

❹ Connect an Emergency Power Off (EPO) switch to one of the three choices of **EPO connections** (24 VDC, 24 VAC, or contact closure).

PDU Display Interface Overview

You can use the display interface to configure settings, set alarm thresholds, and provide audible and visual alarms.
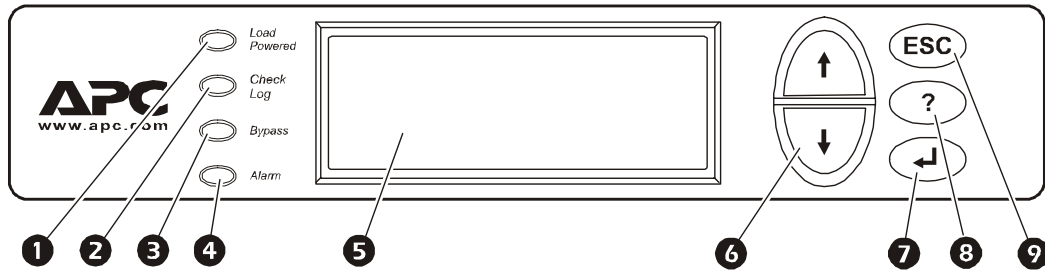
❶	Load Powered LED	When green, all output phases are within the specified threshold limits of the output alarm.
❷	Check Log LED	When yellow, at least one new alarm condition has been detected.
❸	Bypass LED	When yellow, power to the load is being supplied directly by the utility power source—the UPS has been removed from the circuit for maintenance or replacement. Bypass breakers on the PDU function as input circuit breakers to protect the load equipment.
❹	Alarm LED	When red, an alarm condition exists.
❺	LCD	Displays alarms, status data, instructional help, and configuration items.
❻	Up and Down navigation keys	Selects menu items and accesses information.
❼	ENTER key	Opens menu items and inputs changes to system parameters.
❽	HELP key	Launches context-sensitive help. Press the HELP key for information about each item on the screen and for instructions on how to perform certain tasks (i.e. transfering the UPS into Maintenance Bypass operation).
❾	ESC key	Returns to previous screen displayed.

Top-level status screens

After a brief start-up screen after system start-up, the display interface scrolls automatically and continuously through four screens of basic status information. Press the Up and Down arrow keys to interrupt the automatic scrolling to view a specific status screen.

```
Volts In      Volts Out
 L1-2: 000      L1: 000
 L2-3: 000      L2: 000
 L3-1: 000      L3: 000
```
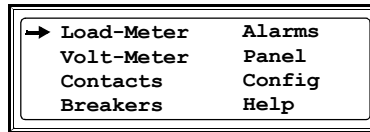
```
Load Current
 L1: 000          Neut:000
 L2: 000
 L3: 000
```

```
Total Output Loading
 kW:  000      PF:  000
 kVA: 000      %LD: 000
 Freq: 00.0
```

```
    No Active Alarms
   System Date/Time:
   Jun-24 2003 07:58
```

Top-level menu screen

On any top-level status screen, press the ENTER key to open the top-level menu screen.

```
━━━━━━━━━━━━━━━━━━━━━━━━
┃ ➡ Load-Meter    Alarms  ┃
┃   Volt-Meter    Panel   ┃
┃   Contacts      Config  ┃
┃   Breakers      Help    ┃
━━━━━━━━━━━━━━━━━━━━━━━━
```
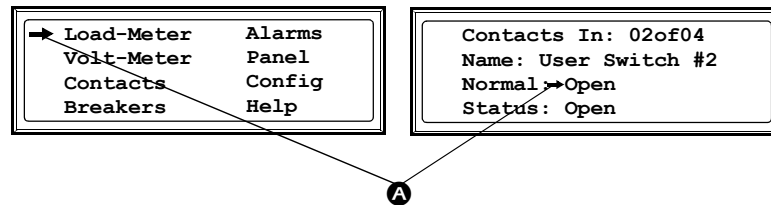
Note: If the display interface is inactive for the time specified as the **Time-out** setting, the interface reverts to the initial basic monitoring screens.
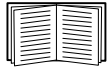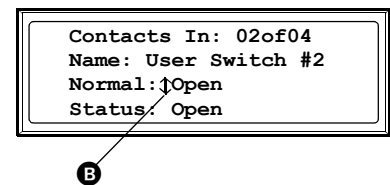
For descriptions of the top-level menu choices, see the individual sections starting on page 10.
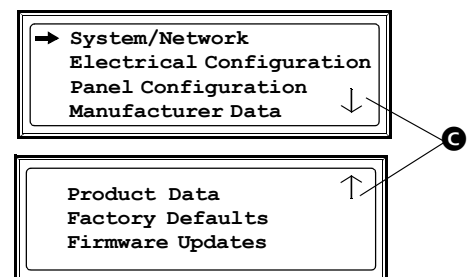
Navigating through screens

To open any screen, press the Up and Down arrow keys until the selector arrow (**Ⓐ**) rests next to your desired selection. Press the ENTER key to view the selected screen.

```
━━━━━━━━━━━━━━━━━━━━━━━━        ━━━━━━━━━━━━━━━━━━━━━━━━
┃ ➡ Load-Meter    Alarms  ┃        ┃ Contacts In: 02of04    ┃
┃   Volt-Meter    Panel   ┃        ┃ Name: User Switch #2   ┃
┃   Contacts      Config  ┃        ┃ Normal➡Open            ┃
┃   Breakers      Help    ┃        ┃ Status: Open           ┃
━━━━━━━━━━━━━━━━━━━━━━━━        ━━━━━━━━━━━━━━━━━━━━━━━━
```

Ⓐ

When configuring settings, press the Up and Down arrow keys until the selector arrow (**Ⓐ**) rests next to the setting you want to change, and press the ENTER key. If the setting is a list of choices, an input arrow (**Ⓑ**) will appear next to the setting. Press the Up and Down arrow keys until your desired change is listed. Press the ENTER key to select the setting.

```
━━━━━━━━━━━━━━━━━━━━━━━━
┃ Contacts In: 02of04    ┃
┃ Name: User Switch #2   ┃
┃ Normal:↕Open           ┃
┃ Status: Open           ┃
━━━━━━━━━━━━━━━━━━━━━━━━
```

Ⓑ

On some screens, a continue arrow (**Ⓒ**) indicates that there are additional screens to view in the category. Press the Up or Down arrow key to view the additional screens.

```
━━━━━━━━━━━━━━━━━━━━━━━━━━━━
┃ ➡ System/Network            ┃
┃   Electrical Configuration  ┃
┃   Panel Configuration       ┃
┃   Manufacturer Data      ↓  ┃
━━━━━━━━━━━━━━━━━━━━━━━━━━━━
━━━━━━━━━━━━━━━━━━━━━━━━━━━━
┃                          ↑  ┃
┃   Product Data              ┃
┃   Factory Defaults          ┃
┃   Firmware Updates          ┃
━━━━━━━━━━━━━━━━━━━━━━━━━━━━
```

Ⓒ

Password-protected screens

When configuring or changing settings, you will be prompted to enter your password:

1. Press the Up or Down arrow key until the correct letter is displayed, and then press the ENTER key.

```
━━━━━━━━━━━━━━━━━━━━━━━━
┃                        ┃
┃    Enter Password:     ┃
┃      ↕*******          ┃
┃                        ┃
━━━━━━━━━━━━━━━━━━━━━━━━
```

Note: After you press the ENTER key, the character you entered is displayed as an asterisk and the input arrow moves to the next space for you to select the next password character.

2. Press the ENTER key twice after you enter your password.

Operation

How to Transfer the UPS into Maintenance Bypass Operation

During maintenance of the system, transfer the system into maintenance bypass operation. When the system is operating in maintenance bypass, input power flows directly to the PDU and out to the load equipment.

1. Transfer the UPS into static bypass operation through the UPS display interface:

   a. Press the ESC key to open the top-level menu.

   b. Select **Control** and press the ENTER key.

Top-Level Menu

```
➡ Control      Logging
  Status       Display
  Setup        Diags
  Accessories  Help
```

   c. Select UPS **Into Bypass** and press the ENTER key.

Control Menu

```
➡ UPS Into Bypass
  Do Self Test
  Simulate Power Fail
  Graceful Reboot
```

```
  Graceful Turn Off
  Start Runtime Cal
  Turn Load On
```

   d. Select **Yes, UPS into Bypass** and press the ENTER key.

Confirmation Screen

```
  Confirm
➡ Yes, UPS into Bypass
  No, Abort
```

The UPS Bypass LED illuminates and the following screens appear:

```
   UPS has been
  commanded to go
   into Bypass...
```
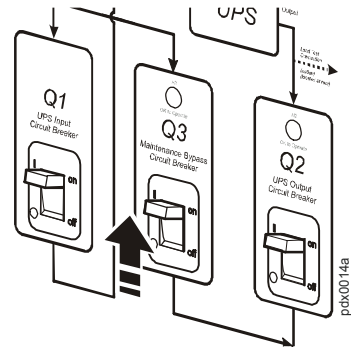
```
 UPS load is in Bypass

   Press any key...
```

> ⊘ **Note:** The **H3** LED above the **Q3** circuit breaker illuminates, indicating that it is safe to operate the **Q3** circuit breaker.
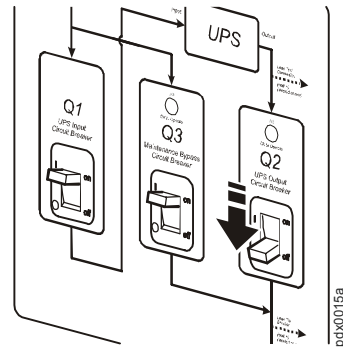
2. Close (turn ON) the **Q3** circuit breaker on the PDU.

    If you have a dual-fed system, check to ensure that power is available before operating the **Q3** circuit breaker.

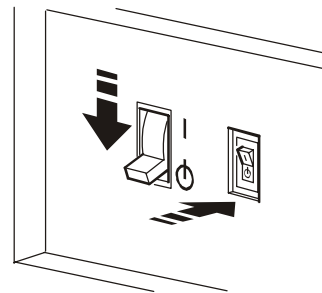> **Note:** The **H2** LED above the **Q2** circuit breaker illuminates, indicating that it is safe to operate the **Q2** circuit breaker.

3. Open (turn OFF) the **Q2** circuit breaker on the PDU.
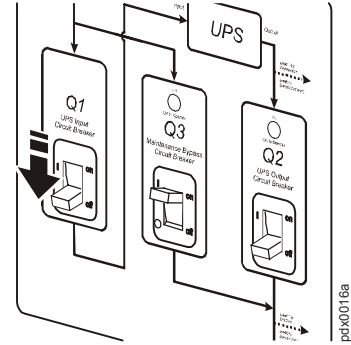
4. Open (turn OFF) the UPS **System Enable** switch. Open (turn OFF) the DC disconnect circuit breaker, if applicable.

5. Open (turn OFF) the XR Battery Enclosure **DC Disconnect** circuit breaker.
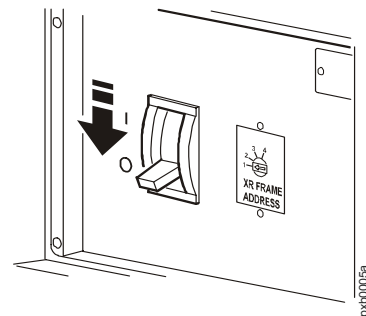
6. Open (turn OFF) the **Q1** circuit breaker on the PDU.

7. If applicable, open (turn OFF) the PDU Q10
   Bypass Input (**B**) switch.
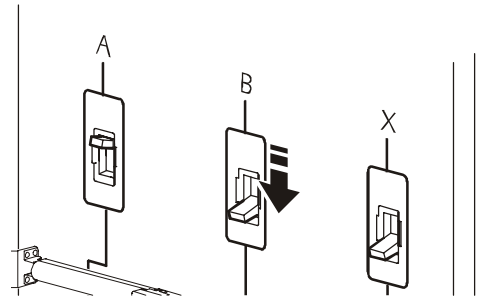
The UPS is now in maintenance bypass operation.

How to Return from Maintenance Bypass Operation

1. Close (turn ON) the **Q1** circuit breaker on the PDU.
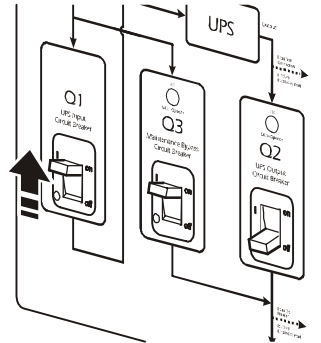
2. If applicable, close (turn ON) the PDU Q10 **Bypass Input** (**B**) switch.
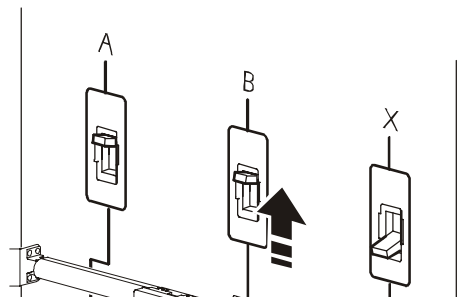
3. Close (turn ON) the XR Battery Enclosure **DC Disconnect** circuit breaker.
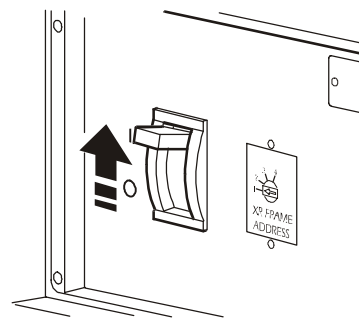
4. Close (turn ON) the UPS **System Enable** switch.

   The UPS will show a **Forced Bypass** message on the display interface, and the Fault LED will be red.

   Close (turn ON) the DC disconnect circuit breaker, if applicable.

5. Command the UPS to apply power to the load:

   a. Press the ESC key to open the top-level menu.

   b. Select **Control**, and press the ENTER key.

Top-Level Menu

```
➡ Control        Logging
  Status         Display
  Setup          Diags
  Accessories    Help
```

   c. Select **Turn Load On** and press the ENTER key.

Control Menu

```
  UPS Into Bypass
  Do Self Test
  Simulate Power Fail
  Graceful Reboot
```

```
  Graceful Turn Off
  Start Runtime Cal
➡ Turn Load On
```

   d. Select **Yes, UPS Load ON**, and press the ENTER key.

Confirmation Screen

```
  Confirm
➡ Yes, UPS Load ON
  No, Abort
```

The **Load On** LED illuminates and the following two screens appear:

```
    UPS has been
  commanded to turn
   load power on...
```

```
  UPS load is on

  Press any key...
```

6. Transfer the UPS into static bypass operation through the UPS display interface:

   a. Press the ESC key to open the top-level menu.

   b. Select **Control** and press the ENTER key.

Top-Level Menu

```
➡ Control        Logging
  Status         Display
  Setup          Diags
  Accessories    Help
```

   c. Select UPS **Into Bypass** and press the ENTER key.

Control Menu

```
➡ UPS Into Bypass
  Do Self Test
  Simulate Power Fail
  Graceful Reboot
```

```
  Graceful Turn Off
  Start Runtime Cal
  Turn Load On
```

   d. Select **Yes, UPS into Bypass**, and press the ENTER key.

Confirmation Screen

```
  Confirm
➡ Yes, UPS into Bypass
  No, Abort
```

Note: The **H2** LED above the **Q2** circuit breaker illuminates, indicating that it is safe to operate the **Q2** circuit breaker.

7. Close (turn ON) the **Q2** circuit breaker on the PDU.
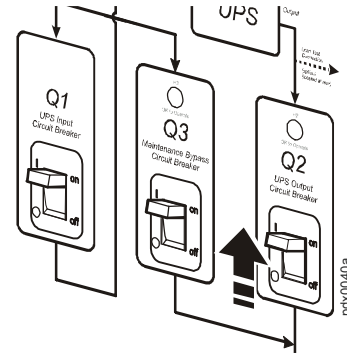
Note: The **H3** LED above the **Q3** circuit breaker illuminates, indicating that it is safe to operate the **Q3** circuit breaker.

8. Open (turn OFF) the **Q3** circuit breaker on the PDU.
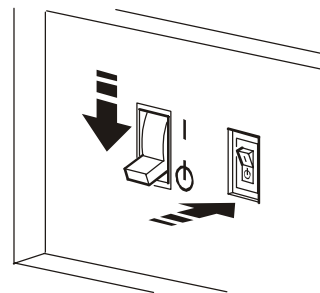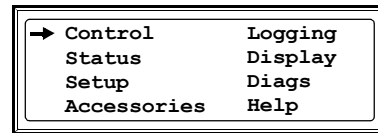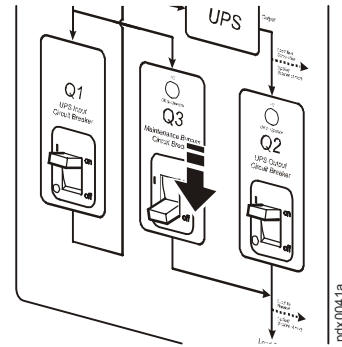

9. Transfer the UPS out of static bypass operation through the UPS display interface:

   a. Press the ESC key to open the top-level menu.

   b. Select **Control**, and press the ENTER key.

   c. Select **UPS Out of Bypass** and press the ENTER key.

   d. Select **Yes, UPS out of Bypass**, and press the ENTER key.

How to Ensure Total Power Off

1. Command the UPS to turn off power to the load:

   a. Press the ESC key to open the top-level menu and have access to eight submenus.

   b. Select **Control**, and press the ENTER key.

   c. Select **Turn Load Off** and press the ENTER key.

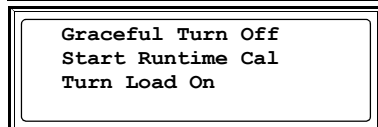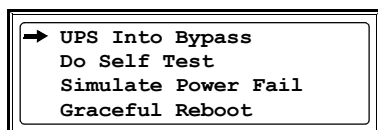   d. Select **Yes, UPS Load OFF**, and press the ENTER key.
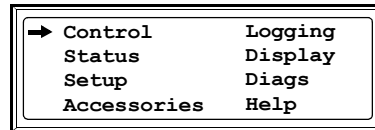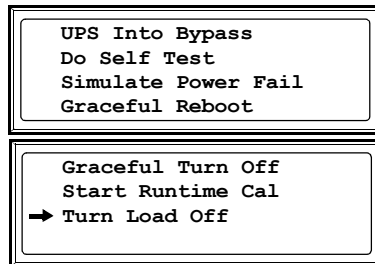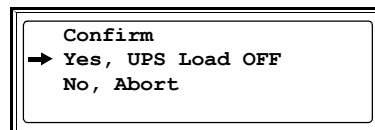
   The Load On LED turns off and the following screens appear:
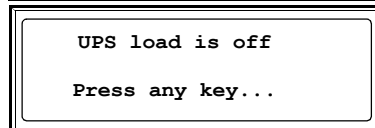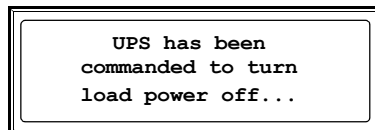
2. Set the UPS **DC Disconnect** circuit breaker and **System Enable** switch to OFF.

Top-Level Menu

```
➡ Control        Logging
   Status        Display
   Setup         Diags
   Accessories   Help
```

Control Menu

```
   UPS Into Bypass
   Do Self Test
   Simulate Power Fail
   Graceful Reboot
```

```
   Graceful Turn Off
   Start Runtime Cal
➡ Turn Load Off
```

Confirmation Screen

```
   Confirm
➡ Yes, UPS Load OFF
   No, Abort
```

```
     UPS has been
   commanded to turn
   load power off...
```

```
   UPS load is off

   Press any key...
```
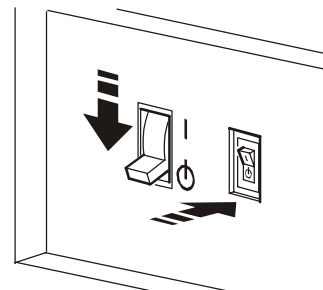
3. If applicable, set the XR Battery Enclosure **DC Disconnect** circuit breaker to OFF.
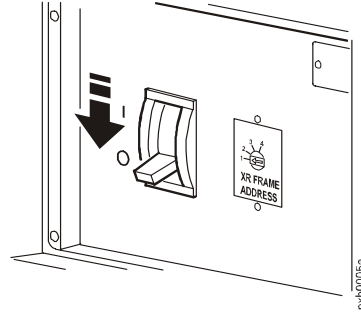
4. Pull out all battery units in the UPS and XR Battery Enclosures to the red battery disconnect line.
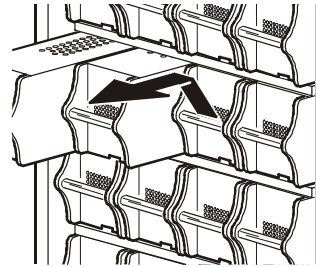
5. Set the PDU **Main Input** switch to OFF.
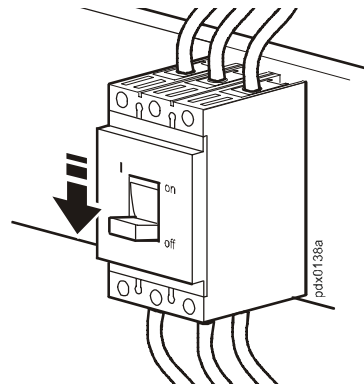
6. Set the **Q1**, **Q2**, and **Q3** circuit breakers on the PDU to OFF.
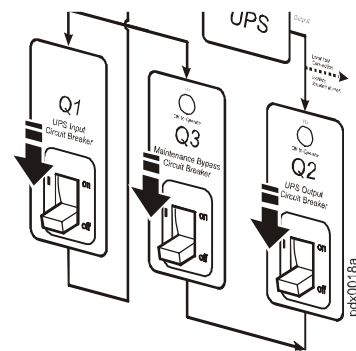
7. Set the upstream input utility circuit breaker to the OFF or Locked Out position.
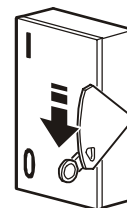
How to Apply Power to the System

This procedure instructs on how to apply power to a system that has already been installed. For initial start-up instructions, refer to the *InfraStruXure Installation and Start-Up* manual included with your PDU.

1. Set the upstream utility circuit breaker to ON.
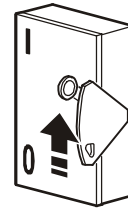
2. Set the **Main Input** switch on the PDU to ON.
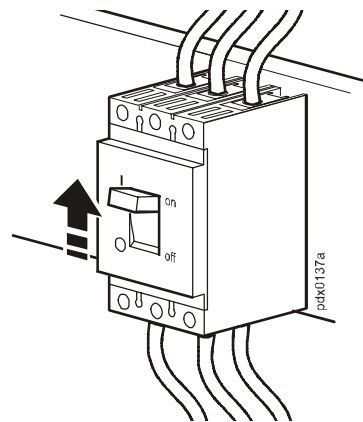
3. Set the **Q1** circuit breaker on the PDU to ON to apply power to the UPS.
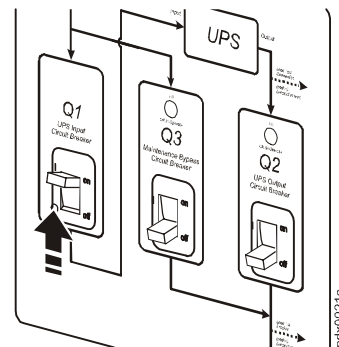
4. Ensure that all battery units are pushed all the way into the Symmetra PX UPS and XR Battery Enclosures and are locked into position.

5. Set the UPS **DC Disconnect** circuit breaker to ON and then, set the UPS **System Enable** switch to ON.
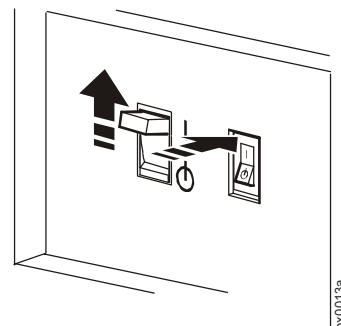
6. If applicable, set the XR Battery Enclosure **DC Disconnect** circuit breaker to ON.
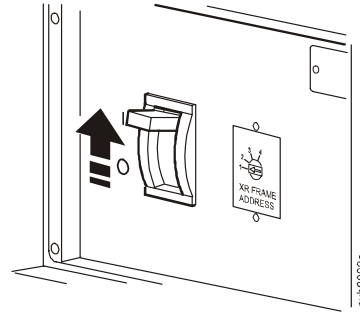
When the **System Enable** switch is placed in the ON position, the Startup screen appears on the display interface of the Symmetra PX UPS.

```
    PowerView RM
  Rev: 000 English
   Please wait...
```
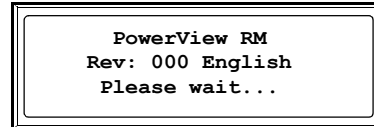
The top-level status screen appears on the display interface. This may take up to 30 seconds.

```
Fuel%     ||||||||||||
Load%     |||
In 208V out000V 60Hz
Runtime: 1hr 2m
```

Top-Level Status Screen
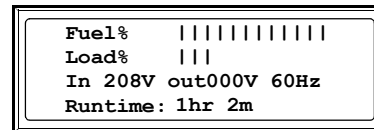
7. Read the messages displayed on the UPS display interface:

   a. Note any alarms, and verify that they are appropriate for start-up conditions.

   b. Verify that the UPS accepts the input.

```
Fuel%     ||||||||||||
Load%     |||
In 208V out000V 60Hz
Runtime: 1hr 2m
```

Top-Level Menu

8. Command the UPS to apply power to the load:

   a. Press the ESC key to open the top-level menu.

   b. Select **Control**, and press the ENTER key.

```
➡ Control       Logging
  Status        Display
  Setup         Diags
  Accessories   Help
```

Control Menu

   c. Select **Turn Load On** and press the ENTER key.

```
UPS Into Bypass
Do Self Test
Simulate Power Fail
Graceful Reboot
```

```
Graceful Turn Off
Start Runtime Cal
➡ Turn Load On
```

   d. Select **Yes, UPS Load ON**, and press the ENTER key.

Confirmation Screen

```
Confirm
➡ Yes, UPS Load ON
  No, Abort
```

```
┌─────────────────────────┐
│  UPS has been           │
│  commanded to turn       │
│   load power on...       │
└─────────────────────────┘
```

The Load On LED illuminates, and the following two screens appear:

```
┌─────────────────────────┐
│  UPS load is on          │
│                          │
│  Press any key...        │
└─────────────────────────┘
```
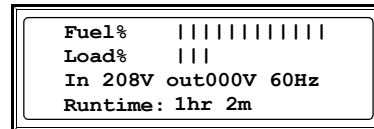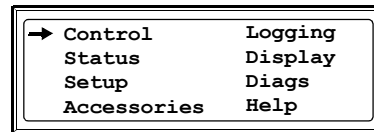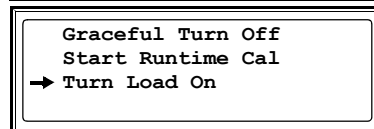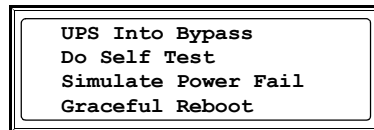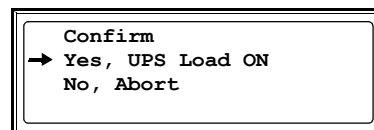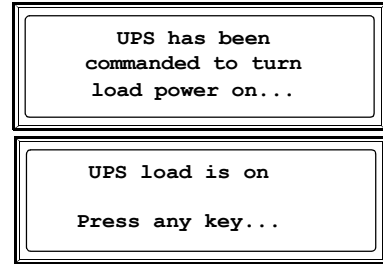
9. To apply power to the PDU distribution panel, close (turn ON) the **Q2** circuit breaker on the PDU.
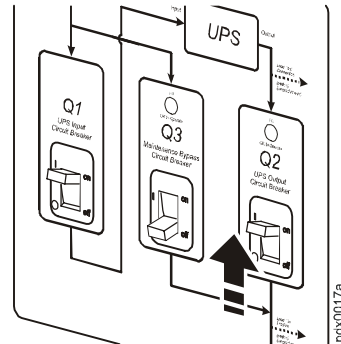
10. To apply power to the PDU power cables and connected equipment, close (turn ON) the distribution panel circuit breakers.
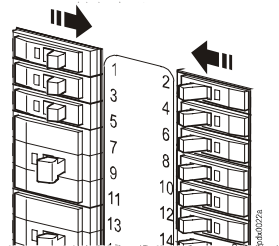
How to Access PDU Status Information

Load-Meter Screen

From the **Load-Meter** screen, you can select the following items:

Total Load by Phase	The load supported by each phase in kVA, in RMS current (**Irms**), and as a percentage of the maximum allowable load (**%LD**).
Total Load Summary	For the total load supported:

- **kW**: The power provided, in kilowatts

- **kVA**: The actual power drawn by the load, in kilovolt-amperes

- **Freq**: The frequency

- **PF**: The power factor (kW/kVA), which affects the power available to the load

- **%LD**: The load as a percentage of the maximum allowable load

Power Factor	For each phase:

- **kVA**: The actual power drawn by the load, in kilovolt-amperes **kW**: The power, in kilowatts provided by the phase

- **PF**: The power factor (kW/kVA), which affects the power available to the load

Volt-Meter Screen

From the **Volt-Meter** screen, you can select the following items:

Output Voltage	Displays each phase-to-phase output voltage (e.g., **L1-2** for phase L1 to phase L2) and each phase-to-neutral output voltage (e.g., **L1** for phase L1 to neutral).
Input Voltage	Displays each phase-to-phase input voltage (e.g., **L1-2** for phase L1 to L2), or, if your service transformer is a wye transformer, each phase-to-neutral input voltage (e.g., **L1** for phase L1 to neutral).

Contacts Screen

Overview. The PDU can monitor external contact closure events. Possible applications include the following:

- Magnetic contact switches

- Window foil

- Tamper switches

- Heat detectors

- Water sensors

- Pressure sensors

- Building smoke and fire detection systems

You can set input contacts to cause alarm conditions based on their current state and a user-defined normal state. Relay outputs can map internal alarms and events to outside devices. Use the **Contacts** screen to display and configure information about input contacts and relay outputs.

Input Contacts   Scroll through the list to display information about each of the installed input contacts. For example, **02of04** displays information about the second of four installed input contacts.

- **Name** —The name of this input contact (*Maximum:* 14 alphanumeric characters).

- **Normal** —The normal position of this input contact, either **Open** or **Closed**.

- **Status** —The position of this input contact. If the position is not the normal position, an alarm condition occurs.

Relay Outputs   Scroll through the list to display information about each of the installed relay outputs. For example, **04of04** displays information about the fourth of the four available relay outputs.

- **Name —** The name of this relay output (*Maximum:* 14 alphanumeric characters).

- **Normal —**The normal position of this relay output, either **Open** or **Closed**.

- **Status —**The position of this relay output.

Alarm Relay Map   Configure the relay outputs, using the Alarm Relay Map. Each Alarm Map corresponds to an relay output. For example, Alarm Map **01of04** corresponds to the first of four relay

```
   Alarm Map: 01 of 04
   [Vo, By, C4]
➔  Map: Input Voltage
   Apply Now
```

outputs. The second line, in brackets [ ], lists the items that you have selected to map to the selected relay. The third line allows you to select the alarms to which you want to map the relay:
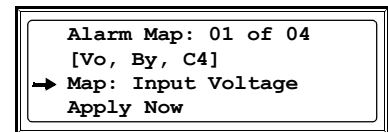
- **Any Load** (L)—Maps to over- or under-current alarms for circuit breaker panels and branch circuits.

- **Overload** (O)—Maps to over-current alarms for circuit breaker panels, branch circuits, and SYSGND.

- **Input Voltage** (Vi)—Maps to any input voltage alarm.

- **Output Voltage** (Vo)—Maps to any output voltage alarm.

- **PDU in Bypass** (By)—Mapping this option will cause the relay output to actuate when the Q3 breaker is closed.

- **Any Breaker** (Br)—Mapping this option will cause the relay output to actuate when the input, bypass input (Q10), or cross-tie output breaker is not in its normal state.

- **Contacts 1–4** (C1,C2,C3,C4)—Maps to the input contact alarms.

Before exiting the screen, to save your changes, select the **Apply Now** option on the bottom line of the screen.

Breakers Screen

Use the **Breakers** screen to view the status of the system and PDU circuit breakers.

UPS & System Bypass	Reports the operation mode of the UPS and the state of the Q1, Q2, and Q3 circuit breakers on the PDU.
Main Input	Reports the status of the PDU Main Input Switch (**Open** or **Closed**). Under normal operation, this switch is **Closed**.

Panel Screen

Branch Ckt Loading.

You can display **Branch Ckt Loading** (Branch Circuit Loading) status if the option to measure current at the distribution circuit breakers is installed.

You can view data for each individual panel position on the distribution panel. To view status of a panel position, select the range that includes the position:

```
 Branch Ckt Loading
 Select Range:
➜[01..41] [02..42]
 [43..83] [44..84]
```
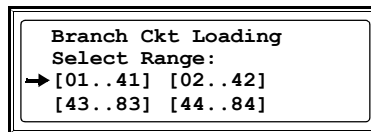
The top line of selections on the screen applies to the top distribution circuit breaker panel on the PDU. The bottom line of selections applies to the bottom distribution circuit breaker panel on the PDU. The panel position numbers on the screen correspond to the numbers on the distribution panel. (Odd numbers are on the left; even numbers are on the right.)

After you have selected the correct range, press the Up and Down arrow keys to scroll through the list of circuit breakers in the selected range. Poles that are tied together will be shown on the same screen.

```
 Ckt:  03of21 Irms %LD
 05: 20A      11.3 56.5
```
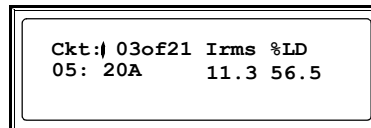
In the example above, the screen shows the third circuit breaker of 21 circuit breakers in the selected range. This is a single-pole circuit breaker, occupying panel position 05. The circuit breaker is rated at 20 amps. The following data are displayed for each pole:

- **Irms**: Measured root mean square (RMS) current of the pole position.

- **%LD**: Present load as a percentage of rated load of the panel position.

Branch Ckt Limits.

Available only if the option to measure individual currents is installed, **Branch Ckt Limits** (Branch Circuit Limits) accesses a scrollable list of the circuit breakers in the panel. For each circuit breaker, the screen displays, in the **Loading** column, the current on each panel position as a percentage of the rated current. In the **Load Alarm** column, you can configure the high and low thresholds for the circuit breaker as a percentage of its rated current. For example, if you set 80% as the high threshold for a single-pole 20-amp circuit breaker, an alarm condition occurs if the current reaches 16 amps.

How to Access a Network Management Interface on a Configured InfraStruXure PDU

> ⊘ **Note:** Disregard the procedures in this section if you have the APC InfraStruXure Manager as part of your system. See the InfraStruXure Manager's *Installation and Quick-Start* manual for access information.

Web interface

As your browser, you can use Microsoft® Internet Explorer 5.0 (and higher) or Netscape® 4.0.8 (and higher, except Netscape 6.*x*) to access the InfraStruXure PDU through its Web interface. Other commonly available browsers also may work but have not been fully tested by APC.

To use the Web browser to configure InfraStruXure PDU options or to view the event log, you can use either of the following:

- The HTTP protocol (enabled by default), which provides authentication by user name and password but no encryption.

- The more secure HTTPS protocol, which provides extra security through Secure Socket Layer (SSL) and encrypts user names, passwords, and data being transmitted. It also provides authentication of Network Management Cards by means of digital certificates.

To access the Web interface and configure the security of your device on the network:

1. Address the InfraStruXure PDU by its IP address or DNS name (if configured).

2. Enter the user name and password (by default, **apc** and **apc** for an Administrator, or **device** and **apc** for a Device Manager).

3. Select and configure the type of security you want. (This option is available only for Administrators).

> ⊘ **Note:** See the chapter entitled "Security" in the Name of second commonly-named product's online *Network Management User's Guide* for information on choosing and setting up your network security. Use the **Web/SSL** option of the **Network** menu to enable or disable the HTTP or HTTPS protocols.

Telnet and SSH

You can access the control console through Telnet or Secure SHell (SSH), depending on which is enabled. (An Administrator can enable these access methods through the **Telnet/SSH** option of the **Network** menu.) By default, Telnet is enabled. Enabling SSH automatically disables Telnet.

Telnet for basic access. Telnet provides the basic security of authentication by user name and password, but not the high-security benefits of encryption. To use Telnet to access an InfraStruXure PDU's control console from any computer on the same subnet:

1. At a command prompt, use the following command line, and press ENTER:

    ```
    telnet address
    ```

    As *address*, use the InfraStruXure PDU's IP address or DNS name (if configured).

2. Enter the user name and password (by default, **apc** and **apc** for an Administrator, or **device** and **apc** for a Device Manager).

SSH for high-security access. If you use the high security of SSL for the Web interface, use Secure SHell (SSH) for access to the control console. SSH encrypts user names, passwords, and transmitted data.

The interface, user accounts, and user access rights are the same whether you access the control console through SSH or Telnet, but to use SSH, you must first configure SSH and have an SSH client program installed on your computer.

See the *Network Management User's Guide* for more information on configuring and using SSH.

SNMP

After you add the PowerNet MIB to a standard SNMP MIB browser, you can use that browser for SNMP access to the InfraStruXure PDU. The default read community name is **public**; the default read/write community name is **private**.

Note: If you enable SSL and SSH for their high-security authentication and encryption, disable SNMP. Allowing SNMP access to the InfraStruXure PDU compromises the high security you implement by choosing SSL and SSH. To disable SNMP, you must be an Administrator; use the **SNMP** option of the **Network** menu.

FTP and SCP

You can use FTP (enabled by default) or Secure CoPy (SCP) to transfer new firmware to the InfraStruXure PDU, or to access a copy of the InfraStruXure PDU's event logs. SCP provides the higher security of encrypted data transmission and is enabled automatically when you enable SSH.

Note: If you enable SSL and SSH for their high-security authentication and encryption, disable FTP. Allowing file transfer to the InfraStruXure PDU through FTP compromises the high security you implement by choosing SSL and SSH. To disable FTP, use the **FTP Server** option of the **Network** menu (you must be an Administrator).

To access the InfraStruXure PDU through FTP or SCP, the default user name and password are **apc** and **apc** for an Administrator, or **device** and **apc** for a Device Manager. In the command line, use the IP address of the unit.
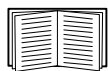
See the *Network Management User's Guide* to use FTP or SCP to retrieve log files from the InfraStruXure PDU or to transfer firmware files to the InfraStruXure PDU.

How to Recover From a Lost Network Management Interface Password

Note: Disregard the procedures in this section if you have the APC InfraStruXure Manager as part of your system. See the InfraStruXure Manager's *Installation and Quick-Start* manual for information on recovering from a lost password.

1. Select a serial port at the local computer, and disable any service that uses that port.

2. Connect the serial cable (APC part number 940-0103) to the selected port on the computer and to the console port on the InfraStruXure PDU monitoring unit.

3. Run a terminal program (such as HyperTerminal®) on your computer and configure the selected port as follows:

   – 9600 bps

   – 8 data bits

   – no parity

   – 1 stop bit

   – no flow control

4. Press ENTER, repeatedly if necessary, to display the **User Name** prompt. If you are unable to display the **User Name** prompt, verify the following:

   – The serial port is not in use by another application.

   – The terminal settings are correct as specified in step 3.

   – The correct cable is being used as specified in step 2.

5. Press the **Reset** button on the InfraStruXure PDU monitoring unit. The Status LED will flash alternately orange and green. Press the **Reset** button on the InfraStruXure PDU monitoring unit a second time immediately while the LED is flashing to reset the user name and password to their defaults temporarily.

6. Press ENTER as many times as necessary to redisplay the **User Name** prompt, then use the default, **apc,** for the user name and password. (If you take longer than 30 seconds to log on after the **User Name** prompt is redisplayed, you must repeat step 5 and log on again.)

7. From the **Control Console** menu, select **System**, then **User Manager**.

8. Select **Administrator**, and change the **User Name** and **Password** settings, both of which are now defined as **apc**.

9. Press CTRL-C, log off, reconnect any serial cable you disconnected, and restart any service you disabled.

Configuration

Config Screen

System/Network

Use this option of the **Config** screen to access these options:

System Password	• **Password**: Change the system password required to access protected screens and fields in the display interface. Enter a string of up to eight alphanumeric characters, followed by the underline character (_) to indicate the end of the string. The default password is APC.
	• **Time-out**: Set the time that the display interface waits for user input before it reverts to the initial scrolling of status screens. Select 1, 2, 5, 10 (the default), or 30 minutes; or 1, 2, or 4 hours, or Forever.
	• **Invalidate NOW**: Re-enter the system password for viewing password-protected screens.
Date/Time	• **Date**: Set the following format: *dd/ mm/ yyyy*.
	• **Time**: Set the following format: *hh:mm:ss*.
Local Interface	• **Contrast**: Set the screen contrast for the LCD. Select from **1** (high contrast) to **8** (low contrast).
	• **Key Click**: Choose **On** for an audible click whenever you press a navigation key. Choose **Off** to disable the key click.
	• **Beeper**: Select **High**, **Medium**, **Low**, or **Off** to adjust the loudness of the audible beeper and the key click.
Network Address	The following values are set by the InfraStruXure Manager during initial configuration:
	• **IP**: The System IP address, which the domain name server translates into a domain name.
	• **Mask**: The subnet mask, which identifies the sub-network on which the InfraStruXure PDU operates.
	• **GW**: The Gateway address. This is the physical address of the InfraStruXure PDU, expressed as a 48-bit hexadecimal number.

Electrical Config

This option of the **Config** screen displays information about the electrical service that provides input to the InfraStruXure PDU. All of the values displayed on this screen are set at the factory. Use this information when viewing and setting alarms.

Input Config	Configure the following items:

- **Main Input**: The voltage from the building's electrical service coming into the PDU Main Input switch.

  – 3W: 3-phase Delta, measured line-to-line

  – 4W: 3-phase Wye, measured line-to-neutral

- **Transformer**: Indicates whether the InfraStruXure PDU has a transformer.

- **Bypass Input**: Indicates whether the PDU has a bypass input switch (B).

- **Fuse**: Indicates whether the PDU has fuses protecting the SCRs in the UPS. The fuses are present only on single-fed PDUs without a transformer.

Output Config	Configure the following items:

- **Panel Voltage**: The nominal voltage of the distribution panels supplying power to the load equipment. (This is measured line-to-neutral.)

- **Panel Breaker**: The rating, in amps, of the circuit breaker feeding the distribution panels.

Other Config Items	Configure the following items:

- **Load Test Port**: Indicates whether the PDU has a load test port installed.

- **Max Power**: Maximum power of your InfraStruXure PDU (40kW or 80kW).

Manufacturer Data

Use this option of the **Config** screen to display a scrollable list containing information about the InfraStruXure PDU. This information is useful when requesting service or product updates. The following information is displayed:

- Manufacturer Name

- Date of Manufacture

- Date of Calibration

- Hardware Revision

- Firmware Revision (for PDU monitoring and metering)

- Serial Number

- Model Number

System ID

Use this option of the **Config** screen to identify your InfraStruXure PDU. The following fields can be configured:

Device Name   Set a unique name for your InfraStruXure PDU.

Product Location   Name the physical location of the product in your data center.

Product Contact   Identify the person to notify concerning questions or problems with regard to the product.

Factory Defaults

Use this option of the **Config** screen to reset all InfraStruXure PDU settings to their factory default values.

Firmware Updates

Use this option of the **Config** screen to download updated firmware to the InfraStruXure PDU.

Panel Configuration

Configure the branch metering settings for each circuit breaker on the distribution panel, or configure both panels simultaneously. To configure a circuit breaker, select the range that includes the circuit breaker. The top line of selections on the screen apply to the top distribution circuit breaker panel on the PDU. The bottom line of selections apply to the bottom distribution circuit breaker panel on the PDU. The panel position numbers on the screen correspond to the numbers on the distribution panel. (Odd numbers are on the left; even numbers are on the right.) After you have selected the correct range, configure the settings for each circuit breaker in the range.

```
   Panel Configuration
   Select Range:
 →[01..41] [02..42]
```
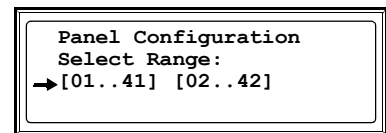
Pos: The panel positions in the selected range.

Breaker: Two configurable items:

- The circuit breaker rating, in amps.

- The circuit breaker tie indicator—define the number of panel positions tied (i.e., associated). You can associate positions with circuit breakers, which enables you to view status about each circuit breaker and receive alarm notification when any of a circuit breaker's poles are above or below the configured branch circuit limit. You can also tie together panel positions that are logically associated. For example, you can tie together panel positions for three separate circuit breakers that are connected to the same PDU power cord and that feed power to the same equipment enclosure.

To configure the values on this screen:

1. From the first column, use the arrow keys to scroll up or down to the pole position you want to configure.

2. Press the ENTER key to move to the item you want to configure in the third column (the circuit breaker rating or the circuit breaker tie indicator).

3. Scroll again to select the value you want for the circuit breaker rating or the circuit breaker tie indicator. To associate one panel position with the next position in the list, choose the + character as

the tie indicator immediately following the circuit breaker rating. To indicate that the position is not tied to (associated with) the next panel position in the list, choose the] character as the tie indicator immediately following the circuit breaker rating. When you change the + or] character that follows the circuit breaker rating in one row, the + or [character before the circuit breaker rating in the next row also changes to indicate the changed association between the panel positions.

For example, this screen shows three, single-pole, 20A, tied circuit breakers occupying positions 08, 10, and 12 on the top right distribution panel.

```
   Pos       Breaker
 ← 08        [ 20A +
   10        + 20A +
   12        + 20A ]
```

Global Panel Config

Configures the same number of poles or circuit breaker ratings for all circuit breakers in both distribution panels simultaneously. For example, if your system uses only 3-pole, 20-amp circuit breakers, choose this option, scroll to the value 3 for **Poles** and 020 for **Amp Rating,** and then select **Apply Now** and **YES** to implement your changes.
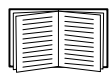
InfraStruXure PDU Management Options

Overview

You have two management options for the InfraStruXure PDU. You can manage the InfraStruXure PDU along with the rest of your InfraStruXure equipment through the InfraStruXure Manager (APC LAN), or you can manage your InfraStruXure PDU through APC's network management interfaces (User LAN).

InfraStruXure Manager

The InfraStruXure Manager is a rack-mount management device that coordinates the management functions of APC InfraStruXure-Certified devices installed in your data center. It provides one single interface to view and configure all APC InfraStruXure-Certified devices. See "Configuring the InfraStruXure Manager" on page 34 for configuration instructions.

For more information about the InfraStruXure Manager, see the *Installation and Configuration* manual included with the InfraStruXure Manager.

Network management interfaces

The control console and Web interfaces provide menus with options that allow you to manage the system. See "Configuring the Network Management Interface" on page 35 for configuration instructions.
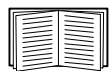
For more information about the internal user interfaces, see the *Network Management User's Guide*.

The SNMP interface allows you to use an SNMP browser with the PowerNet® Management Information Base (MIB) to manage the system. See "Configuring the Network Management Interface" on page 35 for configuration instructions.

To use the PowerNet MIB with an SNMP browser, see the *PowerNet® SNMP Management Information Base (MIB) Reference Guide*, which is provided on the InfraStruXure PDU *Utility* CD.

Configuring the InfraStruXure Manager

Connect the InfraStruXure PDU to the InfraStruXure Manager

1. Connect a Cat-5 network cable to the surge-protected ethernet port on the PDU user connection plate.

   You can make connections from inside the enclosure, or you can remove the user connection plate and make your connections. Remove the plate using a Phillips or standard screwdriver to loosen the two captive screws. Use the knockout in the plate to route cables to and from the user connections on the plate. If you remove the plate, make sure that you do not disturb the existing connections.

2. Run the connected Cat-5 network cable through the knockout in the user connection plate to the InfraStruXure Manager Hub.

3. Once all APC InfraStruXure-Certified equipment is installed, the network cables are connected to the InfraStruXure Manager Hub, and start-up of the system is complete, configure the InfraStruXure Manager.

   For detailed configuration instructions, see the InfraStruXure Manager *Installation and Quick-Start* manual included with your InfraStruXure Manager.

Configuring the Network Management Interface

Connect the InfraStruXure PDU to your network

1. Connect a Cat-5 network cable to the surge-protected ethernet port on the PDU user connection plate.

   You can make connections from inside the enclosure, or you can remove the user connection plate and make your connections. Remove the plate using a Phillips or standard screwdriver to loosen 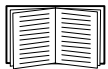the two captive screws. Use the knockout in the plate to route cables to and from the user connections on the plate. If you remove the plate, make sure that you do not disturb the existing connections.

2. Run the connected Cat-5 network cable through the knockout in the user connection plate to your network connection.

3. Configure the TCP/IP settings of the InfraStruXure PDU. See "Configuration Overview" on this page for further instructions.

Configuration Overview

You must configure the following TCP/IP settings before the InfraStruXure PDU can operate on a network:

- IP address of the InfraStruXure PDU

- Subnet mask

- Default gateway

Note: If a default gateway is unavailable, use the IP address of a computer that is located on the same subnet as the InfraStruXure PDU and that is usually running. The InfraStruXure PDU uses the default gateway to test the network when traffic is very light. See "Watchdog Features" in the "Introduction" of the InfraStruXure PDU's online *Network Management User's Guide* for more information about the watchdog role of the default gateway.

TCP/IP configuration methods

Use one of the following methods to define the TCP/IP settings needed by the InfraStruXure PDU:

- Device IP Configuration Wizard (See "Device IP Configuration Wizard" on this page.)

- BOOTP or DHCP server (See "BOOTP & DHCP configuration" on page 36.)

- Local computer (See "Local access to the control console" on page 38.)

- Networked computer (See "Remote access to the control console" on page 38.)

Device IP Configuration Wizard

You can use the Device IP Configuration Wizard on a Windows NT® 4.0, Windows 2000, or Windows XP computer to discover unconfigured InfraStruXure PDUs and configure their basic TCP/IP settings.

> To configure one or more InfraStruXure PDUs by exporting configuration settings from a configured PDU, see "How to Export Configuration Settings" in the online *Network Management User's Guide* on the *Utility* CD.

1. Insert the *Utility* CD into a computer on your network.

2. Launch the Wizard, when prompted, or, if prompted to restart the computer, access the Wizard from the **Start** menu after the computer has restarted.

3. Wait for the Wizard to discover the first unconfigured InfraStruXure PDU, then follow the on-screen instructions.

> **Note:** If you leave the **Start a Web browser when finished** option enabled, you can use **apc** for both the **User Name** and **Password** to access the InfraStruXure PDU through your browser.

BOOTP & DHCP configuration

The **Boot Mode** Setting, a TCP/IP option in the InfraStruXure PDU's **Network** menu, identifies how the TCP/IP settings will be defined. The possible settings are **Manual**, **DHCP only**, **BOOTP only**, and **DHCP & BOOTP** (the default setting).

> **Note:** The **DHCP & BOOTP** setting assumes that a properly configured DHCP or BOOTP server is available to provide TCP/IP settings to InfraStruXure PDUs. If these servers are unavailable, see "Device IP Configuration Wizard" on page 36, "Local access to the control console" on page 38, or "Remote access to the control console" on page 38 to configure the needed TCP/IP settings.

With **Boot Mode** set to DHCP & BOOTP, the InfraStruXure PDU attempts to discover a properly configured server. It first searches for a BOOTP server, then a DHCP server, and repeats this pattern until it discovers a BOOTP or DHCP server.

> **Note:** For more information, see "BOOTP" on this page or "DHCP" on page 37.

BOOTP. You can use an RFC951-compliant BOOTP server to configure the TCP/IP settings for the InfraStruXure PDU.

Note: The BOOTP setting assumes that a properly configured BOOTP server is available to provide TCP/IP settings to APC InfraStruXure PDUs. If a BOOTP server is unavailable, see "Device IP Configuration Wizard" on page 36, "Local access to the control console" on page 38, or "Remote access to the control console" on page 38 to configure the TCP/IP settings.

1. Make sure that the **BOOTP** setting, a **TCP/IP** option in the InfraStruXure PDU's **Network** menu, is enabled.

2. Enter the InfraStruXure PDU's MAC and IP addresses, the subnet mask and default gateway settings, and an optional Bootup file name in the BOOTPTAB file of the BOOTP server.
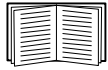
For the MAC address, look on the Quality Assurance slip included with the InfraStruXure PDU.

3. When the InfraStruXure PDU reboots, the BOOTP server provides it with the TCP/IP settings.

   – If you specified a bootup file name, the InfraStruXure PDU attempts to transfer that file from the BOOTP server using TFTP or FTP. The InfraStruXure PDU assumes all settings specified in the bootup file.

   – If you did not specify a bootup file name, the InfraStruXure PDU can be configured remotely by using Telnet or by using the Web interface: **User Name** and **Password** are both **apc**, by default.
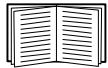
To create the bootup file, see your BOOTP server documentation.

DHCP. You can use a RFC2131/RFC2132-compliant DHCP server to configure the TCP/IP settings for the InfraStruXure PDU.
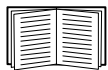
This section briefly summarizes the **InfraStruXure PDU** communication with a DHCP server. For more detail about how a DHCP server is used to configure the network settings for a **InfraStruXure PDU**, see "DHCP Configuration" in the **Name of second commonly-named product**'s online *Network Management User's Guide*.

1. An InfraStruXure PDU sends out a DHCP request that uses the following to identify itself:

   – A Vendor Class Identifier (APC by default)

   – A Client Identifier (by default, the InfraStruXure PDU's MAC address value)

   – A User Class Identifier (by default, the identification of the InfraStruXure PDU's application firmware)

2. A properly configured DHCP server responds with a DHCP offer that includes all of the settings that the InfraStruXure PDU needs for network communication. The DHCP offer also includes the Vendor Specific Information option (DHCP option 43). By default, the InfraStruXure PDU will ignore DHCP offers that do not encapsulate the APC cookie in the Vendor Specific Information option using the following hexidecimal format:

```
Option 43 = 01 04 31 41 50 43
```

where:

– the first byte (`01`) is the code

– the second byte (`04`) is the length

– the remaining bytes (`31 41 50 43`) are the APC cookies
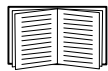
See your DHCP server documentation to add code to the Vendor Specific Information option. To disable the APC cookie requirement, see "Local access to the control console" on page 38.

To change the control console's **DHCP Cookie Is** setting, use the **Advanced** option in the TCP/IP menu. See "Remote access to the control console" on page 38.
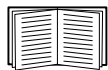
Local access to the control console

You can use a local computer that connects to the InfraStruXure PDU through the console port on the InfraStruXure PDU monitoring unit to access the control console.

1. Select a serial port at the local computer, and disable any service that uses that port.

2. Use the configuration cable (APC part number 940-0103) to connect the selected port to the console port on the InfraStruXure PDU monitoring unit.

3. Run a terminal program (such as HyperTerminal®) on your computer and configure the selected port for 9600 bps, 8 data bits, no parity, 1 stop bit, and no flow control, and save the changes.

4. Press ENTER to display the **User Name** prompt.

5. Use **apc** for the **User Name** and **Password**.

6. See "Control console" on page 39 to finish the configuration.

Remote access to the control console

From any computer on the same subnet as the InfraStruXure PDU, you can use ARP and Ping to assign an IP address to an InfraStruXure PDU, and then use Telnet to access that InfraStruXure PDU's control console and configure the needed TCP/IP settings.

Note: After an InfraStruXure PDU has its IP address configured, you can use Telnet, without first using ARP and Ping, to access that InfraStruXure PDU.

1. Use ARP to define an IP address for the InfraStruXure PDU, and use the InfraStruXure PDU's MAC address in the ARP command. For example, to define an IP address of 156.205.14.141 for an InfraStruXure PDU that has a MAC address of 00 c0 b7 63 9f 67, use one of the following commands:

– Windows command format:

```
arp -s 156.205.14.141 00-c0-b7-63-9f-67
```

– LINUX command format:

```
arp -s 156.205.14.141 00:c0:b7:63:9f:67
```

For the MAC address, look on the Quality Assurance slip included with the InfraStruXure PDU.

2. Use Ping with a size of 113 bytes to assign the IP address defined by the ARP command. For the IP address defined in step 1, use one of the following Ping commands:

    – Windows command format:

```
ping 156.205.14.141 -l 113
```

    – LINUX command format:

```
ping 156.205.14.141 -s 113
```

3. Use Telnet to access the InfraStruXure PDU at its newly assigned IP address. For example:

```
telnet 156.205.14.141
```

4. Use **apc** for both **User Name** and **Password**.

5. See "Control console" on this page to finish the configuration.

Control console

After you log on at the control console, as described in "Local access to the control console" on page 38 or "Remote access to the control console" on page 38:

1. Choose **Network** from the **Control Console** menu.

2. Choose **TCP/IP** from the **Network** menu.

3. If you are not using a **BOOTP** or **DHCP** server to configure the **TCP/IP** settings, select the **Boot Mode** menu. Select **Manual boot mode**, and then press ESC to return to the **TCP/IP** menu. (Changes will take effect when you log out.)

4. Set the **System IP**, **Subnet Mask,** and **Default Gateway** address values.

5. Press CTRL-C to exit to the **Control Console** menu.

6. Log out (option 4 in the **Control Console** menu).

Note: If you disconnected a cable during the procedure described in "Local access to the control console" on page 38, reconnect that cable and restart the associated service.

Maintenance

Important Safety Instructions

Electrical Hazard:
APC does not recommend that you perform maintenance of the PDU while it is receiving input power. However, due to the critical nature of data center loads, this may occur. If you must perform maintenance while the PDU is receiving input power, observe the following precautions to reduce the risk of electric shock:

1.Never work alone.

2.Perform the maintenance only if you are a certified electrician who is trained in the hazards of live electrical installation.

3.Know the procedure for disconnecting electricity to the PDU and the data center in case of an emergency.

4.Wear appropriate personal protective equipment.

5.Use double-insulated tools.

6.Always follow local and site regulations when working on the PDU.

How to Add Circuit Breakers and Power Cables

Add a circuit breaker on the PDU

1. Snap and bolt the new circuit breaker into a position on the panel.
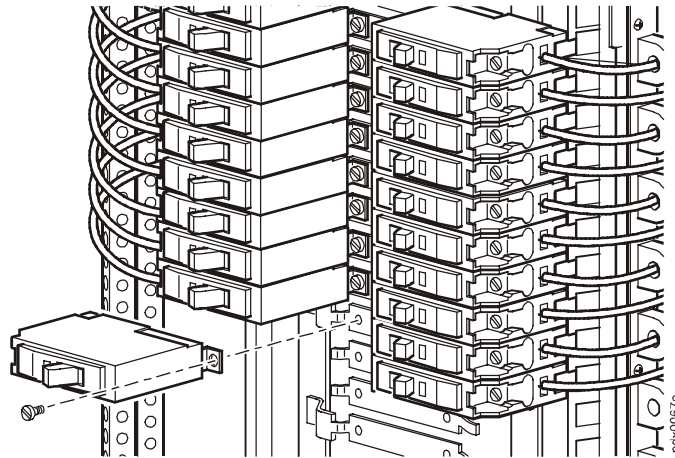
2. Remove the corresponding plastic blanking plate on the front panel of the PDU.

Add a power cable to the PDU

1. Install a strain-relief connector in any available knockout on the roof of the PDU.

2. Slide enough of the power cable through the strain-relief connector to reach the new circuit breaker.

3. Tighten the strain-relief connector.

Note: If you must install a 20 A or 30 A power cable in a knockout designed for a 50 A power cable, you must use reducing washers (included) to adjust the size of the hole.

Note: If you are adding a power cable that will attach to a circuit breaker on the bottom circuit breaker panel, use a non-conductive fish tape to feed the power cable down the rectangular wireway (chute) in the center of the PDU. This will allow you to easily access the bottom circuit breaker panel.

4. At the front of the PDU, connect the power cord's individual wires:

    a. If you have branch current monitoring installed, route the phase conductor through a current sensor. If it is a three-phase cable, route the L1, L2, and L3 wires through a current sensor.

    b. Connect the L1, L2, and L3 wires to the circuit breaker(s). The illustration below shows single-pole breakers; however, you can also connect three-pole breakers.

    c. Connect the neutral wire to the closest open termination point on the Neutral Bar (N).

    d. Connect the ground wire to the closest open termination point on the Ground Bar (G).
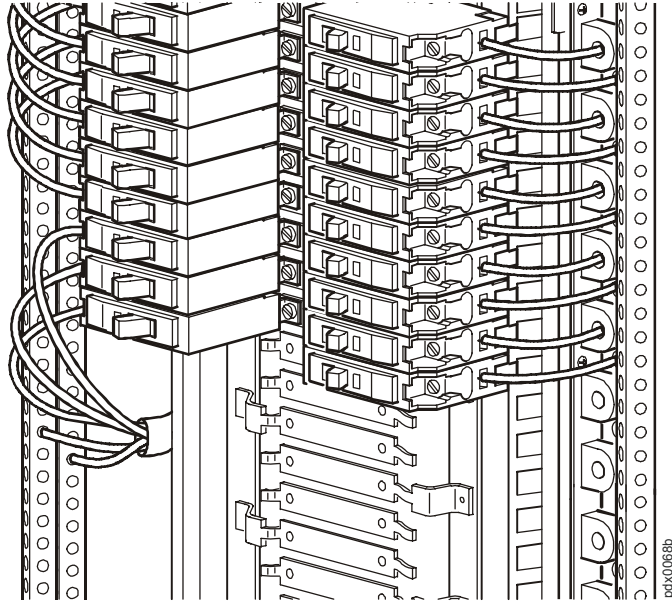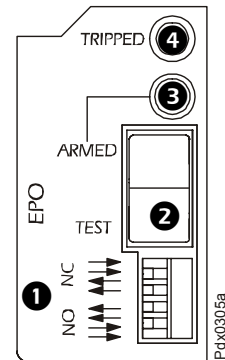

Caution: You can configure your InfraStruXure system through the InfraStruXure Build-Out Tool to use three, 20-A single-pole breakers to feed multi-circuit power cables supplying power to L-N loads. However, one 3-pole, 20 A breaker must be used with any power cable and Rack PDU the feeds L-L loads (NEC, NFPA 70).

How to Test the EPO Switch

Overview

After a certified electrician has connected an EPO switch to the PDU monitoring unit by way of the user connection plate, you can easily test the switch to make sure it is wired and working properly. The illustration to the right shows the EPO functions on the PDU monitoring unit.

❶ **EPO DIP switches** configure the EPO input for the type of EPO switch that is connected—Normally Open (NO) or Normally Closed (NC).

❷ When the **EPO Arm/Test rocker** is in the **Test** position, engaging the EPO switch will not cause the load to be powered off. When the rocker is in the **Armed** position, engaging the EPO switch will cause the PDU's main input switch and the Symmetra PX UPS to be switched **OFF**.

❸ The EPO **Armed LED** is green when the rocker is in the **Armed** position. The LED is dark when the rocker is in the **Test** position.

❹ The EPO **Tripped LED** is red when the EPO switch is engaged (the EPO button is pressed), regardless of the state of the **EPO Arm/Test rocker**.

Testing the EPO wiring and switches

1. Place the **Arm/Test rocker** switch in the **Test** position. The EPO state LEDs will be dark and the PDU display interface will show the following alarm (in addition to any other active alarms):

```
Active Alarm xxofxx
EPO Ready To Test
```
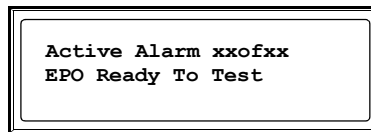
2. Engage the EPO switch. (If your switch is momentary, engage it with one person watching the EPO state LEDs, and another at the EPO switch.)

3. Observe the EPO LEDs. If the switch is wired and working properly, when the switch is engaged, both of the EPO state LEDs are red.

4. If the test was successful, place the **Arm/Test rocker** switch back to the **Arm** position. The PDU display interface will clear the EPO test mode alarm.

> **Note:** Be sure that the **EPO Tripped LED** is **not** illuminated prior to placing the EPO Arm/Test rocker switch back to the **Arm** position.

If the test was not successful, see the troubleshooting chart:

Problem	Action
Neither state LED was red when the EPO switch was engaged	• Check the wiring to your EPO switch • Check to make sure the EPO DIP switch configuration is correct for your switch (NO or NC).
Only one of the state LEDs was red when the EPO switch was engaged	• Check to make sure the EPO DIP switch configuration is correct for your switch (NO or NC) and test again. • If the switch is configured correctly and both LEDs are not red after testing again, contact customer support at a number on the back cover of this manual.

5. Repeat this test for each EPO switch installed.

6. Ensure that the **Arm/Test** rocker switch is in the **Arm** position on the monitoring unit upon completion of testing.

How to Connect User Input Contacts and Relay Outputs to the PDU User Connection Plate

Overview

Make contact closure connections (NO or NC) at the user connection plate to monitor dry contacts. You can make eight connections—four input contacts and four relay outputs.

The figure at the right shows the location of the user connection plate on the roof of the PDU enclosure.

You can make connections from inside the enclosure, or you can remove the user connection plate and make your connections.

Remove the plate using a Phillips or standard screwdriver to loosen the two captive screws. Use the knockout in the plate to route cables to and from the user connection plate. If you remove the plate, make sure that you do not disturb the existing connections.
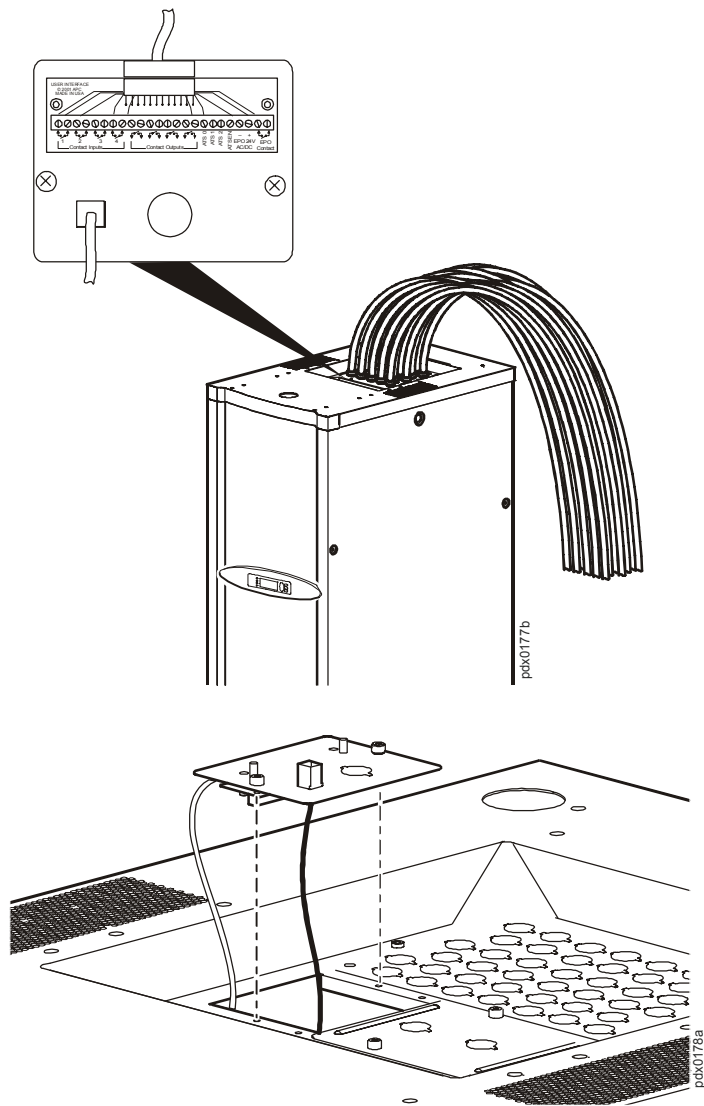
How to connect contacts to the PDU monitoring unit

1. Choose one or more contact numbers on the **User/EPO contacts** port on the user connection plate to which you will connect the contacts. The user connection plate connects to the PDU monitoring unit.

2. From the PDU display interface:

   a. Press the ESC or ENTER key to go to the top-level menu screen.

   b. Select **Contacts** on the top-level menu screen, and press the ENTER key.

   ```
   Load-Meter   Alarms
   Volt-Meter   Panel
 → Contacts     Config
   Breakers     Help
   ```
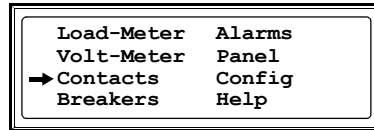
   c. Select **Contact Inputs** (or Relay Outputs) and press ENTER to display the contact inputs (or relay outputs) screen.

   ```
 → >Contact Inputs
   >Relay Outputs
   >Alarm Relay Map
   ```
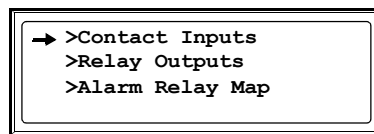
   d. Select **Contact In** and press the ENTER key to select the number of the contacts you are connecting. The continue arrow ⇕ will appear next to the contact number.

   ```
 → Contact In:01of04
   Name:User Contact 1
   Normal:Open
   Status:Closed
   ```
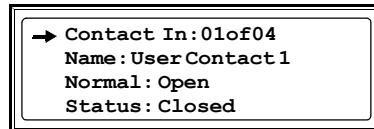
   e. Press the Up or Down arrow key to select the appropriate contact number, and press the ENTER key.

   f. Press the Down arrow key to enter a unique **Name** for the contact and to configure the Normal state of the contact (Open or Closed). The default **Normal** state is Open. Press the ENTER key to select the item to configure.

Note: You will be prompted for your password to configure these items.

3. Connect contact wires (300V-rated cabling required) to the User Contacts terminal block on the user connection plate. You will need a 2.5-millimeter standard screwdriver.

4. Run the wires from the user connection plate to your contact's location.

Warning: Ensure that wires are properly retained and away from high voltage lines and breakers.

How to Download Firmware Upgrades

Upgrading the PDU monitor processor

You can download available PDU monitor processor upgrades through the PDU display interface. The most obvious indication that a firmware upgrade is necessary occurs when the Network Management Card and the monitor processor stop communicating. This lack of communication causes the PDU's data to no longer be accessible through the display interface and a **SysData Mismatch** alarm to occur. When this alarm occurs, perform the following steps to upgrade the PDU monitor processor firmware:

1. Upgrade the PDU Network Management Card.
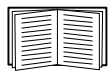
   For instructions on how to upgrade the PDU's Network Management Card, refer to the online *Network Management User's Guide* on the *Utility* CD provided with your InfraStruXure PDU.

2. At the PDU display interface, select **Config,** and then **Firmware Updates**. You will receive the following screen:

```
Upgrade from X.XX
To X.XX
Press a key.
```
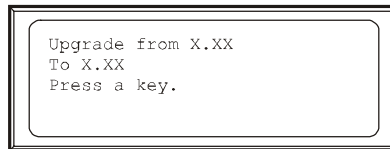
   Press any key to download the upgrade.

   Note: If you do not receive the **SysData Mismatch** alarm, but want to check for available firmware upgrades, you can do so by performing step 2 in the procedure above.

Downloading firmware upgrades from a local computer

To download a firmware upgrade and transfer it to your PDU, see "File Transfers" in the InfraStruXure PDU's online *Network Management User's Guide* on the *Utility* CD.

1. Select a serial port at the local computer, and disable any service that uses that port.

2. Use the configuration cable to connect the selected port to the console port on the PDU monitoring unit.

3. Run a terminal program (such as HyperTerminal®) and configure the selected port for 9600 bps, 8 data bits, no parity, 1 stop bit, and no flow control. Save the changes.

4. Press ENTER twice to display the **User Name** prompt.

5. Enter your **User Name** and **Password** (both **apc**, for adminstrators only) and press the ENTER key.

6. From the **Control Console** menu, select **System**, then **Tools**, then **File Transfer**, then **XMODEM**.

7. The system will then prompt you with `Perform transfer with XMODEM -CRC?` Type `Yes` and press ENTER.

8. The system will then prompt you to choose a transfer rate and to change your terminal settings to match the transfer rate. Press ENTER to set the PDU to accept the download.

9. In the terminal program, send the file using XMODEM protocol. Upon completion of the transfer, the console will prompt you to restore the baud rate to normal.

Note: Do not interrupt the download.

The PDU network management interface will reboot when the download is complete.

Troubleshooting

Alarms

View Active Alarms

Use this option of the **Alarms** screen to display active alarms (alarms that have not been resolved). Scroll through the list to view each active alarm.

Alarm/Event Log

Use this selection of the **Alarms** screen to access the following options:

New Logged Items	Displays a description and the date and time of each alarm that occurred since the last time this option was used. The date/time format is *mm*/*dd/yyyy hh*:*mm*:*ss*. • The most recent alarm is displayed initially. • If the log contains no alarms, the screen displays `Alarm Log Empty`.
Entire Log	Displays a description and the date and time of each alarm in the alarm log. The date/time format is *mm/dd/yyyy hh*:*mm*:*ss*. • The most recent alarm is displayed initially. To move to the previous alarm press the Down arrow key. To move to the next more recent alarm, press the Up arrow key. • If the log contains no alarms, the screen displays `Alarm Log Empty`.
Clear Log	Delete the contents of the alarm log. You will be asked to confirm this deletion.

Alarm Setup

Use this option of the **Alarms** screen to access the following options:

Loading Limits	Configure the following in amps and as a percentage of full load: • **Out High**: The upper limit for output current • **Out Low**: The lower limit for output current • **Out Neut**: The upper limit for current on the neutral wire for the output phases

Voltage Limits   Configure the following as a percentage under or over the rated voltage:

- **Input**: The allowed range for input voltage

- **Output**: The allowed range for output voltage

Other Limits   Configure these limits:

Frequency: The frequency variation, in hertz, that is acceptable for the output current.

Global Alarm Config   Set all the loading limits or all the voltage limits simultaneously as a percentage of full load:

- **Load Limits:** Set the same percentage for the upper limit for output current, the lower limit for output current, and the upper limit for current on the neutral wire for the output phases. (Use the **Loading Limits** option to set these thresholds individually.)

- **Volt Limits:** Set the same percentage for the high and low thresholds for input and output voltage. (Use the **Voltage Limits** option to set these thresholds individually.)

Select **Apply Now** and then **YES** to implement your changes.

Alarm Beeper

Use this option of the **Alarms** screen to turn the alarm beeper ON or OFF.

PDU Alarms

This table lists all alarms that can be generated by the InfraStruXure PDU, as displayed by the **All Possible Alarms** option, with numeric variables between the < > characters. Logged alarms will display specific numbers instead.

Alarm Condition	Explanation
Input V <Ln-N>=<Value> Voltage Under Limit	Input voltage of the phase indicated has dropped below the configured lower limit.
Input V <Ln-N>=<Value> Voltage Over Limit	Input voltage of the phase indicated exceeded the configured upper limit.
Output V <Ln-N>=<Value> Voltage Under Limit	Phase-to-neutral output voltage for phase <L-N> dropped below the configured limit.
Output V <Ln-N>=<Value> Voltage Over Limit	Phase-to-neutral output voltage for phase <L-N> exceeded the configured limit.
Output I L<n>=<Value> Current Over Limit	Current of output phase <n> exceeded the configured limit.
Output I L<n>=<Value> Current Under Limit	Current of output phase<n> dropped below the configured limit.
Output Neut=<Value> Current Over Limit	Current on the neutral wire for the output phases exceeded the configured limit.
Output FDev=<Value> Freq Out of Range	Frequency of the output current is above or below the range that is configured as acceptable.
Input Transformer Temperature Too High	The temperature of the PDU transformer exceeded the normal limit.
Main Breaker Open Alarm Active	The Main Input switch is Off.
<User Contact Name> Alarm Active	A user-configured contact connected to the PDU monitoring unit is reporting an alarm condition.
No UPS Input Breaker Q1 Open	The Q1 circuit breaker is open, and the PDU is not receiving power from the UPS.
No Panel Feed Breakers Q2 & Q3 Open	The Q2 & Q3 circuit breakers are open, and the PDU is not supporting connected equipment.
Atypical Bypass Mode Alarm Active	The system state as set by the Q1, Q2, & Q3 breakers is in a bypass mode.
Branch Ckt Pos: <nn> Current Over Limit	Current on one of the poles of branch circuit breaker <nn> exceeded the configured limit.
Branch Ckt Pos: <nn> Current Under Limit	Current on one of the poles of branch circuit breaker <nn> dropped below the configured limit.

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    Global support searching APC Knowledge Base and using e-support.
- Contact an APC Customer Support center by telephone or e-mail.
  - Regional centers:

Direct InfraStruXure Customer Support Line	(1)(877)537-0607 (toll free)
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