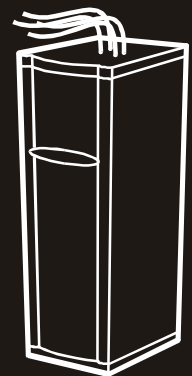




60kW InfraStruXure PDU

PD60H5HK1
PDRPPH1000

Operation and Configuration
400/230V



About This Manual

Audience

This manual is intended for end-users of a 60kW InfraStruXure PDU. It covers the operation, customization, and quick configuration of the PDU, and includes basic InfraStruXure system operation.

Companion manuals

For additional information about the InfraStruXure system, see the *Installation and Start-Up* manual (990-1637B) included with the PDU. It covers the installation and start-up of the PDU, power distribution to the rack, and power distribution within the 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 the component's manual.

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 clicking on the **User Manuals** link on the **Support** page of the APC Web site (www.apc.com). In the list of InfraStruXure manuals, look for the latest letter revision (A, B, etc.) of the part number on this manual.

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Safety

Overview

Save these instructions

This manual contains important instructions that must be followed during installation, operation, and maintenance of the PDU.

Safety symbols used in this manual



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



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



Indicates a potential hazard which could result in damage to product or other property.



Indicates important information.



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



Indicates a standby state. When in standby, the unit is not operating, but it may still contain hazardous voltage. It is not safe to service until the equipment is disconnected from all sources of electrical power.

Cross-reference symbols used in this manual



Indicates that more information is available on the same subject in a different section of this manual.



See also

Indicates that more information is available on the same subject in a different manual.

Warnings

Unpacking/moving

DO NOT tilt the PDU greater than 45° from its vertical axis. Never lay the PDU on its side.

Installation/maintenance

Only a certified electrician can perform these tasks:

- Connect the PDU to its power source
- Connect a switch to the EPO interface on the PDU

Only a certified electrician or an APC Field Service Engineer can perform maintenance of the PDU.

When you connect the PDU to its power source, you must install a 125A circuit breaker to protect the PDU against over-current. The circuit breaker must have a CE mark and a certification mark by a certified body such as VDE, SELV, BSI, Semko, Nemco, or Demko.

Maintenance performed while the PDU is receiving input power

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.

Total Power Off

1. Set the PDU **Main Input** circuit breaker to Off.
2. Set the upstream power source circuit breaker feeding the PDU to Off.

Emergency Power Off (EPO)

This InfraStruXure PDU is provided with an Emergency Power Off switch connection. When this EPO switch is energized, electrical power to the units is de-energized and the system will not transfer to on-battery operation.

EPO can be achieved with either a contact closure or application of an external 24 VAC or 24 VDC from a SELV or PELV source. It's important to note that hazardous voltage from the Mains voltage must be isolated from the contact closure or 24 VAC, 24 VDC. The EPO circuit contact closure, the 24 VAC, or the 24 VDC is considered a SELV circuit as defined in EN 60950 *Safety of Information Technology Equipment* or PELV circuit as defined in IEC 60364-4-41 *Electrical Installations of Buildings, Protection for Safety—Protection Against Electric Shock*. SELV is an abbreviation for Safety Extra Low Voltage. PELV is an abbreviation for Protective Extra Low Voltage. SELV and PELV circuits are isolated from the Mains through a safety isolating transformer, and are designed so that under normal conditions the voltage is limited to 42.4 V_{peak} or 60 VDC.

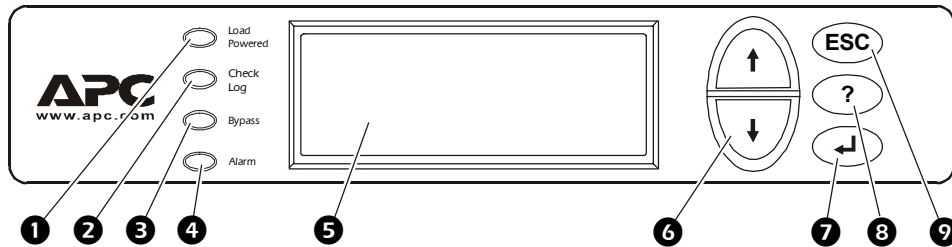
EMI

WARNING —This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take adequate measures. This equipment has been tested and found to comply with EN55022 (1998) and EN55024.

PDU Display Interface

Overview

Use the display interface to configure settings, set alarm thresholds, and provide audible and visual alarms.



1	Load Powered LED	When green, all output phases are within the limits specified by the output alarm limit thresholds.
2	Check Log LED	When yellow, at least one new alarm condition has been detected.
3	Bypass LED	Not used on this model PDU.
4	Alarm LED	When red, an alarm condition exists.
5	LCD	View alarms, status data, instructional help, and configuration items.
6	Up and Down navigation keys	Selects menu items and accesses information.
7	ENTER key	Opens menu items and inputs changes to system parameters.
8	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. placing the UPS into Maintenance Bypass operation.)
9	ESC key	Returns to previous screen displayed.

Top-level status screens

After displaying 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 L1-2: 000 L2-3: 000 L3-1: 000	Volts Out L1: 000 L2: 000 L3: 000	Load Current L1: 000 L2: 000 L3: 000 Neut:000
Total Output Loading kW: 000 kVA: 000 Freq: 00.0	PF: 000 %LD: 000	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 8.

Navigating through screens

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

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

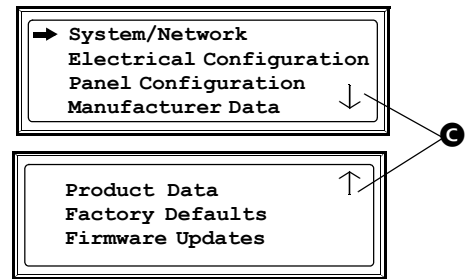
A

When configuring settings, press the Up and Down arrow keys until the selector arrow (A) 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 (B) 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
--

B

On some screens, continue arrows (Ⓞ) indicate that there are additional screens to view in the category. Press the Up or Down arrow key to view the additional screens.



Password-protected screens

When configuring or changing settings, you will be prompted for your password. To enter your password:

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



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.



See “System Password” on page 20 to change your password.

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 (**I_{rms}**), 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**: 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 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 a relay output. For example, Alarm Map **01of04** corresponds to the first of four relay 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 outputs to actuate when the Q3 circuit breaker is closed.
- **Any Breaker (Br)**—Mapping to this option will cause the relay outputs to actuate when the input, bypass input (Q10), or cross-tie output breaker is not in the normal state.
- **Contacts 1–4 (C1, C2, C3, C4)**— Maps to the input contact alarms.

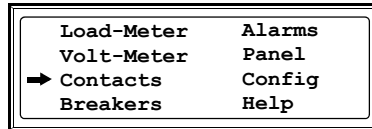
Before exiting the screen, to save your changes, select the **Apply Now** option on the bottom line of the screen.



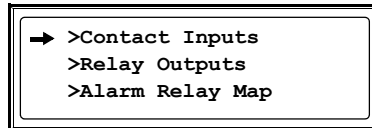
See “Relay Outputs” on page 55 for relay output specifications.

How to connect contacts to the PDU monitoring unit

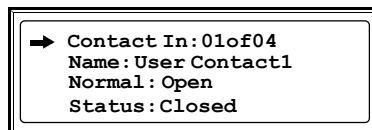
1. Choose one or more contact numbers on the user connection plate to which you will connect the contacts. The user connection plate connects to the **User/EPO port** on the PDU monitoring unit.
2. From the PDU display interface:
 - a. Press the ESC or ENTER key to go to the top-level menu screen.
 - b. Select **Contacts** on the top-level menu screen, and press the ENTER key.



- c. Select **Contact Inputs** (or Relay Outputs) and press the ENTER key to display the contact inputs (or relay outputs) screen.



- d. Select **Contact In** and press the ENTER key to select the number of the contact you are connecting. The continue arrow ⇕ will appear next to the contact number.



- 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 you wish 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-mm standard screwdriver.
4. Run the wires from the terminal block out the roof or under the floor of the PDU to your contact's location.



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

Breakers Screen

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

Main Input

Reports status of PDU Main Input switch (**Open** or **Closed**).
Under normal operation, this switch is **Closed**.

Alarms Screen

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 | Display 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 <i>mm/dd/yyyy hh:mm:ss</i> . <ul style="list-style-type: none">• The most recent alarm is displayed initially.• If the log contains no alarms, the screen displays <code>No New Logged Items</code>. |
| Entire Log | Display a description and the date and time of each alarm in the alarm log. The date/time format is <i>mm/dd/yyyy hh:mm:ss</i> . <ul style="list-style-type: none">• 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 <code>No New Logged Items</code>. |
| Clear Log | Delete the contents of the alarm log. You will be asked to confirm the deletion. |

Alarm Setup

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

- | | |
|----------------------------|---|
| Loading Limits | <p>Configure the following in amps and as a percentage of full load:</p> <ul style="list-style-type: none"> • 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 | <p>Configure the following as a percentage under or over the rated voltage:</p> <ul style="list-style-type: none"> • Input: The allowed range for input voltage • Output: The allowed range for output voltage |
| Other Limits | <p>Configure this limit:</p> <p style="padding-left: 40px;">Frequency: The frequency variation, in hertz, that is acceptable for the output current.</p> |
| Global Alarm Config | <p>Set all the loading limits or all the voltage limits simultaneously as a percentage of full load:</p> <ul style="list-style-type: none"> • Load Limits: Set the same percentage upper limit for output current and current on the neutral wire, and the lower limit for output current. (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.) <p>Select Apply Now and then YES to implement your changes.</p> |

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 PDU, as displayed by the **All Possible Alarms** option, with numeric variables between the < > characters. Logged alarms will display specific numbers instead.

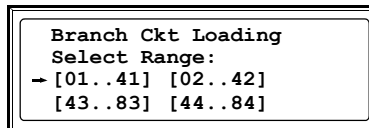
Alarm Condition	Explanation
Input V <Ln-N>=<Value> Voltage Under Limit	Input voltage of the phase indicated has dropped below the configured lower limit.
Input V <Ln-N>=<Value> Voltage Over Limit	Input voltage of the phase indicated exceeded the configured upper limit.
Output V <Ln-N>=<Value> Voltage 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 (if applicable).
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.
Branch Ckt Pos: <nn> Current Over Limit	Current on one of the poles of branch circuit breaker <i>nn</i> exceeded the configured limit.
Branch Ckt Pos: <nn> Current Under Limit	Current on one of the poles of branch circuit breaker <i>nn</i> dropped below the configured limit.

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.

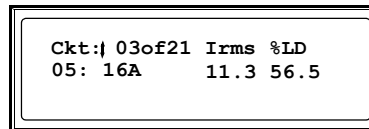
You can view data for each individual panel position on the distribution panel. To view status of a panel position, select the range that includes the position:



```
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.)

Once 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: 16A      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 16 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.

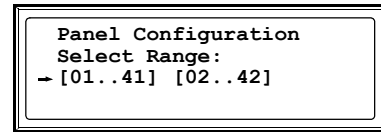
Branch Ckt Limits

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.

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.) Once you have selected the correct range, configure the settings for each circuit breaker in the range:



Pos: The panel positions in the selected range.

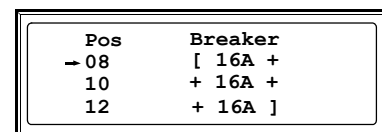
Breaker: Two configurable items:

- The circuit breaker rating, in amps.
- The circuit breaker tie indicator: Define the number of associated panel positions. 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 associate together panel positions that are logically tied together. For example, you can associate 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 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, 16A, associated circuit breakers occupying positions 08, 10, and 12 on the top right distribution panel.



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, 16-amp circuit breakers, choose this option, scroll to the value 3 for **Poles** and 016 for **Amp Rating**, and then select **Apply Now** and **YES** to implement your changes.

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. By default, no password is required.
- **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 in the following format: *dd-mmm yyyy*.
- **Time:** Set in 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 Information Controller 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 subnetwork on which the PDU operates.
- **GW:** The Gateway address. This is the physical address of the 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 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 power source 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 PDU has the optional isolation input 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.

Manufacturer Data

Use this option of the **Config** screen to display a scrollable list containing information about the 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 PDU. The following fields can be configured:

- Device Name** Set a unique name for your 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 PDU settings to their factory default values.

Firmware Updates

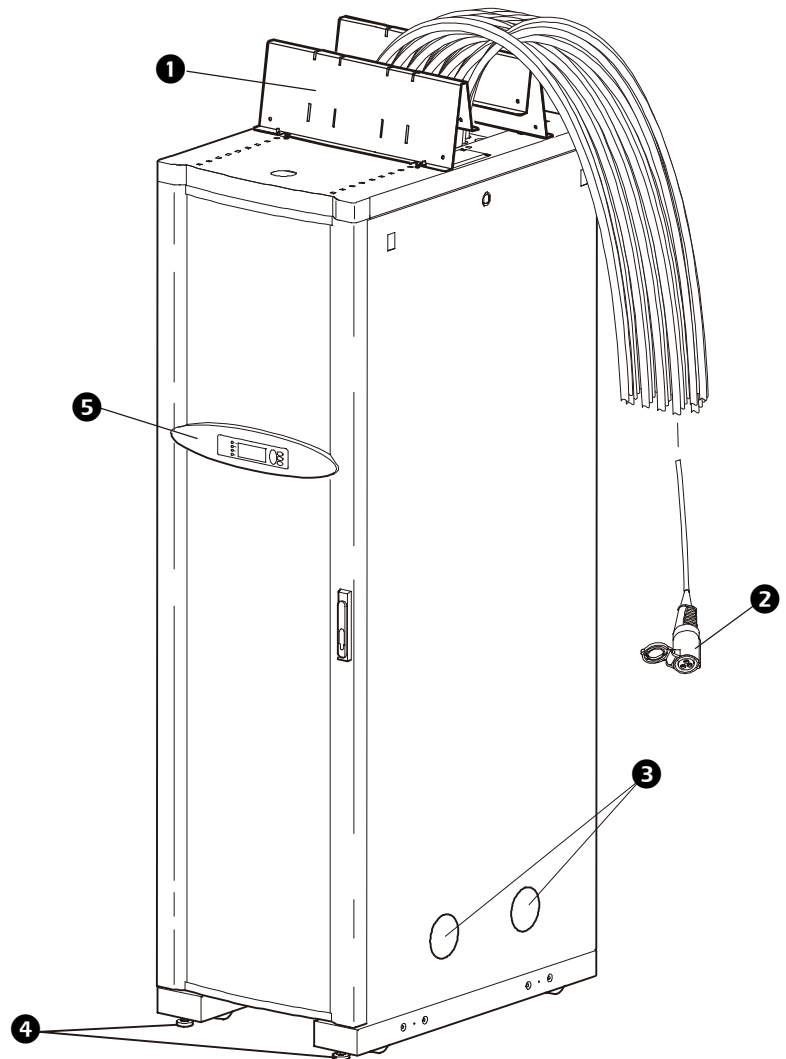
Use this option of the **Config** screen to download updated firmware to the PDU.

Overview

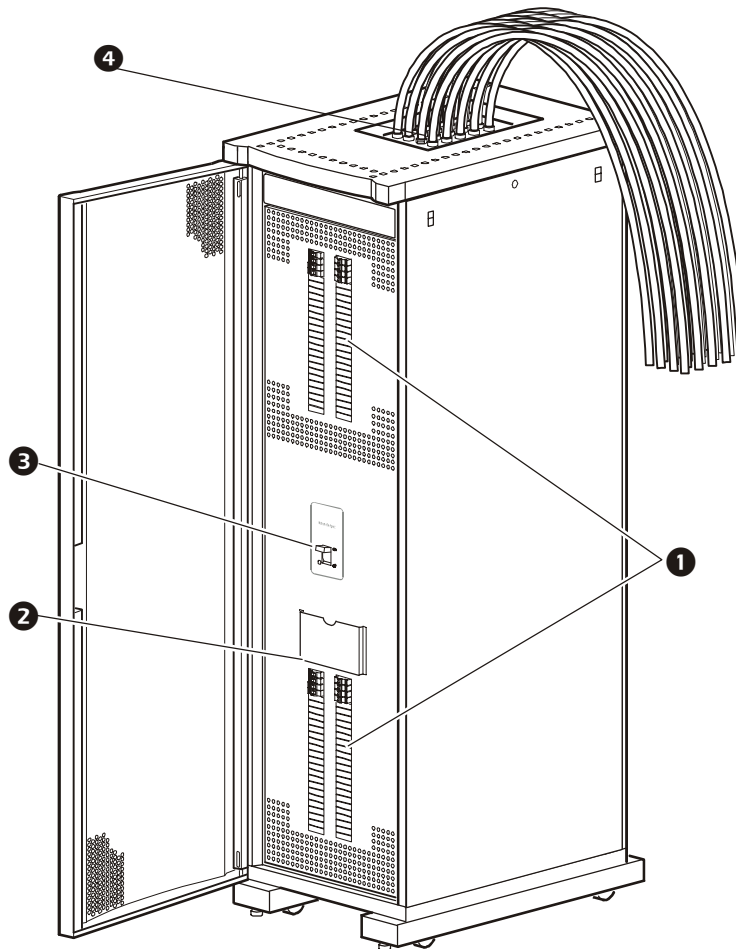
InfraStruXure PDU

Front view

- 1 The **PDU Shielding Trough** accommodates the power cables exiting the roof of the PDU, and separates power cables from data cables.
- 2 The **PDU power cables** supply power to equipment racks; they are fed through knockouts on the top of the PDU. The number of power cables installed in the PDU depends on your system configuration. Each power cable terminates with an IEC 309 outlet, which accepts a variety of APC InfraStruXure rack-mount power distribution accessories.
- 3 Both side panels on the PDU have **cable access holes** for Symmetra PX UPS input and output wiring.
- 4 **Leveling feet** adjust to level the enclosure. All enclosures must be level before installation of the system begins.
- 5 The **display interface** provides a local interface for viewing status data. It has an LCD, five-button interface, basic status lights, and a beeper.

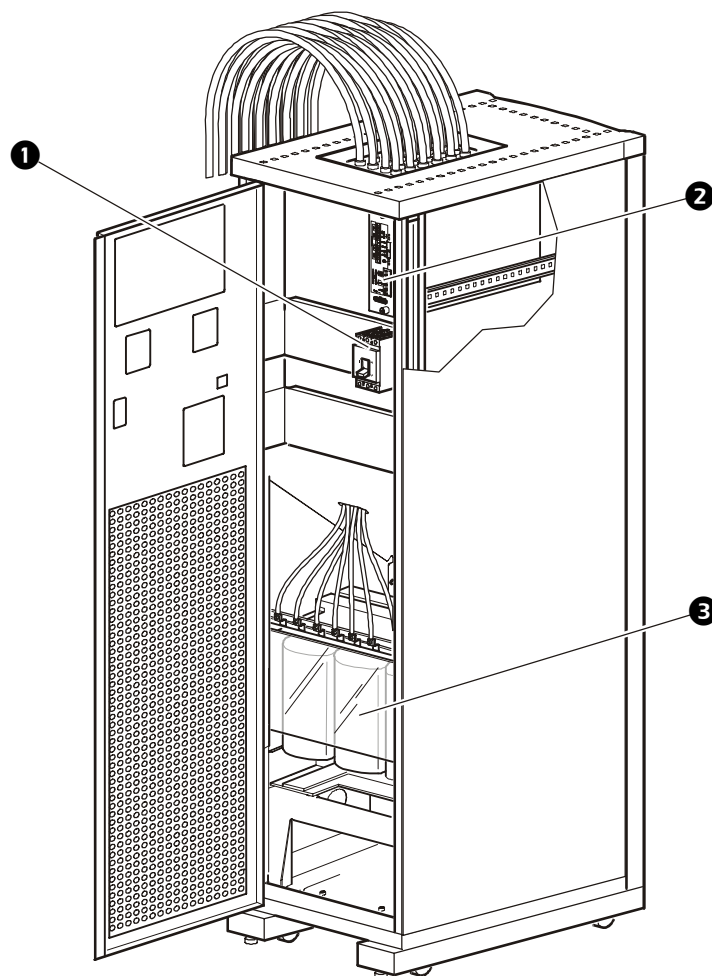


Front view (interior)



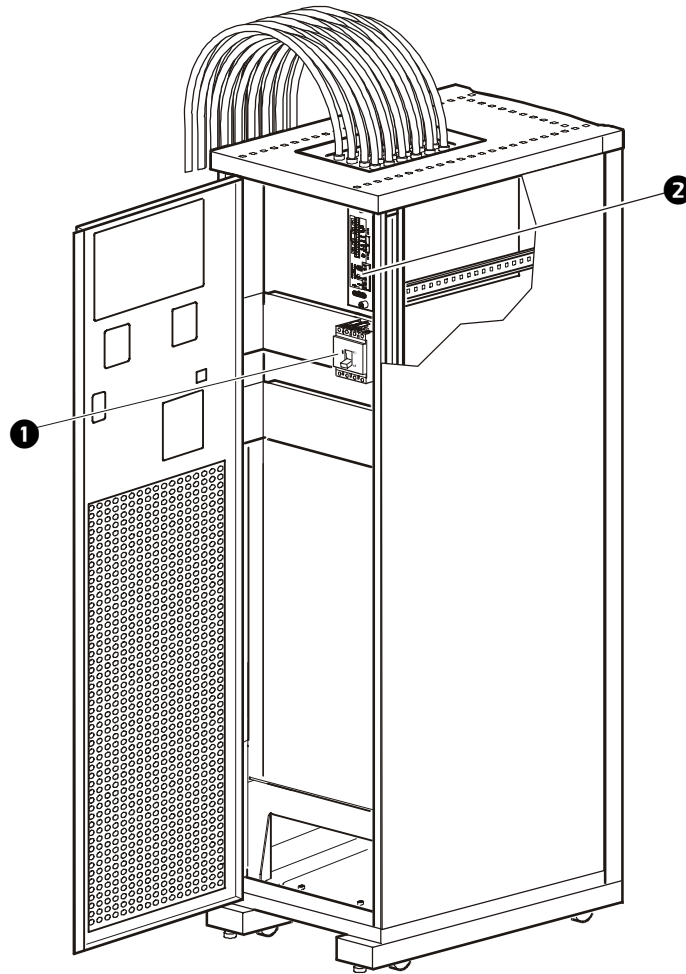
- ❶ The two **42-position circuit breaker panels** provide 84 total single pole positions. Each single pole provides power at 230 volts L-N. The amperage each position provides depends on the size of the circuit breaker used.
- ❷ The **document pocket** provides storage of documents relating to the circuit breaker panels, such as the PDU Panel Board Schedules (provided).
- ❸ The **Main Output** breaker protects the distribution circuit breaker panels. **Note:** On PDUs without a transformer, this breaker is located in the rear interior of the PDU (same as the Main Input).
- 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 of PDU with transformer (interior)



- ❶ The **Main input** switch connects to your main power source. The switch accepts 400V input and requires L1, L2, L3, and PE input conductors.
- ❷ 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 PDU monitoring unit has one 10BaseT (Cat-5) connection to the Information Controller hub (or switch), four relay output connections, four input contact connections, and one EPO input connection. Make these connections at the user connection plate located on the roof of the PDU. See “PDU monitoring unit” on page 27 and “User connection plate” on page 28 for a more detailed description.
- ❸ The output of the optional **isolation input transformer** feeds the input circuit breaker of the maintenance bypass panel.
Note: The secondary side of the optional isolation/input transformer should be provided with a suitable separate connection to an earth electrode.

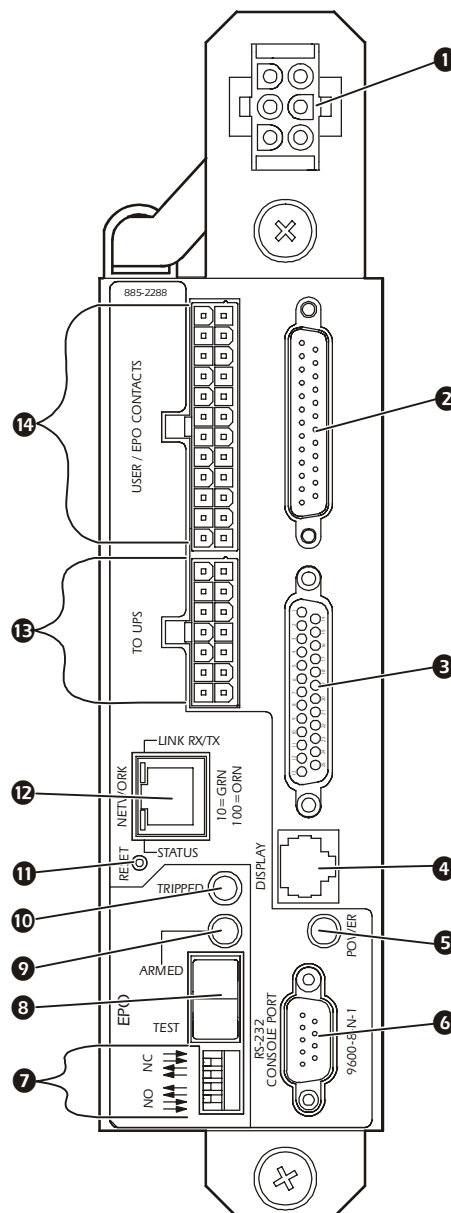
Rear view of PDU without transformer (interior)



- ❶ The **Main input** circuit breaker connects to either the upstream UPS or Mains. The circuit breaker accepts 400V input and requires L1, L2, L3, N, and PE input conductors.
Note: This breaker also serves as the Main Output (disconnect) breaker on PDUs without a transformer.
- ❷ 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 PDU monitoring unit has one 10BaseT (Cat-5) connection to the Information Controller hub (or switch), four relay output connections, four input contact connections, and one EPO input connection. Make these connections at the user connection plate located on the roof of the PDU. See “PDU monitoring unit” on page 27 and “User connection plate” on page 28 for a more detailed description.

PDU monitoring unit

- 1 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.
- 2 Connects to sensors monitoring values such as voltage, current, and power.
- 3 Digital input sensing for monitoring such as circuit breaker status, transformer temperature, fans, etc.
- 4 The **Display port** (RJ-45) connects the PDU monitoring unit to the PDU display interface.
- 5 The **Power LED** indicates whether the monitoring unit is receiving power.
- 6 Use the **Console port** (DB-9) to connect a laptop computer to the monitoring unit using an appropriate communication cable (APC part number 940-0103). This port is used to configure items relating to servicing the PDU.
- 7 **EPO DIP switches** configure the EPO input for the type of EPO switch that is connected—Normally Open (NO) or Normally Closed (NC).
- 8 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 to be switched **OFF**. See “How to Test the Emergency Power Off Switch” on page 49 for more information on testing the EPO switch.
- 9 The **EPO Armed LED** is green when the rocker switch is in the Armed position. The LED is dark when the rocker is in the Test position.
- 10 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** switch.
- 11 The **Reset button** resets the network processor; it does not reset the PDU or PDU monitoring unit.
- 12 Connect to the InfraStruXure Manager through the **network port**.
- 13 Not used on this model PDU.
- 14 The optional **User/EPO Contacts** port is connected to wire harnesses that connect the User Connection Plate in the roof (or floor) of the PDU. The port allows for relay outputs (4), input contacts (4), and an EPO input (1). See “Contacts Screen” on page 10 and “How to Test the Emergency Power Off Switch” on page 49 for more information.

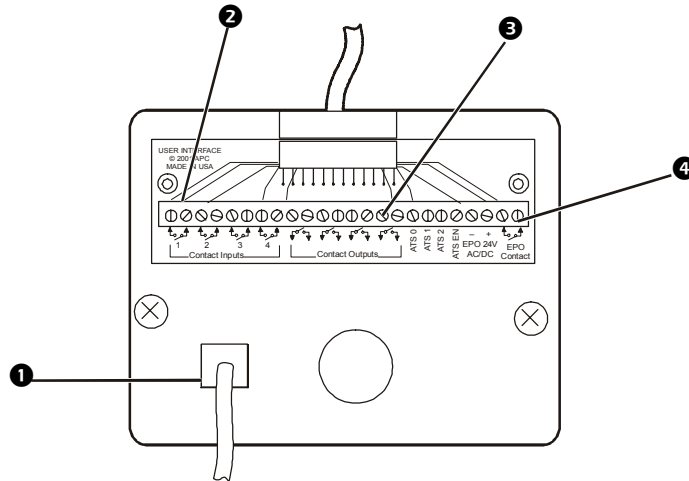


Note

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 labeled 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 detailed description of the user connection plate, see (4) on page 24. For clarity, the user connection plate in the following illustration is shown in greater detail.

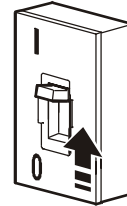


- ❶ Connect the InfraStruXure PDU to the network or the InfraStruXure Manager through the **ethernet port**.
- ❷ The user connection plate has four **input contact connections** for monitoring Normally Open (NO) or Normally Closed (NC) dry contacts. See page 12 and page 48 for more information.
- ❸ The user connection plate has four **relay output connections** for Normally Open (NO) or Normally Closed (NC) dry contacts. See page 12 and page 48 for more information.
- ❹ Connect an Emergency Power Off (EPO) switch at one of three choices of **EPO connections** (24VDC, 24VAC, or contact closure).

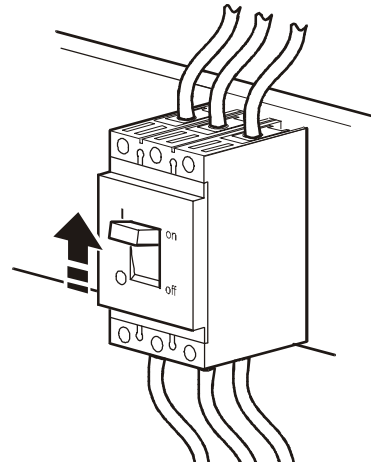
System Operation

How to Apply Power to the System

1. Close (turn ON) the main circuit breaker of the **power source** supplying power to the PDU.



2. Close (turn ON) the **Main Input** on the PDU.

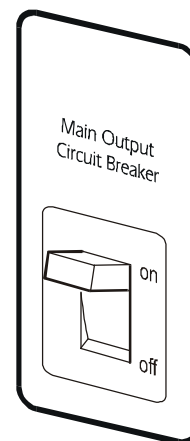


3. Power the PDU **distribution circuit breakers**.

For PDUs with transformer:

- a. Close (turn ON) the **Main Output** circuit breaker on the PDU.

Note: After the **Main Output** circuit breaker has been closed, both PDU distribution panels will be energized.



For PDUs with and without a transformer:

- b. Close (turn ON) the PDU **distribution panel** circuit breakers.

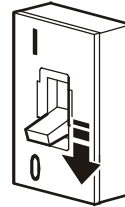


Note

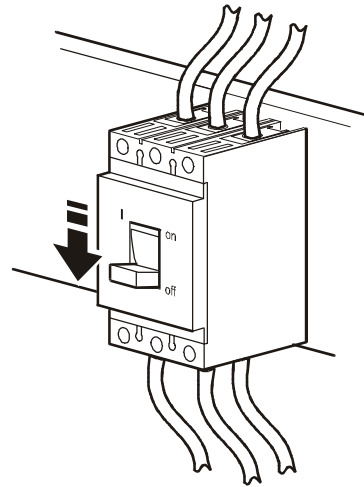
When the **distribution panel** circuit breakers are closed, the PDU power cables and connected equipment are energized.

How to Ensure Total Power Off

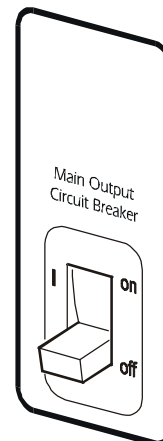
1. Open (turn OFF) the main breaker on the **power source** feeding the PDU.



2. Open (turn OFF) the **Main Input** switch on the PDU.



3. *For PDU with transformer:* Open (turn OFF) the **Main Output** circuit breaker on the front of the PDU.



Communication Configuration

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 32 for configuration instructions.



See also

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 InfraStruXure PDU. See “Configuring the Network Management Interface” on page 33 for configuration instructions.



See also

For more information about the internal user interfaces, see the InfraStruXure PDU's online *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 InfraStruXure PDU. See “Configuring the Network Management Interface” on page 33 for configuration instructions.



See also

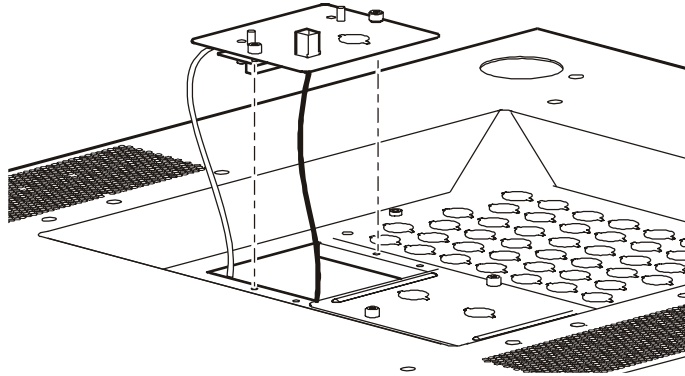
To use the PowerNet MIB with an SNMP browser, see the *PowerNet[®] SNMP Management Information Base (MIB) Reference Guide*, which is provided on the InfraStruXure PDU *Utility CD*.

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



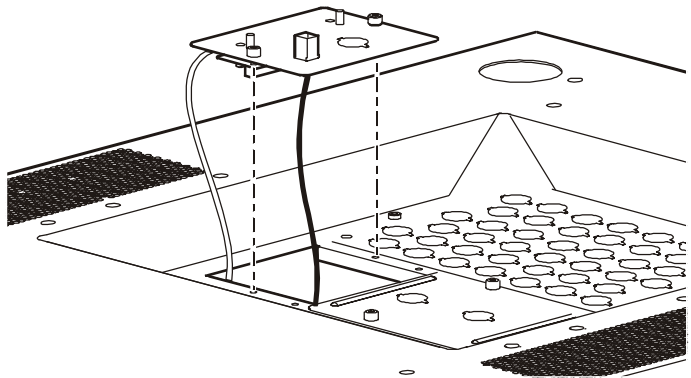
For detailed configuration instructions, see the Information Controller *Installation and Quick-Start* manual included with your Information Controller.

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 Power Distribution Unit’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 35.)
- Local computer (See “Local access to the control console” on page 37.)
- Networked computer (See “Remote access to the control console” on page 37.)

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.



See also

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 InfraStruXure PDU *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 34, “Local access to the control console” on page 37, or “Remote access to the control console” on page 37 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 36.

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 34, “Local access to the control console” on page 37, or “Remote access to the control console” on page 37 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.



See also

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.



See also

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.



See also

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 InfraStruXure PDU’s online *Network Management User’s Guide*.

1. A 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 hexadecimal 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 37.



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 37.

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 38 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
```



See also

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 37 or “Remote access to the control console” on page 37:

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).



If you disconnected a cable during the procedure described in “Local access to the control console” on page 37, reconnect that cable and restart the associated service.

Note

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 Sockets 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.)



See also

See the chapter entitled “Security” in the InfraStruXure PDU’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 also

See the InfraStruXure PDU's online *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, you must be an Administrator; use the **FTP Server** option of the **Network** menu.

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 also**

See the InfraStruXure PDU's online *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.

Customizing and Updating the PDU

Important Safety Instructions



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.

PDU Orderable Part List

Breakers

0M-1293	10A, single-pole breaker	0M-1706	32A with 100mA ELCB, three-pole breaker
0M-1304	16A, single-pole breaker	0M-1707	32A with 30mA ELCB, three-pole breaker
0M-1703	16A with 30mA ELCB, two-pole breaker	0M-1708	16A with 100mA ELCB, three-pole breaker
0M-1704	10A with 30mA ELCB, single-pole breaker	0M-1709	10A with 100mA ELCB, three-pole breaker
0M-1705	32A, single-pole breaker		

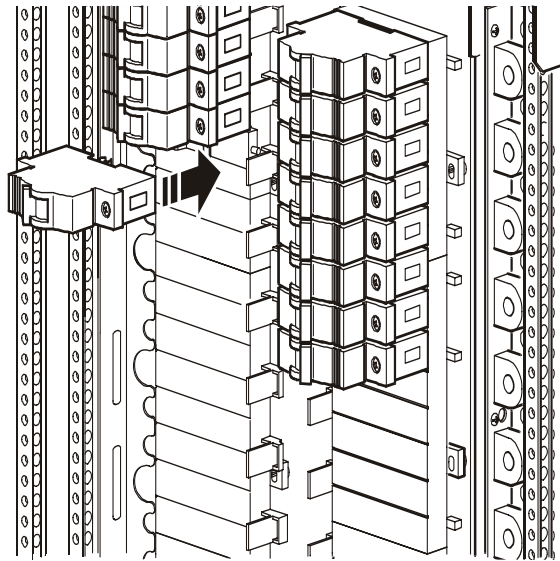
Power Cables

PDW15EC309R	PDW100EC309R
PDW21EC309R	PDW107EC309R
PDW27EC309R	PDW113EC309R
PDW33EC309R	PDW119EC309R
PDW40EC309R	PDW125EC309R
PDW46EC309R	PDW131EC309R
PDW52EC309R	PDW137EC309R
PDW58EC309R	PDW143EC309R
PDW64EC309R	PDW149EC309R
PDW70EC309R	PDW155EC309R
PDW76EC309R	PDW161EC309R
PDW82EC309R	PDW167EC309R
PDW88EC309R	PDW173EC309R
PDW94EC309R	PDW180EC309R

How to Add Circuit Breakers and Power Cables

Add a circuit breaker on the PDU

1. Move the clip on the back of the circuit breaker to correspond to the phase to which you are connecting to (L1, L2, or L3).
2. Snap the new single-pole circuit breaker into a position on the panel.

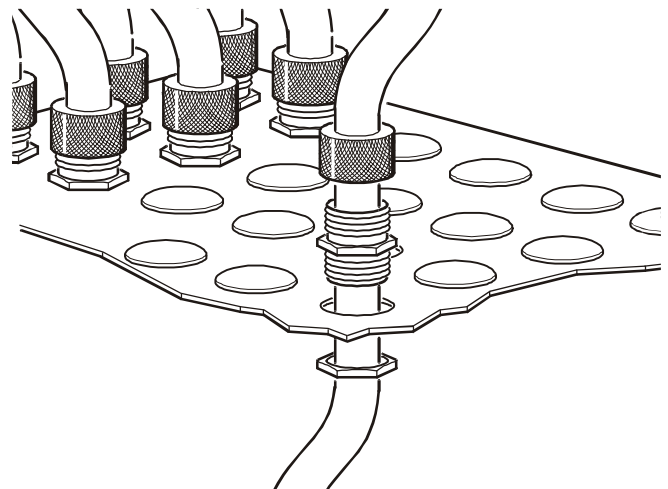


3. Remove the corresponding plastic blanking plate on the front panel of the PDU.

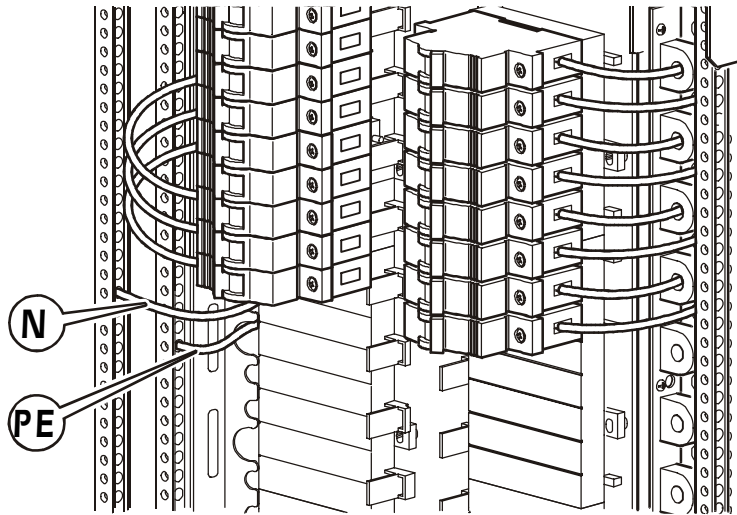
Add a power cable to the PDU

Before adding a power cable, add a circuit breaker:

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.



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.
 - b. Connect the line wire to the circuit breaker.
 - c. Connect the neutral wire to the closest open termination point on the Neutral Bar (N).
 - d. Connect the PE wire to the closest open termination point on the PE Bar (PE).



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

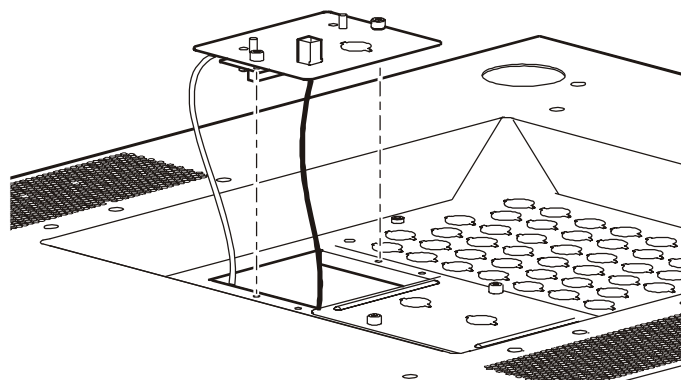
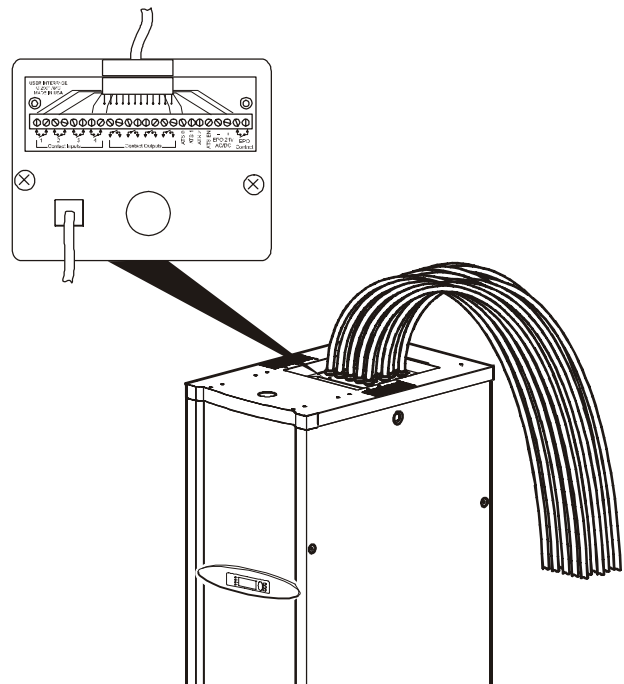
Overview

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.

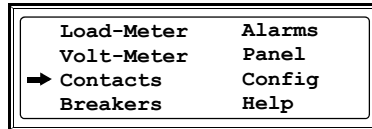
Remove the plate using a Phillips or standard screwdriver to loosen the two captive screws. Use the knockout in the plate to route cables to and from the user connection on the plate. If you remove the plate, make sure that you do not disturb the existing connections.



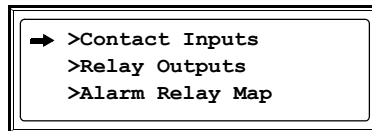
See “Relay Outputs” on page 55 for relay output specifications.

How to connect contacts to the PDU monitoring unit

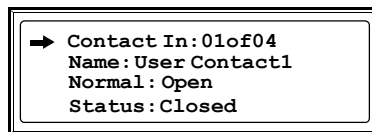
1. Choose one or more contact numbers on the user connection plate to which you will connect the contacts. The user connection plate connects to the **User/EPO port** on the PDU monitoring unit.
2. From the PDU display interface:
 - a. Press the ESC or ENTER key to go to the top-level menu screen.
 - b. Select **Contacts** on the top-level menu screen, and press the ENTER key.



- c. Select **Contact Inputs** (or Relay Outputs) and press the ENTER key to display the contact inputs (or relay outputs) screen.



- d. Select **Contact In** and press the ENTER key to select the number of the contact you are connecting. The continue arrow \updownarrow will appear next to the contact number.



- 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 you wish 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-mm standard screwdriver.
4. Run the wires from the terminal block out the roof or under the floor of the PDU to your contact's location.



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

How to Test the Emergency Power Off Switch



Note

APC offers an optional InfraStruXure EPO System (EPW9). Contact your APC sales representative, or visit the APC Web site (www.apc.com) for more information.



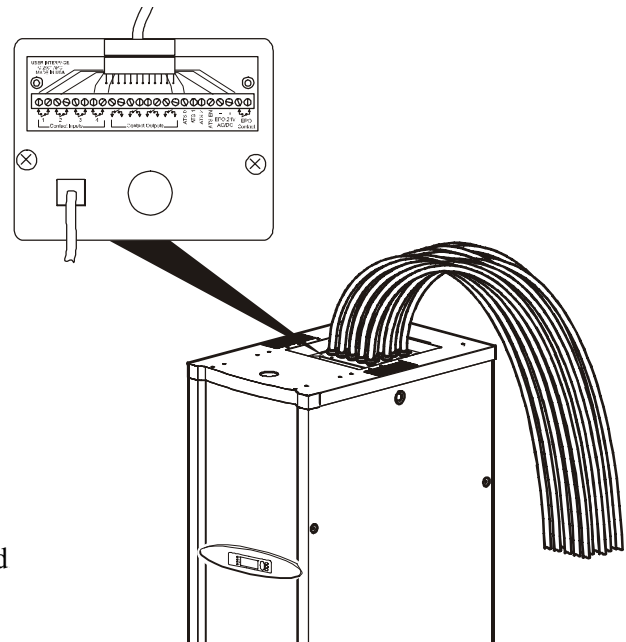
Caution

If you are not connecting an Emergency Power Off switch to the PDU, leave the **Arm/Test** rocker switch on the PDU monitoring unit in the **Test** position.

Overview

Connecting the switch. The Emergency Power Off (EPO) switch connects to the PDU user connection plate. The figure on the right shows the location of the user connection plate on the roof of the PDU. Connect a switch using one of the three following connections:

- Contact closure
- 24VAC
- 24VDC



Note

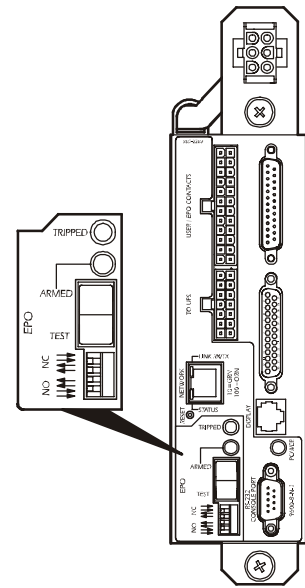
Contact closure is recommended



Caution

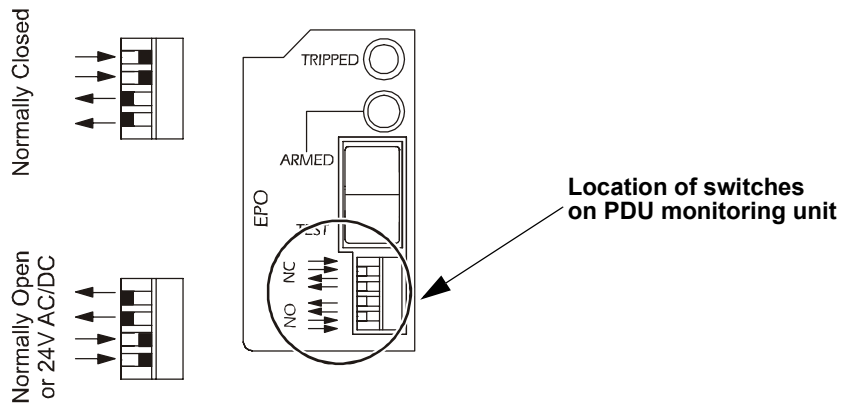
Only a licensed electrician can connect an Emergency Power Off switch to the PDU. For instructions, see the *Installation and Start-Up* manual included with your PDU.

Configuring and testing. Configuring and testing of the switch is done through the EPO interface on the PDU monitoring unit. The figure to the right shows the PDU monitoring unit and the location of the EPO LEDs and DIP switches.

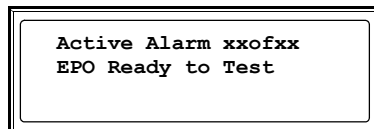


Testing the switch

1. Before testing the EPO switch, verify that the EPO DIP switches on the PDU monitoring unit are configured properly for the signal type you are using. The labels above the switches and the following figure show the correct settings for both the Normally Open (NO) and Normally Closed (NC) position.



2. Test the EPO switch to ensure that it is wired and working correctly:
 - a. Place the **Arm/Test** rocker switch in the **Test** position. The EPO state LEDs will be off and the PDU display interface will show the following alarm (in addition to any other active alarms):



- b. 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.)

- c. 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.
- d. 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. If the test was not successful, see the troubleshooting chart:

Problem	Action
Neither state LED was red when EPO switch was engaged	<ul style="list-style-type: none"> • Check the wiring to your EPO switch. • Check to make sure the EPO DIP switch configuration is correct for your switch (NO or NC). See step 1 on the previous page for proper configuration instructions.
Only one of the state LEDs was red when the EPO switch was engaged	<ul style="list-style-type: none"> • Check to make sure the EPO DIP switch configuration is correct for your switch (NO or NC) and test again. See step 1 on the previous page for proper configuration instructions. • 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.

- e. Repeat this test for each EPO switch installed.
3. Ensure that the **Arm/Test** rocker switch is in the **Arm** position on the monitoring unit.

Emergency Power Off (EPO)

This InfraStruXure PDU is provided with an Emergency Power Off switch connection. When this EPO switch is energized, electrical power to the units is de-energized and the system will not transfer to on-battery operation.

EPO can be achieved with either a contact closure or application of an external 24 VAC or 24 VDC from a SELV or PELV source. It’s important to note that hazardous voltage from the Mains voltage must be isolated from the contact closure or 24 VAC, 24 VDC. The EPO circuit contact closure, the 24 VAC or the 24 VDC are considered a SELV circuit as defined in EN 60950 *Safety of Information Technology Equipment* or PELV circuit as defined in IEC 60364-4-41 *Electrical Installations of Buildings, Protection for Safety—Protection Against Electric Shock*. SELV is an abbreviation for Safety Extra Low Voltage. PELV is an abbreviation for Protective Extra Low Voltage. SELV and PELV circuits are isolated from the Mains through a safety isolating transformer, and are designed so that under normal conditions the voltage is limited to 42.4 V_{peak} or 60 VDC.

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:

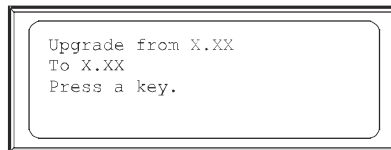
1. Upgrade the PDU Network Management Card.



See also

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 message:



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



See also

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 administrators 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 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.



Do not interrupt the download.

Caution

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

Specifications

InfraStruXure PDU

Electrical	With Transformer	Without Transformer
Output		
Voltage AC	L1, L2, L3, N, PE	400/230V: 3W, N, PE
Full Load Rating	60kVA	100A
Nominal Current	167A	180A
Number of Distribution Panels	2 × 225 A, 42-position	
Max. Distribution Breaker Size	150AT	150AT
Main Breaker	175 A MCCB, 100% rated	225 A MCCB
Input		
Nominal Voltage	400V	400/230V
Frequency	57–63Hz	47–70Hz
Voltage AC	L1, L2, L3, PE	400/230V: 3W, N, PE (WYE)
Nominal Current	167A	100A
Disconnect	225 A molded case switch	N/A
Physical		
Dimensions (H×W×D)		
PDU	2159 × 610 × 864 mm (85 × 24 × 34 in)	2159 × 610 × 864 mm (85 × 24 × 34 in)
Weight		
PDU only	410kg (904lb)	204kg (450lb)
PDU with 28 cables	556kg (1226lb)	351kg (774lb)
Relay Outputs		
Nominal switching capacity	1 A at 30VDC	
Maximum switching power	30W	
Maximum switching voltage	60VDC	
Maximum switching current	2ADC	
Maximum carrying current	2ADC	
Surge Ratings	2kV per Bellcore TA-NWT-001089 1.5kV per FCC part 68	

Environmental

Operating Environment	Protected from water and conductive contaminants
Humidity	
Operating	0–95%, non-condensing
Storage	0–95%, non-condensing
Temperature Class	Class H (220°C)
Storage Elevation	10 000 m (for aircraft transportation)
Heat Rejection at Full Load	6339 BTU/hr. (1.9 kW) for transformer models

Compliance

Approvals	UL Listed
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Product Information

InfraStruXure Standard Warranty

APC warrants that all components of the InfraStruXure system will be free from defect in material and workmanship for a period of two years from the date of start up when start up has been performed by APC authorized service personnel*. If assembly services are included in the original purchase and are also performed by APC authorized service personnel, APC offers an additional year of parts warranty and the first year of on site Next Business Day coverage at no additional charge. In the event that the system fails to meet the foregoing warranty, APC shall repair or replace, at its sole discretion, any such defective parts. Under this warranty, APC will ship all parts to your site at no cost to be available for you the next business day after APC is notified of this requirement. If you choose to upgrade the system to include an on site contract, APC offers modular service packages to match your needs.

Each point product incorporated into the system has a separate factory warranty that is applied when sold as a standalone unit. When incorporated into an InfraStruXure solution, the unit will be covered by the InfraStruXure warranty. In cases where one warranty favors the customer over the other, the stronger of the two warranties will take precedence. The InfraStruXure factory warranty covers only those parts appearing on the bill of materials for that solution. Megawatt UPS systems are not covered under the InfraStruXure factory warranty.

Battery functionality is typically impacted by age and environmental conditions, and therefore certain requirements must be met by the end-user. Failure to adhere to these requirements may put the battery warranty at risk. APC-supplied batteries must always be kept (whether stored or installed) in a climate-controlled environment, and should be re-charged at a minimum of every three (3) months. The battery environment must be free of excessive moisture, construction dirt, corrosive elements, or other contaminants. The temperature range must be maintained at 41 to 95° F (5 to 35° C).

*All warranties are null and void unless startup is performed by authorized an APC Global Services service center.

APC SHALL NOT BE LIABLE UNDER THIS WARRANTY IF ITS TESTING AND EXAMINATION DISCLOSE THAT THE ALLEGED DEFECT IN THE PRODUCT DOES NOT EXIST OR WAS CAUSED BY PURCHASER'S OR ANY THIRD PERSON'S MISUSE, NEGLIGENCE, IMPROPER INSTALLATION OR TESTING, UNAUTHORIZED ATTEMPTS TO REPAIR OR MODIFY, OR ANY OTHER CAUSE BEYOND THE RANGE OF THE INTENDED USE, OR BY ACCIDENT, FIRE, LIGHTNING OR OTHER HAZARD.

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Life-Support Policy

APC Three-Phase Systems

As a general policy, American Power Conversion Corporation and its affiliates and subsidiaries worldwide (APC) do not recommend the use of any of its products in life support applications where failure or malfunction of the APC product can be reasonably expected to cause failure of the life support device or to significantly affect its safety or effectiveness. APC does not recommend the use of any of its products in direct patient care. APC will not knowingly sell its products for use in such applications.

Examples of devices considered to be life support devices are neonatal oxygen analysers, nerve stimulators (whether used for anesthesia, pain relief, or other purposes), autotransfusion devices, blood pumps, defibrillators, arrhythmia detectors and alarms, pacemakers, hemodialysis systems, peritoneal dialysis systems, neonatal ventilator incubators, ventilators for both adults and infants, anesthesia ventilators, infusion pumps, and any other device designated as “critical” by the U.S.F.D.A.

How to Obtain Service



Note

If you ordered on-site service, see your entitlement certificate and terms and conditions of the service before following the procedure described below. An on-site service contract entitles you to an on-site visit by an APC technician to assess the issue, determine the problem, and replace parts, if needed. (Response time varies per contract.)

How to Contact APC

Customer support for this or any other APC product is available at no charge in any of the following ways:

- Visit the APC Web site to access documents in the APC Knowledge Base and to submit any customer support requests.
 - **www.apc.com** (Corporate Headquarters)
Connect to localized APC Web sites for specific countries, each of which provides customer support information.
 - **www.apc.com/support/**
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)
APC Headquarters U.S., Canada	(1) (800) 800-4272 (toll-free)
Latin America	(1) (401) 789-5735 (USA)
Europe, Middle East, Africa	(353) (91) 702000 (Ireland)
Japan	(0) 35434-2021
Australia, New Zealand, South Pacific area	(61) (2) 9955 9366

- Local, country-specific centers: go to **www.apc.com/support/contact** for contact information.

Contact the APC representative or other distributor from whom you purchased your APC product for information on how to obtain local customer support.

Appendix A: Changes in This Manual

Overview

The following list documents the specific changes made to this manual since its last release (990-1662B).

General changes

Communication configuration instructions were added. See pages 31–41.

Changes by page number

Page 28	Added detailed description of the user connection plate.
Pages 31–41	Added communication configuration instructions.
Page 44	Updated PDU Orderable Part List.
Pages 47–36	Added instructions for connecting user input contacts and relay outputs to the user connection plate.
Pages 49–51	Added instructions for testing an Emergency Power Off switch.
Page 52	Added instructions for how to download firmware updates.
Page 60	Updated instructions for how to obtain service for the InfraStruXure PDU.

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