



Powerware

**Powerware® Three-Phase Power Distribution Unit
Installation and Operation Manual**

For use with 30–300 kVA PDU Models

IMPORTANT SAFETY INSTRUCTIONS SAVE THESE INSTRUCTIONS

This manual contains important instructions that you should follow during installation and maintenance of the PDU. Please read all instructions before operating the equipment and save this manual for future reference.

Consignes de sécurité

**CONSIGNES DE SÉCURITÉ IMPORTANTES
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Chapter 1 | Introduction

The Powerware® Three-Phase Power Distribution Unit (PDU) is designed for use with all three-phase Uninterruptible Power Systems and three-phase power sources. The PDU provides power distribution, voltage transformation, metering, status monitoring, and load profiling with easy adaptation and expansion without costly electrical rework.

The PDU is housed in a single, free-standing cabinet, with safety shields behind the doors for hazardous voltage protection. Figure 1-1 through Figure 1-3 show the Powerware PDU.

1.1 Configurations

The following PDU configurations with an output range from 30 to 150 kVA for 208V input models and 30 to 300 kVA for 480V and 600V input models are possible:

- ▶ 208V/208V with no transformer and:
 - one or two 225A 42-circuit distribution panels
 - one to eight 225A subfeed breakers
 - one 225A 42-circuit distribution panel and one to four 225A subfeed breakers
 - up to four front facing sidecars with one or two 225A 42-circuit distribution panels
 - one or two side facing sidecars with one or two 225A 42-circuit distribution panels
- ▶ 480V/208V with transformer and:
 - one or two 225A 42-circuit distribution panels
 - one to eight 225A subfeed breakers
 - one 225A 42-circuit distribution panel and one to four 225A subfeed breakers
 - up to four front facing sidecars with one or two 225A 42-circuit distribution panels
 - one or two side facing sidecars with one or two 225A 42-circuit distribution panels
- ▶ 600V/208V with transformer and:
 - one or two 225A 42-circuit distribution panels
 - one to eight 225A subfeed breakers
 - one 225A 42-circuit distribution panel and one to four 225A subfeed breakers
 - up to four front facing sidecars with one or two 225A 42-circuit distribution panels
 - one or two side facing sidecars with one or two 225A 42-circuit distribution panels

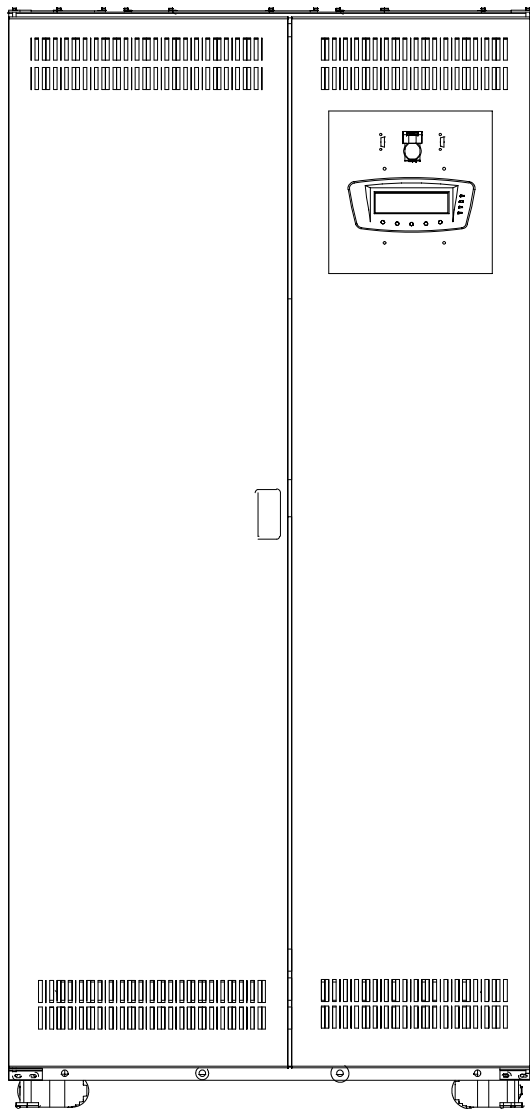


Figure 1-1. Powerware PDU Cabinet

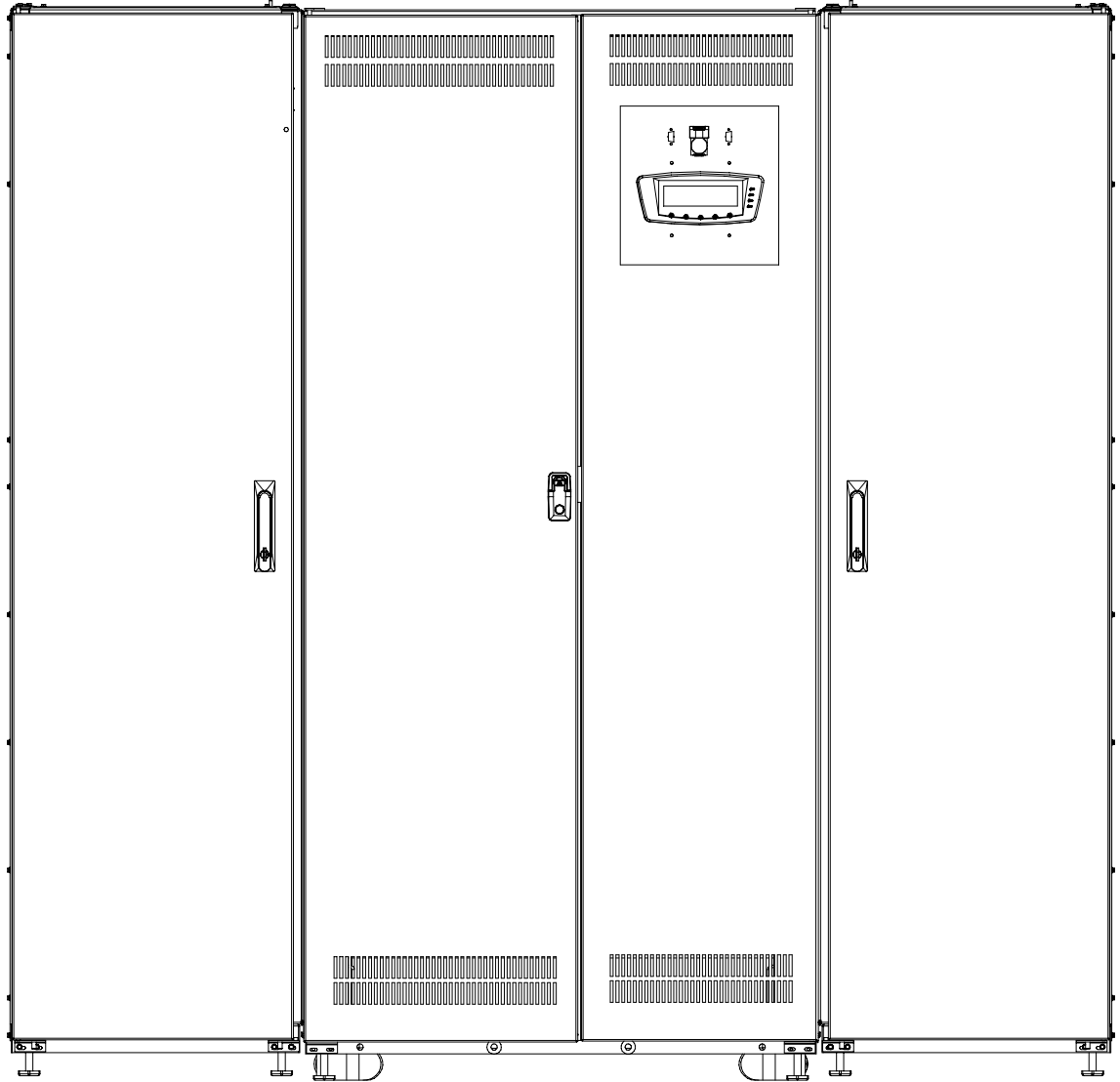


Figure 1-2. Powerware PDU Cabinet with Two Front Facing Sidecars

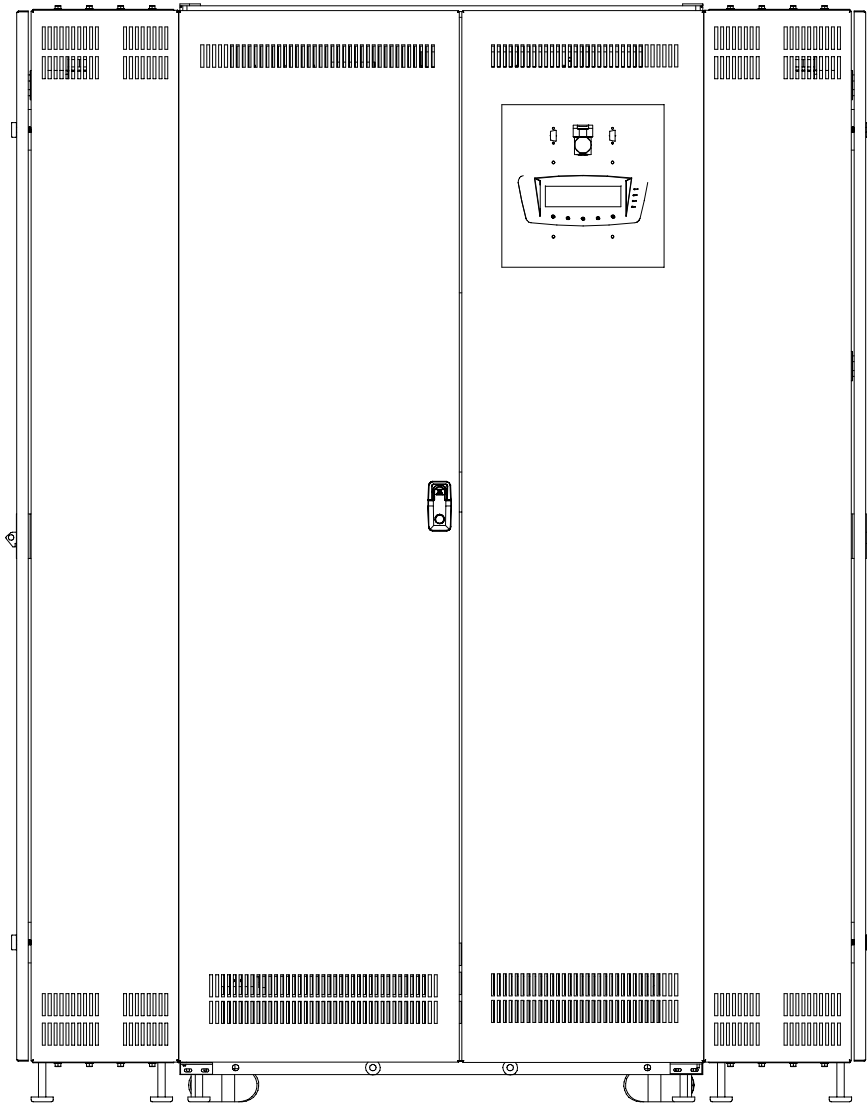


Figure 1-3. Powerware PDU Cabinet with Two Side Facing Sidecars

1.2 Using This Manual

This manual describes how to install and operate the Powerware PDU. Read and understand the procedures described in this manual to help ensure trouble-free installation and operation.

The information in this manual is divided into the sections and chapters listed. At a minimum, Chapters 1 through 3 and Chapter 6 and 7 should be examined.

- ▶ **Chapter 1, “Introduction”** – provides a brief description of the PDU, a description of the content of each chapter, text conventions used in the manual, safety warnings, and reference information.

Section I, Installation

- ▶ **Chapter 2, “PDU Installation Plan and Unpacking”** – explains how to prepare the site for the installation of the PDU. It discusses equipment environmental requirements, inspecting, and unpacking cabinets.
- ▶ **Chapter 3, “Installing the PDU”** – describes how to install and wire the PDU.
- ▶ **Chapter 4, “Installing a Remote Emergency Power-off Control”** – contains information for installing the optional REPO control.

Section II, Operation


- ▶ **Chapter 5, “Understanding PDU Operation”** – provides information on how an PDU works.
- ▶ **Chapter 6, “PDU Features, Options, and Controls”** – describes the standard and optional PDU features and the PDU controls.
- ▶ **Chapter 7, “PDU Control Panel and Operating Instructions”** – describes the controls and indicators found on the control panel, the various information screens displayed on the LCD, and how to use the PDU.
- ▶ **Chapter 8, “System Events”** – lists all the alarms and notices that occur during operation of the PDU.
- ▶ **Chapter 9, “Communication”** – describes the communication features of the PDU and quick start instructions for the ConnectPDU Web/SNMP Card.
- ▶ **Chapter 10, “Maintaining the PDU”** – contains maintenance instructions for the PDU.
- ▶ **Chapter 11, “Product Specifications”** – provides specifications for the PDU.
- ▶ **Appendix A, “Installation Information”** – contains important information on wiring requirements and recommendations, and important diagrams of the cabinets’ mechanical details and electrical access.
- ▶ **Warranty** – provides the Powerware warranty for this product.

Read through each procedure before beginning the procedure. Perform only those procedures that apply to the PDU being installed or operated.

1.3 Conventions Used in This Manual

This manual uses these type conventions:

- ▶ **Bold type** highlights important concepts in discussions, key terms in procedures, and menu options.
- ▶ *Italic type* highlights notes and new terms where they are defined.
- ▶ `Screen` type represents information that appears on the screen or LCD.

Icon	Description
	Information notes call attention to important features or instructions.

1.4 Safety Warnings

IMPORTANT SAFETY INSTRUCTIONS SAVE THESE INSTRUCTIONS

This manual contains important instructions that should be followed during installation and maintenance of the PDU. Please read all instructions before operating the equipment and save this manual for future reference.

The PDU is designed for industrial or computer room applications, and contains safety shields behind the doors. However, the PDU system is a sophisticated power system and should be handled with appropriate care.

DANGER



The PDU contains **LETHAL VOLTAGES**. All repairs and service should be performed by **AUTHORIZED SERVICE PERSONNEL ONLY**. There are **NO USER SERVICEABLE PARTS** inside the PDU with the exception of adding and wiring branch circuit breakers.

WARNING



- ▶ To reduce the risk of fire or electric shock, install this PDU in a temperature and humidity controlled, indoor environment, free of conductive contaminants. Ambient temperature must not exceed 40°C (104°F). Do not operate near water or excessive humidity (95% maximum). The system is not intended for outdoor use.
 - ▶ Ensure all power is disconnected before performing installation or service.
-

CAUTION



- ▶ Keep the PDU doors closed to ensure proper cooling airflow and to protect personnel from dangerous voltages inside the unit.
 - ▶ Do not operate the PDU close to gas or electric heat sources.
 - ▶ The operating environment should be maintained within the parameters stated in this manual.
 - ▶ Keep surroundings uncluttered, clean, and free from excess moisture.
 - ▶ Observe all DANGER, CAUTION, and WARNING notices affixed to the inside and outside of the equipment.
-

1.5 Getting Help

If help is needed with any of the following:

- ▶ Scheduling initial startup
- ▶ Regional locations and telephone numbers
- ▶ A question about any of the information in this manual
- ▶ A question this manual does not answer

Please call the Eaton Help Desk for Powerware products at:

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

In Canada **1-800-461-9166**

All other countries **Call your service representative**

Section I | **Installation**

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Chapter 2 | PDU Installation Plan and Unpacking

Use the following basic sequence of steps to install the Power Distribution Unit (PDU).

1. Create an installation plan for the PDU (Chapter 2).
2. Prepare your site for the PDU (Chapter 2).
3. Inspect and unpack the PDU (Chapter 2).
4. Unload and install the PDU and wire the system (Chapter 3).
5. Install features, accessories, or options, as applicable (Chapters 4 and 9).
6. Complete the Installation Checklist (Chapter 3).
7. Have authorized service personnel perform preliminary operational checks and startup.



NOTE *Startup and operational checks must be performed by an authorized Eaton Customer Service Engineer, or the warranty terms specified on page W-1 become void. This service is offered as part of the sales contract for the PDU. Contact service in advance (usually a two-week notice is required) to reserve a preferred startup date.*

2.1 Creating an Installation Plan

Before installing the PDU, read and understand how this manual applies to the system being installed. Use the procedures and illustrations in the following chapters to create a logical plan for installing the system.

2.2 Preparing the Site

For the PDU to operate at peak efficiency, the installation site should meet the environmental parameters outlined in this manual. If the PDU is to be operated at an altitude higher than 1500m (5000 ft), contact your Eaton service representative for important information about high-altitude operation. The operating environment must meet the weight, clearance, and environmental requirements specified in Drawing 164201629-2 on page A-5 and size requirements specified on Drawing 164201629-9 starting on page A-41.

The PDU uses natural convection cooling to regulate internal component temperature. Air inlets are in the front of the cabinet and outlets are in the top (see Drawing 164201629-9 starting on page A-41). Provide clearance free of any obstructions in front of and above the PDU, for proper air circulation. See Drawing 164201629-2 starting on page A-5 for clearances.

2.2.1 Environmental Considerations

The life of the PDU is adversely affected if the installation does not meet the following guidelines:

- ▶ The system must be installed on a level floor suitable for computer or electronic equipment.
- ▶ The system must be installed in a temperature and humidity controlled indoor area free of conductive contaminants.

Failure to follow guidelines may void your warranty.

2.2.2 Preparing for Wiring the PDU

Wiring requirements for the PDU, including the minimum AWG size of external wiring, can be found on Drawing 164201629-5 starting on page A-17. The input power wiring connections for this equipment are rated at 90°C. If wire is run in an ambient temperature greater than 40°C, higher temperature wire and/or larger size wire may be necessary.

Flex cable is not recommended for wiring the PDU input because of the tight wiring space above the input breaker.

2.3 Inspecting and Unpacking the PDU

The cabinet is shipped bolted to a wooden pallet (see Figure 2-1) and protected with outer protective packaging material.



CAUTION

The PDU is heavy (see Table A on page A-5). If unpacking instructions are not closely followed, the cabinet may tip and cause serious injury.

1. Carefully inspect the outer packaging for evidence of damage during transit.



CAUTION

Do not install a damaged cabinet. Report any damage to the carrier and contact your Eaton service representative immediately.

2. Use a forklift or pallet jack to move the packaged cabinet to the installation site, or as close as possible, before unpacking. Insert the forklift or pallet jack's forks between the pallet supports on the bottom of the unit.



NOTE Verify that the forklift or pallet jack is rated to handle the weight of the cabinet (see Table A on page A-5 for cabinet weight).

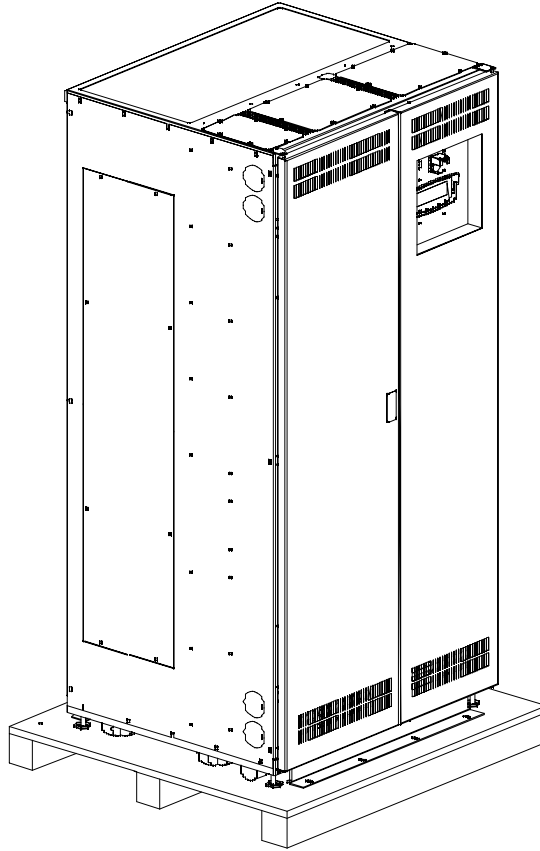


Figure 2-1. Powerware PDU as Shipped on Pallet



CAUTION

Do not tilt the PDU more than 10° from vertical or the cabinet may tip over.

3. Set the pallet on a firm, level surface, allowing a minimum clearance of 3m (10 ft) on each side for removing the cabinet from the pallet.
4. Remove the protective covering from the cabinet.
5. Remove the packing material, and discard or recycle in a responsible manner.
6. Inspect the contents for any evidence of physical damage, and compare each item with the Bill of Lading. If damage has occurred or shortages are evident, contact your Eaton service representative immediately to determine the extent of the damage and its impact upon further installation.



NOTE *While waiting for installation, protect the unpacked cabinet from moisture, dust, and other harmful contaminants. Failure to store and protect the PDU properly may void your warranty.*

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Chapter 3 | Installing the PDU

3.1 Preliminary Installation Information



WARNING

Installation should be performed only by qualified personnel.

Refer to the following while installing the PDU:

- ▶ Appendix A contains installation drawings and additional installation notes.
- ▶ Dimensions are in millimeters and inches.
- ▶ Do not tilt the cabinets more than $\pm 10^\circ$ during installation.
- ▶ The conduit landing plates are to be removed to add conduit landing holes, or remove knockouts, as required. Plate material is 16 gauge steel (1.5 mm/0.060" thick).
- ▶ The cabinets must be installed on a level floor suitable for computer or electronic equipment.
- ▶ If installing with an UPS, refer to the applicable UPS Installation and Operation manual for UPS cabinet wiring requirements, and conduit and terminal locations.
- ▶ See Table A on page A-5 for equipment weight and point loading.

3.2 Unloading the PDU from the Pallet

The PDU is bolted to a wooden pallet supported by wood skids. To remove the pallet, perform the following procedure:



WARNING

- ▶ The PDU is heavy (see Table A on page A-5). If unloading instructions are not closely followed, the cabinet may cause serious injury.
- ▶ Do not install a damaged cabinet. Report any damage to the carrier and contact your Eaton service representative immediately.
- ▶ Do not tilt the PDU more than 10° from vertical or they may tip over.



NOTE *Verify that the forklift or pallet jack is rated to handle the weight of the cabinet (see Table A on page A-5 for cabinet weight).*

1. If not already moved, use a forklift or pallet jack to move the cabinet to the installation site, or as close as possible, before unloading from the pallet. Insert the forklift jacks between the skids on the bottom of the unit.
2. Unfasten the front door latch and swing the left door open. Loosen the top and bottom screws securing the right door and swing the door open.(see Figure 3-1).
3. If the leveling feet are not fully retracted, turn the leveling feet until they are retracted.
4. Remove the four bolts securing the front shipping bracket to the cabinet and the four bolts securing the bracket to the pallet (see Figure 3-1). Remove the front shipping bracket.

If installing the cabinet permanently, retain the shipping bracket and securing hardware for later use.

5. Remove the four bolts securing the rear shipping bracket to the pallet (see Figure 3-2). Do not remove the four bolts securing the bracket to the cabinet.
6. Remove the four front skid bolts securing the removable skid and remove the skid (see Figure 3-1).



NOTE *In the following step the pallet will tilt and act as a ramp when the cabinet is rolled beyond the center of the pallet. Be sure to restrain the cabinet as it continues to roll down the pallet/ramp. The rear shipping bracket will act as a brake to assist restraining the cabinet.*

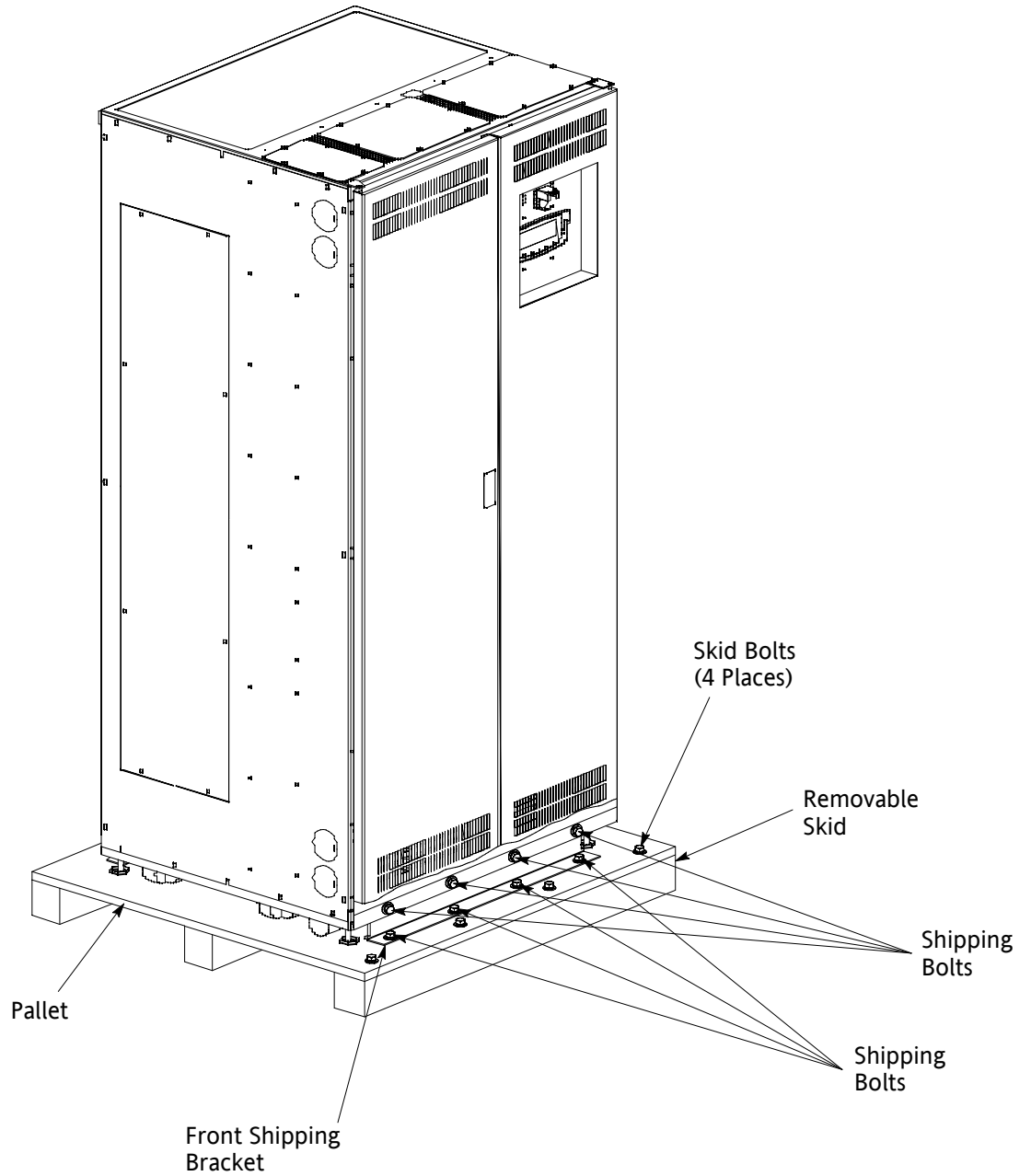
WARNING



Do not stand directly in front of the pallet while unloading the cabinet. If unloading instructions are not closely followed, the cabinet may cause serious injury.

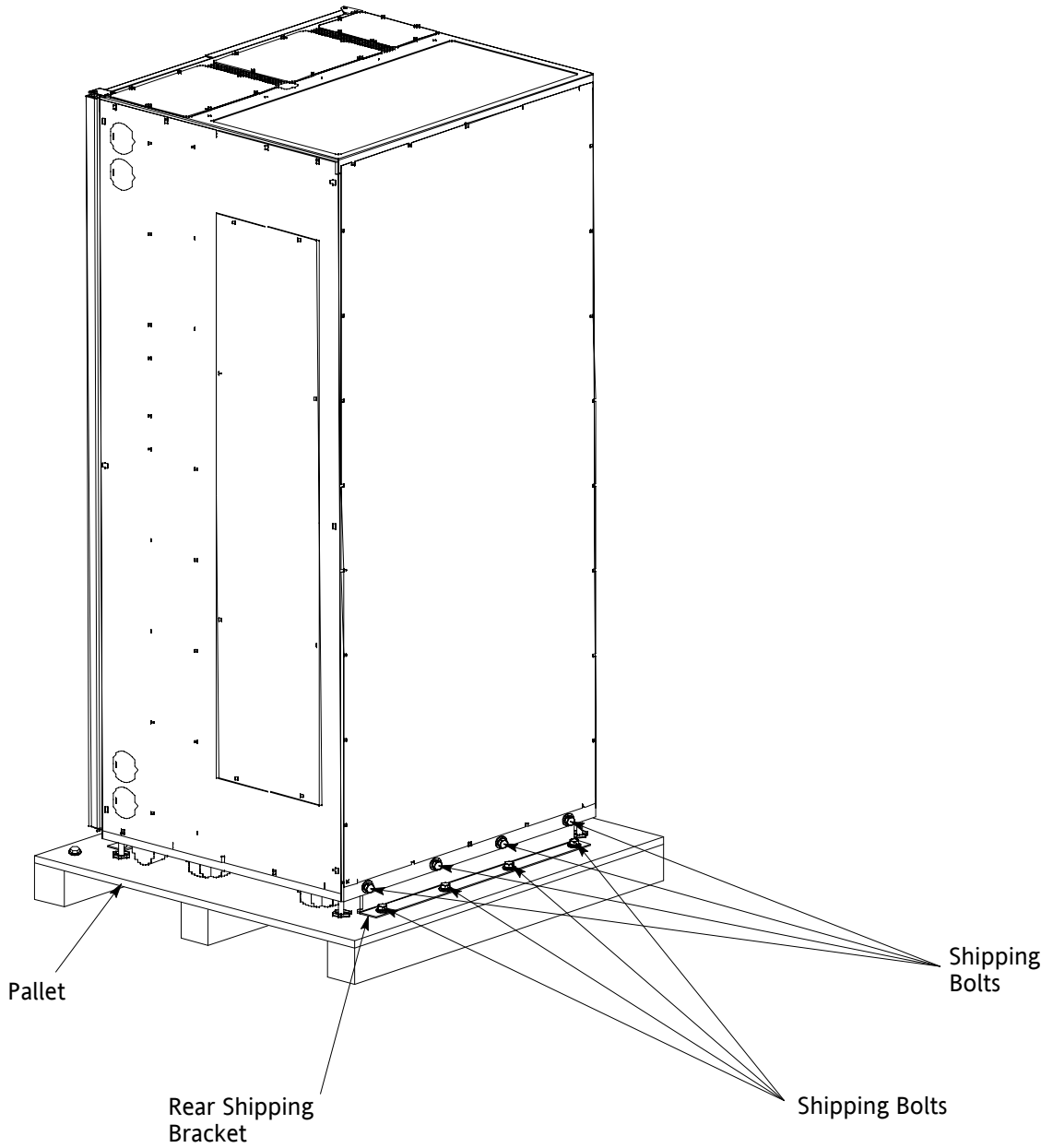
7. Slowly roll the cabinet toward the front of the pallet. Once the pallet tilts, continue rolling the cabinet down the pallet until the cabinet is clear of the pallet.
8. Remove the four bolts securing the rear shipping bracket to the cabinet (see Figure 3-2). Remove the rear shipping bracket.

If installing the cabinet permanently, retain the shipping brackets and hardware; for later use.
9. Discard or recycle the pallet and unused shipping brackets in a responsible manner.
10. Roll cabinet to its final installation location.
11. Proceed to paragraph 3.3.



FRONT VIEW

Figure 3-1. Removing the Front Shipping Bracket on the Powerware PDU



REAR VIEW

Figure 3-2. Removing the Rear Shipping Bracket on the Powerware PDU

3.3 PDU Cabinet Installation

To install the PDU, perform the procedures in the following paragraphs.

1. Roll the PDU to the installation area.
2. If permanently mounting the PDU, proceed to Step 6; otherwise, proceed to Step 3.
3. Secure the PDU in position by lowering the leveling feet until the cabinet is not resting on the casters and the cabinet is level.
4. Proceed to paragraph 3.4.
5. If not already open, unfasten the front door latch and swing the left door open. Loosen the top and bottom screws securing the right door and swing the door open.
6. Using the retained hardware, reinstall the shipping brackets previously removed to the front and rear of the PDU with the angle facing outward (see Figure 3-1 and Figure 3-2).
7. Secure the cabinet to the floor with customer-supplied hardware.
8. Proceed to paragraph 3.4.

3.4 Installing PDU Power Wiring



NOTE Remove the PDU cabinet top or bottom conduit landing plate to drill or punch conduit holes, or remove knockouts (see Drawing 164201629-6 on page A-23). For top conduit landing, locate input conduit over input breaker for ease of installation.

NOTE Flex cable is not recommended for wiring the PDU input because of the tight wiring space above the input breaker.

CAUTION



DO NOT overtighten the terminal lugs to prevent stripping the threads. Tighten lugs to the torque values in Table I through Table L.

1. Verify that all power sources are removed.
2. If not already open, unfasten the front door latch and swing the left door open. Loosen the top and bottom screws securing the right door and swing the door open.
3. Loosen the screws securing the inside distribution panel doors, and swing the doors open.
4. Remove the screws securing the top edge of the top safety shield panel. Swing the panel down and rest panel on top of inside distribution panel doors to gain access to the input terminals.

5. Route the PDU input cables from the AC source to the PDU input terminals. See Drawing 164201629-7, starting on page A-28, for PDU wiring access information and terminal locations.
6. Connect phase A, B, and C, and, if required, Neutral power wiring between the AC source and the PDU input terminals.
7. Ground the PDU according to local and/or national electrical wiring codes by routing the ground wire through the ground CT and connecting to the input ground lug. See Drawing 164201629-7, starting on page A-28, for ground CT and terminal locations.
8. If wiring a PDU with a Distribution Panel, proceed to Step 9; if wiring a PDU with Subfeed Breakers, proceed to Step 12.
9. Install customer-supplied branch circuit breakers (Cutler-Hammer bolt-on type BAB or QBHW breakers for bolt-on panels, or plug-on type HQP or QPHW breakers for plug-on panels) into the Distribution Panel. See Drawing 164201629-7, starting on page A-28, for PDU wiring access information and terminal locations.



NOTE *When wiring branch circuits, begin adding conduits at the back of the center conduit landing plate to simplify future circuit additions.*

10. Wire the branch circuits according to the branch circuit breaker manufacturer's ratings and instructions, and national and local electrical codes (output is prewired to the panelboard).
11. Proceed to Step 13.



NOTE *When wiring Subfeed Breakers, begin adding conduits at the back of the center conduit landing plate to simplify future circuit additions.*

12. Connect phase A, B, and C, and Neutral power wiring from the Subfeed Breakers and Neutral Terminals to the critical load. See Drawing 164201629-7, starting on page A-28, for PDU wiring access information and terminal locations.
13. If wiring a PDU with Sidecars, proceed to Step 14; otherwise, proceed to step 7.
14. Install customer-supplied branch circuit breakers (Cutler-Hammer bolt-on type BAB or QBHW breakers for bolt-on panels, or plug-on type HQP or QPHW breakers for plug-on panels) into the Sidecar Distribution Panel. See Drawing 164201629-7, starting on page A-28, for PDU wiring access information and terminal locations.



NOTE *When wiring branch circuits, begin adding conduits at the back of the center conduit landing plate to simplify future circuit additions.*

15. Wire the branch circuits according to the branch circuit breaker manufacturer's ratings and instructions, and national and local electrical codes (output is prewired to the panelboard).

16. If wiring interface connections, proceed to paragraph 3.5; otherwise, proceed to Step 17.
17. When all wiring is complete, close the top safety shield panel opened in the previous steps and secure with screws.
18. Close the inside distribution panel doors, and secure with screws.
19. Close the right door and secure with screws. Close the left door and secure the latch.

3.5 Installing TB2 and TB3 Interface Connections



NOTE *When installing control wiring (such as building alarms or alarm contacts) to the PDU interface terminals, conduit must be installed between the device and the PDU. Install the control wiring in separate conduit from the power wiring.*

1. Verify that the PDU is turned off and all power sources are removed. See Chapter 7, “PDU Control Panel and Operating Instructions” for shutdown instructions.
2. If not already open, unfasten the front door latch and swing the left door open. Loosen the top and bottom screws securing the right door and swing the door open.
3. Loosen the screws securing the inside distribution panel doors, and swing the doors open.
4. Remove the screws securing the top edge of the top safety shield panel. Swing the panel down and rest panel on top of inside distribution panel doors to gain access to terminal blocks TB2 and TB3.
5. To locate the appropriate terminals and review the wiring and termination requirements, see Drawing 164201629-8 starting on page A-37.
6. Remove the PDU cabinet top or bottom conduit landing plate to drill or punch conduit holes, or remove knockouts (see Drawing 164201629-6 on page A-23).
7. Reinstall the conduit landing plate and install the conduit.
8. Route and connect the wiring.
9. When all wiring is complete, close the top safety shield panel opened in the previous steps and secure with screws.
10. Close the inside distribution panel doors, and secure with screws.
11. Close the right door and secure with screws. Close the left door and secure the latch.

3.6 Initial Startup

Startup and operational checks must be performed by an authorized Eaton Customer Service Engineer, or the warranty terms specified on page W-1 become void. This service is offered as part of the sales contract for the PDU. Contact service in advance (usually a two-week notice is required) to reserve a preferred startup date.

3.7 Completing the Installation Checklist

The final step in installing the PDU is completing the following Installation Checklist. This checklist ensures that you have completely installed all hardware, cables, and other equipment. Completing all items listed on the checklist will ensure a smooth installation. Make a copy of the Installation Checklist before filling it out, and retain the original.

After the installation is complete, a service representative will be able to verify the operation of the PDU and commission it to support the critical load. The service representative cannot perform any installation tasks other than verifying software and operating setup parameters. Service personnel may request a copy of the completed Installation Checklist to verify all applicable equipment installations have been completed.



NOTE *The Installation Checklist MUST be completed prior to starting the PDU for the first time.*

Installation Checklist

- All packing materials and restraints have been removed from each cabinet.
- The PDU is placed in its installed location.
- Shipping brackets are installed on the cabinet and bolted to the floor for permanent installations.
- All conduits and cables are properly routed to the PDU.
- All power cables are properly sized and terminated.
- Distribution Panel branch circuit breakers are installed and wired to load. (OPTIONAL)
- A ground conductor is properly installed.
- Air conditioning equipment is installed and operating correctly.
- The area around the installed PDU is clean and dust-free. (The PDU must be installed on a level floor suitable for computer or electronic equipment.)
- Adequate workspace exists around the PDU and other cabinets.
- Adequate lighting is provided around the PDU.
- A 120V service outlet is located within 25 feet of the PDU.
- Startup and operational checks are performed by an authorized Eaton Customer Service Engineer

Chapter 4 | Installing a Remote Emergency Power-off Switch

A REPO switch can be used in an emergency to shut down the PDU and remove power to the critical load from a location away from where the PDU is installed. Figure 4-1 shows a REPO switch.

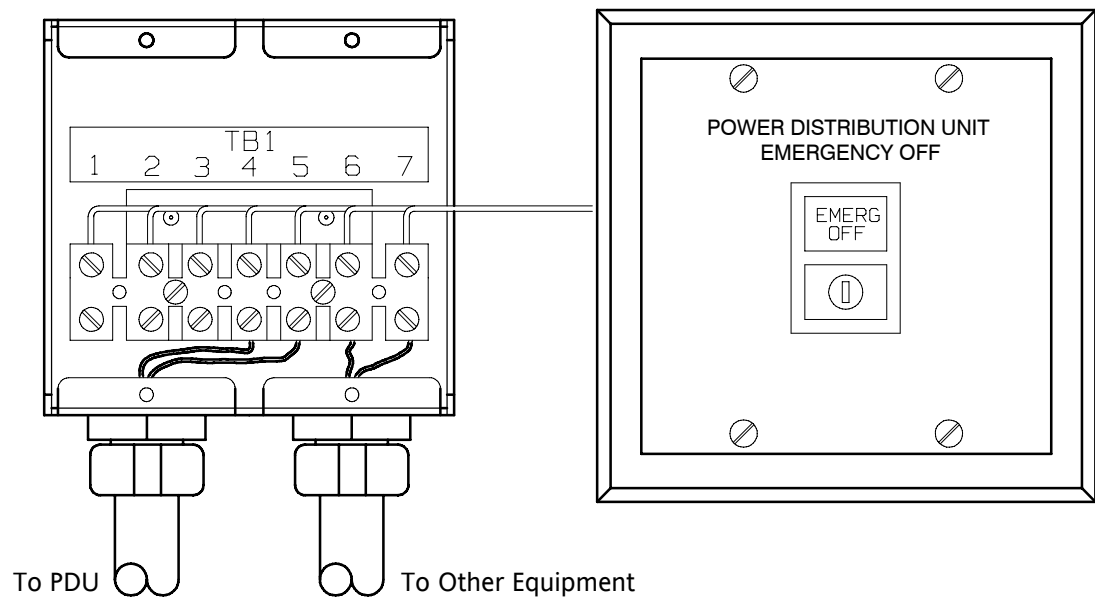


Figure 4-1. REPO Switch



NOTE When installing the REPO switch, you must install conduit between the device and the PDU cabinet for wiring the switch.

NOTE Remove the PDU cabinet top or bottom conduit landing plate to punch conduit holes (see Drawing 164201629-6 on page A-23).

NOTE This switch must be a dedicated latching-type switch not tied to any other circuit.

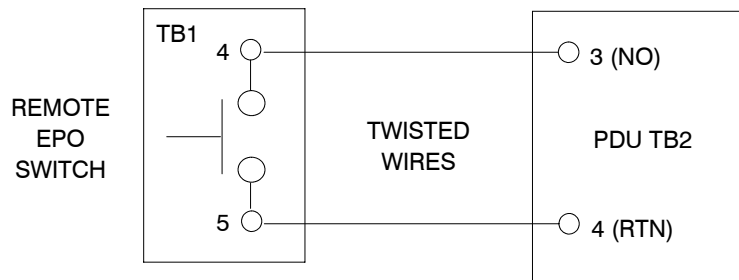
1. Securely mount the REPO station. Recommended locations include operator's consoles or near exit doors. See Drawing 164201629-10 on page A-55 for enclosure dimensions and wiring knockouts.
2. Verify the PDU is turned off and all power sources are removed. See Chapter 7, "PDU Control Panel and Operating Instructions" for shutdown instructions.
3. If not already open, unfasten the front door latch and swing the left door open. Loosen the top and bottom screws securing the right door and swing the door open.
4. Loosen the screws securing the inside distribution panel doors, and swing the doors open.

5. Remove the screws securing the top edge of the top safety shield panel. Swing the panel down and rest panel on top of inside distribution panel doors to gain access to terminal block TB2.
6. To locate the appropriate terminals and review the wiring and termination requirements, see Figure 4-1 and Drawing 164201629-8 starting on page A-37.
7. Route and connect the wiring as shown in Table 4-1 and Table 4-2.

Table 4-1. REPO Wire Terminations

From REPO Station(s)	To Customer Interface Terminal Board TB2 in PDU Cabinet	Remarks
TB1-4	TB2-3	Twisted Wires (2) 14–22 AWG
TB1-5	TB2-4	

Table 4-2. REPO



REPO switch rating is 24 Vdc. 1A minimum if supplied by customer.

NOTE *This switch must be a dedicated normally open latching-type switch not tied into any other circuits.*

8. If you are installing multiple REPO stations, wire additional stations in parallel with the first REPO.
9. If required, install wiring from the REPO station to trip circuitry of upstream protective devices. A normally-open (NO) contact is provided between terminals 6 and 7 of REPO, as shown in Figure 4-1. REPO switch wiring must be in accordance with UL Class II requirements.
10. When all wiring is complete, close the top safety shield panel opened in the previous steps and secure with screws.
11. Close the inside distribution panel doors, and secure with screws.
12. Close the right door and secure with screws. Close the left door and secure the latch.

Section II | **Operation**

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Chapter 5 | Understanding PDU Operation

The PDU consists of an input main breaker, optional transformer, monitoring/operation control panel, integrated communication server, and a distribution panel or subfeed breaker system.

5.1 Distribution Panelboard Configuration

Power from the AC source is routed through the main breaker, an optional transformer, and the Panelboard Input breaker to one or two 42-pole Distribution Panels. Power is then distributed to the critical loads through customer-provided branch circuit breakers.

Figure 5-1 shows the path of electrical power through the PDU with Distribution Panelboards.

5.2 Subfeed Breaker Configuration

Power from the AC source is routed through the main breaker and an optional transformer to one to eight Subfeed Breakers. Power is then distributed to the critical loads through the Subfeed Breakers.

Figure 5-2 shows the path of electrical power through the PDU with Subfeed Breakers.

5.3 Distribution Panelboard and Subfeed Breaker Configuration

Power from the AC source is routed through the main breaker, an optional transformer, and the Panelboard Input breaker to one 42-pole Distribution Panel, and through the main breaker and the optional transformer to one to four Subfeed Breakers. Power is then distributed to the critical loads through customer-provided branch circuit breakers or the Subfeed Breakers.

Figure 5-3 shows the path of electrical power through the PDU with a Distribution Panelboard and Subfeed Breakers.

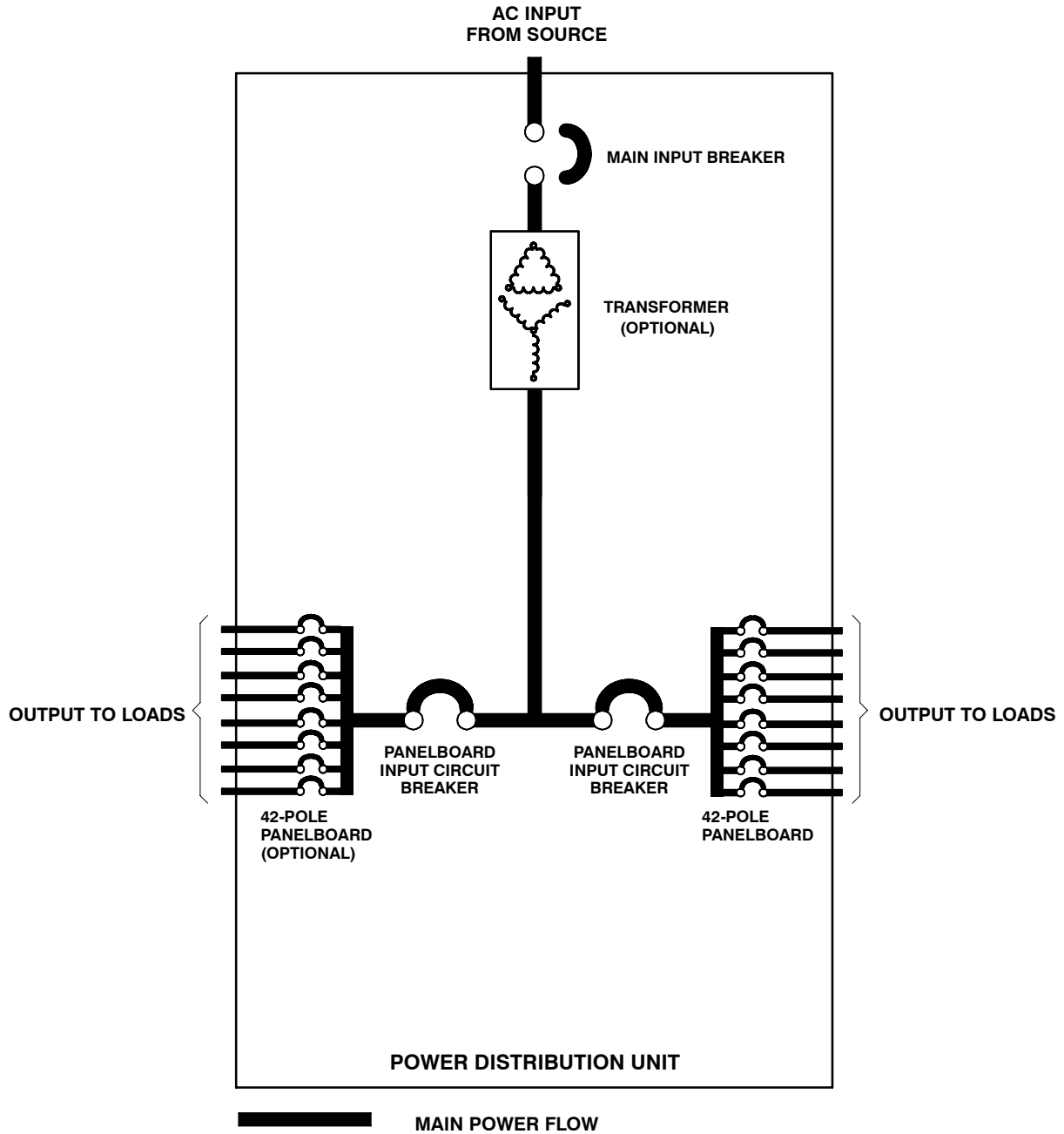


Figure 5-1. Path of Current Through the PDU with Distribution Panelboards

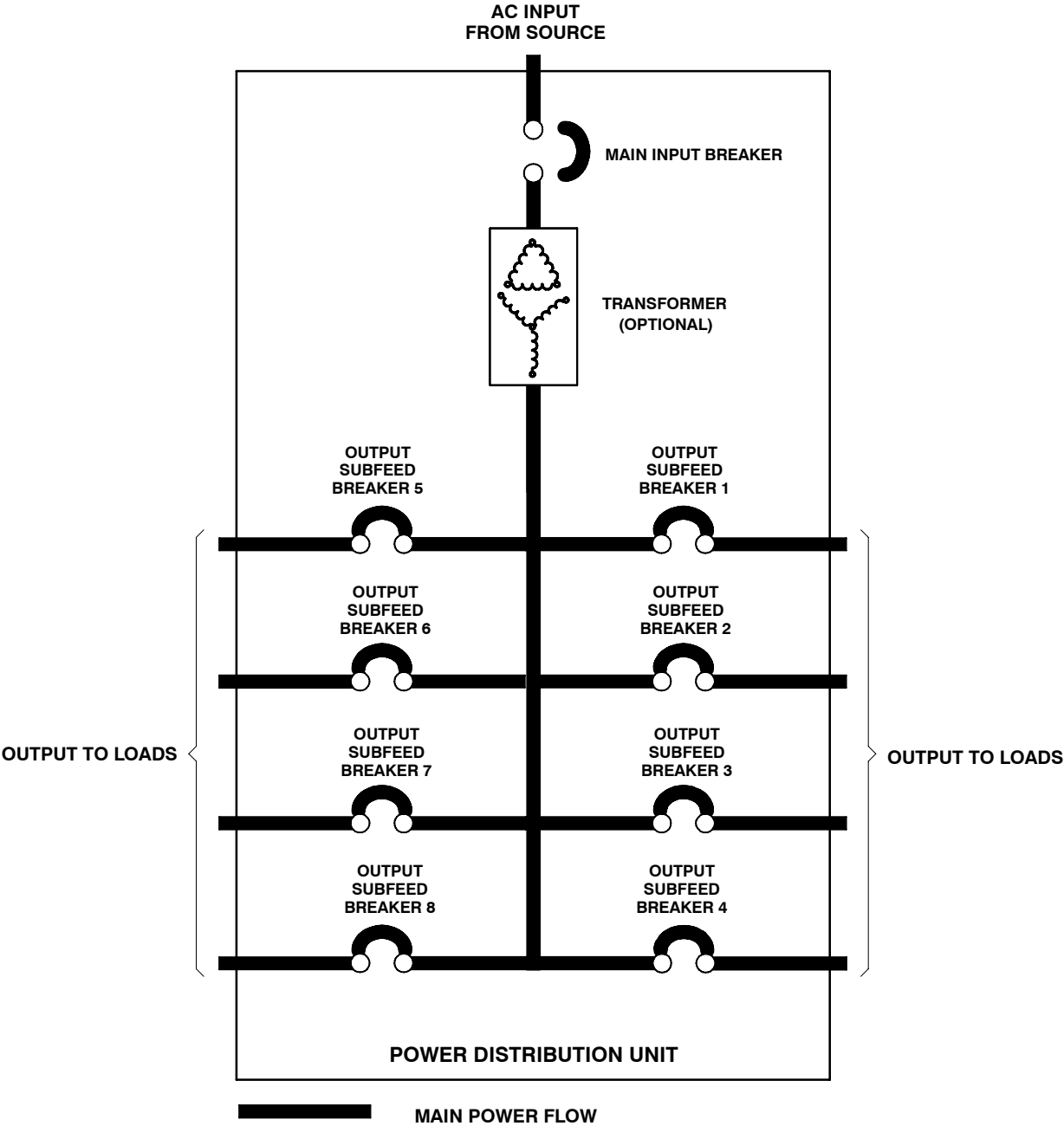


Figure 5-2. Path of Current Through the PDU with Subfeed Breakers

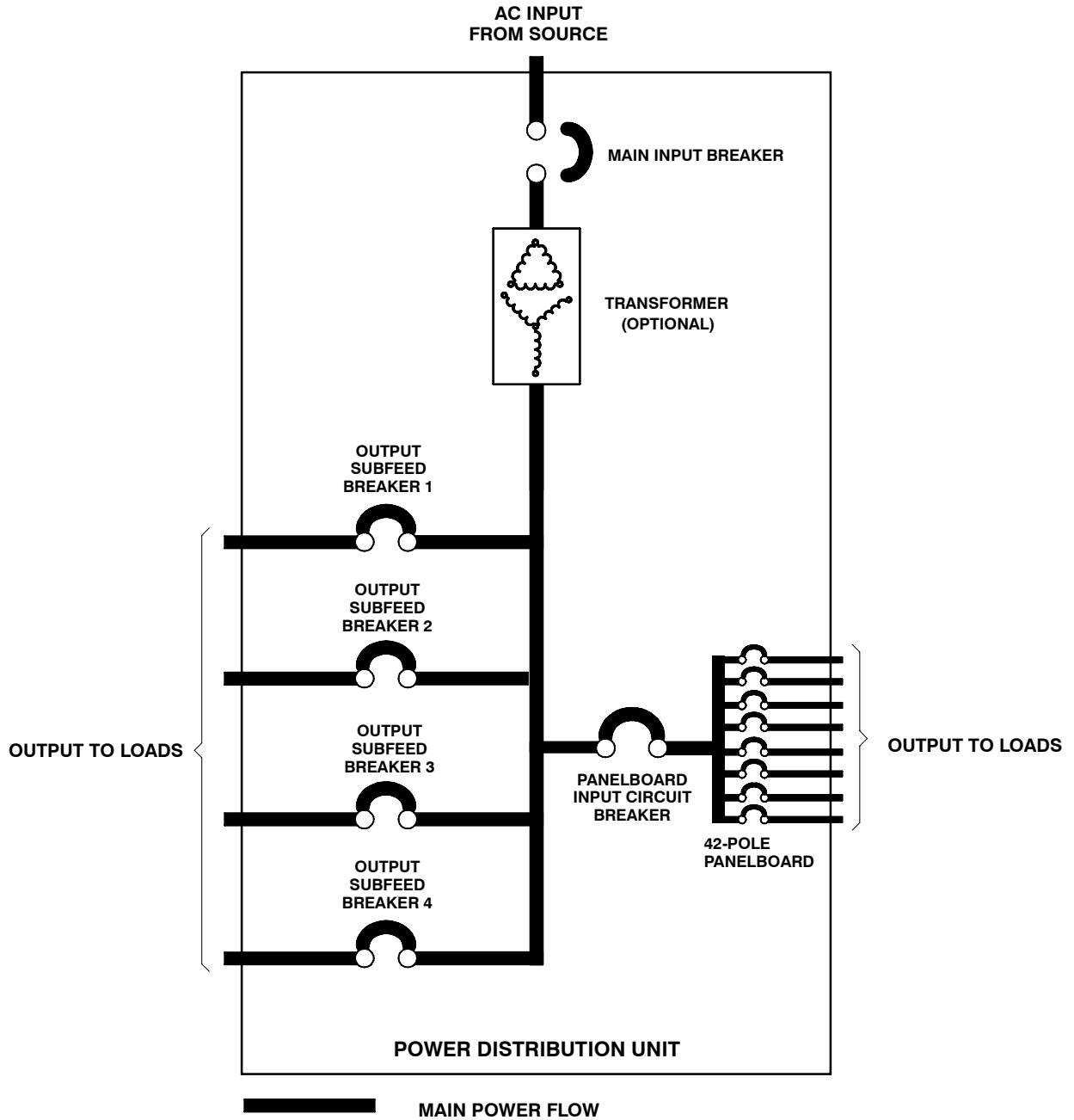


Figure 5-3. Path of Current Through the PDU with Distribution Panelboard and Subfeed Breakers

Chapter 6 | PDU Features, Options, and Controls

6.1 PDU Standard Features

The PDU has many standard features that provide cost-effective and consistently reliable power distribution. The following paragraphs provide descriptions of these features. For location of the customer interface panel and terminals, and for terminal wiring information, see:

- ▶ Drawing 164201629-6 on page A-23
- ▶ Drawing 164201629-8 starting on page A-37

6.1.1 Control Panel

The control panel, located on the front of the PDU, contains an LCD panel and pushbutton switches to control the operation and to display the status of the PDU. See Chapter 7, “PDU Control Panel and Operating Instructions,” for additional information.

6.1.2 Emergency Power-off

An EMERGENCY POWER OFF (EPO) pushbutton provides tripping of the Main input breaker in situations where instantaneous shutdown of the PDU output to the critical load is needed. The operation of the EPO is described in detail in Chapter 7, “PDU Control Panel and Operating Instructions.”

6.1.3 Power Monitoring

The PDU provides the following monitoring features:

- ▶ PDU status and event log recording
- ▶ PDU metering is provided for the following:
 - Input voltages – phase to phase
 - Output voltages – phase to phase and phase to neutral
 - Output current
 - kVA, KW, frequency, and power factor
 - Percent loading per phase
- ▶ Load profiling
 - Minimum and maximum voltage, current, frequency, and kilowatt
 - Highest reading on a monthly basis

See Chapter 7, “PDU Control Panel and Operating Instructions,” for additional information.

6.1.4 Output Transformer

An output transformer provides 208 Vac output from a 480 Vac or 600 Vac input for use with the distribution panels supplying 208/120 Vac to the critical load.

6.1.5 Transformer Monitoring

- ▶ Transformer Overtemperature Monitoring – an overtemperature sensor is provided to monitor the PDU transformer and issue a warning alarm if the temperature of the transformer reaches 180° C.
- ▶ Transformer Shutdown Monitoring – a shutdown sensor is provided to shut down the PDU if the transformer is overloaded and the temperature of the transformer reaches 200° C.

6.1.6 X-Slot Communication Bay

A two-slot communication bay is standard equipment. Two X-Slot cards can be installed in the PDU at any time. See Chapter 9, “Communication,” for additional information.

6.1.7 Building Alarm Monitoring

This standard feature lets you connect the PDU to your building alarms, such as smoke detectors or overtemperature alarms. The customer interface terminals for external connections are located inside the PDU. Use twisted-pair wires for each alarm input and common.

The building alarms can be programmed to display the alarm functional name. Please contact your Eaton service representative for programming.

6.1.8 General-Purpose Relay Contact

One general-purpose relay contact is a standard feature on the PDU. The alarm contact is located inside the PDU on the customer interface terminal board.

A normally-closed or normally-open contact can be used. If the state of the contact changes from the state you specify as normal, a signal is issued. This contact can be connected to equipment at the facility (such as a light or an alarm bell) to signal when an alarm is active on the PDU. This feature is useful if the PDU is located in a remote area where the PDU horn may not be heard immediately.



CAUTION

Contacts should not be operated in excess of 120 Vac @ 5A maximum.

6.1.9 Installation Features

The cabinet can be permanently bolted to the floor or left standing on leveling feet. Power and control wiring can be routed through the top or bottom of the cabinet with connections made to easily accessible terminals.

6.1.10 Expansion

The PDU supports custom configurations and scalability to adapt to changing and future power and distribution needs. See paragraph 6.2 for available options.

6.2 Options

Many options are available to enhance the performance of your system. The following paragraphs provide descriptions of these features. Contact your sales representative for information about any of these available.

6.2.1 Distribution Panels

Optional output 225A Distribution Panels are available to distribute the output power from the AC Source to the critical load. The PDU contains up to two 42-circuit breaker switches (Cutler-Hammer bolt-on type BAB or QBHW, or plug-on type HQP or QPHW) that can be assigned with flexibility to meet facility needs. The Distribution Panels are enclosed behind the hinged doors on the front of the PDU.

6.2.2 Subfeed Breakers

Up to eight optional output 225A Subfeed Breakers are available to distribute the output power from the AC Source to larger critical loads. The Distribution Breakers are enclosed behind the hinged doors on the front of the PDU.

6.2.3 Transient Voltage Surge Suppression

An optional Transient Voltage Surge Suppression (TVSS) module provides protection for sensitive electronic equipment from damaging transients, surges and electrical line noise. See Chapter 7, "PDU Control Panel and Operating Instructions," for TVSS status display indicators.

6.2.4 Sidecars

Optional front facing or side facing sidecars mounted on the left, right, or both sides of the main PDU provide additional branch circuit capacity. Each sidecar contains up to two 42-circuit breaker switches (Cutler-Hammer bolt-on type BAB or QBHW, or plug-on type HQP or QPHW) that can be assigned with flexibility to meet facility needs. The Distribution Panels are enclosed behind the hinged door on the sidecar.

6.2.5 Remote Emergency Power-off

A REMOTE EMERGENCY POWER OFF (REPO) pushbutton option provides tripping of the Main Input breaker in situations where instantaneous shutdown of the PDU output to the critical load is needed from a remote location. This switch must be a dedicated normally open latching-type switch not tied into any other circuits. The operation of the REPO is described in detail in Chapter 7, “PDU Control Panel and Operating Instructions.”

6.2.6 Optional X-Slot Cards

The optional X-Slot cards support several protocols, such as SNMP, and Modbus®. See Chapter 9, “Communication,” for additional information.

6.3 Symbols

The following are examples of symbols used on the PDU to alert you to important information:



RISK OF ELECTRIC SHOCK - Indicates that a risk of electric shock is present and the associated warning should be observed.



CAUTION: REFER TO OPERATOR'S MANUAL - Refer to your operator's manual for additional information, such as important operating and maintenance instructions.

6.4 PDU Controls and Displays

Figure 6-1 through Figure 6-4 identify and show the location of the controls on the Powerware PDU. The descriptions provide a brief overview of the PDU controls, and standard and optional features.



NOTE *Read the operation sections of this manual and have thorough knowledge of PDU operation before attempting to operate any of the PDU controls.*

The PDU can contain the following controls and displays:

- ▶ Main Input breaker CB1
- ▶ TVSS status display
- ▶ EPO
- ▶ Control panel
- ▶ Main PDU right and left Distribution Panels with Panel Input breakers
- ▶ Four left and four right Main PDU Subfeed breakers
- ▶ Sidecar top and bottom Distribution Panels with Panel Input breakers
- ▶ Sidecar left and right Distribution Panels with Panel Input breakers

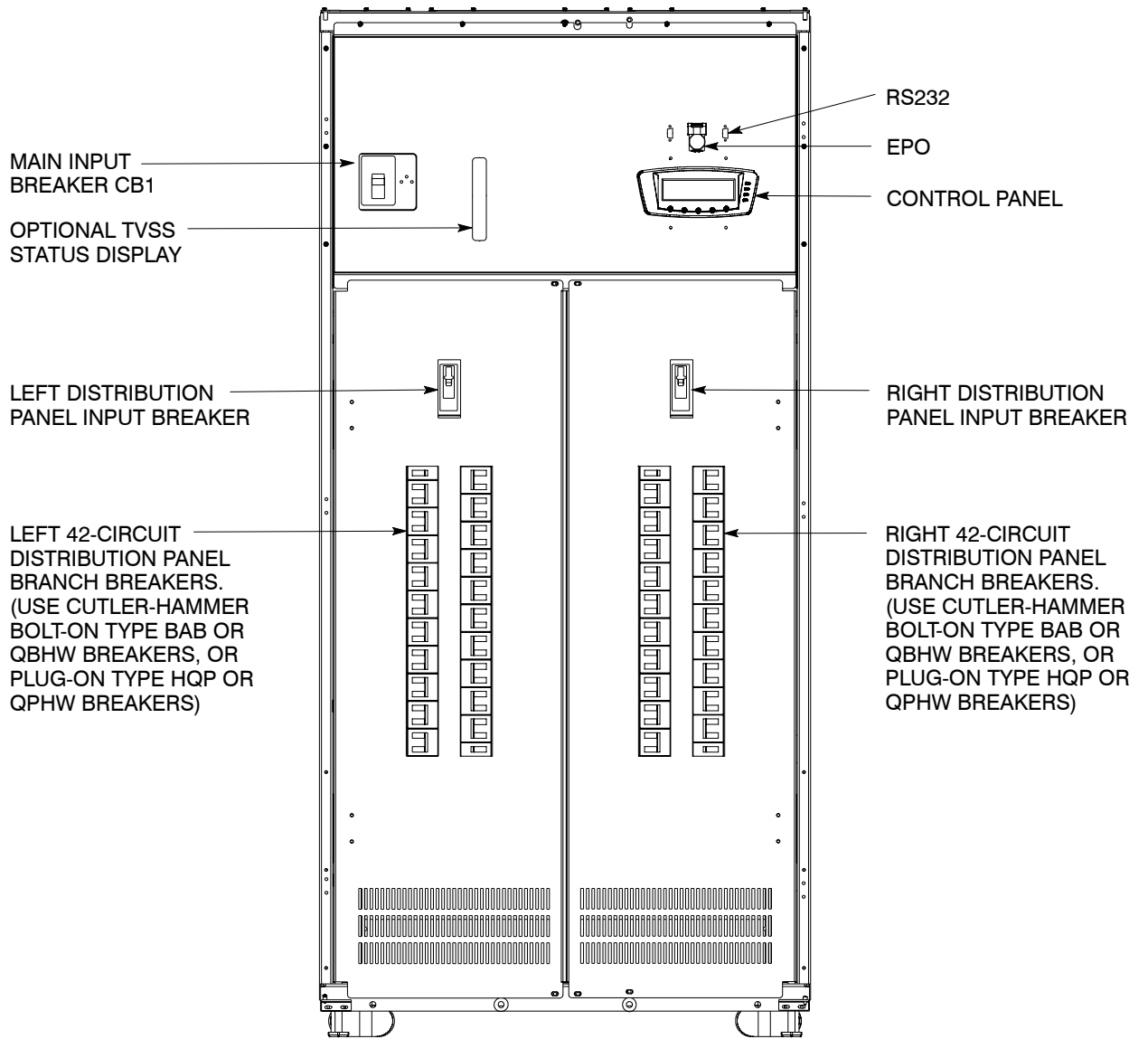


Figure 6-1. Powerware PDU Controls – with Optional Distribution Panels

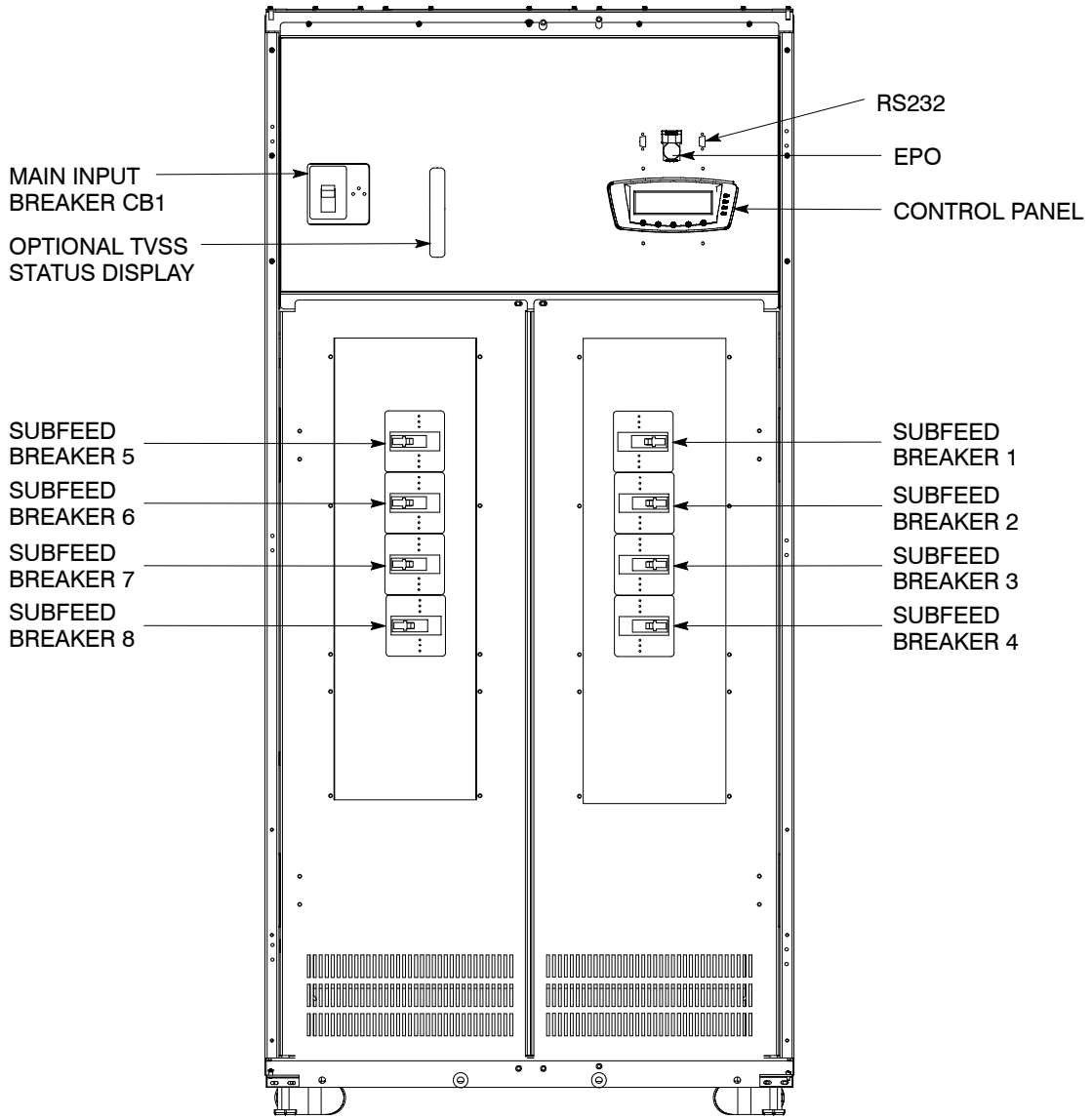


Figure 6-2. Powerware PDU Controls – with Optional Subfeed Breakers

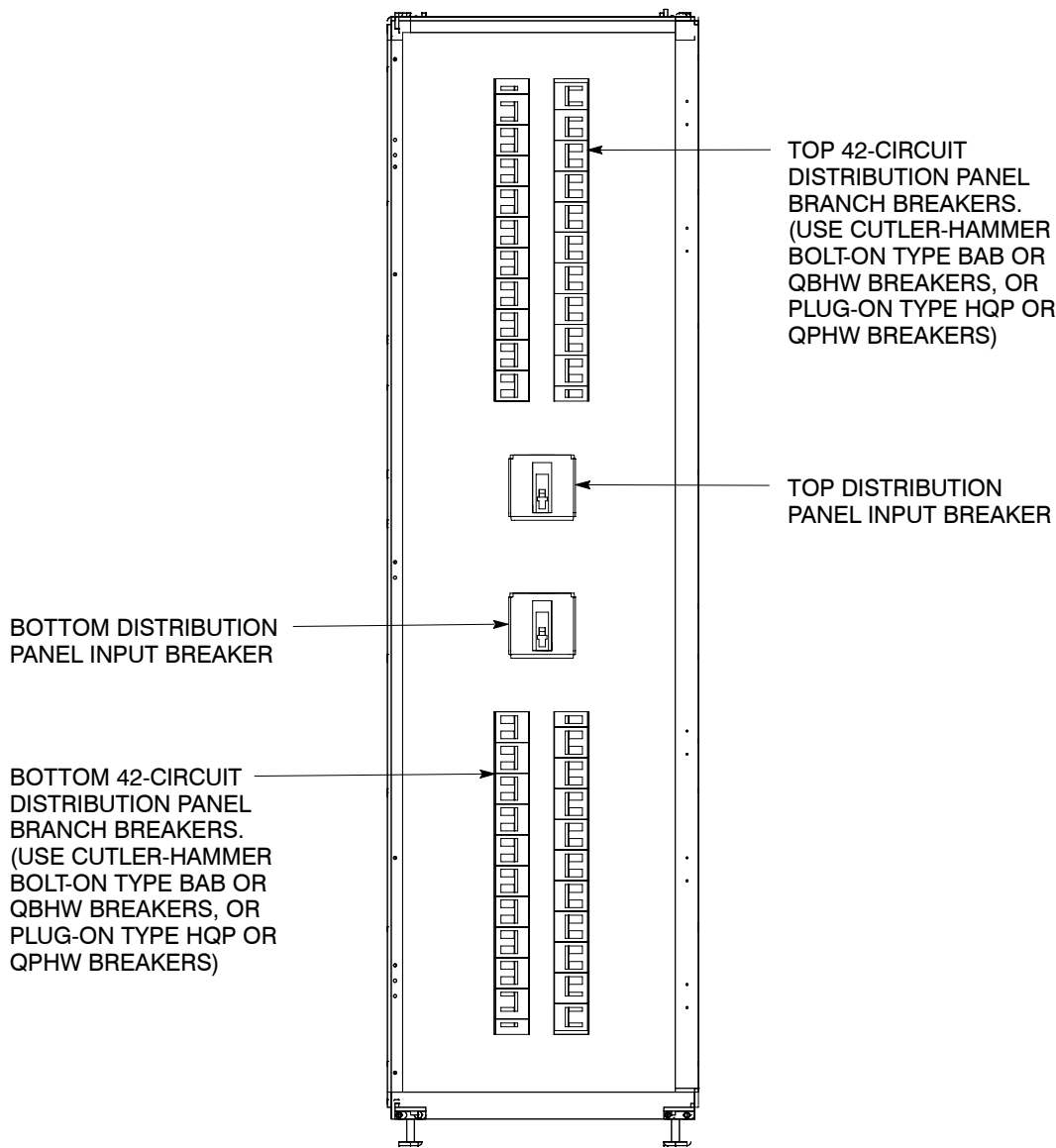


Figure 6-3. Powerware PDU Front Facing Sidecar Controls – with Optional Distribution Panels

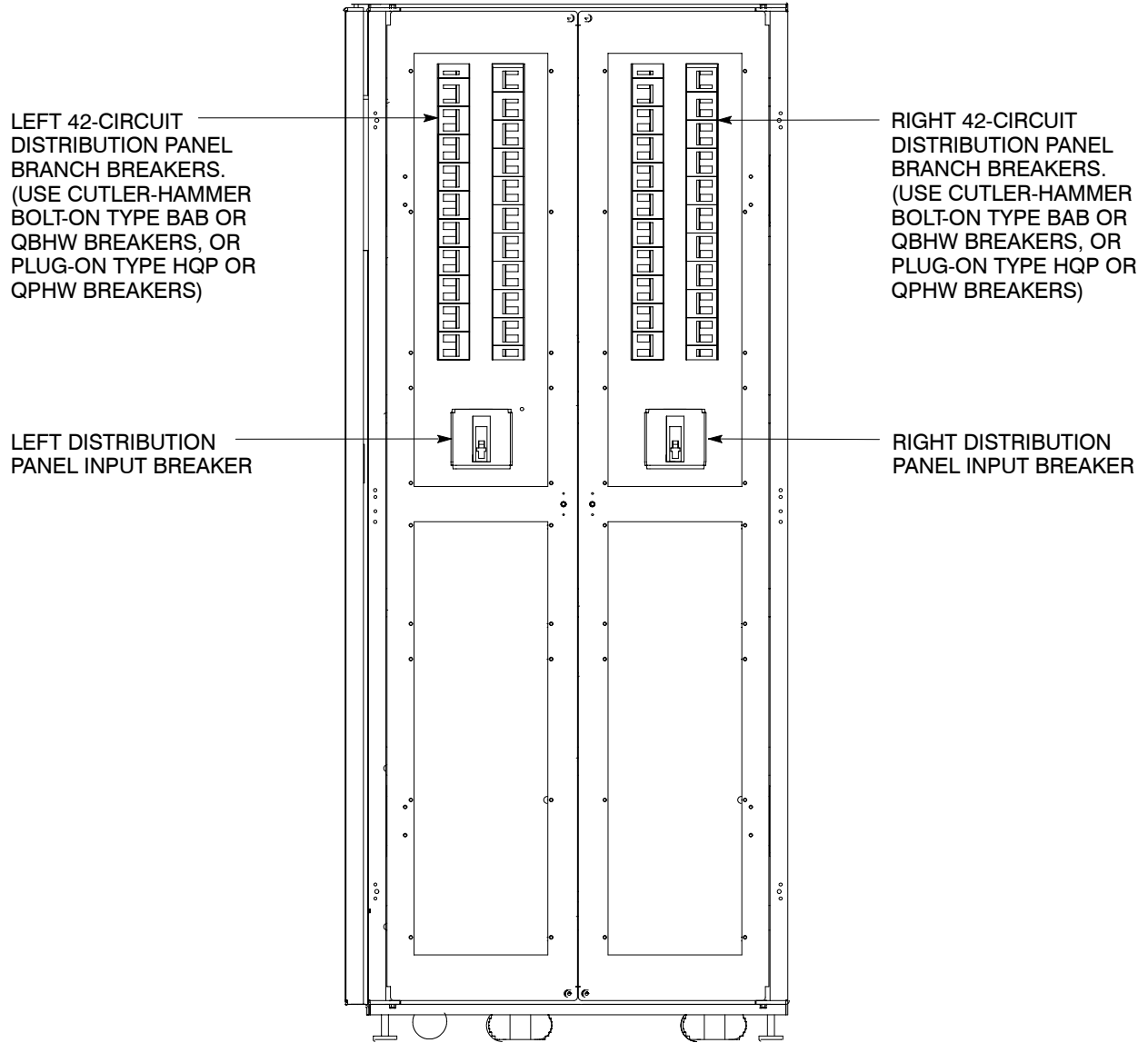


Figure 6-4. Powerware PDU Side Facing Sidecar Controls – with Optional Distribution Panels

This chapter describes the PDU control panel, including controls and indicators, and how to monitor and operate the PDU. The control panel (see Figure 7-1) is located on the front of the PDU.

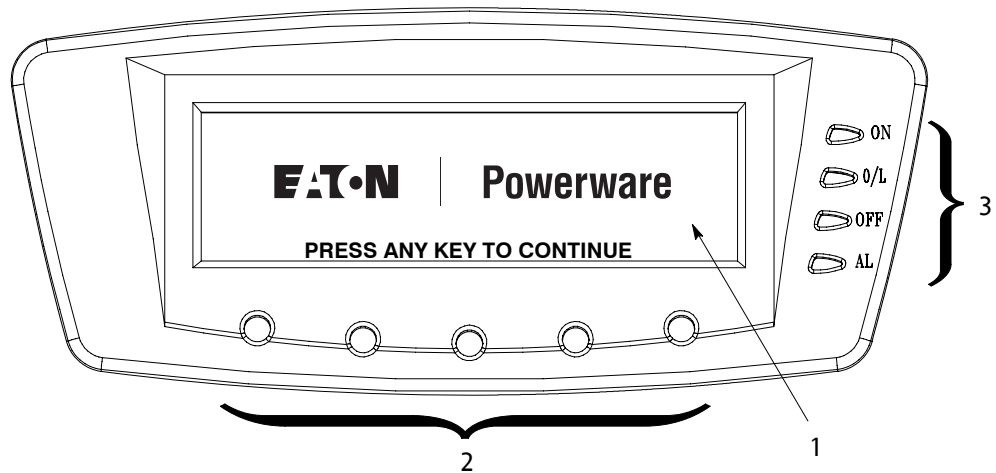


Figure 7-1. PDU Control Panel

The control panel consists of:

- ▶ A liquid crystal display (LCD) (1)
- ▶ A horizontal row of pushbutton switches (2)
- ▶ A vertical column of status indicators (3)

The following paragraphs describe using the PDU control panel to monitor the PDU. See paragraph 7.5, “PDU Operating Instructions,” for use of the operational controls.

When the unit powers up, the screen displays the Eaton | Powerware logo as shown in Figure 7-1. To advance to the Main Menu and Mimic screen, press any control panel pushbutton once.

7.1 Using the LCD and Pushbuttons

The LCD on the control panel provides an operator interface with the PDU. Figure 7-2 identifies the display areas discussed in the following sections.

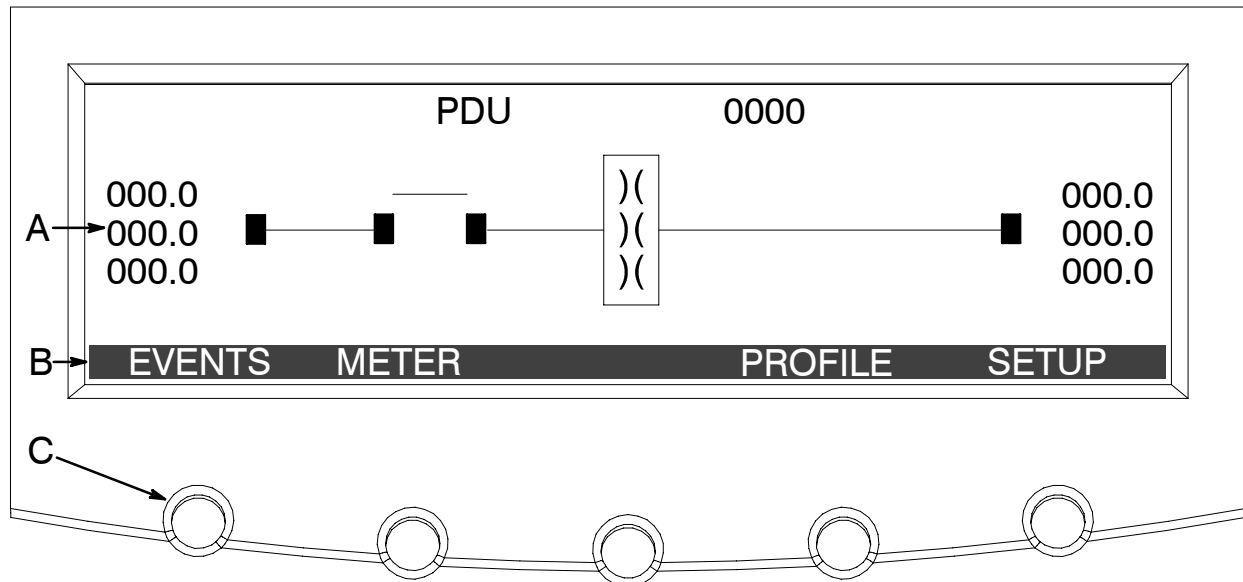


Figure 7-2. Parts of the LCD

- A** The *information area* contains data about PDU status and operations.
- B** The *menu bar* lists the titles of the available screens. To select a screen, press the pushbutton underneath the desired screen.
- C** The *navigation pushbuttons* function depending on the screen displayed. Use the pushbuttons to select menu screens or scroll through available screens. The LCD options above the pushbuttons indicate each pushbutton's function.

You can use the LCD and the pushbuttons to:

- ▶ Look at a log of PDU events (alarms, notices, and commands) (see paragraph 7.2.2)
- ▶ Monitor PDU operation (see paragraph 7.2.3)
- ▶ Set PDU parameters (see paragraphs 7.2.5 and 7.2.6)

After approximately 15 minutes (default delay), the display screen darkens. To restore the screen, press any pushbutton once. The timeout delay is programmable.

7.2 Using the Main Menu

The PDU main menu bar allows you to display data in the information area to help you monitor PDU operation. The following menus and options are available:

Menu Option	Description
EVENTS	Displays the list of Active System Events and a historical log of system events.
METER	Displays performance meters for the system or critical load.
PROFILE	
SETUP	Allows you to set the display contrast, set the date and time for the time stamp, set and enter passwords, and view the firmware version numbers.
←	Returns to Main Menu and Mimic screen from the Events, Meter, Profile, or Setup screens. Returns to the main System Setup Level screen from a setup submenu.

7.2.1 Mimic Screen

Figure 7-3 and Figure 7-4 show the Main Menu and Mimic screen. To select the Mimic screen from the Events, Meters, Profile, or Setup screens, press the ← pushbutton on the current menu bar.

The Mimic screen shows the internal components of the PDU and a real-time graphical representation of the operating status of the system.

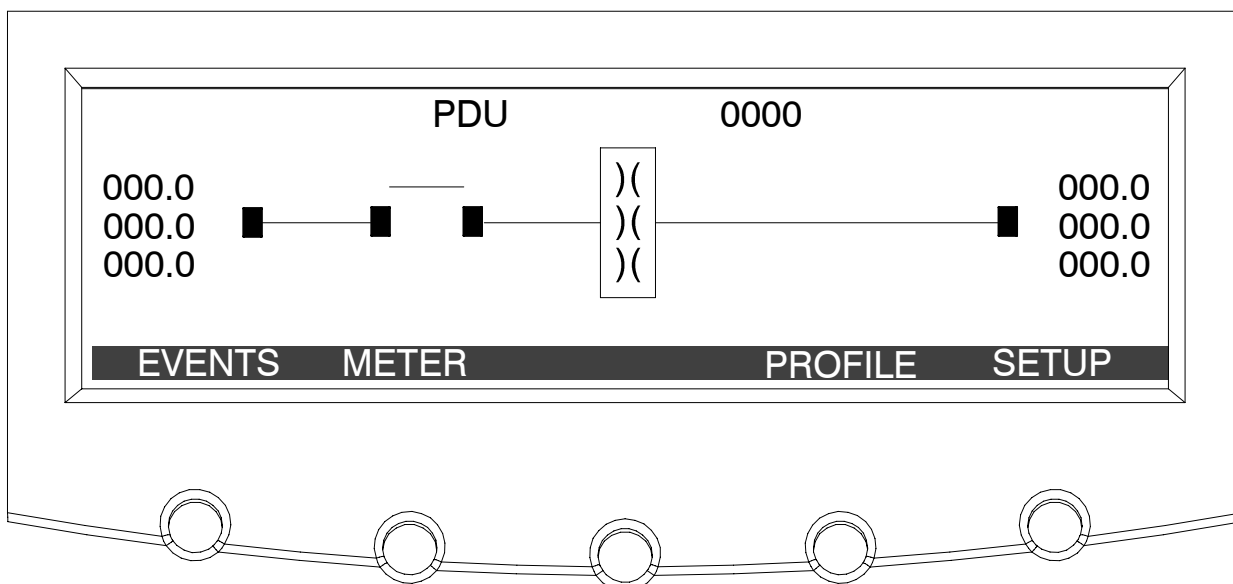


Figure 7-3. Main Menu and Mimic Screen with Transformer

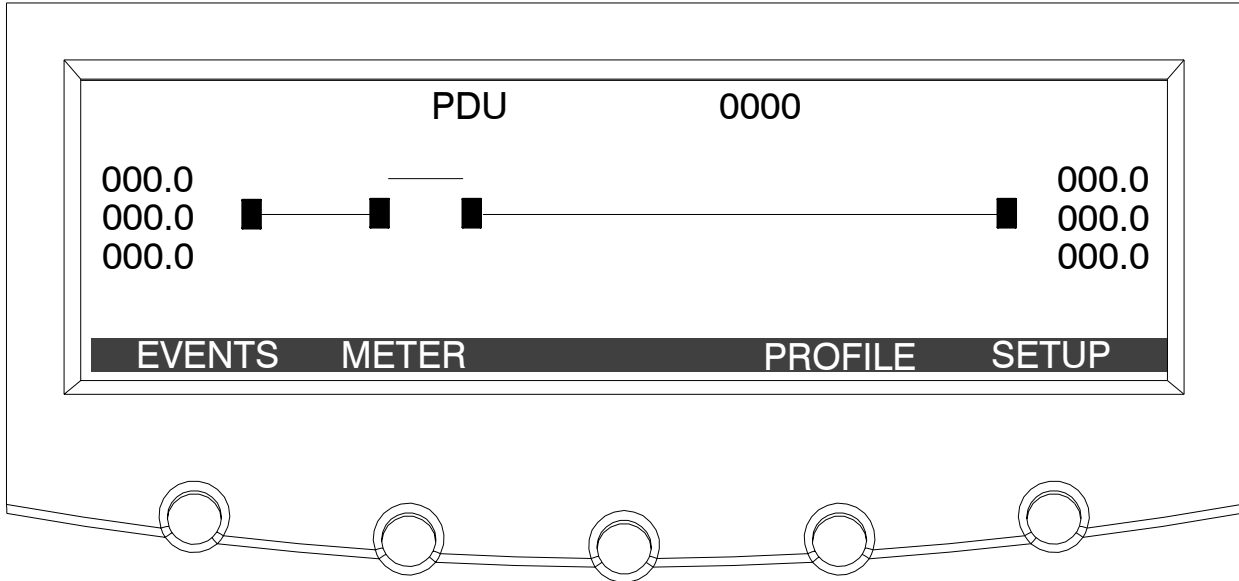


Figure 7-4. Main Menu and Mimic Screen without Transformer

7.2.2 Event Screens

Press the **EVENTS** pushbutton on the main menu bar or History Menu bar to display a listing of all system events that are currently active. The most recent event is listed first. As events clear, they are removed from the Active System Events listing. Figure 7-5 shows the Active Events screen.

To scroll through the events, press the **↑** or **↓** pushbuttons on the menu bar.

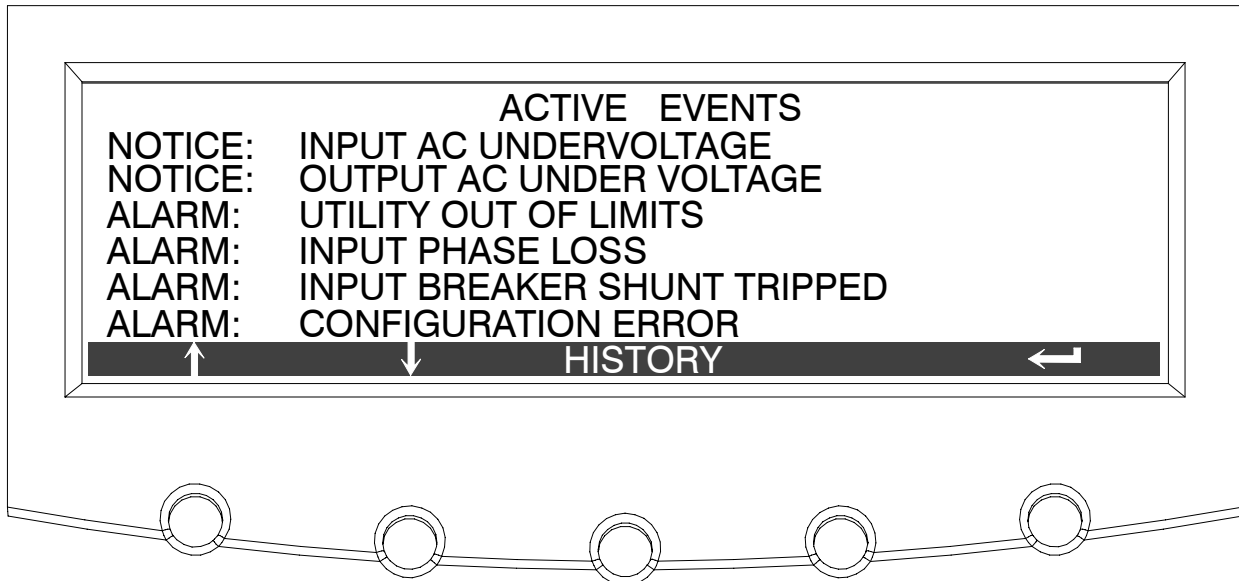


Figure 7-5. Active Events Screen

Press the **HISTORY** pushbutton on the Active Events Menu bar to display the History Log. The History Log lists up to the 127 system events in chronological order, with the most recent event listed last (once 127 is reached, the earliest event is overwritten). The History Log lists the events in the following groups:

- ▶ User and service status
- ▶ User instruction
- ▶ User alarm
- ▶ Check Switchgear
- ▶ Schedule service
- ▶ Emergency shutdown
- ▶ Service alarm

The end of the log (the most recent events) appears when you display the screen, and you must scroll upward to view older event listings. Figure 7-6 shows the History screen.

To scroll through the events, press the **↑** or **↓** pushbuttons on the menu bar. To return to the Active Events screen, press the **EVENTS** pushbutton on the menu bar.

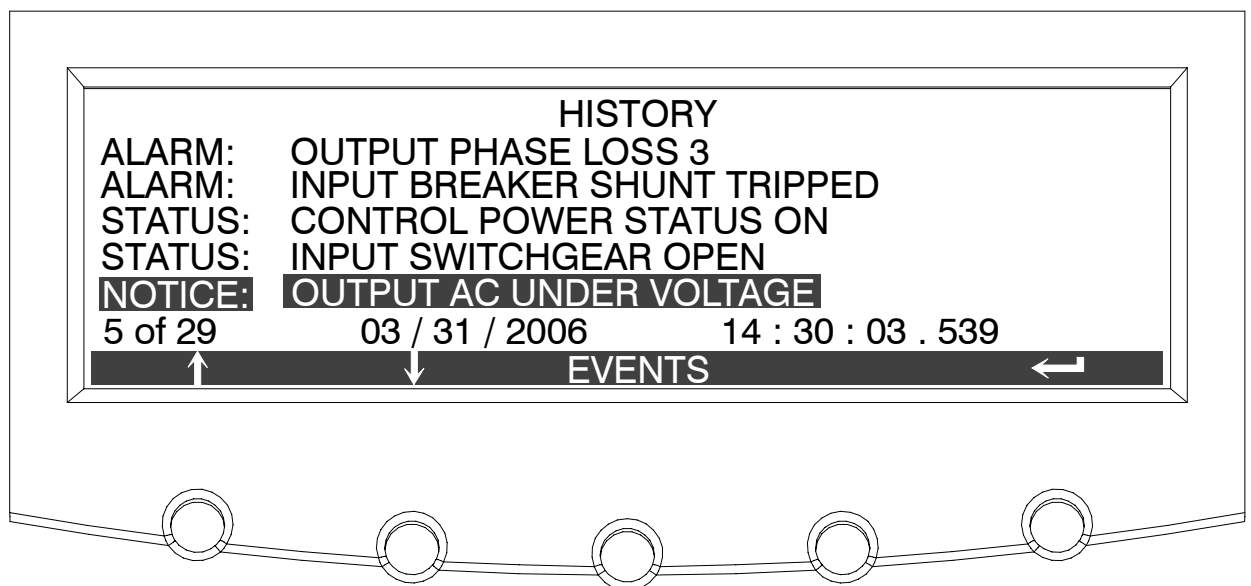


Figure 7-6. History Screen

7.2.3 Meter Screens

The Meter screens show the PDU input and output meter readings.

Press the **METER** pushbutton on the main menu bar to display the Meter screens.

To switch between the Output and Input screens, press the **INPUT** or **OUTPUT** pushbutton on the menu bar to display the desired screens. Figure 7-7 through Figure 7-12 show the Output Meter screens and Figure 7-13 through Figure 7-16 show the Input Meter screens

To scroll through the meter screens, press the **↑** or **↓** pushbuttons on the menu bar. The current PDU readings are displayed in the information area of the screen.

Output RMS Screen 1 shows the total output voltage line-to-line and Output RMS Screen 2 shows the total output voltage line-to-neutral, output current (each phase, neutral, and ground), and frequency being supplied by the PDU, as well as the kVA, kW, and power factor measurements.

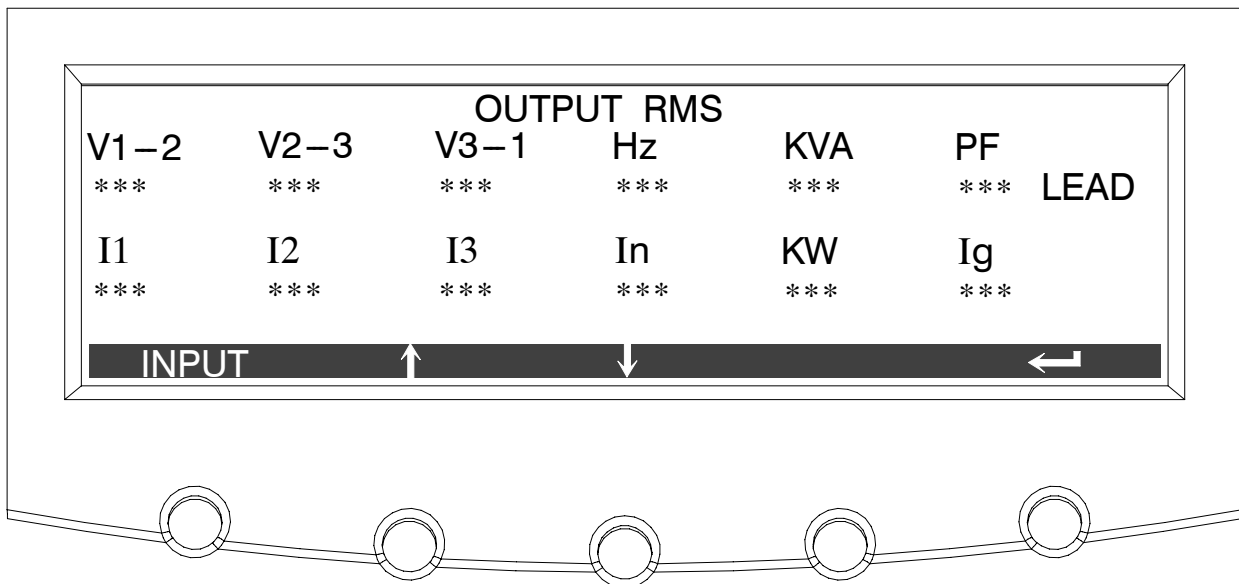


Figure 7-7. Output RMS Meter Screen 1

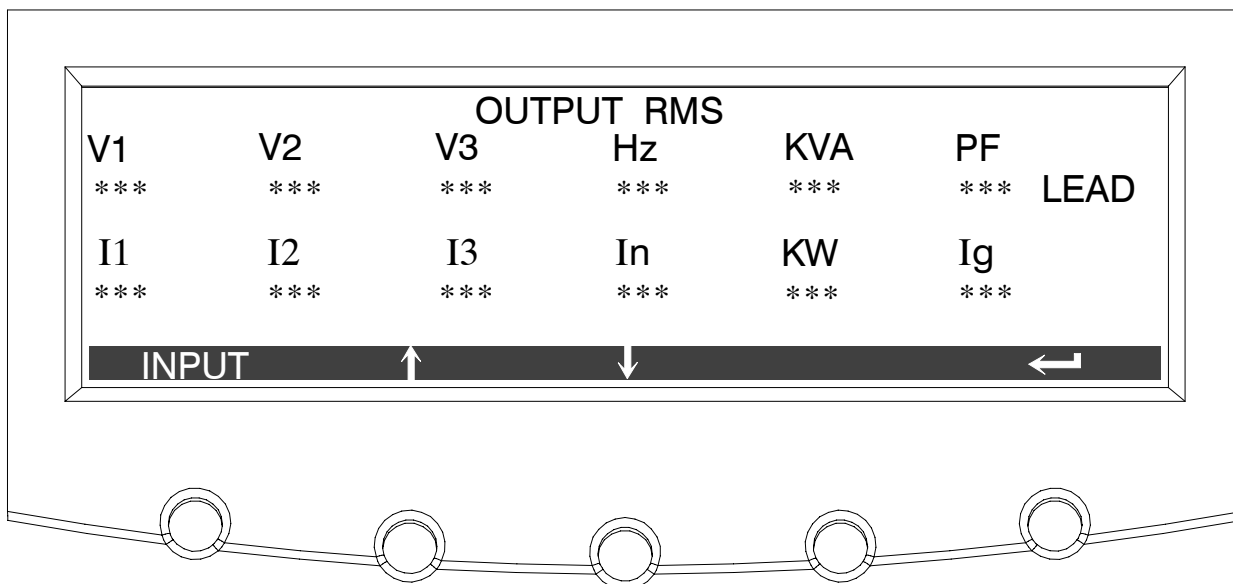


Figure 7-8. Output RMS Meter Screen 2

The Output % screen shows the ratio of present output voltage compared to nominal output voltage rating of the PDU in %.

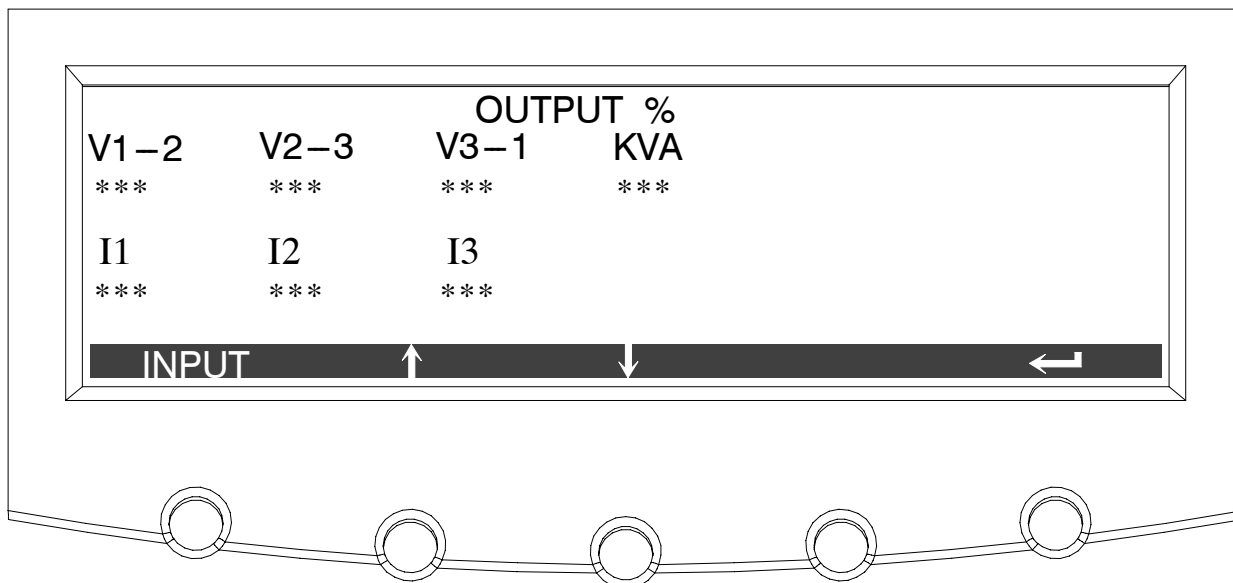


Figure 7-9. Output % Meter Screen

The Output KWH screen shows the total power being supplied by the PDU.

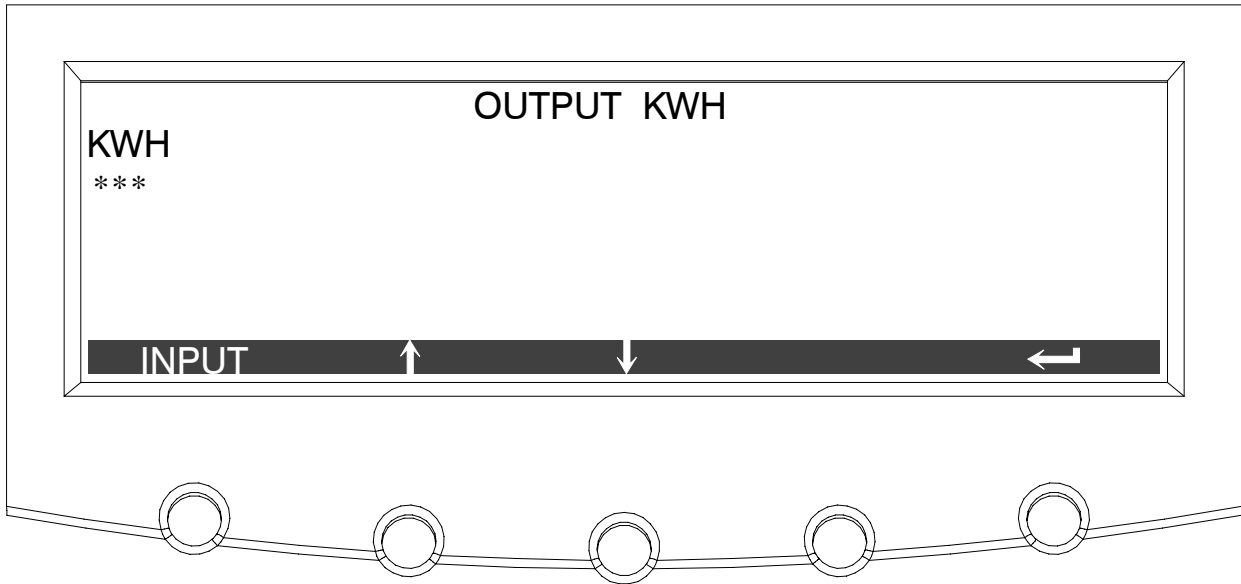


Figure 7-10. Output KWH Meter Screen

The Output THD screen displays the ratio of the distortion present on the output in the form of harmonics and noise compared to fundamental pure sine wave (utility frequency). This value is displayed in tenth percent and does not require calibration.

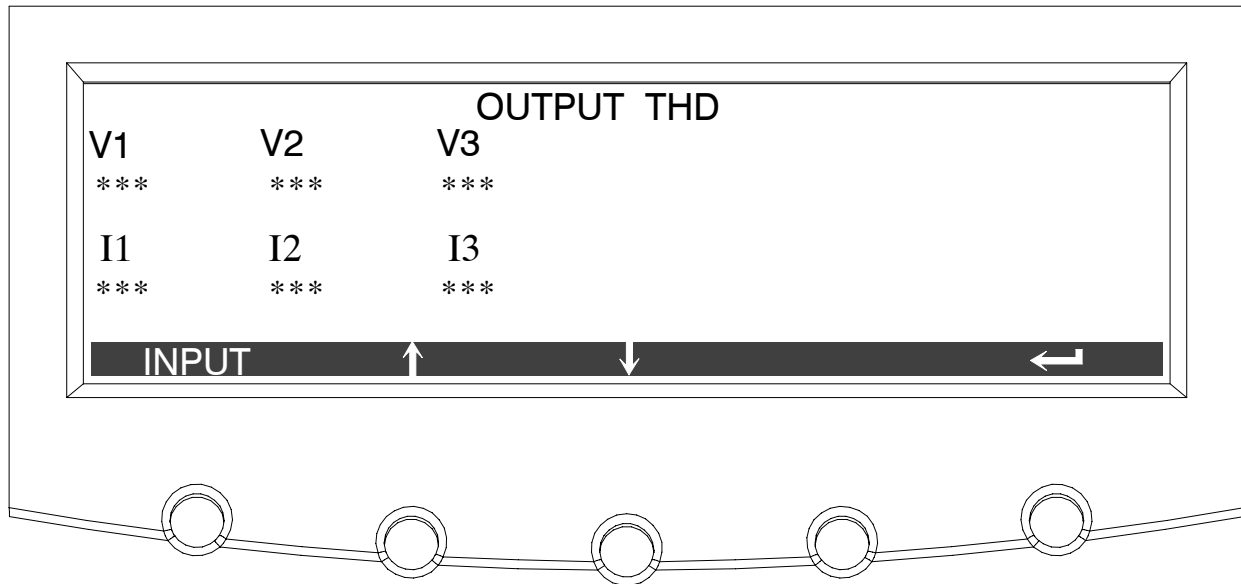


Figure 7-11. Output THD Meter Screen

The Output Crest screen displays the ratio of the peak to RMS of the output currents in %.

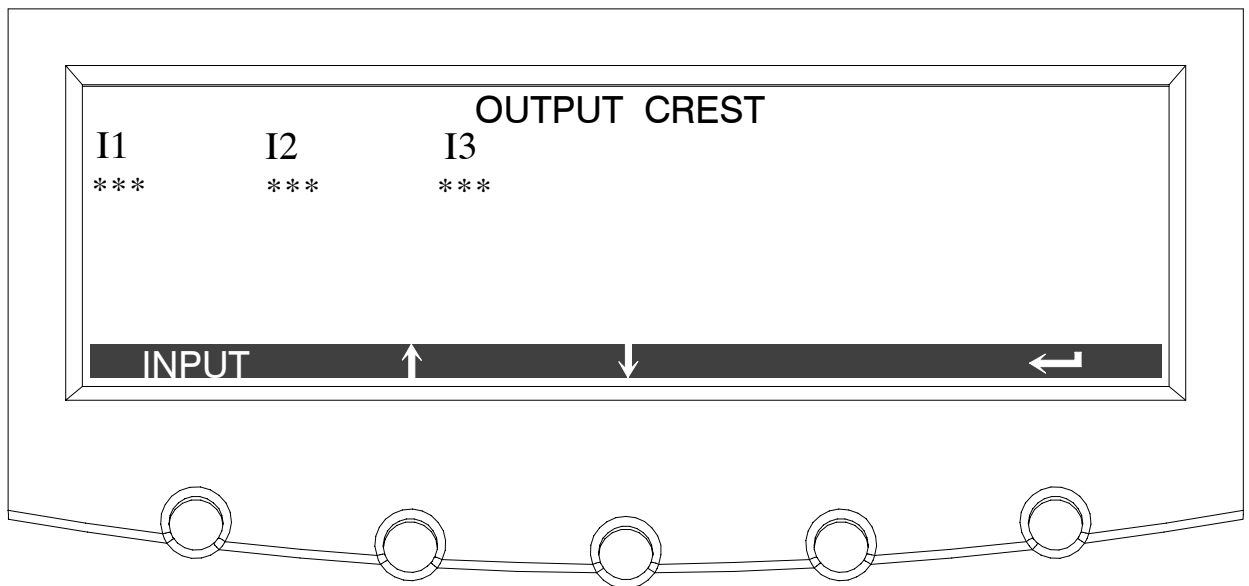


Figure 7-12. Output Crest Meter Screen

Input RMS Screen 1 shows the total input voltage line-to-line and Input RMS Screen 2 shows the total input voltage line-to-neutral, being supplied to the PDU,.

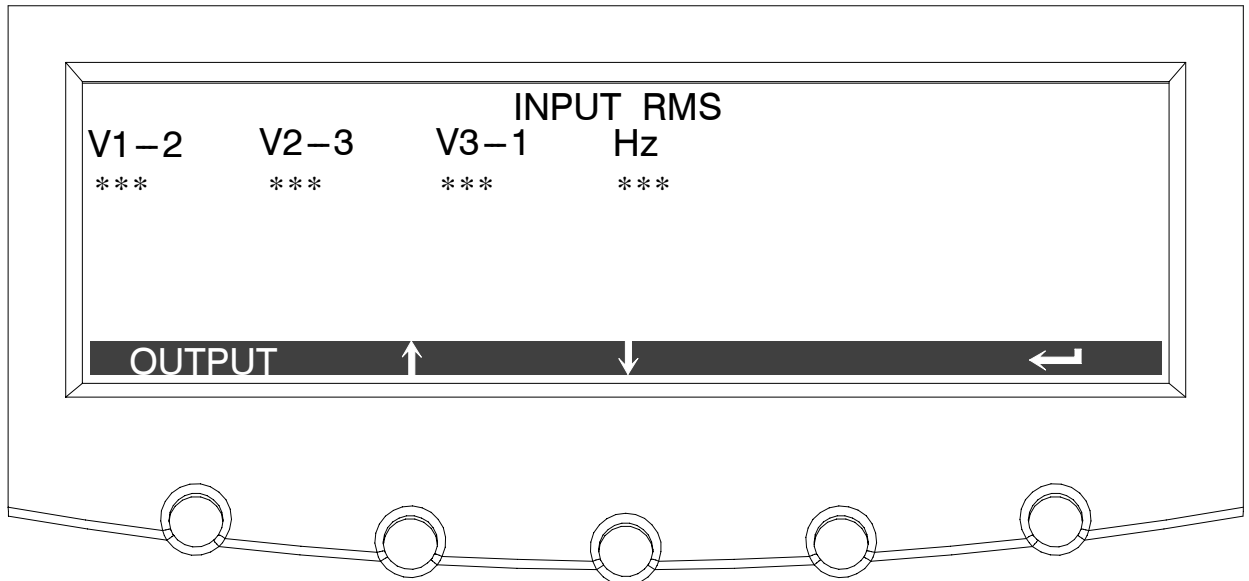


Figure 7-13. Input RMS Meter Screen 1

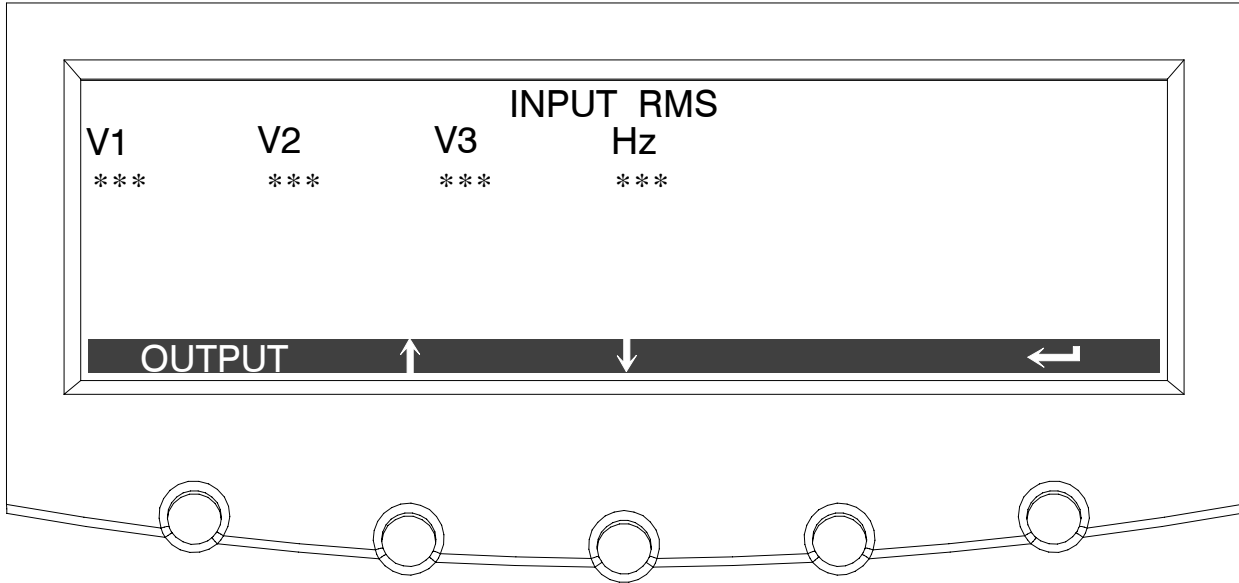


Figure 7-14. Input RMS Meter Screen 2

The Input % screen shows the ratio of the present input voltage compared to the input voltage rating of the PDU in %.

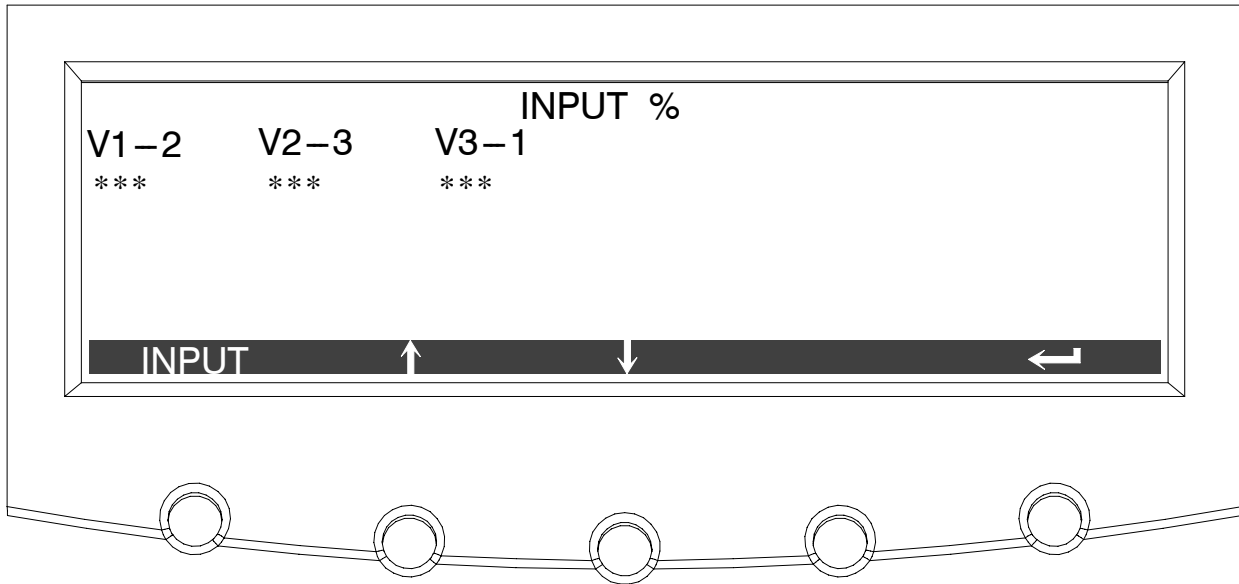


Figure 7-15. Input % Meter Screen

The Input THD screen displays the ratio of the distortion present on the input in the form of harmonics and noise compared to fundamental pure sine wave (utility frequency). This value is displayed in tenth percent and does not require calibration.

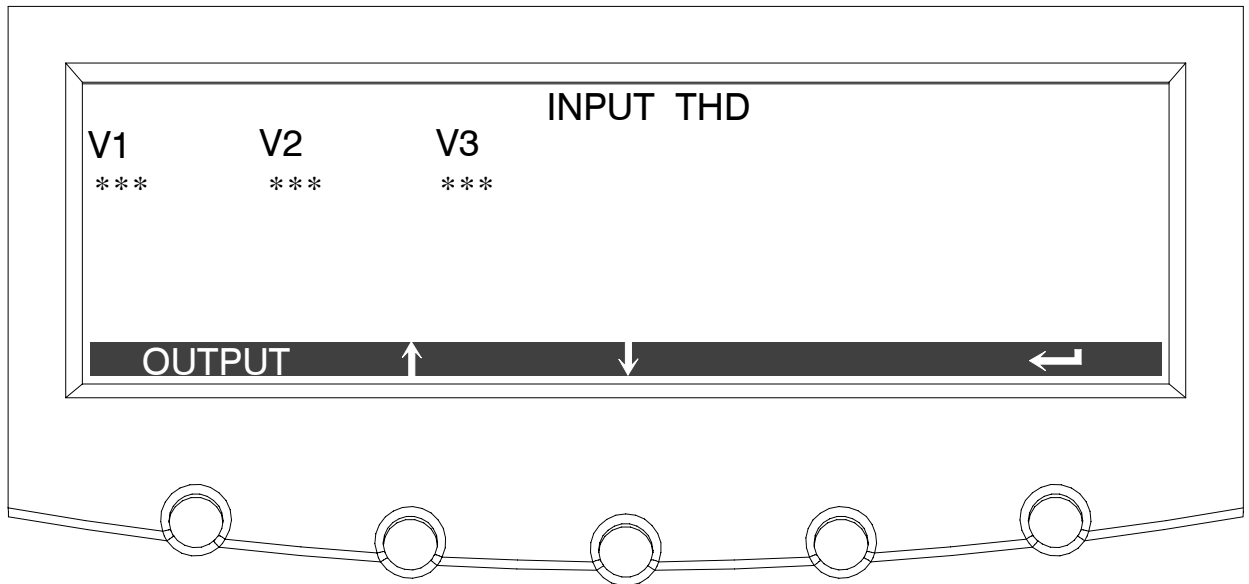


Figure 7-16. Input THD Meter Screen

7.2.4 Profile Screen

The Profile screen shows the highest and lowest currents, frequencies, power level and Total Harmonic Distortion over a four-hour period. The user can scroll the display observing the statistics for the current month and additional past 23 months.

Use the ← or → pushbuttons to select the month to view.

To scroll through the profile screen, press the ↑ or ↓ pushbuttons on the menu bar. The recorded PDU readings are displayed in the information area of the screen.

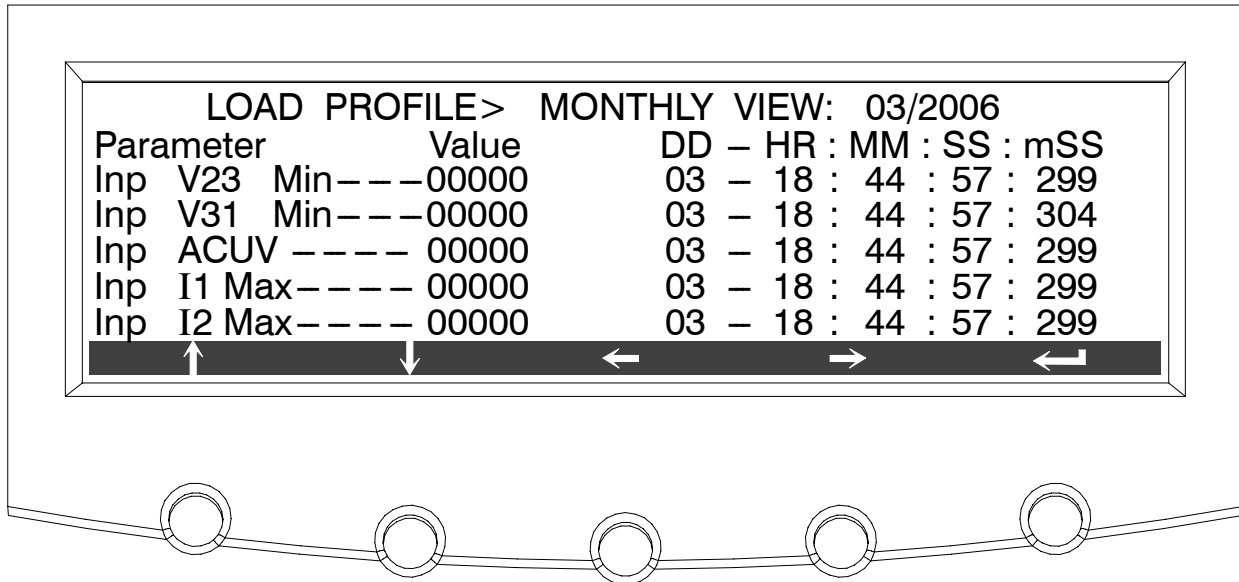


Figure 7-17. Profile Screen

7.2.5 System Setup Level 0 Screens

Press the **SETUP** pushbutton on the main menu bar to display the System Setup Level 0 Screen. This screen can be used to:

- ▶ Enter a password to access Level 1 functions (see paragraph 7.2.6)
No password is necessary to access Level 0 functions.
- ▶ Set date and time
- ▶ Show the firmware versions installed
- ▶ Set the screen contrast

Figure 7-18 shows the System Setup Level 0 menu screen.

Use the **↑** or **↓** pushbuttons to highlight the setup function screen desired, then press the **SELECT** pushbutton to display the function screen.

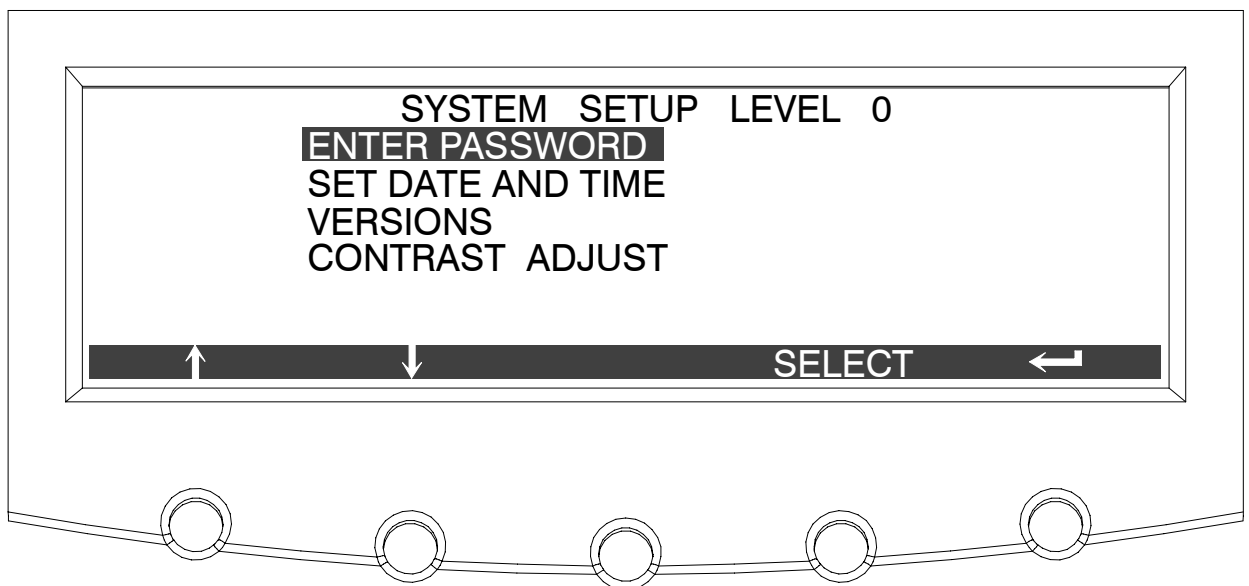


Figure 7-18. System Setup Level 0 Screen

Select **SET DATE AND TIME** from the System Setup Level 0 menu to display the Display (LCD) MM/DD/YYYY screen. This screen allows the internal date and time of the PDU to be set in the month/day/year format. The date and time information is used for display on the screen and for logging events in the Event and History Logs. Figure 7-19 shows the Display (LCD) MM/DD/YYYY screen.

Use the ← or → pushbuttons to highlight the setting to be changed. Use the ↑ or ↓ pushbuttons to make the change. When finished making changes, use the ← or → pushbuttons to highlight SAVE and the ↑ or ↓ pushbuttons to select YES. To complete the save function and return to the System Setup screen, select the ← pushbutton.

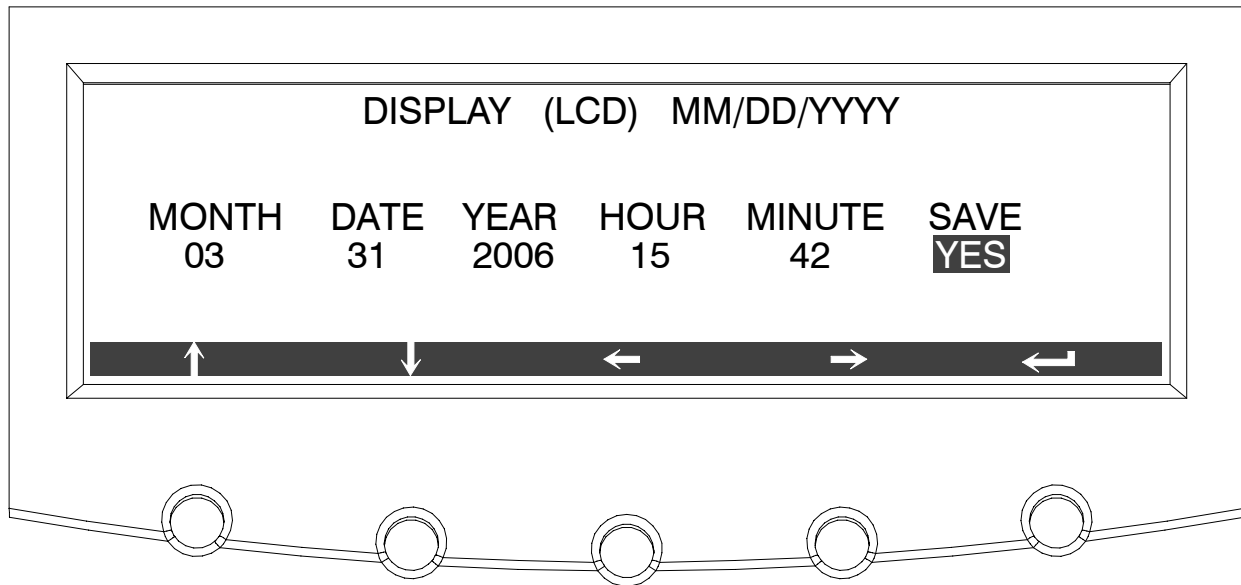


Figure 7-19. Set Date and Time MM/DD/YYYY Screen

Select **VERSIONS** from the System Setup Level 0 menu to display the Versions screen. The Versions screen provides the firmware version numbers installed on the PDU. Figure 7-20 shows the Versions screen.

To scroll through the firmware types, press the **↑** or **↓** pushbuttons on the menu bar. To return to the System Setup screen, press the **←** pushbutton.

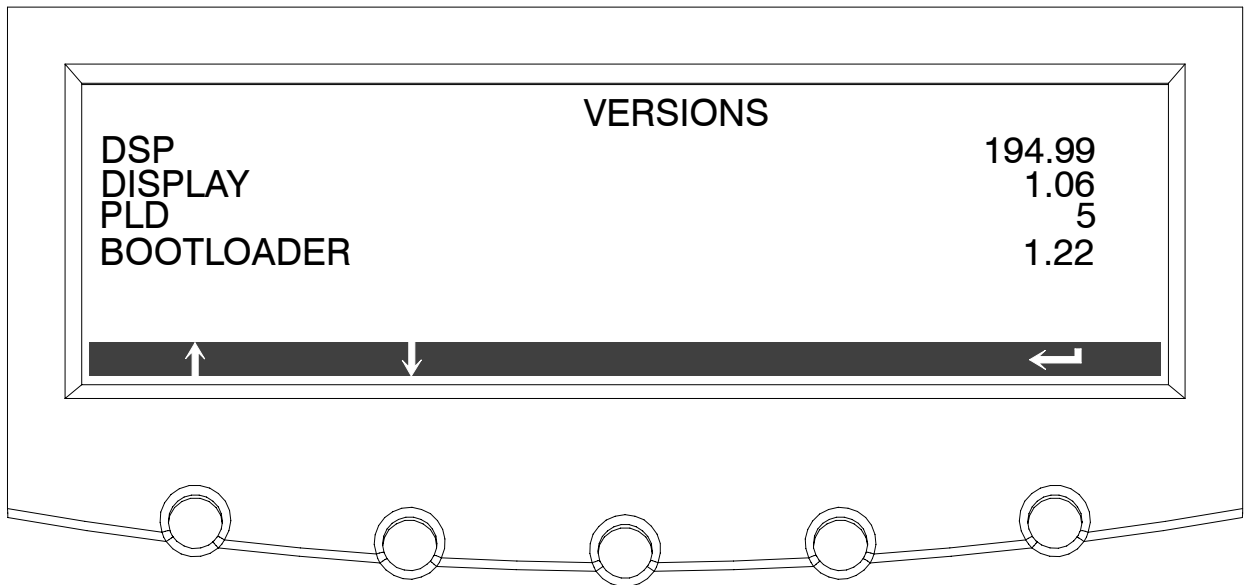


Figure 7-20. Versions Screen

Select **CONTRAST** from the System Setup Level 0 menu to display the Contrast Adjust screen. Figure 7-21 shows the Contrast Adjust screen.

Use the ← or → pushbuttons to adjust the contrast for the LCD. When the contrast adjustment is complete, press the **SAVE** pushbutton. Once the setting is saved, the System Setup screen displays. To return to the System Setup screen without saving the setting, press the ← pushbutton.

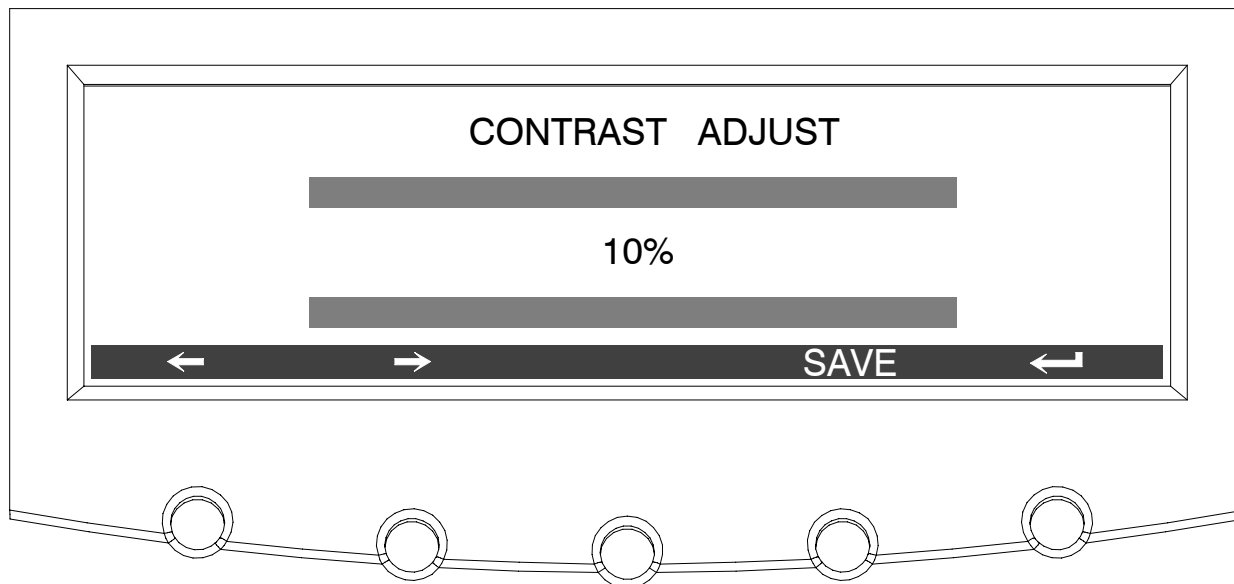


Figure 7-21. Contrast Adjust Screen

7.2.6 System Setup Level 1 Screens

A password is required to access the Level 1 functions. To enter the password, select **ENTER PASSWORD** from the System Setup Level 0 menu to display the Enter Password screen. Figure 7-22 shows the Enter Password screen.

Use the ← or → pushbuttons to select the password character position. Use the ↑ or ↓ pushbuttons to change the password character. Once the password is entered, press the **DONE** pushbutton. The System Setup Level 1 menu screen is displayed. The default password is L1.

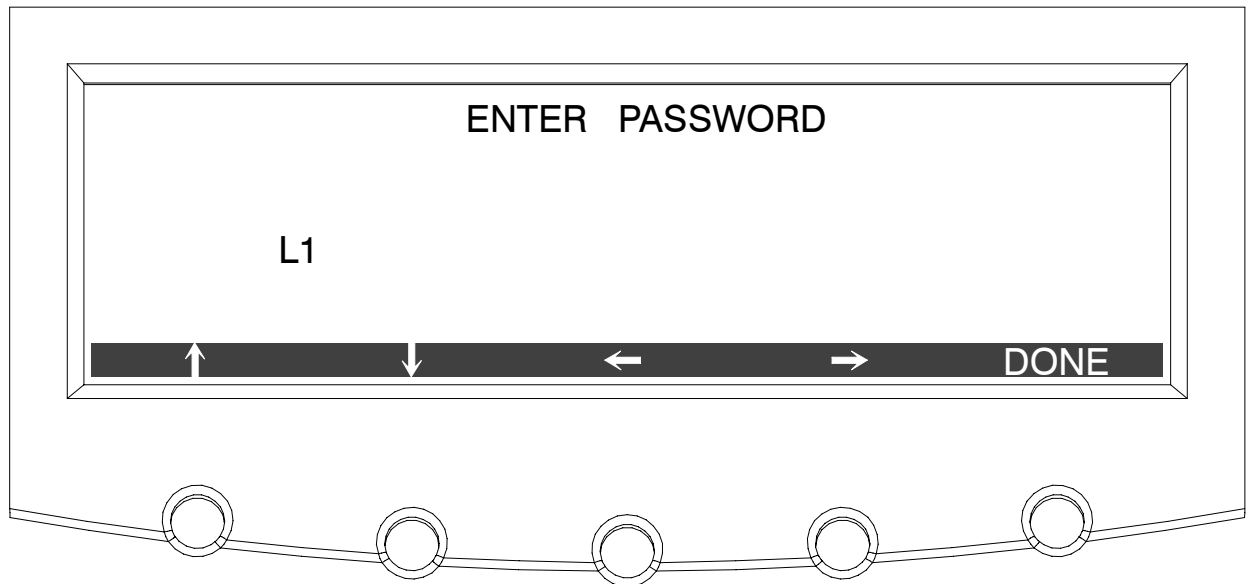


Figure 7-22. Enter Password Screen

In addition to the Level 0 functions, the System Setup Level 1 screen can be used to:

- ▶ Log out of Level 1
- ▶ Change Access Level Password
- ▶ Clear History

Figure 7-23 shows the System Setup Level 1 screen.

Use the **↑** or **↓** pushbuttons to highlight the setup function screen desired, then press the **SELECT** pushbutton to display the function screen.

The Level 1 screen times out after 60 minutes or can be logged out at any time by selecting the **LOG OUT** function from the menu screen.

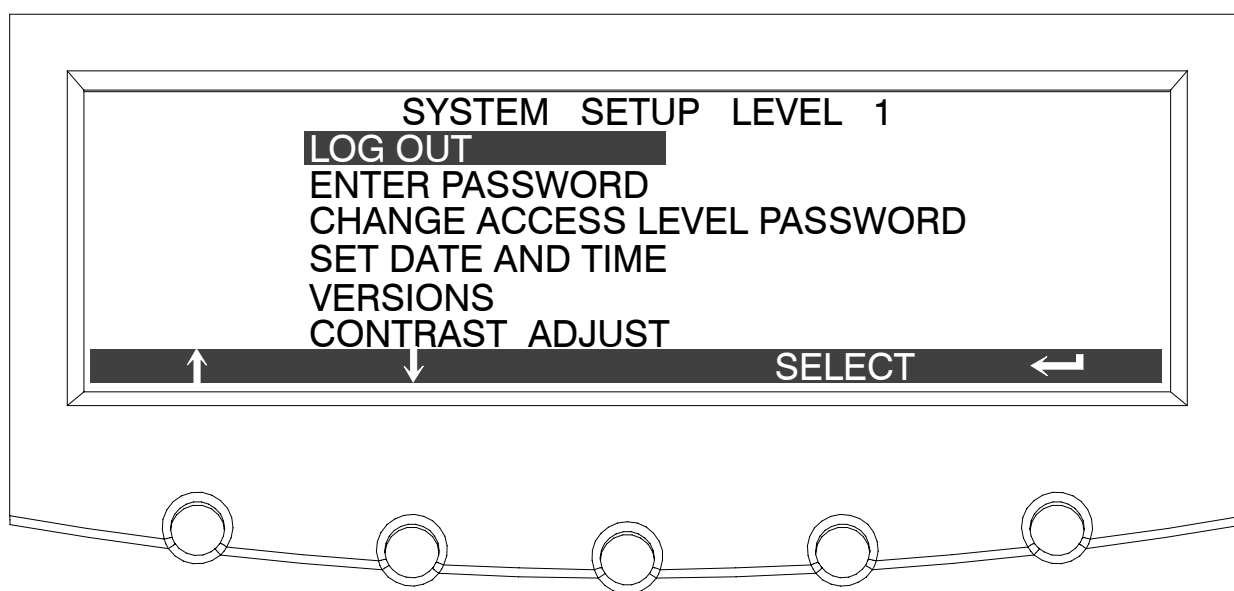


Figure 7-23. System Setup Level 1 Screen

Select **CHANGE ACCESS LEVEL PASSWORD** from the System Setup Level 1 menu to display the Display (LCD) screen. The Display (LCD) screen allows the System Setup Level 1 password to be changed. Figure 7-24 shows the Display (LCD) screen.

Use the ← or → pushbuttons to select the password character position. Use the ↑ or ↓ pushbuttons to change the password character. Once the new password is entered, press the **DONE** pushbutton. The Change Password Save screen is displayed.

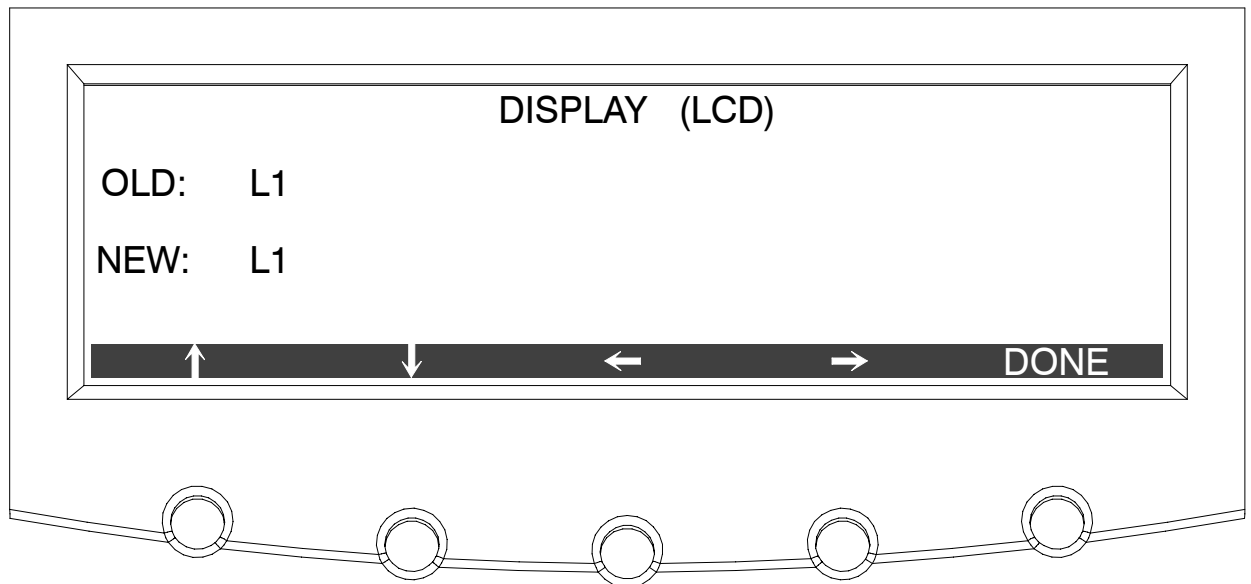


Figure 7-24. Display (LCD) Screen

The Display (LCD) Save screen lets you save the new password, retry another password, or abort the password change. Figure 7-25 shows the Display (LCD) Save screen.

Press **SAVE**, **RETRY**, or **ABORT**. If SAVE or ABORT is pressed, the action is completed, and the System Setup screen displays. If RETRY is pressed, the Display (LCD) screen is redisplayed.

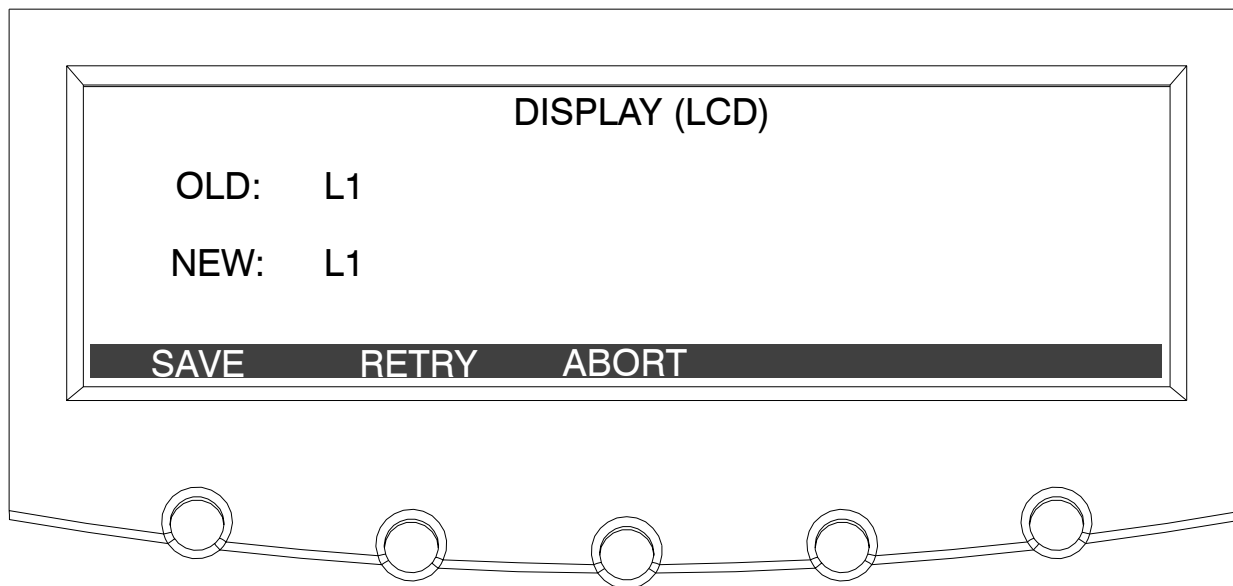






Figure 7-25. Display (LCD) Save Screen

7.3 Reading the PDU Status Indicators

The four symbols on the right side of the control panel are *status indicators*. They are colored light emitting diode (LED) lamps, and they work in conjunction with the alarm horn to let you know the operating status of the PDU.

On		ON	This green indicator is illuminated when the PDU output is energized. The indicator flashes when an informational event occurs. The LCD displays this event as a Notice. The indicator flashes until acknowledged by pressing any control panel pushbutton once. The indicator then returns to steady illumination.
Overload		O/L	This yellow indicator is illuminated when the output current of any phase exceeds 100% or a transformer overload occurs.
Off		OFF	This yellow indicator is illuminated when the PDU output is de-energized.
Alarm		AL	This red indicator is illuminated when a situation requires immediate attention. The LCD shows the highest priority active alarms. All alarms are accompanied by an audible horn. To silence the horn, press any control panel pushbutton once. The Alarm indicator may be illuminated along with other indicators. The indicator flashes until acknowledged by pressing any control panel pushbutton once. The indicator then returns to steady illumination.

For more information about audible horns, see “System Event Horns” on page 8-1.

7.4 Reading the TVSS Status Indicators

The optional TVSS is equipped with four indicators to provide working status of the TVSS. A green indicator is provided for each phase to indicate power is supplied to that phase. A fourth green indicator provides status of the MOVs. If a fault is found with any MOV, this indicator turns off.

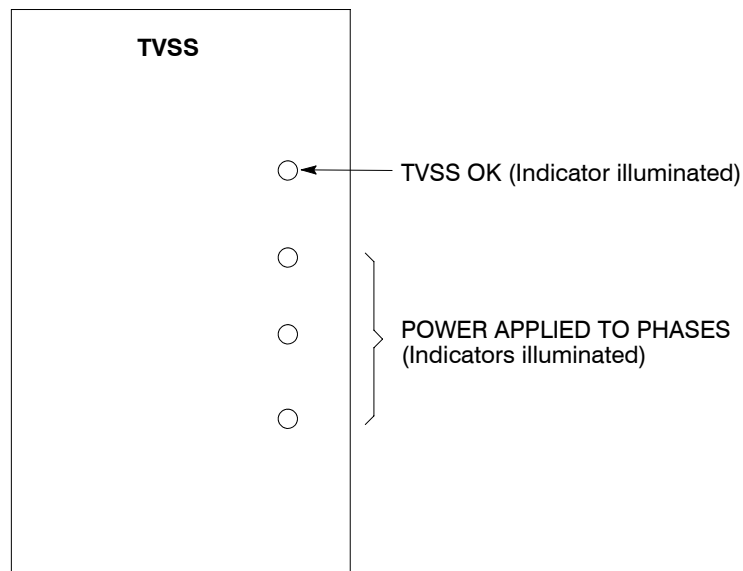


Figure 7-26. TVSS Indicators

7.5 PDU Operating Instructions

7.5.1 Starting the PDU



NOTE Before starting the PDU, verify all installation tasks are complete and a preliminary startup has been performed by an authorized Eaton Customer Service Engineer. The preliminary startup verifies all electrical interconnections to confirm the installation was successful and the PDU operates properly.

1. Unfasten the front door latch and swing the left door open. Loosen the top and bottom screws securing the right door and swing the door open.
2. Verify that the PDU circuit breakers and switches are set as follows:

PDU Main Input Breaker (CB1)	OPEN
PDU Distribution Panel Input Breakers or Subfeed Breakers (if installed)	OPEN
Distribution Panel Branch Breakers (if installed)	OPEN

3. Apply AC source power to the PDU.
4. Verify that the PDU control panel display becomes active after approximately 30 seconds, indicating logic power.
5. Verify that the **OFF** and **ALARM** status indicators on the PDU control panel are illuminated and the horn is sounding.
6. Press any key to silence horn.
7. Set the date and time.
8. Verify that the PDU control panel output current meters read zero (lines 1, 2, and 3 only). If meters do not read zero, wait until meters zero out before continuing to Step 9.
9. Close the PDU Main Input Breaker (CB1).
10. Verify that the **OFF** and **ALARM** status indicators on the PDU control panel are extinguished.
11. Verify that the **ON** status indicator on the PDU control panel is illuminated.
12. Close the PDU Distribution Panel Input Breakers (if installed) or the Distribution Breakers (if installed).
13. Close the Distribution Panel Branch Breakers (if installed).
14. Close the front door and secure the latch.

7.5.2 Restarting the PDU after an Unscheduled Shutdown (Main Breaker Shunt Trip, EPO, or REPO)



CAUTION

Do not attempt to restart the PDU until the cause of the shutdown has been identified and cleared.

1. Unfasten the front door latch and swing the left door open. Loosen the top and bottom screws securing the right door and swing the door open.
2. Reset the Main Input Circuit Breaker (CB1) to OFF position.
3. Restart the PDU using the procedure in paragraph 7.5.1.

7.5.3 Using an Emergency Power-off Switch

A PDU emergency power-off can be initiated by the **EPO** pushbutton switch on the front panel of the PDU. In an emergency, you can use this switch to control the PDU output. The EPO switch de-energizes the critical load, without asking for verification.

The PDU,, remains off until restarted.



CAUTION

All power to the critical load is lost when the EPO switch is activated in the following step. You should use this feature only when you want to de-energize the critical load.

To use the EPO switch:

1. Press the EPO pushbutton switch.

The PDU Main Breaker is tripped, and the PDU turned off immediately, without asking for verification.



CAUTION

Do not attempt to restart the system after using the EPO until the cause of the shutdown has been identified and cleared.

2. To restart the PDU after using the EPO pushbutton follow the procedure in paragraph 7.5.2.

7.5.4 Using a Remote Emergency Power-off Switch

A PDU emergency power-off can be initiated by the **REPO** pushbutton switch. In an emergency, you can use this switch to control the PDU output. The REPO switch de-energizes the critical load, without asking for verification.

The PDU,, remains off until restarted.

CAUTION



All power to the critical load is lost when the REPO switch is activated in the following step. You should use this feature only when you want to de-energize the critical load.



NOTE *The following instructions are for the Eaton supplied REPO switch. If a customer-supplied REPO switch is used, it may not activate in the same manner; refer to the operating instructions provided with the switch.*

To use the REPO switch:

1. Press the REPO pushbutton switch.

The PDU Main Breaker is tripped, and the PDU turned off immediately, without asking for verification. If an upstream feeder breaker is connected to the REPO, the feeder breaker is also tripped.

CAUTION



Do not attempt to restart the system after using the REPO until the cause of the shutdown has been identified and cleared.

2. To restart the PDU after using the REPO pushbutton, reset the REPO switch and then follow the procedure in paragraph 7.5.2.

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Chapter 8 | System Events

8.1 General

When the PDU is operating, it continually monitors itself and the incoming utility power. System events on the PDU can be indicated by horns, lights, messages, or all three.

Select **Events** from the menu bar on the Main Menu screen to look at the Active System Events screen. This screen shows any currently active alarms, notices, or commands. For more information on using the Events screen, see paragraph 7.2.2, “Event Screens.”

8.2 System Event Horns

The system event horn beeps to alert an operator that an event needing attention is taking place. The Horn cycles at a half-second rate.

8.3 System Event Indicators

The status indicators on the PDU control panel work with the event horn to let the operator know when the PDU is operating in any mode other than normal. Only the ON indicator is visible during normal PDU operation. The other indicators illuminate to indicate alarms or events. When an alarm occurs, you should first check these indicators to see what type of event has taken place. For descriptions of the status indicators, see paragraph 7.3, “Reading the PDU Status Indicators.”

8.4 System Event Messages

When a system event occurs, a message appears on the LCD in the PDU status area. This message is also written to the Active Events log and may be added to the Events History log. The messages are divided into four categories: alarms, notices, status, and commands. The following tables contain the events displayed on the Events screen of the control panel. The default actions occurring for the events are listed. Some event actions are programmable. For more information contact your Eaton service representative.

ALARMS					
Message	Horn	Phone	Relay	Log*	Indication
Building Alarm 2	No	No	Yes	HA	User Action Required
Building Alarm 2 OK	No	No	Yes	HA	Condition Cleared
Check Input Switchgear	Yes	Yes	No	HA	Service Required
Check Input Switchgear OK	Off	Yes	No	HA	Condition Cleared
L1 Overload	Yes	No	No	HA	User Action Required
L1 Overload OK	Off	No	No	HA	Condition Cleared
L1 Overload (High Level)	Yes	No	No	HA	User Action Required
L1 Overload (High Level) OK	Off	No	No	HA	Condition Cleared
L1 Overload (Extreme Level)	Yes	No	No	HA	User Action Required
L1 Overload (Extreme Level) OK	Off	No	No	HA	Condition Cleared
L2 Overload	Yes	No	No	HA	User Action Required
L2 Overload OK	Off	No	No	HA	Condition Cleared
L2 Overload (High Level)	Yes	No	No	HA	User Action Required
L2 Overload (High Level) OK	Off	No	No	HA	Condition Cleared
L2 Overload (Extreme Level)	Yes	No	No	HA	User Action Required
L2 Overload (Extreme Level) OK	Off	No	No	HA	Condition Cleared
L3 Overload	Yes	No	No	HA	User Action Required
L3 Overload OK	Off	No	No	HA	Condition Cleared
L3 Overload (High Level)	Yes	No	No	HA	User Action Required
L3 Overload (High Level) OK	Off	No	No	HA	Condition Cleared
L3 Overload (Extreme Level)	Yes	No	No	HA	User Action Required
L3 Overload (Extreme Level) OK	Off	No	No	HA	Condition Cleared
Output Overload	Yes	No	No	HA	User Action Required
Output Overload OK	Off	No	No	HA	Condition Cleared
Remote Emergency Power-off	Yes	No	No	A	User Action Required
Transformer Over Temperature	Yes	No	Yes	HA	User Action Required
Transformer Over Temperature OK	Off	No	Yes	HA	Condition Cleared
TVSS AAAAAAAAAAAAAAAAAA	No	No	Yes	HA	User Action Required
TVSS AAAAAAAAAAAAAAAAAA OK	No	No	Yes	HA	Condition Cleared

*Log codes indicate where the PDU records the event: H = History log; HA = History and Active logs; and A = Active log only.

NOTICES					
Message	Horn	Phone	Relay	Log*	Indication
Check Modem	Yes	No	No	A	Information Only
Input AC Over Voltage	No	No	No	HA	Information Only
Input AC Over Voltage OK	No	No	No	HA	Condition Cleared
Input AC Under Voltage	No	No	No	HA	Information Only
Input AC Under Voltage OK	No	No	No	HA	Condition Cleared
Input Phase Rotation Error	No	No	No	No	Information Only
Input Under or Over Frequency	No	No	No	HA	Information Only
Input Under or Over Frequency OK	No	No	No	HA	Condition Cleared
Modem Call Completion Failed	No	No	No	A	Information Only
Checksum Failure	No	No	No	No	Information Only
Output AC Over Voltage	No	No	No	HA	Information Only
Output AC Over Voltage OK	No	No	No	HA	Condition Cleared
Output AC Under Voltage	No	No	No	HA	Information Only
Output AC Under Voltage OK	No	No	No	HA	Condition Cleared
Output Under or Over Frequency	No	No	No	HA	Information Only
Output Under or Over Frequency OK	No	No	No	HA	Condition Cleared
Site Wiring Fault	No	No	No	No	Information Only

*Log codes indicate where the PDU records the event: H = History log; HA = History and Active logs; and A = Active log only.

STATUS					
Message	Horn	Phone	Relay	Log*	Indication
Incoming Modem Call Started	No	No	No	A	User Status
Modem Call Completed Successfully	No	No	No	A	User Status
Modem Connection Established	No	No	No	A	User Status
Outgoing Modem Call Started	No	No	No	A	User Status

*Log codes indicate where the PDU records the event: H = History log; HA = History and Active logs; and A = Active log only.

COMMAND					
Message	Horn	Phone	Relay	Log*	Indication
Emergency Shutdown	No	No	No	No	Information Only

*Log codes indicate where the PDU records the event: H = History log; HA = History and Active logs; and A = Active log only.

Chapter 9 | Communication

This chapter describes the communication features of the Powerware PDU and provides information about connecting hardware and using Terminal mode.

9.1 X-Slot Cards

The PDU has a standard, factory-installed X-Slot communication bay with two slots. See Drawing 164201629-8 starting on page A-37 for bay location. The PDU is compatible with the following X-Slot cards (see Figure 9-1):

- ▶ Modbus Card - provides direct integration of PDU information (meters and status) to a Building Management System (BMS) using the Modbus RTU protocol.
- ▶ ConnectPDU Web/SNMP Card - provides remote monitoring through a Web browser interface, e-mail, and a network management system using SNMP; connected using a twisted-pair Ethernet (10/100BaseT) network. It has a built-in switching hub that allows three additional network devices to be connected to the network without the requirement of additional network drops.

LAN and telephone drops for use with X-Slot connectivity cards must be provided by facility planners or the customer.

For installation and setup of the ConnectPDU Web/SNMP Card see paragraph 9.4. For installation and setup of all other X-Slot cards please contact Eaton technical support for Powerware products (see page 1-8). Refer to the manual supplied with the X-Slot card for user instructions.

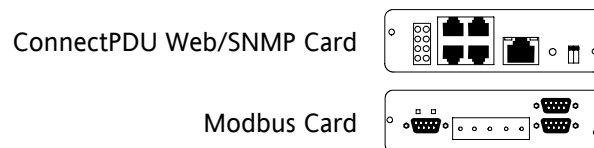


Figure 9-1. Optional X-Slot Cards

9.2 Remote Notification

For connection and setup of a modem, or to enable Remote Notify and Call Home features within the PDU, please contact Powerware (see page 1-8).

Remote Notification provides the PDU with the capability to use a standard off-the-shelf PC modem as a telephone interface. The features provided by this option are:

- ▶ Call a remote terminal or pager based on programmable events and alarms
- ▶ Four separate, programmable notification groups (phone numbers)
- ▶ Automatic answering (user-configurable) for access to the Terminal mode of the PDU
- ▶ Remote and local ability to clear Call Out alarms and events
- ▶ Error detection and correction for misconfigured and disconnected modems.

Remote Notification provides the option of receiving alarms and notices at a remote location. Using the Terminal mode, the user calls the PDU to perform basic monitoring. In the event of a PDU alarm or notice, the user is notified at the remote location. The PDU calls through the modem to the user's computer or pager and leaves a message.

Remote Notification is an extension of the Terminal mode with the additional support algorithms necessary to control an external modem. Connection to the PDU is made when a user calls the PDU on the phone. The user has exactly the same capabilities as if using a terminal connected directly to an RS-232 port.

Remote Notification differs from the basic Terminal mode with the addition the following functions:

- ▶ Call Answer

The Call Answer function allows the user to call into the PDU from a remote location and enter Terminal mode.

- ▶ Call Out

The Call Out function allows the PDU to be configured to call either a remote computer or numeric paging service over the phone line. Call Out allows the PDU to call a remote computer and leave a one-line descriptive message of the alarm or notice condition. Numeric paging support allows the PDU to call a paging service and send numeric messages.

- ▶ Housekeeping

The Housekeeping function maintains the link between the PDU and modem.

9.3 Terminal Mode



NOTE *The brackets ([]) in the following bullets indicate standard keyboard characters. To use a key combination, hold down the Escape key and press the indicated letter key.*

Terminal mode requires a computer with a serial (RS232) port connected to the RS232 port on the PDU. The computer can use HyperTerminal set to emulate ANSI.

In Terminal mode, the following can be requested:

- ▶ **[ESC] [V]** displays the screens as shown on the PDU LCD.
- ▶ **[ESC] [P]** displays the Profile log.
- ▶ **[ESC] [H]** displays the Event History log
- ▶ **[ESC] [A]** displays any new event.

9.3.1 PDU LCD Screens

The local PDU LCD screens can be displayed on a local computer by pressing **[ESC] [V]**. In this mode, keyboard keys “1, 2, 3, 4, and 5” are substituted for the five pushbuttons on the PDU LCD screen. The various screens are invoked using the same procedure described in Chapter 7 PDU “Control Panel and Operating Instructions”

9.3.2 Profile Log

If a computer operating in terminal mode is connected to the RS232 port on the PDU , **[Esc] [P]** can be pressed to print the entire Profile log. The printout begins with the oldest monthly entries in the queue and ends with the most recent. Statistics for the current month and additional past 23 months are displayed.

9.3.3 Event History Log

If a computer operating in terminal mode is connected to the RS232 port on the PDU , **[Esc] [H]** can be pressed to print the entire Event History log with a firmware version header. The printout begins with the oldest alarm entry in the queue and ends with the most recent. Any alarms that occur while the Event History log is printing are included in chronological order.

The Event History log lists up to 127 system events in chronological order with the most recent event listed last. Figure 9-2 shows a sample Event History log printout.

In this mode, system events are continually logged through the serial port to the device connected to the port.

The printed log entries contain a time and date stamp and the alarm text message. Terminal mode uses this format for printing alarm entries:

MM DD YYYY HH:MM:SS.hh KYWD MESSAGE <CR> <LF>

Where:	Equals:
MM	Month (2 digits)
DD	Day (2 digits)
YYYY	Year (4 digits)
HH	Hour (2 digits)
MM	Minute (2 digits)
SS	Second (2 digits)
hh	Hundredths of Second (3 digits)
KYWD	Keyword (ALARM, NOTICE, COMMAND, or STATUS)
MESSAGE	System Diagnostic Information
<CR>	Carriage Return Character (ASCII 13)
<LF>	Line Feed (ASCII 10)

An alarm message is prefixed by the word “CLEAR” whenever an alarm is entered into the Event History Log with a cleared status.

04/14/2006 04:31:17.310 ALARM: Output Phase Loss 1
 04/14/2006 04:31:17.310 ALARM: Output Phase Loss 2
 04/14/2006 04:31:17.310 ALARM: Output Phase Loss 3
 04/14/2006 04:32:16.595 STATUS: Control Power Status On
 04/14/2006 04:32:16.635 NOTICE: Output Ac Under Voltage
 04/14/2006 04:32:16.635 NOTICE: Input Ac Under Voltage
 04/14/2006 04:32:16.905 STATUS: Input Switchgear Open
 04/14/2006 04:32:17.710 ALARM: Input Phase Loss 1
 04/14/2006 4:32:17.710 ALARM: Input Phase Loss 2
 04/14/2006 04:32:17.710 ALARM: Input Phase Loss 3
 04/14/2006 04:33:16.995 STATUS: Control Power Status On
 04/14/2006 04:33:17.035 NOTICE: Output Ac Under Voltage
 04/16/2006 08:05:36.015 ALARM: Building Alarm 2
 04/16/2006 08:05:36.335 ALARM: Building Alarm 2 Ok
 04/16/2006 08:05:36.035 ALARM: Remote Emergency Power Off
 04/16/2006 08:04:32.475 NOTICE: Output Under Or Over Frequency
 04/16/2006 22:34:00.530 NOTICE: Output Ac Under Voltage
 04/16/2006 22:34:00.530 NOTICE: Input Ac Under Voltage
 04/16/2006 22:34:00.570 ALARM: Output Phase Loss
 04/16/2006 22:34:00.790 STATUS: Input Switchgear Open
 04/16/2006 22:34:01.620 ALARM: Input Phase Loss 1
 04/16/2006 22:34:01.620 ALARM: Input Phase Loss 2
 04/16/2006 22:34:01.620 ALARM: Input Phase Loss 3
 04/16/2006 22:34:01.620 ALARM: Output Phase Loss 1
 04/16/2006 22:34:01.620 ALARM: Output Phase Loss 2
 04/16/2006 22:34:01.620 ALARM: Output Phase Loss 3
 04/16/2006 22:35:00.875 STATUS: Control Power Status On
 04/17/2006 13:35:01.225 ALARM: Input Phase Loss 1
 04/17/2006 13:35:01.225 ALARM: Input Phase Loss 2
 04/17/2006 13:35:01.225 ALARM: Input Phase Loss 3
 04/17/2006 13:35:00.095 STATUS: Control Power Status On
 04/17/2006 13:35:00.125 ALARM: Output Phase Loss
 04/17/2006 13:35:00.135 NOTICE: Output Ac Under Voltage
 04/17/2006 13:35:00.135 NOTICE: Input Ac Under Voltage
 04/17/2006 13:35:01.225 ALARM: Input Phase Loss 1
 04/17/2006 13:35:01.225 ALARM: Input Phase Loss 2
 04/17/2006 13:35:01.225 ALARM: Input Phase Loss 3
 04/17/2006 13:35:01.225 ALARM: Output Phase Loss 1
 04/17/2006 13:35:01.225 ALARM: Output Phase Loss 2
 04/17/2006 13:35:01.225 ALARM: Output Phase Loss 3
 04/18/2006 08:05:36.015 ALARM: Building Alarm 1
 04/18/2006 08:05:36.335 ALARM: Building Alarm 1 Ok
 04/18/2006 08:04:32.475 NOTICE: Output Under Or Over Frequency
 04/18/2006 08:04:29.690 ALARM: Remote Emergency Power Off
 04/18/2006 07:36:01.225 ALARM: Input Phase Loss 1
 04/18/2006 07:36:01.225 ALARM: Input Phase Loss 2
 04/18/2006 07:36:01.225 ALARM: Input Phase Loss 3
 04/18/2006 08:05:32.565 STATUS: Control Power Status On

Figure 9-2. Sample Event History Log

9.4.2 Install the Card



NOTE See Drawing 164201629-8 starting on page A-37 for communication bay (X-Slot) location.

To install the ConnectPDU Web/SNMP Card:

1. Verify that the PDU is turned off and all power sources are removed. See Chapter 7, “PDU Control Panel and Operating Instructions” for shutdown instructions.
2. Verify that both DIP switches on the card are set to the **0** (off) position (see Figure 9-3).

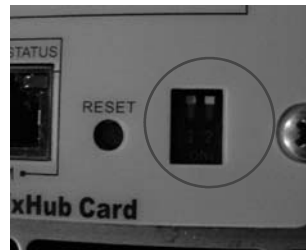


Figure 9-3. Verify DIP Switches



NOTE *If you are setting up the ConnectPDU Web/SNMP Card in a DHCP environment, set DIP switch 2 to the **1** (on) position.*



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

3. To prevent electrostatic discharge (ESD), place one hand on a metal surface such as the PDU cabinet frame.
4. Slide the card into the open slot and secure with the screws.
5. Connect an active Ethernet cable (supplied) to the Uplink Ethernet connector on the ConnectPDU Web/SNMP Card.
6. To configure the card locally using the supplied configuration cable, continue to the paragraph 9.4.3.

To configure the card remotely through a network using a Web browser or Telnet (or similar) utility, refer to the *ConnectPDU Web/SNMP Card User's Guide* PDF downloaded from powerware.com.

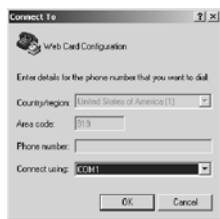
9.4.3 Connect the Card

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

1. Plug the RJ-45 end of the supplied configuration cable (labeled “PC”) into the COM port on the card.

Verify that you have used the port labeled “COM.” The other ports on the card will not work for configuration.

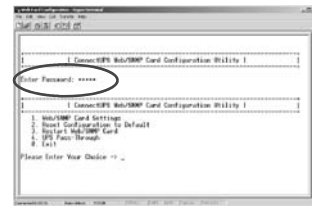
2. Plug the other end of the serial cable into the serial COM port on the computer.
3. Open your terminal emulation program (such as HyperTerminal).
4. Select the appropriate serial connection (such as COM1). See Figure 9-4(a).



(a)



(b)



(c)

Figure 9-4. (a) Select Connection, (b) Configure Port Settings, and (c) Enter Configuration Password

5. Set the serial line to 9600 baud, No parity, 8 data bits, 1 stop bit, and no flow control [see Figure 9-4(b)].
6. Verify that the PDU logic power is turned on.
7. After a few seconds, press Enter. The Password prompt appears [see Figure 9-4(c)].

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

- ▶ Verify the serial line is set to 9600 baud, No parity, 8 data bits, 1 stop bit, and no flow control.
 - ▶ If the serial line settings are correct, check the cabling to verify all connections are secure.
 - ▶ Verify that the terminal program is on the correct communication port for the serial connection.
 - ▶ Verify that the card has power (one or more LEDs on the card are illuminated). The PDU logic power should be turned on.
8. Type your *password* (the default is *admin*) and press Enter. The Main Menu screen appears.

9.4.4 Configure the Card

To configure the card:

1. Type **1** on the Main Menu to display the Web/SNMP Card Settings screen [see Figure 9-5(a)].

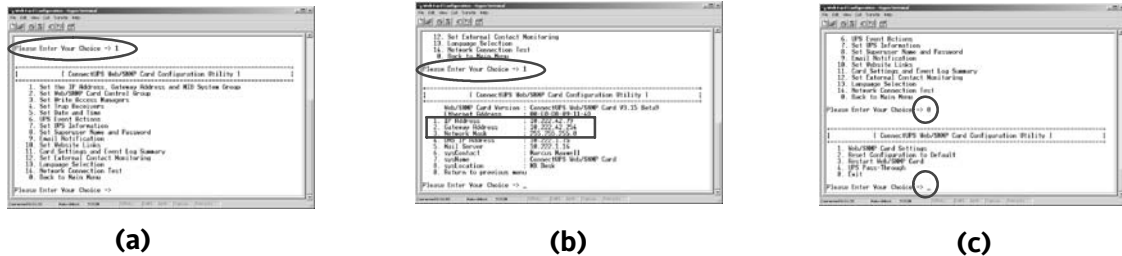


Figure 9-5. (a) Configure Card Setting, (b) Set ConnectPDU Web/SNMP Card IP Address, and (c) Save and Exit

2. Type **1** to display the Set the IP Address, Gateway Address, and MIB System Group screen [see Figure 9-5(b)].
3. To set the IP Address, type **1** and press **Enter**. Type the IP Address (see the Checklist on page 9-6) and press **Enter**.
4. Type **0** to return to the previous menu.
5. Repeat Steps 3 and 4 to set the Gateway Address and Network Mask.
6. Change any other options as needed for this particular configuration by typing the corresponding number shown in the menu.

Each Configuration Menu setting is described in detail in the Appendix of the ConnectPDU Web/SNMP Card *User's Guide*. The other options can be changed later if you prefer.

7. Type **0** until returned to the Main Menu [see Figure 9-5(c)].
8. Type **0** to save all settings and exit the card configuration.

9. Verify network communication by using a Web browser. Type the IP Address of your card and select **Go**. The ConnectPDU Web/SNMP Card Summary page opens (see Figure 9-6).

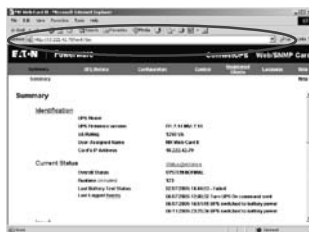


Figure 9-6. ConnectPDU Web/SNMP Card Summary page



NOTE Once the card is reachable on the network, you can use a Web browser, Telnet, or similar utility to adjust any of the configuration settings. The menus are identical to those seen during serial configuration and are password-protected for Superuser access only.

9.5 Modbus Register Mapping

9.5.1 Read Input Status

Modbus Function Code 02

Input registers start at 10000.

Register	Name	Value	Format	Unit
11	System Normal	1	BOOL	Status
16	PDU Off	0	BOOL	Status
NOTE Registers 1 – 16 are mutually exclusive.				
150	Input AC over voltage	0	BOOL	Status
151	Input AC under voltage	0	BOOL	Status
152	Input under or over frequency	0	BOOL	Status
153	Output AC over voltage	0	BOOL	Status
154	Output AC under voltage	0	BOOL	Status
155	Output under or over frequency	0	BOOL	Status
156	Remote emergency power off	0	BOOL	Status
162	Building Alarm 2	0	BOOL	Status
163	Building Alarm 1	0	BOOL	Status

Register	Name	Value	Format	Unit
169	Output overload	0	BOOL	Status
241	Emergency shutdown command	0	BOOL	Status
303	Greater than 106% overload on phase A	0	BOOL	Status
304	Greater than 106% overload on phase B	0	BOOL	Status
305	Greater than 106% overload on phase C	0	BOOL	Status
306	Greater than 125% overload on phase A	0	BOOL	Status
307	Greater than 125% overload on phase B	0	BOOL	Status
308	Greater than 125% overload on phase C	0	BOOL	Status
309	Greater than 150% overload on phase A	0	BOOL	Status
310	Greater than 150% overload on phase B	0	BOOL	Status
311	Greater than 150% overload on phase C	0	BOOL	Status
338	Site Wiring Fault	0	BOOL	Status
345	Transformer OverTemperature	0	BOOL	Status
361	Input Breaker Failed	0	BOOL	Status

9.5.2 Read Input Registers

Modbus Function Code 04
Input registers start at 30000.

Register	Meter Name	Value	Scale	Unit
4	INPUT VOLTS AB	4875	/10	Volts
5	INPUT VOLTS BC	4915	/10	Volts
6	INPUT VOLTS CA	4895	/10	Volts

Register	Meter Name	Value	Scale	Unit
19	INPUT CURRENT PHASE A	0	/10	Amps
20	INPUT CURRENT PHASE B	0	/10	Amps
21	INPUT CURRENT PHASE C	0	/10	Amps
22	OUTPUT TRUE POWER	51	/10	kW
23	INPUT TRUE POWER	0	/10	kW
24	OUTPUT APPARENT POWER	51	/10	kVA
25	INPUT APPARENT POWER	0	/10	kVA
26	OUTPUT POWER FACTOR	100	/100	--
27	INPUT POWER FACTOR	0	/100	--
28	OUTPUT FREQUENCY	600	/10	Hz
29	INPUT FREQUENCY	600	/10	Hz
57	INPUT VOLTS PHASE A	2828	/10	Volts
58	INPUT VOLTS PHASE B	2835	/10	Volts
59	INPUT VOLTS PHASE C	2840	/10	Volts
66	LOAD CURRENT PHASE A	138	/10	Amps
67	LOAD CURRENT PHASE B	138	/10	Amps
68	LOAD CURRENT PHASE C	140	/10	Amps
69	LOAD CURRENT PHASE A BAR CHART	2266	/10	Amps
70	LOAD CURRENT PHASE B BAR CHART	2266	/10	Amps
71	LOAD CURRENT PHASE C BAR CHART	2266	/10	Amps
79	OUTPUT VOLTS A	1230	/10	Volts
80	OUTPUT VOLTS B	1223	/10	Volts
81	OUTPUT VOLTS C	1227	/10	Volts
82	NEUTRAL CURRENT	10	/10	Amps

Chapter 10 | Maintaining the PDU

The components inside the Power Distribution Unit (PDU) are secured to a sturdy metal frame. All repairable parts and assemblies are located for easy removal, with very little disassembly. This design allows authorized service personnel to perform routine maintenance and servicing quickly.

10.1 Important Safety Instructions

The PDU interior is unsafe until AC source power is removed.



WARNING

- ▶ Servicing and maintenance should be performed by qualified service personnel only.
- ▶ LETHAL VOLTAGE PRESENT. This unit should not be operated with the cabinet doors open or protective panels removed. Do not make any assumptions about the electrical state of the PDU.

10.2 Performing Preventive Maintenance

The PDU requires very little preventive maintenance. However, the system should be inspected periodically to verify that the unit is operating normally.

10.2.1 DAILY Maintenance

Perform the following steps daily:

1. Check the area surrounding the PDU. Verify the area is not cluttered, allowing free access to the unit.
2. Verify the air intakes (vents on front of cabinet) and exhaust opening (on top of the cabinet) are not blocked.
3. Verify the operating environment is within the parameters specified in Chapter 11, “Product Specifications”, and Drawing 164201629-2 on page A-5.
4. Record the check results and any corrective actions in a suitable log.

10.2.2 PERIODIC Maintenance

Periodic inspections of the PDU should be made to determine if components, wiring, and connections exhibit evidence of overheating. Particular attention should be given to bolted connections. Maintenance procedures should specify that the bolted connections be retorqued to values listed on labels posted on the equipment.

Refer to the Distribution Panel manufacturer's circuit breaker application and maintenance literature for recommended maintenance practices and procedures.

10.2.3 ANNUAL Maintenance

Annual preventive maintenance, if required, should be performed only by authorized service personnel familiar with maintenance and servicing of the PDU. Contact your Eaton service representative for more information about service offerings.

10.3 Short Circuits

Short circuits are not considered normal phenomena in PDU system applications. Tripping of protective devices due to low impedance short circuits should be thoroughly investigated for damage to conductors, insulation, and the protective devices in accordance with the manufacturer's recommendations.

Chapter 11 | Product Specifications

11.1 Model Number

The PDU is housed in a free-standing cabinet with safety shields behind the doors.

Model	Power Rating	Frequency
Powerware PDU	30 to 300 kVA	60 Hz

11.2 PDU Input

Operating Input Voltage (Nominal +10/–15%)	208 Vac nominal (60 Hz) 480 Vac nominal (60 Hz) 600 Vac nominal (60 Hz)
Operating Input Frequency Range	±5 Hz
Operating Input Current	See Appendix A, Table F through Table H

11.3 PDU Output

Operating Output Voltage (Nominal +10/–15%)	208 Vac nominal (60 Hz) 480 Vac nominal (60 Hz) 600 Vac nominal (60 Hz)
Operating Output Frequency Range	±5 Hz
Output Current	See Appendix A, Table F through Table H

11.4 Environmental Specifications

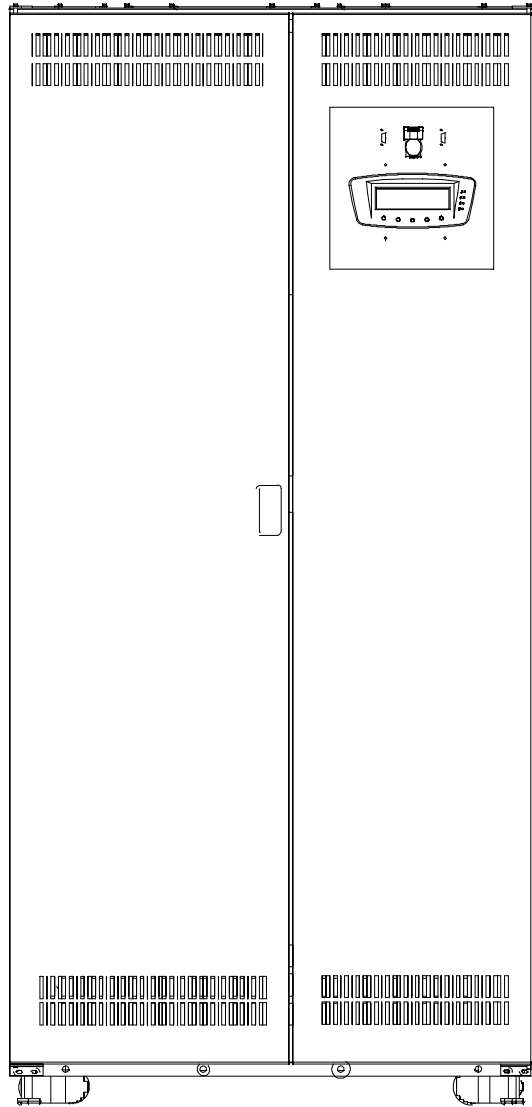
Operating Temperature	0 to 40°C (32–104°F) without derating. The recommended operating temperature is 25°C (77°F).
Operating Altitude	Maximum 1500m (5000 ft) at 40°C without derating
Storage Temperature	–40 to +60°C
Relative Humidity (operating and storage)	10% to 95% maximum noncondensing
Acoustical Noise	Meet or exceed ANSI C89 standard for transformers
EMI Suppression	N/A
Electrostatic Discharge (ESD) Immunity	N/A

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Appendix A | Installation Information

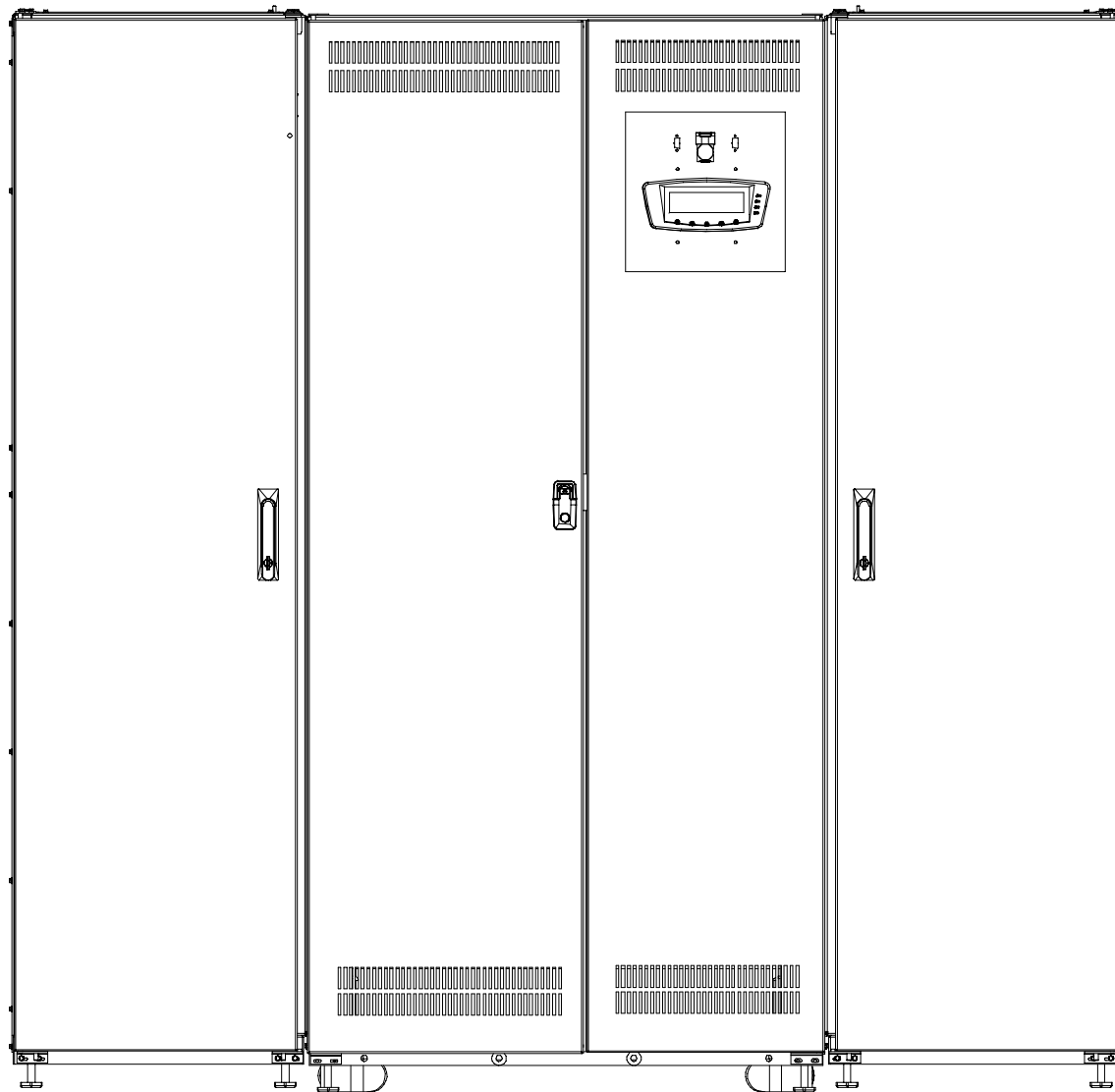
The information in this appendix will help during the planning and installation of the Power Distribution Unit (PDU). This appendix contains the following drawings:

- ▶ 164201629-1 Typical Powerware PDU
- ▶ 164201629-2 Physical Features and Requirements
- ▶ 164201629-3 PDU Online Drawings
- ▶ 164201629-4 PDU Distribution Panel Schematic
- ▶ 164201629-5 Power Wiring Installation Notes
- ▶ 164201629-6 Conduit and Wire Entry Locations
- ▶ 164201629-7 PDU Power Terminal Locations
- ▶ 164201629-8 Interface Wiring Installation Notes and Terminal Locations
- ▶ 164201629-9 PDU Dimensions
- ▶ 164201629-10 Optional Powerware Remote Emergency Power-off



PDU

DESCRIPTION: TYPICAL POWERWARE PDU	
DRAWING NO: 164201629-1	SHEET: 1 of 3
REVISION: A	DATE: 041506

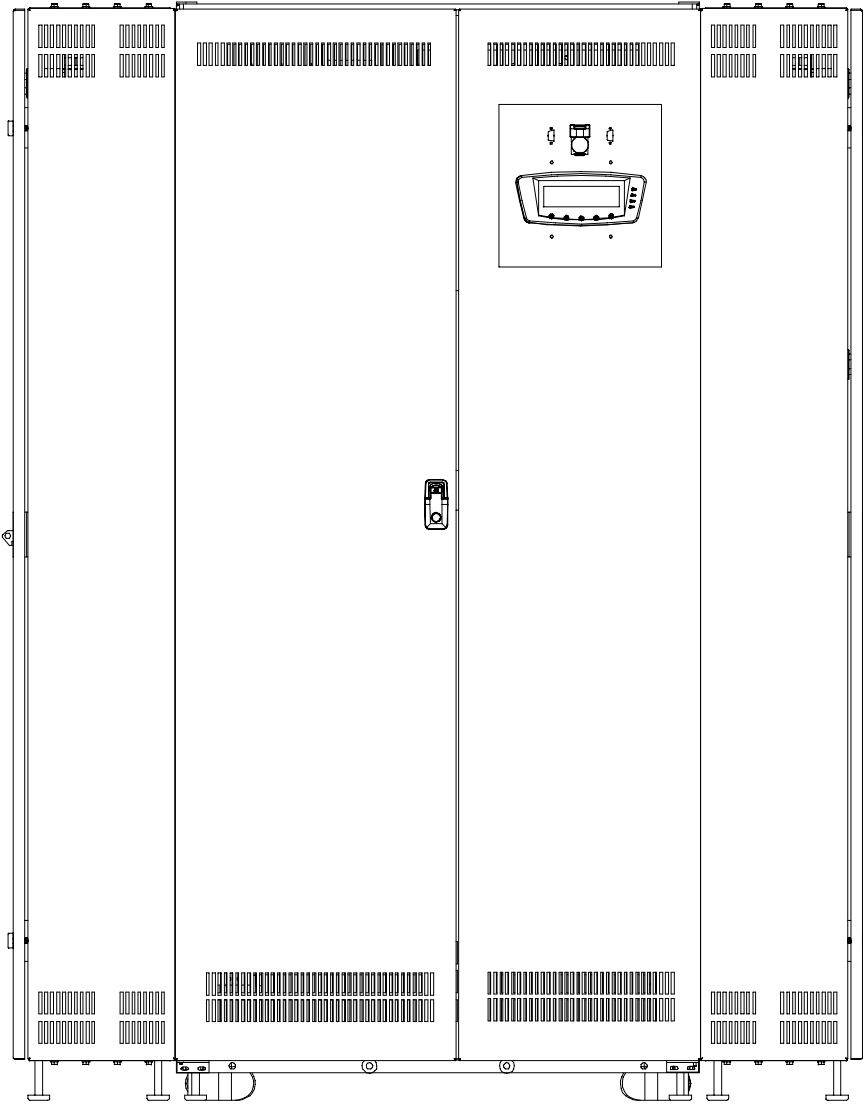


**FRONT FACING
SIDECAR
(OPTIONAL)**

**PDU
WITH FRONT FACING SIDECARS**

**FRONT FACING
SIDECAR
(OPTIONAL)**

<i>DESCRIPTION:</i>		TYPICAL POWERWARE PDU	
<i>DRAWING NO:</i>	164201629-1	<i>SHEET:</i>	2 of 3
<i>REVISION:</i>	A	<i>DATE:</i>	041506



**SIDE FACING
SIDECAR
(OPTIONAL)**

**PDU
WITH SIDE FACING SIDECARS**

**SIDE FACING
SIDECAR
(OPTIONAL)**

DESCRIPTION:

TYPICAL POWERWARE PDU

DRAWING NO: 164201629-1

SHEET: 3 of 3

REVISION: A

DATE: 041506

1. The PDU equipment operating environment must meet the weight requirements shown in Table A and size requirements shown on Drawing 164201629–9.

Table A. Equipment Weight				
<i>Component</i>	<i>Rating kVA</i>	<i>Weight Kgs (lbs)</i>		
		<i>Shipping</i>	<i>Installed</i>	<i>Point Loading</i>
PDU	30	474.5 (1045)	445 (980)	4 at 111.3 (245)
PDU	50	543.5 (1195)	514 (1130)	4 at 128.5 (282.5)
PDU	75	620.5 (1365)	591 (1300)	4 at 147.8 (325)
PDU	100	768.5 (1690)	739 (1625)	4 at 184.8 (406.3)
PDU	125	804.5 (1770)	775 (1705)	4 at 193.8 (193.8)
PDU	150	859.5 (1890)	830 (1825)	4 at 207.5 (456.3)
PDU	200	1052.5 (2315)	1023 (2250)	4 at 255.8 (562.5)
PDU	225	1143.5 (2515)	1114 (2450)	4 at 278.5 (612.5)
PDU	300	1256.5 (2765)	1227 (2700)	4 at 306.8 (675)
PDU with single front facing Sidecar	30	604 (1330)	570 (1255)	4 at 142.5 (313.8)
PDU with single front facing Sidecar	50	673 (1480)	639 (1405)	4 at 159.8 (351.3)
PDU with single front facing Sidecar	75	750 (1650)	716 (1575)	4 at 179 (393.8)
PDU with single front facing Sidecar	100	898 (1975)	864 (1900)	4 at 216 (475)
PDU with single front facing Sidecar	125	934 (2055)	900 (1980)	4 at 225 (495)
PDU with single front facing Sidecar	150	989 (2175)	955 (2100)	4 at 238.8 (525)
PDU with single front facing Sidecar	200	1182 (2600)	1148 (2525)	4 at 287 (631.3)
PDU with single front facing Sidecar	225	1273 (2800)	1239 (2725)	4 at 309.8 (681.3)
PDU with single front facing Sidecar	300	1386 (3050)	1352 (2975)	4 at 338 (743.8)
PDU with single side facing Sidecar	30	593 (1305)	559 (1230)	4 at 139.8 (307.5)
PDU with single side facing Sidecar	50	661 (1455)	627 (1380)	4 at 156.8 (345)
PDU with single side facing Sidecar	75	739 (1625)	705 (1550)	4 at 176.3 (387.5)
PDU with single side facing Sidecar	100	886 (1950)	852 (1875)	4 at 213 (468.8)
PDU with single side facing Sidecar	125	923 (2030)	889 (1955)	4 at 222.3 (488.8)
PDU with single side facing Sidecar	150	977 (2150)	943 (2075)	4 at 235.8 (518.8)
PDU with single side facing Sidecar	200	1170 (2575)	1136 (2500)	4 at 284 (625)
PDU with single side facing Sidecar	225	1261 (2775)	1227 (2700)	4 at 306.8 (675)
PDU with single side facing Sidecar	300	1375 (3025)	1341 (2950)	4 at 335.3 (737.5)

<i>DESCRIPTION:</i> PHYSICAL FEATURES AND REQUIREMENTS	
<i>DRAWING NO.:</i> 164201629–2	<i>SHEET:</i> 1 of 5
<i>REVISION:</i> A	<i>DATE:</i> 041506

2. The PDU cabinet is palletted for shipping.
3. Do not tilt cabinets more than $\pm 10^\circ$ during handling.
4. Dimensions are in millimeters and (inches).
5. The clearances required around the PDU cabinet are shown in Table B and Drawing 164201629–9 , starting on page A–41.

Table B. PDU Cabinet Clearances	
From Top of Cabinet	Minimum clearance over the PDU cabinet is 457.2 millimeters (18 inches) for ventilation
From Front of Cabinet	914.4 millimeters (36 inches) working space
From Back of Cabinet (main PDU only)	None Required
From Back of Cabinet (main PDU with side facing left and right sidecar)	812 mm (32 inches) for door clearance and working space
From Right Side of Cabinet (main PDU, main PDU with front facing left sidecar, or main PDU with side facing left sidecar)	406.4 mm (16 inches) for door clearance and working space
From Left Side of Cabinet (main PDU, main PDU with front facing left sidecar, or main PDU with side facing left sidecar)	482.6 mm (19 inches) for door clearance and working space
From Right Side of Cabinet (main PDU with front facing right sidecar or main PDU with front facing left and right sidecars)	482.6 mm (19 inches) for door clearance and working space
From Left Side of Cabinet (main PDU with front facing right sidecar, or main PDU with front facing left and right sidecars)	482.6 mm (19 inches) for door clearance and working space
From Right Side of Cabinet (main PDU with side facing right sidecar)	812 mm (32 inches) for door clearance and working space
From Left Side of Cabinet (main PDU with side facing left sidecar)	812 mm (32 inches) for door clearance and working space
From Left and Right Side of Cabinet (main PDU with side facing left and right sidecar)	812 mm (32 inches) for door clearance and working space

<i>DESCRIPTION:</i> PHYSICAL FEATURES AND REQUIREMENTS	
<i>DRAWING NO.:</i> 164201629–2	<i>SHEET:</i> 2 of 5
<i>REVISION:</i> A	<i>DATE:</i> 041506

6. The basic environmental requirements for operation of the PDU are:

Ambient Temperature Range: 0–40°C (32–104°F)

Recommended Operating Range: 20–25°C (68–77°F)

Maximum Relative Humidity: 95%, noncondensing

The PDU cooling requirements are shown in Table C through Table E.

Rating		Voltage		Heat Rejection		
kVA	K-factor	Input	Output	Watts	BTU/hr	Kg-cal/hr
30	N/A	208	208	288	983	20
50	N/A	208	208	480	1639	32
75	N/A	208	208	720	2458	48
100	N/A	208	208	880	3004	59
125	N/A	208	208	1210	4130	81
150	N/A	208	208	1320	4506	88
200	N/A	208	208	1450	4949	97
225	N/A	208	208	1650	5632	110
300	N/A	208	208	1920	6553	128

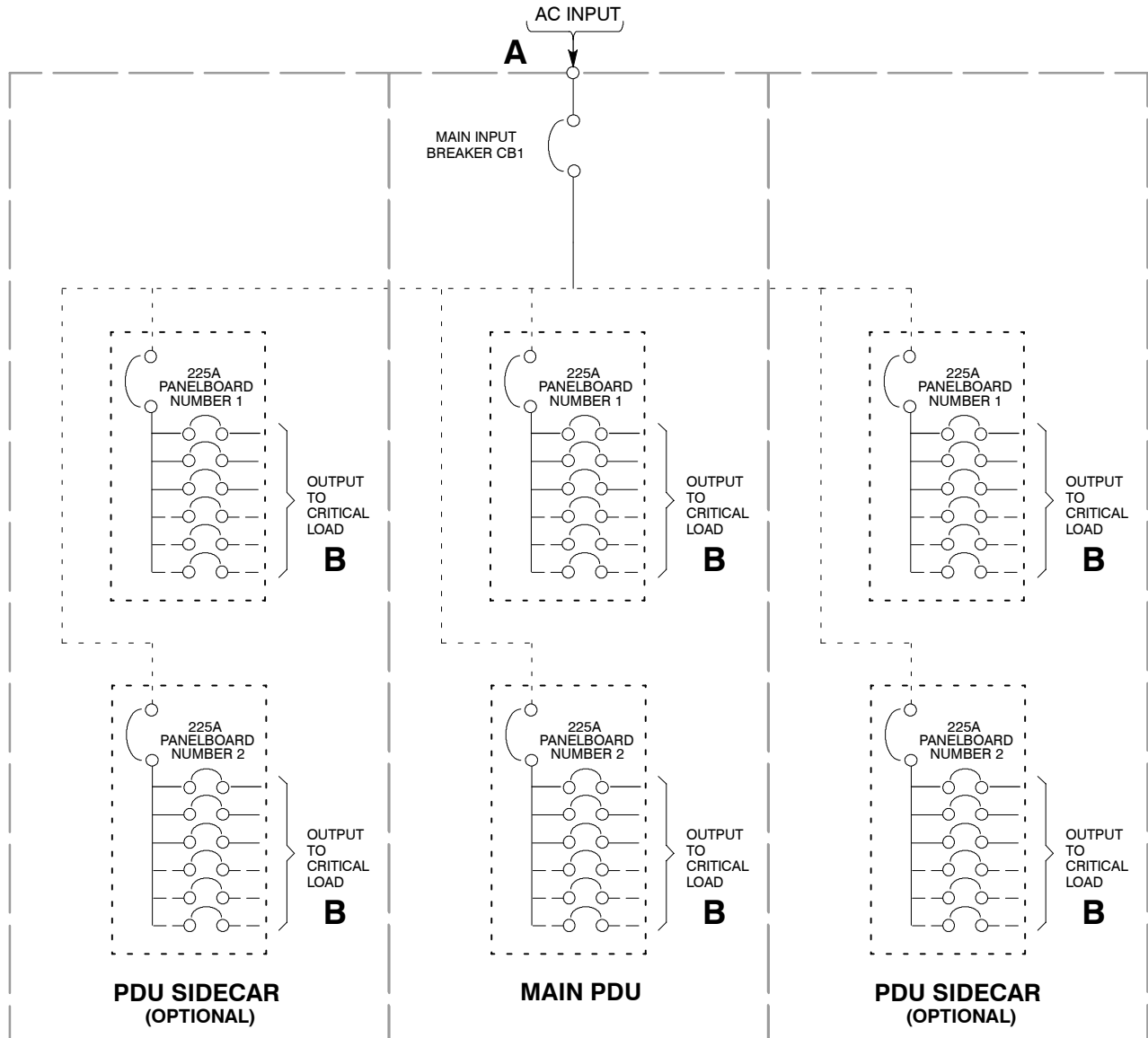
<i>DESCRIPTION:</i> PHYSICAL FEATURES AND REQUIREMENTS		
<i>DRAWING NO.:</i>	164201629–2	<i>SHEET:</i> 3 of 5
<i>REVISION:</i>	A	<i>DATE:</i> 041506

Table D. PDU Cooling Requirements During Full Load Operation with 480V Transformer						
<i>Rating</i>		<i>Voltage</i>		<i>Heat Rejection</i>		
<i>kVA</i>	<i>K-factor</i>	<i>Input</i>	<i>Output</i>	<i>Watts</i>	<i>BTU/hr</i>	<i>Kg-cal/hr</i>
30	1	480	208/120	1728	5898	115
30	13	480	208/120	1584	5407	106
30	20	480	208/120	1536	5243	102
50	1	480	208/120	2880	9830	192
50	13	480	208/120	2640	9011	176
50	20	480	208/120	2560	8738	170
75	1	480	208/120	4320	14744	287
75	13	480	208/120	3960	13516	263
75	20	480	208/120	3840	13106	255
100	1	480	208/120	5280	18021	351
100	13	480	208/120	4800	16382	319
100	20	480	208/120	4620	15768	307
125	1	480	208/120	7260	24778	482
125	13	480	208/120	6240	21297	415
125	20	480	208/120	4680	15973	311
150	1	480	208/120	7920	27031	526
150	13	480	208/120	6120	20887	407
150	20	480	208/120	5760	19659	383
200	1	480	208/120	8700	29693	578
200	13	480	208/120	7140	24369	474
200	20	480	208/120	6660	22730	442
225	1	480	208/120	9900	33788	657
225	13	480	208/120	8040	27440	534
225	20	480	208/120	7800	26621	518
300	1	480	208/120	11520	39317	765
300	13	480	208/120	9450	32252	628
300	20	480	208/120	9240	31536	614

<i>DESCRIPTION:</i> PHYSICAL FEATURES AND REQUIREMENTS	
<i>DRAWING NO:</i> 164201629-2	<i>SHEET:</i> 4 of 5
<i>REVISION:</i> A	<i>DATE:</i> 041506

Table E. PDU Cooling Requirements During Full Load Operation with 600V Transformer						
<i>Rating</i>		<i>Voltage</i>		<i>Heat Rejection</i>		
<i>kVA</i>	<i>K-factor</i>	<i>Input</i>	<i>Output</i>	<i>Watts</i>	<i>BTU/hr</i>	<i>Kg-cal/hr</i>
30	1	600	208/120	1555	5308	104
30	13	600	208/120	1536	5243	102
30	20	600	208/120	1382	4717	92
50	1	600	208/120	2592	8847	173
50	13	600	208/120	2560	8738	170
50	20	600	208/120	2304	7864	153
75	1	600	208/120	3888	13270	259
75	13	600	208/120	3564	12164	237
75	20	600	208/120	3456	11795	230
100	1	600	208/120	4752	16219	316
100	13	600	208/120	4320	14744	287
100	20	600	208/120	4158	14191	276
125	1	600	208/120	6534	22300	434
125	13	600	208/120	5616	19167	373
125	20	600	208/120	4212	14376	280
150	1	600	208/120	7128	24328	474
150	13	600	208/120	5508	18799	366
150	20	600	208/120	5184	17693	345
200	1	600	208/120	7830	26724	520
200	13	600	208/120	6426	21932	427
200	20	600	208/120	5994	20457	398
225	1	600	208/120	8910	30409	592
225	13	600	208/120	7236	24696	481
225	20	600	208/120	7020	23959	466
300	1	600	208/120	10368	35385	689
300	13	600	208/120	8505	29027	565
300	20	600	208/120	8316	28382	552

<i>DESCRIPTION:</i> PHYSICAL FEATURES AND REQUIREMENTS		
<i>DRAWING NO:</i>	164201629-2	<i>SHEET:</i> 5 of 5
<i>REVISION:</i>	A	<i>DATE:</i> 041506

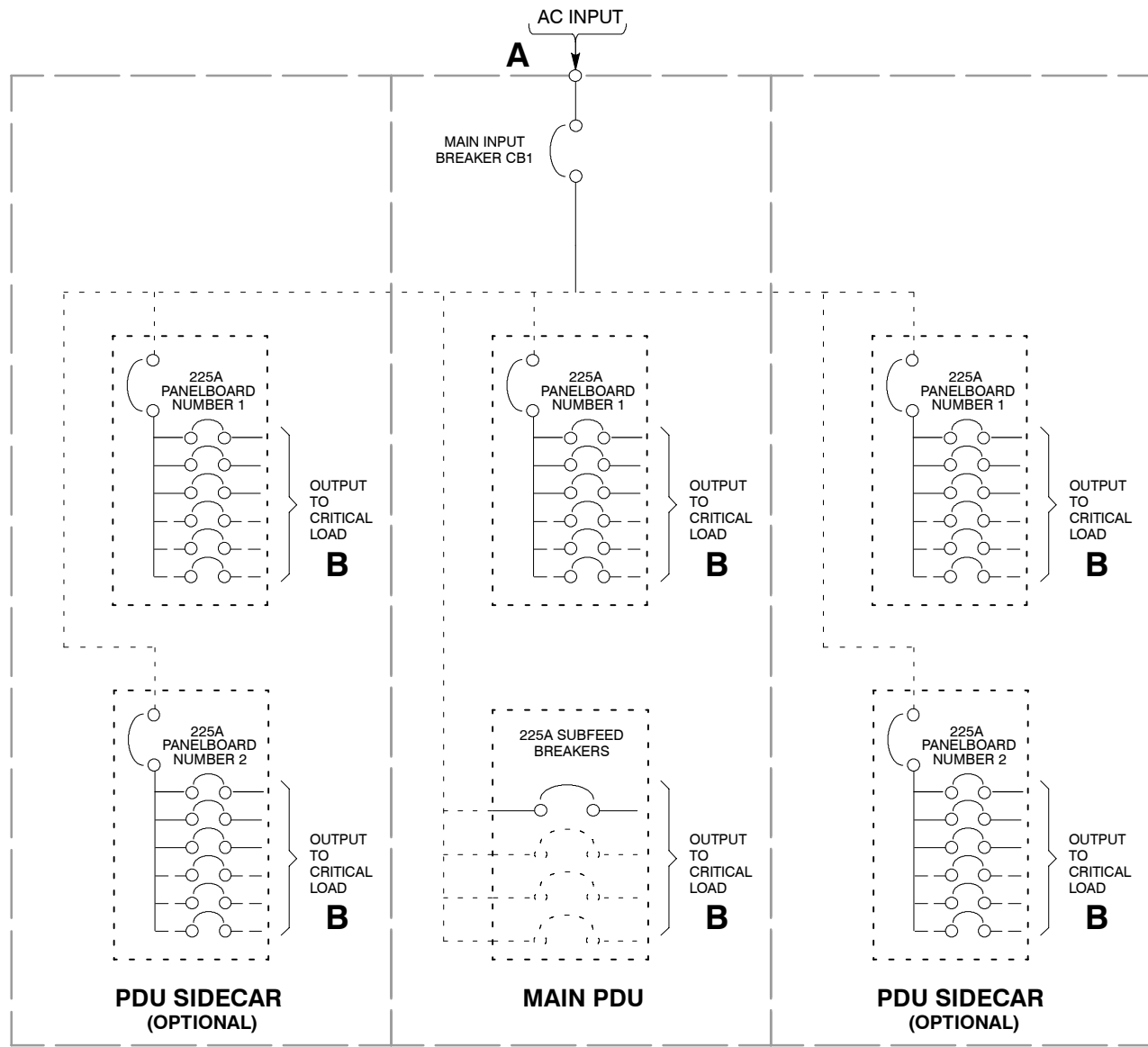


- - - - - OPTIONS

MAIN PDU AVAILABLE WITH OPTIONS FOR ONE OR TWO 42-POLE 225A DISTRIBUTION PANELS.
 SIDECARS AVAILABLE WITH OPTIONS FOR ONE OR TWO 42-POLE 225A DISTRIBUTION PANELS.

DISTRIBUTION PANEL OUTPUT 208V INPUT AND 208V OUTPUT

DESCRIPTION: PDU ONELINE DRAWINGS		
DRAWING NO:	164201629-3	SHEET: 1 of 6
REVISION:	A	DATE: 041506

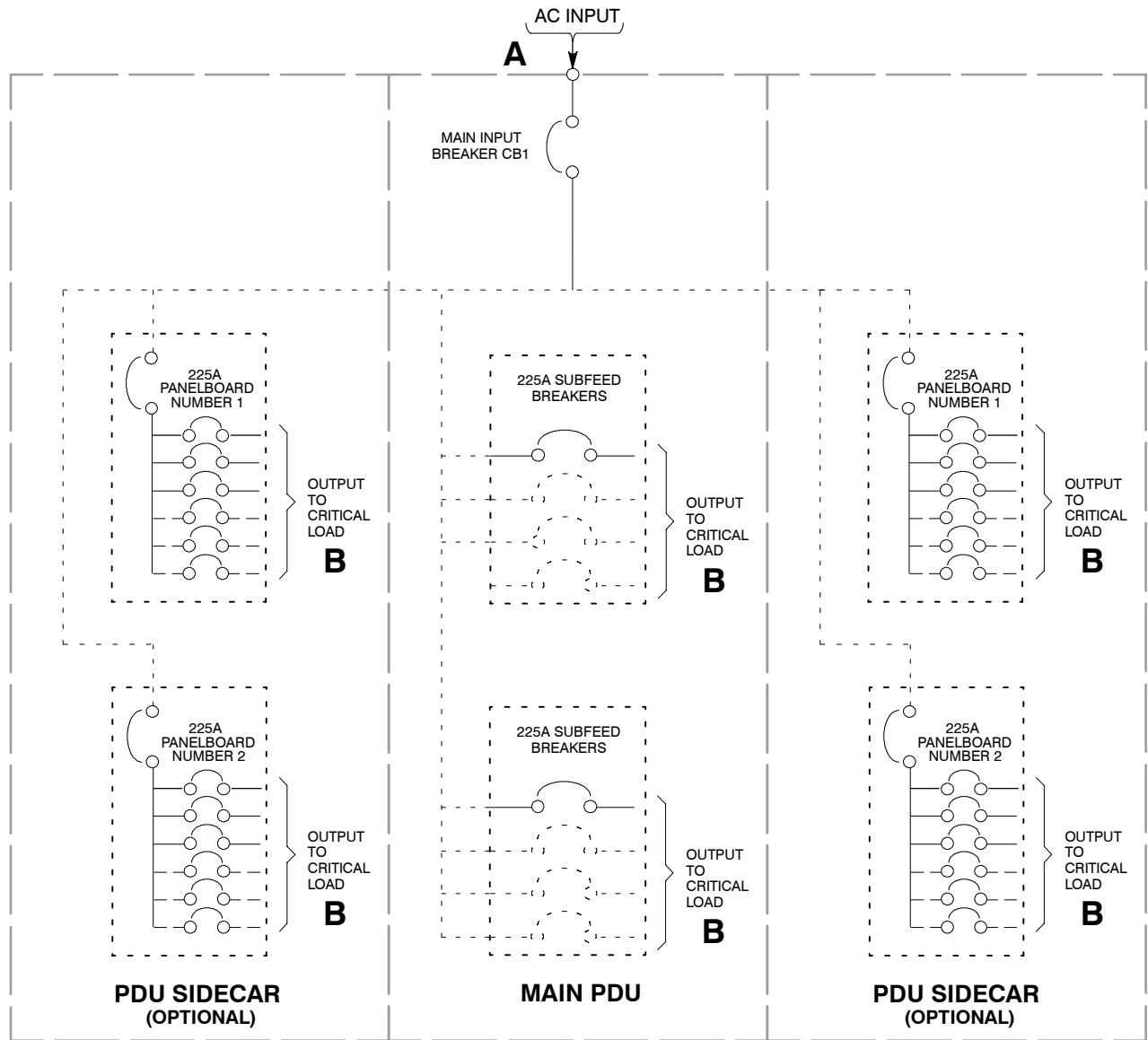


----- OPTIONS

MAIN PDU AVAILABLE WITH OPTIONS FOR ONE 42-POLE 225A DISTRIBUTION PANELS AND UP TO FOUR 225A SUBFEED BREAKERS. SIDECARS AVAILABLE WITH OPTIONS FOR ONE OR TWO 42-POLE 225A DISTRIBUTION PANELS.

**DISTRIBUTION PANEL AND SUBFEED BREAKER OUTPUT
208V INPUT AND 208V OUTPUT**

DESCRIPTION: PDU ONELINE DRAWINGS		
DRAWING NO:	164201629-3	SHEET: 2 of 6
REVISION:	A	DATE: 041506

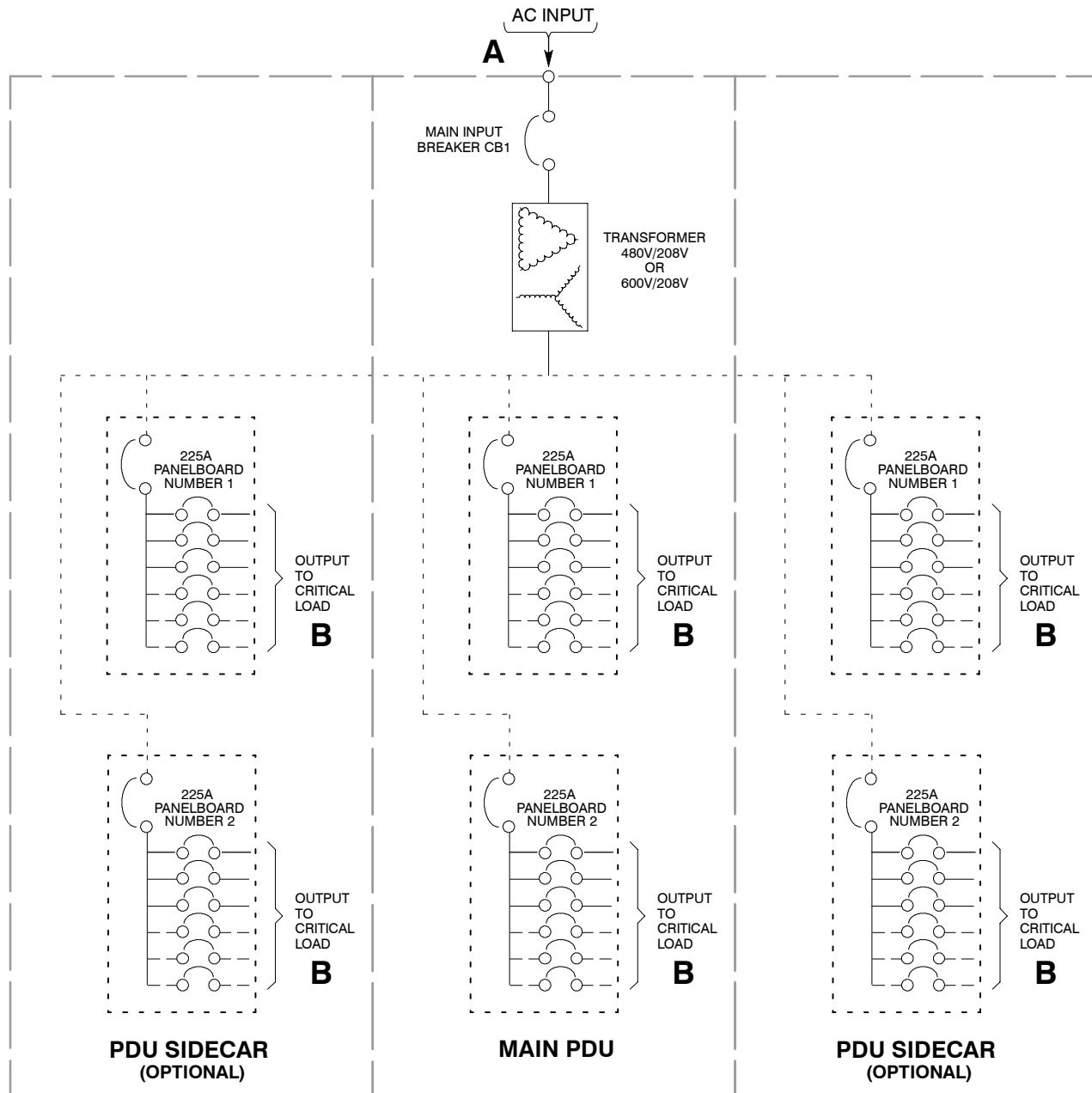


----- OPTIONS

MAIN PDU AVAILABLE WITH OPTIONS FOR UP TO EIGHT 225A SUBFEED BREAKERS. SIDECARS AVAILABLE WITH OPTIONS FOR ONE OR TWO 42-POLE 225A DISTRIBUTION PANELS.

SUBFEED BREAKER OUTPUT 208V INPUT AND 208V OUTPUT

DESCRIPTION: PDU ONELINE DRAWINGS		
DRAWING NO:	164201629-3	SHEET: 3 of 6
REVISION:	A	DATE: 041506

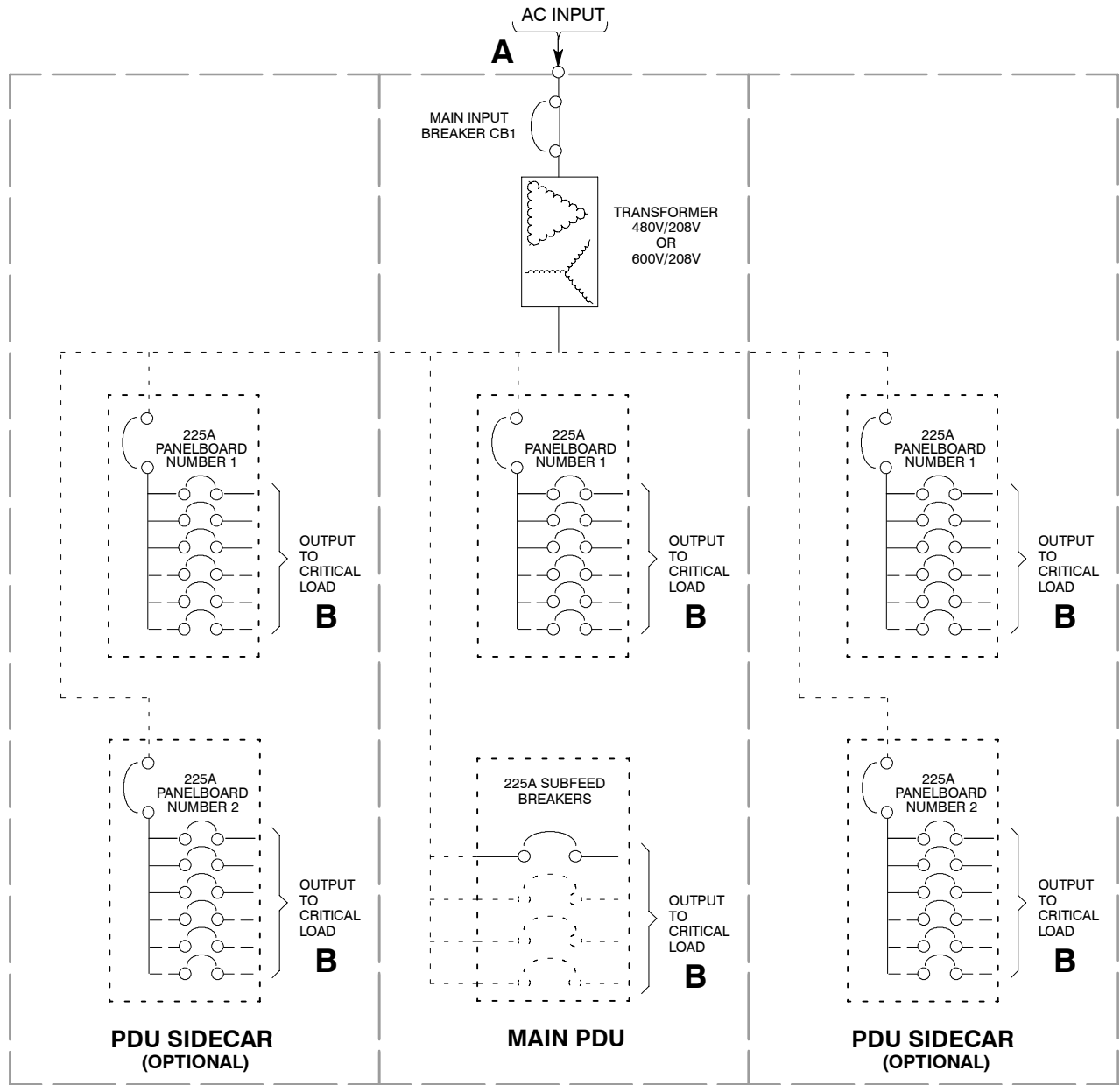


----- OPTIONS

MAIN PDU AVAILABLE WITH OPTIONS FOR ONE OR TWO 42-POLE 225A DISTRIBUTION PANELS.
 SIDECARS AVAILABLE WITH OPTIONS FOR ONE OR TWO 42-POLE 225A DISTRIBUTION PANELS.

**DISTRIBUTION PANEL OUTPUT
 480V INPUT AND 208/120V OUTPUT
 600V INPUT AND 208/120V OUTPUT**

DESCRIPTION: PDU ONELINE DRAWINGS		
DRAWING NO:	164201629-3	SHEET: 4 of 6
REVISION:	A	DATE: 041506

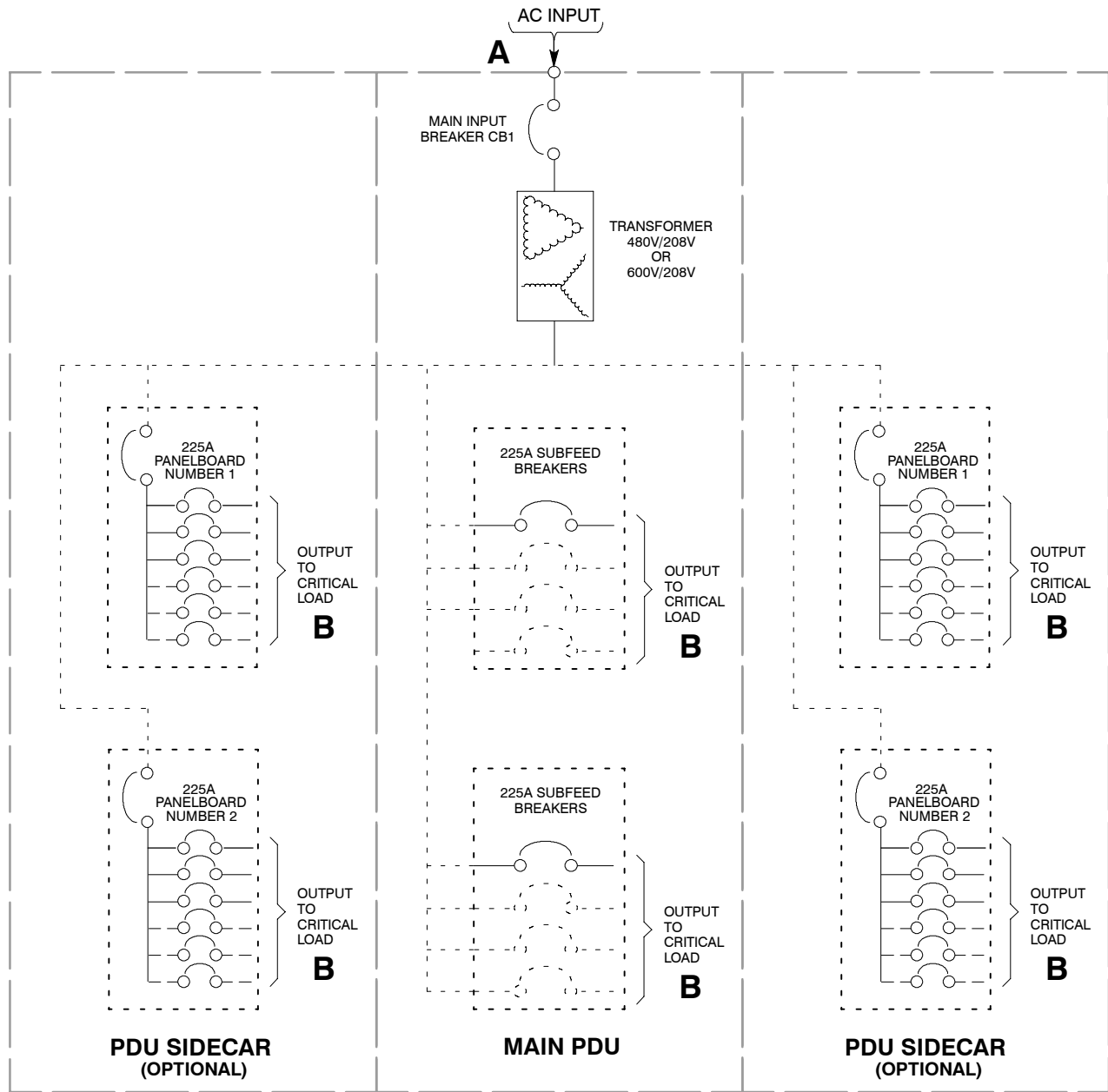


----- OPTIONS

MAIN PDU AVAILABLE WITH OPTIONS FOR ONE 42-POLE 225A DISTRIBUTION PANELS AND UP TO FOUR 225A SUBFEED BREAKERS. SIDECARS AVAILABLE WITH OPTIONS FOR ONE OR TWO 42-POLE 225A DISTRIBUTION PANELS.

**DISTRIBUTION PANEL AND SUBFEED BREAKER OUTPUT
480V INPUT AND 208/120V OUTPUT
600V INPUT AND 208/120V OUTPUT**

DESCRIPTION: PDU ONELINE DRAWINGS		
DRAWING NO:	164201629-3	SHEET: 5 of 6
REVISION:	A	DATE: 041506

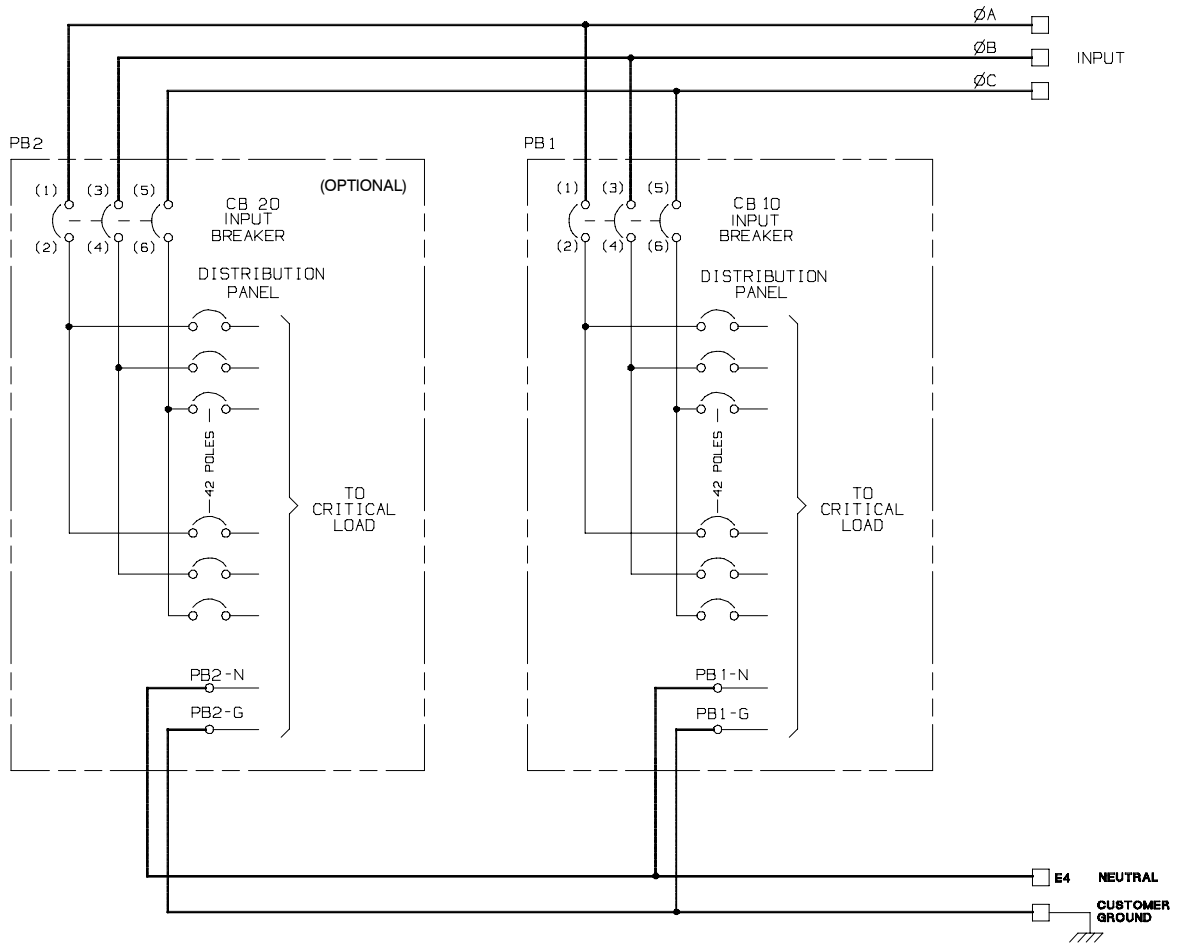


----- OPTIONS

MAIN PDU AVAILABLE WITH OPTIONS FOR UP TO EIGHT 225A SUBFEED BREAKERS. SIDECARS AVAILABLE WITH OPTIONS FOR ONE OR TWO 42-POLE 225A DISTRIBUTION PANELS.

**SUBFEED BREAKER OUTPUT
480V INPUT AND 208/120V OUTPUT
600V INPUT AND 208/120V OUTPUT**

DESCRIPTION: PDU ONELINE DRAWINGS	
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Note: Branch circuit breakers for PB1 and PB2 provided by customer.

DESCRIPTION: PDU DISTRIBUTION PANEL SCHEMATIC	
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Table F. INPUT/OUTPUT Ratings & External Wiring Requirements for the Powerware PDU (208V)								
		Units	Rating 60 Hz					
Basic Unit Rating		kVA	30	50	75	100	125	150
Input		Volts	208	208	208	208	208	208
Output		Volts	208	208	208	208	208	208
AC Input (3) Phases, (1) Neutral –if required, (1) Ground Minimum Conductor Size Number per Phase	A	Maximum AMPS	84	139	209	278	347	417
		AWG or kcmil (each)	Wiring should be sized in accordance with the PDU current rating, power cable termination sizes listed in Table I through Table K, and national and local electrical codes.					
AC Output from Subfeed Breaker to Critical Load (3) Phases, (1) Neutral, (1) Ground	B	Wire branch circuits in accordance with branch circuit breaker manufacturer's ratings, power cable termination sizes listed in Table L, and national and local electrical codes. Maximum output ratings are to be in accordance with the rating label on the PDU and not to exceed 600A. The total combined load is not to exceed the source rating.						
AC Output from Distribution Panel Breakers to Critical Load	B	Wire branch circuits in accordance with branch circuit breaker manufacturer's ratings and instructions, and national and local electrical codes (output is prewired to the panelboard). Maximum output ratings are to be in accordance with the rating label on the PDU and not to exceed 600A. The total combined load is not to exceed the source rating.						

NOTE: Callout letters **A** and **B** map to Drawing 164201629–3.

Read and understand the following notes while planning and performing the installation:

1. Refer to national and local electrical codes for acceptable external wiring practices.
2. Material and labor for external wiring requirements are to be provided by designated personnel.
3. For external input wiring, use 90°C copper wire. See the appropriate column in Table F through Table H. Wire sizes are based on using the supplied breakers.
4. Wire ampacities are chosen from Table 310–16 of the NEC. Input wire is 90°C specification.
5. Flex cable is not recommended for wiring the PDU input because of the tight wiring space above the input breaker.
6. For top conduit landing, locate input conduit over input breaker for ease of installation.
7. Output neutrals are rated for 200%.
8. The PDU cabinet is shipped with a debris shield covering the ventilation grill on top of the unit. Do not remove the debris shield until installation is complete. However, remove the shield before operating the PDU. Once the debris shield is removed, do not place objects on the ventilation grill.
9. Optional 225A Distribution Panels use Cutler-Hammer bolt-on type BAB or QBHW breakers for bolt-on panels, or plug-on type HQP or QPHW breakers for plug-on panels. Breakers to be provided by the customer.
10. 208V input PDU is only available up to 150 kVA. 480V and 600V input PDUs are available up to 300 kVA.

DESCRIPTION: POWER WIRING INSTALLATION NOTES	
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11. Refer to Section I of this manual for installation instructions.

12. If installing with an UPS, refer to the applicable UPS Installation and Operation manual for UPS cabinet wiring requirements, and conduit and terminal locations.

Table G. INPUT/OUTPUT Ratings & External Wiring Requirements for the Powerware PDU (480V)

		Units	Rating 60 Hz								
Basic Unit Rating		<i>kVA</i>	30	50	75	100	125	150	200	225	300
Input		<i>Volts</i>	480	480	480	480	480	480	480	480	480
Output		<i>Volts</i>	208	208	208	208	208	208	208	208	208
AC Input (3) Phases, (1) Neutral—if required, (1) Ground Minimum Conductor Size Number per Phase	A	Maximum AMPS	36	60	90	120	150	180	241	271	361
		AWG or kcmil (each)	Wiring should be sized in accordance with the PDU current rating, power cable termination sizes listed in Table I through Table K, and national and local electrical codes.								
AC Output from Subfeed Breaker to Critical Load (3) Phases, (1) Neutral, (1) Ground	B	Wire branch circuits in accordance with branch circuit breaker manufacturer's ratings, power cable termination sizes listed in Table L, and national and local electrical codes. Maximum output ratings are to be in accordance with the rating label on the PDU and not to exceed 600A. The total combined load is not to exceed the source rating.									
AC Output from Distribution Panel Breakers to Critical Load	B	Wire branch circuits in accordance with branch circuit breaker manufacturer's ratings and instructions, and national and local electrical codes (output is prewired to the panelboard). Maximum output ratings are to be in accordance with the rating label on the PDU and not to exceed 600A. The total combined load is not to exceed the source rating.									

NOTE: Callout letters **A** and **B** map to Drawing 164201629–3.

Table H. INPUT/OUTPUT Ratings & External Wiring Requirements for the Powerware PDU (600V)

		Units	Rating 60 Hz								
Basic Unit Rating		<i>kVA</i>	30	50	75	100	125	150	200	225	300
Input		<i>Volts</i>	600	600	600	600	600	600	600	600	600
Output		<i>Volts</i>	208	208	208	208	208	208	208	208	208
AC Input (3) Phases, (1) Neutral—if required, (1) Ground Minimum Conductor Size Number per Phase	A	Maximum AMPS	29	48	72	96	120	144	192	241	289
		AWG or kcmil (each)	Wiring should be sized in accordance with the PDU current rating, power cable termination sizes listed in Table I through Table K, and national and local electrical codes.								
AC Output from Subfeed Breaker to Critical Load (3) Phases, (1) Neutral, (1) Ground	B	Wire branch circuits in accordance with branch circuit breaker manufacturer's ratings, power cable termination sizes listed in Table L, and national and local electrical codes. Maximum output ratings are to be in accordance with the rating label on the PDU and not to exceed 600A. The total combined load is not to exceed the source rating.									
AC Output from Distribution Panel Breakers to Critical Load	B	Wire branch circuits in accordance with branch circuit breaker manufacturer's ratings and instructions, and national and local electrical codes (output is prewired to the panelboard). Maximum output ratings are to be in accordance with the rating label on the PDU and not to exceed 600A. The total combined load is not to exceed the source rating.									

NOTE: Callout letters **A** and **B** map to Drawing 164201629–3.

DESCRIPTION: POWER WIRING INSTALLATION NOTES	
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13. Per NEC article 300-20(a), all three-phase conductors must be run in the same conduit. Neutral and ground must be run in the same conduit as the phase conductors.
14. Conduit is to be sized to accommodate one neutral conductor the same size as the phase conductor and one ground conductor. If two neutral conductors or an oversized neutral conductor are to be installed, size the conduit to accommodate the extra wire or size. All PDU products can accommodate a double-sized neutral.
15. Terminals are UL and CSA rated at 90°C. See Table I through Table L for power cable terminations. Drawing 164201629–7 shows the location of the power cable terminals inside the PDU cabinet.
16. DO NOT overtighten the terminal lugs to prevent stripping the threads. Tighten lugs to the torque values in Table I through Table L.

Terminal Function	Rating (kVA)	Terminal	Function	Size of Pressure Termination	Tightening Torque Nm (lb in)	Type Screw
AC Input to Main Breaker CB1	30	L1	Phase A	1 – #2	8 (75)	Slotted
		L2	Phase B	1 – #2	8 (75)	Slotted
		L3	Phase C	1 – #2	8 (75)	Slotted
		N	Neutral	2 – 1/0	31 (275)	5/16" Hex
	50	L1	Phase A	1 – 2/0	8 (75)	Slotted
		L2	Phase B	1 – 2/0	8 (75)	Slotted
		L3	Phase C	1 – 2/0	8 (75)	Slotted
		N	Neutral	2 – 1/0	31 (275)	5/16" Hex
	75	L1	Phase A	2 – 1/0	31 (275)	5/16" Hex
		L2	Phase B	2 – 1/0	31 (275)	5/16" Hex
		L3	Phase C	2 – 1/0	31 (275)	5/16" Hex
		N	Neutral	2 – 3/0	31 (275)	5/16" Hex
	100	L1	Phase A	2 – 2/0	31 (275)	5/16" Hex
		L2	Phase B	2 – 2/0	31 (275)	5/16" Hex
		L3	Phase C	2 – 2/0	31 (275)	5/16" Hex
		N	Neutral	3 – 2/0	31 (275)	5/16" Hex
	125	L1	Phase A	2 – 3/0	31 (275)	5/16" Hex
		L2	Phase B	2 – 3/0	31 (275)	5/16" Hex
		L3	Phase C	2 – 3/0	31 (275)	5/16" Hex
		N	Neutral	3 – 3/0	31 (275)	5/16" Hex
	150	L1	Phase A	2 – 300 kcmil	31 (275)	5/16" Hex
		L2	Phase B	2 – 300 kcmil	31 (275)	5/16" Hex
		L3	Phase C	2 – 300 kcmil	31 (275)	5/16" Hex
		N	Neutral	4 – 3/0	31 (275)	5/16" Hex
All		G	Ground	1 – 1/0	31 (275)	5/16" Hex

DESCRIPTION: POWER WIRING INSTALLATION NOTES	
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Table J. PDU INPUT Power Cable Terminations (480V)

Terminal Function	Rating (kVA)	Terminal	Function	Size of Pressure Termination	Tightening Torque Nm (lb in)	Type Screw	
AC Input to Main Breaker CB1	30	L1	Phase A	1 – #6	8 (75)	Slotted	
		L2	Phase B	1 – #6	8 (75)	Slotted	
		L3	Phase C	1 – #6	8 (75)	Slotted	
		N	Neutral	Not Required			
	50	L1	Phase A	1 – #4	8 (75)	8 (75)	Slotted
		L2	Phase B	1 – #4	8 (75)	8 (75)	Slotted
		L3	Phase C	1 – #4	8 (75)	8 (75)	Slotted
		N	Neutral	Not Required			
	75	L1	Phase A	1 – #1	13.5 (120)	13.5 (120)	3/16" Hex
		L2	Phase B	1 – #1	13.5 (120)	13.5 (120)	3/16" Hex
		L3	Phase C	1 – #1	13.5 (120)	13.5 (120)	3/16" Hex
		N	Neutral	Not Required			
	100	L1	Phase A	1 – 1/0	13.5 (120)	13.5 (120)	3/16" Hex
		L2	Phase B	1 – 1/0	13.5 (120)	13.5 (120)	3/16" Hex
		L3	Phase C	1 – 1/0	13.5 (120)	13.5 (120)	3/16" Hex
		N	Neutral	Not Required			
	125	L1	Phase A	1 – 3/0	13.5 (120)	13.5 (120)	3/16" Hex
		L2	Phase B	1 – 3/0	13.5 (120)	13.5 (120)	3/16" Hex
		L3	Phase C	1 – 3/0	13.5 (120)	13.5 (120)	3/16" Hex
		N	Neutral	Not Required			
	150	L1	Phase A	1 – 3/0	13.5 (120)	13.5 (120)	3/16" Hex
		L2	Phase B	1 – 3/0	13.5 (120)	13.5 (120)	3/16" Hex
		L3	Phase C	1 – 3/0	13.5 (120)	13.5 (120)	3/16" Hex
		N	Neutral	Not Required			
	200	L1	Phase A	2 – 1/0	31 (275)	31 (275)	5/16" Hex
		L2	Phase B	2 – 1/0	31 (275)	31 (275)	5/16" Hex
		L3	Phase C	2 – 1/0	31 (275)	31 (275)	5/16" Hex
		N	Neutral	Not Required			
	225	L1	Phase A	2 – 2/0	31 (275)	31 (275)	5/16" Hex
		L2	Phase B	2 – 2/0	31 (275)	31 (275)	5/16" Hex
L3		Phase C	2 – 2/0	31 (275)	31 (275)	5/16" Hex	
N		Neutral	Not Required				
300	L1	Phase A	2 – 3/0	31 (275)	31 (275)	5/16" Hex	
	L2	Phase B	2 – 3/0	31 (275)	31 (275)	5/16" Hex	
	L3	Phase C	2 – 3/0	31 (275)	31 (275)	5/16" Hex	
	N	Neutral	Not Required				
All	G	Ground	1 – 1/0	31 (275)	31 (275)	5/16" Hex	

DESCRIPTION: **POWER WIRING INSTALLATION NOTES**

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Table K. PDU INPUT Power Cable Terminations (600V)

Terminal Function	Rating (kVA)	Terminal	Function	Size of Pressure Termination	Tightening Torque Nm (lb in)	Type Screw	
AC Input to Main Breaker CB1	30	L1	Phase A	1 – #8	8 (75)	Slotted	
		L2	Phase B	1 – #8	8 (75)	Slotted	
		L3	Phase C	1 – #8	8 (75)	Slotted	
		N	Neutral	Not Required			
	50	L1	Phase A	1 – #6	8 (75)	8 (75)	Slotted
		L2	Phase B	1 – #6	8 (75)	8 (75)	Slotted
		L3	Phase C	1 – #6	8 (75)	8 (75)	Slotted
		N	Neutral	Not Required			
	75	L1	Phase A	1 – #3	8 (75)	8 (75)	Slotted
		L2	Phase B	1 – #3	8 (75)	8 (75)	Slotted
		L3	Phase C	1 – #3	8 (75)	8 (75)	Slotted
		N	Neutral	Not Required			
	100	L1	Phase A	1 – #1	13.5 (120)	13.5 (120)	3/16" Hex
		L2	Phase B	1 – #1	13.5 (120)	13.5 (120)	3/16" Hex
		L3	Phase C	1 – #1	13.5 (120)	13.5 (120)	3/16" Hex
		N	Neutral	Not Required			
	125	L1	Phase A	1 – 1/0	13.5 (120)	13.5 (120)	3/16" Hex
		L2	Phase B	1 – 1/0	13.5 (120)	13.5 (120)	3/16" Hex
		L3	Phase C	1 – 1/0	13.5 (120)	13.5 (120)	3/16" Hex
		N	Neutral	Not Required			
	150	L1	Phase A	1 – 3/0	13.5 (120)	13.5 (120)	3/16" Hex
		L2	Phase B	1 – 3/0	13.5 (120)	13.5 (120)	3/16" Hex
		L3	Phase C	1 – 3/0	13.5 (120)	13.5 (120)	3/16" Hex
		N	Neutral	Not Required			
	200	L1	Phase A	2 – 1/0	31 (275)	31 (275)	5/16" Hex
		L2	Phase B	2 – 1/0	31 (275)	31 (275)	5/16" Hex
		L3	Phase C	2 – 1/0	31 (275)	31 (275)	5/16" Hex
		N	Neutral	Not Required			
225	L1	Phase A	2 – 1/0	31 (275)	31 (275)	5/16" Hex	
	L2	Phase B	2 – 1/0	31 (275)	31 (275)	5/16" Hex	
	L3	Phase C	2 – 1/0	31 (275)	31 (275)	5/16" Hex	
	N	Neutral	Not Required				
300	L1	Phase A	2 – 3/0	31 (275)	31 (275)	5/16" Hex	
	L2	Phase B	2 – 3/0	31 (275)	31 (275)	5/16" Hex	
	L3	Phase C	2 – 3/0	31 (275)	31 (275)	5/16" Hex	
	N	Neutral	Not Required				
All	G	Ground	1 – 1/0	31 (275)	5/16" Hex		

DESCRIPTION: POWER WIRING INSTALLATION NOTES	
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Table L. PDU OUTPUT Power Cable Terminations

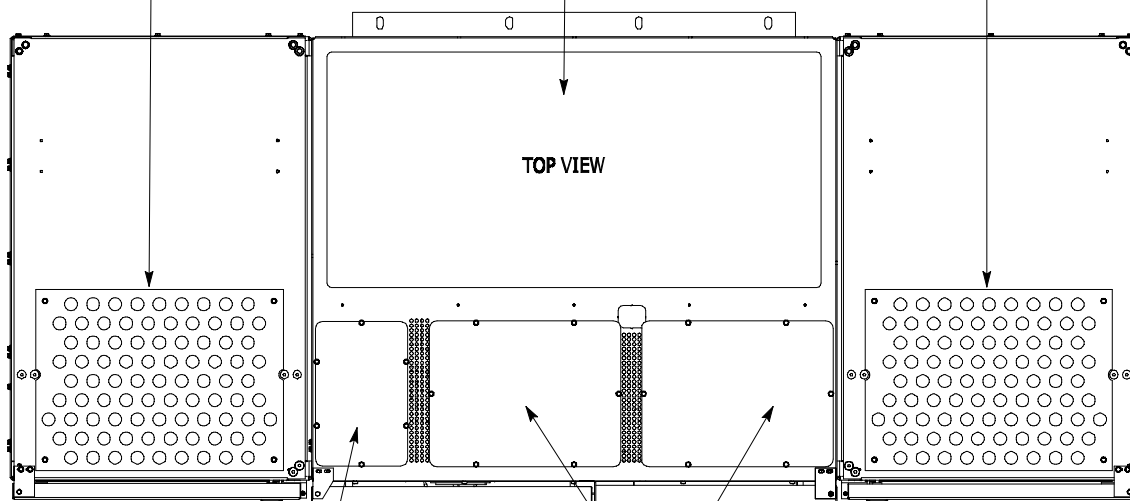
Terminal Function	Rating (A)	Terminal	Function	Size of Pressure Termination	Tightening Torque Nm (lb in)	Type Screw
AC Output from Subfeed Breaker to Critical Load	50	2	Phase A	1 – #14–1/0	8 (75)	Slotted
	60	4	Phase B	1 – #14–1/0	8 (75)	Slotted
	80	6	Phase C	1 – #14–1/0	8 (75)	Slotted
	100	N	Neutral	1 – #6–300 kcmil	31 (275)	5/16" Hex
	125	2	Phase A	1 – #14–4/0	13.5 (120)	3/16" Hex
	150	4	Phase B	1 – #14–4/0	13.5 (120)	3/16" Hex
	175	6	Phase C	1 – #14–4/0	13.5 (120)	3/16" Hex
	200	N	Neutral	1 – #6–300 kcmil	31 (275)	5/16" Hex
	225	N	Neutral	1 – #6–300 kcmil	31 (275)	5/16" Hex
	All	G	Ground	8 – 1/0	31 (275)	5/16" Hex
AC Output from Distribution Panel Breakers to Critical Load	Wire branch circuits in accordance with branch circuit breaker manufacturers ratings and instructions and national and local electrical codes (output is prewired to the panelboard).					
	N	Neutral	84 – #4–#14 or 3 x #10–#14	#4–#6: 4.0 (35) #8: 2.8 (25) #10–#14: 2.3 (20)		Slotted
	G	Ground	84 – #4–#14 or 2 x #12–#14	#4–#6: 4.0 (35) #8: 2.8 (25) #10–#14: 2.3 (20)		Slotted

DESCRIPTION: POWER WIRING INSTALLATION NOTES	
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TOP ENTRY CONDUIT LANDING PLATES FOR AC OUTPUT FROM SIDECAR. (REMOVE PANEL TO DRILL OR PUNCH CONDUIT HOLES, OR REMOVE KNOCKOUTS.)

REMOVE DEBRIS SHIELD COVERING EXHAUST GRILL BEFORE OPERATING SYSTEM.

TOP ENTRY CONDUIT LANDING PLATES FOR AC OUTPUT FROM SIDECAR. (REMOVE PANEL TO DRILL OR PUNCH CONDUIT HOLES, OR REMOVE KNOCKOUTS.)



FRONT OF PDU

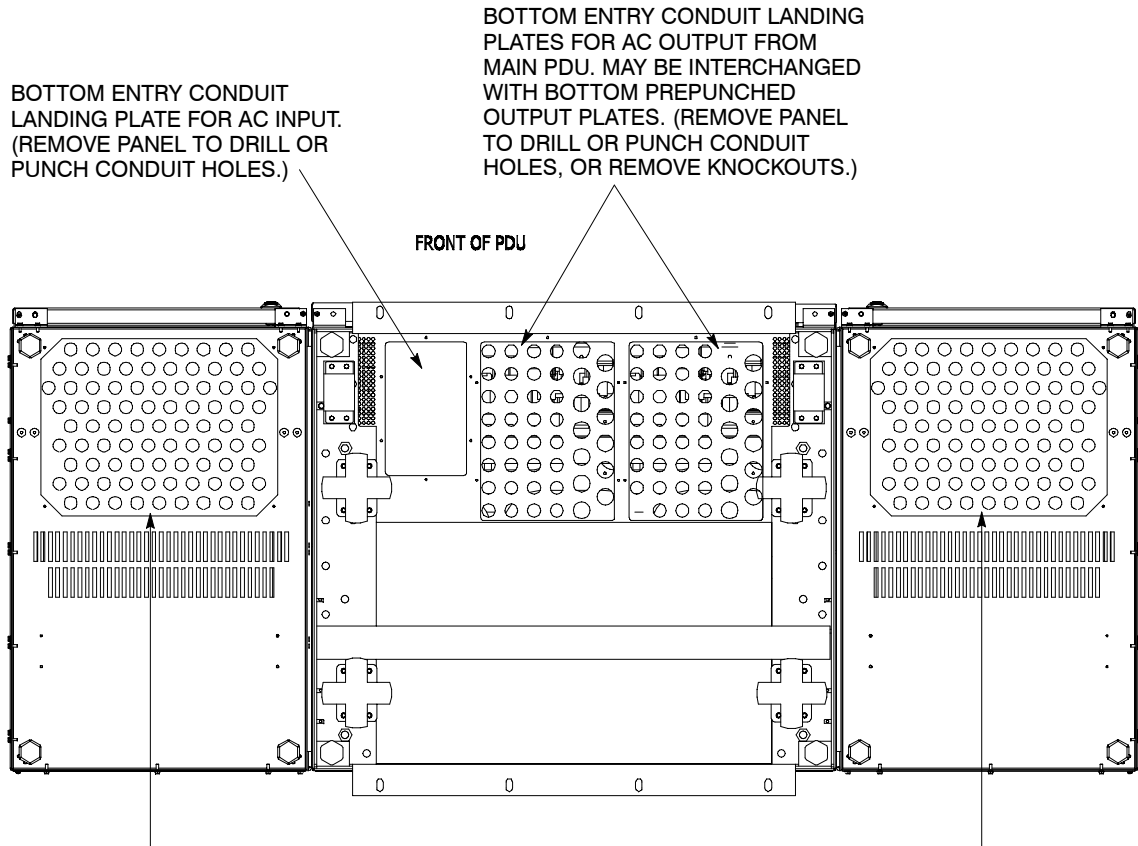
TOP ENTRY CONDUIT LANDING PLATE FOR AC INPUT. (REMOVE PANEL TO DRILL OR PUNCH CONDUIT HOLES.)

TOP ENTRY CONDUIT LANDING PLATES FOR AC OUTPUT FROM MAIN PDU. MAY BE INTERCHANGED WITH BOTTOM PREPUNCHED OUTPUT PLATES. (REMOVE PANEL TO DRILL OR PUNCH CONDUIT HOLES, OR REMOVE KNOCKOUTS.)

TOP VIEW WITH FRONT FACING SIDECARS

NOTE: For top conduit landing, locate input conduit over input breaker for ease of installation.

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BOTTOM ENTRY CONDUIT LANDING PLATES FOR AC OUTPUT FROM SIDECAR. (REMOVE PANEL TO DRILL OR PUNCH CONDUIT HOLES, OR REMOVE KNOCKOUTS.)

BOTTOM ENTRY CONDUIT LANDING PLATES FOR AC OUTPUT FROM SIDECAR. (REMOVE PANEL TO DRILL OR PUNCH CONDUIT HOLES, OR REMOVE KNOCKOUTS.)

BOTTOM VIEW WITH FRONT FACING SIDECARS

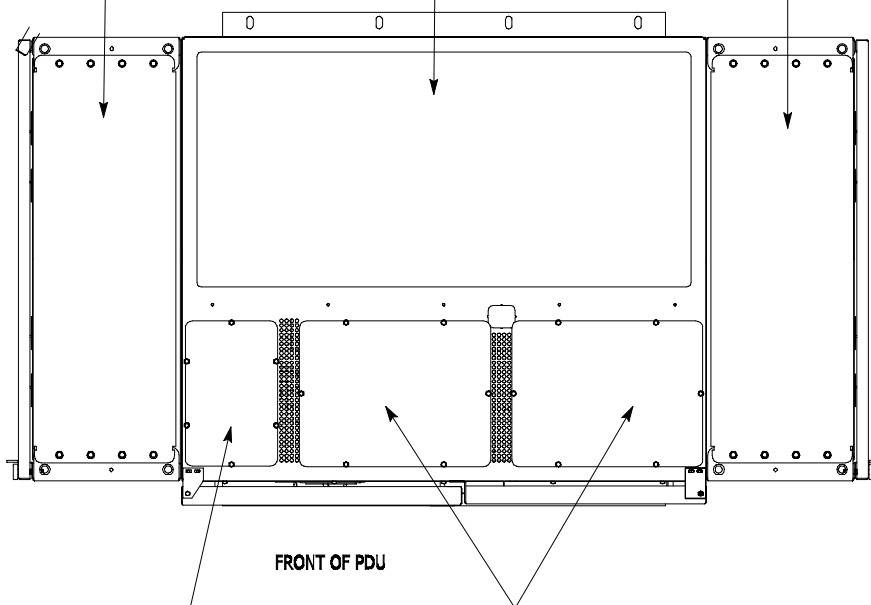
NOTE: For top conduit landing, locate input conduit over input breaker for ease of installation.

DESCRIPTION: CONDUIT AND WIRE ENTRY LOCATIONS		
DRAWING NO:	164201629-6	SHEET: 2 of 5
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TOP ENTRY CONDUIT LANDING PLATES FOR AC OUTPUT FROM SIDECAR. MAY BE INTERCHANGED WITH BOTTOM PREPUNCHED OUTPUT PLATES. (REMOVE PANEL TO DRILL OR PUNCH CONDUIT HOLES, OR REMOVE KNOCKOUTS.)

REMOVE DEBRIS SHIELD COVERING EXHAUST GRILL BEFORE OPERATING SYSTEM.

TOP ENTRY CONDUIT LANDING PLATES FOR AC OUTPUT FROM SIDECAR. MAY BE INTERCHANGED WITH BOTTOM PREPUNCHED OUTPUT PLATES. (REMOVE PANEL TO DRILL OR PUNCH CONDUIT HOLES, OR REMOVE KNOCKOUTS.)



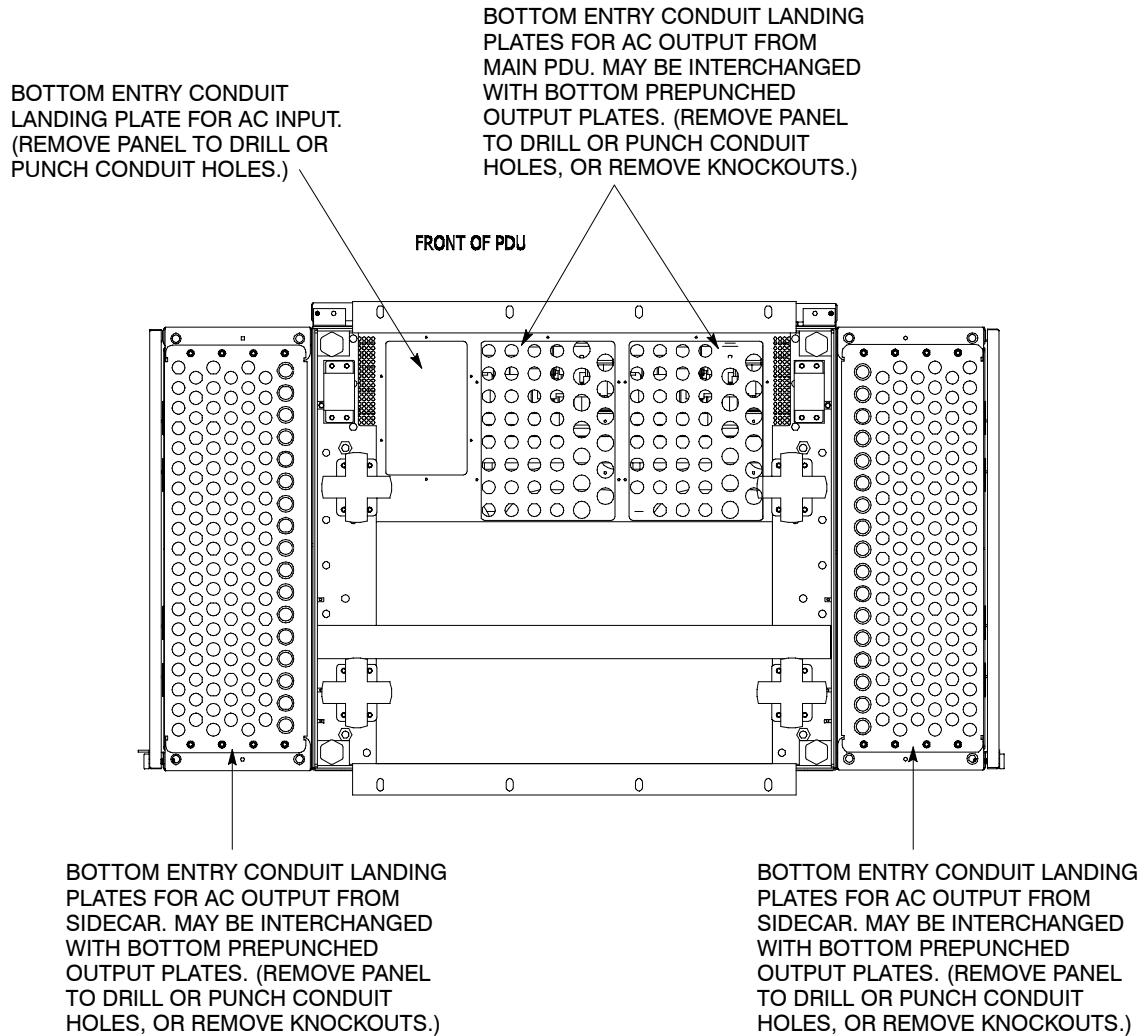
TOP ENTRY CONDUIT LANDING PLATE FOR AC INPUT. (REMOVE PANEL TO DRILL OR PUNCH CONDUIT HOLES.)

TOP ENTRY CONDUIT LANDING PLATES FOR AC OUTPUT FROM MAIN PDU. MAY BE INTERCHANGED WITH BOTTOM PREPUNCHED OUTPUT PLATES. (REMOVE PANEL TO DRILL OR PUNCH CONDUIT HOLES, OR REMOVE KNOCKOUTS.)

TOP VIEW WITH SIDE FACING SIDECARS

NOTE: For top conduit landing, locate input conduit over input breaker for ease of installation.

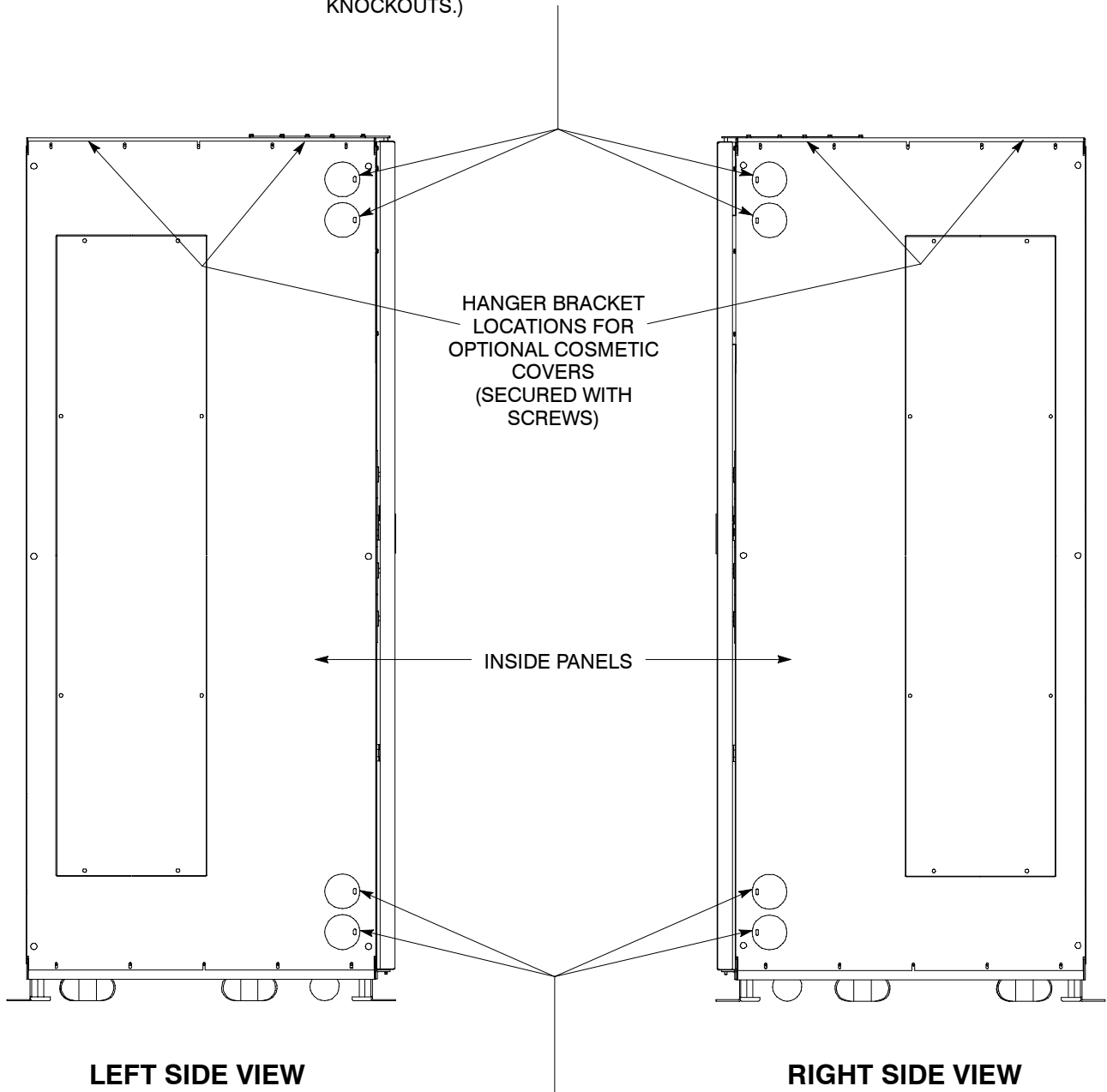
DESCRIPTION: CONDUIT AND WIRE ENTRY LOCATIONS		
DRAWING NO:	164201629-6	SHEET: 3 of 5
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BOTTOM VIEW WITH SIDE FACING SIDECARS

DESCRIPTION: CONDUIT AND WIRE ENTRY LOCATIONS		
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INTER-CABINET WIRING ACCESS KNOCKOUTS.
REMOVE KNOCKOUTS, AS REQUIRED, TO
ROUTE WIRES BETWEEN CABINETS. (INSTALL
NYLON GROMMET AFTER REMOVAL OF
KNOCKOUTS.)



HANGER BRACKET
LOCATIONS FOR
OPTIONAL COSMETIC
COVERS
(SECURED WITH
SCREWS)

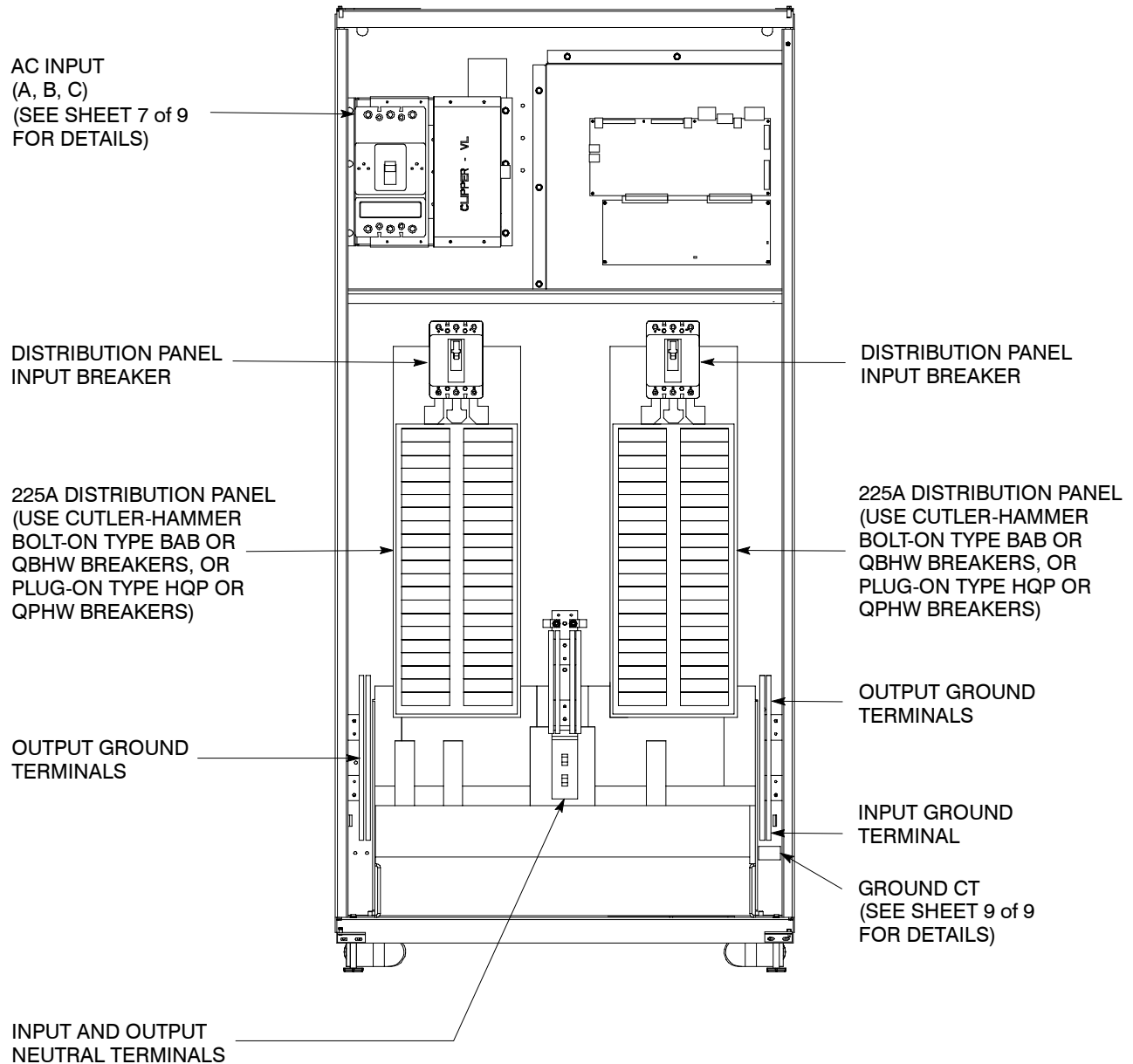
← INSIDE PANELS →

LEFT SIDE VIEW

RIGHT SIDE VIEW

INTER-CABINET WIRING ACCESS KNOCKOUTS.
REMOVE KNOCKOUTS, AS REQUIRED, TO
ROUTE WIRES BETWEEN CABINETS. (INSTALL
NYLON GROMMET AFTER REMOVAL OF
KNOCKOUTS.)

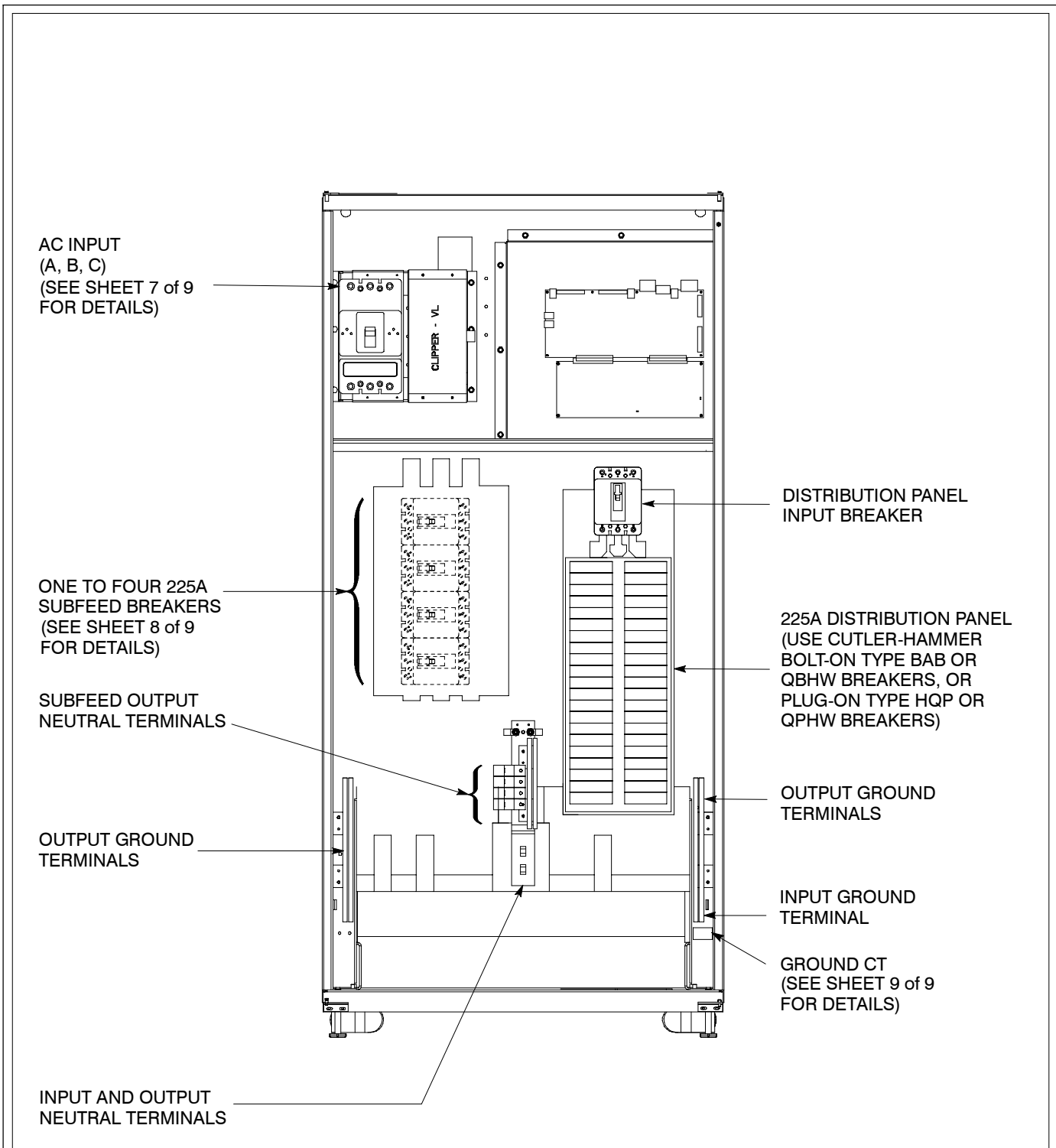
DESCRIPTION: CONDUIT AND WIRE ENTRY LOCATIONS	
DRAWING NO: 164201629-6	SHEET: 5 of 5
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MAIN PDU WITH ONE OR TWO OUTPUT DISTRIBUTION PANELS

NOTE: Metal shields covering wiring terminals must be removed or opened to gain access to terminals.

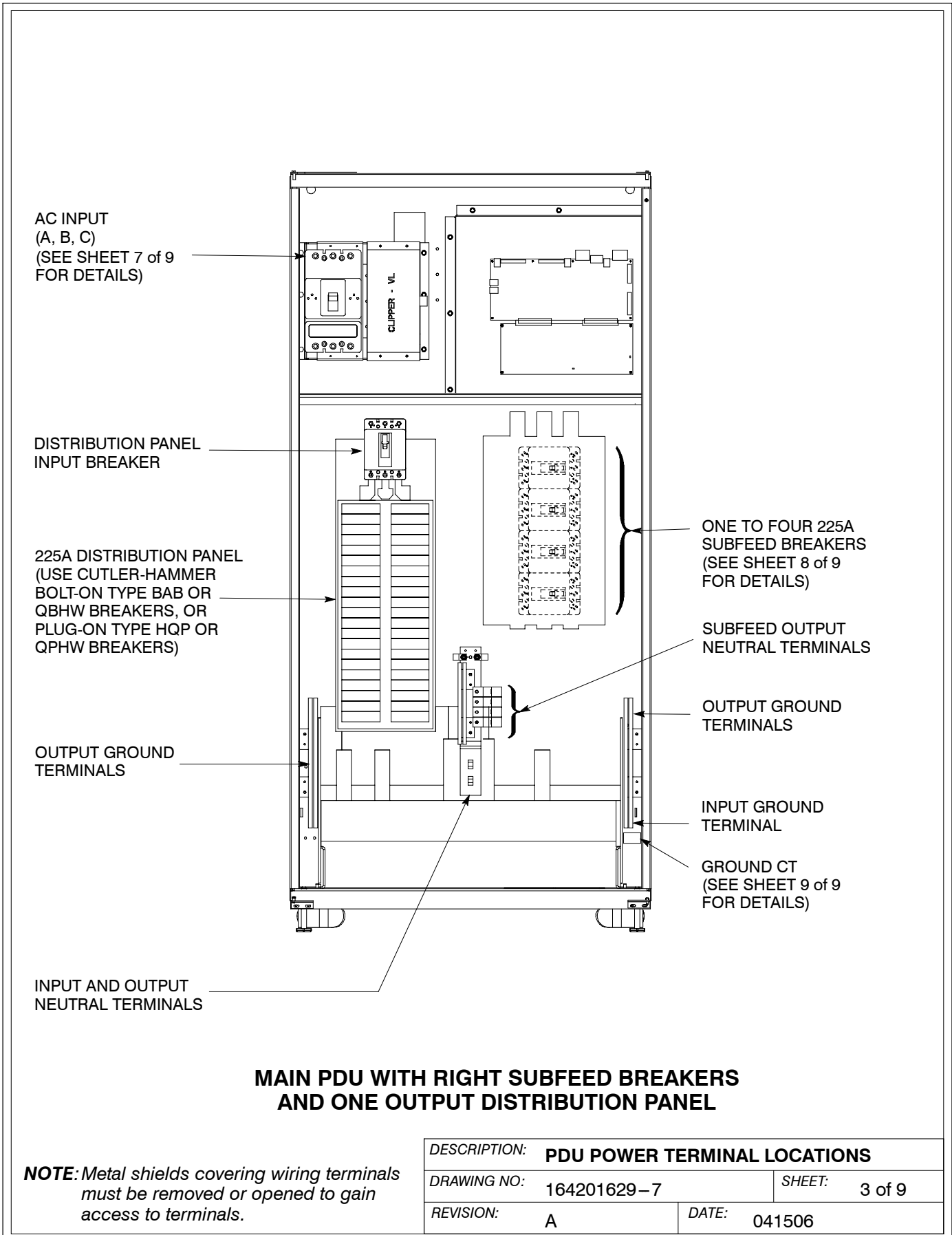
DESCRIPTION:	PDU POWER TERMINAL LOCATIONS	
DRAWING NO:	164201629-7	SHEET: 1 of 9
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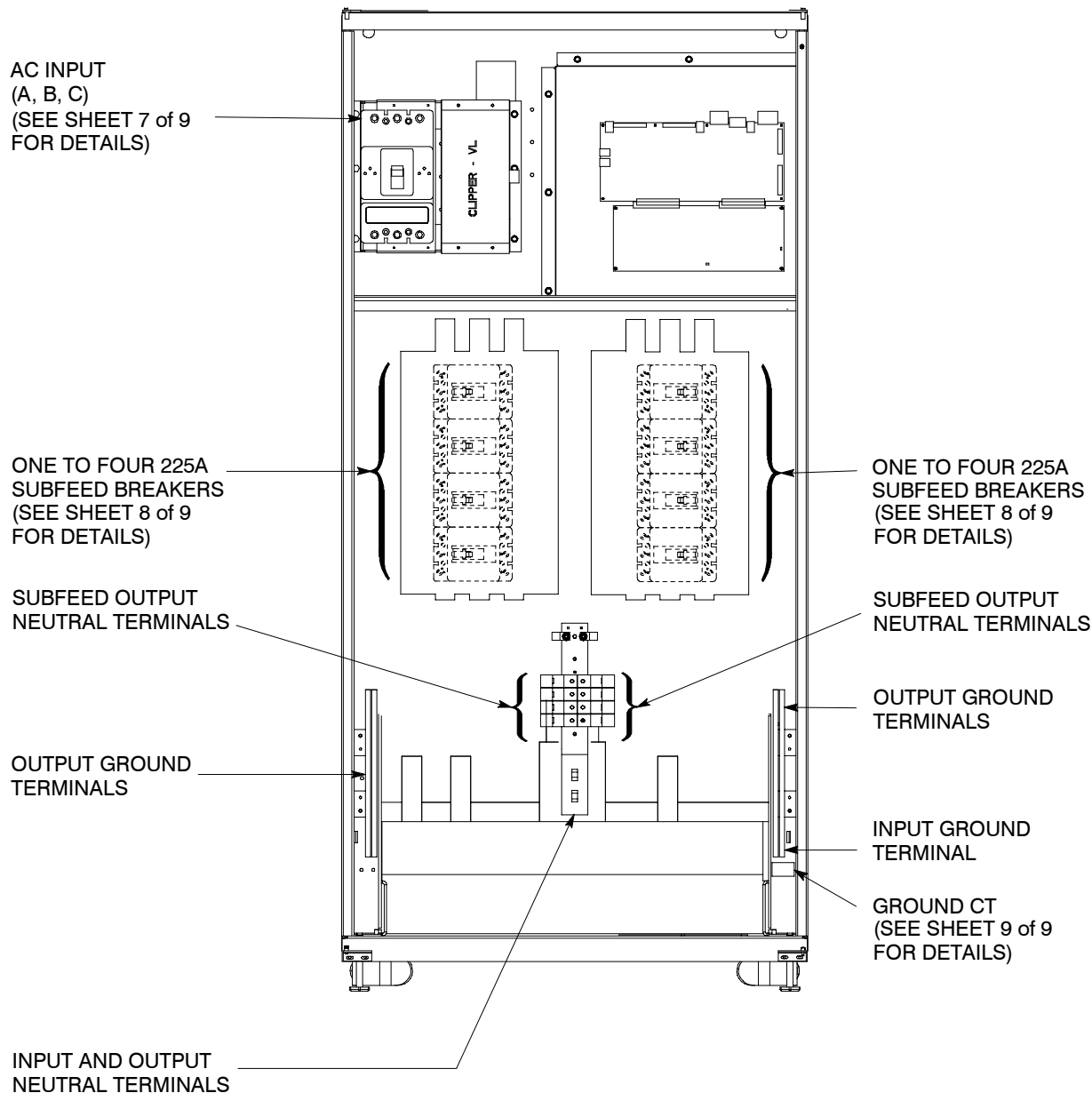


MAIN PDU WITH LEFT SUBFEED BREAKERS AND ONE OUTPUT DISTRIBUTION PANEL

NOTE: Metal shields covering wiring terminals must be removed or opened to gain access to terminals.

DESCRIPTION:	PDU POWER TERMINAL LOCATIONS		
DRAWING NO:	164201629-7	SHEET:	2 of 9
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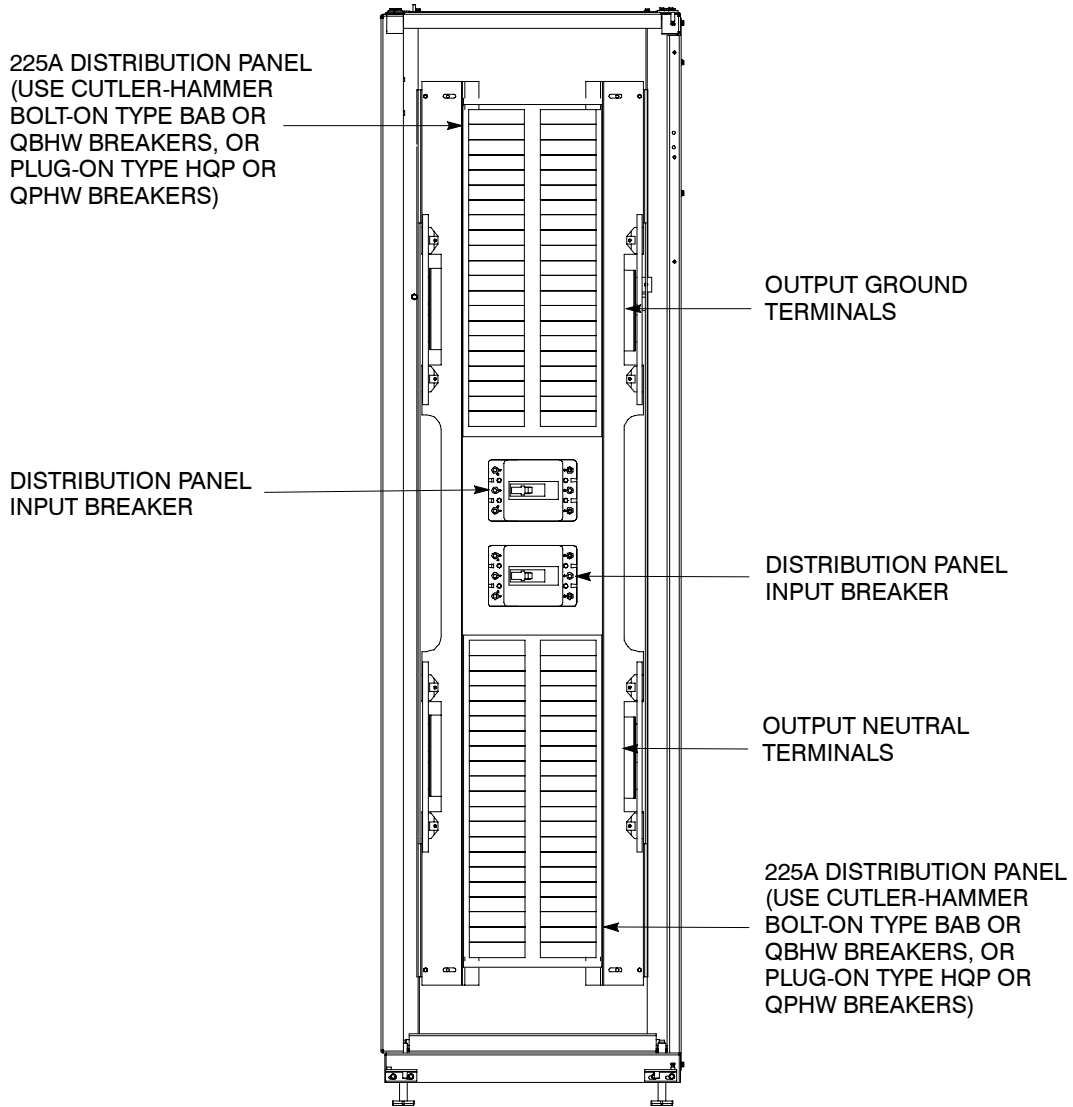




MAIN PDU WITH LEFT AND RIGHT SUBFEED BREAKERS

NOTE: Metal shields covering wiring terminals must be removed or opened to gain access to terminals.

DESCRIPTION: PDU POWER TERMINAL LOCATIONS	
DRAWING NO: 164201629-7	SHEET: 4 of 9
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**LEFT OR RIGHT FRONT FACING SIDECAR
ONE OR TWO OUTPUT DISTRIBUTION PANELS**

<i>DESCRIPTION:</i> PDU POWER TERMINAL LOCATIONS		
<i>DRAWING NO:</i> 164201629-7	<i>SHEET:</i> 5 of 9	
<i>REVISION:</i> A	<i>DATE:</i> 041506	

225A DISTRIBUTION PANEL
(USE CUTLER-HAMMER
BOLT-ON TYPE BAB OR
QBHW BREAKERS, OR
PLUG-ON TYPE HQP OR
QPHW BREAKERS)

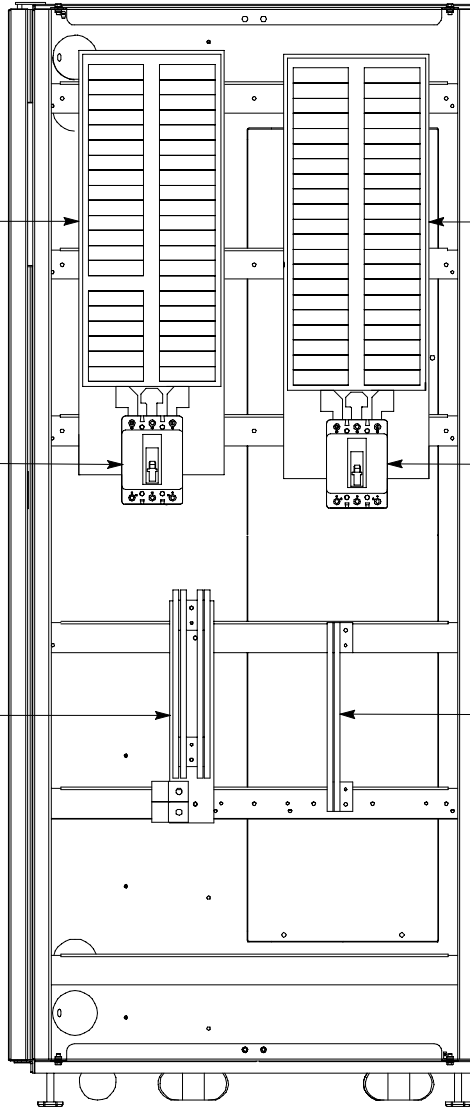
225A DISTRIBUTION PANEL
(USE CUTLER-HAMMER
BOLT-ON TYPE BAB OR
QBHW BREAKERS, OR
PLUG-ON TYPE HQP OR
QPHW BREAKERS)

DISTRIBUTION PANEL
INPUT BREAKER

DISTRIBUTION PANEL
INPUT BREAKER

OUTPUT NEUTRAL
TERMINALS

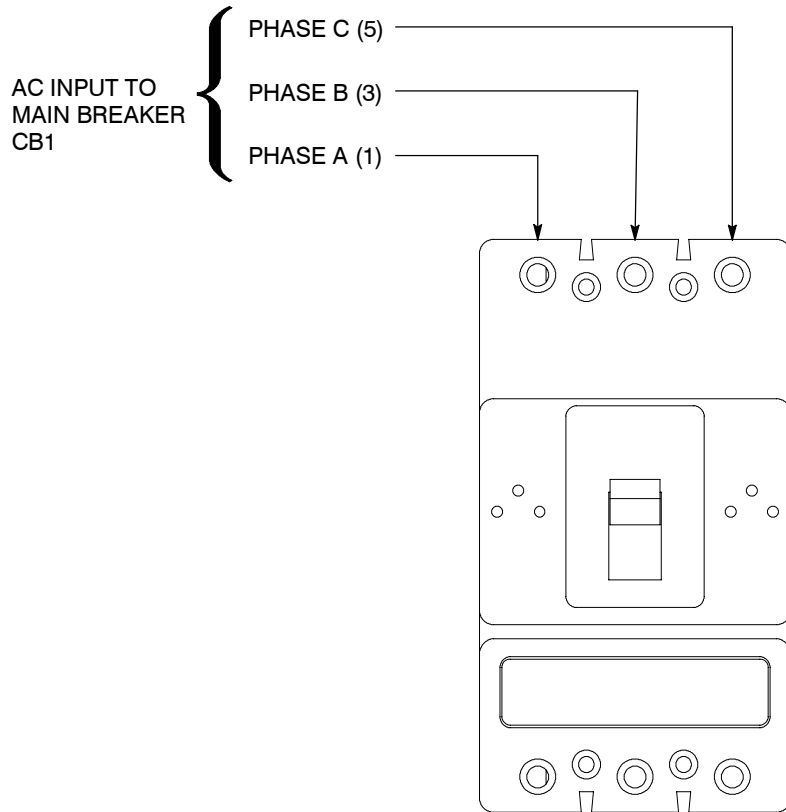
OUTPUT GROUND
TERMINALS



**LEFT OR RIGHT SIDE FACING SIDECAR
ONE OR TWO OUTPUT DISTRIBUTION PANELS**

DESCRIPTION: PDU POWER TERMINAL LOCATIONS	
DRAWING NO: 164201629-7	SHEET: 6 of 9
REVISION: A	DATE: 041506

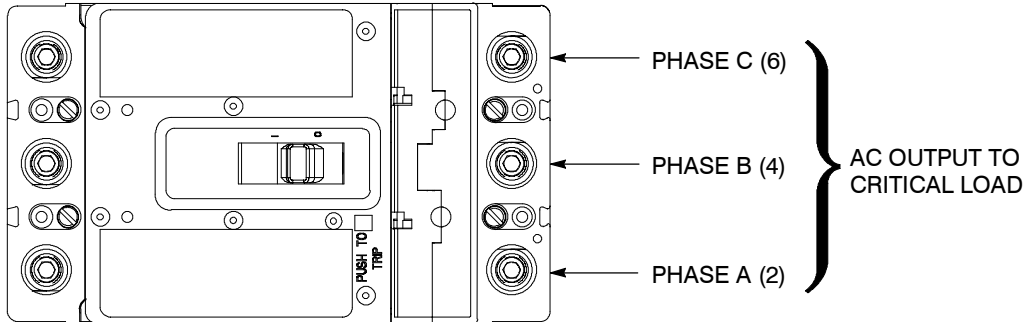
INPUT MAIN BREAKER CB1 TERMINAL DETAIL



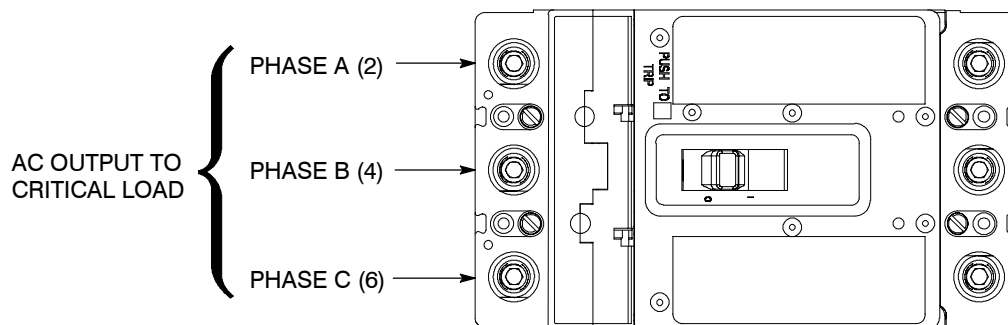
DESCRIPTION: PDU POWER TERMINAL LOCATIONS	
DRAWING NO: 164201629-7	SHEET: 7 of 9
REVISION: A	DATE: 041506

OUTPUT SUBFEED BREAKER TERMINAL DETAIL

RIGHT SIDE BREAKERS (1, 2, 3, AND 4)

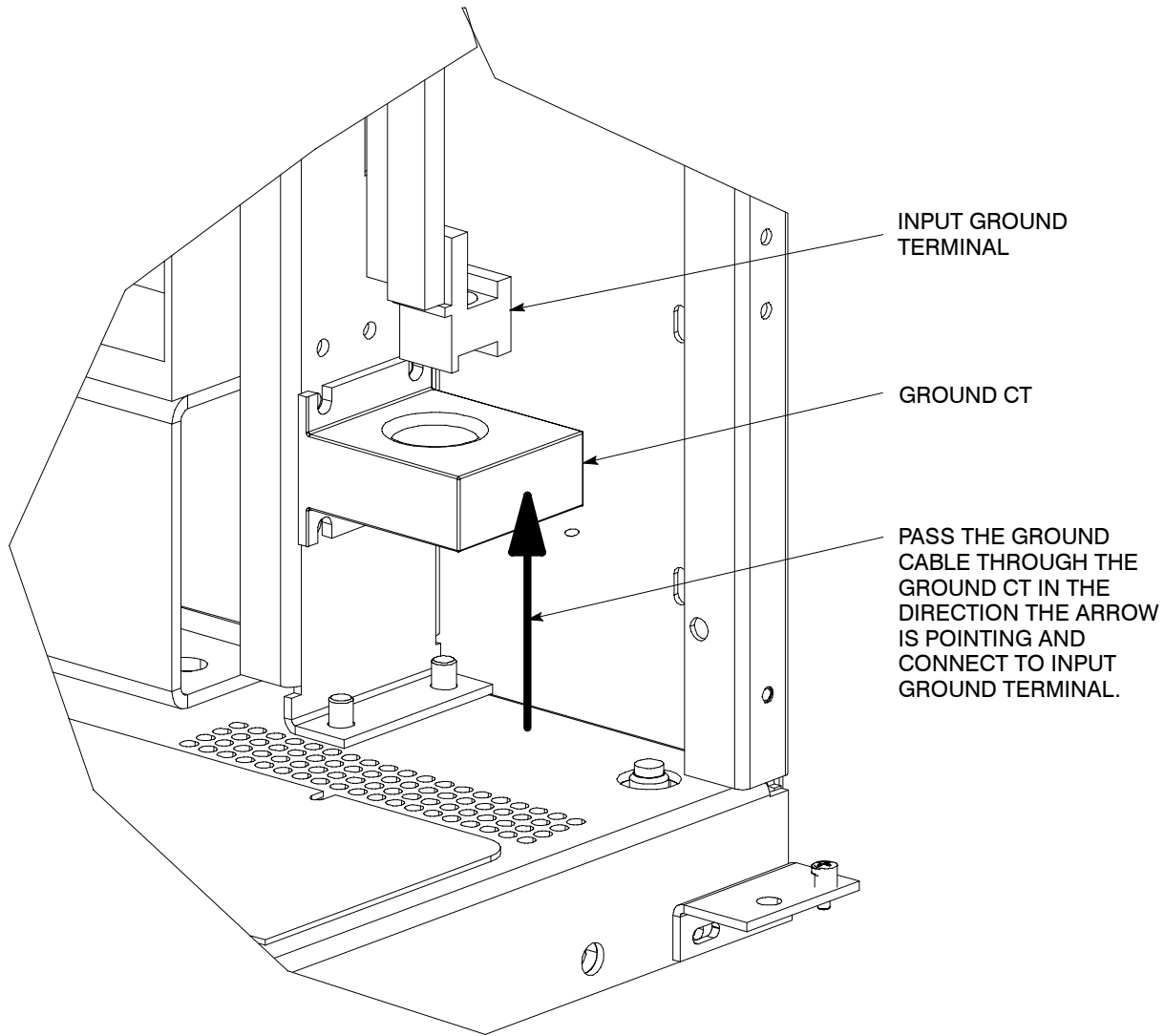


LEFT SIDE BREAKERS (5, 6, 7, AND 8)



DESCRIPTION:	PDU POWER TERMINAL LOCATIONS		
DRAWING NO:	164201629-7	SHEET:	8 of 9
REVISION:	A	DATE:	041506

INPUT GROUND CT DETAIL



DESCRIPTION: PDU POWER TERMINAL LOCATIONS	
DRAWING NO: 164201629-7	SHEET: 9 of 9
REVISION: A	DATE: 041506

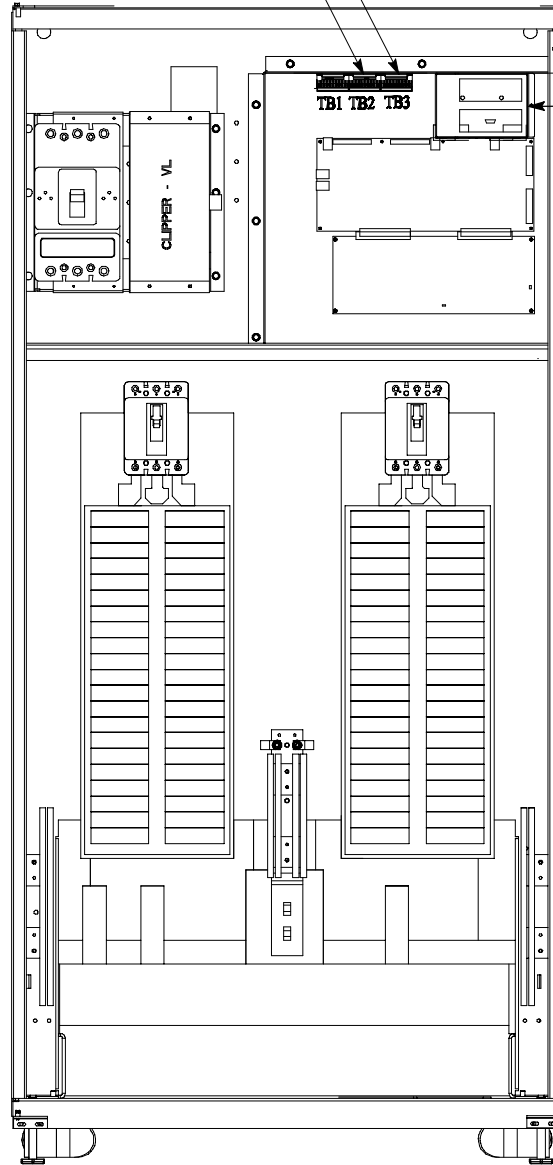
1. Use Class 1 wiring methods (as defined by the NEC) for interface wiring up to 30V. The wire should be rated at 24V, 1A minimum. Use twisted-pair wires for each input and common. All control wiring is customer-supplied.
2. Use Class 2 wiring methods (as defined by the NEC) for interface wiring from 30 to 600V. The wire should be rated at 600 volts, 1A minimum and 12 AWG maximum. Use twisted-pair wires for each input and common. All control wiring is customer-supplied.
3. When installing external interface wiring (for example, building alarm, relay output, and X-Slot) to the PDU interface terminals, conduit must be installed between each device and the PDU cabinet. Install the interface wiring in separate conduit from the power wiring.
4. All building alarm inputs or remote features require an isolated normally-open contact or switch (rated at 24 Vdc, 20 mA minimum) connected between the alarm input and common terminal as shown. All control wiring and relay and switch contacts are customer-supplied. Use twisted-pair wires for each alarm input and common.
5. The building alarms can be programmed to display the alarm functional name. Please contact your Eaton service representative for programming.
6. See Table M through Table O and Chapters 3, 4, and 9 for customer interface wiring.
7. LAN and telephone drops for use with X-Slot connectivity cards must be provided by facility planners or the customer.

Table M. TB2 and TB3 Interface Connections		
<i>Terminal TB2</i>	<i>Name</i>	<i>Description</i>
1	Not Used	
2	Not Used	
3	Remote EPO NO	Input: Normally-open dry contact to activate EPO of PDU from a remote switch
4	Remote EPO Return	
5	Not Used	
6	Not Used	
7	Not Used	
8	Not Used	
9	Not Used	
10	Building Alarm 1 Return	
<i>Terminal TB3</i>	<i>Name</i>	<i>Description</i>
1	Building Alarm 1	Input: Programmable PDU alarms, activated by a remote dry contact closure.
2	Building Alarm 2	
3	Building Alarm 2 Return	
4	Building Alarm 1 Return	
5	Alarm Relay NC	Output: General purpose normally-open and normally-closed relay contacts.
6	Alarm Relay Common	
7	Alarm Relay NO	
8	Not Used	
9	Not Used	
10	Not Used	
NOTE: "RETURN" INDICATES CONNECTION TO ELECTRONICS CIRCUIT GROUND: "COMMON" INDICATES CONNECTION TO COMMON SIDE OF ISOLATED RELAY CONTACT.		

DESCRIPTION: INTERFACE WIRING INSTALLATION NOTES AND TERMINAL LOCATIONS	
DRAWING NO: 164201629-8	SHEET: 1 of 4
REVISION: A	DATE: 041506

INTERFACE TERMINAL LOCATIONS

TERMINAL TB2
TERMINAL TB3



X-SLOT
COMMUNICATION BAY

NOTE: Metal shields covering wiring terminals must be removed or opened to gain access to terminals.

DESCRIPTION: **INTERFACE WIRING INSTALLATION
NOTES AND TERMINAL LOCATIONS**

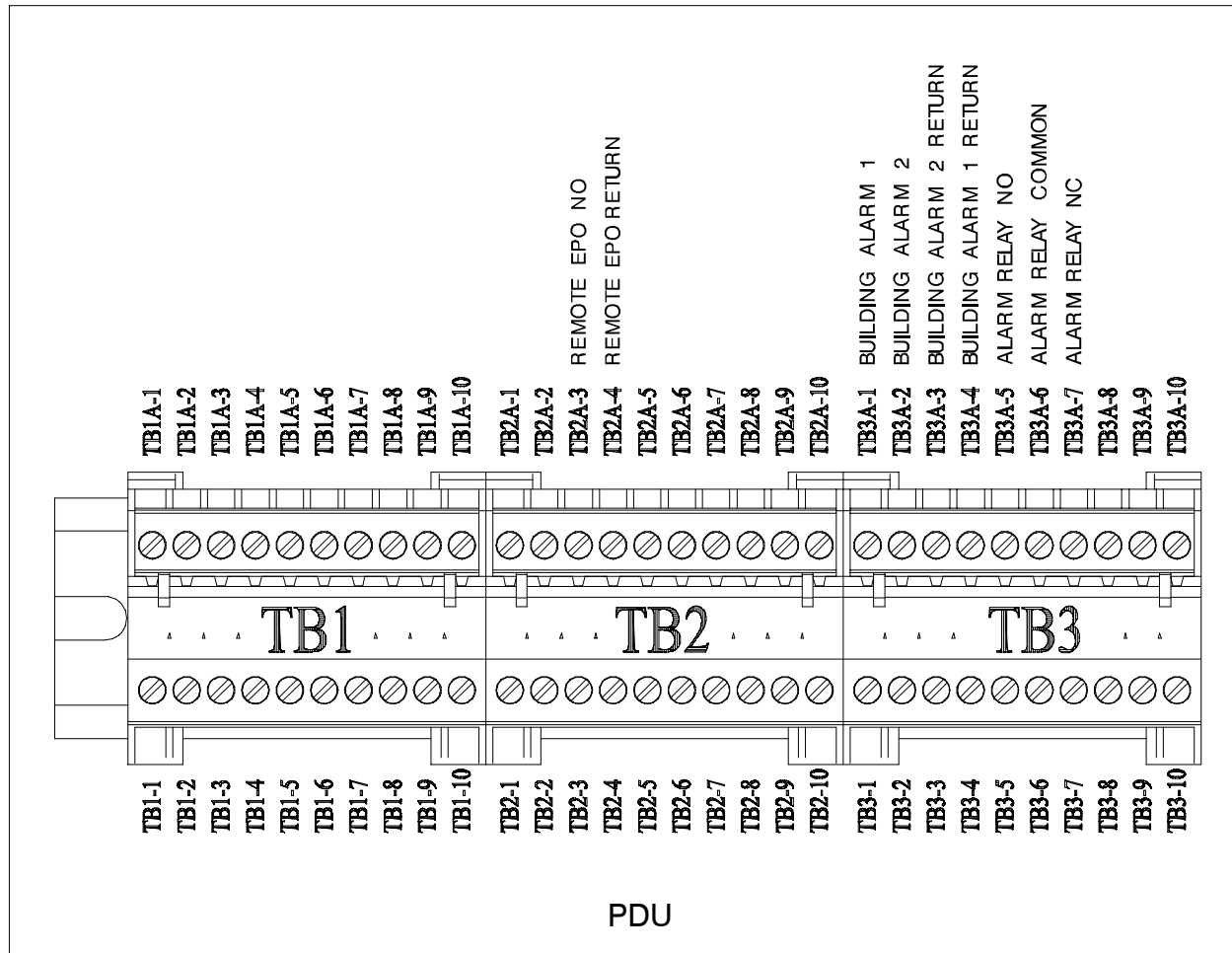
DRAWING NO: 164201629-8

SHEET: 2 of 4

REVISION: A

DATE: 041506

INTERFACE TERMINALS

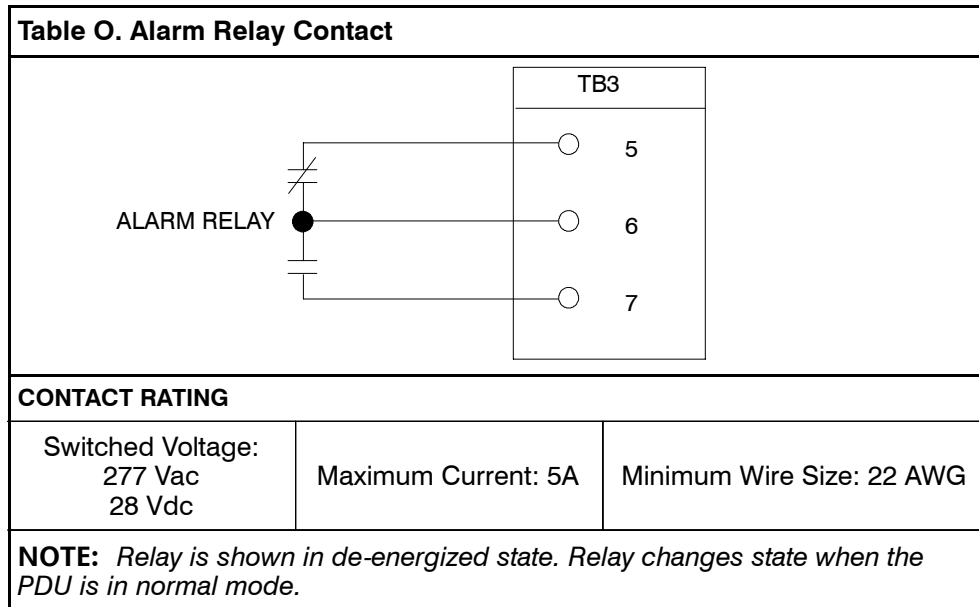
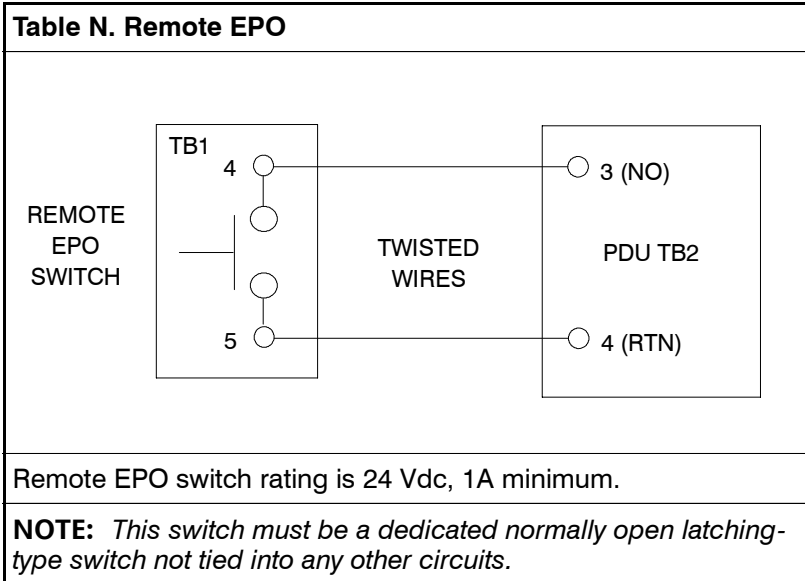


NOTE: 1. All building alarm inputs require an isolated normally-open or normally-closed contact or switch (rated at 24 Vdc, 20 mA minimum) connected between the alarm input and common terminal as shown. Building alarm inputs can be programmed for use with either normally-open or normally-closed contacts. All control wiring and relay and switch contacts are customer-supplied.

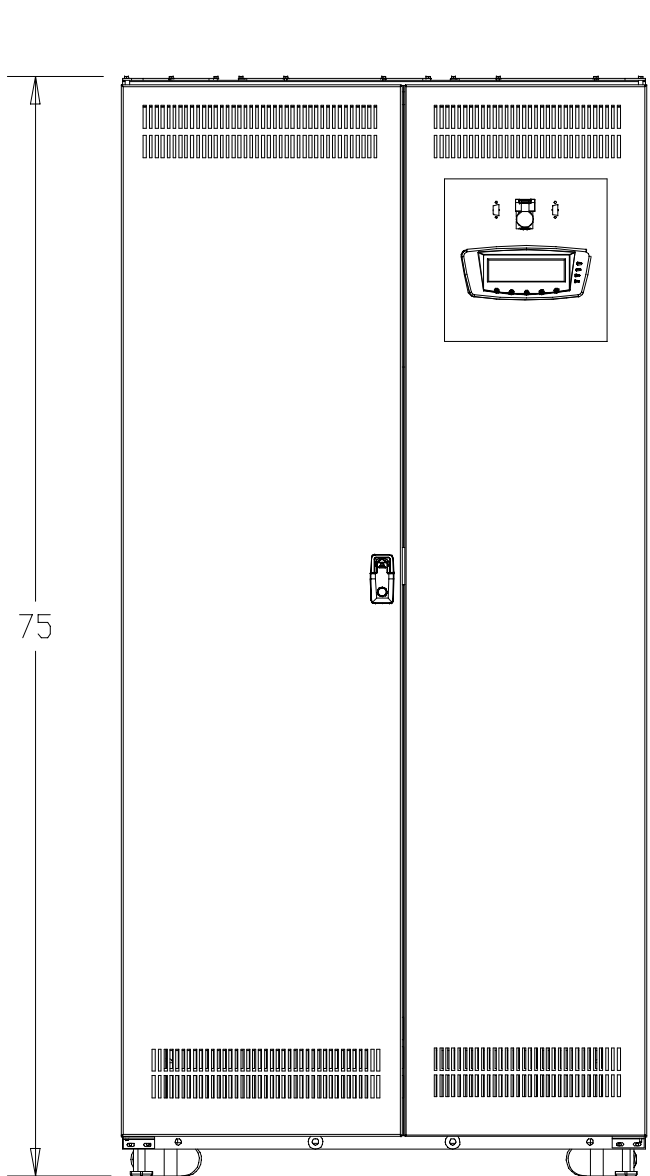
2. The building alarms can be programmed to display the alarm functional name. Please contact your Eaton service representative for programming.

DESCRIPTION: INTERFACE WIRING INSTALLATION NOTES AND TERMINAL LOCATIONS	
DRAWING NO: 164201629-8	SHEET: 3 of 4
REVISION: A	DATE: 041506

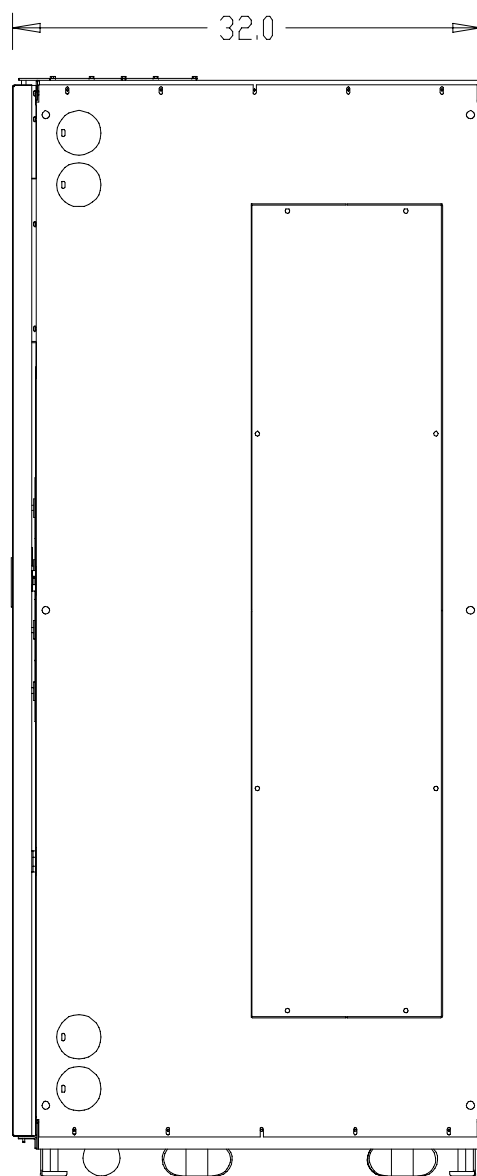
8. The Remote EPO feature opens PDU circuit breaker CB1 and isolates power from your critical load. Local electrical codes may also require tripping upstream protective devices.
9. Remote EPO wiring should be a minimum of 22 AWG.
10. The REPO switch is provided by the customer and must be a dedicated latching-type switch not tied into any other circuits.



DESCRIPTION: INTERFACE WIRING INSTALLATION NOTES AND TERMINAL LOCATIONS	
DRAWING NO.: 164201629-8	SHEET: 4 of 4
REVISION: A	DATE: 041506



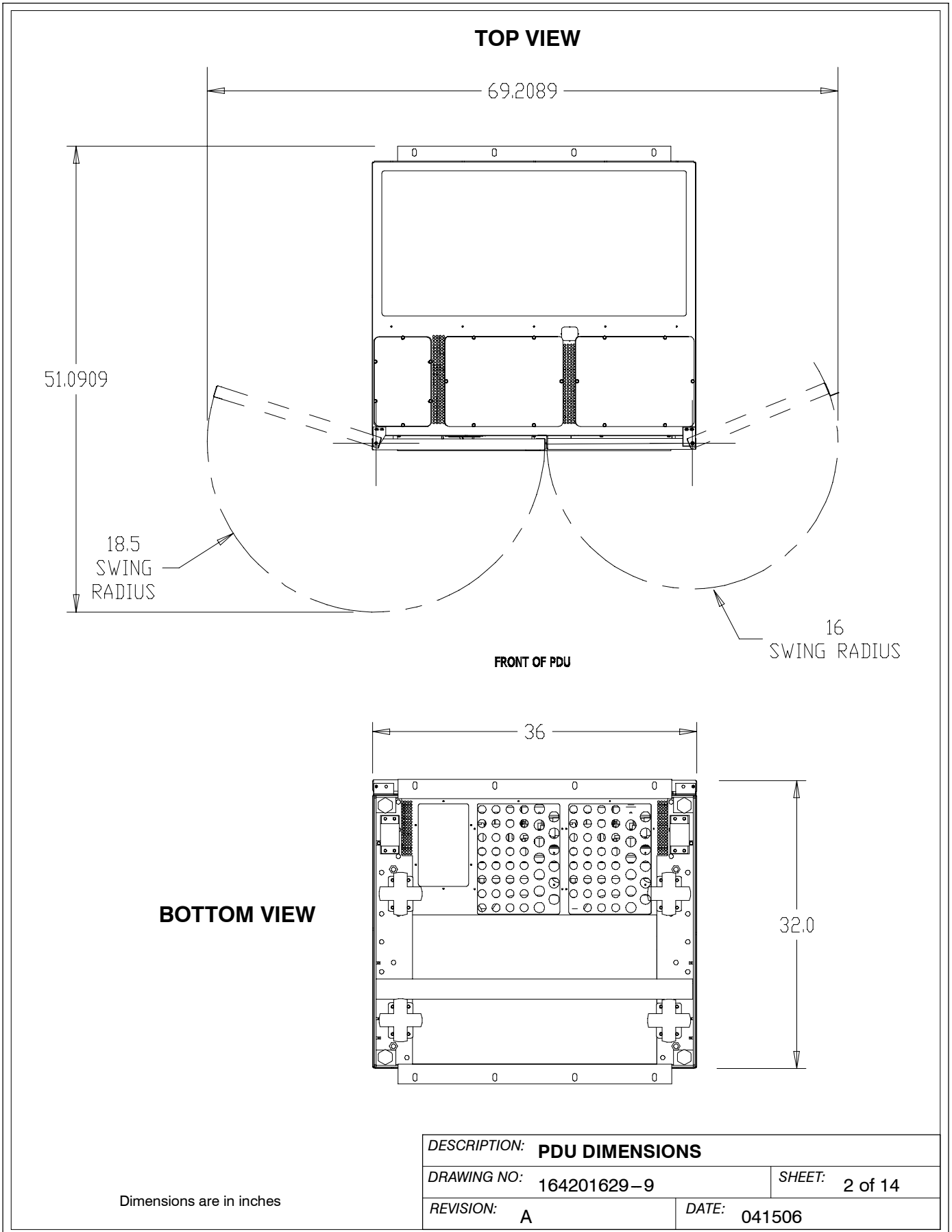
FRONT VIEW

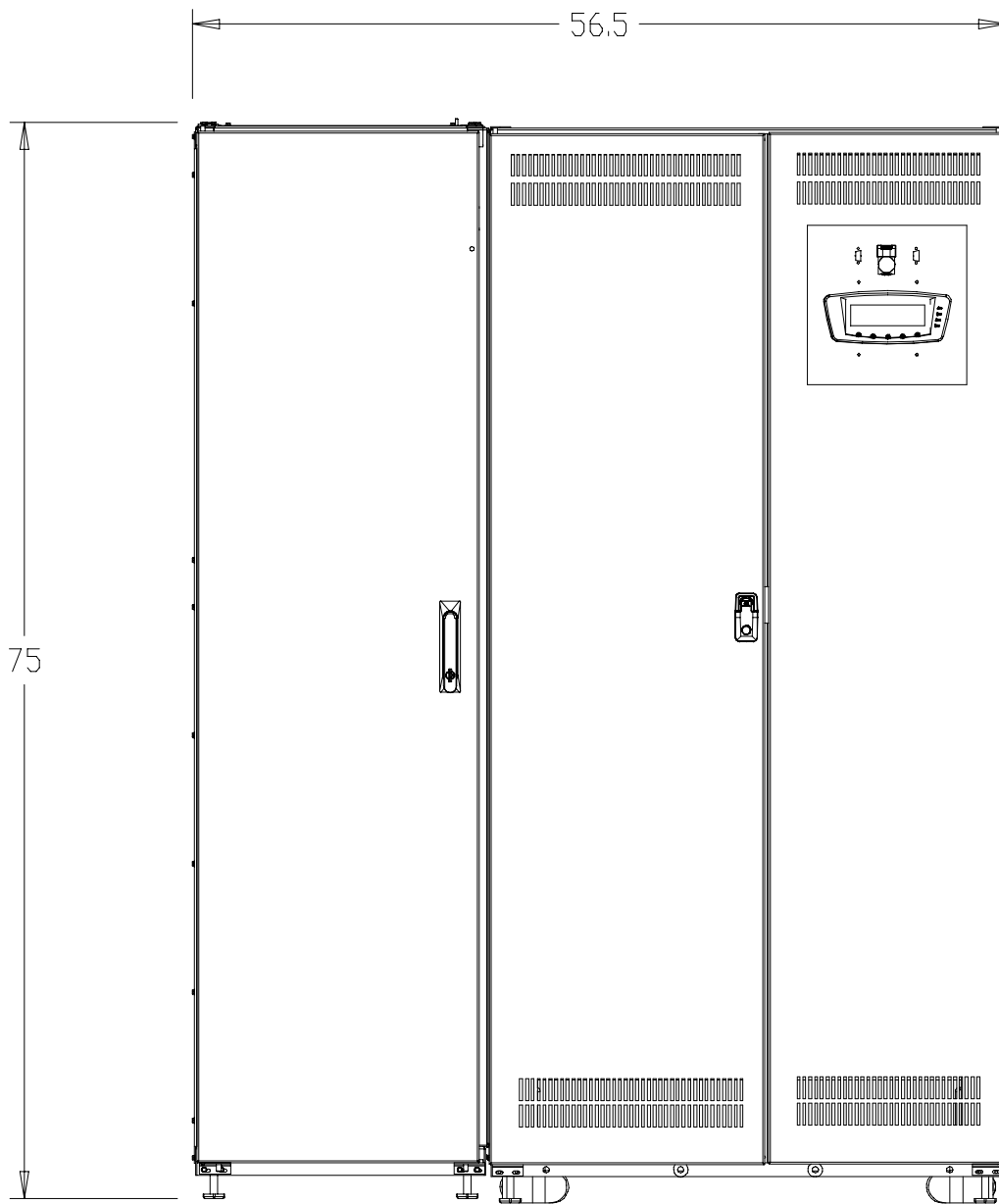


RIGHT SIDE VIEW

Dimensions are in inches

DESCRIPTION: PDU DIMENSIONS	
DRAWING NO: 164201629-9	SHEET: 1 of 14
REVISION: A	DATE: 041506



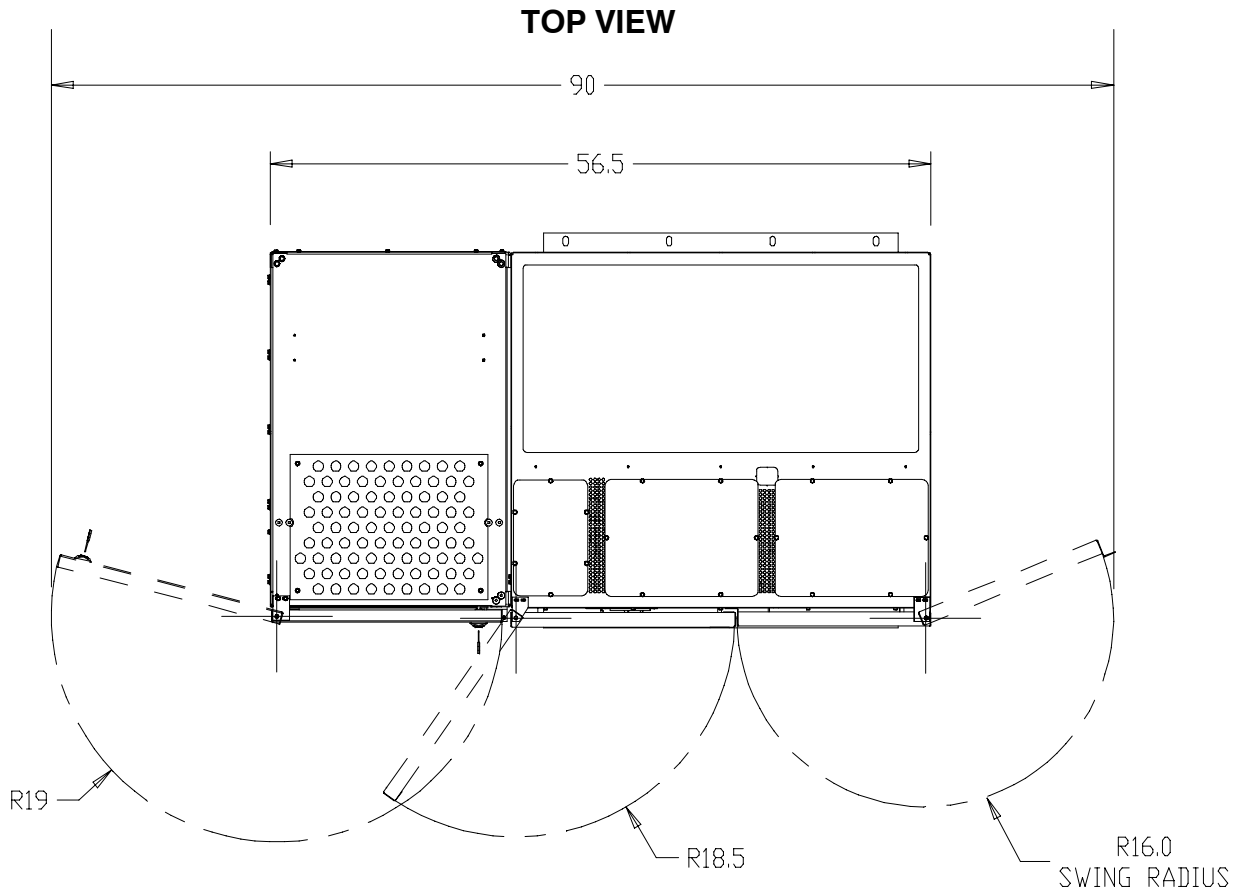


FRONT VIEW

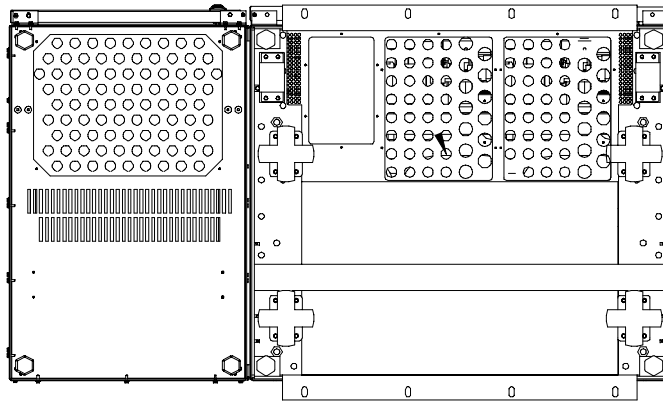
PDU WITH FRONT FACING LEFT SIDECAR

Dimensions are in inches

<i>DESCRIPTION:</i> PDU DIMENSIONS	
<i>DRAWING NO:</i> 164201629-9	<i>SHEET:</i> 3 of 14
<i>REVISION:</i> A	<i>DATE:</i> 041506



FRONT OF PDU

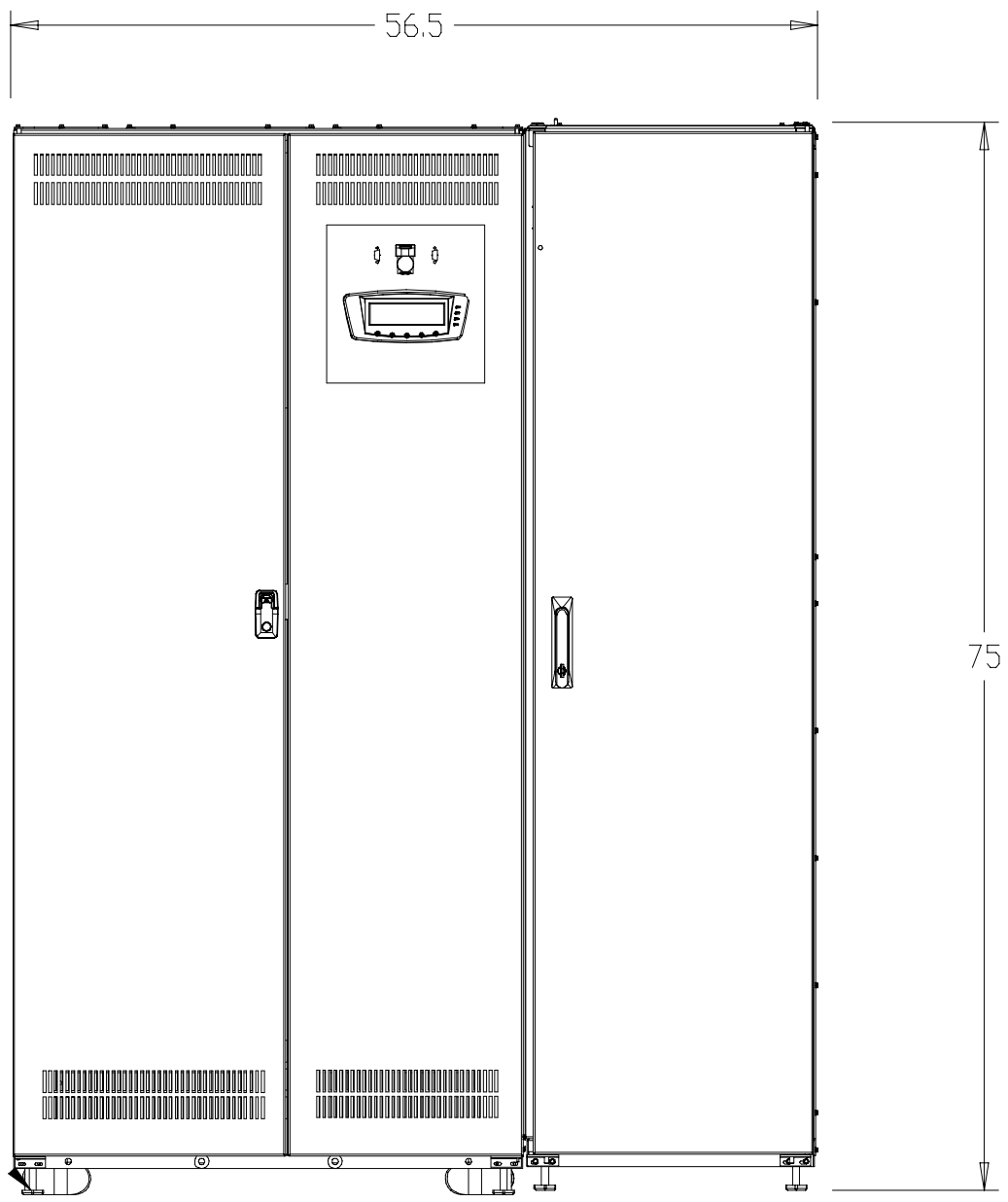


BOTTOM VIEW

PDU WITH FRONT FACING LEFT SIDECAR

Dimensions are in inches

DESCRIPTION: PDU DIMENSIONS	
DRAWING NO: 164201629-9	SHEET: 4 of 14
REVISION: A	DATE: 041506

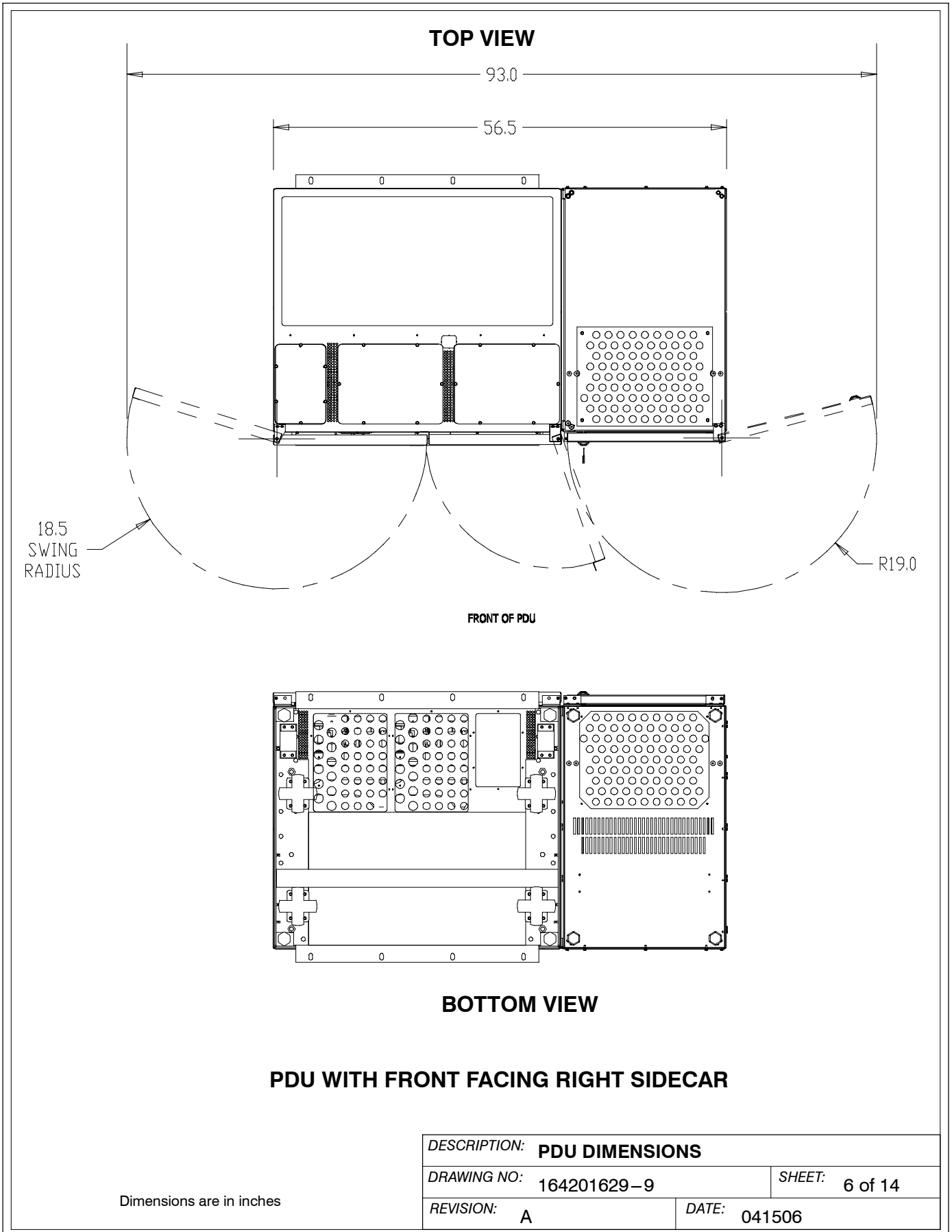


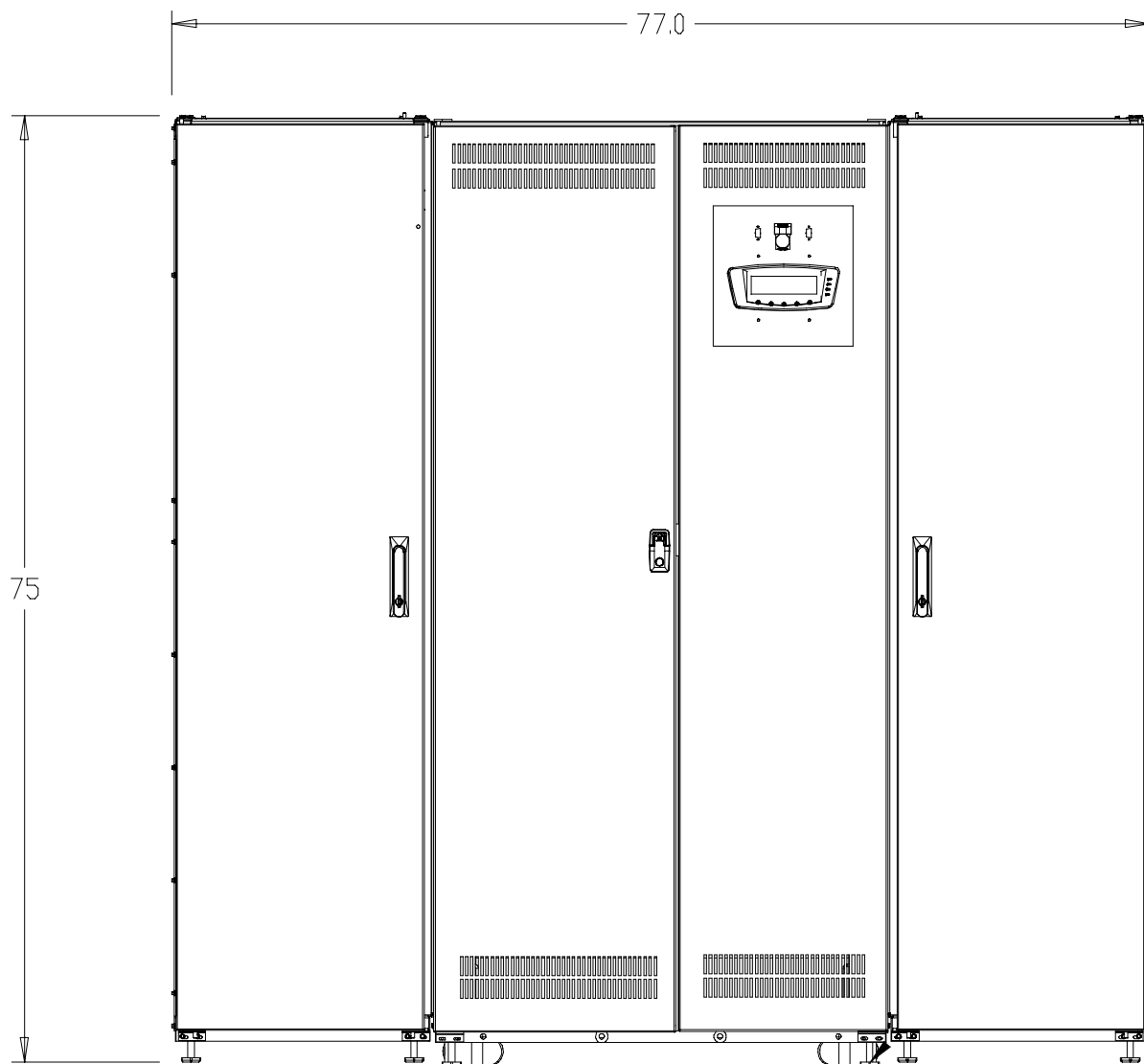
FRONT VIEW

PDU WITH FRONT FACING RIGHT SIDECAR

Dimensions are in inches

<i>DESCRIPTION:</i> PDU DIMENSIONS	
<i>DRAWING NO.:</i> 164201629-9	<i>SHEET:</i> 5 of 14
<i>REVISION:</i> A	<i>DATE:</i> 041506





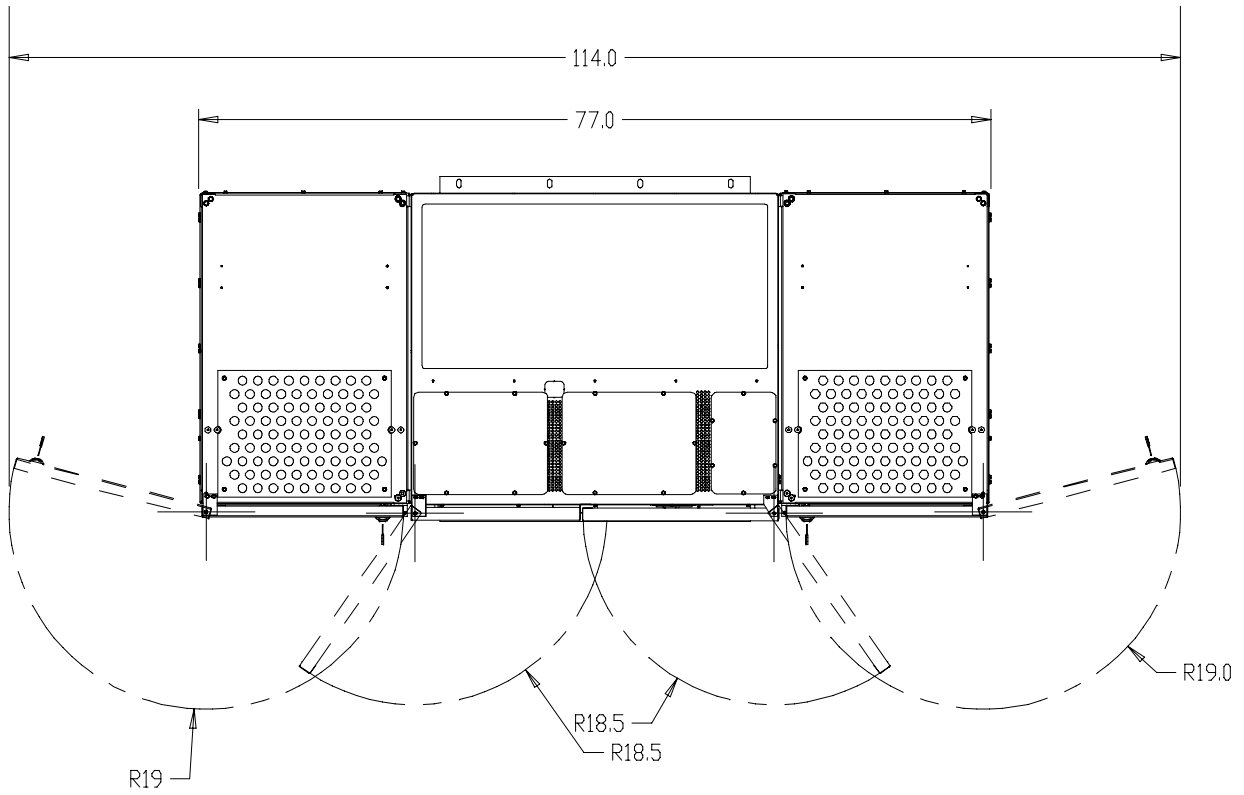
FRONT VIEW

PDU WITH FRONT FACING LEFT AND RIGHT SIDECARS

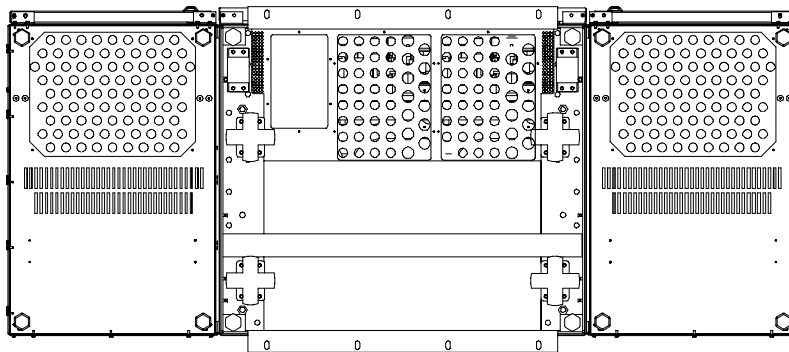
Dimensions are in inches

DESCRIPTION: PDU DIMENSIONS	
DRAWING NO: 164201629-9	SHEET: 7 of 14
REVISION: A	DATE: 041506

TOP VIEW



FRONT OF PDU

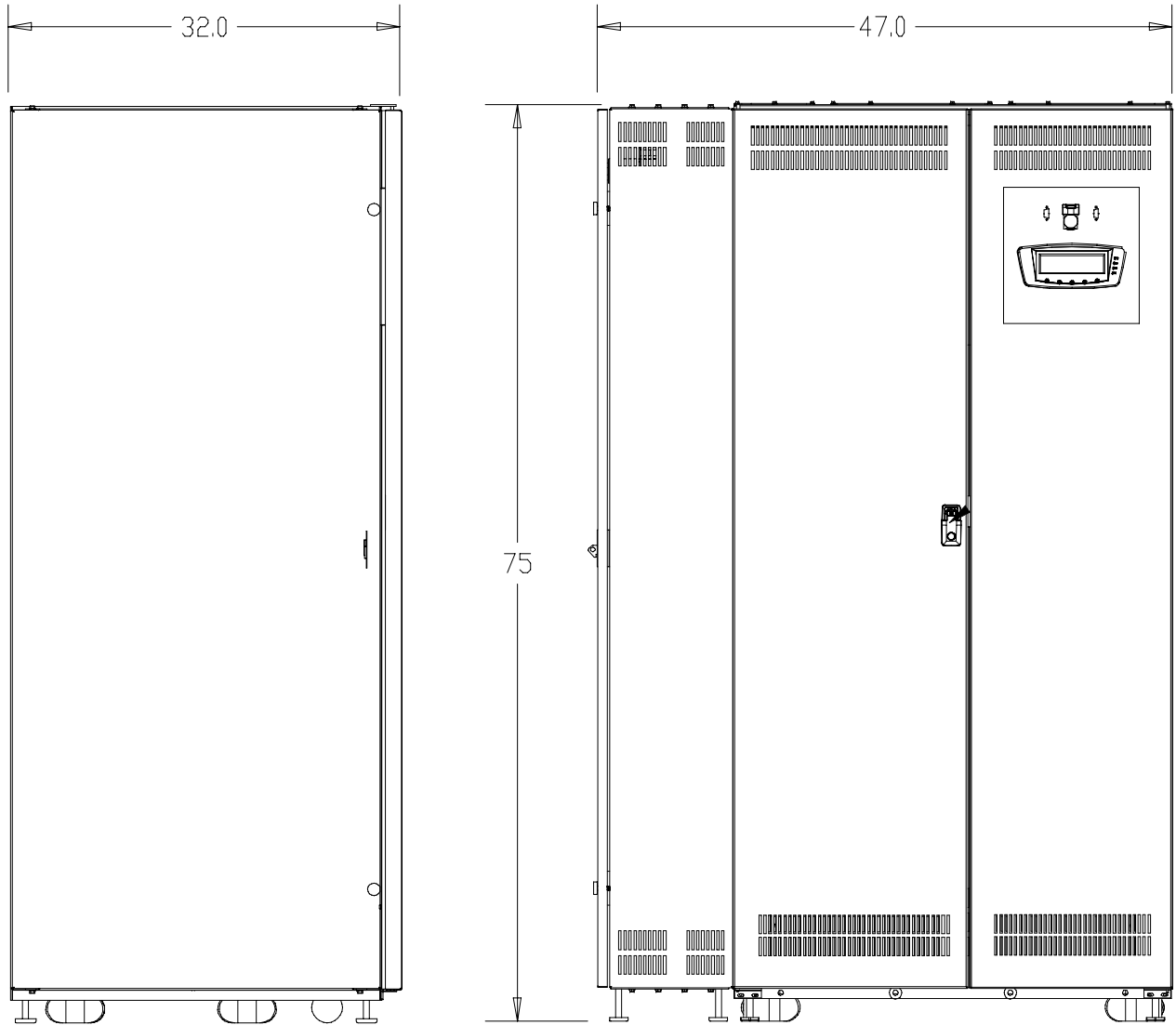


BOTTOM VIEW

PDU WITH FRONT FACING LEFT AND RIGHT SIDECARS

Dimensions are in inches

DESCRIPTION: PDU DIMENSIONS		SHEET: 8 of 14
DRAWING NO: 164201629-9		
REVISION: A	DATE: 041506	



LEFT SIDE VIEW

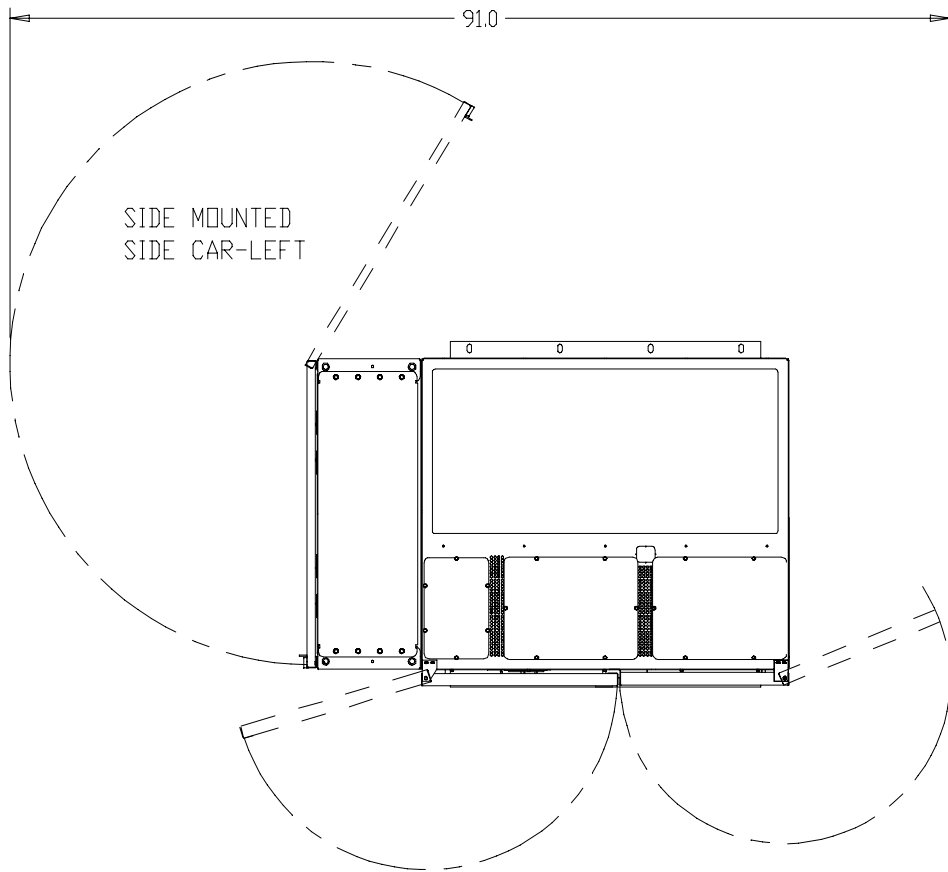
FRONT VIEW

PDU WITH SIDE FACING LEFT SIDECAR

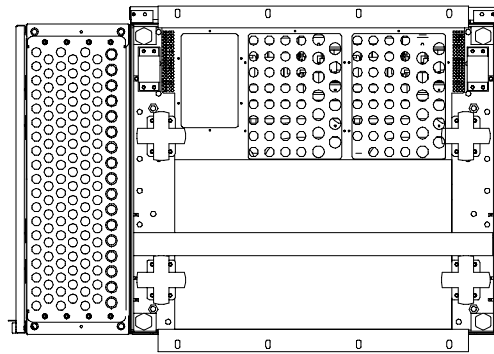
Dimensions are in inches

DESCRIPTION: PDU DIMENSIONS	
DRAWING NO.: 164201629-9	SHEET: 9 of 14
REVISION: A	DATE: 041506

TOP VIEW



FRONT OF PDU

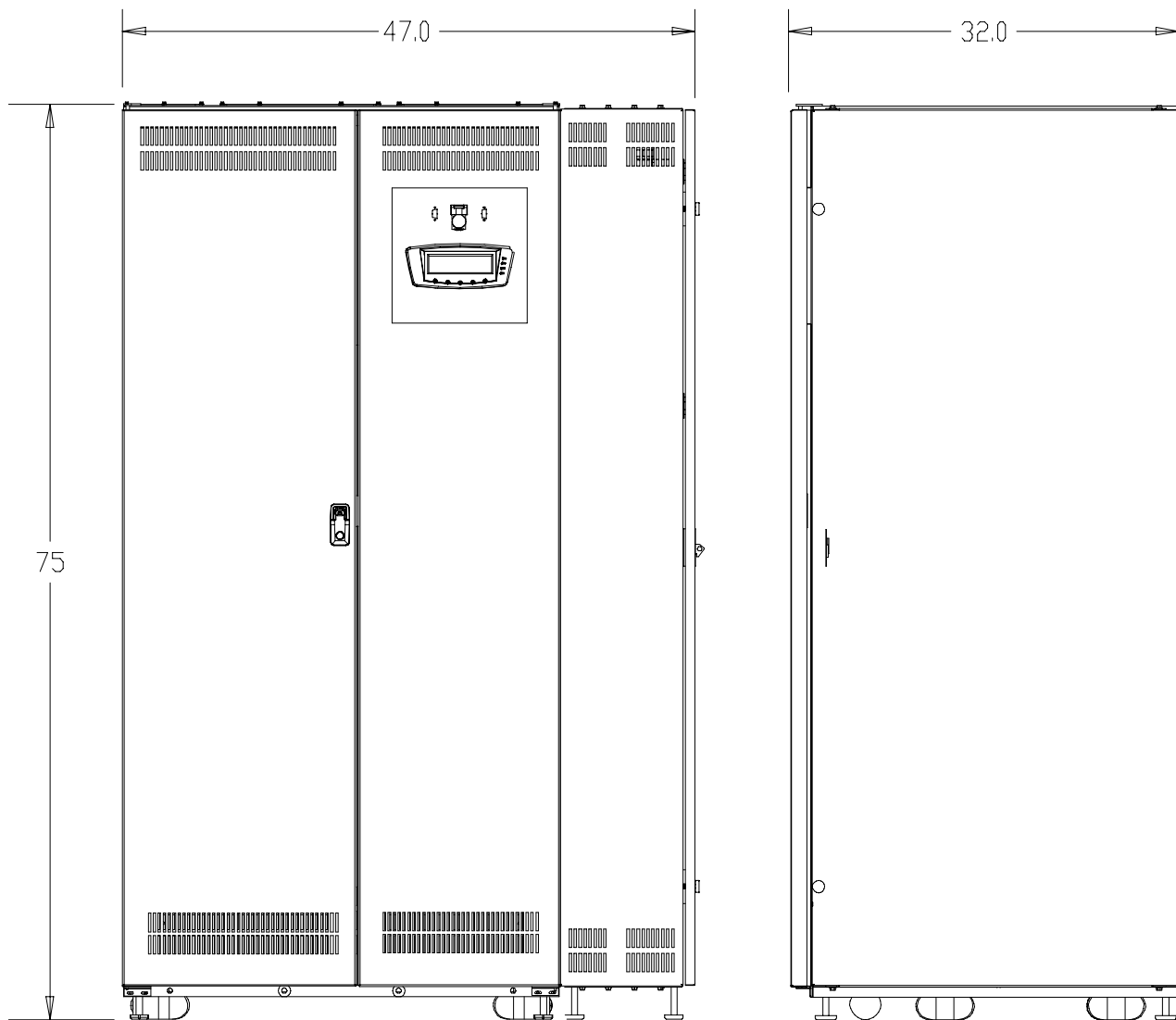


BOTTOM VIEW

PDU WITH SIDE FACING LEFT SIDECAR

Dimensions are in inches

DESCRIPTION: PDU DIMENSIONS		SHEET: 10 of 14
DRAWING NO.: 164201629-9		
REVISION: A	DATE: 041506	



FRONT VIEW

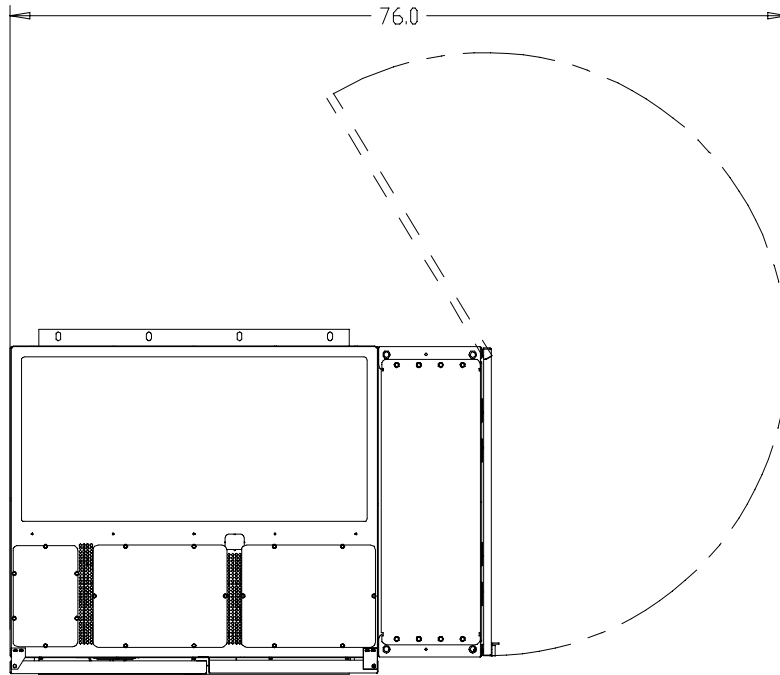
RIGHT SIDE VIEW

PDU WITH SIDE FACING RIGHT SIDECAR

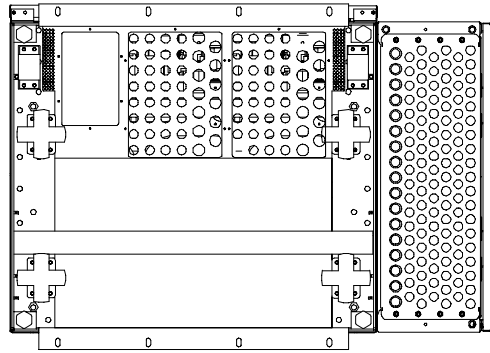
Dimensions are in inches

DESCRIPTION: PDU DIMENSIONS	
DRAWING NO: 164201629-9	SHEET: 11 of 14
REVISION: A	DATE: 041506

TOP VIEW



FRONT OF PDU

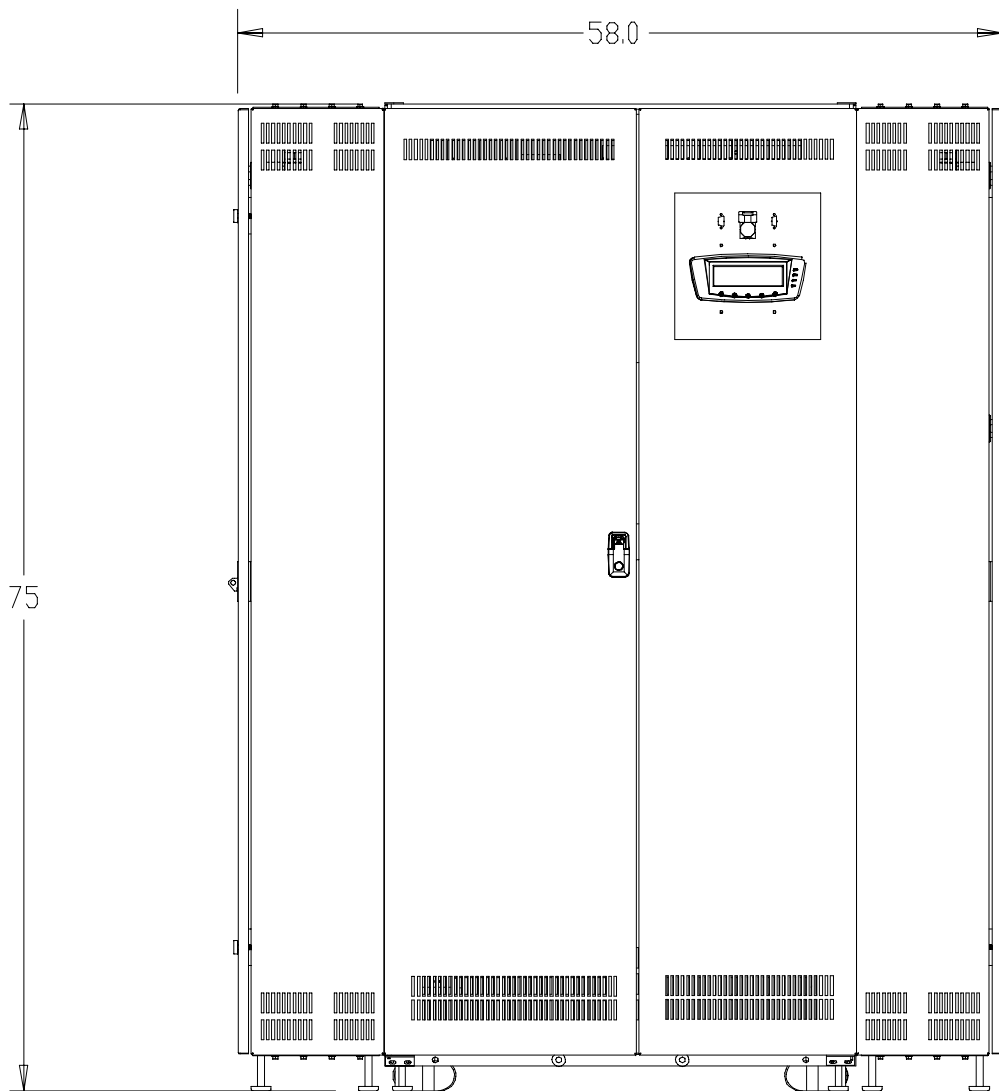


BOTTOM VIEW

PDU WITH SIDE FACING RIGHT SIDECAR

Dimensions are in inches

<i>DESCRIPTION:</i> PDU DIMENSIONS		<i>SHEET:</i> 12 of 14
<i>DRAWING NO.:</i> 164201629-9		
<i>REVISION:</i> A	<i>DATE:</i> 041506	



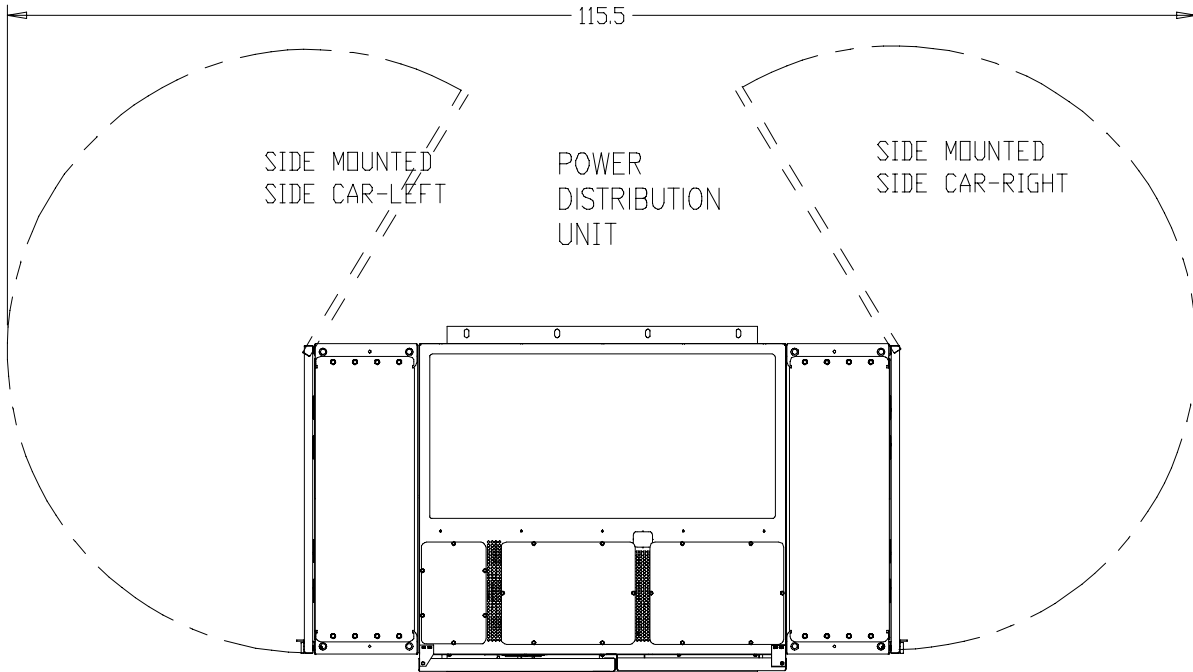
FRONT VIEW

PDU WITH SIDE FACING LEFT AND RIGHT SIDECARS

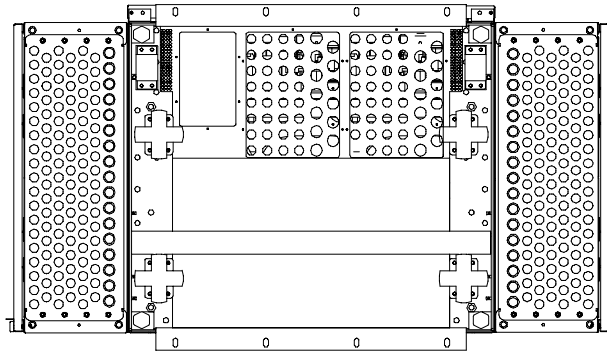
Dimensions are in inches

<i>DESCRIPTION:</i> PDU DIMENSIONS		<i>SHEET:</i> 13 of 14
<i>DRAWING NO:</i> 164201629-9		
<i>REVISION:</i> A	<i>DATE:</i> 041506	

TOP VIEW



FRONT OF PDU

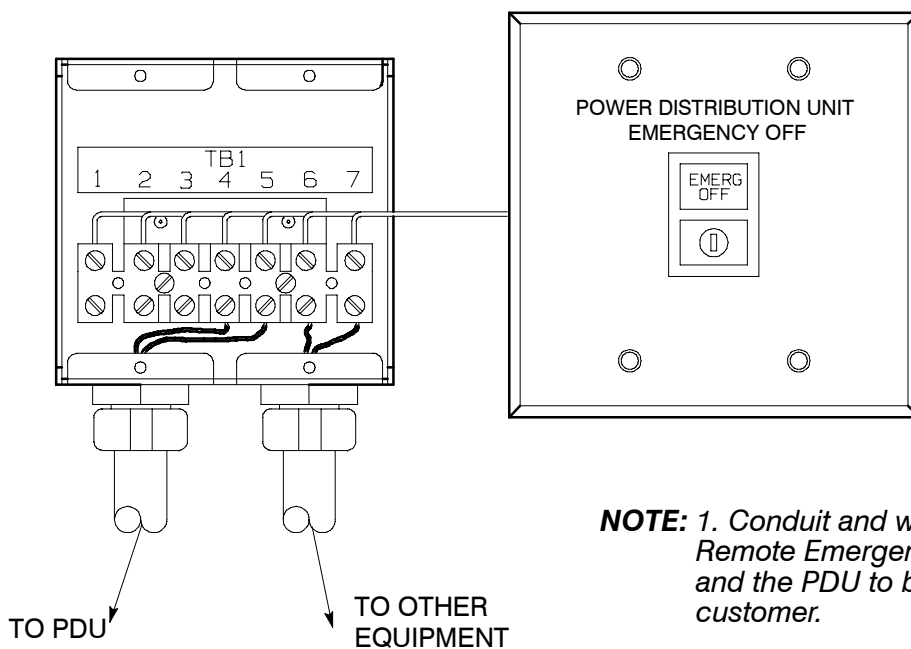
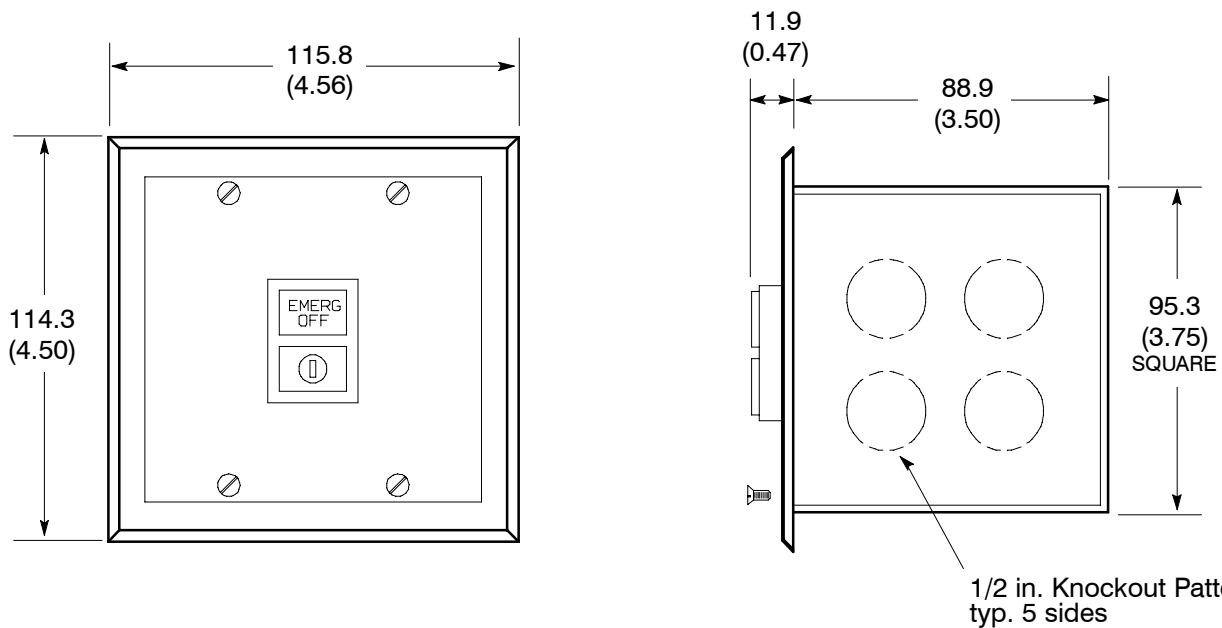


BOTTOM VIEW

PDU WITH SIDE FACING LEFT AND RIGHT SIDECARS

Dimensions are in inches

DESCRIPTION: PDU DIMENSIONS		SHEET: 14 of 14
DRAWING NO.: 164201629-9		
REVISION: A	DATE: 041506	



NOTE: 1. Conduit and wiring between the Remote Emergency Power-off (REPO) and the PDU to be supplied by the customer.

2. Maximum distance between the Remote EPO and the PDU not to exceed 500 feet.

3. Maximum wire size #14 AWG. Minimum wire size #22 AWG.

DESCRIPTION:		OPTIONAL POWERWARE REMOTE EMERGENCY POWER-OFF	
DRAWING NO:	164201629-10	SHEET:	1 of 1
REVISION:	A	DATE:	041506

Dimensions are in millimeters [inches]

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Warranty

LIMITED FACTORY WARRANTY FOR POWERWARE® 3 PHASE POWER DISTRIBUTION UNIT (PDU) PRODUCTS

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

LIMITED WARRANTY: This limited warranty (this "Warranty") applies only to the original end-user (the "End-User") of the Powerware 3 Phase PDU Products (the "Product") and cannot be transferred. This Warranty applies even in the event that the Product is initially sold by Eaton for resale to an End-User.

LIMITED WARRANTY PERIOD: The period covered by this Warranty for Product installed [and currently located] in the fifty (50) United States and the District of Columbia is twelve (12) months from the date of Product start-up or eighteen (18) months from date of Product shipment, whichever occurs first, for parts coverage and 90 days from the date of Product start-up for labor coverage. The period covered by this Warranty for Product installed [and currently located] outside of the fifty (50) United States and the District of Columbia is twelve (12) months from the date of Product start-up or eighteen (18) months from date of Product shipment, whichever occurs first, for parts coverage.

WHAT THIS LIMITED WARRANTY COVERS: The warrantor warrants that the Powerware three-phase PDU electronics and Eaton-built accessories (individually and collectively, the "Warranted Items") are free from defects in material and workmanship. If, in the opinion of Eaton, a Warranted Item is defective and the defect is within the terms of this Warranty, Eaton's sole obligation will be to repair or replace such defective item (including by providing service, parts and labor, as applicable), at the option of Eaton. The Warranted Item will be repaired or replaced onsite at the End-User's location or such other location as determined by Eaton. Any parts that are replaced may be new or reconditioned. All parts replaced by Eaton shall become the property of Eaton.

WHAT THIS LIMITED WARRANTY DOES NOT COVER: This Warranty does not cover any defects or damages caused by: (a) failure to properly store the Product before installation; (b) shipping and delivery of the Product if shipping is FOB Factory; (c) neglect, accident, abuse, misuse, misapplication, incorrect installation; (d) repair or alteration, not authorized in writing by Eaton personnel or performed by an authorized Eaton Customer Service Engineer or Agent; or (e) improper testing, operation, maintenance, adjustment, or any modification of any kind not authorized in writing by Eaton personnel or performed by an authorized Eaton Customer Service Engineer or Agent.

This Warranty is not valid: (a) unless an authorized Eaton Customer Service Engineer (in USA) or Agent (outside of USA) performs start-up and commissioning of the Product; (b) if the Product is moved to a new location by someone other than an authorized Eaton Customer Service Engineer (in USA) or Agent (outside of USA); or (c) if the Product's serial numbers have been removed or are illegible. Any Warranted Items repaired or replaced pursuant to this Warranty will be warranted for the remaining portion of the original Warranty subject to all the terms thereof. Labor warranty is not provided for Product located outside of the fifty (50) United States or the District of Columbia. Any equipment, parts or materials included in the Product and not manufactured by Eaton are warranted solely by the manufacturer of such equipment, parts or materials and are not included as part of this warranty.

THIS WARRANTY IS THE END-USER'S SOLE REMEDY AND IS EXPRESSLY IN LIEU OF, AND THERE ARE NO OTHER, EXPRESSED OR IMPLIED GUARANTEES OR WARRANTIES (INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE, WHICH ARE EXPRESSLY DISCLAIMED).

LIMITATION OF LIABILITY: In no event shall Eaton be liable for any indirect, incidental, special or consequential damages of any kind or type whatsoever, or based on any claim or cause of action, however denominated. Eaton shall not be responsible for failure to provide service or parts due to causes beyond Eaton's reasonable control. In no case will Eaton's liability under this Warranty exceed the replacement value of the Warranted Items.

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

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

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

OBTAINING WARRANTY SERVICE: In the USA, call the Eaton Customer Reliability Center 7x24 at 800-843-9433. Outside of the USA, call your local Eaton sales or service representative, or call the Eaton Customer Reliability Center in the USA at 919-870-3028. For comment or questions about this Limited Factory Warranty, write to the Customer Quality Representative, 3301 Spring Forest Road, Raleigh, North Carolina 27616 USA.

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